

# Closed Captions Packaging

*JPEG Interop Group*

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This document describes how to package closed caption essence for usage within the JPEG Interop Group.

Acronyms:

CPL – Composition Playlist

URI – Uniform Resource Identifier

XML – Extensible Markup Language

Normative References:

1. [Interop CPL] JPEG Interop – Composition Playlist
2. [CineCanvas] Subtitle Specification (XML File Format) for DLP Cinema Projection Technology - Rev C (2005, March 31)
3. [XML 1.0] World Wide Web Consortium (W3C) (2004, February 4) - Extensible Markup Language (XML) 1.0 (Third Edition), see <http://www.w3.org/TR/2004/REC-xml-20040204/>
4. [XML Schema Part 1: Structures] World Wide Web Consortium (W3C) (2004, October 28) - XML Schema Part 1: Structures (Second Edition), see <http://www.w3.org/TR/2004/REC-xm1schema-1-20041028/>
5. [XML Schema Part 2: Datatypes] World Wide Web Consortium (W3C) (2004, October 28) - XML Schema Part 2: Datatypes (Second Edition), see <http://www.w3.org/TR/2004/REC-xm1schema-2-20041028/>
6. [RFC 2396] Internet Engineering Task Force (IETF) (1996, November), RFC 2396 – Uniform Resource Identifiers (URI): Generic Syntax

## 1. Introduction

This document specifies the closed caption file format to be used within the JPEG Interop Group. It also defines a new Composition Playlist (CPL) extension element to reference the closed caption essence and describes how to include a single track (corresponding to a single language) of closed caption essence into a JPEG Interop Composition.

## 2. Closed Captions Essence

### 2.1 Closed Captions File Format

The closed captions file format shall be as specified by the document [CineCanvas] “Subtitle Specification for DLP Cinema Projection Technology”, revision C dated from 03/31/2005.

### 2.2 File Format Constraints

The following constraints shall apply to the [CineCanvas] format for closed caption essence usage:

1. The time window defined by the TimeIn and TimeOut values of each <Subtitle> element shall not overlap the time windows of another <Subtitle> element in the file.

Informative Note: Each caption is considered to be an independent event, unaffected by previous caption display and without effect on subsequent caption display. This also facilitates random-access startup in mid-stream.

2. Each <Subtitle> element shall have a maximum of three <Text> sub-elements, with each <Text> sub-element having a different VPosition value. This ensures that all the text to be displayed at a given time only requires 3 lines on the closed captions device – this should enforce device independence as some of the existing devices might only have three lines.

Informative Note: Large number of devices already installed (Rear Window Caption displays) are limited to 3 lines maximum. That limit, in turn, was based on the widespread implementation of closed caption authoring in the broadcast environment. The DCI specification version 1.1, section 3.4.3.7, also states: “There shall be a maximum number of 3 lines of text allowed for simultaneous display.”

3. The sub-elements <Image> shall NOT be present in the file, as PNG files shall not be used in the context of closed captions essence.
4. Within a <Subtitle> element, all the <Text> sub-elements shall have the same VAlign attribute value (for example, all set to “top” or all set to “bottom”).

Informative Note: Each set of <Text> sub-elements is intended to represent a caption. As such, they are intended to be grouped together for the purposes of display on a wide array of external devices with unknown geometry.

5. Within a <Subtitle> element, the VPosition value of each <Text> sub-element shall define the *relative* display order of these <Text> sub-elements, and NOT a percentage on the display device. Taking into account point 4 above, this ensures the VAlign values of such <Text> sub-elements to be the same to facilitate the interpretation.

This should avoid the display conflict of a closed captions file with two <Text> sub-elements of the same <Subtitle> element having their respective VPosition values set to 10% and 15% from the bottom and that would have to be displayed on a 3-lines device – without this constraint, these two lines would correspond to the same line on such 3-lines device.

For example, a <Subtitle> element containing the following <Text> sub-elements sequence:

```
<Text HAlign="left" HPosition="0.0" VAlign="top" VPosition="10.0"> This is the first line </Text>
```

```
<Text HAlign="left" HPosition="0.0" VAlign="top" VPosition="15.0"> This is the second line </Text>
```

only means that the first <Text> sub-element provides the text to be displayed on the first line of the closed captions device, and that the second <Text> sub-element provides the text to be displayed on the second line of the closed captions device (it does not mean that a percentage of 10 or 15 has to be taken into account for these locations on the display device).

Another example based on bottom alignments is provided below:

<Text HAlign="left" HPosition="0.0" VAlign="bottom" VPosition="30.0"> This is the 1<sup>st</sup> line </Text>

<Text HAlign="left" HPosition="0.0" VAlign="bottom" VPosition="25.0"> This is the 2<sup>nd</sup> line </Text>

A third example based on center alignments is provided below:

<Text HAlign="left" HPosition="0.0" VAlign="center" VPosition="-10.0"> This is the 1<sup>st</sup> line </Text>

<Text HAlign="left" HPosition="0.0" VAlign="center" VPosition="10.0"> This is the 2<sup>nd</sup> line </Text>

<Text HAlign="left" HPosition="0.0" VAlign="center" VPosition="25.0"> This is the 3<sup>rd</sup> line </Text>

Informative Note: Second and subsequent <Text> sub-elements have implicit line breaks associated with them, such that a complete caption could be assembled by concatenating the sub-elements in their VPosition-rank-order, either with line breaks between them (if the display engine wishes to preserve them) or with only a space between them (if the display engine wishes to combine and word-wrap them).

#### Recommendation:

A maximum number of 32 characters for each <Text> sub-element is recommended. If in special circumstances a <Text> sub-element contains more than 32 characters, the concerned file should be considered as valid – assuming that it complies with the constraints 1 to 5 above.

Informative Note: A large number of devices already installed (Rear Window Caption displays) are limited to a maximum of 32 characters per line. That limit, in turn, is based on the most prevalent closed caption technology in broadcast space, codified in CEA-608. Adherence to this recommendation will limit the amount of reformatting necessary to service the release of movies into the aftermarket of DVD and broadcast. Existence of captions of longer length does not necessarily preclude rendering on RWC displays, but certainly presents a challenge for a software implementation and may actually be impossible for specific captions, depending on the related <Text> sub-elements.

### **3. Constraints on Package Structure**

Within a package, each closed captions file shall be placed in a directory labeled with the UUID of the SubtitleID element of that file.

Closed captions file resources (font) shall be placed in a directory structure as indicated by the relevant URI that references the resource.

## 4. MainClosedCaption Element

In order to reference the closed caption essence in a standard Composition Playlist, a `MainClosedCaption` element is defined and shall be used as an extension element in the `Reel` element of a Composition Playlist as specified in [Interop CPL] "JPEG Interop Composition Playlist", Section 9.6.

The `MainClosedCaption` element shall indicate closed caption essence to be reproduced on the closed captions device in the auditorium.

The `MainClosedCaption` element shall be an instance of `SubtitleTrackFileAssetType` and its structure is defined in [Interop CPL] "JPEG Interop Composition Playlist", Section 9.10.

The `Language` parameter specifies the main language used by the closed caption essence. It is represented as an XML language code.

The `MainClosedCaption` element structure defined in this standard is 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 `MainClosedCaption` element specification shall be associated with a unique XML namespace name that shall be the string value "<http://www.digicine.com/PROTO-ASDCP-CC-CPL-20070926#>". This namespace name conveys both structural and semantic version information, and serves the purpose of a traditional version number field.

XML namespace names used in this standard are identified in Table 1. Namespace names are represented as Uniform Resource Identifier (URI) values [RFC 2396]<sup>1</sup>.

Table 1: XML Namespaces.

Qualifier	URI
cc-cpl	<a href="http://www.digicine.com/PROTO-ASDCP-CC-CPL-20070926#">http://www.digicine.com/PROTO-ASDCP-CC-CPL-20070926#</a>
cpl	<a href="http://www.digicine.com/PROTO-ASDCP-CPL-20040511#">http://www.digicine.com/PROTO-ASDCP-CPL-20040511#</a>
xs	<a href="http://www.w3.org/2001/XMLSchema">http://www.w3.org/2001/XMLSchema</a>

URIs listed in Table 1 are normative, whereas the namespace qualifier values themselves (used in Table 1 and elsewhere in this standard) are not normative. Thus, namespace qualifier values may be replaced in instance documents by any arbitrary XML compliant namespace qualifier, meaning that conformant implementations shall expect any XML compliant namespace qualifier value that is associated with a URI from Table 1.

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<sup>1</sup> Readers unfamiliar with URI values as XML namespace names should be aware that although a URI value begins with a "method" element ("http" in this case), the value is designed primarily to be a unique string and does not necessarily correspond to an actual on-line resource. Applications implementing this standard should not attempt to resolve URI values on-line.

## 5. Schema

The XML schema of the MainClosedCaption element is provided below:

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="http://www.digicine.com/PROTO-ASDCP-CC-CPL-20070926#"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:cpl="http://www.digicine.com/PROTO-ASDCP-CPL-20040511#"
  elementFormDefault="qualified" attributeFormDefault="unqualified">

  <xs:import namespace="http://www.digicine.com/PROTO-ASDCP-CPL-20040511#"
    schemaLocation="http://www.digicine.com/PROTO-ASDCP-CPL-20040511.xsd"/>

  <!--MainClosedCaption-->
  <xs:element name="MainClosedCaption" type="cpl:SubtitleTrackFileAssetType"/>

</xs:schema>
```

In case of conflict between the prose and the schema, the prose shall be the authoritative expression of the MainClosedCaption element definition.

## 6. MIME Type

The MIME type for a track file containing closed caption essence shall be text/xml;asdcKind=Subtitle.

## 7. Annex A: CPL Sample (Informative)

```
<?xml version="1.0" encoding="UTF-8"?>
<CompositionPlaylist xmlns="http://www.digicine.com/PROTO-ASDCP-CPL-20040511#">
  <Id>urn:uuid:f4ee21ac-1c2d-4548-b7e4-0ccc73617b00</Id>
  <AnnotationText>Test Closed Captions</AnnotationText>
  <IssueDate>2007-10-26T23:28:31-07:00</IssueDate>
  <Issuer>Company Name</Issuer>
  <Creator>Packaging software version 1.4.7</Creator>
  <ContentTitleText>Test Closed Captions</ContentTitleText>
  <ContentKind>test</ContentKind>
  <RatingList/>
  <ReelList>
    <Reel>
      <Id>urn:uuid:68f20cff-134e-4474-ae61-803fbe464511</Id>
      <AssetList>
        <MainPicture>
          <Id>urn:uuid:08699e95-c054-5942-98ec-38869f16ad22</Id>
          <EditRate>24 1</EditRate>
          <IntrinsicDuration>720</IntrinsicDuration>
          <EntryPoint>0</EntryPoint>
          <Duration>720</Duration>
          <FrameRate>24 1</FrameRate>
          <ScreenAspectRatio>1.85</ScreenAspectRatio>
        </MainPicture>
        <MainSound>
          <Id>urn:uuid:d7e45e04-ce7c-674c-aa10-e8a6ec196333</Id>
          <EditRate>24 1</EditRate>
          <IntrinsicDuration>720</IntrinsicDuration>
          <EntryPoint>0</EntryPoint>
          <Duration>720</Duration>
        </MainSound>
        <cc-cpl:MainClosedCaption xmlns:cc-cpl="http://www.digicine.com/PROTO-ASDCP-CC-CPL-20070926#">
          <Id>urn:uuid:94b7bfb4-c201-4d4a-9fcc-20eb78773a44</Id>
          <EditRate>24 1</EditRate>
          <IntrinsicDuration>720</IntrinsicDuration>
          <EntryPoint>0</EntryPoint>
          <Duration>720</Duration>
          <Language>en</Language>
        </cc-cpl:MainClosedCaption>
      </AssetList>
    </Reel>
  </ReelList>
</CompositionPlaylist>
```