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Information technology — Open systems interconnection —

Part 4: The Directory: Procedures for distributed operation

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Foreword

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This document was prepared by ITU-T as ITU-T X.518 (10/2019) and drafted in accordance with its editorial rules, in collaboration with Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*.

This ninth edition cancels and replaces the eighth edition (ISO/IEC 9594-4:2017), which has been technically revised.

A list of all parts in the ISO/IEC 9594 series can be found on the ISO website.

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Introduction

This Recommendation | International Standard, together with other Recommendations | International Standards, have 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 procedures by which the distributed components of the Directory interwork in order to provide a consistent service to its users.

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 ninth edition technically revises and enhances the eighth edition of this Recommendation | International Standard.

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

Rec. ITU-T X.511 (1993) | ISO/IEC 9594-3 (1995), Rec. ITU-T X.518 (1993) | ISO/IEC 9594-4 (1995) and Rec. ITU-T X.519 (1993) | ISO/IEC 9594-5 (1995) and their previous edition 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 nine editions, except for those specifically assigned to version 2, are accommodated using the rules of extensibility defined in Rec. ITU-T X.519 | ISO/IEC 9594-5.

Annex A, which is an integral part of this Recommendation | International Standard, provides the ASN.1 module for directory distributed operations.

Annex B, which is an integral part of this Recommendation | International Standard, provides the ASN.1 module providing definitions for hierarchical operational bindings.

Annex C, which is not an integral part of this Recommendation | International Standard, describes an example of distributed name resolution.

Annex D, which is not an integral part of this Recommendation | International Standard, describes authentication in the distributed operations environment.

Annex E, which is not an integral part of this Recommendation | International Standard, illustrates knowledge maintenance.

Annex F, 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.

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INTERNATIONAL STANDARD ISO/IEC 9594-4
RECOMMENDATION ITU-T X.518

Information technology – Open Systems Interconnection – The Directory: Procedures for distributed operation

SECTION 1 – GENERAL

1 Scope

This Recommendation | International Standard specifies the behaviour of DSAs taking part in a distributed directory consisting of multiple Directory systems agents (DSAs) and/or LDAP servers with at least one DSA. The allowed behaviour has been designed to ensure a consistent service given a wide distribution of the DIB across a distributed directory. Only the behaviour of DSAs taking part in a distributed directory is specified. The behaviour of LDAP servers are specified in relevant LDAP specifications. There are no special requirements on an LDAP server beyond those given by the LDAP specifications.

The Directory is not intended to be a general purpose database system, although it may be built on such systems. It is assumed that there is a considerably higher frequency of queries than of updates.

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

- Recommendation ITU-T X.500 (2019 | ISO/IEC 9594-1:2020, *Information technology – Open Systems Interconnection – The Directory: Overview of concepts, models and services*.
- Recommendation ITU-T X.501 (2019) | ISO/IEC 9594-2:2020, *Information technology – Open Systems Interconnection – The Directory: Models*.
- Recommendation ITU-T X.509 (2019) | ISO/IEC 9594-8:2020, *Information technology – Open Systems Interconnection – The Directory: Public-key and attribute certificate frameworks*.
- Recommendation ITU-T X.511 (2019) | ISO/IEC 9594-3:2020, *Information technology – Open Systems Interconnection – The Directory: Abstract service definition*.
- Recommendation ITU-T X.519 (2019) | ISO/IEC 9594-5:2020, *Information technology – Open Systems Interconnection – The Directory: Protocol specifications*.
- Recommendation ITU-T X.520 (2019) | ISO/IEC 9594-6:2020, *Information technology – Open Systems Interconnection – The Directory: Selected attribute types*.
- Recommendation ITU-T X.521 (2019) | ISO/IEC 9594-7:2020, *Information technology – Open Systems Interconnection – The Directory: Selected object classes*.
- Recommendation ITU-T X.525 (2019) | ISO/IEC 9594-9:2020, *Information technology – Open Systems Interconnection – The Directory: Replication*.
- Recommendation ITU-T X.680 (2015) | ISO/IEC 8824-1:2015, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*.

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2.1.2 Other references

- Recommendation ITU-T X.681 (2015) | ISO/IEC 8824-2:2015, *Information technology – Abstract Syntax Notation One (ASN.1): Information object specification*.
- Recommendation ITU-T X.682 (2015) | ISO/IEC 8824-3:2015, *Information technology – Abstract Syntax Notation One (ASN.1): Constraint specification*.
- Recommendation ITU-T X.683 (2015) | ISO/IEC 8824-4:2015, *Information technology – Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications*.
- IETF RFC 4511 (2006), *Lightweight Directory Access Protocol (LDAP): The Protocol*.
- IETF RFC 4514 (2006), *Lightweight Directory Access Protocol (LDAP): String Representation of Distinguished Names*.

2.2 Non-normative reference

- IETF RFC 4510 (2006), *Lightweight Directory Access Protocol (LDAP): Technical Specification Road Map*.

3 Definitions

For the purposes of this Recommendation | International Standard, the following definitions apply:

3.1 Basic Directory definitions

The following terms are defined in Rec. ITU-T X.500 | ISO/IEC 9594-1:

a) *(the) Directory*;
b) *Directory Information Base*.

3.2 Directory model definitions

The following terms are defined in Rec. ITU-T X.501 | ISO/IEC 9594-2:

a) *access point*;
b) *alias*;
c) *Directory Information Tree* ;
d) *Directory System Agent (DSA)*;
e) *Directory User Agent (DUA)*;
f) *distinguished name*;
g) *relative distinguished name*.

3.3 DSA information model definitions

The following terms are defined in Rec. ITU-T X.501 | ISO/IEC 9594-2:

a) *category*;
b) *commonly usable*;
c) *context prefix*;
d) *cross reference*;
e) *DIB fragment*;
f) *DSA information tree*;
g) *DSA-Specific Entry (DSE)*;
h) *DSE type*;
i) *immediate superior reference*;
j) *knowledge information*;
k) *knowledge reference category*;
l) *knowledge reference type*;

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