# DECE Device Specification

Version 2.2  31 July 2015

# Device Specification Version 2.2

Notice:

As of the date of publication, this document is a release candidate specification subject to DECE Member review and final adoption by vote of the Management Committee of DECE in accordance with the DECE LLC Operating Agreement. Unless there is notice to the contrary, this specification will become an adopted "Ecosystem Specification" on 15 September 2015.

THIS DOCUMENT IS PROVIDED "AS IS" WITH NO WARRANTIES WHATSOEVER, INCLUDING ANY WARRANTY OF MERCHANTABILITY, NONINFRINGEMENT, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY WARRANTY OTHERWISE ARISING OUT OF ANY PROPOSAL, SPECIFICATION OR SAMPLE.  Digital Entertainment Content Ecosystem (DECE) LLC ("DECE") and its members disclaim all liability, including liability for infringement of any proprietary rights, relating to use of information in this specification. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted herein.

This document is subject to change under applicable license provisions, if any.

Copyright © 2009-2015 by DECE.  Third-party brands and names are the property of their respective owners.

Optional Implementation Agreement:

In addition to the UltraViolet License Agreements which cover implementation of the DECE Ecosystem Specifications within the UltraViolet Ecosystem, DECE offers an optional license agreement relating to the implementation of this document outside the Ecosystem ("RAND Agreement"). Entities executing the optional RAND Agreement receive the benefit of the commitments made by DECE's members to license on reasonable and nondiscriminatory terms their patent claims necessary to the implementation of this document in exchange for a comparable patent licensing commitment. Copies of the license agreements are available at the DECE web site referenced below.

Contact Information:

Licensing and contract inquiries and requests should be addressed to us at:
http://www.uvvu.com/uv-for-business

# Device Specification Version 2.2

**Contents**

# Device Specification Version 2.2

## 1 Document Description

### 1.1 Scope

This document specifies mandatory and optional features of DECE Devices; the features are operational when the Device joins a DECE Account via a domain-bound DRM Client.

This document also defines a "Common Player" and a "Common Streaming Player". These definitions are suitable for reference by other ecosystems that play formats defined in [DMedia], [DStream], [DMeta] and so forth.

### 1.2 Document Organization

This document is organized as follows:

1. Introduction—Provides background, scope and conventions

2. DECE Devices and DECE Ecosystem – Describes how DECE Devices interact with other elements of the Ecosystem

3. Content Rights Purchase

4. Container Fulfillment – process for locating DECE Common File Format (CFF) Containers (DCC) and downloading them

5. Playing Content – Device requirements and limitations on decoding and presenting media

6. User-Related Requirement – Additional user interface functions

7. DLNA – Information on DECE Devices interacting with Digital Living Network Alliance (DLNA) devices

8. DECE Media Package (DMP) Support – Describes Device requirements related to DMPs

9. File Management – Information about placement and management of files

### 1.3 Document Notation and Conventions

Except where noted, notations and conventions are as per DECE Coordinator API Specification.

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 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".

## 1.4  Normative References

### 1.4.1  DECE References

| | |
|---|---|
| [DSystem] | System Specification |
| [DMeta] | Content Metadata Specification |
| [DMedia] | Common File Format& Media Format Specification |
| [DDMP] | DECE Media Package (DMP) Specification |
| [DCManifest] | DECE Common Media Manifest Specification |
| [DFulfill] | Content Fulfillment Specification |
| [DPlayer] | Common Player Specification |

### 1.4.2  Other Normative References

| | |
|---|---|
| [IANA-LANG] | IANA Language Subtag Registry. http://www.iana.org/assignments/language-subtag-registry |
| [RFC2141] | IETF RFC 2141, URN Syntax, May 1997. http://tools.ietf.org/html/rfc2141 |

| [RFC2460] | IETF RFC 2460, Internet Protocol, Version 6 (IPv6) Specification, December 1998. http://tools.ietf.org/html/rfc2460 |
| --- | --- |
| [RFC2616] | IETF RFC 2616, Hypertext Transfer Protocol -- HTTP/1.1, June 1999. http://tools.ietf.org/html/rfc2616 |
| [RFC2617] | IEFT RFC 2617, HTTP Authentication: Basic and Digest Access Authentication, June 1999. http://tools.ietf.org/html/rfc2617 |
| [RFC2782] | IETF RFC 2782, A DNR RR for specifying the location of services (DNS SRV), February 2000. http://tools.ietf.org/html/rfc2782 |
| [RFC4346] | IETF RFC 4346, The Transport Layer Security (TLS) Protocol, Version 1.1, April 2006, http://tools.ietf.org/html/rfc4346 |
| [RFC4647] | Philips, A., et al, *RFC 4647, Matching of Language Tags,* September 2006. http://www.ietf.org/rfc/rfc4647.txt |
| [RFC5646] | Philips, A, et al, *RFC 5646, Tags for Identifying Languages*, IETF, September, 2009. http://www.ietf.org/rfc/rfc5646.txt |
| [MPEG4S] | ISO/IEC 14496-1:2010, "Information technology — Coding of audio-visual objects — Part 1: Systems" |
| [UNICODE] | UNICODE 6.0.0, "The Unicode Standard Version 6.0", http://www.unicode.org/versions/Unicode6.0.0/ |

### 1.4.3  Informative References

| [ISO-P2H] | ISO/IEC Directives, Part 2, Annex H: http://www.iso.org |
| --- | --- |
| [SRGB] | IEC 61996-2-1, Multimedia systems and equipment - Colour measurement and management - Part 2-1: Coulour management - Default RGB colour space - sRGB |
| [ITU-BT.1886] | ITU-R Recommendation, "BT.1886 : Reference electro-optical transfer function for flat panel displays used in HDTV studio production", International Telecommunications Union. |
| [UPNPCDS3] | *ContentDirectory:3 Service Template Version 1.01,* September 30, 2008, www.upnp.org/specs/av/UPnP-av-ContentDirectory-v3-Service.pdf |

## 1.5  Terminology and Requirements Scope

Device-related terminology is defined in [DSystem].

DCCs may be contained in DECE Media Packages (DMPs). In all cases, except where noted, when a DCC is discussed this normatively refers to a DCC either by itself or as part of a DMP.

## 1.6 XML Change Management

DECE Devices SHALL comply with XML Change Management defined in [DSystem], Section 1.6.

## 2 DECE Devices and DECE Ecosystem

This specification defines functionality associated with the "Device Role" which is specified in this document.  A DECE Device is a hardware or software product or combination of products that implement a Device Role. DECE Devices include a DRM Client and a Licensed Application.  DECE Devices are produced by Client Implementers.

As illustrated below, the DECE Device can interact with several components of the Ecosystem, such as

- Access Portal
- Retailer

DECE Devices may, via non-DECE interfaces including Proxies, also have interfaces to Retailers and LASPs (for streaming).
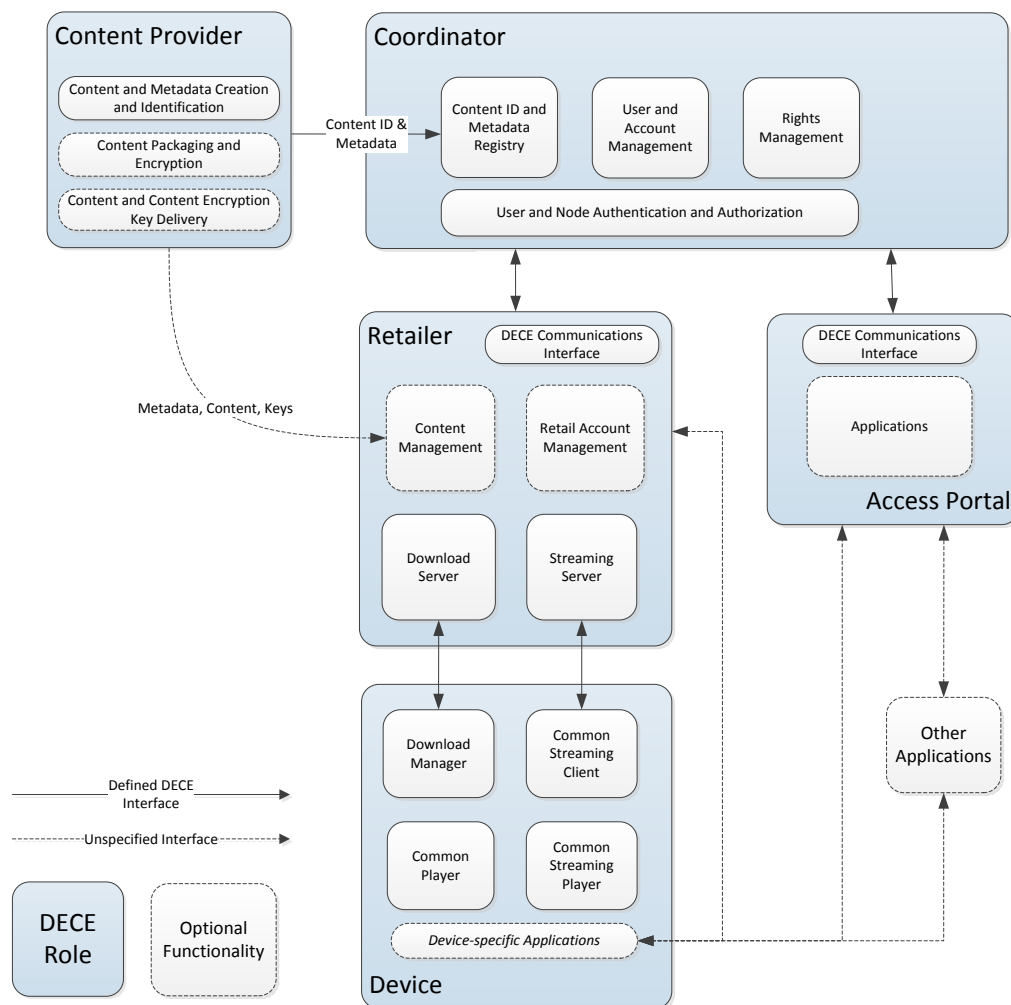
# Device Specification Version 2.2

Separate from the DRM-specific interfaces, the DECE Device can interact with other components in the DECE ecosystem in as follows:

- To the Web Portal, using HTML and username/password authentication [DSecMech], Section 6;

- Indirectly, through a Retailer Node using a proprietary Device-Retailer interface.

- Indirectly, via an Access Portal Node using a proprietary Device-Access Portal interface.

The software in the DECE Device that performs functions specified by DECE is called a Licensed Application.

In any DECE Device implementation, DRM decryption and playback function must be performed in a single physical device. For avoidance of doubt, playback function of a DECE Device may include re-encryption of content without decoding by an Approved Output Technology. These physical devices may be connected to Tethered Hosts, typically a general purpose computer in the possession of a User, or to a Device Proxy, typically a server under the control of the Client Implementer.

Unless otherwise prohibited, any function assigned to a DECE Device MAY be implemented on a Tethered Host, a Device Proxy or a combination. Playback distribution is not allowed as per Section 8.6.

## 3    Content Rights Purchase Support

The process of obtaining content Rights (i.e., purchasing) is not part of this specification as the device has no normative role in the process, with one exception.  That exception relates to superdistributed content and is described below.

### 3.1    Purchase of Content Rights

Content Rights are sold by DECE Retailers and posted to the Coordinator. In general, any involvement of a DECE Device in the purchase process is outside of the scope of DECE specification.  Interfaces are considered proprietary to the Retailer and purchase applications.  This section assumes a purchase application associated with a DECE Device running on the same physical device or otherwise implemented in conjunction with the Licensed Application.  The purchase application may provide information to a Licensed Application.

A Retailer may return information to a purchase application that can help the Licensed Application download the DCCs associated with the purchased Right.  This is desirable because it saves the step of the Licensed Application locating the DCC (see DCC Acquisition below).  For example, the information returned may include one or more of the following:

- An HTML page containing links leading to DCC download,

- An HTML page containing a link to a Download Manifest,

- A Download Manifest.

If the Licensed Application receives a Download Manifest, it is expected that a Download Manager on the Device is able to parse that document and proceed to download the files. The format of the DECE Download Manifest is defined in DECE System Design [DSystem].

If a purchase application associated with a Device attempts to purchase Rights before the Device has joined any DECE Account, the application may give the user the opportunity to join the Device to a DECE Account. This process is also outside the scope of this specification.

### 3.2    Purchasing Rights for Superdistributed Content

DCCs can arrive at DECE Devices through Superdistribution (see  [DSystem], Sections 1.4 and 15), possibly as part of a DMP.  Typically, a User is expected to obtain a DCC and attempt to play it on one of their DECE Devices.  As the Superdistributed file does not contain a license for the User's Account and the Device's DRM, it will not play.  This process is described under DRM License Acquisition below.

If the User wishes to purchase a Right to play the DCC, it is necessary to identify a Retailer that sells Rights to the Superdistributed DCC.  Although a general mechanism for locating a Retailer who sells the Rights to a DCC is not specified by DECE, it is possible to find one such Retailer by using the a Purchase URL (PURL) that can be derived from information in the DCC.  Note that DMPs can contain PURL information.  This can assist purchasing.

## 3.2.1  Purchase URL (PURL) Construction

The Digital Asset may optionally include a Base PURL Location that can be used to create a PURL.

The Purchase URL provides a location where a Right may be purchased via a web browser.  There is no implicit guarantee that the Right can be purchased (e.g., Retailer may have stopped selling that content), but there is a guarantee that if the Right is purchased, the DCC with the PURL will be licensable under that Right.

Base PURL Location is read or written (accessed) in accordance with the following:

- From a Multi-track DCC that is not in a DMP, the Licensed Application SHALL access Base PURL Location from the 'bloc' Box of DCC as defined in [DMedia], Annex E.
- From a DMP, the Licensed Application SHALL access Base PURL Location, in the BasePurlLocation element of the BaseLocations Part of the DMP as defined in [DDMP], Section 4.3.5.

If the Digital Asset includes a Base PURL Location, a Licensed Application MAY construct the PURL in accordance with [DSystem], Section 8.3.3 and use a web browser to enable purchase.

At least once, a Licensed Application SHALL obtain <decedomain> from the Coordinator using DeviceDecedomain().

The Licensed Application SHALL validate that Base PURL Location uses RFC-conformant syntax and ensure the domain name ends with <decedomain> as per [DSystem], Section 8.3.3.  This prevents situations where the BasePurlLocation would result in a PURL that refers to a domain not under DECE control.  For example, a BasePurlLocation of 'phishingdomain.com/' would be rejected as it would result in a PURL such as 'http://purchase.phishingdomain.com/.uvvu.com/?index.html?apid=…'

## 3.2.2  Alternate Mechanisms for locating Retailers

Although not specified by DECE, a Licensed Application may use other methods to locate a Retailer, including use of third party services, or having a pre-existing relationship with one or more DECE Retailers.

## 4    Digital Asset Fulfillment

DECE supports several methods of delivering content to Devices and incorporating that content into the Device's storage.  Fulfillment is the term used to describe the process of delivering licensed DECE Content in the form of DCCs and DMPs to the Device.

DCCs and DMPs (including DMP Parts), are collectively referred to as Digital Assets.

Devices SHALL be able to acquire any DCCs consistent with their supported profiles from a DSP.

Devices SHALL be able to acquire any DMPs consistent with their supported profiles from a DSP.  Note that Devices that do not support Outbound Transfer are not required to maintain information in DMP format.

In this context, the term 'acquire' is used to indicate that the Device can gain access to the Digital Asset in some manner. For example, it can download the Digital Asset, it can access the Digital Asset over a LAN, it can be side-loaded with a storage device with the Digital Asset, or it can otherwise gain access to that Digital Asset.

## 4.1   Initiating Fulfillment and Streaming

Fulfillment and Streaming can be initiated through a Retailer, through the Web Portal or via a Rights Locker query to the Device Portal.  The Retailer and Web Portal cases are web-based or use proprietary interfaces between the Retailer and the DECE Device; and are outside the scope of this specification (see [DSystem], Section 11.)

Before initiating a download or stream, a Licensed Application must first obtain either a URL pointing to a download or stream web site (called a Fulfillment Web Location) or a URL point to a manifest file that includes information for downloading or streaming one or more Digital Assets.

These locations can be obtained from the Coordinator via the Rights Token query APIs.  Licensed Applications MAY support RightsTokenGet() as defined on [DCoord], Section 7.

The particular relevant elements of the Rights Token are `FulfillmentWebLoc` and the `FulfillmentManifestLoc`.  At least one of each will exist, and there may be more than one.  These location elements each contain a URL and optionally an element called Preference defined as an integer. Preference defines an ordering.

Licensed Applications SHOULD use the URLs with the following precedence:

1.   URLs with lower `Preference` value are used before URLs with higher `Preference` value

2. URLs with `Preference` are used before URLs without Preference

3. Two or more URLs with the same `Preference` may be used in any order

4. Two or more URLs without `Preference` may be used in any order

`FulfillmentWebLoc` MAY be passed to a browser in the Licensed Application.

`FulfillmentWebLoc` MAY be passed outside of the Licensed Application. For example, it may be passed to another device with a web browser.

## 4.2 Download Manager, Web Download, and Streaming

### 4.2.1 Protocol

Protocol applies to both Download Manager, Web Download and Streaming

Licensed Applications that support Download Manager SHALL support protocols in accordance with [DFulfill], Section 4.1.

Licensed Applications that support Common Streaming SHALL support HTTP and HTTPS in accordance with [RFC2616] and TSL 1.1 [RFC4346].

Licensed Applications SHOULD support Range GETs for resuming partial downloads [RFC 2616], Section 14.35 'Range'.

### 4.2.2 Download Manager and Stream Manager

Download Manager is used to download Content. Stream Manager is used to stream Content using Common Streaming.

The Download Manager knows which files to download based on a Fulfillment Manifest and Fulfillment Manifest File as defined in the System Design Specification [DFulfill].

The Stream Manager knows which files to stream based on Fulfillment Manifest and Fulfillment Manifest File as defined in the System Design Specification [DFulfill] and [DStream].

The first step is to obtain the Fulfillment Manifest File. It is obtained using HTTP GET as specified under Protocol above.

The DCC download process is at the discretion of the Licensed Application.

The DMP download process is at the discretion of the Licensed Application, although the end product of a downloaded SHALL be complaint with [DDMP], except for Devices that do not support Outbound File Transfer.

A Licensed Application MAY interact with the User to select which files to download or stream.

Licensed Applications SHOULD support continuation of downloads that were interrupted.

A Fulfillment Manifest is only valid for the download or stream session; that is, for one or more downloads in parallel or sequentially, or streaming, without limited interruption.  Note that downloading a DMP including its forced download components is considered a single session.  It is important that manifests be current as old manifests could cause incorrect files to be downloaded, including the wrong Content.

A DECE Device SHOULD obtain a Fulfillment Manifest each time it begins a new download operation.

A DECE Device SHOULD obtain a new Fulfillment Manifest when it encounters indications of a stale manifest such as inoperable links.

### 4.2.3  Web Download

Web download is via standard web download mechanisms.

To enable web download, fully functional (populated) DMPs must be provided by the DSP.  Alternatively, a download manager must be used.

## 4.3  Digital Asset Download Options

Licensed Applications SHALL support Digital Asset acquisition from DSPs by either downloading directly from the DSP or by supporting the ability to transfer Digital Asset from devices that download directly from DSPs.

Licensed Applications SHOULD support Digital Asset acquisition via Superdistribution.

Licensed Applications MAY support Digital Asset acquisition via other mechanisms.

Licensed Applications SHALL support DMP acquisition from DSPs either by downloading directly from the DSP or by supporting the ability to transfer DMPs from devices that download directly from DSPs.

### 4.3.1 Download from DSP

Download is performed through a connection between the DECE Device and a DSP. DECE Devices include Tethered DECE Devices, although the connection may be performed by the Tethered Host.

A Connected DECE Device MAY support Direct Download of Digital Assets, either via Web Download or Download Manager, or both.

 A DECE Device that supports download SHOULD support the Download Manager mechanism.

### 4.3.2 Separate Download and Copy

Download may be initiated by a physical device other than the DECE Device. The downloaded file is then copied to the DECE Device.

Retailers and DSPs may present mechanisms to download files to a User. For example, the Retailer may implement a web site with links to locations where DCCs may be downloaded. Alternatively, Retailers or 3rd parties might supply download applications that will download Digital Assets.

These mechanisms result in a Digital Asset available to a DECE Device.

DECE Devices SHOULD accept files downloaded via indirect downloads and copied to the DECE Device.

### 4.3.3 Other Loading Mechanisms

Tethered DECE Devices SHALL accept Digital Asset via a Tethered Host. DECE Devices MAY accept Digital Assets via copying. Copying is the process of delivering content to a device through a mechanism other than the Internet or tethering. Copying may occur via portable media or local wired or wireless connection. Sometimes the term sideloading is used in reference to copying to a device and should be interpreted the same as copying.

## 4.4 Progressive Download

Licensed Applications MAY begin playback during download.

## 4.5 License Acquisition after Download

[Section removed]

## 4.6 DMP Download Requirements

Licensed Applications that download DMPs SHALL implement a Common Download Client as defined in [DFulfill], Section 6.2. The terms CMP and OCMP in [DFulfill] are to be interpreted as refering to DMP and ODMP respectively.

That is, any Licensed Application that downloads DMPs must do so in the manner defined in this section. In particular, this section does not apply to Licensed Applications that only obtain Digital Assets via Other Loading Mechanisms, as per Section 4.3.3.

Licensed Applications that download DMPs that do not support Outbound File Transfer NEED NOT store files in a DMP. Note that the ODMP download is still required, but DMP Part downloads can be stored at the discretion of the Device.

## 5   Playing Content

This section describes the playback process.

Before a DECE Device can play a DCC, the following conditions must be met:

1. A valid DCC must be available to the DECE Device;

2. A valid license for the Content to be played must be available to the DECE Device

DECE Devices MAY be pre-loaded with DCCs and Licenses at the time of Device purchase or manufacture.

Before a DECE Device can stream using Common Streaming, the following conditions must be met:

1. The DECE Device must be in a Domain

2. A valid MPD must be available to the DECE Device;

3. A valid license to Content referenced by the MPD must be available to the DECE Device

A DECE Device SHALL comply with all the requirements of a Common Player as defined in [DPlayer], Section 3, as modified by this section.

A DECE Device that supports Common Streaming SHALL comply with all requirements of a Common Streaming Player as defined in [DPlayer], Section 4, as modified by this section.

"HD Device" and "SD Device" are defined in [DSystem], Section 4.7.4.

### 5.1   Media Profile, Codec and Delivery Target Support

A DECE Device is classified in terms of Interoperability Points which are a combination of Media Profile (e.g., SD, HD), Delivery Target (i.e., download or streaming; single-track, multi-track), and required codecs within the Media Profile (e.g., AVC and HEVC).  Media Profiles ("Profile") and Delivery Targets ("Target") are described in [DMedia], Section 1.7.7 and defined in [DMedia] Annexes B and C respectively.  Interoperability Points are defined in [DMedia], Annex E.

Each Media Profile is associated with a set of picture formats, audio and video codecs, metadata, and other parameter values in the [DMedia]. To support any particular Media Profile, a DECE Device SHALL be able to handle all of the allowed format, codec and parameter options for that Profile.

Profile support is downwardly inclusive:

- An HD Device SHALL play Content as referenced in [DMedia], Annex E, Table E-2, "AVC Download and Prepackaged Interoperability Points".   Note that these are the download and prepackaged combinations.

- An HD Device MAY play Content as referenced in [DMedia], Annex E, Table E-4, "HEVC Download and Prepackaged Interoperability Points".

- An HD Device MAY play Content as referenced in in [DMedia], Annex E, Table E-3, "AVC Streaming Interoperability Points".

- An HD Device MAY play Content as referenced in in [DMedia], Annex E, Table E-5, "HEVC Streaming Interoperability Points".

- If an HD Device is capable of playing any Streaming Interoperability Point, it SHALL play all Streaming Interoperability Points with Media Profile of "SD" and "HD".  For the avoidance of doubt, it must support both or neither.

- An SD Device SHALL play Content as referenced in [DMedia], Annex E Annex E, Table E-2, "AVC Download and Prepackaged Interoperability Points" with Media Profile of "SD".

- An SD Device MAY play Content as referenced in [DMedia], Annex E Annex E, Table E-4, "HEVC Download and Prepackaged Interoperability Points" with Media Profile of "SD".

- An SD Device MAY play Content as referenced in [DMedia], Annex E, Table E-3, "AVC Streaming Interoperability Points", with Media Profile of "SD".

- An SD Device MAY play Content as referenced in [DMedia], Annex E, Table E-5, "HEVC Streaming Interoperability Points", with Media Profile of "SD".

Profile support is upwardly exclusive:

- An SD Device SHALL NOT play Content with an HD Profile.

## 5.2  DCC Support

DECE Devices SHALL be able to decode and present all DCCs in accordance with Conditions for Playback as defined in [DPlayer], Section 3.1 plus the following condition:

- A valid DRM license for the Content in the DCC is available to the Device, possibly in the DCC as outlined in [DMedia], Section 3.1;

### 5.2.1  File Media Type and Filename Extension

Devices SHALL recognize files with Media Type (MIME type) or extension specified in [DMedia], Annex E, Section E.5.

Devices SHALL recognize files Media Type (MIME type) or extension as specified in [DDMP], Section 4.4.

### 5.2.2  DECE Version Compatibility

A DECE Device SHALL play DCCs that meet all of the following conditions:

- The DCC meets Common Player CFF Compatibility requirements defined in [DPLayer], Section 3.
- The DCC is compliant with DECE-specific constraints on the File Type Box ('ftyp') and Content Information Box ('cinf') as specified in [DMedia], Annex E, Section E.1.2 for a Compatible Version listed in [DMedia], Annex A.

## 5.3  Content Encryption

DECE Devices SHALL comply with Common Player Content Encryption requirements as defined in [DPlayer], Section 3.2.

## 5.4  Audio, Video and Subtitle Elementary Stream Requirements

DECE Devices SHALL comply with Common Player Audio, Video and Subtitle Elementary Stream Requirements as defined in [DPlayer], Section 3.3.

### 5.4.1.1 Subtitle Playback

DECE Devices SHOULD support rendering of all glyphs that correspond to the Unicode Code Points defined the "da", "nl", "fi", "fr", "de", "it", "no", "sv", "es" and "pt" Language Subtags in [DMedia], Section 6.9.2, Table 6-1.  Note that this requirement will become normatively 'SHALL' in a future version of this specification.

## 5.5  Licensed Applications

A DRM Client in a DECE Domain SHALL NOT allow an unlicensed Licensed Application to decrypt DECE licensed Content.

## 5.6 Restrictions on Distributing DECE Device Functions

Although some functions may be distributed to Tethered Hosts and Device Proxies, playback may not. Playing Content function includes DRM Client's decryption function, decoding and output control functions including re-encrypting content using Approved Output Technologies.

DECE Devices SHALL NOT distribute Playing Content functionality to Tethered Hosts, Device Proxies, or Access Portals.

## 5.7 DECE Media Package (DMP) Playback Support

To playback Content from a DMP, DECE Devices must be able to locate and read tracks from multiple DCCs, typically in DMPs. Within a DMP, as per [DDMP] Media Presentations are defined in a TableOfContents part and Media Presentations are defined in Presentation parts of the DMP. Late Binding requires the ability to playback any combination of video track, audio track and subtitle track from a Media Presentation.

DECE Devices SHALL meet all requirements from Section 5.1 through 5.6 for playback of tracks from one or more DCCs in a DMP or equivalent as defined in [DDMP] and [DMedia]. A DMP equivalent refers to DMP information stored in a manner other than in a DMP, such as on Devices that do not support Outbound File Transfer.

DECE Devices MAY play one or more track via progressive download while playing one or more tracks from a DMP.

## 5.8 Common Streaming Playback

DECE Devices that support Common Streaming SHALL comply with Common Streaming Player requirements as defined in [Common Player], Section 4.

DECE Devices that support Common Streaming SHALL support Streaming Interoperability Points as defined in Section 5.1.

DECE Devices that support Common Streaming SHALL meet all requirements from all of the following, except as noted in this specification:

- Section 5.1 and 8.3 through 5.6 for playback
- [DSystem], Section 13.2.3

Note that the above references are in addition to those stated in [DPlayer], Section 4.

Section 7 defines obtaining a Fulfillment Manifest including FufillmentManifest/StreamingInfo.  Further defined was the method of obtaining BaseLocations that contains information necessary to acquire Licenses.

DECE Devices SHALL locate Licenses as defined in [DStream], Section 4.5.

## 5.9  Experience Media Application Playback

DECE Devices SHALL comply with Common Player Experience Media Playback requirements as defined in [DPlayer], Section 3.6.

## 6    User-Related Requirements

### 6.1   Rights Display

A DECE Device MAY display Rights information obtained from the Retailer or Access Portal.

Proportional scaling is a transformation on an image that changes the number of horizontal and vertical pixels in the same ratio within single-pixel rounding errors. Aspect ratio is maintained. Non-proportional scaling changes horizontal or vertical sizes in different ratios.

DECE Devices MAY proportionally scale images in a Container if such image is the desired aspect ratio but not the desired size. DECE Devices SHOULD scale larger images to a smaller images rather than scaling smaller to larger.

DECE Devices SHALL NOT crop images from a Container if an image of the desired aspect ratio is present in the Container. If a DECE Device crops an image it MAY also proportionally scale that image.

DECE Devices SHALL NOT scale non-proportionally.

### 6.2   Ratings Enforcement

Devices SHALL restrict Content playback based on ratings in DCCs. Ratings in DCCs is in Mandatory Metadata as defined in [DMedia] Section 2.3.4.

A DECE Device SHOULD restrict the display of Rights based on Rating information in Metadata associated with the Right (such as, metadata obtained from the Portal as part of the Rights query).

A Device MAY have a user-modifiable device-specific parental control setting.

# Device Specification Version 2.2

## 7 DLNA (Informative)

This section is for information purposes only.

It is envisioned that some DECE Devices will also be DLNA devices. In order for such a device to render content in a similar way as that defined in DLNA, DECE-related metadata needs to be placed in the DLNA Content Directory Service (CDS) in a standardized way. This section explains how a DLNA Digital Media Server (DMS) that serves UPnP AV CDS places such metadata into a CDS item that refers to a DCC.

Upon acquisition of a DCC, a DECE Device which also hosts a DLNA DMS or a UPnP MediaServer Device which supports ContentDirectory Service:3 [UPNPCDS3] or higher SHOULD create a CDS item which encapsulates the Required Metadata found in the DCC as defined in [DMeta], Section 4.1 in a *upnp:foreignMetadata* property; if it does so, it SHALL use the values indicated in the table below:

| UPnP CDS Property | Value |
|---|---|
| *upnp:foreignMetadata@type* | `"uvvu.com_mddece"` |
| *upnp:foreignMetadata::fmId* | Value of `mddece:APID` |
| *upnp:foreignMetadata::fmClass* | "UltraViolet Container" + value of `mddece:DECEMediaProfile` |
| *upnp:foreignMetadata::fmProvider* | Value of `mddece:Publisher` |
| *upnp:foreignMetadata::fmBody@xmlFlag* | 1 |
| *upnp:foreignMetadata::fmBody::fmEmbeddedXML* | `mddece:MetadataMovie` including all child elements |
| *dc:title* | value of `mddece:TitleDisplay60` |
| *res@duration* | Value of `RunLength` converted to `"H+:MM:SS"` format |
| *dc:date* | Value of `mddece:ReleaseDate` converted to [ISO 8601] format |
| *dc:description* | Value of `mddece:Summary190` |
| *res@protocolInfo* | "http-get:*:video/vnd.dece.mp4:*" |

The values of `APID` and `DECEMediaProfile` can be found in the 'ainf' box; all other metadata referenced in this table can be found in the 'meta' box in the DCC.

# 8 DECE Media Package (DMP) Support

The DECE Media Package (DMP) format allows one or more Digital CFF Containers (DCCs) to be stored, together with additional metadata and application data, in a single archive. The DECE Media Package is defined in [DDMP].

## 8.1 DMP Support

Devices complying with this specification support functionality associated with DMPs. Not all Devices are required to support all DMP functions, as indicated in this specification.

### 8.1.1 General requirements

In the case that this specification has missed a particular case covering DMPs, this general requirement is provided.

DECE Devices SHALL support all DCC requirements, regardless of whether the DCC is part of a DMP or not; except where noted.

DECE Devices SHALL NOT perform any operation on a DMP that results in a DMP that does not comply with [DDMP].  That is, not operation can corrupt the DMP.

When using a DMP, DECE Devices SHALL NOT access the following from the DCC

- Base Locations ('bloc' Box)
- Licenses
- Metadata ('meta' Box).

### 8.1.2 Primary Video Track

For licensing purposes, this specification defines the term Primary Video Track.

Each video track in each DCC within a Presentation has a type defined within that Presentation's Mandatory Metadata by the MetadataMovie/Track/Video/Type element.  Note that the association is through MetadataMovie/Track/Video/TrackReference.  If a video track's Type='primary' or the Type element is absent (that is, default is 'primary' as per [TR-META-CM]), then it is the Primary Video Track.

A Presentation SHALL have only one Primary Video Track.

Note that currently, a Presentation has only one video track.  However, it is not allowed to assume this is the Primary Video Track as other video tracks might be added in future implementations.  For backwards

compatibility it is important that implementation properly recognize the Primary Video Track.  An implementation that does not distinguish the Primary Video Track from other video tracks is non-compliant.

## 9 File Management

## 9.1 Default File Locations

This section specifies where Licensed Applications are encouraged to store DECE files. In this context, a DECE file is a DCC or DMP stored in a file system.

There are two categories of devices where it is applicable for Licensed Applications to store files in a specific location

- Devices that are capable of Outbound File Transfer, including devices where Licensed Applications are capable of writing removable media
- Devices or collection of devices where multiple Licensed Applications can share a file system. Note that the file system might be internal such as on a general purpose computer, or external, such as on a Network Attached Storage (NAS) device.

Although there might be other conditions where writing files to a known location applies, this section assumes that files will be written in specific file locations given those conditions.

### 9.1.1 Using Default File Locations

As applicable, Licensed Applications SHALL comply with requirements defined in [DPlayer], Section 5, where:

- [DPlayer], Section 5 "Applications" are Licensed Applications, and
- [DPlayer], Section 5 "ecosystem files" are DECE files.

Although these requirements are written towards Licensed Applications, they are strongly recommended for all other entities accessing DECE files such as Download Managers that are independent of Licensed Applications.

### 9.1.2 Default File Locations

Licensed Applications SHALL use Default File Location as specified in [DPlayer], Section 5. where <ecosystem> is 'UltraViolet' and <ecosystem-short> is 'UV'.

### END ###