CHAPTER 1

Product Overview

This describes the Cisco UCS Fabric Interconnects and their components, and includes the following sections:

Interconnect Features

A Cisco UCS 6200 series fabric interconnect is a top-of-rack fabric interconnect that provides Ethernet and Fibre Channel to all servers in the UCS system. Servers connect to the fabric interconnect, and it connects to the LAN or SAN.

This family of fabric interconnects connect UCS servers to 10 Gigabit Ethernet 1, 2, 4, and 8 Gbps Fibre Channel networks, and provides consolidated I/O connectivity to both production Ethernet LANs and Fibre Channel SANs in a cost-effective, high-performance, low-latency environment.

The Cisco UCS 6200 series has the following characteristics:

- The UCS 6248 UP fabric interconnect is a one-rack-unit (1 RU), 10-Gigabit Ethernet and FCoE device that offers up to 960-Gbps throughput and up to 48 ports. It has 32 1- or 10-Gbps fixed small form-factor pluggable plus (SFP+) ports and one expansion slot. The Cisco UCS 6248 UP has 32 ports on the base system and can be upgraded with one expansion module providing an additional 16 ports.
- The UCS 6296 UP fabric interconnect is a two-rack-unit (2 RU), 10-Gigabit Ethernet and FCoE device that offers up to 1920-Gbps throughput and up to 96 ports. It has 48 1- or 10-Gbps fixed small form-factor pluggable plus (SFP+) ports and three expansion slots. The Cisco UCS 6248 UP has 48 ports on the base system and can be upgraded with three expansion modules providing an additional 48 ports.
- Universal port functionality allows Ethernet or Fibre Channel over Ethernet (FCoE) physical port types to be selected in software.

- Slots on the back of the switch for an expansion module. You can use the UCS EIGUP module.
- Slots on the front of the chassis for hot swap-capable power supplies.
- Slots on the front of the chassis for fan modules.
- One USB port at the front of the switch.

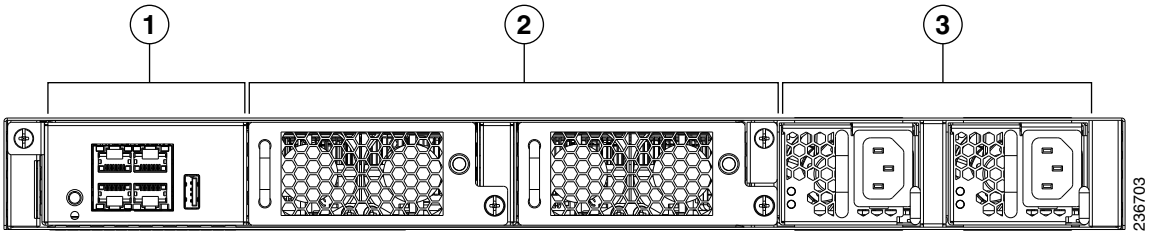
Cisco UCS 6248 UP Fabric Interconnect Chassis

The Cisco UCS 6248 UP chassis is 1 RU, 1.72 inches tall, 17.3 inches wide and 30.0 inches deep. It mounts in a standard 19-inch rack (the Cisco R Series rack is an ideal choice). The chassis has two power supplies and two fan modules on the front of the chassis, and it has network ports on the rear of the chassis as well as also has one USB port (usb1:) at the front. This external USB flash memory is installed in a supervisor module used for storing image files, configuration files, and other miscellaneous files. You can create directories on external flash memory and navigate through these directories. You can also create and access files. The usb1: port usage on the Cisco UCS 6248 is the same as that on Cisco NX-OS devices. (For details, see http://www.cisco.com/en/US/docs/switches/datacenter/sw/5_x/nx-os/fundamentals/configuration/guide/Cisco_Nexus_7000_Series_NX-OS_Fundamentals_Configuration_Guide_Release_5.x_chapter7.htm)

Thirty-two fixed 10-Gigabit Ethernet ports and an expansion modules slot supporting 16 ports are at the rear of the switch. The airflow is front to back. Figure 1-1 shows the front of the Cisco UCS 6248 UP.

Figure 1-1 shows the front of the chassis.

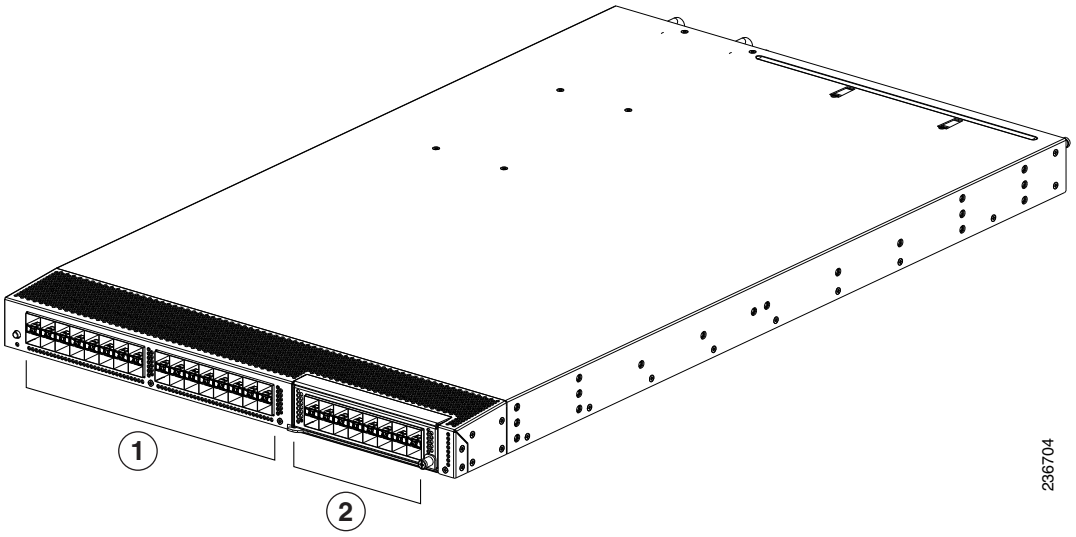
Figure 1-1 Cisco UCS 6248 UP Front View



1	Management (10/100/1000) port, console port, and USB port (see Figure 1-4)	**3**	Two power supplies (AC shown)
2	Two fan modules		

The rear of the Cisco UCS 6248 UP chassis has 32 fixed 10-Gigabit, Fiber Channel over Ethernet-capable SFP+ Ethernet ports, 1 slot for an optional expansion module, Figure 1-2 shows the rear of the Cisco UCS 6248 UP.

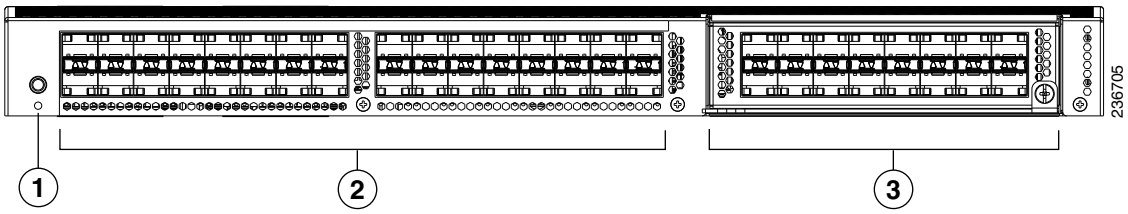
Figure 1-2 Cisco UCS 6248 UP Rear View



1	32 fixed 10-Gigabit Ethernet ports	**2**	16 Expansion module ports

Figure 1-3 shows a close-up view of the rear of the Cisco UCS 6248 UP chassis.

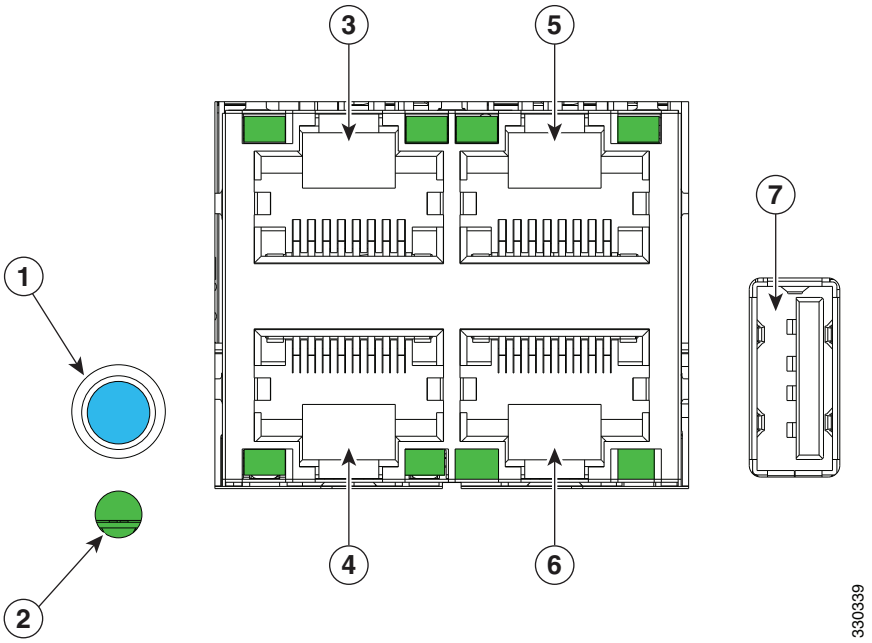
Figure 1-3 *Cisco UCS 6248 UP* Switch Rear View Close-up



1	System status LED and beaconing LED/button	**3**	16 port Expansion module
2	32 fixed 10-Gigabit Ethernet ports		

The front connector ports are in a 2x2 stacked RJ-45 jack. Figure 1-4 shows a close-up view of the Ethernet connector ports.

Figure 1-4 Connector Ports, LEDs



1	Beaconing LED/button	**5**	Network management port
2	System Status LED	**6**	Console port
3	UCS cross connect port L1	**7**	USB port
4	UCS cross connect port L2		

Table 1-1 lists the LED descriptions for all Ethernet LEDs.

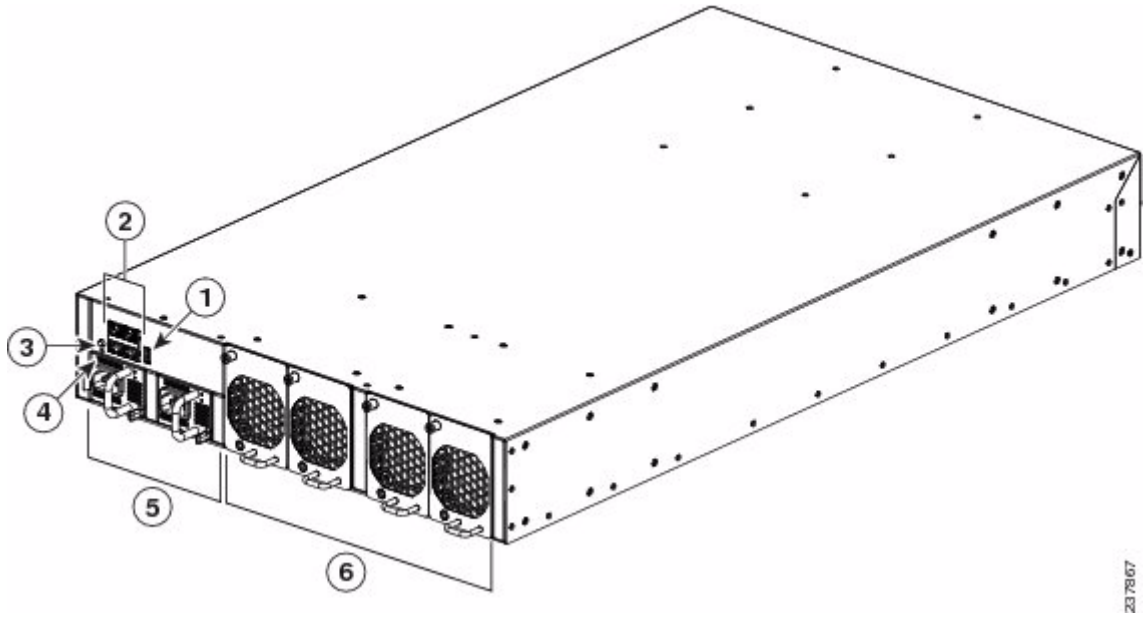
Table 1-1 Ethernet LED Descriptions

LED	Status	Description
Left	Off	No link
	Solid green	Physical link
Right	Off	No activity
	Blinking green	Activity

Cisco UCS 6296 UP Fabric Interconnect Chassis

The Cisco UCS 6296 UP chassis is 2 RU or 3.47 inches (8.8 cm) tall, 17.3 inches (43.9 cm) wide, and 29.5 inches (74.9 cm) deep. It is designed to be mounted in a standard 19-inch wide rack. The front of the switch, shown in Figure 1-5, has a USB port, four Ethernet and ports (two cross-connect ports, one management port, and one console port), two power supplies, and four fan modules.

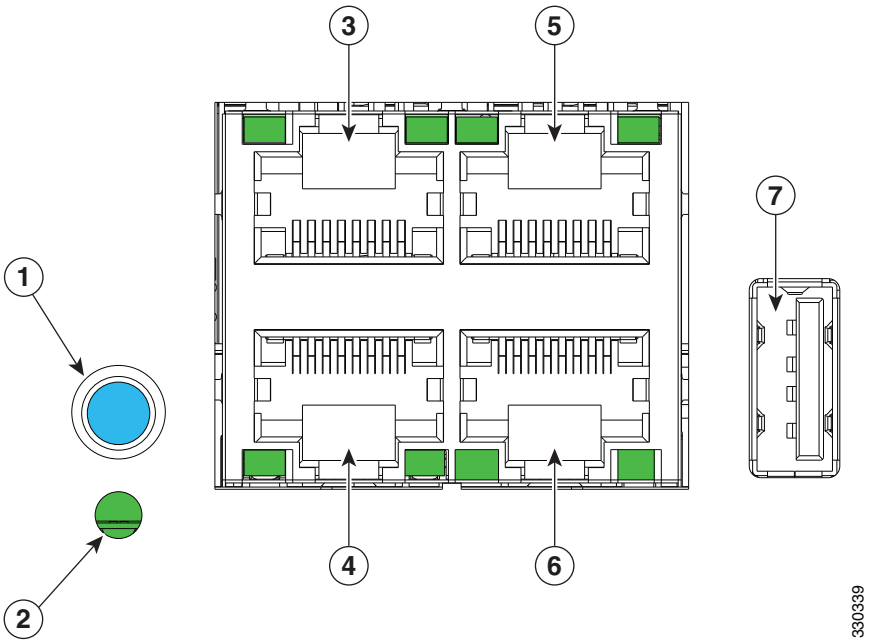
Figure 1-5 Front View of the Cisco UCS 6296 UP



1	USB port	**4**	System status LED
2	Management and console ports (two RJ-45 Ethernet connector ports on the left, a RJ-45 network management connector on the upper right, and a console connector on the lower right)	**5**	Two power supplies
3	Identifier LED	**6**	Four fan modules

The management and console ports are in a 2 x 2 stacked RJ-45 jack. Figure 1-6 shows a close-up view of these ports. For information about the connector port LEDs, see Table D-1 on page D-2.

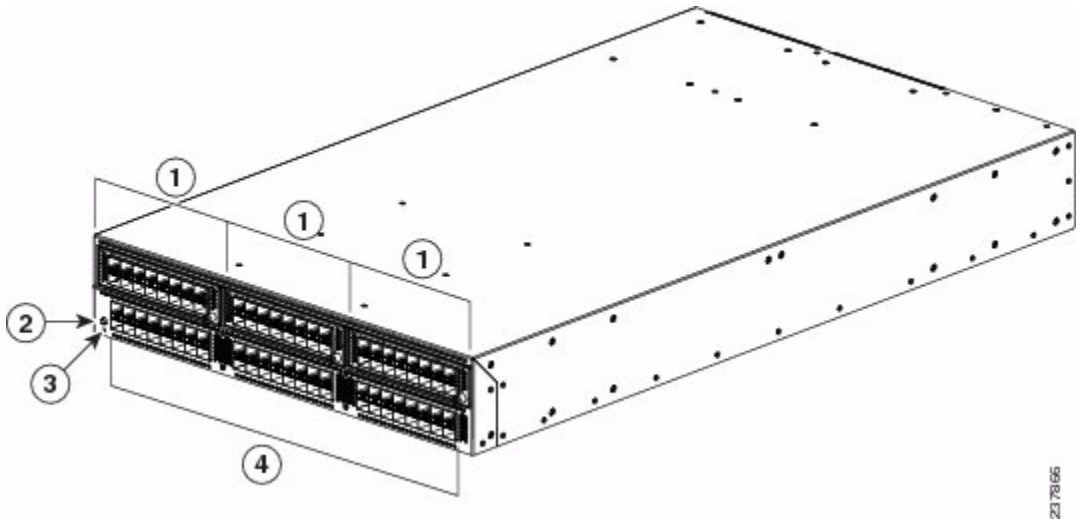
Figure 1-6 Management and Console Ports



1	Beaconing LED/button	**5**	Network management port
2	System Status LED	**6**	Console port
3	UCS cross connect port L1	**7**	USB port
4	UCS cross connect port L2		

The rear of the Cisco UCS 6296 UP chassis, shown in Figure 1-7, has 48 fixed 10-Gigabit Ethernet data ports on the bottom and three slots for optional expansion modules on top.

Figure 1-7 Rear View of the Cisco UCS 6296 UP



1	Expansion modules, shown here with three 16-port Universal GEM2 modules (can also have Layer 3 GEM2 modules)	**3**	System status LED
2	Identifier LED	**4**	48 fixed 1- and 10-Gigabit Ethernet ports

UCS Unified Port Expansion Module

Expansion modules allow Cisco UCS 6200 Series Fabric Interconnect to be configured as cost-effective 10-Gigabit Ethernet fabric interconnects and as I/O consolidation platforms with native Fibre Channel connectivity. The Cisco UCS 6248 UP has one slot for an optional expansion module.The Cisco UCS 6296 has three slots for an optional uplink expansion module. The expansion modules are hot swappable. Only the 16-port UCS E16UP expansion module using the small form factor pluggable plus (SFP+) interface is supported.

Figure 1-8 shows the UCS E16UP expansion module.

Figure 1-8 16-port 10Gb Unified Port Expansion Module (UCS-FI-E16UP)

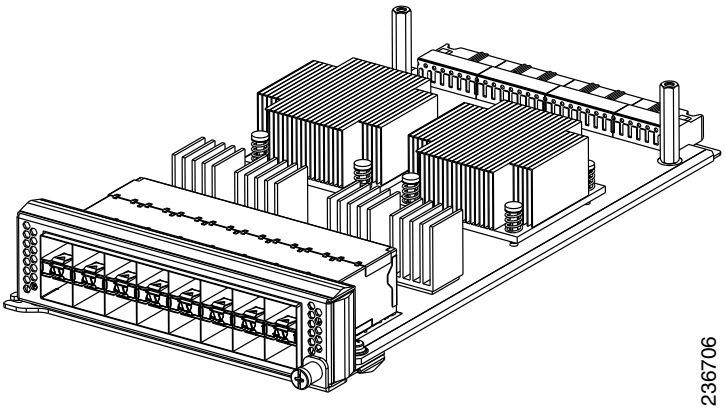
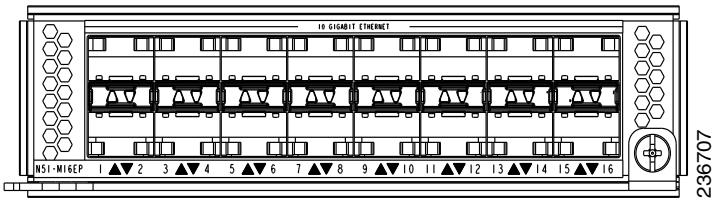


Figure 1-9 shows a front view of the expansion module.

Figure 1-9 UCS E16UP GEM

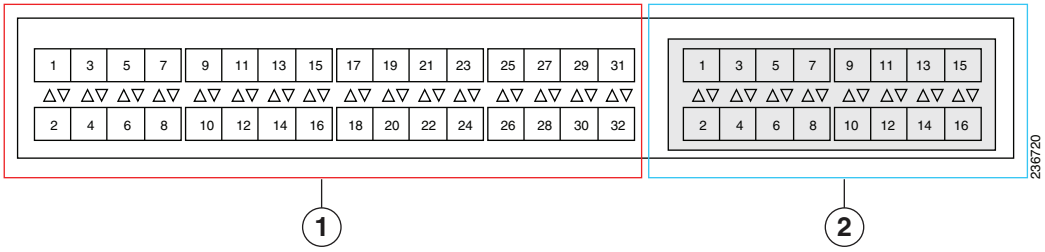


Cisco UCS 6248 UP Port Numbering

Each individual port is numbered, and groups of ports are numbered based on their function. The ports are numbered top to bottom and left to right.

There are 32 to 48 ports on the Cisco UCS 6248 UP, depending on whether an expansion module is installed. Each individual port is numbered, and groups of ports are numbered based on their function. The ports are numbered from top to bottom and left to right.

Figure 1-10 Port Numbering of the Cisco UCS 6248UP with an Expansion Module



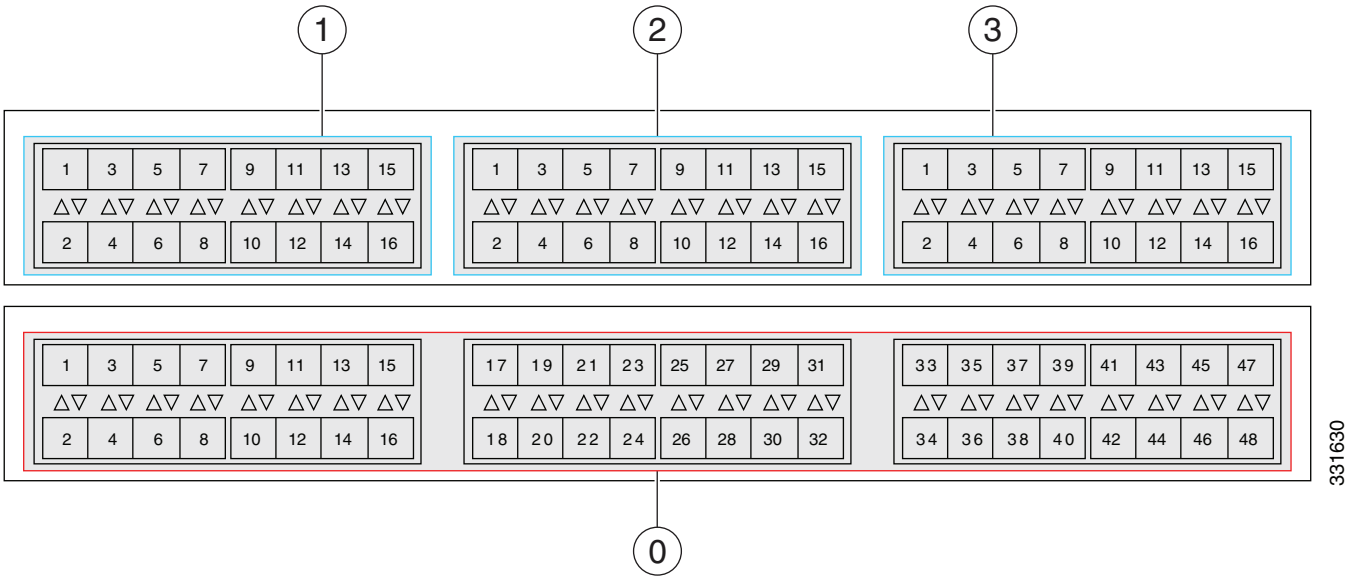
1	Slot 1, 32 fixed ports	**2**	Slot 2, Expansion module (UCS E16UP)

Cisco UCS 6296 UP Port Numbering

Each port on the Cisco UCS 6296 UP is numbered, and groups of ports are numbered based on their function. The ports are numbered top to bottom and left to right. The 48 fixed ports support 8-, 4-, 2-, or 1-Gbps Fibre Channel transceivers and 1- or 10-Gigabit Ethernet transceivers.

Figure 1-11 shows how ports are numbered and grouped by function for both the fixed ports and the Fibre Channel plus Ethernet expansion module ports.

Figure 1-11 Port Numbering of Fixed Ports and Fibre Channel Plus Ethernet Expansion Module Ports



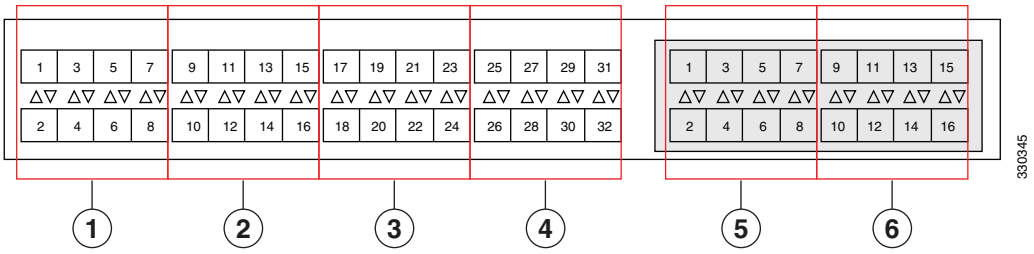
0	Port numbering for the 48 fixed ports	**2**	Port numbering for the 16-port GEM in slot 1
3	Port numbering for the 16-port GEM in slot 2	**4**	Port numbering for the 16-port GEM in slot 3

Cabling Considerations for Fabric Port Channels

When you configure the links between the UCS 2208 IOM to the UCS 6248 fabric interconnect in fabric port channel mode, the available VIF namespace on the adapter varies depending on where the IOM uplinks are connected to the fabric interconnect ports.

Inside the 6248 fabric interconnect there are six sets of eight contiguous ports, with each set of ports managed by a single chip. When uplinks are connected such that all of the uplinks from an IOM are connected to a set of ports managed by a single chip, Cisco UCS Manager maximizes the number of VIFs used in service profiles deployed on the blades in the chassis. If uplink connections from an IOM are distributed across ports managed by separate chips, the VIF count is decreased.

Figure 1-12 Port Groups for Fabric Port Channels



Caution Adding or removing links from a fabric port channel is disruptive and may affect the available amount of VIF namespace.

For high availability cluster mode applications, symmetric cabling configurations are strongly recommended. If the cabling is asymmetric, the maximum number of VIFs available is the smaller of the two cabling configurations.

For more information on the maximum number of VIFs for your Cisco UCS environment, see the configuration limits document for your for your hardware and software configuration.

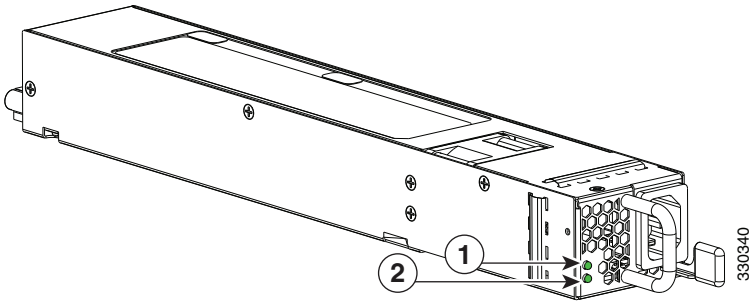
Power Supplies

Table 1-2 Power Supply Models

Cisco PID	Fabric Interconnect	Source	Wattage
UCS-PSU-6248UP-AC	Cisco UCS 6248 UP	110 VAC	390
UCS-PSU-6248UP-DC	Cisco UCS 6248 UP	-48 VDC	390
UCS-PSU-6296UP-AC	Cisco UCS 6296 UP	110 VAC	680

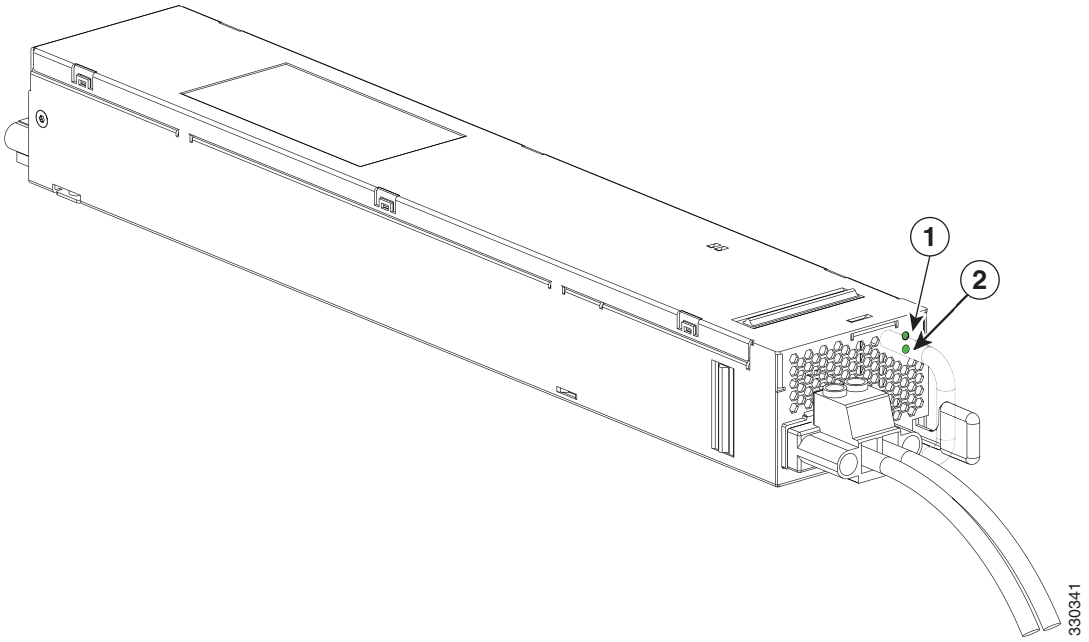
The fabric interconnect uses a front-end power supply. The chassis has slots for two power supplies. Two power supplies can be used for redundancy, but the fabric interconnect is fully functional with one power supply. Figure 1-13 shows the 390 W AC power supply, which has two LEDs: one for power status and one for failure condition. Figure 1-15 shows the 390 W power supply, which has two LEDs: one for power status and one for failure condition.

Figure 1-13 AC Power Supply for the Cisco UCS 6248 UP Fabric Interconnect



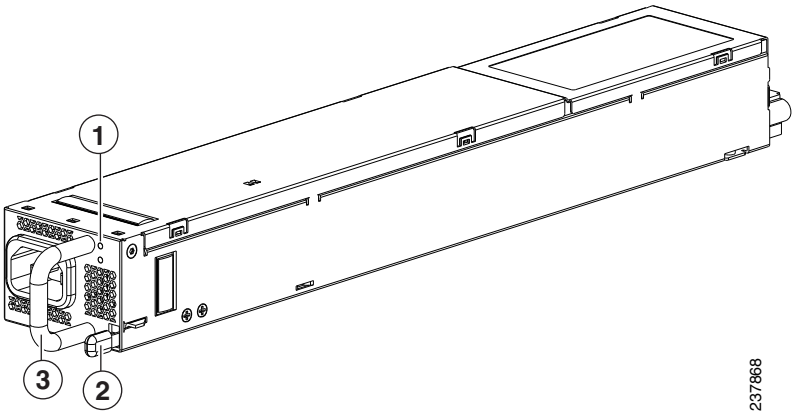
1	Fault LED	2	Power LED

Figure 1-14 DC Power Supply for the Cisco UCS 6248 UP Fabric Interconnect



1	Amber LED indicates a failure condition.	2	Green LED indicates the input power status.

Figure 1-15 Power Supply for the Cisco UCS 6296 UP Switch



1	Failure (top) and Power (bottom) LEDs	**3**	Release lever
2	Handle		

Table A-2 Table A-3 and list the power supply properties of the Cisco UCS 6248 UP.

Table 1-3 describes the status of the two power supply LEDs.

Table 1-3 Power Supply LED Descriptions

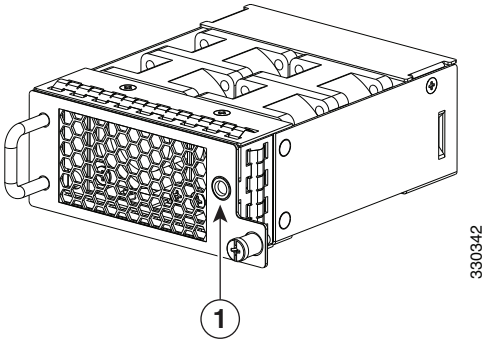
Power Supply Condition	Power LED Status	Fail LED Status
No AC power to all power supplies.	Off	Off
Power supply failure, including over voltage, over current, over temperature, and fan failure.	Off	On
Power supply warning events where the power supply continues to operate. These events include high temperature, high power, and slow fan.	Off	1 Hz Blinking
AC present, 3.3 voltage standby (VSB) on, and the power supply unit is off.	1 Hz blinking	Off
Power supply on and OK.	On	Off

If one power supply is installed in the chassis, but the other power supply slot is empty, a blank filler panel (N10-S1BLKP=) should be used to cover the empty slot.

Fan Module

TheCisco UCS 6248 UP fabric interconnect has slots for two fan modules (also called fan trays). Each fan module houses 4 fans. The combination of 4 fans per module and 2 modules provides the chassis with 8 fans. Figure 1-16 shows the fan module for the Cisco UCS 6248 UP.

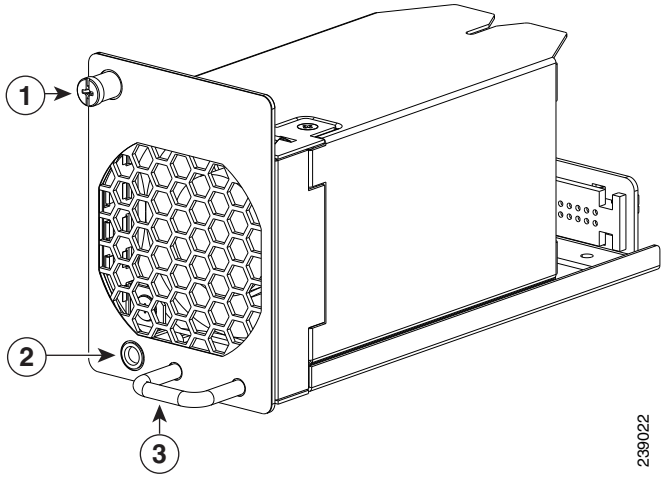
Figure 1-16 Cisco UCS 6248 UP Fan Module (UCS-FAN-6248UP=)



1	Fan Tray Status LED (see Table 1-4)

The Cisco UCS 6296 UP switch has four fan modules with one fan each.

Figure 1-17 Cisco UCS 6296 UP Fan Module



1	Captive screw	3	Handle
2	Status LED		

The bi-color fan module LED indicates fan tray health. Green indicates normal operation, while amber indicates a fan failure.

LED Descriptions

The switch has three chassis activity LED's.

Table 1-4 describes the LEDs for the Cisco UCS 6200 series fabric interconnect.

Table 1-4 LEDs for the Cisco UCS 6248 UP

LED	Location	Function	Color	Status	Description
System Status LED	Front	Power/Health	Green	Solid On	System is on and operating normally
				Off	Switch is powered off
			Amber	On	Fault condition
Fan Tray Status	Fan trays (front)	Fan tray health indicator (multi color)	Green	On	Fan tray is operating normally
			Amber	On	Fan failure has occurred within the fan tray
PSU Status	Power supply (front)	PSU Health (multi color)	Green	OFF	No AC power to power supply
				Solid On	Power supply on and OK
			Amber	Solid On	Power supply failures, overvoltage, overcurrent, overtemperature
				1 Hz blinking	AC present, 3.3 VSB on, PSU is off
				OFF	Operating normally
Beaconing	Front of chassis	Identify selected chassis	Blue	Solid on	Chassis is selected
				Off	Chassis is not selected

Port Level LEDs

There are port activity LEDs on the chassis and on the expansion modules. Table 1-5 summarizes the behavior of the port LEDs.

Table 1-5 Port LEDs

Color	Description
Green (blinking)	Link is up, enabled, and active.
Amber	Link is administratively disabled.
Amber (blinking)	POST or operational error.
Off	Link is down.

Supported Transceivers

The fabric interconnect supports SFP+ Ethernet transceivers, SFP transceivers, and SFP Fibre Channel transceivers. Specifications for these transceivers is at:

http://www.cisco.com/en/US/docs/interfaces_modules/transceiver_modules/installation/note/78_15160.html

SFP+ Transceivers

The high bandwidth of 10-Gigabit Ethernet poses challenges to transmissions that are met by the transceiver and cabling options supported by the Cisco UCS 6200 platform.

The enhanced SFP+ 10-Gigabit Ethernet transceiver module is a bidirectional device with a transmitter and receiver in the same physical package. It has a 20-pin connector on the electrical interface and duplex LC connector on the optical interface. Table 1-6 lists the supported transceiver options.

Table 1-6 Supported Transceivers

Cisco SFP	Description
FET-10G	10G SFP+ Fabric extender transceiver module
SFP-10G-SR	10GBASE-SR SFP+ module (multimode fiber [MMF])
SFP-10G-LR	10GBASE-LR SFP+ module (single-mode fiber [SMF])
SFP-H10GB-CU1M	10GBASE-CU SFP+ cable 1 m (Twinax cable)
SFP-H10GB-CU3M	10GBASE-CU SFP+ cable 3 m (Twinax cable)
SFP-H10GB-CU5M	10GBASE-CU SFP+ cable 5 m (Twinax cable)
SFP-H10GB-ACU7M	10GBASE-CU SFP+ cable 7 m (Twinax cable)
SFP-H10GB-ACU10M	10GBASE-CU SFP+ cable 10 m (Twinax cable)
GLC-T	1000BASE-T SFP
GLC-SX-MM	GE SFP, LC connector SX transceiver (MMF)
GLC-LH-SM	GE SFP, LC connector LX/LH transceiver (SMF)
SFP-GE-T	1000BASE-T SFP, extended temperature range
SFP-GE-S	GE SFP, LC connector SX transceiver (MMF), extended temperature range and digital optical monitoring (DOM)
SFP-GE-L	GE SFP, LC connector LX/LH transceiver (SMF), extended temperature range and DOM
DS-SFP-FC4G-SW	4-Gbps Fibre Channel SW SFP, LC (for FC configured Unified ports)
DS-SFP-FC4G-LW	4-Gbps Fibre Channel LW SFP, LC (for FC configured Unified ports)
DS-SFP-FC8G-SW	8-Gbps Fibre Channel SW SFP+, LC(for FC configured Unified ports)
DS-SFP-FC8G-LW	8-Gbps Fibre Channel LW SFP+, LC (for FC configured Unified ports)

Note The maximum length of fiber optic runs is limited to 300 meters. This is imposed by our use of 802.3X/802.1Qbb Priority Pauses. SFP-10G-LR is supported between fabric interconnect and I/O Module, but the 300m limit still applies.

SFP Transceivers

The SFP 1 -Gigabit Ethernet transceiver module is a bidirectional device with a transmitter and receiver in the same physical package. Table 1-7 lists the supported SFP optical transceivers.

Table 1-7 Supported SFP Optical Transceivers

Model	Description
GLC-T	1-Gigabit Ethernet copper SFP module
GLC-SX-MM	1-Gigabit Ethernet—short range (550m max) SFP module
GLC-LH-SM	1-Gigabit Ethernet—long range (10km) SFP module

Note The maximum length of fiber optic runs is limited to 300 meters. This is imposed by our use of 802.3X/802.1Qbb Priority Pauses. SFP-10G-LR is supported between fabric interconnect and I/O Module, but the 300m limit still applies.

SFP+ Copper Cables

Copper cables are available for use with the 10-Gigabit Ethernet SFP+ module. See Table 1-8 for a description of these cables.

Table 1-8 Cables Used with the 10-Gbps Ethernet SFP+ Transceivers

Model	Description
SFP-H10GB-CU1M	10GBASE-CU SFP+ 1-meter cable
SFP-H10GB-CU3M	10GBASE-CU SFP+ 3-meter cable
SFP-H10GB-CU5M	10GBASE-CU SFP+ 5-meter cable
SFP-H10GB-ACU7M=	10GBASE-CU SFP+ 7-meter cable
SFP-H10GB-ACU10M=	10GBASE-CU SFP+ 10-meter cable

On the Cisco UCS 6200 platforms, you can use an innovative Twinax copper cable that connects to standard SFP+ connectors for in-rack use, and on optical cable for longer cable runs.

For in-rack or adjacent-rack cabling, the Cisco UCS 6200 platform supports SFP+ direct-attach 10-Gigabit Ethernet copper, which integrates transceivers with Twinax cables into an energy efficient, low-cost, and low-latency solution. SFP+ direct-attach 10-Gigabit Twinax copper cables use only 0.1 watts of power per transceiver and introduce only approximately 0.25 microsecond of latency per link.

For longer cable runs, the Cisco UCS 6200 platform supports multimode, short-reach optical SFP+ transceivers. These optical transceivers use approximately 1 W per transceiver and have a latency of less than 0.1 microsecond.

Table 1-9 shows details of the cables supported:

Table 1-9 Supported Cables

Connector (Media)	Cable	Distance	Power (each side)	Transceiver Latency (Link)	Standard
SFP+ CU copper	Twinax	5 m	~ 0.1 W	~ 0.1 microseconds	SFF 8431
SFP+ ACU copper	Active Twinax	7 m/ 10 m	~ 0.5 W	~ 6.8 nanoseconds	SFF 8461
SFP+ SR MMF and SR	MM OM2 MM OM3	82 m/ 300 m	1 W	~ 0 microseconds	IEEE 802.3ae

SFP Fibre Channel Transceivers

The Cisco UCS 6200 series fabric interconnects support multimode 850nm 4 Gbps and 8 Gbps SFPs with 150m reach (see Table 1-10).

Table 1-10 SFP Fiber Channel Transceivers

Model	Description
Cisco DS-SFP-FC4G-SW	4 Gbps Fibre Channel-SW SFP, LC (for FC configured Unified ports)
Cisco DS-SFP-FC4G-LW	4 Gbps Fibre Channel-LW SFP, LC, (10 km reach) (for FC configured Unified ports)
Cisco DS-SFP-FC8G-SW	8-Gbps Fibre Channel SW SFP+, LC (for FC configured Unified ports)
Cisco DS-SFP-FC8G-LW	8-Gbps Fibre Channel LW SFP+, LC (for FC configured Unified ports)

Note The maximum length of fiber optic runs is limited to 300 meters. This is imposed by our use of 802.3X/802.1Qbb Priority Pauses.