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Information technology — Open systems interconnection —

Part 1: The Directory: Overview of concepts, models and services

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Foreword

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This document was prepared by ITU-T as ITU-T X.500 (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 9594-1:2017), which has been technically revised.

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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CONTENTS

Page

1 Scope 1
2 Normative references 1
2.1 Identical Recommendations | International Standards 1
3 Definitions 2
3.1 Communication model definitions 2
3.2 Directory model definitions 2
3.3 Distributed Operation definitions 3
3.4 Replication definitions 3
3.5 Basic directory definitions 3
4 Abbreviations 3
5 Conventions 4
6 Overview of the Directory 4
7 The Directory Information Base (DIB) 5
8 The Directory service 7
8.1 Introduction 7
8.2 Service qualification 7
8.3 Directory interrogation 7
8.4 Directory modification 8
8.5 Other outcomes 8
9 The distributed Directory 9
9.1 Functional model 9
9.2 Organizational model 9
9.3 Operation of the model 9
10 Access control in the Directory 13
11 Service administration 14
12 Replication in the Directory 15
12.1 Introduction 15
12.2 Forms of Directory replication 15
12.3 Replication and consistency of Directory information 16
12.4 Views of replication 16
12.5 Replication and Access Control 17
13 Directory protocols 17
Annex A – Applying the Directory 18
A.1 The Directory environment 18
A.2 Directory service characteristics 18
A.3 Patterns of use of the Directory 18
Annex B – Amendments and corrigenda 22

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Introduction

This Recommendation | International Standard together with 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 introduces and models the concepts of the Directory and of the DIB and overviews the services and capabilities which they provide. Other Recommendations | International Standards make use of these models in defining the abstract service provided by the Directory, and in specifying the protocols through which this service can be obtained or propagated.

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.

Annex A, which is an integral part of this Recommendation | International Standard, describes the types of use to which the Directory can be applied.

Annex B, 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
ITU-T RECOMMENDATION

Information technology – Open Systems Interconnection – The Directory: Overview of concepts, models and services

1 Scope

The Directory provides the directory capabilities required by many application layer standards and telecommunication services. Among the capabilities which it provides are those of "user-friendly naming", whereby objects can be referred to by names which are suitable for citing by human users (though not all objects need have user-friendly names); and "name-to-address mapping" which allows the binding between objects and their locations to be dynamic. The latter capability allows networks, for example, to be "self-configuring" in the sense that addition, removal and the changes of object location do not affect network operation.

The Directory is not intended to be a general-purpose database system, although it may be built on such systems. It is assumed, for instance, that, as is typical with communication directories, there is a considerably higher frequency of "queries" than of updates. The rate of updates is expected to be governed by the dynamics of people and organizations, rather than, for example, the dynamics of networks. There is also no need for instantaneous global commitment of updates; transient conditions, where both old and new versions of the same information are available, are quite acceptable.

It is a characteristic of the Directory that, except as a consequence of differing access rights or un-propagated updates, the results of directory queries will not be dependent on the identity or location of the inquirer. This characteristic renders the Directory unsuitable for some telecommunication applications, for example some types of routing. For cases where the results are dependent on the identity of the inquirer, access to directory information and updates of the Directory may be denied.

2 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 Identical Recommendations | International Standards

- Recommendation ITU-T X.200 (1994) | ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The basic model*.
- 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.518 (2019) | ISO/IEC 9594-4:2020, *Information technology – Open Systems Interconnection – The Directory: Procedures for distributed operation*.
- 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*.

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3 Definitions

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

3.1 Communication model definitions

The following terms are defined in Rec. ITU-T X.519 | ISO/IEC 9594-5:

a) application-entity;
b) application layer;
c) application process.

3.2 Directory model definitions

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

a) access control;
b) Administration Directory Management Domain;
c) alias;
d) ancestor;
e) attribute;
f) attribute type;
g) attribute value;
h) authentication;
i) compound entry;
j) context;
k) Directory Information Tree (DIT);
l) Directory Management Domain (DMD);
m) Directory System Agent (DSA);
n) Directory User Agent (DUA);
o) distinguished name;
p) entry;
q) family (of entries);
r) hierarchical group;
s) LDAP client;
t) LDAP requester;
u) LDAP responder;
v) LDAP server;
w) name;
x) object (of interest);
y) Private Directory Management Domain;
z) related entries;
aa) relative distinguished name;
bb) root;
cc) schema;
dd) security policy;
ee) subordinate object;
ff) superior entry;
gg) superior object;
hh) tree.

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3.3 Distributed Operation definitions

The following terms are defined in Rec. ITU-T X.518 | ISO/IEC 9594-4:

a) uni-chaining;

b) multi-chaining;

c) referral.

3.4 Replication definitions

The following terms are defined in Rec. ITU-T X.525 | ISO/IEC 9594-9:

a) caching;

b) cache copy;

c) entry copy;

d) master DSA;

e) replication;

f) shadow consumer;

g) shadow supplier;

h) shadowed information;

i) shadowing agreement.

3.5 Basic directory definitions

The following terms are defined in this Recommendation | International Standard:

3.5.1 **the Directory**: A collection of open systems cooperating to provide directory services.

3.5.2 **directory information base (DIB)**: The set of information managed by the Directory.

3.5.3 **(directory) user**: The end user of the Directory, i.e., the entity or person which accesses the Directory.

4 Abbreviations

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

ACI	Access Control Information
DAP	Directory Access Protocol
DIB	Directory Information Base
DISP	Directory Information Shadowing Protocol
DIT	Directory Information Tree
DMD	Directory Management Domain
DOP	Directory Operational Binding Management Protocol
DSA	Directory System Agent
DSP	Directory System Protocol
DUA	Directory User Agent
LDAP	Lightweight Directory Access Protocol
OSI	Open Systems Interconnection
RDN	Relative Distinguished Name

5 Conventions

The term "Directory Specification" (as in "this Directory Specification") shall be taken to mean Rec. ITU-T X.500 | ISO/IEC 9594-1. The term "Directory Specifications" shall be taken to mean the Rec. ITU-T X.500 | ISO/IEC 9594-1, Rec. ITU-T X.501 | IO/IEC 9594-2, Rec. ITU-T X.511 | ISO/IEC 9594-3, Rec. ITU-T X.518 | ISO/IEC 9594-4,

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