

Unique Material Identifier (UMID)



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Foreword

SMPTE (the Society of Motion Picture and Television Engineers) is an internationally-recognized standards developing organization. Headquartered and incorporated in the United States of America, SMPTE has members in over 80 countries on six continents. SMPTE's Engineering Documents, including Standards, Recommended Practices, and Engineering Guidelines, are prepared by SMPTE's Technology Committees. Participation in these Committees is open to all with a bona fide interest in their work. SMPTE cooperates closely with other standards-developing organizations, including ISO, IEC and ITU.

SMPTE Engineering Documents are drafted in accordance with the rules given in Part XIII of its Administrative Practices.

SMPTE ST 330 was prepared by Technology Committee 30MR.

Intellectual Property

SMPTE draws attention to the fact that it is claimed that compliance with this Standard may involve the use of one or more patents or other intellectual property rights (collectively, "IPR"). The Society takes no position concerning the evidence, validity, or scope of this IPR.

Each holder of claimed IPR has assured the Society that it is willing to License all IPR it owns, and any third party IPR it has the right to sublicense, that is essential to the implementation of this Standard to those (Members and non-Members alike) desiring to implement this Standard under reasonable terms and conditions, demonstrably free of discrimination. Each holder of claimed IPR has filed a statement to such effect with SMPTE. Information may be obtained from the Director, Standards & Engineering at SMPTE Headquarters.

Attention is also drawn to the possibility that elements of this Standard may be subject to IPR other than those identified above. The Society shall not be responsible for identifying any or all such IPR.

Introduction

The UMID is a unique identifier for audiovisual material that is locally created and globally unique. It differs from many unique identifiers in that the number does not depend wholly upon a pre-registration process, but can be generated automatically at the point of material origination without reference to a central resource.

1 Scope

This standard defines the format of the unique material identifier (UMID).

The UMID provides a method of identification for instances of audiovisual material and thus enables the material to be linked with its associated metadata. The UMID itself is neither intended for the identification of copyright nor the ownership of rights. Nor, for example, does it identify program content or works.

The UMID consists of an ordered group of components each providing a key aspect to the identification of the audiovisual material, be it picture, sound or data. A key property of a UMID generated in accordance with this standard is that it is possible to use the resulting UMID simply as a globally unique dumb number.

The UMID can exist in one of two forms:

- A basic UMID, which contains the minimum components necessary for unique identification; and
- An extended UMID, which attaches a packed metadata set (source pack) to the basic UMID.

This standard specifies the formats of each component in both the basic UMID and the extended UMID.

This standard also identifies and specifies methods by which the components of the identifier can be created.

A glossary is provided to define the terms used in this standard and this scope.

2 Conformance Notation

Normative text is text that describes elements of the design that are indispensable or contains the conformance language keywords: "shall", "should", or "may". Informative text is text that is potentially helpful to the user, but not indispensable, and can be removed, changed, or added editorially without affecting interoperability. Informative text does not contain any conformance keywords.

All text in this document is, by default, normative, except: the Introduction, any section explicitly labeled as "Informative" or individual paragraphs that start with "Note:"

The keywords "shall" and "shall not" indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

The keywords, "should" and "should not" indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

The keywords "may" and "need not" indicate courses of action permissible within the limits of the document.

The keyword "reserved" indicates a provision that is not defined at this time, shall not be used, and may be defined in the future. The keyword "forbidden" indicates "reserved" and in addition indicates that the provision will never be defined in the future.

A conformant implementation according to this document is one that includes all mandatory provisions ("shall") and, if implemented, all recommended provisions ("should") as described. A conformant implementation need not implement optional provisions ("may") and need not implement them as described.

Unless otherwise specified, the order of precedence of the types of normative information in this document shall be as follows: Normative prose shall be the authoritative definition; Tables shall be next; followed by formal languages; then figures; and then any other language forms.

3 Normative References

Note: All references in this document to other SMPTE documents use the current numbering style (e.g. SMPTE ST 298:2009) although, during a transitional phase, the document as published (printed or PDF) may bear an older designation (such as SMPTE 298-2009). Documents with the same root number (e.g. 298) and publication year (e.g. 2009) are functionally identical.

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 editions of the standards indicated below.

SMPTE ST 298:2009, Universal Labels for Unique Identification of Digital Data

SMPTE ST 12-1:2008, Time and Control Code

SMPTE ST 309:1999, Television — Transmission of Date and Time Zone Information in Binary Groups of Time and Control Code

SMPTE ST 2029:2009, Uniform Resource Names for SMPTE Resources

SMPTE ST 336:2007, Data Encoding Protocol Using Key-Length-Value

SMPTE RP 210, Metadata Dictionary Registry of Metadata Element Descriptions

AES3-2009, AES Standard for Digital Audio Engineering — Serial Transmission Format for Two-Channel Linearly Represented Digital Audio Data

IEEE 1394-1995, High Performance Serial Bus

ISO 3166-1:2006, Codes for the Representation of Names of Countries and Their Subdivisions — Part 1: Country Codes

ISO/IEC 8859-1:1998, Information Technology — 8-Bit Single-Byte Coded Graphic Character Sets — Part 1: Latin Alphabet No. 1

IETF RFC 4122:2005, A Universally Unique Identifier (UUID) URN Namespace

DMA TR 8350.2, Department of Defense, World Geodetic System 1984. U.S. Defense Mapping Agency DMA TR 8350.2, Second Edition, 1 September 1991

4 Glossary of Terms

audio-visual material: Any one or any combination of picture (or video) essences, sound (or audio) essences and data (or auxiliary) essences. This term is also frequently referred to simply as “material”.

dumb number: A number, the value of which has no intrinsic meaning.

essence: An abstract term that describes any data or signal necessary to represent any single type of visual, aural or other sensory experience independent of the method of coding. Essence excludes any form of metadata.

material unit: The entity that represents the quantum of the audiovisual material defined by its cyclic sampling structure. The material unit duration depends on the type of material; examples being an AES3 block and a video frame. Note that the duration of a material unit is defined by the requirements of the audiovisual material type and its application. The value of the material unit duration is not specified in the basic UMID. It can, however, be specified in the source pack.

metadata: Data which conveys information about the audio-visual material. For example, information about identification, essence coding, timelines, intellectual property, business operations, etc.

5 General Specification

A unique material identifier (UMID) provides for the globally unique identification of any audiovisual material.

This standard defines a dual approach through the specification of a basic UMID and an extended UMID.

The basic UMID provides a globally unique identification for audiovisual material that comprises an integer number of one or more contiguous material units. The basic UMID has no embedded mechanism to distinguish between individual material units within a single instance of audiovisual material. The data in the basic UMID can be created through automatic generation.

The extended UMID comprises the basic UMID followed immediately by a source pack that provides a signature for material units. The source pack comprises a fixed length metadata pack of 32 bytes that provides sufficient metadata by which source “when, where and who (or what)” information can be identified regardless of current ownership or status. The extended UMID also provides a mechanism to distinguish between individual material units within a single instance of audiovisual material.

The basic UMID is 32 bytes long and the extended UMID is 64 bytes long.

Both UMID types use the key-length-value construct defined by SMPTE ST 336. The key is a 16-byte universal label truncated to 12 bytes.

In the case of the basic UMID, the length field has a value of 13h and the value is formed by the combination of a material number and an instance number.

In the case of the extended UMID, the length field has a value of 33h and the value is formed by the combination of the material and the instance numbers followed by the source pack.

All components of the UMID have a defined byte order for consistent application in storage and streaming environments.

Figure 1 illustrates the layout of the both basic UMID and the extended UMID.

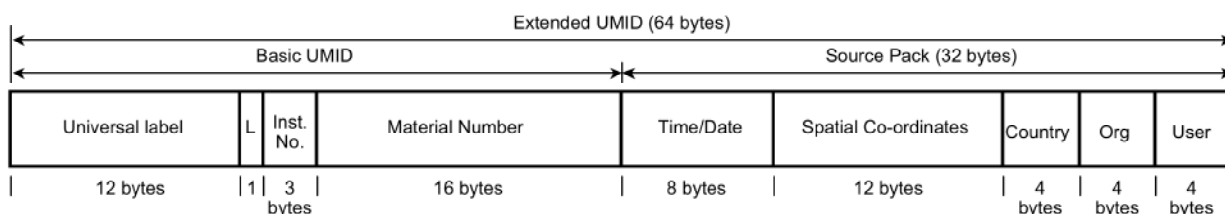


Figure 1 – Basic and extended UMID structures

The components of the basic UMID are:

1. A 12-byte universal label,
2. A 1-byte length value,
3. A 3-byte instance number, and
4. A 16-byte material number.

The combination of the instance and material numbers can be treated as a dumb number.

Note: The material number does not indicate the status of the material (such as copy number) or its representation (such as the compression kind). The material number can be identical in copies and in different representations of the material. The purpose of the instance number is to separately identify different representations or instances of audiovisual material. Thus, for example, a high-resolution picture and a thumbnail can both have the same

material number because they both represent the same picture but, because they are different instances, they will have different instance numbers for the different representations. Guidance for the consistent application of new material numbers and instance numbers is given in SMPTE RP 205.

The extended UMID comprises a basic UMID, followed by a source pack. The components of the source pack are:

1. An 8-byte date stamp and unit count component,
2. A 12-byte geospatial coordinate,
3. A 4-byte country code,
4. A 4-byte organization code, and
5. A 4-byte originator code.

Notes:

1. The source pack metadata only represents that information available at the time when the extended UMID is first applied. The source pack values therefore refer to the “when, where and who (or what)” at the point of application of the source pack and this can differ from the originating device.
2. All metadata fields in the source pack can be automatically generated for each material unit using a timer, a global position calculator and pre-registered identification data. Where automatic generation of any value is not possible, it can be manually entered.
3. The source pack needs to be registered in a Metadata Groups Register.
4. The terms origination and originator above refer to physical origination and have no meaning in terms of intellectual property.

6 UMID Format Specification

Section 6.1 defines the basic UMID, Section 6.2 defines the extended UMID, and Section 6.3 defines the source pack.

Number formats including the material and instance numbers together with the date/time and geospatial coordinate fields shall be presented with the least significant byte first (also known as little-endian byte order) unless otherwise defined.

6.1 Basic UMID

6.1.1 Structure of the Basic UMID

The basic UMID shall be 32 bytes long, and shall contain a 12-byte universal label, a length, an instance number, and a material number in this order with each item as defined below.

6.1.2 12-Byte Universal Label

The 12-byte universal label defines the type of material, which the UMID identifies and the methods by which the material number and instance number are created.

The first 12 bytes of the UMID shall identify the UMID with a SMPTE universal label as defined by SMPTE ST 298 having the registered string value defined in Table 1.

Table 1 – UMID universal label

Byte No.	Description	Value (hex)	Meaning
1	Object identifier	06h	Universal label start
2	Label size	0Ah	12-byte Universal label
3	Designation: ISO	2Bh	ISO registered
4	Designation: SMPTE	34h	SMPTE registered
5	Registry category	01h	Dictionaries
6	Specific category	01h	Metadata dictionaries
7	Structure	01h	Dictionary standard (SMPTE ST 335)
8	Version number	05h	Version of the metadata dictionary (defined in SMPTE RP 210)
9	Class	01h	Identifiers and locators
10	Subclass	01h	Globally unique identifiers
11	Material type	XXh	See Section 6.1.2.1
12	Number creation method	YYh	See Section 6.1.2.2

Note: SMPTE ST 298 defines SMPTE labels as having a length of 16 bytes. The 12-byte UMID universal label is still a valid and unique ISO object identifier as defined in SMPTE ST 298. When the UMID universal label is used in isolation, the 12-byte UMID universal label can be converted to a SMPTE label by padding with 4 bytes of null fill and changing the value of the label size in byte 2 from '0Ah' to '0Eh'.

6.1.2.1 Material type identification

Byte 11 of the UL shall define the material type being identified using one of the values defined in Table 2.

The use of material types '01h', '02h', '03h' and '04h' shall be deprecated for use in implementations using this revised standard. These values are preserved only for compatibility with systems implemented using SMPTE ST 330:2000.

Table 2 – Material type identification

Byte value	Meaning	Examples and notes
01h	picture material	Deprecated
02h	audio material	Deprecated
03h	data material	Deprecated
04h	other material	Deprecated (originally not only picture, audio, or data material, but also a combination of material types)
05h	single picture component	e.g. Y component
06h	Two or more picture components in a single container	e.g. interleaved Y, Cb and Cr components
08h	single audio component	e.g. mono audio
09h	two or more audio components in a single container	e.g. AES3 audio pair
0Bh	single auxiliary (or data) component	e.g. sub-titles only
0Ch	two or more auxiliary (or data) components in a single container	e.g. multiple sub-titles streams in different languages
0Dh	mixed group of components in a single container	e.g. video & stereo audio pair
0Fh	material type is not identified	

6.1.2.2 Number creation method identification

Byte 12 of the UL shall define the method by which the material and instance numbers are created. This byte is divided into top and bottom nibbles for the purpose of this definition.

The top nibble shall occupy the 4 most significant bits (MSBs) of the byte and the value shall be used to define the method of material number creation. The values used by this nibble shall be limited to the range 0 to 7h so that byte 12 conforms to the ASN.1 BER short form coding rules used by SMPTE ST 298.

The methods of material number generation shall be as defined in table 3 and the specification of the each method shall be as defined in Annex A.

Note: New material number generation methods can be added by amendment or revision of this document. Each addition will provide the proposed value (within the range of values currently identified as “Reserved but not defined”) for inclusion in Table 3 together with the supporting definition to be added to Annex A.

Table 3 – Identification of material number generation method

Value (hex)	Method
0	No defined method
1	SMPTE method
2	UUID/UL method
3	Masked method
4	IEEE 1394 network method
5~7	Reserved but not defined