Cisco Content Delivery Engines – Generation 1

The Cisco® Content Delivery Engines (CDEs) are a family of carrier-class appliances that power the Cisco Content Delivery System (CDS), an innovative, network-based, modular video-delivery platform. The Cisco CDS delivers an unprecedented level of scalability and reliability, while giving service providers a unique service-velocity advantage in enabling the next generation of personalized entertainment and interactive media. The Cisco CDS platform combines CDEs with Content Delivery Applications (CDAs), software elements that provide real-time, scalable, and resilient capabilities such as ingest, storage, caching, personalization, and streaming. Cisco CDEs and CDAs can be flexibly configured to support a host of networked value-added services that telcos, cable operators, and other service providers can rapidly deploy in order to attract and retain subscribers.

Networked Cisco CDEs work together to form a scalable, flexible, and highly available system that enables telcos, cable operators, and other service providers to rapidly deploy a variety of high-value services, such as video on demand (VoD), time-shift TV, network personal video recording (nPVR), and targeted ad insertion.

Product Overview

Cisco CDEs form the hardware foundation of the Cisco CDS platform, which consists of a number of networked, multifunction server appliances which can be centrally managed as a single "virtual" server. Each Cisco CDE within the virtual server performs one or more functions depending on which of the CDAs are installed on it.

Cisco CDAs can be grouped into the following service types:

- TV streaming: Content delivery to TV sets through cable or IPTV set-top boxes
- Internet streaming: Content delivery to IP devices connected to the Internet
- Visual quality experience: Error repair, statistics gathering, and channel-change-time acceleration

Table 1 lists the Cisco CDAs currently supported on each CDE. To obtain detailed information on all CDAs, please refer to the CDA product literature.

Table 1. Cisco CDAs Currently Supported by Each CDE Model

Service Type	Content Delivery Application	CDE100	CDE110-1	CDE110-2	CDE200	CDE300	CDE400
TV Streaming	CDS Manager—TV streaming	Yes					
	Vault				Yes		Yes
	TV Streamer				Yes	Yes	
	TV PlayOut				Yes		Yes
	Integrated Streamer-Vault (ISV)				Yes		Yes
	Video Navigator			Yes			
Internet Streaming	CDS Manager—Internet streaming	Yes					
	Internet Streamer	Yes			Yes		
	Service Router				Yes		
	Content Acquirer				Yes		
Visual Quality Experience (VQE)	VQE Channel Provisioning Tool (VCPT)		Yes				
	VQE Server		Yes				

Key Features and Benefits

Designed for maximum flexibility, Cisco CDEs can be grouped into arrays that operate as a single logical system. Service providers can easily expand capacity by simply attaching additional CDEs to the array, thereby achieving virtually unlimited video storage and streaming capacity. The Cisco CDS employs a unique hierarchical storage design that allows service providers to maintain huge content libraries, while actually simplifying content storage management. With a logically distributed architecture that can separate ingest and storage from streaming, each function can be scaled independently of the other by simply adding another Cisco CDE—which dynamically increases the pooled ingest, storage, caching, and streaming resources available throughout the network.

Cisco CDEs adapt automatically to unpredictable and rapidly changing traffic patterns. The platform preserves video programming in a common, shared storage array that is instantly accessible for streaming anywhere in the network. Cisco's Intelligent Caching technology automates the distribution of video content between Cisco CDEs by responding dynamically to actual viewer demand and popularity trends. This adaptive content distribution model helps ensure that the content that is most popular at any point in time at each network node is always available in local storage—reducing the bandwidth burden on the network backbone by 95 percent or more. This flexible architecture and the effectively unlimited scalability of content libraries make the Cisco CDS the industry's only solution for efficiently and cost-effectively delivering long-tail content, network-based time-shifted programming, and user-generated content. This serves to maximize the network's scalability while at the same time minimizing capital expenditures (CapEx) and operating expenses (OpEx).

Cisco CDEs are also designed for fault-tolerant operation. They can share state and work together as a single logical pool of resources that can be dynamically re-allocated across the network's available hardware capacity in response to service requests. In the event of hardware failure (if a disk crashes, an I/O card fails, or even if an entire vault server goes down), the Cisco CDS immediately delegates the functions being performed by the failed device to other Cisco CDEs in

the network. Furthermore, the system automatically discovers the addition or removal of a Cisco CDE and reconfigures itself without service disruption or manual intervention, vastly simplifying maintenance and upgrade operations.

A network populated with Cisco CDEs becomes a platform upon which new services and applications can be layered over time and deployed much more quickly than was possible in the past—unleashing the power of IP networking technology by creating a video infrastructure capable of delivering nonstop availability, unprecedented scalability, and low total cost of ownership. Taking advantage of the extensible architecture of the Cisco CDS, operators can deploy on-demand video services today with the knowledge that they can expand their services to support real-time applications and multiple forms of rich-media content delivered to many types of devices.

A summary of the features and benefits of the Cisco Content Delivery Engines appear in Table 2.

Table 2.   Cisco CDE Features and Benefits

Feature	Benefit
Multifunction capabilities	Facilitate design and implementation of a converged content delivery architecture for any type of video user interface.
	Accelerate deployment of new services by enabling new applications on the existing Cisco CDE network infrastructure with only a software upgrade.
	Simplify service provider's personnel training and equipment sparing strategies.
Logic server arrays	Resource pooling and load balancing enable Cisco CDEs to be networked into logic server arrays that can provide virtually unlimited amounts of content storage (vault array) and streaming capacity (streamer array) throughout the network.
	Additional streams or storage capacity can be added to the array without outages or service interruption. The Cisco CDS detects when new CDEs are added or removed from the logic array and optimally load balances the entire resource pool.
	Independent scaling of content library size and stream count optimizes CapEx.
Multi-topology support	The network-based architecture of the Cisco CDS supports a variety of network topologies including centralized, distributed, and hybrid approaches. This gives service providers the flexibility to adopt the appropriate deployment strategy for each site depending on expected demand and network connectivity considerations.
Intelligent caching	Unlike traditional video delivery systems, the Cisco CDS does not require operators to predict which content will be requested the most and when. Cisco's Intelligent Caching algorithm is constantly running across all CDEs, making traffic-based decisions on where each asset should be cached. This automatically optimizes content distribution based on ever-changing content popularity.
	The unique Intelligent Caching algorithm helps ensure that any content not available on the local streamer cache when requested will be streamed to any subscriber in the network within 300 ms of a request and made available locally for future requests (cache fill).
	This approach allows users to perceive all content as local while at the same time reducing metropolitan bandwidth consumption by 95 percent or more (typically over 95 percent of the content requested is made available locally by the Intelligent Caching algorithm).
Non-stop service availability	Unique failover features help ensure that hardware failures don't bring down the network, eliminating service outages.
	The content library is resiliently stored on vault arrays with fast mirroring and hitless failover.
	Cisco CDEs in streamer arrays constantly interact to provide enhanced resiliency.
High-performance streaming	Low-level drivers are optimized for industry-leading streaming performance, helping the service provider achieve the lowest possible CapEx.
Industry-leading ingest capabilities	With the ability to simultaneously ingest 200 standard-definition streams per server, Cisco CDEs offers a unique platform to enable real-time services and time-shifting applications.
Optimized storage cost structure	The Cisco CDS minimizes CapEx by storing content libraries on inexpensive SATA devices and automatically caching the most popular content in DRAM and on fast SAS disks in the streaming devices.
Centralized management	Management is simple, with a single, easy-to-use GUI to configure, monitor, and troubleshoot the Cisco CDEs and applications throughout the entire system.
	Management simplicity contributes to reduction in OpEx.

Cisco CDE Models

There are five models of Cisco CDEs. Each CDE is optimized for the CDAs that are supported on it, as shown in Table 1. Table 3 shows a high-level summary of all Cisco CDEs.

Table 3. High-Level Cisco CDE Summary

	Rack Space	Processors	Storage	Memory (DRAM)	I/O[1]
CDE100	1RU	One dual-core	290 GB (4x 73-GB SCSI)	4 GB	2 TX GE
CDE110	1RU	Two dual-core	CDE110-1: 36 GB (1x 36-GB SAS)	CDE110-1: 4 GB	4 TX GE
			CDE110-2: 438 GB (3x 146-GB SAS)	CDE110-2: 8 GB	
CDE200	2RU	Two dual-core	6 TB (12 x 500-GB SATA)	8 GB	Copper: 4 TX GE / Fiber: 4 SX GE
CDE300	3RU	Two dual-core	1.15 TB (16x 73-GB SCSI)	16 GB	Copper: 12 TX GE / Fiber: 8 SX GE
CDE400	4RU	Two dual-core	12 TB (24x 500-GB SATA)	4 GB	Copper: 6 TX GE / Fiber: 6 SX GE

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[1] In addition to these interfaces, all models of the Cisco CDE200, CDE300, and CDE400 have two TX GE interfaces on the motherboard, one of which is typically used for out-of-band management. On the CDE400, the second interface on the motherboard is used as an ingest interface.

Cisco CDE100

Figure 1.   Cisco CDE100

The Cisco CDE100 (Figure 1) is a 1-rack-unit (1RU) device optimized to run the Cisco CDS Manager Application for both TV streaming and Internet streaming types of services. A single Cisco CDE100 can be used to configure and manage an entire Cisco CDS consisting of many CDEs. Furthermore, monitoring and reporting can be performed not only for each network element, but also for an array or even an entire Cisco CDS using a "command once, manage many" model that simplifies operations and reduces OpEx.

Each Cisco CDE100 is AC-powered and has two 10/100/1000BASE-T copper network interfaces. Table 4 provides product specifications.

Table 4.   Technical Specifications for the Cisco CDE100

Rack units	1
Storage	290 GB SCSI (4x 73-GB SCSI disks)
Memory	4 GB DRAM
Network interfaces	Two 10/100/1000BASE-T (copper)
Other interfaces	One serial port for console
Compact Flash	128 MB
Optical drive	CD/DVD-ROM
Power	100-240 VAC; Single, internal power supply
Power rating	350W peak
Humidity	5 to 95% noncondensing
Operating temperature	0 to 35°C (32 to 95°F)
Altitude	−60 to 4000m
Dimensions (H x W x D)	1.75 x 19 x 27.6 in. (4.45 x 48.26 x 70.10 cm)
Weight (fully configured)	35 lb (15.88 kg)
Approvals: Safety	UL 1950, 3rd edition
Approvals: EMC	FCC Part 15 Class A (USA)

Cisco CDE110

Figure 2.   Cisco CDE110

The Cisco CDE110 (Figure 2) is a 1RU appliance that is available in two hardware configurations. The Cisco CDE110-1 model currently runs a number of Cisco Visual Quality Experience Applications. The Cisco CDE110-2 model supports the Cisco Video Navigator Application. Both configurations of the Cisco CDE110 server appliance are available with AC or DC power, optionally configurable with a redundant power supply.

Table 5.   Technical Specifications for Cisco CDE110

	Cisco CDE110-1	Cisco CDE110-2
Rack units	1	1
Storage	36 GB SAS (1x 36 GB SAS)	438 GB SAS (3x 146 GB SAS)
Memory	4 GB DRAM	8 GB DRAM
Network interfaces	Four 10/100/1000BASE-T (copper)	Four 10/100/1000BASE-T (copper)
Other interfaces	Two RJ-45 console interfaces	Two RJ-45 console interfaces
Compact Flash	None	4 GB
Hardware RAID	None	Standard
Optical drive	CD/DVD-ROM	CD/DVD-ROM
Power	115-240 VAC or -48 VDC; Optional redundant power supply	115-240 VAC or –48 VDC; Optional redundant power supply
Power rating	450W	450W
Humidity	5 to 90% noncondensing	5 to 90% noncondensing
Operating temperature	5 to 40°C (41 to 104°F)	5 to 40°C (41 to 104°F)
Altitude	0 to 4000m	0 to 4000m
Dimensions (H x W x D)	1.70 x 17 x 20 in. (4.45 x 43.2 x 50.8 cm)	1.70 x 17 x 20 in. (4.45 x 43.2 x 50.8 cm)
Weight (fully configured)	28 lb (12.7 kg)	28 lb (12.7 kg)
Approvals: Safety	UL60950-1, 1st Edition/CSA 22.2 60950-1, Low Voltage Directive	UL60950-1, 1st Edition/CSA 22.2 60950-1, Low Voltage Directive.
Approvals: EMC	FCC 47 CFR Parts 2 and 15, Verified Class A Limit	FCC 47 CFR Parts 2 and 15, Verified Class A Limit

Cisco CDE200

Figure 3.　Cisco CDE200

The Cisco CDE200 (Figure 3) is a 2RU device that can run a variety of Cisco Content Delivery Applications for both TV streaming and Internet streaming service types. The Cisco CDE200 can be purchased with either four 10/100/1000BASE-T interfaces or four 1000BASE-SX interfaces. In both models two 10/100/1000BASE-T interfaces are available for management. The Cisco CDE200 comes with either AC or DC redundant power supplies.

Table 6.　Technical Specifications for Cisco CDE200

Rack units	2
Storage	6 TB SATA (12x 500-GB SATA)
Memory	8GB DRAM
Network interfaces	Copper: Four 10/100/1000BASE-T Fiber: Four 1000BASE-SX
Other interfaces	Two 10/100/1000BASE-T on motherboard of which one is used for out-of-band management; one serial port for console
Compact Flash	128 MB
Optical drive	None
Power	115–240 VAC or –48 VDC; Redundant power supplies included
Power rating	500W
Humidity	5 to 95% noncondensing
Operating temperature	0 to 35°C (32 to 95°F)
Altitude	–60 to 4000m
Dimensions (H x W x D)	3.50 x 17.50 x 28.50 in. (8.90 x 44.45 x 72.39 cm)
Weight (fully configured)	53.5 lb (24.27 kg)
Approvals: Safety	UL 1950, 3rd edition
Approvals: EMC	FCC Part 15 Class A (USA)

Cisco CDE300

Figure 4. Cisco CDE300

The Cisco CDE300 and CDE302 (Figure 4) are 3RU devices optimized to run the Cisco TV Streamer Application. Each has 1.15 TB of SCSI storage capacity. With high-performance SCSI disks and DRAM cache, these Cisco CDEs maximize streaming capacity.

The Cisco CDE300 and CDE302 each has two network interface options; they can be purchased with either twelve 10/100/1000BASE-T interfaces or eight 1000BASE-SX interfaces. In both cases two additional 10/100/1000BASE-T interfaces are available for management functions. The Cisco CDE300 and CDE302 come with either AC or DC redundant power supplies.

The only difference between the Cisco CDE300 and the CDE302 is the initial amount of stream licenses bundled with the appliance.

Technical Specifications for Cisco CDE300 and CDE302

Rack units	3
Storage	1.15 TB SCSI (16x 73-GB SCSI disks)
Memory	16 GB DRAM
Network interfaces	Copper: Twelve 10/100/1000BASE-T Fiber: Eight 1000BASE-SX
Other interfaces	Two 10/100/1000BASE-T on motherboard of which one is used for out-of-band management; one serial port for console
Compact Flash	None
Optical drive	None
Power	100–240 VAC or –48 VDC; Redundant power supplies included
Power rating	650W peak; 506W nominal
Humidity	5 to 90% noncondensing
Operating temperature	0 to 35°C (32 to 95°F)
Altitude	–60 to 4000m
Dimensions (H x W x D)	4.75 x 17.25 x 27.50 in. (12.1 x 43.8 x 69.9 cm)
Weight (fully configured)	125 lb (56.7 kg)
Approvals: Safety	UL 1950, 3rd edition
Approvals: EMC	FCC Part 15 Class A (USA)

Cisco CDE400

Figure 5.   Cisco CDE400

The Cisco CDE400 (Figure 5) is a 4RU device that can run Cisco Vault, TV Playout, or Integrated Streamer-Vault Applications.

The Cisco CDE400 can be purchased with either four 10/100/1000BASE-T interfaces or four 1000BASE-SX interfaces. In both cases, two 10/100/1000BASE-T interfaces are available for management functions. The Cisco CDE400 comes with either AC or DC redundant power supplies.

Table 7.   Technical Specifications for Cisco CDE400

Rack units	4
Storage	12 TB SATA (24x 500-GB SATA disks)
Memory	4 GB DRAM
Network interfaces	Copper: Six 10/100/1000BASE-T Fiber: Six 1000BASE-SX
Other interfaces	Two 10/100/1000BASE-T on motherboard of which one is used for out-of-band management and the other for Ingest; one serial port for console
Compact Flash	None
Optical drive	None
Power	100-240 VAC or –48 VDC; Redundant power supplies included
Power rating	950W peak; 627W nominal
Humidity	5 to 95% noncondensing
Operating temperature	0 to 35°C (32 to 95°F)
Altitude	–60 to 4000m
Dimensions (H x W x D)	7.00 x 17.25 x 26.50 in. (17.8 x 43.8 x 67.3 cm)
Weight (fully configured)	150 lb (68.0 kg)
Approvals: Safety	UL 1950, 3rd edition
Approvals: EMC	FCC Part 15 Class A (USA)

Ordering Information

Table 9 lists the Cisco CDE 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 Table 9.

Table 8. Ordering Information

Part Number	Product Description
CDE100-1-073TXA-K9	1RU Engine, 290G Storage, GE TX, AC, 1 Content Del. Appl.
CDE110-1-036TXA-K9	1RU Engine, 36G HDD GE TX, AC incl. 1 Content Del. Appl.
CDE110-1-036TXD-K9	1RU Engine, 36G HDD GE TX, DC incl. 1 Content Del. Appl.
CDE110-2-146TXA-K9	1RU Engine, 3x146G HDD GE TX, AC, 1 Content Del. Appl
CDE110-2-146TXD-K9	1RU Engine, 3x146G HDD GE TX, DC, 1 Content Del. Appl
CDE200-2-500TXA-K9	2RU Engine, 6TB Storage, GE TX, AC, 1 Content Del. Appl.
CDE200-2-500TXD-K9	2RU Engine, 6TB Storage, GE TX, DC, 1 Content Del. Appl.
CDE200-2-500SXA-K9	2RU Engine, 6TB Storage, GE SX, AC, 1 Content Del. Appl.
CDE200-2-500SXD-K9	2RU Engine, 6TB Storage, GE SX, DC, 1 Content Del. Appl.
CDE300-4-073TXA-K9	3RU Engine, 1TB Storage, GE-TX, AC, 1 Content Del. Appl.
CDE300-4-073TXD-K9	3RU Engine, 1TB Storage, GE-TX, DC, 1 Content Del. Appl.
CDE300-4-073SXA-K9	3RU Engine, 1TB Storage, GE-SX, AC, 1 Content Del. Appl.
CDE300-4-073SXD-K9	3RU Engine, 1TB Storage, GE-SX, DC, 1 Content Del. Appl.
CDE302-4-073TXA-K9	3RU Engine, 1TB Storage, GE-TX, AC, 1 Content Del. Appl.
CDE302-4-073TXD-K9	3RU Engine, 1TB Storage, GE-TX, DC, 1 Content Del. Appl.
CDE302-4-073SXA-K9	3RU Engine, 1TB Storage, GE-SX, AC, 1 Content Del. Appl.
CDE302-4-073SXD-K9	3RU Engine, 1TB Storage, GE-SX, DC, 1 Content Del. Appl.
CDE400-2-500TXA-K9	4RU Engine, 12TB Storage, GE TX, AC, 1 Content Del. Appl.
CDE400-2-500TXD-K9	4RU Engine, 12TB Storage, GE TX, DC, 1 Content Del. Appl.
CDE400-2-500SXA-K9	4RU Engine, 12TB Storage, GE SX, AC, 1 Content Del. Appl.
CDE400-2-500SXD-K9	4RU Engine, 12TB Storage, GE SX, DC, 1 Content Del. Appl.
Hardware Options and Spares	
CDE-PWR-11X-A	AC Power supply for CDE110
CDE-PWR-11X-D	DC Power supply for CDE110
CDE-PWR-11X-A=	AC Power supply for CDE110
CDE-PWR-11X-D=	DC Power supply for CDE110
CDE-PWR-20X-A=	AC Power supply for CDE200
CDE-PWR-20X-D=	DC Power supply for CDE400
CDE-PWR-30X-A=	AC Power supply for CDE30x
CDE-PWR-30X-D=	DC Power supply for CDE30x
CDE-PWR-40X-A=	AC Power supply for CDE400
CDE-PWR-40X-D=	DC Power supply for CDE400
CDE-HDD-SATA-500=	500 GB SATA Disk Drive for CDE200 and CDE400
CDE-HDD-SCSI-073=	073 GB SCSI Disk Drive for CDE100 and CDE30x
CDE-HDD-SAS-146=	Spare 146GB SAS Disk Drive for CDE110-2
CDE-RCK-EIA19=	Spare rack mount kit, EIA 19 inch for the Cisco CDE110
CDE-RCK-EIA23ETSI=	Spare rack mount kit, EIA 23 inch and ETSI for the Cisco CDE110

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.

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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