
**Information technology — Open Systems
Interconnection — The Directory:
Protocol specifications**

*Technologies de l'information — Interconnexion de systèmes ouverts
(OSI) — L'annuaire: Spécifications du protocole*

Withdrawn

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

Withdrawn



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2008

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published by ISO in 2009

Published in Switzerland

CONTENTS

	<i>Page</i>
Foreword	v
Introduction	vi
1 Scope	1
2 References	1
2.1 Normative references	1
2.2 Non-normative references	2
3 Definitions	2
3.1 Basic Directory definitions	3
3.2 Distributed Operation Definitions	3
3.3 Protocol specification definitions	3
4 Abbreviations	4
5 Conventions	4
6 Common protocol specification	5
6.1 Directory associations and operations	5
6.2 Specification for Directory operations	5
6.3 Directory protocol overview	7
6.4 Operation codes	8
6.5 Error codes	8
6.6 Abstract syntaxes	9
7 Directory protocols using the OSI stack	9
7.1 OSI-PDUs	9
7.2 Directory PDU structure	9
7.3 Session PDUs	10
7.4 OSI addressing	10
7.5 Procedure and sequencing	10
7.6 Directory PDU specifications	11
8 Directory protocol mapping onto OSI services	24
8.1 Abstract syntaxes and transfer syntaxes	24
8.2 Application contexts	25
8.3 Session Layer specification	26
8.4 Use of transport service	32
8.5 OSI Transport Layer on top of TCP	33
9 IDM protocol	47
9.1 IDM-PDUs	47
9.2 Sequencing requirements	49
9.3 Protocols	49
9.4 Reject reasons	50
9.5 Abort reasons	50
9.6 Mapping onto TCP/IP	51
9.7 Addressing	51
9.8 Use of TLS	51
10 Directory protocol mapping onto the IDM protocol	52
10.1 DAP-IP protocol	52
10.2 DSP-IP protocol	52
10.3 DISP-IP protocol	52
10.4 DOP-IP protocol	53

	<i>Page</i>
11 Protocol stack coexistence	53
11.1 Coexistence between OSI and IDM stacks	53
11.2 Coexistence in the presence of LDAP	53
11.3 Defining network addresses for Internet Protocol, Version 4 support	53
11.4 Definition of NSAP like address for long addressing information	54
12 Versions and the rules for extensibility	55
12.1 DUA to DSA	55
12.2 DSA to DSA	56
12.3 Rules of extensibility for NSAP addresses	57
12.4 Rules of extensibility for object classes	57
12.5 Rules of extensibility for user attribute types	57
13 Conformance	57
13.1 Conformance by DUAs	57
13.2 Conformance by DSAs	58
13.3 Conformance by a shadow supplier	62
13.4 Conformance by a shadow consumer	62
Annex A – Common protocol specifications in ASN.1	64
Annex B – OSI Protocol in ASN.1	66
Annex C – Directory OSI Protocols in ASN.1	72
Annex D – IDM Protocol in ASN.1	75
Annex E – Directory IDM Protocols in ASN.1	78
Annex F – Directory operational binding types	80
Annex G – Amendments and corrigenda	81

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 9594-5:2008 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*, in collaboration with ITU-T. The identical text is published as ITU-T Rec. X.519 (11/2008).

This sixth edition cancels and replaces the fifth edition (ISO/IEC 9594-5:2005), which has been technically revised.

ISO/IEC 9594 consists of the following parts, under the general title *Information technology — Open Systems Interconnection — The Directory*:

- *Part 1: Overview of concepts, models and services*
- *Part 2: Models*
- *Part 3: Abstract service definition*
- *Part 4: Procedures for distributed operation*
- *Part 5: Protocol specifications*
- *Part 6: Selected attribute types*
- *Part 7: Selected object classes*
- *Part 8: Public-key and attribute certificate frameworks*
- *Part 9: Replication*
- *Part 10: Use of systems management for administration of the Directory*

Introduction

This Recommendation | International Standard, together with the other Recommendations | International Standards, has been produced to facilitate the interconnection of information processing systems to provide directory services. A set of such systems, together with the directory information that 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.

This Recommendation | International Standard specifies the application service elements and application contexts for two protocols – the Directory Access Protocol (DAP) and the Directory System Protocol (DSP). The DAP provides for access to the Directory to retrieve or modify Directory information. The DSP provides for the chaining of requests to retrieve or modify Directory information to other parts of the distributed Directory System where the information may be held.

In addition, this Recommendation | International Standard specifies the application service elements and application contexts for the Directory Information Shadowing Protocol (DISP) and the Directory Operational Binding Management Protocol (DOP). The DISP provides for the shadowing of information held in one DSA to another DSA. The DOP provides for the establishment, modification and termination of bindings between pairs of DSAs for the administration of relationships between the DSAs (such as for shadowing or hierarchical relationships).

This Recommendation | International Standard provides the foundation frameworks upon which industry profiles can be defined by other standards groups and industry forums. Many of the features defined as optional in these frameworks may be mandated for use in certain environments through profiles. This sixth edition technically revises and enhances, but does not replace, the fifth edition of this Recommendation | International Standard. Implementations may still claim conformance to the fifth edition. However, at some point, the fifth edition will not be supported (i.e., reported defects will no longer be resolved). It is recommended that implementations conform to this sixth edition as soon as possible.

This sixth edition specifies versions 1 and 2 of the Directory protocols.

The first and second editions specified only version 1. Most of the services and protocols specified in this edition are designed to function under version 1. However some enhanced services and protocols, e.g., signed errors, will not function unless all Directory entities involved in the operation have negotiated version 2. Whichever version has been negotiated, differences between the services and between the protocols defined in the six editions, except for those specifically assigned to version 2, are accommodated using the rules of extensibility defined in this edition of ITU-T Rec. X.519 | ISO/IEC 9594-5.

Annex A, which is an integral part of this Recommendation | International Standard, provides the ASN.1 module for the common specifications for the Directory protocols.

Annex B, which is an integral part of this Recommendation | International Standard, provides the ASN.1 module for the OSI protocol specification.

Annex C, which is an integral part of this Recommendation | International Standard, provides the ASN.1 module for the Directory OSI protocols.

Annex D, which is an integral part of this Recommendation | International Standard, provides the ASN.1 module for the IDM protocol specification.

Annex E, which is an integral part of this Recommendation | International Standard, provides the ASN.1 module for the Directory IDM protocols.

Annex F, which is an integral part of this Recommendation | International Standard, provides the ASN.1 module which contains all the ASN.1 object identifiers assigned to identify operational binding types in this series of Recommendations | International Standards.

Annex G, which is not an integral part of this Recommendation | International Standard, lists the amendments and defect reports that have been incorporated to form this edition of this Recommendation | International Standard.

**INTERNATIONAL STANDARD
ITU-T RECOMMENDATION**

**Information technology – Open Systems Interconnection –
The Directory: Protocol specifications**

1 Scope

This Recommendation | International Standard specifies the Directory Access Protocol, the Directory System Protocol, the Directory Information Shadowing Protocol, and the Directory Operational Binding Management Protocol fulfilling the abstract services specified in ITU-T Rec. X.511 | ISO/IEC 9594-3, ITU-T Rec. X.518 | ISO/IEC 9594-4, ITU-T Rec. X.525 | ISO/IEC 9594-9, and ITU-T Rec. X.501 | ISO/IEC 9594-2.

2 References

2.1 Normative references

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. 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.

2.1.1 Identical Recommendations | International Standards

- ITU-T Recommendation X.200 (1994) | ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The basic model.*
- ITU-T Recommendation X.213 (2001) | ISO/IEC 8348:2002, *Information technology – Open Systems Interconnection – Network service definition.*
- ITU-T Recommendation X.214 (1995) | ISO/IEC 8072:1996, *Information technology – Open Systems Interconnection – Transport service definition.*
- ITU-T Recommendation X.500 (2008) | ISO/IEC 9594-1:2008, *Information technology – Open Systems Interconnection – The Directory: Overview of concepts, models and services.*
- ITU-T Recommendation X.501 (2008) | ISO/IEC 9594-2:2008, *Information technology – Open Systems Interconnection – The Directory: Models.*
- ITU-T Recommendation X.509 (2008) | ISO/IEC 9594-8:2008, *Information technology – Open Systems Interconnection – The Directory: Public-key and attribute certificate frameworks.*
- ITU-T Recommendation X.511 (2008) | ISO/IEC 9594-3:2008, *Information technology – Open Systems Interconnection – The Directory: Abstract service definition.*
- ITU-T Recommendation X.518 (2008) | ISO/IEC 9594-4:2008, *Information technology – Open Systems Interconnection – The Directory: Procedures for distributed operation.*
- ITU-T Recommendation X.520 (2008) | ISO/IEC 9594-6:2008, *Information technology – Open Systems Interconnection – The Directory: Selected attribute types.*
- ITU-T Recommendation X.521 (2008) | ISO/IEC 9594-7:2008, *Information technology – Open Systems Interconnection – The Directory: Selected object classes.*
- ITU-T Recommendation X.525 (2008) | ISO/IEC 9594-9:2008, *Information technology – Open Systems Interconnection – The Directory: Replication.*
- ITU-T Recommendation X.530 (2008) | ISO/IEC 9594-10:2008, *Information technology – Open Systems Interconnection – The Directory: Use of systems management for administration of the Directory.*

- ITU-T Recommendation X.680 (2008) | ISO/IEC 8824-1:2008, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation.*
- ITU-T Recommendation X.681 (2008) | ISO/IEC 8824-2:2008, *Information technology – Abstract Syntax Notation One (ASN.1): Information object specification.*
- ITU-T Recommendation X.682 (2008) | ISO/IEC 8824-3:2008, *Information technology – Abstract Syntax Notation One (ASN.1): Constraint specification.*
- ITU-T Recommendation X.683 (2008) | ISO/IEC 8824-4:2008, *Information technology – Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications.*
- ITU-T Recommendation X.690 (2008) | ISO/IEC 8825-1:2008, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER).*

2.1.2 ISO/IEC Standards

- ISO/IEC 10646:2003, *Information technology – Universal Multiple-Octet Coded Character Set (UCS).*

2.1.3 Other references

- ITU-T Recommendation E.164 (2005), *The international public telecommunication numbering plan.*
- ITU-T Recommendation X.121 (2000), *International numbering plan for public data networks.*
- IETF RFC 2025 (1996), *The Simple Public-Key GSS-API Mechanism (SPKM).*
- IETF RFC 793 (1981), *Transmission Control Protocol – DARPA Internet Program – Protocol Specification.*
- IETF RFC 1738 (1994), *Uniform Resource Locators (URL).*
- IETF RFC 2246 (1999), *The TLS Protocol Version 1.0.*
- IETF RFC 4511 (2006), *Lightweight Directory Access Protocol (LDAP): The Protocol.*
- IETF RFC 3546 (2003), *Transport Layer Security (TLS) Extensions.*
- IETF RFC 3986 (2005), *Uniform Resource Identifier (URI): Generic Syntax.*

2.2 Non-normative references

- ITU-T Recommendation X.217 (1995) | ISO/IEC 8649:1996, *Information technology – Open Systems Interconnection – Service definition for the Association Control Service Element.*
- ITU-T Recommendation X.224 (1995) | ISO/IEC 8073:1997, *Information technology – Open Systems Interconnection – Protocol for providing the connection-mode transport service.*
- ITU-T Recommendation X.225 (1995) | ISO/IEC 8327-1:1996, *Information technology – Open Systems Interconnection – Connection-oriented Session protocol: Protocol specification.*
- ITU-T Recommendation X.226 (1994) | ISO/IEC 8823-1:1994, *Information technology – Open Systems Interconnection – Connection-oriented Presentation protocol: Protocol specification.*
- ITU-T Recommendation X.227 (1995) | ISO/IEC 8650-1:1996, *Information technology – Open Systems Interconnection – Connection-oriented protocol for the Association Control Service Element: Protocol specification.*
- ITU-T Recommendation X.881 (1994) | ISO/IEC 13712-2:1995, *Information technology – Remote Operations: OSI realizations – Remote Operations Service Element (ROSE) service definition.*
- IETF RFC 1006 (1987), *ISO Transport Service on top of the TCP Version: 3.*
- IETF RFC 1277 (1991), *Encoding Network Addresses to Support Operation over Non-OSI Lower Layers.*
- IETF RFC 2126 (1997), *ISO Transport Service on top of TCP (ITOT).*