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Digital cinema (D-cinema) packaging —

Part 7: Composition playlist

Emballage du cinéma numérique (cinéma D) —

Partie 7: Liste d'écoute de composition

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

ISO 26429-7 was prepared by the Society of Motion Picture and Television Engineers (as SMPTE 429-7-2006) and was adopted, under a special “fast-track procedure”, by Technical Committee ISO/TC 36, *Cinematography*, in parallel with its approval by the ISO member bodies.

ISO 26429 consists of the following parts, under the general title *Digital cinema (D-cinema) packaging*:

— *Part 3: Sound and picture track file*

— *Part 4: MXF JPEG 2000 application*

— *Part 6: MXF track file essence encryption*

— *Part 7: Composition playlist*

Introduction

This International Standard comprises SMPTE 429-7-2006 and the following informative notes.

— Table 2 (Content Kind): Business arrangements by national practice determine what is inclusive in the definition of a “feature”.

— Table 4 (Standard Marker Labels): An additional marker called “First Frame Lights On” (FFLO), which could be used by the production company to indicate an appropriate position within the end credits to turn on the lights, is optionally available and has been proposed for incorporation into SMPTE 429-7.

The International Organization for Standardization (ISO) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent.

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SMPTE 429-7-2006

SMPTE STANDARD

D-Cinema Packaging — Composition Playlist

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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.

Proposed SMPTE Standard 429-7 was prepared by Technology Committee DC28.

1 Scope

This document specifies the Composition Playlist structure. The Composition Playlist is a self-contained representation of a single complete D-Cinema work, such as a motion picture, or a trailer, or an advertisement, etc. The Composition Playlist consists of an ordered sequence of Reel structures, each referencing a set of external Track Files, e.g. a sound or picture Track File, which are meant to be reproduced in parallel. Each Reel is analogous to a film reel and the Composition Playlist controls the order and timing of the playout of the Reels.

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.

World Wide Web Consortium (W3C) (2004, February 4). Extensible Markup Language (XML) 1.0 (Third Edition).

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

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

World Wide Web Consortium (W3C) (2002, February 12). XML-Signature Syntax and Processing.

Internet Engineering Task Force (IETF) (1996, November). RFC 2045 – Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies.

Internet Engineering Task Force (IETF) RFC2046 (November 1996) Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types.

Internet Engineering Task Force (IETF) (1996, November). RFC 2396 – Uniform Resource Identifiers (URI): Generic Syntax.

Internet Engineering Task Force (IETF) (2001, September). RFC 3174 – US Secure Hash Algorithm 1 (SHA-1).

Internet Engineering Task Force (IETF) (1997, May) RFC 2141 – URN Syntax.

Internet Engineering Task Force (IETF) (2001, April) RFC 4051 – Additional XML Security Uniform Resource Identifiers (URIs).

Internet Engineering Task Force (IETF) (2005, July). RFC 4122 – A Universally Unique Identifier (UUID) URN Namespace.

3 Overview

A composition, depicted in Figure 1, is a self-contained representation of a single complete D-Cinema work, such as a motion picture, or a trailer, or an advertisement, etc. It tangibly consists of a Composition Playlist file and one or more track files which contain the actual essence. Specifications of track file formats are beyond the scope of this document.

A Composition Playlist (CPL) is a document which specifies the manner in which track files are rendered. A CPL represents a composition as an ordered sequence of *Reels*. Each Reel contains one or more Assets, which identify Track File segments to be reproduced in parallel. In other words, it specifies the assembly of track files both in parallel, e.g. sound with picture, and in sequence; e.g., Reel 2 after Reel 1. The Composition Playlist is typically created under editorial control in the mastering environment and is then included in the D-Cinema package distributed to exhibition.

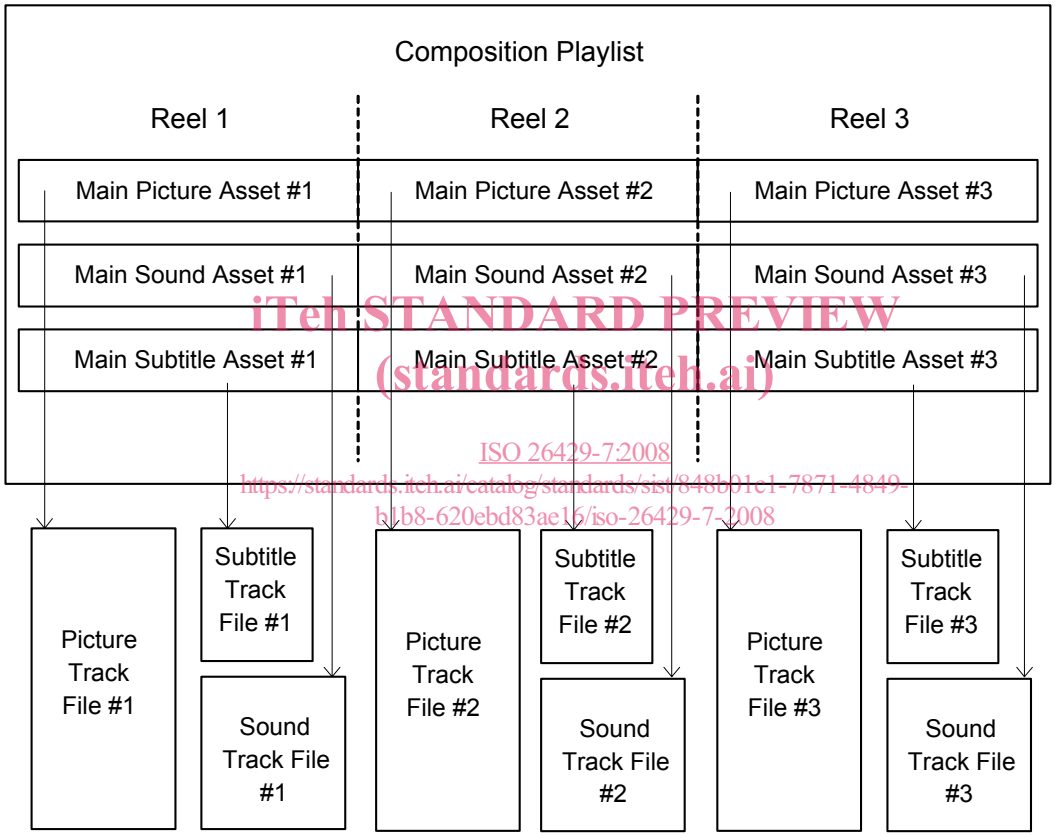

Figure 1 – Prototypical Composition Playlist

The structures defined in this document are represented using the Extensible Markup Language (XML) [XML 1.0], and specified using XML Schema [XML Schema Part 1: Structures] and [XML Schema Part 2: Datatypes]. This specification shall be associated with a unique XML namespace name [Namespaces in XML]. The namespace name shall be the string value "`http://www.smpte-ra.org/schemas/429-7/2006/CPL`". This namespace name conveys both structural and semantic version information, and serves the purpose of a traditional version number field.

Table 1 lists the XML namespace names used in this specification. Namespace names are represented as Uniform Resource Identifier (URI) values [RFC 2396]. These values shall be considered as simple strings, and applications should not attempt to resolve them as URLs.

Table 1 – XML Namespaces

Qualifier	URI
cpl	http://www.smpte-ra.org/schemas/429-7/2006/CPL
xs	http://www.w3.org/2001/XMLSchema
ds	http://www.w3.org/2000/09/xmldsig

The namespace qualifier values (*namespace prefixes* in XML jargon) used in this document (`cpl, xs, ds`), are not normative values. Implementations shall perform correctly with any XML compliant namespace prefix value that is associated with a URI from table 1.

Datatypes from other schemas that are used in this document will be prefixed with the appropriate namespace qualifier (e.g., `xs:dateTime`). See [XML Schema Part 2: Datatypes] and [XML-Signature Syntax and Processing] for further information about these types.

The MIME type [IETF RFC 2046] for a document containing a single Composition Playlist element as its root shall be `"text/xml"`.

4 Terminology

The following terms are used to describe the features of this standard.

Clip: A contiguous set of Editable Units intended to be reproduced sequentially.

Composition: A complete artistic or informational motion picture work, such as a feature, or a trailer, or an advertisement, etc.

Editable Unit: The smallest temporal increment of access to Essence, e.g. a *frame* or a *sample*.

Edit Rate: A number of Editable Units to be reproduced during a temporal interval having a duration of exactly one (1.0) second. Because Edit Rate values are not always integer values and sometimes require many digits of precision, Edit Rate values are expressed as a rational number (the ratio of two integers).

Essence: The sound, picture and data resources that make up a Composition.

Native Duration: The total number of Editable Units in a Track File.

Native Start Point: The first Editable Unit of a Track File. All Track Files are viewed by a Composition Playlist as a sequence of Editable Units numbered from 0 (zero). Consequently, the Editable Unit number of the Native Start Point of a Track File will always be 0 (zero).

Native End Point: The last Editable Unit of a Track File.

Playable Region: The set of Editable Units within a Track File that are intended to be reproduced as part of a Composition. A Track File may contain Editable Units before and/or after the Playable Region.

Track File: A file containing a single Clip of simple Essence, such as sound, picture or subtitle essence.

Sample Rate: The number of essence samples per second. Sample Rate values are expressed as a rational number (the ratio of two integers).

Frame Rate: The number of frames per second. Frame Rate values are expressed as a rational number (the ratio of two integers).

Rational Number: A number value that is expressed as the ratio of two integers. This provides for the definition of precise values that are not subject to the inaccuracies of floating point representation.

5 Synchronization

The Composition Playlist defines an idealized playback timeline. As depicted in Figure 2, the timeline consists of a sequence of contiguous Reels. A Reel defines a temporal segment of the composition and consists of a set of single-essence Assets.

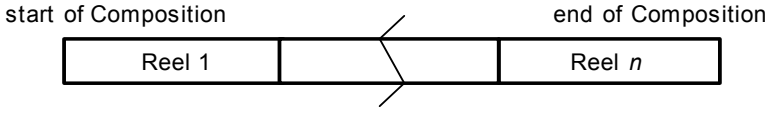

Figure 2 – Composition timeline

An Asset identifies a segment of a Track File to be reproduced in parallel with the other Assets in the same Reel. The Asset's Entry Point and Duration parameters define the sequence of Editable Units within the Track File that is to be reproduced (the Playable Region). For a given time offset T from the start of the Reel, the corresponding time offset T_n within a Track File F shall be equal to $(EntryPoint_F / EditRate_F) + T$. Editable Units across Track Files aligned with the same time offset T are synchronized and shall be reproduced simultaneously. Figure 3 illustrates the timing relationship between Assets within a Reel.

Figure 3 – Timing relationships within a Reel

At the start of a given Reel, playback of all Assets contained within the Reel shall start simultaneously at the Entry Point given for each respective Track File. The duration of a Reel shall be equal to the duration of the Reel's `MainPicture` Asset, or the Asset with the shortest duration if the `MainPicture` Asset is not present.

The Assets within each Reel shall be in editorial sync. In other words, the Composition Playlist timeline shall not compensate[1] for any processing delay that may occur in the exhibition environment, such as the internal image processing delay in a projector, and shall reflect the same time relationships the editor intended the audience to observe in exhibition.

[1] Any compensation for essence delay through the exhibition equipment is to be applied in-theatre, not in the mastering process. Such compensation may be applied by the digital cinema playback system, the cinema sound processor, or some other device.

6 CompositionPlaylist Structure

As depicted in Figure 4, a Composition Playlist shall be represented by a unique XML element, the `CompositionPlaylist` element. The Composition Playlist shall be encoded using the UTF-8 character encoding [XML 1.0].

The `CompositionPlaylist` element is defined using XML Schema in Section 10. The `CompositionPlaylist` element is illustrated in Figure 4 and the individual elements that comprise the `CompositionPlaylist` element are defined in the remaining sub-sections.

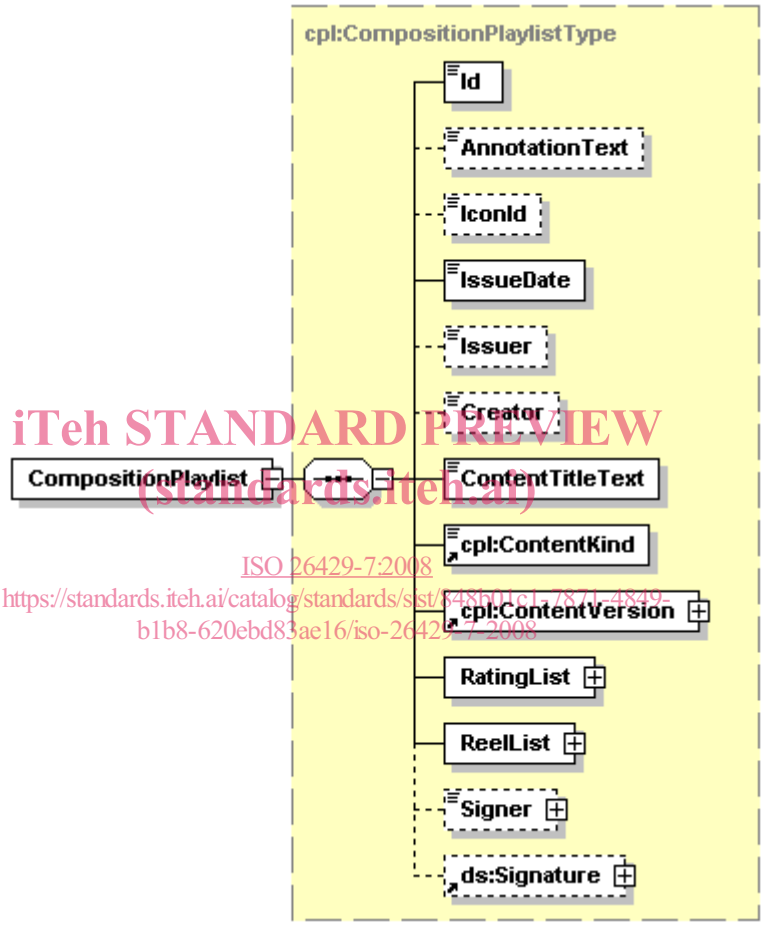

Figure 4 – CompositionPlaylist structure (Dotted lines denote optional elements)

6.1 Id

The Id element uniquely identifies the Composition Playlist for asset management purposes. It shall not uniquely identify the content represented by the composition – see Section 6.9. It shall be encoded as a urn:uuid per [RFC 4122].

6.2 AnnotationText [optional]

The `AnnotationText` element shall be a free-form, human-readable annotation describing the composition. It is meant strictly as a display hint to the user. The optional language attribute is an `xs:language` language

code and indicates the language used for the text. If the language attribute is not present, the default value `en` shall be used.

6.3 IconId [optional]

The `IconId` element uniquely identifies an external image resource containing a picture icon illustrating the composition. The icon may be rendered, for instance, from a frame of the underlying content. The `IconId` element shall be encoded as a `urn:uuid` per [RFC 4122]. The mapping of UUID values to actual image resources is beyond the scope of this document.

6.4 IssueDate

The `IssueDate` element shall be used to define the time and date at which the Composition Playlist was issued. It may be displayed to the user. It shall be encoded as an `xs:dateTime`.

6.5 Issuer [optional]

The `Issuer` element shall be a free-form, human-readable annotation that shall identify the entity that created the Composition Playlist. It is meant strictly for display to the user. The optional `language` attribute is an `xs:language` language code and indicates the text language of the content of the element. If the `language` attribute is not present, the default value `en` shall be used.

6.6 Creator [optional]

The `Creator` element shall be a free-form, human-readable annotation that shall identify the application used to create the Composition Playlist. It is meant strictly for display to the user. The optional `language` attribute is an `xs:language` language code and indicates the text language of the content of the element. If the `language` attribute is not present, the default value `en` shall be used.

6.7 ContentTitleText

The `ContentTitleText` element shall contain a human-readable title for the composition, e.g. *The Jazz Singer*. It is strictly meant as a display hint to the user. The optional `language` attribute is an `xs:language` language code and indicates the language of the content of the element. If the `language` attribute is not present, the default value `en` shall be used.

6.8 ContentKind

The `ContentKind` element defines the kind of material referred to by the Composition Playlist. It is meant to be both human and machine-readable. An optional `scope` attribute with default URI value `http://www.smpte-ra.org/schemas/429-7/2006/CPL#standard-content` determines the permissible values of the element. If the `scope` attribute is absent, or set to its default value, the content of the element shall match one of the values listed in Table 2; otherwise the content of the element is outside the scope of this specification but may be displayed to the user.