# Cisco Content Delivery System: TV Streaming Applications

Cisco® Content Delivery System (CDS) product family introduces a novel approach for video content delivery where functions such as content ingest, storage, distribution, ad-insertion, and streaming are performed in an intelligent way across a network-based, modular platform. Such “virtual video server” approach offers unprecedented level of scalability and reliability while providing Service Providers a unique service velocity edge to deliver the next generation of personalized entertainment and interactive media to their subscribers.

The Content Delivery System product family consists of Content Delivery Applications (CDAs), which are the software elements of the CDS (providing capabilities such as ingest, storage, caching, personalization, and streaming) and Content Delivery Engines (CDEs), which are a set of carrier-class, high-performance server appliances.

The Cisco Content Delivery Applications (CDAs) for TV Streaming are a set of standards-based applications that allow carriers to deploy a variety of next-generation, value-added video entertainment services such as Video on Demand, network-based Personal Video Recording (nPVR) and Broadcast Services.

## Product Overview

Cisco TV Streaming applications (CDAs) are software applications that together offer content ingest, storage and delivery to TV sets through cable or IPTV set-top boxes. The TV Streaming Content Delivery Applications are listed in Table 1 below.

**Table 1.** Cisco TV Streaming CDAs

| Content Delivery Applications for TV Streaming | Description |
|---|---|
| **Vault** | The Cisco Vault application provides fast video ingest and resilient, shared storage of a highly scalable content library available to any streaming node on the network. |
| **TV Streamer** | The Cisco TV Streamer application provides video caching, personalization, and streaming capability to set-top boxes and television sets serviced by telco and cable service providers. Cisco CDEs running the TV Streamer applications can either be co-located with Cisco CDEs running the Vault application or distributed closer to the edge of the network. |
| **Content Cache** | The Cisco Content Cache application increases caching efficiency in a large-scale content delivery network by acting as an intermediate, popularity-based cache between Vault and Streamer arrays distributed across the network. |
| **Integrated Streamer-Vault (ISV)** | The Cisco Integrated Streamer-Vault application combines scalable storage and streaming functions in a single CDE for entry-level deployments or those requiring less capacity. |
| **TV Playout** | The Cisco TV Playout application provides video storage and multicast streaming for conventional scheduled or looping content delivery, ideal for deploying broadcast-oriented services such as Public, Education, and Government (PEG) access channels, barker channels, near VoD (nVoD). |

In addition, a Cisco CDS network can be configured and managed through the Cisco Content Delivery System Manager (CDS Manager). Please see CDS Manager data sheet for details.

The capabilities of the Cisco CDS network as “virtual video server” and the specific features and benefits of each Cisco CDA for TV Streaming Services follow.

## Benefits of a Network Based Approach

Thanks to its network-based approach, the Cisco Content Delivery System offers a number of key benefits summarized in Table 2.

**Table 2.** Cisco CDS Features and Benefits

| Feature | Benefit |
|---|---|
| **Superior Scalability** | Modular architecture with Cisco Vault and Streaming applications running independently on separate arrays. This allows independent scaling of content library size and streaming capabilities:<br>• Virtually unlimited amount of content storage and streaming capacity throughout the network.<br>• It is possible to scale from the smallest network to millions of streams without equipment change-outs. |
| **Nonstop Service Availability** | • Unique failover features ensure that hardware failures don’t bring down the network.<br>• Additional streams or storage capacity can be added without outages or service windows. The Cisco CDS automatically detects when new CDEs are added or removed from the system and optimally load balances the entire resource pool. |
| **Dynamic Content Propagation** | A unique content caching protocol ensures that any content is available to be streamed to any subscriber in the network within 300 ms of a request. This is particularly critical to enable real-time and time-shift TV or network-based PVR services. |
| **Hierarchical Caching Architecture** | The system dynamically optimizes its hierarchical cached storage, automatically responding to real-time viewer demand by ensuring that popular content is always available at the network edge, while being able to fetch and stream long tail content within a fraction of a second of viewer request.<br>This also enables dramatic bandwidth savings in the core backbone infrastructure by ensuring that the most popular content is always cached close to the network edge. |
| **Software-Centric Architecture** | Service velocity is achieved by avoiding costly and time-consuming design cycles for proprietary hardware. New functions and services can be added with only a software upgrade and allows service providers to take advantage of new, improved hardware without forklift upgrades. |
| **Management As Single System** | Management is simple, with a single, easy-to-use graphical user interface used to configure, monitor and troubleshoot the Cisco CDEs and applications throughout the entire system.<br>This has a direct impact to reduce OpEx. |

## Operator Services

The above Cisco Content Delivery Applications enable service providers to deploy a number of next-generation video services, such as the following:

### VoD

Integrated with popular back-office systems and utilizing industry-standard protocols, the Cisco CDS lets operators deploy VoD services quickly and economically in either a centralized or decentralized network topology. The Cisco CDS features best in class scaling of both streaming capacity and content library, and can be deployed either in new VoD deployments or as a replacement to an existing VoD system. Once in place providing VoD services, operators can easily leverage the Cisco CDS platform to launch new applications such as time-shift TV and network personal video recording (nPVR).

### Time-Shift TV and nPVR

With the Cisco CDS, operators can economically deliver time-shift TV services to their installed base of digital STBs, allowing users to restart live broadcast programs from the beginning, catch up on past broadcasts or provide the ability to record, rewind, and pause live TV, directly over the network. Recording can either be performed under operator control, or via operator-defined set-top box software that adds the program guide and control features of a PVR integrated with Cisco's advanced video networking technology that is capable of fast ingest, resilient storage, and dense streaming capacity.

### Broadcast Services

The Cisco CDS can be used to broadcast "barker channels" that stream looping promotional content or informational services, such as a TV channel guide. Operators also can schedule and deliver a linear program line-up for PEG channels.

### nVoD

With the Cisco CDS, operators can deploy nVoD services through multicast streaming of non-timeshifted content (such as pay-per-view movies) at staggered intervals across multiple channels. nVoD lets subscribers browse programs of interest and watch them at their convenience, without the bandwidth or infrastructure requirements of a full VoD system.

## Content Delivery Applications for TV Streaming

Table 3 lists the Cisco CDAs currently supported on each Cisco CDE model. To obtain detailed information and technical specifications on all Cisco CDEs please refer to the CDE product literature.

**Table 3.** Cisco TV Streaming CDAs Currently Supported by Each CDE Model

| Content Delivery Application for TV Streaming | Entry Level | Dense | High-End |
|---|---|---|---|
| **Vault** | | CDE220-2A | CDE420-4A |
| **Content Cache** | | | CDE420-4G |
| **TV Streamer** | CDE220-2C1 | CDE220-2C2 | |
| **Integrated Streamer-Vault** | CDE220-2D1 | | |
| **TV Playout** | CDE200 | | |

Key features and product specifications of the Cisco Content Delivery Applications for TV Streaming Services are described in the following pages. Throughout this document, we make reference to Standard Definition Equivalent (SDE) streams and hours: actual amount of streams and hours depends on the specific content encoding mechanisms and rate. Typically, 1 SDE is equal to 1x 3.75Mbps SD MPEG2 or 1/4x HD MPEG2 or 2x SD MPEG4/AVC or 1/2x HD MPEG4/AVC

## Cisco Vault Application

Cisco Vault application provides a number of key Content Delivery System services from highly scalable content acquisition to reliable content storage, from dynamic Trick Mode Creation to optimized content propagation. This makes the Cisco Vault application ideal for VoD, real-time time-shift TV and network-based PVR services.

**Table 4.** Cisco Vault Application Features and Benefits

| Feature | Benefit |
|---|---|
| **Highly Scalable Content Acquisition** | Cisco Vault application offers flexible ingest capability that supports two modes of ingesting content: FTP-based ingest for acquiring content from catcher systems and ingesting real-time content from a broadcast stream. |
| **Reliable Content Storage** | Cisco Vault is typically deployed across an array of CDEs to form a vault array. Content is replicated across multiple CDEs in a vault array to protect against server and network failures. In case of a failure, CDS automatically detects and rebuilds the mirrored copies to protect against any subsequent events. |
| **High Performance Content Propagation** | Cisco Vault application is designed for high-throughput cache fill to the streamers by utilizing an intelligent algorithm that does not constrain the throughput by single disk access speeds. |
| **Dynamic Trick Modes Creation** | Cisco Vault allows operators to specify up to 8 forward and reverse speeds – the corresponding trick mode files are created dynamically during ingest to provide a fast response time to the consumer. |
| **Content Retrieval** | Cisco Vault application allows operators to retrieve content assets in the originally ingested format. This is particularly useful; for example, operators need to re-ingest content in an independent system. |

### Product Specifications

Cisco CDS Vault Application is available in a number of options to service operator needs for scalable content storage. The table below summarizes the options offered.

**Table 5.** Scaling Capabilities of Cisco Vault Application[1]

| Application | CDE Model | Base Storage License[2] | |
|---|---|---|---|
| **Dense Vault** | CDE220-2A | CDAVLT2-6000 | 6,000 SDE Hours |
| **High-End Vault** | CDE420-4A | CDAVLT2-12000 | 12,000 SDE Hours |

## Cisco TV Streamer Application

Cisco TV Streaming application is architected to achieve efficient and personalized streaming to the consumers. Content is obtained and cached from vault arrays in optimally sized segments to balance responsiveness to user and backbone bandwidth usage. Flexible deployment model allows Cisco TV Streamers to either be co-located with the Vault servers or distributed closer to the edge of the Cisco Content Delivery System

**Table 6.** Cisco TV Streamer Application Features and Benefits

| Feature | Benefit |
|---|---|
| **Standards-Based Streaming** | Cisco TV Streamer application supports industry-standard session control mechanisms (such as ISA CORBA and RTSP) and supports a range of real-time control protocols standards (such as LSCP and RTSP). |
| **Stream Resiliency** | Cisco TV Streamer applications are typically deployed across a group of Cisco CDEs forming a stream group. If there is a streaming failure between a Cisco TV Streamer and set-top box, either due to server error or network failures, a secondary TV Streamer takes over the session and will continue streaming from nearly the same frame of the content. |
| **No Single Point of Failure** | Cisco CDS also supports redundant interface to the back office system for processing the stream setup requests and assigning the stream to the streamer that has the most resource availability in the array. |
| **Segmented Cache-Fill Operation** | Unique caching technique allowing 64Kilobytes segments of content to be transferred from the content library in a cache-miss scenario, providing both minimum bandwidth utilization and extremely low latency (less than 300 ms), especially critical for time-shifted TV services |
| **Dynamic Cache Management** | Advanced content popularity algorithms leverage two levels of cache, allowing the most popular content to be always available at the edge of the network and optimizing network bandwidth. This proves particularly beneficial in a large regional or nationwide configuration, where it is likely that two or more people will request access to the same content concurrently. |

[1] Please see the latest Cisco Global Price List for availability of each model.
[2] Includes Content and Trick Modes assets.

### Product Specifications

Cisco CDS TV Streaming Application is available in a variety of base licenses and software upgrade options to provide maximum flexibility to service operators who want to tailor the Cisco Content Delivery System to their deployment scenarios and seamlessly grow their stream count over time. The table below provides a summary of the available options.

**Table 7.** Scaling Capabilities of Cisco TV Streamer Application[3]

| Application | CDE Model | Base License | | Maximum Configuration |
|---|---|---|---|---|
| **Entry-Level TV Streamer** | CDE220-2C1 | CDATSTR2-0500 | 500 SDE[4] Streams | 750 SDE Streams |
| **Dense TV Streamer** | CDE220-2C2 | CDATSTR2-1000 | 1000 SDE Streams | 2500[5] SDE Streams |

## Cisco Content Cache Application

Cisco Content Cache application is a high-performance component of the Cisco CDS Network and a building block of the Cisco Virtual Video Infrastructure (VVI). It is optimized to perform intelligent caching of MPEG2 and MPEG4 video content and allows service providers to manage unprecedented scale and complexity of deploying Video 2.0 services fast. Additional information on Cisco's VVI can be found on Cisco.com

**Table 8.** Cisco Content Cache Application Features and Benefits

| Feature | Benefit |
|---|---|
| **Dynamic Cache Management** | Advanced content popularity algorithms leverage two levels of cache, allowing the most popular content to be always available at the edge of the network and optimizing network bandwidth. This proves particularly beneficial in a large regional or nationwide configuration, where it is likely that two or more people will request access to the same content concurrently. |
| **Distributed Asset Location** | Cisco Content Cache application enhances the Cisco CDS system by expanding the caching capabilities at the edge of network and allowing content to be filled from any Cisco Vault located across the distributed content library network if necessary. |
| **Cache Resiliency** | Cisco Content Cache applications are deployed across a group of Cisco CDEs, forming a stream group. If there is a failure between a Cisco TV Streamer and set-top box, either due to server error or network failures, a secondary TV Streamer takes over the session and will continue streaming from nearly the same frame of the content. |
| **HTTP Gateway** | Cisco Content Cache application can optionally support an HTTP gateway interface for integration with third-party streaming servers. |

### Product Specifications

Cisco Content Cache Application is available today as described in the Table below.

**Table 9.** Scaling Capabilities of Cisco Content Cache Application[6]

| Application | CDE Model | Base License | | Optional Feature License |
|---|---|---|---|---|
| **Content Cache** | CDE420-4G | CDACACHE2 | • 10,000 GB Cache Capacity<br>• 10 Gbps Throughput | CDACACHE2-HTTP |

[3] Please see the latest Cisco Global Price List for availability of each model.
[4] SDE: Standard Definition Equivalent. Typically 1 SDE = 1x 3.75Mbps SD MPEG2, 1/4x HD MPEG2, 2x SD MPEG4/AVC, 1/2x HD MPEG4/AVC.
[5] Copper based model only. Fiber based model has fewer physical interfaces and will support maximum 1900 SDE streams
[6] Please see the latest Cisco Global Price List for availability of each model.

## Cisco Integrated Streamer-Vault (ISV) Application

Cisco Integrated Streamer-Vault application is a very flexible solution for deployment scenarios where the scaling requirements for content storage and streaming are relatively small or for a centralized architecture where both functions reside in the same location.

**Table 10.** Cisco Integrated Streamer-Vault Application Features and Benefits

| Feature | Benefit |
|---|---|
| **Content Acquisition** | Cisco ISV application offers flexible ingest capability that supports two modes of ingesting content: FTP-based ingest for acquiring content from catcher systems and ingesting real-time content from a broadcast stream. |
| **Reliable Content Storage** | Cisco ISV application acts a single Vault-Streamer system suitable for small deployments. Content is replicated locally across multiple disks to protect against failures. |
| **Dynamic Trick Modes Creation** | Cisco ISV allows operators to specify up to 8 forward and reverse speeds -- the corresponding trick mode files are created dynamically during ingest to provide a fast response time to the consumer. |
| **Standards-based Streaming** | Cisco ISV application supports industry-standard session control mechanisms (such as ISA CORBA and RTSP) and supports a range of real-time control protocols standards (such as LSCP and RTSP). |

## Specifications

Cisco CDS Integrated Streamer-Vault Application is available with a base license for a minimum number of content hours and streams and can be updated via software upgrade options to provide maximum flexibility to service operators who want to grow their deployment over time. The table below summarizes the available options.

**Table 11.** Scaling capabilities of Cisco Integrated-Streamer-Vault (ISV) Application[7]

| Application | CDE Model | Base License | | Maximum Configuration |
|---|---|---|---|---|
| **Integrated Streamer-Vault** | CDE220-2D1 | CDATSV2-0300-2000 | 2000 SDE [8] Hours<br>300 SDE Streams | 3000 SDE Hours<br>750 SDE Streams |

## Cisco TV Playout Application

Cisco TV Playout application provides content ingest and storage capabilities, as well as scheduled or looped play out of content. A typical use of this application is for streaming promotional, educational or governmental (PEG) programs, but is also suitable for nVOD services where subscribers browse programs of interest and watch them at their convenience.

**Table 12.** Cisco TV Playout Application Features and Benefits

| Feature | Benefit |
|---|---|
| **Local Content Ingest** | Cisco TV Playout application supports a manual ingest interface to allow content to be ingested locally using FTP from an external server. |
| **User Friendly Interface** | Cisco TV Playout application features an intuitive scheduler interface that allows operators to create time-of-day based or looped playlists |
| **Export Interface** | Cisco TV Playout supports an export interface that allows operators to easily replicate Playlist schedule across multiple sites |
| **Resiliency** | Cisco TV Playout can be deployed across two CDEs, which can be configured to run in an “Active-Active” or “Active-Standby” model |

[7] Please see the latest Cisco Global Price List for availability of each model
[8] SDE: Standard Definition Equivalent. 1 SDE = 1x 3.75Mbps SD MPEG2, 1/4x HD MPEG2, 2x SD MPEG4/AVC, 1/2x HD MPEG4/AVC

## Specifications

**Table 13.** Scaling Capabilities of Cisco TV Playout Application

| Application | CDE Model | Base License | |
|---|---|---|---|
| **TV Playout** | CDE200[9] | CDAPLAYOUT | 3000 SDE[10] Hours<br>200 SDE Streams<br>200 SD Channels Ingest |

## Ordering Information

Tables 14 and 15 list the Cisco CDS TV software application product descriptions and part numbers required to place an order. Before you place an order, please check the availability of the part number by checking the Cisco Global Price List. To place an order, visit the Cisco Ordering Home Page and refer to Tables 14 and 15.

**Table 14.** Ordering Information for Basic Cisco CDAs[11]

| Product Name | Part Number | Product Description | Supported CDEs |
|---|---|---|---|
| **TV Streamer** | CDATSTR2-0500 | TV Stream Application, 500 SD Streams | CDE220 Model 2C1 |
| | CDATSTR2-1000 | TV Stream Application, 1000 SD Streams | CDE220 Model 2C2 |
| **Vault** | CDAVLT2-6000 | Vault Application, 6000 Hours SD | CDE220 Model 2A |
| | CDAVLT2-12000 | Vault Application, 12000 Hours SD | CDE420 Model 4A |
| **Content Cache** | CDACACHE2 | Content Cache Application | CDE420 Model 4G |
| **Integrated Streamer-Vault** | CDATSV2-0300-2000 | ISV Application: 300 SD TV streams, 2000 Hours SD | CDE220 Model 2D1 |
| **TV Playout** | CDAPLAYOUT | Playout, NVOD, Barker Application | CDE200 |

**Table 15.** Ordering Information for Optional CDAs Licenses and Upgrades

| Product Name | Part Number | Product Description | Supported CDEs |
|---|---|---|---|
| **TV Streaming Upgrade Licenses** | CDATSTR-UP50 | Additional 50 SD TV Stream Licenses | CDE220 Model 2C1;<br>CDE220 Model 2C2;<br>CDE220 Model 2D1 |
| **Stream Resiliency Upgrade** | CDATSTR-R50 | Stream Resiliency Option, 50 Streams | CDE220 Model 2C1;<br>CDE220 Model 2C2;<br>CDE220 Model 2D1 |
| **HTTP Gateway Upgrade** | CDACACHE2-HTTP | HTTP Gateway License for Content Cache | CDE420 Model 4G |
| **Vault Upgrade Licenses** | CDAVLT-UP100 | Vault Upgrade, 100 additional hours SD | CDE220 Model 2D1 |

## Service and Support

Cisco offers a wide range of services programs to accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. Cisco services help you protect your network investment, optimize network operations, and prepare your network for new applications to extend network intelligence and the power of your business. For more information about Cisco services, refer to Cisco Technical Support Services or Cisco Advanced Services.

[9] TV Playout is not yet supported on next-generation CDE220, but will be supported in future
[10] SDE: Standard Definition Equivalent. 1 SDE = 1x 3.75Mbps SD MPEG2, 1/4x HD MPEG2, 2x SD MPEG4/AVC, 1/2x HD MPEG4/AVC
[11] Please see the latest Cisco Global Price List for availability of each model

## For More Information

For more information about the Cisco Content Delivery System or the Cisco Content Delivery Engines, refer to Cisco Content Delivery System product literature.

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