System Specification

Version 2.4 2 March 2016

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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 17 April 2016.

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:

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1 Introduction

1.1 Scope

1.2 Document Organization

This document describes a new digital content ecosystem 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.

Section 1	Introduces the organization of this document, and describes its notations and conventions. It includes a glossary of terms, and lists references uses throughout the document.
Section 2	Provides an overview of the Ecosystem.
Section 3	Provides an informational overview of the DECE Architecture and its Roles.
Section 4	Describes the key Ecosystem entities, known as Roles, defining the Coordinator, Retailer, Locker Access Streaming Provider (LASP), and Access Portal Roles.
Section 5	Defines the structure of the identifiers used throughout the Ecosystem, their syntax, and which entity serves as their naming authority.
Section 6	Introduces a Node, which is an instance of a Role, and serves as a trust boundary with a unique, certified identity for mutually authenticating and securely communicating with other nodes in the Ecosystem. It also introduces a Security Token which is used for secure delegation of User authorization, and describes the end to end message security.
Section 7	Describes DECE Accounts, Users, and Rights Locker operations.
Section 8	Introduces the Common File Format used to contain instances of Content.
Section 9	Describes how a Content Provider creates a Container and publishes it to the Ecosystem.
Section 10	Outlines how a Retailer sells Rights to Content and updates the Rights Locker.

Section 11	Shows how Containers are downloaded to Devices.
Section 12	Describes how Content is Licensed for playback and how the Rights Locker relates to native DRM systems.
Section 13	Discusses how Content is streamed or downloaded.
Section 14	References support for Discrete Media Rights.
Section 15	Contains details on Superdistribution including Container initialization and License Acquisition.
Appendices	Tables of DECE Ecosystem parameters and DRM identifiers.

1.3 Document Notation and Conventions

1.3.1 Notations

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].

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”.

1.3.2 Sequence Diagram Conventions

Sequence diagrams loosely conform to the OMG UML 2.0 [UML] conventions.

Usage new to UML 2.0:

Use of iteration frames, especially REF to reference repeated sequences packaged into a shared drawing, and LOOP to illustrate simple iterations with guards denoting the iteration range.

Non-conforming Usage:

Use of double headed arrows to denote a sequence of messages and responses grouped together for simplicity.

Messages and responses colored in red denote messages and responses which are out of the scope of the DECE and are included for illustrative purposes.

1.4 Definitions

Access Portal	A Node implemented by a DECE-licensed entity to act as an intermediary communicating with the Coordinator on one side and applications controlled by the entity on the other side.
Account or DECE Account	The collection managed by the Coordinator of all DECE data relevant to a single household (Users, Rights Tokens, Rights Locker, etc.).
Adaptive Streaming	Continuous internet download and playback of media Segments while automatically adjusting media bit rate (and possibly encoded picture size) by selecting from alternative Media Segments available from Web servers in order to dynamically adapt bitrate to network throughput without interrupting playback.
Approved Discrete Media Fulfillment Method (ADMFM)	The use of a format and content protection system in a manner approved by DECE for fulfilling a Discrete Media Right.
Approved DRM	A DRM system that has passed the DECE DRM approval process. A list of the Approved DRMs is contained in Appendix B.

Approved Stream Protection Technology	A DRM system or other content protection technology approved by Content Providers for Streaming. A list of the Approved Stream Protection Technologies is contained in Appendix C.
Asset	A component of Content in abstract form (see Logical Asset) or concrete form (see Physical Asset).
Browser	Browser is used in these specifications as shorthand for *web browser*, which is an end-user software application for retrieving, presenting, and traversing information resources on the World Wide Web. A W3C "user agent."
Compliance Verification	The process for a DECE Role to carry out all defined requirements for the Compliance Verification Process (CVP).
Client Implementer	An entity that implements a DECE Device.
Common File Format (CFF)	The standard DECE Content delivery file format, encoded in one of the approved Media Profiles and packaged (encoded and encrypted) as defined by the DECE Common Container & Media Format Specification.
Common File Format Timed Text (CFF-TT)	Common File Format Timed Text, as defined in [DMedia]. CFF-TT tracks are referred to as subtitle tracks.
Common Streaming	A framework for delivering stream segments streams conforming with the Common Streaming Format (CSF) definition from a LASP to Devices where that Device can play those stream segments.
Common Streaming Format (CSF)	Common Streaming Format (CSF) refers to any Common File Format (CFF) specializations or profiles that are specifically designated for streaming.
Consent	Permission from a User for a policy or policies to be applied to the User or to the User's Account.

Container	Shorthand for Digital CFF Container (DCC).
Content	A movie, television show, music video, or other media work made available in the Ecosystem. The term Content used informally may include Assets. (In [FRBR], a “work.”)
Content Key	A cryptographic key used to decrypt portions of DCC. See Keyset.
Content Provider	A DECE-licensed entity that publishes Content to the Ecosystem.
Coordinator	The central entity controlled by the DECE LLC that facilitates interoperability across Ecosystem services, and stores and manages Accounts.
DASH	Dynamic Adaptive Streaming over HTTP, as specified by [DASH].
DECE	Digital Entertainment Content Ecosystem.
DECE CFF Container (DCC)	Synonym for Digital CFF Container.
DECE Device or Device	A hardware or software implementation of the Device Specification. The term DECE Device and Device are used synonymously. This is distinguished from a “physical device” used to refer to hardware regardless of whether or not it implements a DECE Device.
Digital CFF Container (DCC)	An instance of Content published in the Common File Format.
Discrete Media	Standalone physical media (e.g., an optical disc or memory device) containing Content bound to the media using an Approved Discrete Media Fulfillment Method and playable on non-DECE devices.
Discrete Media Client	An application that fulfills Discrete Media Rights by recording Content to Discrete Media using an Approved Discrete Media Fulfillment Method.

Discrete Media Content	An instance of a Physical Asset bound to standalone media (such as an optical disc or memory device) in an approved format.
Discrete Media Right	A Right specific to Discrete Media. That is, permission for a User to obtain Content as Discrete Media.
Domain or DRM Domain	A defined and identifiable group of devices, typically associated with a single User or Account, which can share DRM licenses. Each DRM Client in a DECE Device may be associated with one or more DRM Domains.
Download Manager	Software that downloads DCCs using DECE-defined protocols.
Download Manifest	A data structure providing information a Download Manager needs to obtain DCCs associated with a Right. That is, a list of files, download locations, and related information provided by a Retailer.
Download Service Provider (DSP)	A service formerly responsible for fulfilling Rights on behalf of a Retailer by delivering DCCs, DMPs, and DRM licenses. This Role is no longer licensed by DECE.
DRM	Digital Rights Management.
DRM Client	An implementation of a DECE-approved DRM that can decrypt DCCs using the Keyset carried in the DRM license and enforce usage rules according to a DRM license and/or policy.
DRM Domain Credential	The object used by a DRM to bind devices and DRM Licenses to a DRM Domain. Details of the identity and cryptographic methods used are specific to each DRM.
DRM License	An object or policy issued by a DRM License Manager allowing a DRM Client to decrypt a Container.

Dynamic LASP (DLASP)	LASP service or LASP Client that authenticates a User on a session-by-session basis.
Ecosystem	The manifestation of the DECE architecture, as defined by the DECE specifications and implemented by DECE participants.
Experience	Defines the relationships between Presentations, Applications and other data associated with Content.
Experience Media Application	A Media Application that defines an Experience. An Experience Media Application provides enough information to create a user interface that allows a User to Navigate the Content associated with that Experience.
Fulfill	To deliver Physical Assets associated with an Account's Right at the behest of a User in that Account.
ISO	1) The ISO Base Media File format ("ISO container" or "ISO media file") as used in the DECE Common Container & Media Format Specification. 2) The ISO 9660 file format for storing the contents of an optical disc ("DVD ISO image" or "DVD ISO"). 3) The International Organization for Standardization, which defined both file formats above.
Keyset	The set of all Content Keys needed to decrypt playable elements of a DCC.
Late Binding	The combination of separately delivered content (e.g. audio, video, or subtitles) into a single, synchronous presentation.
Late Bound Common Streaming	A mix of Late Binding and Common Streaming. A Device plays a combination of tracks played from a DCC and tracks streamed using Common Streaming.
LASP (Locker Access Streaming Provider)	A DECE-licensed service provider that Streams Physical Assets associated with an Account's Right to a LASP Client.

LASP Client	Hardware and/or software that renders a Stream under control of a LASP and conforms to the DECE output control policies in the LASP Compliance Rules.
LASP Session	A period of time during which an authenticated User or Account may receive a stream from a LASP.
License Manager	A DRM service that issues and manages DRM Licenses.
Linked LASP (LLASP)	LASP service or a LASP Client that is persistently bound by the LASP to a User.
Logical Asset	An abstract instance of Content, independent of the manifestation such as encoding or packaging. (In [FRBR], an “expression.”)
Media Application	An application (presentation control program) associated with Content. A Media Application may take forms ranging from simple play lists, declarative data, and markup languages; to procedural language programs that are interpreted by players or virtual machines, or compiled to binary to run on specific processors.
Media Player or DECE Media Player	A device or software application that decodes and presents Content from a DCC..
Media Presentation	As defined in [DASH], “collection of data that establishes a bounded or unbounded presentation of media content.” A Media Presentation closely corresponds with a Common File Format DCC, although a Media Presentation can also be an abstract representation of media components that play together through a DMP or Streaming.
Media Presentation Description (MPD)	As defined in [DASH], “formalized description for a Media Presentation for the purpose of providing a streaming service.” Note: The formalized description is an XML schema and an instance document of that schema is referred to as an MPD.

Media Profile or Profile	Requirements and constraints such as resolution and subtitle format for Content in the Common File Format.
Metadata	Data that describes Content, including Logical Assets and Physical Assets.
Node	An instance of a Role. A Node is assigned a unique certified identity (a certificate) by DECE, creating a trust boundary used to mutually authenticate and secure communication between the Node and the Coordinator.
Outbound File Transfer	Copying or moving a Digital Asset from a Device so that it can potentially be delivered to another DECE Device.
Parental Control	See Ratings Enforcement.
Parental Control Information or Parental Controls	Coordinator-managed settings to restrict a User's access to Content and visibility of Content. Compare to Ratings Enforcement.
Provisioned LASP Client	A LASP Client under control of and persistently tied to the LASP service. Compare to Single-session LASP Client and Persistent User-bound Mode.
Persistent LASP Client	A LASP Client in a personal device such as a smartphone or tablet. Compare to Single-session LASP Client and Provisioned LASP Client.
Physical Asset	A specific manifestation of an Asset for a single Media Profile, such as a DCC. (In [FRBR], a "manifestation.")
Playback Device	A DECE Device, a LASP Client, or the physical device containing a LASP Client.
Policy	1) Rules for operating in the Ecosystem. 2) A data structure in the Coordinator used to specify an allowable action or configuration.

Profile	See Media Profile.
Ratings	Subjective classifications of suitability of Content for particular audiences. Ratings may include reasons, which are attributes of a given rating, such as adult language or violence.
Ratings Enforcement	Limiting access to Content or Content listings by applying Parental Control settings to Content Ratings. Nodes, Devices, and other playback implementations may do Ratings Enforcement by comparing device-specific or service-specific settings to Ratings in DCCs/DMPs or Coordinator Metadata or other Ratings sources. Compare to Parental Control Information.
Ratings System	A set of Ratings, typically defined by a ratings body.
Retail Account	An account maintained by a Retailer for facilitating purchases. A Retail Account may be bound to a DECE User.
Retailer	A DECE-licensed entity operating a consumer-facing storefront that sells Rights.
Right	A collection of allowed usages of one Profile of a Logical Asset (a particular piece of Content) associated with an Account. Rights may relate to whether the Content can be downloaded, streamed, or otherwise processed.
Rights Locker	Coordinator functionality that manages a collection of Rights Tokens, uniquely associated with an Account.
Rights Token	An object managed by the Coordinator representing a Right.
Role	A DECE entity that implements a specific set of functionality and both exposes and invokes a defined collection of interfaces. Roles are Coordinator, Portal (Web Portal), Access Portal, Content Provider, Retailer, LASP, and Customer Support.

Security Token	An object for exchanging authentication and authorization data between the Coordinator and a Node. Delegation Security Tokens (often simply called Security Tokens) are primarily for User and Account authentication and intrinsically identify which Coordinator services the Node is authorized to use on behalf of the User or Account. Delegation Security Tokens can be constructed for transient authenticated sessions or for persistent delegation when linking a User to a Node. Federation Security Tokens allow for remote authentication (e.g., authenticated links from a Node to the Web Portal) and distributed identity (e.g., providing a User ID to a Node for Content access). Different from User Credential.
Single-session LASP Client	A LASP Client establishing only a short-term session, requiring User authentication. Typically intended for use with Web Browsers. Compare to Provisioned LASP Client and Persistent LASP Client.
Stream or Streaming	Transmitted Content, protected by an Approved Stream Protection Technology, that is not persistently stored on the receiving LASP Client except for the purposes of buffering, including for instant start of playback, and to enable trick-play.
Superdistribution	Any means of distributing DCCs in advance of the recipient obtaining a Right to the Content. This includes preloading DCCs on media or DECE Devices, sharing DCCs on download services or peer to peer networks, and copying a DCC from one DECE Device to another DECE Device in a different Account. Before Superdistributed Content can be accessed (decrypted), a User must obtain the associated Right from a Retailer.
Trust Authority	A trusted entity, usually the Coordinator, that issues digital certificates for use by Nodes and other entities licensed by DECE.
User or DECE User	A person with a User Credential that is a member of an Account.
User Access Level	A set of privileges specifying allowed behaviors of a User.

User Credential	A unique assertion of User identity (a username) secured by a password. Different from Security Token.
Web Portal	An interactive HTML application made available by DECE, independent of any particular Retailer or LASP, giving Users direct access via a Web Browser to functions such as Account settings, User management, and Rights Locker viewing.

1.5 References

1.5.1 DECE References

The following versions of documents SHALL comprise the version 2.3 DECE "Ecosystem Specifications":

[DSystem]	System Specification, Version 2.4
[DCoord]	Coordinator API Specification, Version 2.4; coordinator-2.2.xsd
[DDiscrete]	Discrete Media Specification, Version 2.0.1
[DPublisher]	Content Publishing Specification, Version 2.0
[DDevice]	Device Specification, Version 2.2
[DMeta]	Content Metadata Specification, Version 2.2; mddece-2.2.xsd
[DCMeta]	Common Metadata Specification, Version 2.3c; md-v2.3.xsd
[DCMetaCR]	Common Metadata Ratings Specification, Version 2.2.2
[DMedia]	Common File Format & Media Formats Specification, Version 2.2; cff-tt-1.1.zip
[DSecMech]	Message Security Mechanisms Specification, Version 2.4
[DGeo]	Geography Policies Specification, Version 2.3
[DKeyDelivery]	Keyset Delivery Format Specification, Version 2.0.1; keydelivery-2.0.1.xsd; keydelivery_redefine-2.0.1.xsd
[DDMP]	Media Package Specification, Version 2.1
[DStream]	Common Streaming Protocol Specification, Version 2.2
[DCManifest]	Common Media Manifest Metadata, Version 1.4; manifest-1.4.xsd

[DFulfill]	Content Fulfillment, Version 1.0; fmdece-1.0.xsd
[DPlayer]	Common Player Specification, Version 2.2

Some specifications are more concerned with certain Roles than others, and the following table summarizes which specifications are most applicable to each Role. However, the table below is provided for convenience only; it does not in any way limit Role implementers' obligations to comply with all requirements applicable to them regardless of which specification contains those requirements and whether those specifications are indicated as "most applicable" by the table below. (See Section 4 for details on all the DECE Roles.)

	Content Provider	Retailer	LASP
DSystem	●	●	●
DCoord	●	●	●
DSecMech	●	●	●
DMeta	●	●	●
DDiscrete	●	●	
DMedia	●	●	●
DDevice & DPlayer		●	●
DPublisher	●	●	●
DGeo	●	●	●
DKeyDelivery	●	●	●
DDMP	●	●	●
DStream	●		●
DFulfill		●	●

Specification and Roles Table

1.5.2 External References

[DASH]	ISO/IEC 23009-1:2011, "Dynamic Adaptive Streaming over HTTP"
[EIDR]	EIDR ID Format v1.02 http://eidr.org/documents/EIDR_ID_Format_v1.02_Jan2012.pdf
[EVCert]	Guidelines for the Issuance and Management of Extended Validation Certificates http://www.cabforum.org/Guidelines_v1_2.pdf
[FRBR]	IFLA Study Group on Functional Requirements for Bibliographic Records http://www.ifla.org/en/publications/functional-requirements-for-bibliographic-records
[HTTP]	Hypertext Transfer Protocol – HTTP/1.1 (RFC 2616) http://www.ietf.org/rfc/rfc2616.txt

[HTTP Auth]	HTTP Authentication (RFC 2617) http://www.ietf.org/rfc/rfc2617.txt
[ISAN]	ISO 15706-2:2007, "Information and documentation -- International Standard Audiovisual Number (ISAN) -- Part 2: Version identifier
[ISO-P2H]	ISO/IEC Directives, Part 2, Annex H http://www.iec.ch/tiss/iec/Directives-part2-Ed5.pdf
[RFC3986]	"Internationalized Domain Names in Applications (IDNA): Protocol", J. Klensin, August 2010. http://www.ietf.org/rfc/rfc5891.txt
[RFC5891]	"Uniform Resource Identifier (URI): Generic Syntax" T. Berners-Lee, R. Fielding and L. Masinter, January 2005. http://www.ietf.org/rfc/rfc3986.txt
[SAML]	Security Assertion Markup Language Version 2.0 http://saml.xml.org/saml-specifications
[SMPTE2053]	SMPTE ST 2053:2011, *Media Package for Storage, Distribution and Playback of Multimedia File Sets and Internet Resources*, July 13, 2011.
[TLS]	The Transport Layer Security (TLS) Protocol, Version 1.2 (RFC 5246) http://tools.ietf.org/html/rfc5246
[UML]	Object Management Group (OMG) Unified Modeling Language (UML) http://www.omg.org/spec/UML/2.0/
[URI]	Uniform Resource Identifier (URI): Generic Syntax (RFC 3986). http://tools.ietf.org/html/rfc3986 and Uniform Resource Identifiers (URIs), URLs, and Uniform Resource Names (URNs): Clarifications and Recommendations (RFC 3305) http://tools.ietf.org/html/rfc3305
[X.509]	Internet X.509 Public Key Infrastructure Certificate and CRL Profile (RFC 2459) http://www.ietf.org/rfc/rfc2459.txt

1.6 XML Change Management

XML schemas necessarily change as systems evolve. In particular, DECE Nodes and Devices will encounter situations where XML documents are authored against newer revisions of defining XML schemas. It is necessary that Nodes and Devices handle this situation gracefully by extracting needed information from the document while ignoring extraneous changes to the document.

In DECE specifications, schema updates are designed to support backwards compatibility. For example, element and attributes can be added, but required elements are not removed; or more generally ordinality of elements and attributes can be widened but not narrowed. Values are not changed in either syntax or semantics.

Given these rules for encoding, Nodes and Devices also follow rules to support backwards compatibility.

An XML document is considered compatible if its structure does not preclude the extraction of data from the document. For example, a document with additional elements and attributes do not preclude schema parsing and data extraction.

For all uses of compatible XML documents other than use of the Coordinator API, the following requirements apply:

- Nodes and Devices SHALL NOT reject compatible XML documents, even if they fail schema validation.
- Nodes and Devices SHALL extract data from compatible XML documents.
- Nodes and Devices MAY ignore elements and attributes whose presence is not allowed in the specification and schema versions against which that Node or Device was built. For example, if the original schema allows one instance and three instances are found, the 2nd and 3rd instance may be ignored.

The Coordinator API is exempt as it always uses well defined namespaces that map to version-based URLs corresponding to released API versions.

2 DECE Overview

2.1 Background

Today's consumer of audio and video media has, over many decades, grown used to a simple yet effective method of acquiring content that ultimately results in the purchase of some form of physical media such as CDs, DVDs and now Blu-ray Disks. Consumers have come to expect convenience and flexibility with the CD and DVD purchase and usage experience. In particular, consumers can choose among several retailers and make the decision on where to make their purchase based on price, choice, convenience, affinity, and the like. Competition creates a robust ecosystem that is beneficial to the consumer, retailer, distributor, rights holder, and device manufacturers. Furthermore consumers know that content purchased at any retailer will play on any CD or DVD player. The consumer knows that the content they purchased is theirs and they are free to take it with them and enjoy it wherever they like. This is based on the trust consumers have placed in the DVD and CD brands, the underlying technologies and the industry's success at educating consumers that "it will just work".

With the wide spread availability and penetration of high-speed broadband, and the movement towards devices with direct IP connectivity, that physical media in general, and optical media specifically, may soon be outdated. As we move from a world of DVDs and CDs to a world where content can be purchased and enjoyed directly from the comfort of your living room or personal media player follows that consumers will continue to expect the flexibility and convenience of the DVD experience as described above. They will expect the usage model they have grown accustomed to in the physical world will work for content they will purchase in the digital world.

The reality is that to date this has not been the case. Existing digital content solutions are closed ecosystems, resulting in a market of numerous non-interoperable silos. Each silo has a different set of usage rules enforced by a single Digital Rights Management (DRM) solution and each is linked to a single retail portal selling a limited set of content. Content licensing in these silos is usually bound to a single or very limited set of devices, as defined by the specific usage rules for each silo, limiting how and when consumers can enjoy the content they have purchased. These "silo" ecosystems are neither flexible nor convenient and fall short when it comes to the expectations of consumers. Ultimately, this results in a fragmented market that gives little incentive for consumers to shift to purchasing content online.

In one scenario consumers will simply fail to adopt online content acquisition in sufficient quantity to be fiscally viable, and continue to purchase content on physical media. In the worst case, consumers may use of illegal file sharing networks to gain access to the content they want on any or all devices they own. Apple has achieved a degree of success with its iPod + iTunes, but this has primarily been for music not video. Aside from Apple, the increasing trend is to deliver music DRM-free in MP3 format. For music,

the unprotected MP3 format provides the flexibility and convenience associated with traditional CDs. However, the music industry's delay in defining a convenient legal electronic ecosystem has contributed to widespread piracy and financial disaster for the industry. The task at hand is to define and implement a convenient, flexible ecosystem for digital content, particularly high-value studio film content that meets consumer expectations for convenience and choice, and presents a better experience than today's physical delivery systems or piracy.

2.2 New Ecosystem

This new Ecosystem must benefit all participants.

- **The consumer** – The Ecosystem must allow consumers to seamlessly experience any digital content from any retailer across many devices.
- **The retailer** – The Ecosystem must not constrain the ability of retailers to compete in the market place.
- **The device manufacturer** – The device manufacturer must be able to easily implement and innovate on a range of competitive devices that can compete in the marketplace
- **The content owner** – The Ecosystem must ensure the security of the content owner's intellectual property.

It may seem like a daunting set of requirements, however, frameworks and technologies do exist today that can be used to create an ecosystem that can address them. At a minimum, the solution must address several important areas.

- There must exist a single well branded Ecosystem and associated usage model that is shared and enforced across all Ecosystem participants.
- It must leverage a single universal media format, playable on a large class of devices.
- It must allow for the use of multiple Digital Rights Management (DRM) technologies that are able to enforce the usage model. This will ensure that content can be rendered on a wide range of systems and devices.
- Media formats and DRM systems should be generally invisible to the consumer: a consumer should only be concerned with the title and the quality level (profile) of his purchase but should be unaware of the technical details of media formats and protection systems.

- A record of consumer purchases is maintained in the cloud by the Ecosystem, easing consumer management and availability.
- In order to ensure true interoperability, a single architectural framework must exist that will enable consumers to easily purchase and access content they own from a diverse set of content retailers on a wide-ranging set of devices, while still allowing competition and innovation in the marketplace.

3 DECE Architecture (Informative)

The Digital Entertainment Content Ecosystem (DECE or the "Ecosystem") has been designed to provide the consumer with the best possible digital content experience. In effect the Ecosystem is *user centric*, allowing the consumer to purchase, play and share digital content as they have grown accustomed in doing with physical media. Three major concepts form the foundation of the Ecosystem:

1. Users are able to purchase Content from multiple Retailers.
2. Multiple Users representing a household can be aggregated (grouped) into a single Account, enabling the sharing of Content between them.
3. Any User that is a member of the Account can acquire and play Content across a large range of devices.

In order to realize the concepts described above, the Ecosystem defines a set of entities that have well specified relationships and behavior. The entity at the center of the Ecosystem is the DECE Account. The DECE Account in turn manages two additional entities that are instrumental in enforcing the Ecosystem usage rules: The Rights Locker and a set of Users.

A Rights Locker stores all proofs of purchases, also known as Rights Tokens, for content purchased by any User associated with the Account. Rights Tokens are device- and DRM-independent representations of the rights associated with an instance of purchased Content. All Users associated with the Account have access to the Rights Tokens in the Account's Rights Locker including those that were purchased by other Users associated with the Account.

An Account is uniquely associated with a set of DECE Users. Each User is uniquely identified by the Ecosystem and Users authenticate themselves to the Coordinator via a User Credential. Retailers continue to manage their own retail accounts and login credentials as they do today, however in order to purchase Content a User must give a Retailer access to the DECE Account by authenticating to the Coordinator and optionally linking the Account to the Retailer. The Ecosystem makes use of a DECE User's identity to enable several key features, including Content fulfillment. In addition the User is assigned one of three permission levels. Details of these concepts are further defined in Section 7.2.2.

The diagram below depicts these entities and relationships.

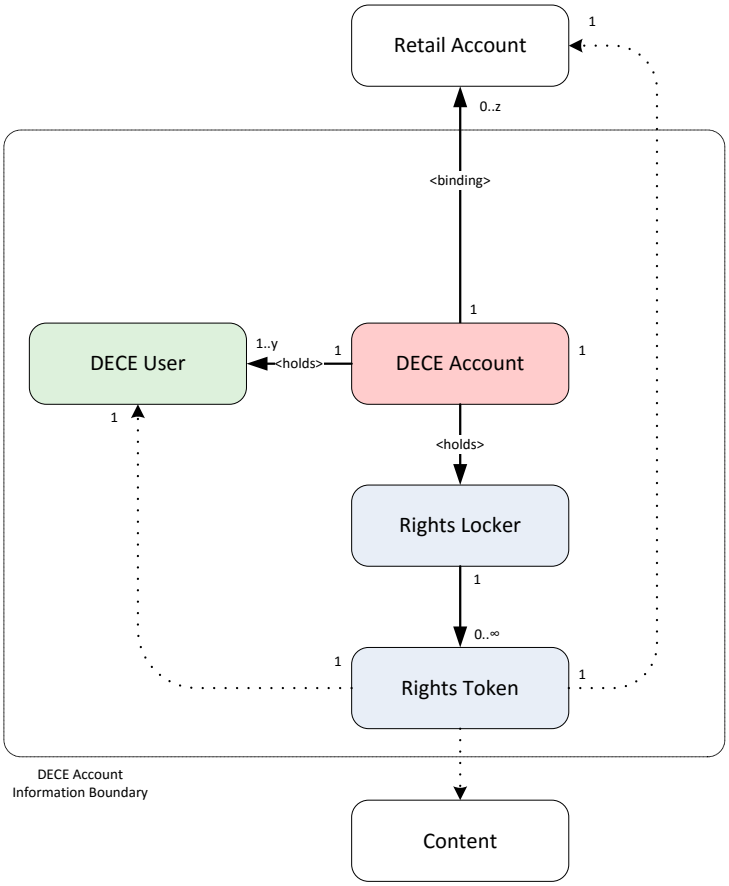


Figure 1 – Entity – Relationship Diagram (Informative)

Entities within the DECE Boundary are managed by the Coordinator where entities outside of this boundary are managed by other service providers in the Ecosystem.

3.1 DECE Roles Overview

One of the underlying goals of the Ecosystem is to minimize the impact to the existing processes and procedures Content Owners and Retailers use to obtain, package, deliver, and license Content they sell to consumers. The DECE architecture is designed as a coordination layer on top of the existing retail content service offerings. Retail content service offerings will continue to obtain, package, deliver, and license Content to their customers pretty much as they do today.

In order to support new Ecosystem functionality the Retailers must augment their infrastructure to now support multiple domain-based DRM's. In addition Retailers must now communicate with a global and central Ecosystem run service, known as the Coordinator, which enables the interoperability across Retailers, Devices and Users.

The architecture defines a set of Roles and their relations. The following diagram depicts these Roles and defines the high level architecture for the Ecosystem.

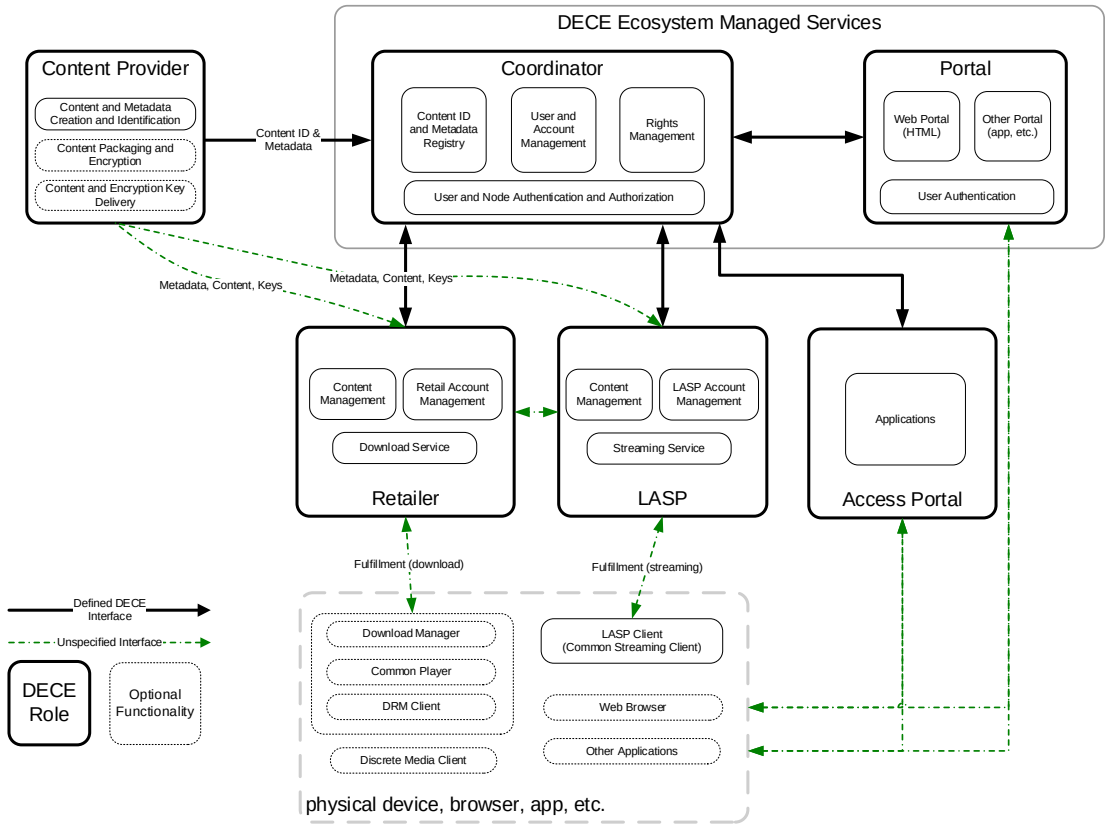


Figure 2 – Ecosystem High Level Architecture

4 Roles

A *Role* is an entity that implements a specific set of Ecosystem functionality and both exposes and invokes a defined collection of interfaces. This section briefly describes each of the Roles that exist in the Ecosystem. Only companies with a valid license agreement with the DECE LLC may create instances of a Role in accordance with the assigned obligations of the Role.

4.1 The Coordinator Role

The Coordinator is a central entity operated on behalf of the DECE LLC that facilitates interoperability across Ecosystem services and stores/manages the Account. The Coordinator operates at a known Internet address.

The Coordinator Role enables interoperability between each of the other Roles in the Ecosystem. It manages the Ecosystem data and is responsible for enforcing the Ecosystem parameters globally. Communication with the Coordinator occurs using either a set of DECE-defined web service API's or via the Web Portal (a Coordinator-hosted consumer-facing user interface. It is important to note that the Coordinator does not manage, deliver, or license Content. This functionality is handled by the Retailer, defined in Section 4.2 and Section 4.3 respectively. The Coordinator provides *authorization* for content delivery, domain management, and license issuance whereas the Retailer *manages, delivers, and licenses* content.

The functionality of the Coordinator role is split into several modules.

4.1.1 User/Account Management

As described earlier, the Coordinator is responsible for managing all of the DECE Accounts. Each Account contains one or more Users which are authenticated to the Ecosystem by a User ID and password.

Each User is associated with a set of attributes including standard fields such as first name, last name, email address, and the like. The User is assigned a single permission level, which is used to control access to Ecosystem data and services.

See Section 7.1 for further details on Accounts, and Section 7.2 for Users.

4.1.2 Rights Management (Rights Locker)

The Rights Locker stores all proofs of purchases (excluding pricing information), also known as Rights Tokens, for content purchased by any User associated with the Account. Rights Tokens are DRM-independent representations of the rights associated with an instance of purchased Content. All Users

associated with the Account have access to the Rights Tokens in the Accounts Rights Locker including those that were purchases by other Users. Other information about the User's rights to Content is managed by the Rights Token, including the profile level of the content and an indication if a Discrete Media Right is available or has been fulfilled. Although Rights Tokens do not exist outside of the context of the Ecosystem, they are accessed, managed and manipulated via the web services interfaces exposed by the Coordinator role. Rights Tokens are used by LASPs and Retailers to authorize content acquisition and native DRM licensing.

4.1.3 Content ID and Metadata Registry

Content is made available for sale within the Ecosystem via Content Providers. To bootstrap this process Content Providers communicate the unique identifier and a small subset of descriptive and technical metadata, such as title and rating, to a Content Registry managed by the Coordinator. (See Section 9.1.2 for additional details.)

4.2 Retailer Role

The Retailer Role provides the customer-facing storefront service and sells Ecosystem-specific content to consumers. This typically includes providing the storefront and e-commerce functionality, managing the User's retail account and providing payment capabilities. When a Retailer sells DECE Content the Retailer Role is responsible for notifying the Coordinator of the details of the content sold to the User. The Retailer creates a unique Rights Token object that is passed to the Coordinator via a web service call for inclusion in the User's Rights Locker. This Rights Token can then be referenced for future interactions with the Ecosystem.

In addition to the Retailer specific requirements throughout this document, the following requirements are also normative.

The Retailer SHALL conform to protocols defined in [DCoord].

The Retailer SHALL authenticate with the Coordinator as described in [DCoord] Section 2.3 and [DSecMech].

Retailers SHALL ensure all DECE Rights obtained through them are licensable across all DECE Approved DRM's.

Note that a Retailer is not obligated to make its store front operational on every Device. But it is still responsible for every Device to be able to fulfill and license any rights sold through them for all Approved DRMs.

The Retailer SHALL update a User's Rights Locker by creating a Rights Token as described in Section 10.1.1 when a User purchases a Right.

Retailers SHALL ensure all DECE Rights obtained through them can be fulfilled as described in Section 11.1.

A Retailer SHALL access the DECE Account with a Security Token as described in Section 7.1.2.

A Retailer MAY bind the Retailer account to the DECE Account as described in Section 7.1.2.

A Retailer SHALL NOT persistently store User Credentials (DECE Username and password) obtained solely for the purpose of creating a new User.

Accessing a DECE Account via a Security Token enables the `LockerViewAllConsent` policy, granting the Retailer access to an Account's entire Rights Locker regardless of the Retailer who originally sold the Right to the Content. See Section 7.1.2.2 and [DCoord] Section 5.5.

If the `LockerViewAllConsent` policy is enabled, when a Retailer displays an Account's Rights Locker the Retailer SHALL show all Rights Tokens, or provide a means to show all Rights Tokens, in an Account's Rights Locker regardless of whether the Right was sold by the Retailer.

The Retailer SHOULD write the Base Location to the Container as described in Section 8.3.2.2.

The Retailer MAY write the Base Purl Location to the Container as described in Section 8.3.2.23.

A Retailer cannot Stream Content using its Retailer Node. In order to Stream Content, a Retailer must also be a LASP and Stream Content via its LASP Node. See Section 6.5.2 for information on how a Retailer that is also a LASP can support sharing a Security Token across Nodes.

4.3 The Download Service Provider (DSP) Role [Discontinued]

Note: DECE formerly defined the DSP Role as an adjunct to the Retailer Role. The DSP Role is no longer licensed by DECE. Tasks related to download fulfillment, DRM domain management, and DRM licensing are handled by the Retailer, which may engage third-party services such as Content Delivery Networks (CDNs) for this purpose.

Although references to the DSP Role and the DECE Domain appear in this and other specifications, these are vestigial and are not normative.

4.4 Locker Access Streaming Provider Role (LASP) Role

A *Locker Access Streaming Provider* (LASP) is defined as a streaming media service provider that participates in the Ecosystem and complies with DECE Policies to stream Content to devices. These devices may consist of user devices as well as devices operated by a service/system operator, e.g., Set Top Box, cellular phone, and general purpose computer.

Providing streaming services is an important capability of the Ecosystem because it allows Users flexible, remote, and real-time access to their purchased content. A LASP participates in the Ecosystem by allowing DECE Users to access their Rights Locker in order to authorize the LASP to stream their content to a LASP Client. As part of the Ecosystem, a LASP operates under a bilateral licensing agreement with Content Providers to acquire Content and provide this service. Content Providers have the option to grant streaming rights without the need for a bilateral agreement.

The Coordinator protocols required for a LASP to stream Content to a LASP Client are described in Section 13.2.

DECE originally defined two categories of LASP services: *Linked* (LLASP) and *Dynamic* (DLASP). These have been replaced by three categories of LASP Clients, providing more flexibility for LASPs. As a result, LASPs SHALL use only the DLASP subrole.

There are three types of LASP Client, each defined by different requirements. A LASP can service any of the different LASP Clients.

Single-session LASP Client

For short-term, User-authenticated Streaming sessions, is intended for transient environments such as web browsers, Internet cafes, and hospitality industry installations (providing Content access from hotel rooms, airplanes, etc.). Frequent re-authentication is required. See section 4.4.2.1 for details.

Persistent LASP Client

A LASP Client persistently associated with a single User, such as apps on a tablet or smartphone. Requirements are placed on LASP Clients serviced in this mode and limits are placed on the corresponding User-level Account bindings that a LASP can put in place. See section 4.4.2.1 for details.

Provisioned LASP Client

LASP Clients that may be used by multiple Users in an Account, and are therefore strongly associated with the Account, such as cable set-top boxes and applications on smart TVs. Requirements are placed on this type of LASP Client and limits are placed on the corresponding User-level Account bindings that a LASP can put in place. See section 4.4.2.3 for details.

4.4.1 General LASP Requirements

A LASP SHALL only Stream Content to a LASP Client.

A LASP SHALL conform to protocols defined in [DCoord].

A LASP SHALL authenticate with the Coordinator as described in [DCoord] Section 2.3 and [DSecMech].

A LASP SHALL access the DECE Account with a Security Token as described in Section 7.1.2.

A LASP MAY bind the LASP account to the DECE Account as described in Section 7.1.2.

A LASP SHALL NOT persistently store User Credentials (DECE User name and password) obtained solely for the purpose of creating a new User.

The protocol a LASP uses to stream Content to a LASP Client is out of the scope of the DECE.

A LASP can access an Account's entire Rights Locker regardless of the Retailer who originally sold the Right to the Content. See the `LockerViewAllConsent` policy in [DCoord] Section 5.5.

A LASP SHALL respect session stream limits. The number of simultaneous streams allowed per Account is limited. The LASP_SESSION_LIMIT parameter in Section 16 defines the current limit set by DECE policy. The Coordinator enforces this limit as described in Section 13.2.2.

Prior to streaming Content to a User, the LASP SHALL ensure the Rights Locker contains a Rights Token allowing the User to stream that Content. See the `CanStream` element in [DCoord] Section 7.2.5.

A LASP SHALL terminate all active Sessions upon unbinding from an Account.

A LASP MAY use the Digital CFF Container for streaming, or it MAY use an alternate format.

A LASP can only Stream Content. That is, a LASP is not permitted to sell Rights to Content or to provide fulfillment services.

A LASP SHALL provide DECE Account Management functions in accordance with the LASP Compliance Rules. The LASP MAY either refer the user to the DECE Web Portal, or provide an interface using the Coordinator APIs ([DCoord] Section 13), except in Persistent User-Bound Mode, where a custom interface must be provided (see Section 4.4.2.2).

A LASP providing an Account Management interface using Coordinator APIs SHALL at minimum allow setting the User's e-mail address and password. Account Management consent (ManageAccountConsent + ManageUserConsent) is not required for this functionality, but in the case where such consent has not been given to the LASP, the LASP SHALL provide a set-only feature and SHALL NOT display the existing email address and password.

Note: Until a future release of the Coordinator, LASP ability to set these fields may be blocked in the absence of Account Management consent, in which case the latter requirement above does not apply.

4.4.2 LASP Client Requirements

4.4.2.1 LASP Requirements for a Single-session LASP Client

A LASP choosing to service a Single-session LASP Client SHALL meet all of the following requirements whenever it is servicing such LASP Client.

The LASP SHALL interface with the Coordinator using the Dynamic LASP (DLASP) subrole.

The LASP SHALL only bind to the DECE Account at the User Level.

Before Streaming can begin, the LASP SHALL require the User to authenticate directly to the Coordinator using their User Credential or indirectly to the Coordinator through the LASP using their LASP credential, according to DYNAMIC_LASP_AUTHENTICATION_DURATION (see Section 16). In other words, if it has been more than DYNAMIC_LASP_AUTHENTICATION_DURATION since a previous User authentication or if there was no previous User authentication, the LASP SHALL require the User to authenticate using one of the two specified methods.

The LASP SHALL make reasonable efforts, where possible, to prevent credential caching at user agents and to force re-authentication to occur at user agents. For example, random field names in HTML forms may prevent Browsers from storing passwords.

4.4.2.2 LASP Requirements for a Persistent LASP Client

A LASP choosing to service a Persistent LASP Client SHALL meet all of the following requirements whenever it is servicing such LASP Client.

The LASP Client, including user interface and authentication methods, SHALL be under the control of the LASP.

The LASP Client SHALL be persistently tied to an account at the LASP service.

The LASP SHALL interface with the Coordinator using the Dynamic LASP (DLASP) subrole.

The LASP SHALL only bind to the DECE Account at the User Level.

Each LASP Account bound for use in this mode SHALL only be bound to Users within a single DECE Account. That is, binding from a single LASP Account using the Dynamic LASP subrole can occur multiple times but only to a single DECE Account.

The LASP SHALL bind to a maximum of DYNAMIC_LASP_PERSISTENT ACCOUNT_LIMIT DECE Users at a time (see Section 16). The LASP SHALL enforce this limit (as opposed to Persistent Account-bound Mode, where the Coordinator enforces a similar limit).

The LASP SHALL provide DECE Account Management functions, at minimum the ability for the User to set email address and password, as described in section 4.4.1. Such functions SHALL be accessible directly from every LASP Client serviced in Persistent User-bound Mode and SHALL NOT require separate or additional authentication other than what is required for Streaming.

If the Coordinator signals to the LASP via an error message that authentication is required, the LASP SHALL require the User to authenticate directly to the Coordinator using their User Credential or indirectly to the Coordinator through the LASP using their LASP credential.

4.4.2.3 LASP Requirements for a Provisioned LASP Client

A LASP choosing to service a Provisioned LASP Client SHALL meet all of the following requirements whenever it is servicing such LASP Client.

The LASP Client, including user interface and authentication methods, SHALL be under the control of the LASP.

The LASP Client SHALL be persistently tied to an account at the LASP service.

The LASP SHALL interface with the Coordinator using the Dynamic LASP (DLASP) subrole.

The LASP SHALL only bind to the DECE Account at the User Level.

Each LASP Account bound for use with a Linked LASP service SHALL only be bound to a single DECE Account. That is, binding from a single LASP Account using a Provisioned LASP Client can only be to a single DECE Account.

The LASP SHALL bind to a maximum of LINK_LASP_ACCOUNT_LIMIT DECE Accounts at a time (see Section 16). The LASP enforces this limit.

4.5 DECE Portal Role (Web Portal)

Consumers of DECE content are able to interact with the Ecosystem via the DECE Portal Role. This role makes available an interactive web application (referred to as the *Web Portal*) for the DECE consumer brand and gives Users direct access to Account settings such as a view of their Rights, management of Users in their household account and the ability to add and remove Devices via the use of standard web browsers.

The DECE Portal Role is separate from the Coordinator role to enable, if desired, an entity or organization other than the Coordinator operator to build and manage the consumer facing user experience. Over time, multiple Web Portal Roles may exist, running perhaps in parallel, to enable multiple user experiences that cater to different to environments – ranging from rich interactive environments based on Flash or Silverlight to simple no-frills user experiences built for constrained mobile devices connected to low-bandwidth high-latency networks. The Web Portal Role leverages the same DECE defined B2B interfaces used by other Roles in the Ecosystem such as a Retailer or LASP. However in order to provide the best experience for the consumer this Role may also use interfaces not available to other Roles.

Access to all of the functionality provided by this Role is based on authentication of the User via their DECE User Credentials.

4.6 Content Provider Role

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 Digital CFF Container,
- Delivery of Containers, Content Metadata and Content Encryption Key(s).

Once the Content Provider completes the Content Publishing process, as defined in [DPublisher] it is available for use by Retailers and LASPs. As shown in Figure 2, while the [DPublisher] will define the behavior required of the Content Provider, including how content is created, encoded, encrypted, and what data will be communicated to various DECE Roles, it will only normatively define how content metadata and identifiers are conveyed between the Content Provider and Coordinator. How data is communicated to other Roles in the Ecosystem will not be defined by the DECE Ecosystem.

4.7 Device

Note: DECE formerly defined the Device Role for Client Implementer licensees. The Device Role is no longer licensed by DECE, although the Device Specification continues to define a DECE Device, with features for CFF download and streaming, DRM license acquisitions, superdistribution, and so on. Retailers and LASPs may choose to implement DECE Devices in conjunction with their DECE Role.

A DECE Device (or Device) is a hardware or software product or combination of products that implement the Device Specification. See [DDevice] and [DPlayer] for more information.

The term *device* may be used to refer to both DECE Devices and consumer products that do not meet DECE's definition of a DECE Device.

4.7.1 Devices and Media Profiles

Not all Devices can play all Media Profiles. Devices may be defined in terms of which Media Profiles they can play, based on Interoperability Points, such as an 'HD Device' or 'SD Device'.

4.8 See Annex B and Annex E of [DMedia].Access Portal Role

An Access Portal is an application or service that provides User access to DECE functions such as Locker view, User and Account management, and so on, similar to the access that may be provided by a Retailer, LASP, or Web Portal.

A Device implementer may additionally take the Role of an Access Portal provider to implement applications integrated with a DECE Device to enable Coordinator functions.

To avoid scenarios where a new Account is created without an associated Retailer to provide content, Access Portals are not allowed to create Accounts and are not allowed to add Users to Accounts.

The interface between the Access Portal and applications that connect to it is not specified by DECE.

5 URN Structure & Identifiers

DECE Universal Resource Names (URN) structure used for identifiers and other purposes SHALL conform to RFC 3986 and RFC 3305 [URI]. It SHALL use the "dece" namespace identifier (NID). The basic structure for a DECE URN is:

```
<DECEURN> ::= "urn:dece:" <type> ":" <type-dependent>
```

- <type> is the type of identifier. The value of this token SHALL be one of the tokens defined in the table below. Note that some type values have the literal prefix, "type:".
- <type-dependent> is a string that is defined by the DECE specification provision that defines the <type>.

DECE URNs are case insensitive except where the definition of a particular <type> specifies case requirements for the <type-dependent> portion of the DECE URN.

When using URN's in a URL (e.g. HTTP requests), clients SHALL ensure the URL conforms to the encoding provisions of [URI].

Type	Defined In
accountid	[DCoord] Section 13.1.1.1
alid	Section 5.5.1.1
apid	Section 5.5.1.2
applicationid	Section
bid	Section 5.5.3
cid	Section 5.5.2
container	[DMedia] Section 6.4.2
dmpid	Section 5.5.5
errorid	[DCoord] Appendix B
experienceid	Section 5.5.7
org	Section 5.2
presentationid	Section 5.5.4
protocolversion	[DCoord] Appendix C
pskc	[DKeyDelivery] Section 4
rightslockerid	[DCoord] Section 13.3
rightstokenid	[DCoord] Section 11.2.2
role	[DCoord] Section 2.3.3

Type	Defined In
streamid	[DCoord] Section 11.1.1.2
type:**discretemediaformat**	[DCoord] Section 16.2.5
type:**false**	[DCoord] Section 17.8
type:**geoloc**	[DCoord] Section 17.8.2
type:**geoprofile**	[DGeo] Section 2.4
type:M**ediaProfile**	[DCoord] Section 6.5.3
type:**policy**	[DCoord] Section 5.4.1
type:**rating**	[DCoord] Section 5.5.5.3
type:**state**	[DCoord] Section 16.2.3
type:**status**	[DCoord] Section 17.2.1
type:**tokentype**	[DSecMech] Section 5
type:**transaction**	[DCoord] Section 17.9
type:**true**	[DCoord] Section 17.8
type:**unknown**	[DCoord] Section 17.8
type:**viewfilter**	[DCoord] Section 3.15
userid	[DCoord] Section 14.1.2.3

DECE requires the use of multiple types of identifiers. In most cases, the only requirement for identifiers is that they be unique within the Ecosystem. That is, two objects exchanged by DECE components using DECE interfaces will only use the same ID if they refer to the same entity. IDs often must be persistent. That is, the identified entity will always be referred to by the same identifier.

5.1 DECE Identifier Structure

5.1.1 Internal Coordinator Managed/Assigned Identifiers

Identifiers of this type are assigned by the Coordinator and represent a unique entity/resource within the Ecosystem. These identifiers are used to build the Path value defined for each interface.

5.1.2 Ecosystem Assigned Identifiers

These identifiers are manually assigned by DECE. That is, DECE administrative personnel explicitly assign them in accordance with rules here and with DECE policies. Profile Identifiers will be assigned based on which profiles are approved for use in the Ecosystem. Organization and Node identifiers uniquely identify organizations who have executed the corresponding license agreements.

5.1.3 Content Identifiers

A Content Identifier is a DECE URN with a <type> of one of the following:

- “alid” (An Asset Logical Identifier. See Section 5.5.1.1)
- “apid” (An Asset Physical Identifier. See Section 5.5.1.2)
- “bid” (A Bundle Identifier. See Section 5.5.3)
- “cid” (A Content Identifier. See Section 5.5.2)
- “presentationid” (A Media Presentation Identifier. See Section 5.5.4)
- “dmpid” (A DECE Media Package Identifier. See Section 5.5.5)
- “applicationid” (Media Application identifier. See Section 5.5.6)
- “experienceid” (Experience ID from Media Manifest, See Section 5.5.7)

Content Identifiers must be unique throughout the Ecosystem.

The basic structure for a Content Identifier is:

```
<DECEID> ::= <DECEURN> “:” <scheme> “:” <SSID>
```

- <scheme> is either a DECE recognized naming scheme (e.g., “ISAN”) or “org” non-standard naming. These are specific to ID type and are therefore discussed in sections addressing IDs of each type.
- <SSID> (scheme specific ID) is a string that corresponds with IDs in scheme <scheme>. For example, if the scheme is “ISAN” then the <SSID> would be an ISAN number.

There is a special case where <scheme> is “org”, allowing organizations to use their own identifier scheme. See Section 5.1.3.2.

All Content Identifiers are subject to the following requirements:

- The Content Identifier together SHALL NOT refer to more than one Asset.
- The <scheme> SHALL NOT contain a colon (“:”) character.
- The <scheme> MAY be any unique name of an identifier standard, with the corresponding SSID being the unique asset identifier defined by that scheme.

- The <SSID> MAY contain a single colon (":") character. Other URN reserved characters SHALL be escape encoded.

If the <scheme> is one of the schemes listed in the "Scheme" column of Table 3, then the <SSID> SHALL be constructed to conform to the requirements listed in the corresponding "Section" column of the same table.

Scheme	Expected value for <SSID>	Section
EIDR-S	Entertainment Identifier Registry [EIDR]. EIDR-S is a shortened EIDR that does not include the "10.5240/" prefix.	5.1.3.3
EIDR-X	Entertainment Identifier Registry [EIDR]. EIDR-X is a shortened EIDR that does not include the "10.5240/" prefix, along with an additional extension.	5.1.3.4
org	<SSID> begins with the Organization Name of the assigning organization and follows with a string of characters that provides a unique identifier.	5.1.3.2

Table 3 – Content Identifier Schemes with Normative Requirements

Table 4 shows other commonly used schemes for Content Identifiers and their SSID.

Scheme	Expected value for <SSID>
AMG	AMG
DOI	Digital Object Identifier, http://www.doi.org
EIDR	Entertainment Identifier Registry; see section 2.4 in [EIDR]. Since EIDR uses a forward slash ("/") character in the SSID, it is recommended that the "eidr-s" or "eidr-x" scheme be used instead.
EIDRS	The use of the "eidrs" scheme is deprecated and should not be used. Use "eidr-s" or "eidr-x" instead.
File	Indicates that the identifier that follows is a local file name.
grid	A Global Release identifier for a music video; exactly 18 alphanumeric characters
IMDB	IMDB
ISAN	An <ISAN> element, as specified in ISO15706-2 Annex D.
ISBN	An ISBN, ISO 2108, http://www.isbn-international.org
ISMN	Printed music, ISO 10957, http://ismn-international.org/
ISRC	Master recordings, ISO 3901, http://www.ifpi.org/content/section_resources/isrc.html
ISSN	Serials. ISO 3297:1998.
ISTC	Textual works. ISO 21047

Scheme	Expected value for <SSID>
ISWC	Musical Works, http://www.cisac.org
MUZE	Muze
TRIB	Tribune
TVG	TV Guide
URI	A URI; this allows compatibility with TVAnytime and MPEG-21
UUID	A UUID in the form 8-4-4-4-12

Table 4 – Content Identifier SSIDs

Some sample identifiers are:

Organization ID	urn:dece:org:org:dece:mycompany
Content ALID	urn:dece:alid:ISAN:000000018947000000000000
Content ALID	urn:dece:alid:org:mystudio:12345abcdef

5.1.3.1 Content Identifier SSID Canonicalization

If a Content Identifier scheme of Table 3, with the exception of <UID> of "org", incorporates external registry identifiers, and the syntax rules of that registry allow optional characters that are not considered part of the formal syntax, such identifiers SHALL be canonicalized to their normal form, in accordance with that identifier's canonicalization requirements.

If a Content Identifier scheme of Table 4 incorporates external registry identifiers, and the syntax rules of that registry allow optional characters that are not considered part of the formal syntax, such identifiers SHOULD be canonicalized to their normal form, in accordance with that identifier's canonicalization requirements.

5.1.3.2 "org" Scheme Requirements

The "org" scheme allows organizations recognized by the DECE organization to assign IDs using their own naming conventions. If <scheme> is "org" then:

```
<SSID> ::= <organization>":"<UID>
```

- <organization> SHALL be the Organization Name assigned by DECE to an organization. See Section 5.2.1.
- <UID> is a unique identifier assigned by the organization identified in <organization>. Organizations may use any naming convention as long as it complies with RFC 3986 [URI] syntax.

When DECE assigns identifiers, <organization> is “dece” and an ID would have the form:

```
“urn:dece:”<type>”:org:dece:”<UID>
```

5.1.3.3 EIDR-S Scheme Requirements

EIDR-S is used when an Entertainment Identifier Registry identifier [EIDR] is desired. To avoid the use of the ‘/’ character in a DECE Content Identifier, the EIDR-S scheme is recommended as a shortened version of EIDR that does not include the “10.5240/” prefix.

If the Content Identifier scheme is EIDR-S, the following requirements SHALL apply:

- <scheme> SHALL be “eidr-s”.
- <SSID> SHALL be the canonical form for the DOI suffix defined in [EIDR] section 1.2 with the following stipulations:
    - The DOI prefix and terminating “/” (the “10.5240/” prefix) SHALL NOT be included in the <SSID>.
    - The normalization rules defined in [EIDR] section 1.2 SHALL be followed. For example, the EIDR ID is required to be normalized to upper case, the hyphens in the ID are required, and the check character is required to be included.

Examples of eidr-s identifiers are:

eidr-s ALID	urn:dece:alid:eidr-s:50A5-34E1-4FFF-0BBD-17C9-G
eidr-s ContentID	urn:dece:cid:eidr-s:1E63-2E9A-11AB-FE88-1B89-M

5.1.3.4 EIDR-X Content Identifier Requirements

In order to create an arbitrary number of Content Identifiers for a given EIDR, it is necessary to create an identifier that is the concatenation of an EIDR with additional unique information in the form of an extension.

The recommended solution is the creation of the ‘eidr-x’ scheme. This scheme is an eidr-s identifier concatenated with an alphanumeric <extension>. The identifier creator must ensure the EIDR identifier and extension taken together is a unique identifier for an Asset. The identifier creator must establish a best practice to avoid collisions if multiple identifier creators are using extensions with the same EIDR identifier.

If the Content Identifier scheme is EIDR-X, the following requirements SHALL apply:

- <scheme> SHALL be “eidr-x”.
- <SSID> SHALL be the <SSID> defined for the EIDR-S scheme in Section 5.1.3.2, followed by a “:” and an <extension>. The <extension> SHALL be an alphanumeric string (consisting of A-Z, 0-9 characters, case insensitive).

Examples of eidr-x identifiers are:

eidr-x ALID	urn:dece:alid:eidr-x:50A5-34E1-4FFF-0BBD-17C9-G:1
eidr-x ALID	urn:dece:alid:eidr-x:50A5-34E1-4FFF-0BBD-17C9-G:france
eidr-x ALID	urn:dece:alid:eidr-x:50A5-34E1-4FFF-0BBD-17C9-G:123abc

5.1.4 ID Assignment

The following table shows the ID and which entity is responsible for generating the values to assign to an ID. The entity can be the Coordinator, Ecosystem or Content Provider.

Category	ID	<type>	Assignment
Organization/Role			
	Organization Name	N/A	Ecosystem
	OrganizationID	org	Ecosystem
	Role	N/A	Ecosystem
User/Account			
	AccountID	accountid	Coordinator
	UserID	userid	Coordinator
	RightsLockerID	rightslockerid	Coordinator
	RightsTokenID	rightstokenid	Coordinator
	StreamID	streamid	Coordinator
Content			
	AssetLogicalID	alid	Content Provider
	AssetPhysicalID	apid	Content Provider
	ContentID	cid	Content Provider
	BundleID	bid	Content Provider, Retailer

Table 5 – Identifier Type and Assignment

5.2 Organization Identifiers

This section describes identifiers associated with Organizations and Roles.

5.2.1 Organization Names

Organizations are identified uniquely by an *Organization Name* which is assigned by DECE as part of an organization entering the Ecosystem.

Organization Names are two or more characters up to a maximum of 63 characters. Since Organization Names can also be used as part of an internet domain name (see Section 8.3.3 for an example), they are limited to only using upper and lowercase letters and decimal digits as defined by [URI]. Graphic symbols normally allowed by [URI] including hyphen, period, underscore, and tilde and percent-encoded data octets are SHALL NOT be used for an Organization Name. For example a space cannot be added such as: "my%20company". As with all DECE identifiers, Organization Names are case insensitive.

For example, "mycompany" and "best4you" are examples of Organization Names.

Organization Names are used along with "org:" for other types of identifiers and in Role IDs as well. For example:

ALID	urn:dece:alid:org:mycompany:abcdefg
Retailer Role ID	urn:dece:retailer:mycompany

5.2.2 Organization IDs

An Organization ID is of the form:

```
"urn:dece:org:org:dece:"<organization>
```

- <organization> is the Organization Name as defined in Section 5.2.1.

Note that <type> is "org", the <scheme> is "org" denoting a private naming authority as described in Section 5.1, and the <SSID> is "dece:<organization>" as DECE is the only valid naming authoring for Organization IDs at this time.

Organization ID	urn:dece:org:org:dece:MYCOMPANY

5.3 User and Account-related Identifiers

All these IDs are assigned by the Coordinator. <type> shall be in conformance with Table 5 – Identifier Type and Assignment above. The <SSID> of these IDs is at the discretion of the Coordinator. They must be unique throughout the Ecosystem.

5.4 (Deleted)

5.5 Content Identifiers

Content Identifiers are assigned by Content Providers, independent of the Coordinator. However, they must be globally unique within the Ecosystem. The following scheme provides flexibility in naming while maintaining uniqueness.

5.5.1 Asset Identifiers

DECE maintains several types of asset identifiers:

- An Asset Logical Identifier (ALID) denotes an abstract representation of a content item. An ALID is referred to in a Rights Token, indicating the media object for which rights have been obtained. Each ALID must have at least one Media Profile.
- Asset Physical Identifier (APID) refers to a physical entity (i.e., a Digital CFF Container) for a single Media Profile that is associated with a logical asset. The APID is structured to be included in the container. An APID is sufficient identification for a DRM system to determine a license.

The following describes the current assumptions for relationships between ALIDs, APIDs and file names. If the assumptions change, the naming rules may also change

- An ALID is referred to in a Rights Token as the media object for which rights have been obtained.
- The actual Right is an ALID/profile pair.
- An ALID explicitly refers to one or more physical assets. That is, ALIDs map to one or more APIDs.
- A physical asset contains only one Media Profile. That is, an APID maps to only one Media Profile.
- An ALID is retrievable from an APID for the purpose of rights verification.

5.5.1.1 ALID

Syntax:

```
“urn:dece:alid:”<scheme>“:”<SSID>
```

The following restrictions apply to the <scheme> and <SSID> part of an ALID:

- An ALID scheme may not contain the colon character
- An ALID SSID may contain a single colon character. Other URN reserved characters must be escape encoded.
- An ALID scheme may be any unique name of an identifier standard, as long as it does not contain a colon, with the SSID being the unique asset identifier defined by that scheme. See Section 5.1.3.

5.5.1.2 APID

Syntax:

```
“urn:dece:apid:”<ALID scheme>“:”<APID SSID>
```

Each APID is associated with one or more ALIDs, although typically there will be a single ALID associated with a single APID. The APID-to-ALID mapping information described in [DCoord] section 6.2 allows associated ALID(s) to be retrieved for a given APID. An APID is constrained as follows:

- Each APID is globally unique
- <ALID scheme> matches the <scheme> from the associated ALID
- <APID SSID> may contain a single colon character. Other URN reserved characters must be escape encoded.
- The scheme of the <APID SSID> is the same as <ALID scheme>, and the SSID is in accordance with Section 5.1.3.

For example:

ALID (org)	`urn:dece:alid:org:mycompany:abcdefg`
invalid APID (org)	`urn:dece:apid:org:mycompany:abcdefg:100` (extra colon: scheme = “org”, SSID = “mycompany:abcdefg:100” but can only contain one colon)

ALID (ISAN)	urn:dece:alid:isan:0000000189470000000000000
APID (ISAN)	urn:dece:apid:isan:0000000189470000000000000:a203
ALID (EIDR-S)	urn:dece:alid:eidr-s:1E63-2E9A-11AB-FE88-1B89-M
CID (EIDR-X)	urn:dece:cid:eidr-x:C854-F52D-B0CF-1AE4-391A-7:EST

5.5.2 ContentID

Syntax:

```
"urn:dece:cid:"<scheme>":"<SSID>
```

A ContentID points to Coordinator-required metadata. Each ALID must have an associated ContentID. ContentIDs are not necessarily associated with an ALID. ContentIDs may refer to items such as shows or seasons, even if there is no single asset for that entity.

The <scheme> and <SSID> for ContentIDs are described in Section 5.1.3.

For example:

ContentID	urn:dece:cid:eidr-s:1E63-2E9A-11AB-FE88-1B89-M

5.5.3 Bundle Identifiers

Syntax:

```
"urn:dece:bid:"<scheme>":"<SSID>
```

- <scheme> is "org:"<organization>
- <organization> is the Organization Name as defined in Section 5.2.1.

A Bundle defines and describes an arbitrary group of logical assets sold together. When posted with a Rights Token as part of the SoldAs element, the Bundle indicates the context of the sale, specifically the set of ALIDs sold in the Retail transaction. Bundles may be created by Content Providers or Retailers.

A Bundle's structure and APIs are defined in [DCoord] Section 6.3. Guidelines on structuring bundles can be found in [DPublisher] Section 7.5.

There are no standard identifiers for bundles: the scheme type of a bundle must be "org".

Example:

BID	urn:dece:bid:org:mycompany:1234abc567

5.5.4 Media Presentation ID

Syntax:

```
"urn:dece:presentationid:"<scheme>":"<SSID>
```

Each Media Presentation ID (PresentationID) identifies a Media Presentation. The concept of a Media Presentation is derived from [DASH] "collection of data that establishes a bounded or unbounded presentation of media content." A Media Presentation closely corresponds closely with a Common File Format DCC, so the construct of a Presentation ID is identical to an APID that PresentationIDs have a <type> of "presentationid" where APIDs have a <type> of "apid".

A PresentationID is constrained as follows:

- Each PresentationID is globally unique
- <scheme> should be EIDR-S or EIDR-X

5.5.5 DECE Media Package (DMP) ID

Syntax:

```
"urn:dece:dmpid:"<scheme>":"<SSID>
```

Each DECE Media Package (DMPID) identifies an Original DMP (DMP) and any instantiation of that ODMP including the defined components. A DMPID is constrained as follows:

- Each DMPID is globally unique

5.5.6 Media Application ID

Syntax:

```
"urn:dece:applicationid:"<scheme>":"<SSID>
```

Each Media Application ID (ApplicationID) identifies a Media Application. DECE does not currently support any Media Application technology. However, the DMP structure allows the inclusion of Media Applications. If included, they must be properly identified with an ApplicationID.

An ApplicationID is constrained as follows:

- Each ApplicationID is globally unique

5.5.7 Experience ID

Syntax:

```
“urn:dece:experienceid:”<scheme>”:”<SSID>
```

Each Experience ID (ExperienceID) identifies an Experience as defined in Common Metadata Media Manifest [DCManifest].

Note: Many identifiers have the requirement that they be globally unique. This is not true for the Experience ID. One notable exception is that all Experience Media Applications in a Common Media Package (CMP) or DECE Media Package (DMP) as defined in [DDMP] have a well-known Experience ID.

5.6 Role Identifiers

The naming for DECE Roles is as follows:

```
“urn:dece:role:”<role>[“:customersupport”]
```

The <role> element corresponds to a DECE defined role as indicated in the table below:

Role	<role>	[:customersupport] allowed**
Content Provider	contentprovider	Yes
Coordinator	coordinator	Yes
Customer Support	customersupport	No
DECE Portal	portal	Yes
Dynamic LASP*	lasp:dynamic	Yes
Access Portal	accessportal	Yes
Retailer	retailer	Yes
User	user	No

Table 6 – Role Identifiers

*Note that there is only one Role for a LASP, and only one subrole of Dynamic LASP. The Linked LASP subrole remains for historical reasons but is no longer used.

**The column labeled “[:customersupport] allowed” indicates whether the optional sub-role for customer support can be added to a Role identifier. For example: “urn:dece:role:retailer:customersupport” is legal, while “urn:dece:role:account:customersupport” is not. The Coordinator treats customer support as a separate Node with separate API permissions. See [DCoord] Section 1.8 for more information.

Example Role Identifier:

Retailer	urn:dece:role:retailer

6 Nodes and Communication

Now that we have defined the Roles in the Ecosystem, we must define how Roles securely communicate with the Coordinator and occasionally with each other. To enable this, the concept of a Node is introduced. A *Node* is a trust boundary that is assigned a unique, certified identity (e.g., a certificate) by a trust authority. This certified identity is used to mutually authenticate and secure the communication to other nodes in the Ecosystem.

A Node is identified by Fully Qualified Domain Name (FQDN) that is present in the associated Node certificate.

A Node can only be associated with one Role. If an Organization provides multiple Roles such as a combined Retailer and LASP, each of its Roles requires separate Nodes with unique certificates.

A Role can have multiple Nodes associated with it. Each Node fully represents the Organization in that Role. This is typically used when an Organization has distinct divisions or has contracted other companies to provide services on its behalf. Node operations can then be separately identified, and individual Node identities can be revoked if needed.

Note that Devices are not Nodes. Devices communicate with the Coordinator through another Role such as Retailer or LASP.

The Coordinator Role is always asserted by a single Node run by the DECE organization.

6.1 Node Communication to the Coordinator

A single interaction between a DECE Node and the Coordinator Node consists of a synchronous messaging round-trip (one request and one response) between a requesting node and a responding node that exposes a DECE-defined web service interface. All messages pass through a secure communications layer designed to protect and deliver each message.

Nodes may also communicate with other Nodes, such as required by Security Token delegation and federation. See [DSecMech] for requirements on how the communication must be secured.

As shown in Figure 7, the application layer functionality provided by the node, together with the secure communication layer components, comprise a Node. Nodes in DECE rely on standard networking infrastructure for delivery of messages; the DECE layers simply add DECE specific trust and security properties.

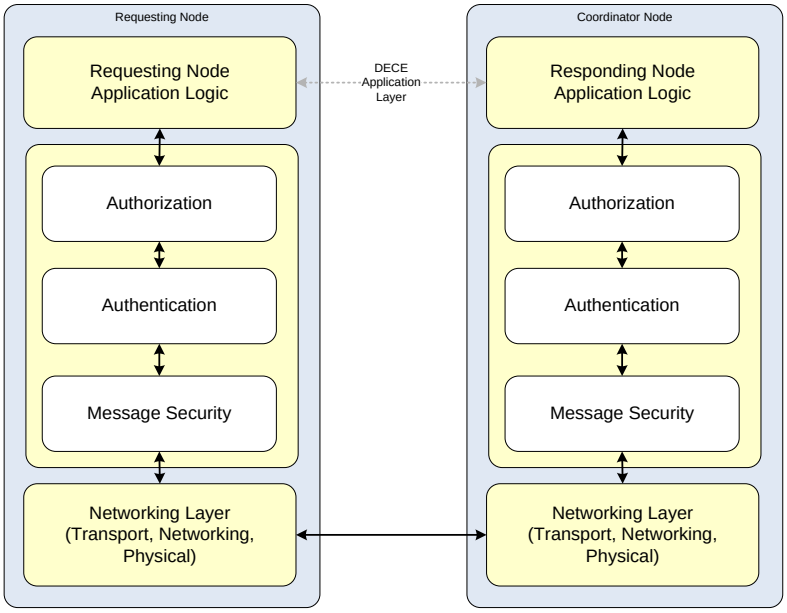


Figure 7 – Node Messaging Diagram

6.2 Secure Communications Layer

This section describes the various components of the DECE defined secure communications layer and how they are used together to properly control access to DECE functions and data. Industry standard security technologies are defined to enable authentication, authorization and overall end to end message security.

6.2.1 Node Authentication

Node authentication is accomplished via the use of Internet profiled X.509 digital certificate [X509] that identify the domain name and organization of the Node. These TLS [TLS] certificates will be provided during Node licensing by the Coordinator Role.

Nodes authenticate to the Coordinator via mutual TLS authentication mechanisms. The Coordinator matches the certificate subject as a licensed Node. These certificates are provided to the coordinator prior to activating the Node to the coordinator. Nodes requiring Consumer interactions (e.g. Browsers) must use Extended Validation Certificates [EVCert].

An organization that operates multiple Roles must utilize unique certificates for each Node it operates.

See [DCoord] Section 2.3 for Node Authentication normative requirements.

6.2.2 Node Authorization

Node authorization is enabled by the Coordinator maintaining access permissions mapped to Roles. A Node is authorized to belong to exactly one given Role based on a license agreement with the DECE LLC.

The Coordinator checks the Node's Role against the allowed Roles for a given API call (see [DCoord] Appendix A).

See [DCoord] Section 2.3 for Node Authentication normative requirements.

6.3 User Authentication and Authorization

6.3.1 User Authentication

DECE Users (described in Section 7.2) are identified by a User Credential (a unique username and password pair managed by the Coordinator).

User passwords may only be changed by the User directly interacting with the Coordinator or an Account Management Node. The Coordinator does not require passwords to be changed periodically.

See [DCoord] Section 2.1 and [DSecMech] for normative requirements on User authentication and username and password restrictions.

6.3.2 User Authorization

Once properly authenticated DECE Users are authorized to access DECE data and services based on their access level as defined in Section 7.2.2

See [DCoord] Section 2.4 for more details on User authorization.

6.4 (Deleted)

6.5 Security Token

There are many scenarios where a DECE Node, such as a Retailer or LASP, is interacting with the Coordinator on behalf of a User. In order to properly control access to user data while providing a simple yet secure experience for the User, authorization will be explicitly delegated by the User to the Node using a Delegation Security Token.

A *Security Token* is an XML object used for exchanging authentication and authorization data between an *identity provider* (such as the Coordinator) and a *service provider*[1] (the consumer of assertions such as a Retailer or a LASP).

The Coordinator can support multiple Security Token profiles, but as of this specification the only Security Token profile in use is the Security Assertion Markup Language (SAML) version 2.0 [SAML], which is an XML-based framework developed by the Organization for the Advancement of Structured Information Standards (OASIS). It allows security information relating to a subject to be shared among service providers in a platform-independent way. SAML uses the public-key infrastructure (PKI) based model to establish trust, and supports WS-Security for securing web services messages.

Security Tokens are a central mechanism for authenticating and authorizing a User in the Ecosystem. Security Tokens:

- Provide a secure cross-vendor and platform-independent Single Sign-On (SSO). A User accessing the Ecosystem through a Retailer or LASP need only use their personal credentials once to login, after which a Security Token is returned allowing the service provider to continue to operate on behalf of the User as long as the token remains valid. With User consent, a service provider can bind their account to the DECE Account via the Security Token. See Section 7.1.2 for details on Account binding.

- Improve privacy: User information such as the User ID and Account ID are mapped into per-Node unique identifiers. The actual values are never directly stored in a Security Token, so that different Nodes will use different identifiers to refer to the same entity. This mapping is transparent to the service provider as all Coordinator APIs expecting user or account identifiers take the per-Node values.

- Allow delegation: A service provider such as a Retailer needs to conditionally allow other service providers, such as a LASP, to operate on the User's behalf. A Delegation Security Token allows constrained delegation, where specifically authorized Nodes can act in a limited but transparent fashion on behalf of the User. For example, a long-term Security Token resulting from binding a Retailer's account to a User's DECE Account (see Section 7.1.2) allows the Retailer Node or its LASP Nodes to use the Security Token to access Rights Tokens in the User's Rights Locker.

[1] Note that while a Device is not typically thought of as a service provider in the web sense of the word, it does provide services to the User. While an *agent* may be a more suitable word in the context of DECE, SAML uses the terms Identity Provider (IdP) and Service Provider (SP), and this document conforms to SAML terminology to help a reader understand the SAML specifications.

- Allow federation: A service provider can rely on the identity provided by the DECE ecosystem in addition to or in place of establishing its own identity for the user. Federation Security Tokens support single sign-on and authenticated handoff between Nodes. For example, LASPs can give Users the option to sign in to their LASP services using a single set of DECE Credentials instead of separate credentials specific to each LASP, or LASPS can provide an account management link that takes Users directly to their profile pages at a Web Portal without requiring them to sign in at the Web Portal.
- Have a specified validity period allowing for a Security Token to have a limited duration.
- Support revocation as either the service provider or the identity provider can terminate the Security Token. For example, a User can terminate a relationship with Retailer without having to change their password or other User Credential.

6.5.1 Establishing a Security Context

Most of the Coordinator API calls require a Delegation Security Token to be passed in the HTTP headers in order to establish a security context for the call.

The Delegation Security Token can be obtained by a variety of mechanisms described in [DSecMech]. For example, a User can login via HTTP Basic Auth [HTTP Auth] to the Coordinator to establish the security context, and the Coordinator will return the Delegation Security Token in the HTTP Response.

Once the Delegation Security Token is obtained, it is included in the HTTP header in subsequent calls to the Coordinator. A Security Token is long-lived or short-lived (session-based).

In order to reduce the need for frequent explicit User authentication, Users may bind their Retailer, LASP, or Access Portal accounts to their DECE Account, allowing the service to store a long-lived Delegation Security Token for access on the User's behalf as specified by User and Account consent policies without requiring the User to re-enter their User Credentials each time. See Section 7.1.2 for information on Account binding, Section 7.1.6 for Account consent policies, and Section 7.2.3 for User consent policies.

6.5.2 Using Security Tokens Across Multiple Nodes

While organizations supporting multiple Roles must use a separate Node per Role, a Security Token can be shared across Nodes to support a multiple Role login. For example a Retailer that is also a LASP can bind their Retailer account to a User's DECE Account, and then use the same long-lived Security Token enabled by the bind operation to authenticate the User from their LASP Node.

This is possible since Security Tokens may specify a set of Nodes, identified by NodeID, any which of which are authorized to use the same Security Token in Coordinator protocol messages. The SAML Token Profile defined in [DSecMech] uses the Audience element of the SAML Assertion to indicate what Nodes are authorized to use the Assertion. This allows an implementation which operates multiple Roles (and therefore multiple Nodes) within the Ecosystem to share the same Assertion.

6.5.3 User-level vs. Account-level Security Tokens

A Security Token always represents a particular User, and contains both the Account and User identifiers. Depending on the Coordinator API and the Role of the requesting Node, the Coordinator may interpret the Security Token at an "Account level" or a "User level" depending upon the context.

However, for simplicity, the Ecosystem specifications sometimes refer to an "Account-level" or "User-level" Security Token. This is a convention to mean that the Security Token is issued to a Node that will use the Security Token to access Coordinator APIs at the appropriate Account or User level.

6.6 Single Sign-on using Federation Security Tokens

In addition to employing Security Tokens for delegation, the Web Portal supports Federation Security Tokens specified in [DSecMech] that enable User single sign-on from eligible Nodes to the Web Portal. Nodes which can establish local authentication sessions with a User may assert the Users identity towards the Web Portal.

Nodes that choose to assert a User's identity to the Web Portal must already possess a Delegation Security Token, and are required to make reference to that delegation token in their Federation Security Token. Other constraints and processing rules are provided in [DSecMech].

6.7 End-To-End Message Security

End-to-end message confidentiality and integrity functions are provided by the use of TLS [TLS].

Intra-Node communication is based on mutually authenticated TLS using Node certificates plus the addition of the Node's Role Assertion. The requesting Node asserts its identity and the responding Node verifies that (a) the identity is asserted by a mutually trusted naming authority, (b) that the roles asserted in the authorization layer were asserted about the Node identified, and (c) that the communication provably originates from the Node asserting its identity.

All communications between the DECE User and the DECE Portal role is protected by server-side TLS authentication and HTTP Basic Authentication of the user.

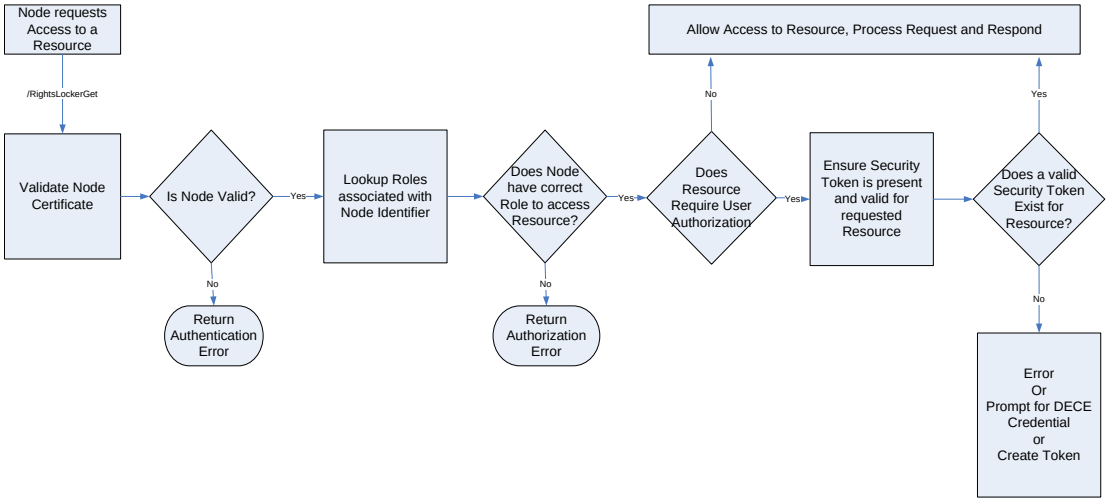


Figure 8 – Authentication (AuthN) and Authorization (AuthZ) Flow

7 Account and Rights Management

7.1 The Account

The Account lies at the center of all DECE-defined entities. Each Account is associated with exactly one Domain, one Rights Locker, and a set of Users.

7.1.1 Account Creation

DECE Accounts can be created via a DECE Web Portal interface or interfaces maintained by Retailers, LASPs, or Access Portals using the `AccountCreate` API [DCoord] Section 13.1.1.

In the simple case, a user prepares to create an account by browsing to an account creation page provided by a Web Portal or a Node. The page will present a form requesting the first User's information such as Username, Password, Contact info, etc. (See Section 7.2 for details on Users.) When the form is posted, the Web Portal or other Node creates the Account with the `AccountCreate` and `UserCreate` Coordinator APIs [DCoord] Section 14.1.2.

The Coordinator creates a new Account, DECE Domain, and an empty Rights Locker. It also creates the first User in the account with Full-Access rights using the user information from the form. The Security Token for the created User is returned.

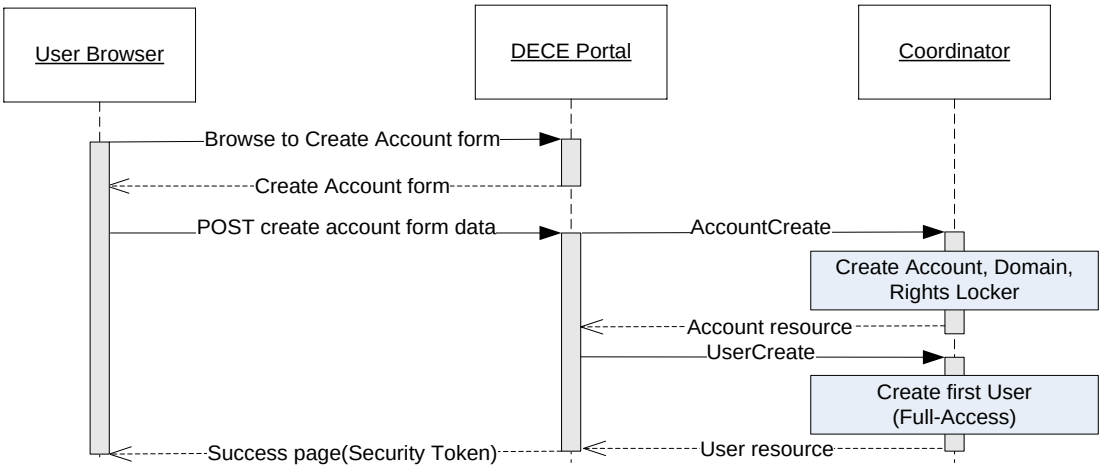


Figure 9 – Account Creation

A Retailer or LASP can combine Account creation with Account binding as described below.

7.1.2 Account Access and Binding

Access to Account and User information in the Coordinator by a Node on behalf of a User is granted by the User logging in through an UltraViolet authentication interface and obtaining a Delegation Security Token. Access can also be provided to a Node as part of the process when the Node creates a new User. Access allows the Node to read and in some cases write information to the User and Account resources and associated resources, including the Rights Locker. This allows Nodes to display Content in a Rights Locker, Retailers to provide Content purchase, LASPs to Stream Content, Nodes to provide Account Management (i.e., changing user settings and policies such as username, password, and email address) with proper User consent, and so on.

Account binding (often called account linking) is the process of granting a Node persistent access on behalf of a User without subsequent explicit Coordinator logins. (See the [DCoord] Section 12 on Node to Account Delegation for more information on Account binding.)

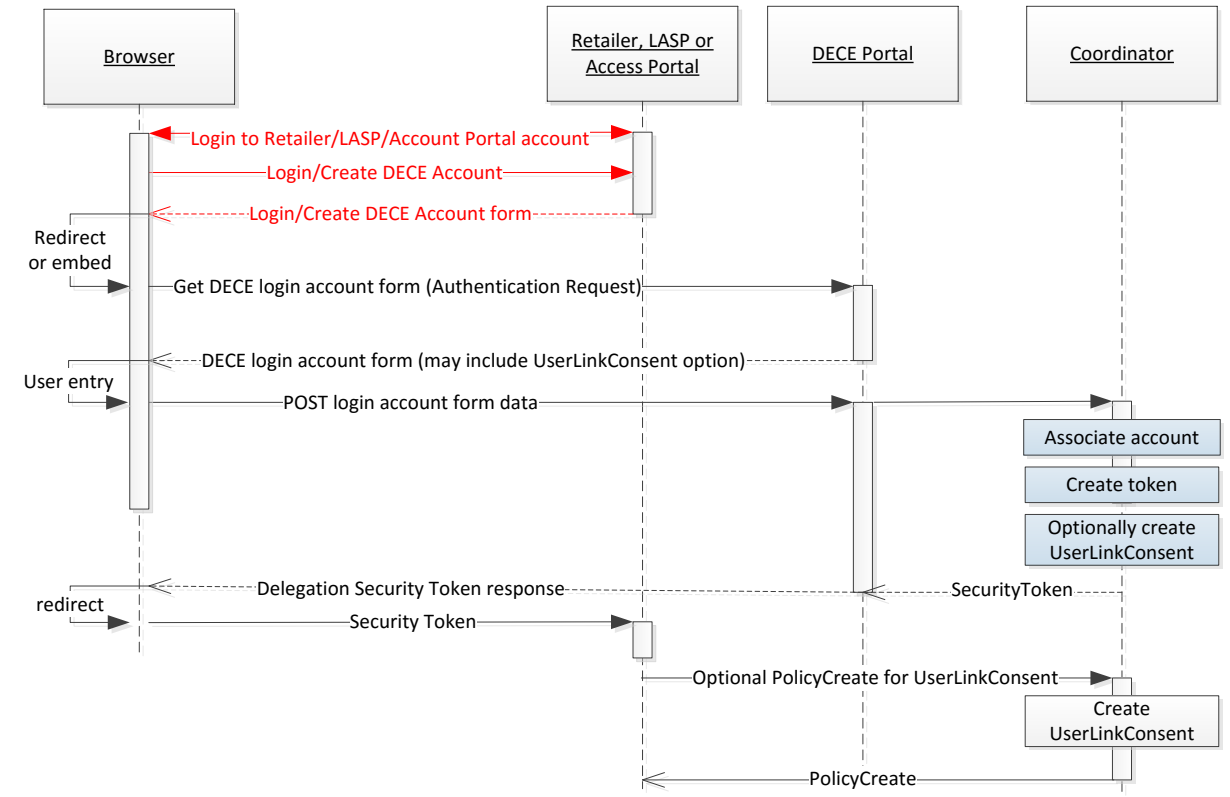
Note that Account binding is a convenience to the User and is not required prior to performing Coordinator functions. For example, a Retailer can allow a User to purchase Content without requiring a bound DECE Account. In this example the User's Browser would log the User into the Coordinator to obtain a short-term Security Token for the User's DECE Account.

The Coordinator keeps track of what Nodes an Account is bound to.

Security Tokens are described in Section 6.5.

7.1.2.1 General Account Binding Flow

The workflows for binding a Retailer, LASP, and an Access Portal are the same. They differ in how the Coordinator records the binding, the type of Security Token that is returned, and its duration.



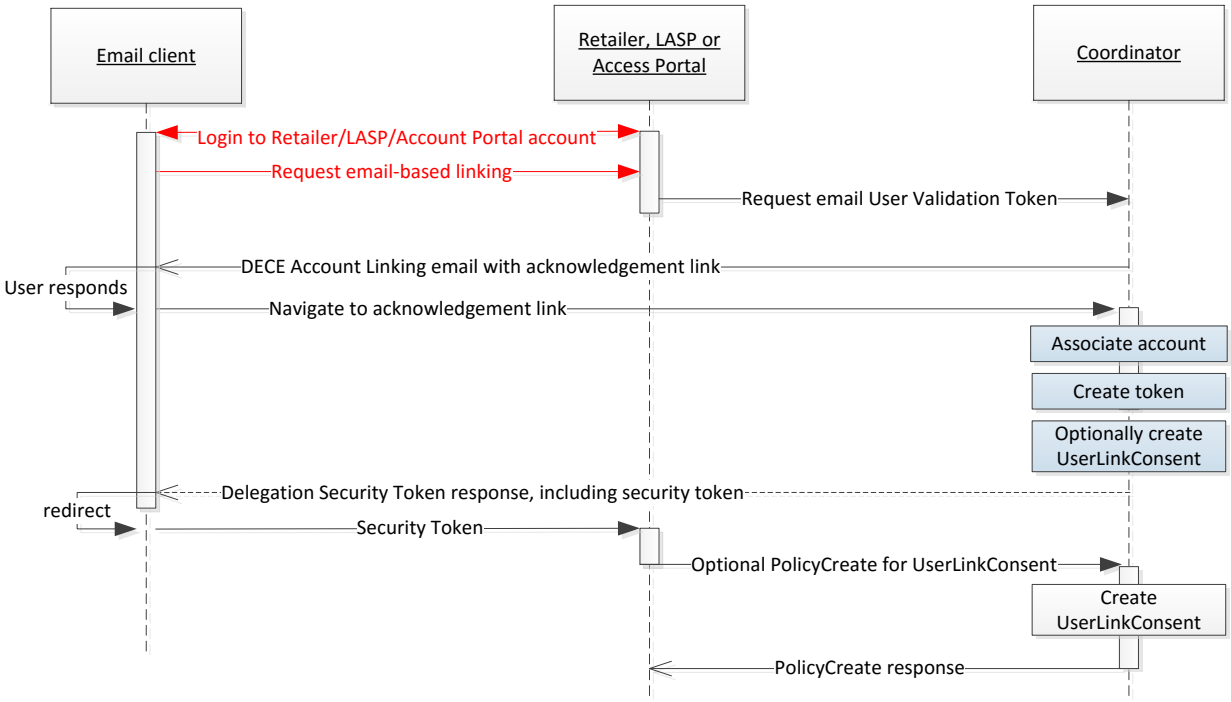


Figure 10 – DECE Account Binding

First, the User must browse to a Retailer, LASP, or Access Portal and navigate to a page to login to their DECE Account. The Node's login page redirects to the DECE authentication page or embeds in an HTML "iframe" the DECE authentication page by sending an authentication request message to the Coordinator (see section 4.3 and the relevant Token Profile section(s) of [DSecMech]).

The DECE authentication interface allows the User to enter their User Credentials to log into their existing Account. The POST of the form data causes the Coordinator to return a Delegation Security Token via a redirect to the Node's page. The authentication UI includes an option such as "Link my account" for the User to consent to account binding. If the user agrees, the Coordinator binds the Account to the Node by setting a UserLinkConsent policy on the Account (see [DCoord] Section 5).

Alternatively, the Node may separately collect user consent for account linking, before or after invoking the DECE authentication interface. In the case where link consent is not collected directly by the Coordinator, the Node receives a short-lived Delegation Security Token, which provides access to the User's account but does not bind the Account to the Node. If the User agrees to the Node's request to link to the User's Account, the Node may then set a UserLinkConsent policy on the Account, using the short-lived Delegation Security Token, thus binding the Account to the Node. The Node should then call the Security Token Service (see [DSecMech] section 8) to receive a new, long-lived Delegation Security Token.

As an alternative to invoking the DECE authentication interface, a Node may use email-based linking. This allows the Node to fully control the user interface, which may be necessary in an environment that does not support HTML as required by the DECE authentication interface. In this case the Node uses the DelegationTokenRequest variation of the UserValidationTokenCreate API to cause an email message to be sent to the User, presenting the Node's request to link to the User's Account. If the user responds, the Coordinator sets the UserLinkConsent policy, binding the Account to the Node, and returns a long-lived Delegation Security Token to the Node. See [DCoord] Section 14.1.6 for details.

For new users without an existing UltraViolet Account, a Node may create a User (and an Account, if creating the first User) and bind to the Account of newly created User. The Node uses the Coordinator APIs to create the Account, if necessary, and then create a User in the Account. The Node calls the Security Token Service (see [DSecMech] section 8) to exchange the User Credentials provided during User create for a short-term Delegation Security Token. As part of the User creation process, the Node may request consent from the User to link accounts. If the User agrees, the Node may then set a UserLinkConsent policy on the Account, using the short-term Delegation Security Token, thus binding the Account to the Node. The Node should then call the Security Token Service (see [DSecMech] section 8) to receive a new, long-term Delegation Security Token.

The details of how the Coordinator does the binding and the characteristics of the Delegation Security Token differ depending on the Node's Role as a Retailer, LASP, or Access Portal.

A User may delete an Account binding at any time (see 7.1.3).

7.1.2.2 Retail Account Binding

A Retail account is bound to a Security Token at the User level.

No special User permission level is required to bind their Retail account to their DECE Account.

7.1.2.3 LASP Account Binding

A LASP account is bound to a Security Token at the User level.

A LASP may establish short-term access to a User's Account for session-based streaming, such as on a Web Browser in an Internet cafe, or it may bind to the Account at the User level for persistent access, such from a streaming app. See 4.4.2 for details of different LASP modes.

The LASP MAY capture a User Credential for the purpose of User Creation. A LASP SHALL NOT store such User Credential.

Section 4.4.2 defines LASP requirements, including the normative requirements for re-authentication.

7.1.3 Deleting Account Binding

Deleting an Account binding removes the association between the DECE Account and the bound Node in the Coordinator. An Account binding is removed by deleting the UserLinkConsent policy for the bound Node. The Coordinator revokes all associated Delegation Security Tokens (see [DSecMech] Section 4.3.2), and the Node may receive a disconnect or logout message from the Coordinator.

A LASP SHALL remove all Account-specific and User-specific identification information when deleting an Account binding including Security Tokens.

Upon unbinding a LASP Account from an Account, all active LASP Sessions SHALL be terminated.

A User may revoke consent for Account binding at any time, at the Web Portal or an Account Management Node, which results in deletion of the UserLinkConsent policy for the Node and revocation of the Delegation Security Token issued to the Node.

In order to regain access to an Account after unbinding, the Node must repeat the authentication process described in 7.1.2.1.

7.1.4 Account Deletion

Accounts can be deleted via the DECE Web Portal interface or an interface provided by a Node with Account Management consent. See [DCoord] Section 13.1.3.

Deleting an Account sets the status of all the Account and related elements to “deleted”, effectively making the Account inaccessible. The Account is not physically deleted for a limited duration and retains the previously purchased Rights in the Rights Locker in case the account is later restored, such as by a Customer Support intervention. Subsequent calls to the Coordinator such as for purchases, Rights Locker gets, fulfillment, license acquisition etc. return an error. See [DCoord] Section 13.1.3 for details.

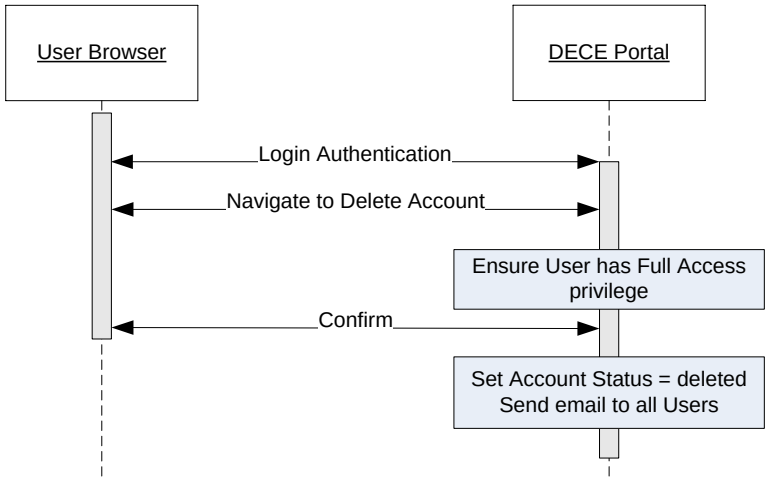


Figure 11 – Account Deletion

7.1.5 Account Limits

The Coordinator enforces certain limits:

- The ACCOUNT_USER_LIMIT parameter specifies the maximum number of Users in a DECE Account.
- The LASP_SESSION_LIMIT parameter specifies a small limit on the number of concurrent streams via a LASP.

The values of these parameters are determined by DECE policies, and are subject to change. There are other limits as well beyond the key ones highlighted above. The Appendix in Section 16 lists the current limits.

7.1.6 Account Consent Policies

[DCoord] Section 5.5.1 describes the complete list of Consent policies applicable to Accounts. Key Account-level consent policies (and the corresponding Coordinator policy name) include:

- **Purchase History** (`LockerViewAllConsent`). Permission for the identified Retailer or LASP to view all Rights Tokens in the Account's Rights Locker, with limited information from Rights Tokens from other Retailers.
- **Manage Account** (`ManageAccountConsent`). Permission for the identified Retailer or LASP to provide an interface to make changes at the Account level (add/delete Users, merge Account, rename Account, etc., subject to User Access Control). ([DCoord] Section 5.5.1.2).
- **Allow Users to Consent to User Management** (`EnableManageUserConsent`). Permission for all Users in the Account to set their User Management policy (see Section 7.2.3).
- **Allow Users to Consent to User Marketing** (`EnableUserDataUsageConsent`). Permission for all Users in the Account to set their User Marketing policy (see Section 7.2.3).

Only Full-Access Users (Section 7.2.2) can change the above consent policies.

Consent policies and who is permitted to consent are subject to local law and the age of the User.

7.2 Users

As a result of decentralizing the formerly centralized multi-user approach, creation of additional Users in an UltraViolet Account is deprecated. It's expected that Retailers will instead implement multi-user features appropriate to their service, including creating sub-users, defining account profiles, and so on, subject to bilateral agreements with Content Providers. In most cases, Retailers will link a shared-user Retailer account to a single User within an Account at the Coordinator.

Where allowed by relevant agreements, a Retailer may add Users to an Account, enabling the Content to be shared between Users within the Account. However, most Accounts will contain only a single User.

A User can only be associated with a single Account, and is identified by a unique Username.

7.2.1 User Data

Field Name	Description
UserID	Unique identifier generated by the Coordinator.
Username	User's username, part of their Credentials for authentication.

Password	User's password, part of their Credentials for authentication. Randomly generated by the Coordinator if not supplied.
GivenName	User's first name or names.
Surname	User's last name.
PrimaryEmail	The primary email account.
Country	Postal address Country.
DateOfBirth	The full date (year, month, day) of the User's birth.

Table 12 – Required User data collected by the Coordinator (informative)

Table 12 shows the minimum required User data collected by the Coordinator for informative purposes. The full details are described in the `UserData-type` defined in [DCoord] Section 14.2.

Note that many regions have privacy laws governing the collection of personal information from users, especially children. A Retailer SHALL conform to all applicable privacy regulations for their region.

7.2.2 User Access Levels

A User is associated with a single User Access Level.

The Ecosystem defines the following three User Access Levels. These MAY be modified by applicable Geography-based Policies [DGeo]:

Nodes SHALL NOT set the Access Level of a User to BAU. (BAU is no longer supported, however the definition is retained here as informative detail.)

- Basic-Access User (BAU):
    - Can be any age.
    - Can obtain Content from a Retailer; that is, add a Rights Token to the Account's Rights Locker.
    - Can bind or unbind one or more of their Retailer accounts with the Account.
    - Can view the Account's Rights Locker and download Content.
    - Can consume the Discrete Media Right.
    - Can view the list of Users in the Account.
    - Can view their User Access Level.
    - Can set their User information: username, password, display name, e-mail address, and alternate e-mail address.

- Standard-Access User (SAU):
  - Inherits all Basic-Access User privileges.
  - Can create or remove a BAU or SAU in the Account.
  - Can bind or unbind one or more of their LASP accounts with the Account.
  - Can initiate a LASP Session from aLASP account.
- Full-Access User (FAU):
  - Inherits all Standard-Access User privileges.
  - Can delete the Account.
  - Can set the Account name.
  - Can add or remove an FAU, SAU, and BAU to the Account.
  - Can set the User Access Level for each User in their Account.
  - The initial User created when the Account is created is granted Full-Access User privileges.

Function	BAU	SAU	FAU
Delete Account			●
View the list of Users in their Account	●	●	●
Create FAU			●
Create SAU		●	●
Create BAU		●	●
Remove FAU			●
Remove SAU		●	●
Remove BAU		●	●
Remove themself		●	●
Promote / Demote Access Level for all Users			●
Purchase Content (add Token to Rights Locker)	●	●	●
Bind/Unbind their Retail accounts	●	●	●
Unbind Retail accounts for all Users			●
Initiate an authenticated LASP Session		●	●
Bind/Unbind their LASP accounts		●	●
Unbind LASP accounts for all Users			●
View Rights Locker	●	●	●
Download Content	●	●	●
Consume Discrete Media Right	●	●	●

Table 13 – User Access Level Permissions

7.2.3 User Consent Policies

Consent policies and who is permitted to consent are subject to local law and the age of the User. See [DGeo].

[DCoord] Section 5.5.2 describes the complete list of Consent policies applicable to Users. Key User-level consent policies (and the corresponding Coordinator policy name) include:

- **Bind Account** (`UserLinkConsent`). BAU, SAU, or FAU. Permission for the identified Retailer or LASP to receive a long-lived Security Token to communicate with the Coordinator on the User or Account's behalf.
- **User Management** (`ManageUserConsent`). BAU, SAU, or FAU. Permission for the identified Account Management Node to update information about or delete the specified User. This can only be applied if the `EnableManageUserConsent` Account level policy had previously been set.
- **User Marketing** (`UserDataUsageConsent`). BAU, SAU or FAU. Permission for the identified Retailer or LASP to use information in the Coordinator about that User, such as e-mail, for marketing purposes.

7.2.4 Adding Users

Only Retailers are allowed to provide the feature to add new Users to an account, subject to bilateral agreements with Content Providers.

Only a User with Standard-Access or better (see Section 7.2.2) may add or remove Users from their Account.

Retailers MAY use the `UserCreate` Coordinator API [DCoord] Section 14.1.2 to allow a User who has already bound their retail account to their DECE Account to add new Users to the Account.

7.2.5 Deleting Users

Users can be deleted via the DECE Web Portal interface or an interface provided by a Node with Account Management consent (see [DCoord] Section 14.1.5).

Deleting a User flags them as deleted, rather than completely removed for a limited duration to provide an audit trail and to allow Customer Support to correct improperly deleted Users.

A deleted User cannot log into the Account, and any previously issued User-level Security Tokens will be denied access.

The Coordinator will not allow the deletion of the last User of the Account. It will otherwise allow the invoking User to delete themself.

7.2.6 Parental Controls and Ratings Enforcement

Parental Controls are settings used to restrict access to Content and visibility of Content. *Ratings enforcement* is the application of Parental Control settings to Content ratings. Retailers, LASPs, and Access Portals are expected to have their own Parental Control settings and Ratings Enforcement for controlling purchases, locker viewing, streaming, and playback of downloaded files. Services and player developers are encouraged to use the Common Metadata Ratings Specification [DCMetaCR] and the associated ratings published as Basic Metadata into the Coordinator by Content Providers, but alternative methods and sources can be employed.

Rating systems are associated with regions. For example, the Motion Picture Association of America (MPAA) rating system is used in the US for movies, the TV Parental Guidelines rating system is used in the US for TV shows, and the British Board of Film Classification (BBFC) rating system is used for movies in the UK. Content Providers are required to provide Content Ratings information when available, using systems and ratings values defined in the Common Metadata Ratings Specification [DCMetaCR]. See [DGeo] 2.6.6.

7.3 DRMs and Interoperability

DECE does not define Digital Rights Management (DRM) systems or require any specific approach to content protection. DECE media specifications support the MPEG Common Encryption standard, allowing content to be encrypted and published once, then protected with any compliant DRM. (See [DMedia].) The Coordinator provides mechanisms for DRM Clients in Devices to obtain DRM license information from Retailers.

In general, a *digital rights domain* is a group of devices belonging to a user or household that can share the same DRM licenses. The concept of a device domain is supported by the latest versions of most major DRMs. In a non-domain-based DRM scheme, licenses are bound to an identifier and cryptographic key previously provisioned in each device. As such, content protected by this license can only be accessed on a single device. If access is required on another device a new license must be issued, usually at an additional cost to the consumer.

In a domain-based DRM scheme, licenses are bound to a domain identifier represented by a cryptographic key. This domain key is shared between a set of devices owned by a consumer within the domain. This provisioning process is handled by DRM specific (e.g., native) domain manager interfaces and messages. Once the domain key is available on all devices of the same DRM, licenses can then be

bound to the domain key, instead of the device directly, allowing for protected content to be accessed on all devices within the domain without the need reacquire a new license.

The Common Encryption approach, as supported by DECE, uses AES keys to encrypt content in a Container, allowing a compliant DRM system to add information to the DCC or the DMP sufficient for a DRM Client to decrypt the file for playback. In this way a file can be published, downloaded, and distributed in DRM-independent ways, and then played on any compliant player, as long as the player is able to retrieve an appropriate DRM license from an entity authorized to provide access to the Content.

Once content has been licensed by a native DRM, the native DRM system manages the licensed playback. How licensing works when Content is moved or shared across DECE Devices is covered in Section 12.

7.4 The Rights Locker

This section describes the concept of the Rights Locker and Rights Tokens.

As previously described in Section 4.1.2, the Coordinator maintains the Rights Locker for a DECE Account. The Rights Locker stores all proofs of purchases in the form of Rights Tokens for content purchased by any User associated with the Account.

7.4.1 Rights Token Overview

A *Rights Token* is a representation of the rights associated with an instance of purchased Content. Other information about the User's rights to Content is managed by the Rights Token, including which Media Profiles were purchased, and whether the Content may be copied to Discrete Media. Although Rights Tokens do not exist outside of the context of the Ecosystem, they are accessed, managed and manipulated via the web services interfaces exposed by the Coordinator role.

A Rights Token contains (among other information, see [DCoord] Section 7.2):

Element	Description
ALID	The Asset Logical ID for the asset.
ContentID	The Content ID for the metadata corresponding with the ALID.
Profile	A list of the Media Profiles included in the Right.
CanDownload	Per profile, whether the Containers can be downloaded
CanStream	Per profile, whether the content can be streamed
DiscreteMediaRightsRemaining	Per profile, whether the content can be exported to discrete media

SoldAs	Purchase information when multiple assets are purchased together. See 10.1.1.3.
PurchaseInfo	Retailer information about the purchase. See 10.1.1.4.
FulfillmentWebLoc	Locations of web pages or direct HTTP links to DCCs for downloading Content. See 11.1.3.
FulfillmentManifestLoc	Locations of manifest files for device downloading. See 11.1.4.
StreamWebLoc	Locations of web resources to Stream the Content. See 10.1.1.5.
LicenseAcqBaseLoc	Location used for calculating a licensing address. See 12.2.2.

Table 14 – Rights Token Elements

See [DDiscrete] for additional information in the Rights Token controlling Discrete Media exports.

7.4.2 Adding Rights

A Rights Token is added to the Rights Locker by a Retailer when a Right is purchased by a User. Section 10 describes the purchase process, and describes how a Retailer adds a Right Token to the Rights Locker for the DECE Account associated with the purchasing User.

7.4.3 Viewing the Rights Locker

All Users associated with the Account have access to the Rights Tokens in the Account's Rights Locker including those that were purchases by other Users, subject to Ratings Enforcement by the Coordinator as described below.

The Coordinator provides a Web Portal user interface for a User to manage and view their Rights Locker.

The Coordinator also provides a web service programmatic interface for use by a Retailer, LASP, Access Portal, and other Roles. The APIs for managing Rights Tokens and the Rights Locker are described in [DCoord] Section 7.

If explicit User consent to a Node (such as a Retailer, LASP, or Access Portal) having full view of the Rights in the Rights Locker is required in a region, the `LockerViewAllConsent` Policy is employed. Otherwise the Policy is automatically set by the Coordinator. See the `LockerViewAllConsent` policy in [DCoord] Section 5.5.1.

If the `LockerViewAllConsent` policy is not true, the Coordinator filters the Rights Locker view to exclude Rights Tokens issued by other Retailers. Once the `LockerViewAllConsent` policy is set to true, the Retailer is able to see and display in their user interface Rights Tokens from any Retailer.

A Standard-Access or Full-Access User can also opt in to a Node having Rights Locker data access such as for purchase recommendations and marketing. This was formerly recorded at the Coordinator with the `UserDataUsageConsent` Policy, but is now managed solely by the Node.

7.4.4 Authorizing Access to Content and License Issuance

Prior to licensing access to Content, a Retailer SHALL ensure that there exists a corresponding Rights Token in the Account's Rights Locker as described in Section 12.4.

Similarly, a LASP SHALL ensure a Rights Token allowing streaming exists prior to streaming Content as described in Section 13.2.

7.4.5 Rights Availability Windows and Recalling APIDs

Content Providers may occasionally need to specify time periods where fulfilling, licensing, streaming and using Discrete Media Rights to Content may be restricted. The time period for restricted access is referred to as a *Window* or a *holdback* in DECE documents. As these restriction Windows are for an entire Content as represented by an ALID, the Window is not expressed in the Rights Token but rather in a separate `LogicalAsset` resource (a *Logical to Digital Asset Mapping*) in the Coordinator (see [DCoord] Section 6.5).

The type of restrictions an ALID (for all or select Profiles) may be subject to include:

- APIDs for the ALID may be Recalled (revoked) or Replaced.
- Downloads (fulfillment) may be restricted for certain regions and time periods.
- Licensing may be similarly restricted.
- Streaming may be similarly restricted.
- Discrete Media Rights fulfillment may be similarly restricted.

Any such restrictions are stored in the `LogicalAsset`, which can be updated at any time by the Content Provider as described in [DPublisher].

The `LogicalAsset` applies to an ALID and Media Profile. The `LogicalAsset` stores the ALID, Media Profile, Content ID, Discrete Media Fulfillment methods, one or more `DigitalAssetGroup` elements within one or more `AssetFulfillmentGroup` elements, and optional `AssetRestriction` elements.

7.4.5.1 Recalled and Replaced APIDs

The AssetFulfillmentGroup is explained in [DCoord] Section 6.5.2. It contains a set of DigitalAssetGroup elements indicating the active APIDs for the ALID, and also listing the Replaced APIDs and Recalled APIDs. Before an APID can be used, this collection must be checked to determine if the APID is valid. See [DCoord] Section 6.5.2.4.

The LogicalAsset is checked prior to fulfillment to see if an APID has been recalled or replaced (Section 11.1.6), and the LogicalAsset may be checked for holdback information prior to licensing (Section 12.4.1). This is done by obtaining the LogicalAsset for the given ALID and Media Profile. The DigitalAssetGroup element indicates whether the APID in the LogicalAsset is in an ActiveAPID element (e.g. has not been replaced or recalled).

7.4.5.2 Asset Restriction Windows

Holdback information stored in the LogicalAsset is used in Locker views provided by the Web Portal Role and other Roles to indicate to Users that Content may not be available in a certain region and time period.

The AssetRestriction element in the LogicalAsset indicates constraints on Container Fulfillment, Container Licensing, Streaming, and Discrete Media Fulfillment for a time range in a region. See [DCoord] Section 6.5.2.6.

Note that the AssetWindow construct from earlier versions of the specifications is replaced by AssetRestriction.

Section 11.1.6 defines the conditions under which the Retailer checks the LogicalAsset before Fulfilling a Container. Section 12.4.1 defines the conditions under which the Retailer checks the LogicalAsset before Licensing a Container. Section 13.2 defines the conditions under which the LASP checks the LogicalAsset before Streaming Content.

7.4.6 Coordinating Rights

As the Ecosystem enables multiple retailers to sell content, the coordination of rights is another essential Ecosystem concept. Rights Tokens represent a purchase of content from any Retailer by a particular User associated with a specific Account. These rights are made available to any Users associated with the Account and can be fulfilled by Retailers and LASPs.

8 Common File Format Container and DECE Media Package

8.1 Overview

DECE Content is encoded into the Common File Format (CFF) and is packaged in a Digital CFF Container (DCC, or simply referred to as a Container in this document). The Common File Format is designed to:

- Play across multiple devices
- Work with multiple DRMs
- Support progressive (segmented) download
- Contain information for licensing and purchasing
- Contain metadata describing the Content
- Hold DRM licenses in the Container for ease of transporting Containers within a Domain

The Common File Format and Digital CFF Container are described in detail in [DMedia].

DCCs can be packaged in DECE Media Packages (DMPs) defined in [DDMP].

The CFF supports the use of video elementary streams encoded in the AVC format (H.264) with some additional requirements and constraints. A wide range of audio coding technologies are supported, including several based on MPEG-4 AAC as well as Dolby® and DTS™ formats. Graphics and text-based subtitles are supported. The CFF also supports a common fragmentation structure enabling fast searching and trick modes as well as streaming. See [DMedia] for details on the video, audio and subtitle tracks encoding.

The CFF specifies a standard encryption scheme and key mapping that can be used with multiple Approved DRM systems. Standard encryption algorithms are specified for regular, opaque sample data, and for AVC video data with sub-sample level headers exposed to enable reformatting of video streams without decryption. See [DMedia] for details on track encryption and DRM support.

Protected DECE files contain a set of metadata, minimally including descriptive metadata (e.g., title), identifying metadata (e.g., DECE content identifier), ratings metadata, license resolution metadata (License Manager URLs), and one or more pointers to more complete metadata resources.

DECE content may also be made available for a limited number of exports to Discrete Media (e.g. a DVD or secure memory device), and may also be consumed in streaming mode through authorized streaming services, referred to as LASPs (see Section 4.4).

For Discrete Media exports, the Coordinator keeps track of the number of exports to ensure that the maximum number of allowed exports is not exceeded. See [DDiscrete] and [DCoord] for more information about Discrete Media Rights.

8.2 Media Profiles

Audio-visual content in the Ecosystem are classified in a limited number of *Media Profiles*, very similar to MPEG profiles, where each Media Profile specifies a set of constraints on encoding formats, bitrates, number and type of audio-visual channels, aspect ratio, and more. Each Media Profile is targeted to a specific class of devices, trying to match the computational and rendering resources of the device class, while at the same time providing an optimal user experience. *Delivery Targets* further define particular fulfillment methods such as streaming and download. Various Media Profiles are defined in [DMedia]. The following Media Profiles are supported in the Ecosystem by Rights Token purchase profiles and profile parameters.

- a standard definition (SD) profile,
- a high definition (HD) profile,
- an ultra-high definition (UHD) profile for “4k” resolution and higher frame rates,
- a 10-bit high dynamic range (HDR) profile, applying to HD and UHD resolutions,
- a 12-bit high dynamic range (HDR) profile, applying to HD and UHD resolutions, and
- a Dolby Vision (DV) high dynamic range profile, applying to HD and UHD resolutions

Only SD and HD Media Profiles are supported in the Ecosystem in the form of Physical Assets.

The following table indicates how Purchase Profiles defined in [DCoord] correlate to general Media Profiles defined in [DMedia] Annex B.

Purchase Profile	Profile Parameter (HDR, WCG, HFR)	Media Profile
SD	Not Allowed	SD
HD	False	HD, xHD
HD	True	HDR10, HDR12, DV
UHD	False	UHD
UHD	True	UHD, HDR10, HDR12, DV

8.3 DECE Metadata

DECE Metadata is described in [DMeta]. How it is stored in the Container is described in [DMedia].

There are different types of Metadata stored in the Container:

- Physical Asset Information: consisting of the Asset Physical Identifier (APID) and Media Profile information, along with additional information used for licensing (Base Location) and to assist in locating a Retailer for Superdistributed Containers (Base PURL Location).
- Required Metadata: mandatory metadata describing the Content in the Container, including a ContentID and basic Movie and track information including Ratings, Images, title, run length, publisher, release year, etc.
- Optional Metadata: additional metadata that may be included to further describe the content.

8.3.1 Asset Physical Identifier (APID)

The Asset Physical Identifier (APID) defined in Section 5.5.1 is stored in the DCC in the Asset Information Box (`'ainf'`) along with the Media Profile and Media Profile version. See [DMedia] Section 2.2.4.

The APID is stored in the Container when the Container is created by the Content Provider.

8.3.2 Base Location

The *Base Location* is information provided by the Retailer to locate the License Managers. The Base Location is an Internet domain name that is used to construct fully qualified domain names for licensing and downloading Content as described below.

The Base Location is stored in the Base Location Box (`'bloc'`) in the DCC as defined in [DMedia] Section E.1.1 or in the BaseLocations part of a DMP as defined [DDMP], Section 4.2.5.

The Base Location SHALL be encoded as a string of bytes as defined by Internationalized Domain Names constraints [RFC5891], followed by null bytes (0x00) to a length of 256 bytes.

A Base Location is constructed as:

```
BaseLocation ::= [<retailersub>”.”]<retailerID> “.” <decedomain>
```

Where

- <decedomain> is the fully qualified domain name for the DECE licensing organization

- <retailerID> is a name assigned to the licensed retailer by the DECE
- <retailersub> are additional optional subdomain names a retailer can freely use at their discretion

For example: craigstore.decellc.org or mexico.craigstore.decellc.com

8.3.2.1 Reading the Base Location

The Base Location may not always be set, or it may be invalid. In this case, licensing and download URLs can be obtained from the Coordinator as described in Section 12.2.2.

8.3.2.2 Setting the Base Location

For a DCC not part of a DMP, the Retailer SHALL write the Base Location to the Container. How the Retailer does this is outside the scope of the DECE. The Retailer can do this when Content received from a Content Provider is added to their system, or it can be updated later during Content fulfillment.

For a DMP, the Retailer SHALL create a BaseLocations document for each Presentation.

For a DMP, the Retailer SHALL either include the BaseLocations Parts in the downloaded DMP, or include these Parts as required downloads for the DMP (as indicated by forceDownload in the Manifest, as per Section 11. In other words, BaseLocations will always be included in the DMP after the initial download process has completed.

The Retailer SHALL ensure the DNS zone for the Base Location is set to resolve to the correct Retailer web server.

If a purchase changes the Base Location, such as by the User selecting a different Retailer, the DECE Device shall replace the existing Base Location with the new Base Location in the Container or DMP. This is necessary because the Base Location is used for licensing and an incorrect Base Location will cause unnecessary redirects as part of the licensing process. This requirement is defined in the DECE Device Specification [DDevice] Section 5.2.3.

8.3.3 Purchase URL (PURL)

A *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., the Retailer may have stopped selling that content), but there is a guarantee that if the Right is purchased, the Container with the Base Purl Location will be licensable under that Right.

The Container or DMP may optionally include a Base Purl Location that can be used to create a Purchase URL. The Base Purl Location is stored in the Base Location Box (‘bloc’) in the DCC as per [DMedia] Section 2.2.3 or in the BaseLocations Part within a DMP as per [DDMP] 4.3.5. This is primarily useful when Content is superdistributed or copied outside of a DECE Domain, requiring a Right to be purchased before the Content can be used.

Although not specified by DECE, a DECE Device 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.

The Base Purl Location is optional. If it is not supplied the Retailer does not support constructing Purchase Locations. Otherwise the purchase internet domain is constructed by combining the BasePurlLocation with a hardcoded DECE internet domain, as in:

```
PurchaseUrl ::= “http://purchase.” <basePurlLocation> “.” <decedomain>
“/index.html?apid=” <APID>
```

Where

- <basePurlLocation> is the Retailer’s Organization Name (see Section 5.2.1) stored in the BasePurlLocation element in the File Metadata box in the Container. If no Base Purl Location is defined, this field SHALL be filled with null bytes (0x00). If defined, the Base Purl Location SHALL be encoded as a string of bytes as defined by [RFC3986], followed by null bytes (0x00) to a length of 256 bytes.
- <decedomain> is the fully qualified domain name for the DECE licensing organization.
- <APID> is the APID from the Container. See Section 8.3.1.

For example:
http://purchase.xyzstore.decellc.com/index.html?apid=urn:dece:apid:ISAN:1209123091029:a203

8.3.3.1 Reading the Base Purl Location

If a Device attempts to license a DCC and determines that the Domain does not have the Right to play the Content, the Device MAY use the BasePurlLocation element to construct a Purchase URL and direct the user to the Retailer website to potentially acquire the Right. See [DDevice] Section 5.2.1.

8.3.3.2 Setting the Base Purl Location

The Retailer (or Content Provider on behalf of the Retailer) MAY write the Base Purl Location to the Container. How this is done is outside the scope of the DECE.

If the Retailer writes the Base Purl Location, the Retailer SHALL use its Organization Name (Section 5.2.1) as the value of the `BasePurlLocation` element.

8.3.4 License Acquisition Location

The *License Acquisition Location* (LALOC) is a fully-qualified domain name (FQDN) for the License Manager responsible for licensing the Content for a particular DRM. It is derived from the Base Location stored in the DCC or from the Rights Token `LicenseAcqBaseLoc`, and is not directly stored itself.

Assuming a Base Location, the License Acquisition Location (LALOC) is constructed as follows:

```
LALOC ::=  <DRM name> “-license.” <BaseLocation>
```

Where

- <DRM name> is defined by the DRM provider.
- <BaseLocation> is the Base Location from the Container (Section 8.3.2) or from the `LicenseAcqBaseLoc` element in the Rights Token (Section 12.2.2).

For example: playready-license.xyzstore.decellc.com

9 Content Publishing

The figure below provides an overview of the Ecosystem publishing flow. Many parts of this flow are out-of-scope for DECE, but are included to provide a relatively complete view of information flow and linkages within the Ecosystem. The accompanying text provides a narrative description of the key activities within the publishing flow, offering context for the publishing requirements enumerated in the next section.

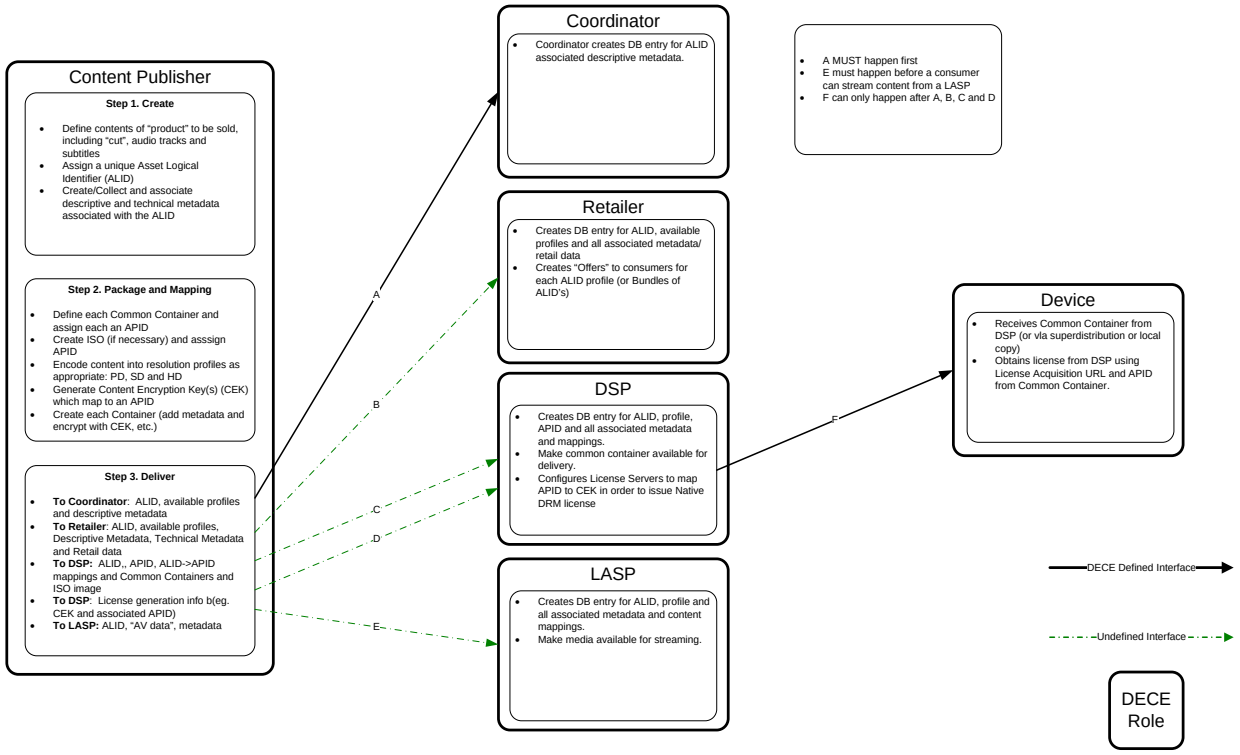


Figure 15 – DECE High Level Content Publishing Architecture (Informative)

9.1 Content Provider

The starting point for the DECE publishing flow is when the Content Provider is ready to make a DECE product available for sale and fulfillment.

9.1.1 Product Creation

Product Creation involves defining what will be sold (logical assets), how it will be fulfilled (containers) and how it will be described (metadata). It is important to have a relatively broad view of the product; for example, think not just of an episode, but consider it as part of a season, and in turn part of a show. Consider how other assets, such as DVD extras, will be included in the product. This definition needs to

be detailed to include which video, audio and subtitle tracks will be provided. DECE Content Publishing [DPublisher] provides guidance on product structuring.

Generally, the first step is to identify which Rights will be sold and in what combination. This closely aligns with the physical assets (Containers) that the User gets when purchasing the product. The Rights definition also includes which Media Profiles (e.g., HD and SD) will be offered.

The next step is to detail the product definition. This includes defining the specific Profiles, Rights and Containers, and the mapping between Rights/Profiles and Containers. Containers need to be defined to the track level (video, audio, and subtitle). It is necessary to determine track assignment, coding parameters, encryption key structure and so forth.

The Content Providers and Retailers may collaborate on any aspect of Product Creation, although that is outside of DECE scope.

9.1.2 Metadata

It must be determined which Metadata will be prepared for the product, including metadata associated with the Right (Basic Metadata), metadata describing parent objects (also Basic Metadata) and associated with the Containers (Container Metadata.) Each metadata element has a globally unique ContentID.

There is also metadata associated with product structures, in particular Bundles. Bundles describe groupings of products not otherwise described by the metadata structure. This allows products to consist of collections of works constructed for marketing purposes (e.g., all movies with a particular actor).

Metadata is described in detail in [DMeta].

9.1.3 Content Preparation for Fulfillment

Once defined, the product must be built. Although this section describes Container construction in a particular order, as long as a Container is valid, it need not be constructed in this order.

First the video, audio, and subtitles must be gathered and encoded and built into Containers in accordance with DECE Media Format Specification [DMedia]. Discrete Media must also be constructed if required for the profiles to be offered.

Most DECE Containers contain encrypted tracks, protected by Digital Rights Management. The key structure must be defined, Content Encryption Keys (CEKs) generated and content appropriately encrypted in accordance with the [DMedia]. Keys must be managed securely.

Identifiers must be created for the product. This includes Asset Logical IDs (ALIDs) for the Right, ContentIDs for metadata, and Asset Physical IDs (APIDs) for Containers. The requirements on these identifiers are that they conform to the identifier encoding rules in this specification, and they are globally unique. Encoding rules allows Content Providers to use standard ID schemes, such as [ISAN], or house IDs while creating container(s).

Containers contain Required Metadata and may contain Container Optional Metadata as defined in [DMeta] Section 4 and Content Publishing [DPublisher] Section 4.2. How the metadata is stored in the DCC is described in [DMedia], Section 2.3.3. Appropriate metadata is generated and inserted into the Container. If optional metadata is included, it should cover the Basic Metadata for the media and Digital Asset Metadata for each track. That is, the overall work should be described as well as each track. There are provisions for including multiple languages for Content Providers to use as appropriate for their products.

If Discrete Media Rights are supported, the Discrete Media packages must be prepared and encrypted as described in [DDiscrete].

When DMPs are to be used, the Content Provider prepares Original DECE Media Packages (ODMP) and additional components to be added to the ODMP. Note that Containers are essential elements of a DMP, but are not necessarily present in the ODMP.

When Content Provider intends to offer Content through Late Bound Common Streaming, the Content Provider can create CSF tracks suitable for Common Streaming in conjunction with the downloadable DECE Container tracks. Note that this does not preclude a Retailer from creating its own Late Bound Common Streaming tracks.

9.1.4 Content Preparation for a LASP

The format of content published to LASPs is not defined by DECE, it is important that the appropriate media packages are prepared for conveyance to LASPs. These media packages may be Digital CFF Containers, although alternatives are also acceptable.

When Content is to be offered through Common Streaming, the Content Provider can create CSF tracks suitable for Common Streaming. Note that this does not preclude a Retailer from creating its own Common Streaming tracks.

9.1.5 Delivery

Once everything is prepared, it must be delivered.

9.1.5.1 Delivery to Coordinator

The Content Provider delivers information to the Coordinator, typically using the API interface defined in [DCoord] Section 6. Published information includes basic metadata, for both Assets being offered (Logical Assets) as well as parent information (e.g., seasons and shows); physical metadata for each Container, mappings between Logical Assets and Metadata (ALID to ContentID), mappings for fulfillment (ALID to one or more APIDs) and any Content Provider defined Bundles. Logical to Digital Asset Mapping also includes policies, such as Licensing and Fulfillment Windows, if any (see Section 7.4.5).

[DCoord] Section 6 describes the Coordinator data structures and APIs for publishing metadata, the Logical to Digital Asset Mapping Table, and creating Bundles.

9.1.5.2 Delivery to Retailer

Although out of scope of DECE specification, it is assumed that Content Providers will make the ALID, available profiles, metadata, bundle information as well as business rules available to Retailers.

If the Retailer desires to use CFF for Fulfillment, the Retailer needs the Container or Package, along with the corresponding ALID, APID, and the Contents Encryption Key (CEK), and any other information needed to generate licenses.

9.1.5.3 Delivery to LASP

LASPs need the ALID, media and other information necessary to stream content in a form that the LASP can use to stream media which is out of scope for DECE specification. This may be in the form of Containers or some other format such as mezzanine files.

9.1.6 Product Update

Products may change over time, either for marketing reasons or because of a need to correct an anomaly in the product.

It is the responsibility of the Content Provider to distributed updates to appropriate destinations, including the Coordinator, Retailers, and LASPs.

Metadata may be updated, but it must include a revision to allow 3rd parties to determine which version is the most recent (`UpdateNum` element).

Bundles should not be updated. Bundles contain information about how a product was offered and sold. If a bundle changes, it may cause confusion and support issues with Users. Content Providers should create new bundles (new BundleIDs) to correct bundle issues.

Containers and Packages may be updated if necessary. They should be distributed to Retailers and LASPs who use CFF. DECE supports replacing Containers with improved Containers. The Content Provider may determine whether downloads and/or licensing on the old Container is still allowed. There is also a means to halt distribution of a Container (e.g., if it is found to violates a parental control restriction). These Containers may not be downloaded or licensed, and are considered 'recalled'. Content Providers may specify region and time based download and licensing policies to implement holdbacks and other contractual restrictions. These are handled through the Logical to Digital Asset Mapping Table (Section 7.4.5)

9.2 Retailer Content Preparation

Once the Retailer has the necessary information and appropriate agreements, it may proceed with selling the product.

DECE allows the Retailer to further define the product, although business agreements may restrict this. Retailers can group Logical Assets together into Bundles. Bundle construction is the same as for Content Providers and must be posted to the Coordinator.

Even without Bundles, Retailers can sell multiple assets together, such as offering an entire season consisting of all individual episodes. In many of these groupings, the metadata already defines the grouping structure so there a Bundle should not be created.

Although the process of selling is discussed elsewhere in this specification (Section 10), it is worth noting that the Retailer posts relevant grouping information into the Rights Token (i.e., the `SoldAs` element). If the asset was sold as part of a bundle, the BundleID is posted. If it was sold as part of a grouping covered by metadata, the list of ContentIDs associated with that group are included in the Rights Token. This allows the User to later reconstruct how the Rights were obtained.

The Retailer can modify the Container to facilitate licensing. In particular, they can include the appropriate Base Location (see Section 8.3.1) information in the Container prior to download, allowing the Device to direct to the appropriate License Manager. The Retailer may also include Purchase Location (see `basePurlLocation`, Section 8.3.3) used by a DECE Device to construct a Purchase URL facilitating purchase of superdistributed or shared Containers.

Retailers may insert licenses as part of the download process to make Content playable when it arrives at the Device, without an additional licensing step.

Retailers should keep information current, particularly which Containers should be offered for download and licensed. This information should arrive from the Content Provider, but the Retailer should also keep track of ALID to APID mappings to ensure replaced and recalled Containers are handled correctly.

9.3 LASP

LASP are not directly involved in publishing other than as recipients of metadata and media.

10 Purchasing Content

The DECE does not specify how a User selects a Retailer or how the Retailer enables a User to browse and purchase Content. Content purchased from any DECE Retailer will play on any DECE Device with the appropriate Profile, once a DRM license is supplied by the Retailer or other party.

10.1 Coordinating Purchased Rights

Once a Right to Content is purchased, a Retailer must update the Coordinator to add the purchased Rights into the Rights Locker in the User's DECE Account.

A Retailer SHALL call `RightsTokenCreate` to the Coordinator with a fully formed `RightsToken` as described in the DECE Coordinator Interface Specification [DCoord] Section 7.1.2 and Section 7.2.

This creates a Rights Token in the User's Rights Locker granting rights (such as download, streaming, and Discrete Media export) to various Media Profiles (e.g. HD or SD) of a piece of Content specified by an ALID and ContentID or to a BundleID. It also includes information about the purchase transaction, and other information described in the `RightsTokenCreate` API.

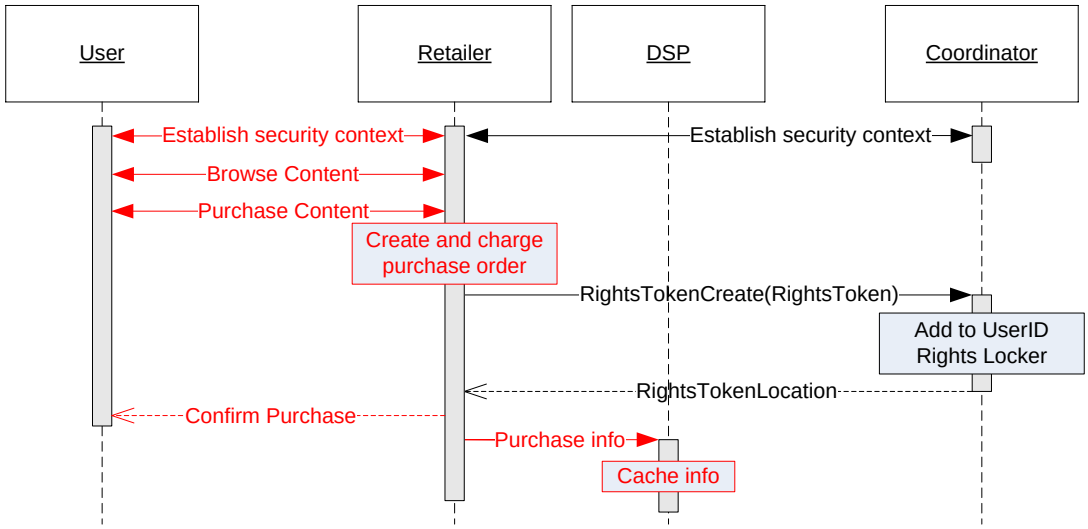


Figure 16 – Purchasing Content

10.1.1 Creating the Rights Token

The Retailer must create a Rights Token that describes the Right purchased and the context of the purchase. In this context, the term 'purchase' is used broadly to cover any action that leads to the acquisition of a Right.

The Retailer SHALL create Rights Tokens in accordance with DECE Policies. For example, the Rights Token must include all required Media Profiles.

The Retailer SHALL create Rights Tokens in accordance with the terms of the purchase. That is, the content of the Rights Token accurately reflects aspects of the purchase the asset purchased, rights acquired, the context of the purchase, and parties involved in the purchase.

10.1.1.1 Rights Identification

The `ALID` element of the Rights Token defines which asset is added to the Account. The Retailer SHALL populate the `ALID` element with the Asset Logical ID for the asset being added to the Rights Locker.

The `RightsProfiles` element defines the Rights are around each Media Profile. The Retailer SHALL create a `PurchaseProfile` element for each Media Profile associated with the purchase. In accordance with DECE Policies, subject to change, the sub-elements are set up as follows:

- `DiscreteMediaRightsRemaining` element is included if exporting to Discrete Media is supported
- `CanDownload` set to 'true'
- `CanStream` set to 'true'

Note that the Rights Token is structured to support future rental Use Cases. However, these are not supported at this time.

10.1.1.2 Metadata Reference

The `ContentID` element SHALL be set to the ContentID corresponding with the ALID.

10.1.1.3 Metadata regarding Sale

The `SoldAs` element is used to describe the context of the sale.

If a right is sold alone, that is a single ALID is the only asset sold in the transaction, `SoldAs` will typically be absent.

The Retailer MAY include the `SoldAs` element when more than one asset is purchased together. Note that this supports alternative views of the Rights Locker, and may assist Customer Support.

If present, the `SoldAs` element SHALL include either one or more `ContentID` elements or a `BundleID` element.

As described in DECE Content Publishing [DPublisher], Section 7, structure of content can either be defined in metadata or in a Compound Object. In metadata-structured content, such as episodes of a season, a sequence of `ContentID` elements will fully describe the grouping. When a product is structured as a Compound Object, a `BundleID` element best describes the grouping.

If Rights are sold in a structure not covered by metadata or an existing Bundle, the Retailer SHOULD create a Bundle as defined in DECE Coordinator Interface Specification [DCoord], Section 6.

When viewing a Rights Locker, it can be helpful to see a description of a grouping; for example, "Show XYZ, Season 2." The Retailer MAY include a DisplayName in the `SoldAs` element. The Retailer is expected to include this element if they determine it will improve readability.

10.1.1.4 Purchase Info

The Retailer SHALL populate the `PurchaseInfo` element.

The `PurchaseInfo` element is populated as follows:

- `RetailerID` SHALL be the Retailer's RetailerID
- `RetailerTransaction` SHALL include a string that allows the Retailer to associate the Rights Token with an internal transaction. Note that this supports customer support.
- `PurchaseAccount` SHALL be the AccountID for the DECE account for which the Right was originally purchased. The AccountID can be obtained from the Security Token.
- `PurchaseUser` SHALL be the UserID (obtainable from the Security Token) for the User who purchased the Right. `PurchaseTime` SHALL include UTC date and time of the transaction.

Note that fields in `PurchaseInfo` are not modified if a Rights Token is moved to another Account. Therefore, over time, certain information such as `PurchaseAccount` will not necessarily align with the DECE Account.

10.1.1.5 Fulfillment and Licensing Locations

Part of the Rights Token created by the Retailer includes Internet locations used for licensing and downloading Content. These locations are specific to the Retailer, and can be set by the Retailer on behalf of the Retailer since the Retailer's Security Token enables it to be shared with a Retailer.

If fulfillment is required, the Retailer SHALL provide one or more `FulfillmentWebLoc` elements for each Media Profile included in the Right. The `FulfillmentWebLoc` is a URL to a fulfillment web page

or a DCC. How the FulfillmentWebLoc is used is described in Section 11.1.3. More than one FulfillmentWebLoc may be specified with the same MediaProfile attribute along with an associated Preference indicating a preferred order as defined in [DCoord] Section 7.2.8 and 7.2.9.

The Retailer MAY use a distinct FulfillmentWebLoc URL per Media Profile, or the Retailer MAY use the same FulfillmentWebLoc URL for all Media Profiles. Using the same URL allows the Retailer to let the User select the desired profile on a common fulfillment web page.

The Retailer MAY also include additional information in the FulfillmentWebLoc URL (e.g. in the URL query string) to allow the Retailer to implement access control as described in Section 11.1.5.

If fulfillment is required, the Retailer SHALL provide one or more FulfillmentManifestLoc elements. The FulfillmentManifestLoc is a URL to a network location where a media manifest can be obtained. The manifest file is defined in [DFulfill], Section 5. Use of this field is explained in Section 11.1.4.

The Retailer SHALL ensure that a valid manifest file is present at the FulfillmentManifestLoc endpoint.

The Retailer SHALL ensure that the manifest file provides the location of at least one Container for each applicable Media Profile, and that a valid Container is present at the provided location(s).

If fulfillment is required, the Retailer SHALL provide one LicenseAcqBaseLoc element. The LicenseAcqBaseLoc element contains the Base Location used to calculate the License Acquisition URL. Section 8.3.2 describes how to create the Base Location.

The StreamWebLoc element contains a URL and is designed to help the User find Streaming access provided by the Retailer from which they acquired the Content. Multiple instances of this element can be provided. StreamWebLoc is primarily designed for Browsers, although applications may use the URL too. It is assumed that applications would use file type to determine which StreamWebLoc instance to use.

If Streaming is required, the Retailer SHALL provide one or more StreamWebLoc elements for the Rights Token (i.e., one or more StreamWebLoc elements without a MediaProfile attribute) or one or more StreamWebLoc elements for each Media Profile for which Streaming is required.

LASPs may support Streaming from a Browser. That is, the User can select a link and Streaming can begin; perhaps by launching an application. Alternatively, LASPs may Stream only from applications not accessible directly from a browser (e.g., an embedded application in a device).

In cases where Streaming is accessible from a Browser, the Retailer SHALL provide a `StreamWebLoc` that links directly or closely to a location where the User can Stream.

The Retailer SHALL NOT provide a `StreamWebLoc` that links to the top level of a web site unless Streaming is directly available from the top level.

In cases where Streaming is not accessible from a Browser, the Retailer SHALL provide a `StreamWebLoc` that links to a web page containing instructions on how to Stream the Content.

10.2 Purchasing Superdistributed or Copied Content

While the DECE does not specify how to locate a Retailer in general, it does provide a mechanism for a Retailer or Content Provider to place a suggested Retailer into a Digital CFF Container. Then if a User has a copy of the Container they have an easy way to locate a preferred Retailer able to sell Rights to the Content.

This can happen when Content is Superdistributed (see Section 15), or simply copied or shared between friends. In any of these cases, the User will not have a license to view the Content, and the native DRM system would not recognize any licenses stored in the Container as valid as they would not be keyed to the User's DRM domain.

To ease purchasing rights to a Container already in the User's possession, a Retailer or Content Provider (operating in conjunction with a Retailer) can store a Purchasing Location in the Container. Section 8.3.3 describes how the Purchasing Location in the Container can be used to construct a Purchase URL, which a DECE Device may use to locate a Retailer able to sell Rights to the Content.

There is no implicit guarantee that the Right can be purchased. For example, the Retailer may have stopped selling that content. But there is a guarantee that if the Right is purchased, the Container with the Purchasing Location will be licensable under that Right.

Other methods may be used to locate a Retailer. A DECE Device may use third party services, or have a pre-existing relationship with one or more DECE Retailers.

11 Content Fulfillment

Retailers and LASPs are expected to fulfill content to Users who access their Account through the Retailer or LASP service. Retailers provide fulfillment as downloads or Discrete Media, and LASPs provide fulfillment as streams. Details of specific fulfillment mechanisms are out of scope of DECE.

DECE provides specifications that support download, streaming, and Discrete Media (see [DPublisher], [DMedia], [DFulfill], [DStream], [DDMP], and [DDiscrete]), and encourages all ecosystem participants to use these formats to optimize interoperability.

Download may be done one file at a time using standard HTTP mechanisms ("Web download") or by a Download Manager using the DECE download manifest mechanism ("Manifest download").

11.1 File Download

11.1.1 Common Download Server

The Content Fulfillment Specification [DFulfill] defines a Common Download Server and a Common Download Client. To promote reuse, [DFulfill] uses generic terms. The following mappings are required for DECE.

- The Common Download Server may be part of fulfillment by Retailers and LASPs.
- A Common Download Client function is DECE Device's Download Manager.
- CMP and OCMP correspond with DMP and ODMP.

The Download Server SHALL comply with Common Download Server requirements as defined in [DFulfill], Section 6.1 and as further constrained by this section.

11.1.2 Download Locations Provided in the Coordinator

One or more fulfillment locations may be obtained from the Coordinator via the `RightsTokenGet` query. See [DCoord] Section 7.1.4.

The 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 associated with a Media Profile and optionally an element called `Preference` defined as an integer. Preference defines an ordering.

Download implementations SHOULD use the URLs with the following precedence:

1. URLs with lower numbers Preference are used before URLs with higher number Preference
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

The fulfillment locations are specified in the Rights Token when it is created when Content is purchased as described in Section 10.1.1.

11.1.3 Web-initiated Download from a Fulfillment Web Page

A Web-initiated download is done by directing a Web Browser to a fulfillment URL provided by the Retailer to download a file for a given Media Profile. The URL is stored in the Rights Token by the Retailer in the `FulfillmentWebLoc` element and may optionally include the desired `MediaProfile` attribute (see Section 10.1.1.5). A Retailer may also direct a Web Browser to a fulfillment web page, typically after Content is purchased.

The `FulfillmentWebLoc` can be a direct URL to the file for the specified Media Profile or a URL to a fulfillment web page containing links for downloading one or more files. The file may be a DCC (Container) or a DMP (Package). A fulfillment web page may have links to individual files for HTTP download using the download feature of the browser, or may point to Fulfillment Manifest files for use by a Download Manager if one is available (see Section 11.1.4 below).

There is a separate `FulfillmentWebLoc` element which may optionally include a `MediaProfile` attribute for each Media Profile in the Right. While this can be used to point to an individual file or fulfillment web page for a given profile, the same URL can be used for multiple Media Profiles if a Retailer prefers to have a web page containing download options for several or all Media Profiles.

Individual Containers use the `video/vnd.dece.mp4` MIME type (see [DCIF] Section 2.1), which may be recognized by the Web Browser to launch a player or may simply be downloaded.

It is recommended that the fulfillment web page provide a description for each link so that that User can choose the appropriate file(s) to download for the desired Media Profile (e.g. SD or HD). Containers and other files may be collected into a single file, such as a zip file. DECE provides the Media Package Specification [DDMP] for creating and managing packages of files.

11.1.4 Download Manager Download using a Fulfillment Manifest

A Fulfillment Manifest, defined in [DFulfill], Section 5, is provided by the Retailer to reference one or more files for a Download Manager to selectively download.

`FulfillmentManifestLoc`, the URL to a Fulfillment Manifest, is obtained from the Coordinator via a `RightsTokenGet` query or from a link. The URL references a Fulfillment Manifest resource retrieved with HTTP GET. The Fulfillment Manifest is an XML structure defined by `FulfillmentManifest-type`. XML schema documentation conventions are the same as the Coordinator Interface Specification [DCoord].

The download manager retrieves the Fulfillment Manifest from the provided location, chooses which assets to download, and uses the URLs provided to connect to an HTTP server to download the assets.

The Download Manager MAY interact with the User and list the available assets for the User to choose from, or MAY select the assets automatically based on User preferences (or a combination of both).

The Manifest can include information to support DECE Media Package (DMP) downloading. When downloading the DMP, the download manager first downloads the Original DMP (ODMP). Information in the DMP instructs the download manager what other assets are required for download, and which are optional. The download manager downloads the required assets. The download manager MAY interact with the User and list the available optional assets for the User to choose from, or MAY select the optional assets automatically based on User preferences (or a combination of both).

The Manifest can include information to support updates. When an APID is replaced (including recalls where the asset is replaced), the replaced APIDs are listed, indicating to the download manager that an asset has been replaced.

A DMP is updated by revising parts of that DMP while maintaining the same DMPID. Content Providers publish updates only when the Manifest update mechanism supports those changes; otherwise a new DMP is created, identified by a new DMP ID.

When a DMP has been updated, the Retailer SHALL include a properly constructed DMP element in the Manifest as follows reflecting the current state of the DMP; and also including indication of obsolete DMP Parts. The specific mechanisms for signaling obsolete Parts is provided later in this section.

The Manifest supports Common Streaming through the StreamingInfo element. This element provides information to provide Common Streaming information corresponding with an audio, video or subtitle track that is part of a DCC.

11.1.5 Access Control

Content protection is provided by the DRM Client, so downloading does not per se require authentication or secure communication. However, Retailers and their associated download services will typically wish to provide download services only to Users with a legitimate right to access the content.

Authority to access Content is provided by the Retailer. The `FulfillmentWebLoc`, `FulfillmentManifestLoc`, or `LocationURL` URLs may include user authentication credentials, which should be opaque to the Download Manager or Web Browser. For example, the Retailer may check the Rights Token in the Coordinator to ensure that the User has purchased the Content, and then place SAML or other authentication tokens specific to the User in the URLs it generates for the Fulfillment Manifest. Another example approach would be for theRetailer to generate single-use or limited-time URLs managed by a CDN.

If the Retailer cannot fulfill a request due to an access control violation, the Retailer SHALL return an HTTP 403 error response as accordance with Section 11.1.7.

11.1.6 Replaced/Recalled APIDs and Fulfillment Window Restrictions

Content Providers may occasionally need to recall or replace APIDs, or specify time periods where fulfilling Content may be restricted, as described in Section 7.4.5.

The Retailer SHALL NOT Fulfill Containers whose APID is listed as Recalled in the associated `LogicalAsset` with the exception that the RecalledAPID MAY be licensed if the LicensingAllowed attribute is set to ‘true’. See [DCoord] Section 6.5.2.4.

For APIDs listed as Replaced, the Retailer SHOULD instead Fulfill with a Container whose APID is in the corresponding ActiveAPID element if the Retailer possesses the Container.

The Retailer NEED NOT observe the constraints in any applicable AssetRestriction when fulfilling a Container. However, note that there might be contractual requirements imposed by Content Providers that require a Retailer to comply with fulfillment constraints, which may or may not be the same as the constraints in any applicable AssetRestriction.

If the Retailer cannot fulfill a request due to the APID being invalid or due to the ALID being subject to a Fulfillment restriction, the Retailer SHALL return a HTTP 403 error response as accordance with Section 11.1.7.

11.1.7 Fulfillment Error Handling

A Retailer may not be able to fulfill a download request to a DCC for the following reasons:

- Payment Required: The Retailer has a policy requiring an additional payment to be made to download content once the DECE fulfillment obligations for a free download have been met.
- APID Recalled: The Content Provider has recalled the APID. See Section 7.4.5.
- Fulfillment Restricted: The Retailer is unable to fulfill the request due to the ALID being subject to a Download restriction for the relevant Region. See Section 11.1.6.
- Access Control: The Retailer does not permit the download to occur. For example, the Content was not purchased. See Section 11.1.5.
- Any other error where the Retailer prohibits the request from being fulfilled.

Whenever the Retailer prohibits a request from being fulfilled, the Retailer SHALL respond to the request with an HTTP 403 Forbidden response ([HTTP] Section 6 and 10.4.4), and the Retailer SHALL return a `ResponseError-type` XML structure conforming to [DCoord] Section 18.1, using values for the ErrorID attribute and the ErrorLink element as described below.

11.1.7.1 Error ID

All of the Error IDs are prefixed with `urn:dece:errorid:org:dece:`

Error ID	Description	Code
FulfillmentPaymentRequired	A payment is required to download the file.	403
FulfillmentAPIDRecalled	The content file has been recalled.	403
FulfillmentRestricted	Downloads of the content are restricted at this time.	403
FulfillmentInvalidAccess	The retailer does not allow access to the content file.	403
FulfillmentProhibited	Any other error requiring an HTTP 403 response.	403

11.1.7.2 ErrorLink

The `ErrorLink` element of the ResponseError-type ([DCoord] Section 18.1) should be the URL of a web page describing the error.

12 Licensing Content

The first time Content is played on a DECE Device, the DRM Client on the Device must acquire a native DRM license for the Content. The license authorizes the DRM Client to permit playback of the Content, and provides the necessary keys for Content decryption. The process of a DRM Client obtaining a license is called *license acquisition*.

The DECE specifications [DMedia] support the MPEG Common Encryption mechanism, allowing content to be encrypted and published once, and be protected by any compliant DRM. DRM Domain management, DRM licensing, and content protection are out of scope for DECE.

12.1 License Cached in the Device or Container

When a DECE Device attempts to play Content, the Device first determines if it already has a license for the Content accessible to its DRM Client. How a DRM system does this is out of the scope of the DECE. It may check a local license cache maintained by the DRM system on the device (#1 in Figure 17), or contact its License Manager if it knows the address (#2 in Figure 17).

If a valid license is not found, the Device must also check for a valid license cached in the Container (#3 in Figure 17). How licenses are stored in the Container is described in [DDevice] Section 7.2.5. This supports a user copying a Container to another DECE Device in the same domain via normal file system or other non-DRM enabled operations, and then taking the Device offline before playing the content and acquiring a license.

Note that the user experience of copying a Container to a Device, going offline, and then attempting playback will vary. Offline license acquisition will fail if the License has not been cached in the Container. Even if the Container had been played, if it had been played only by Devices with a different DRM than the target Device, a usable license will not have been cached in the Container.

The DECE Device checks the Container for a valid license prior to license acquisition.

If a license is obtained during license acquisition, the DECE Device will store the license in the Container as described in [DDevice] Section 7.2.5, replacing any older license as needed.

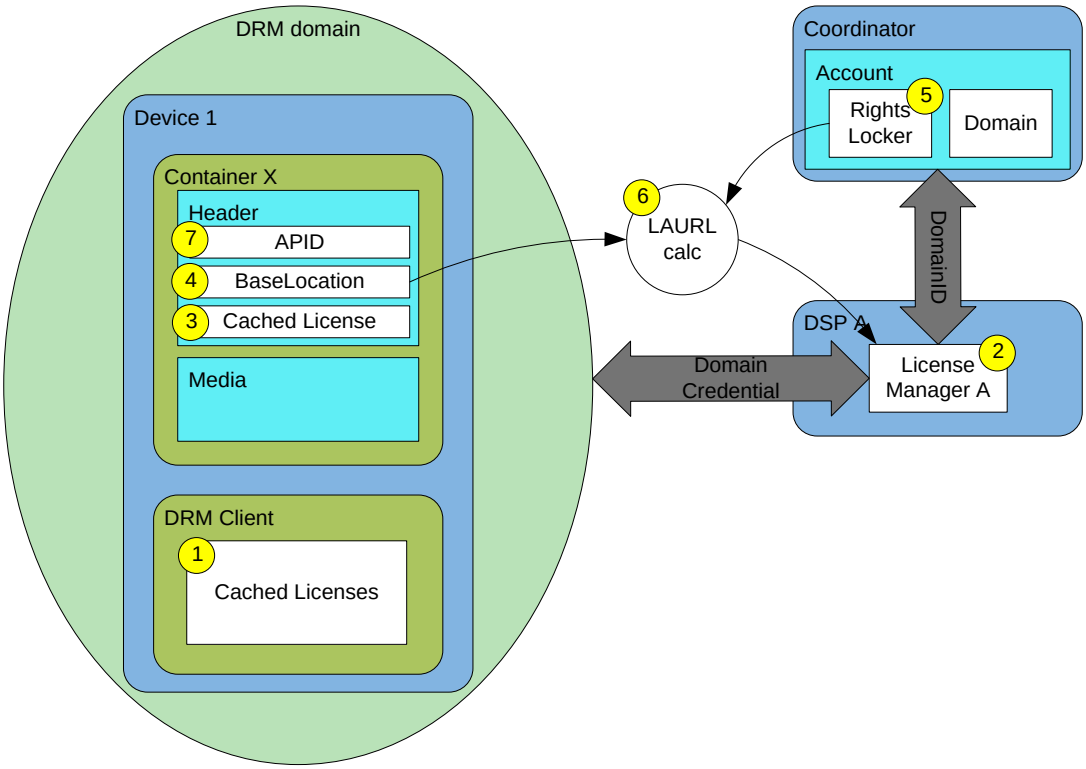


Figure 17 – License Acquisition (simplified) (informative)

12.2 Locating a License Manager

If the DRM Client does not have a valid license, it must determine the URL to contact the License Manager authorized to issue licenses for the Right owned by the Account. A Retailer may assist by:

- Providing a Base Location in the Container (#4 in Figure 17) to cache an association to the Retailer, which is used to construct a URL to the License Manager.
- Storing the License Manager Location in the Coordinator. (#5 in Figure 17.)

12.2.1 Base Location in the Container

The Base Location (#4 in Figure 17) is a box in the Container or in a DMP as defined in Section 8.3.1. It contains the Internet domain of the Retailer who sold or distributed the content, which can be used to construct the Retailer's License Acquisition Location (LALOC) as described in Section 8.3.4.

The Base Location is a cache of the Retailer location. It may be empty or otherwise invalid (e.g. pointing to a previous User's Retailer if the Container had been copied).

Normally, the Base Location is maintained by:

- A Retailer who sets the Base Location when a Container is made available for distribution or fulfillment. This requirement is specified in Section 8.3.2.2.
- A DECE Device updating a Base Location if it was changed by a successful license acquisition. This requirement is specified in the DECE Device Specification [DDevice] Section 5.2.3.

If the License Manager cannot be located via the Base Location, or if it returns an error, then the LALOC is derived from the Coordinator as described next in Section 12.2.2.

The DECE Device (which includes the DRM Client) will attempt to locate the License Manager via the Base Location in the Container prior to obtaining the address from the Coordinator.

12.2.2 License Acquisition Location from the Coordinator

If the License Manager address cannot be determined from the Container, it can be derived from the Coordinator (#5 in Figure 17). When a Retailer sells a right to Content, it must update the Rights Token in the User's Rights Locker as described in Section 10.1. One of the fields in the Rights Token the Retailer must set is the `LicenseAcqBaseLoc` element containing the Base Location used to calculate the address of the appropriate Retailer's License Manager. Section 10.1.1.5 describes the Retailer requirement to set this element, and Section 8.3.4 defines how to calculate the License Acquisition Location (LALOC) from the Base Location stored in the element.

Typically a DECE Device is associated with a Retailer or LASP, which performs a `RightsTokenGet` query to the Coordinator to get the Rights Token.

12.3 License Acquisition

The URL to contact the License Manager is constructed from the LALOC, and is called the License Acquisition URL (LAURL). The LALOC contains the hostname portion of the URL, regardless of whether it was calculated from the Container `BaseLocation` or from the Coordinator Rights Token `LicenseAcqBaseLoc` element. The License Acquisition URL is calculated from the LALOC to obtain the full URL of the native DRM License Manager (#6 in Figure 17). License acquisition is initiated via a DRM license trigger retrieved from the DRM License Manager similar to the DRM join and leave triggers retrieved from the Coordinator. The license trigger is retrieved from the License Manager by appending the APID as path parameter to the LALOC as follows:

```
LAURL ::= "http://" <LALOC> "/" <APID> ["?" <DRM specific parameters>]
```

Where

- <LALOC> License Acquisition Location (Section 8.3.4).

- <APID> Asset Physical Identifier as stored in the DCC (Section 8.3.1)
- <DRM specific parameters> DRM system specific parameters may be appended as URL parameters as required by the DRM system.

The LAURL MAY be percent-encoded if any parameters contain reserved characters in accordance with [URI]. The Retailer SHALL accept both percent-encoded and non-percent-encoded forms in accordance with [URI].

For example: playready-license.xyzstore.uvvu.com/urn:dece:apid:org:mycompany:abcdefg:100?DRMspecificparameter=value

Once a License Acquisition URL is obtained, the DRM Client uses it to connect to its License Manager and retrieve a DRM license trigger via a HTTP GET. The license trigger is executed by the DRM Client to retrieve a DRM license for the APID.

12.4 Issuing a License

If the DRM License Manager doesn't have a valid license for the domain, the Retailer must issue a license after determining if the User has rights to the Content.

When a Content Provider distributed Content to a Retailer, the Content Provider provided the Containers, ALIDs, APIDs, ALID to APID mapping, and the Content Encryption Keys (CEKs) along with any other information needed to generate licenses.

When licensing occurs for a Container within a DMP, the licensing is still based on the Media Presentation. However, rather than using the PresentationID for that Presentation, the APID of the DCC containing the Primary Video Track (as defined in [DDevice], Section 11.1) is used. This makes licensing of Presentations within a DMP and licensing of multi-track DCCs equivalent. Note that APID within the DMP being licensed might be a multi-track DCCs, or a single track DCCs containing a video track.

The Retailer is responsible for ensuring the APID or Presentation ID is valid and the ALID is not subject to Window restricting licensing. See Section 12.4.1 below.

The Retailer SHALL do a RightsTokenGet Coordinator query [DCoord] Section 7.1.4 if it cannot otherwise determine if the User has a Right to the Content. This query can be done by Presentation ID, APID, or ALID.

If the User does not have a valid Rights Token for a Right the Retailer SHALL NOT create a license for that Right.

If the User has a valid Rights Token, the Retailer creates the license by:

- Setting the DRM license fields as required by the Content Provider and DRM for the Media Profile corresponding to the Right.
- Looking up the CEKs for the APID and setting the DRM license key accordingly.

The new license is returned to the DRM Client, successfully completing the license acquisition.

The DECE Device updates the DRM-specific license in the Container with the new license upon a successful license acquisition. See [DDevice], Section 7.2.5.

12.4.1 Licensing Restriction Windows and Recalled APIDs

Content Providers may occasionally need to recall or replace Physical Assets, or specify time periods where licensing Content may be restricted, as described in Section 7.4.5.

The Retailer SHALL NOT License Containers whose APID is listed as Recalled in the associated `LogicalAsset` if the LicensingAllowed attribute is not set to 'true'. See [DCoord] Section 6.5.2.4.

A Container can be licensed indirectly by providing a license for a Media Presentation that references the APID. Therefore, Licensing a Presentation that includes a Container is equivalent to Licensing that Container. Furthermore, as licensing is not currently performed against individual audio tracks, so the Retailer has no knowledge whether it is licensing a particular audio track. The following requirement roots from this condition.

The Retailer SHOULD NOT enforce LicensingAllowed rules when Licensing DCCs with exactly one audio track.

The Retailer NEED NOT observe the constraints in any applicable AssetRestriction when licensing a Container. However, note that there might be contractual requirements imposed by Content Providers that require a Retailer to comply with licensing constraints, which may or may not be the same as the constraints in any applicable AssetRestriction.

12.5 Examples

12.5.1 Container Copied to DECE Device in same DRM Domain

If the Container was played on the initial DECE Device, it will have a license cached in the Digital CFF Container associated with the DRM ID.

When the Container is copied to another DECE Device using the same DRM and joined to the same domain, the Container should be playable without requiring Internet connectivity. This works because the license stored in the Container will work on all DECE Devices joined to the same domain.

12.5.2 Container Copied to DECE Device in a Different Domain or Different DRM

In this case any licenses stored in the Container will be invalid. A DRM license is tied to the DRM Domain Credentials of the native DRM.

In most cases the BaseLocation will be invalid. In this case the DECE Device will query the Coordinator for a Rights Token, which will fail if the new User had not previously purchased the Content.

The Retailer must determine if the Device is associated with an Account that has a Rights Token for the Content. Details of this process are out of scope of DECE. If the Retailer determines that the Account has a right to the Content, the Retailer MAY issue a DRM license for the new domain (using the same DRM) or the new domain (using a different DRM)

If the Retailer determines that the Account does not have a Rights Token for the Content, it MAY prompt the new User to purchase rights to the Content so it can be played.

Likewise, if the Device's request for a license is rejected, it MAY prompt the new User to visit a Retailer and purchase rights to the Content so it can be played.

13 Playing Content

13.1 Playing from a Digital CFF Container

A DECE Device plays media from a Digital CFF Container as described in DECE Device Specification [DDevice], Section 8.

A Digital CFF Container includes Required Metadata and may include Optional Metadata as described in 8.3. Included in these metadata are descriptions of the content within the Container that can be used for informative purposes (e.g., displaying information about the content) or functionally (e.g., implementing Ratings Enforcement based on ratings in the Movie Metadata).

Assuming the Container meets the requirement for play, such as it is compatible with the profile of the Device and parental controls are appropriately applied, the content is decrypted and decoded on the Device and presented. Presentation may be on a built-in display, or through an external interface such as HDMI.

During the playback process, the Device and the DRM Client are responsible for protecting the content and the keys associated with decrypting the content. The DRM Client decrypts the Content (described in [DMedia] Section 3) and enforces Output Controls as specified by the DRM Client compliance rules.

Playback may include trick play; that is the ability to perform actions such as fast forward and rewind, depending on the Device's capabilities.

If a Device has the ability to play a Container while it is being downloaded (Progressive Download) it may do so.

If a Container has more than one audio track, the Device offers the capabilities to select which track is played.

If a Container has one or more subtitle tracks, the Device offers the capability to select a subtitle track.

For situations where a User wishes to play specific tracks but not save them, a Device can offer the option of streaming some tracks while playing other tracks from the Container. This mechanism is called Late Bound Common Streaming as it uses the mechanisms of Common Streaming to obtain track files that are Late Bound with Container tracks during playback. Examples where this might be relevant include playback of a director's commentary, or alternate video. Note that this creates additional possibilities for interactive Content.

Late Bound Common Streaming uses the Domain model for DRM. That is, the licensing and playback content security are the same for the streamed tracks as it is for the Container-based tracks.

13.2 Streaming from LASP

Before a LASP can stream content, it must first authenticate with the Coordinator. A LASP does this by binding to a DECE Account as described in Section 7.1.2.3. An authentication operation, with an optional Account binding step, is required to get a Security Token from the Coordinator allowing viewing of the Rights Locker and streaming to be managed.

The LASP uses the Coordinator APIs to view the Rights Locker (see [DCoord] Section 7) and provide an interface for the User to select content to stream.

Content Providers may occasionally need to specify regions and time periods where streaming Content may be restricted as described in Section 7.4.5.

The LASP NEED NOT observe the constraints in applicable AssetRestriction elements. However, note that there might be contractual requirements imposed by Content Providers that require a LASP to comply with streaming constraints, which may or may not be the same as the constraints in any applicable AssetRestriction.

The LASP SHALL NOT stream from Containers whose APID is listed as Recalled in the associated `LogicalAsset` except in the case where the LASP has a contractual agreement with the Content Provider allowing otherwise. See [DCoord] Section 6.5.2.4.

Before the LASP can stream the Content, the LASP SHALL ensure the Rights Locker has a valid corresponding Rights Token with the `CanStream` element set to “true” for the Profile to be streamed.

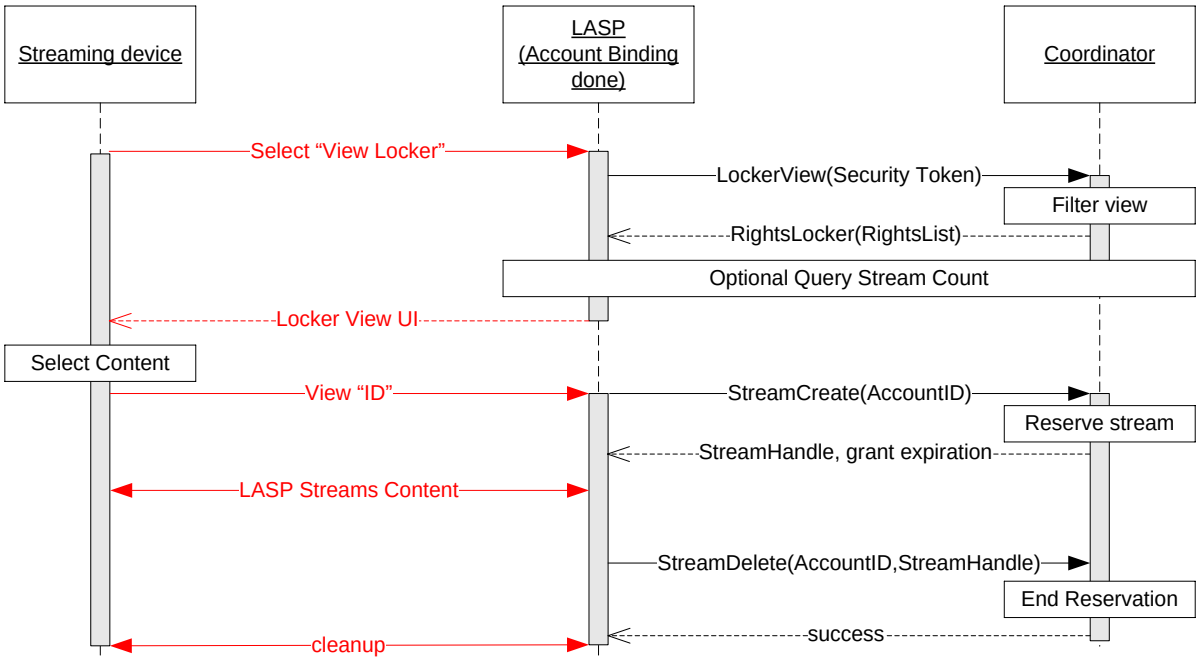


Figure 18 – LASP Streaming Flow

13.2.1 View Filtering

Note: The Coordinator formerly filtered the User's `RightsList` to only show Content viewable by the User, in some cases restricted by Parental Control settings. The Coordinator no longer provides Ratings Enforcement and no longer filters the User's view of the Locker.

13.2.2 Stream Counts and Reservation

The Coordinator keeps track of how many streams are active for an Account, and enforces a maximum limit. (See LASP_SESSION_LIMIT in Section 16.)

A LASP SHALL adhere to the streaming API specified in the [DCoord] Section 11.

A LASP MAY request a list of active streams for the account using the `StreamList` Coordinator query. The LASP may display this list to the User to enable them to terminate conflicting streams.

A LASP MAY determine how many streams are available by reading the `AvailableStreams` attribute of the `StreamList` Coordinator query. See [DCoord] Section 11.1.2 for more information.

A LASP SHALL POST `StreamCreate` to the Coordinator when it streams content. The LASP is not required to wait for a response before starting the stream, however, if the Coordinator returns a

response indicating that the limit of simultaneous streams has been exceeded for the Account, the LASP SHALL stop streaming See [DCoord] 11.1.1.

A Content Provider MAY exempt a LASP from the requirement to post StreamCreate and/or respect the response from the Coordinator. In this case the Content Provider MAY require the LASP to provide non-realtime reporting of streams. See [DCoord] ???.

`StreamCreate` updates the stream count for the Account. A stream can only be reserved for a limited amount of time so that reservations will be released if a User stops watching Content without terminating the stream (e.g. leaves the stream paused and turns off the display).

The Stream reservation expiration limit is subject to changes in policy. Streams can be renewed if the time limit is exceeded via the `StreamRenew` call.

13.2.3 Common Streaming

Common Streaming refers to the ability to generate a streamable Container in accordance with [DMedia] and stream in accordance with [DStream] and [DDevice].

Informative information on publishing for Common Streaming is included in [DPublisher], Section x.x.

Common Streaming uses industry standards to simplify implementation. Common Streaming is based on Common File Format (CFF) as defined in [DMedia]. Consequently, playback of CSF is close to CFF. The streaming protocol is based on MPEG DASH [DASH]. Other Common Streaming functions, such as Licensing, are existing DECE mechanisms.

Nodes that support Common Streaming SHALL support Common Streaming requirements in accordance with DECE Specifications. For avoidance of doubt, this does not preclude any other streaming mechanisms, including those that may differ from Common Streaming only slightly. The intent here is to clearly differentiate between implementations that are compliant and those that are not.

Nodes that stream in accordance with Common Streaming SHALL comply with [DStream].

Requirements for Devices can be found in [DDevice].

14 Discrete Media Rights

See [DDiscrete] for information about Discrete Media Rights.

15 Superdistribution

Superdistribution is any means of distributing DCCs in advance of the recipient purchasing a Right to the DCC. This includes preloading DCCs on media or DECE Devices, sharing DCCs on download services or peer to peer networks, and copying a DCC from one DECE Device to another DECE Device in a different Account. Before Superdistributed Content can be accessed (decrypted), a User must obtain the associated Right.

Superdistribution allows and encourages encrypted Containers to be distributed freely while the Content owner retains control over the ability to use and modify the product. Superdistribution is a highly efficient means of distribution because distribution is not impeded by any barriers and anyone can become a distributor. Superdistributed Content generally requires a license that the User must purchase before being able to play the Content.

15.1 Preparing a Container for Superdistribution

If a Content Provider or Retailer desires to Superdistribute a Container, the Content Provider or Retailer SHALL prepare the Container by ensuring the BasePurlLocation in the Container is set to the Organization Name of the preferred Retailer as described in Section 8.3.3.

A Content Provider or Retailer SHALL also set the `BaseLocation` in a Container intended to be Superdistributed as described in Section 8.3.2.

Setting the `BasePurlLocation` enables a User to purchase a Right to the Content from the preferred Retailer who enabled the Superdistribution. However, it does not guarantee that the User or Device will purchase the Right from the preferred Retailer.

15.2 Licensing Superdistributed Content

If the Content Provider chooses to encrypt the Container, it can be freely Superdistributed without concern since the Content cannot be accessed without a User licensing the Content (in order to obtain the key required to decrypt the Container).

15.2.1 Initial Licensing of Superdistributed Content

When a Superdistributed Container is attempted to be played for the first time, the Device will not have a License for the Container and will attempt License Acquisition as described in Section 12 first trying the license acquisition URL derived from `BaseLocation`, and when that fails the Device will need to use a Retailer or LASP intermediary to do a `RightsTokenGet` query to determine the authoritative license

acquisition URL. However, as the User has not yet purchased a Right to the Content, License Acquisition will fail when no Rights Token is found.

The Device should then prompt the User to purchase a Right to the Content. It may use the `BasePurlLocation` to locate the preferred Retailer's web page for the Container's APID, or it may use another Retailer preferred by the User or the Device as described in Section 10.2. The Retailer's API or web interfaces used to purchase Rights are out of DECE scope.

When the User purchases a Right to the Content, the Retailer will update the Coordinator by calling RightsTokenCreate to add a Rights Token to the User's Rights Locker.

License Acquisition can then proceed. If the Right was purchased from a different Retailer than specified by the `BasePurlLocation`, the Device will locate the License Manager from information in the Coordinator as described in Section 12.2.2. Otherwise, the Device will use `BaseLocation` to create a License Acquisition URL to locate the License Manager as described in Section 12.2.1. As the Right was purchased for the User's Account, License Acquisition should succeed and Content playback should be allowed.

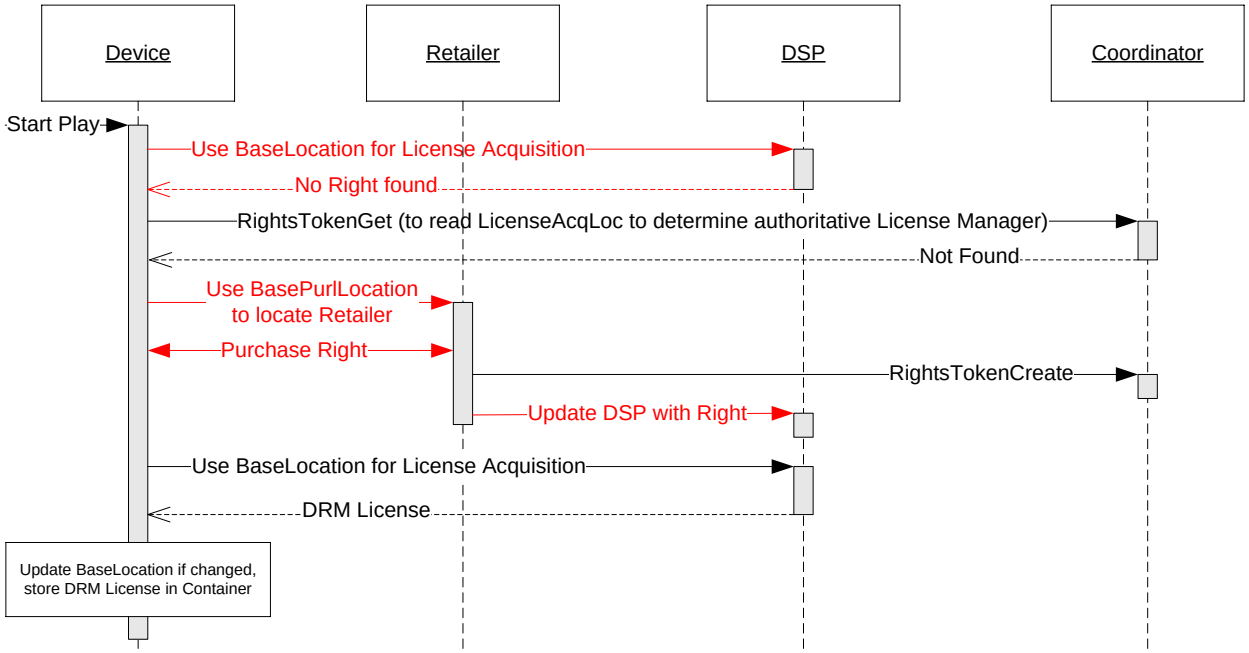


Figure 19 – Superdistributed Container License Acquisition

Note that Figure 19 is simplified:

- authentication is omitted,

- whether the Device uses a Browser or a web service API to communicate with the Retailer is omitted as it is out of DECE scope,
- it omits calls by the Retailer to determine licensing windows (Section 12.4.1) and to verify the Rights Token validity if the information from the Retailer is insufficient,
- the case where the `BaseLocation` is invalid is not shown during the final License Acquisition; in that case the Device would do a `RightsTokenGet` query to obtain the `LicenseAcqBaseLoc` (Section 12.2.2).

15.2.2 Licensing of Copied Content

Once a Container has been played by a User on a Device, it should have the `BaseLocation` set to the Retailer the Right was obtained from, and a native DRM license for the Device's Domain may be stored in the Container as described in Section 12.

If the Container is copied to another Device associated with the Account (as in another Device in the same household), either the cached license in the Container can be used (as it is valid for a Device in the same Domain) or License Acquisition can succeed as the Right will still be in the Account's Rights Locker, regardless of which native DRM the Device uses. The mechanism for Retailers to determine whether or not a Device is associated with an Account is out of scope for DECE.

However, if the Container is copied to a Device that is not associated with the Account, such as to a friend's Device, License Acquisition will fail and a new Right will have to be purchased by the new User, unless the new User already has a Right for the Content.

The result is the same as for the initial Licensing of Superdistributed Content described above in Figure 19. The Device should prompt the User to purchase a Right to the Content using the `BasePurlLocation` or an alternative preferred Retailer. When a Right is purchased, the new User's Rights Locker will be updated, and License Acquisition will succeed and the Container can be played on the User's Device.

16 Appendix A: Ecosystem Parameters

Parameter	User Limits	Description
ACCOUNT_USER_LIMIT	6	The maximum number of concurrent Users per Account.
DISCRETE_MEDIA_LIMIT	none	Defined by Content Provider.
DYNAMIC_LASP_AUTHENTICATION_DURATION	24 hours	The maximum time between user re-authentication to the LASP.
LASP_SESSION_LIMIT	12	The maximum number of concurrent LASP Sessions per Account (i.e., maximum number of concurrent streams for one Account). May be changed by DECE at any time, but will be at least LASP_SESSION_MINIMUM_LIMIT.
LASP_SESSION_MINIMUM_LIMIT	3	The minimum value for LASP_SESSION_LIMIT.
LINK_LASP_ACCOUNT_FLIPPING_LIMIT	9 times per 365 days	The maximum number of times a LLASP account is allowed to re-bind to a previous Account after an intervening bind to a different LLASP.
DYNAMIC_LASP_PERSISTENT_USER_FLIPPING_LIMIT	2 times per 365 days	The maximum number of times a DLASP account is allowed to re-bind to a previous User, for streaming in Persistent User-bound Mode, after an intervening bind to a different LASP. This limit is not currently enforced.
LINK_LASP_ACCOUNT_LIMIT	2	The maximum number of active bindings to any one Account from a LLASP.
DYNAMIC_LASP_PERSISTENT ACCOUNT_LIMIT	1	The maximum number of active bindings to any one User from a DLASP for use in Persistent User-bound Mode.

Table 20 – Ecosystem Parameters

17 Appendix B: (Deleted)

18 Appendix C: Approved Stream Protection Technology List

Licensing Authority	Technology	Video Format Resolution from [DMedia]	Restrictions
Adobe	Flash Access 2.0	SD, HD	
Cisco/SA	PowerKey	SD, HD	Closed Devices
Marlin	Marlin	SD, HD	
Microsoft	MediaRoom	SD, HD	Closed Devices
Microsoft	PlayReady	SD, HD	
Motorola	MediaCipher	SD, HD	Closed Devices
Motorola	SecureMedia	SD, HD	HD, see 18.1
Nagra	Media ACCESS CLK, ELK	SD, HD	Closed Devices
Nagra	MediaAccess PRM	SD, HD	HD, see 18.1
NDS	VideoGuard	SD, HD	Closed Devices
CMLA	CMLA-OMA DRM	SD, HD	
Rovi	DivX DRM Series 5	SD, HD	HD, see 18.1
Verimatrix	VCAS	SD, HD	HD, see 18.1
WideVine	WideVine Version 4.0	SD, HD	

Notes:

Licensing Authority refers to the manufacturer or other entity responsible for licensing the Stream Protection Technology.

Technology is the name, which may include a version, of the Stream Protection Technology that has been approved.

Media Resolution lists which profiles are approved for streaming by the Stream Protection Technology.

Restrictions are other limitations on the use of the Stream Protection Technology as described in Section 18.1.

18.1 Restrictions

Closed Devices	The stream protection technology is only approved for use to provisioned devices under the control and administration of a system operator and using a conditional access system. These devices must not support unrestricted addition of applications or playback of content.
DivX DRM Series 5	Approved for HD Content only on DivX Certified players that follow the robustness rules detailed in the DivX® Certified Test Kit (CTK) DivX Plus Streaming (DPS) Profile Requirements document version 1.0 section 2.12.
Motorola SecureMedia, Nagra Media PRM and Verimatrix VCAS	HD content only on Closed Devices or LASP Clients featuring secure boot, signed software image, scrambled RAM, platform-based decryption, hardware root of trust, and a secure, unique identity that specifies the device type and version. If the LASP Client does not meet the requirements above, only SD resolution playback SHALL be allowed.

END