



## Managing System Hardware

---

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

- [Displaying Switch Hardware Inventory, page 9-2](#)
- [Displaying the Switch Serial Number, page 9-4](#)
- [Displaying Power Usage Information, page 9-5](#)
- [Power Supply Configuration Modes, page 9-6](#)
- [About Module Temperature, page 9-9](#)
- [About Fan Modules, page 9-10](#)
- [About Clock Modules, page 9-11](#)
- [Displaying Environment Information, page 9-11](#)
- [Default Settings, page 9-12](#)

***Send documentation comments to [mdsfeedback-doc@cisco.com](mailto:mdsfeedback-doc@cisco.com).***

## Displaying Switch Hardware Inventory

Use the **show inventory** command to view information on the field replaceable units (FRUs) in the switch, including product IDs, serial numbers, and version IDs. See [Example 9-1](#).

### **Example 9-1** *Displays the Hardware Inventory*

```
switch# show inventory
NAME: "Chassis",  DESCR: "MDS 9506 chassis"
PID: DS-C9506           ,  VID: 0.104,  SN: FOX0712S00T

NAME: "Slot 3",  DESCR: "2x1GE IPS, 14x1/2Gbps FC Module"
PID: DS-X9302-14K9     ,  VID: 0.201,  SN: JAB081405AF

NAME: "Slot 4",  DESCR: "2x1GE IPS, 14x1/2Gbps FC Module"
PID: DS-X9302-14K9     ,  VID: 0.201,  SN: JAB081605A5

NAME: "Slot 5",  DESCR: "Supervisor/Fabric-1"
PID: DS-X9530-SF1-K9   ,  VID: 4.0,   SN: JAB0747080H

NAME: "Slot 6",  DESCR: "Supervisor/Fabric-1"
PID: DS-X9530-SF1-K9   ,  VID: 4.0,   SN: JAB0746090H

NAME: "Slot 17", DESCR: "MDS 9506 Power Supply"
PID: DS-CAC-1900W      ,  VID: 1.0,   SN: DCA07216052

NAME: "Slot 19", DESCR: "MDS 9506 Fan Module"
PID: DS-6SLOT-FAN      ,  VID: 0.0,   SN: FOX0638S150
```

Use the **show hardware** command to display switch hardware inventory details. See [Example 9-2](#).



#### **Note**

To display and configure modules, see [Chapter 10, "Managing Modules."](#)

### **Example 9-2** *Displays the Hardware Information*

```
switch# show hardware
Cisco Storage Area Networking Operating System (SAN-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2003-2004 by Cisco Systems, Inc. All rights reserved.
The copyright for certain works contained herein are owned by
Cisco Systems, Inc. and/or other third parties and are used and
distributed under license.

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
```

***Send documentation comments to [mdsfeedback-doc@cisco.com](mailto:mdsfeedback-doc@cisco.com).***

```
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
```

***Send documentation comments to [mdsfeedback-doc@cisco.com](mailto:mdsfeedback-doc@cisco.com).***

```
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.

*Send documentation comments to [mdsfeedback-doc@cisco.com](mailto:mdsfeedback-doc@cisco.com).*

## 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 9-3](#).



### 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 9-3 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
-----
```

[Send documentation comments to mdsfeedback-doc@cisco.com.](mailto:mdsfeedback-doc@cisco.com)

## Power Supply Configuration Modes

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# <b>config t</b>	Enters configuration mode.
Step 2	switch(config)# <b>power redundancy-mode combined</b> switch(config)#	Configures combined power supply mode.
	switch(config)# <b>power redundancy-mode redundant</b> switch(config)#	Reverts to the redundant (default) power supply mode.



### Note

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

## Power Supply Configuration Guidelines

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 9-1](#)):
 

**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.

**Send documentation comments to [mdsfeedback-doc@cisco.com](mailto:mdsfeedback-doc@cisco.com).**

**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 9-1 Redundant Mode Power Supply Scenarios**

Scenario	Power Supply 1 (W) <sup>1</sup>	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 9-2](#)):

**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 9-2 Combined Mode Power Supply Scenarios**

Scenario	Power Supply 1 (W) <sup>1</sup>	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 9-3](#).

**Send documentation comments to [mdsfeedback-doc@cisco.com](mailto:mdsfeedback-doc@cisco.com).**

**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 9-3 Combined Mode Power Supply Scenarios**

Scenario	Power Supply 1 (W) <sup>1</sup>	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



*Send documentation comments to [mdsfeedback-doc@cisco.com](mailto:mdsfeedback-doc@cisco.com).*

## 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:
  - System 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):

System 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 system 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.

---

**Send documentation comments to [mdsfeedback-doc@cisco.com](mailto:mdsfeedback-doc@cisco.com).**

## Displaying Module Temperature

Use the **show environment temperature** command to display temperature sensors for each module (see [Example 9-4](#)).

### Example 9-4 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 MDS SAN-OS software. In case of a fan failure, the following action is taken:

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

**Send documentation comments to [mdsfeedback-doc@cisco.com](mailto:mdsfeedback-doc@cisco.com).**

Use the **show environment fan** command to display the fan module status (see [Example 9-5](#)).

**Example 9-5 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.

Use the **show environment clock** command to display the status for both clock modules (see [Example 9-6](#)).

**Example 9-6 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 9-7 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
```

**Send documentation comments to [mdsfeedback-doc@cisco.com](mailto:mdsfeedback-doc@cisco.com).**

```

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 9-4 lists the default hardware settings.

**Table 9-4** Default Hardware Parameters

Parameters	Default
Power supply mode	Redundant mode.