



Managing System Hardware

This chapter provides details on monitoring the health of the switch. It includes the following sections:

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Displaying Switch Hardware Inventory

Use the **show hardware** command to display switch hardware inventory details. See [Example 8-1](#).



Note

To display and configure modules, see [Chapter 7, “Managing Modules.”](#)

Example 8-1 Displays the Hardware Information

```
switch# show hardware
Cisco Storage Area Networking Operating System (SAN-OS) Software
TAC support: http://www.cisco.com/tac
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Software
  BIOS:          version 1.0.8
  loader:        version 1.1(0.114)
  kickstart:     version 1.3(4a)
  system:        version 1.3(4a)

  BIOS compile time:      08/07/03
  kickstart image file is: bootflash:///boot-17r
  kickstart compile time: 10/25/2010 12:00:00
  system image file is:   bootflash:///isan-17r
  system compile time:    10/25/2020 12:00:00

Hardware
  RAM 1024592 kB

  bootflash: 1000944 blocks (block size 512b)
  slot0:      0 blocks (block size 512b)

  172.22.90.21 uptime is 7 days 4 hours 48 minute(s) 2 second(s)

  Last reset at 272247 usecs after Thu Sep 11 21:47:05 1980
  Reason: Reset Requested by CLI command reload
  System version: 1.3(4a)

This supervisor carries Pentium processor with 1024592 kB of memory
Intel(R) Pentium(R) III CPU at family with 512 KB L2 Cache
Rev: Family 6, Model 11 stepping 1

512K bytes of non-volatile memory.
1000944 blocks of internal bootflash (block size 512b)
-----
Chassis has 9 slots for Modules
-----
Module in slot 1 is empty

Module in slot 2 is empty

Module in slot 3 is empty

Module in slot 4 is empty

Module in slot 5 is ok
  Module type is "Supervisor/Fabric-1"
  No submodules are present
```

Model number is DS-X9530-SF1-K9
H/W version is 1.0
Part Number is 73-7523-06
Part Revision is A0
Manufacture Date is Year 6 Week 47
Serial number is JAB064705E1
CLEI code is CNP6NT0AAA

Module in slot 6 is empty

Module in slot 7 is empty

Module in slot 8 is empty

Module in slot 9 is empty

Chassis has 2 Slots for Power Supplies

PS in slot A is ok
Power supply type is "1153.32W 110v AC"
Model number is WS-CAC-2500W
H/W version is 1.0
Part Number is 34-1535-01
Part Revision is A0
Manufacture Date is Year 6 Week 16
Serial number is ART061600US
CLEI code is

PS in slot B is ok
Power supply type is "1153.32W 110v AC"
Model number is WS-CAC-2500W
H/W version is 1.0
Part Number is 34-1535-01
Part Revision is A0
Manufacture Date is Year 5 Week 41
Serial number is ART0541003V
CLEI code is

Chassis has one slot for Fan Module

Fan module is ok
Model number is WS-9SLOT-FAN
H/W version is 0.0
Part Number is 800-22342-01
Part Revision is
Manufacture Date is Year 0 Week 0
Serial number is
CLEI code is

Displaying the Switch Serial Number

The serial number of your Cisco MDS 9000 Family switch can be obtained by looking at the serial number label on the back of the switch (next to the power supply), or by executing the operating system **show sprom backplane 1** command.

```
switch# show sprom backplane 1
DISPLAY backplane sprom contents:
Common block:
Block Signature : 0xabab
Block Version   : 2
Block Length    : 156
Block Checksum  : 0x106f
EEPROM Size     : 512
Block Count     : 3
FRU Major Type  : 0x6001
FRU Minor Type  : 0x0
OEM String      : Cisco Systems, Inc.
Product Number  : DS-C9506
Serial Number : FOX0712S007
Part Number     : 73-8697-01
Part Revision   : 01
Mfg Deviation   : 0
H/W Version     : 0.1
Mfg Bits        : 0
Engineer Use    : 0
snmpOID         : 9.12.3.1.4.26.0.0
Power Consump   : 0
RMA Code        : 0-0-0-0
Chassis specific block:
...
```

**Note**

If you are installing a new license, use the **show license host-id** command to obtain the switch serial. Refer to [Chapter 3, “Obtaining and Installing Licenses”](#) for further information.

Displaying Power Usage Information

Use the **show environment power** command to display the actual power usage information for the entire switch. In response to this command, power supply capacity and consumption information is displayed for each module. See [Example 8-2](#).



Note

In a Cisco MDS 9500 Series switch, power usage is reserved for both supervisors regardless of whether one or both supervisor modules are present.

Example 8-2 Displays Power Management Information

```
switch# show environment power
```

```
-----
PS  Model                Power      Power      Status
    (Watts)      (Amp @42V)
-----
1   DS-CAC-2500W         1153.32   27.46      ok
2   WS-CAC-2500W         1153.32   27.46      ok
```

```
Mod Model                Power      Power      Power      Power      Status
  Requested Requested  Allocated Allocated
  (Watts)    (Amp @42V) (Watts)    (Amp @42V)
-----
1   DS-X9032             199.92    4.76       199.92    4.76      powered-up
4   DS-X9032             199.92    4.76       199.92    4.76      powered-up
5   DS-X9530-SF1-K9      126.00    3.00       126.00    3.00      powered-up
6   DS-X9530-SF1-K9      126.00    3.00       126.00    3.00      powered-up
9   DS-X9016             220.08    5.24       220.08    5.24      powered-up
```

```
Power Usage Summary:
```

```
-----
Power Supply redundancy mode:                redundant
```

```
Total Power Capacity                        1153.32 W
```

```
Power reserved for Supervisor(s) [-]        252.00 W
```

```
Power reserved for Fan Module(s) [-]        0.00 W
```

```
Power currently used by Modules [-]         619.92 W
```

```
-----
Total Power Available                        281.40 W
-----
```

Configuring Power Supplies

Switches in the MDS 9000 Family have two redundant power supply slots. The power supplies can be configured in either redundant or combined mode.

- Redundant mode—Uses the capacity of one power supply only. This is the default mode. In case of power supply failure, the entire switch has sufficient power available in the system.
- Combined mode—Uses the combined capacity of both power supplies. In case of power supply failure, the entire switch can be shut down (depends on the power used) causing traffic disruption. This mode is seldom used, except in cases where the switch has two low power supply capacities but a higher power usage.



Note

The chassis in the Cisco MDS 9000 Family uses 1200 W when powered at 110 V, and 2500 W when powered at 220 V.

To configure the power supply mode, follow these steps:

	Command	Purpose
Step 1	switch# config t	Enters configuration mode.
Step 2	switch(config)# power redundancy-mode combined switch(config)#	Configures combined power supply mode.
	switch(config)# power redundancy-mode redundant switch(config)#	Reverts to the redundant (default) power supply mode.

Power Supply Guidelines



Note

Use the **show environment power** command to view the current power supply configuration.

Follow these guidelines when configuring power supplies:

1. When power supplies with different capacities are installed in the switch, the total power available differs based on the configured mode, either redundant or combined:
 - a. Redundant mode—the total power is the lesser of the two power supply capacities. For example, suppose you have the following usage figures configured:
 - Power supply 1 = 2500 W
 - Additional power supply 2 = not used
 - Current usage = 2000 W
 - Current capacity = 2500 W
 Then the following three scenarios differ as specified (see [Table 8-1](#)):
 - Scenario 1:** If 1800 W is added as power supply 2, then power supply 2 is shut down.
 - Reason:** 1800 W is less than the usage of 2000 W.
 - Scenario 2:** If 2200 W is added as power supply 2, then the current capacity decreases to 2200 W.
 - Reason:** 2200 W is the lesser of the two power supplies.

Scenario 3: If 3000 W is added as power supply 2, then the current capacity value remains at 2500 W.

Reason: 2500 W is the lesser of the two power supplies.

Table 8-1 Redundant Mode Power Supply Scenarios

Scenario	Power Supply 1 (W) ¹	Current Usage (W)	Insertion of Power Supply 2 (W)	New Capacity (W)	Action Taken by Switch
1	2500	2000	1800	2500	Power supply 2 is shut down.
2	2500	2000	2200	2200	Capacity becomes 2200 W.
3	2500	2000	3300	2500	Capacity remains the same.

1. W = Watts

- b. Combined mode—the total power is twice the lesser of the two power supply capacities.

For example, suppose you have the following usage figures configured:

Power supply 1 = 2500 W

Additional Power supply 2 = not used

Current Usage = 2000 W

Current capacity = 2500 W

Then, the following three scenarios differ as specified (see [Table 8-2](#)):

Scenario 1: If 1800 W is added as power supply 2, then the capacity increases to 3600 W.

Reason: 3600 W is twice the minimum (1800 W).

Scenario 2: If 2200 W is added as power supply 2, then the current capacity increases to 4400 W.

Reason: 4400 W is twice the minimum (2200 W).

Scenario 3: If 3000 W is added as power supply 2, then the current capacity increases to 5000 W.

Reason: 5000 W is twice the minimum (2500 W).

Table 8-2 Combined Mode Power Supply Scenarios

Scenario	Power Supply 1 (W) ¹	Current Usage (W)	Insertion of Power Supply 2 (W)	New Capacity (W)	Action Taken by Switch
1	2500	2000	1800	3600	Power is never shut down. The new capacity is changed.
2	2500	2000	2200	4400	
3	2500	2000	3300	5000	

1. W = Watts

2. When you change the configuration from combined to redundant mode and the system detects a power supply that has a capacity lower than the current usage, the power supply is shut down. If both power supplies have a lower capacity than the current system usage, the configuration is not allowed. Several configuration scenarios are summarized in [Table 8-3](#).

Scenario 1: You have the following usage figures configured:

Power supply 1 = 2500 W
 Additional Power supply 2 = 1800 W
 Current Usage = 2000 W
 Current mode = combined mode (so current capacity is 3600 W)

You decide to change the switch to redundant mode. Then power supply 2 is shut down.

Reason: 1800 W is the lesser of the two power supplies and it is less than the system usage.

Scenario 2: You have the following usage figures configured:

Power supply 1 = 2500 W
 Additional Power supply 2 = 2200 W
 Current Usage = 2000 W
 Current mode = combined mode (so current capacity is 4400 W).

You decide to change the switch to redundant mode. Then the current capacity decreases to 2200 W.

Reason: 2200 W is the lesser of the two power supplies.

Scenario 3: You have the following usage figures configured:

Power supply 1 = 2500 W
 Additional Power supply 2 = 1800 W
 Current Usage = 3000 W
 Current mode = combined mode (so current capacity is 3600 W).

You decide to change the switch to redundant mode. Then the current capacity decreases to 2500 W and the configuration is rejected.

Reason: 2500 W is less than the system usage (3000 W).

Table 8-3 Combined Mode Power Supply Scenarios

Scenario	Power Supply 1 (W) ¹	Current Mode	Current Usage (W)	Power Supply 2 (W)	New Mode	New Capacity (W)	Action Taken by Switch
1	2500	combined	2000	1800	N/A	3600	This is the existing configuration.
	2500	N/A	2000	1800	redundant	2500	Power supply 2 is shut down
2	2500	combined	2000	2200	N/A	4400	This is the existing configuration.
	2500	N/A	2000	2200	redundant	2200	The new capacity is changed.
3	2500	combined	3000	1800	N/A	3600	This is the existing configuration.
	2500	N/A	3000	1800	redundant	N/A	Rejected, so the mode reverts to combined mode.

1. W = Watts

About Module Temperature

Built-in, automatic sensors are provided in all switches in the Cisco MDS 9000 Family to monitor your switch at all times.

Each module (switching and supervisor) has four sensors: 1 (outlet sensor), 2 (intake sensor), 3 (onboard sensor), and 4 (onboard sensor). Each sensor has two thresholds (in degrees Celsius): minor and major.

**Note**

A threshold value of -127 indicates that no thresholds are configured or applicable.

- Minor threshold—When a minor threshold is exceeded, a minor alarm occurs and the following action is taken for all four sensors:
 - Syslog messages are displayed.
 - Call Home alerts are sent (if configured).
 - SNMP notifications are sent (if configured).
- Major threshold—When a major threshold is exceeded, a major alarm occurs and the following action is taken.
 - For sensors 1, 3, and 4 (outlet and onboard sensors):

Syslog messages are displayed.

Call Home alerts are sent (if configured).

SNMP notifications are sent (if configured).
 - For sensor 2 (intake sensor):

If the threshold is exceeded in a switching module, only that module is shut down.

If the threshold is exceeded in an active supervisor module with HA-standby or standby present, only that supervisor module is shut down and the standby supervisor module takes over.

If you do not have a standby supervisor module in your switch, you have an interval of 2 minutes to decrease the temperature. During this interval the software monitors the temperature every five (5) seconds and continuously sends syslog messages as configured.

**Tip**

To realize the benefits of these built-in, automatic sensors on any switch in the Cisco MDS 9500 Series, we highly recommend that you install dual supervisor modules. If you are using a Cisco MDS 9000 Family switch without dual supervisor modules, we recommend that you immediately replace the fan module even if one fan is not working.

Displaying Module Temperature

Use the **show environment temperature** command to display temperature sensors for each module (see [Example 8-3](#)).

Example 8-3 Displays Temperature Information

```
switch# show environment temperature
-----
Module  Sensor  MajorThresh  MinorThres  CurTemp  Status
          (Celsius)  (Celsius)    (Celsius)
-----
2       Outlet  75           60          35       ok
2       Intake  65           50          33       ok

5       Outlet  75           60          44       ok
5       Intake  65           50          36       ok

6       Outlet  75           60          42       ok
6       Intake  65           50          35       ok

7       Outlet  75           60          33       ok
7       Intake  65           50          30       ok

9       Outlet  75           60          34       ok
9       Intake  65           50          39       ok
```

About Fan Modules

Hot-swappable fan modules (fan trays) are provided in all switches in the Cisco MDS 9000 Family to manage airflow and cooling for the entire switch. Each fan module contains multiple fans to provide redundancy. The switch can continue functioning in the following situations:

- One or more fans fail within a fan module—even with multiple fan failures, switches in the Cisco MDS 9000 Family can continue functioning. When a fan fails within a module, the functioning fans in the module increase their speed to compensate for the failed fan(s).
- The fan module is removed for replacement—The fan module is designed to be removed and replaced while the system is operating without presenting an electrical hazard or damage to the system. When replacing a failed fan module in a running switch, be sure to replace the new fan module within five minutes.



Tip

If one or more fans fail within a fan module, the Fan Status LED turns red. A fan failure could lead to temperature alarms if not corrected immediately.

The fan status is continuously monitored by the Cisco SAN-OS software. In case of a fan failure, the following action is taken:

- Syslog messages are displayed
- Call Home alerts are sent (if configured)
- SNMP notifications are sent (if configured)

Displaying the Fan Module Status

Use the **show environment fan** command to display the fan module status (see [Example 8-4](#)).

Example 8-4 Displays Chassis Fan Information

```
switch# show environment fan
-----
FAN                Model                Hw                Status
-----
Chassis            WS-9SLOT-FAN        0.0              ok
PS-1               --                  --                ok
PS-2               --                  --                ok
```

About Clock Modules

All switches in the Cisco MDS 9000 Family have two clock modules—Module A (primary) and Module B (redundant). The clock modules are designed, tested, and qualified for mission-critical availability with a mean time between failures (MTBF) of 3,660,316 hours. This translates to a potential failure every 365 years. Additionally, Cisco MDS 9000 Family switches are designed to automatically switch to the redundant clock module should the active clock module fail.



Tip

We recommend that the failed clock module be replaced during a maintenance window.

Monitoring Clock Modules

Use the **show environment clock** command to display the status for both clock modules (see [Example 8-5](#)).

Example 8-5 Displays Chassis Clock Information

```
switch# show environment clock
-----
Clock              Model                Hw                Status
-----
A                  DS-C9500-CL         0.0              ok/active
B                  DS-C9500-CL         0.0              ok/standby
```

Displaying Environment Information

Use the **show environment** command to display all environment-related switch information.

Example 8-6 Displays All Environment Information

```
switch# show environment
Clock:
-----
Clock              Model                Hw                Status
-----
```

```

A          Clock Module          1.0      ok/active
B          Clock Module          1.0      ok/standby

Fan:
-----
FAN        Model                  Hw        Status
-----
Chassis    DS-2SLOT-FAN                   0.0      ok
PS-1       --                               --       ok
PS-2       --                               --       absent
Temperature:
-----
Module     Sensor  MajorThresh  MinorThres  CurTemp  Status
          (Celsius)  (Celsius)   (Celsius)
-----
1         1        75           60          32       ok
1         2        65           50          32       ok
1         3       -127         -127        43       ok
1         4       -127         -127        39       ok
Power Supply:
-----
PS  Model                Power      Power      Status
          (Watts)    (Amp @42V)
-----
1  PWR-950-AC            919.38    21.89     ok
2  --                    --        --        absent
Mod Model                Power      Power      Power      Power      Status
          Requested Requested  Allocated Allocated
          (Watts)    (Amp @42V) (Watts)    (Amp @42V)
-----
1  DS-X9216-K9-SUP      220.08    5.24      220.08    5.24      powered-up
Power Usage Summary:
-----
Power Supply redundancy mode:                redundant
Total Power Capacity                          919.38 W
Power reserved for Supervisor(s) [-]          220.08 W
Power reserved for Fan Module(s) [-]          0.00 W
Power currently used by Modules [-]           0.00 W
-----
Total Power Available                          699.30 W
-----

```

Default Settings

Table 8-4 lists the default hardware settings.

Table 8-4 Default HARDware Parameters

Parameters	Default
Power supply mode	Redundant mode.