SMPTE STANDARD

Interoperable Master Format – Dynamic Metadata for Color Volume Transform (DMCVT) Plug-in

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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 its Standards Operations Manual. This SMPTE Engineering Document was prepared by Technology Committee 35PM.

Intellectual Property

At the time of publication no notice had been received by SMPTE claiming patent rights essential to the implementation of this Engineering Document. However, attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. SMPTE shall not be held responsible for identifying any or all such patent rights.

Introduction

This section is entirely informative and does not form an integral part of this Engineering Document.

This standard specifies an IMF application plug-in mechanism to allow the carriage of Dynamic Metadata for Color Volume Transform (DMCVT) as specified by SMPTE ST 2094-2. This standard defines a specialized data essence track file, an associated virtual track for compositions to reference and the required constraints. The resulting DMCVT track file can be added to any compatible IMF Application. The structure of this document can serve as a template for future extrinsic timeline metadata extensions.

1 Scope

This Standard specifies a method for adding Dynamic Metadata for Color Volume Transform (DMCVT) as specified in SMPTE ST 2094-2 to IMF Applications.

This standard defines:

- a DMCVT track file to carry DMCVT metadata as specified in SMPTE ST 2094-2;
- a DMCVT virtual track.

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; then formal languages; then figures; and then any other language forms.

3 Normative References

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

SMPTE ST 2067-2:2016, Interoperable Master Format – Core Constraints

SMPTE ST 2067-3:2016, Interoperable Master Format – Composition Playlist

SMPTE ST 2094-2:2017, Dynamic Metadata for Color Volume Transform – KLV Encoding and MXF Mapping

World Wide Web Consortium (W3C) (26 November 2008). Extensible Markup Language (XML) 1.0 (Fifth Edition)

World Wide Web Consortium (W3C) (8 December 2009). Namespaces in XML 1.0 (Third Edition)

World Wide Web Consortium (W3C) (28 October 2004). XML Schema Part 1: Structures (Second Edition)

World Wide Web Consortium (W3C) (28 October 2004). XML Schema Part 2: Datatypes (Second Edition)

4 XML Schema Definitions

This section shall apply whenever a data structure is specified using XML schema definitions as specified in W3C XML Schema Part 1: Structures and W3C XML Schema Part 2: Datatypes.

In order to avoid duplication between text and schema, the cardinality and default values of elements are specified in the schema definitions only.

In the event of a conflict between schema definitions and the prose, the prose shall take precedence.

5 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

5.1 DMCVT

Dynamic Metadata for Color Volume Transform, as defined in SMPTE ST 2094-2.

6 DMCVT Track File

6.1 General

A DMCVT Track File shall conform to section 5.1 of SMPTE ST 2067-2 and section 6 of this document.

6.2 Wrapping

The DMCVT Track File shall conform to section 7 of SMPTE ST 2094-2.

Note: A DMCVT Track File contains a single, frame-wrapped, Essence Container that contains SMPTE ST 2094 metadata sets as specified in SMPTE ST 2094-2, and a single essence track described by a single Data Essence Descriptor. The essence comprises DMCVT Application Sets for one ST 2094 Application only, and all such Sets have the same set key, same application number, and same application version as specified.

7 DMCVT Virtual Track

A Composition as defined in SMPTE ST 2067-3 that reference DMCVT metadata shall contain one or more DMCVT Virtual Tracks.

Each DMCVT Virtual Track shall consist of one or more instances of DMCVTSequence elements as specified in Table 1.

Table 1 – DMCVTSequence Element Schema Definition

```
<xs:schema
  targetNamespace="http://www.smpte-ra.org/ns/2067-200/2018"
  xmlns:cpl="http://www.smpte-ra.org/schemas/2067-3/2016"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified"
  attributeFormDefault="unqualified">
  <xs:import namespace="http://www.smpte-ra.org/schemas/2067-3/2016" />

  <xs:element name="DMCVTSequence" type="cpl:SequenceType"/>
</xs:schema>
```

Each DMCVTSequence element shall contain Resource elements of type TrackFileResourceType as defined in SMPTE ST 2067-3, each Resource element referencing a single DMCVT Track File.

The Edit Rate of a DMCVT Virtual Track shall be equal to the Edit Rate of the Main Image Virtual Track as defined in SMPTE ST 2067-2.

A DMCVT Virtual Track shall reference DMCVT Track Files with identical value for the Data Essence Coding item as specified by SMPTE ST 2094-2 section 7.4.

Annex A XML Schema (Informative)

This specification is accompanied by the following element, which is an XML schema document as specified in XML Schema Part 1: Structures.

st2067-200a-2018.xsd

This element collects the XML schema definitions defined in this specification. It is informative and, in case of conflict, this specification takes precedence.

Annex B CPL Examples for DMCVT Usage (Informative)

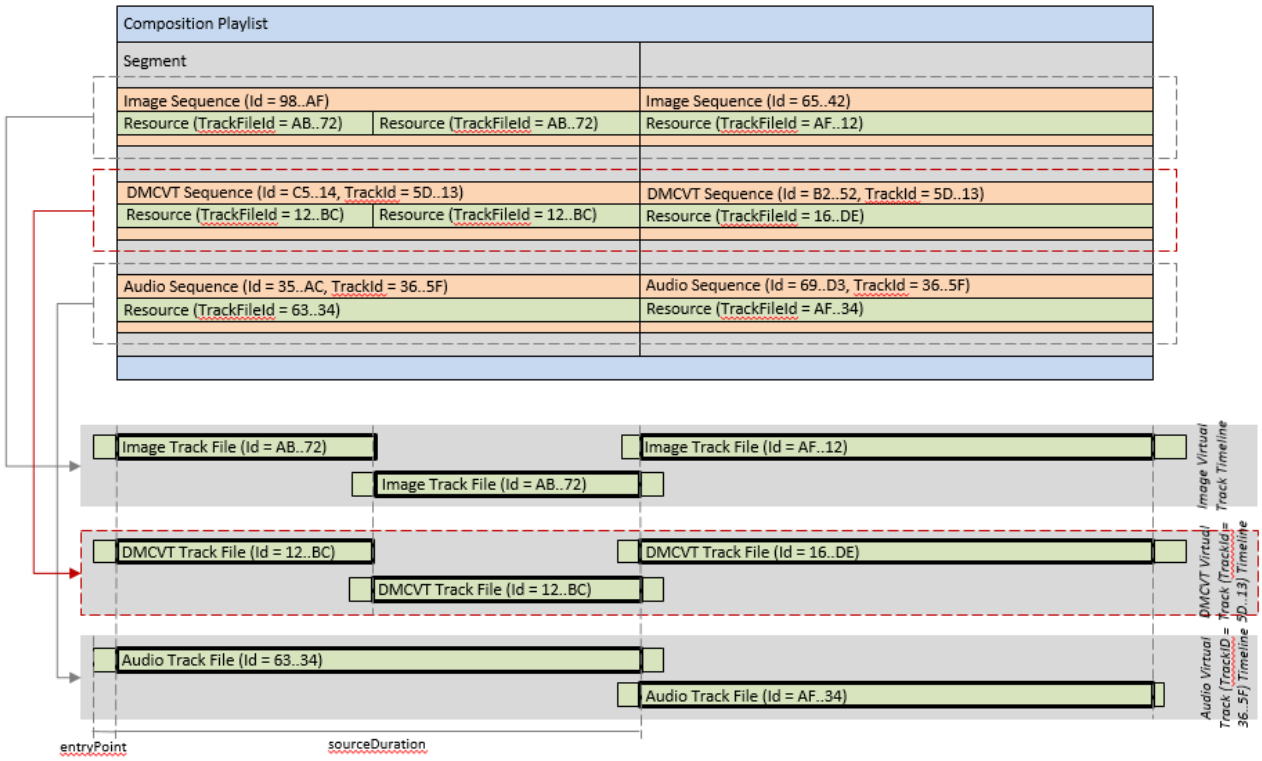

Figure 1. Sample CPL using DMCVT track files following Main Image Virtual Track
Only the first and last bytes of UUIDs are represented.

A Composition timeline using a DMCVT Virtual Track referencing two DMCVT track file is illustrated in Figure 1. In this example, the editorial structure of the DMCVT resources in the DMCVT Virtual Track timeline follows exactly the editorial structure of the Image resources in the Image Virtual Track timeline.

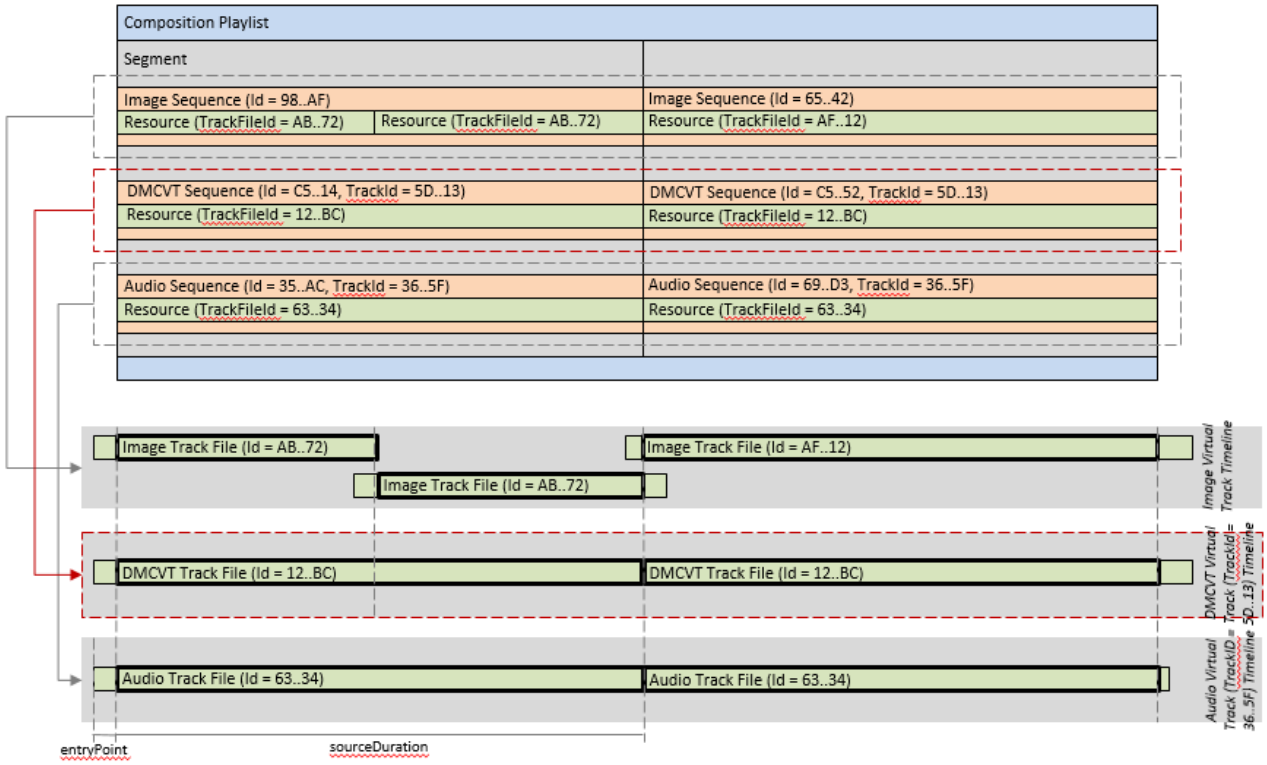

Figure 2. Sample CPL using a single compiled DMCVT track file
Only the first and last bytes of UUIDs are represented.

A Composition timeline using a DMCVT Virtual Track referencing a single compiled DMCVT track file is illustrated in Figure 2. In this example, the DMCVT track file is a single compiled or assembled data track similar to the audio track file. The editorial structure of the DMCVT resources in the DMCVT Virtual Track timeline follow exactly the editorial structure of the Audio Virtual Track timeline.