



Managing the Switch

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Displaying Information About the Installed Hardware Modules

You can display information about the switch hardware and the hardware modules that are installed in the switch chassis by using the **show hardware** command.

Displaying the Hardware Inventory for a Switch

You can display information about the field replaceable units (FRUs), including product IDs, serial numbers, and version IDs by using the **show inventory** command. The output for this command displays information about modules that respond to command line interface commands. Modules such as supervisors, system controllers, line cards, fans, fabric modules, and power supplies. But does not display information for modules that do not respond to those commands, such as blank modules that cover empty slots to manage airflow.

Displaying the Backplane and Serial Number Information

You can display the backplane information, including the serial number for the switch by using the **show srom backplane** command.

Displaying Environmental Information for the Switch

You can display all the environment-related switch information by using the **show environment** command.

```
switch# show environment
Power Supply:
Voltage: 12.0 Volts
```

Power Supply	Model	Actual Output (Watts)	Total Capacity (Watts)	Status
1	N9K-PAC-3000W-B	0 W	3000 W	shut
2	-----	N/A W	0 W	Absent
3	N9K-PAC-3000W-B	1277 W	3000 W	ok
4	-----	N/A W	0 W	Absent
5	-----	N/A W	0 W	Absent
6	-----	N/A W	0 W	Absent
7	N9K-PUV-3000W-B	1312 W	3000 W	ok
8	-----	N/A W	0 W	Absent
9	-----	N/A W	0 W	Absent
10	-----	N/A W	0 W	Absent

Module	Model	Actual Draw (Watts)	Power Allocated (Watts)	Status
1	N9K-X9736C-FX	398 W	720 W	Powered-Up
2	N9K-X9736C-FX	381 W	900 W	Powered-Up
22	N9K-C9516-FM-E2	414 W	720 W	Powered-Up
24	N9K-C9516-FM-E2	377 W	720 W	Powered-Up
26	N9K-C9516-FM-E2	378 W	720 W	Powered-Up
27	N9K-SUP-A	56 W	72 W	Powered-Up
29	N9K-SC-A	12 W	24 W	Powered-Up
30	N9K-SC-A	12 W	24 W	Powered-Up
fantray1	N9K-C9516-FAN	83 W	444 W	Powered-Up
fantray2	N9K-C9516-FAN	86 W	444 W	Powered-Up
fantray3	N9K-C9516-FAN	84 W	444 W	Powered-Up

N/A - Per module power not available

Power Usage Summary:

```
-----
Power Supply redundancy mode (configured)           Non-Redundant (combined)
Power Supply redundancy mode (operational)          Non-Redundant (combined)
```

```
Total Power Capacity (based on configured mode)    6000 W
Total Power of all Inputs (cumulative)              6000 W
Total Power Output (actual draw)                   2589 W
Total Power Allocated (budget)                     5168 W
```

```
Total Power Available for additional modules
switch#
```

831 W

Displaying the Current State of a Module

You can display information about modules that are installed in the switch chassis by using the **show module** command. This information includes module type, bootup status, MAC addresses, serial numbers, software versions, and hardware versions. You can use this command in the following ways to display information about all the installed modules or a specific module:

- For information on all modules, use the **show module** command.
- For information on a specific supervisor, system controller, line card, or fabric module, use the **show module slot_number** command to specify a slot number.



Note To determine the slots to specify, use the **show inventory** command.



Note This command reports on only software-controlled modules, such as supervisors, system controllers, line cards, fabric modules, fan trays, and power supplies. It doesn't report on modules that are not software controlled, such as blank modules installed in empty slots to control airflow.

This table provides descriptions of the module status that is displayed with the **show module** commands.

Line Card State	Description
powered up	The hardware has electrical power. When the hardware is powered up, the software begins booting.
testing	The module has established connection with the supervisor and the module is performing bootup diagnostics.
initializing	The diagnostics have completed successfully and the configuration is being downloaded.
failure	The switch detects a module failure upon initialization and automatically attempts to power-cycle the module three times. After the third attempt, the module powers down.
ok	The switch is ready to be configured.
power-denied	The switch detects insufficient power for a line card to power up.
active	This module is the active supervisor or system controller module and the switch is ready to be configured.
HA-standby	The HA switchover mechanism is enabled on the standby supervisor module.
standby	The switchover mechanism is enabled on the standby system controller module.

Use the **show module [slot_number]** command to display information about all the installed modules or for the module that you specify by its slot number.



Note This example shows how to display information about a module in a specific slot (slot 4) of the chassis.

```
switch# show module 4
Mod  Ports  Module-Type                Model                Status
---  ---
4    36      36p 40G Ethernet Module    N9k-X9636PQ         ok

Mod  Sw                Hw
---  ---
4    6.1 (4.11)        0.1010

Mod  MAC-Address(es)                Serial-Num
---  ---
4    00-22-bd-f8-2a-83 to 00-22-bd-f8-2a-b6  SAL17257AHD
switch#
```

Displaying Temperatures for a Module

You can display temperature readings for module temperature sensors by using the **show environment temperature** command. System controllers, supervisors, line cards, and fabric modules have temperature sensors with two thresholds:

- Minor temperature threshold—When a minor threshold is exceeded, a minor alarm occurs and the following actions occur for all four sensors:
 - Displays system messages
 - Sends Call Home alerts (if configured)
 - Sends SNMP notifications (if configured)
- Major temperature threshold—When a major threshold is exceeded, a major alarm occurs and the following actions occur:
 - For sensors 1, 3, and 4 (outlet and on-board sensors), the following actions occur:
 - Displays system messages.
 - Sends Call Home alerts (if configured).
 - Sends SNMP notifications (if configured).
 - For sensor 2 (intake sensor), the following actions occur:
 - 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 up to 2 minutes to decrease the temperature. During this interval, the software monitors the temperature every 5 seconds and continuously sends system messages as configured.



Tip We recommend that you install dual supervisor modules. If you are using a switch without dual supervisor modules, we recommend that you immediately replace the fan module if just one fan is not working.



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



Note This command reports on only software-controlled modules, such as supervisors, system controllers, line cards, fabric modules, fan trays, and power supplies. It reports on modules that are not controlled by software, such as blank modules installed in empty slots to control airflow.

Use the **show environment temperature** command to display the temperature readings for each of the powered-up modules.

```
switch# show environment temperature
Temperature:
-----
Module   Sensor           MajorThresh   MinorThres   CurTemp   Status
          (Celsius)       (Celsius)    (Celsius)
-----
4        CPU              105           95           32        Ok
4        TD2-1           105           95           41        Ok
4        TD2-2           105           95           41        Ok
4        TD2-3           105           95           41        Ok
4        VRM-1           110           100          41        Ok
4        VRM-2           110           100          45        Ok
4        VRM-3           110           100          40        Ok
22       CPU              105           95           34        Ok
22       TD2-1           105           95           45        Ok
22       TD2-2           105           95           41        Ok
22       VRM-1           110           100          49        Ok
22       VRM-2           110           100          47        Ok
27       OUTLET          75            55           29        Ok
27       INLET           60            42           20        Ok
27       CPU              90            80           27        Ok
28       OUTLET          75            55           27        Ok
28       INLET           60            42           22        Ok
28       CPU              90            80           33        Ok
29       CPU              105           95           40        Ok
30       CPU              105           95           34        Ok
switch#
```

Connecting to a Module

You can connect to any module by using the **attach module slot_number** command. When the module prompt appears, you can obtain further details about the module by using module-specific commands in EXEC mode.

You can also use the **attach module** command to display the standby supervisor module information, although you cannot configure the standby supervisor module using this command.



Note To see which slots are filled with modules, use the **show inventory** command.

Use the **attach module slot_number** command to get direct access to a specific module.

This example shows how to attach to the supervisor in slot 28.

```
switch# attach module 28
Attaching to module 28 ...
To exit type 'exit', to cancel type '$.'
Cisco Nexus Operating System (NX-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2013, 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
switch(standby)#
```



Note To exit the module-specific prompt, use the **exit** command.



Tip If you are not accessing the switch from a console terminal, this command is the only way to access the standby supervisor module.



Note This command reports on only software-controlled modules, such as supervisors, system controllers, line cards, fabric modules, fan trays, and power supplies. It reports on modules that are not controlled by software, such as blank modules installed in empty slots to control airflow.

Saving the Module Configuration

To save the new configuration to nonvolatile storage, use the **copy running-config startup-config** command from EXEC mode. Once you enter this command, the running and the startup copies of the configuration are identical.

The following table lists various scenarios when module configurations are preserved or lost.

Scenario	Result
A particular switching module is removed and you used the copy running-config startup-config command.	The configured module information is lost.

Scenario	Result
A particular switching module is removed and a different switching module is replaced and you used the copy running-config startup-config command.	The configured module information is lost.
A particular switching module is removed and the same switching module is replaced before you enter the copy running-config startup-config command again.	The configured module information is preserved.
A particular switching module is removed and replaced with the same type switching module, and you entered the reload module slot_number command.	The configured module information is preserved.
A particular switching module is reloaded when you enter the reload module slot_number command.	The configured module information is preserved.

Shutting Down or Starting Up a Module

You can shut down a module by using the **poweroff module** command to specify the module by its slot number in the chassis.

You can power up a module by using the **no poweroff module** command to specify the module by its slot number in the chassis.



Note To determine the slot number for a module, use the **show inventory** command.



Note You can use this command with software-controlled modules, such as supervisors, system controllers, line cards, fabric modules, fan trays, and power supplies. It does not work with modules that are not controlled by software, such as blank modules installed in empty slots to control airflow.

Step 1 Use the **configure terminal** to enter the global configuration mode.

Example:

```
switch# configure terminal
switch(config)#
```

Step 2 Shut down (or alternatively power up) a specific module by entering the **[no] poweroff module slot_number** command.

Example:

```
switch(config)# poweroff module 3
switch(config)#
```

Example:

```
switch(config)# no poweroff module 3
switch(config)#
```

Purging a Nonfunctioning Module from the Running Configuration

Verify that either the system controller, line card, or fabric slot is empty or that the module that is installed in the slot is powered down.

You can clear the running configuration for a system controller, line card, or fabric slot (slots 1 to 30) that is not functioning. To clear the configuration, use the `purge module` command in EXEC mode.



Note This command does not work on supervisor slots or on any line card slot that currently has a powered-up module or on blank modules. Use the `purge module slot_number running-config` command to clear the running configuration for the specified line card slot.

```
switch# purge module 4 running-config
```

For example, suppose that you create an IP storage configuration with a line card in slot 3 of Switch A. This module uses an IP address. You decide to remove this line card module and move it to Switch B, and you no longer need the IP address. If you try to configure this unused IP address, you receive an error message that prevents you from proceeding with the configuration. In this case, you enter the `purge module 3 running-config` command to clear the old configuration in Switch A before using the IP address.

Displaying Power Usage Information

To display the power usage information for the entire switch, use the `show environment power` command. This command shows the power usage for the power consuming modules that are installed in the switch.



Note Power usage is reserved for both supervisor modules regardless of whether one or both supervisor modules are present.

Use the `show environment power` command to display power usage information for the switch.

Reload a Module

You can reset a module by using the `reload module slot_number` command and specifying the module by its slot number in the chassis.



Caution Reloading a module disrupts traffic through the module.



Note To see which slots are filled with modules, use the **show inventory** command.



Note These commands report on only software-controlled modules, such as supervisors, system controllers, line cards, fabric modules, fan trays, and power supplies. Modules that are uncontrolled by software, such as blank modules installed in empty slots to control airflow are not reported on.

Step 1 Use the **configure terminal** command to enter the global configuration mode.

Example:

```
switch# configure terminal
switch(config)#
```

Step 2 Use the **reload module slot_number** command to specify the slot number of the module to reset.

Example:

```
switch(config)# reload module 4
This command will reload module 4. Proceed[y/n]? [n] y
reloading module 4 ...
switch(config)#
```

Rebooting a Switch

You can reboot or reload the switch by using the **reload** command without any options.



Note If you use the **reload** command, be sure to save the running configuration first by using the **copy running-config startup-config** command.

Step 1 Use the **configure terminal** command to enter the global configuration mode.

Example:

```
switch# configure terminal
switch(config)#
```

Step 2 Use the **copy running-config startup-config** command to save the running configuration.

Example:

```
switch(config)# copy running-config startup-config
```

Step 3 Use the **reload** command to reload the switch.

Example:

```
switch(config)# reload
```

Overview of Supervisor Modules

The switch has one or two supervisor modules of the following types:

- Supervisor A (N9K-SUP-A) modules with four cores, 4 executable threads, 16 GB of memory, and 64 GB of SSD
- Supervisor A+ (N9K-SUP-A+) with four cores, 8 executable threads, 1.8 GHz, 16 GB of memory, and 64 GB of SSD
- Supervisor B (N9K-SUP-B) with six cores, 12 executable threads, 2.2 GHz, 24 GB of memory, and 256 GB of SSD
- Supervisor B+ (N9K-SUP-B+) with six cores, 12 executable threads, 1.9 GHz, 32 GB of memory, and 256 GB of SSD

When a switch has two supervisors, one supervisor is automatically active while the other is in standby mode. If the active supervisor goes down or is disconnected for replacement, the standby supervisor automatically becomes active. If you replace one of two installed supervisor modules with another module, you can do so without interrupting operations. The supervisor that you are not replacing becomes the active supervisor and retains the kickstart configuration while you replace the other supervisor. If the switch has just one supervisor, you can install the new supervisor in the open supervisor slot during operations. You can make that supervisor active after the installation.



Note If there are two supervisors that are installed in the chassis, both must be the same type as shown in the following table:

Table 1:

Active Supervisor	Standby Supervisor	Is Combination Allowed?
Supervisor A	Supervisor A	Yes
Supervisor B	Supervisor B	Yes
Supervisor A+	Supervisor A+	Yes
Supervisor B+	Supervisor B+	Yes

Supervisor modules are automatically powered up and started with the switch.

To understand the terms that are used for the supervisors, see the following table.

Module Terms	Usage	Description
module-27 and module-28	Fixed	<ul style="list-style-type: none"> Module-27 refers to the supervisor module in chassis slot 27 (labeled as SUP 1 on the chassis). Module-28 refers to the supervisor module in chassis slot 28 (labeled as SUP 2 on the chassis).
sup-1 and sup-2	Fixed	<ul style="list-style-type: none"> sup-1 refers to the supervisor module in the SUP 1 slot (slot 27 in the CLI output). sup-2 refers to the supervisor module in the SUP 2 slot (slot 28 in the CLI output).
sup-active and sup-standby	Relative	<ul style="list-style-type: none"> sup-active refers to the active supervisor module—relative to the slot that contains the active supervisor module. sup-standby refers to the standby supervisor module—relative to the slot that contains the standby supervisor module.
sup-local and sup-remote	Relative	<p>If you are logged into the active supervisor, the following applies:</p> <ul style="list-style-type: none"> sup-local refers to the active supervisor module. sup-remote refers to the standby supervisor module. <p>If you are logged into the standby supervisor, the following applies:</p> <ul style="list-style-type: none"> sup-local refers to the standby supervisor module (the one that you are logged into). There is no sup-remote available from the standby supervisor module (you cannot access a file system on the active supervisor).

Overview of Power Modes

You can configure the power modes to either use (redundancy mode for when there is a power loss, or the combined power that is provided by the installed power supply units (no power redundancy):

***n*+1 redundancy mode**

This mode allocates one power supply as a reserve power supply in case an available power supply fails. The remaining power supplies are allocated for available power. The reserve power supply must be at least as powerful as each power supply used for the available power. You activate this mode by using the **ps-redundant** command.

For example, if a switch requires 2.0 kW of available power and the switch has three power supplies that each output 3 kW, then one of the power supplies provides 3.0 kW of available power and one power supply provides 3.0 kW of reserve power in case a power supply fails.

***n*+*n* redundancy mode**

This mode insures load sharing, but the budget becomes half the total PSU capacity. Use a different power source for the active and reserve power sources. So that if the power source that is used for active power fails, the reserve power supply can provide power for the switch. You activate this mode by using the **insrc-redundant** command.

For example, if the switch requires 4.0 kW of power, the switch has four power supplies that each output 3 kW. If you have two power grids, you use both grid A and grid B to power four 3-kW power supplies that provide the available power for the switch.

Combined mode

This mode allocates the combined power of all power supplies to active power for switch operations. This mode does not allocate reserve power for power redundancy in case of power outages or power supply failures. This mode is not recommended for production.

The amounts of available and reserve power depend on the power redundancy mode that you specify. The amounts of available and reserve power also depends on the number of power supplies that are installed in the switch. For each redundancy mode, consider the following:

***n*+1 redundancy mode**

The power supply that outputs the most power provides the reserve power so that it can take over for any other power supply that fails. All the other installed power supplies provide the available power. You activate this power mode by using the **power redundancy-mode ps-redundant** command.

For example, if the power requirement for a switch is 5.2 kW and the switch has two 3.0-kW power supplies outputting 3.0 kW each, consider the following power planning scenarios:

- Scenario 1—No added power supplies

One 3-kW power supply provides the reserve power and the other 3-kW power supply, also outputting 3.0 kW, provides the available power. The available power (3.0 kW) does not meet the switch requirements of 5.2 kW, so the switch powers up except for some of its line cards.

- Scenario 2—Adding one 3-kW power supply

One 3-kW power supply, which outputs 3.0 kW, provides the reserve power and the other two 3-kW power supplies, also outputting 3.0 kW each, provide enough power (6.0 kW) to meet the switch requirements (5.2 kW), so the entire switch powers up.

The following table shows the results for each scenario.

Scenario	Power Requirement	Output (kW) for Power Supplies			Available Power	Reserve Power	Result
		1	2	3			
1	5.2 kW	3.0 kW	3.0 kW	—	3.0 kW	3.0 kW	Available power is less than the power requirement for the switch. You cannot power the entire switch (some of the line cards will not be able to power up).
2	5.2 kW	3.0 kW	3.0 kW	3.0 kW	6.0 kW	3.0 kW	Available power exceeds the power requirement for the switch, so the entire switch can power up.

For grid redundancy mode, the power supplies must be divided into two equal sets and installed as follows:

- Slots PS 1 to PS 5 must be connected to one grid (Grid A)
- Slots PS 6 to PS 10 must be connected to another grid (Grid B)

n+n redundancy mode

Half of the 3-kW power supplies are connected to one power source (grid) and the other half are connected to another power source. The available power is provided by one power source and the reserve power is provided by the other power source. If the power source that provides the available power fails, the switch uses the reserve power source to provide its required power. You activate this power mode by using the **power redundancy-mode insrc_redundant** command.

For example, if the power requirement for a switch is 5.2 kW and the switch has two power supplies that output 3 kW, consider the following power planning scenarios:

- Scenario 1—No added power supplies

The available power is 3.0 kW (output from one 3-kW power supply) and the reserve power is 3.0 kW (output from the other power supply). The available power (3.0 kW) does not meet the switch

requirements (5.2 kW), so most of the modules power up but some of the line cards will not be able to power up.

- Scenario 2—Adding two 3-kW power supplies

The available power is 6.0 kW (output from two 3-kW power supplies on grid A) and the reserve power is 6.0 kW (output from the other two power supplies on grid B). The available power (6.0 kW) exceeds the power requirement of the switch (5.2 kW), so the entire switch can power up.

The following table shows the results for each scenario.

Scenario	Power Requirement	Output for Power Supplies				Available Power	Reserve Power	Result
		1	2	3	4			
1	5.2 kW	3.0 kW	3.0 kW	—	—	3.0 kW	3.0 kW	Available power (3.0 kW) is less than the power requirement for the switch (5.2 kW)—switch powers up but some of the line cards cannot power up.
2	5.2 kW	3.0 kW	3.0 kW	3.0 kW	3.0 kW	6.0 kW	6.0 kW	Available power (6.0 kW) exceeds the power requirement for the switch (5.2 kW)—entire switch powers up.

Combined mode

The Total Power Capacity equals the combined output of all installed power supplies. There is no reserve power. You activate this mode by using the **power redundancy-mode combined** command. If the Total Power Allocated (budget) for a switch is 5.2 kW and the switch has one 3-kW power supply with 220-V input and 3.0-kW output, consider the following power planning scenarios:

- Scenario 1—No added power supplies

If you do not add a power supply unit, the available power (3.0 kW) is insufficient for the switch power requirement of 5.2 kW. The switch powers the supervisor modules, system controllers, fan trays, and at least one fabric module before powering as many of the fabric and line cards as the remaining available power can support (one or more fabric or line cards might not be powered).

- Scenario 2—Install an extra 3-kW power supply

If you install an extra 3-kW power supply unit that can output 3.0 kW, the available power becomes 6.0 kW. The increased amount of available power exceeds the switch power requirement of 5.2 kW, so all the modules and fan trays in the switch can power up.

The following table shows the results for each scenario.

Scenario	Power Requirement	Power Supply 1 Output	Power Supply 2 Output	Available Power	Reserve Power	Result
1	5.2 kW	3.0 kW	—	3.0 kW	—	Available power is less than the power requirement for the switch. You cannot power the entire switch (some of the line cards will not be able to power up).
2	5.2 kW	3.0 kW	3.0 kW	6.0 kW	—	Available power exceeds the power requirement for the switch, so the entire switch can power up.

Setting the Power Mode

You can configure the power supply mode by using the **power redundancy-mode** command.



Note To display the current power supply configuration, use the **show environment power** command.

Before you begin

For grid redundancy mode, the power supplies must be divided into two equal sets and installed as follows:

- Slots PS 1 to PS 5 must be connected to one grid (Grid A).
- Slots PS 6 to PS 10 must be connected to another grid (Grid B).

Step 1 Use the **configure terminal** command to enter the global configuration mode.

Example:

```
switch# configure terminal
switch(config)#
```

Step 2 Use the **power redundancy-mode mode** command to specify one of the following power modes:

- For combined mode, include the **combined** keyword.
- For $n+1$ redundancy mode, include the **ps-redundant** keyword.
- For $n+n$ redundancy mode, include the **insrc-redundant** keyword.

Example:

```
switch(config)# power redundancy-mode insrc-redundant
switch(config)#
```

Overview of Fan Trays

Fan trays provide airflow through the switch for cooling. Each fan tray contains multiple fans to provide redundancy. The switch can continue functioning in the following situations:

- One or more fans fail within a fan tray—Even with multiple fan failures, the switch can continue functioning. When a fan fails within a tray, the functioning fans in the module increase their speed to compensate for the failed fans.
- The fan tray is removed for replacement—The fan tray is removed and replaced while the switch is operating without presenting an electrical hazard or damage to the switch. The switch can operate for three minutes without the fan tray that you are replacing, but if the switch air-inlet temperature is less than 86 degrees Fahrenheit (30 degrees Celsius), you have up to 72 hours to replace the fan tray. Because temperatures can change over time, we recommend that you replace the fan tray within three minutes.
- If you remove more than one fan tray at a time, the switch can operate up to three minutes before shutting down. To prevent a shutdown, remove only one fan tray at a time.



Note When a fan fails or when you remove a fan tray, the remaining operating fans speed up to compensate for the loss of fans. This process can increase the noise that is made by the fan trays until you replace the missing fan tray or replace the defective fan tray.



Note When replacing a failed fan tray in a running system, be sure to replace the fan tray promptly.



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

The software is continuously monitoring the fan status. In a fan failure, the following actions occur:

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

To display the fan module statuses, see [Displaying the Status for the Fan Trays, on page 17](#).



Note The fan trays fill slots FAN 1, FAN 2, and FAN 3 in the chassis.

Displaying the Status for the Fan Trays

You can display the status of the fan trays by using the **show environment fan** command.



Note If the status is not reported for a fan tray and the status LED is not lit for that installed fan tray, check to be sure that there is a fabric module that is installed behind the fan tray. There must be a functioning fabric module installed behind that fan tray in order for the fan tray to be powered up.
