Product Overview

The Cisco MDS 9700 Series of Multilayer Directors elevate the standard for director-class switches. It allows a deployment of high-performance SANs with low cost of ownership, layering a rich set of intelligent features onto a high-performance, protocol-agnostic switch fabric.

The Cisco MDS 9700 Series of Multilayer Directors addresses the stringent requirements of large data center storage environments — Providing high availability, security, scalability, ease of management, and transparent integration of new technologies.

The Cisco MDS 9700 Series of Multilayer Directors include the following directors:

- Cisco MDS 9718 Director
- Cisco MDS 9710 Director
- Cisco MDS 9706 Director

This chapter has the following topics:

Cisco MDS 9718 Director

The Cisco MDS 9718 Director is a high-port density switch that is designed to meet the requirements of a large-scale enterprise data center storage environment. It provides superior performance, scalability, redundancy,

multiprotocol convergence, and enterprise-grade availability in a data center network. The Cisco MDS 9718 Director includes the following components:

- An 18-slot chassis (DS-C9718)
- 1-2 supervisor modules. The supervisor modules include the following types:
  - Cisco MDS 9700 Supervisor-4 Module (DS-X97-SF4-K9)
  - Cisco MDS 9700 Supervisor-1E Module (DS-X97-SF1E-K9)
- 1-6 crossbar switching fabric modules. The crossbar switching fabric modules include the following types:
  - Cisco MDS 9718 Crossbar Fabric-3 Switching Module (DS-X9718-FAB3)
  - Cisco MDS 9718 Crossbar Fabric-1 Switching Module (DS-X9718-FAB1)
- 1-16 I/O modules. The I/O modules include the following types:
  - A 48-Port 64-Gbps Fiber Channel Switching Module (DS-X9748-3072K9)
  - A 48-Port 32-Gbps Fiber Channel Switching Module (DS-X9648-1536K9)
  - A 48-Port 16-Gbps Fiber Channel Switching Module (DS-X9448-768K9)
  - A 48-Port 10-Gbps Fiber Channel over Ethernet Module (DS-X9848-480K9)
  - A 24-Port 40-Gbps Fiber Channel over Ethernet (FCoE) Module (DS-X9824-960K9)
  - A 24/10-port SAN Extension Module (DS-X9334-K9)
- Three fan modules or trays
  - Cisco MDS 9718 Fan Module (DS-C9718-FAN)
- 1-16 power supply units. The power supply units include the following types:
  - Cisco MDS 9700 3000W AC power supply (DS-CAC97-3KW)
  - Cisco MDS 9700 3000W DC power supply (DS-CDC97-3KW)
  - Cisco MDS 9700 3500W High-Voltage power supply (DS-CHV-3.5KW)
- Cisco MDS 9718 Accessory Kit for Cisco (DS-9718-KIT-CCO)

The Cisco MDS 9718 Director supports up to 768 ports in an 18-slot modular chassis, with up to 1152 ports in a single rack. The 768 ports can be configured as 2/4/8/10/16/32/64-Gbps Fiber Channel ports, or 1/10-Gbps Fiber Channel over Ethernet (FCoE) ports, or 384 40-Gbps FCoE ports, or a mix of both Fiber Channel and FCoE ports. In addition to the FC and FCoE ports the Cisco MDS 9718 Director supports up to 128 1/10-Gbps IPStorage ports or 32 25-Gbps IPStorage ports or 32 40-Gbps IPStorage ports. These IPStorage ports are used for establishing FCIP ISLs.

Cisco MDS 9718 Director Features

The Cisco MDS 9718 Director supports the following features:

- Up to 6(DS-X9718-FAB3) x 512 x 16 slots = 49.152-Tbps per chassis Fiber Channel switching, full duplex-bandwidth
- Up to 6(DS-X9718-FAB1) x 256 x 16 slots = 24.576-Tbps per chassis Fiber Channel switching, full duplex-bandwidth
- Up to 6(DS-X9718-FAB3) x 440 x 16 slots = 42.240-Tbps per chassis FCoE switching bandwidth
- Up to 6(DS-X9718-FAB1) x 220 x 16 slots = 21.120-Tbps per chassis FCoE switching bandwidth
- Comprehensive security features
- Intelligent network services, including VSAN technology, IVR, and smart zoning
- SAN management tools including Cisco Nexus Dashboard Fabric Controller (Formerly Cisco Data Center Network Manager (DCNM)) and the command-line interface (CLI)
- Online diagnostics (GOLD, Call Home, and so on)
- Multiprotocol architecture, including Fiber Channel, Fiber Channel over Ethernet (FCoE), Fiber Channel over IP (FCIP), and NVMe over fabrics
- High availability with full redundant components, including fabric cards, supervisors, and power supplies
- Industry-leading scalability

Cisco MDS 9710 Director

The Cisco MDS 9710 Director is a high-performance SAN switch that is designed to meet the requirements of an enterprise data center storage environment. The Cisco MDS 9710 Director includes the following components that are designed specifically for a deployment in the Cisco MDS 9700 series:

- A 10-slot chassis (DS-C9710)
- 1-2 supervisor modules. The supervisor modules include the following types:
  - Cisco MDS 9700 Supervisor-4 Module (DS-X97-SF4-K9)
  - Cisco MDS 9700 Supervisor-1 Module (DS-X97-SF1-K9)
- 1-6 crossbar switching fabric modules. The crossbar switching fabric modules include the following types:
  - Cisco MDS 9710 Crossbar Fabric-3 Switching Module (DS-X9710-FAB3)
  - Cisco MDS 9710 Crossbar Fabric-1 Switching Module (DS-X9710-FAB1)
- 1-8 I/O modules. These I/O modules include the following types:
  - A 48-Port 64-Gbps Fiber Channel Switching Module (DS-X9748-3072K9)
  - A 48-Port 32-Gbps Fiber Channel Switching Module (DS-X9648-1536K9)
  - A 48-Port 16-Gbps Fiber Channel Switching Module (DS-X9448-768K9)
  - A 48-Port 10-Gbps Fiber Channel over Ethernet Module (DS-X9848-480K9)

    - A 24-Port 40-Gbps Fiber Channel over Ethernet (FCoE) Module (DS-X9824-960K9)
    - A 24/10-port SAN Extension Module (DS-X9334-K9)
- Three fan modules or trays
    - Cisco MDS 9710 Fan Module (DS-C9710-FAN)
- 1-8 power supply units. The power supply units include the following types:
    - Cisco MDS 9700 3000W AC power supply (DS-CAC97-3KW)
    - Cisco MDS 9700 3000W DC power supply (DS-CDC97-3KW)
    - Cisco MDS 9700 3500W High-Voltage power supply (DS-CHV-3.5KW)
- Cisco MDS 9710 Accessory Kit for Cisco (DS-9710-KIT-CCO)

The Cisco MDS 9710 Director supports up to 384 ports in a 10-slot modular chassis, with up to 1152 ports in a single rack. The 384 ports can be configured as 2/4/8/10/16/32/64-Gbps Fiber Channel ports, or 1/10-Gbps Fiber Channel over Ethernet (FCoE) ports, or 192 40-Gbps FCoE ports, or a mix of both Fiber Channel and FCoE ports. In addition to the FC and FCoE ports the Cisco MDS 9710 Director supports up to 64 1/10-Gbps IPStorage ports or 16 25-Gbps IPStorage ports or 16 40-Gbps IPStorage ports. These IPStorage ports are used for establishing FCIP ISLs.

Cisco MDS 9710 Director Features

The Cisco MDS 9710 Director supports the following features:

- Up to 6(DS-X9710-FAB3) x 512 x 8 slots = 24.576-Tbps per chassis Fiber Channel switching, full-duplex bandwidth
- Up to 6(DS-X9710-FAB1) x 256 x 8 slots = 12.288-Tbps per chassis Fiber Channel switching, half-duplex bandwidth
- Up to 6(DS-X9710-FAB3) x 440 x 8 slots = 21.120-Tbps per chassis FCoE switching bandwidth
- Up to 6(DS-X9710-FAB1) x 220 x 8 slots = 10.560-Tbps per chassis FCoE switching bandwidth
- Comprehensive security features
- Intelligent network services, including VSAN technology, IVR, and smart zoning
- SAN management tools including Cisco Nexus Dashboard Fabric Controller (NDFC) and the command-line interface (CLI)
- Online diagnostics (GOLD, Call Home, and so on)
- Multiprotocol architecture, including Fiber Channel, Fiber Channel over Ethernet (FCoE), Fiber Channel over IP (FCIP), and NVMe over fabrics
- High availability with full redundant components, including fabric cards, supervisors, and power supplies
- Industry-leading scalability

Cisco MDS 9706 Director

The Cisco MDS 9706 Director is designed for a deployment in small-to medium-sized storage networks that can support enterprise clouds and business transformation.

The Cisco MDS 9706 Director includes the following components:

- A 6-slot chassis (DS-C9706)
- 1-2 supervisor modules. The supervisor modules include the following types:
  - Cisco MDS 9700 Supervisor-4 Module (DS-X97-SF4-K9)
  - Cisco MDS 9700 Supervisor-1 Module (DS-X97-SF1-K9)
- 1-6 crossbar switching fabric modules. The crossbar switching fabric modules include the following types:
  - Cisco MDS 9706 Crossbar Fabric-3 Switching Module (DS-X9706-FAB3)
  - Cisco MDS 9706 Crossbar Fabric-1 Switching Module (DS-X9706-FAB1)
- 1-4 I/O modules. These I/O modules include the following types:
  - A 48-Port 64-Gbps Fiber Channel Switching Module (DS-X9748-3072K9)
  - A 48-Port 32-Gbps Fiber Channel Switching Module (DS-X9648-1536K9)
  - A 48-Port 16-Gbps Fiber Channel Switching Module (DS-X9448-768K9)
  - A 48-Port 10-Gbps Fiber Channel over Ethernet Module (DS-X9848-480K9)
  - A 24-Port 40-Gbps Fiber Channel over Ethernet (FCoE) Module (DS-X9824-960K9)
  - A 24/10-port SAN Extension Module (DS-X9334-K9)
- Three fan modules or trays
  - Cisco MDS 9706 Fan Module (DS-C9706-FAN)
- 1-4 power supply units. The power supply units include the following types:
  - Cisco MDS 9700 3000W AC power supply (DS-CAC97-3KW)
  - Cisco MDS 9700 3000W DC power supply (DS-CDC97-3KW)
  - Cisco MDS 9700 3500W High-Voltage power supply (DS-CHV-3.5KW)
- Cisco MDS 9706 Accessory Kit for Cisco (DS-9706-KIT-CCO)

The Cisco MDS 9706 supports up to 192 ports in a 6-slot modular chassis, with up to 768 ports in a single rack. The 192 ports can be configured as 2/4/8/10/16/32/64-Gbps Fiber Channel ports, or 1/10-Gbps Fiber Channel over Ethernet (FCoE) ports, or 96 40-Gbps FCoE ports, or a mix of both Fiber Channel and FCoE ports. In addition to the FC and FCoE ports the Cisco MDS 9706 Director supports up to 32 1/10-Gbps IPStorage ports or 8 25-Gbps IPStorage ports or 8 40-Gbps IPStorage ports. These IPStorage ports are used for establishing FCIP ISLs.

Cisco MDS 9706 Director Features

The Cisco MDS 9706 Director supports the following features:

- Up to 6(DS-X9706-FAB3) x 512 x 4 slots = 12.288-Tbps per chassis Fiber Channel switching, full-duplex bandwidth
- Up to 6(DS-X9706-FAB1) x 256 x 4 slots = 6.144-Tbps per chassis Fiber Channel switching, full-duplex bandwidth
- Up to 6(DS-X9706-FAB3) x 440 x 4 slots = 10.560-Tbps per chassis FCoE switching bandwidth
- Up to 6(DS-X9706-FAB1) x 220 x 4 slots = 5.280-Tbps per chassis FCoE switching bandwidth
- Comprehensive security features
- Intelligent network services, including VSAN technology, IVR, and smart zoning
- SAN management tools including Cisco Nexus Dashboard Fabric Controller (Formerly Cisco Data Center Network Manager (DCNM)) and the command-line interface (CLI)
- Online diagnostics (GOLD, Call Home, and so on)
- Multiprotocol architecture, including Fiber Channel, Fiber Channel over Ethernet (FCoE), Fiber Channel over IP (FCIP), and NVMe over fabrics
- High availability with full redundant components, including fabric cards, supervisors, and power supplies
- Industry-leading scalability

Chassis Description

This section describes the chassis in the Cisco MDS 9700 Multilayer Director Series. The chassis are:

Cisco MDS 9718 Director Chassis

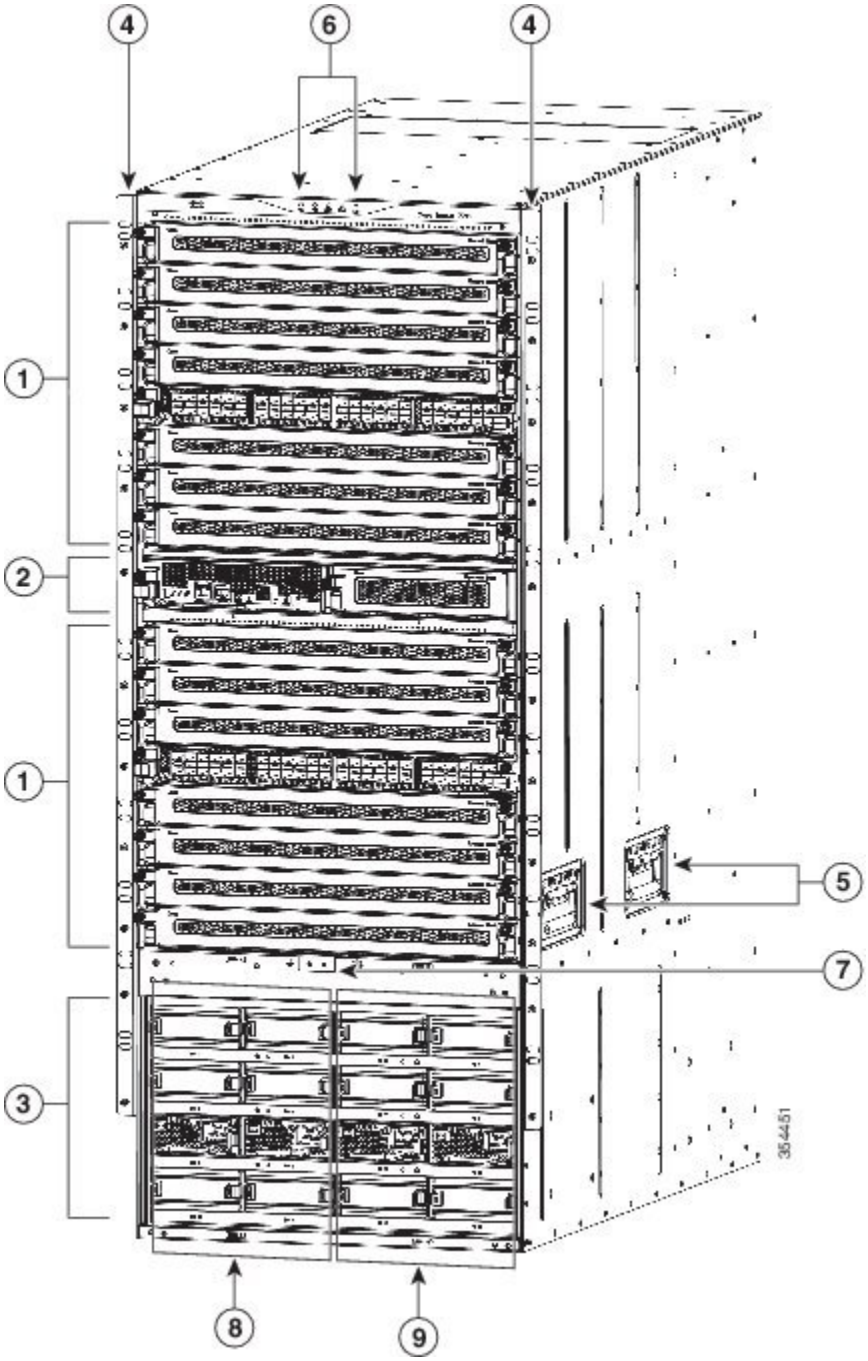
The Cisco MDS 9718 Director (DS-C9718) is an 18-slot chassis with up to two supervisor modules and up to 16 I/O modules. The chassis holds up to six crossbar fabric switching modules, up to 16 AC or DC 3-kW power supplies, and three fan modules. Airflow is front-to-back (port-side intake) in the Cisco MDS 9718 chassis.

Note The base configuration of the Cisco MDS 9718 (DS-C9718) Director ships with two supervisor modules (DS-X97-SF4-K9), six crossbar fabric switching modules (DS-X9718-FAB3), and 12 power supplies.

To group the networking cables for each I/O module on this chassis, you can install cable management frames on the chassis. You can also install an optional locking front door, an optional set of air filters on the front door, and cable management frames.

The following figure shows the standard hardware features seen from the front of the chassis.

Figure 1: Cisco MDS 9718 Chassis Front View

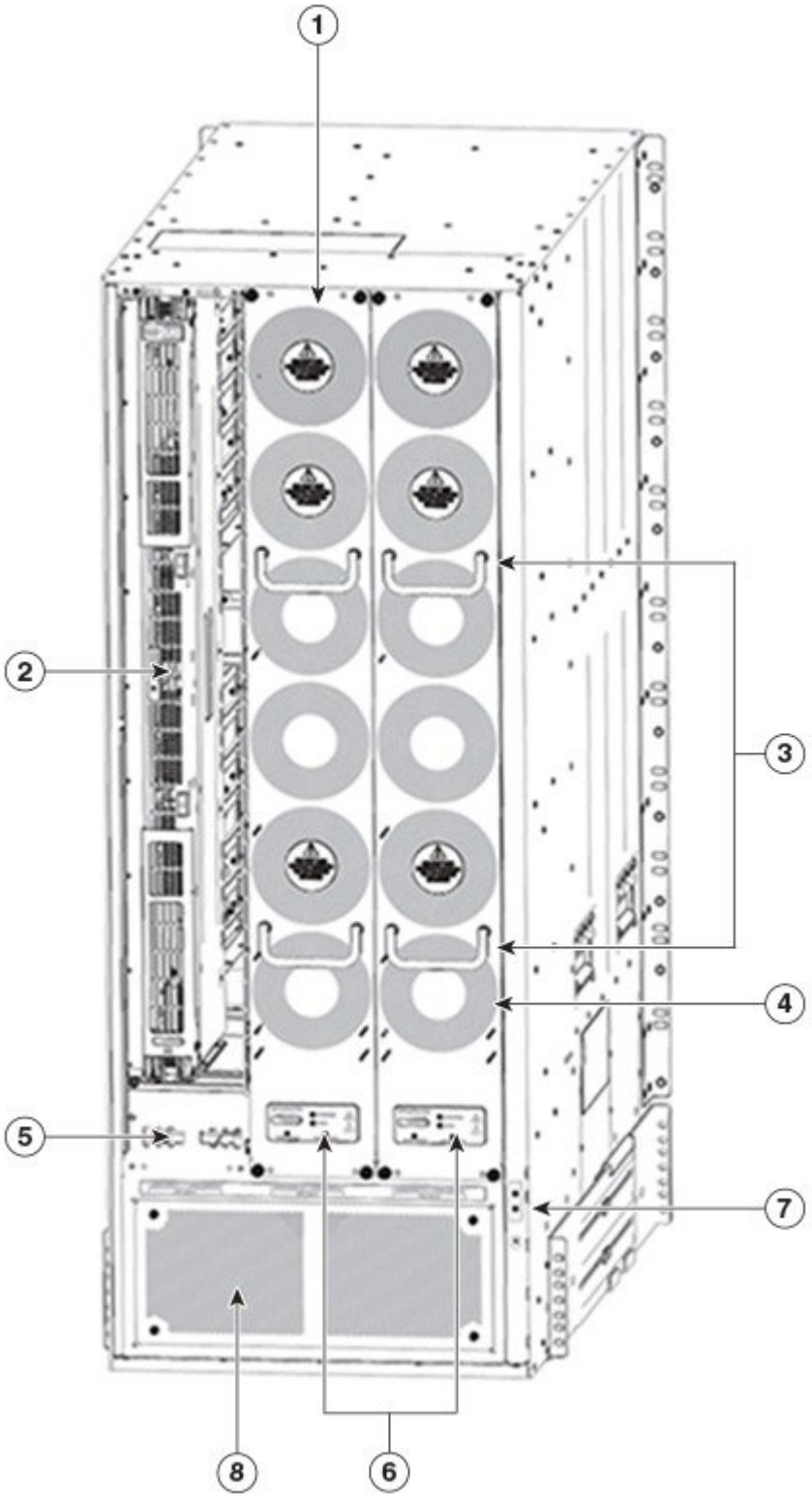


1	I/O modules slots numbered 1-8 and 11-18 from top to bottom.	**6**	Chassis LEDs

2	Supervisor modules (one or two) in slots numbered 9 and 10 from left to right. Each slot is half the width of the chassis and each slot can hold one supervisor module.	**7**	Ground point
3	Power supply unit bays numbered 1-16, starting from the top left and increasing left to right and top to bottom. • There are four rows of power supply bays at the bottom of the chassis. Each bay can hold one power supply. • The top row has bays 1-4, numbered left to right. • The second row has bays 5-8, numbered left to the right. • The third row has bays 9-12, numbered left to the right. • The fourth row has bays 13-16, numbered left to the right.	**8**	Grid A PSU bays (1, 2, 5, 6, 9, 10, 13, 14)
4	Chassis mounting brackets	**9**	Grid B PSU bays (3, 4, 7, 8, 11, 12, 15, 16)
5	Chassis handles **Note** Handles are to be used only for positioning an empty chassis.		

The following figure shows the standard hardware features seen from the rear of the chassis.

Figure 2: Cisco MDS 9718 Chassis Rear View


1
2
3
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6
354820

1	Fan modules or trays - (Three fan modules or trays) 1-3 are numbered left to the right. When the fan modules are installed, they cover the crossbar fabric switching modules. Only two fan modules or trays are shown in the figure. One fan module or tray is removed to show the crossbar fabric switching module in the back.	**5**	Fan power connector
2	Crossbar fabric switching modules - (up to six crossbar fabric switching modules with two modules behind each fan module or tray). The crossbar fabric switching modules 1 and 2 are behind the fan module 1, fabric modules 3 and 4 are behind the fan module 2, and fabric modules 5 and 6 are behind the fan module 3.	**6**	Fan and crossbar fabric switching modules LEDs
3	Fan module or tray handle	**7**	Ground point
4	Fan module or tray exhaust	**8**	PSU exhaust

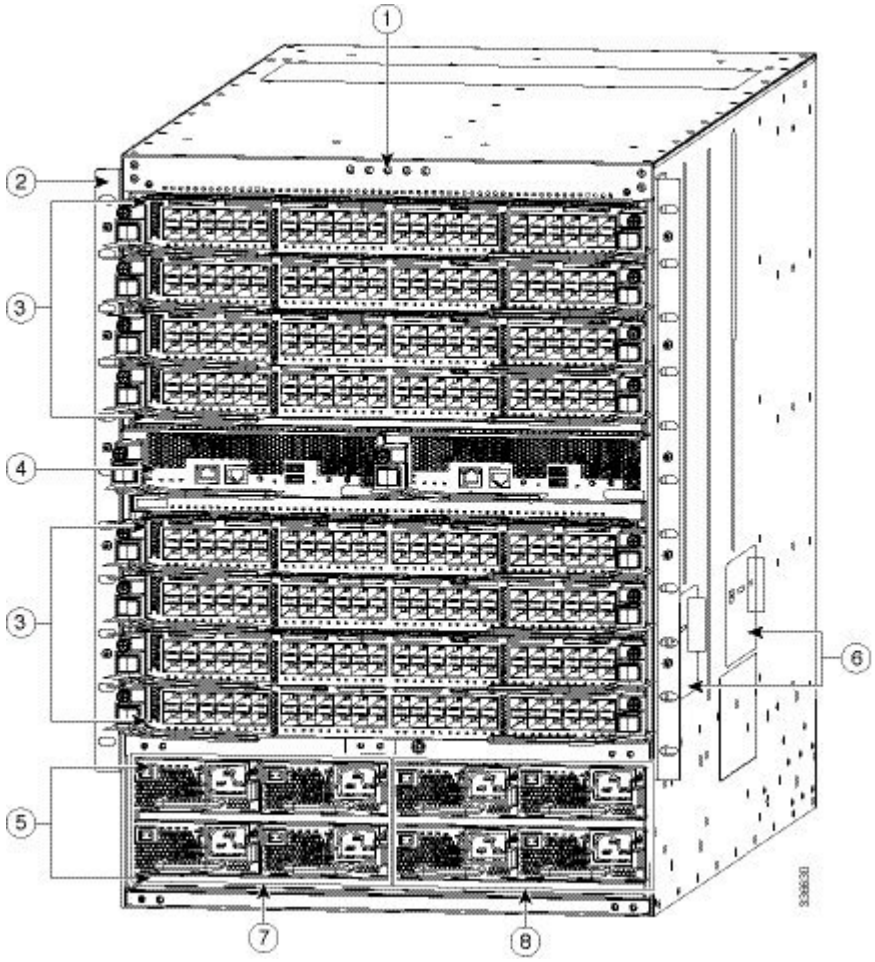
Cisco MDS 9710 Director Chassis

The Cisco MDS 9710 Director (DS-C9710) is a 10-slot chassis with up to two supervisor modules and up to 8 I/O modules. The chassis holds up to six crossbar fabric switching modules, up to 8 AC or DC 3-kW power supplies, and three fan modules. Airflow is front-to-back (port-side intake) in the Cisco MDS 9710 chassis.

Note The base configuration of the Cisco MDS 9710 (DS-C9710) Director ships with two supervisor modules (DS-X97-SF4-K9), three crossbar fabric switching modules (DS-X9718-FAB3), and six power supplies.

The following figure shows the front view of the Cisco MDS 9710 chassis.

Figure 3: Cisco MDS 9710 Chassis Front View

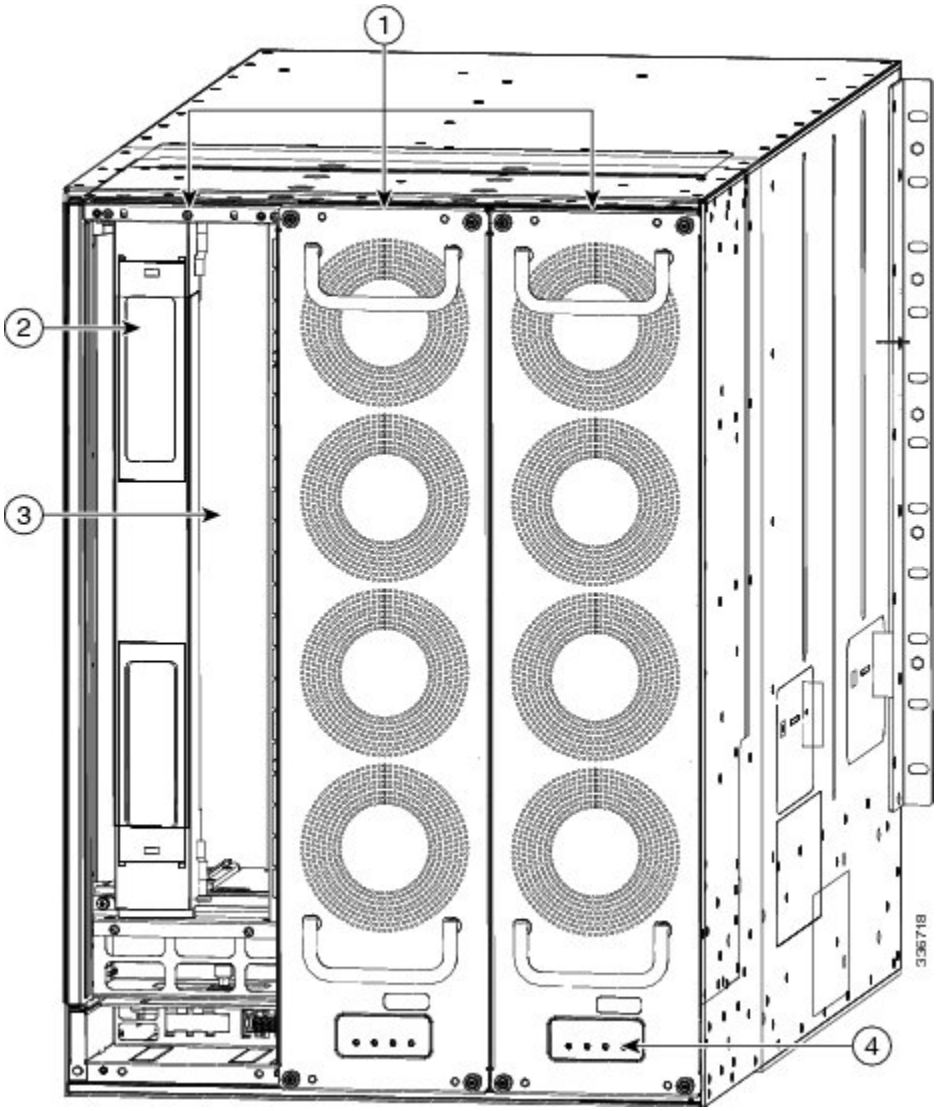


1	Chassis LEDs
2	Chassis mounting brackets
3	I/O modules slots numbered 1-4 and 7-10 from top to bottom
4	Supervisor modules (one or two) in slots numbered 5 and 6 from left to right. Each slot is half the width of the chassis and each slot can hold one supervisor module
5	Power supplies (up to 8 bays). • There are two rows of power supply bays at the bottom of the chassis. Each bay can hold one power supply. • The top row has bays 1-4, numbered left to right. • The second row has bays 5-8, numbered left to the right.

6	Chassis handles **Note** Handles are to be used only for positioning an empty chassis.
7	Grid A PSU bays (1, 2, 5, 6)
8	Grid B PSU bays (3, 4, 7, 8)

The following figure shows the rear view of the Cisco MDS 9710 chassis.

Figure 4: Cisco MDS 9710 Chassis Rear View



1	Fan modules or trays - (Three fan modules or trays) 1-3 are numbered left to the right. When the fan modules or trays are installed, they cover the crossbar fabric switching modules. Only two fan modules or trays are shown in the figure. One fan module or tray is removed to show the crossbar fabric switching module in back.
2	Crossbar fabric switching modules - (up to six crossbar fabric switching modules with two modules behind each fan module). The crossbar fabric switching modules 1 and 2 are behind the fan module or tray 1, fabric modules or trays 3 and 4 are behind the fan module or tray 2, and fabric modules or trays 5 and 6 are behind the fan module or tray 3.
3	Midplane
4	Crossbar fabric switching modules and fan LEDs

The Cisco MDS 9710 chassis can be mounted on a standard 19-inch EIA equipment rack by using the standard rack-mount hardware, or mounted on a standard two-post Telco rack, with mounting rails.

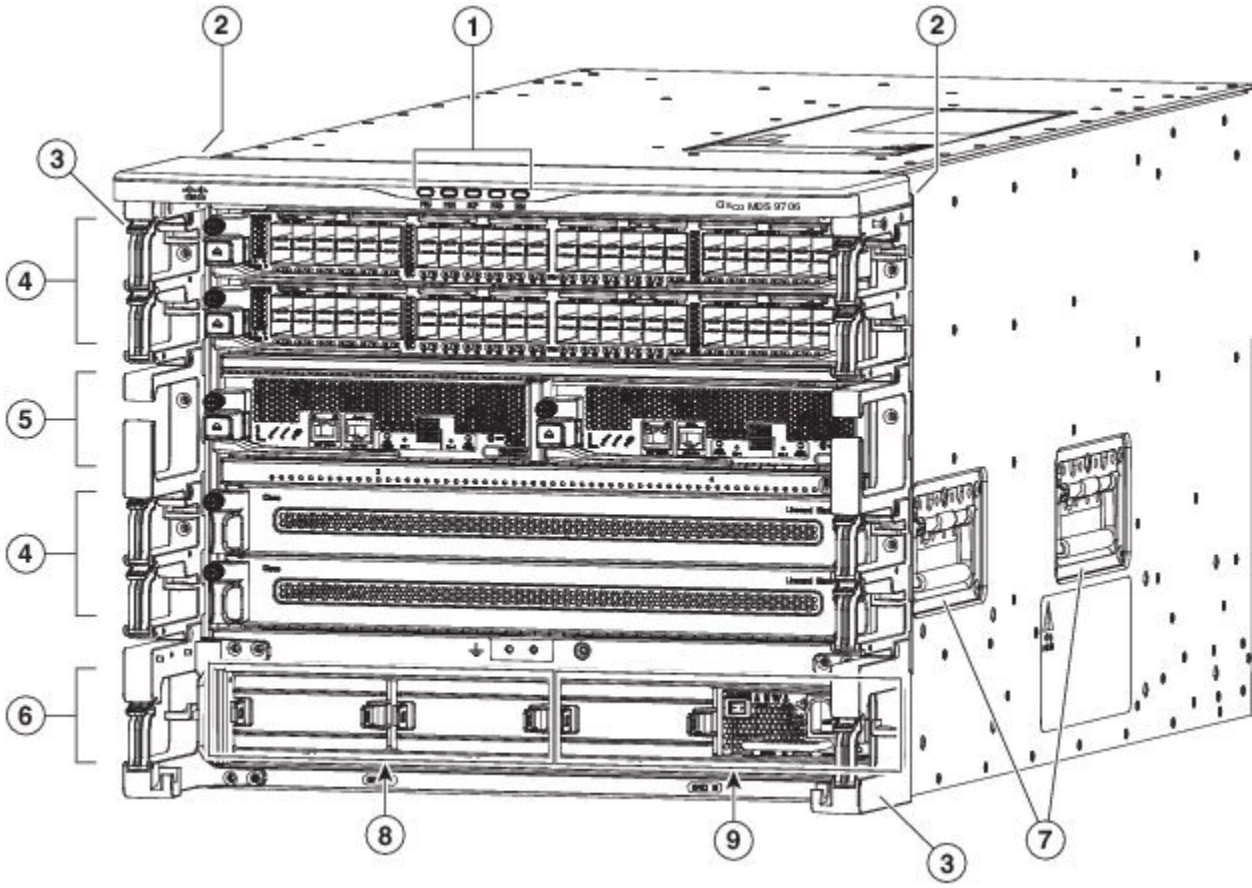
Cisco MDS 9706 Director Chassis

The Cisco MDS 9706 Director (DS-C9706) is a six-slot chassis with one or two supervisor modules, and up to four I/O modules. The chassis holds up to six crossbar fabric switching modules, up to four AC or DC 3-kW power supplies and three fan modules. Airflow is front-to-back (port-side intake) in the Cisco MDS 9706 chassis.

Note The base configuration of MDS 9706 (DS-C9706) ships with two supervisor modules (DS-X97-SF4-K9), three crossbar fabric switching modules (DS-X9718-FAB3), and four power supplies.

The following figure shows the front view of the Cisco MDS 9706 chassis.

Figure 5: Cisco MDS 9706 Chassis Front View

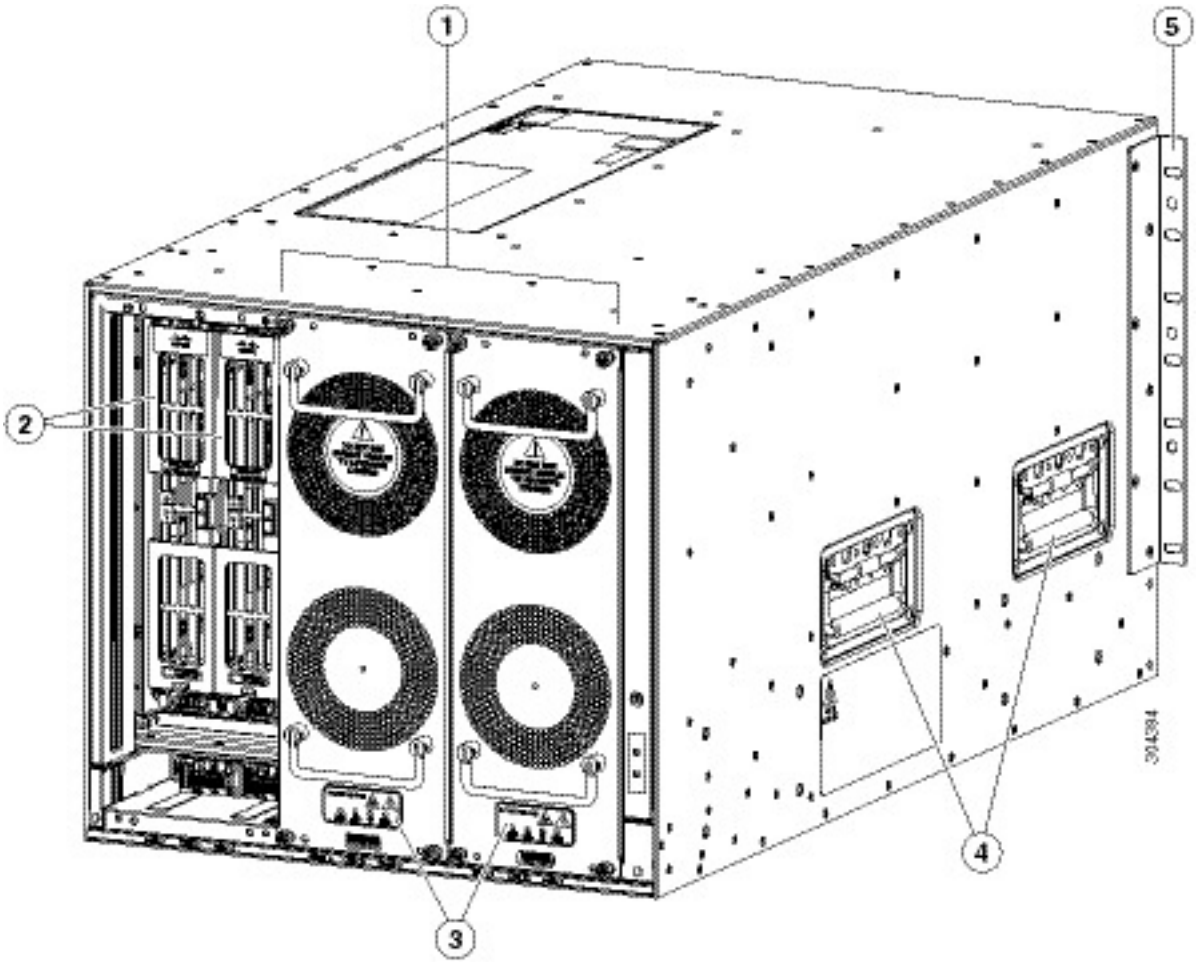


1	Chassis LEDs
2	Chassis mounting brackets
3	Cable management frame
4	I/O modules slots numbered 1-2 and 5-6 from top to bottom
5	Supervisor modules (one or two) in slots numbered 3 and 4 from left to right. Each slot is half the width of the chassis and each slot can hold one supervisor module
6	Power supplies (up to 4 bays). The last row has 4 bays of power supply at the bottom of the chassis. Each bay can hold one power supply.
7	Chassis handles **Note** Handles are to be used only for positioning an empty chassis

8	Grid A PSU bays (1, 2 slots)
9	Grid B PSU bays (3, 4 slots)

The following figure shows the rear view of the Cisco MDS 9706 chassis.

Figure 6: Cisco MDS 9706 Chassis Rear View



1	Fan modules or trays - (Three fan modules or trays) 1-3 are numbered left to the right. When the fan modules or trays are installed, they cover the crossbar fabric switching modules. Only two fan modules or trays are shown in the figure. One fan module or tray is removed to show the crossbar fabric switching module in back.
2	Crossbar fabric switching modules - (up to six crossbar fabric switching modules with two modules behind each fan module). The crossbar fabric switching modules 1 and 2 are behind the fan module or tray 1, fabric modules 3 and 4 are behind the fan module or tray 2, and fabric modules 5 and 6 are behind the fan module or tray 3.

3	Crossbar fabric switching modules and fan LEDs
4	Handles used for adjusting the chassis placement
5	Vertical mounting brackets

System LEDs

The following table describes the system LEDs for the Cisco MDS 9700 Series.

Table 1: Cisco MDS 9700 Series System LEDs

LED	Status	Description
Power supply unit	Green	Power supply units are operational.
	Amber	One of the following problems has occurred: • Any power supply unit LED is red. • Any power supply unit is down.
Fan module	Green	Fan modules are operational.
	Amber	At least one I/O module has the red STATUS LED.
Supervisor modules	Green	Supervisor modules are operational.
	Amber	At least one I/O module has the red STATUS LED.
Crossbar fabric switching modules	Green	Crossbar fabric switching modules are operational.
	Amber	At least one I/O module has the red STATUS LED.
I/O modules	Green	Switching modules are operational.
	Amber	At least one I/O module has the red STATUS LED.

Supervisor Modules

This section describes supervisor modules that are supported by different Cisco MDS 9700 Series switches. The supervisor modules are:

Cisco MDS 9700 Series Supervisor-4 Module

The Cisco MDS 9700 Series Supervisor-4 Module (DS-X97-SF4-K9) provides control and management functions for the Cisco MDS Director switches and enables intelligent, resilient, scalable, and high-performance multilayer SAN switching.

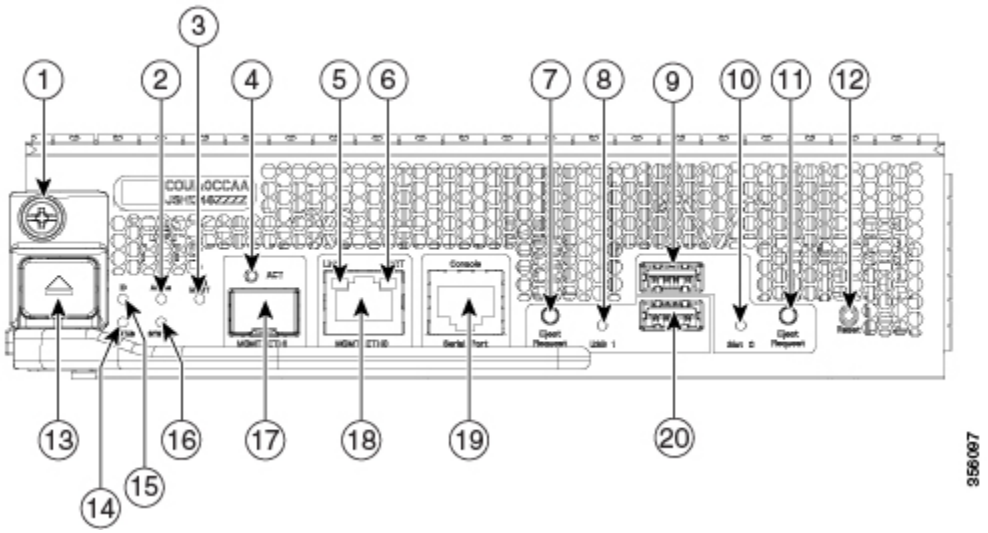
The Cisco MDS 9700 Series Supervisor-4 Module (DS-X97-SF4-K9) is supported on the Cisco MDS 9706 and 9710 Multilayer Directors from Cisco MDS NX-OS Release 8.4(1) or later. It is supported on the Cisco MDS 9718 Multilayer Director from Cisco MDS NX-OS Release 8.4(2a) or later.

The Cisco MDS 9700 Series Supervisor-4 Module supports the following features:

- Supports up to 768 2/4/8/10/16/32/64-Gbps Fiber Channel ports, or 1/10-Gbps FCoE ports in a single Cisco MDS 9718 Multilayer Director chassis
- Supports up to 384 2/4/8/10/16/32/64-Gbps Fiber Channel ports, or 1/10-Gbps FCoE ports in a single Cisco MDS 9710 Multilayer Director chassis
- Supports up to 192 2/4/8/10/16/32/64-Gbps Fiber Channel ports, or 1/10-Gbps FCoE ports in a single Cisco MDS 9706 Multilayer Director chassis
- Supports up to 384 40-Gbps FCoE ports in a single Cisco MDS 9718 Multilayer Director chassis
- Supports up to 192 40-Gbps FCoE ports in a single Cisco MDS 9710 Multilayer Director chassis
- Supports up to 96 40-Gbps FCoE ports in a single Cisco MDS 9706 Multilayer Director chassis
- Supports up to 48-Tbps in a single Cisco MDS 9718 Multilayer Director chassis
- Supports up to 24-Tbps in a single Cisco MDS 9710 Multilayer Director chassis
- Supports up to 12-Tbps in a single Cisco MDS 9706 Multilayer Director chassis
- Supports DS-X9718-FAB3, DS-X9710-FAB3 and DS-X9706-FAB3 crossbar fabric switching modules on the Cisco MDS 9718, Cisco MDS 9710 and Cisco MDS 9706 Multilayer Directors respectively
- Multipathing based on Fabric Shortest Path First (FSPF)
- Nondisruptive software upgrades
- Provides high availability. The Cisco MDS 9700 Series Supervisor-4 Module can automatically restart failed processes, making it exceptionally robust. In the rare event that a supervisor module is reset, complete synchronization between the Active and Standby supervisor modules helps ensure a Stateful Failover with no disruption of traffic.
- Supports Secure Boot capabilities
- Supports two USB 3.0 ports
- Network management through the command-line interface (CLI) and through Cisco Data Center Network Manager (DCNM)
- Extensive security features including RADIUS and TACACS+, Fiber Channel Security Protocol (FC-SP), Secure File Transfer Protocol (SFTP), Secure Shell (SSH) Protocol, and Simple Network Management Protocol Version 3 (SNMPv3) implementing Advanced Encryption Standard (AES), VSANs, hardware-enforced zoning, ACLs, and per-VSAN role-based access control
- Integrated hardware-based virtual SAN (VSAN) technology and inter-VSAN routing (IVR)
- Network services such as access control lists (ACLs) and quality of service (QoS)
- Smart zoning
- Power-on self-test (POST) and diagnostics
- Switched Port Analyzer (SPAN) and Remote Switched Port Analyzer (RSPAN)

The following figure shows the Cisco MDS 9700 Series Supervisor-4 Module.

Figure 7: Cisco MDS 9700 Series Supervisor-4 Module Front View



1	Module retaining screw
2	Active: supervisor redundancy status LED
3	PWR MGMT: system power status LED
4	ACT: management port packet activity LED
5	Link: management port link status LED
6	ACT: management port packet activity LED
7	Eject Request: eject request button for USB3 device
8	USB3: usb3 status LED
9	USB Slot 0: USB ports
10	Slot0: slot0 status LED
11	Eject Request: eject request button for a slot0 device
12	Reset: module reset button
13	Module lock release button
14	Status: system diagnostic test status LED
15	ID: locator LED
16	System: system environment status LED
17	MGMT Ethernet1: MGMT1 Ethernet out of band management port
	Note: The MGMT1 Ethernet port is not yet supported.
18	MGMT Ethernet0: MGMT0 Ethernet out of band management port.
19	Console Serial Port: module RS232 serial console port
20	USB Slot 1: USB port

The following table describes the LEDs on the Cisco MDS 9700 Series Supervisor-4 Module.

Table 2: Cisco MDS 9700 Series Supervisor-4 Module LEDs

LED	Status	Description
ID	Blinking blue	A user has activated this LED to allow a person to fi
	Off	Location identification is deactivated for this module
Status	Green	All module diagnostics passed. The module is operat
	Red	Indicates one of the following conditions: • The module has detected an error and cannot po • The module is not properly inserted. • A bootup or runtime diagnostic test has failed.
	Blinking Red	Indicates one of the following conditions: • An over temperature condition has occurred. (A exceeded during an environmental monitoring.) • The module is resetting. • The ejector lever is open.
	Off	The module is not receiving power.
System	Green	All environmental sensors in the system are within o
	Amber	At least one power supply has failed or the power su
	Red	The temperature of the supervisor module exceeded t
Active	Green	The supervisor is operational and in the HA-active st
	Amber	The supervisor module is in the HA-standby state.
Power Management	Green	There is sufficient power available for all installed m
	Amber	There is insufficient power for all installed modules.
MGMT0 Ethernet	Green	The mgmt0 interface is administratively active when state.
		From Cisco MDS NX-OS Release 8.4(2), when the s the mgmt0 interface is not administratively active.
	Amber	On Cisco MDS NX-OS Release 8.4(1a) or earlier, wh HA-standby state, the mgmt0 interface is not adminis
	Off	The mgmt0 interface is uninitialized. No signal is det
ACT	Green	Frames are being transmitted or received by the inter
	Off	There is no activity on the interface.

LED	Status	Description
Link	Green	The management port link is operational.
	Amber	The management port link has been disabled by s
	Blinking amber	The management port has been disabled by a hard
	Off	No link signal received.
USB3	Green	The flash device is mounted.
	Red	The device is a valid device type, but failed to be r file system format.
	Off	The flash device is not mounted and can be safely
Slot0	Green	The flash device is mounted.
	Red	The device is a valid device type, but failed to be r file system format.
	Off	The flash device is not mounted and can be safely

Cisco MDS 9700 Series Supervisor-1E Module

The Cisco MDS 9700 Series Supervisor-1E Module (DS-X97-SF1E-K9) delivers advanced switching technology and resources to support the 18 slot chassis (DS-C9718).

The DS-X97-SF1E-K9 module is designed for the Cisco MDS 9718 Director.

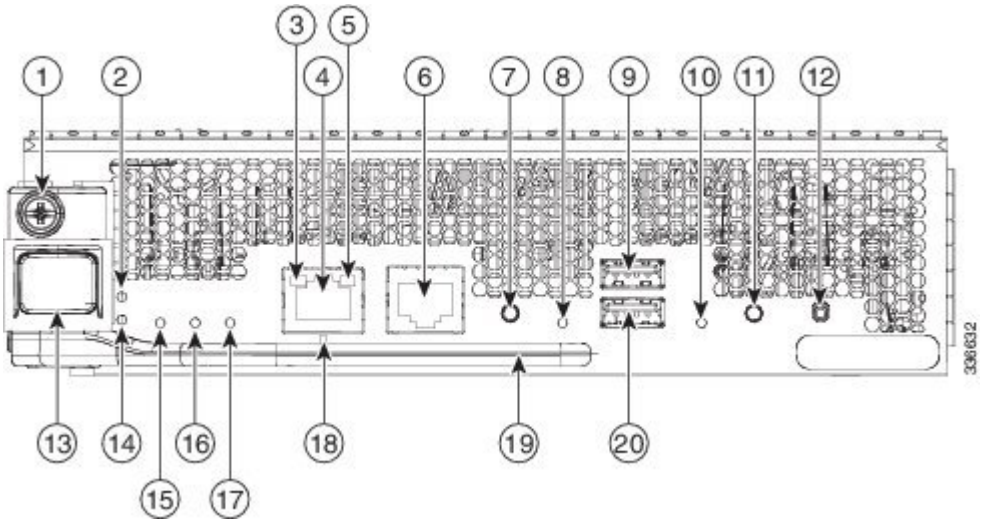
The Cisco MDS 9700 Series Supervisor-1E Module supports the following features:

- Supports up to 768 2/4/8/10/16/32-Gbps Fiber Channel ports, or 1/10-Gbps FCoE ports in a single Cisco MDS 9718 Multilayer Director chassis
- Supports up to 384 40-Gbps FCoE ports in a single Cisco MDS 9718 Multilayer Director chassis
- Supports up to 48-Tbps of Fiber Channel system bandwidth
- Supports DS-X9718-FAB1 crossbar fabric switching module on the Cisco MDS 9718 Multilayer Director
- Multipathing based on Fabric Shortest Path First (FSPF)
- Nondisruptive software upgrades
- Provides high availability. The Cisco MDS 9700 Series Supervisor-1E Module ca automatically restart failed processes, making it exceptionally robust. In the rare event that a supervisor module is reset, complete synchronization between the Active and Standby supervisor modules helps ensure a Stateful Failover with no disruption of traffic.
- Network management through the command-line interface (CLI) and through Cisco Data Center Network Manager (DCNM)
- Extensive security features including RADIUS and TACACS+, Fiber Channel Security Protocol (FC-SP), Secure File Transfer Protocol (SFTP), Secure Shell (SSH) Protocol, and Simple Network Management Protocol Version 3 (SNMPv3) implementing Advanced Encryption Standard (AES), VSANs, hardware-enforced zoning, ACLs, and per-VSAN role-based access control (RBAC)
- Support for virtual SAN (VSAN) technology and inter-VSAN routing (IVR)

- Network services such as access control lists (ACLs) and quality of service (QoS)
- Smart zoning
- Power-on self-test (POST) and diagnostics
- Switched Port Analyzer (SPAN) and Remote Switched Port Analyzer (RSPAN)

The following figure shows the Cisco MDS 9700 Series Supervisor-1E Module.

Figure 8: Cisco MDS 9700 Series Supervisor-1E Module



1	Module retaining screw
2	ID: locator LED
3	Link: management port link status LED
4	MGMT Ethernet: MGMT0 Ethernet out of band port
5	ACT: management port packet activity LED
6	Console Serial Port: module serial console port
7	Eject Request: eject request button for USB1 device
8	USB1: usb1 status LED
9	USB1 USB port
10	Slot0: slot0 status LED
11	Eject Request: eject request button for a slot0 device
12	Reset: module reset button
13	Module lock release button
14	Status: system diagnostic test status LED
15	System: system environment status LED
16	Active: supervisor redundancy status LED

17	PWR MGMT: system power status LED
18	Management port operational status LED
19	Module ejection lever
20	Slot0 USB port

The following table describes the LEDs on the Cisco MDS 9700 Series Supervisor-1E Module.

Table 3: Cisco MDS 9700 Series Supervisor-1E Module LEDs

LED	Status	Description
ID	Blinking blue	A user has activated this LED to allow a person to f
	Off	Location identification is deactivated for this modu
Status	Green	All module diagnostics passed. The module is opera
	Red	Indicates one of the following conditions: • The module has detected an error and cannot p • The module is not properly inserted. • A bootup or runtime diagnostic test has failed.
	Blinking Red	Indicates one of the following conditions: • An over temperature condition has occurred. (an environmental monitoring.) • The module is resetting. • The ejector lever is open.
	Off	The module is not receiving power.
System	Green	All environmental sensors in the system are within
	Amber	At least one power supply has failed or the power s
	Red	The temperature of the supervisor module exceeded
	Off	The slot has detected a slot ID parity error
Active	Green	The supervisor is operational and in the HA-active
	Amber	The supervisor module is in HA-standby state.
Power Management	Green	There is sufficient power available for all installed
	Amber	There is insufficient power for all installed modules

LED	Status	Description
MGMT0 Ethernet	Green	The mgmt0 interface is administratively active when th
		From Cisco MDS NX-OS Release 8.4(2), when the supe is not administratively active.
	Amber	On Cisco MDS NX-OS Release 8.4(1a) or earlier, whe mgmt0 interface is not administratively active.
	Blinking amber	The management port link is bad and has been disabled
	Off	The mgmt0 interface is uninitialized. No signal is detec
ACT	Blinking Green	Frames are being transmitted or received by the interfa
	Off	There is no activity on the interface.
Link	Green	The management port link is operational.
	Off	No link signal received.
LOG FLASH	Green	The log flash CompactFlash or USB disk is being acce off.
	Off	The expansion flash CompactFlash or USB disk is not this LED is off.
Slot0	Green	The log flash CompactFlash or USB disk is being acce off.
	Off	The expansion flash CompactFlash or USB disk is not this LED is off.

Cisco MDS 9700 Series Supervisor-1 Module

The Cisco MDS 9700 Series Supervisor-1 Module (DS-X97-SF1-K9) provides control and management functions for the Director switches and enables high-performance switching.

The Cisco MDS 9700 Series Supervisor-1 Module (DS-X97-SF1-K9) is designed specifically for the Cisco MDS 9706 and 9710 chassis.

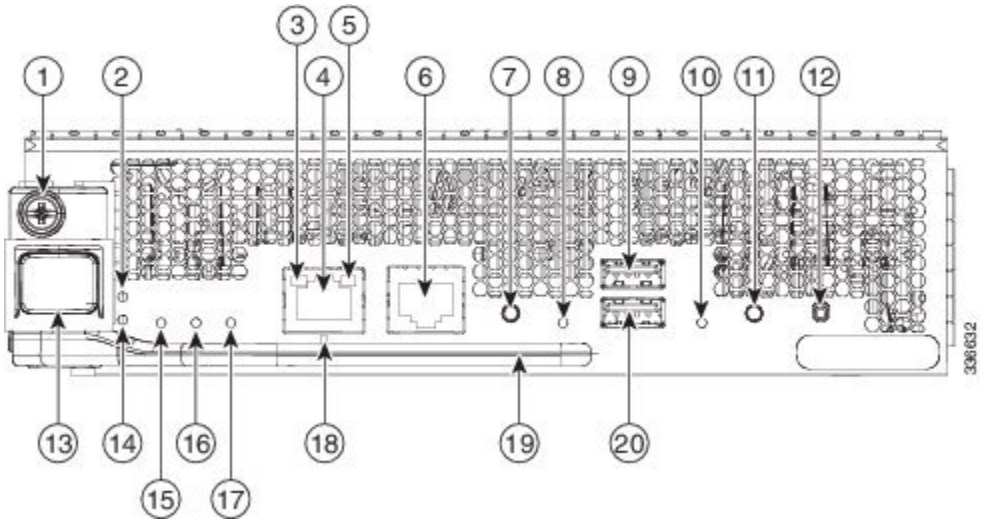
The Cisco MDS 9700 Series Supervisor-1 Module supports the following features:

- Supports up to 384 2/4/8/10/16/32-Gbps Fiber Channel ports, or 1/10-Gbps FCoE ports in a single Cisco MDS 9710 Multilayer Director chassis
- Supports up to 192 2/4/8/10/16/32-Gbps Fiber Channel ports, or 1/10-Gbps FCoE ports in a single Cisco MDS 9706 Multilayer Director chassis
- Supports up to 192 40-Gbps FCoE ports in a single Cisco MDS 9710 Multilayer Director chassis
- Supports up to 96 40-Gbps FCoE ports in a single Cisco MDS 9706 Multilayer Director chassis
- Up to 24 terabits per second (Tbps) in a single Cisco MDS 9710 Multilayer Director chassis
- Up to 12 terabits per second (Tbps) in a single Cisco MDS 9706 Multilayer Director chassis
- Supports DS-X9710-FAB1 and DS-X9706-FAB1 crossbar fabric switching module on the Cisco MDS 9710 and 9706 Multilayer Directors respectively

- Multipathing based on Fabric Shortest Path First (FSPF)
- Nondisruptive software upgrades
- Provides high availability. The Cisco MDS 9700 Series Supervisor-1 Module has the ability to automatically restart failed processes, making it exceptionally robust. In the rare event that a supervisor module is reset, complete synchronization between the Active and Standby supervisor modules helps ensure a Stateful Failover with no disruption of traffic.
- Stateful process restart and failover
- Fully redundant operation
- Network management through the command-line interface (CLI) and through Cisco Data Center Network Manager (DCNM)
- Extensive security features including RADIUS and TACACS+, Fiber Channel Security Protocol (FC-SP), Secure File Transfer Protocol (SFTP), Secure Shell (SSH) Protocol, and Simple Network Management Protocol Version 3 (SNMPv3) implementing Advanced Encryption Standard (AES), VSANs, hardware-enforced zoning, ACLs, and per-VSAN role-based access control
- Support for virtual SAN (VSAN) technology and inter-VSAN routing (IVR)
- Network services such as access control lists (ACLs) and quality of service (QoS)
- Smart zoning
- Power-on self-test (POST) and diagnostics
- Switched Port Analyzer (SPAN) and Remote Switched Port Analyzer (RSPAN)

The following figure shows the Cisco MDS 9700 Series Supervisor-1 Module.

Figure 9: Cisco MDS 9700 Series Supervisor-1 Module Front View



1	Module retaining screw
2	ID: locator LED
3	Link: management port link status LED

4	MGMT Ethernet: MGMT0 Ethernet out of band port
5	ACT: management port packet activity LED
6	Console Serial Port: module serial console port
7	Eject Request: eject request button for USB1 device
8	USB1: usb1 status LED
9	USB1: USB port (USB 3.0)
10	Slot0: slot0 status LED
11	Eject Request: eject request button for a slot0 device
12	Reset: module reset button
13	Module lock release button
14	Status: system diagnostic test status LED
15	System: system environment status LED
16	Active: supervisor redundancy status LED
17	PWR MGMT: system power status LED
18	Management port operational status LED
19	Module ejection lever
20	Slot0: USB port (USB 2.0)

The following table describes the LEDs on the Cisco MDS 9700 Series Supervisor-1 Module.

Table 4: Cisco MDS 9700 Series Supervisor-1 Module LEDs

LED	Status	Description
ID	Blinking blue	A user has activated this LED to allow a pers
	Off	Location identification is deactivated for this

LED	Status	Description
Status	Green	All module diagnostics passed. The modu
	Red	Indicates one of the following conditions • The module has detected an error an • The module is not properly inserted. • A bootup or runtime diagnostic test
	Blinking Red	Indicates one of the following conditions • An over temperature condition has c during an environmental monitoring • The module is resetting. • The ejector lever is open.
	Off	The module is not receiving power.
System	Green	All environmental sensors in the system a
	Amber	At least one power supply has failed or th
	Red	The temperature of the supervisor modul
Active	Green	The supervisor is operational and in a HA
	Amber	The supervisor module is in a HA standb
Power Management	Green	There is sufficient power available for all
	Amber	There is insufficient power for all installe
MGMT0 Ethernet	Green	The mgmt0 interface is administratively a
		From Cisco MDS NX-OS Release 8.4(2) interface is not administratively active.
	Amber	On Cisco MDS NX-OS Release 8.4(1a) c the mgmt0 interface is not administrative
	Off	The mgmt0 interface is uninitialized. No
ACT	Green	Frames are being transmitted or received
	Off	There is no activity on the interface.
Link	Green	The management port link is operational.
	Amber	The management port link has been disab
	Blinking amber	The management port has been disabled l
	Off	No link signal received.

LED	Status	Description
USB1	Green	The flash device is mounted.
	Red	The device is a valid device type, but failed to format.
	Off	The flash device is not mounted and can be s
Slot0	Green	The flash device is mounted.
	Red	The device is a valid device type, but failed to format.
	Off	The flash device is not mounted and can be s

Crossbar Fabric Switching Modules

In this section, details about the following crossbar fabric switching modules are provided:

Cisco MDS 9718 Director Crossbar Fabric Switching Modules

The Cisco MDS 9718 Director supports up to six crossbar fabric (xbar) switching modules. The crossbar fabric switching modules, DS-X9718-FAB1 and DS-X9718-FAB3 are supported. The crossbar fabric switching modules are installed vertically at the back of the chassis behind the fan modules.

Crossbar fabric switching modules slots 1 and 2 are behind the fan module slot 1, the crossbar fabric switching modules slots 3 and 4 are behind the fan module slot 2, and crossbar fabric switching modules slots 5 and 6 are behind the fan module slot 3.

Cisco MDS 48-Port 32-Gbps Fiber Channel Switching Module needs a minimum of 6 (DS-X9718-FAB1) Crossbar Fabric-1 Switching Modules to deliver full bandwidth to all the modules in the switch. Each DS-X9718-FAB1 Crossbar Fabric-1 Switching Module provides 256-Gbps of fiber channel bandwidth per slot.

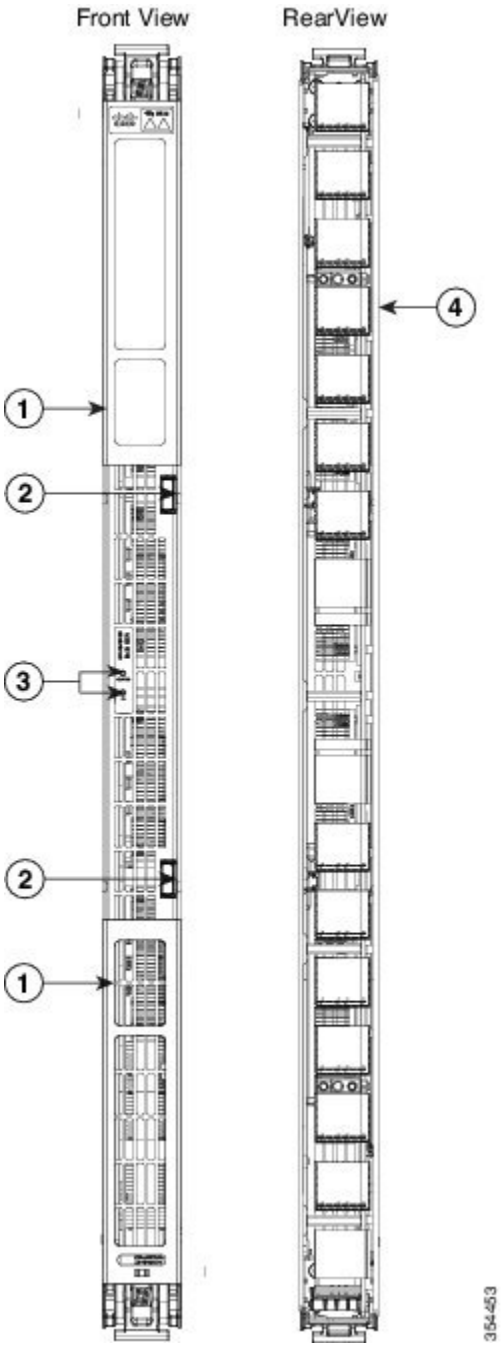
Cisco MDS 48-Port 32-Gbps Fiber Channel Switching Module needs a minimum of 3 (DS-X9718-FAB3) Crossbar Fabric-3 Switching Modules to deliver full bandwidth to all the modules in the switch. Each DS-X9718-FAB3 Crossbar Fabric-3 Switching Module provides 512-Gbps of fiber channel bandwidth per slot. A fourth crossbar fabric switching module is required for N+1 protection.

The DS-X9718-FAB1 Crossbar Fabric-1 Switching Modules are supported from Cisco MDS NX-OS Release 7.3(1) or later. DS-X9718-FAB1 modules are supported only with Supervisor-1E Modules (DS-X97-SF1E-K9).

The DS-X9718-FAB3 Crossbar Fabric-3 Switching Modules are supported from Cisco MDS NX-OS Release 8.4(2a) or later. DS-X9718-FAB3 modules are supported only with Supervisor-4 Module (DS-X97-SF4-K9).

Note You cannot have a mix of different supervisor modules or a mix of different crossbar fabric switching modules in a chassis, except during migration of a supervisor module or a crossbar fabric switching module.

Figure 10: Cisco MDS 9718 Crossbar Fabric Switching Module



1	Locking lever
2	Unlocking button
3	Crossbar fabric switching module LEDs
4	Connector pins

The LEDs on the crossbar fabric switching modules indicate the status of the modules. The table shown below describes the LEDs.

Table 5: Cisco MDS 9718 Director Crossbar Modules LEDs

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (no
	Red	Indicates one of the following: • The diagnostic test has failed. The module is r during the initialization sequence. • The inlet air temperature of the system has exc the card (a major environmental warning). The damage.
	Blinking Red	Indicates one of the following: • The crossbar fabric switching module has just • An over temperature condition has occurred ar • The power was turned off with a CLI comman • The module is resetting and both ejector lever
	Off	The module is not receiving power.
Locater ID	Blinking Blue	The operator has activated this LED to identify this
	Off	Operator has not flagged this card for identification

Since the crossbar fabric switching modules are located behind the fan modules in the chassis, the LEDs on the crossbar fabric switching modules are not easily visible from the back of the chassis. So, crossbar fabric switching module status LEDs are provided on the fan modules as well. Since each fan module covers two crossbar fabric switching modules, the status LEDs for the two crossbar fabric switching modules are present on each fan module. If the fan module is removed the status and locator LEDs on crossbar fabric switching modules will be visible.

When a crossbar fabric switching module needs to be located, the locator LED of the corresponding fan module needs to be activated, followed by the locator LED of the crossbar fabric switching module, using the CLIs **locator-led fan <** *fan module number* **>** and **locator-led xbar <** *xbar slot number* **>**. For example, to locate a crossbar fabric switching module in slot 4, the locator LED of the fan module 2 needs to be activated followed by the locator LED of the crossbar fabric switching module 4.

Cisco MDS 9710 Director Crossbar Fabric Switching Modules

The Cisco MDS 9710 Director supports up to six crossbar (xbar) fabric switching modules. The crossbar fabric switching modules DS-X9710-FAB1 and DS-X9710-FAB3 are supported. The crossbar fabric switching modules are installed vertically at the back of the chassis behind the fan modules.

Crossbar fabric switching modules slots 1 and 2 are behind the fan module slot 1, the crossbar fabric switching modules slots 3 and 4 are behind the fan module slot 2, and crossbar fabric switching modules slots 5 and 6 are behind the fan module slot 3.

Cisco MDS 48-Port 32-Gbps Fiber Channel Switching Module needs a minimum of 6 (DS-X9710-FAB1) Crossbar Fabric-1 Switching Modules to deliver full bandwidth to all the modules in the switch. Each DS-X9710-FAB1 Crossbar Fabric-1 Switching Module provides 256-Gbps of fiber channel bandwidth per slot.

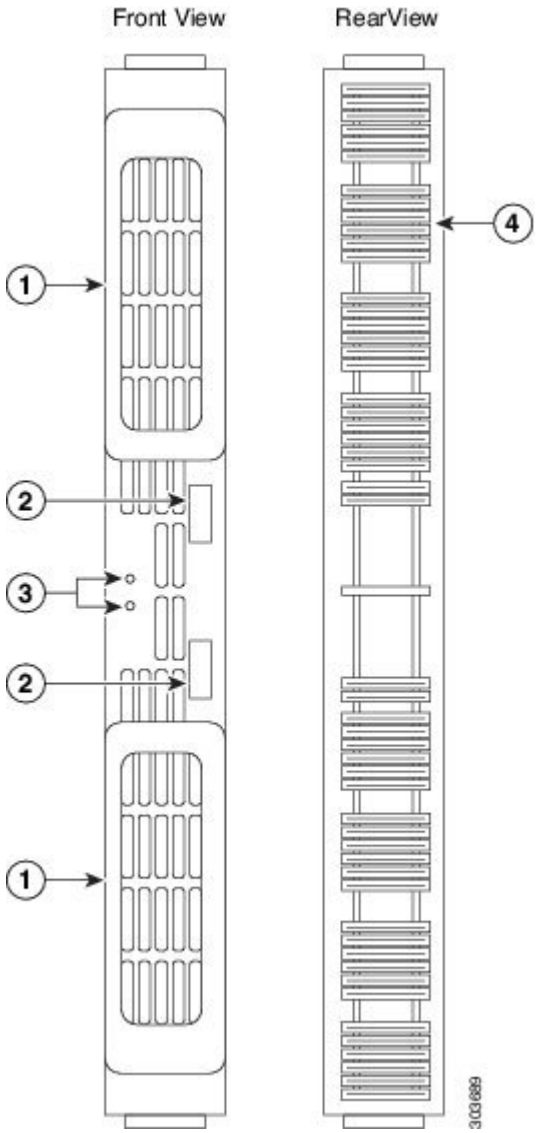
Cisco MDS 48-Port 32-Gbps Fiber Channel Switching Module needs a minimum of 3 (DS-X9710-FAB3) Crossbar Fabric-3 Switching Modules to deliver full bandwidth to all the modules in the switch. Each DS-X9710-FAB3 Crossbar Fabric-3 Switching Module provides 512-Gbps of fiber channel bandwidth per slot. A fourth crossbar fabric switching module is required for N+1 protection.

The DS-X9710-FAB1 crossbar fabric switching module is supported from Cisco MDS NX-OS Release 6.2(1) or later. DS-X9710-FAB1 modules are supported only with Supervisor-1 Modules (DS-X97-SF1-K9).

The DS-X9710-FAB3 crossbar fabric switching module is supported from Cisco MDS NX-OS Release 8.4(1) or later. DS-X9710-FAB3 modules are supported only with Supervisor-4 Modules (DS-X97-SF4-K9).

Note You cannot have a mix of different supervisor modules or a mix of different crossbar fabric switching modules in a chassis, except during migration of a supervisor module or a crossbar fabric switching module.

Figure 11: Cisco MDS 9710 Crossbar Fabric Switching Module



1	Locking lever
2	Unlocking button
3	Crossbar fabric switching module LEDs
4	Connector pins

The LEDs on the crossbar fabric switching modules indicate the status of the modules. The table below describes the LEDs.

Table 6: Cisco MDS 9710 Director Crossbar Fabric Switching Modules LEDs

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (nor sequence).
	Orange	One of the following occurs: • The module is booting or running diagnostics (sequence). • An over temperature condition occurred (a min exceeded during environmental monitoring).
	Red, Blinking	One of the following occurs: • The diagnostic test failed. The module is not op fault occurred during the initialization sequence • An over temperature condition occurred (a maj exceeded during environmental monitoring). • Crossbar fabric switching module has been mar
	Red	Bad slot ID parity.
	Off	The module is not receiving power.
Locater ID	Blue Blinking	Operator has flagged this card for identification.
	Off	Operator has not flagged this card for identification.

Since the crossbar fabric switching modules are located behind the fan modules in the chassis, the LEDs on the crossbar fabric switching modules are not easily visible from the back of the chassis. So, crossbar fabric switching module status LEDs are provided on the fan modules as well. Each fan module covers two crossbar fabric switching modules, the status LEDs for the two crossbar fabric switching modules are present on each fan module. If the fan module is removed, the status and locator LEDs on the crossbar fabric switching modules will be visible.

When a fabric module needs to be located, the locator LED of the corresponding fan module must be activated, followed by the locator LED of the crossbar fabric switching module, using the CLIs **locator-led fan** < *fan module number* > and **locator-led xbar** < *xbar slot number* >. For example, to locate the crossbar fabric switching module in slot 4, the locator LED of the fan module 2 needs to be activated followed by the locator LED of the crossbar fabric switching module 4.

Cisco MDS 9706 Director Crossbar Fabric Switching Modules

The Cisco MDS 9706 Director supports up to six crossbar (xbar) fabric switching modules. The crossbar fabric switching modules DS-X9706-FAB1 and DS-X9706-FAB3 are supported. The crossbar fabric switching modules are installed vertically at the back of the chassis behind the fan modules. Crossbar fabric switching modules slots 1 and 2 are behind the fan module slot 1, crossbar fabric switching modules slots 3 and 4 are behind the fan module slot 2, and crossbar fabric switching modules slots 5 and 6 are behind the fan module slot 3.

Cisco MDS 48-Port 32-Gbps Fiber Channel Switching Module needs a minimum of 6 (DS-X9706-FAB1) Crossbar Fabric-1 Switching Modules to deliver full bandwidth to all the modules in the switch. Each DS-X9706-FAB1 Crossbar Fabric-1 Switching Module provides 256-Gbps of fiber channel bandwidth per slot.

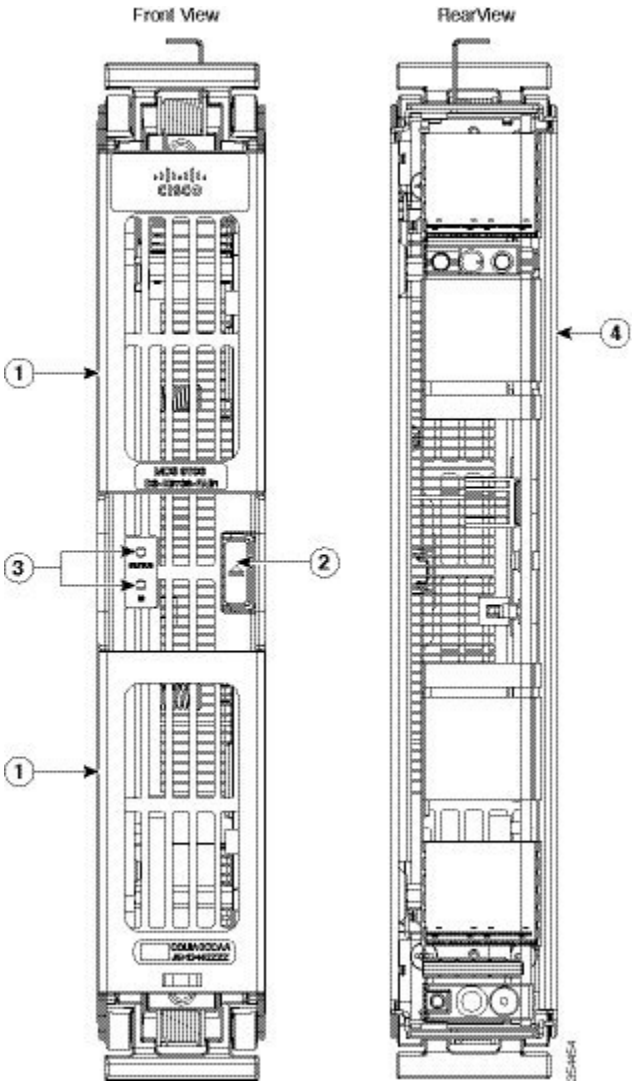
Cisco MDS 48-Port 32-Gbps Fiber Channel Switching Module needs a minimum of 3 (DS-X9706-FAB3) Crossbar Fabric-3 Switching Modules to deliver full bandwidth to all the modules in the switch. Each DS-X9706-FAB3 Crossbar Fabric-3 Switching Module provides 512-Gbps of fiber channel bandwidth per slot. A fourth crossbar fabric switching module is required for N+1 protection.

The DS-X9706-FAB1 crossbar fabric switching module is supported from Cisco MDS NX-OS Release 6.2(9) or later. DS-X9706-FAB1 modules are supported only with Supervisor-1 Modules (DS-X97-SF1-K9).

The DS-X9706-FAB3 crossbar fabric switching module is supported from Cisco MDS NX-OS Release 8.4(1) or later. DS-X9706-FAB3 modules are supported only with Supervisor-4 Modules (DS-X97-SF4-K9).

Note You cannot have a mix of different supervisor modules or a mix of different crossbar fabric switching modules in a chassis, except during migration of a supervisor module or a crossbar fabric switching module.

Figure 12: Cisco MDS 9706 Crossbar Fabric Switching Module



1	Locking lever	**3**	Crossbar fabric switching module LEDs
2	Unlocking button	**4**	Connector pins

The LEDs on the crossbar fabric switching modules indicate the status of the modules. The table below describes the LEDs.

Table 7: Cisco MDS 9706 Director Crossbar Fabric Switching Modules LEDs

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	One of the following occurs: • The module is booting or running diagnostics (normal initialization sequence). • An over temperature condition occurred (a minor threshold was exceeded during environmental monitoring).
	Red, Blinking	One of the following occurs: • The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. • An over temperature condition occurred (a major threshold was exceeded during environmental monitoring). • Crossbar fabric switching module has been manually powered off.
	Red	Bad slot ID parity.
	Off	The module is not receiving power.
Locator ID	Blue Blinking	Operator has flagged this card for identification.
	Off	Operator has not flagged this card for identification.

The crossbar fabric switching modules are located behind the fan modules in the chassis, the LEDs on the crossbar fabric switching module are not easily visible from the back of the chassis. So, the crossbar fabric switching module status LEDs are provided on the fan modules as well. Each fan module covers two crossbar fabric switching modules, the status LEDs for two crossbar fabric modules are present on each fan module. If the fan module is removed, the status and locator LEDs on the crossbar fabric switching modules will be visible.

When a crossbar fabric switching module needs to be located, the locator LED of the corresponding fan module must be activated, followed by the locator LED of fabric module, using the CLIs **locator-led fan** < *fan module number* > and **locator-led xbar** < *xbar slot number* >. For example, to locate the crossbar fabric switching module in slot 4, the locator LED of the fan module 2 needs to be activated followed by the locator LED of the crossbar fabric switching module 4.

Fiber Channel Switching Modules

In this section, the following fiber channel switching modules are discussed:

Cisco MDS 48-Port 64-Gbps Fiber Channel Switching Module

The Cisco MDS 9700 48-Port 64-Gbps Fiber Channel Switching Module is designed specifically for the Cisco MDS 9700 Multilayer Director Switches. With 64-Gbps Fiber Channel ports, the 64-Gbps 48 port Fiber

Channel Switching Module meets the high performance needs for flash memory and Non-Volatile Memory Express (NVMe) over Fiber Channel SANs. The switching module has a built in Network Processing Unit (NPU) for inline analytics. This module also supports hot-swappable Enhanced Small Form-Factor Pluggable (SFP+) transceivers.

Individual ports can be configured with Cisco 64-Gbps, 32-Gbps, and 16-Gbps SFP+ transceivers. Each port supports 1000 buffer credits when configured as E port. With the Cisco Enterprise Package license, up to 16000 buffer credits can be allocated to an individual port when all other ports in the port group are configured with minimum BB credits, enabling full link bandwidth over long distances with no degradation in link utilization.

Note Cisco MDS 9700 Series Supervisor-4 Module (DS-X97-SF4-K9) and Cisco MDS Crossbar Fabric-3 Switching Modules (depending on the chassis type) are required for Cisco MDS 9700 48-Port 64-Gbps Fiber Channel Switching Module to function.

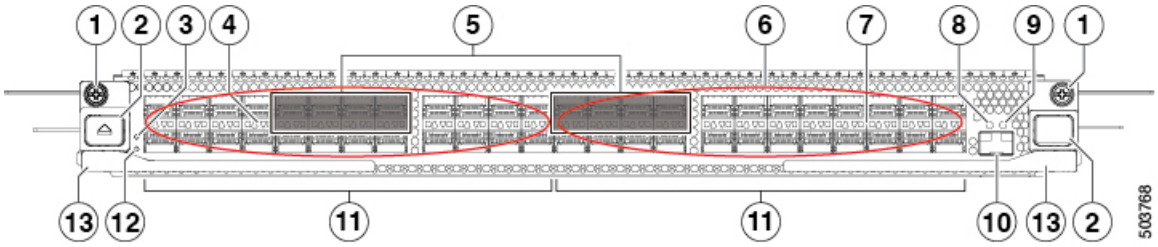
In Cisco MDS NX-OS Release 9.2(1), the SAN Analytics feature is not supported on Cisco MDS 9700 48-Port 64-Gbps Fiber Channel Switching Module.

For more information on the Cisco MDS 48-Port 64-Gbps Fiber Channel Switching Module, see the Cisco MDS 9700 48-Port 64-Gbps Fibre Channel Switching Module datasheet.

Note The 64-Gbps module supports Forward Error Correction (FEC) on links configured for 16-Gbps speed only with Transmitter Training Signal (TTS). This is a change from the 16 Gbps and 32 Gbps Fiber Channel modules. For more information, see the Cisco MDS 9000 Series Interfaces Configuration Guide, Release 9.x.

The following figure shows a Cisco MDS 48-Port 64-Gbps Fiber Channel Switching Module.

Figure 13: Cisco MDS 48-Port 64-Gbps Fiber Channel Switching Module



1	Detention screw (2)
2	Unlocking button (2)
3	Locator LED
4	FC port status LEDs (48)
5	Fiber Channel encryption ports [1] (8)
6	Airflow grill
7	FC ports (48 x 4/8/16/32/64 Gbps, pluggable SFP and SFP+ compatible)
8	Analytics port link status LED

9	Analytics port link activity LED
10	Ethernet Analytics port[2] (1 Gbps, pluggable SFP compatible)
11	Fiber Channel port group. A port group consists of 24 ports.
12	Status LED
13	Ejector levers (2)

[1] Encryption ports support AES 128-bit link-level encryption. Support for AES 256-bit encryption will be added in future releases.
[2] Not operational (supported in future releases).

The following table describes the LEDs for the 48-Port 64-Gbps Fiber Channel Switching Module.

Table 8: Cisco MDS 48-Port 64-Gbps Fiber Channel Switching Module LEDs

LED	Status	Description
Status	Green	All diagnostic tests passed. The module is operational (normal initialization sequence).
	Blinking Red	One of the following conditions exist: • The module is resetting. The switch has been powered on or the module has been hot inserted during the normal initialization sequence. • The module is resetting and ejector levers are out. • The module does not have sufficient power. • An over temperature condition has occurred. (A major temperature threshold has been exceeded during environmental monitoring.) • The module failed to download code and configure information successfully during the initial reset, the module does not come online.
	Solid Red	One of the following conditions exist: • The module has detected a slot ID parity error on the mid plane. The module cannot determine its slot number and will not respond to the supervisor. • The module has failed diagnostics tests and has powered off.
	Off	The module is not receiving power.

LED	Status	Description
Locator	Blinking Blue	The operator has activated this LED via the **locator-led** command to identify this module in the chassis.
	Off	The operator has not activated this LED via the **locator-led** command.
Link	Green	The port is active (the link is connected and operational).
	Solid Orange	The port is disabled by the administrator or is not initializing.
	Blinking Orange	The port is faulty and has been automatically disabled by the software.
	Off	The port is not active or the link is not connected.

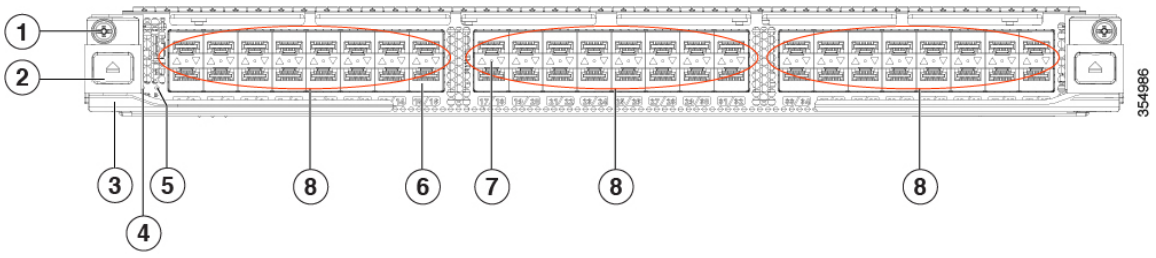
Cisco MDS 48-Port 32-Gbps Fiber Channel Switching Module

The Cisco MDS 9700 48-Port 32-Gbps Fiber Channel Switching Module is designed specifically for the Cisco MDS 9700 Multilayer Director Switches. With 768 line-rate 32-Gbps Fiber Channel ports per director, the 32-Gbps 48 port Fiber Channel Switching Module meets the high-performance needs for flash-memory and Non-Volatile Memory Express (NVMe) over Fiber Channel workloads. The switching module has built-in network processing unit for inline analytics. This module also supports hot-swappable Enhanced Small Form-Factor Pluggable (SFP+) transceivers.

Individual ports can be configured with Cisco 32-Gbps, 16-Gbps, and 8-Gbps SFP+ transceivers. Each port supports 500 buffer credits when configured as E port for exceptional extensibility without the need for additional licenses. With the Cisco Enterprise Package license, up to 8170 buffer credits can be allocated to an individual port when all other ports in the port group are configured with minimum BB credit, enabling full link bandwidth over long distances with no degradation in link utilization.

For more information on the Cisco MDS 48-Port 32-Gbps Fiber Channel Switching Module, see the Cisco MDS 9700 48-Port 32-Gbps Fibre Channel Switching Module Data Sheet.

Figure 14: Cisco MDS 48-Port 32-Gbps Fiber Channel Switching Module



1	Detention screw	**5**	Locator LED
2	Unlocking button	**6**	FC ports
3	Ejector Lever	**7**	Link LEDs

4	Status LED	**8**	Fiber Channel port group. A port group consists of 16 ports.

The following table describes the LEDs for the 48-Port 32-Gbps Fiber Channel Switching Module.

Table 9: Cisco MDS 48-Port 32-Gbps Fiber Channel Switching Module LEDs

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	One of the following occurs or occurred: • The module is booting or running diagnostics (normal initialization sequence). • An over temperature condition has occurred. (A minor temperature threshold has been exceeded during environmental monitoring.)
	Blinking Red	One of the following occurs: • The module is resetting. The switch has been powered on or the module has been hot inserted during the normal initialization sequence. • An over temperature condition has occurred. (A major temperature threshold has been exceeded during environmental monitoring.) • If the module fails to download code and configuration information successfully during the initial reset, the LED stays blinking red; the module does not come online.
	Solid Red	The module has detected a slot ID parity error on the mid plane. The module cannot determine its slot number and will not respond to the supervisor.
	Off	The module is not receiving power.
ID	Blinking blue	The operator has activated this LED to identify this module in the chassis.
	Off	This module is not selected.
Link	Green	The port is active (the link is connected and operational).
	Solid Orange	SFP is not present or Admin is down.
	Blinking Orange	A fault condition exists.
	Off	The port is not active or the link is not connected.

Cisco MDS 48-Port 16-Gbps Fiber Channel Switching Module

The Cisco MDS 9700 48-Port 16-Gbps Switching Module is designed specifically for the Cisco MDS 9700 Series Director Switches. These modules are hot-swappable and compatible with 2, 4, 8, 10, and 16-Gbps interfaces, and they support hot-swappable Enhanced Small Form-Factor Pluggable (SFP+) transceivers.

The FC switching module has 12, 4-port, port groups. Each port group is capable of a speed of 64-Gbps in each direction simultaneously. The ports of this switching module support expansion port (E port), fabric port (F port), fabric loop port (FL port), SPAN destination port (SD port), and (TE port) port mode.

Individual ports can be configured with Cisco 16-Gbps, 8-Gbps, or 10-Gbps shortwave or longwave SFP+ transceivers. Each port that is configured as mode E supports 500 buffer credits with no additional licensing required. With the Cisco Enterprise Package, up to 4095 buffer credits can be allocated to an individual port.

The FC switching module also provides Cisco VMpath technology that enables advanced virtual machine-aware SAN provisioning and monitoring for virtualized data centers. With Cisco VMpath, you can monitor, manage, and control SAN resource allocation and performance on a per-virtual machine basis and map out paths from the server to storage.

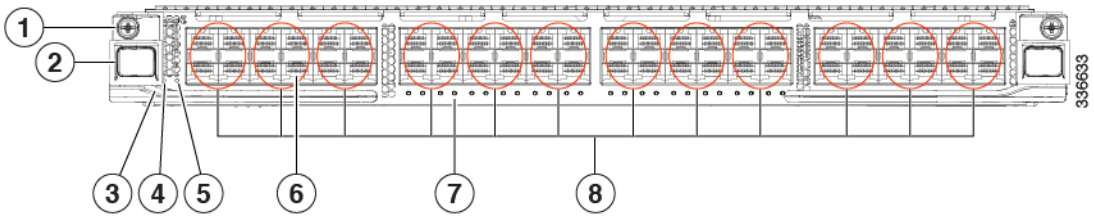
The FC switching module is hot-swappable and has hot-swappable SFP+ transceivers. It includes online diagnostics, stateful process restart, and nondisruptive supervisor failover. In addition, the FC switching module has any module, any port configuration for port channels, fabric-based multipathing, per-VSAN fabric services, and port tracking. The module also supports Virtual Routing Redundancy Protocol (VRRP) for management.

The Cisco MDS 9700 48-Port 16-Gbps Fiber Channel Switching Module provides the following features:

- Configuration file management
- Nondisruptive software upgrades for FC interfaces
- Call Home
- Power-management LEDs
- Port beaconing
- System LED
- SNMP traps for alerts
- Network boot

The following figure shows a 48-Port 16-Gbps Fiber Channel Switching Module. The front panel connectors support standard modular SFP+ transceivers and the speed detection is autosensing.

Figure 15: 48-Port 16-Gbps Fiber Channel Switching Module



1	Detention screw	**5**	Locator LED
2	Unlocking button	**6**	Fiber Channel ports
3	Ejector Lever	**7**	Link LEDs
4	Status LED	**8**	Fiber Channel port group. A port group consists of 4 ports.

The following table describes the LEDs for the 48-Port 16-Gbps Fiber Channel Switching Module.

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	One of the following occurs or occurred: • The module is booting or running diagnostics (normal initialization sequence). • The inlet air temperature of the system has exceeded the maximum system operating temperature limit (a minor environmental warning). To ensure maximum product life, you should immediately correct the environmental temperature and restore the system to normal operation.
	Red	One of the following occurs: • The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. • The inlet air temperature of the system has exceeded the safe operating temperature limits of the card (a major environmental warning). The card has been shut down to prevent permanent damage.
ID	Blinking blue	The operator has activated this LED to identify this module in the chassis.
	Off	This module is not being identified.
Link	Solid green	Link is up.
	Intermittent blinking green	Link is up (traffic on port).
	Solid orange	SFP is not present or Admin is down.
	Blinking orange	A fault condition exists.
	Off	The port is not active or the link is not connected.

SAN Extension Modules

The following section describes the Cisco MDS 9000 SAN extension modules.

Cisco MDS 24/10 port SAN Extension Module

The Cisco MDS 24/10 port SAN Extension Module provides a high performance, flexible, unified platform for deploying enterprise class disaster recovery and business continuance SAN extension solutions. The MDS 24/10 port SAN Extension Module is supported on Cisco MDS 9700 Series Multilayer Director Switches. With 24 line rate 2-, 4-, 8-, 10-, and 16-Gbps Fiber Channel ports and eight 1 and 10GE or two 40GE Fiber Channel over IP (FCIP) ports, this module enables large and scalable deployment of SAN extension solutions.

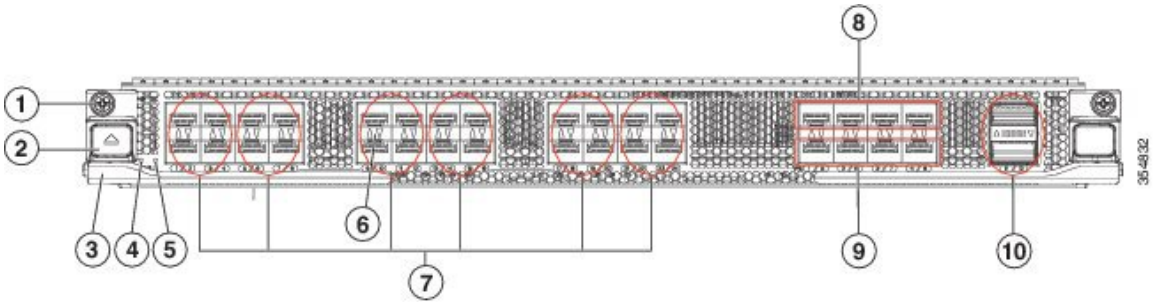
The SAN extension module has two independent service engines that can each be individually and incrementally enabled to scale as business requirements expand. The SAN extension module supports the full range of services available on other Cisco MDS 9000 Family Fiber Channel switching modules, including virtual SAN (VSAN), security, and traffic management services. The FCIP module uses Cisco expertise and knowledge of IP networks to deliver outstanding SAN extension performance, reducing latency for disk and tape operations with FCIP acceleration features, including FCIP write acceleration and FCIP tape write and read acceleration. Hardware-based encryption helps secure sensitive traffic with IP Security (IPsec), and hardware-based compression dramatically enhances performance for both high and low speed links, enabling immediate cost savings in expensive WAN infrastructure. Multiple FCIP interfaces within a single engine or across service engines can be grouped into a port channel of up to 16 links for high availability and increased aggregate throughput.

For more information on the Cisco MDS 24/10 Port SAN Extension Module, see the Cisco MDS 9000 24/10 port SAN Extension Module for Cisco MDS 9700 Series Multilayer Directors Datasheet.

Note 40GE IP Storage interfaces are supported from Cisco MDS NX-OS Release 8.5(1) or later releases.

The following figure shows a Cisco MDS 24/10 Port SAN Extension Module.

Figure 16: Cisco MDS 24/10 Port SAN Extension Module



1	Detention screw	**6**	Link LEDs
2	Unlocking button	**7**	Fiber Channel port group. A port group consists of four ports. 16-Gbps ports.
3	Ejector Lever	**8, 9**	10-G IPS port group. A port group consists of four ports.
4	Status LED	**10**	40-G IPS port group. A port group consists of two ports.
5	Locator LED		

The following table describes the LEDs for the 24/10 port SAN extension module.

Table 10: Cisco MDS 9700 Series 24/10 Port SAN Extension Module LEDs

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	One of the following occurs or occurred: • The module is booting or running diagnostics (normal initialization sequence). • An over temperature condition has occurred. (A minor temperature threshold has been exceeded during environmental monitoring.)
	Blinking Red	One of the following occurs: • The module is resetting. The switch has just been powered on or the module has been hot inserted during the normal initialization sequence. • An over temperature condition has occurred (a major temperature threshold has been exceeded during environmental monitoring). • If the module fails to download the code and configuration information successfully during the initial reset, the LED stays blinking red; the module does not come online.
	Solid Red	The module has detected a slot ID parity error on the mid plane. The module cannot determine its slot number and hence will not respond to the Supervisor.
ID	Blinking blue	The operator has activated this LED to identify this module in the chassis.
	Off	This module is not being identified.
Link	Solid green	Link is up.
	Steady Blinking Green	Port Beacon On (beacon is used to identify port).
	Intermittent Blinking Green	Link is up (traffic on port).
	Solid Orange	SFP is not present or Admin is down.
	Blinking Orange	A fault condition exists.
	Off[3]	The port is not active or the link is not connected.

[3] The Link LED status of IP Storage ports indicates Solid Orange when an SFP is present and the link is not connected.

Fiber Channel over Ethernet Switching Modules

The following section describes the fiber channel over Ethernet switching modules.

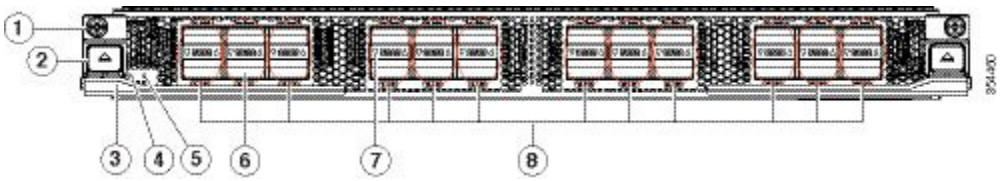
Cisco MDS 24-Port 40-Gbps Fiber Channel over Ethernet Module

The next-generation Cisco MDS 24-Port 40-Gigabit Fiber Channel over Ethernet (FCoE) Module (DS-X9824-960K9) provides Cisco Unified fabric connectivity to the SAN core. It empowers mid-size and large enterprises that are rapidly deploying cloud-scale applications with Inter-Switch Link (ISL) consolidation, four times the bandwidth, and exceptional investment protection for their SANs. The data center fabric is already using 40-Gbps connectivity in the core for more efficient convergence, higher performance, and lower total cost of ownership (TCO). With the entire Cisco Nexus® Family supporting 40-Gbps FCoE, this capability can now be extended to the SAN core. You can extend the benefits of FCoE beyond the access layer to the data center core with a full line-rate FCoE module for the Cisco MDS 9700 Series Multilayer Directors.

For more information on the Cisco MDS 24-Port 40-Gbps FCoE Module, see the Cisco MDS 9700 24 Port 40 Gbps Fiber Channel over Ethernet Module Datasheet.

The following figure shows a Cisco MDS 24-Port 40-Gigabit Fiber Channel over Ethernet module.

Figure 17: Cisco MDS 24-Port 40-Gbps FCoE Module



1	Detention screw	**5**	Locator LED
2	Unlocking button	**6**	FCoE ports
3	Ejector Lever	**7**	Link LEDs
4	Status LED	**8**	FCoE port group. Each port group consists of two ports.

The following table describes the LEDs for the 24-Port 40-Gbps Fiber Channel over Ethernet module.

Table 11: Cisco MDS 9700 Series 24-Port 40-Gbps FCoE Module LEDs

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	One of the following occurs or occurred: • The module is booting or running diagnostics (normal initialization sequence). • The inlet air temperature of the system has exceeded the maximum system operating temperature limit (a minor environmental warning). To ensure maximum product life, you should immediately correct the environmental temperature and restore the system to normal operation.
	Red	One of the following occurs: • The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. • The inlet air temperature of the system has exceeded the safe operating temperature limits of the card (a major environmental warning). The card has been shut down to prevent permanent damage.
ID	Blinking blue	The operator has activated this LED to identify this module in the chassis.
	Off	This module is not being identified.
Link	Solid green	Link is up.
	Solid orange	SFP is not present or Admin is down.
	Blinking Orange	A fault condition exists.
	Off	The port is not active or the link is not connected.

Cisco MDS 48-Port 10-Gbps Fiber Channel over Ethernet Module

The Cisco MDS 48-Port 10-Gbps Fiber Channel over Ethernet module (DS-X9848-480K9) is designed for the MDS 9700 Series Directors. These modules are hot-swappable and they support 10-Gigabit Fiber Channel over Ethernet ports in SFP+ form factor.

The Cisco MDS 48-Port 10-Gbps Fiber Channel over Ethernet module delivers integrated Fiber Channel over Ethernet (FCoE), simplifies the network infrastructure, and helps reduce costs. The FCoE module allows you to extend the existing Fiber Channel SANs by using FCoE. The Cisco MDS 48-Port 10-Gigabit Fiber Channel over Ethernet module supports connectivity to FCoE switching platforms and to FCoE targets. This module also supports connectivity to FCoE initiators and targets that only send FCoE traffic.

The Cisco MDS 48-Port 10-Gbps Fiber Channel over Ethernet module has the MPC8572 processor and 2 GB DDR3 SDRAM. The module delivers 720 million packets per second (MPPS) and is capable of 480-Gbps of data throughput. This module can power down data path slices to save power when the attached ports are not in use.

The Cisco MDS 9700 10-Gbps 48-Port FCoE module provides the following features:

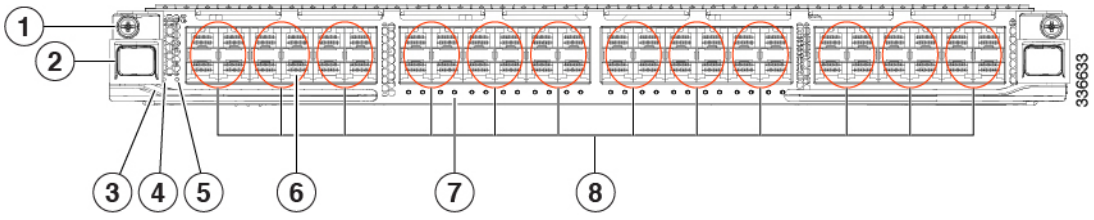
- High performance—Cisco MDS 9700 Series architecture, based on central arbitration and crossbar fabric switching module provides 10-Gbps line-rate, nonblocking, predictable performance across all traffic conditions for every FCoE port in the chassis.
- Efficient encoding—FCoE takes advantage of the more efficient encoding mechanisms of 10-Gbps Ethernet to provide 50-percent more bandwidth than 8-Gbps Fiber Channel (the actual throughput of 8-Gbps Fiber Channel is 6.8 Gbps). Therefore, you need fewer 10-Gigabit Ethernet links to achieve the same bandwidth as with multiple 8-Gbps links.
- High availability—The Cisco MDS 9700 Series provides outstanding availability and reliability. The Cisco MDS 9710 Multilayer Director is the industry's first director-class switch that enables redundancy on all major components, including the fabric card. It provides grid redundancy on the power supply and 1+1 redundant supervisors. Users can add fabric cards to enable N+1 fabric redundancy.
- Scalability—The Cisco MDS 9700 48-Port 10-Gbps FCoE Module provides the scalability of 384 10-Gbps full line-rate autosensing ports in a single chassis, or up to 1152 ports in a single rack.
- Intelligent network services—VSAN technology, access control lists (ACLs) for hardware-based intelligent frame processing, and fabric-wide quality of service (QoS) enable migration from SAN islands to enterprise-wide storage networks.
- Sophisticated diagnostics—The Cisco MDS 9700 48-Port 10-Gbps FCoE Module provides intelligent diagnostics, protocol decoding, and network analysis tools as well as integrated Cisco Call Home capability for greater reliability, faster problem resolution, and reduced service costs.

The Cisco MDS 48-Port 10-Gbps Ethernet Module also provide the following advanced FCoE features:

- Inter-VSAN Routing (IVR)
- Nondisruptive software upgrade
- Port channels (up to 16 links)
- SAN trunking
- SNMP traps for alerts
- Virtual SANs (VSANs)

The following figure shows a Cisco MDS 48-Port 10-Gigabit Fiber Channel over Ethernet module. The front panel connectors support standard modular SFP+ transceivers.

Figure 18: Cisco MDS 48-Port 10-Gbps Fiber Channel over Ethernet Module



1	Detention screw	**5**	Locator LED
2	Unlocking button	**6**	FCoE ports

3	Ejector Lever	**7**	Link LEDs
4	Status LED	**8**	FCoE port group. Each port group consists of 4 ports.

The following table describes the LEDs for the 48-Port 10-Gbps Fiber Channel over Ethernet Module.

Table 12: Cisco MDS 9700 Series 48-Port 10-Gbps FCoE Module LEDs

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	One of the following occurs or occurred: • The module is booting or running diagnostics (normal initialization sequence). • The inlet air temperature of the system has exceeded the maximum system operating temperature limit (a minor environmental warning). To ensure maximum product life, you should immediately correct the environmental temperature and restore the system to normal operation.
	Red	One of the following occurs: • The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. • The inlet air temperature of the system has exceeded the safe operating temperature limits of the card (a major environmental warning). The card has been shut down to prevent permanent damage.
ID	Blinking blue	The operator has activated this LED to identify this module in the chassis.
	Off	This module is not being identified.
Link	Solid green	Link is up.
	Intermittent blinking green	Link is up (traffic on port).
	Solid orange	SFP is not present or Admin is down.
	Blinking orange	A fault condition exists.
	Off	The port is not active or the link is not connected.

Fan Modules or Trays

This section describes the fan modules or trays present in the Cisco MDS 9700 Series Directors.

If a fan module or tray fails, it does not affect the thermal performance of the system. The redundant fan controllers and other internal mechanisms ensure that the switch, and fan modules are operational.

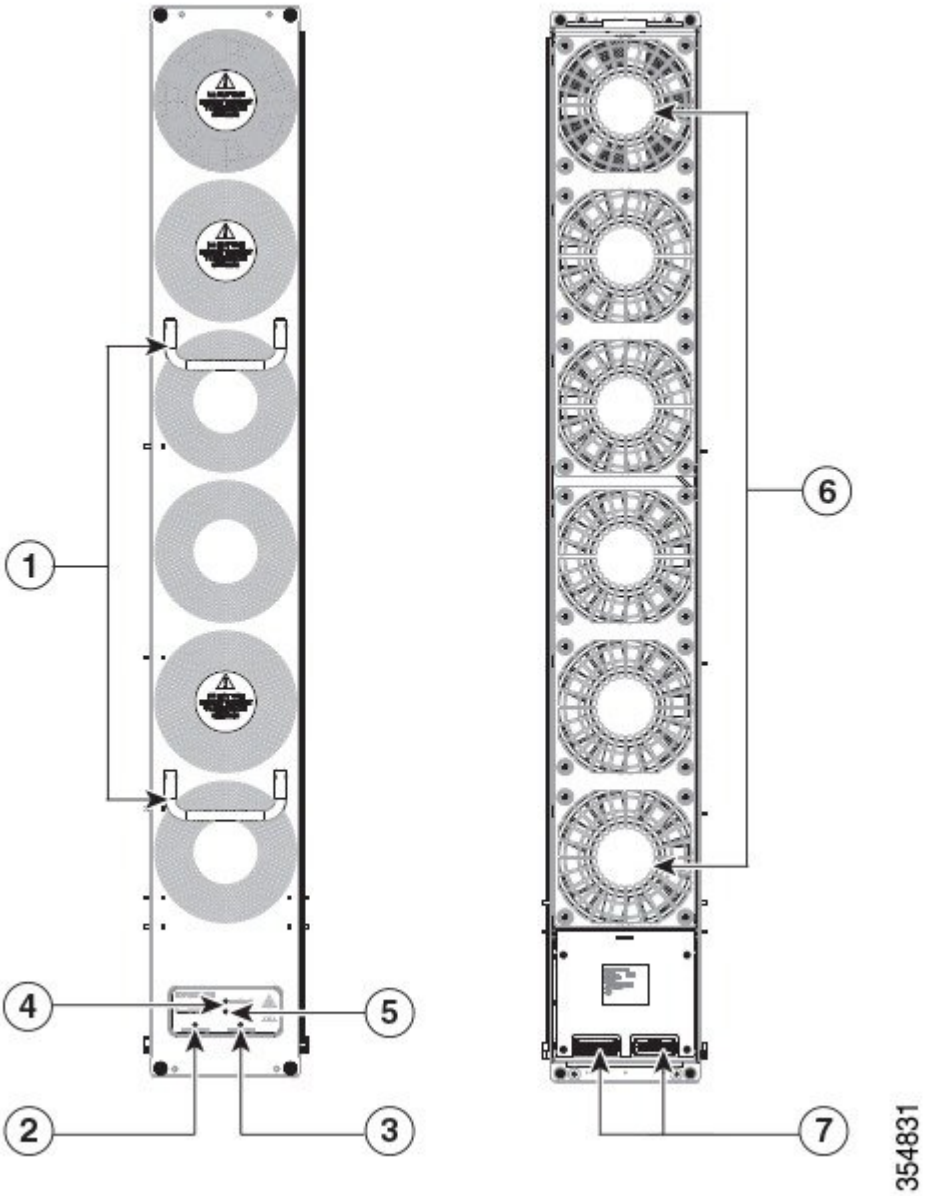
If a single fan module or tray fails, the system continues to operate under all conditions. Two fan failures might cause alarms from ASIC when the temperature exceeds the threshold. At 86°F (30°C) or less, a single fan module or tray can be removed and the system can continue to operate up to 72 hours to allow for replacement of a failed fan module or tray. When the temperature exceeds the threshold, the device automatically shuts down in 3 minutes.

Cisco MDS 9718 Director Fan Modules

The Cisco MDS 9718 Director has three fan modules, each with six fans, that are installed vertically at the back of the chassis. Each fan module can be removed while the other two fan modules continue to move air through the chassis.

The fan modules cover the crossbar fabric switching modules in the back of the chassis. Fan module 1 must be removed to access the crossbar fabric switching modules 1 and 2, fan module 2 must be removed to access the crossbar fabric switching modules 3 and 4, and the fan module 3 must be removed to access the crossbar fabric switching modules 5 and 6.

Figure 19: MDS 9718 Fan Modules External and Internal View



1	Fan handles	**5**	Right crossbar fabric switching module status LED
2	Fan module status LED	**6**	Fans (6)
3	Fan module locator LED	**7**	Fan module connectors

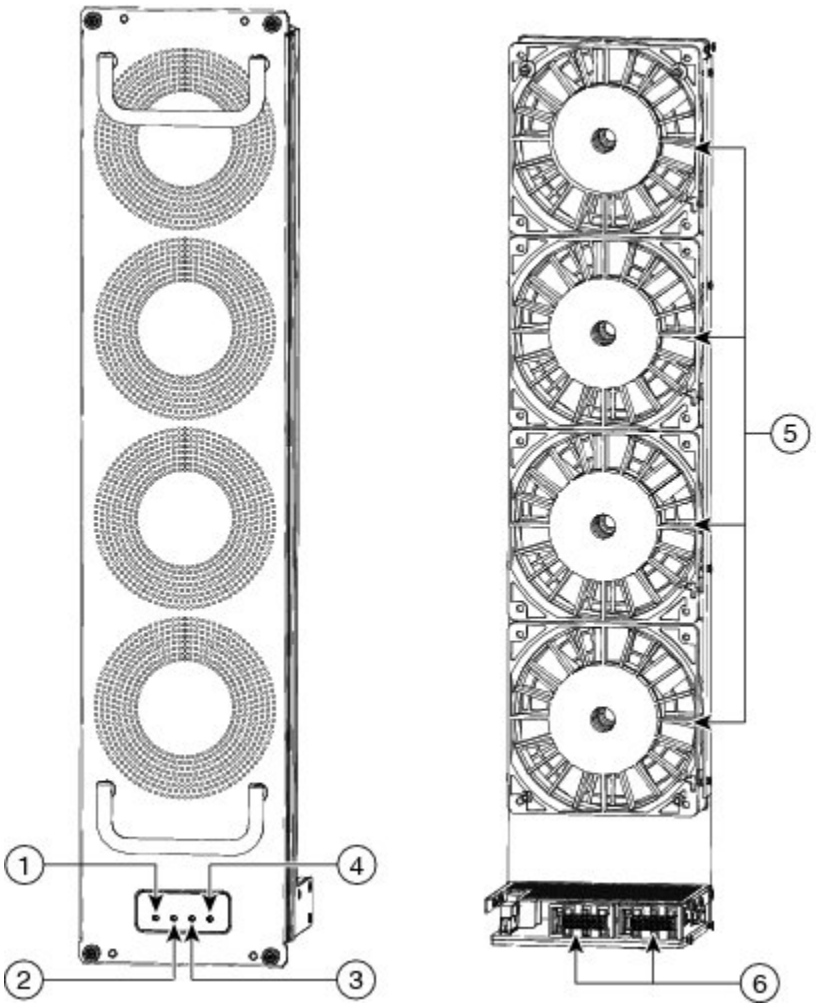
4	Left crossbar fabric switching module status LED		

Cisco MDS 9710 Director Fan Modules

The Cisco MDS 9710 Director has three fan modules, each with four fans, that are installed vertically at the back of the chassis. Each fan module can be removed while the other two fan modules continue to move air through the chassis.

The fan modules cover the crossbar fabric switching modules in the back of the chassis. Fan module 1 must be removed to access the crossbar fabric switching modules 1 and 2, the fan module 2 must be removed to access the crossbar fabric switching modules 3 and 4, and the fan module 3 must be removed to access the crossbar fabric switching modules 5 and 6.

Figure 20: MDS 9710 Fan Modules External and Internal View



1	Left crossbar fabric switching module status LED	**4**	Right crossbar fabric switching module status LED
2	Fan module status LED	**5**	Fans (4)

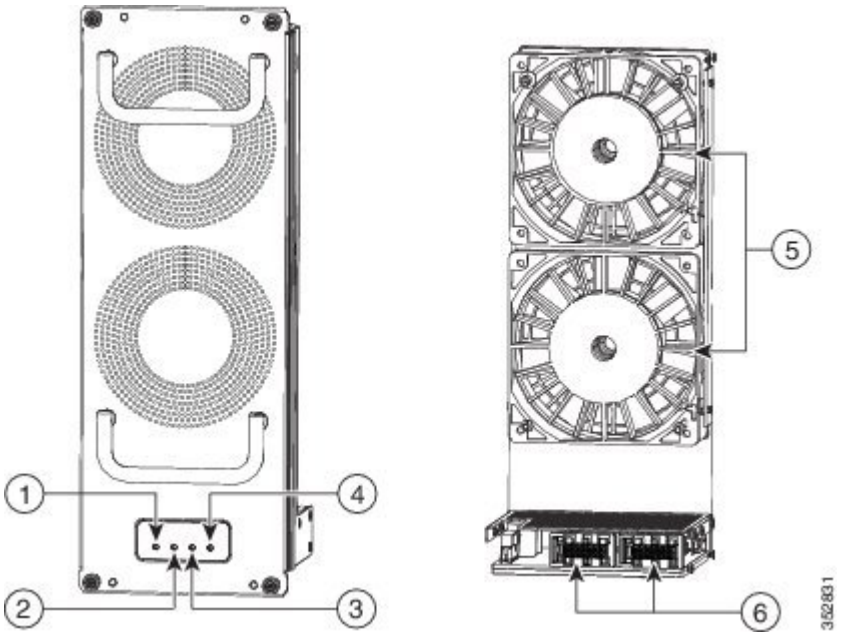
3	Fan module locator LED	**6**	Fan module connectors

Cisco MDS 9706 Director Fan Modules

The Cisco MDS 9706 Director has three fan modules, each with two fans, that are installed vertically at the back of the chassis. Each fan module can be removed while the other two fan modules continue to move air through the chassis.

The fan modules cover the crossbar fabric switching modules in the back of the chassis. Fan module 1 must be removed to access the crossbar fabric switching modules 1 and 2, the fan module 2 must be removed to access the crossbar fabric switching modules 3 and 4, and the fan module 3 must be removed to access the crossbar fabric switching modules 5 and 6.

Figure 21: Cisco MDS 9706 Fan Modules External and Internal View



1	Left crossbar fabric switching module status LED	**4**	Right crossbar fabric switching module status LED
2	Fan module status LED	**5**	Fans (4)
3	Fan module locator LED	**6**	Fan module connectors

Power Supplies

The Cisco MDS 9700 Series supports the following types of power supplies:

- 3000-W AC power supply (AC input and DC output) (DS-CAC97-3KW)
- 3000-W DC power supply (DC input and DC output) (DS-CDC97-3KW)
- 3.5-kW HVAC/HVDC power supply (AC/DC input and DC output) (DS-CHV-3.5KW)

The Cisco MDS 9718 Director supports up to 16 hot-swappable 3000-W AC or DC power supplies.

The Cisco MDS 9710 Director supports up to eight hot-swappable 3000-W AC or DC power supplies.

The Cisco MDS 9706 Director supports up to four hot-swappable 3000-W AC or DC power supplies.

The 3000-W AC power supply unit may be connected to either 220 V or 110 V AC power sources. When connected to 220 V each PSU has a maximum output capacity of 3000 W. When connected to 110 V each PSU has a maximum output capacity of 1450 W.

Each power supply module monitors its output voltage and provides the status to the supervisor module. In addition, the power supply modules provide information about local fans, power, shutdown control, and E2PROM to the supervisor.

Note The minimum number of AC PSUs required to achieve grid redundancy on each of the Cisco MDS 9700 Series Directors differ. For more information, see the *AC Power Supply Requirements for Grid Redundancy* section. For more information on power supply specifications, see the *Power Supply Specifications* section under the *Technical Specifications* chapter.

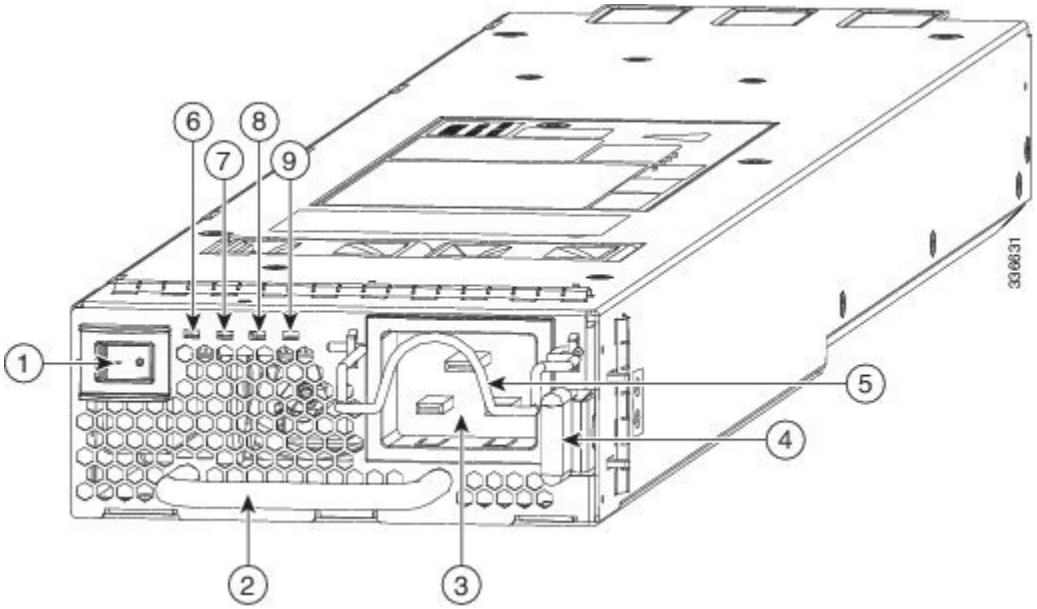
When PSUs are in 1450-W mode and the system is configured in redundant power mode, the total power available to the system may not be sufficient to power all modules installed in the chassis. For more information, refer to the *Cisco MDS 9000 Family NX-OS Fundamentals Configuration Guide*.

Starting from Cisco MDS NX-OS Release 6.2(19), all Cisco MDS NX-OS 6.2(x) releases support a 3500-W high-voltage DC (HVDC) power supply unit (DS-CHV-3.5KW) on Cisco MDS 9706 and MDS 9710 Directors.

Starting from Cisco MDS NX-OS Release 8.3(1), a 3500-W high-voltage DC (HVDC) power supply unit (DS-CHV-3.5KW) is supported on Cisco MDS 9718 Directors.

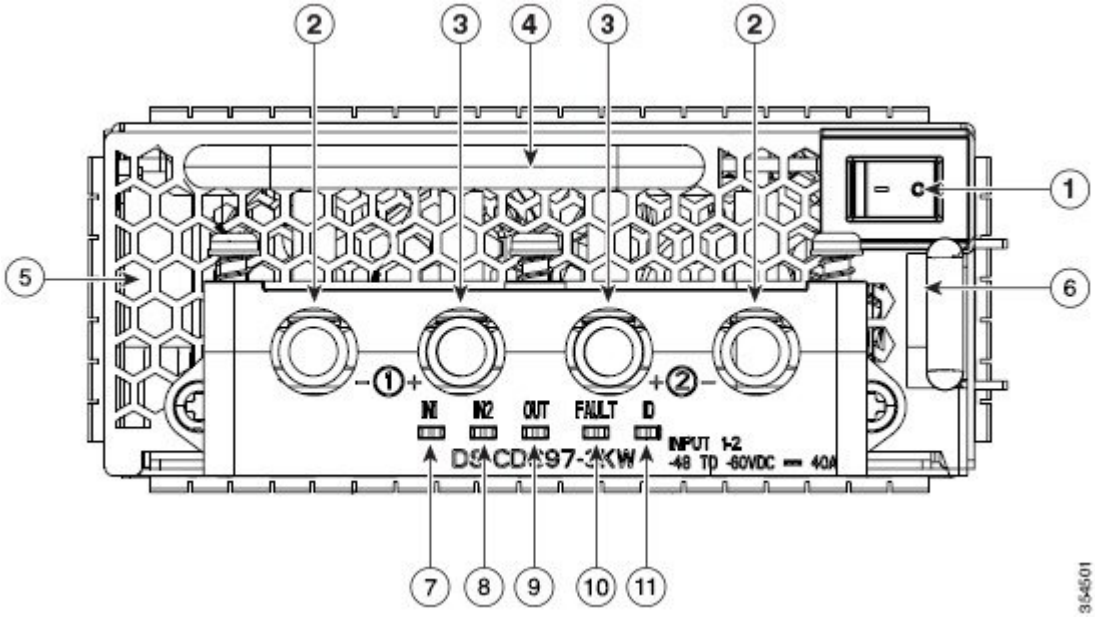
Starting from Cisco MDS NX-OS Release 8.1(1b), a 3500- W high-voltage DC (HVDC) power supply unit (DS-CHV-3.5KW) is supported on Cisco MDS 9700 Series switches.

Figure 22: 3000-W AC Power Supply



1	Power supply switch
2	Power module handle
3	AC power connection
4	Ejector lever
5	Power cable retainer
6	Input power module LED
7	Output power module LED
8	Fault power module LED
9	ID power module LED

Figure 23: 3000-W DC Power Supply



1	Power supply switch
2	Negative terminals
3	Positive terminals
4	Power supply handle
5	Power supply exhaust
6	Ejector lever
7	Power module LED – Input1 power module LED
8	Power module LED – Input2 power module LED
9	Power module LED – Output power module LED
10	Fault power module LED

11	ID power module LED

The following table describes the power supply LEDs for the Cisco MDS 9700 Series.

Table 13: Cisco MDS 9700 Series Power Supply LEDs

LED	Status	Description
Input 1	Green	The AC or DC input voltage is within the valid range.
	Off	The AC or DC input voltage is outside the valid range.
Input 2 (available only on DC power supply units)	Green	The DC input voltage is within the valid range.
	Off	The DC input voltage is outside the valid range.
Output	Green	The AC or DC output power is within the valid range.
	Off	The AC or DC output power is outside the valid range.
Fault	Red, blinking (The blinking stops when the fault condition is cleared.)	Self-diagnostic tests have failed or another power supply failure has occurred.
	Off	The AC or DC output voltage and power supply unit tests are okay.
ID	Blue, blinking	The operator has activated this LED to identify this module in the chassis.
	Off	This module is not being identified.

Supported Transceivers

The Cisco MDS 9710 Director supports the Fiber Channel SFP+ transceivers in Shortwave (SW), Longwave (LW), Long Distance (CWDM and DWDM), or Extended Long Wavelength (ELW).

Fiber Channel SFP+ Transceivers

The transceivers are field-replaceable and hot-swappable. You can use any combination of SFP+ transceivers that are supported by the switch. The only restrictions are that SW transceivers must be paired with SW transceivers, and LW transceivers with LW transceivers, and the cable must not exceed the stipulated cable length for reliable communications.

For more information about a specific Cisco SFP+ transceiver, see the *SFP+ Transceiver Specifications* section. SFP+ transceivers can be ordered separately or with the Cisco MDS 9700 Series.

Note Use only Cisco transceivers or Cisco qualified transceivers in the Cisco MDS 9700 Series. Each Cisco transceiver is encoded with model information that enables the switch to verify that the transceiver meets the requirements for the switch.