SMPTE ST 2067-3:2016
Revision of
SMPTE ST 2067-3:2013

SMPTE STANDARD

Interoperable Master Format — Composition Playlist

Table of Contents

Page

Approved
May 18, 2016

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 Operations Manual.

SMPTE ST 2067-3 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.

The IMF is an interoperable file-based framework designed to facilitate the management and processing of multiple content versions (airline edits, special edition, languages…) of the same high-quality finished work (feature, episode, trailer, advertisement, etc) destined for distribution channels worldwide. Each content version is embodied in a composition, which combines metadata and essence.

The Composition Playlist defines the playback timeline for the Composition and includes metadata applicable to the Composition as a whole. It is a human-readable structure expressed using XML and specified using XML Schema. It includes multiple extension points supporting both backward- and forward-compatibility.

The Composition Playlist is not designed to contain essence but rather reference external Track Files that contain the actual essence. This allows multiple compositions to be managed and processed without duplicating the essence in common. For convenience, metadata contained in the Track Files is exposed in the Composition Playlist (see Section 6.1.10.)

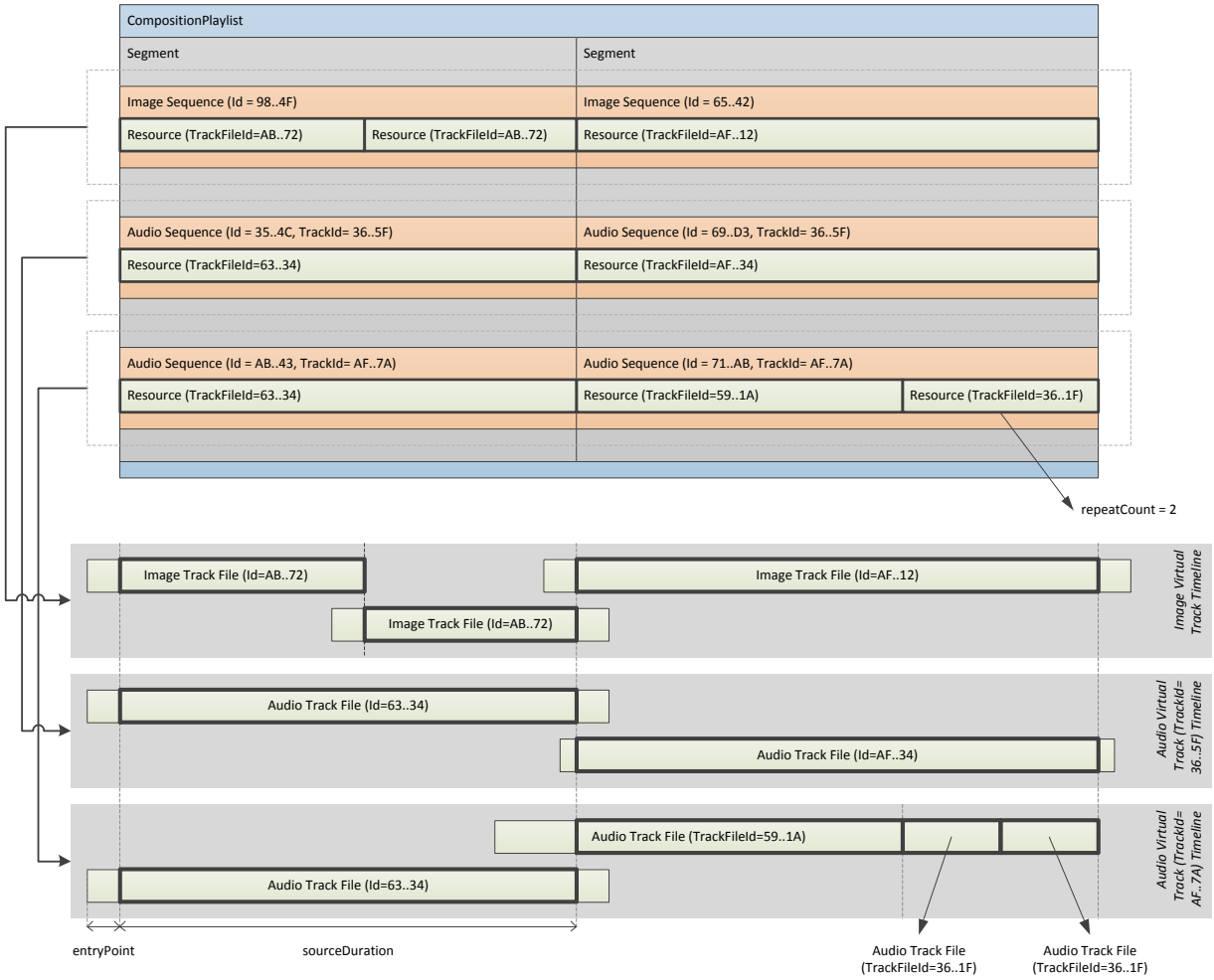

Figure 1 – Sample Monoscopic Composition Playlist
Only the first and last bytes of UUIDs are represented.

The Composition timeline[1] is illustrated in Figure 1. It consists of a list of Segments that are reproduced sequentially and without gaps. The number of Segments and the duration of each Segment are determined by the content provider to fit both the particular workflow and content type. For example, a Segment can be the same duration as a reel or it can be the running time of a television program between commercials. Each Segment consists of a list of Sequences that are played in parallel and have the same duration. Each Sequence is associated with a single kind of essence or metadata and consists of a list of Resources that are reproduced sequentially.

Each Resource references a playable region of essence (audio, image, data, etc.) or metadata contained in an underlying Asset. The Composition timeline makes no assumption on the format of the asset, other than its ability to reproduce essence or metadata in the playable region.

[1] The Composition Playlist does not use timecode to synchronize Assets but defines a canonical synthetic timecode, which implementations can use.

Assets will typically be external Track Files, which can be referenced by multiple Resources, within and outside a particular Track. In Figure 1, Audio Track File Id=63..34 is referenced by Audio Sequences Id= 35..4C and Id=AB..43. Image Track File Id=AB..72 is referenced twice within the first Image Sequence. A Track File can be repeated multiple times within a single Resource. This allows, for instance, gaps in Audio Tracks to be filled by repeating a Track File containing a few samples of silence. If an Asset contains a very small amount of XML information and is referenced by a single Resource, it can be included directly within the Composition Playlist structure, e.g. see MarkerResourceType in Section 6.13.

The Composition Playlist does not define any form of transition or overlap between resources. In other words, the essence contained in Assets is prepared for artifact-free reproduction across these boundaries.

Temporal offsets and durations on the Composition timeline are expressed as integer multiples of Edit Units, the smallest temporal increment accessible on the timeline and the inverse of the Edit Rate. Edit Rates and Edit Units can be defined independently for the Composition and each Resource. The Composition Edit Rate will generally correspond to the image frame rate.

To support a range of applications within its stated scope, the Composition Playlist allows flexibility in the nature and structure of Sequences, Resources and Track Files. Applications are therefore expected to constrain these characteristics to fit their respective requirements. Similarly, the method by which essence is wrapped in an Asset is left to the specification defining the Asset.

1 Scope

This standard specifies the Composition Playlist (CPL) for the Interoperable Master Format (IMF). The Composition Playlist is a representation of a single version of a finished IMF composition (feature, episode, trailer, advertisement, etc). It contains the information necessary to describe the composition and synchronize its underlying essence; e.g., for playout or transcoding. It is an extensible, human-readable structure designed for file-based operations.

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

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 recommended practice are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

[1)] [SMPTE ST 12-1:2008] SMPTE ST 12-1:2008, Television — Time and Control Code

[SMPTE ST 433] SMPTE ST 433:2008 D-Cinema — XML Data Types