

Media Package Specification

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1 Introduction

1.1 Scope

This document specifies a format for Common Media Packages (CMP). It also describes the application of the Common Media Package to DECE in the form of the DECE Media Package (DMP).

1.2 Document Organization

This document is organized as follows:

1. Introduction—Provides background, scope and conventions
2. Common Media Package Overview
3. Common Media Package Contents
4. DECE Media Package (DMP)

1.3 Document Notation and Conventions

The following terms are used to specify conformance elements of this specification. These are adopted from the ISO/IEC Directives, Part 2, Annex H [ISO-P2H]. For more information, please refer to those directives.

- SHALL and SHALL NOT indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.
- 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.
- MAY and NEED NOT indicate a course of action permissible within the limits of the document.

1.4 Normative References

1.4.1 DECE Normative References

The following DECE technical specifications are cited within the normative language of this document.

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[DCMETA]	Common Metadata Specification, Version 2.3; md-v2.3.xsd
[DSysm]	System Specification
[DMeta]	Content Metadata Specification
[DMedia]	Common File Format & Media Format Specification

1.4.2 External References

The following external references are cited within the normative language of this document.

[DASH]	ISO/IEC 23009-1:2014, Second edition 2014-05-15, "Information technology — Dynamic adaptive streaming over HTTP (DASH) - Part 1: Media presentation description and segment formats"
[SMPTE2053]	SMPTE ST 2053:2011, <i>Media Package for Storage, Distribution and Playback of Multimedia File Sets and Internet Resources</i> , July 13, 2011.
[ISO14496-12]	ISO/IEC 14496-12:2012, Fourth edition 2012-07-15, Corrected version 2012-09-15, "Information technology - Coding of audio-visual objects – Part 12: ISO Base Media File Format" with Amendment 1, Amendment 2, Corrigendum 1, Corrigendum 2, Corrigendum 3, Corrigendum 4
[ISO29500-2]	ISO/IEC 29500-2 <i>Open Packaging Conventions</i> (OPC, 2008 November 15), http://standards.iso.org/ittf/PubliclyAvailableStandards/c051459_ISOIEC%2029500-2_2008%28E%29.zip
[UNICODE]	UNICODE 6.0.0, "The Unicode Standard Version 6.0", http://www.unicode.org/versions/Unicode6.0.0/
[ISO-P2H]	ISO/IEC Directives, Part 2, Annex H http://www.iec.ch/tiss/iec/Directives-part2-Ed5.pdf

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[RFC4122]	Leach, P., et al, A Universally Unique Identifier (UUID) URN Namespace, July 2005 http://www.ietf.org/rfc/rfc4122.txt
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Note: Readers are encouraged to investigate the most recent publications for their applicability.

1.5 Informative References

The following external references are cited within the informative language of this document.

[DPublisher]	Content Publishing Specification, Version 2.0
[CENC]	ISO/IEC 23001-7:2014, Second edition, "Information technology - MPEG systems technologies - Part 7: Common encryption in ISO base media file format files"

1.6 Terms, Definitions and Acronyms

DECE Media Package terminology is defined in [DSystem], Section 1.4.

Common Media Package is a generalized version of the DMP.

1.7 XML Change Management

Recipients of XML Documents encoded using this specification SHALL comply with XML Change Management defined in [DSystem], Section 1.6.

1.8 Common Media Packages and Ecosystem Application

The Common Media Package (CMP) is designed to contain the data necessary to provide a media experience to a user. The CMP is designed as the basis for the DECE Media Package (DMP).

Section 4 describes the application of the DECE Media Package as an illustration of the application of a CMP to an ecosystem. The CMP can equivalently be applied to other ecosystems.

1.8.1 Object Naming

In some cases, this document uses terms specific to DECE, such as "APID". Although the same terms might not be used by other ecosystems that adopt the CMP, the concepts generally remain the same.

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For example, the term APID refers to an identifier suitable to refer to Physical Asset, regardless of what it is named. The adopting specification should clarify any term translations required.

Terms using capitals, such as “Devices” and “DECE Devices” are DECE-defined terms. Where applicable, they should be interpreted as generic concepts.

1.8.2 Identifier Naming Conventions

Identifiers are to be interpreted generically. The DECE terminology is used, but these should be mapped to identifiers in the adopting system. All identifiers can be translated to the applicable ecosystem unless otherwise noted.

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2 Common Media Package Overview

2.1 Overview of CMP

The Common Media Package (CMP) is an application of the SMPTE Media Package standard (ST2053) with constraints and requirements specific to storage, download, and playback of CFF files and CFF Track Files.

At minimum, CMPs consist of a Zip container conforming to ISO/IEC 29500-2 that contains XML manifest files identified as one Table of Contents document, and one or more Presentation Description documents. CMPs may also contain media and other files. Files do not use Zip compression, so they may be read in-place, without extraction, similar to a directory or folder in the device's native file system.

CMPs enable “on demand” download and storage of media files, metadata files, presentation applications, licenses, and other files identified in accordance with a current Download Manifest. In fact, all CMP files can be added or updated. For simplicity, update operations only requires the client to add or replace files in the CMP Zip container, not to edit XML documents, which are updated by the publisher when new or different content is offered for that package.

Publishers can prepackage files that are most likely to be used, and make other files available for download on demand. When other audio tracks, subtitle tracks, presentation metadata or presentation applications become available later, publishers can update their Web resident manifest files and download manifest to make the new files available for download on demand. A user who downloads files to a CMP may copy that CMP as a single Zip file to their other DECE Devices, retaining all the files that have been downloaded.

Devices can identify compatible presentations and tracks for offline late bound playback by reading the Table of Contents and Presentation Description manifest files, and reading the CMP Zip directory to identify APID file names corresponding to Presentation Description tracks and resource files that are stored in the CMP. When online, users have the option to download or progressive download files corresponding to APIDs listed in manifest files that are not yet downloaded and present in the Zip directory.

2.2 CMP Use of SMPTE Media Package

A SMPTE Media Package is a Zip container derived from the ISO/IEC 29500-2 Open Packaging Convention for the purpose of storing media presentations, and it additionally specifies manifest files

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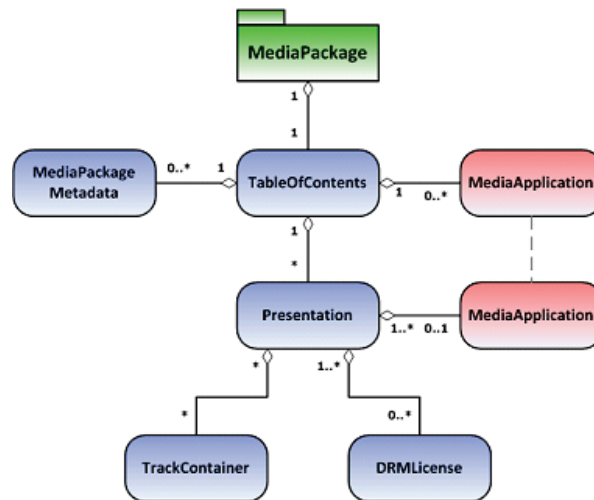
consisting of a Table of Contents XML document, and one or more Presentation Description XML documents defined in the SMPTE ST2053 standard. Media files and related manifest and presentation files may be prepackaged in the Zip container, stored as “Parts¹”, or may be downloaded on demand to add them to a locally stored the Media Package.

Version numbers identify newer manifest files and media files available as Web resources that may be downloaded to replace older files in a local Media Package, and new files, such as CFF Track Files, may be added to new manifest versions at any time to make them available for download.

An important CMP constraint on SMPTE Media Package is that CMP SHALL exclude the OPC specified “/rels/.rels” package-level Relationships part and associated “[Content_Types].xml” file as defined in ISO 29500-2, Section 10.2.61 that specifies the MIME Media Types for Parts that are stored in the package.

The reason for this exclusion is to simplify CMP media players that add files to a CMP by only requiring that they add files using basic ZIP functionality without having to edit XML in the /.rels part and /[Content_Types].xml document when files are added. CMP SHALL resolve the LocalSource element without using /.rels.

Below is an overview of the SMPTE Media Package XML structure as applied to CMP.



SMPTE Media Package structure, showing components unique to a Media Package

¹ Parts is an [ISO29500-2] term) referring to the files within the ZIP container associated with a particular function

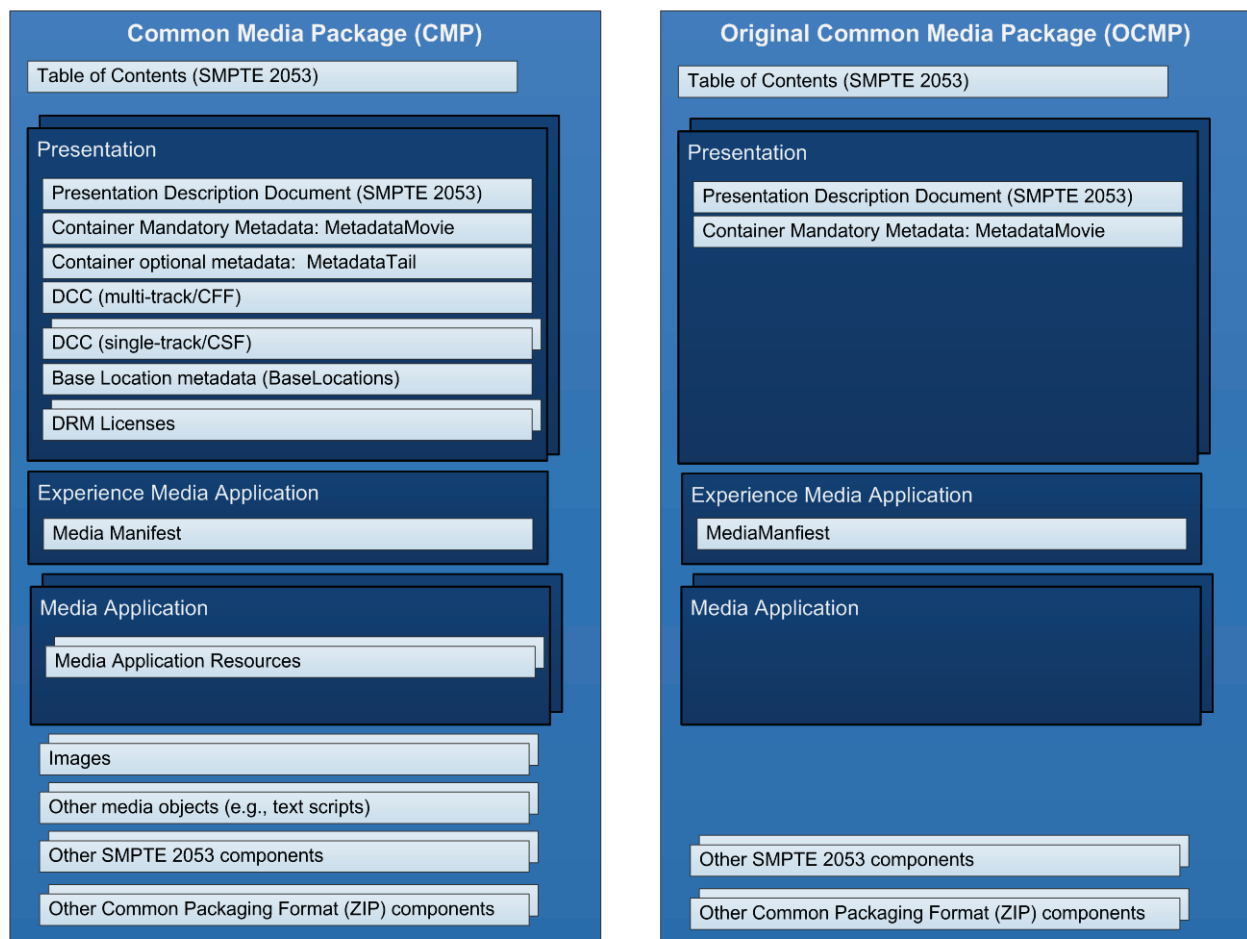
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3 Common Media Package Contents

A CMP contains ZIP components such as a directory, and a series of files. This section defines those files and when those files are required. An Original CMP (OCMP) is a CMP containing a minimal subset of files. In some models, the OCMP represents versions that can be distributed, with the missing parts being filled in later.

The following illustration shows examples of a fully populated CMP and an OCMP. The components are shown as a logical representation but could be positioned differently. The OCMP illustration shows the minimal set, although any other component can be published in an OCMP.

Note that some applications only include fully populated CMPs, obviating the concept of an OCMP. Note also that some CMP parts might not apply to all applications, and additional parts could be allowed or required.



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3.1 CMP Structure

CMP SHALL comply with [SMPTE2053], except when noted.

3.2 CMP ZIP File Constraints

Where requirements conflict with Open Packaging Convention [ISO29500-2], this document takes precedence.

The CMP SHALL NOT use ZIP encryption.

Normative language is as follows:

- ‘SHALL be = “<value> (or similar) indicates that the field is required in the CMP and SHALL be set to <value>
- ‘SHALL be included’ indicates the item is required in the CMP with any constraints as indicated. Any decoding device SHALL be capable of properly decoding the CMP with the values set accordingly.
- ‘SHOULD/MAY be included’ indicates the item is optionally included in the CMP, but only with the constraints given. The item SHALL NOT be included in a manner that conflicts with the constraints, unless otherwise noted. Any decoding device SHALL be capable of properly decoding the CMP with the values set accordingly.
- “N/A” indicates the item is optionally included in the CMP. Any entity decoding device can safely ignore this item.

CMPs SHALL comply with the following constraints:

Local File Header:

local file header signature	SHALL be = 0x04034b50
version needed to extract	SHALL be 1.0 for baseline, 4.5 for Zip64, 6.3 for UTF-8 <i>[Note 1]</i>
general purpose bit flag	
bit 0 (encryption)	SHALL be = 0 (not encrypted)
bits 1-2	N/A
bit 3 (CRC and size values follow file data)	MAY be = 1
bits 4-10	N/A

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bit 11	SHALL be included
bit 12-15	N/A
compression method	SHALL be = 0 (no compression)
last mod file time	SHALL be included. When a Part is updated, it SHALL be assigned a date-time later than the previous version.
last mod file date (above)	
crc-32	SHALL be included
compressed size	SHALL be included, supporting both 4- and 8-byte fields
uncompressed size	SHALL be included, supporting both 4-and 8-byte fields
file name length	SHALL be included
extra field length	SHALL be included
file name (variable size)	SHALL be included
extra field (variable size)	MAY be included

Note 1: In this context, signaling ZIP 4.5 only indicates the Zip64 feature is used. Signaling ZIP 6.3 only indicates the Zip64 and UTF-8 encoding features are used. Other features might be used.

File data MAY be included.

Data descriptor MAY be included.

Archive decryption header is N/A.

Archive extra data record is N/A.

Central Directory File Header (same as Local File Header except):

central file header signature	SHALL be = 0x02014b50
version made by	N/A
file comment length	MAY be included
disk number start	SHALL be = 0
internal file attributes	N/A
external file attributes	N/A
relative offset of local header	MAY be included
file name (variable size)	MAY be included
extra field (variable size)	MAY be included
file comment (variable size)	N/A

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The Central Directory SHALL NOT be encrypted.

The Central Directory SHALL NOT be compressed.

Zip64 end of central directory record (same as Local File Header except):

zip64 end of central dir signature	SHALL be = 0x06064b50
size of zip64 end of central directory record	MAY be included
number of this disk	N/A
number of the disk with the start of the central directory	N/A
total number of entries in the central directory on this disk	N/A
total number of entries in the central directory	N/A
size of the central directory	N/A
offset of start of central directory with respect to the starting disk number	N/A
zip64 extensible data sector	N/A

Zip64 end of central directory locator:

zip64 end of central dir locator signature	SHALL be = 0x07064b50
number of the disk with the start of the zip64 end of central directory	SHALL be = 0
relative offset of the zip64 end of central directory record	MAY be included
total number of disks	SHALL be = 1

End of central directory record:

end of central dir signature	SHALL be = 0x06054b50
number of this disk	N/A
number of the disk with the start of the central directory	N/A
total number of entries in the central directory on this disk	N/A
total number of entries in the central directory	N/A
size of the central directory	N/A
offset of start of central directory with respect to the starting disk number	MAY include
.ZIP file comment length	MAY include
.ZIP file comment	N/A

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3.3 CMP Parts

In the following statements, the terms ‘Part’ and ‘Parts’ (an [ISO29500-2] term) refer to the files associated with a particular function. For example, when it is stated that a [SMPTE2053] Table of Contents is required, implicit in this statement is that, as required in [SMPTE2053].

The CMP SHALL contain all data required by [SMPTE2053], including data required by [ISO29500-2], unless otherwise noted.

For the avoidance of doubt, this includes both files and data within those files. All required XML document parts and attributes are required. Note that the CMP does not use the “/rels/.rels” and “[Content_Types].xml” mechanisms, so those files are not required.

Unless otherwise noted, and with the exception of DECE backwards compatibility guidelines ([DSystem], 1.6), XML documents SHALL validate against the respective schemas associated with the same namespace.

The following terminology is used in this section

- ‘Potential Media Presentation’ refers to a Media Presentation that could be included in the CMP. DCCs may be present or not. This is to distinguish from Media Presentations that are not supported by the Table of Contents, Metadata and/or other material.
- ‘Populated Media Presentation’ refers to a Media Presentation whose DCCs are included in the CMP.
- ‘Unpopulated Media Presentation’ refers to a Media Presentation whose DCCs are not included in the CMP.

In the following sections, XML definitions of [SMPTE2053] elements and attributes are defaulted to their definition in [SMPTE2053].

3.3.1 Versioning, Naming and Types

This section describes versioning and naming within a CMP.

3.3.1.1 Versioning

There are three mechanisms for tracking versions within a CMP

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- Version elements and attributes. Some Parts contain information about their version. These are called Versioned Parts. Resources reference by the [SMPTE2053] Presentation Description documents and Table of Contents are versioned.
- DCCs are identified by APIDs. Although there is not a strict version ordering mechanism, such as found with a version number, an APID identifies the correct version.
- Resource Name. Some Parts' versions are identified by unique names for each version. There is no information in the CMP that indicates which is the most current version, but external information can indicate which version of the Part is most current. These are called Resource Parts. Everything that is not a Version Part or Referenced media and applications is a Resource Part. From the standpoint of updates, the means of identifying a version of a Resource Part is the Part Name. Part Name maps to ZIP file name by removing the leading slash ("/").

Versioned Parts include the following:

- Table of Contents document
- Presentation Description document
- Container Mandatory Metadata
- Container Optional Metadata
- Experience Media Application

XML documents defined by [SMPTE2053] contain a Version attribute. References to these documents have a @VersionRequired attribute corresponding. An XML object is current if it has a Version that is greater than or equal to the @VersionRequired attribute in referring document. For example, Presentation/@Version in a Presentation Description Document should be greater or equal to PresentationRef/@VersionRequired in the TableOfContents.

A CMP SHALL NOT contain XML documents whose Version attribute is less than the corresponding @VersionRequired attribute in the referring document.

Version applies to certain other Parts of the CMP.

In Container Required Metadata, MetadataMovie/@MetadataVersionReference is the 'Version' corresponding with @VersionRequired attribute in referencing objects. Note that although @MetadataMovieReference is defined as xs:string, its value must be correspond with @VersionRequired which is defined as xs:nonNegativeInteger.

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In Container Optional Metadata, MetadataTail/@MetadataVersionReference is the 'Version' corresponding with @VersionRequired in referencing objects. Note that although @MetadataMovieReference is defined as xs:string, its value must be correspond with @VersionRequired which is defined as xs:nonNegativeInteger.

In Experience Media Application, ExperienceMediaApp/@updateNum is the 'Version' corresponding with VersionRequired in referencing objects.

Media Application Part referenced in the [SMPTE2053] Presentation Description documents and Table of Contents (i.e., MediaApplications/Application/@LocalSource) documents is assumed to be current. Any Media Application Part not referenced is assumed to be obsolete.

Any DCC referenced by a TrackReference in a current MetadataMovie is assumed to be current. Any DCC not reference is assumed to be obsolete.

Parts defined as Resources, that is Parts identified by Presentation/ResourceLibrary/Resource, have a unique name. This is included in Presentation/ResourceLibrary/Resource/@LocalSource and is the Part Name in the CMP. There is no information in the Part itself that indicates the Version. Version can be provided externally. To illustrate external versioning, note that [DSysstem], Section 11 defines a Manifest that includes Resource versioning information.

3.3.1.2 Naming and Types

Open Packaging Conventions identifies data by Parts, generally corresponding with files in a ZIP.

References in CMPs SHALL be Open Packaging Convention Part names. The OPC Relationships mechanism is not used. The SMPTE Media Package "/rels/.rels" is not part of a CMP.

All Part names SHALL use the Part URI format as per [ISO29500-2], Section 9. That is, certain characters require percent encoding.

As Part names are file names, it is important to consider practical use of these names. Generally, the names should be readable, so excessive percent encoding (e.g., %20 for space) is undesirable. Also, CMPs are generally constructed from files in a filesystem and can be extracted into filesystems so it is important to avoid characters that are no valid in popular filesystems.

Part names SHOULD NOT use characters that require percent encoding. Note that the URI encoding allows percent encoding, although percent encoding is generally undesirable. This requirement recommends against excessive percent encoding.

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Some characters are valid in Part URI format, but are not valid in some popular filesystems. To avoid problems when extracting these files it is best to percent encode these characters. The Operating System Constrained Characters SHOULD be percent encoded.

“Operating System Constrained Characters” are defined as follows:

Character	Character Name	Unicode	Notes
#	pound	0x23	
<	left angle bracket	0x3C	
\$	dollar sign	0x24	
+	plus sign	0x2B	
%	percent	0x25	
>	right angle bracket	0x3E	
!	exclamation point	0x21	
`	backtick	0x60	
&	ampersand	0x26	
*	asterisk	0x2A	
'	single quotes	0x91	
	pipe	0x7C	
{	left bracket	0x7B	
?	question mark	0x3F	
“	double quotes	0x93	
=	equal sign	0x3D	
}	right bracket	0x7D	
/	forward slash	0x2F	Except when it is part of a file path
:	colon	0x3A	
\	back slash	0x5C	Except when it is part of a file path
@	at sign	0x40	
,	comma	0x2C	

These encoding constraints requires that Part names that use colon (":") be percent encoded. For example, a Presentation Description Document for a Presentation with the ID

`urn:dece:presentationid:org:craig:1235` would be given a Part Name in the form

`<PresentationID>/Presentation.xml` would be encoded as follows:

`/urn%3Adece%3Apresentationid%3Aorg%3Acraig%3A1235/Presentation.xml`. The identifier in the XML would still be in non-percent-encoded form, so translation is required.

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CMPs do not use the “[Content_Types].xml” mechanism of OPC, so therefore, unlike SMPTE Media Package [SMPTE2053], this is not required.

CMPs NEED NOT include “[Content_Types].xml”.

UTF-8 encoding of DCC filenames and comment fields is allowed.

Part Naming SHALL be as shown in the following table

Part	Part Name	Example (note that ZIP file name does not have the leading slash (“/”))
TOC	/TableOfContents.xml	/TableOfContents.xml
Presentation	/<PresentationID>/Presentation.xml	/urn%3Adece%3Apresentationid%3Aorg%3Acraig%3A1235/Prese ntation.xml
BaseLocations	Definition is part of an ecosystem-specific definition. To avoid directory conflicts, the /PresentationID directory SHOULD be used for Presentation-specific Base Locations.	
MetadataMovie	/<PresentationID>/MetadataMovie.xml	/urn%3Adece%3Apresentationid%3Aorg%3Acraig%3A1235/Metad ataMovie.xml
MetadataTail	/<PresentationID>/MetadataTail.xml	/urn%3Adece%3Apresentationid%3Aorg%3Acraig%3A1235/Metad ataTail.xml
Other Resources unique to Presentation	/<PresentationID>/<PresResource>	/urn%3Adece%3Apresentationid%3Aorg%3Acraig%3A1235/Other Data.xml
DCC	/<APID>.[uvu uva uvv uvt]	/urn%3Adece%3Aapid%3Aeidr-x%3A50A5-34E1-4FFF-0BBD-17C9- G%3A1.uvu
Experience Media Application	/<ExperienceMediaAppID>/ExperienceMediaApp.xml	/urn%3Adece%3Aapplicationid%3Aorg%3Adece%3Aexperienceme diaapp/ExperienceMediaApp.xml
MediaApplication	/<ApplicationID>/<AppName>	/urn%3Adece%3Aapplicationid%3Aorg%3Acraig%3A1235/FunStu ff.html
Media Application components, including images exclusive to Media Application	/<ApplicationID>/<AppResource>	/urn%3Adece%3Aapplicationid%3Aorg%3Acraig%3A1235/SubMen u.html
Images exclusive to Presentation	/<PresentationID>/<image name>	/urn%3Adece%3Apresentationid%3Aorg%3Acraig%3A1235/ urn%3Adece%3Acontainer%3Ametadadataimageindex%3A23.png /urn%3Adece%3Apresentationid%3Aorg%3Acraig%3A1235/ chapter1.png
Shared images	/Images/<image name>	/Images/pretypicture.jpg
License	Definition is part of an ecosystem-specific definition. To avoid directory conflicts, the /Licenses directory SHOULD be used for licenses.	
Other Resources shared between Presentations	/Resource/<resourcefilename>	/Resources/YetAnotherFile.xml

In a CMP, the LocalSource attribute in SMPTE Media Package XML Documents refers to an OPC Part. Since Part names are ZIP file names, LocalSource contains the file name within the ZIP.

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The following are as defined

- <PresentationID> is the Presentation ID for the associated Presentation
- <PresResource> is the name of a Resource as referenced in Presentation/ResourceLibrary/Resource/@LocalSource for that Resource. It SHALL be unique within the associated directory (i.e., /<PresentationID> directory)
- <APID> is the APID for the associated Digital Asset.
- <ExperienceMediaAppID> is the well-known Media Application ID for the Experience Media Application as defined in Section 3.3.7.1. Note that this can be ecosystem-dependent. /<ExperienceMediaAppID>/ExperienceMediaApp.xml SHALL correspond with Application/@LocalSource in the Table of Contents document.
- <ApplicationID> is the Application ID for the associated Media Application
- <AppName> is the name of the Application. /<ApplicationID>/<AppName>. SHALL correspond with Application/@LocalSource in the Presentation or Table Of Contents document.
- <AppResource> is the name of a Media Application Resource. It SHALL be unique within its associated directory
- <image name> is a name for the image, including a file extension corresponding to the image type. <image name> SHALL be unique within the /Images directory. <image name> can be an Image URN as defined in [DMeta] Section 4.3 . See also Section 3.3.4.
- <resourcefilename> is the unique part of the Resource's Name.

Note that Part Names start with a slash ("/") and ZIP file names cannot start with a slash. OPC instructs that the slash should be removed when translating a Part Name to ZIP file name [ISO29500-2], Section 10.2.3.

3.3.2 SMPTE Media Package objects

3.3.2.1 Table of Contents

The Table of Contents Part specifies the list of presentations included within the SMPTE Media Package.

The `TableOfContents` element is the single root XML node of the Table of Contents Document, which is stored as a Part in the OPC/Zip container. The Table of Contents Part shall contain an XML document conformant with the XML Schema Definition file at the following location:

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<http://www.smpte-ra.org/schemas/2053/2011/MediaPackage/2053a-Media-Package-TableOfContents.xsd>

A CMP SHALL contain a TableOfContents element.

The TableOfContents element SHALL be present in the CMP as follows:

Element	Attribute	Definition	Type	Card.
TableOfContents			Defined in accordance with [SMPTE2053] except where noted in this specification.	
	Version	Version of the TableOfContents.		
	Source	CMPID for this CMP		
MediaApplications		Reference to Media Applications. Instances MAY be included.		0..1
PresentationRef		There SHALL be a PresentationRef instance for every Potential Media Presentation		1..n

Other [SMPTE-2053] elements and attributes MAY be included in TableOfContents. The intent is that they not be included unless a particular ecosystem requires their use.

A `PresentationRef` element contains the basic information about a presentation included in the SMPTE Media Package so that a consumer or device may select an appropriate presentation from the Table of Contents to download or play. It also contains basic metadata about that presentation.

There SHALL be a `PresentationRef` element for each Potential Media Presentation.

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PresentationRef SHALL be populated as following. Note that cardinality is defined in this table (i.e., a blank 'Card.' entry means the element or attribute is required).

Element	Attribute	Definition	Type	Card.
PresentationRef			Defined in accordance with [SMPTE2053] except where noted in this specification.	
	VersionRequired	The VersionRequired attribute specifies the version of the Presentation part that is expected. If this Table of Contents reference requires a higher version number than the stored Presentation document it references, then the newer version of the Presentation document should be downloaded to replace the older version.		
	ContentId	PresentationID for the Media Presentation described by this element.		
	LocalSource	Part Name of the associated Presentation Description Document.		
Title		Title of Media Presentation. This is for debugging and not for operational CMP use. Title SHOULD be equal to TitleDisplayUnlimited from one instance of LocalizedInfo in BasicMetadata.		
DescriptiveMetadata		An internal reference to MetadataMovie document (Container Required Metadata) for this Presentation.		

Other [SMPTE-2053] elements and attributes MAY be included in PresentationRef. The intent is that they not be included unless a particular ecosystem requires their use.

3.3.2.2 Presentation Description

A Presentation Description Document as per [SMPTE2053] SHALL be present for each Potential Media Presentation in the CMP.

The Presentation Part shall contain an XML document conformant with the XML Schema Definition file at the following location:

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<http://www.smpte-ra.org/schemas/2053/2011/MediaPackage/2053c-Media-Package-PresentationRef.xsd>

The Presentation element SHALL be populated as follows:

Element	Attribute	Definition	Type	Card.
Presentation			Defined in accordance with [SMPTE2053] except where noted in this specification.	
	Version	This value SHALL equal TableOfContents/PresentationRef/@Version Required attribute for the PresentationRef associated with this Presentation.		
ResourceLibrary		Resources within the Presentation.		0..1
DescriptiveMetadata		An internal reference to MetadataTail.		0..1
MediaApplications		Reference to Media Applications. Instances MAY be included.		0..1

Other [SMPTE-2053] elements and attributes MAY be included in Presentation. The intent is that they not be included unless a particular ecosystem requires their use.

Note that the DRM element is not required because licensing is handled through the DCC. The TrackGroup element is not required because track references are in MetadataMovie.

TableOfContents and Presentation are published together. If Version and VersionRequired do not match (e.g., after download), then the Table of Contents is not correct. This makes it possible to refer to [SMPTE2053] data with a single version value. TableOfContents/@Version SHALL match TableOfContents/PresentationRef/@VersionRequired.

ResourceLibrary, if present, SHALL contain a Resource element for each Part of the CMP that is not one of the following

- Table of Contents document
- Presentation Description document
- Container Mandatory Metadata
- Container Optional Metadata
- DCC

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- Media Application
- Licenses

If ResourceLibrary is present, the following apply

- ResourceLibrary/Resource/@Id SHALL include the identifier for the Resource, if any. If there is no identifier associated with the resource, @Id SHALL contain a unique identifier value. Note that it must conform to xs:Id format (i.e., xs:NCName).
- ResourceLibrary/Resource/@LocalSource SHALL be the Part Name of the Resource in accordance with Naming defined in Section 3.3.1.2.
- ResourceLibrary/Resource/@VersionRequired SHALL be the Version of the Resource. Version SHALL increase with each revision.
- Other elements and attributes of ResourceLibrary/Resource SHOULD NOT be included.
- Examples of objects that are Resources that must be listed are images, including those referenced by MetadataMovie, and Presentation-related ecosystem-specific objects (e.g., BaseLocations). Individual ecosystems can specify which ecosystem-specific objects are Resources and which are not.

3.3.3 Media

An OCMP MAY contain DCC files.

3.3.4 Metadata and Images

Container Metadata as defined in [DMeta] contains information required by Devices to select Presentations, select default tracks and provide other data-related functions (e.g., chapters). The principal element for Container Metadata is MetadataMovie. This is required in DCCs.

3.3.4.1 MetadataMovie

MetadataMovie in a CMP contains complete information about a Media Presentation. This includes where a track can be found (i.e., which DCC) and information needed to properly play the Media Presentation (e.g., chapters and default track selection information). Note that DCCs contain MetadataMovie, but since they do not necessarily describe all tracks, information for playback might be incomplete. Therefore, it is generally necessary to use the metadata in the CMP.

A CMP SHALL contain MetadataMovie for all Presentations that are referenced by the Table of Contents.

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The additional constraints apply to MetadataMovie within a CMP:

- The PresentationID attribute SHALL be present
- Within each instance of //MetadataMovie/TrackMetadata/Track/[Audio|Video|Subtitle],
 - TrackIdentifier/Namespace SHALL be included and correspond with the namespace for the APID. Note that it is recommended this term be defined as an ecosystem-specific requirement.
 - TrackIdentifier/Identifier SHALL be the APID for the DCC containing that track
 - TrackIdentifier/Location SHALL be the Part Name of the DCC containing that track. Note that Part Name includes the full path.
 - TrackReference SHALL be the track_id value found in the Track Header Box ('tkhd') of the referenced track within the DCC associated with that APID
 - Note that there can be multiple instances of TrackIdentifier. This is intended where multiple identifiers/ecosystems apply.
- When referring to an image in a Container,
 - TrackReference SHALL be the APID for the DCC with that image
 - TrackIdentifier SHALL be set with Namespace='DCCImageRef' and Identifier SHALL be the image reference as per [DMeta] 4.3.
- When referring to images in a CMP and not in a Container
 - TrackReference SHALL be the CMPID for the CMP. Note this allows the image to be found, even when the metadata is separated from the CMP
 - TrackIdentifier SHALL be set with Namespace='CMPImageRef', Identifier SHALL be blank, and Location SHALL be the Part Name of the Image within the CMP. Note that Part Name includes the full path.

3.3.4.2 Storing Images

A CMP SHALL contain images in accordance with [DMeta] Container requirements; for example, chapter images, poster art images and other images referenced by metadata.

Images in a CMP SHALL be stored as files.

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Images associated with a Presentation SHOULD be stored in the directory associated with that Presentation as defined in Section 4.2.2 unless that image is used across multiple Presentations.

Images shared by multiple Presentations SHOULD be stored in the /images directory as defined in Section 4.2.2.

3.3.5 Base Locations and Licenses

Base Locations contain information used for functions such as licensing and for assistance with purchasing the Right associated with a DCC. Licenses, such as DRM licenses, are required to play encrypted Content in some ecosystems.

Where applicable, use of Base Locations and Licenses are part of ecosystem-specific requirements.

Note that Licenses are typically not referenced from within the TableOfContents or Presentation Description Document. However, Base Locations are typically referenced by the Presentation Description Document to facilitate updates.

3.3.6 Constraints on DCCs within CMPs

ZIP compression and encryption is not applied to DCCs or the central directory. In ZIP parlance, compression method 0, “stored,” is used. To be clear, this applies to DCCs in their entirety, not internal components of the DCC that are compressed and/or encrypted in accordance with [DMedia].

DCCs SHALL NOT be compressed ZIP objects.

DCCs SHALL NOT be encrypted ZIP objects.

3.3.7 Media Applications

The CMP MAY contain Media Applications as defined in [SMPTE2053].

3.3.7.1 Experience Media Application

An Experience Media Application is Media Application CMP Part. The content of this part is defined in [DMeta], Section 4.5 as ExperienceMediaApp element.

The Experience Media Application provides the information for a Device to properly use the Content within a CMP. As the Experience Media Application contains the default navigation instructions for the

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CMP, it is unique; and, there is therefore at most one Experience Media Application in the CMP. This does not preclude the addition of other Media Applications using the same format.

A CMP MAY contain a Media Application containing a single XML document containing an ExperienceMediaApp element as defined in [DMeta], Section 4.5. This Media Application is referred to as the Experience Media Application.

The Experience Media Application Part is subject to the following constraints

- ExperienceMediaApp/@ExperienceMediaAppID SHOULD either be a globally unique ID for that Experience Media Application or use the following identifier:
'urn:dece:applicationid:org:dece:experiencemediaapp'
- The CMP Part SHALL be named in accordance with Section 3.3.1.

There SHALL be at most one Experience Media Application included in a CMP. For avoidance of doubt, there cannot be more than one Experience Media Application in a CMP.

If an Experience Media Application is included or referenced in an CMP, the CMP's TableOfContents SHALL include a MediaApplications/Application element for the Experience Media Application with the following constraints

- The Application element for the Experience Media Application SHALL be the first instance of Application within MediaApplications
- Application/@Type SHALL equal 'ExperienceMediaApplication'. Note that interpretation is case insensitive.
- Application/@LocalSource SHALL refer to the CMP Part containing the Experience Media Application.

3.3.7.2 Other Media Applications

This section applies to Media Applications other than the Experience Media Application.

If a Media Application is included or referenced in an CMP, that reference, whether from the TableOfContents or the Presentation Description Document SHALL include a MediaApplications/Application element for the Media Application with the following constraints

- The first ResourceRef instance SHALL contain an @id equal to the ApplicationID.

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- There SHALL be a ResourceRef instance for each Part of the Media Application containing the Part Name of the Part.
- All ResourceRef instances in the Application instance SHALL belong to the same Application. Note that this does not preclude multiple Media Applications referencing the same Part; for example, images.

3.3.8 Ancillary Tracks

Ancillary Tracks are tracks that are not in themselves playable, but provide additional information in conjunction with other tracks (called Base Tracks). All Ancillary tracks are bound to a specific track audio, video, subtitle track (Base Track) in the same Presentation. Metadata for Ancillary Tracks is defined in [DCMETA], primarily Section 5.2.12. As TrackMetadata is based on [DCMETA], the CMP includes this metadata.

Within a CMP, an Ancillary Track is stored, in accordance with Section 3.3.1.2, either as a DCC or as an 'Other Resource Unique to Presentation'. For example, a Dolby Vision Enhancement Layer track is stored as a DCC. A metadata ancillary track would be categorized as an 'Other Resource'.

Ancillary Tracks SHALL be included as a Resource in the same Presentation as the Base Track. Note that this defines where the Part is stored, how the Part is referenced in SMPTE 2053 data, and how the Part is referenced in CMP metadata.

3.4 CMP Naming

CMP naming is part of ecosystem definition.

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4 DECE Media Package

This section defines the requirements for the DECE Media Package (DMP). The DMP is derived from the CMP.

4.1 DMP in the DECE Ecosystem (Informative)

DECE Media Packages are delivered from Content Providers to DSPs as shown in the following diagram as “Content”. Also, although not specifically shown, Content Providers can also deliver CMPs to LASPs.



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streaming Common Streaming Format DCCs. Devices can simultaneously play stored tracks (DMP) formats and streaming tracks (Common Streaming).

In its simplest form, the DMP is functionally equivalent to a single DCC. It contains ZIP components, such as a directory; SMPTE Media Package components, such as a Table of Contents; and a DCC. All Devices can locate the DCC within the DMP and play it just as if the DCC were not in a DMP.

A DMP can contain more than one DCC. All Devices can recognize and play multi-track DCCs based on the Common File Format as defined in [DMedia]. Devices that support Late Binding are capable of playing tracks from multi-track DCCs that are built accordingly to [DMedia], Sections B.7 and C.7.

It is also possible to construct and deliver a DMP that has no media Containers. The DMP is built with the same components, less the DCCs. There is enough information in the DMP to determine what pieces are missing so they can be obtained. To support this functionality, information that typically resides in the DCC is replicated in the DMP, outside of the DCC. For example, metadata that is required for the DCC must exist in the DMP, whether or not the DCC is present. Similarly, the DMP supports the storage of licenses and data such as BaseLocation and Purchase URL (PURL) references.

DMPs also support the inclusion of Media Applications, such as applications to navigate Media Presentations and, ultimately, more advance applications such as games.

4.2 DMP-specific Requirements

A DMP SHALL comply with CMP requirements, except as specified in this section.

The term ‘CMPID’ in the body of this document refers to the DECE DMPID as defined in [DSystem]

4.2.1 Additional CMP ZIP Constraints

The following additional constraints apply using terminology of Section 3.2.

Note that the following requirements constrain a DMP to a single disk.

number of this disk	SHALL be 0
number of the disk with the start of the central directory	SHALL be 0

4.2.2 Versions, Naming and Types

Part Names SHALL NOT use Operating System Constrained Characters.

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The following file names SHALL be used in a DMP

BaseLocations	/<PresentationID>/BaseLocations.xml	/urn%3Adece%3Apresentationid%3Aorg%3Acraig%3A1235/BaseLocations.xml
License	/Licenses/<DRM>/[<PresentationID> <APID>].uvl	/Licenses/playready/urn%3Adece%3Apresentationid%3Aorg%3Acraig%3A1235.uvl

4.2.3 Media

There SHALL be exactly one DCC containing a video track associated with each Media Presentation.

4.2.4 Metadata and Images

Within each instance of //MetadataMovie/TrackMetadata/Track/[Audio|Video|Subtitle], TrackIdentifier/Namespcae element SHALL be the string 'DECE'. Note that *Namespcae* is an element within md:ContentIdentifier-type.

4.2.5 Base Locations and Licenses

Base Locations are required for licensing and for assistance with purchasing the Right associated with a DCC. DRM Licenses are required to play encrypted Content.

Note that this document describes where the format supports Base Locations and DRM Licenses. [DDevice] provides specific instructions on rules for storage. These rules can change over time.

4.2.5.1 Base Location in a CMP Part

The DMP SHALL have Base Location information for each Presentation in the DMP.

Base Location Parts SHALL be XML documents containing a BaseLocations element as defined in [DMeta], Section 4.

BaseLocations Part names SHALL be as defined in Section 4.2.2.

4.2.5.2 Licenses in a CMP Part

When DRM Licenses are obtained, DRM License Parts are added to the DMP. This is typically done by the Device although it can also be done by a DSP.

DRM License Parts SHALL be binary files contain a single 'pssh' box as defined in [DMedia].

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DRM Licenses SHALL be organized by DRM in the /Licenses directory as defined in Section 4.2.2, with subdirectory names corresponding with DRM Name as per [DSystem], Section 17.

The License Part Name SHALL correspond with the APID associated with that License as defined in Section 4.2.2.

4.2.6 DMP Naming

The media type of the UltraViolet File Format SHALL be “application/vnd.dece.zip” and the file extension SHALL be “.uvz” as registered with [IANA].

END