MPEG Interoperability Initiative: Composition Playlist Specification

Application Specification for Digital Cinema Packaging (AS-DCP)

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Contents

Composition Playlist
Application Specification for Digital Cinema Packaging (AS-DCP)

1   Scope

This document specifies the d-cinema composition playlist in the context of the overall Application Specification for Digital Cinema Packaging (AS-DCP).

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.

[DSIG] World Wide Web Consortium (W3C) (2002, February 12). *XML-Signature Syntax and Processing* [WWW document]. URL http://www.w3.org/TR/2002/REC-xmldsig-core-20020212/

[MIME] Internet Engineering Task Force (IETF) (1996, November). *Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies* [WWW document]. URL http://www.ietf.org/rfc/rfc2045.txt

The Internet Engineering Task Force (IETF) RFC2046 (November 1996) *Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types* URL http://www.ietf.org/rfc/rfc2046.txt

[XSCH] XML Schema 1.0, W3C Recommendation, [2 May 2001]. http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/

[SHA1] Internet Engineering Task Force (IETF) RFC3174 (September 2001) "*US Secure Hash Algorithm 1*" http://www.ietf.org/rfc/rfc3174.txt

[XML] World Wide Web Consortium (W3C) Recommendation (06 October 2000). *Extensible Markup Language (XML)* http://www.w3.org/TR/2000/REC-xml-20001006

[UUID] The Internet Engineering Task Force (IETF), *A UUID URN Namespace* [WWW document]. URL http://www.ietf.org/internet-drafts/draft-mealling-uuid-urn-03.txt (update)

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 consists of a composition playlist and a number of track files, which contain the actual essence. Track files are specified in other documents.

A composition playlist specifies the manner in which track files are rendered and is an ordered sequence of reels, each mimicking a film reel. It is associated with a number of track files, which are 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 included in the d-cinema package distributed to exhibition.
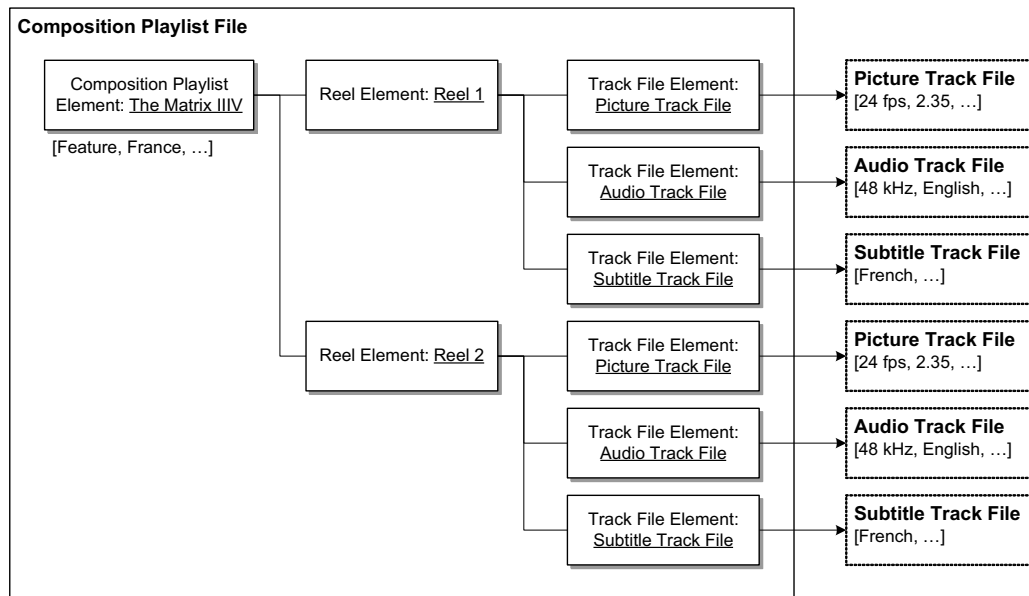

Figure 1. Prototypical Composition Playlist.

The structures defined in this document are represented using the XML language [XML], and specified using the W3C schema language [XSCH]. This version of the specification is associated with a unique XML namespace, namely `http://www.digicine.com/PROTO-ASDCP-CPL-20040511#`. This namespace conveys both structural and semantic version information, and serves the purpose of a traditional version number field. Table 1 lists the XML namespaces used in this specification [XNAM].

Table 1. XML Namespaces.

Qualifier	URI
cpl	http://www.digicine.com/PROTO-ASDCP-CPL-20040511#
xs	http://www.w3.org/2001/XMLSchema
ds	http://www.w3.org/2000/09/xmldsig#

The MIME type for a document containing a single Composition Playlist element shall be `text/xml;asdcpKind=CPL`.

4   CompositionPlaylist Structure

As depicted in Table 2, a composition playlist is represented by a unique XML element, the CompositionPlaylist element. In order to simplify parsing, the composition playlist must be encoded using the UTF-8 character encoding scheme [XML].

4.1   Id
The Id parameter uniquely identifies the composition for asset management purposes. It is encoded as a UUID [UUID].

4.2   AnnotationText [optional]

The AnnotationText parameter is a free-form, human-readable annotation describing the composition. It is meant strictly as a display hint to the user. Unless the optional language attribute is specified, the content of the field is English.

Table 2. CompositionPlaylist structure.

Parameter	Description
Id	Unique identifier for asset management purposes.
AnnotationText	Human-readable description of the composition.
IconId	Unique identifier for an icon illustrating the composition.
IssueDate	Date and time of creation of the composition.
Issuer	Entity that created the composition
Creator	System that created the composition
ContentTitleText	Human-readable title of the composition.
ContentKind	Kind of content contained in the composition, e.g. trailer, feature…
+*ContentVersion*	Identifies the version of the composition, e.g. different markets, locale or edits.
+RatingList	List of ratings, e.g. PG.
+ReelList	List of reels.
+*Signer*	Identifies the entity signing the composition.
+*Signature*	Digital signature from the signer.
Parameters prefixed by a plus (+) sign are complex parameters, which contain nested parameters. *Parameters in italic type* are optional parameters.	

4.3   IconId [optional]

The IconId parameter uniquely identifies an external file containing a picture icon illustrating the composition. It is encoded as a UUID. The icon may be rendered, for instance, from a frame of the underlying content.

4.4   IssueDate

The issue-date parameter indicates the time and date at which the composition was issued. It may be displayed to the user.

4.5   ContentTitleText

The ContentTitleText parameter contains a human-readable title for the composition, e.g. When Pigs Will Fly II. It is strictly meant as a display hint to the user. Unless the optional language attribute is specified, the content of the field is English.

4.6 Issuer

The *Issuer* parameter is a free-form, human-readable annotation describing the person or company who has created the packing list. It meant strictly as a displayed guidance for the user.

4.7 Creator

The *Creator* parameter is a free-form, human-readable annotation describing the system (hardware/software) used to create the packing list. It meant strictly as a displayed guidance for the user.

Table 3. Content Kind.

Kind	Description
feature	A theatrical feature.
trailer	Short (2 to 3 minutes) content promoting an upcoming theatrical feature.
test	Content used to test, calibrate or setup d-cinema exhibition equipment.
teaser	Very short (less than 1 minute) content promoting an upcoming theatrical feature.
rating	Slate/still picture indicating the recommended age group permitted to view the content to follow. This rating is generally unique per country.
advertisement	Content promoting a product or service other than an upcoming feature.
short	Non advertising/promotional content (3 to 15 minutes) typically before a theatrical feature.
transitional	Extremely short content (1 to 15 seconds) separating unrelated compositions.
psa	Public service announcement.
policy	Content defining the code of conduct for patrons.

4.8   ContentKind

The ContentKind parameter describes the kind of material referred to be the composition playlist. It is meant both as a display hint to the user and a machine-interpretable for scheduling content. Unless its scope attribute is set, the content of the parameter must match one of the values listed in Table 3.
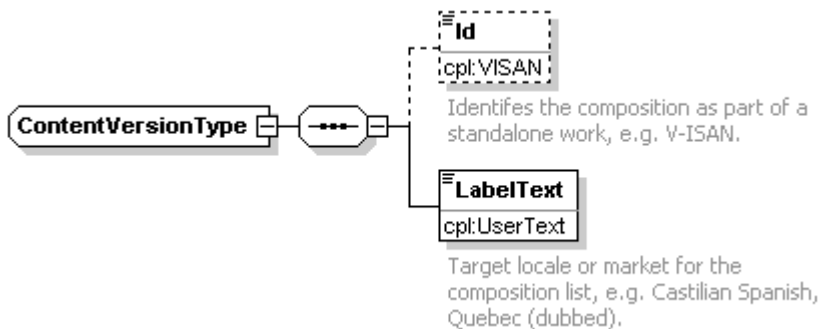

Figure 2. ContentVersion structure (update). Dotted lines denote an optional element.

4.9   ContentVersion [optional]

The ContentVersion parameter describes the particular version of the content referred to by the composition. While two compositions may share the same title, they may refer to two different versions, such as French (dubbed) and French (original) It is meant to assist the user and exhibition software in scheduling content. As shown in Figure 2, it contains an optional Id parameter and a LabelText parameter. The first is a URN and the second a human readable label, e.g. "French (1.85 picture, 16.1 sound, dubbed)".

Table 4. Sample Ratings (Informative).

Agency	Labels
http://www.mpaa.org/2003-ratings	R, PG, PG-13, G, NC-17
http://rcq.qc.ca/2003-ratings	G, 13+, 16+, 18+

4.10   RatingList

The RatingList parameter contains a list of zero or more ratings associated with the composition. Each rating element, shown in Figure 3, contains an agency and label element and is meant to be human- and machine-readable. There shall be only one Rating per given agency.
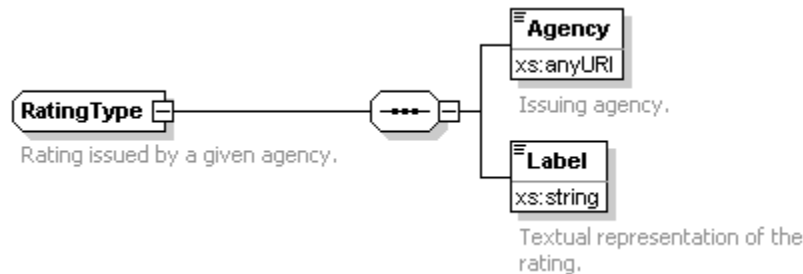

Figure 3. Rating Element Structure. Dotted lines denote an optional element.

The Agency parameter contains a URI uniquely identifying the agency issuing the rating. The Label parameter contains a textual representation of the rating, which may for instance be displayed to the user. For each issuing agency, and hence unique URI, there are a number of permissible Labels. This mapping will be defined in other documents, but an informational sample mapping is shown in Table 4.

4.11   ReelList

The ReelList parameter contains an ordered list of reel elements to be reproduced in sequence. The structure of the latter is described in Section 5.

4.12   Signer [optional]

The Signer parameter uniquely identifies the entity, and hence public key, that digitally signs the composition playlist. It shall be an instance of the Key Info type defined in W3C XML digital signature standard [DIGS]. The Key Info element shall contain an X509IssuerSerial element. The Signer parameter is required if the playlist is signed.

The X509IssuerSerial element contains two elements: the X509IssuerName and the X509SerialNumber. These elements uniquely identify the certificate used to sign the composition list..

4.13   Signature [optional]

The Signature parameter contains a digital signature authenticating the composition playlist. It shall be an instance of the SignatureType type defined in the W3C XML digital signature standard [DIGS]. The digital signature is enveloped and applies to the entire composition list. It is generated by the signer, as identified by the Signer parameter, using its private key.

The standard Signature element is a highly flexible construct, which can adapt to a wide range of applications. For the purpose of the composition playlist, it shall satisfy the following constraints.

- The KeyInfo element shall be present, and shall contain the entire certificate chain for the signer.
- The Object element shall not be present
- The Reference element URI shall be set to "", since the signature is enveloped.
- The Reference element shall contain a single DigestMethod element, with its Algorithm attribute set to http://www.w3.org/2000/09/xmldsig#sha1.
- The Reference element shall contain a single Transform element, with its Algorithm attribute set http://www.w3.org/2000/09/xmldsig#enveloped-signature.
- The CanonicalizationMethod shall be http://www.w3.org/TR/2001/REC-xml-c14n-20010315.

- ▪ The SignatureMethod shall be http://www.w3.org/2000/09/xmldsig#rsa-sha1.

The entire certificate chain shall be carried in the KeyInfo element as a sequence of X509Data elements. Each of the X509Data elements shall correspond to one certificate in the chain, and contain one X509IssuerSerial element and one X509Certificate element.

5 Reel Structure

The Reel structure contains a list of assets to be reproduced in parallel. While a number of assets are predefined in this specification for convenience, additional assets may be added in the future – see Section.9

Table 5. Reel structure.

Parameter	Description
Id	Unique identifier for asset management purposes.
AnnotationText	Human-readable description of the reel.
+AssetList	List of assets to be reproduced in parallel.
Parameters prefixed by a plus (+) sign are complex parameters, which contain nested parameters. *Parameters in italic type* are optional parameters.	

5.1 Id

The id parameter uniquely identifies the reel for asset management purposes. It is represented by a UUID.

5.2 AnnotationText [optional]

The AnnotationText parameter is a free-form, human-readable annotation associated with the reel. It meant strictly as a display hint to the user. Unless the optional language attribute is specified, the content of the field is English.

Table 6. AssetList structure.

Parameter	Description
+MainMarkers	Markers, e.g. FFOC, associated with the Reel.
+MainPicture	Picture essence to be shown on the main screen.
+MainSound	Primary sound essence to be reproduced in the main auditorium.
+MainSubtitle	Subtitle essence to be reproduced on the main screen.
+ProjectorData	Display equipment configuration data intended to be synchronized with the composition.
Parameters prefixed by a plus (+) sign are complex parameters, which contain nested parameters. *Parameters in italic type* are optional parameters.	

5.3 AssetList

The AssetList parameter contains the media assets that will be reproduced in parallel during reel playback. Each member of the parameter must be derived from the GenericAssetType described in Section 6.1.

As additional assets are defined, e.g. sub-titles, the AssetList element will be extended by introducing additional members, each derived from the GenericAssetType described in Section 6.1.

5.4 MainMarkers [optional]

The MainMarkers parameter describes markers [TSYS], e.g. FFOC, LFOC…, associated with the main portion of the theatrical presentation, i.e. MainPicture and MainSound assets. Markers are referenced from the start of the reel they are associated with. The structure of the parameter is described in more details in Section 6.3.

5.5   MainPicture [optional]

The MainPicture parameter describes the picture associated with the picture projected onto the main screen. The actual picture essence is contained in an external track file. The structure of the parameter is described in more details in Section 6.4.

5.6   MainSound [optional]

The MainSound parameter describes the essence to be reproduced in the auditorium. The actual sound essence is contained in an external track file. The content of the parameter is described in more details in Section 6.5.

5.7   MainSubtitle [optional]

The MainSubtitle parameter describes the subtitle essence to be reproduced on the main screen in the auditorium. The actual subtitle essence is contained in an external track file. The content of the parameter is described in more details in Section 6.6.

5.8   ProjectorData [optional]

The ProjectorData parameter describes the data that may be used to provide synchronized   projection equipment configuration data. The content of the parameter is described in more detail in Section 6.7.

6   Asset Structures

6.1   GenericAssetType

The GenericAssetType, depicted in Figure 4, describes a generic asset meant to be reproduced as part of a reel.

6.1.1   Id

The Id parameter uniquely identifies the asset for asset management purposes. It is represented by a UUID.

6.1.2   AnnotationText [optional]

The AnnotationText parameter is a free-form, human-readable annotation associated with the asset. It meant strictly as a display hint to the user. Unless the optional language attribute is specified, the content of the field is English.

6.1.3   EditRate

The EditRate parameter is used to express time-related events associated with the asset. It is in units of 1/s and represented as a ratio of integers. The EntryPoint, IntrinsicDuration and Duration parameters are expressed in units of 1/EditRate. Note that this edit rate may differ from the native frame rate or sample rate of the underlying essence.
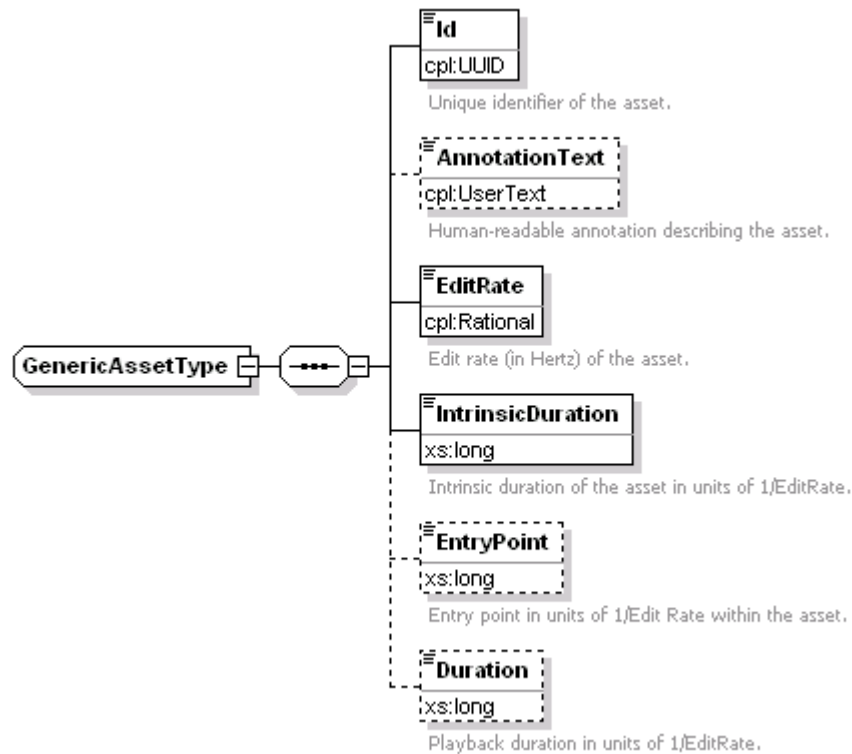
Figure 4. GenericAssetType Structure. Dotted lines denote an optional element.

6.1.4   IntrinsicDuration

The IntrinsicDuration parameter describes the intrinsic duration of the asset, as depicted in Figure 5. As such it does not take into account the EntryPoint and Duration parameters. It is expressed in units of 1/EditRate, i.e. in units of time, and encoded as an integer. If this parameter is also present in some underlying essence, e.g. track file, then it is included here for informational purposes only.
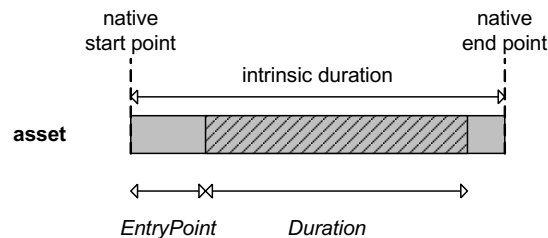

Figure 5. Asset Timing Parameters. Unless the optional EntryPoint and Duration parameters are specified, playback of the asset shall start at the native start point and terminate at the native end point of the asset.

6.1.5   EntryPoint [optional]

The EntryPoint parameter describes the point in time from the native start of the asset where playback shall start. It is encoded as integer number and expressed in units of 1/EditRate units, i.e. in units of time. If this optional parameter is absent, asset playback shall start at the native starting point of the asset.

6.1.6   Duration [optional]

The Duration parameter describes the playback duration of the asset, starting at the EntryPoint. It is represented as integer number of 1/EditRate units, i.e. in units of time. If this optional parameter is absent, asset playback shall stop at the native end of the asset.

6.2   TrackFileAssetType

The TrackFileAssetType, depicted in Table 7 , is derived from GenericAssetType. It describes an asset based on an external track file such as an AS-DCP Picture and Sound Track File [TFIL].

Table 8. TrackFileAssetType structure.

Parameter	Description
All parameters from parent GenericAssetType type.	
KeyId	Uniquely identifies the key used for the encryption of the underlying track file.
Hash	Hash of the underlying track file.
Parameters prefixed by a plus (+) sign are complex parameters, which contain nested parameters. *Parameters in italic type* are optional parameters.	

6.2.1   *KeyId [optional]*

The KeyId parameter uniquely identifies the cryptographic key used to encrypt the underlying track file. It is a UUID. This parameter shall be present if any portion of the underlying track file is encrypted.

6.2.2   *Hash [optional]*

The Hash parameter contains a hash of the underlying track file computed using the SHA-1 algorithm. When combined with the digital signature included in the composition playlist, it may be used to verify the integrity and authenticity of the underlying track file. The resulting 160 bit integer is encoded using base64 representation. SHA-1 is defined by IETF RFC3174 [SHA1]

6.3   MainMarkers

The MainMarkers element is an instance of MarkerAssetType, depicted in Figure 6. MarkerAssetType is derived from GenericAssetType. It describes the content markers, e.g. FFOC, associated with a reel.
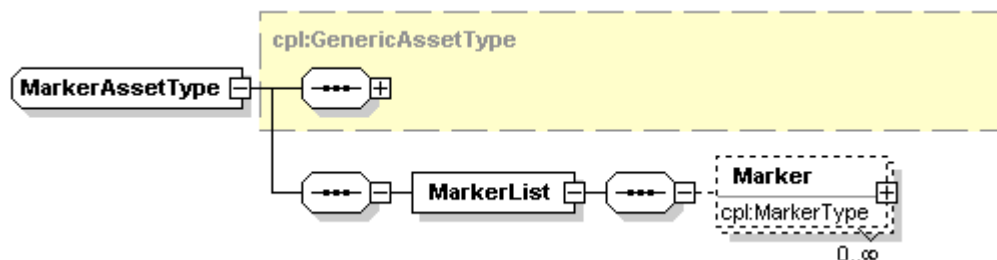
Figure 6. Content Marker Asset Structure. Dotted lines denote an optional element.

6.3.1   *MarkerList*

The MarkerList parameter contains a list of zero or more markers. The structure of each individual marker is shown in Figure 7.

6.3.2   *Label*

The Label parameter contains a textual representation of the marker. . An optional scope attribute with default value http://www.smpte-ra.org/PROTO-ASDCP-CPL-20040510#standard-markers determines the permissible values of the parameter. If the attribute is absent or set to its default value, the content of the parameter shall match one of the values listed in Table 9; otherwise the content of the parameter is outside the scope of this specification but may be displayed to the user.

Table 9. Standard Marker Labels.

Label	Description
FFOC	First Frame of Content. First displayable frame of a composition. Also commonly referred to as First Frame Of Action or FFOA.
LFOC	Last Frame of Content. Last displayable frame of a composition. Also commonly referred to as Last Frame Of Action or LFOA.
FFTC	First Frame of Title Credits. First displayable frame of content that contains any intensity of the Title Credits (a non zero alpha value), which appear at the beginning of a feature.
LFTC	Last Frame of Title Credits. Last displayable frame of content that contains any intensity of the Title Credits (a non zero alpha value), which appear at the beginning of a feature.
FFOI	First Frame of Intermission.
LFOI	Last Frame of Intermission.
FFEC	First Frame of End Credits. First displayable frame of content that contains any intensity of the End Credits (a non zero alpha value), which appear at the end of a feature.
LFEC	Last Frame of End Credits. Last displayable frame of content that contains any intensity of the End Credits (a non zero alpha value), which appear at the end of a feature.
FFOB	First Frame of Ratings Band. First displayable frame of content of the Rating Band, which is usually a slate at the beginning of a feature.
LFOB	Last Frame of Ratings Band. Last displayable frame of content of the Rating Band, which is usually a slate at the beginning of a feature.
FFMC	First displayable frame of content that contains any intensity of moving, rolling or scrolling credits (a non-zero alpha value), which appear at the end of the feature.
LFMC	Last displayable frame of content that contains any intensity of moving, rolling or scrolling credits (a non-zero alpha value), which appear at the end of the feature.

6.3.3   *AnnotationText [optional]*

The AnnotationText parameter is a free-form, human-readable annotation associated with the marker. It meant strictly as a display hint to the user. Unless the optional language attribute is specified, the content of the field is English.
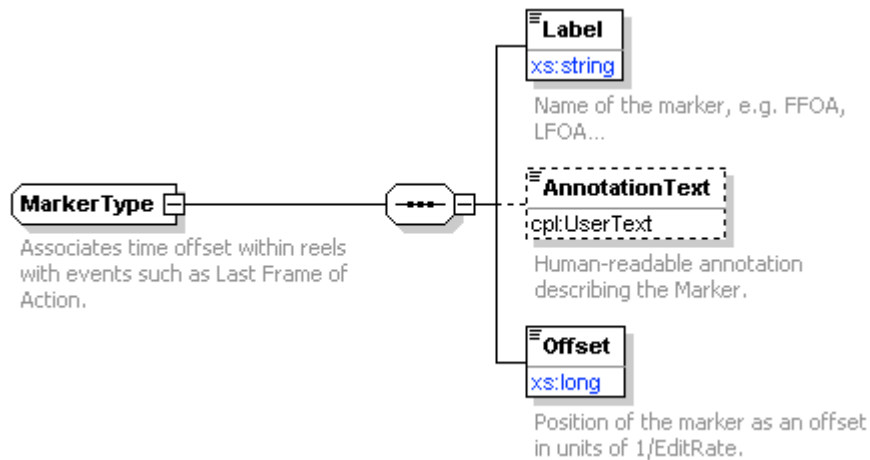

Figure 7. Marker Structure. Dotted lines denote an optional element.

6.3.4   Offset

The Offset parameter specifies the absolute position of the marker from the start of the marker asset. It is represented as integer number of 1/EditRate units, as inherited from GenericAssetType.
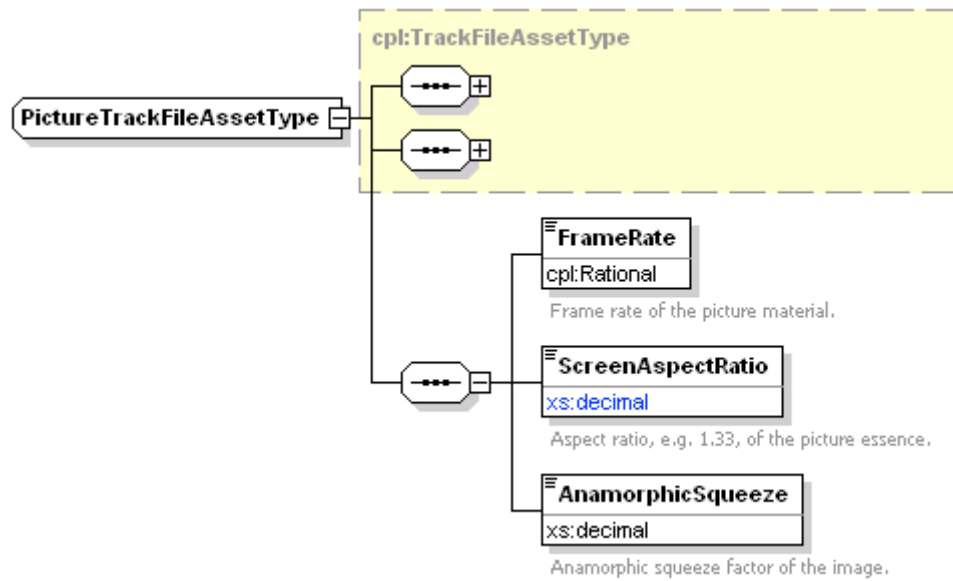

Figure 8. Picture Track File Asset Structure. Dotted lines denote an optional element.

6.4   MainPicture

The MainPicture element is an instance of PictureTrackFileAssetType, itself derived from TrackFileAssetType. It describes the picture material associated with the main presentation.

Note: The parameters specified below reflect values contained in the underlying picture track file. They are included in the composition playlist for convenience only. They may be used, for instance, by exhibition users and scheduling software to select appropriate projection equipment. It is also likely that these parameters will be amended, and others added, as the nature of the picture portion of the AS-DCP is refined.

6.4.1   FrameRate

The FrameRate parameter indicates the frame rate of the underlying picture track file. As such it is included in the composition playlist for convenience only. It may be used in conjunction with the IntrinsicDuration parameters to determine the number of frames contained in the underlying track file, for instance. It is specified as 1/s and represented as a ratio of integers.

Table 10. Screen Aspect Ratios.

1.33
1.66
1.77
1.85
2.00
2.39

6.4.2   ScreenAspectRatio

The ScreenAspectRatio parameter reflects the aspect ratio of the picture information contained in the underlying picture track file. As such, it is included in the composition playlist for convenience only and may

be used, for instance, to select an appropriate screen mask. It is supplemented by an optional scope attribute. Unless the scope attribute is specified, the content of the field shall be one of the values described in Table 10.

6.5   MainSound

The MainSound element is an instance of SoundTrackFileAssetType, itself derived from TrackFileAssetType. It describes the sound material associated with the main presentation.
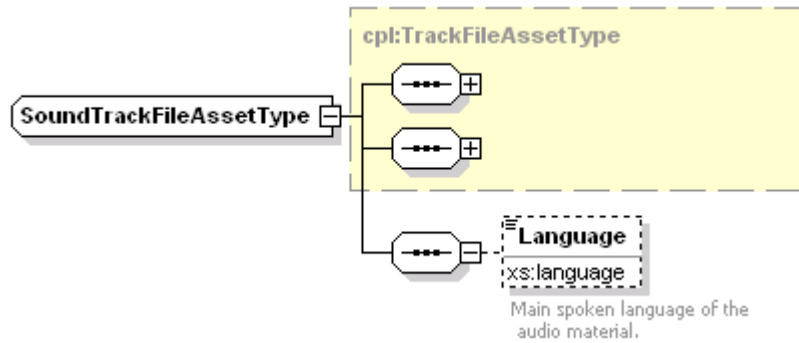
Figure 9. Sound Track File Asset structure. Dotted lines denote an optional element.

6.5.1   Language [optional]

The Language parameter specifies the main spoken language of the sound material of the underlying sound track file. It is represented as an XML language code [XML].

6.6   MainSubtitle

The MainSubtitle element is an instance of SubtitleTrackFileAssetType, itself derived from TrackFileAssetType. It describes the subtitle material associated with the main presentation.

6.6.1   Language [optional]

The Language parameter specifies the main language used by the subtitle essence. It is represented as an XML language code [XML]

[Insert structure figure???]

6.7   ProjectorData

The ProjectorData element is an instance of ProjectorDataAssetType, itself derived from GenericAssetType. It describes projector configuration data used to provide a known reference configuration for the projector.

6.7.1   DataInfo [optional]

This string parameter provides information that can be used to distinguish this projector configuration file from another one

[Insert structure figure???]

7   Operational Constraints

7.1   Content Markers

The Content Markers of Section 6.3 are intimately related to the content they describe and hence most efficiently created at time of mastering. In fact, in order to create the same markers in an exhibition environment, a human operator would have to manually scrub through the content upon reception.

In order to avoid burden on exhibition operators and devices, Table 11 lists the content markers that should be inserted at mastering, as a function of the kind of content described by the composition list. If the underlying content does not support a particular marker, e.g. a particular feature does not have title credits, then the corresponding content market must not be created, even if present in Table 11. Only one instance of each marker must be present in any given composition list.

Table 11. Content Markers.

Content Kind	Markers
feature	FFOC, LFOC, FFTC, LFTC, FFOI, LFOI, FFEC, FFOB, LFOB, LFEC
trailer	FFOC, LFOC
test	FFOC, LFOC
teaser	FFOC, LFOC
rating	FFOC, LFOC, FFOB, LFOB
advertisement	FFOC, LFOC
short	FFOC, LFOC
transitional	FFOC, LFOC
psa	FFOC, LFOC
policy	FFOC, LFOC

8   Sample [Informative] UPDATE

The following CompositionPlaylist sample XML structure is a valid instance of the CompositionPlaylist schema. It is not-functional and meant for informative purposes only. The optional Signer, Signature, and Hash parameters were omitted for sake of simplicity.

```
<?xml version="1.0" encoding="UTF-8"?>
<CompositionPlaylist xmlns="http://www.digicine.com/PROTO-ASDCP-CPL-20040511#"
                     xmlns:ds="http://www.w3.org/2000/09/xmldsig#">
  <Id>urn:uuid:00000000-0000-0000-0000-000000000000</Id>
  <AnnotationText>First D-Cinema Feature</AnnotationText>
  <IconId>urn:uuid:00000000-0000-0000-0000-000000000000</IconId>
  <IssueDate>2001-12-17T09:30:47-05:00</IssueDate>
  <Issuer>Picture Labs</Issuer>
  <Creator>Playlist Creator 1.0</Creator>
  <ContentTitleText>When Pigs Will Fly II</ContentTitleText>
  <ContentKind>Feature</ContentKind>
  <ContentVersion>
    <Id>urn:uuid aaaa-aaaa-aaaa-aaaa-a-aaaa-aaaa-a</Id>
    <LabelText>English (Theatrical)</LabelText>
  </ContentVersion>
  <RatingList>
    <Rating>
      <Agency>http://www.mpaa.org/2003-ratings</Agency>
      <Label>PG</Label>
    </Rating>
    <Rating>
      <Agency>http://rcq.qc.ca/2003-ratings</Agency>
      <Label>G</Label>
    </Rating>
  </RatingList>
  <ReelList>
    <Reel>
```

```
            <Id>urn:uuid:00000000-0000-0000-0000-000000000000</Id>
            <AnnotationText>Reel #1 of When Pigs Will Fly II</AnnotationText>
            <AssetList>
              <MainMarkers>
                <Id>urn:uuid:00000000-0000-0000-0000-000000000000</Id>
                <EditRate>24 1</EditRate>
                <IntrinsicDuration>3600</IntrinsicDuration>
                <MarkerList>
                  <Marker>
                     <Label>FFOC</Label>
                     <Offset>0</Offset>
                  </Marker>
                  <Marker>
                     <Label>LFOC</Label>
                     <Offset>3600</Offset>
                  </Marker>
                </MarkerList>
              </MainMarkers>
              <MainPicture>
                <Id>urn:uuid:00000000-0000-0000-0000-000000000000</Id>
                <AnnotationText>Picture for Reel #1 of When Pigs Will Fly II</AnnotationText>
                <EditRate>24 1</EditRate>
                <IntrinsicDuration>3800</IntrinsicDuration>
                <EntryPoint>100</EntryPoint>
                <Duration>3600</Duration>
                <KeyId>urn:uuid:00000000-0000-0000-0000-000000000000</KeyId>
                <FrameRate>24 1</FrameRate>
                <ScreenAspectRatio>1.85</ScreenAspectRatio>
              </MainPicture>
              <MainSound>
                <Id>urn:uuid:00000000-0000-0000-0000-000000000000</Id>
                <AnnotationText>Soundtrack for Reel #1 of When Pigs Will Fly II</AnnotationText>
                <EditRate>24 1</EditRate>
                <IntrinsicDuration>3600</IntrinsicDuration>
                <KeyId>urn:uuid:00000000-0000-0000-0000-000000000000</KeyId>
                <Language>en-us</Language>
              </MainSound>
            </AssetList>
          </Reel>
       </ReelList>
</CompositionPlaylist>
```

9 XML Schema

```
<xs:schema targetNamespace="http://www.digicine.com/PROTO-ASDCP-CPL-20040511#"
                          elementFormDefault="qualified" attributeFormDefault="unqualified"
                          xmlns:cpl="http://www.digicine.com/PROTO-ASDCP-CPL-20040511#"
                          xmlns:xs="http://www.w3.org/2001/XMLSchema"
                          xmlns:ds="http://www.w3.org/2000/09/xmldsig#">
…
</xs:schema>
```

9.1 CompositionPlaylist

```
<xs:element name="CompositionPlaylist" type="cpl:CompositionPlaylistType" />
<xs:complexType name="CompositionPlaylistType">
  <xs:sequence>
    <xs:element name="Id" type="cpl:UUID"/>
    <xs:element name="AnnotationText" type="cpl:UserText" minOccurs="0"/>
    <xs:element name="IconId" type="cpl:UUID" minOccurs="0"/>
    <xs:element name="IssueDate" type="xs:dateTime"/>
    <xs:element name="Issuer" type="cpl:UserText"/>
    <xs:element name="Creator" type="cpl:UserText"/>
    <xs:element name="ContentTitleText" type="cpl:UserText"/>
    <xs:element ref="cpl:ContentKind"/>
    <xs:element ref="cpl:ContentVersion" minOccurs="0"/>
    <xs:element name="RatingList">
      <xs:complexType>
        <xs:sequence>
          <xs:element ref="cpl:Rating" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
      </xs:complexType>
```

```
        </xs:element>
        <xs:element name="ReelList">
          <xs:complexType>
            <xs:sequence>
              <xs:element ref="cpl:Reel" maxOccurs="unbounded"/>
            </xs:sequence>
          </xs:complexType>
        </xs:element>
        <xs:element name="Signer" type="ds:KeyInfoType" minOccurs="0"/>
        <xs:element ref="ds:Signature" minOccurs="0"/>
      </xs:sequence>
  </xs:complexType>
```

9.2   Marker

```
<xs:element name="Marker" type="cpl:MarkerType" />
<xs:complexType name="MarkerType">
   <xs:sequence>
      <xs:element name="Label">
         <xs:complexType>
            <xs:simpleContent>
               <xs:extension base="xs:string">
                  <xs:attribute name="scope" type="xs:anyURI" use="optional"
                              default="http://www.digicine.com/PROTO-ASDCP-CPL-20040511#standard-
                              markers" />
               </xs:extension>
            </xs:simpleContent>
         </xs:complexType>
      </xs:element>
      <xs:element name="AnnotationText" type="cpl:UserText" minOccurs="0" />
      <xs:element name="Offset">
         <xs:simpleType>
            <xs:restriction base="xs:long">
               <xs:minInclusive value="0" />
            </xs:restriction>
         </xs:simpleType>
      </xs:element>
   </xs:sequence>
</xs:complexType>
```

9.3   Rating

```
<xs:element name="Rating" type="cpl:RatingType"/>
   <xs:complexType name="RatingType">
      <xs:sequence>
         <xs:element name="Agency" type="xs:anyURI" />
         <xs:element name="Label" type="xs:string" />
      </xs:sequence>
   </xs:complexType>
```

9.4   ContentKind

```
<xs:element name="ContentKind" type="cpl:ContentKindType"/>
<xs:complexType name="ContentKindType">
   <xs:simpleContent>
      <xs:extension base="xs:string">
         <xs:attribute name="scope" type="xs:anyURI" use="optional"
                        default="http://www.digicine.com/PROTO-ASDCP-CPL-20040511#standard-
                        content"/>
      </xs:extension>
   </xs:simpleContent>
</xs:complexType>
```

9.5   ContentVersion

```
<xs:element name="ContentVersion" type="cpl:ContentVersionType"/>
<xs:complexType name="ContentVersionType">
   <xs:sequence>
      <xs:element name="Id" type="xs:anyURI" minOccurs="0"/>
      <xs:element name="LabelText" type="cpl:UserText"/>
   </xs:sequence>
</xs:complexType>
```

9.6   Reel

```
<xs:element name="Reel" type="cpl:ReelType" />
<xs:complexType name="ReelType">
  <xs:sequence>
    <xs:element name="Id" type="cpl:UUID" />
    <xs:element name="AnnotationText" type="cpl:UserText" minOccurs="0" />
    <xs:element name="AssetList">
       <xs:complexType>
         <xs:sequence>
           <xs:element name="MainMarkers" type="cpl:MarkerAssetType" minOccurs="0"/>
           <xs:element name="MainPicture" type="cpl:PictureTrackFileAssetType" minOccurs="0"/>
           <xs:element name="MainSound" type="cpl:SoundTrackFileAssetType" minOccurs="0"/>
           <xs:element name="MainSubtitle" type="cpl:SubtitleTrackFileAssetType"
                          minOccurs="0"/>
           <xs:element name="ProjectorData" type="cpl:ProjectorDataAssetType" minOccurs="0"
                          maxOccurs="unbounded"/>
           <xs:any namespace="##other" minOccurs="0" maxOccurs="unbounded"/>
         </xs:sequence>
       </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

9.7   GenericAssetType

```
<xs:complexType name="GenericAssetType" abstract="1">
  <xs:sequence>
    <xs:element name="Id" type="cpl:UUID" />
    <xs:element name="AnnotationText" type="cpl:UserText" minOccurs="0" />
    <xs:element name="EditRate" type="cpl:Rational" />
    <xs:element name="IntrinsicDuration" type="xs:long" />
    <xs:element name="EntryPoint" type="xs:long" minOccurs="0" />
    <xs:element name="Duration" type="xs:long" minOccurs="0" />
  </xs:sequence>
</xs:complexType>
```

9.8   TrackFileAssetType

```
<xs:complexType name="TrackFileAssetType" abstract="1">
  <xs:complexContent>
    <xs:extension base="cpl:GenericAssetType">
      <xs:sequence>
        <xs:element name="KeyId" type="cpl:UUID" minOccurs="0"/>
        <xs:element name="Hash" type="xs:base64Binary" minOccurs="0"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

9.9   SoundTrackFileAssetType

```
<xs:complexType name="SoundTrackFileAssetType">
  <xs:complexContent>
    <xs:extension base="cpl:TrackFileAssetType">
      <xs:sequence>
        <xs:element name="Language" type="xs:language" minOccurs="0"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

9.10   SubtitleTrackFileAssetType

```
<xs:complexType name="SubtitleTrackFileAssetType">
  <xs:complexContent>
    <xs:extension base="cpl:TrackFileAssetType">
      <xs:sequence>
        <xs:element name="Language" type="xs:language" minOccurs="0"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

9.11 PictureTrackFileAssetType

```
<xs:complexType name="PictureTrackFileAssetType">
   <xs:complexContent>
      <xs:extension base="cpl:TrackFileAssetType">
         <xs:sequence>
            <xs:element name="FrameRate" type="cpl:Rational"/>
            <xs:element name="ScreenAspectRatio">
               <xs:complexType>
                  <xs:simpleContent>
                     <xs:extension base="xs:decimal">
                        <xs:attribute name="scope" type="xs:anyURI" use="optional"
                                   default="http://www.digicine.com/PROTO-ASDCP-CPL-20040511#standard-
                                   aspectratio"/>
                     </xs:extension>
                  </xs:simpleContent>
               </xs:complexType>
            </xs:element>
""""           </xs:sequence>
         </xs:extension>
      </xs:complexContent>
</xs:complexType>
```

9.12 MarkerAssetType

```
<xs:complexType name="MarkerAssetType">
   <xs:complexContent>
      <xs:extension base="cpl:GenericAssetType">
         <xs:sequence>
            <xs:element name="MarkerList">
               <xs:complexType>
                  <xs:sequence>
                     <xs:element name="Marker" type="cpl:MarkerType" minOccurs="0"
                                maxOccurs="unbounded"/>
                  </xs:sequence>
               </xs:complexType>
            </xs:element>
         </xs:sequence>
      </xs:extension>
   </xs:complexContent>
</xs:complexType>
```

9.13 ProjectorDataAssetType

```
<xs:complexType name="ProjectorDataAssetType">
   <xs:complexContent>
      <xs:extension base="cpl:GenericAssetType">
         <xs:sequence>
            <xs:element name="DataInfo" type="xs:string" minOccurs="0">
         </xs:sequence>
      </xs:extension>
   </xs:complexContent>
</xs:complexType>
```

9.14 Rational

```
<xs:simpleType name="Rational">
   <xs:restriction>
      <xs:simpleType>
         <xs:list itemType="xs:long"/>
      </xs:simpleType>
      <xs:length value="2"/>
   </xs:restriction>
</xs:simpleType>
```

9.15 UUID

```
<xs:simpleType name="UUID">
   <xs:restriction base="xs:anyURI">
      <xs:pattern value="urn:uuid:[0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-
                         9a-fA-F]{12}" />
   </xs:restriction>
</xs:simpleType>
```

9.16 UserText

```
<xs:complexType name="UserText">
      <xs:simpleContent>
        <xs:extension base="xs:string">
          <xs:attribute ref="xml:lang" use="optional" default="en"/>
        </xs:extension>
      </xs:simpleContent>
   </xs:complexType>
```

10 Bibliography

Ref	Author, Date: Title (URL)
KMDC	SMPTE DC28.30 Key Management AHG Digital Cinema Role Certificate
TSYS	SMPTE DC28.7 Theatre Systems Closing Report
TFIL	SMPTE DC28.20 Packaging AHG AS-DCP Track File Specification
XNAM	http://www.w3.org/TR/WD-xml-names/

11 Change History

Ver	Date	By	Sect	Description
1	8 June 2004			Original modification of SMPTE doc.
2	16 June 2004			Updates from review.
2.4	8 July 2004			Minor schema corrections. Addition of projector config. file support.