CHAPTER 1

Introducing the Cisco CDE110

This chapter provides an overview of the Cisco Content Delivery Engine 110 (CDE110) hardware and includes the following major topics:

Introduction

The hardware components in the various CDE110 models are customized for the specific processing and storage requirements of the Cisco Content Delivery Applications (CDAs) that each model hosts. The CDE110 models are as follows:

- For Cisco CDS Video Navigator (CDS Video Navigator) and Cisco TV Content Delivery System Manager (TV CDSM), the models are CDE110-2-146TXA-K9 and CDE110-2-146TXD-K9.
- For Cisco Visual Quality Experience (VQE), the models are:
  - CDE111-2-146TXA-K9 and CDE111-2-146TXD-K9
  - CDE110-1-036TXA-K9 and CDE110-1-036TXD-K9

For detailed specifications on the hardware components in each of the CDE110 models, see Appendix A, "Technical Specifications and Part Numbers."

The Cisco CDE110 includes the following hardware components:

- Two 64-bit Quad-Core Intel Xeon L5410 processors with 12 MB of shared L2 cache, or two 64-bit Dual-Core Intel Xeon LV 5148 processors with 4 MB of shared L2 cache
- For memory, dual-channel Fully Buffered DIMM (FB-DIMM) technology at 667 MHz
- One 1U chassis
- For hard disk drives, simple-swap serial attached SCSI (SAS) disk drives
- With Cisco CDS Video Navigator and TV CDSM models, components for Hardware RAID
- Three SAS hard disk drive trays
- One combination CD/DVD RW combo drive
- For all CDE110 models except CDE110-1-036TXA-K9 and CDE110-1-036TXD-K9, a 4-GB flash drive
- One 450W AC or DC power supply (for redundancy a separately orderable power supply is needed)
- Ports supported
  - Network—Integrated four-port 10/100/1000 Mbps Ethernet.
  - PS/2—Keyboard and mouse connections
  - USB 2.0 ports—Three: one front/two rear
  - COM ports—Two: one front/one rear
- For Video Quality Experience models CDE111-2-146TXA-K9 and CDE111-2-146TXD-K9, a PCI Express riser card and Intel PRO/1000 PT Dual Port Server Adapter (with two 10/100/1000 Mbps Ethernet ports) is installed.
- Four dualrotor fans for cooling the processor(s), DIMM(s), PCI slot(s) and other internal components
- Cables and connectors

All hardware components are pre-installed in the Cisco CDE110 appliance.

In addition to the Red Hat Linux operating system and other third-party software, the Cisco CDE110 also includes a set of Cisco CDS/CDA software components.

- On Cisco CDS Video Navigator models of the CDE110, the CDS Video Navigator software is pre-installed. For information on configuring and using the Cisco CDS Video Navigator software, see the *Cisco CDS Video Navigator Application User Guide*.
- On Cisco TV Content Delivery System Manager models of the CDE110, the TV CDSM software is pre-installed. For information on configuring and using TV CDSM, see one of the following documents depending on your deployment type:
  - *Cisco TV CDS 2.0 ISA Software Configuration Guide*
  - *Cisco TV CDS 2.0 RTSP Software Configuration Guide*
- On Cisco Visual Quality Experience models of the CDE110, either Cisco VQE Server (VQE-S) software or VQE Tools software (VQE Channel Provisioning Tool [VCPT] and VQE Client Channel Configuration Delivery Server) is pre-installed. For information on configuring and using the software, see the *Cisco CDA Visual Quality Experience Application User Guide*.

A CD with the software is included with the product in case software needs to be reinstalled.

Hardware Features

This chapter briefly describes the main features of the Cisco CDE110. This chapter provides a diagram of the product, a list of the server features, and diagrams showing the location of important components and connections on the server system.

Figure 1-1 shows the Cisco CDE110.

Figure 1-1 Cisco CDE110

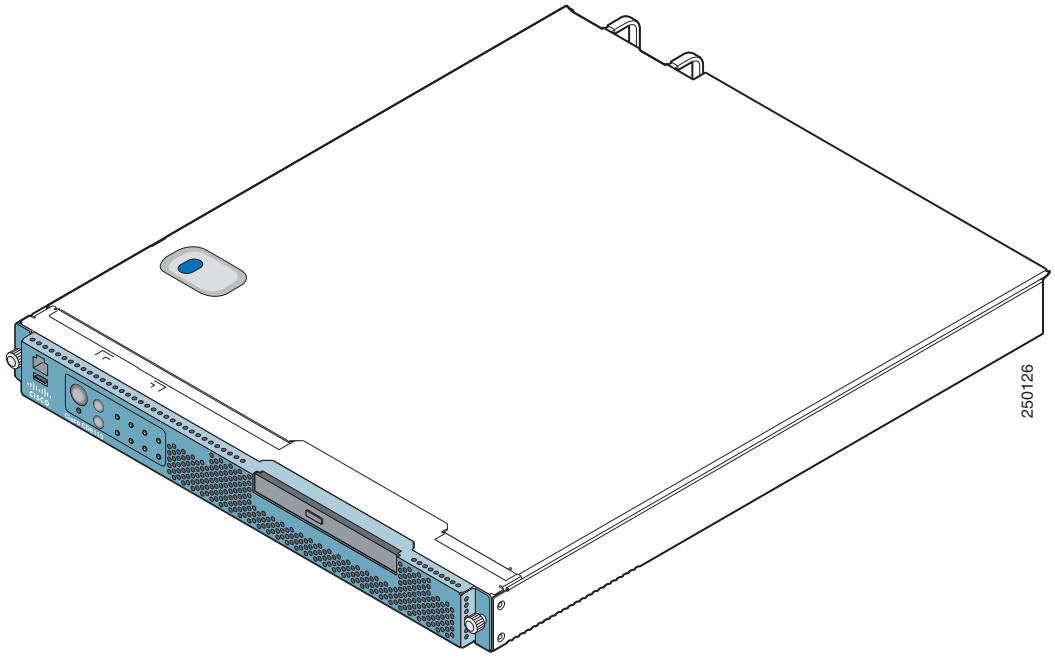


Table 1-1 summarizes the major features of the server system.

Table 1-1 Cisco CDE110 Features

Feature	Description
Compact, high-density system	Rack-mount server with a height of 1U (1.75 inches) and a depth of 20.0 inches
Serviceability	Rear access to hot-swappable power supplies Front access to hot-swappable disk drives
Availability	Two hot-swappable 450W power supplies in optional redundant (1+1) configuration Integrated support for software RAID levels 0 and 1 using three internal hot-swappable 2.5-inch SAS (Serial Attached SCSI) disk drives and RAID levels 0, 1, and 10 when using additional external SAS drive(s) through rear-panel connector. For Cisco CDS Video Navigator and TV CDSM models, provides ROMB (RAID On Mother Board) hardware RAID operation for RAID 5 capability with an Intel® RAID Activation Key and ECC Mini-DIMM. Memory rank sparing

Table 1-1 Cisco CDE110 Features (continued)

Feature	Description
Manageability	Remote management and diagnostics support
	Emergency management port (serial and LAN)
	IPMI 2.0-compliant
Upgradeability and investment protection	Uses Quad-Core Intel Xeon L5410 processors, or Dual-Core Intel Xeon LV 5148 processors
	Multi-generational chassis
	Supports Intel 64 architecture (formerly known as Extended Memory 64 Technology)
System-level scalability	Supports 24 Gbyte DDR2-533 or DDR2-667 MHz Registered SDRAM FBD DIMM memory
	Sockets for two Intel® Xeon® processors
	Full-height, full-length, 64-bit x 100/66 MHz PCI-X or x8 PCI Express slot
	Three internal hot-swappable 2.5-inch hard disk drives
	Supports up to four external SAS hard disk drives
	Low profile optical drive

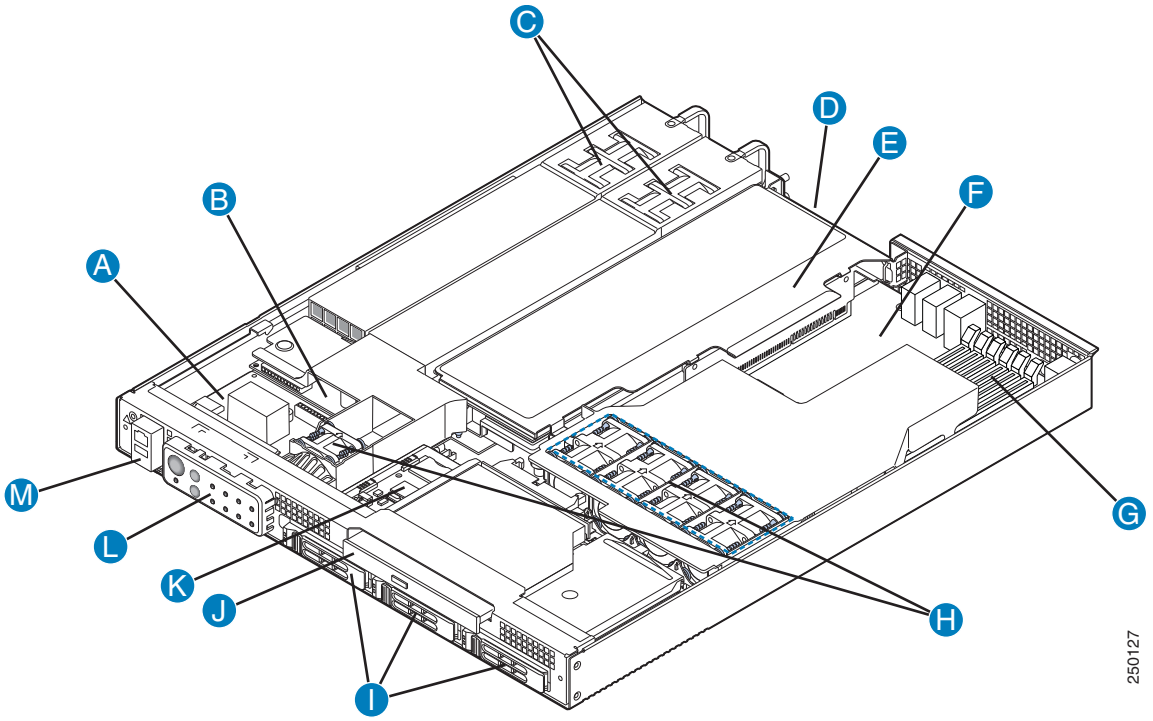
Table 1-1 Cisco CDE110 Features (continued)

Feature	Description
Front panel	• Power switch • Reset switch • NMI switch • ID switch • Main power LED • HDD activity LED • NIC activity LED • ID LED • Telco power alarm fault LED/relay • Telco critical alarm fault LED/relay • Telco major alarm fault LED/relay • Telco minor alarm fault LED/relay
I/O	Front Access: • Serial B port (RJ45) • USB port RearAccess: • Dual PS/2 ports for keyboard and mouse • Serial B port (RJ45) • Two USB ports • Four GbE ports • GCM 100 Mb Management port • SAS 4x drive port with RAID support • Video port • Telco alarms port

Internal Components

Figure 1-2 shows the internal components of the Cisco CDE110 (top cover and front bezel removed).

Figure 1-2 Cisco CDE110 Components



A	SAS Front Panel (SFP) board	H	System fans
B	Power Distribution Board (PDB)	I	SAS hard disk drive bays
C	Power supplies (AC or DC)	J	Optical drive
D	PCI card bracket (full-length)	K	SysCon board (optional)
E	Riser card assembly	L	Front panel LEDs and switches
F	Server board	M	Front panel serial port (COM2/Serial B)/USB connector
G	System memory		

Back Panel

The number of Ethernet ports on the back panel differs on the Cisco CDE110 models:

- For models CDE110-1-036TXA-K9, CDE110-1-036TXD-K9, CDE110-2-146TXA-K9, and CDE110-2-146TXD-K9, the back panel has four Ethernet ports. Figure 1-3 shows the back panel with the filler panel installed in location (E).
- For models CDE111-2-146TXA-K9 and CDE111-2-146TXD-K9, the back panel has six Ethernet ports. Figure 1-4 shows the back panel with the Intel PRO/1000 PT Dual Port Server Adapter installed in location (E). This adapter provides two Ethernet ports.

Figure 1-3 Rear View: Filler Panel in Location (E)

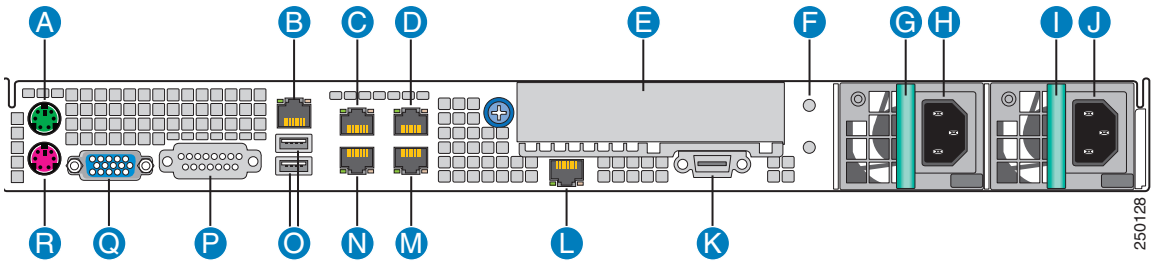
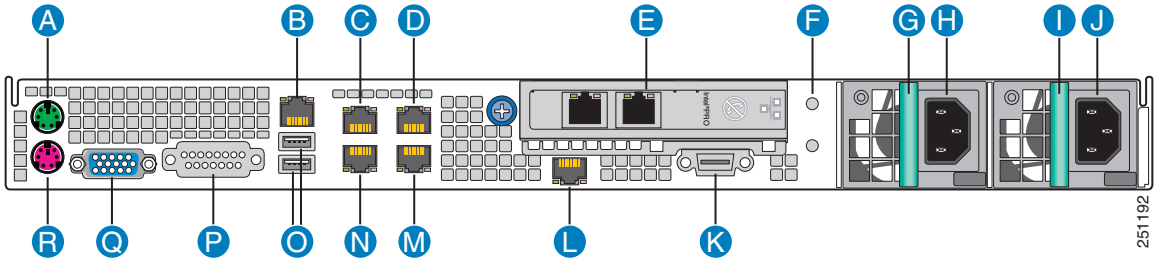


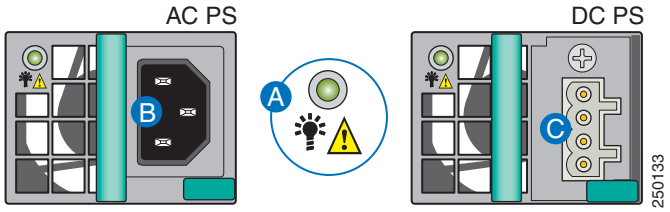
Figure 1-4 Rear View: Intel PRO/1000 PT Dual Port Server Adapter in Location (E)



A	PS/2 mouse	J	AC power connection
B	RJ45 serial port (COM2/Serial B)	K	External x4 SAS connector
C	RJ45 NIC connector	L	Remote Management Module (RMM) connector (not available on the Cisco CDE110)
D	RJ45 NIC connector	M	RJ45 NIC connector
E	Filler panel (Figure 1-3) or Intel PRO/1000 PT Dual Port Server Adapter (Figure 1-4)	N	RJ45 NIC connector
F	Ground studs (2)	O	USB port 0 and USB port 1
G	Power supply #2	P	Telco alarms connector
H	AC power connection	Q	Video connector
I	Power supply #1	R	Keyboard connector

Note Figure 1-3 and Figure 1-4 show the AC input power configuration. Items G to J can also be configured for DC operation.

Figure 1-5 Power Supply Status LED and Input



A	Power Supply Status LED	C	DC Power Input
B	AC Power Input		

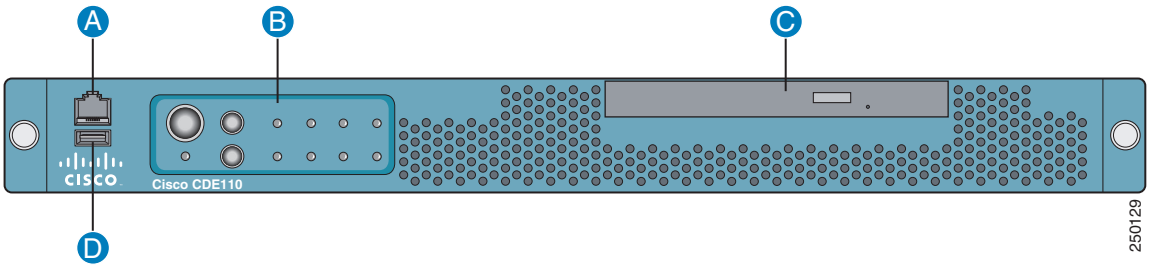
Table 1-2 Power Supply Status LED Indicators

Power Supply Condition	Bi-color LED Indication
No power to all power supplies	OFF
No power to this power supply module only (for 1+1 configuration) or Power supply *critical event* causing a shutdown: failure, fuse blown (1+1 only), OCP(12V), OVP(12V), fan failed	Amber
Power supply *warning events* where the power supply *continues to operate*: high temp, high power/high current, slow fan.	Blinking Amber
Power present / Only 5V standby on (PS Off)	Blinking Green
Output On and OK	Green

For information on the indicator lights on the Intel PRO/1000 PT Dual Port Server Adapter, see the "Intel PRO/1000 PT Dual Port Adapter" section on page 1-11.

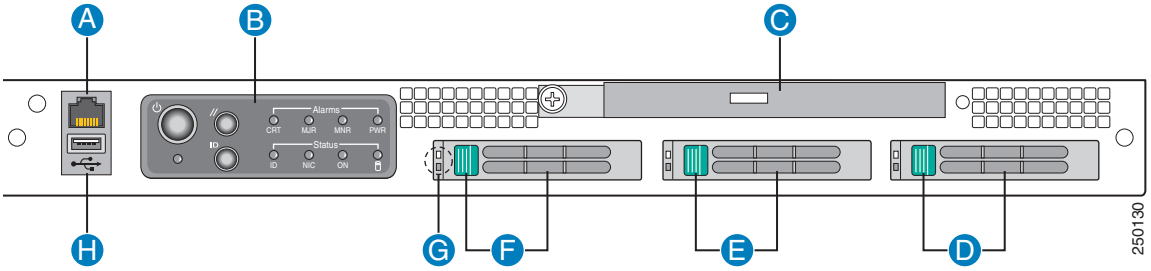
Front Panel

Figure 1-6 Front View (Bezel Installed)



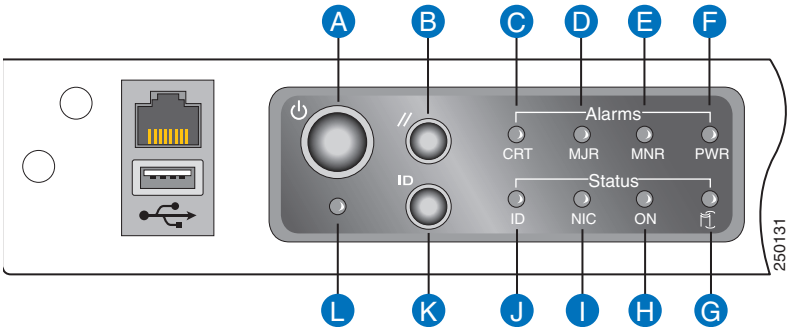
A	RJ45 serial port (COM2/Serial B)	C	Optical drive
B	Control panels	D	USB port 2

Figure 1-7 Front View (Bezel Removed)



A	RJ45 serial port (COM2/Serial B)	E	Drive bay 1 and handle
B	Front panel control switches and LEDs	F	Drive bay 2 and handle
C	Optical drive	G	HDD LEDs top = fault (amber) bottom = activity (ready/green; active/blinking green)
D	Drive bay 0 and handle	H	USB port 2

Figure 1-8 Control Panel



	Front Panel Switches	
A	Power switch	Toggles the system power
B	Reset switch	Resets the system
K	ID switch	Toggles the system ID LED
L	NMI switch	Asserts NMI to the server board
	Front Panel Alarm LEDs and Relays	
C	Critical (amber)	When continuously lit, indicates the presence of a Critical System Fault. A critical system fault is an error or event that is detected by the system with a fatal impact to the system. In this case, the system cannot continue to operate. An example could be the loss of a large section of memory, or other corruption, that renders the system non-operational. The front panel critical alarm relay engages.

D	Major (amber)	When continuously lit, indicates the presence of a Major System Fault. A major system fault is an error or event that is detected by the system that has discernible impact to system operation. In this case, the system can continue to operate but in a "degraded" fashion (reduced performance or loss of non-fatal feature reduction). An example could be the loss of one of two mirrored disks. The front panel major alarm relay engages.
E	Minor (amber)	When continuously lit, indicates the presence of a Minor System Fault. A minor system fault is an error or event that is detected by the system but has little impact to actual system operation. An example would be a correctable ECC error. The front panel minor alarm relay engages.
F	Power (amber)	When continuously lit, indicates the presence of a Power System Fault. The front panel power alarm relay engages.
	Front Panel Status LEDs	
G	Disk activity/fault LED (green/amber)	Indicates SAS hard drive activity when blinking green, or a disk SAS hard drive fault when amber (refer to SAS HDD LEDs to determine specific drive activity or fault).
H	Main power LED (green)	When continuously lit, indicates the presence of DC power in the server. The LED goes out when the power is turned off or the power source is disrupted.
I	NIC activity LED (green)	Indicates NIC activity
J	System ID LED (white)	Indicates system identity LED can be toggled remotely or by front-panel ID switch for identification purposes

Rear Panel Ethernet Ports

All Cisco CDE110 models have four Gigabit Ethernet NIC ports mounted on the baseboard that are accessible from the rear of the chassis. Some Cisco CDE110 models have the Intel PRO/1000 PT Dual Port Server Adapter that provides two additional Ethernet ports, which are also accessible from the rear of the chassis. See the "Intel PRO/1000 PT Dual Port Adapter" section on page 1-11.

There are no Gigabit Ethernet NIC ports accessible from the front of the Cisco CDE110.

The Gigabit Ethernet NIC ports are intended to be installed with shielded cabling that is grounded at both ends of the cable.

Warning **The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly MUST NOT be metallically connected to interfaces that connect to the outside plant (OSP) or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.**

Intel PRO/1000 PT Dual Port Adapter

For Cisco Visual Quality Experience, CDE110 models CDE111-2-146TXA-K9 and CDE111-2-146TXD-K9 come with a PCI Express (PCIe) riser card on which the Intel PRO/1000 PT Dual Port Server Adapter is installed. The PCI Express riser card is installed on the server motherboard and implements one x8 slot compatible with a full-height, full-length PCIe board.

The Intel PRO/1000 PT Dual Port Server Adapter provides two high-performance PCIe Gigabit Ethernet connections. The dedicated I/O bandwidth of PCIe ensures priority performance on each port without bus sharing. The I/O bracket and Gigabit Ethernet ports of the PRO/1000 PT Dual Port Adapter are accessible through the CDE110's rear panel.

The Gigabit Ethernet NIC ports are intended to be installed with shielded cabling that is grounded at both ends of the cable.

Warning **The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly MUST NOT be metallically connected to interfaces that connect to the outside plant (OSP) or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.**

The faceplate for the Intel PRO/1000 PT Dual Port Server Adapter is shown in Figure 1-9. The adapter faceplate has the indicator lights listed in Table 1-3.

Figure 1-9 Faceplate for the Intel PRO/1000 PT Dual Port Server Adapter

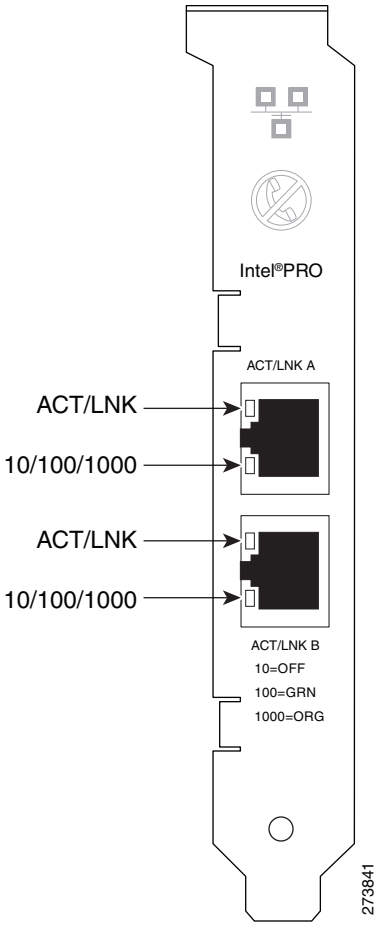


Table 1-3 Indicator Lights for the Intel PRO/1000 PT Dual Port Server Adapter

Label	Indication	Meaning
ACT/LNK	Green on	The Adapter is connected to a valid link partner.
	Green flashing	Data activity
	Off	No link
10=OFF 100=GRN 1000=ORG	Off	10 Mbps
	Green	100 Mbps
	Yellow	1000 Mbps

Hard Disk Drives

The Cisco CDE110 chassis provides three hot-swappable hard drive tray assemblies at the front of the chassis. Each drive can consume up to 17W of power. The number of the installed hard disk drives varies by model.

- The Cisco CDS Video Navigator and TV CDSM models (CDE110-2-146TXA-K9 and CDE110-2-146TXD-K9) have three 146-GB simple-swap Serial Attached SCSI (SAS) hard disk drives.
- The Cisco Visual Quality Experience models have the following:
  - CDE111-2-146TXA-K9 and CDE111-2-146TXD-K9 have one 146-GB simple-swap SAS hard disk drive.
  - CDE110-1-036TXA-K9 and CDE110-1-036TXD-K9 have one 36-GB simple-swap SAS hard disk drive.

Flash Drive

All models of the CDE110 except CDE110-1-036TXA-K9 and CDE110-1-036TXD-K9 include a 4-GB flash drive.

Note Only CDS Video Navigator and TV CDSM models currently use the flash drive to store the software image used to boot the server.

The 4-GB flash drive provides a more reliable boot mechanism in the event of hard-drive failure. The flash drive stores the software image used to boot the server and serves as a file system for failsafe booting as well as non-volatile storage for system configuration data.

The solid state flash drive combines Intel NAND Flash memory and a USB controller to deliver a reliable and durable solution for embedded and thin-client markets. The system is based on a Single Level Cell (SLC) flash technology, which is ideal for the needs of high performance platforms. The high speed USB 2.0 controller includes 4 symbol error correction capability as well as wear-leveling algorithms for enhanced NAND management. The controller is backward compatible to the USB 1.1 specification and complies with USB Mass Storage Class Specification v1.0.

A Flash Interposer Kit is used to connect the flash drive to the Front Panel I/O Board.

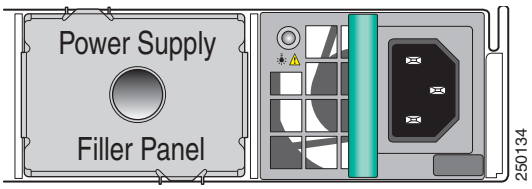
Power Supply

The power subsystem has up to two power supply modules capable of operating in redundant mode and a Power Distribution Board (PDB). A power supply filler panel for the empty power supply site is supplied for systems without redundancy.

The power supply is rated for 450W output capability in full AC (or DC) input voltage range.

Caution If only one power supply module is installed, it must be in the right-side slot and a power supply filler panel must be installed in the left slot to ensure proper system cooling. See Figure 1-10.

Figure 1-10 Power Supply Filler Panel



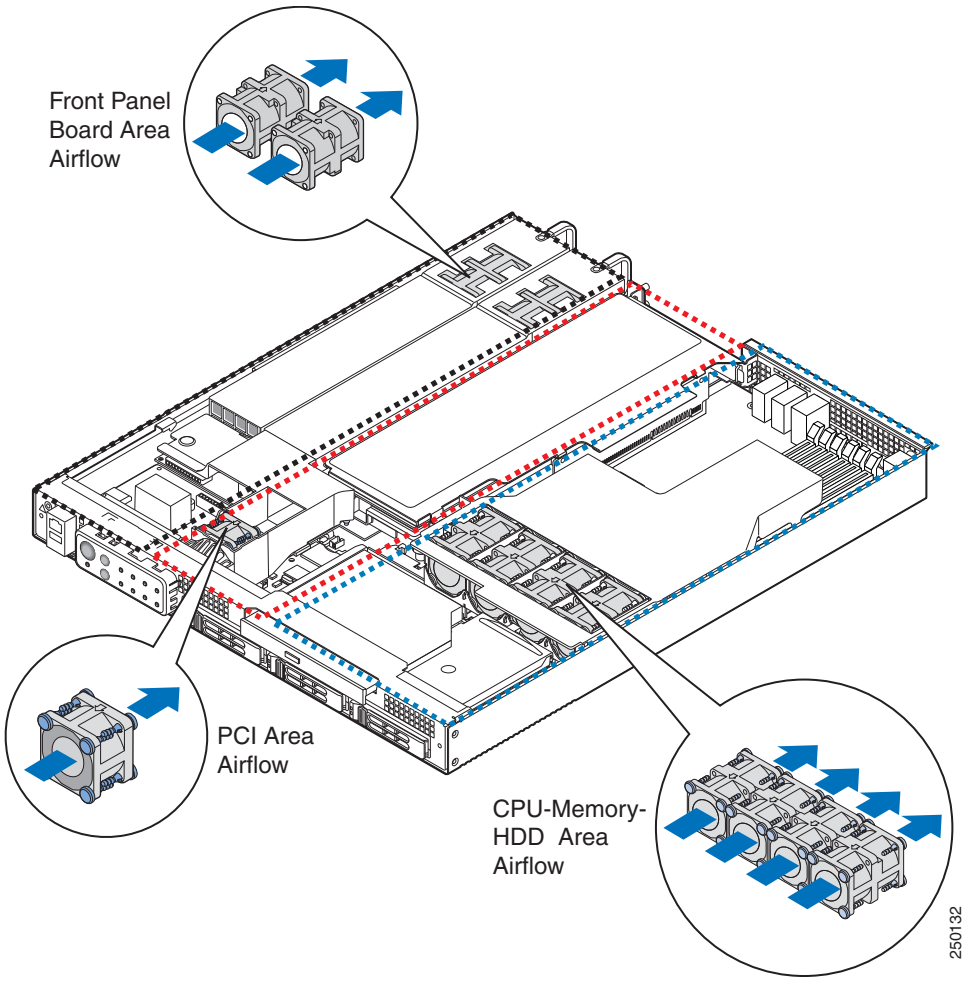
To maintain hot-swap capability, make sure that an active power supply module is in both chassis slots before replacing (hot-swapping) a power supply module. Check the power supply status LED to determine which power supply module has failed.

Warning **Never install an AC power module and a DC power module in the same chassis.** Statement 1050

System Cooling

There are three cooling areas in the Cisco CDE110: Front Panel Board area, PCI area, and the CPU-Memory-HDD area.

Figure 1-11 System Cooling Areas



Front Panel Cooling Area

The left one-fourth of the SFP front panel board and the portion of the Power Distribution Board (PDB) in this area are cooled by 40x40x56mm PSU dual-rotor fans. One PSU fan is sufficient to cool this portion of the front panel board area and two PSU fans provide cooling redundancy for this area.

PSU fans draw air in through the bezel from the front of the system and from vents in the left front side of the chassis over this portion of the front panel board and PDB, through and exhausting out the rear of the PSUs. The left wall of the PCI fan air duct and the PSU guide wall provide an air flow barrier between the front panel board cooling area and the PCI cooling area.

PCI Cooling Area

The 40 x 40 x 28 mm single-rotor PCI fan cools the portions of the server board, PDB, and SFP that are in this area as well as a PCI add-in card installed in the riser card assembly.

The PCI fan draws in air through the front bezel and exhausts through the rear of the system. A plastic air duct directs the air flow in this area, houses the PCI fan, and provides air flow barriers between:

- The front panel board and the PCI cooling areas

- The PCI and the CPU / memory / HDD cooling areas

A second plastic part behind the PCI air duct continues the air flow barrier between the PCI cooling area and the CPU / memory / HDD cooling area. The riser card provides the third portion of the air flow barrier between the PCI cooling area and the CPU / memory / HDD cooling area.

CPU/Memory/HDD Cooling Area

The Cisco CDE110 uses four 40x40x56mm dual-rotor fans that are assembled in a sheet metal bracket attached to the chassis.

The server draws air in through the bezel from the front of the system and exhausts out the rear of the chassis. The CPU/Memory/HDD cooling area air flow path is isolated from the rest of the system by an air duct and riser card. Air entering the CPU-Memory air duct is preheated by the hard drives.

Hardware RAID

The Cisco CDS Video Navigator and TV CDSM models of the CDE110 provide Hardware RAID (redundant arrays of independent disks) on the motherboard. Hardware RAID includes the following three components:

- Intelligent Battery Backup Unit (IBBU)
- RAID Activation Key
- RAID MiniDIMM

The CDE110 supports RAID 0/1/10/5. The SFP board supports a RAID On MotherBoard (ROMB) solution via the Intel 80333 I/O processor in conjunction with the LSI1068 SCSI controller.

To activate the hardware RAID feature, a RAID Activation Key device is provided. This pre-programmed serial device contains a configuration code to unlock specific features to support the LSI Logic MegaRAID solution.

In addition to the activation key, hardware RAID mode uses a DDR-2 mini-DIMM to provide memory for the IOP and to serve as a disk cache to store write data to the drives. If power to the Intel 80333 I/O processor drops below specifications, an RAID Smart Battery unit (also known as an Intelligent Battery Backup Unit or IBBU) maintains the contents of the ROMB DIMM by keeping the DIMM in self-refresh mode until power is restored. After power is restored, the data can be safely written to drives, maintaining the integrity of the disk array.

RAID 1 Disk Duplexing

On the Cisco CDS Video Navigator and TV CDSM models of the CDE110, the three hard disk drives are configured, by default, to use RAID 1 disk duplexing. RAID 1 is an easy and highly efficient way to provide data redundancy and system availability.

By default on these models of the CDE110, two drives are configured for RAID 1, and the third drive is configured as a hot spare. If one hard disk in the disk-duplexed pair fails, all data is immediately available on the other without an impact on performance. With a hot spare drive, any disk failure will start an automatic rebuild of the data onto the hot spare drive. The hot spare automatically replaces the failed drive in the disk-duplexed pair.

With RAID 1, because all data is duplicated, only half of the total drive space can be counted as available space. Therefore, data capacity for the disk-duplexed pair of drives (two 146-GB drives) is approximately 146 GB total.