



# Managing System Hardware

This chapter provides details on how to manage system hardware other than services and switching modules and how to monitor the health of the switch.

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## 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. The following example shows the **show inventory** command output:

```
switch# show inventory
NAME: "Chassis", DESCR: "MDS 9710 (10 Slot) Chassis "
PID: DS-C9710 , VID: V00 , SN: JAF1647AQTL

NAME: "Slot 2", DESCR: "2/4/8/10/16 Gbps Advanced FC Module"
PID: DS-X9448-768K9 , VID: V02 , SN: JAE192008U7

NAME: "Slot 3", DESCR: "4/8/16/32 Gbps Advanced FC Module"
PID: DS-X9648-1536K9 , VID: V01 , SN: JAE203901Z0

NAME: "Slot 5", DESCR: "Supervisor Module-3"
PID: DS-X97-SF1-K9 , VID: V02 , SN: JAE17360E6B

NAME: "Slot 6", DESCR: "Supervisor Module-3"
PID: DS-X97-SF1-K9 , VID: , SN: JAE164300E8

NAME: "Slot 7", DESCR: "1/10/40G IPS,2/4/8/10/16G FC Module"
PID: DS-X9334-K9 , VID: V00 , SN: JAE195001TJ

NAME: "Slot 8", DESCR: "4/8/16/32 Gbps Advanced FC Module"
PID: DS-X9648-1536K9 , VID: V01 , SN: JAE203901ZJ
```

```

NAME: "Slot 10",  DESCR: "1/10 Gbps Ethernet Module"
PID: DS-X9848-480K9      ,  VID: V01 ,  SN: JAE172603Q9

NAME: "Slot 11",  DESCR: "Fabric card module"
PID: DS-X9710-FAB1      ,  VID: V01 ,  SN: JAE18040A1N

NAME: "Slot 12",  DESCR: "Fabric card module"
PID: DS-X9710-FAB      ,  VID: V01 ,  SN: JAE164705RF

NAME: "Slot 13",  DESCR: "Fabric card module"
PID: DS-X9710-FAB1      ,  VID: V01 ,  SN: JAE18040A22

NAME: "Slot 14",  DESCR: "Fabric card module"
PID: DS-X9710-FAB1      ,  VID: V01 ,  SN: JAE1640085T

NAME: "Slot 15",  DESCR: "Fabric card module"
PID: DS-X9710-FAB      ,  VID: V01 ,  SN: JAE16410AR4

NAME: "Slot 16",  DESCR: "Fabric card module"
PID: DS-X9710-FAB1      ,  VID: V00 ,  SN: JAE19500864

NAME: "Slot 33",  DESCR: "MDS 9710 (10 Slot) Chassis Power Supply"
PID: DS-CAC97-3KW      ,  VID: V01 ,  SN: DTM1649022W

NAME: "Slot 34",  DESCR: "MDS 9710 (10 Slot) Chassis Power Supply"
PID: DS-CAC97-3KW      ,  VID: V01 ,  SN: DTM16490239

NAME: "Slot 35",  DESCR: "MDS 9710 (10 Slot) Chassis Power Supply"
PID: DS-CAC97-3KW      ,  VID: V01 ,  SN: DTM164602ZP

NAME: "Slot 40",  DESCR: "MDS 9710 (10 Slot) Chassis Power Supply"
PID: DS-CAC97-3KW      ,  VID: V01 ,  SN: DTM164602XH

NAME: "Slot 41",  DESCR: "MDS 9710 (10 Slot) Chassis Fan Module"
PID: DS-C9710-FAN      ,  VID: V00 ,  SN: JAF1647ADCN

NAME: "Slot 42",  DESCR: "MDS 9710 (10 Slot) Chassis Fan Module"
PID: DS-C9710-FAN      ,  VID: V00 ,  SN: JAF1647ACHH

NAME: "Slot 43",  DESCR: "MDS 9710 (10 Slot) Chassis Fan Module"
PID: DS-C9710-FAN      ,  VID: V00 ,  SN: JAF1647ADCE

```

Use the **show hardware** command to display switch hardware inventory details. The following example shows the **show hardware** command output:

```

switch# show hardware
Cisco Nexus Operating System (NX-OS) Software
TAC support: http://www.cisco.com/tac
Documents: http://www.cisco.com/en/US/products/ps9372/tsd_products_support_series_home.html
Copyright (c) 2002-2017, Cisco Systems, Inc. All rights reserved.
The copyrights to certain works contained in this software are
owned by other third parties and used and distributed under
license. Certain components of this software are licensed under
the GNU General Public License (GPL) version 2.0 or the GNU
Lesser General Public License (LGPL) Version 2.1. A copy of each
such license is available at
http://www.opensource.org/licenses/gpl-2.0.php and
http://www.opensource.org/licenses/lgpl-2.1.php

Software
  BIOS:          version 3.1.0

```

```
kickstart: version 8.2(1)
system:     version 8.2(1)
BIOS compile time:      02/27/2013
kickstart image file is: bootflash:///m9700-sf3ek9-kickstart-mz.8.2.1.bin.S46
kickstart compile time: 8/30/2017 23:00:00 [09/27/2017 12:00:46]
system image file is:   bootflash:///m9700-sf3ek9-mz.8.2.1.bin.S46
system compile time:    8/30/2017 23:00:00 [09/27/2017 14:57:51]
```

## Hardware

```
cisco MDS 9710 (10 Slot) Chassis ("Supervisor Module-3")
Intel(R) Xeon(R) CPU C5528 @ 2.13GHz with 8167228 kb of memory.
Processor Board ID JAE17360E6B
```

```
Device name: sw-9710-101
bootflash:   3915776 kB
slot0:       0 kB (expansion flash)
```

Kernel uptime is 0 day(s), 2 hour(s), 25 minute(s), 2 second(s)

Last reset at 969755 usecs after Wed Nov 8 06:28:35 2017

```
Reason: Reset Requested by CLI command reload
System version: 8.2(1)
Service:
```

## plugin

```
Core Plugin, Ethernet Plugin
```

-----  
Switch hardware ID information  
-----

## Switch is booted up

```
Switch type is : MDS 9710 (10 Slot) Chassis
Model number is DS-C9710
H/W version is 0.2
Part Number is 73-14586-02
Part Revision is 02
Manufacture Date is Year 16 Week 47
Serial number is JAF1647AQTL
CLEI code is 0
```

```
-----
Chassis has 10 Module slots and 6 Fabric slots
-----
```

Module1 empty

Module2 powered-dn

```
Module type is : 2/4/8/10/16 Gbps Advanced FC Module
0 submodules are present
Model number is DS-X9448-768K9
H/W version is 1.3
Part Number is 73-15110-04
Part Revision is A0
Manufacture Date is Year 19 Week 20
Serial number is JAE192008U7
CLEI code is CMUIAHUCAC
```

```
.
.
.
```

Module10 ok

```
Module type is : 1/10 Gbps Ethernet Module
0 submodules are present
```

```

Model number is DS-X9848-480K9
H/W version is 1.0
Part Number is 73-15258-05
Part Revision is A0
Manufacture Date is Year 17 Week 26
Serial number is JAE172603Q9
CLEI code is CMUCAD5BAA

```

```

Xbar1 ok
Module type is : Fabric card module
0 submodules are present
Model number is DS-X9710-FAB1
H/W version is 1.2
Part Number is 73-15234-02
Part Revision is C0
Manufacture Date is Year 18 Week 4
Serial number is JAE18040A1N
CLEI code is CMUCAD1BA

```

```

.
.
.

```

```

Xbar6 powered-dn
Module type is : Fabric card module
0 submodules are present
Model number is DS-X9710-FAB1
H/W version is 1.0
Part Number is 73-100994-01
Part Revision is 03
Manufacture Date is Year 19 Week 50
Serial number is JAE19500864
CLEI code is CLEI987656

```

```

-----
Chassis has 8 PowerSupply Slots
-----

```

```

PS1 ok
Power supply type is: 3000.00W 220v AC
Model number is DS-CAC97-3KW
H/W version is 1.0
Part Number is 341-0428-01
Part Revision is A0
Manufacture Date is Year 16 Week 49
Serial number is DTM1649022W
CLEI code is CMUPABRCAA

```

```

.
.
.

```

```

PS8 ok
Power supply type is: 3000.00W 220v AC
Model number is DS-CAC97-3KW
H/W version is 1.0
Part Number is 341-0428-01
Part Revision is A0
Manufacture Date is Year 16 Week 46
Serial number is DTM164602XH
CLEI code is CMUPABRCAA

```

```

-----
Chassis has 3 Fan slots
-----

```

```

Fan1(sys_fan1) ok
Model number is DS-C9710-FAN

```

```
H/W version is 0.2
Part Number is 73-15236-02
Part Revision is 02
Manufacture Date is Year 16 Week 47
Serial number is JAF1647ADCN
CLEI code is

Fan2(sys_fan2) ok
Model number is DS-C9710-FAN
H/W version is 0.2
Part Number is 73-15236-02
Part Revision is 02
Manufacture Date is Year 16 Week 47
Serial number is JAF1647ACHH
CLEI code is

Fan3(sys_fan3) ok
Model number is DS-C9710-FAN
H/W version is 0.2
Part Number is 73-15236-02
Part Revision is 02
Manufacture Date is Year 16 Week 47
Serial number is JAF1647ADCE
CLEI code is
```

## Running CompactFlash Tests

You can run the test on demand by using the **system health check bootflash fix-errors** or **system health check logflash bad-blocks** CLI command in EXEC mode.

Use the GOLD (Generic Online Diagnostics) feature on the Cisco MDS 9700 Series Multilayer Directors to tests and verifies the hardware devices and data path in a live system. For more information on GOLD, see the Configuring Online Diagnostics chapter in [Cisco MDS 9000 Series NX-OS System Management Configuration Guide](#).

## Displaying the Switch Serial Number

You can display the serial number of your Cisco MDS 9000 Series switch by looking at the serial number label on the back of the chassis (next to the power supply), or by using the **show sprom backplane 1** command.

```
switch# show sprom backplane 1
DISPLAY backplane sprom contents:
Common block :
Block Signature : 0xabab
Block Version   : 3
Block Length    : 160
Block Checksum  : 0x134f
EEPROM Size     : 65535
Block Count     : 5
FRU Major Type  : 0x6001
FRU Minor Type  : 0x0
OEM String      : Cisco Systems, Inc.
Product Number  : DS-C9710
Serial Number   : JAF1647AQTL
Part Number     : 73-14586-02
Part Revision   : 02
Mfg Deviation   : 0
```

```

H/W Version      : 0.2
Mfg Bits        : 0
Engineer Use     : 0
snmpOID         : 0.0.0.0.0.0.0.0
Power Consump   : 0
RMA Code        : 0-0-0-0
CLEI Code       : 0
VID             : V00
Chassis specific block:
.
.
.

```



**Note** If you are installing a new license, use the **show license host-id** command to obtain the switch serial number. For more information, see the [Cisco MDS 9000 Series NX-OS Software Licensing Guide](#).

## 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.



**Note** In a Cisco MDS 9700 Series switch, power usage is reserved for both supervisors regardless of whether one or both supervisor modules are present.

```
switch# show environment power
```

```

Power Supply:
Voltage: 50 Volts
Power
Supply      Model                Actual      Total
           Model                Output      Capacity   Status
-----
1          DS-CAC97-3KW                549 W      3000 W     Ok
2          DS-CAC97-3KW                535 W      3000 W     Ok
3          DS-CAC97-3KW                539 W      3000 W     Ok
4          DS-CAC97-3KW                535 W      3000 W     Ok
5          -----                    0 W        0 W        Absent
6          -----                    0 W        0 W        Absent
7          -----                    0 W        0 W        Absent
8          -----                    0 W        0 W        Absent

```

```

Module      Model                Actual      Power
           Model                Draw      Allocated   Status
-----
2          DS-X9448-768K9                N/A        0 W        Powered-Dn
3          DS-X9648-1536K9               265 W      750 W      Powered-Up
5          DS-X97-SF1-K9                 113 W      190 W      Powered-Up
6          DS-X97-SF1-K9                 106 W      190 W      Powered-Up
7          DS-X9334-K9                   441 W      480 W      Powered-Up
8          DS-X9648-1536K9               252 W      750 W      Powered-Up
10         DS-X9848-480K9                363 W      500 W      Powered-Up
Xb1       DS-X9710-FAB1                 95 W       150 W      Powered-Up

```

Xb2	DS-X9710-FAB	91 W	150 W	Powered-Up
Xb3	DS-X9710-FAB1	94 W	150 W	Powered-Up
Xb4	DS-X9710-FAB1	90 W	150 W	Powered-Up
Xb5	DS-X9710-FAB	98 W	150 W	Powered-Up
Xb6	DS-X9710-FAB1	N/A	150 W	Powered-Dn
fan1	DS-C9710-FAN	50 W	600 W	Powered-Up
fan2	DS-C9710-FAN	40 W	600 W	Powered-Up
fan3	DS-C9710-FAN	45 W	600 W	Powered-Up

N/A - Per module power not available

Power Usage Summary:

Power Supply redundancy mode (configured)	Redundant
Power Supply redundancy mode (operational)	Redundant
Total Power Capacity (based on configured mode)	6000 W
Total Power of all Inputs (cumulative)	12000 W
Total Power Output (actual draw)	2158 W
Total Power Allocated (budget)	5560 W
Total Power Available for additional modules	440 W

## Power Supply Modes

Cisco MDS 9000 Series Multilayer Switches support different number and capabilities of power supplies. This section describes the power modes that are available on Cisco MDS 9000 Series Multilayer Switches.

Cisco MDS 9710 Multilayer Switches can support up to four power supplies when they have only Cisco MDS 9700 48-Port 32-Gbps Fibre Channel Switching Modules installed on them. By default, the four power supplies are installed in the power supply bays 1 to 4.

You can configure one of the following power modes to use the combined power provided by the installed power supply units (no power redundancy) or to provide power redundancy when there is power loss. We recommend that you configure the full redundancy power mode on your switch for optimal performance.

- **Combined mode**—This mode uses the combined capacity of all the power supplies. In case of power supply failure, the entire switch can be shut down (depending on the power used) causing traffic disruption. This mode is seldom used, except in cases when the switch requires more power.
- **Input Source (grid) redundancy mode**—This mode allocates half of the power supplies to the available category and the other half to the reserve category. You must use different power supplies for the available and reserve categories so that if the power supplies used for the active power fails, the power supplies used for the reserve power can provide power to the switch. If the grid-redundancy mode is lost, the power mode reverts to combined mode.
- **Power-supply (N+1) redundancy mode**—This mode allocates one power supply as reserve to provide power to the switch in case an active power supply fails. The remaining power supplies are allocated for the available category. The reserve power supply must be at least as powerful as each of the power supplies used for the active power.
- **Full-redundancy mode**—This mode is a combination of input-source (grid) and power-supply (N+1) redundancy modes. Similar to the input-source redundancy mode, this mode allocates half of the power supplies to the available category and the remaining power supplies to reserve category. One of the reserve power supplies can alternatively be used to provide power if a power supply used for the active power fails.

For more information on the power supply modes supported on your switch, see the *Hardware Installation Guide* corresponding to your switch.

## Configuration Guidelines for Power Supplies

For information that is specific to the power supplies supported on your switch, see the *Hardware Installation Guide* corresponding to your switch.



### Note

- Some Cisco MDS switches support DC and high-voltage DC (HVDC) power supplies. HVDC power supplies support 440 V (higher voltage), whereas DC power supplies support up to 110 or 220 V. Also, HVDC power supplies are efficient in transmitting power over a long distance.
- The Cisco MDS 9250i switch has three power supplies whose power supply mode is configured to N+1 mode. Cisco MDS 9250i switch can also be operated with only two power supplies when 1+1 grid redundancy is required. All the other Cisco MDS 9000 switches (excluding Directors) have a nonconfigurable power supply mode set to 1+1 grid redundancy.

A Cisco MDS 9700 Series switch ships with enough power supplies to power a fully populated chassis in the grid-redundant (N+N) mode. For example, depending on your switch's configuration, Cisco MDS 9710 switch may ship with six power supplies, by default, and can power a fully populated chassis in the grid-redundant power-configuration (N+N) mode. All the power supplies are always powering the chassis. However, for managing, reporting, and budgeting the power supplies, Cisco MDS NX-OS supports various configurable power supply modes. One of the features of the power supply modes is to make assumptions, especially in grid configuration, to identify power supplies that are connected to grid A and grid B power whips. For information on connecting power supplies, see the "Product Overview" section in the [Cisco MDS 9700 Series Hardware Installation Guide](#).

The following table provides information about the power supply bays with respect to grid configurations:

**Table 1: Cisco MDS 9700 Grid-Slot Location**

Cisco MDS Switch	Grid A	Grid B
Cisco MDS 9718	PSU1, PSU2, PSU5, PSU6, PSU9, PSU10, PSU13, PSU14	PSU3, PSU4, PSU7, PSU8, PSU11, PSU12, PSU15, PSU16
Cisco MDS 9710	PSU1, PSU2, PSU5, PSU6	PSU3, PSU4, PSU7, PSU8
Cisco MDS 9706	PSU1, PSU2	PSU3, PSU4

The following is a list of power supply modes supported on Cisco MDS switches:



### Note

Changing between power modes is non disruptive and is possible only if there is enough power available in the target mode. If enough power is not available, MDS NX-OS rejects the command with "Insufficient capacity" message.

- Ps-redundant mode—The default power supply mode is the ps-redundant mode, which is equivalent to the N+1 redundant mode because this mode is flexible enough to cover the deployments in the most



diverse environments. In this mode, N functioning power supplies are used for budgeting, alerting, reporting, and monitoring, and one power supply is used as reserve. The total available power is the sum of capacities of the N power supplies.

In the ps-redundant mode, there is no restriction for the placement of power supplies in the chassis slots. The power supplies need not be placed in grid A or grid B as recommended. Even if the power supplies are placed as recommended in grid A or grid B, MDS NX-OS will not support budgeting, alerting, reporting, and monitoring as per a grid configuration because of the N+1 redundancy mode.

**Table 2: ps-redundant Mode**

Scenario	Grid A			Grid B			Available Capacity (Watts)	Power Supply Operational Mode
	Power Supply 1 (Watts)	Power Supply 2 (Watts)	Power Supply 5 (Watts)	Power Supply 3 (Watts)	Power Supply 4 (Watts)	Power Supply 7 (Watts)		
1	3000	3000	3000	3000	3000	3000	15000	N+1 redundant mode. Available power capacity is the sum of power capacities of all the operational power supply units (PSUs), except one, which is used as reserve.
2	3000	3000	3000	3000	3000	Off	12000	
3	3000	3000	3000	3000	Off	Off	9000	
4	3000	3000	3000	Off	Off	Off	6000	

- insrc-redundant mode—If a grid (N+N) mode is required in a chassis for proper budgeting, alerting, reporting, and monitoring purposes, power supplies must be configured, as shown in [Table 2: ps-redundant Mode, on page 9](#) and then the ps-redundant mode should be changed to the insrc-redundant mode.

After the insrc-redundant mode is configured, and if a power supply fails, the power supply mode is changed to combined (nonredundant) mode in relation to the least-populated grid.

When the insrc-redundant mode is configured and a grid fails, the insrc-redundant mode is disabled until the grid is back online. In the meantime, the operational power supply mode is changed to combined (nonredundant) mode and power is used from all the power supplies for budgeting, alerting, reporting, and monitoring.

Table 3: *insrc-redundant Mode*

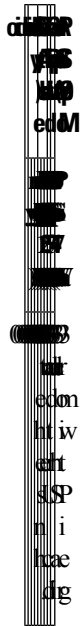
Scenario	Grid A			Grid B			Available Capacity (Watts)	Power Supply Operational Mode
	Power Supply 1 (Watts)	Power Supply 2 (Watts)	Power Supply 5 (Watts)	Power Supply 3 (Watts)	Power Supply 4 (Watts)	Power Supply 7 (Watts)		
1	3000	3000	3000	3000	3000	3000	9000	3+3 redundant mode.  Available capacity is the sum of power capacities of three PSUs, which are used as reserve.
2	3000	3000	3000	3000	3000	Off	6000	Combined (nonredundant) mode because of uneven distribution of PSUs in grids. Available capacity is the sum of power capacities of PSUs of the least populated grid.
3	3000	3000	3000	3000	Off	Off	3000	Combined (nonredundant) mode because of uneven distribution of PSUs in grids. Available capacity is the sum of power capacities of PSUs of the least populated grid.

Scenario	Grid A			Grid B			Available Capacity (Watts)	Power Supply Operational Mode
4	3000	3000	3000	Off	Off	Off	9000	Combined (nonredundant) mode because of the grid B failure.

- **Redundant mode**—Redundant mode is a combination of grid (N+N) and ps-redundant (N+1) modes. If the MDS NX-OS power supply mode is set to redundant mode and if there are an equal number of functioning power supplies in each grid location (grid A and grid B), the operational power supply mode is set to the grid (insrc-redundant) mode. If a grid fails, the operational power supply mode is changed to ps-redundant (N+1) mode. The ps-redundant mode is different from the insrc-redundant mode because a grid failure in insrc-redundant mode defaults to combined (nonredundant) mode.

When configured in redundant mode and if a power supply fails, the power supply mode is changed to combined (nonredundant) mode in relation to the least-populated grid.

Table 4: Redundant Mode



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ig  
ca  
y  
s i  
ent  
ms  
r o  
SP  
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**Note** When the insrc-redundant or redundant mode is configured, the grid power supply with an unbalanced configuration (that is, 2+4, and so on) results in the power supply mode to change to combined (nonredundant) operational mode and insufficient power may be budgeted. We recommend that you do not use a grid power supply with an unbalanced configuration when the insrc-redundant or redundant mode is configured.

- Combined (nonredundant) mode—This has no restrictions on how external power sources are connected to a Cisco MDS 9710 switch. The power that is available to the switch is the sum of all the working power supplies in the chassis. You can change from other power modes to the combined mode without disrupting the traffic.

**Table 5: Combined (Nonredundant) Mode**

Scenario	Grid A			Grid B			Available Capacity (Watts)	Power Supply Operational Mode
	Power Supply 1 (Watts)	Power Supply 2 (Watts)	Power Supply 5 (Watts)	Power Supply 3 (Watts)	Power Supply 4 (Watts)	Power Supply 7 (Watts)		
1	3000	3000	3000	3000	3000	3000	18000	In the combined (non redundant) mode, the position of PSUs do not matter. All PSUs are available for budgeting.
2	3000	3000	3000	3000	3000	Off	15000	
3	3000	3000	3000	3000	Off	Off	12000	
4	3000	3000	3000	Off	Off	Off	9000	

The following table provides information about moving from combined (nonredundant) mode to other power supply modes:

**Table 6: Moving from Combined (Nonredundant) Mode to Other Power Supply Modes**

Scenario	Grid A			Grid B			Current Usage (Watts)	Cu
	Power Supply 1 (Watts)	Power Supply 2 (Watts)	Power Supply 5 (Watts)	Power Supply 3 (Watts)	Power Supply 4 (Watts)	Power Supply 7 (Watts)		

Scenario	Grid A			Grid B			Current Usage (Watts)
1	3000	3000	3000	3000	3000	3000	6500
	3000	3000	3000	3000	3000	3000	6500
2	3000	3000	3000	3000	3000	Off	6500
	3000	3000	3000	3000	3000	Off	6500
3	3000	3000	3000	3000	3000	Off	5500
	3000	3000	3000	3000	3000	Off	5500
4	3000	3000	3000	3000	3000	Off	6500
	3000	3000	3000	3000	3000	Off	6500

## Configuring the Power Supply Mode

You can configure power supply modes.

### SUMMARY STEPS

1. **configure terminal**
2. **power redundancy-mode** {combined | insrc-redundant | ps-redundant | redundant}
3. (Optional) **show environment power**
4. (Optional) **copy running-config startup-config**

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>configure terminal</b>  <b>Example:</b> switch# configure terminal switch(config)#	Enters global configuration mode.

	Command or Action	Purpose
<b>Step 2</b>	<p><b>power redundancy-mode</b> {combined   insrc-redundant   ps-redundant   redundant}</p> <p><b>Example:</b></p> <pre>switch(config)# power redundancy-mode combined</pre>	Configures the power supply mode. The default is <b>redundant</b> .
<b>Step 3</b>	<p>(Optional) <b>show environment power</b></p> <p><b>Example:</b></p> <pre>switch(config)# show environment power</pre>	Displays the power mode configuration.
<b>Step 4</b>	<p>(Optional) <b>copy running-config startup-config</b></p> <p><b>Example:</b></p> <pre>switch(config)# copy running-config startup-config</pre>	Copies the running configuration to the startup configuration.

## About Module Temperature Monitoring

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), and 3 (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 and 3 (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 9700 Series, we highly recommend that you install dual supervisor modules. If you are using a Cisco MDS 9000 Series switch without dual supervisor modules, we recommend that you immediately replace the fan module if even one fan is not working.

## Displaying Module Temperatures

Use the **show environment temperature** command to display temperature sensors for each module.

This example shows the temperature information.

```
switch# show environment temperature
Temperature:
-----
```

Module	Sensor	MajorThresh (Celsius)	MinorThres (Celsius)	CurTemp (Celsius)	Status
3	Crossbar0 (s1)	125	115	46	Ok
3	Crossbar1 (s2)	125	115	54	Ok
3	Arb-mux (s3)	125	105	48	Ok
3	CPU (s4)	125	105	48	Ok
3	PCISW (s5)	125	105	66	Ok
3	IOSlice0 (s6)	125	115	38	Ok
3	IOSlice1 (s7)	125	115	39	Ok
3	IOSlice2 (s8)	125	115	40	Ok
5	Inlet (s1)	60	42	23	Ok
5	Crossbar(s2)	125	115	71	Ok
5	Arbiter (s3)	125	105	51	Ok
5	L2L3Dev1 (s4)	125	110	41	Ok
5	CPU1CORE1 (s5)	85	75	35	Ok
5	CPU1CORE2 (s6)	85	75	28	Ok
5	CPU1CORE3 (s7)	85	75	35	Ok
5	CPU1CORE4 (s8)	85	75	31	Ok
5	DDR3DIMM1 (s9)	95	85	31	Ok
6	Inlet (s1)	60	42	25	Ok
6	Crossbar (s2)	125	115	70	Ok
6	Arbiter (s3)	125	105	52	Ok
6	L2L3Dev1 (s4)	125	110	41	Ok
6	CPU1CORE1 (s5)	85	70	36	Ok
6	CPU1CORE2 (s6)	85	70	34	Ok
6	CPU1CORE3 (s7)	85	70	36	Ok
6	CPU1CORE4 (s8)	85	70	33	Ok
6	DDR3DIMM1 (s9)	95	85	31	Ok
7	Crossbar0 (s1)	125	115	83	Ok
7	Crossbar1 (s2)	125	115	82	Ok
7	Arb-mux (s3)	125	115	52	Ok
7	CPU (s4)	125	115	53	Ok
7	L2L3Dev0 (s5)	125	115	66	Ok

7	IOSlice0 (s6)	125	115	56	Ok
7	IOSlice1 (s7)	125	115	56	Ok
7	IOSlice2 (s8)	125	115	57	Ok
7	FC-IP 0 (s9)	95	85	55	Ok
7	FC-IP 1 (s10)	95	85	56	Ok
8	Crossbar0 (s1)	125	115	52	Ok
8	Crossbar1 (s2)	125	115	52	Ok
8	Arb-mux (s3)	125	105	50	Ok
8	CPU (s4)	125	105	47	Ok
8	PCISW (s5)	125	105	56	Ok
8	IOSlice0 (s6)	125	115	40	Ok
8	IOSlice1 (s7)	125	115	41	Ok
8	IOSlice2 (s8)	125	115	42	Ok
10	Crossbar1 (s1)	125	115	79	Ok
10	Crossbar2 (s2)	125	115	78	Ok
10	Arb-mux (s3)	125	105	56	Ok
10	L2L3Dev1 (s5)	125	110	61	Ok
10	L2L3Dev2 (s6)	125	110	61	Ok
10	L2L3Dev3 (s7)	125	110	57	Ok
10	L2L3Dev4 (s8)	125	110	56	Ok
10	L2L3Dev5 (s9)	125	110	61	Ok
10	L2L3Dev6 (s10)	125	110	52	Ok
10	L2L3Dev7 (s11)	125	110	58	Ok
10	L2L3Dev8 (s12)	125	110	66	Ok
10	L2L3Dev9 (s13)	125	110	57	Ok
10	L2L3Dev10 (s14)	125	110	58	Ok
10	L2L3Dev11 (s15)	125	110	66	Ok
10	L2L3Dev12 (s16)	125	110	61	Ok
xbar-1	Crossbar1 (s1)	125	115	49	Ok
xbar-1	Crossbar2 (s2)	125	115	54	Ok
xbar-2	Crossbar1 (s1)	125	115	56	Ok
xbar-2	Crossbar2 (s2)	125	115	63	Ok
xbar-3	Crossbar1 (s1)	125	115	51	Ok
xbar-3	Crossbar2 (s2)	125	115	64	Ok
xbar-4	Crossbar1 (s1)	125	115	59	Ok
xbar-4	Crossbar2 (s2)	125	115	67	Ok
xbar-5	Crossbar1 (s1)	125	115	61	Ok
xbar-5	Crossbar2 (s2)	125	115	68	Ok

## About Fan Modules

Hot-swappable fan modules (fan trays) are provided in all switches in the Cisco MDS 9000 Series 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 Series 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.



**Note** 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 NX-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).

Use the **show environment fan** command to display the fan module status.

This example shows the chassis fan information.

```
switch# show environment fan
Fan:
-----
Fan          Model          Hw          Status
-----
Fan1 (sys_fan1) DS-C9710-FAN    0.2         Ok
Fan2 (sys_fan2) DS-C9710-FAN    0.2         Ok
Fan3 (sys_fan3) DS-C9710-FAN    0.2         Ok
Fan_in_PS1    --             --          Ok
Fan_in_PS2    --             --          Ok
Fan_in_PS3    --             --          Ok
Fan_in_PS4    --             --          Absent
Fan_in_PS5    --             --          Absent
Fan_in_PS6    --             --          Absent
Fan_in_PS7    --             --          Absent
Fan_in_PS8    --             --          Ok
Fan Zone Speed %(Hex): Zone 1: 40.78(0x68)
```

The possible Status field values for a fan module on the Cisco MDS 9700 Series switches are as follows:

- If the fan module is operating properly, the status is ok.
- If the fan is physically absent, the status is absent.
- If the fan is physically present but not working properly, the status is failure.

## Displaying Environment Information

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

```
switch# show environment
Power Supply:
Voltage: 50 Volts
Power          Actual          Total
Supply         Model          Output          Capacity       Status
-----
1              DS-CAC97-3KW    548 W          3000 W        Ok
2              DS-CAC97-3KW    535 W          3000 W        Ok
3              DS-CAC97-3KW    535 W          3000 W        Ok
```

Displaying Environment Information

4	-----	0 W	0 W	Absent
5	-----	0 W	0 W	Absent
6	-----	0 W	0 W	Absent
7	-----	0 W	0 W	Absent
8	DS-CAC97-3KW	535 W	3000 W	Ok

Module	Model	Actual Draw	Power Allocated	Status
2	DS-X9448-768K9	N/A	0 W	Powered-Dn
3	DS-X9648-1536K9	265 W	350 W	Powered-Up
5	DS-X97-SF1-K9	107 W	190 W	Powered-Up
6	DS-X97-SF1-K9	106 W	190 W	Powered-Up
7	DS-X9334-K9	441 W	480 W	Powered-Up
8	DS-X9648-1536K9	252 W	750 W	Powered-Up
10	DS-X9848-480K9	363 W	500 W	Powered-Up
Xb1	DS-X9710-FAB1	95 W	150 W	Powered-Up
Xb2	DS-X9710-FAB1	94 W	150 W	Powered-Up
Xb3	DS-X9710-FAB1	91 W	150 W	Powered-Up
Xb	DS-X9710-FAB1	N/A	150 W	Powered-Dn
fan1	DS-C9710-FAN	45 W	600 W	Powered-Up
fan2	DS-C9710-FAN	45 W	600 W	Powered-Up
fan3	DS-C9710-FAN	50 W	600 W	Powered-Up

N/A - Per module power not available

Power Usage Summary:

Power Supply redundancy mode (configured)	Redundant
Power Supply redundancy mode (operational)	Redundant
Total Power Capacity (based on configured mode)	6000 W
Total Power of all Inputs (cumulative)	12000 W
Total Power Output (actual draw)	2153 W
Total Power Allocated (budget)	5560 W
Total Power Available for additional modules	440 W

Clock:

Clock	Model	Hw	Status
A	Clock Module	--	NotSupported/None
B	Clock Module	--	NotSupported/None

Fan:

Fan	Model	Hw	Status
Fan1(sys_fan1)	DS-C9710-FAN	0.2	Ok
Fan2(sys_fan2)	DS-C9710-FAN	0.2	Ok
Fan3(sys_fan3)	DS-C9710-FAN	0.2	Ok
Fan_in_PS1	--	--	Ok
Fan_in_PS2	--	--	Ok
Fan_in_PS3	--	--	Ok
Fan_in_PS4	--	--	Absent
Fan_in_PS5	--	--	Absent
Fan_in_PS6	--	--	Absent
Fan_in_PS7	--	--	Absent
Fan_in_PS8	--	--	Ok

Fan Zone Speed % (Hex): Zone 1: 40.78 (0x68)

## Temperature:

Module	Sensor	MajorThresh (Celsius)	MinorThres (Celsius)	CurTemp (Celsius)	Status
3	Crossbar0 (s1)	125	115	46	Ok
3	Crossbar1 (s2)	125	115	54	Ok
3	Arb-mux (s3)	125	105	49	Ok
3	CPU (s4)	125	105	48	Ok
3	PCISW (s5)	125	105	66	Ok
3	IOSlice0 (s6)	125	115	38	Ok
3	IOSlice1 (s7)	125	115	39	Ok
3	IOSlice2 (s8)	125	115	40	Ok
5	Inlet (s1)	60	42	24	Ok
5	Crossbar(s2)	125	115	71	Ok
5	Arbiter (s3)	125	105	51	Ok
5	L2L3Dev1 (s4)	125	110	42	Ok
5	CPU1CORE1 (s5)	85	75	35	Ok
5	CPU1CORE2 (s6)	85	75	29	Ok
5	CPU1CORE3 (s7)	85	75	35	Ok
5	CPU1CORE4 (s8)	85	75	30	Ok
5	DDR3DIMM1 (s9)	95	85	31	Ok
6	Inlet (s1)	60	42	26	Ok
6	Crossbar(s2)	125	115	70	Ok
6	Arbiter (s3)	125	105	52	Ok
6	L2L3Dev1 (s4)	125	110	41	Ok
6	CPU1CORE1 (s5)	85	70	36	Ok
6	CPU1CORE2 (s6)	85	70	34	Ok
6	CPU1CORE3 (s7)	85	70	36	Ok
6	CPU1CORE4 (s8)	85	70	33	Ok
6	DDR3DIMM1 (s9)	95	85	31	Ok
7	Crossbar0 (s1)	125	115	83	Ok
7	Crossbar1 (s2)	125	115	82	Ok
7	Arb-mux (s3)	125	115	52	Ok
7	CPU (s4)	125	115	53	Ok
7	L2L3Dev0 (s5)	125	115	66	Ok
7	IOSlice0 (s6)	125	115	56	Ok
7	IOSlice1 (s7)	125	115	57	Ok
7	IOSlice2 (s8)	125	115	57	Ok
7	FC-IP 0 (s9)	95	85	56	Ok
7	FC-IP 1 (s10)	95	85	56	Ok
8	Crossbar0 (s1)	125	115	52	Ok
8	Crossbar1 (s2)	125	115	52	Ok
8	Arb-mux (s3)	125	105	50	Ok
8	CPU (s4)	125	105	47	Ok
8	PCISW (s5)	125	105	56	Ok
8	IOSlice0 (s6)	125	115	40	Ok
8	IOSlice1 (s7)	125	115	41	Ok
8	IOSlice2 (s8)	125	115	42	Ok
10	Crossbar1 (s1)	125	115	79	Ok
10	Crossbar2 (s2)	125	115	79	Ok
10	Arb-mux (s3)	125	105	56	Ok
10	L2L3Dev1 (s5)	125	110	61	Ok
10	L2L3Dev2 (s6)	125	110	61	Ok
10	L2L3Dev3 (s7)	125	110	57	Ok
10	L2L3Dev4 (s8)	125	110	56	Ok
10	L2L3Dev5 (s9)	125	110	61	Ok
10	L2L3Dev6 (s10)	125	110	52	Ok
10	L2L3Dev7 (s11)	125	110	58	Ok
10	L2L3Dev8 (s12)	125	110	66	Ok
10	L2L3Dev9 (s13)	125	110	57	Ok
10	L2L3Dev10 (s14)	125	110	59	Ok
10	L2L3Dev11 (s15)	125	110	66	Ok

10	L2L3Dev12 (s16)	125	110	62	Ok
xbar-1	Crossbar1 (s1)	125	115	49	Ok
xbar-1	Crossbar2 (s2)	125	115	54	Ok
xbar-2	Crossbar1 (s1)	125	115	56	Ok
xbar-2	Crossbar2 (s2)	125	115	63	Ok
xbar-3	Crossbar1 (s1)	125	115	51	Ok
xbar-3	Crossbar2 (s2)	125	115	64	Ok
xbar-4	Crossbar1 (s1)	125	115	59	Ok
xbar-4	Crossbar2 (s2)	125	115	67	Ok
xbar-5	Crossbar1 (s1)	125	115	61	Ok
xbar-5	Crossbar2 (s2)	125	115	68	Ok

## Default Settings

This table lists the default hardware settings

**Table 7: Default Hardware Parameter Settings**

Parameter	Default Setting
Power supply mode	PS redundant mode.