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Proposed SMPTE Standard

This document is subject to change.

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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 21DC.

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.

Conformance

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.

Introduction

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

D-cinema standards have historically relied on SMPTE ST 377:2004, which was superseded by SMPTE ST 377-1:2019. The latter introduces new features and makes significant editorial improvements over the former.

This document is intended to replace references to SMPTE ST 377:2004, to benefit from the improvements of SMPTE ST 377-1:2019 while retaining compatibility with ST 377:2004. As such this document clarifies, and specifies constraints on, SMPTE ST 377-1:2019 such that: (a) files that conform to this document also conform to SMPTE ST 377:2004, (b) implementations that conform to SMPTE ST 377:2004 require no modifications to process a file that conforms to this document and (c) implementations that conform to SMPTE ST 377:2004 are not expected to process a file that conform to SMPTE ST 377-1:2019 but does not conform to this document.

1 Scope

This document specifies constraints on SMPTE ST 377-1:2019 for use in D-Cinema applications.

2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions of this document. Dated references require that the specific edition cited shall be used as the reference. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

SMPTE ST 377-1:2019, Material Exchange Format (MXF) — File Format Specification

3 Terms and Definitions

For the purposes of this document, the terms and definitions given in SMPTE ST 377-1:2019 and the following apply.

3.1. ProductVersion

comprises 5 values indicating, in order, Major, Minor, Patch (or tweak), Build and Release version numbers

[SOURCE: SMPTE ST 377:2004, 3.3]

NOTE 1: ProductVersion describes the version of the tool that created or modified the file. The specific use of the first four values is defined by the tool. The ‘Release’ number is enumerated as follows: 0 = Unknown version, 1 = Released version, 2 = Development version, 3 = Released version with patches, 4 = Pre-release beta version, 5 = Private version not intended for general release.

NOTE 2: SMPTE ST 377-1:2019 slightly modifies the semantics, but not the syntax, of the Product Version item from that was specified in SMPTE ST 377:2004.

4 General

All requirements specified at SMPTE ST 377-1:2019 shall apply, unless specified otherwise in this document.

5 Constraints

5.1. Minor Version item of the Partition Pack

The Minor Version item of the Partition Pack shall be equal to 2.

NOTE: This signals conformance to SMPTE ST 377:2004.

5.2. Preface Set

5.2.1. Version item

The Version item of the Preface Set shall be equal to 258.

NOTE: This signals conformance to SMPTE ST 377:2004.

5.2.2. Other items

The following items should not be present since they were not specified in SMPTE ST 377:2004:

- Application Schemes Batch; and
- Is RIP Present.

NOTE: These items are not for use in D-Cinema applications.

5.3. UL values in the Primer Pack

Each UID item within the LocalTagEntry Batch of the Primer Pack should be a UL.

NOTE: The encoding of UUID values as UID items is ambiguous in SMPTE ST 377:2004.

5.4. Index Table Segment

The length of each Index Table Segment shall be encoded using 2-byte local length.

NOTE 1: SMPTE ST 377:2004 does not support Index Table Segment lengths encoded as BER local lengths.

The following items should not be present since they were not specified in SMPTE ST 377:2004:

- Single Index Location
- Single Essence Location
- Forward Index Direction

NOTE 2: These items are not for use in D-Cinema applications.

5.5. Filler set

Filler sets, as specified at SMPTE ST 377-1:2019, B.11, shall be not present.

5.6. Metadata Plug-Ins

The following items should not be present since they were not specified in SMPTE ST 377:2004:

- Application Metadata Plug-Ins, as specified in SMPTE ST 377-1:2019, 9.7
- Linked Descriptive Framework Plug-In ID item in an instance of a subclass of Descriptive Framework;
- Linked Descriptive Object Plug-In ID item in an instance of a subclass of Descriptive Object.
- Descriptive Metadata Plug-In ID item in a DM Segment
- Descriptive Metadata Scheme item in a DM Segment; and
- Descriptive Metadata Application Environment ID item in a DM Segment.

NOTE: These items are not for use in D-Cinema applications. SMPTE ST 429-6:2006 defines a Descriptive Metadata Framework that does not use the items specified above.

5.7. Package Marker Objects

Package Marker Objects should not be present since they were not specified in SMPTE ST 377:2004.

NOTE: Package Marker Objects are not for use in D-Cinema applications.

5.8. Interchange Object

The following items should not be present since they were not specified in SMPTE ST 377:2004:

- Object Class; and
- ApplicationPlug-In Batch

NOTE: These items are not for use in D-Cinema applications.

5.9. IndexSID and BodySID values

Encoders should not create files with identical IndexSID and BodySID values.

Files may have IndexSID and BodySID with identical values.

Decoders shall accept files where IndexSID and BodySID have identical values.

NOTE: SMPTE ST 377-1:2019, 6.2.1 allows identical values for files that conform to SMPTE ST 377:2004, but otherwise requires that IndexSID and BodySID have different non-zero values.

5.10. ProductVersion

The semantics of ProductVersion item are defined at 3.1.

NOTE: The semantics of ProductVersion item defined in SMPTE ST 377-1:2019 do not apply.

5.11. Essence Container Data

The following items should not be present since they were not specified in SMPTE ST 377:2004:

- Preceding Index Table
- Singular Partition Usage

- Following Index Table
- Is Sparse

NOTE: These items are not for use in D-Cinema applications.

5.12. Track Name

The following default values for the Track Name item apply:

- "Picture" for Track (picture)
- "Sound" for Track (sound)
- "Auxiliary Data" for Track (data)
- "Descriptive Metadata" for Track (DM)
- "Master Timecode" for Track (time code)
- "Descriptive Metadata" for Event track (DM)
- "Descriptive Metadata" for Static track (DM)

NOTE: SMPTE ST 377:2004 specifies default values for the Track Name item, whereas SMPTE ST 377-1:2019 does not.

5.13. Generic Picture Essence Decriptor

The following items should not be present since they were not specified in SMPTE ST 377:2004:

- Coding Equations; and
- Color Primaries

NOTE 1: The above items are not for use in D-Cinema applications.

The default value of the Transfer Characteristic item is ambiguous.

NOTE 2: SMPTE ST 377:2004 specified conflicting default values for the Transfer Characteristic item (named Capture Gamma in SMPTE ST 377:2004).

5.14. Best Effort properties

The following Best Effort properties may be absent:

- Video Line Map property of Generic Picture Essence Descriptor
- Duration property of DM Segment

NOTE: SMPTE ST 377:2004 and SMPTE ST 377-1:2019 diverge in their respective definitions of Best Effort properties. Whereas the former merely recommend that Best Effort properties be present, the latter requires that Best Effort properties be present. In all cases, the processing of Best Effort properties by decoders are subject to their individual requirements, independently of the definition of Best Effort.

6 Clarifications (informative)

6.1. Array syntax

SMPTE ST 377-1:2019, 6.2.1 clarifies that an Array value includes a header of 8 bytes, followed by the Array elements.

6.2. Ordering of Set Items syntax

SMPTE ST 377:2004 and SMPTE ST 377-1:2019 do not necessarily list Structural Metadata Sets items in the same order. Such ordering however does not impact conformance since the ordering of items is arbitrary when encoding Structural Metadata Set and items are instead located using their respective local tag.

EXAMPLE: Among possibly other items, the order of the following items differs between SMPTE ST377-1:2019 and SMPTE ST 377:2004:

- Duration item in DM Segments and in SourceClip Sets
- GenerationUID item in Essence Container Data Set and in Generic Package Set
- Sequence item in Track (picture), Track (sound), Track (data), Track (time code), and Track (DM)
- Rounded Time Code Base and Start Time Code items in Time Code Component Set

6.3. Linked Package UID

SMPTE ST 377-1:2019 specifies that the type of the Linked Package UID item is Package Reference (PackageRef), which is implemented in MXF using a basic UMID.

NOTE: SMPTE ST 377:2004 explicitly specifies that the type of the Linked Package UID item is UMID.

6.4. Timeline track class names

As illustrated in Table 1, SMPTE ST 377:2004 and SMPTE ST 377-1:2019 use different timeline track class names. The underlying Set Keys are however identical.

Table 1. Correspondence between Timeline Track Class Names.

SMPTE ST 377-1:2019	SMPTE ST 377:2004
Timeline Track (Picture)	Track (picture)
Timeline Track (Sound)	Track (sound)
Timeline Track (Data)	Track (data)
Timeline Track (DM)	Track (DM)
Timeline Track (Timecode)	Track (time code)

6.5. Set Item names

The names of Structural Metadata Sets items occasionally diverge between SMPTE ST 377:2004 and SMPTE ST 377-1:2019.

These names affect neither file nor implementation conformance: it is the unique UL associated with each of these items that is used in the processing of the files.

The definitive definition of names for Structural Metadata Sets items is specified in SMPTE ST 2123.

EXAMPLE:

- Sound Essence Compression in SMPTE ST 377:2004 is named Sound Essence Coding in SMPTE ST 377-1:2019
- Capture Gamma in SMPTE ST 377:2004 is named Transfer Characteristic in SMPTE ST 377-1:2019

Bibliography (Informative)

SMPTE ST 2123, SMPTE Metadata Registers

SMPTE ST 429-6:2006, D-Cinema Packaging — MXF Track File Essence Encryption

NOTE: SMPTE ST 429-6:2006 Am1:2018 is not appropriate for use with this document.