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Information technology — Open Systems Interconnection — Procedures for the operation of OSI Registration Authorities: General procedures and top arcs of the ASN.1 Object Identifier tree

Technologies de l'information — Interconnexion de systèmes ouverts (OSI) — Procédures opérationnelles pour les organismes d'enregistrement de l'OSI: Procédures générales et arcs sommitaux de l'arborescence des identificateurs d'objet ASN.1

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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.

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 9834-1 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.660.

This second edition cancels and replaces the first edition (ISO/IEC 9834-1:1993), which has been technically revised. It also incorporates the Amendments ISO/IEC 9834-1:1993/Amd.1:1997 and ISO/IEC 9834-1:1993/Amd.2:1998.

ISO/IEC 9834 consists of the following parts, under the general title *Information technology — Open Systems Interconnection — Procedures for the operation of OSI Registration Authorities:*

— *Part 1: General procedures and top arcs of the ASN.1 Object Identifier tree*

— *Part 2: Registration procedures for OSI document types*

— *Part 3: Registration of Object Identifier arcs beneath the top-level arc jointly administered by ISO and ITU-T*

— *Part 4: Register of VTE Profiles*

— *Part 5: Register of VT Control Object Definitions*

— *Part 6: Registration of application processes and application entities*

— *Part 7: Joint ISO and ITU-T Registration of International Organizations*

— *Part 8: Generation and registration of Universally Unique Identifiers (UUIDs) and their use as ASN.1 Object Identifier components*

INTERNATIONAL STANDARD
ITU-T RECOMMENDATION

Information technology – Open Systems Interconnection – Procedures for the operation of OSI Registration Authorities: General procedures and top arcs of the ASN.1 Object Identifier tree

1 Scope

This Recommendation | International Standard:

a) specifies a Registration-Hierarchical-name-tree (RH-name-tree) which is a generic tree structure for allocations made by Registration Authorities, and the ASN.1 object identifier tree which is a specific instance of the RH-name-tree;

b) registers the three top-level arcs of the ASN.1 object identifier tree;

c) specifies procedures which are generally applicable to registration in the context of an RH-name-tree;

d) provides guidelines for the establishment and operation of International Registration Authorities;

e) provides guidelines for additional Recommendations | International Standards which choose to reference the procedures in this Recommendation | International Standard.

NOTE 1 – This Recommendation | International Standard does not exclude or disallow the use of any syntactic forms of names or any naming domains for registration purposes provided that the domains ensure non-ambiguity within their scope. This Recommendation | International Standard is intended to cover those cases where the registration-hierarchical-name is appropriate.

NOTE 2 – Information about registration for specific objects is contained in separate Recommendations | International Standards.

This Recommendation | International Standard applies to registration by Recommendations | International Standards, by International Registration Authorities, 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

– ITU-T Recommendation X.207 (1993) | ISO/IEC 9545:1994, *Information technology – Open Systems Interconnection – Application layer structure.*

– ITU-T Recommendation X.501 (2001) | ISO/IEC 9594-2:2001, *Information technology – Open Systems Interconnection – The Directory: Models*.

– ITU-T Recommendation X.520 (2001) | ISO/IEC 9594-6:2001, *Information technology – Open Systems Interconnection – The Directory: Selected attribute types.*

– ITU-T Recommendation X.650 (1996) | ISO/IEC 7498-3:1997, *Information technology – Open Systems Interconnection – Basic Reference Model: Naming and addressing.*

– ITU-T Recommendation X.662 (2004) | ISO/IEC 9834-3:2005, *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.*

- ITU-T Recommendation X.680 (2002) | ISO/IEC 8824-1:2002, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation.*
- ITU-T Recommendation X.681 (2002) | ISO/IEC 8824-2:2002, *Information technology – Abstract Syntax Notation One (ASN.1): Information object specification*.
- ITU-T Recommendation X.690 (2002) | ISO/IEC 8825-1:2002, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER), and Distinguished Encoding Rules (DER)*.
- ITU-T Recommendation X.691 (2002) | ISO/IEC 8825-2:2002, *Information technology – ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)*.
- ITU-T Recommendation X.693 (2001) | ISO/IEC 8825-4:2002, *Information technology – ASN.1 encoding rules: XML Encoding Rules (XER)*.
- ITU-T Recommendation X.722 (1992) | ISO/IEC 10165-4:1992, *Information technology – Open Systems Interconnection – Structure of management information: Guidelines for the definition of managed objects.*

2.2 Paired Recommendations | International Standards equivalent in technical content

- ITU-T Recommendation F.400/X.400 (1999), *Message handling system and service overview*.

  ISO/IEC 10021-1:2003, *Information technology – Message Handling Systems (MHS) – Part 1: System and service overview*.

2.3 Additional references

- ITU-T Recommendation X.121 (2000), *International numbering plan for public data networks*.
- ISO 3166-1:1997, *Codes for the representation of names of countries and their subdivisions – Part 1: Country codes.*
- ISO 3166-2:1998, *Codes for the representation of names of countries and their subdivisions – Part 2: Country subdivision code.*
- ISO 3166-3:1999, *Codes for the representation of names of countries and their subdivisions – Part 3: Code 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 8571-1:1988, *Information processing system – Open Systems Interconnection – File transfer, access and management – Part 1: General introduction.*

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 OSI Reference Model terms

This Recommendation | International Standard uses the following terms defined in ITU-T Rec. X.650 | ISO/IEC 7498-3:

a) name;

b) naming authority;

c) naming domain;

d) synonym.

3.3 Application Layer Structure terms

This Recommendation | International Standard uses the following terms defined in ITU-T Rec. X.207 | ISO/IEC 9545:

a) application-entity-title;

b) application-process-title.

3.4 ASN.1 terms

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

a) object;

b) object descriptor type;

c) object identifier type.

This Recommendation | International Standard uses the following term defined in ITU-T Rec. X.681 | ISO/IEC 8824-2:

a) information object.

3.5 Directory terms

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

a) Directory;

b) Directory name.

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

a) attribute;

b) attribute type;

c) attribute value;

d) attribute value assertion;

e) object class;

f) relative distinguished name.

3.6 Additional definitions

3.6.1 additional secondary identifier: A secondary identifier for an arc of the ASN.1 OID tree that is assigned from time-to-time by a simple Resolution of the relevant ITU-T Study Group and ISO/IEC JTC 1 Subcommittee without requiring any change to this or any other International Standard (see A.5.5).

3.6.2 administrative role (of a registration authority): Assigning and making available unambiguous names according to the Recommendation | International Standard defining the procedures for the authority.

3.6.3 international registration authority: A Registration Authority (see 3.6.8) acting at the international level according to the procedures for its operation defined in the relevant Recommendation | International Standard (see clause 7).

3.6.4 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 ITU-T Rec. X.680 | ISO/IEC 8824-1), information objects (see ITU-T Rec. X.681 | ISO/IEC 8824-2) and managed objects (see ITU-T Rec. X.722 | ISO/IEC 10165-4).

3.6.5 object identifier tree: A specific form of an RH-name-tree whose root corresponds to this Recommendation | International Standard and whose nodes correspond to registration authorities responsible for allocating arcs from a parent node.

3.6.6 primary value: A value of a specified type (integer, in the case of the ASN.1 OID tree) assigned to an arc of the RH-name-tree that can be used to provide an unambiguous identification of that arc.

NOTE – For the ASN.1 OID tree, the primary value of an arc is referred to as a primary integer value.

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

3.6.8 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 International Registration Authority).

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. For clarity, the term International Registration Authority is used in this Recommendation | International Standard to refer to an organization performing registration at the international level.

3.6.9 registration-hierarchical-name: A name which is unambiguous within the registration-hierarchical-name-tree and which is assigned by registration. The semantic form of this name is structured according to the rules in clause 6.

3.6.10 registration-hierarchical-name-tree: A tree whose nodes correspond to objects that are registered and whose non-leaf nodes may be registration authorities.

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

3.6.12 secondary value: A value of some type (an ASN.1 "identifier" in the case of the ASN.1 OID tree) 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.

NOTE – In the case of the ASN.1 OID tree, the secondary value of an arc is referred to as a secondary identifier.

3.6.13 sponsoring authority: An organization recognized by the requirements of this Recommendation | International Standard to receive proposals for registration and to submit applications accordingly to an International Registration Authority (see 7.2).

3.6.14 technical role (of a registration authority): Recording definitions of the objects to which names are assigned and verifying that these definitions are in accordance with the Recommendation | International Standard defining the form of the definition.

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
DCC	Data Country Code
DIT	Directory Information Tree
DNIC	Data Network Identification Code
DSA	Directory System Agent
DUA	Directory User Agent
FTAM	File Transfer, Access and Management
ISP	International Standardized Profile
ITU-R	International Telecommunication Union – Radiocommunication Sector
MHS	Message Handling System
OID	Object Identifier
OSI	Open Systems Interconnection
RDN	Relative Distinguished Name
RH-name	Registration-Hierarchical-name
RH-name-tree	Registration-Hierarchical-name-tree
ROA	Recognized Operating Agency
TSB	Telecommunication Standardization Bureau

5 Registration

5.1 Overview

5.1.1 Many Recommendations | International Standards define certain objects for which unambiguous identification is required. This is achieved by registration.

NOTE – Examples of these objects are given in 3.6.4.

5.1.2 Registration is the assignment of a name to an object in a way which makes the assignment available to interested parties. It is carried out by a registration authority.

5.1.3 Registration can be effected by a Recommendation | International Standard, by publishing in the Recommendation | International Standard the names and the corresponding definitions of object. Such a mechanism requires amendment of the Recommendation | International Standard for each registration, and hence is not appropriate in cases where the registration activity is high.

5.1.4 Alternatively, registration can be effected by permitting one or more organizations to act as registration authorities to perform registration on a flexible basis.

5.1.5 The form of name used (see 6.1.5) and the management of the registration naming domain ensure independent assignment of unambiguous names by different registration authorities.

5.2 Management of the registration naming domain

5.2.1 The management of the entire registration naming domain is accomplished by a process of delegation of authority. In this process the registration authority responsible for a given naming domain may partition that naming domain. In doing so, it may or may not delegate the registration responsibility for the naming domain formed by each partition to a subordinate registration authority. The naming of a partition does not necessarily imply authority to register objects under that partition. This delegation of registration responsibility can be applied repeatedly with a subordinate registration authority partitioning further the naming domain for which it is responsible and delegating responsibility for those partitions to registration authorities subordinate to it.

5.2.2 The registration authority responsible for a given naming domain must assign a name to the partition of that naming domain that a given sub-authority will manage. The name assigned shall be globally unambiguous, and shall be concatenated as a prefix to all names assigned by that sub-authority. The repeated application of this process through a hierarchy of registration agents ensures the generation of unambiguous names. The generation of names for registration purposes is discussed further in clause 6.

NOTE – An organization, a Recommendation | International Standard or an automated facility can be the registration authority for more than one partition of a naming domain.

5.3 Operation

5.3.1 A registration authority may concern itself only with unambiguous assignment of names (the administrative role) or may in addition need to concern itself with recording definitions of objects and verifying that these definitions are in accordance with the Recommendation | International Standard defining the form of the definition (the technical role).

5.3.2 The criteria for registering an object may vary among registration authorities. It is the responsibility of each authority to establish those criteria. A registration authority may also choose to define criteria for any authorities which are subordinate to it.

NOTE – Among the criteria to be considered in the registration of an object is the level at which registration is appropriate. For example it may be that the definition of an object registered by a particular registration authority may find wide use beyond the community serviced by that registration authority. Although the assigned name is globally unambiguous and can be used outside that community, it may be desirable to restate the definition in the style acceptable to the larger community of interest. If so, the restated definition should be registered with the registration authority appropriate for that larger community.

5.3.3 Synonyms are created when an instance of a type of object is registered more than once. There may be valid reasons for creating synonyms, e.g., the Directory aliases. It is difficult to detect occurrences of synonyms. In case where synonyms are undesirable it may be possible to reduce the number by such means as technical review or administrative fees (in the case of registration authorities). It must be decided in each case whether this is necessary and practical.

NOTE – There is no practical way to ensure that the same object has not been registered by multiple registration authorities and the procedures in this Recommendation | International Standard do not ensure that only a single name is assigned to an object.

6 Registration-hierarchical-names

6.1 The generic RH-name-tree

6.1.1 The RH-name-tree is a generic concept that applies to any form of hierarchical naming in which a name is constructed by the concatenation of values of arcs starting from the root of a tree and proceeding to one of its leaves. RH-name-trees differ in the sort of values assigned to arcs (typically names or numbers or attribute type-value pairs). All of Directory names, MHS names, and ASN.1 object identifiers are hierarchical names that are supported by a specific form of RH-name-tree.

6.1.2 The introduction here of the RH-name-tree concept is intended to make it possible to specify procedures that are applicable to registration authorities related to all three naming conventions. The use of this term should be restricted to standards that address at least two of the specific naming structures that the term RH-name-tree encompasses.

6.1.3 The RH-name-tree is a tree whose root corresponds to this Recommendation | International Standard and whose leaf and non-leaf nodes correspond to objects that are registered. Non-leaf nodes correspond to registration authorities where registration responsibility has been delegated to them by a superior node.

6.1.4 The arcs from a given node to its immediate subordinates are unambiguously identified within the scope of the node by each of one or more primary values of different types. These primary values are assigned by the registration authority corresponding to the superior node. Thus, any path from the root to a node provides an unambiguous name for that node by concatenating (in order) the primary values of a given type for the arcs on the path. An arc may also have secondary values associated with it that are not necessary for the unambiguous identification of the arc, but that can appear in human-readable notation (in addition to the primary values) in order to describe more clearly the nature of an object identified by a path through the RH-name-tree.

NOTE – If any arc is not assigned a primary value of a given type, then the node identified by the arc and all of its subordinates can only be referenced using names constructed with primary values of a different type.

6.1.5 The types of values assigned by a registration authority can include integer values, alphanumeric values and other types of values. The contents of character sets and composition rules for values formed at subordinate arcs should be defined in registration authority procedure standards. The contents of character sets and composition rules may be further constrained or extended by subordinate registration authorities taking into consideration the expected use of the resulting values in different forms of name.

NOTE – To keep to a minimum the number of values assigned to top-level arcs in the RH-name-tree, it is desirable that the types of values assigned to arcs be generic, i.e., applicable to many name forms.

6.1.6 Where a given set of registration authorities assigns values of more than one type, the significance, if any, of the relationship between the resultant names (generated as defined in 6.1.4) is outside the scope of this Recommendation | International Standard.

6.1.7 The generation of some specific forms of name for registration purposes is defined in the annexes. The generation of other forms of name is also defined in other registration authority documents or in relevant Recommendations | International Standards.

6.2 The specific RH-name-tree for ASN.1 object identifiers

6.2.1 An object identifier type, as specified in ITU-T Rec. X.680 | ISO/IEC 8824-1, is an ASN.1 type whose abstract values are associated with a specific form of RH-name. The semantics of an object identifier value are defined by reference to an *object identifier tree*. Each arc of the tree is labelled with a primary value that is a non-negative integer value. The integer value is unbounded except that:

a) the top-level arcs are restricted to three arcs numbered `0` to `2`; and

b) the arcs beneath root arcs `0` and `1` are restricted to forty arcs numbered `0` to `39`.

NOTE – This enables optimized encodings to be used in which the values of the top two arcs for all arcs under top-level arcs `0` and `1`, and arcs `0` to `47` under top-level arc `2` encode in a single octet in an object identifier encoding (see the ITU-T Rec. X.690 series | ISO/IEC 8825 multi-part Standard).

6.2.2 An arc may (but need not) also have associated with it one or more secondary values that are identifiers that are human-readable values. The identifiers of an arc are required to commence with a lowercase letter, and to contain only letters, digits, and hyphens. The last character shall not be a hyphen, nor shall there be two consecutive hyphens in the name (see ITU-T Rec. X.680 | ISO/IEC 8824-1, 11.3).

6.2.3 From any given vertex, the primary integer values for arcs from that vertex are all required to be distinct.

NOTE – No requirement is placed on the secondary identifiers (but see 6.2.6).

6.2.4 Each object to be identified is allocated precisely one vertex (normally, but not necessarily, a leaf), and no other object (of the same or a different type) is allocated to that same vertex. Thus, an object is uniquely and unambiguously identified by the sequence of primary integer values (object identifier component values) labelling the arcs in a path from the root to the vertex allocated to the object.

NOTE – The authorities allocating integer values and identifiers to object identifier components for the top-level arcs are identified in Annex A.

6.2.5 An object identifier value is semantically an ordered list of object identifier component values. Starting with the root of the object identifier tree, each object identifier component value identifies an arc in the object identifier tree. The last object identifier component value identifies an arc leading to a vertex to which an object has been assigned. It is this object that is identified by the object identifier value.

6.2.6 The significant part of an object identifier component is the primary integer value of the arc. The secondary identifiers (if present) aid human readability but are not used in computer communication. It is not recommended that the same identifier be used for two objects that are registered under the same node.

NOTE 1 – In general, an object is a class of information (for example, a file format), rather than an instance of such a class (for example, an individual file). It is thus the class of information (defined by some referenceable specification), rather than the piece of information itself, that is assigned a place in the tree.

NOTE 2 – It is recommended that, whenever a Recommendation, International Standard or other document assigns object identifier values to identify objects, there should be an appendix or annex which summarizes the assignments made therein. It is also recommended that an authority assigning an object identifier value to identify an object should also assign a value of ASN.1 type ObjectDescriptor (see ITU-T Rec. X.680 | ISO/IEC 8824-1, clause 44) to describe that object.

NOTE 3 – ITU-T Rec. X.680 | ISO/IEC 8824-1, clause 31, defines a number of syntactic forms for the specification of object identifier values within an ASN.1 module. Where these syntactic forms make no use of ASN.1 value references, they are independent of the ASN.1 environment and can be used to specify object identifier values outside of ASN.1 modules. Examples of the ASN.1 syntactic forms for the specification of object identifier values are given in ITU-T Rec. X.680 | ISO/IEC 8824-1, clause 31. There are also defined representations for an object identifier value specified relative to a given position in the object identifier tree.

NOTE 4 – ITU-T Rec. X.690 series | ISO/IEC 8825 multi-part standard defines encodings of object identifier values that can be used in computer communication.

7 International Registration Authorities

NOTE – Although this clause applies only to International Registration Authorities, other registration authorities may wish to implement similar rules for their operation.

7.1 Requirement for an International Registration Authority

The identification of, and formal agreement on the need for, an International Registration Authority is established in the Recommendation | International Standard which defines the type of object. Procedures which are generally applicable to the operation of International Registration Authorities are defined in this clause. Procedures which are specific to the type of object are defined in a separate Recommendation | International Standard developed for that purpose.

NOTE – The identity of the organization operating any specific International Registration Authority can be obtained from the ITU-T TSB or ISO Central Secretariat.

7.2 Operation of International Registration Authorities

7.2.1 Each International Registration Authority shall maintain a register of the names assigned to objects and (where the registration authority performs a technical role) the associated definitions of the objects. The form of name to be used and the form of register entry are defined in a separate Recommendation | International Standard.

7.2.2 With regard to the initial assignment of names and definitions to objects and of subsequent additions to the register, the responsibilities of an International Registration Authority shall be as follows:

a) to receive from Sponsoring Authorities (see 7.3) proposals for register entries;

b) to process proposals for entries according to the procedures specified in the applicable Recommendation | International Standard;

c) to record names for each register entry that is accepted, in accordance with the procedures specified in the applicable Recommendation | International Standard;

d) to promulgate the register entries according to the procedures specified in the applicable Recommendation | International Standard; and

e) to convey the results in a specified form to the appropriate Sponsoring Authority when the processing of a proposal has been completed.