Standards and Recommended Practices

Proposed SMPTE Standard

A Proposed SMPTE Standard is published here for a trial period and pubic review: SMPTE 298M, Television — Universal Labels for Unique Identification of Digital Data. The proposal will be submitted to the American National Standards Institute if no adverse comments are received from publication. Comments should be addressed to Carlos V. Girod, Jr., Director of Engineering, at Society Headquarters prior to August 1, 1996. SMPTE 298M is available from Society Headquarters for $13.00.

Proposed SMPTE Recommended Practice

Published here for a trial period and public review is a Proposed SMPTE Recommended Practice: RP 190, Care and Preservation of Audio Magnetic Recordings. Address comments to Carlos V. Girod, Jr., Director of Engineering, at Society Headquarters prior to August 1, 1996. Available from Headquarters, RP 190 is $13.00.

Approved American National Standards

The American National Standards Institute recently approved four American National Standards: ANSI/SMPTE 87M-1996, Motion-Picture Film (16-mm) — 100-Mil Magnetic Striping; ANSI/SMPTE 183M-1996, Motion-Picture Film — Photographic Audio Level Test Films — Measurement of Photoelectric Output Factor; ANSI/SMPTE 209M-1996, Motion-Picture Film (8-mm Type S — Magnetic Audio Records — Recorded Characteristic; and ANSI/SMPTE 211M-1996, Motion-Picture Film — 16- and 35-mm Variable-Area Photographic Audio Records — Signal-to-Noise Ratio. ANSI/SMPTE 87M, 183M, and 209M are available from Headquarters for $10.00 each and ANSI/SMPTE 211M for $13.00.

A complete revision of RP 173, Loudspeaker Placements for Audio Monitoring in High-Definition Electronic Production, is currently under way in the SMPTE Engineering Committee. Please disregard the version previously published for trial and comment in the April 1993 *Journal*.

— Carlos V. Girod, Jr. P.E.,
Director of Engineering

SMPTE Standards Subscription Service

The Society provides a Standards Subscription Service to assist firms, libraries, and individuals in establishing and maintaining a complete and current file of approved American National Standards, SMPTE Recommended Practices, and SMPTE Engineering Guidelines in the motion-picture, television, and video magnetic recording fields. Through this service, the Society makes automatic distribution to standards subscribers of all new and revised standards, recommended practices, and guidelines that are approved during the calendar year in these fields.

For further information, write to: Standards Subscription Service, Engineering Dept., Society of Motion Picture and Television Engineers, 595 West Hartsdale Ave., White Plains, NY 10607.

PROPOSED SMPTE STANDARD

SMPTE 298M

for Television — Universal Labels for Unique Identification of Digital Data

Contents

1 Scope

This standard defines universal labels, a universal labeling mechanism to be used in identifying the type and encoding of data within a general-purpose data stream. The labeling mechanism is intended to function across all types of digital communications protocols and message structures, allowing the intermixture of data of any sort. Labels created using the mechanism specified are intended to be attached to the data they identify and to travel together with them through communications channels.

The meanings of specific labels created using the mechanism provided in this standard are defined by organizations that are part of a hierarchical structure of organizations that begins with the International Organization for Standardization (ISO) and the International Telecommunication Union (ITU) sharing the top level. Each organization that is part of the hierarchy is automatically given part of a specified name space to use in defining labels for data types and forms under its responsibility. SMPTE is one such organization.

The primary use of labels is to identify the type and encoding of data within a general-purpose data stream. Other meanings associated with the use of specific labels are completely within the control of the particular organizations defining those labels.

This standard defines universal labels that can be used by any organization that wishes to label data in a manner that is universally unambiguous, globally unique, and traceable to the authorizing organization.

A specific form of universal label, called an SMPTE-administered universal label, is the mechanism used to identify and distinguish data contained in data streams that have been generated by the use of other SMPTE standards and recommended practices.

2 Normative references

The following standards contain provisions, which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

ISO/IEC 8824-1:1995 (ITU-T X.680), Information Technology — Abstract Syntax Notation One (ASN.1) — Specification of Basic Notation

THIS PROPOSAL IS PUBLISHED FOR COMMENT ONLY

ISO/IEC 8825-1:1995 (ITU-T X.690), Information Technology — ASN.1 Encoding Rules — Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER), and Distinguished Encoding Rules (DER)

3 Glossary of terms

The following subclauses define the most important terms used in this standard:

3.1 universal label: A variable-length label, defined by this standard and administered by an organization that is registered internationally by ISO/ITU or one of their constituent organizations.

3.2 SMPTE-administered universal label: A fixed-length (16-byte) universal label, defined by this standard and administered by SMPTE.

4 Label structure

Within this standard, the type and format or other characteristics of messages exchanged in a general-purpose data stream shall be identified using the ISO/ITU registration system as specified by ASN.1. A universal label is composed of an ISO/ITU identifier or path specification to an authorized administrative organization within the ISO/ITU name space followed by a data type identifier defined by that organization and located within its subsection of the name space.

5 Label name space

The universal label name space shall conform to the definition of object identifiers specified by ISO/IEC 8824-1.

The ISO/ITU identifiers are organized in a hierarchy that is registered internationally by ISO, ITU, and their constituent organizations. The root or initial part of the identifier hierarchy is specified in ISO/IEC 8824-1 annexes B, C, and D and summarized in figure 1 below (see annex A of this standard for a further description of the ISO/ITU identifier hierarchy registration system).

6 Notation

A universal label shall utilize the notation specified by ISO/ITU 8824-1, ASN.1 for the object identifier type. ASN.1 specifies a human readable notation for the precise representation of object identifiers within the ISO/ITU identifier hierarchy. A universal label includes an identifier; the identifier is represented by a

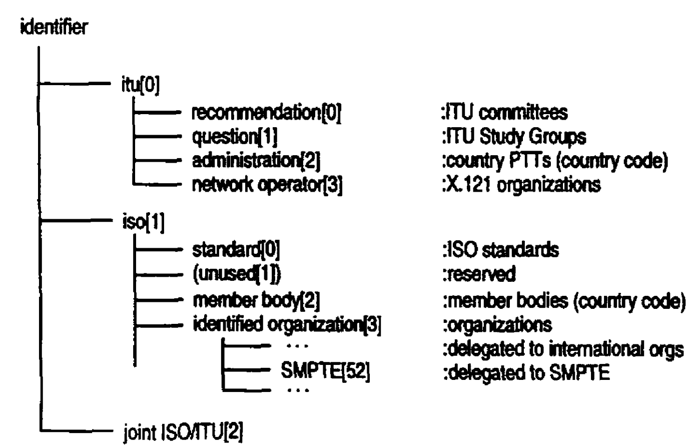

Figure 1 – ISO/ITU identifier hierarchy

sequence of unsigned integer components, enclosed within braces, that designate a location in the identifier name space starting at the root of the ISO/ITU hierarchy and selecting which branch to take as each level of the hierarchy is descended.

Names consisting of strings of lower-case characters may be used in addition to or, in certain circumstances, in place of the integer components. Names assigned in annexes B, C, and D of ISO/ITU 8824-1 may be used in place of the integer components at the root of the sequence. Names assigned by an identified organization may be used, followed by their equivalent integer values enclosed in parentheses (see annex A of this standard for a further description of the ISO/ITU identifier notation).

The following examples are all valid identifiers of the fourth recommendation from committee T of the International Telecommunication Union (ITU) (coincidentally, the Group 3 facsimile standard):

{itu(0) recommendation(0) t(20) 4}
{0 0 20 4}
{itu recommendation t(20) 4}

7 Label definition

A universal label shall be an "object identifier" as specified by ISO/IEC 8824-1.

8 Universal label encoding

Universal labels shall be encoded according to the basic encoding rules (BER) as specified by ISO/IEC 8825-1, with the additional requirement that the encoding of the object identifier value shall use either "primitive" encoding or "constructed" encoding at the option of the authorizing organization.

Universal labels, as defined in this standard, when administered by an organization registered within the ISO/ITU identifier hierarchy, shall use either the primitive encoding or the constructed encoding with a length that is a multiple of 4 octets.

SMPTE-administered universal labels shall be encoded using primitive encoding only, and their values shall be defined so that the primitive encoding of the entire label has a fixed length of 16 octets.

8.1 Primitive encoding

The primitive encoding of a universal label value shall be as specified by ISO/IEC 8825-1 (BER) subclause 8.19, "Encoding of an Object Identifier Value." (See annex B for a description of primitive encoding.) If necessary, an organization shall supplement its object identifier with up to three null values (corresponding to additional branches in the ISO/ITU hierarchy) so that the encoded length of the universal label is an integer multiple of 4 bytes.

The encoded label consists of an object identifier (OID) tag (06_{16} per ASN.1) and a length followed by a sequence of subidentifier octets. The first two integer components of the object identifier are coded within the first subidentifier octet. Each additional integer component of the object identifier is encoded by a sequence of one or more subidentifier octets. Following is an example of the primitive encoding of the universal label having the value {itu(0) recommendation(0) t(20) 4}, or simply {0 0 20 4}.

OID tag	Length	Contents
06_{16}	03_{16}	00_{16} 14_{16} 04_{16}

A SMPTE-administered universal label shall be encoded using primitive encoding and shall have a fixed 4-octet prefix that identifies the SMPTE organization in the ISO/ITU hierarchy, followed by a 12-octet subidentifier string assigned and administered by SMPTE. Following is an example of the 16-octet SMPTE-administered universal label having the value {iso(1) organization(3) smpte(52) committee(18) standard (10) identifier(1) 0 0 0 0 0 0 0 0 0}, or (as decimal numbers) {1 3 52 18 10 1 0 0 0 0 0 0 0 0 0}[1]:

OID tag	Length	SMPTE
06_{16}	$0E_{16}$	$2B34_{16}$

Subidentifiers
12_{16} $0A_{16}$ 01_{16} 00_{16} 00_{16} 00_{16} 00_{16} 00_{16} 00_{16} 00_{16} 00_{16} 00_{16}

[1] SMPTE-administered universal labels are zero padded to create 16-octet encoded labels. Work on the length and meaning of subidentifiers is incomplete at the time of approval of this standard, and no conclusion should be drawn from the use of this example that such a structure will ultimately be approved by SMPTE.

8.2 Constructed encoding

When an organization specifies alternative encoding rules for its data type identifiers, a constructed encoding of a universal label value may be used. The constructed encoding of a universal label value shall be as specified by ISO/IEC 8825-1 (BER) subclause 8.1, General Rules for Encoding, regarding constructed types. The encoded label consists of the following sequence: an object identifier (OID) tag with the constructed bit set (26_{16}), a length, a primitively encoded object identifier (as described in 8.1 of this standard), and a primitively encoded octet string. If necessary, an organization shall supplement its object identifier with up to three null values (corresponding to additional branches in the ISO/ITU hierarchy) so that the encoded length of the universal label has a length that is an integer multiple of 4 bytes. The primitively encoded octet string consists of an identifier tag (04_{16}), a length, and a sequence of octets (see annex C for a detailed description of constructed encoding).

For example, {1 3 64 "00 10 0A FF"} represents a constructed-encoding form of the universal label having an organization identifier value of {iso(1) organization(3) hypothetical-organization(64)}, and a data type identifier value specified by the organization to be encoded as 00_{16} 10_{16} $0A_{16}$ FF_{16}:

OID tag	Length	Contents
26_{16}	$0A_{16}$	

OID tag	Length	Contents	Octet string	Length	Contents
06_{16}	02_{16}	$2B_{16}$ 40_{16}	04_{16}	04_{16}	00_{16} 10_{16} $0A_{16}$ FF_{16}

Annex A (informative)
ISO/ITU identifier hierarchy registration system and notation

ISO/ITU identifiers are organized in a hierarchy that is registered and administered internationally by ISO, ITU, and their constituent organizations. The roots (prefixes) of the hierarchy are illustrated in figure A.1.

A defined notation is used to specify names in the ISO/ITU name space hierarchy. A name is a sequence of unsigned integers that designates a location in the name space starting at the root and selecting which branch to take as each level is descended. In ASN.1 and its related encoding standards, the human readable notation for the sequence of unsigned integers is a sequence of decimal numbers within braces. Names are sometimes assigned to the unsigned integers and may be used in their place (see ISO 8824 clause 29 for a description of the notation of the object identifier type).

The following examples are all valid identifiers of the ITU T.4 (Group 3 Fax) standard:

{itu(0) recommendation(0) t(20) 4}
{0 0 20 4}
{itu recommendation t(20) 4}

The initial symbol "itu" (value 0) indicates the name is an International Telecommunication Union (ITU)-administered name. The second symbol "recommendation" (value 0) indicates the name is an ITU recommendation. ITU recommendations are administered by committees A through Z, thus 20 indicates that committee T (20 is the location of T in the alphabet) wrote the recommendation. The value 4 identifies the committee document that specifies Group 3 Fax. For example, using this name in a message header would identify a message as containing Group 3 Fax data.

All ISO standards are registered as {iso(1) standard(0)}. Sovereign bodies are registered under {iso(1) member-body(2) country-code}. ISO delegates registration authority to international organizations (e.g., SMPTE) and companies under {iso(l) organization(3)} so that individual organizations can autonomously administer a portion of the name space.

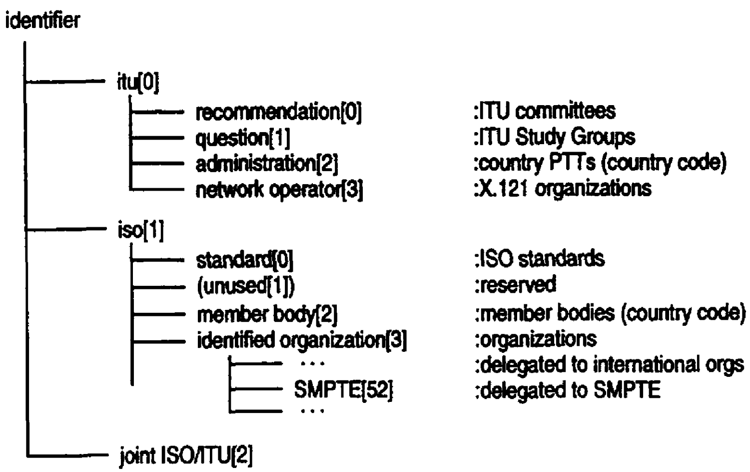

Figure A.1 – ISO/ITU identifier hierarchy

Annex B (informative)
Primitive encoding

As defined by this standard, the primitive encoding of a universal label is specified by the basic encoding rules (BER) for the encoding of an object identifier value. The encoding of an object identifier follows the BER general encoding for a data value with definite length and short form which consists of an OID (object identifier) octet, a size octet, a code octet, and subid (subidentifier) octets, as illustrated in figure B.1.

The OID octet shall have a value of 06_{16}. Bit 6 of the OID octet indicates whether constructed or primitive encoding is used, with bit 6=0 indicating primitive encoding. The size octet specifies the number of additional octets used to encode the value of the identifier which, in the short form, can specify from 0 to 127 octets.

The value of an object identifier consists of a sequence of unsigned integer components which represent the location of the identifier within the ISO/ITU hierarchy. Since the first two integer components which represent the root of the ISO/ITU hierarchy have values that are restricted to integers less than 16, these two integer values can be packed into a single code octet using the formula specified by equation B.1, where id[0] and id[1] represent the first and second integer component values, respectively.

$$code = (40_{10} \times id[0]) + id[1] \qquad (B.1)$$

The code-value ranges generated by the code octet encoding are tabulated in table B.1.

The remaining integer components of the object identifier are encoded as additional subidentifier octets, subid[1] through subid[n-1], as illustrated in figure B.1. Each integer component is encoded as one or more subid octets depending on the value of the component. Each subid octet codes 7 bits of the integer value; therefore, a single subid octet can code an integer component with a value from 0 to 127. Integer component values greater than 127 are coded using additional subid octets with the most significant bits of the integer value coded first. Bit 8 of the subid octets is used to specify the end of each integer coding sequence. The most significant bit in the first through the next-to-last octet of each subid sequence is one; the most significant bit in the last octet of each subid sequence is zero.

Within each subidentifier, the first-through-last octets are used to encode the most- through least-significant portions of the unsigned integer object identifier component. Within figure B.1, for example, the data[0]-through-data[k-1] octets are the most- through least-significant portions of the unsigned integer being encoded.

For example, the 16-octet SMPTE-administered universal label for SMPTE document 128 would be printed as {1 3 52 128 ...} which starts with the 6-octet "$06_{16}0E_{16}2B_{16}34_{16}81_{16}00_{16}$" sequence. This encoding is illustrated in figure B.2.

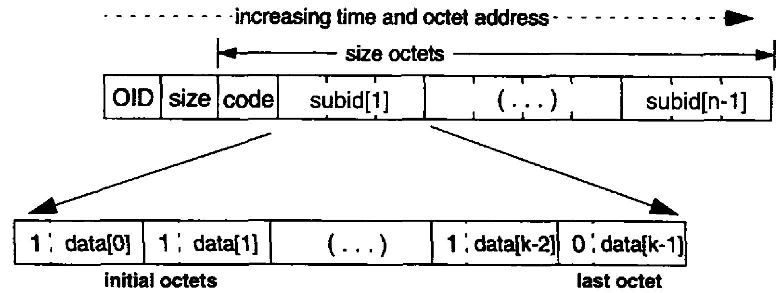

Figure B.1 – Object identifier encoding

Table B.1 – Identifier code field values

Organization	Code	Name	Description
CCITT	0	Recommendation	CCITT committees
	1	Question	CCITT study groups
	2	Administration	Country PTTs (country code)
	3	Network operator	X.121 organizations
	4–39	—	Reserved
ISO	40	Standard	ISO standards
	41	—	Reserved
	42	Member body	Member bodies (country code)
	43	Identified organization	Organizations
	44–79	—	Reserved
Joint ISO CCITT	80–127	—	(Delegated to ANSI)

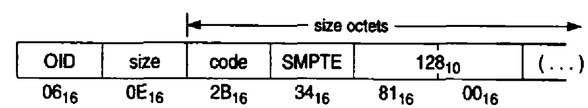

Figure B.2 – A typical SMPTE-assigned universal label with primitive encoding

Annex C (informative)
Constructed encoding

The constructed encoding of a universal label has a leading CID (constructed object identifier) and size octet. The distinct CID value of 26_{16} distinguishes the constructed encoding from the primitive encoding option (for the primitive encoding, the first octet is 06_{16}). These octets are followed by a primitive object identifier (which identifies the organization) and data-type identifier (provided by the organization), as illustrated in figure C.1.

The data-type identifier consists of an OCT (octet string) identifier, a size C octet, and other octets. The OCT octet has a value of 04_{16}. The format and function of the remaining octets shall be defined by the organization specified within the primitive object identifier.

For example, the constructed encoding for ISO standard #5 would include the organization's object identifier {iso(l) standard(l) 5} value and (for example) an assigned 6-octet value of AC_{16} DE_{16} 48_{16} 23_{16} 45_{16} 67_{16}. This encoding, with the object identifier extended to make the universal label a multiple of 4 bytes in size, is represented by {1 1 5 0 0 "AC DE 48 23 45 67"} and is encoded as illustrated in figure C.2.

Because many organizations have larger (than 2-byte) code/subidentifier values and may assign a larger-than 6-byte data-type identifier, the constructed form of the universal label is often expected to be longer than this 16-byte illustration.

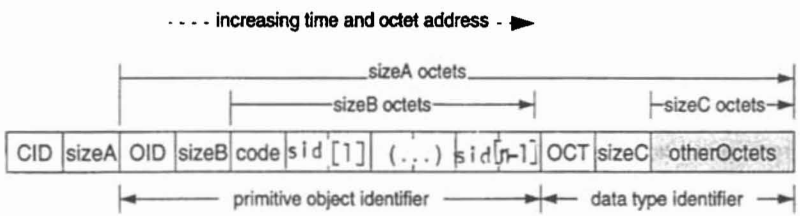

Figure C.1 – Constructed encoding format

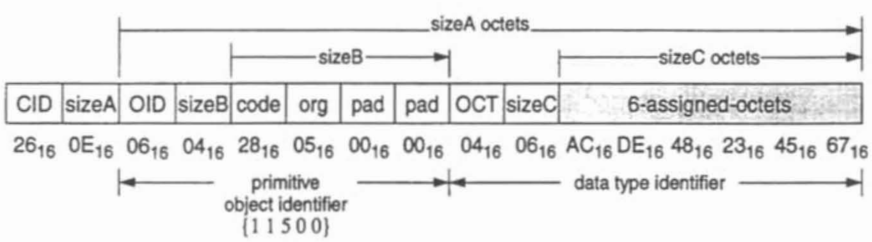

Figure C.2 – A universal label, constructed encoding

Annex D (informative)
Universal label comparisons

D.1 Arbitrary label comparisons

Within most applications, the universal labels can be checked (for a match to several supported values) without parsing of the label contents. Equality comparisons can be performed between inputs and tables of reference universal label values, label checking hardware need only know the data-stream location of the universal label (this might, in some applications, involve a first-octet comparison) and the label length (two more than the label's second-octet value).

Simple fixed-length (in this example, 64-octet) comparisons between the incoming label and a table of preencoded universal label values are sufficient to detect which of N (in this example, N=4) universal label values have been received, as illustrated in figure D.1.

In this example, the incoming universal label value is extended with null (zero-valued) octets to form a fixed-length 64-octet value. This post-padded value can be compared against a table of (also post-padded) universal label values, to determine which label has been received. The known location of the universal label's size field simplifies the post-padding operation; the size value also allows unsupported labels to be skipped when their contents do not match any supported universal label values.

Note that any post-pad value can be used, if the value is used when generating table entries and padding input label values. Similarly, a prepadding extension could also be used, if table entries and input labels are prepadded in a consistent fashion.

D.2 SMPTE label comparisons

Label recognition is simpler when only SMPTE-administered labels are supported, as illustrated in figure D.2. In this case, the first four octets are compared for a SMPTE-prefix match. If these match, the remaining 12 octets can be compared to a table of 12-octet SMPTE-supported sublabel values.

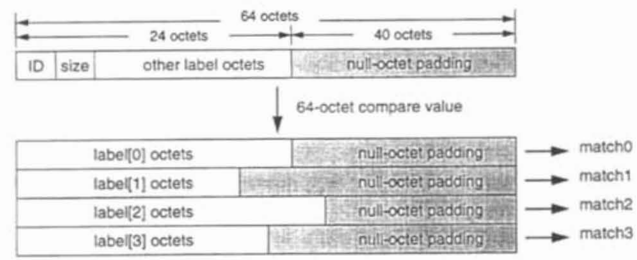

Figure D.1 – Arbitrary (up to 64-octet) label comparisons

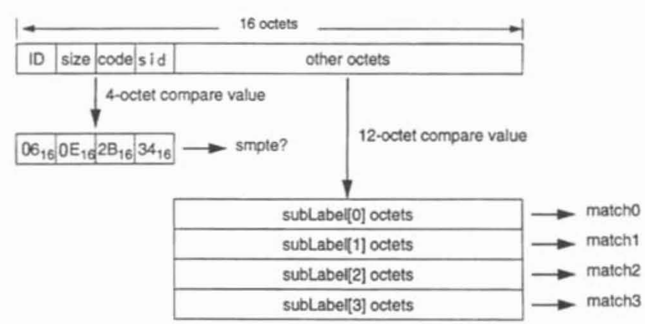

Figure D.2 – SMPTE-administered label comparisons