

Content Publishing Specification

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1 INTRODUCTION

1.1 Document Purpose

The DECE Ecosystem defines a service-based architecture to enable interoperability of content from multiple providers across multiple retailers, devices, DRM's, and fulfillment providers. Successful launch and ongoing operations of DECE depends upon ecosystem-wide consistency and reliability for certain aspects of:

- (i) what content and other information is made available by each of the DECE roles
- (ii) how published information is expressed or formatted
- (iii) what rules or constraints must be observed within and among published artifacts
- (iv) to which other DECE roles, and in what sequence, information must be made available
- (v) which mechanisms, interfaces, or protocols are used to convey the information

Several other DECE specifications describe detailed information and other requirements regarding specific and focused aspects of the ecosystem (e.g. Coordinator Interfaces, DECE Common Container Format, and DSP/Device Interfaces). This Specification provides an overview of the DECE publishing process, including an end-to-end information model. It describes how information published to the ecosystem by a particular DECE roles flows through the ecosystem and is made available to and/or impacts downstream requirements on other DECE roles.

In addition to unifying the related specifications by providing an end-to-end description of the publishing flow, a primary purpose of this document is to define the scope of publishing requirements, and to enumerate a set of requirements, spanning all DECE roles, on the DECE publishing process.

1.2 Scope

This document specifies requirements for publishing video assets into the DECE Ecosystem.

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-DP2]. For more information, please see that work.

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.

Terms defined to have a specific meaning within this specification will be capitalized, e.g. "Track", and should be interpreted with their general meaning if not capitalized. Normative key words are written in all caps, e.g. "SHALL"

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1.4 References

1.4.1 Normative References

[DCoord]	Coordinator API Specification
[DDiscrete]	Discrete Media
[DSystem]	System Specification
[DMeta]	Content Metadata Specification
[DMedia]	Common File Format & Media Format Specification

1.4.2 Informative References

[DKeyDelivery]	Keyset Delivery Format Specification
[ISO-DP2]	ISO/IEC Directives, Part 2, Annex H: http://www.iec.ch/tiss/iec/Directives-Part2-Ed5.pdf
[IANA-A]	IANA Audio Media Types, http://www.iana.org/assignments/media-types/audio/
[IANA-V]	IANA Video Media Types, http://www.iana.org/assignments/media-types/video/
[TR-META-CM]	<i>Common Metadata</i> , TR-META-CM, v1.2d, September 24, 2012, Motion Picture Laboratories, Inc., http://www.movielabs.com/md/md/v1.2/Common%20Metadata%20v1.2d.pdf
[XSD-META-CM]	XML Schema to accompany [TR-META-CM], October 29, 2010, http://www.movielabs.com/schema/md/v1.07/md.xsd
[TR-META-EMA]	EMA Metadata, TR-META-EMA, v1.0, January 5, 2010,

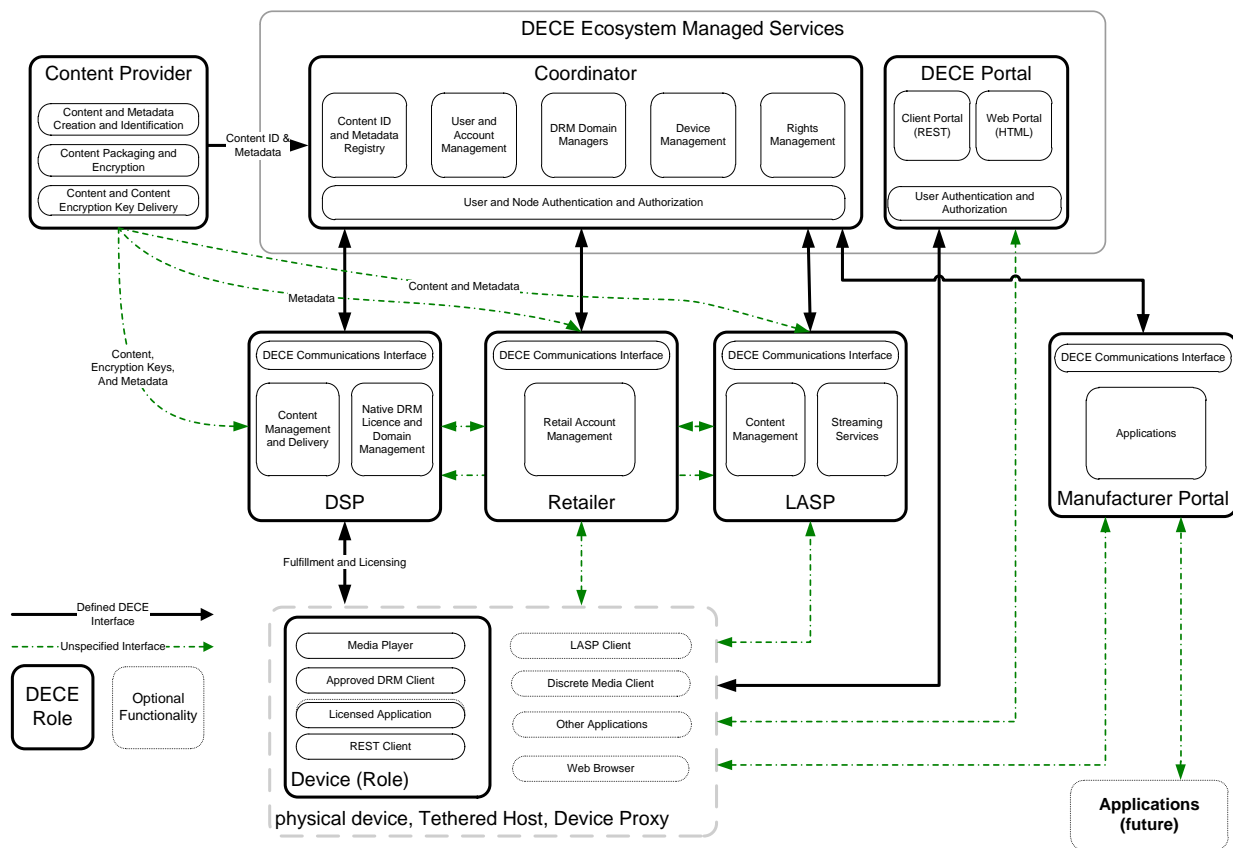
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2 DOCUMENT STRUCTURE

The Content Provider Role is the authoritative source for all DECE Content and is implemented and run by the various content owner or their partners. The Content Provider Role is responsible for:

- Content and Content Metadata creation and Identification,
- Encoding and encryption of Content into a DECE CFF Container,
- Delivery of Containers, Content Metadata and Content Encryption Key(s).

This document defines Content Provider requirements with respect to publishing Content into the Ecosystem.



2.1 Document Organization

An overview of the Content publishing process is provided in [DSystem] Section 9 and in Section 3. This specification describes the publishing process performed by the Content Provider. Section 4 defines Content Provider requirements. Section 5 describes DECE Common File Format Container (DCC) creation. Sections 6 and 7 are informative section providing guidance on organizing and encoding information for publishing.

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2.2 Relationship to Other DECE Specifications

2.2.1 Media Format Specification

The DECE Media Format Specification describes many requirements regarding the structure, information content, and constraints for the “DECE Common Container” (DCC). Because the DCC is one of the key artifacts published within the DECE ecosystem, this document refers extensively to the Media Format Specification, and delegates many publishing conformance requirements, by reference, to that specification.

2.2.2 Metadata Specification

The DECE Metadata Specification contains descriptions and schemas for several classes of metadata artifacts published within the DECE ecosystem. This document refers extensively to the DECE Metadata Specification, and delegates many publishing conformance requirements, by reference, to that specification.

2.2.3 Coordinator API Specification

The DECE Coordinator Interface Specification contains descriptions and schemas for service-oriented interfaces to the DECE Coordinator. In many cases, DECE artifacts must be expressed in the schemas specified in these interfaces, and published to the Coordinator using the mechanisms specified in the Coordinator Interface Specification. As such, this document refers extensively to the Coordinator Interface Specification, and delegates many publishing requirements, by reference, to that specification.

2.2.4 Device Specification

The DECE Device Specification describes a minimal fulfillment-side interface that must be supported all DECE Devices. Because content published to the DECE ecosystem is ultimately made available to consumers through this interface, this document refers to the Device Specification, and in some cases delegates requirements, by reference, to that Specification.

2.2.5 System Specification

The DECE System Specification defines the overall architecture and operation of the DECE ecosystem. It describes how the ecosystem is designed to allow users to purchase digital media from multiple retailers, sharing their purchases with all members of their household, and enabling seamless playing of the media on all devices in their household.

2.2.6 Discrete Media Specification

The DECE Discrete Media specification specifies requirements and formats for fulfilling the Discrete Media right. It describes requirements for delivery methods and hardware/software clients that record content onto Discrete Media and it lists approved publishing and fulfillment formats. It describes the way Content Providers publish Discrete Media.

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3 PUBLISHING INFORMATION MODEL

In order to best provide an overview of the publishing flow in the next section, this section describes the end-to-end information model used throughout the DECE ecosystem. In some cases, some or most of the information in the artifacts below are out-of-scope for DECE specification. However, all artifacts that include any DECE information that is the subject of publishing requirements are included in this section. What the Content Providers publishes to the ecosystem is a subset of what gets delivered to the device.

This section provides a narrative description of the scope and purpose of each of the artifacts in the publishing information model, as well as the key relationships among those artifacts.

3.1 Product Definition

The Product is the entity that is sold by the retailer, and is typically referenced in the commercial deal terms between each Content Provider and retailer. Product information will typically include a definition of the included content, key commercial terms between the Content Provider and retailer, and any additional information needed to promote or market the Product. Product information is nearly completely out-of-scope for DECE. However Retailers and Content Providers do need:

- A consistent way to specify the DECE content that is included in any Product
- A way to identify this DECE content so that when Products that include such content are sold the associated DECE content can be identified at point-of-sale and required actions can be taken within the DECE ecosystem such as the creation of a rights token
- Retailers can reliably account for settlement with Content Providers as regards DECE content

Content publishers and retailers will likely address these needs by embedding references to DECE Products in their product information, although they are not required by DECE to do so. A DECE product offering may include multiple pieces of unique content.

3.1.1 Product

A DECE Product consists of DECE content identified as one or more DECE Logical Assets. A Product that is more than one logical asset can be created when the logical assets are associated through their metadata. DECE Products express content scope in terms of DECE Content Identifiers (ContentIDs) and Asset Logical Identifiers (ALIDs).

In addition to one or more ALIDs, a DECE Product includes ALID to APID (Asset Physical Identifier) mappings, one or more DECE profiles (see section 3.2.3), metadata and product encryption keys.

ContentIDs, ALIDs and APIDs are defined in [DSystem] section 5.5. The metadata consists of Asset Information described in [DMedia] section 2.2.4, and Required and Optional Metadata defined in [DMeta] section 4 and [DMedia], Section 2.3.4.

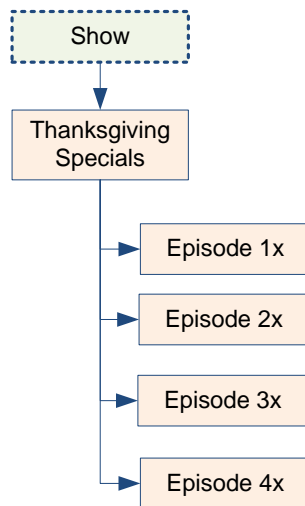
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3.1.2 Bundle

Frequently, the structure of Logical Assets sold together is implicit. For example, when episodes of a season are sold, Basic Metadata can be used to reconstruct the structure. For example, it is encoded in Basic Metadata that Episodes 1, 2 and 3 are part of Season 2 and Season 2 is part of Show.



However, sometimes content is sold as part of a grouping; for example, a group may include “Best-of” or other groupings meaningful to the Content Publisher or Retailer. For example, in the following, selected episodes were chosen as a special grouping



When the product is sold, without information describing the grouping it would be impossible for the Portal or other Nodes to reconstruct the context of the purchase (e.g., were episodes bought individually, as part of a season, or as part of a best-of offering). The Bundle mechanism provides context for the acquisition of a Right in these cases. Bundle references are optionally included in the Rights Token.

A Bundle defines and describes an arbitrary collection Logical Assets.

Bundles are referenced with a globally unique Bundle Identifier as defined in [DSystem] Section 5.5.3. Bundles structure and APIs are defined [DCoord], Section 6. Section 7.5 of this document, “Bundles, Compound Objects and Special Offerings” provides guidelines on structuring bundles.

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3.2 Content and Rights

3.2.1 Content Structure and Identification

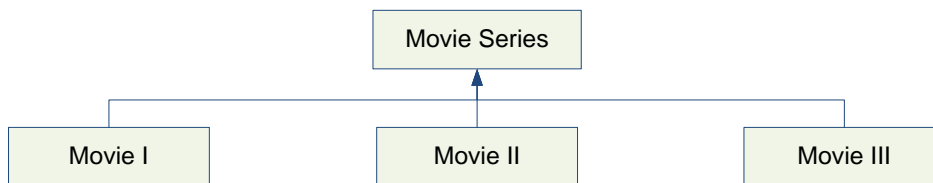
A Content Identifier (ContentID) uniquely identifies metadata associated with content. This can be anywhere from a TV Show or movie to a TV Season or Show, a movie series, a miniseries, or a franchise containing movies, television and games. Content Identifiers can also reference clips, mashups, “best-ofs” and other pieces or compilations.

The Content Provider provides metadata for any of these entities and provides a unique Content Identifier for each.

In the following illustration, each box (the Show, each Season and each Episode) would have a unique ContentID.



Similarly, for movies, each movie in the series and the series itself would have a ContentID.



The following illustrates a non-standard structure; specifically, there exists an entity “Selected Scenes” that are portion of Episode 1. “Selected Scenes” would have its own ContentID.



The Content Provider however has a choice as to what the product offering looks like. For example, the Content Provider might package the product offering such that an entity is one episode or in such a way that an entity is a

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season. This latter approach has shortcomings; not least of these being that the metadata information is limited because there is no way to describe individual episodes.

Content Identification and Metadata are defined in [DMeta].

3.2.2 Logical Asset

A DECE **Logical Asset** expresses a logical scope of content to which consumer usage rights (expressed through *Media Profiles*), as well as a physical expression of the content scope (expressed through DECE *Logical to Physical Mappings* and a set of DECE *Physical Assets*) can be bound. Thus a Logical Asset maps to one or more Physical Assets. The basic DECE product offering is a single Logical Asset. Logical Assets are identified by Asset Logical IDs (ALIDs).

Each Logical Asset is associated with a single Content Identifier. This is the mechanism by which Logical Assets reference metadata.

Logical Assets and ALIDs are defined in [DSystem] section 5.5.1.

3.2.3 Profile

DECE has defined *Media Profiles*, each of which includes a consistent and well-defined set of consumer usage rights that are described in the DECE policy documents. The Media Profiles are:

- HD – High Definition
- SD – Standard Definition.

Each Logical Asset must have at least one Profile. Business rules in the *DECE Content Provider Licensing Agreement* define valid combinations of Media Profiles. The following rule applies to content offerings

- If HD is offered, SD must be available

For each Media Profile made available to consumers for a defined Logical Asset, corresponding physical content must also be made available for fulfillment. Physical content published within the DECE ecosystem by Content Providers is therefore also tagged with a corresponding Media Profile. This allows fulfilled physical content to be chained back to the corresponding Logical Asset plus Profile combination, and enables DSPs to validate (through the DECE Coordinator) that corresponding rights to physical content have been purchased prior to issuing DRM-specific licenses for such content.

Publishing requirements for Discrete Media are defined in the [DiscreteMedia].

3.2.4 Right and Rights Token

A Right is a combination of Logical Asset and Profile. Each of an Account's Rights is stored in a Rights Token. Rights Tokens are identified by Asset Logical Identifiers (ALIDs) and contain additional data about which Profiles the User has a Right. [DSystem] defines the identifier syntax. [DCoord] defines the token structure.

[DSystem] section 7.4 has an overview of the Rights Locker and Rights Tokens.

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3.3 Containers and Files

3.3.1 Origin DECE CFF Container (ODCC)

The DECE Common Container format includes provisions for including a DRM-non-specific DECE identifier and DRM-non-specific information describing the layout of encrypted segments and tracks within the container. It also includes provisions for each approved DECE DRM system to embed DRM-specific information within the DCC. An **Origin DECE CFF Container (ODCC)** is a DCC which includes at least the required DRM-non-specific information, but which does not include any DRM-specific information. ODCCs are created by Content Providers.

3.3.2 Physical Asset

A DECE *Physical Asset* is a DECE Common File Format Container (DCC) as defined in the [DMedia]. DECE Physical Assets are not bound to files or filenames, and are intended to be usable by multiple DSPs, multiple retailers, and multiple devices within the DECE Ecosystem. DECE Physical assets are made available by Content Providers.

One or more DCC must exist for each Right. These Physical Assets are fulfilled by DSPs to DECE consumers and devices whenever that User has the Right (i.e., that User's Account Contains a Rights Token that contains the Right).

Physical Assets are defined by Asset Physical Identifiers (APIDs). APIDs are defined in [DSystem] section 5.5.

3.3.3 File

Neither DECE Physical Assets nor DCCs are necessarily bound to files. Stated differently, the ways in which they may be bound to files by Content Providers for distribution to DSPs is out of scope of DECE and this specification.

By the time DCCs are delivered to consumers in the field they are likely bound to files on one or more content distribution networks, each with location and access protocol information.

DSPs are free to bind DCCs to files in ways that optimize their operations. The "same" DCC may be made available by multiple DSPs with different filename bindings, and made available to consumers through different content distribution networks with different location paths and access protocols.

[DSystem] section 11 defines how DCCs are fulfilled, and how Retailers/DSPs update fulfillment locations.

3.3.4 Asset Delivery

How assets are described and delivered from Content Providers to DSPs is out of scope. An example of transmittal metadata can be found in [TR-META-EMA].

3.4 Logical to Physical Mapping

For each Right offered by Content Providers, a Logical to Physical Mapping is also published. The Logical to Physical Mapping for a Right enumerates the Physical Assets included within that Right.

Logical to Physical Mappings are made available and maintained by Content Providers. Logical to Physical Mappings are used by DSPs to determine which Physical Assets should be fulfilled for each Logical Asset within a Bundle requested for fulfillment by a consumer.

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Logical to Physical Mappings are defined [DCoord]. Logical to Physical Mappings are provided to the Coordinator through APIs defined in [DCoord] section 6.2.

3.5 Encoding

3.5.1 Source A/V Materials

Content Providers create and make available Physical Assets (published ODCCs) for each Media Profile of each Logical Asset being offered.

The published ODCC are used by DSPs in download fulfillment transactions. They may also be used by LASPs for streaming transactions. Content Providers may make content available to LASPs in other formats if desired.

3.5.2 Picture Format

The [DMedia] defines a number of supported *Picture Formats*. A Picture Format is the horizontal and vertical pixels, and aspect ratio in a frame of video. The video in each video track within a DCC conforms to one of the defined Picture Formats.

Physical Assets provided by Content Providers for the purpose of fulfilling a particular Media Profile for a particular Logical Asset must include Picture Format(s) that are consistent with that Media Profile.

3.6 Asset Metadata

DECE Bundles and Logical Assets each include by reference an instance of DECE Basic Metadata through the Content Identifier (`ContentID`).

For each DCC made available, Content Providers must also make available corresponding DECE *Digital Asset Metadata*.

Metadata can be made available and maintained by the Content Provider and may be supplied to other DECE Roles to support their ecosystem activities—this interface is out of scope.

Metadata included in the DECE CFF Container is defined in [DMedia].

Digital Asset Metadata and Basic Metadata are detailed in [DMeta], Section 3. Metadata is provided to the Coordinator through APIs defined in [DCoord].

3.7 DRM

3.7.1 Keyset

The DECE CFF Container may include encrypted content. All such encrypted content uses a consistent content encryption mechanism as described more fully in [DMedia]. Content publishers choose which content tracks, and which segments within those tracks, within a DCC will be encrypted. Content publishers also choose and manage the encryption keys used to encrypt any encrypted content.

A DECE **Keyset** is a data structure that captures how content within a DCC has been encrypted – which tracks, which segments within those tracks, and the encryption key used for each such segment. DECE Keyset information

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is provided by Content Providers. DRM License Servers used by various DSPs will need this information to be able to construct corresponding DRM-specific license(s) for the DCC.

A subset of the DECE Keyset information for each DCC (everything except the keys themselves) is also embedded within the DCC in a DRM-non-specific fashion as described in more detail in [DMedia]. This allows DCCs to be used across multiple (current and future) approved DECE DRM systems.

3.7.2 License

DECE supports multiple approved DRM systems. Each DECE DSP supports one or more approved DRMs, and DECE retailers must contract with DSP such that the retailer supports all approved DRMs.

In order to play encrypted content held within DECE CFF Containers, DECE Devices (and their embedded DRM client) must be able to reliably identify DECE Physical Assets (ODCCs), and obtain a license that corresponds to the Keyset with which the ODCC was encrypted. The license includes the keys required for the DRM client to play the content, appropriately protected in a DRM-specific manner.

Licenses are created by DSPs, for approved DRMs that they support, for content that was purchased from retailers with whom they have contracted. Licenses are created using and consistent with Keyset information for the corresponding Physical Asset(s) as provided to the DSP by the Content Provider.

The publishing process requires that linkages must be reliably maintained across: the DCC on a device; a license request and resulting corresponding license; a request for purchase validation and rights token lookup within the Coordinator; the corresponding Bundles and Logical to Physical Mappings published and maintained by the Content Provider, and the Keyset used by the Content Provider to encrypt the Physical Asset.

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4 CONTENT PROVIDER REQUIREMENTS

This section enumerates requirements for each area of the DECE publishing process, noting the DECE role(s) to which each requirement applies.

4.1 General Requirements

4.1.1 DECE Identification and Naming

The Content Provider SHALL create identifiers in accordance with rules defined in [DSystem].

4.2 Product Definition

4.2.1 Logical Asset Creation

4.2.1.1 Logical Asset Identification

The Content Provider SHALL identify a Logical Asset to be offered as a Right.

A unique ALID and one or more Profiles SHALL be defined for each Right.

Profiles offered SHALL be consistent with the *DECE Content Provider Licensing Agreement*.

4.2.1.2 Metadata

Metadata SHALL be created for the Logical Asset.

A unique Content ID (`ContentID`) SHALL be created for this metadata.

Metadata MAY be created for Content that is parent to the Logical Asset.

Each metadata node SHALL be identified with a unique Content ID (`ContentID`).

Metadata for the Logical Asset SHALL reference or include `parent` Content if it exists. For example, episodes reference seasons and shows.

Publisher SHALL post and make available any images referenced in the metadata.

Metadata SHALL be published in accordance with [DMeta], Section 3, Common Metadata Derived Types.

Metadata images SHALL be published in accordance with [DMeta], Section 3.

Metadata SHALL be published in an ODCC in accordance with [DMedia] and [DMeta] Section 4.

4.2.1.2.1 Updates

Content Providers SHOULD update metadata as additional information becomes available.

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When Metadata is updated, UpdateNum element SHALL increase with each update. The value of UpdateNum with the first update SHALL be no less than 2. Note that the absence of UpdateNum element implies the value 1.

4.2.1.2.2 Audio CODEC

DigitalAssetAudioEncoding-type, CodecType element and Codec element SHALL BE encoded as follows:

CodecType encoding	Codec
IANA:audio/mpeg4-generic;profile-level-id=41	MPEG4 AAC - Stereo
IANA:audio/mpeg4-generic;profile-level-id=4156	MPEG4 AAC – Stereo + MPEG Surround
IANA:audio/mpeg4-generic;profile-level-id=42	MPEG4 AAC – 5.1 Channel
IANA:audio/mpeg4-generic;profile-level-id=48	MPEG4 HE AAC v2
IANA:audio/mpeg4-generic;profile-level-id=4856	MPEG4 HE AAC v2 + MPEG Surround
IANA:ac3	Dolby Digital (DD, AC-3)
IANA:eac3	Dolby Digital Plus (DD+, E-AC-3)
IANA: vnd.dolby.mlp	Dolby TrueHD (MLP)
IANA:vnd.dts;profile=dts	DTS
IANA:vnd.dts;profile=dtses	DTS ES (Extended Surround)
IANA:vnd.dts.hd;profile=dtshr	DTS-HD High Resolution Audio
IANA:vnd.dts;profile=dts96	DTS 96/24
IANA:vnd.dts.hd;profile=dtsma	DTS-HD Master Audio
IANA:vnd.dts.hd;profile=lbr	DTS-HD LBR

The IANA registry for audio media types can be found at www.iana.org. See reference [IANA-A].

4.2.2 Bundle Creation

The Content Provider MAY create one or more Bundles that contain the Logical Asset ID.

Each such defined Bundle MUST conform with the DECE Bundle Definition defined in [DCoord].

Content Providers SHOULD NOT update Bundles. New Bundles SHOULD be created for new offerings. A potential exception is adding to an existing Bundle. However, in this case it is necessary for all Rights Tokens to be updated or added to reflect new aspects of a Bundle. Bundles SHALL NOT be updated to remove Rights.

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4.3 Container Creation

DECE Common Containers are created in compliance with 'Common Container Creation' below.

4.4 Fulfillment Definition

The fulfillment definition consists of several parts:

- Version – Identifies the sequence of updates to the fulfillment list
- ALID and Profile to identify the Right to be fulfilled
- One or more Containers – Containers that can fulfill including replacements, alternatives and removed containers. These are grouped in `FulfillmentGroup` and `DigitalAssetGroup` elements.
- One or more window (optional) – description of any holdbacks. [DSystem] lists the DSP and LASP requirements for enforcing Windows.

A Content Provider SHALL publish to the Coordinator at least one `LogicalAsset` element Logical Asset to Container Maps as defined in [DCoord], Section 6.5 for each Profile of each Logical Asset offered.

4.4.1 Defining Fulfillment Options

`DigitalAssetGroup` element lists which DCC (identified by APIDs) may be fulfilled, which ones may alternatively be fulfilled, and which may not be fulfilled (recalled). The set of DCCs to be fulfilled requires one or more `DigitalAssetGroup` elements and are grouped within a single `FulfillmentGroup` element. The `DigitalAssetGroup` structure allows replacement set of DCCs to have a different structure from the original structure of DCCs (see *Updating Logical Asset Elements* below.)

`FulfillmentGroup` groups of `DigitalAssetGroup` elements. The presumption is that DSPs will have access to all DCCs in the `DigitalAssetGroup` elements within a `FulfillmentGroup`. However, different DSPs may be assigned different `FulfillmentGroup` elements. That is, alternate options for fulfillment are specified by creating multiple `FulfillmentGroup` elements.

`FulfillmentGroup` elements MAY contain `FulfillmentGroupID` attributes of the Content Provider's choosing. This ID is designed for communication with DSPs regarding which groups are relevant, although the usage of this attributed is not specified by DECE.

`LatestContainerVersion` SHALL be included and contains the the highest version of each DCC referenced within the group. The version of the DCC is the `major_brand` in a Container's 'ftyp' Box as defined in [DMedia], Section 2.3.1.

A Content Provider MAY specify alternate groups of Physical Assets that fulfill a given Right as defined in DECE Coordinator Interface Specification [DCoord].

A `DigitalAssetGroup` is defined for Discrete Media when the `DiscreteMediaFulfillmentMethod` element is included. The Content Provider MAY define Discrete Media fullment options through `DiscreteMediaFullfillmentMethod` in the `DigitalAssetGroup` element.

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4.4.2 Defining Windows

Windows will be enforced by DSPs with respect to download and licensing, and by LASPs with respect to streaming in accordance to the policies defined in the `Window` element of the `LogicalAsset` element. However, sales constraints are outside the scope of DECE specification.

The Content Provider MAY specify `Window` elements as part of `LogicalAsset` elements in accordance with [DCoord], Section 6.5. The absence of a `Window` element implies no DSP-enforced constraints on distribution to time and/or region.

4.4.3 Updating LogicalAsset Element

Content Providers may wish to replace DCCs or to recall DCCs as described in this document. Rules regarding recalled and replaced DCCs will be enforced by DSPs with respect to download and licensing in accordance to the policies defined in the `FulfillmentGroup`, `DigitalAssetGroup` and `Window` elements of the structure. However, sales constraints are outside the scope of DECE specification.

Content Providers MAY replace or recall Containers or groups of ODCCs using the `DigitalAssetGroup` as described in this section.

When ODCCs are updated a new APID SHALL be assigned with the following exceptions: ODCCs MAY be changed in the following areas as defined in [DMedia] without requiring a new APID:

- Mandatory Metadata, [DMedia] Section 2.3.4.1.
- Optional metadata, [DMedia] Section 2.3.4.2.
- DRM-specific information boxes as defined in [DMedia] Section 3.

Note that an ODCC that differs only from another ODCC in data such as way that a new APID is not required, may be assigned distinct APID.

A Container is replaced by updating the `DigitalAssetGroup` to include a an `ActiveAPID` element with the APID for the new DCC. The replaced DCC's APID is moved from an `ActiveAPID` element to either the `ReplacedAPID` element or a `RecalledAPID` element. If moved to a `ReplacedAPID` element, policy is included to express whether download of that APID is allowed. Note that APIDs in the `ReplacedAPID` element are licensable and APIDs in the `RecalledAPID` elements are neither licensable nor downloadable. The new `DigitalAssetGroup` is published to the Coordinator.

A DCC is removed from licensing and/or fulfillment by updating the `DigitalAssetGroup` , moving the APID for the recalled Container from the `ActiveAPID` element to a `RecalledAPID` element. The new `DigitalAssetGroup` is published to the Coordinator.

When updating any portion of a `LogicalAsset` element the Content Provider SHALL include the `version` attribute, initially with a value of 1, and subsequently increased by at least 1 over the previous version.

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4.5 Publishing to the Coordinator

4.5.1 Posting Information

The Content Provider SHALL post data associated with a Logical Asset to the Coordinator prior to attempts to create Rights Tokens referencing that Logical Asset.

Data associated with a Logical Asset for download includes the following:

- Basic Metadata (including ContentID)
- Digital Asset Metadata (including APID)
- ALID to ContentID Mapping
- Logical to Physical Mapping (ALID to APID)

The Content Provider SHALL post data associated with a Logical Asset to the Coordinator prior to attempts to stream that Logical Asset.

Data associated with a Logical Asset for streaming includes the following:

- Basic Metadata (including ContentID)
- ALID to ContentID Mapping

Note that ALID to physical object mapping for streaming is outside DECE's scope, although Content Providers and LASPs may bilaterally agree to use DECE Containers.

The Content Provider or Retailer SHALL post Bundle to the Coordinator prior to attempts to create Rights Tokens referencing the Bundle.

4.5.2 Updating Information

4.5.2.1 Basic Metadata

Basic Metadata MAY be updated at any time. Updates SHALL include the `UpdateNum` element that is incremented for each revision for that ContentID.

4.5.2.2 Digital Asset Metadata

Digital Asset Metadata MAY be updated at any time. Updates SHALL include the `UpdateNum` element that is incremented for each revision for that ContentID.

4.5.2.3 ALID to ContentID Mapping

ALID to ContentID Mapping SHALL NOT be updated with the only exception of making corrections to incorrectly posted ALID to ContentID mappings.

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4.5.2.4 Logical to Physical Mapping

Logical to Physical Mapping (ALID to APID) MAY be updated at any time.

The Logical to Physical Mapping SHALL always reflect valid fulfillment options for Right with an obligation to Fulfill. This is not intended to conflict with business rules, and it should not be interpreted as necessary to support fulfillment of Rights to which there is no obligation to fulfill.

4.6 Publishing to DSPs, LASPs and Retailers

The Content Provider SHALL ensure that all ODCCs associated with Rights and published to the Coordinator are available prior to offering. With the exception of recall, if ALID to APID mappings are updated, the associated ODCCs SHALL also be made available.

If the ODCC is encrypted, the Content Provider is required to supply keysets associated with APID to the DSP and LASP. [DKeyDelivery] defines a format for delivering keysets.

DECE does not define the process of publishing to DSPs, LASPs and Retailers.

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5 COMMON CONTAINER CREATION

Content Providers produce a constrained version of a DECE Common File Format Container (DCC) called an Origin DCC (ODCC). An ODCC includes at least the required DRM-non-specific information, but which does not include any DRM-specific information. ODCCs are created by Content Providers.

The Content Provider SHALL define ODCCs in accordance with the [DMedia] and additional constraints herein.

The Content Providers SHALL produce ODCCs for each Profile in accordance with the *DECE Content Provider Licensing Agreements*.

The following sections define additional constraints on the ODCC.

5.1 Container Identification

Each ODCC SHALL be identified by an APID. APIDs SHALL be in accordance with the definition in [DSystem].

APIDs SHALL be globally unique. That is no two ODCCs may have the same APID.

Two ODCCs SHALL be considered different if they require distinct licenses. Note that any change to media content will require such a change.

APIDs SHALL be stored in the Asset Information Box ('ainf') as described in [DMedia], Section 2.2.4.

5.2 Container Constraints

The ODCC SHALL be constructed in accordance with [DMedia].

5.2.1 Profile Constraints

SD Profile ODCC SHALL be as defined in [DMEDIA] Annex B.

HD profile ODCC SHALL be as defined in [DMEDIA] Annex C.

5.2.2 Free Space

Reserve space is allocated in the Container for the later inclusion of DRM-specific information, such as Licenses.

The Free Space Box ('free' Box) in the DECE Container File Header as defined in [DMedia] Section 2.1.2 SHALL be at least 300K bytes (defined as 300×1024 bytes), including the box header.

An ODCC SHALL NOT contain DRM License (as per [DSystem], Section 1.4) data.

5.2.3 Encoding Constraints

Content Providers SHOULD consider SMPTE-TT document sizes that enable better random access aligned with common access points, such as chapters.

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5.2.4 Subtitle Constraints

The following definitions apply to Subtitle Constraints:

- “Type” is per [DMeta] Section 4.
- “Language” is per [DMeta] Section 4.
- “Country Set 1” is defined as Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden and Switzerland.
- “English” is defined as a “Language” which contains the [IANA-LANG] “en” language subtag.
- “Country Set 1 Language” is defined as a “Language” which contains one of the following IANA Language Tags [IANA-LANG]: "de", "nl", "fr", "da", "fi", "it", "no", "pt", "es", or "sv".

A Container that contains one or more “English” language subtitle tracks with a “Type” of "normal", "SDH" or “large” SHALL include at least one “English” language subtitle track in the CFF-TT text format.

A Container for which Rights Tokens can be issued by Retailers in “Country Set 1” that contains one or more subtitle tracks with “Type” of "normal", "SDH" or “large” in a “Country Set 1 Language” SHOULD include at least one “Country Set Language 1” language track in the CFF-TT text format. Note that this requirement will become normatively ‘SHALL’ in a future version of this specification.

It is highly desirable that a Container for which Rights Tokens can be issued by Retailers in “Country Set 1” that contains any subtitle tracks with a “Type” of "normal", "SDH" or “large” and in a “Country Set 1 Language” to include at least one subtitle track for each of the included “Country Set 1 Languages” in the CFF-TT text format.

CFF-TT text subtitle tracks SHOULD use only subtitle characters that correspond to the Unicode Code Points defined for Language Subtags in [DMedia], Annex D.3 that are contained in the language definition associated with the CFF-TT text subtitle track per [DMeta], Section 4.

5.3 DECE Media Package (DMP)

The DECE Media Package (DMP) format allows one or more DECE CFF Containers (DCCs) to be stored together other data in a single archive.

For the avoidance of doubt, Content Providers publish such that DSPs deliver in ODCC format, not DMP format.

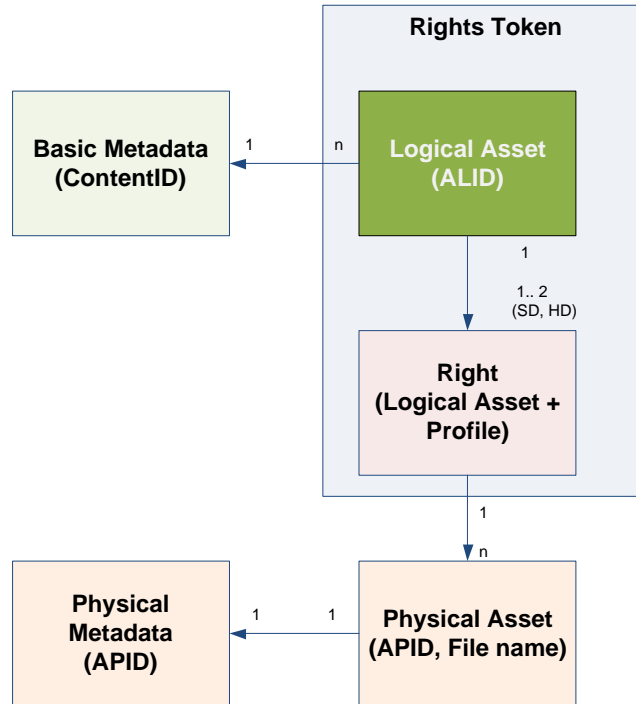
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6 RIGHT TO CONTAINER MAPPING (INFORMATIVE)

This section defines the mapping between logical assets and rights to Containers.

6.1 Information Model

The following model represents the relationship between metadata (Basic and Physical), Logical Assets, Profiles, Rights tokens and Physical Assets (Containers). It also shows where Content Identifiers (ContentIDs), Asset Logical Identifiers (ALIDs) and Asset Physical Identifiers (APIDs) are used.



A Logical Asset is identified by an ALID. There are up to two profiles (SD and HD) that may be associated with that ALID. Technically, the Discrete Media image is not a profile, but in terms of information management it is treated as such. The combination of Logical Asset and Profile are referred to as a Right. Rights are maintained in the Rights Token.

Rights map to Physical Assets. A Physical Asset is a DECE Common Container. There must be at least one container associated with each Right. There is no strict limit to the number of Containers associated with a Right, although it is anticipated it will typically be 1, and if not 1, a small number.

Associated with each Container is Physical Metadata. Both the Container and the Physical Metadata are identified by an APID.

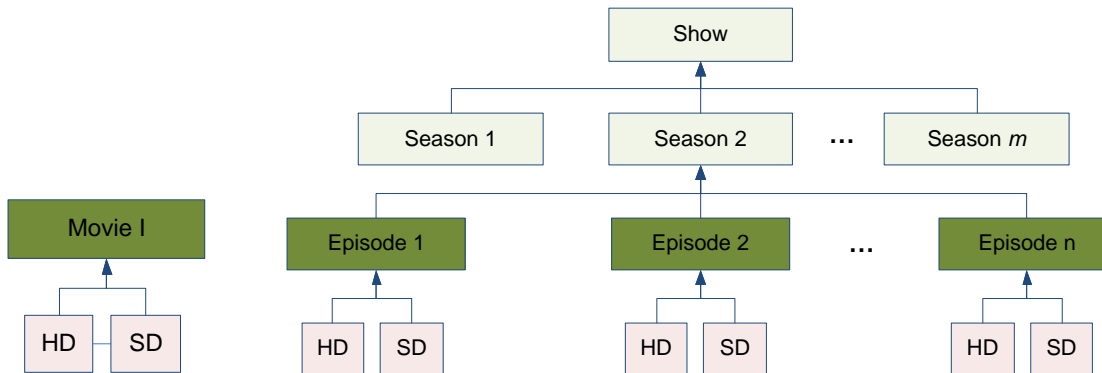
A Logical Asset is described in Basic Metadata. The Logical Asset references the Basic Metadata through a ContentID. More than one Logical Asset may reference the same metadata. The Basic Metadata does not specify which languages (audio and subtitle) are included—that allows it to be reused for different logical assets with different languages. The full combination of Basic Metadata, ALID to APID mapping and Physical metadata define the product.

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6.2 Right

For the purposes of download, a Right consists of an ALID plus a profile. The status of a Right is maintained in the Rights Token.

The following illustrates the Rights (shown in pink) for a movie and some episodes of a TV series. Note that there is a right for each Profile.

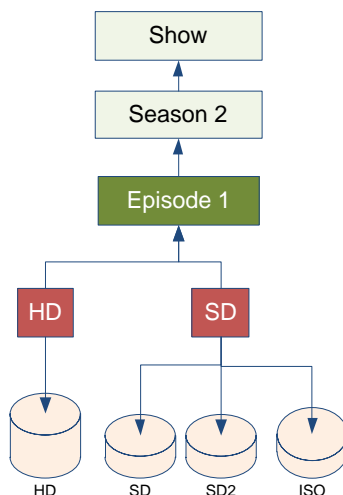


In this example, a ContentID has been assigned to the movie, the show, each season and each episode. An ALID has been assigned to the movie and each episode.

6.3 Information to fulfill a Right (ALID-APID mapping)

To fulfill a Right it is necessary to know which Containers are offered as part of the Right. This is handled through the ALID to APID mapping as described in the ALIDAsset-type. The Content Provider must create an ALIDAsset-type entry in the Coordinator for each such mapping.

The following illustrates the mapping for a single episode. Each profile is mapped to one or more files. These files are DECE Common Containers and are identified by a unique Asset Physical Identifier (APID). In this example, there are two SD files plus an SD DVD ISO image file. The ISO image file is provided for discrete media fulfillment. See [DDiscrete].

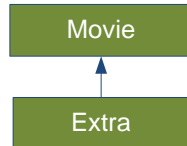


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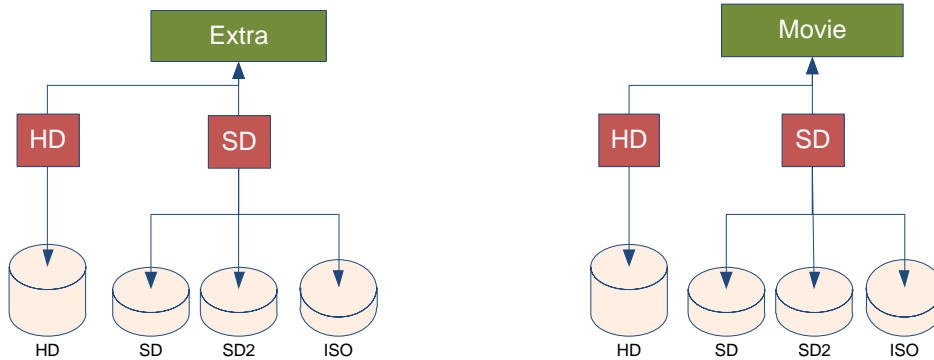
Note that the season and show have no mappings. They are not assigned ALIDs, and no mapping is necessary or possible.

Some structures require APIDs at multiple levels. Such an example would be a movie with an extra. Both are assets that have their own metadata. The metadata structure defines their relationship. The ALID-APID mapping shows what container fulfills each asset.

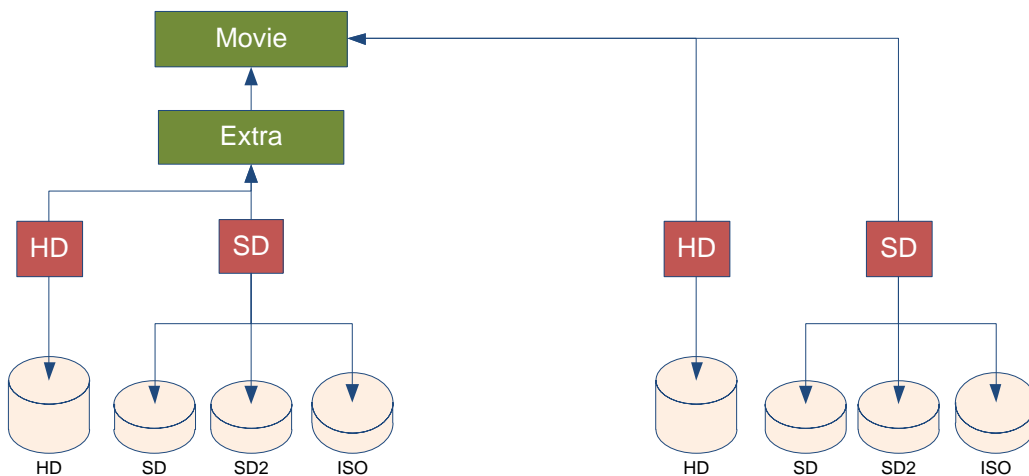
Both the movie and the extra have metadata. There is both an ALID and ContentID assigned to these entities. From the stand point of metadata structure, it looks like this:



The ALID/APID mapping looks like this:



The whole product looks like this:



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7 METADATA ENCODING GUIDELINES (INFORMATIVE)

Content generally has a natural structure, for example, TV episodes are part of seasons, seasons are part of shows; Movies stand alone, or might be part of a series; and music might be a single, or part of an album. Two works are the same except for a particular aspect (e.g., colored video). Internet distribution has expended types to include webisodes, clips, mashups and other extractions or compilations.



The Content Structure defined for Common Metadata is designed to accommodate various structures for content. The structure itself includes is designed to be general, which means there are some abstractions that are not immediately obvious or intuitive. However, common cases are easy to define and complex cases are possible to define.

The structure itself is defined in Common Metadata. This document describes how to use the structure for encoding common structures, and some not-so-common structures.

7.1 Tree Structure and Identification

We discuss metadata in the context of diagrams like the following:



Each box (node¹) on the diagram represents a definable entity that can be uniquely identified and described with metadata. As the same node may appear in different contexts, it is important that a unique identifier be defined.

¹ Note we are using graph/tree terminology: node, parent, child, leaf, edge, etc.

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7.1.1 Content Identifier (ContentID)

For lack of a better term, we called these nodes ‘content’ and they are identified by a ‘Content Identifier’ or ‘ContentID’. Throughout this section, unless otherwise noted, each node has a ContentID.

A ContentID is a string defined in such a way as to be globally unique. It may use a standard identifier, such as ISAN, or it might use an organization-specific identifier.

It is the responsibility of the Publisher to create a ContentID for each node that is globally unique.

Note that ContentIDs are metadata identifiers. As all DECE Logical Assets have metadata, every ALID has a corresponding ContentID. There is also metadata describing shows, seasons, movie series and other asset groupings. These metadata are also identified with ContentIDs.

7.1.2 Metadata

Each node has metadata. The metadata in question is defined as Basic Metadata in *Common Metadata*. Regardless of where it is on the tree, certain common elements exist, such as title and summary. Some metadata, such as Release Date, applies only for content with media associated, so not all elements are populated at all levels.

Included in the metadata is the reference to other nodes in the content structure. For example, an episode will reference a season. These relationships are encoded in the “Parent” element. Details on usage are described in the following sections.

7.2 Work Type

Work Type is enumerated to one of the following (categories are to support the definition, but are not included in the enumeration). The following are allowed WorkType values (from [TR-META-CM], Section 4.1.1.1).

Music related:

- ‘Album’ – A collection of songs
- ‘Song’
- “Music Video” – Music Video, not ‘Performance’

Film related:

- ‘Movie’ – A full length movie regardless of distribution (e.g., theatrical, TV, direct to disc, etc.) and content (e.g., includes documentaries).
- ‘Short’ – a film of length shorter than would be considered a feature film.
- ‘Promotion’ – promotional material associated with a film. This includes teasers, trailers and other materials

TV, web and mobile related:

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- 'Series' – a show that might span one or more seasons or might be a miniseries.
- 'Season' – a season of a Series. It will contain one more episodes.
- 'Episode' – an episodes of a season or miniseries. A pilot is also an episode. If episode is a 'webisode', 'mobisode' or other specialized sequence, it should be noted in Keywords.
- 'Non-episodic Show' – TV or other show that is non-episodic; for example, sports and news.
- 'Ad' – any form of advertisement including TV commercials, infomercials, public service announcements and promotions. This does not include movie trailers and teasers even though they might be aired as a TV commercial.

Other:

- 'Excerpt' – An asset that consists primarily of portion or portions of another work or works; for example, something having the 'isclipof' or 'iscompositeof' relationship.
- 'Supplemental' – Material designed to supplement another work. For example, and extra associated with a Movie for a DVD.
- 'Collection' – A collection of assets not falling into another category. For example, a collection of movies.
- 'Franchise' – A collection or combination of other types, for example, a franchise might include multiple TV shows, or TV shows and movies.

Although there is some overlap with Genre, Work Type is not language or culturally specific. Although terms may overlap, the usage does not. For example, the Work Type of 'Sport' refers to the capture of a sporting event, where a documentary on sport would have the 'Non-episodic Show' work type.

7.2.1 Sequencing

Some nodes such as episodes and seasons are inherently sequenced. Sometimes, an asset, such as movie will have no sequence, but a sequel is later made and then it becomes part of the sequence. Some sequences are ordered (seasons, episodes, many movies) and some are not (most typically documentaries).

The SequenceInfo element allows definition of the sequence. WorkType defines the context of the sequencing (e.g., season, episode, etc.).

Typically, sequenced assets will have parent objects.

7.2.2 Relationship

When a node has a parent, it must define the relationship to that parent. These are expressed in the relationshipType attribute that allows the following enumerations (from Metadata Specification):

- "isclipof" – The asset is a subset of the larger body that is a contiguous subset of the parent. It may include unique small amounts of pre- and post-material such as new titles and credits. A typical example is a clip extracted from a larger video.

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- “isepisodeof” – The asset is an instance of an ordered sequence (i.e., an episode)
- “isseasonof” – The asset is a season and the parent is a show
- “ispartof” – The asset is one complete segment of a larger body not covered by other definitions here. This may include a movie that is part of a series of movies. A song will be part of an album.
- “isderivedfrom” – The asset is a modification of the parent work. Some examples include a colorized version derived from a B&W version, and an edit such as a “Director’s Cut” or “Unrated Edition”.
- “iscompositeof” – Asset includes a subset of the parent, such as may be found in a mashup. This contrasts a clip which is a proper subset otherwise unmodified.
- “issupplementto” – is supplemental material. For example, outtakes and making-of would be supplements.

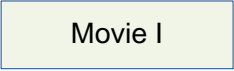
These are not always immediately intuitive, but in with the guidelines in this document, they should be easy to use. Those encoding or interpreting metadata will find them relatively straightforward.

7.3 Common Use Cases

7.3.1 Movies

7.3.1.1 Standalone Movie

The simplest case is a single movie:



Movie I

It is not connected to other nodes, so it has no “Parent” element. In this case, the SequenceInfo element would not be present. If the movie later becomes part of a series, SequenceInfo can be added later with a metadata update.

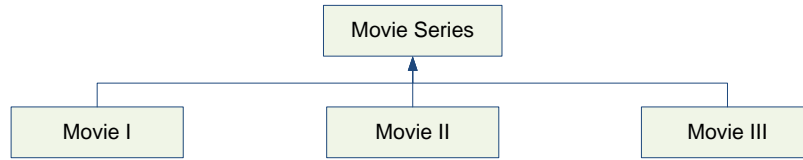
Depending on the work itself, WorkType could be “Movie” or “Short”.

7.3.1.2 Movie as part of a series

Frequently, movies have sequels and therefore are part of a series. The Publisher must create a node for the series, shown here as “Movie Series”. The WorkType for the Movie Series is ‘Collection’.

Each Movie references the Movie Series in the Parent element with relationshipType of ‘ispartof’. If the order is relevant, SequenceInfo may be included to indicate where in the work is ordered. SequenceInfo contains the ordinality of the item in Number.

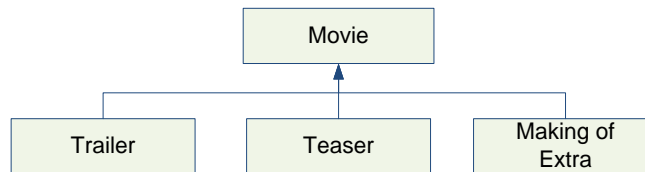
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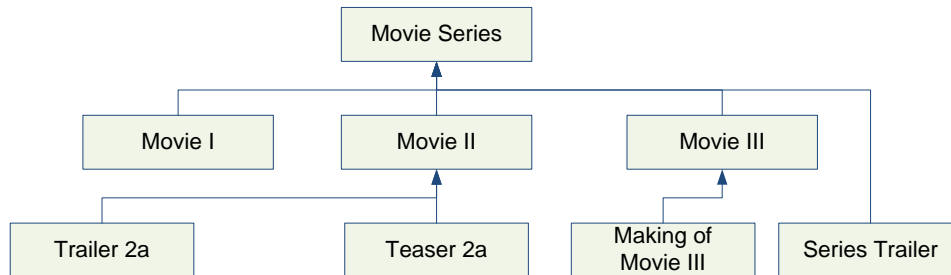
7.3.1.3 Trailers, Teasers, Making-of

Most movies have various forms of associated advertisements. From a metadata standpoint, each movie node has WorkType of “Promotion” (not “Advert”). These nodes reference the Movie or Movie Series through the Parent relationshipType of ‘issupplementto’. A making-of is structured the same, but the WorkType is “Supplemental”.

The following is an example comparable to a DVD or Blu-ray. There is a Movie, a trailer, a teaser and a Making-of extra.



In the following example, Movie 2 has a Trailer and a Teaser. There is also a Series Trailer and a Making-of documentary



7.3.2 Television

Television is relatively hard-coded into the metadata structure. In particular, the relationshipType’s of ‘isepisodeof’ and ‘isseasonof’ makes it straightforward to define a typical show. WorkType is “Series”, “Season”, “Episode” or “Non-episodic Show”. A non-episodic show might, for example, be a series documentary where order is irrelevant. It is still legal to encode Sequence in non-episodic material to retain HouseSequence.

In the following illustration, each box (the Show, each Season and each Episode) has a unique ContentID. Episodes referencing seasons use the relationshipType ‘isepisodeof’ and seasons use the relationshipType of ‘isseasonof’ to reference shows.

Within the SequenceInfo element, the Number element is the airing number. HouseSequence element contains a Producer-internal sequence number.

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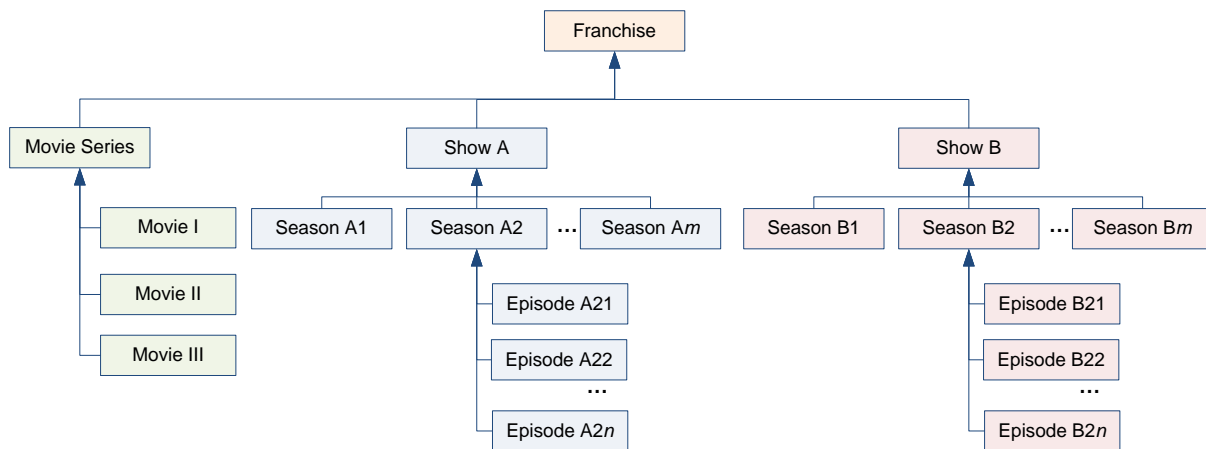


Within the SequenceInfo element, episodes are sequenced using SequenceInfo.

7.3.3 Franchise

A *franchise* is a collection of multiple shows, movie series, or combinations. Without stating specific examples², there are numerous cases where a theme is sufficiently popular that multiple movies are made, one or more TV series are made (perhaps live and animated), and perhaps games are produced.

Franchises are not specifically encoded as such, but are a use case that must be handled by the metadata structure. The following illustrates a franchise with a series of movies and two TV shows. Note that this is not fully enumerated, but the full content tree with all nodes would be too large to illustrate.



Everything for the movies and shows are encoded as exactly as described above, but with the addition of Parent elements for “Movie Series”, “Show A” and “Show B”; and if desired, SequenceInfo elements to show the order of “Show A” and “Show B”. “Movie Series”, “Show A” and “Show B” include “Franchise” as the Parent, with relationshipType of ‘ispartof’.

The WorkType for Franchise is “Franchise”.

² Let’s say hypothetically, there was a science fiction body of work that started with a television show, but later grew to include multiple movies, follow-on TV shows, books games, music compilations CDs, etc. Graphic novels sometimes spawn franchises.

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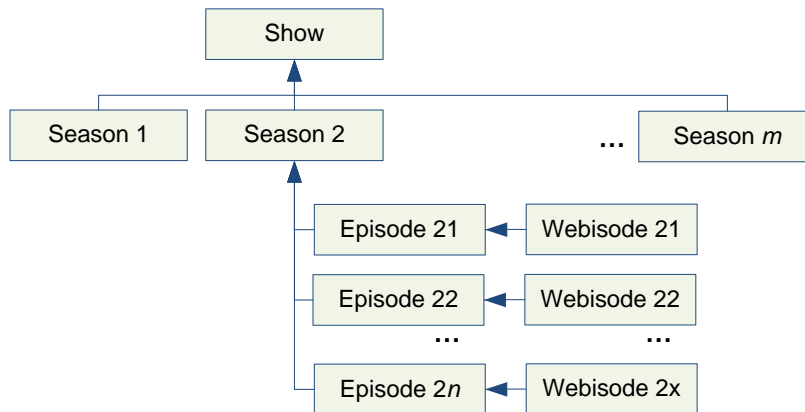
7.4 Additional Use Cases

7.4.1 Clips, selected scenes and shortened versions

These are all subsets of the parent work. The following illustrates an entity “Selected Scenes” that are portion of Episode 1. “Selected Scenes” would reference Episode 1 with the relationshipType of “iscompositeof”. It would have a WorkType of ‘Excerpt’.



Some shows have derived works such as webisodes (in this context shortened versions of the original). The following structure maintains this linkage:

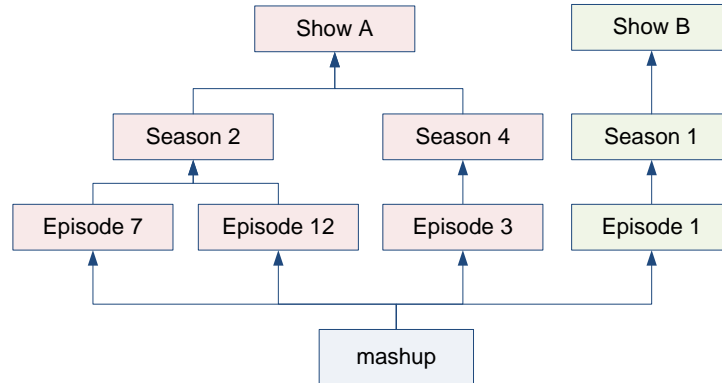


7.4.2 Mashups

Mashups are collections from more than one source. Audio and video might be from different sources. From the metadata standpoint, it is desired to indicate the original works.

This is structured similarly to clips, selected scenes and shortened versions, except that there are multiple parents. In the following example, “mashup” has four parents. Each one is referenced with the relationshipType of ‘iscompositeof’. The mashup asset has a WorkType of “Excerpt”.

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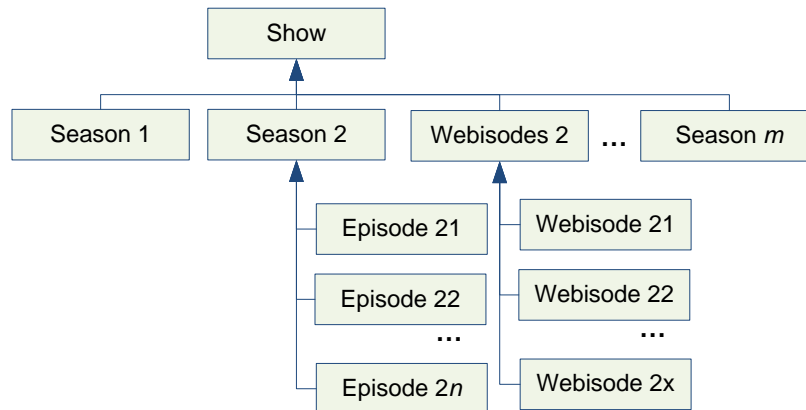


7.4.3 Short episodes, not derived from other episodes

In an earlier section webisodes were discussed as excerpts. Alternatively, webisodes, mobisodes and like can be generated as original material. The metadata structure depends on the intent of the asset, and two potential models are presented here as examples.

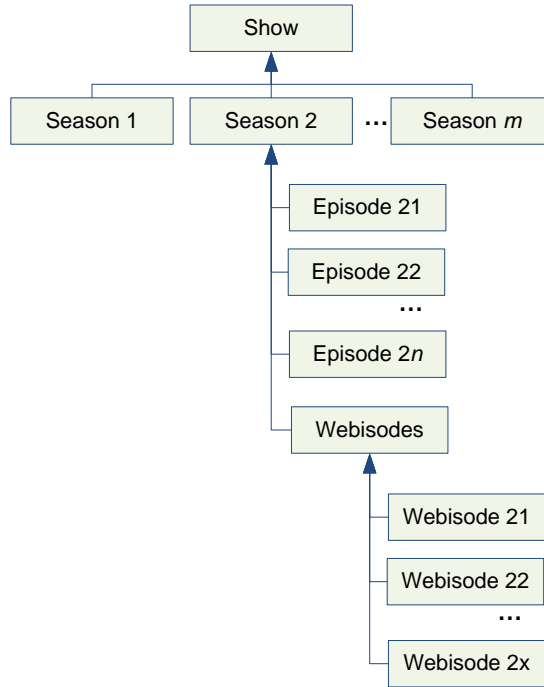
Note that the User Interface would typically follow the structure of the metadata, so the structure should reflect the intent of the publisher with respect to how the assets are presented to the consumer. This could be used to accommodate esthetic, marketing or other concerns relating to presentation.

In the first example, the webisodes are tied loosely to the season but are actually independent:



The next example integrates the webisodes into the season.

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A third alternative, not illustrated, interleaves webisodes and episodes. This is not recommended because it is not accommodated in the metadata sequence numbering system.

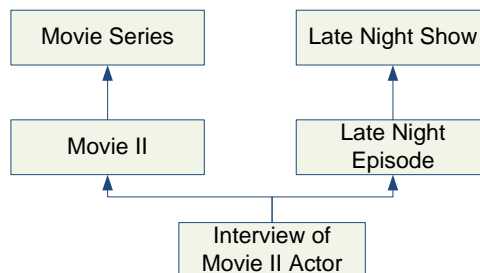
7.4.4 Interviews and reviews (multiple parents)

This assumes a video containing a review of a show. For example, it might be an interview of a lead actor on a late night show.

In the following example there is a show “Late Night Show” with an episode of that show “Late Night Episode”. As discussed under Television, the Late Night Episode refers to “Late Night Show” its Parent element with the ‘isepisodeof’ relationshipType attribute.

“Interview of Movie II Actor” is a portion of “Late Night Episode”, and references it with a Parent element and a relationshipType of ‘isclipof’ and the WorkType is “Excerpt”.

The interview may have a second Parent element referencing “Movie II” with relationshipType attribute of ‘isclipof’. The fact that there is some overlap is inconsequential.



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7.5 Bundles, Compound Objects and Special Offerings

The structures defined above are intended to be static for works created and allow new works to be added. Once metadata and structure is established, this should not change.

However, offerings can be created that also reference content in these static structures. This section describes the means to define that structure in what are called Bundles. Bundles carry additional information and are described in [DCoord], Section 5.5.3. This section describes the primary building block of Bundles called Compound Objects (represented as the `CompObj` element in the Bundle.)

Where metadata described above points up to parent objects, Compound Objects point downward to child objects. The following should illustrate Compound Objects and define how they should be encoded.

Compound Objects are designed to be simple when encoding simple groupings, yet offer the robustness to define complex arbitrary groupings.

The Compound Object is defined with the `md:CompObj`-type and a slight variant `md:CompObjData`-type.

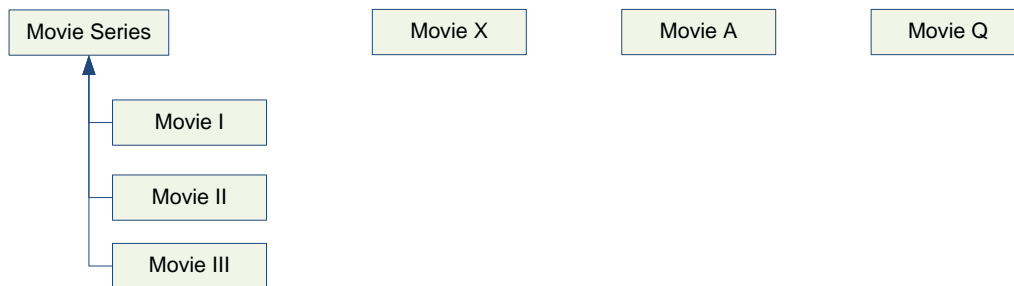
7.5.1 Collections (grouping)

Compound Objects allow arbitrary groupings of assets.

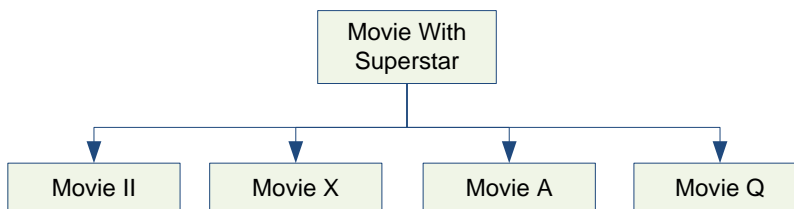
7.5.1.1 Movie collection

While a movie a sequence of movies (Xyz 1, Xyz 2, etc.) are logically grouped, there are other groupings that may be relevant. For example, there might be a collection of movies that include a particular actor, or movies made a given year. This structure would not appear in the basic metadata but are still important.

The following illustrates an unassociated collection of movies, some of which include an actor named Superstar.



Superstar is in Movie II, X, A, and Q. The following would be a Compound Object that includes those movies.



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This diagram shows one new object (“Movie With Superstar”) and other objects that have already been defined as part of the normal movie structure. Each existing box references the metadata via the ContentID. New boxes may include metadata. They use the BasicMetadata structure so it is fully internationalized and fields are compatible with user interfaces and other systems.

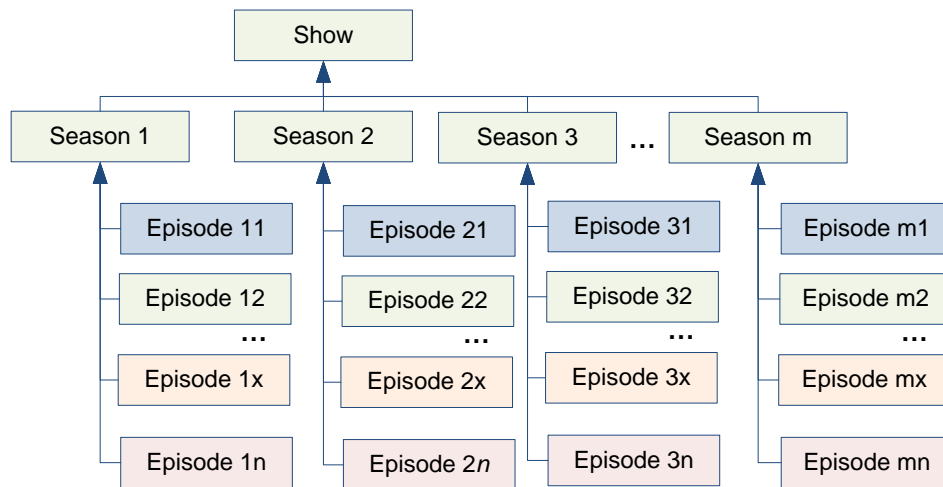
Although the boxes exist, the Compound Object introduces the links that point in the opposite direction of metadata described above. That is, rather than saying the movie is part of a series, it says “Movie With Superstar” is composed of these movies. This distinction is necessary given that there is only one “natural” ordering for metadata, but there are unlimited collections that need to be represented as Compound Objects.

7.5.2 Selections (subset)

7.5.2.1 Selected episodes

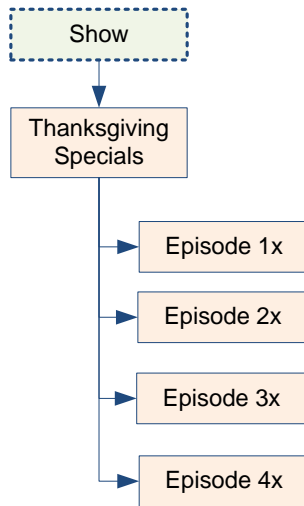
Not infrequently, and offering is a collection of special episodes. In the example shown here is holiday episodes.

It starts with a conventional structure as described above:



The Compound Object will include selected episodes as shown in the following illustration.

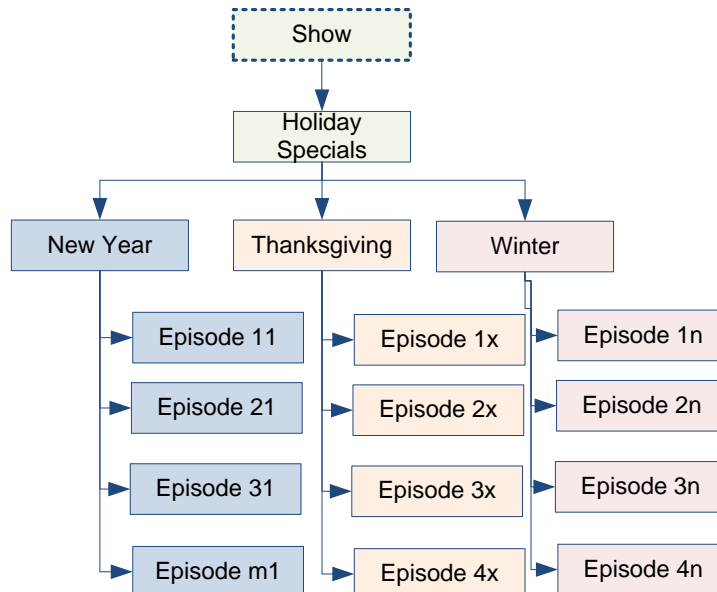
Content Publishing Specification Version 1.0.6



This diagram shows one new object (“Thanksgiving Specials”) and other objects that have already been defined as part of the normal show/season/episode structure. Like the movie example above, each existing box references the metadata via the ContentID and new boxes may include metadata.

The reverse links, rather than saying an episode is part of a season, it says “Thanksgiving Specials” is composed of these episodes. This distinguishes between the natural position and order of episodes and a collection as expressed in a Compound Object.

The following illustrates a more complex example.



In this example, there are 4 new objects: “Holiday Specials”, “New Years”, “Thanksgiving” and “Winter”. The Compound Object definition allows the full structure to be represented and communicated.

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The Compound Object encoding is a nested tree structure corresponding to the boxes above. Boxes that refer to existing metadata simply contain a ContentID. Boxes that are new (e.g., “New Year”) may contain metadata.

END