



Managing System Hardware

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

- [Displaying Switch Hardware Inventory, page 7-2](#)
- [Displaying Power Usage Information, page 7-5](#)
- [Configuring Power Supplies, page 7-6](#)
- [Displaying Module Temperature, page 7-9](#)
- [Monitoring Fan Modules, page 7-10](#)
- [Monitoring Clock Modules, page 7-10](#)
- [Displaying Environment Information, page 7-11](#)

Send documentation comments to mdsfeedback-doc@cisco.com

Displaying Switch Hardware Inventory

Use the **show hardware** command to display switch hardware inventory details. See [Example 7-1](#).



Note

To display and configure modules, see [Chapter 6, “Managing Modules.”](#)

Example 7-1 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) 2002-2003 by Cisco Systems, Inc. All rights reserved.
The copyright for certain works contained herein are owned by
Andiamo Systems, Inc. and/or other third parties and are used and
distributed under license.

Software
  BIOS:          version 1.0.3
  loader:        version error [last 1.0(1)]
  kickstart:     version 1.1(1) [build 1.1(0.94)] [gdb]
  system:        version 1.1(1) [build 1.1(0.94)] [gdb]

  BIOS compile time:      11/18/02
  kickstart image file is: bootflash:/bootimage
  kickstart compile time: 2/12/2003 11:00:00
  system image file is:   isanimage
  system compile time:    2/12/2003 12:00:00

Hardware
  RAM 1027628 kB

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

  172.22.90.171 uptime is 0 days 3 hours 0 minute(s) 36 second(s)

  Last reset at 669882 usecs after Thu Feb 13 07:20:41 2003
  Reason: Reset Requested by CLI command reload
  System version: 1.0(1)

This supervisor carries Pentium processor with 1027628 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 ok
  Module type is "1/2 Gbps FC Module"
  1 submodules are present
  RAM size is 0 (kb)
  Model number is DS-X9016
```

Send documentation comments to mdsfeedback-doc@cisco.com

```
H/W version is 0.0
Part Number is 73-8127-03
Part Revision is
Manufacture Date is Year 0 Week 0
Serial number is
CLEI code is
```

```
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 0.0
Part Number is 73-7523-06
Part Revision is
Manufacture Date is Year 0 Week 0
Serial number is
CLEI code is
```

```
Module in slot 6 is empty
```

```
Module in slot 7 is empty
```

```
Module in slot 8 is ok
Module type is "IP Storage Module"
3 submodules are present
RAM size is 0 (kb)
Model number is DS-X9308-SMIP
H/W version is 0.2
Part Number is 73-8083-02
Part Revision is 2
Manufacture Date is Year 7 Week 2
Serial number is JAB0702065h
CLEI code is 0
```

```
Module in slot 9 is ok
Module type is "1/2 Gbps FC Module"
1 submodules are present
RAM size is 0 (kb)
Model number is DS-X9016
H/W version is 0.0
Part Number is 73-8127-03
Part Revision is
Manufacture Date is Year 0 Week 0
Serial number is
CLEI code is
```

```
-----
Chassis has 2 Slots for Power Supplies
-----
```

```
PS in slot A is ok
Power supply type is "1153.32W 110v AC"
Model number is DS-CAC-2500W
H/W version is 1.0
Part Number is 341-0061-01
Part Revision is A0
Manufacture Date is Year 6 Week 16
Serial number is ART061600VA
CLEI code is
```

```
PS in slot B is ok
Power supply type is "1153.32W 110v AC"
```

Send documentation comments to mdsfeedback-doc@cisco.com

```
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 20
Serial number is ART0620005N
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
```

Send documentation comments to 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 7-2](#).



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 7-2 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
-----
```

Send documentation comments to mdsfeedback-doc@cisco.com

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**—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**—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 1200Watts when powered at 110 volts, and 2500Watts when powered at 220 volts.

To configure the power supply mode, follow these steps:

	Command	Purpose
Step 1	switch# <code>config t</code>	Enters configuration mode.
Step 2	switch(config)# <code>power redundancy-mode combined</code> switch(config)#	Configures combined power supply mode.
	switch(config)# <code>power redundancy-mode redundant</code> 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:
 - In **redundant** mode, the total power is the lesser of the two power supply capacities. For example, if you have the following usage figures configured:

Power supply 1 = 2500Watts
 Additional Power supply 2 = not used
 Current usage = 2000Watts
 Current capacity = 2500Watts

Then the following three scenarios differ as specified (see [Table 7-1](#)):

- a. **Scenario 1:** If 1800Watts is added as power supply 2, then power supply 2 is shut down. Reason: 1800Watts is less than the usage of 2000Watts.
- b. **Scenario 2:** If 2200Watts is added as power supply 2, then the current capacity decreases to 2200Watts. Reason: 2200Watts is the lesser of the two power supplies.

Send documentation comments to mdsfeedback-doc@cisco.com

- c. **Scenario 3:** If 3000Watts is added as power supply 2, then the current capacity value remains at 2500Watts.
Reason: 2500Watts is the lesser of the two power supplies.

Table 7-1 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 2200Watts.
3	2500	2000	3300	2500	Capacity remains the same.

1. W = Watts

- In **combined** mode, the total power is twice the lesser of the two power supply capacities.

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

Power supply 1 = 2500Watts

Additional Power supply 2 = not used

Current Usage = 2000Watts

Current capacity = 2500Watts

Then, the following three scenarios differ as specified (see [Table 7-2](#)):

- Scenario 1:** If 1800Watts is added as power supply 2, then the capacity increases to 3600Watts.
Reason: 3600Watts is twice the minimum (1800Watts).
- Scenario 2:** If 2200Watts is added as power supply 2, then the current capacity increases to 4400Watts.
Reason: 4400Watts is twice the minimum (2200Watts).
- Scenario 3:** If 3000Watts is added as power supply 2, then the current capacity increases to 5000Watts.
Reason: 5000Watts is twice the minimum (2500Watts).

Table 7-2 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

Send documentation comments to mdsfeedback-doc@cisco.com

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. Various configuration scenarios are displayed and summarized in [Table 7-3](#).
 - a. **Scenario 1:** You have the following usage figures configured:
 - Power supply 1 = 2500Watts
 - Additional Power supply 2 = 1800Watts
 - Current Usage = 2000Watts
 - Current mode = **combined** mode (so current capacity is 3600Watts)
 You decide to change the switch to **redundant** mode. Then power supply 2 is shut down.
Reason: 1800Watts is the lesser of the two power supplies and it is less than the system usage.
 - b. **Scenario 2:** You have the following usage figures configured:
 - Power supply 1 = 2500Watts
 - Additional Power supply 2 = 2200Watts
 - Current Usage = 2000Watts
 - Current mode = **combined** mode (so current capacity is 4400Watts).
 You decide to change the switch to **redundant** mode. Then the current capacity decreases to 2200Watts.
Reason: 2200Watts is the lesser of the two power supplies.
 - c. **Scenario 3:** You have the following usage figures configured:
 - Power supply 1 = 2500Watts
 - Additional Power supply 2 = 1800Watts
 - Current Usage = 3000Watts
 - Current mode = **combined** mode (so current capacity is 3600Watts).
 You decide to change the switch to **redundant** mode. Then the current capacity decreases to 2500Watts and the configuration is rejected.
Reason: 2500Watts is less than the system usage (3000Watts).

Table 7-3 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	Existing configuration.
	2500	N/A	2000	1800	redundant	2500	Power supply 2 is shut down
2	2500	combined	2000	2200	N/A	4400	Existing configuration.
	2500	N/A	2000	2200	redundant	2200	The new capacity is changed.
3	2500	combined	3000	1800	N/A	3600	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

Displaying Module Temperature

Use the **show environment temperature** command to display temperature sensors for each module (see [Example 7-3](#)).

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 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 as follows:
 - 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, the module is shut down.
 - If the threshold is exceeded in a supervisor module with HA-standby or standby present, the supervisor module is shut down.
 - If the standby supervisor is not present, the entire switch is shut down.



Note

Switch shut down only happens after a two-minute interval. During this interval the software monitors the temperature every five (5) seconds and continuously sends syslog messages as configured. If the required action is not taken (for example, a new fan module is inserted to decrease temperature) and if the temperature does not come down, the system is shut down at the end of two minutes.

Example 7-3 Displays Temperature Information

```
switch# show environment temperature
```

Module	Sensor	MajorThresh (Celsius)	MinorThres (Celsius)	CurTemp (Celsius)	Status
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

Send documentation comments to mdsfeedback-doc@cisco.com

7	Outlet	75	60	33	ok
7	Intake	65	50	30	ok
9	Outlet	75	60	34	ok
9	Intake	65	50	39	ok

Monitoring Fan Modules

Use the **show environment fan** command to display the fan status for each fan module. See [Example 7-4](#).

Example 7-4 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
```

The fan status is continuously monitored. In case of a fan module failure, the following action is taken:

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



Caution

A fan failure could lead to temperature alarms if not corrected immediately.

Monitoring Clock Modules

Use the **show environment clock** command to display the clock status for the chassis. See [Example 7-5](#).

Example 7-5 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
```

Each switch has two clock modules for redundancy: Clock A (primary) and Clock B. The redundant clock module (Clock B) takes over if the primary clock module fails. If Clock A is available at startup, the switch uses Clock A, otherwise it uses Clock B.

If Clock A fails, the switch is reset and Clock B automatically takes over. Clock modules cannot be configured. If both modules fail, the switch shuts down. The probability of a clock failure is low given that the mean time between failures (MTBF) is 3660316 hours.

Send documentation comments to mdsfeedback-doc@cisco.com

Displaying Environment Information

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

Example 7-6 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
-----
```

Send documentation comments to mdsfeedback-doc@cisco.com