



AMWA Specification

AMWA Specification Policy

Application Specification UL Guidelines

May 24, 2016 (rev 1.1)

Executive Summary

This document describes requirements and recommended practices for creating SMPTE Universal Label values for use in AMWA Application Specifications. The approach to managing Universal Labels documented by this specification is intended solely for use by AMWA Application Specifications. However, the approach is general enough that it may be of interest as a guide to third party organizations that need to define, and manage, their own Universal Labels for use with Application Specifications.

Contents

Executive Summary	1
Contents.....	2
1 Scope	3
2 Conformance Language.....	3
3 Reference Documents	4
3.1 Normative References	4
3.2 Nonnormative References.....	4
4 Acronyms and Terms	4
5 SMPTE Universal Label Structure Review	5
5.1 AMWA Class 13 Space and Application Specification Designation	7
5.2 Application Specification Label Hierarchy	9
5.3 Application Specification UL Registry	11
6 Legacy Universal Labels (AS-03)	12
7 Appendix A.....	13

1 Scope

This document describes requirements and recommended practices for creating SMPTE Universal Label values for use in AMWA Application Specifications. This approach to managing Universal Labels is intended solely for use by AMWA Application Specification. However, the approach is general and may be of interest as a guide to third party organization that need to define, and manage, their own Universal Labels for use with Application Specifications. Examples of such third party applications includes the definition of ULs by shims intended for use with AMWA Application Specifications but not strictly within the scope of their specification.

These recommendations augment existing SMPTE standards related to ST 298:2009 Universal Labels by specifying exactly how the Item Designator part of a Universal Label should be defined for AMWA Application Specifications.

2 Conformance Language

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 Reference Documents

3.1 Normative References

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

AMWA AS-03 MXF Program Delivery
 AMWA Registry AMWA Metadata Registry

SMPTE EG 42:2004 Material Exchange Format (MXF) - MXF Descriptive Metadata
 SMPTE RP 210v12:2010 Metadata Dictionary Registry of Metadata Element Descriptions
 SMPTE ST 298:2009 Universal Labels for Unique Identification of Digital Data
 SMPTE ST 335:2012 Metadata Element Dictionary Structure
 SMPTE ST 336:2007 Data Encoding Protocol Using Key-Length-Value
 SMPTE ST 395:2003 Metadata Groups Registry Structure
 SMPTE ST 400:2004 SMPTE Labels Structure
 SMPTE ST 2003:2012 Types Dictionary Structure

3.2 Nonnormative References

Note that the follow standards are referenced in this document for the purpose of illustration and example only and are not considered normative.

AMWA AS-11 MXF Program Contribution
 AMWA AS-12 MXF Commercial Delivery

4 Acronyms and Terms

Acronym or Term	Description
AAF	Advanced Authoring Format
AMWA Class 13 Subclass Designator	UL byte 11 used to sub-divide AMWA’s Class 13 UL space. Note, that ST 395:2003 calls UL byte 11 the Organization minor ID.
AMWA Registry	The metadata registry that is used to manage the definitions of all ULs required to create the AAF object model, associated SMPTE ULs, and ULs assigned for use by AMWA Application Specifications.
Application Specification	The term used to describe AWMA specifications that specify how to use MXF (typically) to fulfill particular application requirements.

Acronym or Term	Description
Class 13	This is used in reference to the value (13) of UL byte 9 that identifies a UL that is of class “Organizationally Registered for Public Use” per ST 335:2012.
Class 13 Organization ID	A number assigned by SMPTE that uniquely identifies an organization's Class 13 registration. This is stored in UL byte 10.
Item Designator	Bytes 9 to 16 of a Universal Label
Metadata Registry	A managed collection of ULs that act as the authoritative source of information that describes the ULs.
MXF	Material Exchange Format
Registry	Same as Metadata Registry.
UL	See Universal Label
UL Designator	A field in a UL that servers to designate a particular feature of the UL.
Universal Label	A 16 byte key used to identify metadata. See SMPTE 298:2009.

5 SMPTE Universal Label Structure Review

A SMPTE Universal Label (UL) is a 16 byte ISO/ITU 8824-1 object identifier. The encoding of the 16 bytes that comprise the UL is described by ST 298:2009. The UL encoding is illustrated in figure 1 and summarized as follows:

- A four byte header that identifies the UL as a 16 byte object identifier administered by SMPTE.
- A four byte UL designator whose role is to categorize the UL and identify the dictionary in which it is defined.
- An 8 byte item designation that identifies the particular metadata item.

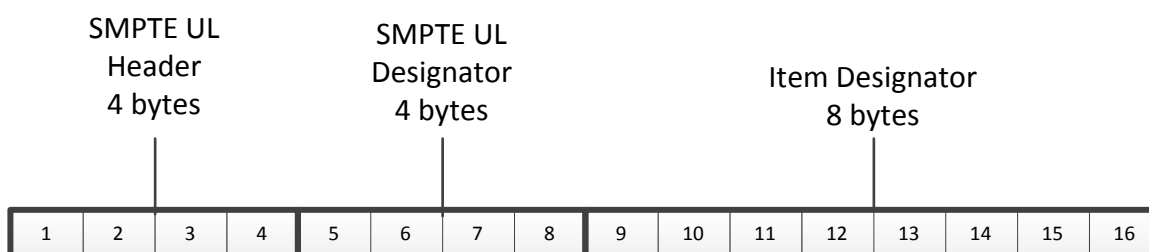


Figure 1 – SMPTE UL Layout, general

The UL Header value (bytes 1-4) is defined by ST 298:2009 and is always 060E2B34₁₆. This constant value conforms to ISO/ITU 8824-1 as specified by ST 298:2009. Its purpose is to identify the UL as a 16 byte object identifier that is administered by SMPTE.

The UL Designator is defined by ST 336:2012. These four bytes categorize the type of information that is labeled by the UL, the Registry where the UL defined, and encodes registry version information.

The Item Designation identifies the metadata item that is labelled by the UL. Its value is determined according to ST 335:2012, ST 395:2003, ST 400:2004, and ST 2003:2012 in conjunction with policies and standards dictated by the organization responsible for management of the Metadata Registry in which the UL is defined. Note, that the first two bytes of the Item Designation (bytes 9 and 10 in the UL) further categorize the “class” of the metadata item as defined by ST 335:2012, ST 395:2003, ST 400:2004, and ST 2003:2012.

Figure 2 and Table 1 summarize this structure in more detail.

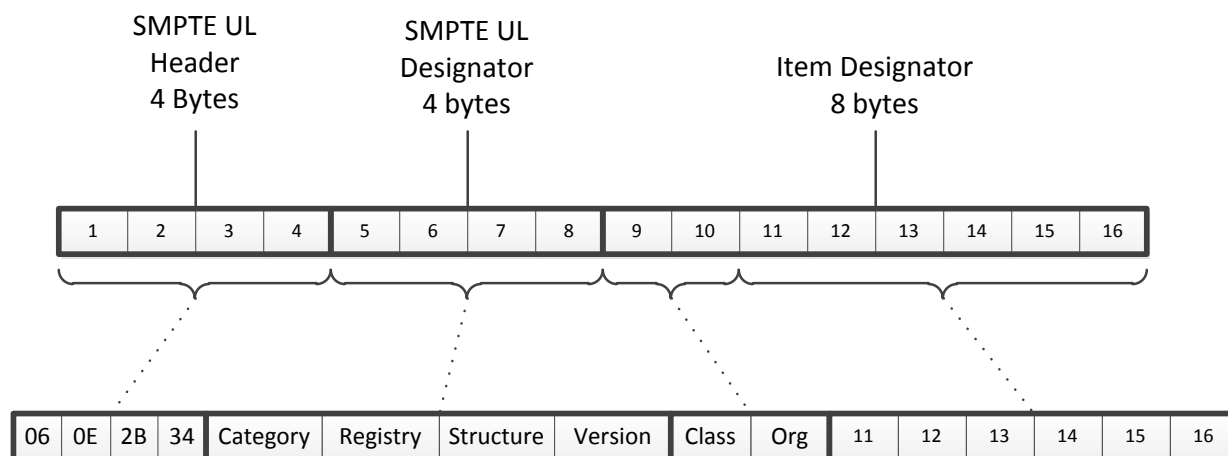


Figure 2 – SMPTE UL Layout, for AS purposes. Also see Table 1.

UL Byte Index	Field Name	Description
1-4	UL Header	Fixed value of 060E2B34 ₁₆ per SMPTE 298:2001.
5	Category Designator	Categorizes the UL as one that identifies individual metadata items (value 1), groups of items (e.g. a class in object oriented sense, value 2), wrappers or containers (value 3), or ULs that are used as labels (value 4). See ST 336:2007.
6	Registry Designator	Identifies the registry in which the UL is defined. See ST 336:2007.
7	Structure Designator	Identifies the structure of the metadata dictionary. May be thought of as a major version number for the registry. See ST 336:2007.
8	Version Designation	Identifies the version of the registry where the UL first appeared.

UL Byte Index	Field Name	Description
9	Item Class Designator	The metadata item class as defined by ST 335:2012. Note, that this document is concerned solely with class 13 (“Organizationally registered for public use”) ULs. See ST 335:2012.
10	Organization ID	If the Item Class Designation is Class 13 then this values is assigned by SMPTE and identifies the registering organization. See ST 335:2012.
11-16	Item Designator (available bytes)	The last 6 bytes of the Item Designator that are available for use within a Class 13 UL to uniquely define individual labels.

Table 1 – Description of bytes in a SMPTE UL.

5.1 AMWA Class 13 Space and Application Specification Designation

SMPTE has assigned Class 13 Organization ID number 1 to AMWA. The AMWA Class 13 space is used to define many of the Universal Labels shared by the AAF and MXF object models. Over time it has also been used to manage other Universal Labels used for MXF metadata such as those defined for DMS-1 descriptive metadata (ST 380:2004). The AMWA Class 13 space has evolved such that byte 11 of the UL has become a further designator that sub-divides the AMWA Class 13 space. The byte 11 designator is referred to as the AMWA Class 13 Subclass Designator.

Current AMWA Class 13 Partition Designations are summarized in Table 2.

AMWA Class 13 Subclass Designator (UL byte 11)	UL Item Designator trunk value	Description
1	0D01010000000000	AAF Structural Metadata
2	0D01020000000000	MXF Partition Packs
3	0D01030000000000	Essence Containers
4	0D01040000000000	DMS
5	0D01050000000000	Generic Stream Partition
6	0D01060000000000	Application Metadata Plugin
7	0D01070000000000	AMWA Application Specifications
8	0D01080000000000	AMWA Rules based Specifications

Table 2 – AMWA Class 13 byte 11 subclasses. Note, the values in this table are defined in the AMWA Registry and are provided here for reference only. This document is concerned strictly, and solely, with the AMWA Application Specifications (value 7) Subclass Designation.

Application Specification UL Guidelines

For AMWA Class 13 Subclass Designator values 1-6, an agreement is in place between the AMWA board and SMPTE, for SMPTE to be able to make assignments within these nodes for use by MXF specifications. Such assignments will be visible as part of the online SMPTE metadata registers. New assignments by AMWA in AMWA Class 13 Subclass Designator values 1-6 must be done in coordination with the SMPTE metadata editor to avoid potential conflicts.

AMWA Class 13 Subclass Designator value 7 is reserved for use by AMWA Application Specifications ULs. The Application Specification subclass is further divided into individual spaces for each Application Specification using UL byte 12 and byte 13. This is referred to simply as the Application Specification Designator. An Application Specification Designator shall be assigned for each Application Specification. Application Specifications shall define their metadata ULs using their assigned Application Specification Designator value.

Byte 12, the first byte of the AS Designator, is normally considered a version number and is given the value one when the AS Designator is first assigned and registered.

Byte 13, the second byte of the AS Designation normally matches the number of the Application Specification (e.g. AS "11"). While a matching number is a convenient choice, it is not a requirement of this specification. Note, that this specification does not prevent two different Application Specifications from sharing a single Application Specification Designator value if that makes sense for their application.

Note, that the byte 9/10/11 (Class/Org/Subclass) values are constant for AMWA Application Specification labels and have the value 0D0107₁₆. Bytes 7/8 (Structure/Version) values, defined in ST 336:2007, are also constant and have the value 0101₁₆. Note, that for a Class 13 UL byte 8 (Version) is set at the discretion of the organization identified by byte 10. AMWA leaves this value at 01₁₆.

With these additional designator bytes fixed, the AMWA Application Specification UL appears as illustrated in Figure 3.

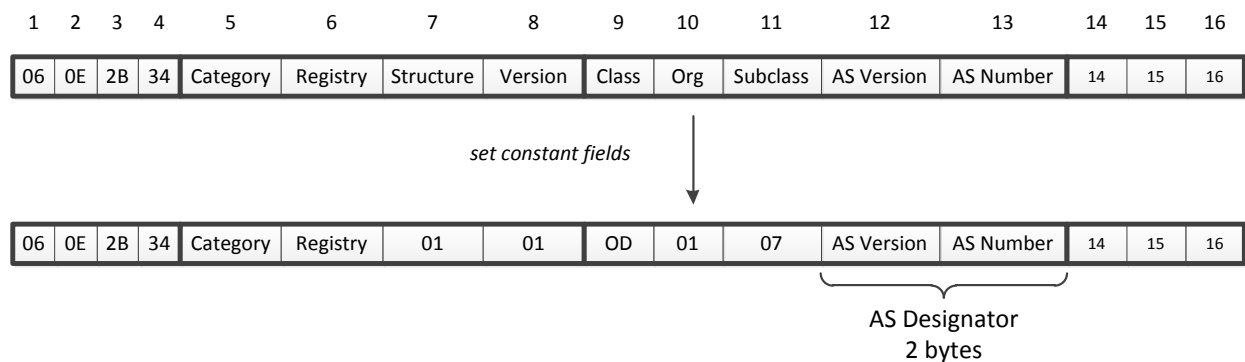


Figure 3 – SMPTE UL fixed field values for the definition of AMWA Application Specification Universal Labels.

The values for bytes 5/6 (Category and Registry designators) are defined by ST 336:2007. These values must be assigned correctly for each individual metadata UL. Note, the Category designator value is

0x01, 0x02, or 0x04 for values that represent metadata elements, groups, or labels, respectively. Note, the Registry designator value for group ULs changes depending on the file encoding. It is normally 0x53 for MXF files, 0x06 for AAF files, 0x7F for XML files. The value normally used in metadata registries is also the value 0x7F – which indicates that the group UL Registry byte value must be assigned based on the encoding of the file where the group UL is used. The Registry value used for element and label ULs is normally 0x01.

5.2 Application Specification Label Hierarchy

The last three bytes (bytes 14/15/16) of the UL remain for the purpose of assigning Universal Label values to metadata items for Application Specifications. An Application Specification is free to allocate values to these final three bytes as necessary to meet the requirements of the Application Specification.

It is standard practice to organize the allocation of Universal Labels into a tree hierarchy where each level of the tree represents a level of organizational division and leaf nodes represent individual metadata labels that will ultimately be used to tag metadata (e.g. in MXF files). This structure is described in ST 335:2012, ST 395:2003, ST 400:2004, and ST 2003:2012. Both RP 210v12:2012 and the AMWA Registry are organized in this way and may be used as working examples.

Application Specifications that simply define one or more additional MXF descriptive metadata tracks, in accordance with EG 42:2004, typically define one or more DM Scheme Labels, one or more specialized DM Framework classes, and individual metadata elements contained by these specialized DM Framework classes. The recommended pattern used to assign Universal Labels in this case is:

1. Use byte 14 to distinguish each DM Scheme label.
2. Use byte 15 to distinguish each DM Framework. A DM Framework is typically clearly associated with a DM Scheme and should “inherit” that scheme’s byte 14 designator.
3. Use byte 16 to distinguish each individual metadata item (element) in each DM Framework. The elements Universal Labels “inherit” bytes 14 and 15 of the UL for the DM Framework that contains them.

This pattern is illustrated in Figure 4.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
06	0E	2B	34	Category	Registry	01	01	OD	01	07	AS Version	AS Number	Scheme	Framework	Element

Figure 4 – Recommended pattern for assigning Universal Labels for Application Specifications that use descriptive metadata tracks in accordance with EG 42:2004. Also see Table 3.

UL Byte Index	Field Name	Description
5	Category	Categorizes the UL as one that identifies individual metadata items (value 1), groups of items (e.g. a class in object oriented sense, value 2), wrappers or containers(value 3), or ULs that are used as labels (value 4). See ST 336:2012.
6	Registry	Identifies the registry in which the UL is defined. See ST 336:2012.
12	AS Version	The first byte of the two by AS Designator. Typically this is used to express the version number of the AS UL values.
13	AS Designator	The second byte of the AS Designator. Typically matches the AS specification number but this is not strictly required.
14	Scheme Designator	Designator for a DM Scheme used by the AS designated by byte 13.
15	Framework Designator	Designator for a DM Framework that is associated with the DM Scheme designated by byte 14.
16	Element Designator	Designator for individual element ULs that are contained by the DM Framework designated by byte 15.

Table 3 – Field descriptions for the Application Specification Universal Label in Figure 4.

AMWA AS-11 and AS-12 follow these recommendations. The AS-12 metadata items are shown in Table 4 for reference.

Item Category	Item Name	Universal Label Byte Number															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
label	DMS_AS_12	06	0e	2b	34	04	01	01	01	0d	01	07	01	0c	01	00	00
group	DMS_AS_12_Framework	06	0e	2b	34	02	53	01	01	0d	01	07	01	0c	01	01	00
element	AS_12_ShimName	06	0e	2b	34	01	01	01	01	0d	01	07	01	0c	01	01	01
element	AS_12_Slate	06	0e	2b	34	01	01	01	01	0d	01	07	01	0c	01	01	02
group	DMS_AS_12_Slate	06	0e	2b	34	04	53	01	01	0d	01	07	01	0c	01	02	00

Table 4 – Universal Labels defined by AS-12, for use in an MXF file, for reference. Byte 12 is the AS Version and always has the value 1 when the ULs are initially assigned to the AS. Byte 13, with value C₁₆ (decimal 13), is the AS Number and matches the specification number in this case. Byte 14, with value 1, is the DM Scheme Designator value for DMS_AS_12. All metadata items in the table are part of this DM Scheme therefore they all share the same byte 14 value. Byte 15, with value 1, is the Framework Designator for DMS_AS_12_Framework. It contains two metadata elements, AS_12_Shimname and AS_12_Slate that share its byte 14 value and assign byte 16, the Element Designation, the values 1 and 2 respectively. The final entry, DMS_AS_12_Slate is a second DM Framework defined by AS 12. It gets the next available Framework Designator value. Note, the unused bytes 15 and 16 in this table are zero valued. Bytes 5 and 6 are assigned values appropriate for use in an MXF file in accordance with ST 335:2007.

5.3 Application Specification UL Registry

Universal Labels used by AMWA Application Specifications are allocated within, and described by, the AMWA Registry. The AMWA Registry organizes the ULs it manages in accordance with ST 335:2012, ST395:2003, ST 400:2004, and ST 2003:2012. The registry structure encodes a tree of values where the leaves of the tree are individual metadata items and nodes that are not leaves identify sub-trees based on the UL designators. The tree organizes the labels based on Item Designator (the last eight bytes, see Figure 1). The SMPTE Header and Designator, the first eight bytes of the UL, are used to identify root nodes in the tree – referred to as a “trunk” in the registry.

Figure 5 is an example of the registry tree structure that is represented in the AMWA Registry that manages the AS ULs. Additional examples may be found in Appendix A.

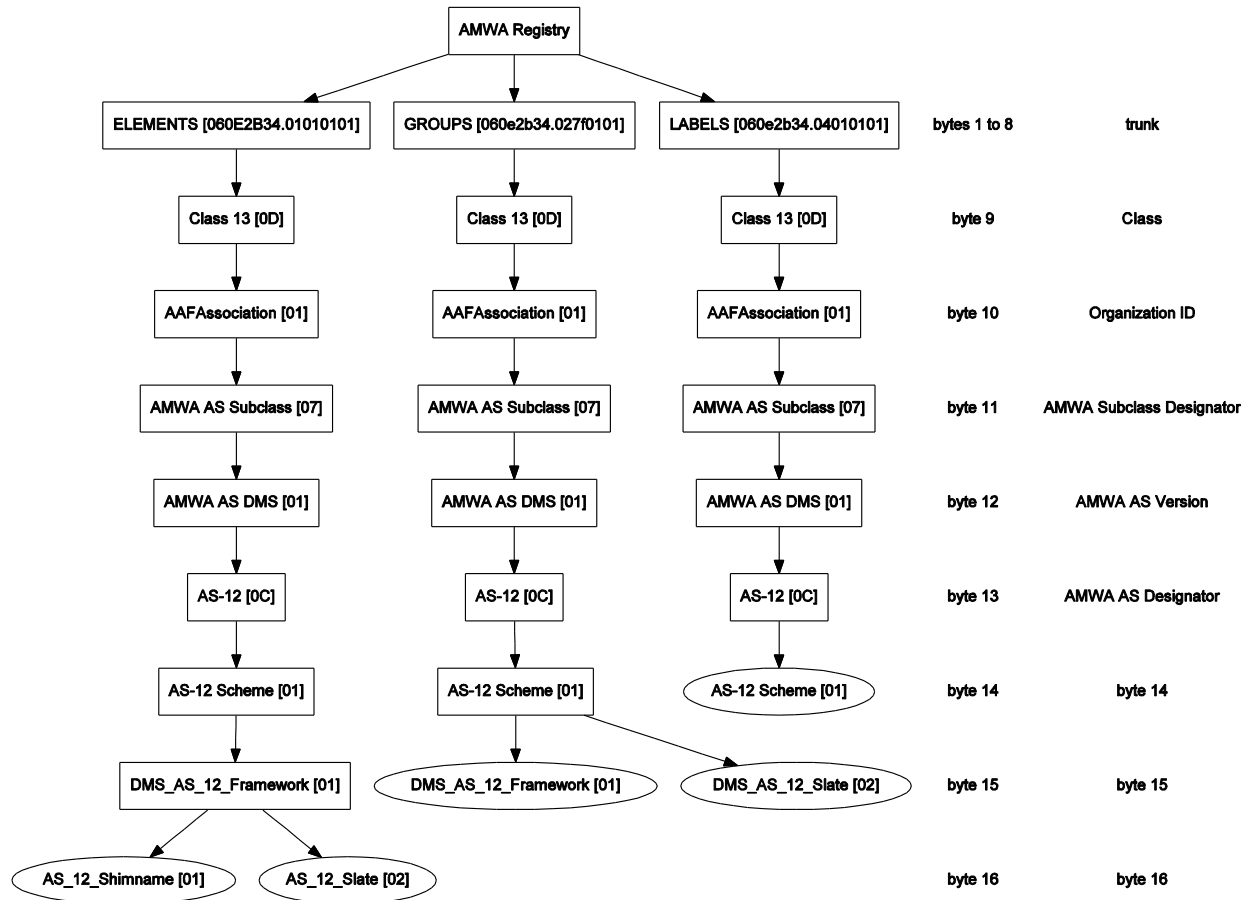


Figure 5 – AS-12 Universal Label definitions illustrated as a tree. The tree leaves are ovals and represent the individual metadata items defined by the AS-12 specification. The rectangular nodes are metadata registry entries that exist for organizational purposes and do not represent metadata items. Bytes 1 to 12 are as defined in Figure 4, with the values from Table 3. Byte 13, the AS Designator, is assigned the value C_{16} (decimal 12 to match the specification number). Bytes 14 to 16 are defined by the AS-12 specification and follow the recommendations of this specification.

6 Legacy Universal Labels (AS-03)

The AMWA AS-03 MXF Program Delivery specification predates this specification. The Universal Label values it defines are known to be incompatible with this specification. The AS-03 labels shall be maintained as-is, without conflict with any other SMPTE Universal Labels that exist in the AMWA Class 13 space. Any new labels created for future revisions of AS-03 shall be created in accordance with this specification.

7 Appendix A

This appendix documents the registry structure of the AS-11 Universal Labels as an additional reference.

Item Category	Item Name	Universal Label Byte Number															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
label	DM_AS_11_Core	06	0e	2b	34	04	01	01	01	0d	01	07	01	0B	01	00	00
group	DM_AS_11_Core_Framework	06	0e	2b	34	02	53	01	01	0d	01	07	01	0B	01	01	00
element	Shim name	06	0e	2b	34	01	01	01	01	0d	01	07	01	0B	01	01	04
element	Programme Title	06	0e	2b	34	01	01	01	01	0d	01	07	01	0B	01	01	02
label	DM_AS_11_Segmentation	06	0e	2b	34	04	01	01	01	0d	01	07	01	0B	02	00	00
group	DM_AS_11_Segmentation_Framework	06	0e	2b	34	02	53	01	01	0d	01	07	01	0B	02	01	00
element	Part Number	06	0e	2b	34	01	01	01	01	0d	01	07	01	0B	02	01	01
element	Part Total	06	0e	2b	34	01	01	01	01	0d	01	07	01	0B	02	01	02

Table A.1 – AS-11 DM Scheme and DM Framework ULs and select element ULs, for use in an MXF file. AS-11 demonstrates an Application Specification that includes more than one scheme and framework.

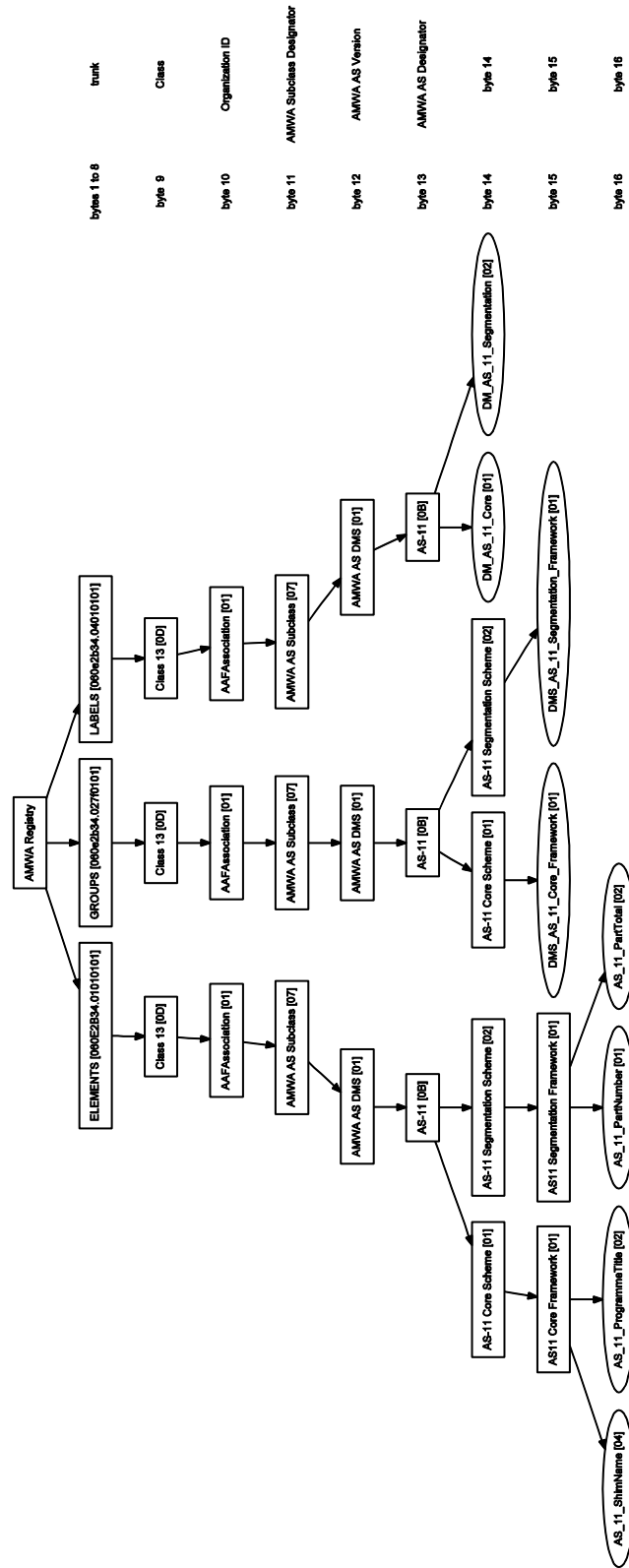


Figure A.1 – AS-11 UL registry tree structure of the UL shown in Table A.1.

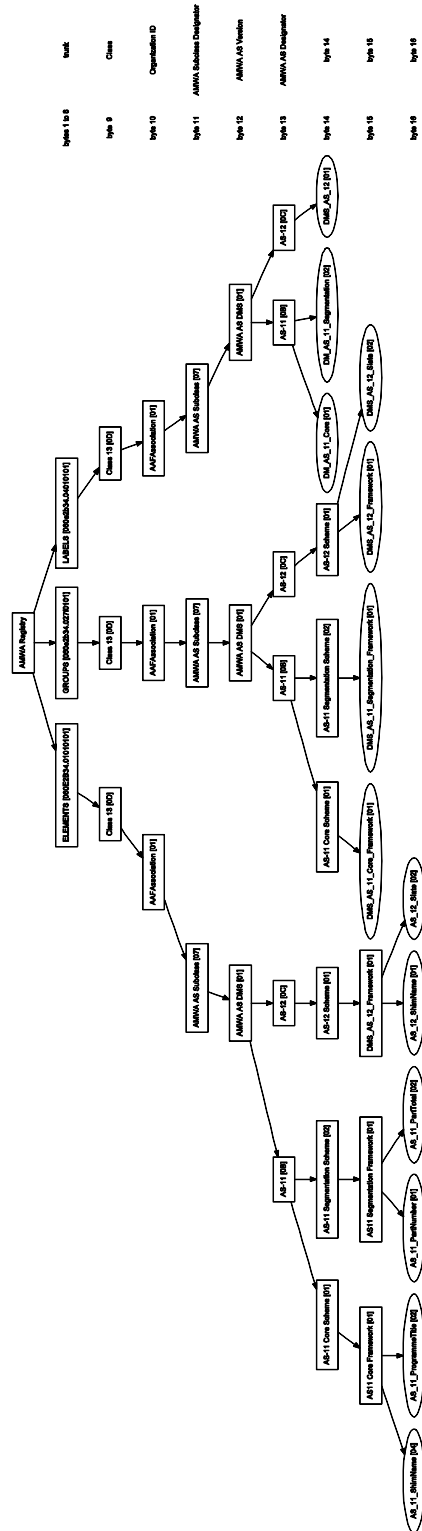


Figure A.2 – Combined AS-11 and AS-12 UL registry tree showing the relationship between the two in the UL registry.