INTERNATIONAL STANDARD

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9834-1

Fourth edition
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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

Technologies de l'information — Procédures opérationnelles pour les organismes d'enregistrement d'identificateur d'objet: Procédures générales et arcs sommitaux de l'arborescence des identificateurs d'objet internationale

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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 Rec. ITU-T X.660 (07/2011).

This fourth edition cancels and replaces the third edition (ISO/IEC 9834-1:2008), which has been technically revised.

ISO/IEC 9834 consists of the following parts, under the general title *Information technology — Procedures for the operation of object identifier registration authorities*:

⎯ *Part 1: General procedures and top arcs of the international 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*

⎯ *Part 9: Registration of object identifier arcs for applications and services using tag-based identification*

INTERNATIONAL STANDARD
RECOMMENDATION ITU-T

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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

</div>

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

IANA	Internet Assigned Numbers Authority
ICD	International Code Designator
IRI	Internationalized Resource Identifier
OID	Object Identifier
OID-IRI	OID-Internationalized Resource Identifier
OSI	Open Systems Interconnection
RA	Registration Authority
ROA	Recognized Operating Agency
TSB	Telecommunication Standardization Bureau
URI	Uniform Resource Identifier

5   Notation

5.1   Unicode characters are specified in two ways. For a single character, it is normal to use the Unicode character name in a special font followed by the word "character". For example:

   SPACE character

5.2   For a range of characters, it is normal to use the letter U followed by eight hex digits for the start and end of the range (both in a special font) in accordance with the notation defined in ISO/IEC 10646. For example:

   U0000F900 to **U0000FDCF**

6   Registration

6.1   Overview

6.1.1   Many ITU-T Recommendations and International Standards define certain objects for which unambiguous identification is required. This is achieved by registration.

   NOTE – Examples of these objects are given in 3.5.10.

6.1.2   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.

6.1.3   Registration can be effected by an ITU-T Recommendation and/or International Standard, by publishing in the ITU-T Recommendation and/or International Standard the names and the corresponding definitions of the object. Such a mechanism requires an amendment of the ITU-T Recommendation and/or International Standard for each registration, and hence is not appropriate in cases where the registration activity is high.

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

6.1.5   The form of name used and the registration procedures ensure independent assignment of unambiguous names by different Registration Authorities.

6.2   Management of the OID tree

6.2.1   The management of the entire OID tree is accomplished by a process of delegation of authority. In this process, the Registration Authority responsible for a given OID may delegate the registration responsibility for each subsequent OID to a subordinate Registration Authority. This delegation of registration responsibility can be applied repeatedly.

6.2.2   The Registration Authority responsible for a given OID must assign a name to the subsequent OID 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 7.

   NOTE – An organization, an ITU-T Recommendation and/or International Standard or an automated facility can be the Registration Authority for more than one level of the OID tree.

6.3 Operation

6.3.1 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 ITU-T Recommendation and/or International Standard defining the form of the definition (the technical role).

6.3.2 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.

6.3.3 Synonyms are created when an instance of a type of object is registered more than once. There may be valid reasons for creating synonyms. 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.

7 International OID tree

7.1 The ASN.1 object identifier (**OBJECT IDENTIFIER**) and OID-internationalized resource identifier (**OID-IRI**) types, as specified in Rec. ITU-T X.680 | ISO/IEC 8824-1, are ASN.1 types whose abstract values are associated with the OID tree. The semantics of the values of these types is defined by reference to the OID tree.

7.2 Each arc of the OID tree shall be labelled with a primary integer value that automatically defines an integer-valued Unicode label (see 7.4). It may also have zero or more non-integer Unicode labels, and zero or more secondary identifiers. Some of the non-integer Unicode labels and secondary identifiers may be additional Unicode labels or additional secondary identifiers.

NOTE – ITU-T Recommendations and/or International Standards (including this Recommendation | International Standard) assign a primary integer value (that defines an integer-valued Unicode label), a Unicode label that is not integer-valued, and a secondary identifier to all top-level arcs. Additional Unicode labels and additional secondary identifiers are assigned from time-to-time in accordance with A.6 (by a simple Resolution of the relevant ITU-T study group and of the relevant ISO/IEC JTC 1 Sub-Committee).

7.3 The integer-valued Unicode label shall contain no characters other than those in the range from the **DIGIT ZERO** character to the **DIGIT NINE** character and shall not commence with a **DIGIT ZERO** character, unless it has only a single character and the primary integer value of the arc is zero.

7.4 The integer-valued Unicode label, when treated as the representation of an integer value in accordance with normal conventions for the decimal representation of an integer value, shall produce the value of the primary integer value.

7.5 A non-integer Unicode label shall satisfy the following constraints.

7.5.1 It shall contain at least one character that is not in the range from the **DIGIT ZERO** character to the **DIGIT NINE** character.

7.5.2 It shall contain only the following characters, subject to clause 7.5.3:
HYPHEN-MINUS character
>   **FULL STOP** character
>   **LOW LINE** character
>   **TILDE** character
>   **DIGIT ZERO** to **DIGIT NINE**
>   **LATIN CAPITAL LETTER A** to **LATIN CAPITAL LETTER Z**
>   **LATIN SMALL LETTER A** to **LATIN SMALL LETTER Z**
>   **U000000A0** to **U0000DFFE**
>   **U0000F900** to **U0000FDCF**
>   **U0000FDF0** to **U0000FFEF**
>   **U00010000** to **U0001FFFD**
>   **U00020000** to **U0002FFFD**

```
U00030000  to  U0003FFFD
U00040000  to  U0004FFFD
U00050000  to  U0005FFFD
U00060000  to  U0006FFFD
U00070000  to  U0007FFFD
U00080000  to  U0008FFFD
U00090000  to  U0009FFFD
U000A0000  to  U000AFFFD
U000B0000  to  U000BFFFD
U000C0000  to  U000CFFFD
U000D0000  to  U000DFFFD
U000E1000  to  U000EFFFD
```

NOTE 1 – This allows all the characters that are not reserved in [11].

NOTE 2 – The forbidden characters arise from their use (or reservation) for special purposes in ISO/IEC 10646.

7.5.3 Characters within the above ranges that are identified by ISO/IEC 10646 as "(This position shall not be used)" are excluded from the range.

NOTE – Tool implementers should note that this designation may be removed in future versions of ISO/IEC 10646 and may choose to be tolerant of violations of this constraint.

7.5.4 A Unicode label shall not start or end with a **HYPHEN-MINUS** character, and shall not contain two **HYPHEN-MINUS** characters in the third and fourth character positions.

NOTE – This is to avoid ambiguity when Unicode labels are normalized (see clause 7.5.5).

7.5.5 Two Unicode labels are considered to be the same if, after normalization, their sequence of characters are equal. The normalization consists of a conversion to an A-label as specified in IETF RFC 5891, section 5.3.

7.6 Primary integer values for arcs (and the corresponding integer-valued Unicode label) are unbounded, except that:

a) the root arcs are restricted to three arcs with primary integer values **0** to **2**; and

b) the arcs beneath the root arcs **0** and **1** are restricted to forty arcs with primary integer values **0** to **39**.

NOTE – This enables optimized encodings to be used in which the primary integer values of the top-level arcs under root arcs **0** and **1**, and arcs **0** to **47** under root arc **2** encode in a single octet in an ASN.1 object identifier encoding [8].

7.7 An arc may (but need not) also have assigned to it zero or more secondary identifiers that are human-readable values but are not necessarily unambiguous. The secondary 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-MINUS** character, nor shall there be two consecutive **HYPHEN-MINUS** characters in the name (see Rec. ITU-T X.680 | ISO/IEC 8824-1).

NOTE 1 – This lexical constraint is inherited from the ASN.1 notation for object identifiers specified in Rec. ITU-T X.680 | ISO/IEC 8824-1.

NOTE 2 – It is recommended not to use the same secondary identifier for two different arcs beneath a given node.

7.8 From any given node, the primary integer value from that node is required to be distinct from all those assigned to other arcs from the same node, and all Unicode labels assigned to an arc (including long arcs) from that node are required to be distinct after normalization (see 7.5.5) from all those assigned to other arcs (including long arcs) from the same node.

NOTE 1 – In the case of the root arc with primary identifier 2, it is possible to allocate a long arc from the root to a node directly beneath arc 2. The above requirement for Unicode labels from a node to be unambiguous applies to these long arcs in addition to labels to nodes directly beneath the root.

NOTE 2 – There is no concept of style or font, which relates to display and printed representations. All that matters is the Unicode character code.

7.9 Each object to be identified is allocated precisely one node (normally, but not necessarily, a leaf), and no other object (of the same or a different type) is allocated to that same node. Thus, an object is uniquely and unambiguously identified by the sequence of primary integer values of the arcs in the path from the root to the node allocated to the object. It is also unambiguously (but not necessarily uniquely) identified by a sequence of Unicode labels (one for each arc) for the arcs in the path from the root to the node allocated to the object.

NOTE – The authorities allocating primary integer values (which define an integer-valued Unicode label), secondary identifiers, and additional secondary identifiers to the top-level arcs are identified in Annex A.

7.10 Arcs beneath the root arc with primary integer value 2 are allocated by joint agreement between ITU-T and ISO/IEC. The allocation of Unicode labels to root arcs is also determined by joint agreement between ITU-T and ISO/IEC.

NOTE – It is also possible for a long arc to be allocated which directly identifies a path consisting of two arcs from the root to an arc beneath the root arc that has a primary integer value 2 (Unicode label **"Joint-ISO-ITU-T"** – see A.7).

7.11 An ASN.1 OID value is semantically an ordered list of OID components. Starting with the root of the OID tree, each OID component identifies an arc in the tree using the primary integer value for that arc. The last OID component identifies an arc leading to a node to which the object has been assigned. It is this object that is identified by the ASN.1 **OBJECT IDENTIFIER** value.

NOTE – The Rec. ITU-T X.690-series | ISO/IEC 8825 multipart Standard [8] defines encodings of **OBJECT IDENTIFIER** values that can be used in computer communication.

7.12 An ASN.1 **OID-IRI** value is semantically an ordered list of OID-IRI components. Starting with the root of the OID tree, each OID-IRI component identifies an arc in the tree using one of the Unicode labels for that arc. The last OID-IRI component identifies an arc leading to a node to which the object has been assigned. It is this object that is identified by the **OID-IRI** value.

NOTE – The Rec. ITU-T X.690-series | ISO/IEC 8825 multipart Standard [8] defines encodings of **OID-IRI** values that can be used in computer communication.

7.13 The value notation for an ASN.1 **OBJECT IDENTIFIER** type can contain secondary identifiers but not Unicode labels. The value notation for an OID-IRI can contain only Unicode labels.

7.14 It is recommended that, whenever an ITU-T Recommendation, International Standard or other document assigns primary integer values, Unicode labels and/or secondary identifiers to identify objects, there should be an appendix or annex which summarizes the assignments made therein, using either or both of **OBJECT IDENTIFIER** or **OID-IRI** value notation, and recording all the variants of the names that can be used to identify that object (using some appropriate convention if there are many variants).

7.15 It is also recommended that an authority assigning an **OBJECT IDENTIFIER** value or an **OID-IRI** value to identify an object should also assign a value of the ASN.1 object descriptor type (see Rec. ITU-T X.680 | ISO/IEC 8824-1) to describe that object.

7.16 The ASN.1 value notation for an **OID-IRI** can be used outside of an ASN.1 module to identify an object. The ASN.1 value notation for an **OBJECT IDENTIFIER** can be used outside of an ASN.1 module to identify an object, provided it does not contain an ASN.1 value reference.

8 International Registration Authorities

NOTE – Although this clause applies only to International Registration Authorities defined by other ITU-T Recommendations and/or International Standards, other Registration Authorities may wish to implement similar rules for their operation. The concept of Sponsoring Authorities applies only in the case of an International Registration Authority.

8.1 Requirement for an International Registration Authority

The identification of, and formal agreement on the need for, an International Registration Authority is established in the ITU-T Recommendation and/or 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 ITU-T Recommendation and/or 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 (see http://www.iso.org/iso/standards_development/maintenance_agencies.htm).

8.2 Operation of International Registration Authorities

8.2.1 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 ITU-T Recommendation and/or International Standard.

8.2.2 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 8.3) proposals for register entries;

    b) to process proposals for entries according to the procedures specified in the applicable ITU-T Recommendation and/or International Standard;

    c) to record names for each register entry that is accepted, in accordance with the procedures specified in the applicable ITU-T Recommendation and/or International Standard;

d) to promulgate the register entries according to the procedures specified in the applicable ITU-T Recommendation and/or 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.

8.2.3 With regard to deletions from the register, the responsibilities of an International Registration Authority shall be as follows:

a) to receive proposals from Sponsoring Authorities (see 8.3);

b) to process the proposals for deletion, according to the procedures specified in the applicable ITU-T Recommendation and/or International Standard;

c) to promulgate the register deletions according to the procedures specified in the applicable ITU-T Recommendation and/or International Standard; and

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

NOTE – The name of a deleted object should not be reused.

8.3 Sponsoring Authorities

8.3.1 A Sponsoring Authority is an ITU-T study group, an ISO/IEC JTC 1 Sub-Committee, an ISO Technical Committee, an IEC Technical Committee, a national administration of an ITU Member State, an ISO Member Body or an IEC National Committee.

8.3.2 The responsibilities of a Sponsoring Authority shall be as follows:

a) to receive proposals concerning objects from within their respective countries or organization;

b) to effect any necessary rationalizations or coordination of these proposals and to forward them to the International Registration Authority; and

c) to make known within their respective countries or organizations the decisions taken on their proposals as transmitted to them by the International Registration Authority.

9 Contents of registration procedures for objects of a particular type

9.1 Registration procedures for objects of a particular type may be specified in a separate ITU-T Recommendation and/or International Standard. A clear distinction shall be made in these registration procedures between those procedures which apply in general to registration for the type of object, and those which apply to the specific International Registration Authority (if any) established by a given Recommendation and/or International Standard.

9.2 The contents of each ITU-T Recommendation and/or International Standard shall include:

a) the justification of the need for the registration;

b) a statement of the scope of objects to be registered;

c) references to the ITU-T Recommendation and/or International Standard in which the type of object is defined and to any other applicable ITU-T Recommendations and/or International Standards, together with identification of the ITU-T study group and/or ISO/IEC JTC 1 Sub-Committee responsible (or any other standardization body) for the definition of the type of object;

d) definitions and abbreviations used in the registration procedures;

e) a statement whether the registration requires a Registration Authority to perform a technical role;

f) a specification of the contents of register entries, including at least:

1) the types used for the specification of primary and secondary values, and the way they are combined;

2) the name of the organization that proposed the entry;

3) the dates of submission/registration;

4) the definition of the object (where the Registration Authority performs a technical role);

g) identification of those clauses of this Recommendation | International Standard which apply together with the specification of any necessary amendments to be applied to those clauses for the purposes of the specific registration;

h)   for an International Registration Authority, a complete specification of the procedures (manual or automated) to be applied to create, interrogate, modify, delete or audit registered items. This includes any access restrictions imposed on these operations. In particular, the following are specified:

1)   the method used to determine whether a request for registration or deletion should be accepted;

NOTE 1 – The following criteria for rejection of a proposal may be relevant:

i)   incomplete or incomprehensible definition;

ii)   existence of an identical or similar entry in the register;

iii)   the proposed entry is not one of the permitted entries;

iv)   the proposed entry does not conform to an ITU-T Recommendation and/or International Standard listed in the References of the appropriate ITU-T Recommendation and/or International Standard;

v)   the justification for inclusion in the register is not adequate.

2)   how rejections shall be resolved;

3)   whether modification of register entries or reuse of the names of register entries is allowed and (if so) a specification of mechanisms to allow this to happen; and

4)   the procedures to be applied to determine whether and how the register shall be updated to include relationships to further ITU-T Recommendations and/or International Standards;

i)   identification of any propagation/notification requirements associated with registered items;

NOTE 2 – For example, there should be a statement on whether the registered information is to be made available to users through an ITU-T Recommendation and/or International Standard or an international standardized profile (ISP), or by application to the International Registration Authority; and, in the case of application to the International Registration Authority, a description of the procedure to be followed by people or organizations which need to obtain registered information.

j)   examples of register entries (in one or more annexes to the ITU-T Recommendation and/or International Standard).

10   Progression of registration procedures for objects of a particular type

The registration procedures for objects of a particular type may be specified in a separate Recommendation | International Standard. The progression of such a Recommendation | International Standard follows the procedures defined below:

a)   identification and formal agreement that a new ITU-T Recommendation and/or International Standard is required, and identification and agreement on the requirements for registration shall be stated in any prospective ITU-T Recommendation and/or International Standard which gives rise to the need for registration.

NOTE 1 – An ITU-T Recommendation and/or International Standard is normally appropriate for any object where either:

1)   an explicit International Registration Authority is needed because of the expected frequency of new or amended registrations at the international level; or

2)   a number of ITU-T Recommendations and/or International Standards have identified the need for registration for a type of object, but, because of the complexity of the information necessary to define instances of the type, it is judged to be desirable to specify this information in a separate document; or

3)   registration procedures to be used by organizations requiring registration for their own purposes cannot be adequately described by a reference only to this Recommendation | International Standard from another ITU-T Recommendation and/or International Standard.

b)   assignment of the development of a new ITU-T Recommendation and/or International Standard to a specific ITU-T study group and/or Working Group of an ISO/IEC JTC 1 Sub-Committee;

c)   generation and approval of a New Work Item proposal using normal ISO/IEC JTC 1 procedures, or, if necessary, the generation and approval of a new Question using normal ITU-T procedures;

d)   progression of the ITU-T Recommendation and/or International Standard to become an ITU-T Recommendation and/or International Standard according to normal procedures.

NOTE 2 – Where an International Registration Authority is necessary for the operation of a base ITU-T Recommendation and/or International Standard, the base ITU-T Recommendation and/or International Standard normally receives final approval only when the relevant ITU-T Recommendation and/or International Standard specifying the procedures for the registration authority is at least a consented (or determined) ITU-T Recommendation and/or at the Draft International Standard ballot stage, and an organization has been nominated to act as the Registration Authority. Where an International Registration Authority is not necessary, this constraint does not apply.

NOTE 3 – The criteria to be applied in the choice of a body which is proposed for an International Registration Authority are determined by ITU-T and/or ISO/IEC JTC 1, as appropriate. The proposal of an organization to ITU-T and/or ISO/IEC JTC 1 to act as an International Registration Authority requires at the same time the provision by the submitter of the proposal of an estimate of the activity expected at the international level (e.g., volume of requests for registration per year).

NOTE 4 – In cases where modification of the operation of a Registration Authority requires modification to an ITU-T Recommendation and/or International Standard, this modification must follow normal procedures for changing ITU-T Recommendations and/or International Standards.

11   Recommended fee structure

11.1   An organization providing an RA in accordance with this Recommendation | International Standard should do so on a cost-recovery basis. The fee structure should be designed to recover the expenses of operating the RA, to cover web publication of registrations (which is strongly encouraged), to support enquiry requests, and to discourage frivolous and multiple requests.

11.2   The fee values should be determined by the RA, subject to the approval of any superior RA. Fees can apply to:

    a)   registration;

    b)   inquiry request;

    c)   request for update.

11.3   For an RA operating internationally, fees should be independent, subject to the exchange rate fluctuations of the country that the application is made from.

11.4   Once the fee associated with making an initial register entry has been charged, there should be no further charges for the maintenance of that entry or its web publication.

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Annex A

Top-level arcs of the OID tree

(This annex forms an integral part of this Recommendation | International Standard.)

</div>

A.1   General

A.1.1   This annex specifies all the root arcs and some of the top-level arcs of the OID tree. Other top-level arcs are specified by other ITU-T Recommendations in the Rec. ITU-T X.660-series | parts of ISO/IEC 9834 that are referenced by this annex.

A.1.2   This annex also specifies the assignment of Unicode labels (by joint ITU-T | ISO/IEC agreement) to long arcs from the root that directly identifies any node immediately beneath the node from the root arc that has a primary integer value 2 (Unicode label **"Joint-ISO-ITU-T"** – see A.7 and A.8).

> NOTE – Currently, this is the only permitted use of long arcs.

A.2   Assignment of primary integer values, Unicode labels and secondary identifiers to root arcs

A.2.1   This clause specifies the three root arcs of the OID tree, and assigns primary integer values, Unicode labels and secondary identifiers to them. Additional Unicode labels and secondary identifiers are assigned in accordance with A.6 and published in accordance with A.8.

A.2.2   There are (only) three root arcs. The assignment of primary integer values, Unicode labels, secondary identifiers, and the authority for subordinate arcs, is as follows:

Primary integer value	Resulting integer-valued Unicode label	(Non-integer) Unicode label	Secondary identifier(s)	Authority for subordinate arcs
0	**"0"**	**"ITU-T"**	**itu-t** (**ccitt** – see A.2.4)	Administered by ITU-T (see A.3)
1	**"1"**	**"ISO"**	iso	Administered by ISO (see A.4)
2	**"2"**	**"Joint-ISO-ITU-T"**	**joint-iso-itu-t** (**joint-iso-ccitt** – see A.2.4)	Jointly-administered by ISO and ITU-T (see A.5)

> NOTE – The ASN.1 encoding of **OBJECT IDENTIFIER** values specified in Rec. ITU-T X.680 | ISO/IEC 8824-1 requires that there be only three arcs allocated from the root node (with primary integer values of **0**, **1**, and **2**), and at most forty arcs from the first two of these arcs (with primary integer values of **0** to **39**).

A.2.3   The secondary identifiers **itu-t**, **iso** and **joint-iso-itu-t**, assigned above, may each be used without their associated primary integer value as a "NameForm" of an ASN.1 **OBJECT IDENTIFIER** value (see Rec. ITU-T X.680 | ISO/IEC 8824-1) and identify the corresponding primary integer value.

> NOTE – The use of the "NameAndNumberForm" of an ASN.1 **OBJECT IDENTIFIER** value (see Rec. ITU-T X.680 | ISO/IEC 8824-1, 32.3) in new specifications for these and for subordinate arcs is nonetheless recommended where additional secondary identifiers (see A.6) have already been assigned to the arc.

A.2.4   For historical reasons, the secondary identifiers **ccitt** and **joint-iso-ccitt** are synonyms for **itu-t** and **joint-iso-itu-t**, respectively, and thus may appear in ASN.1 **OBJECT IDENTIFIER** values, and also identify the corresponding primary integer value.

> NOTE – These names are not assigned as Unicode labels, as the international object identifier concept post-dates the change of name from CCITT to ITU-T.

A.3   Assignment of primary integer values, Unicode labels and secondary identifiers to arcs administered by ITU-T

A.3.1   Arcs beneath the root arc with the primary integer value **0** (Unicode label **"ITU-T"** and secondary identifier **itu-t**) are administered by the ITU-T. All decisions related to these arcs will be recorded as amendments to this Recommendation | International Standard, but such changes to the joint text will be regarded as editorial changes by ISO/IEC.

NOTE – The assignment of additional secondary identifiers or additional Unicode labels to the root arc with the primary integer value **0** (Unicode label **"ITU-T"** and secondary identifier **itu-t;** see A.6) requires joint agreement between the relevant ITU-T study group and the relevant ISO/IEC JTC 1 Sub-Committee, as there is a requirement that all secondary identifiers and all Unicode labels are distinct across all three root arcs.

A.3.2   Six arcs are specified from the node with the primary integer value **0** (Unicode label **"ITU-T"** and secondary identifier **itu-t)**. The assignment of primary integer values, Unicode labels and secondary identifiers, and the authority for subordinate arcs, is as follows:

Primary integer value	Resulting integer-valued Unicode label	(Non-integer) Unicode label	Secondary identifier	Authority for subordinate arcs
0	**"0"**	**"Recommendation"**	**recommendation**	See A.3.3
1	**"1"**	(see A.3.4)	**question**	See A.3.4
2	**"2"**	**"Administration"**	**administration**	See A.3.5
3	**"3"**	**"Network-Operator"**	**network-operator**	See A.3.6
4	**"4"**	**"Identified-Organization"**	**identified-organization**	See A.3.7
5	**"5"**	**"R-Recommendation"**	**r-recommendation**	See A.3.8
9	**"9"**	**"Data"**	**data**	See A.3.9

The first five secondary identifiers (for arcs with primary integer values **0** to **4**) may be used without their primary integer value in an ASN.1 object identifier "NameForm" (see Rec. ITU-T X.680 | ISO/IEC 8824-1, 32.3) and identify the corresponding primary integer values. The secondary identifiers **r-recommendation** and **data** shall not be used in an ASN.1 object identifier "NameForm", but the corresponding Unicode label can (of course) be used in the value notation for an ASN.1 **OID-IRI**.

NOTE – The restriction on the use of **r-recommendation** and **data** is because only secondary identifiers that were present in the initial version of this Recommendation | International Standard can be used in an ASN.1 object identifier "NameForm", in order to avoid backward compatibility problems for related software.

A.3.3   The arcs below **"Recommendation"** are specified in A.3.3.1 to A.3.3.5.

A.3.3.1   The arcs below the arc with the primary integer value **0** (Unicode label **"Recommendation"** and secondary identifier **recommendation)** have the primary integer values of **1** to **26** (and hence the integer-valued Unicode labels of **"1"** to **"26")** and also have (non-integer) Unicode labels of **"A"** to **"Z"** and secondary identifiers of **a** to **z**. The secondary identifiers **a** to **z** may be used in a "NameForm", and identify the corresponding primary integer value.

A.3.3.2   Arcs below each of the arcs specified in A.3.3.1 have primary integer values (and hence integer-valued Unicode labels) that are the numbers of the ITU-T (and CCITT) Recommendations in the series identified by the letter.

A.3.3.3   The editor of the identified Recommendation may, subject to the approval of the ITU-T study group responsible for development or maintenance of that Recommendation, determine the addition of one or more Unicode labels to the arc that identifies the Recommendation. These Unicode labels shall consist of the number of the Recommendation followed by any string of Unicode characters chosen by the editor that does not start with a digit, and such that the result forms a valid Unicode label for that arc. This is called an acronym for the Recommendation, and shall be chosen by the editor and approved by the study group. Such allocations shall be published in the applicable Recommendation.

NOTE – Best efforts should be used to ensure that a chosen acronym is not used for other ITU-T Recommendations or International Standards. The OID repository, currently at http://www.oid-info.com, can assist in this task.

A.3.3.4   Secondary identifiers for the arcs specified in A.3.3.2 are not assigned in this Recommendation | International Standard, but authority is given for the Recommendation identified by these arcs to contain text that allocates one or more secondary identifiers to the arc identifying it (see A.3.3.3). Such allocations shall be published in the applicable Recommendation.

A.3.3.5   Arcs below the arcs specified in A.3.3.2 are determined as necessary by the corresponding ITU-T (or CCITT) Recommendation.

A.3.4   Arcs below the arc with the primary integer value **1** (secondary identifier **question**) have primary integer values corresponding to ITU-T study groups, qualified by the study period. The value is computed by the formula:

$$\text{Study Group number} + (\text{Study Period} * 32)$$

where "Study Period" has the value 0 for 1984-1988, 1 for 1988-1992, etc., and the multiplier is 32 decimal. The arcs below each study group have primary integer values corresponding to the Questions assigned to that study group. Arcs

below this are determined as necessary by the group (e.g., Working Party or special Rapporteur group) assigned to study the question.

NOTE – The arcs beneath the arc with the primary integer value **1** have never been used and are of historical interest only. A non-integer Unicode label has not been assigned to these arcs.

A.3.5   Arcs below the arc with the primary integer value **2** (Unicode label **"Administration"** and secondary identifier **administration**) have primary integer values (and hence integer-valued Unicode labels) that are the values of data country codes (DCCs) as defined in Rec. ITU-T X.121. Arcs below this are determined as necessary by the national administration of the country identified by the DCC. These arcs have a non-integer Unicode label and a secondary identifier, both consisting of the two-letter alpha-2 code element (see ISO 3166-1) for the corresponding country.

A.3.6   Arcs below the arc with the primary integer value **3** (Unicode label **"Network-Operator"** and secondary identifier **network-operator**) have primary integer values (and hence integer-valued Unicode labels) that are the values of data network identification codes (DNICs) as defined in Rec. ITU-T X.121. Arcs below this are determined as necessary by the national Administration or ROA identified by the DNIC. These arcs have no non-integer Unicode labels and no secondary identifiers assigned by default.

A.3.7   Arcs below the arc with the primary integer value **4** (Unicode label **"Identified-Organization"** and secondary identifier **identified-organization**) are assigned primary integer values (and hence integer-valued Unicode labels), non-integer Unicode labels, and secondary identifiers by the ITU-T TSB in accordance with the registration and publication procedures specified in Rec. ITU-T X.669. Arcs below this are determined as necessary by the identified organization.

NOTE – Organizations which may find this arc useful include:

–   recognized operating agencies not operating a public data network;

–   scientific and industrial organizations;

–   regional standards organizations; and

–   multinational organizations.

A.3.8   Arcs below the arc with the primary integer value **5** (Unicode label **"R-Recommendation"** and secondary identifier **r-recommendation**) are determined by ITU-R in accordance with the procedures defined by ITU-R.

NOTE – An additional Unicode label of "**ITU-R**", and an additional secondary identifier, of **itu-r** have been allocated to the root arc with the primary integer value **0** (Unicode label **"ITU-T"** and secondary identifier **itu-t**, see A.2.2), for use with the **r-recommendation** arc. This allows ASN.1 **OBJECT IDENTIFIER** values such as **{itu-r(0) r-recommendation(5) ...}** and ASN.1 **OID-IRI** values such as **"/ITU-R/R-Recommendation/..."**.

A.3.9   No other arcs are assigned below the arc with the primary integer value **9** (Unicode label **"Data"** and secondary identifier **data**) except **{itu-t(0) data(9) pss(2342) ucl(19200300)}** which is used in conjunction with "The COSINE and Internet X.500 Schema" [10].

A.4   Assignment of primary integer values, Unicode labels and secondary identifiers to arcs administered by ISO

A.4.1   Arcs beneath the root arc with the primary integer value **1** (Unicode label **"ISO"** and secondary identifier **iso**) are administered by the ISO. All decisions related to these arcs will be recorded as amendments to this Recommendation | International Standard, but such changes to the joint text will be regarded as editorial changes by ITU-T.

NOTE – The assignment of additional secondary identifiers or additional Unicode labels to the root arc with the primary integer value **1** (Unicode label "**ISO**" and secondary identifier **iso**) requires joint agreement between ITU-T and ISO/IEC, as there is a requirement that all secondary identifiers and all Unicode labels are distinct across all arcs from the root.

A.4.2   Four arcs are specified from the node with the primary integer value **1** (Unicode label **"ISO"** and secondary identifier **iso**). The assignment of primary integer values, Unicode labels and secondary identifiers, and the authority for subordinate arcs, is as follows:

Primary integer value	Resulting integer-valued Unicode label	(Non-integer) Unicode label	Secondary identifier	Authority for subordinate arcs
0	**"0"**	**"Standard"**	**standard**	See A.4.3
1	**"1"**	**"Registration-Authority"**	**registration-authority**	See A.4.5
2	**"2"**	**"Member-Body"**	**member-body**	See A.4.6
3	**"3"**	**"Identified-Organization"**	**identified-organization**	See A.4.7

These secondary identifiers may be used without their primary integer value in an ASN.1 object identifier "NameForm" (see Rec. ITU-T X.680 | ISO/IEC 8824-1, 32.3) and identify the corresponding primary integer values.

A.4.3   Arcs below the arc with the primary integer value **0** (Unicode label **"Standard"** and secondary identifier **standard**) have primary integer values (and hence integer-valued Unicode labels) that are the number of an International Standard published by ISO or IEC (see A.4.4 for non-integer Unicode labels). Where the International Standard is multipart, there shall be an additional arc for the part number, unless this is specifically excluded in the text of the International Standard. Arcs below this are determined as necessary by the corresponding International Standard.

NOTE – If a non-multipart International Standard allocates subordinate arcs, and subsequently becomes a multipart International Standard, it shall continue to allocate subordinate arcs as if it were a single part International Standard.

A.4.4   The editor of the identified International Standard may, subject to agreement with the ISO Committee or Sub-Committee responsible for the development or maintenance of that International Standard, determine the addition of one or more Unicode labels to the arc that identifies the International Standard. These Unicode labels shall consist of the number of the International Standard followed by any string of Unicode characters chosen by the editor that does not start with a digit, and such that the result forms a valid Unicode label for that arc. This is called an acronym for the International Standard, and shall be chosen by the editor and approved by the Committee or Sub-Committee. Such allocations shall be published in the applicable International Standard.

NOTE – Best efforts should be used to ensure that the chosen acronym is not used for other International Standards or ITU-T Recommendations. The OID repository at http://www.oid-info.com can assist in this task.

EXAMPLE 1: The "FTAM PCI" abstract-syntax information object, defined in ISO 8571-1 [12], has been assigned the ASN.1 **OBJECT IDENTIFIER** value:
```
{iso(1) standard(0) ftam(8571) abstract-syntax(2) pci(1)}
```

EXAMPLE 2: A future revision of ISO 8571-1 [12] could also assign (with the agreement of the ISO/IEC JTC 1 Sub-Committee responsible for the maintenance of ISO 8571-1) the following value of the ASN.1 **OID-IRI** type:
"/ISO/Standard/8571_FTAM/Abstract-Syntax/PCI"

A.4.5   Arcs below the arc with the primary integer value **1** (Unicode label **"Registration-Authority"** and secondary identifier **registration-authority**) are determined by those International Standards that, in one or more of their parts, specify the procedures for the operation of a Registration Authority. Arc numbers with primary integer values from **1** to **10** (and hence integer-valued Unicode labels **"1"** to **"10"**) are reserved to identify a part of the ISO/IEC 9834 multipart Standard, and the primary integer value is the number of that part. For other International Standards, the primary integer value is the number of the International Standard. In all cases, the identified International Standard or part of the ISO/IEC 9834 multipart Standard allocates subsequent arcs.

A.4.6   Arcs below the arc with the primary integer value **2** (Unicode label **"Member-Body"** and secondary identifier **member-body**) are assigned the primary integer value (and hence integer-valued Unicode labels) of a numeric country code (without the leading zeros), as specified in the column labelled "Numeric code" in the table in ISO 3166-1, that identifies the ISO Member Body in that country. Each arc for a country is also assigned by default non-integer Unicode labels which are the corresponding two-letter alpha-2 code element (in capitals) in the column labelled "Alpha-2 code" in the table in ISO 3166-1. The "NameForm" of an ASN.1 object identifier component is not permitted for these arcs. Arcs below the "country code" are allocated by the identified ISO Member Body. The assignment of registration responsibilities within a country is a national decision but the ISO Member Body should inform ISO/IEC JTC 1/SC 6 of its decision by sending a letter indicating which organization in the country has been assigned those responsibilities.

NOTE – The existence of a country code in ISO 3166 (see http://www.iso.org/iso/country_codes.htm) does not necessarily imply that there is an ISO Member Body representing that country (see http://www.iso.org/iso/about/iso_members.htm) or that the ISO Member Body for that country administers a scheme for the allocation of subordinate arcs. ISO 3166-3 identifies historical numeric-2 codes that can still appear in old OIDs.

A.4.7   Arcs below the arc with the primary integer value **3** (Unicode label **"Identified-Organization"** and secondary identifier **identified-organization**) have primary integer values (and hence integer-valued Unicode labels) that are the values of an international code designator (ICD) allocated by the Registration Authority for ISO/IEC 6523-2 that identifies an issuing organization specifically registered by that authority as allocating international object identifier components (see Notes 1 and 2). The arcs immediately below the ICD have primary integer values (and hence integer-valued Unicode labels) that are the values of an "organization code" allocated by the issuing organization in accordance with ISO/IEC 6523-2. They have no non-integer Unicode labels associated by default, but secondary identifiers and Unicode labels for arcs beneath the ICD can be assigned by the identified organization.

NOTE 1 – The requirement that issuing organizations are recorded by the Registration Authority for ISO/IEC 6523 as allocating international object identifier components ensures that only numerical values in accordance with this International Standard are allocated.

NOTE 2 – The declaration to the Registration Authority for ISO/IEC 6523 that an issuing organization allocates international object identifier components does not preclude the use of the ICD code for the allocation of Unicode labels. This is to avoid the

need to modify the registration with the Registration Authority for ISO/IEC 6523 when Unicode labels are, in addition, to be allocated.

A.5 Assignment of OID components jointly administered by ISO and ITU-T

A.5.1 The allocation of arcs under the jointly-administered root arc with the primary integer value **2** (Unicode label **"Joint-ISO-ITU-T"** and secondary identifier **joint-iso-itu-t**) is determined by resolution of the relevant ITU-T study group and of the relevant ISO/IEC JTC 1 Sub-Committee.

NOTE – The jointly agreed assignment of one or more arcs, and the responsibility for the nodes beneath those arcs to an organization may result in joint agreement on the allocation of additional Unicode labels or additional secondary identifiers for the top-level arc with the primary integer value **2** (Unicode label **"Joint-ISO-ITU-T"** and secondary identifier **joint-iso-itu-t**). Such additional Unicode labels and secondary identifiers are allocated in accordance with A.6 and A.7.

A.5.2 Arcs under the jointly-administered root arc with the primary integer value **2** (Unicode label **"Joint-ISO-ITU-T"** and secondary identifier **joint-iso-itu-t**) have values that are assigned and agreed from time to time by a simple Resolution of the relevant ITU-T study group and the relevant ISO/IEC JTC 1 Sub-Committee, and are recorded and published in accordance with A.8 in the *Register of arcs beneath the root arc with primary integer value 2*. These allocations can provide an OID namespace to other international standards organizations, to areas of joint work, or to other bodies requiring object identifiers or OID-internationalized resource identifiers. For details of the information content of the registration entries and the application and approval process, see Rec. ITU-T X.662 | ISO/IEC 9834-3.

NOTE – Unicode labels (long arcs) can also be allocated that directly identify these nodes from the root node – see A.7.

A.5.3 Arcs beneath each arc allocated by A.5.1 shall be allocated in accordance with the mechanisms established when the arc is allocated.

NOTE – It is expected that this will involve delegation of authority to the joint agreement of ITU-T Rapporteurs and ISO Conveners (advised by the respective Editors) for a joint area of work, or to an international organization.

A.5.4 An arc beneath **joint-iso-itu-t** has been allocated to the area of joint work on registration procedures by ITU-T and ISO/IEC, with a primary integer value of **17** and a non-integer Unicode label of **"Registration_Procedures"** and a secondary identifier of **registration-procedures**. Arcs are assigned beneath this to ITU-T Recommendations and/or International Standards concerned with ITU-T and/or ISO/IEC registration procedures. Where an ITU-T Recommendation and/or International Standard specifies the operation of an International Registration Authority it will, in general, assign the use of the arcs for which it is responsible to that authority. The assignment of primary integer values and secondary identifiers, and the authority for subordinate arcs, is as follows (no non-integer Unicode labels are assigned to those arcs):

Primary integer value	Resulting integer-valued Unicode label	Secondary identifier	Authority for subordinate arcs
1	"1"	module	Rec. ITU-T X.660 | ISO/IEC 9834-1 supplemented by Rec. ITU-T X.520 | ISO/IEC 9594-6
2	"2"	document-types	ISO/IEC 9834-2
3	"3"	asn-1	Rec. ITU-T X.666 | ISO/IEC 9834-7
4	"4"		Reserved
5	"5"	international-md	Rec. ITU-T X.666 | ISO/IEC 9834-7
6	"6"	international-organization	Rec. ITU-T X.666 | ISO/IEC 9834-7

A.5.5 The area of joint registration within a country has been assigned (as specified in Rec. ITU-T X.662 | ISO/IEC 9834-3) an arc which produces the ASN.1 **OBJECT IDENTIFIER** value:

{joint-iso-itu-t(2) country(16)}

and the corresponding **OID-IRI** value:

"/Joint-ISO-ITU-T/Country"

The primary integer values (and hence the integer-valued Unicode labels) assigned to arcs under this object-identifier are the values of the numeric-3 codes of ISO 3166-1 (without leading zeros), and non-integer Unicode labels and secondary identifiers are assigned that are the (two-letter) alpha-2 code elements of ISO 3166-1 in capitals. The nodes identified by these arcs may be used to assign subordinate arcs (and hence **OBJECT IDENTIFIER** and **OID-IRI** values) within a country. The administration of nodes identified by these arcs is not prescribed by Rec. ITU-T X.662 | ISO/IEC 9834-3, but it is recommended that a single national Registration Authority be determined by the joint decision of the country's ITU Member State and the ISO Member Body (and, if necessary, the IEC National Committee for the country). The assignment of registration responsibilities within a country is a national decision but the ITU Member

State and the ISO Member Body should inform the relevant ITU-T study group (Study Group 17 at the time of publication of this Recommendation) and ISO/IEC JTC 1/SC 6 of their decision by sending a jointly signed letter indicating which organization in the country has been assigned those responsibilities.

NOTE – The existence of a country code in ISO 3166 (see http://www.iso.org/iso/country_codes.htm) does not necessarily imply that there is an ISO Member Body representing that country (see http://www.iso.org/iso/about/iso_members.htm), nor does it imply that the ISO Member Body for that country or the administration representing that country in ITU (see http://www.itu.int/GlobalDirectory/search.html) administer a scheme for the allocation of subordinate arcs. ISO 3166-3 identifies historical numeric-2 codes that can still appear in old OIDs.

A.6   Assignment of additional Unicode labels and secondary identifiers to the root arcs

A.6.1   Assignment of additional Unicode labels and secondary identifiers to the root arcs shall be made from time-to-time (only) by Resolutions of the relevant ITU-T study group and of the relevant ISO/IEC JTC 1 Sub-Committee, in accordance with the following subclauses.

NOTE 1 – It will be normal to assign such additional Unicode labels and secondary identifiers when an international organization is given responsibility for one or more nodes beneath the root arc with the primary integer value **2** (Unicode label **"Joint-ISO-ITU-T"** and secondary identifier **joint-iso-itu-t**), but this is not a requirement. Assignment of additional Unicode labels and secondary identifiers to root arcs with the primary integer values **0** or **1** (Unicode labels **"ITU-T"**, **"ISO"** and secondary identifiers **itu-t** and **iso**) are expected to be rare, and to reflect the need for additional names to correctly reflect the organizations responsible for some lower-level arcs, or the needs of changing organization names.

NOTE 2 – Examples of where the assignment of additional Unicode labels and secondary identifiers for these arcs might be appropriate would be the sharing of a number-space for lower-level arcs between, for example, ISO and IEC standards.

A.6.2   Additional secondary identifiers shall not be used in an ASN.1 object identifier "NameForm" (see Rec. ITU-T X.680 | ISO/IEC 8824-1, 32.3), nor shall an ASN.1 object identifier "NameForm" be used in the specification of any subordinate arcs if these additional secondary identifiers are used.

NOTE 1 – This condition is imposed to avoid the need for frequent updates to software that needs to know the primary integer value, for example, for inclusion in an encoding of the ASN.1 object identifier.

NOTE 2 – Most top-level arcs have additional Unicode labels corresponding to currently defined secondary identifiers. The use of these in ASN.1 **OID-IRI** values is, of course, allowed. Software that does not recognize a Unicode label (which may be an additional Unicode label added after the software was written) in an **OID-IRI** should normally give a warning error message, and take appropriate action, depending on the context.

A.6.3   Assignment of additional Unicode labels and secondary identifiers shall require a resolution for the addition of the following register entry to the *Register of additional Unicode labels and secondary identifiers for root arcs* and shall be recorded and published in accordance with A.8.

(1)	The root arc with primary integer value (and Unicode label) **0** (**"ITU-T"**), **1** (**"ISO"**) or **2** (**"Joint-ISO-ITU-T"**) to which the additional Unicode label or secondary identifier is to be assigned. Example: **0** (**"ITU-T"**)	(2a)	The additional Unicode label (if any) that is to be assigned to that root arc. Example: **"Org-X"**
		(2b)	The additional secondary identifier (if any) that is to be assigned to that root arc. Example: **org-x** NOTE – It is expected to be normal for the same additional names to be added as both an additional Unicode label and as an additional secondary identifier, but this is not required.
(3)	Contact (officer) of the international organization identified. Example: **Standards liaison officer**.	(4)	Conditions for use of the additional Unicode label and/or secondary identifier (see the Notes below).

NOTE 1 – It is expected that the relevant ITU-T study group and the relevant ISO/IEC JTC 1 Sub-Committee will ensure that all Unicode labels and secondary identifiers allocated under this subclause and under A.7.2 are unique across all arcs from the root (this is required for Unicode labels).

NOTE 2 – The conditions for use of the additional Unicode labels and secondary identifiers are expected to relate to arcs in which specified lower-level arcs are included (see A.3.8).

EXAMPLE: An additional Unicode label "**ITU-R**" and secondary identifier **itu-r** is permitted for the root arc with the primary integer value **0** (Unicode label "**ITU-T**" and secondary identifier **itu-t**) if and only if the object being identified has an ASN.1 **OBJECT IDENTIFIER** value that begins with **{0 5 x}**, where **x** is a primary integer value assigned to a series of ITU-R Recommendations (see A.3.8). This permits ASN.1 **OBJECT IDENTIFIER** value notations of:

```
{itu-r(0) r-recommendation(5) br(101) ...}
```

and **OID-IRI** value notations of:

```
"/ITU-R/R-Recommendation/BR/..."
```

EXAMPLE: An **"IEC"** additional Unicode label and secondary identifier might be permitted for the top-level arc with primary integer value **1** if and only if the object identified has an ASN.1 **OBJECT IDENTIFIER** value that begins with **{1 0 x}**, where **x** is the number of an IEC Standard and not an ISO Standard. This would permit values of the ASN.1 **OBJECT IDENTIFIER** type of:

        {iec(1) standard(0) 2579 ... }

and values of the ASN.1 **OID-IRI** type of:

        "/IEC/Standard/2579/..."

EXAMPLE: An additional Unicode label **"Org-X"** and secondary identifier **org-x** might be permitted for the root arc with the primary integer value **2** (Unicode label "**Joint-ISO-ITU-T**" and secondary identifier **joint-iso-itu-t**) if and only if the object identified has an ASN.1 **OBJECT IDENTIFIER** value that begins with **{2 x}**, where **x** is a primary integer value on an arc identifying organization ORG-X. Assuming that the registration in accordance with Rec. ITU-T X.662 | ISO/IEC 9834-3 had assigned the additional Unicode label "**Tech-com**" and secondary identifier **tech-com**, this would permit ASN.1 **OBJECT IDENTIFIER** value notations of (for example):

        {org-x(2) tech-com(x) web-services(0) ... }

and ASN.1 **OID-IRI** value notations of (for example):

        "/Org-X/Tech-com/Web-services/..."

> NOTE 3 – These examples do not imply that the additional Unicode labels and secondary identifiers have been assigned. They are for illustration only.

A.6.4   Approval of additional Unicode labels and secondary identifiers for the root arcs with the primary integer values **0**, **1**, and **2** (Unicode labels "**ITU-T**", "**ISO**" and "**Joint-ISO-ITU-T**", and secondary identifiers **itu-t**, **iso** and **joint-iso-itu-t**) shall be made as follows:

   a) determination in ITU-T that a register entry be added for the root arc with the primary integer value **0** (Unicode label "**ITU-T**" and secondary identifier **itu-t**) in accordance with A.6.3, with approval in ISO for the assignment of the additional Unicode label and/or secondary identifier (by simple resolution of the relevant ISO/IEC JTC 1 Sub-Committee); or

   b) determination in ISO that a register entry be added for the root arc with the primary integer value **1** (Unicode label "**ISO**" and secondary identifier **iso**) in accordance with A.6.3, with approval in ITU-T for the assignment of the additional Unicode label and/or secondary identifier (by simple resolution of the relevant ITU-T study group); or

   c) determination as part of (or following) the allocation of one or more arcs to an international organization that an additional Unicode label and/or secondary identifier be assigned to the root arc with the primary integer value **2** (Unicode label "**Joint-ISO-ITU-T**" and secondary identifier **joint-iso-itu-t**) (by simple resolution of both the relevant ITU-T study group and the relevant ISO/IEC JTC 1 Sub-Committee after discussion and agreement in the Collaborative Team for object identifiers).

A.7   Assignment of additional Unicode labels from the root to lower-level arcs (long arcs)

A.7.1   Assignment of additional Unicode labels from the root that identifies directly nodes beneath the node identified by the root arc with primary integer value **2** (Unicode label "**Joint-ISO-ITU-T**" and secondary identifier **joint-iso-itu-t**) shall be made from time-to-time (only) by resolutions of the relevant ITU-T study group and the relevant ISO/IEC JTC 1 Sub-Committee, in accordance with the following subclauses.

> NOTE – It will be normal to assign such additional Unicode labels and secondary identifiers when it is appropriate to provide an **OID-IRI** that directly identifies the joint work or international body or other organization without the use of the Unicode label "**Joint-ISO-ITU-T**".

A.7.2   Assignment of these Unicode labels shall require a resolution for the addition of the following register entry to the *Register of Unicode labels from the root to nodes beneath the root arc with integer value 2* and shall be recorded and published in accordance with A.8:

(1)   The node that the additional Unicode label or secondary identifier is to be assigned, using either ASN.1 **OBJECT IDENTIFIER** or ASN.1 **OID-IRI** notation.
 	
Example: **{2 41}**
 	
        or
 	
  "/Joint-ISO-ITU-T/BIP"
	(2) The additional Unicode label (if any) that is to be assigned from the root to that node.
	Example: **"BIP"**

NOTE – It is expected that the ITU-T study group and the ISO/IEC JTC 1 Sub-Committee will ensure that all Unicode labels allocated under this clause and under A.6.3 are unique across all arcs from the root.

A.7.3 Approval of additional Unicode labels from the root under this clause shall be made as follows:

   a) determination in ITU-T that a register entry be added, with approval in ISO for the assignment of the additional Unicode label (by simple resolution of the relevant ISO/IEC JTC 1 Sub-Committee); or

   b) determination in ISO/IEC that a register entry be added, with approval in ITU-T for the assignment of the additional Unicode label (by simple resolution of the relevant ITU-T study group).

A.8 Publication of register entries requiring joint ITU-T and ISO approval

A.8.1 General

A.8.1.1 Specification of many top-level arcs and their properties (primary integer identifier, Unicode labels, secondary identifiers) are statically determined by this Recommendation | International Standard and the ITU-T Recommendations and/or International Standards that it references.

A.8.1.2 Allocation of arcs at lower levels is the responsibility of a hierarchy of RAs, each of which determines independently whether to publish allocations, and if so how and to what community of interest.

NOTE – All RAs are encouraged to provide information about registrations using the OID repository at http://www.oid-info.com.

A.8.1.3 Other top-level arcs and additional associated information for top-level arcs are determined from time-to-time by simple resolutions of both the relevant ITU-T study group and the relevant ISO/IEC JTC 1 Sub-Committee. These are:

   a) the assignment of arcs (and their properties) beneath the root arc with primary integer value **2** (see A.5);

   b) the assignment of additional secondary identifiers and non-integer Unicode labels to the root arcs, including the root arc with primary integer value **2** (see A.6);

   c) the assignment of Unicode labels for long arcs (see A.7).

These are called "jointly administered registers".

A.8.1.4 Jointly administered registers (see A.8.3) are maintained on a website provided by the relevant ITU-T study group, and are updated by the Joint ITU-T | ISO/IEC JTC 1 Collaborative Team for object identifiers when there are changes to the register entries.

NOTE – At the time of publication of this Recommendation | International Standard, the jointly administered registers were available from http://www.itu.int/ITU-T/studygroups/com17/. The OID repository http://www.oid-info.com is also updated as necessary.

A.8.2 Application for an entry to a jointly administered register

A.8.2.1 Such applications shall be submitted to either the relevant ITU-T study group (via ITU-T TSB) or to the relevant ISO/IEC JTC 1 Sub-Committee (via the Sub-Committee Secretariat), or both, with the information specified in A.8.3.

A.8.2.2 It is expected that such applications will be initially discussed at the next meeting of the Joint ITU-T | ISO/IEC JTC 1 Collaborative Team for object identifiers, and progressed to the appropriate Resolutions in a timely manner.

A.8.2.3 Following approval, publication of additional top-level arcs and additional properties shall be via a web page (see A.8.1.4).

A.8.2.4 There is no fee for this activity.

A.8.3 Information to be recorded on the web page for the jointly administered registers

A.8.3.1 *Register of additional Unicode labels and secondary identifiers for root arcs*: See A.6.3 for the information to be recorded for each entry.

A.8.3.2 *Register of arcs beneath the root arc with primary integer value 2*: See Rec. ITU-T X.662 | ISO/IEC 9834-3 for the information to be recorded for each entry.

A.8.3.3 *Register of Unicode labels from the root to nodes beneath the root arc with integer value 2*: See A.7.2 for the information to be recorded for each entry.

Annex B

References to this Recommendation | International Standard

(This annex does not form an integral part of this Recommendation | International Standard.)

B.1   Where an ITU-T Recommendation and/or International Standard defines types of objects for which unambiguous identification of instances of the type are required, then it establishes a requirement for registration.

B.2   The writers of the ITU-T Recommendation and/or International Standard determine, for each such name, the appropriate forms of registration. There are four main options which arise:

    a)   registration in the ITU-T Recommendation and/or International Standard which defines the type of object;

    b)   registration in ITU-T Recommendations and/or International Standards referencing the ITU-T Recommendation and/or International Standard which defines the type of object;

    c)   registration by any International Registration Authority;

    d)   registration by any organization which requires to act as a Registration Authority.

B.3   Registration in the ITU-T Recommendation and/or International Standard which defines the type of object is generally only appropriate if the number of registrations is small and likely to be changed infrequently. (A current example is the definition of names for FTAM constraint-set fields which, if necessary, will be extended by amendment). If this is the only registration considered appropriate, the following text should be included in the applicable ITU-T Recommendation and/or International Standard:

> "The names to be used in this field are specified in Annex... An International Registration Authority covering this type of object is not currently intended."

There would be no reference to Rec. ITU-T X.660 | ISO/IEC 9834-1.

B.4   Registration in ITU-T Recommendations and/or International Standards referencing the Recommendation | International Standard which defines the type of object is appropriate if the names and corresponding definitions are closely tied to those ITU-T Recommendations and/or International Standards. (A current example is ACSE application-context fields and presentation abstract syntax fields). If this is the only registration considered appropriate, the following text should be included in the applicable ITU-T Recommendation and/or International Standard:

> "The names to be used in this field are specified in the ITU-T Recommendations and/or International Standards referencing this ITU-T Recommendation and/or International Standard. The name shall be defined in accordance with Rec. ITU-T X.660 | ISO/IEC 9834-1. An International Registration Authority covering this type of object is not currently intended."

The referencing ITU-T Recommendation and/or International Standard will assign a name in accordance with Rec. ITU-T X.660 | ISO/IEC 9834-1, but need not reference Rec. ITU-T X.660 | ISO/IEC 9834-1.

B.5   Registration by an International Registration Authority requires the development of a new ITU-T Recommendation and/or International Standard. If this is the only registration considered appropriate, the ITU-T Recommendation and/or International Standard which defines the type of object should contain the text:

> "This ITU-T Recommendation and/or International Standard requires an International Registration Authority for... The procedures governing the Authority and the form of register entries are specified in Rec. ITU-T ... and/or ISO/IEC..."

NOTE – In this case, the ITU-T Recommendation and/or International Standard which defines types of objects will not normally receive final approval until the applicable ITU-T Recommendation and/or International Standard is a consented (or determined) ITU-T Recommendation and/or Draft International Standard at ballot stage, and an organization has been nominated as the Registration Authority.

B.6   Where registration by any organization which has a need is considered appropriate, two further criteria need to be examined. These are:

    a)   are there any special relationships (requiring explanation) between these names and other names?

    b)   is a more detailed specification (beyond that which can be inferred from the ITU-T Recommendation and/or International Standard which defines the type of object) needed of the information which would constitute registration?