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SERIES X: DATA NETWORKS, OPEN SYSTEM
COMMUNICATIONS AND SECURITY

OSI networking and system aspects – Naming,
Addressing and Registration

**Information technology – Procedures for the
operation of object identifier registration
authorities: General procedures and top arcs of
the international object identifier tree**

Recommendation ITU-T X.660

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**Information technology – Procedures for the operation
of object identifier registration authorities: General procedures
and top arcs of the international object identifier tree**

Summary

Recommendation ITU-T X.660 | ISO/IEC 9834-1 defines a tree structure that supports international object identifiers (OIDs). It includes registration of the top-level arcs of the OID tree. It also specifies procedures for the operation of an International Registration Authority for use, when needed, by other ITU-T Recommendations and/or International Standards.

For easy reference, and to emphasize that this tree is an extended form of the original OID tree (defined in earlier versions of this Recommendation | International Standard), this specific tree can be referred to as "the International Object Identifier tree", or more commonly as just "the OID tree".

The original OID tree required all arcs to be unambiguously identified by a primary integer value, with the use for human readability of (not necessarily unambiguous) secondary identifiers (restricted to the Latin alphabet). Secondary identifiers were not normally carried in protocols or used for machine identification. The international object identifier tree extends this by allowing an arc to also be unambiguously identified by a Unicode label (a string of Unicode characters) that can be carried in protocols and can be used for machine identification.

The primary integers and secondary identifiers of the international object identifier tree continue to be used in encodings (primary integer values only) and value notation (primary integer values and secondary identifiers) of the ASN.1 **OBJECT IDENTIFIER** type, which is unchanged. The Unicode labels can only be used in encodings and value notation of the ASN.1 **OID-IRI** type.

This Recommendation | International Standard also provides recommendations on an appropriate fee structure for registration of lower level arcs.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T X.660	1992-09-10	VII
1.1	ITU-T X.660 (1992) Amd. 1	1996-10-05	7
1.2	ITU-T X.660 (1992) Amd. 2	1997-08-09	7
2.0	ITU-T X.660	2004-08-22	17
3.0	ITU-T X.660	2008-08-29	17
4.0	ITU-T X.660	2011-07-29	17

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

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INTERNATIONAL STANDARD RECOMMENDATION ITU-T

Information technology – Procedures for the operation of object identifier registration authorities: General procedures and top arcs of the international object identifier tree

1 Scope

This Recommendation | International Standard:

- a) specifies a tree structure for allocations made by a hierarchical structure of Registration Authorities, called the international OID tree, which supports the ASN.1 **OBJECT IDENTIFIER** type and the ASN.1 **OID-IRI** type (see Rec. ITU-T X.680 | ISO/IEC 8824-1);
- b) registers top-level arcs of the international object identifier tree;
- c) specifies procedures which are generally applicable to registration at any level of the international OID tree;
- d) provides guidelines for the establishment and operation of International Registration Authorities for use, when needed, by other ITU-T Recommendations and/or International Standards;
- e) provides guidelines for additional ITU-T Recommendations and/or International Standards which choose to reference the procedures in this Recommendation | International Standard;
- f) provides a recommended fee structure for lower-level Registration Authorities.

NOTE – Information about registration for specific objects is contained in separate ITU-T Recommendations and/or International Standards.

This Recommendation | International Standard applies to registration by ITU-T Recommendations and/or International Standards, by International Registration Authorities (see clause 8), and by any other Registration Authority.

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.500 (2008) | ISO/IEC 9594-1:2008, *Information technology – Open Systems Interconnection – The Directory: Overview of concepts, models and services*.
- Recommendation ITU-T X.501 (2008) | ISO/IEC 9594-2:2008, *Information technology – Open Systems Interconnection – The Directory: Models*.
- Recommendation ITU-T X.662 (2008) | ISO/IEC 9834-3:2008, *Information technology – Open Systems Interconnection – Procedures for the operation of OSI Registration Authorities: Registration of object identifier arcs beneath the top-level arc jointly administered by ISO and ITU-T*.
- Recommendation ITU-T X.680 (2008) | ISO/IEC 8824-1:2008, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*.

2.2 Paired Recommendations | International Standards equivalent in technical content

None.

2.3 Additional references

- Recommendation ITU-T X.121 (2000), *International numbering plan for public data networks*.
- Recommendation ITU-T X.669 (2008), *Procedures for ITU-T registration of identified organizations*.

- IETF RFC 5891 (2010), *Internationalized Domain Names in Applications (IDNA): Protocol*.
- ISO 3166-1:2006, *Codes for the representation of names of countries and their subdivisions – Part 1: Country codes*.
- ISO 3166-3:1999, *Codes for the representation of names of countries and their subdivisions – Part 3: Codes for formerly used names of countries*.
- ISO/IEC 6523-1:1998, *Information technology – Structure for the identification of organizations and organization parts – Part 1: Identification of organization identification schemes*.
- ISO/IEC 6523-2:1998, *Information technology – Structure for the identification of organizations and organization parts – Part 2: Registration of organization identification schemes*.
- ISO/IEC 10646:2011, *Information technology – Universal Multiple-Octet Coded Character Set (UCS)*.
NOTE – Recommendation ITU-T T.55 [2] recommends the use of ISO/IEC 10646 for the representation of the languages of the world.

3 Definitions

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

3.1 Organization definition

This Recommendation | International Standard uses the following term defined in ISO/IEC 6523-1:

- a) organization.

3.2 ASN.1 terms

This Recommendation | International Standard uses the following terms defined in Rec. ITU-T X.680 | ISO/IEC 8824-1:

- a) (ASN.1) identifier;
- b) object;
- c) object descriptor type;
- d) (ASN.1) object identifier type.

3.3 Directory terms

3.3.1 This Recommendation | International Standard uses the following terms defined in Rec. ITU-T X.500 | ISO/IEC 9594-1:

- a) Directory.

3.3.2 This Recommendation | International Standard uses the following terms defined in Rec. ITU-T X.501 | ISO/IEC 9594-2:

- a) attribute;
- b) attribute type;
- c) attribute value;
- d) Directory name;
- e) object class;
- f) relative distinguished name.

3.4 Unicode terms

This Recommendation | International Standard uses the following terms defined in ISO/IEC 10646:

- a) coded character.

3.5 Additional definitions

3.5.1 additional secondary identifier: A secondary identifier for a top-level arc of the international object identifier tree that is assigned from time-to-time by a simple Resolution of both the relevant ITU-T study group and the

relevant ISO/IEC JTC 1 Sub-Committee, without requiring any change to this or any other ITU-T Recommendation and/or International Standard (see A.6.4).

3.5.2 additional Unicode label: A Unicode label for one of the top-level arcs of the international object identifier tree that is assigned from time-to-time by a simple Resolution of both the relevant ITU-T study group and the relevant ISO/IEC JTC 1 Sub-Committee, without requiring any change to this or any other ITU-T Recommendation | International Standard (see A.6.4).

3.5.3 administrative role (of a Registration Authority): Assigning and making available unambiguous names according to the ITU-T Recommendation and/or International Standard defining the procedures for the Registration Authority.

3.5.4 integer-valued Unicode label: A Unicode label for an arc that is the character representation (with no leading zeros) of the primary integer value of that arc.

NOTE – An arc of the international object identifier tree can have no other Unicode label that is the character representation (with or without leading zeros) of an integer value (see 7.4).

3.5.5 international object identifier tree: A tree whose root corresponds to this Recommendation | International Standard and whose nodes correspond to Registration Authorities responsible for allocating arcs from a parent node.

3.5.6 International Registration Authority: A Registration Authority (see 3.5.17) acting at the international level where the procedures for its operation, defined in a relevant ITU-T Recommendation and/or International Standard, declare it to operate as an International Registration Authority (see clause 8).

3.5.7 Joint ITU-T | ISO/IEC JTC 1 Collaborative Team for object identifiers: A group established in accordance with Rec. ITU-T A.23, Annex A | ISO/IEC JTC 1 Standing Document [1], clause 8, to progress work on joint text in relation to object identifiers (OIDs).

3.5.8 long arc: A Unicode label from a superior node in the international object identifier tree that identifies a node that is not immediately beneath the superior node.

NOTE 1 – The long arc (in addition to normal arcs) has to satisfy the unambiguity requirements (after normalization) for all arcs from that superior node (see 7.8).

NOTE 2 – The only property of a long arc (see 3.5.15) is its Unicode label. It does not have a primary integer value or a secondary identifier. It is essentially a short-cut for a series of arcs, each of which has a primary integer value and its own Unicode labels.

NOTE 3 – The long arc can therefore not be used to define the value of an ASN.1 OBJECT IDENTIFIER type. It can only be used in an OID-internationalized resource identifier (see 3.5.12).

NOTE 4 – Joint action by ITU-T and ISO/IEC can allocate a Unicode label for a long arc that identifies a node which is two levels beneath the root (see A.7). This Recommendation | International Standard only allows long arcs for arcs beneath the top-level arc with primary integer value 2.

3.5.9 normalization (of a Unicode label): Transformation of any Unicode label into a form suitable for comparison (see 7.5.5).

3.5.10 object (of interest): Anything in some world, generally the world of telecommunications and information processing or some part thereof,

- a) which is identifiable (can be named); and
- b) which may be registered.

NOTE – Examples of objects are ASN.1 modules (see Rec. ITU-T X.680 | ISO/IEC 8824-1), information objects [6], managed objects [9], XML namespaces [15] and any other object that can be identified by an OID, URI or IRI.

3.5.11 object identifier: An ordered list of primary integer values from the root of the international object identifier tree to a node, which unambiguously identifies that node (see 7.8).

3.5.12 OID-internationalized resource identifier: An ordered list of Unicode labels from the root of the international object identifier tree that unambiguously identifies a node in that tree (see 7.8).

NOTE – The ASN.1 **OID-IRI** type (see Rec. ITU-T X.680 | ISO/IEC 8824-1) is the set of all OID-internationalized resource identifier values, and provides value notations for all OID-internationalized resource identifiers based on the international object identifier tree. The corresponding encodings are specified in [8].

3.5.13 primary integer value: A primary value of type integer used to unambiguously identify an arc of the international object identifier tree.

NOTE – An arc of the international object identifier tree has precisely one primary integer value, apart from long arcs, which have only Unicode labels.

3.5.14 primary value: A value of a specified type assigned to an arc of the OID tree that can provide an unambiguous identification of that arc within the set of arcs from its superior node.

3.5.15 properties of an arc: The primary integer value, Unicode labels and secondary identifiers assigned to that arc.

NOTE – Long arcs (see 3.5.8) have only Unicode labels. All other arcs have precisely one primary integer value.

3.5.16 registration: The assignment of an unambiguous name to an object in a way which makes the assignment available to interested parties.

3.5.17 Registration Authority: An entity such as an organization, a standard or an automated facility that performs registration of one or more types of objects (see also 3.5.6).

NOTE – For this Recommendation | International Standard, the above definition of Registration Authority extends the term to cover registration by organizations acting at international, regional and national levels, and by other means.

3.5.18 registration procedures: The specified procedures for performing registration and amending (or deleting) existing registrations.

3.5.19 relevant ISO/IEC JTC 1 Sub-Committee: The ISO/IEC JTC 1 Sub-Committee that is responsible for the Joint ITU-T | ISO/IEC JTC 1 Collaborative Team for object identifiers.

3.5.20 relevant ITU-T study group: The ITU-T study group that is responsible for the Joint ITU-T | ISO/IEC JTC 1 Collaborative Team for object identifiers.

3.5.21 root arc: One of the three arcs from the root of the international object identifier tree.

3.5.22 secondary identifier: A secondary value restricted to the characters forming an (ASN.1) identifier (see Rec. ITU-T X.680 | ISO/IEC 8824-1), assigned either in an ITU-T Recommendation, an International Standard or by some other Registration Authority to an arc of the OID tree.

NOTE – An arc of the international object identifier tree can have zero or more secondary identifiers.

3.5.23 secondary value: A value of some type associated with an arc that provides additional identification useful for human readers, but that does not in general unambiguously identify that arc, and is not normally included in computer communications.

3.5.24 Sponsoring Authority: An organization recognized to receive proposals for registration and to submit applications to an International Registration Authority as defined by a given ITU-T Recommendation and/or International Standard (see clause 8).

3.5.25 synonym: An OID for an object that is also identified by another distinct OID.

3.5.26 technical role (of a Registration Authority): Verifying that an application for registration of an OID arc is in accordance with the ITU-T Recommendation and/or International Standard defining the form of the application.

3.5.27 top-level arcs (top arcs): The subset of arcs of the international object identifier tree that are assigned identifiers in this Recommendation | International Standard (supplemented by references to the Rec. ITU-T X.660 series | ISO/IEC 9834 multipart Standards, or by a Resolution from time-to-time of both the relevant ITU-T study group and the relevant ISO/IEC JTC 1 Sub-Committee).

3.5.28 Unicode character: A character from the Unicode character set.

3.5.29 Unicode character set: The set of coded characters specified in ISO/IEC 10646.

NOTE – This is the same character set as that defined by the Unicode Consortium in [16].

3.5.30 Unicode label: A primary value that consists of an unbounded sequence of Unicode characters that does not contain the **SPACE** character (see 7.5 for other restrictions) used to unambiguously identify an arc of the OID tree.

NOTE 1 – Unicode labels are always case sensitive for matching purposes and when determining unambiguity. However, all Unicode labels from a given OID node shall be distinct after normalization.

NOTE 2 – An arc of the international object identifier tree can have multiple Unicode labels.

NOTE 3 – The ability to include effectively the full range of Unicode characters may make it easier to execute certain forms of OID-IRI mimicking (also called "spoofing"). Applications that will present OID-IRIs to human users shall adhere to best practices regarding address mimicking in order to help prevent attacks that result from spoofed addresses (e.g., the phenomenon known as "phishing" (see details in [11])).

4 Abbreviations

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

ACSE	Association Control Service Element
ASN.1	Abstract Syntax Notation One
FTAM	File Transfer, Access and Management