Installing Cooling Modules in Avaya Virtual Services Platform 9000

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Chapter 1: Introduction

Purpose

This document provides information about the cooling modules for the Virtual Services Platform 9010 and the Virtual Services Platform 9012.

The following list shows the different cooling module types for the VSP 9000 according to the configured mode:

- Virtual Services Platform 9010 uses the following cooling module type:
  - 2 x 9010CM cooling module
- Virtual Services Platform 9012 uses the following two types of cooling modules when configured in first generation mode:
  - 2 x 9012FC IO cooling module
  - 2 x 9012RC SF cooling module
- Virtual Services Platform 9012 uses the following two cooling module types when you configure second generation modules in second generation mode:
  - 2 x 9012FCHS cooling module
  - 2 x 9012RC SF cooling module

Note:

The Virtual Services Platform 9000 supports the 9048XS-2 module in first generation mode and second generation mode. The Virtual Services Platform 9012 requires the 9012FCHS I/O cooling module to be installed before you install the 9048XS-2 module.

- For information about environmental specifications for the chassis, see *Installing the Avaya Virtual Services Platform 9000,* NN46250-304.
- For information about Installing the 9048XS-2 I/O module, see *Release Notes for Avaya Virtual Services Platform 9000,* NN46250-401.

Related resources

Documentation

See *Documentation Reference for Avaya Virtual Services Platform 9000,* NN46250-100 for a list of the documentation for this product.

Training

Ongoing product training is available. For more information or to register, you can access the website at http://avaya-learning.com/.

Course code	Course title
4D00010E	Knowledge Access: ACIS - Avaya ERS 8000 and VSP 9000 Implementation
5D00040E	Knowledge Access: ACSS - Avaya VSP 9000 Support

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Searching a documentation collection

On the Avaya Support website, you can download the documentation library for a specific product and software release to perform searches across an entire document collection. For example, you can perform a single, simultaneous search across the collection to quickly find all occurrences of a particular feature. Use this procedure to perform an index search of your documentation collection.

Before you begin

- Download the documentation collection zip file to your local computer.
- You must have Adobe Acrobat or Adobe Reader installed on your computer.

Procedure

1. Extract the document collection zip file into a folder.
2. Navigate to the folder that contains the extracted files and open the file named <*product_name_release*>.pdx.
3. In the Search dialog box, select the option **In the index named <*product_name_release*>.pdx**.
4. Enter a search word or phrase.
5. Select any of the following to narrow your search:
   - Whole Words Only
   - Case-Sensitive
   - Include Bookmarks
   - Include Comments
6. Click **Search**.

   The search results show the number of documents and instances found. You can sort the search results by Relevance Ranking, Date Modified, Filename, or Location. The default is Relevance Ranking.

Chapter 2: New in this release

The following sections detail what is new in *Installing Cooling Modules in Avaya Virtual Services Platform 9000,* NN46250-302, for Release 4.0.

Features

See the following sections for information about feature changes.

Second generation I/O modules

Temperature information is updated to reflect the introduction of second generation I/O modules. For more information, see Temperature alarms on page 14 and Temperature alarms on page 32.

show sys-info

Release 4.0 updates the output for the **`show sys-info`** command. For more information, see:

- Temperature alarms on page 14.
- Temperature alarms on page 32.

Other changes

See the following sections for information about changes that are not feature-related.

Regulatory information

Regulatory information is removed from this document because the content exists in a separate regulatory document. For more information, see *Regulatory Reference for Avaya Virtual Services Platform 9000,* NN46250-112 (700509061).

Chapter 3: Cooling module fundamentals

This chapter describes the Avaya Virtual Services Platform 9000 cooling modules for the Virtual Services Platform 9010 and the Virtual Services Platform 9012. The Virtual Services Platform 9010 requires only one type of cooling module and the Virtual Services Platform 9012 requires an Input Output (IO) cooling module and a Switch Fabric (SF) cooling module.

Each chassis type has a separate section within this chapter, which contains cooling module information for that specific chassis, followed by information that is common to both chassis.

Virtual Services Platform 9010

This section describes the 9010CM cooling module for the Virtual Services Platform 9010.

9010CM cooling module

The Virtual Services Platform 9010 uses two 9010CM cooling modules to provide airflow redundancy. You must install the cooling modules horizontally in the front of the chassis. The cooling modules provide cooling from front-to-back for the Input Output (IO) , the Control Processor (CP), and the Switch Fabric (SF) modules. Each cooling module includes four axial fans.

You can hot swap the cooling modules and replace each cooling module individually, without turning off the Virtual Services Platform 9000 system.

Danger:

Risk of personal injury

When you remove a cooling module, allow time for the fans to spin down before you fully withdraw the cooling module. Be careful to keep your fingers out of the fan blades.

When removing a 9010 Cooling Module, pressing the Service Button disables the fans for 30 seconds to permit safe removal.

Warning:

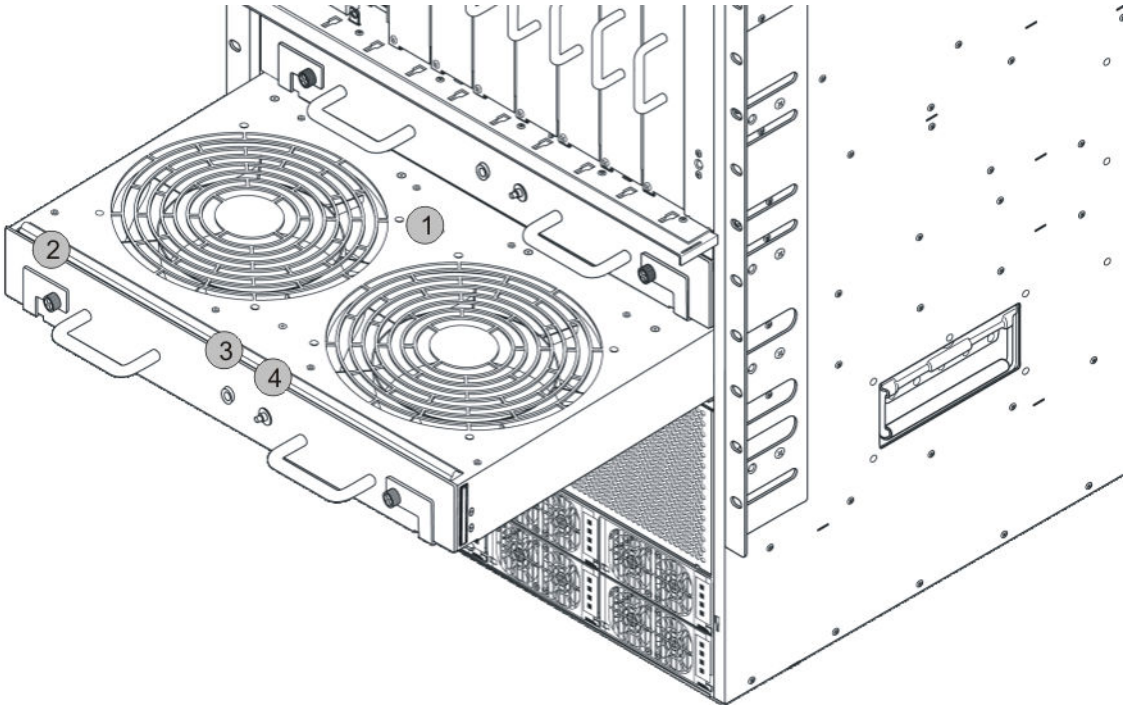
To prevent damage to equipment, do not allow a chassis to operate for an extended period of time with only a single cooling module. An empty cooling module slot can cause the chassis to depressurize and result in significant loss in cooling capacity. Keep the failed cooling module

installed in the chassis until you have a replacement module or keep a replacement cooling module available for immediate replacement.

For more information about installing and removing the cooling module, see Cooling module installation and removal for the VSP 9010 on page 46.

For more information about the power specifications of the Virtual Services Platform 9010 cooling module, see *Installing the Avaya Virtual Services Platform 9000,* NN46250-304.

The following figure shows the Virtual Services Platform 9010 cooling module in a partially open position.



The following table identifies the numbered areas in the preceding figure.

Table 1: Figure notes for Virtual Services Platform 9010 chassis cooling module

Diagram	Description
1	fan
2	action lever in a closed position
3	status LED
4	service button

The following table provides the dimensions for the 9010CM cooling module.

Table 2: Cooling module dimensions

	Width	Length	Depth	Weight
9010CM cooling module	16.5 inches	24 inches	2.125 inches	20 pounds
	(419.1 millimeters)	(609.6 millimeters)	(54 millimeters)	(9.07 kilograms)

Front panel LED for the 9010CM cooling module

The 9010CM cooling module for the Virtual Services Platform 9010 provides a single, multicolored LED on the front panel to indicate the fan status. The following table provides a description of the LED colors.

Table 3: 9010CM cooling module LED status

LED color	Status	Description
Green	Normal operation	All four fans are operational and spinning at the programmed rate.
Amber	Powering up	An amber light appears in the following situations: • The cooling module was just inserted and is powering up. • The controller is initializing and waiting for the Control Processor (CP) to take control of the module. • The Control Processor has lost communication to the fan. **Note:** A flashing amber light can appear when the cooling module fans have not reached the programmed speed.
Red	Fault	One or more fans are not functioning properly. **Note:** During a hot swap installation, a red LED briefly appears until the fans reach programmed speed. The LED then flashes amber for about 15 seconds before it turns green.
Flashing red	Maintenance	The LED flashes red after the service button has been pressed for 3 seconds to indicate that you can remove the cooling module. **Important:** The fans do not spin down completely at this point due to the spinning fans of the companion cooling module. You have 15 seconds to remove the cooling module before the fans begin to spin back up. The LED flashes faster when only 5 seconds remains.
Off	Fault	There is no power to the controller or the controller module has failed.

Airflow in the Virtual Services Platform 9010

Cool air enters the Virtual Services Platform 9010 through an air inlet vent below the cooling modules. The fans in the cooling modules draw the cool air in, and push it up and over the CP, I/O, and SF modules. The hot air exhaust is at the rear of the chassis.

The power supplies include their own fans for cooling. The power supplies draw cool air in at the front of the chassis, and hot air exits at the rear.

Looking at the rear of the AC chassis, the hot air exhaust for the CP and I/O modules is at the top. The hot air exhaust for the SF modules is to the right of the SF module slots.

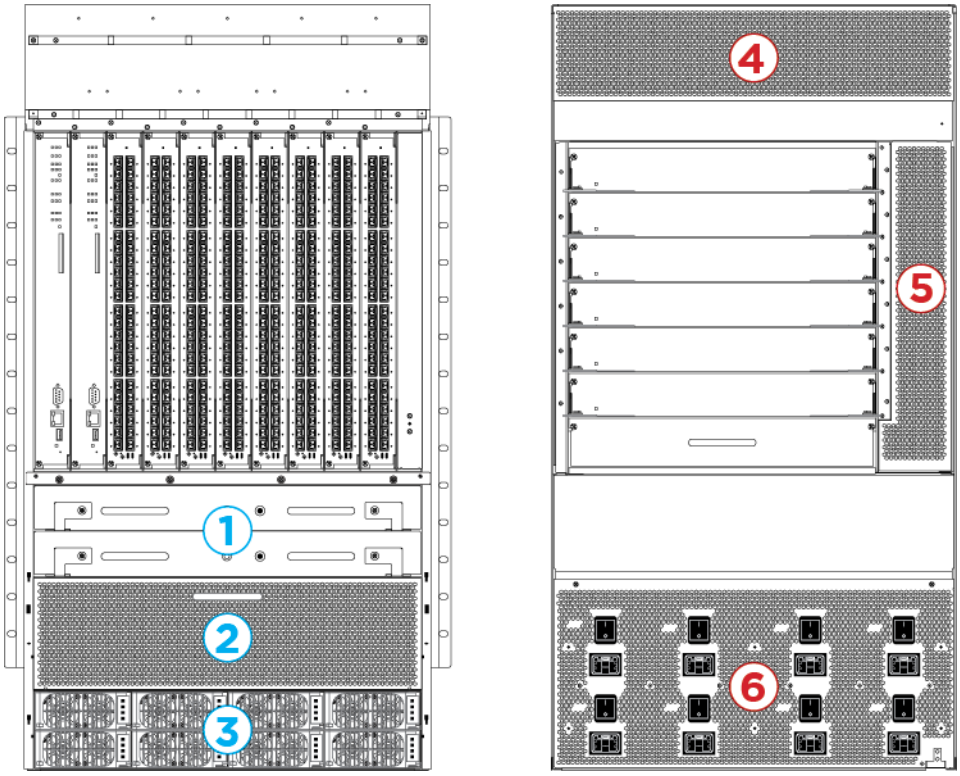


Figure 1: Front-to-back cooling in the Virtual Services Platform 9010

The following table identifies the numbered areas in the preceding figure.

Table 4: Airflow in the Virtual Services Platform 9010

Diagram	Description
1	Cooling modules installed at the front of the chassis.
2	Cool air inlet at the front of the chassis.
3	Power supply air inlet.
4	Hot air exhaust for the CP and I/O modules at the rear of the chassis.
5	Hot air exhaust for the SF modules at the rear of the chassis.

Diagram	Description
6	Hot air exhaust for the power supplies at the rear of the chassis.

Temperature alarms

The system monitors the temperature on the modules. If a module exceeds the alarm threshold temperature by one degree, the system initiates an SNMP trap and the module online LED displays as blinking red.

After the temperature of the module exceeds the alarm threshold temperature, the system logs the temperatures of all sensors each time the temperature increases by one degree or decreases by two degrees within a 30-second polling period. The module online LED returns to green when all module temperatures are below the threshold.

The system shuts down the module when the module exceeds the shutdown threshold temperature by one degree.

Virtual Services Platform 9010 temperature threshold quick reference

Use the information in the following table as a quick reference for temperature thresholds on the Virtual Services Platform 9010.

Note:

The I/O module alarm threshold and shutdown threshold temperatures differ for the Virtual Services Platform 9010 and the Virtual Services Platform 9012.

Table 5: Alarm threshold and shutdown threshold temperatures for VSP 9010 modules

Modules on the VSP 9010	Module LED color	Alarm threshold	Shutdown threshold
CP and SF modules	Blinking red	54 °C At 55 °C, the system triggers the alarm when the module exceeds the alarm threshold by one degree.	59 °C At 60 °C, the system shuts down the module when the module exceeds the shutdown threshold by one degree.
	Green	Alarm clears after the temperatures of the modules are at 53 °C.	—
First generation I/O module sensors in first generation mode			
Inlet and outlet sensors	Blinking red	69 °C At 70 °C, the system triggers the alarm when the module exceeds the alarm threshold by one degree.	74 °C At 75 °C, the system shuts down the module when the module exceeds the shutdown threshold by one degree.

Modules on the VSP 9010	Module LED color	Alarm threshold	Shutdown threshold
	Green	Alarm clears after the temperatures of the modules are at 68 °C.	—
Second generation I/O module sensors			
Inlet and outlet sensors	Blinking red	79 °C At 80 °C, the system triggers the alarm when the module exceeds the alarm threshold by one degree.	84 °C At 85 °C, the system shuts down the module when the module exceeds the shutdown threshold by one degree.
	Green	Alarm clears after the temperatures of the modules are at 78 °C.	—
Field Programmable Gate Array (FPGA) sensors	Blinking red	90 °C At 91 °C, the system triggers the alarm when the module exceeds the alarm threshold by one degree.	95 °C At 96 °C, the system shuts down the module when the module exceeds the shutdown threshold by one degree.
	Green	Alarm clears after the temperatures of the modules are at 89 °C.	—
Fabric Adapter (FA) sensors	Blinking red	100 °C At 101 °C, the system triggers the alarm when the module exceeds the alarm threshold by one degree.	105 °C At 106 °C, the system shuts down the module when the module exceeds the shutdown threshold by one degree.
	Green	Alarm clears after the temperatures of the modules are at 99 °C.	—

Bringing the module online

If a module shuts down due to heat, you must intervene to bring the slot back online. After you correct the temperature issue and the heat condition clears, you must bring the module back online. The module does not go online again unless you re-enable the module. After CP, SF, or I/O modules shut down, use the **`sys power slot {slot[-slot][,...]}`** command to bring the module back online.

Fan speed

The cooling module fan speed increases as the temperature reading of the sensors increases. The cooling module fan speed decreases as the temperature reading of the sensors decreases.

System temperature information

Each of the zones correspond to temperature sensors on the modules. For instance, the I/O module has five temperature zones. Zones 1, 2, and 3 are inlet air sensors and 4 and 5 are outlet air sensors. The SF module has two temperature sensors and the CP module has four temperature sensors. The alarm threshold is the temperature the zone can reach before the device moves from normal to alarm mode. If the module exceeds the shutdown threshold by one degree it causes the module to shut down.

The zone alarm is triggered after one of the following events occurs:

- A module alarm is triggered.
- Module alarms are cleared.

Heat sensor locations for first generation and second generation I/O modules

The following figure shows the baseboard component of a first generation I/O module on the left and the PIM component of a first generation I/O module on the right.

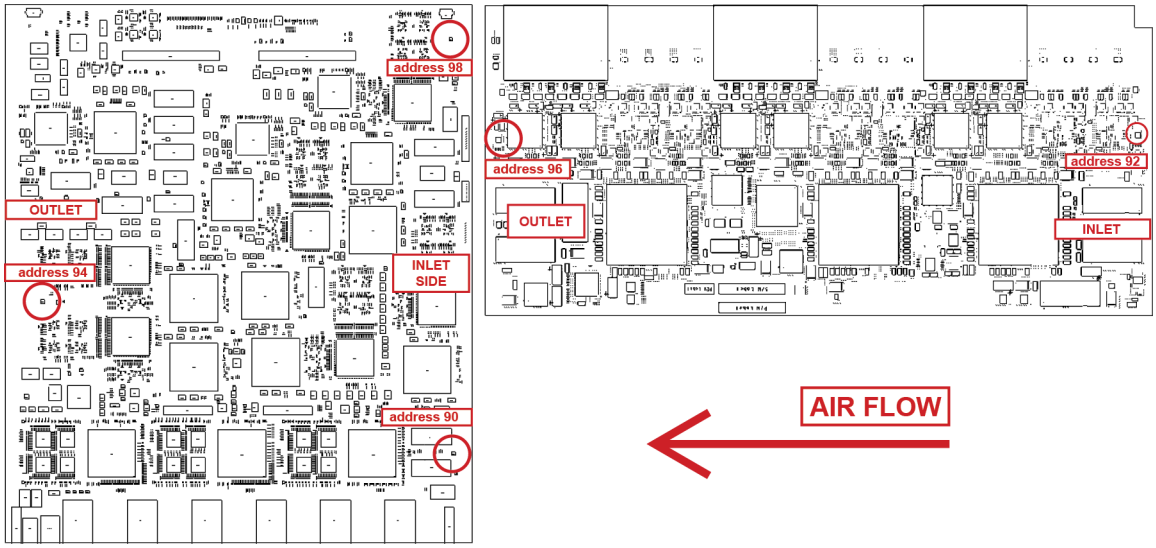
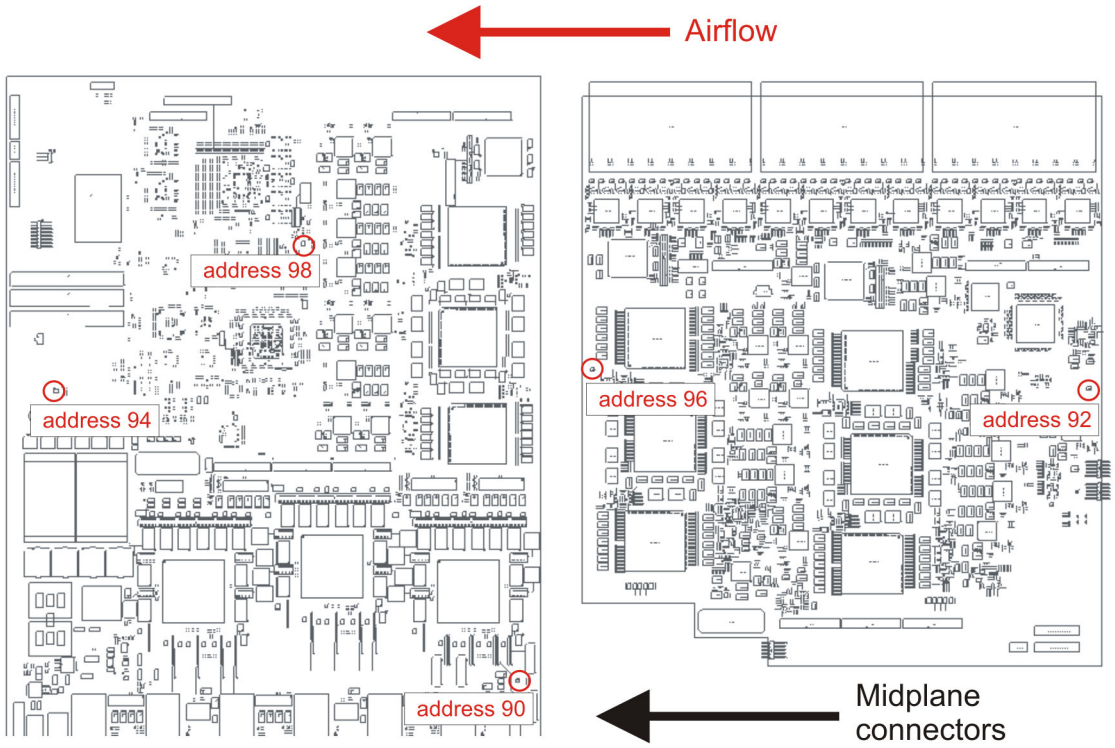


Figure 2: Heat sensor locations in a first generation I/O module

The following figure shows the baseboard component of a second generation I/O module on the left and the PIM component of a second generation I/O module on the right.

Comments? infodev@avaya.com



Use the following table to understand the heat sensors in the preceding I/O modules for first generation and second generation modules.

Table 6: Zone to heat sensor mapping for first generation .and second generation I/O modules

Zones	Heat sensors
zone 1	address 90
zone 2	address 92
zone 3	address 98
zone 4	address 94
zone 5	address 96

The system monitors the temperature every 30 seconds and displays the temperature on all the modules with the following command: **`show sys-info temperature`**

Note:

The I/O module alarm threshold and shutdown threshold temperatures differ for the Virtual Services Platform 9010 and the Virtual Services Platform 9012.

The following example shows command output for both first and second generation I/O modules.

```
Switch:1#show sys-info temperature

Temperature Info :

Slot Zone-1 Zone-2 Zone-3 Zone-4 Zone-5  Highest  Lowest    Alarm     Shutdown
     Temp   Temp   Temp   Temp   Temp    Temp     Temp      Threshold Threshold
```

```
1      36      32      --      32      31      36      31      54      59
2      40      32      --      32      31      40      31      54      59
3      37      39      32      45      48      48      32      69      74
4      32      31      38      35      43      43      31      79      84
6      31      30      37      36      43      43      30      79      84
7      31      31      41      38      49      49      31      79      84
8      33      31      38      38      49      49      31      79      84
9      37      38      35      54      50      54      35      69      74
10     34      34      31      48      50      50      31      69      74
SF1    32      --      --      38      --      38      32      54      59
SF2    30      --      --      37      --      37      30      54      59
SF3    32      --      --      38      --      38      32      54      59
SF4    32      --      --      39      --      39      32      54      59
SF5    34      --      --      41      --      41      34      54      59
SF6    33      --      --      40      --      40      33      54      59
```

The following example displays additional command output that appears for second generation I/O modules.

```
Extended Temperature Zones :

                     Sensor Temperatures

Slot Zone    Slice-1      Slice-2      Slice-3    Highest  Lowest    Alarm     Shutdown
               1   2   3   1   2   3   1   2   3      Temp    Temp  Threshold  Threshold
 4   FPGA     49  45  51  50  51  52  44  51  52        52      44     90         95
 4   FA       39  --  --  48  --  --  71  --  --        71      39    100        105
 6   FPGA     52  53  56  50  52  57  50  49  51        57      49     90         95
 6   FA       39  --  --  49  --  --  62  --  --        62      39    100        105
 7   FPGA     47  51  52  55  56  55  52  59  58        59      47     90         95
 7   FA       42  --  --  50  --  --  66  --  --        66      42    100        105
 8   FPGA     67  51  52  55  53  52  55  57  61        67      51     90         95
 8   FA       39  --  --  50  --  --  72  --  --        72      39    100        105
```

The following table describes the output for the **`show sys-info temperature`**.

Table 7: sh

Value	Description
Temperature Info	
Zones 1 through 3	Specifies the inlet sensors on the module.
Zones 4 and 5	Specifies the outlet sensors on the module.
Highest Temp	Specifies the highest temperature reached on the slot.
Lowest Temp	Specifies the lowest temperature reached on the slot.
Alarm Threshold	Specifies the temperature, when exceeded by one degree, that causes the system to initiate an SNMP trap and causes the module online LED to display as blinking and red.
Shutdown Threshold	Specifies the temperature, when exceeded by one degree, that causes the system to shutdown the module by removing power from the slot.
Extended Temperature Zones This information applies only to second generation modules.	

Value	Description
FPGA	Specifies the temperature of the FPGA sensors. A value of -- indicates that this sensor is not available on this slot.
FA	Specifies the temperature of the FA sensor, located on the slice. A value of -- indicates that this sensor is not available on this slot.
Slice-1 through Slice–3	Specifies temperature information for sensors on each slice. Sensors provide temperature information for various datapath components.
Highest Temp	Specifies the highest temperature of all the FPGA or FA sensors located on this I/O module.
Lowest Temp	Specifies the lowest temperature of all the FPGA or FA sensors located on this I/O module.
Alarm Threshold	Specifies the FPGA or FA temperature, when exceeded by one degree, that causes an alarm.
Shutdown Threshold	Specifies the FPGA or FA temperature, when exceeded by one degree, that causes the system to shutdown the module by removing power from the slot.

Virtual Services Platform 9010 show sys-info output

On the Virtual Services Platform 9010, you can see the zone alarm information under the Fan Trays Info section of the command output for the **`show sys-info`** command. The following output displays on a Virtual Services Platform 9010 without a second generation module:

```
Fan Trays Info :

   Zone Info :
      FRONT zone :

        Mode : NORMAL
        Mode Status : Normal
        Highest Temperature : 37 C
        Extended Zone :
          FPGA Highest Temperature : --
          FA Highest Temperature : --
      REAR zone :
        Mode : NORMAL
        Mode Status : Normal
        Highest Temperature : 0 C

   Fan Info :
          Tray   CardType           Serial#            Part#
         FAN 1     9010CM                       EC1411012-E6
         FAN 2     9010CM                       EC1411012-E6

          Zone       Tray     Unit      Status
         FRONT      FAN 1        1          OK
         FRONT      FAN 1        2          OK
         FRONT      FAN 1        3          OK
         FRONT      FAN 1        4          OK
         FRONT      FAN 2        1          OK
         FRONT      FAN 2        2          OK
```


Comments? infodev@avaya.com

```
        FRONT      FAN 2        3          OK
        FRONT      FAN 2        4          OK
```

The following output displays on a Virtual Services Platform 9010 with a second generation module:

```
Fan Trays Info :

   Zone Info :

      FRONT zone :
        Mode : NORMAL
        Mode Status : Normal
        Highest Temperature : 53 C
        Extended Zone :
          FPGA Highest Temperature : 67 C
          FA Highest Temperature : 72 C
      REAR zone :
        Mode : NORMAL
        Mode Status : Normal
        Highest Temperature : 0 C

   Fan Info :
          Tray   CardType           Serial#            Part#
         FAN 1     9010CM    LBNNTMC29Y004F     EC1411012-E6
         FAN 2     9010CM    LBNNTMC29Y0043     EC1411012-E6

          Zone       Tray     Unit      Status
        FRONT      FAN 1        1          OK
        FRONT      FAN 1        2          OK
        FRONT      FAN 1        3          OK
        FRONT      FAN 1        4          OK
        FRONT      FAN 2        1          OK

        FRONT      FAN 2        2          OK
        FRONT      FAN 2        3          OK
        FRONT      FAN 2        4          OK
```

Use the data in the following table to understand the output for the **`show sys-info`** command on the Virtual Services Platform 9010.

Value		Description
FRONT zone: For the 9010 module, the front zone consists of two fan trays with four fans in each tray, which cool the CP and I/O modules.	Mode:	Each zone operates in either normal mode or alarm mode.
	Mode Status:	Normal Mode – All the fans are healthy and no temperatures exceed the warning threshold. Alarm Mode – Indicates fan or fan tray failures or temperature exceed the warning threshold.
	Highest Temperature	Specifies the highest temperature reached in the front zone.
	Extended Zone:	

Value		Description
	FPGA Highest Temperature	This information applies only to second generation modules. Specifies the temperature of the FPGA sensors. A value of -- indicates that this sensor is not available on this slot.
	FA Highest Temperature	This information applies only to second generation modules. Specifies the temperature of the FA sensor, located on the slice. A value of -- indicates that this sensor is not available on this slot.
REAR zone: For Virtual Services Platform 9010, no rear fan controllers exist. **Note:** For VSP 9012, rear fan controllers exist and the output displays different values.	Mode:	For VSP 9010, no rear fan zone exists, as a result, Mode always displays as NORMAL.
	Mode Status:	For VSP 9010, no rear fan zone exists, as a result, the Mode Status always displays as Normal.
	Highest Temperature	For VSP 9010, no rear fan zone exists, as a result, the temperature always reports as 0 C.
Fan Info:	FAN 1	Specifies the module type under card type.
	FAN 2	Specifies the module type under card type.
	FRONT FAN 1 Unit 1	Specifies the status of a fan in the first cooling module.
	FRONT FAN 1 Unit 2	Specifies the status of a fan in the first cooling module.
	FRONT FAN 1 Unit 3	Specifies the status of a fan in the first cooling module.
	FRONT FAN 1 Unit 4	Specifies the status of a fan in the first cooling module.
	FRONT FAN 2 Unit 1	Specifies the status of a fan in the second cooling module.
	FRONT FAN 2 Unit 2	Specifies the status of a fan in the second cooling module.
	FRONT FAN 2 Unit 3	Specifies the status of a fan in the second cooling module.
	FRONT FAN 2 Unit 4	Specifies the status of a fan in the second cooling module.

Virtual Services Platform 9012

This section describes the types of cooling modules required for the Virtual Services Platform 9012 according to the configured mode.

You require the following types of cooling modules when the Virtual Services Platform 9012 is in first generation mode:

- 9012FC I/O cooling module or 9012FCHS I/O cooling module
- 9012RC SF cooling module

You require the following types of cooling modules when the Virtual Services Platform 9012 is in second generation mode.

- 9012FCHS I/O cooling module
- 9012RC SF cooling module

9012FCHS I/O cooling module supported configurations

Refer to the following tables to understand the supported configurations for the 9012FCHS and 9012FC cooling modules.

The following table describes the supported configuration for the 9012FCHS I/O cooling modules for first generation, second generation, and a mix of first and second generation I/O modules.

I/O cooling modules installed	First generation, second generation, and a mix of first and second generation I/O modules expected behavior
Two 9012FCHS I/O cooling module	First and second generation I/O modules run as expected and only shut down if their thermal sensors exceed the temperature threshold.

The following table describes the supported configuration for first generation modules only.

I/O cooling modules installed	First generation I/O modules expected behavior
Two 9012FC I/O cooling modules or Two 9012FCHS I/O cooling modules	First generation I/O modules run as expected, and only shut down if their thermal sensors are greater than the temperature threshold.

The following table describes non-supported configurations. Avaya allows the following configurations for short time periods to install or swap I/O cooling modules.

I/O cooling modules installed	First generation I/O modules expected behavior	Second generation I/O modules expected behavior
One 9012FCHS I/O cooling module and one 9012FC I/O	First generation I/O modules run as expected, and only shut down if their thermal sensors are greater than the temperature threshold. Avaya provides this	Second generation I/O modules shut down.

I/O cooling modules installed	First generation I/O modules expected behavior	Second generation I/O modules expected behavior
cooling module (Mixed installation) or One 9012FC I/O cooling module	mode to permit a time window for you to install or swap I/O cooling modules.	
No I/O cooling modules or One 9012FCHS I/O cooling module	First generation I/O modules run as expected and only shut down if their thermal sensors exceed the temperature threshold. Avaya provides this mode to permit a time window for you to install or swap I/O cooling modules.	Second generation I/O modules run as expected and only shut down if their thermal sensors exceed the temperature threshold. Avaya provides this mode to permit a time window for you to install or swap I/O cooling modules.

9012FCHS I/O cooling module

Avaya supports the high-speed 9012FCHS Input/Output (I/O) cooling module for the Avaya Virtual Services Platform 9012 chassis to support the high-density 10 Gigabit Ethernet, as well as the 40 Gigabit Ethernet, I/O modules.

The high-speed cooling module is available as a field replaceable unit (FRU), (EC1411004–E6).

Virtual Services Platform 9012 uses the 9012FCHS in the front I/O cooling module slots to provide cooling for the I/O modules and the Control Processor (CP) modules. Each 9012FCHS cooling module includes eight fans, and provides side-to-side cooling.

The minimum software revision that supports the 9012FCHS is Release 3.4.2.2.

Second generation I/O modules require two 9012FCHS I/O cooling modules.

The software does not support a mixed configuration of the 9012FC and 9012FCHS cooling modules in the same chassis.

Important:

- The 9012FCHS I/O cooling module enables the Virtual Services Platform 9012 to operate at a higher ambient temperature than if you use the 9012FC I/O cooling module. The software monitors the internal temperature of the I/O modules and the chassis, and regulates the fan speed. If the internal I/O module temperature begins to rise, as the ambient temperature increases, the fan speed increases accordingly to try to maintain the I/O module temperature. This means that when you use the 9012FCHS cooling modules the actual temperature of the I/O module will not appear lower than if you use the 9012FC, but the Virtual Services Platform 9012 chassis can run at a higher ambient temperature.
- You must use the 9012FCHS cooling module if you install and configure second generation modules; otherwise, the second generation modules remain offline until you install the 9012FCHS cooling modules.

- You can use two 9012FCHS I/O cooling modules or two 9012FC I/O cooling modules in the Virtual Services Platform 9012. Do not use the 9012FCHS I/O and the 9012FC I/O cooling modules together.
- The CP monitors the temperature for each module. If the temperature exceeds the software configured limit, the CP shuts down only the affected module. The I/O cooling modules are hot swappable. You can replace them, one at a time, without turning off the Virtual Services Platform 9000.

The following figure shows the 9012FCHS cooling module for the Virtual Services Platform 9012.

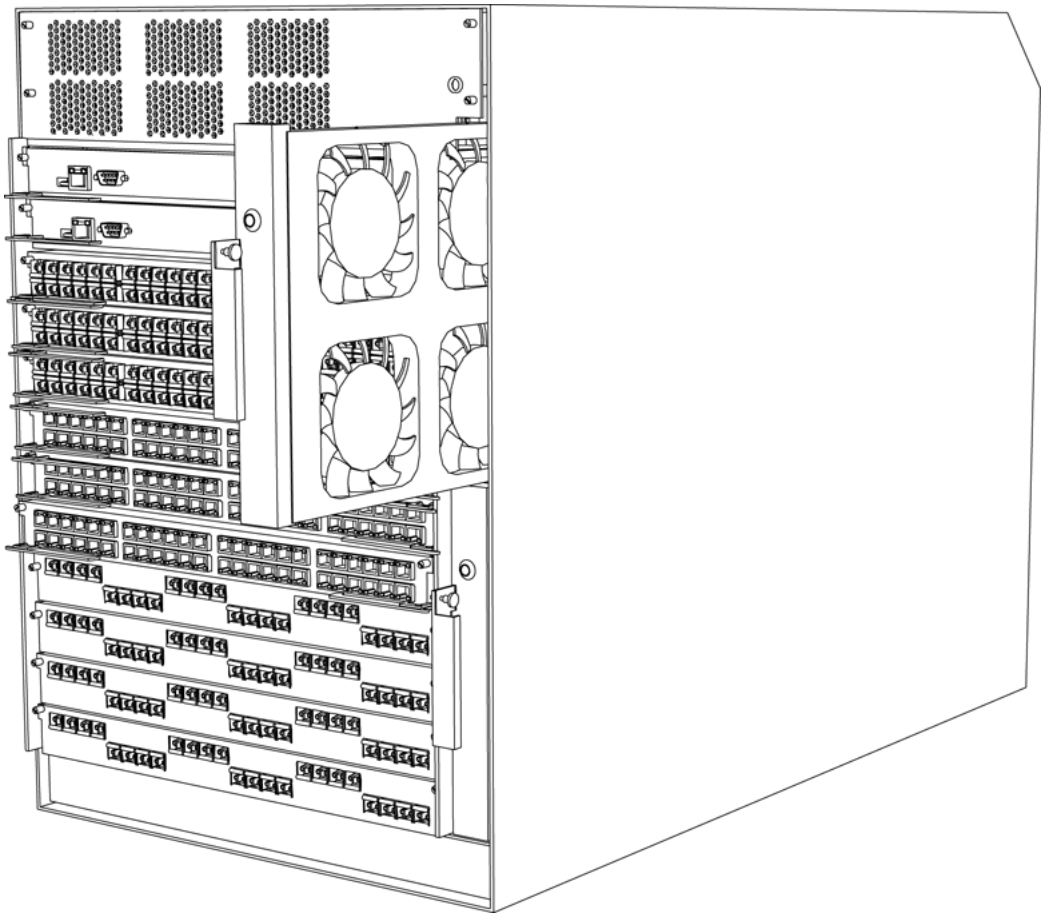


Figure 3: 9012FCHS cooling module partially removed

The following table provides the dimensions for the 9012FCHS I/O cooling module.

Table 8: 9012FCHS cooling module dimensions

	Width	Length	Depth	Weight
9012FCHS I/O cooling module	9.875 inches	23.5 inches	1.125 inches	9 pounds
	(250.8 millimeters)	(596.9 millimeters)	(28.6 millimeters)	(4.08 kilograms)

Comments? infodev@avaya.com

9012FC I/O cooling module

The Virtual Services Platform 9012 requires two 9012FC I/O cooling modules for first generation I/O modules. You must install the I/O cooling modules in the front of the chassis. The I/O cooling modules provide cooling for the interface modules and the Control Processor (CP) modules. Each I/O cooling module includes eight fans.

Important:

- You must use the 9012FCHS cooling module if you install and configure second generation modules; otherwise, the second generation modules remain offline until you install the 9012FCHS cooling modules. For more information about the 9012FCHS cooling module, see 9012FCHS I/O cooling module on page 23.
- The CP monitors the temperature for each module. If the temperature exceeds the software set limit, the CP shuts down only the affected module.

The I/O cooling modules are hot swappable. You can replace them, one at a time, without turning off the Virtual Services Platform 9000.

The following figure shows the cooling module for the Virtual Services Platform 9012.

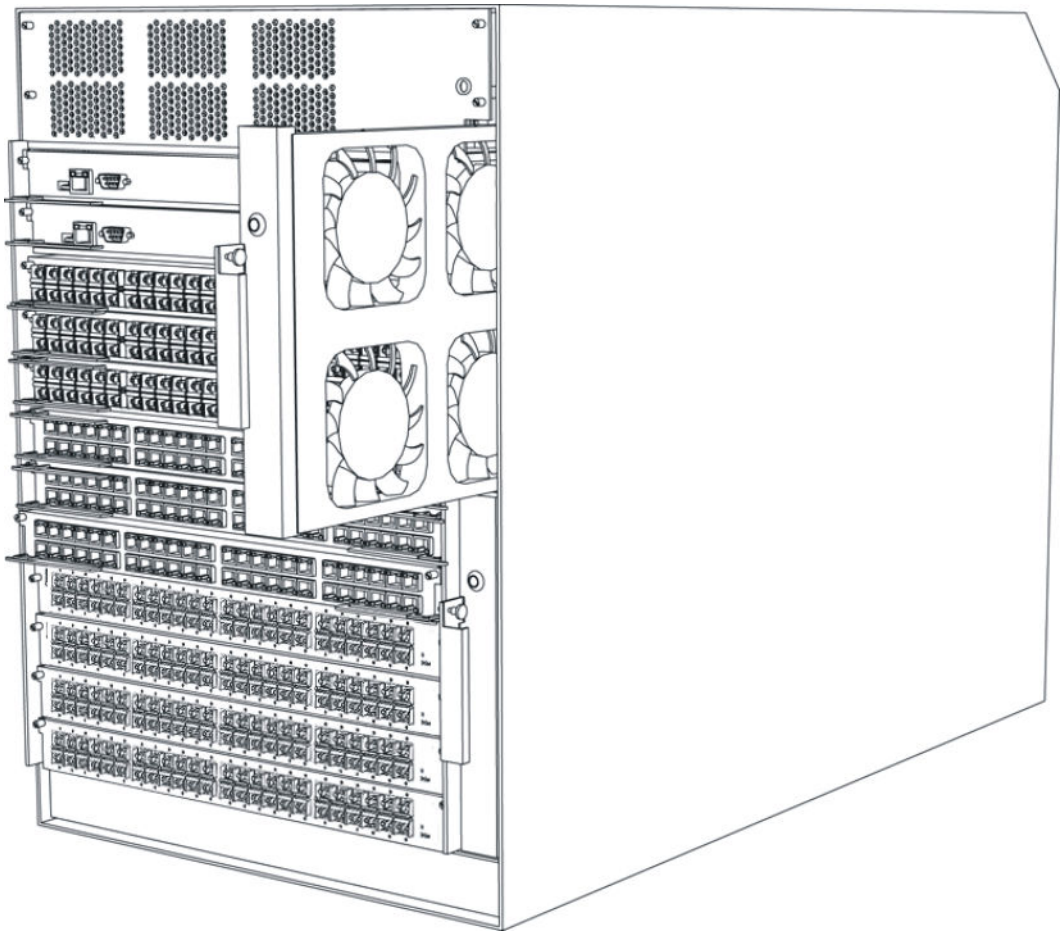


Figure 4: I/O cooling module partially removed

The following table provides the dimensions for the 9012FC I/O cooling module.

Table 9: 9012FC cooling module dimensions

	Width	Length	Depth	Weight
9012FC I/O cooling module	9.875 inches	23.5 inches	1.125 inches	9 pounds
	(250.8 millimeters)	(596.9 millimeters)	(28.6 millimeters)	(4.08 kilograms)

Front panel LED for the 9012FC and 9012FCHS I/O cooling modules

The 9012FC and the 9012FCHS I/O cooling modules for the Virtual Services Platform 9012 provides a bicolor LED on the front panel to indicate the fan status. The following table provides a description of the LED colors:

Table 10: 9012FC and 9012FCHS I/O cooling module LED status

LED Color	Status	Description
Green	Normal	All fans are functional and spinning above the program controlled FAN_FAULT_THRESHOLD register settings.
Amber (both red and green LED turned on)	Warning	One of the fans is not functioning properly. Either it is spinning below the FAULT threshold setting or does not spin at all. The fan tray can still provide enough cooling by increasing the fan speed of the remaining fans.
Red	Fail	Two or more fans are not working, either from spinning too slowly or not at all. The fan tray may not provide enough cooling.

9012RC SF cooling module

The Virtual Services Platform 9012 requires two 9012RC SF cooling modules. You must install the SF cooling modules in the back of the chassis. The SF cooling modules provide cooling based on the demand of the SF modules. Each cooling module includes two fans.

The SF cooling modules are hot swappable. You can replace them, one at a time, without turning off the Virtual Services Platform 9000.

The following figure shows the SF cooling module for the chassis.

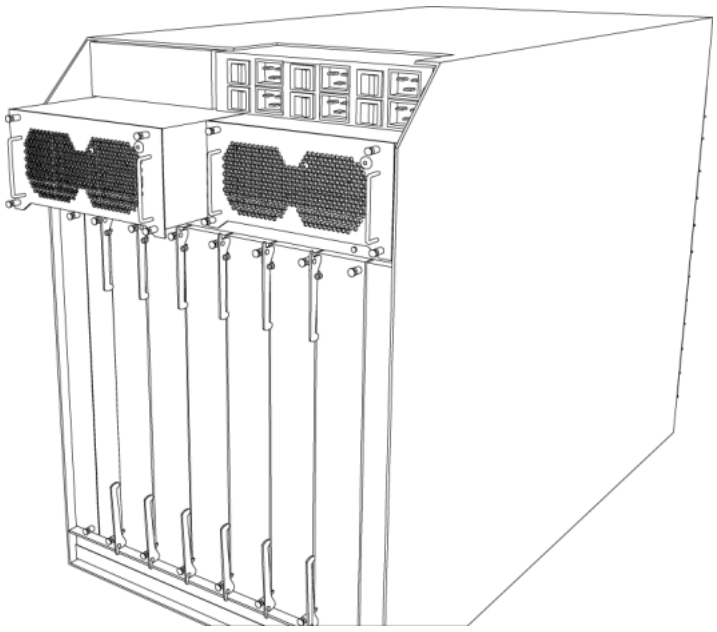


Figure 5: SF cooling module partially removed

The following table provides the dimensions for the 9012RC SF cooling module.

Table 11: Cooling module dimensions

	Width	Length	Depth	Weight
9012RC SF cooling module	4.625 inches	8.75 inches	3.5 inches	2 pounds
	(117.5 millimeters)	(222.3 millimeters)	(88.9 millimeters)	(.91 kilograms)

Front panel LED for the 9012RC SF cooling module

The 9012RC SF cooling module for the Virtual Services Platform 9012 provides a bicolor LED on the front panel to indicate fan status. The following table provides a description of the LED colors.

Table 12: 9012RC SF cooling module LED status

LED Color	Status	Description
Green	Normal	Both fans are functional and spinning above the program controlled FAN_FAULT_THRESHOLD register settings.
Red	Fail	One or both fans are not working, either from spinning too slowly or not at all. The fan tray may not provide enough cooling.

Airflow in the Virtual Services Platform 9012

Airflow in the Virtual Services Platform 9012 is from left-to-right (as viewed from the front) for I/O modules and front-to-back for switch fabric cards and power supplies.

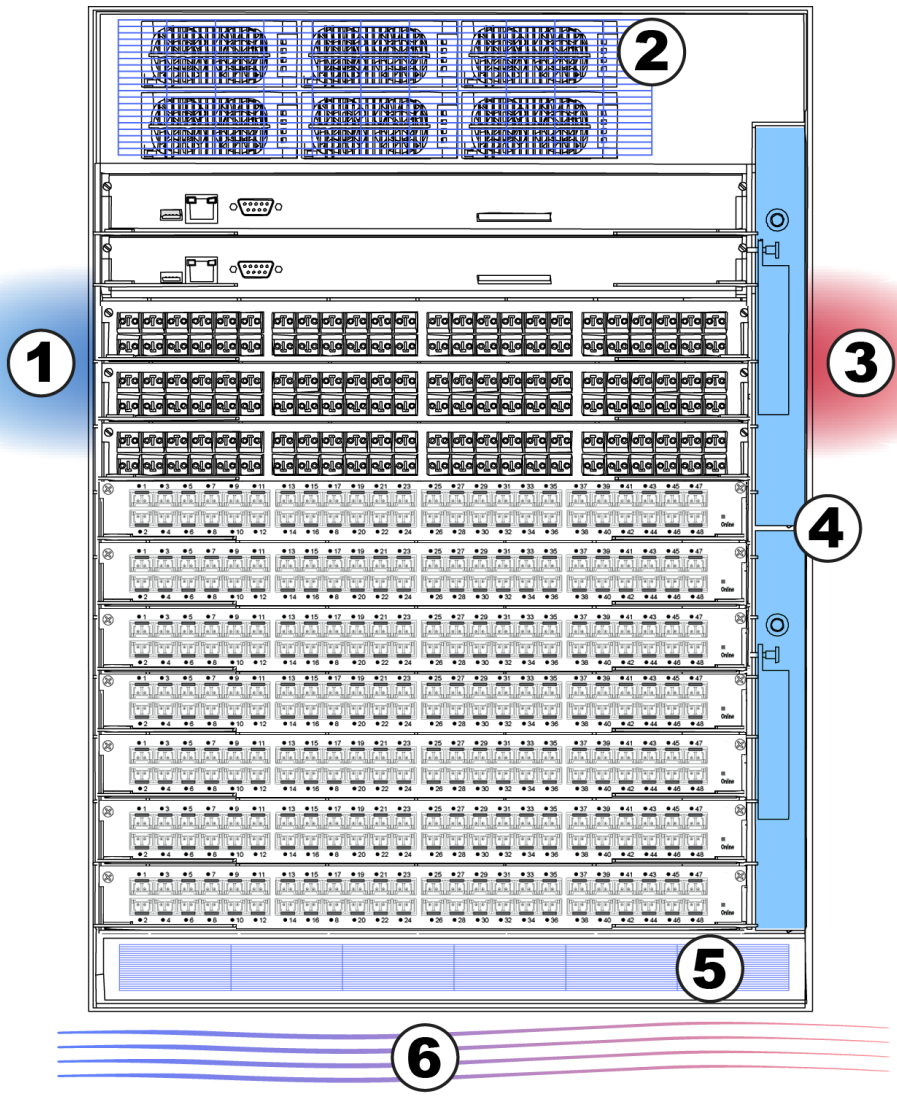


Figure 6: Front of the Virtual Services Platform 9012

Table 13: Front of the Virtual Services Platform 9012

Diagram	Description
1	I/O module air inlet
2	Power supply fan air inlet
3	I/O module air exhaust
4	9012FC or 9012FCHS cooling modules
5	Switch Fabric module air inlet
6	Airflow – left to right

Left-to-right cooling

Airflow moves from left to right to cool the Control Processor and I/O modules. You require either two 9012FC cooling modules or two 9012FCHS cooling modules (for use with second generation modules in second generation mode or first generation modules in first generation mode) on the front right side of the Virtual Services Platform 9012. The 9012 cooling modules provide air movement and have an adjustable fan speed that depends on the system temperature.

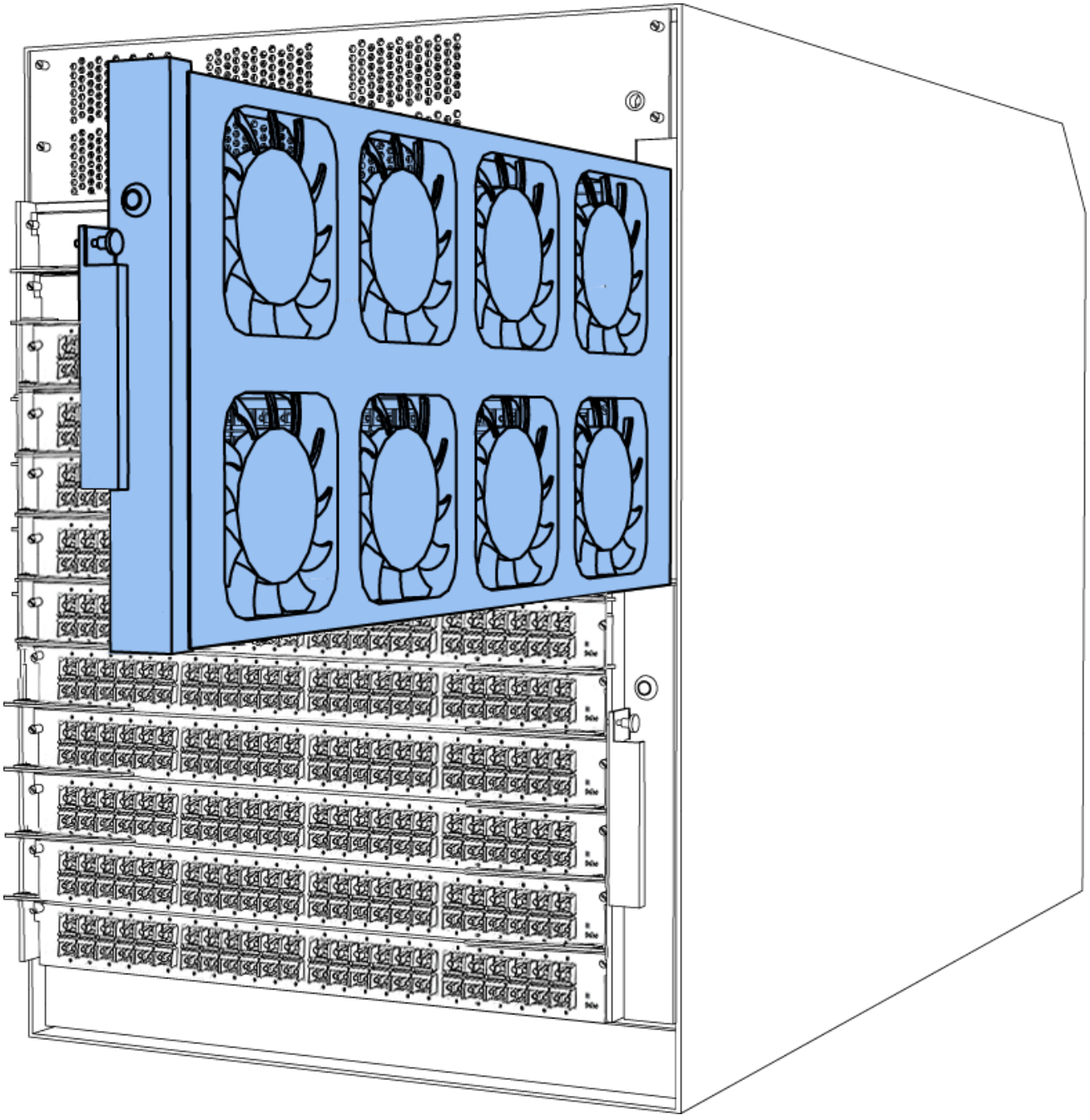


Figure 7: 9012 cooling module

Each 9012FC cooling module or 9012FCHS cooling module has eight fans. The platform polls all I/O module and CP module sensors, and adjusts the 9012 fan speed accordingly.

Front-to-back cooling

Airflow moves from front-to-back to cool the Switch Fabric and auxiliary modules. Two 9012RC cooling modules, at the top back of the Virtual Services Platform 9012, provide the air movement and have adjustable fan speed that depends on system temperature.

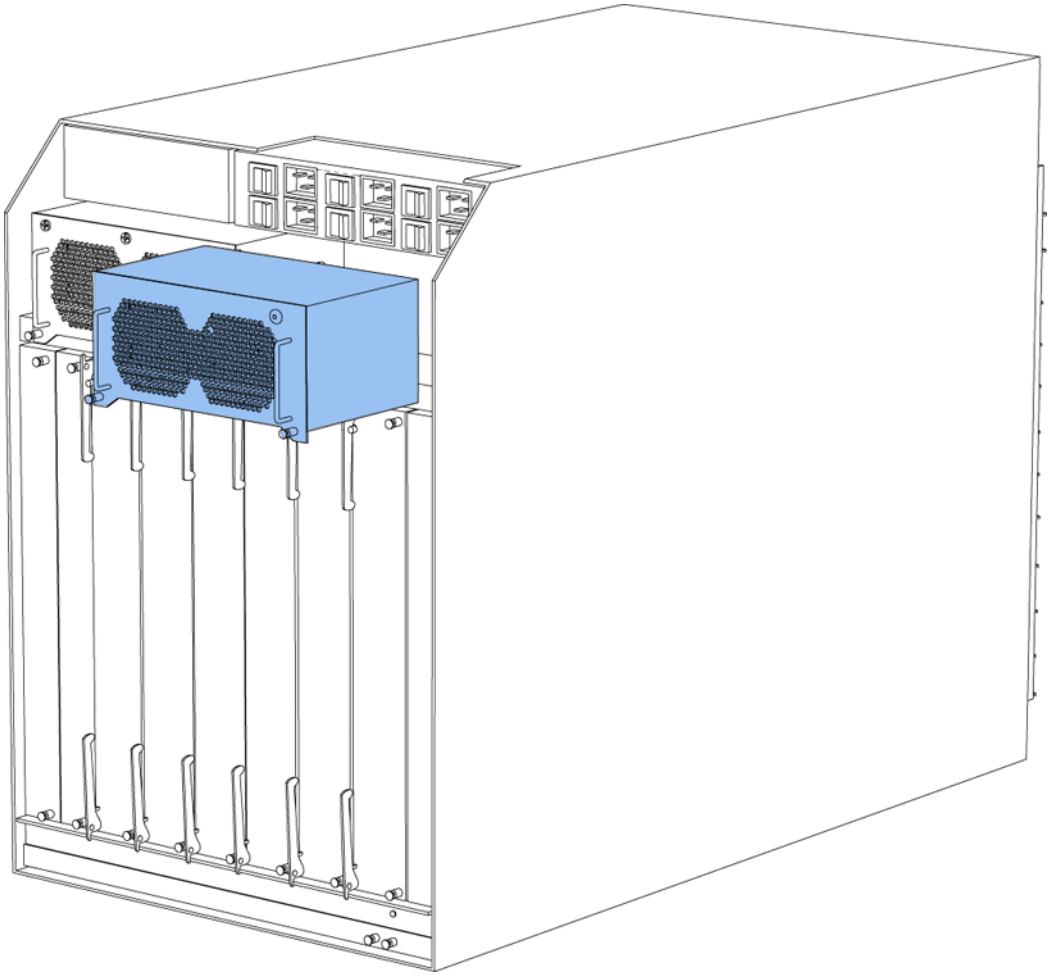


Figure 8: 9012RC cooling module

In the Virtual Services Platform 9012, two fans exist in each 9012RC cooling module and pull air from front-to-back. The platform polls all Switch Fabric module sensors and adjusts the 9012RC fan speed accordingly.

Note:

Do not place the Virtual Services Platform 9012 directly against a wall, equipment, or other obstruction. Avaya recommends 36 inches (91 centimeters) of free space in both the front and back of the machine, and 6 inches (15.2 centimeters) on each side extra. Depending on the circumstances, increase the free space at the side to allow for more airflow or cool airflow into the Virtual Services Platform 9012.

Temperature alarms

The system monitors the temperature on the modules. If a module exceeds the alarm threshold temperature by one degree, the system initiates an SNMP trap and the module online LED displays as blinking red.

After the temperature of the module exceeds the alarm threshold temperature, the system logs the temperatures of all sensors each time the temperature increases by one degree or decreases by two degrees within a 30-second polling period. The module online LED returns to green when all module temperatures are below the threshold.

The system shuts down the module when the module exceeds the shutdown threshold temperature by one degree.

Virtual Services Platform 9012 temperature threshold quick reference

Use the information in the following table as a quick reference for temperature thresholds on the Virtual Services Platform 9012.

Note:

The I/O module alarm threshold and shutdown threshold temperatures differ for the Virtual Services Platform 9010 and the Virtual Services Platform 9012.

Table 14: Alarm threshold and shutdown threshold temperatures for VSP 9012 modules

Modules on the VSP 9012	Module LED color	Alarm threshold	Shutdown threshold
CP and SF modules	Blinking red	54 °C At 55 °C, the system triggers the alarm when the module exceeds the alarm threshold by one degree.	59 °C At 60 °C, the system shuts down the module when the module exceeds the shutdown threshold by one degree.
	Green	Alarm clears after the temperatures of the modules are at 53 °C.	—
First generation I/O module sensors in first generation mode			
Inlet and outlet sensors	Blinking red	59 °C At 60 °C, the system triggers the alarm when the module exceeds the alarm threshold by one degree.	64 °C At 65 °C, the system shuts down the module when the module exceeds the shutdown threshold by one degree.
	Green	Alarm clears after the temperatures of the modules are at 58 °C.	—
Second generation I/O module sensors			

Modules on the VSP 9012	Module LED color	Alarm threshold	Shutdown threshold
Inlet and outlet sensors	Blinking red	69 °C At 70 °C, the system triggers the alarm when the module exceeds the alarm threshold by one degree.	74 °C At 75 °C, the system shuts down the module when the module exceeds the shutdown threshold by one degree.
	Green	Alarm clears after the temperatures of the modules are at 68 °C.	—
Field Programmable Gate Array (FPGA) sensors	Blinking red	90 °C At 91 °C, the system triggers the alarm when the module exceeds the alarm threshold by one degree.	95 °C At 96 °C, the system shuts down the module when the module exceeds the shutdown threshold by one degree.
	Green	Alarm clears after the temperatures of the modules are at 89 °C.	—
Fabric Adapter (FA) sensors	Blinking red	100 °C At 101 °C, the system triggers the alarm when the module exceeds the alarm threshold by one degree.	105 °C At 106 °C, the system shuts down the module when the module exceeds the shutdown threshold by one degree.
	Green	Alarm clears after the temperatures of the modules are at 99 °C.	—

Bringing the module online

If a module shuts down due to heat, you must intervene to bring the slot back online. After you correct the temperature issue and the heat condition clears, you must bring the module back online. The module does not go online again unless you re-enable the module. After CP, SF, or I/O modules shut down, use the **`sys power slot {slot[-slot][,...]}`** command to bring the module back online.

Fan speed

The cooling module fan speed increases as the temperature reading of the sensors increases. The cooling module fan speed decreases as the temperature reading of the sensors decreases.

System temperature information

Each of the zones correspond to temperature sensors on the modules. For instance, the I/O module has five temperature zones. Zones 1, 2, and 3 are inlet air sensors and 4 and 5 are outlet air sensors. The SF module has two temperature sensors and the CP module has four temperature sensors. The alarm threshold is the temperature the zone can reach before the device moves from

normal to alarm mode. If the module exceeds the shutdown threshold by one degree it causes the module to shut down.

The zone alarm is triggered after one of the following events occurs:

- A module alarm is triggered.
- Module alarms are cleared.

Heat sensor locations for first generation and second generation I/O modules

The following figure shows the baseboard component of a first generation I/O module on the left and the PIM component of a first generation I/O module on the right.

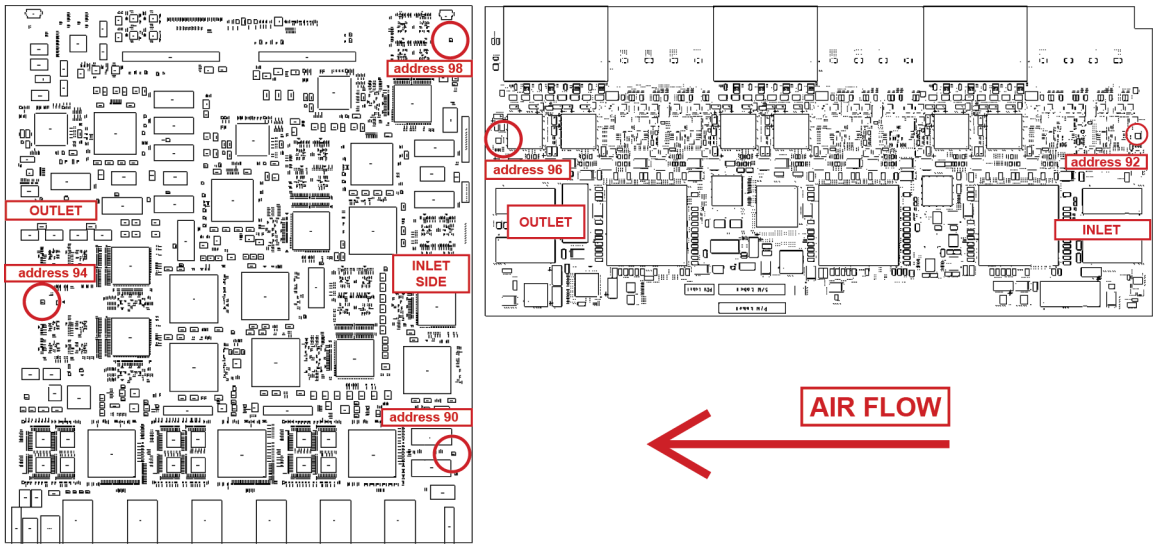


Figure 9: Heat sensor locations in a first generation I/O module

The following figure shows the baseboard component of a second generation I/O module on the left and the PIM component of a second generation I/O module on the right.

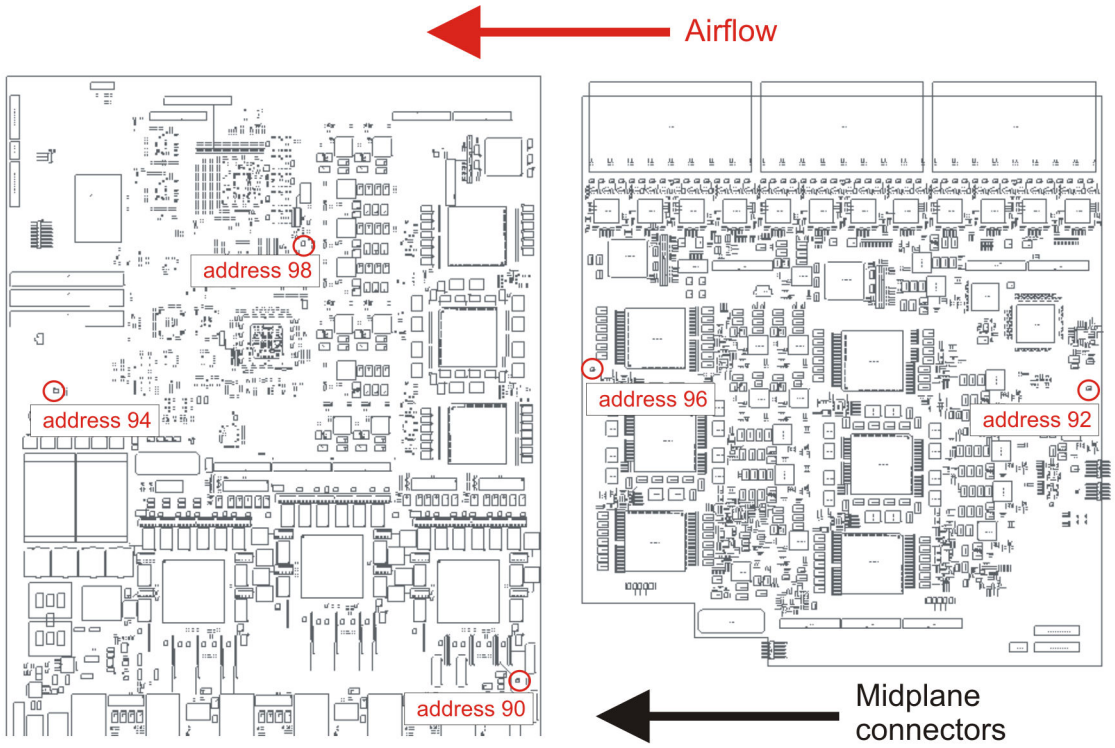


Figure 10: Heat sensor locations in a second generation I/O module

Use the following table to understand the heat sensors in the preceding I/O modules for first generation and second generation modules.

Table 15: Zone to heat sensor mapping for first generation .and second generation I/O modules

Zones	Heat sensors
zone 1	address 90
zone 2	address 92
zone 3	address 98
zone 4	address 94
zone 5	address 96

The system monitors the temperature every 30 seconds and displays the temperature on all the modules with the following command: **`show sys-info temperature`**

Note:

The I/O module alarm threshold and shutdown threshold temperatures differ for the Virtual Services Platform 9010 and the Virtual Services Platform 9012.

The following example shows command output for both first and second generation I/O modules.

```
Switch:1#show sys-info temperature

Temperature Info :
```

```
Slot Zone-1 Zone-2 Zone-3 Zone-4 Zone-5  Highest  Lowest Alarm      Shutdown
     Temp   Temp   Temp   Temp   Temp    Temp     Temp   Threshold  Threshold
1     37     25     --     31     24       37      24     54         59
2     34     25     --     30     23       34      23     54         59
4     33     29     39     36     45       45      29     69         74
8     35     30     38     36     43       43      30     69         74
10    34     34     41     38     47       47      34     69         74
12    35     29     34     35     30       35      29     59         64
SF1   33     --     --     40     --       40      33     54         59
SF2   32     --     --     36     --       36      32     54         59
SF3   30     --     --     31     --       31      30     54         59
SF4   29     --     --     31     --       31      29     54         59
SF5   31     --     --     36     --       36      31     54         59
```

The following example displays additional command output that appears for second generation I/O modules.

```
Extended Temperature Zones :

                     Sensor Temperatures

Slot  Zone    Slice-1     Slice-2     Slice-3    Highest  Lowest  Alarm     Shutdown
              1   2   3   1   2   3   1   2   3  Temp     Temp    Threshold Threshold
4     FPGA    56  51  56  56  55  59  54  47  62  62       47      90         95
4     FA      41  --  --  49  --  --  66  --  --  66       41      100        105
8     FPGA    58  53  57  55  55  51  53  51  51  58       51      90         95
8     FA      37  --  --  53  --  --  70  --  --  70       37      100        105
10    FPGA    53  51  51  55  57  59  57  57  53  59       51      90         95
10    FA      41  --  --  49  --  --  64  --  --  64       41      100        105
```

The following table describes the output for the **`show sys-info temperature`** command.

Value	Description
Temperature Info	
Zones 1 through 3	Specifies the inlet sensors on the module.
Zones 4 and 5	Specifies the outlet sensors on the module.
Highest Temp	Specifies the highest temperature reached on the slot.
Lowest Temp	Specifies the lowest temperature reached on the slot.
Alarm Threshold	Specifies the temperature, when exceeded by one degree, that causes the system to initiate an SNMP trap and causes the module online LED to display as blinking and red.
Shutdown Threshold	Specifies the temperature, when exceeded by one degree, that causes the system to shutdown the module by removing power from the slot.
Extended Temperature Zones This information applies only to second generation modules.	
FPGA	Specifies the temperature of the FPGA sensors. A value of -- indicates that this sensor is not available on this slot.

Value	Description
fa	Specifies the temperature of the FA sensor, located on the slice. A value of -- indicates that this sensor is not available on this slot.
Slice-1 through Slice–3	Specifies temperature information for sensors on each slice. Sensors provide temperature information for various datapath components.
Highest Temp	Specifies the highest temperature of all the FPGA or FA sensors located on this I/O module.
Lowest Temp	Specifies the lowest temperature of all the FPGA or FA sensors located on this I/O module.
Alarm Threshold	Specifies the FPGA or FA temperature, when exceeded by one degree, that causes an alarm.
Shutdown Threshold	Specifies the FPGA or FA temperature, when exceeded by one degree, that causes the system to shutdown the module by removing power from the slot.

Virtual Services Platform 9012 show sys-info output

On the Virtual Services Platform 9012, you can see the zone alarm information under the Fan Trays Info section of the command output for the **`show sys-info`** command. The following output displays on a Virtual Services Platform 9012 without a second generation module:

```
Fan Trays Info :

   Zone Info :

      FRONT zone :
        Mode : NORMAL
        Mode Status : Normal
        Highest Temperature : 33 C
        Extended Zone :
          FPGA Highest Temperature : --
          FA Highest Temperature : --
      REAR zone :
        Mode : NORMAL
        Mode Status : Normal
        Highest Temperature : 31 C

   Fan Info :
          Tray   CardType           Serial#            Part#
      IO-FAN 1     9012FC
      IO-FAN 2     9012FC
      SF-FAN 1     9012RC
      SF-FAN 2     9012RC

           Zone        Tray     Unit      Status
         FRONT   IO-FAN 1        1          OK
         FRONT   IO-FAN 1        2          OK
         FRONT   IO-FAN 1        3          OK

         FRONT   IO-FAN 1        4          OK
         FRONT   IO-FAN 1        5          OK
         FRONT   IO-FAN 1        6          OK
         FRONT   IO-FAN 1        7          OK
```

```
         FRONT   IO-FAN 1        8          OK
         FRONT   IO-FAN 2        1          OK
         FRONT   IO-FAN 2        2          OK
         FRONT   IO-FAN 2        3          OK
         FRONT   IO-FAN 2        4          OK
         FRONT   IO-FAN 2        5          OK
         FRONT   IO-FAN 2        6          OK
         FRONT   IO-FAN 2        7          OK
         FRONT   IO-FAN 2        8          OK
          REAR   SF-FAN 1        1          OK
          REAR   SF-FAN 1        2          OK
          REAR   SF-FAN 2        1          OK
          REAR   SF-FAN 2        2          OK
```

The following output displays on a Virtual Services Platform 9012 with a second generation module:

```
Fan Trays Info :

   Zone Info :

      FRONT zone :
        Mode : NORMAL
        Mode Status : Normal
        Highest Temperature : 49 C
        Extended Zone :
          FPGA Highest Temperature : 62 C
          FA Highest Temperature : 70 C
      REAR zone :
        Mode : NORMAL
        Mode Status : Normal
        Highest Temperature : 40 C

   Fan Info :
          Tray   CardType           Serial#            Part#
      IO-FAN 1   9012FCHS    LBNNTMRJ000172     EC1411004-E6
      IO-FAN 2   9012FCHS    LBNNTMRJ00015T     EC1411004-E6
      SF-FAN 1     9012RC    LBNNTMRJ000049     EC1411002-E6
      SF-FAN 2     9012RC    LBNNTMRJ000046     EC1411002-E6

          Zone       Tray     Unit      Status
         FRONT   IO-FAN 1        1          OK
         FRONT   IO-FAN 1        2          OK
         FRONT   IO-FAN 1        3          OK

         FRONT   IO-FAN 1        4          OK
         FRONT   IO-FAN 1        5          OK
         FRONT   IO-FAN 1        6          OK
         FRONT   IO-FAN 1        7          OK
         FRONT   IO-FAN 1        8          OK
         FRONT   IO-FAN 2        1          OK
         FRONT   IO-FAN 2        2          OK
         FRONT   IO-FAN 2        3          OK
         FRONT   IO-FAN 2        4          OK
         FRONT   IO-FAN 2        5          OK
         FRONT   IO-FAN 2        6          OK
         FRONT   IO-FAN 2        7          OK
         FRONT   IO-FAN 2        8          OK
          REAR   SF-FAN 1        1          OK
          REAR   SF-FAN 1        2          OK
          REAR   SF-FAN 2        1          OK
          REAR   SF-FAN 2        2          OK
```

Use the data in the following table to understand the output for the **`show sys-info`** command on the Virtual Services Platform 9012.

Value		Description
FRONT zone: For the VSP 9012, the front zone consists of two fan trays with eight fans in each tray, which cool the CP and I/O modules.	Mode:	Each zone operates in either normal mode or alarm mode.
	Mode Status:	Normal Mode – All the fans are healthy and no temperatures exceed the warning threshold. Alarm Mode – Indicates fan or fan tray failures or temperature exceed the warning threshold.
	Highest Temperature	Specifies the highest temperature reached in the front zone.
	Extended Zone:	
	FPGA Highest Temperature	This information applies only to second generation modules. Specifies the temperature of the FPGA sensors. A value of -- indicates that this sensor is not available on this slot.
	FA Highest Temperature	This information applies only to second generation modules. Specifies the temperature of the FA sensor, located on the slice. A value of -- indicates that this sensor is not available on this slot.
REAR zone: For the VSP 9012, the rear zone consists of two fan trays with two fans in each tray, which cool the SF modules.	Mode:	Each zone operates in either normal mode or alarm mode.
	Mode Status:	Normal Mode – All the fans are healthy and no temperatures exceed the warning threshold. Alarm Mode – Indicates fan or fan tray failures or temperature exceed the warning threshold.
	Highest Temperature	Specifies the highest temperature reached in the front zone.
Fan Info:	IO-FAN 1	Specifies the module type.
	IO-FAN 2	Specifies the module type.
	SF-FAN 1	Specifies the module type.
	SF-FAN 2	Specifies the module type.
	FRONT IO-FAN 1 (1-8)	Specifies the status of each of the fans in the first cooling module.
	FRONT IO-FAN 2 (1-8)	Specifies the status of each of the fans in the first cooling module.

Value		Description
	REAR SF-FAN 1 (1-2)	Specifies the status of each of the fans in the rear cooling module.
	REAR SF-FAN 2 (1-2)	Specifies the status of each of the fans in the rear cooling module.

Data center floor plan

Typically a data center optimizes airflow through the creation of hot aisles and cold aisles.

The cold aisles can have a raised floor, which consists of tiles with perforations to allow cold air to enter the devices.

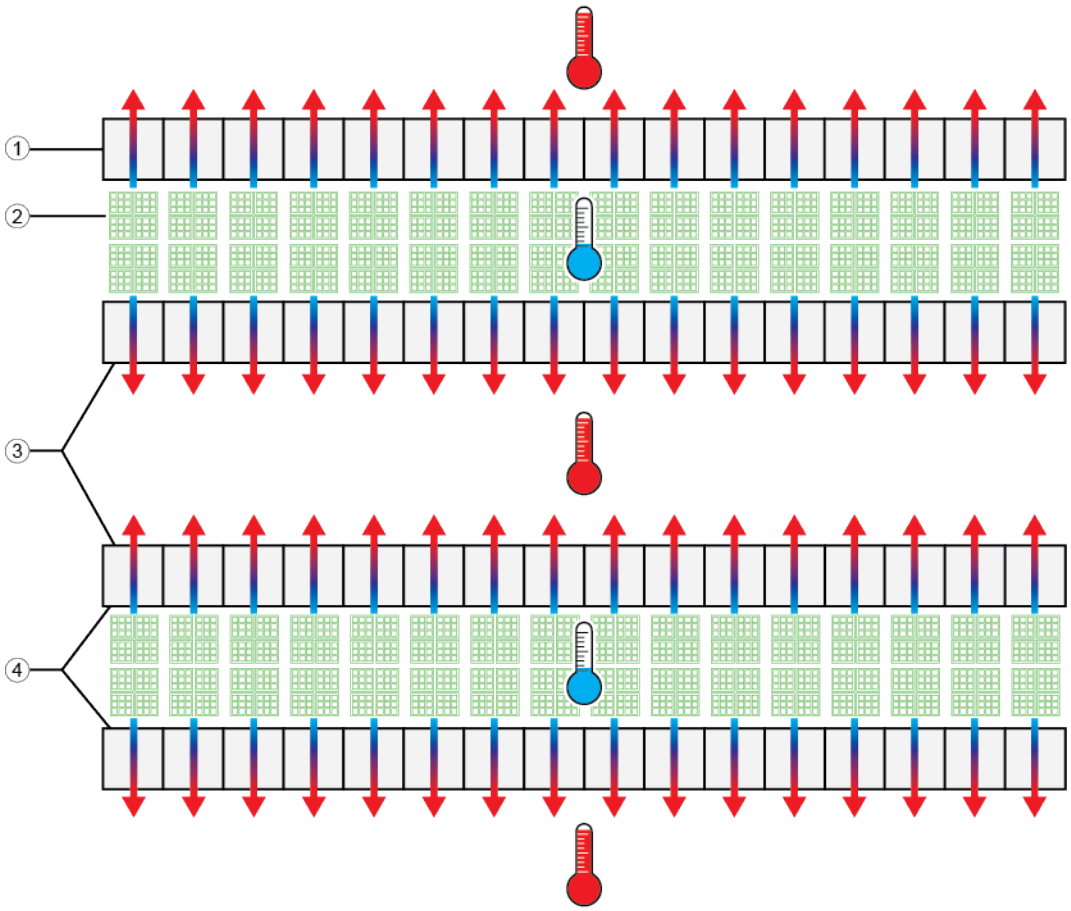


Figure 11: Data center floor plan of hot and cold aisles

The following table describes the layout of the data center in the preceding figure.

Table 16: Data center layout

Diagram	Description
1	Chassis racks
2	Cold aisle floor tiles in a raised floor
3	Back of chassis
4	Front of chassis

In a data center configuration, the front of the equipment faces the cold aisle, while the rear of the equipment faces the hot aisle. The chassis take in cold air from the cold aisle and discharge hot air into the hot aisle.

Each Virtual Services Platform 9012 chassis takes in cold air from the left and discharges hot air to the right. The Virtual Services Platform 9010 chassis takes in cold air from the front and discharges hot air from the back.

The typical data center layout works well for front-to-back cooling, but not as well for side-to-side cooling.

In this typical setup, if you place each Virtual Services Platform 9012 chassis in a row from left to right, the chassis to the left discharges hot air into the cool intake of the chassis to the right. This installation does not optimize cool airflow.

Optimizing cooling in a data center

To optimize left-to-right cooling, perform the following tasks:

- Increase the space between each Virtual Services Platform 9012 chassis
- Relocate the cooling floor tiles to improve cool air movement into the side of the Virtual Services Platform 9012 chassis
- Add baffles to redirect the hot air discharged from the Virtual Services Platform 9012 chassis from the right side to the hot aisle at the back

For instance, in the following diagram the hot and cold aisles remain, but now space exists between some of the Virtual Services Platform 9012 chassis. Baffles are added to redirect air from the side to the back of the chassis into the hot aisles. Cooling floor tiles are relocated near the cool air intake to improve cooling.

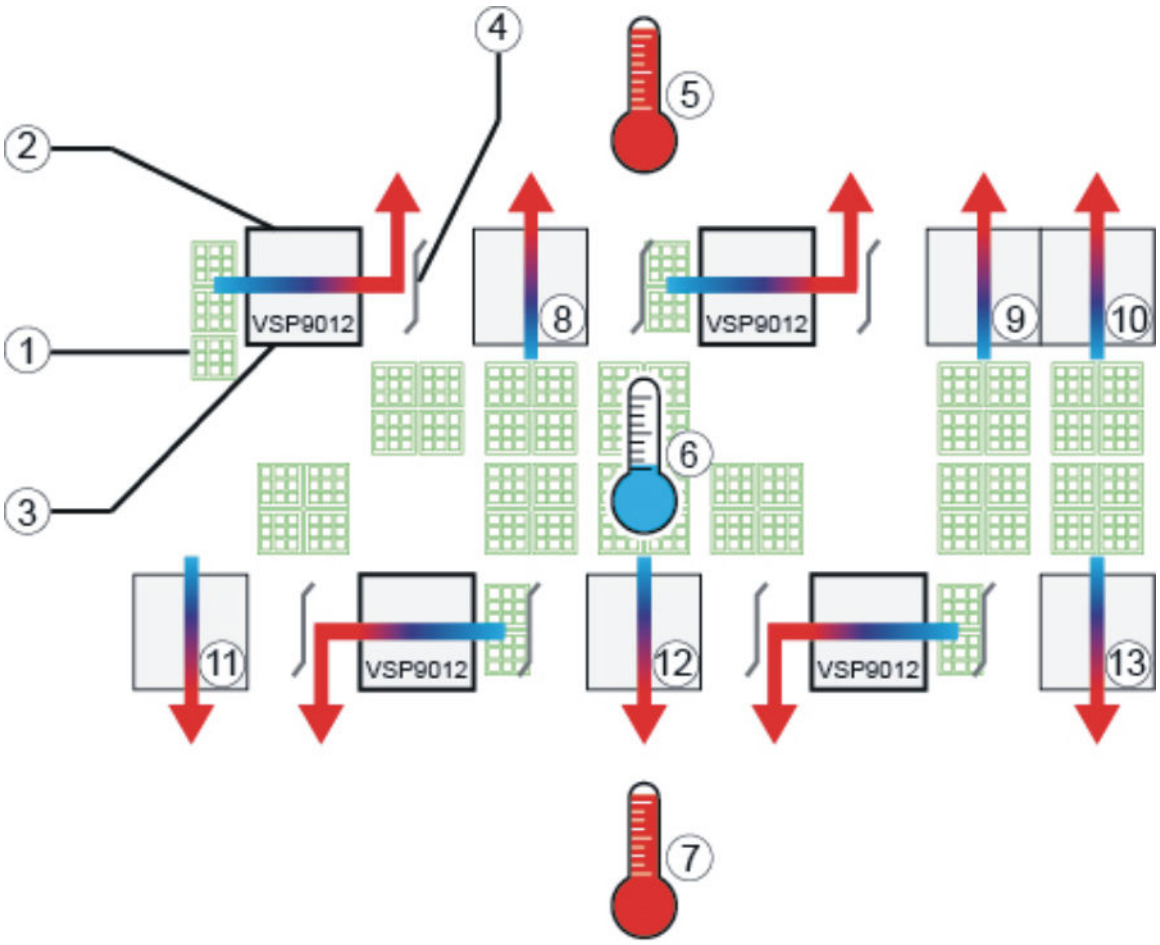


Figure 12: Data center with optimized cooling

Table 17: Data center with optimized cooling

Diagram	Description
1	Cooling floor tiles
2	Back of VSP 9012 chassis
3	Front of VSP 9012 chassis
4	Baffle
5, 7	Hot aisles
6	Cold aisle
8 to 13	Other equipment, front to back cooling

Virtual Services Platform 9012 placement in the rack

If you place each Virtual Services Platform 9012 in a row from left to right, the chassis to the left discharges hot air into the cool intake of the chassis to the right.

To optimize airflow, stagger each chassis in racks and add a baffle that redirects hot air discharged by a chassis from the side to the hot aisle at the back.

Note:

Before setting up your data center plan airflow of cool air into each chassis.

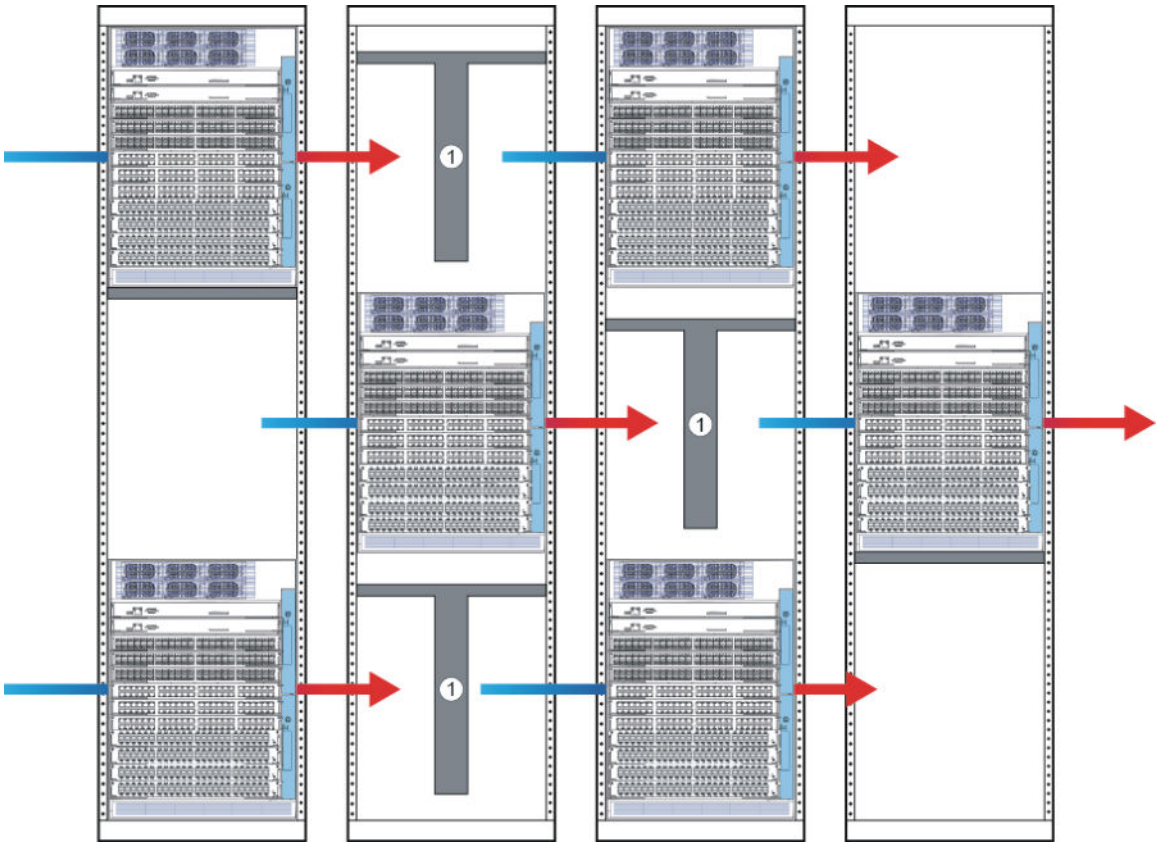


Figure 13: Arrangement of VSP 9012 in rack to optimize airflow

Other cooling considerations

This table offers suggestions for other cooling considerations.

Situation	Considerations
Raised floors versus non-raised floors for cooling	If you do not have raised floors for cooling you need to ensure air is injected into the cool intake at the left side. You can add extra stand alone fans to ensure air enters the chassis.
Adjacent equipment	Consider hot airflow from other pieces of equipment in the vicinity of the Virtual Services Platform 9012. Computers, Telecommunications, and other equipment located above and below the Virtual Services Platform 9012 can discharge hot air onto the chassis.
Blocked cooling modules	Placement of the Virtual Services Platform 9012 near walls or placement of exterior items for cable management can decrease the capacity of the cooling

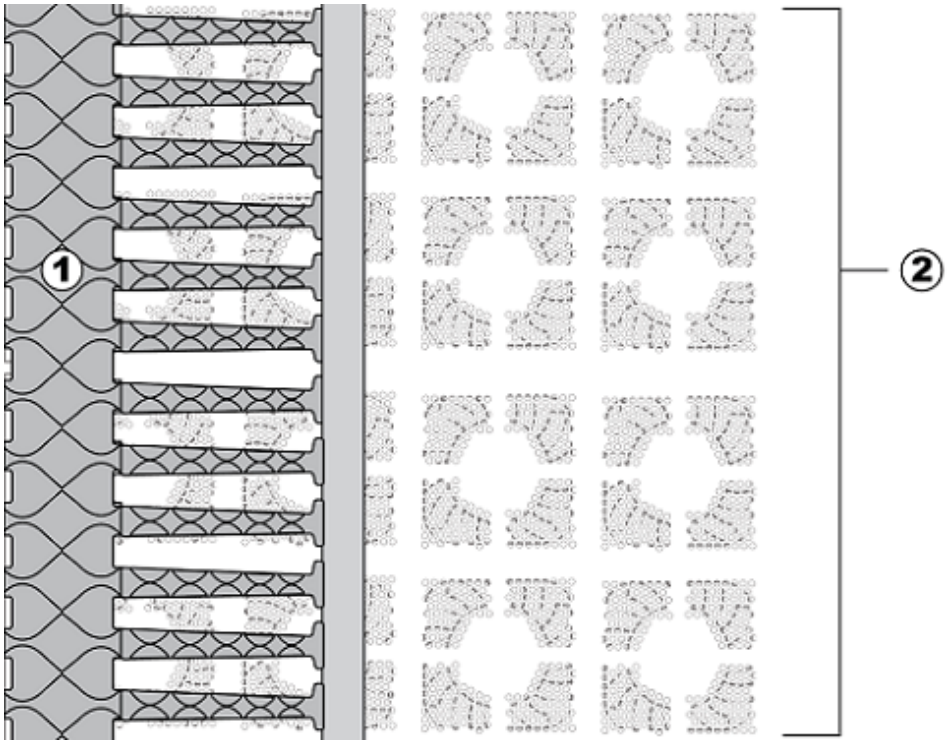
<table>
<tr><th>Situation</th><th>Considerations</th></tr>
<tr><td></td><td>modules. For instance, the following diagram shows how cable management blocks two out of four fans in a row. As a result, the cooling module can only offer 50 per cent of the cooling airflow.


Figure 14: Cable management cooling modules
<table>
<tr><th>Diagram</th><th>Description</th></tr>
<tr><td>1</td><td>Cable management blocking fans</td></tr>
<tr><td>2</td><td>Fans</td></tr>
</table></td></tr>
<tr><td>Clearance</td><td>Do not place the Virtual Services Platform 9012 chassis directly against a wall, equipment, or other obstruction. Avaya recommends 36 inches (91 centimeters) of free space in both the front and back of the machine and 6 inches (15.2 centimeters) on each side). However, dependent on circumstances, increase the space at the side of the Virtual Services Platform 9012 to improve airflow.</td></tr>
</table>

Protecting modules

Virtual Services Platform 9000 modules are larger and heavier than Ethernet Routing Switch 8000 series modules.

Handle the modules used in Virtual Services Platform 9000 with care. Take the following items into consideration when you handle modules:

- To prevent damage from electrostatic discharge, always wear an antistatic wrist strap connected to an ESD jack when you connect cables or you perform maintenance on this device.
- Always place the modules on appropriate antistatic material.
- Support the module from underneath with two hands. Do not touch components or connector pins with your hand, or damage can result.
- Damage to a module can occur if you bump the module into another object, including other modules installed in a chassis. Be careful not to bump module connectors against the action levers of an adjacent module. Damage to connectors can result. Use both hands to support modules.
- Visually inspect the connectors for damage before you insert the module. If you insert a module with damaged connectors you will damage the midplane.
- Check the clearance between the insertion lever and the gasket on adjacent modules during insertion or extraction.
- Do not stack modules one on top of the other when you move them.
- Do not leave slots open. Fill all slots with modules or filler modules to maintain safety compliance, proper cooling, and EMI containment.
- Do not over tighten screws. Tighten until snug. Do not use a power tool to tighten screws.

Chapter 4: Cooling module installation and removal for the VSP 9010

This section describes how to install and remove the cooling modules in the Virtual Services Platform 9010.

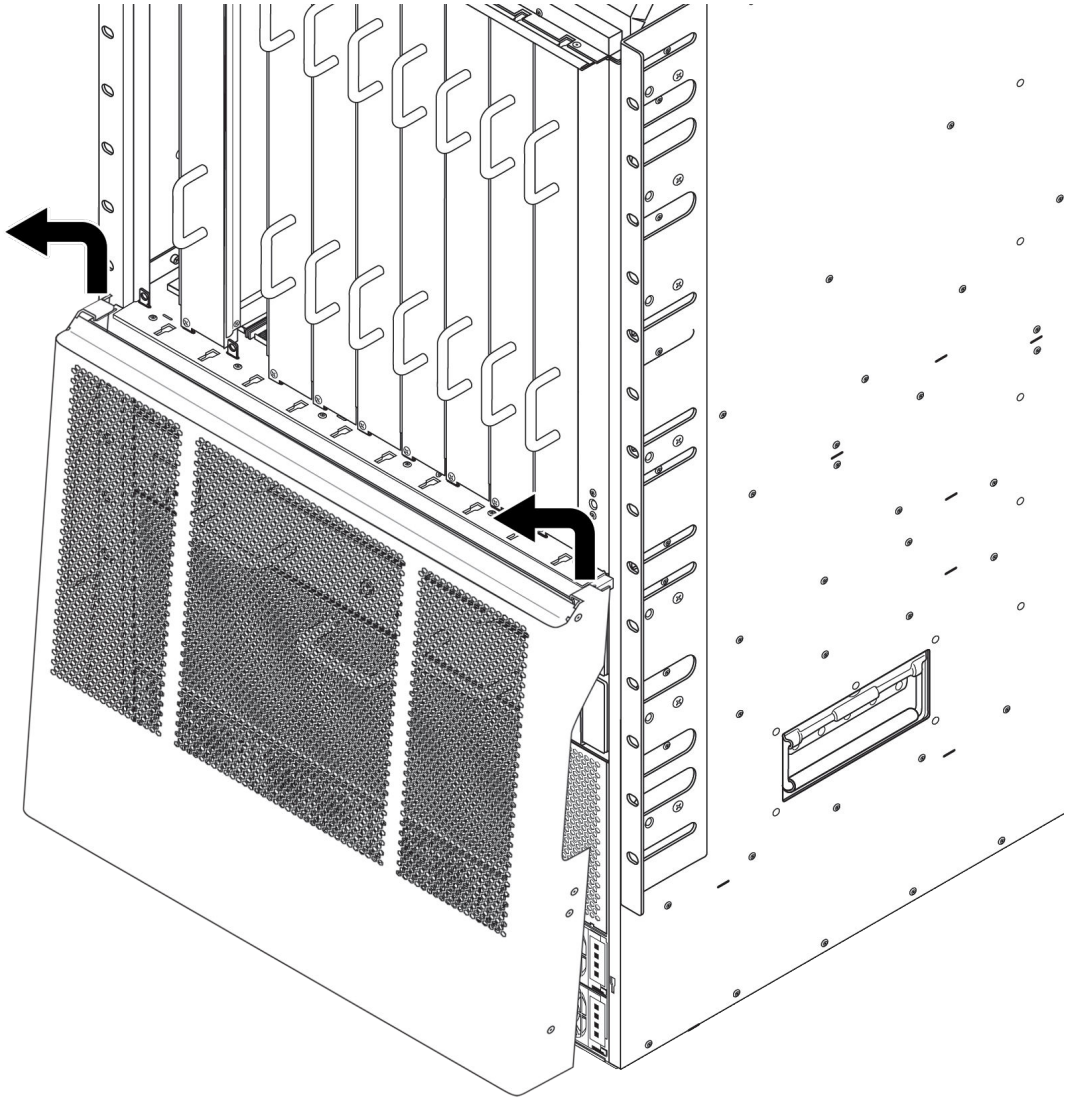
Install the cooling module in the front of the chassis to provide cooling to the modules in the front of the chassis and also to the Switch Fabric in the back of the chassis. Installation takes 2 to 5 minutes.

Removing the air inlet cover

Before you can install or remove a power supply or cooling module, you must remove the air inlet cover from the chassis.

Procedure

1. Grasp the cover on each side.
2. Lift the cover up and away from the chassis.



Installing the cooling module for the VSP 9010

The cooling module for the Virtual Services Platform 9010 provides cooling from front-to-back. You must install two 9010CM cooling modules in the chassis. You can hot swap the cooling modules. Install the cooling modules horizontally in the front of the Virtual Services Platform 9010.

Before you begin

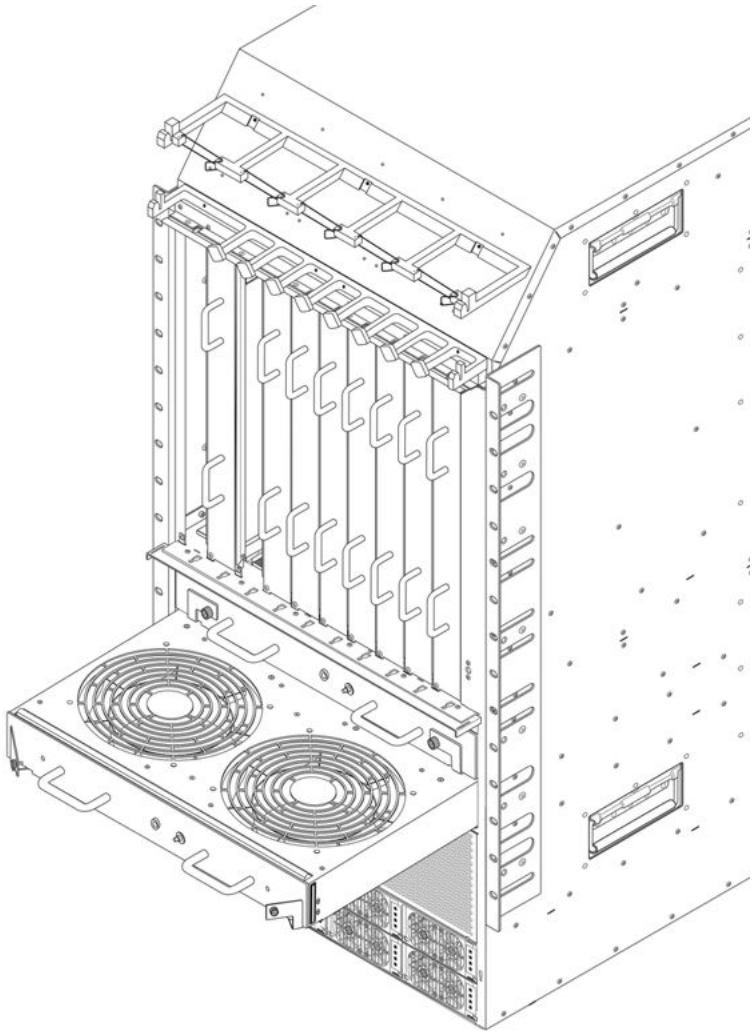
- Remove the air inlet bezel.
- Acquire the following items:
  - Phillips #2 screwdriver
  - Antistatic wrist strap

Electrostatic alert:

ESD can damage electronic circuits. Do not touch electronic hardware unless you wear a grounding wrist strap or other static-dissipating device.

Procedure

1. Locate the bay where you want to install the cooling module.
2. Rotate the two action levers on the front of the module to the fully open position, as shown in the following figure.



3. Slide the cooling module into the chassis until the cooling module is flush with the sides of the chassis.

   The connector at the rear of the cooling module must connect to the midplane.
4. Rotate the action levers until the levers are parallel with the module.
5. Use the screwdriver to tighten the two captive screws to the left and right of the cooling module to secure the cooling module to the chassis.

6. Verify that the cooling module LED light is green.

   Note:

   The LED goes from yellow to green. It can take up to 1 minute for the LED to turn green.

Removing the cooling module from the VSP 9010

Remove the cooling module from the slot at the front of the chassis to replace it. You can hot swap the cooling modules.

Before you begin

- Remove the air inlet bezel.
- Acquire the following items:
  - Phillips #2 screwdriver
  - Antistatic wrist strap

Electrostatic alert:

ESD can damage electronic circuits. Do not touch electronic hardware unless you wear a grounding wrist strap or other static-dissipating device.

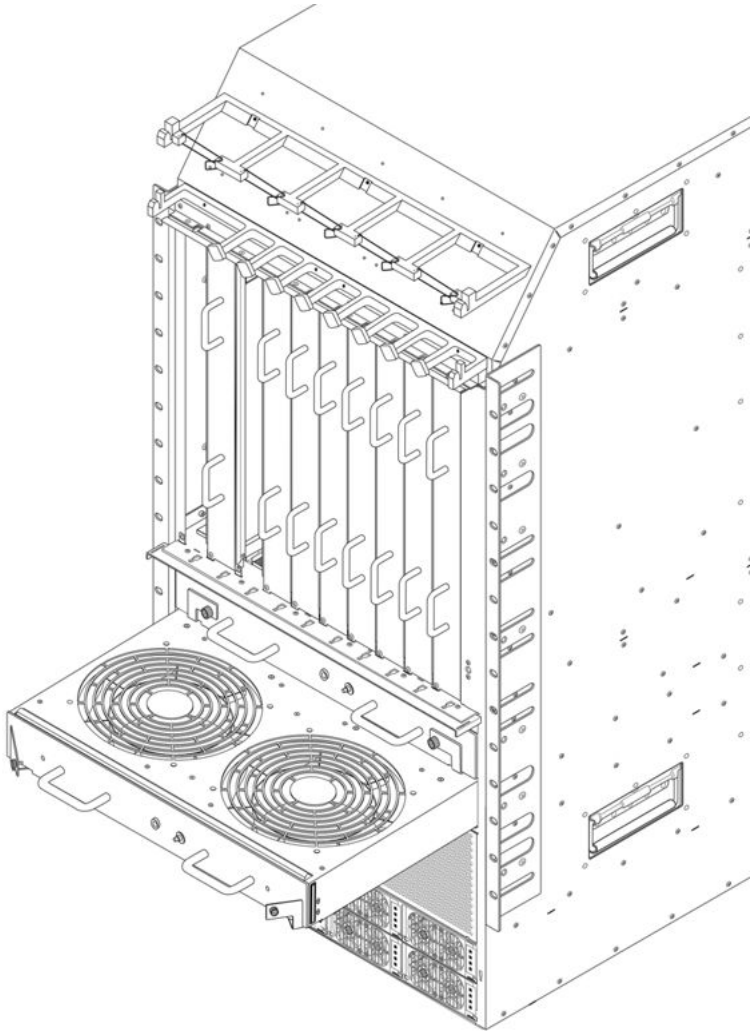
Procedure

1. Loosen the captive screws that secure the cooling module to the midplane.
2. Press the cooling module service button and hold for 3 seconds or until the LED flashes red. The fans begin to spin down.

   Important:

   The fans do not spin down completely at this point due to the spinning fans of the companion cooling module. You have 15 seconds to remove the cooling module before the fans begin to spin back up. The LED flashes faster when only 5 seconds remains.

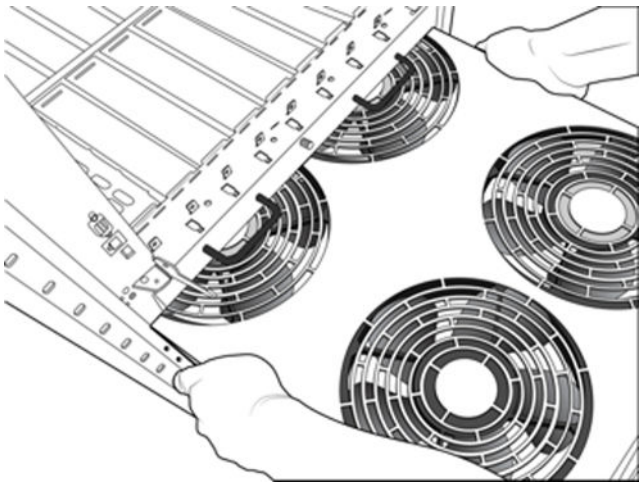
3. Rotate the action levers on the front of the module to the fully open position, as shown in the following figure.



Danger:

Risk of personal injury

When you remove a cooling module, allow time for the fans to spin down before you fully withdraw the cooling module. Be careful to keep your fingers out of the fan blades, as shown in the following figure.



4. Grasp the handles and partially remove the cooling module to expose two of the four axial fans, and allow them to spin down, as shown in the preceding figure.

   Important:

   Do not leave the cooling module in a partially open position for an extended period of time because the metal of the cooling module can rest on top of the spinning fans of the companion cooling module and cause significant loss in air volume.

   Warning:

   The cooling module is heavy. Use both hands to support the weight of the module.

5. Grasp the cooling module on both sides midway between the front and rear fans to support the weight of the cooling module. Continue to slide the module out of the chassis.

   Caution:

   To prevent data loss from a module overheating and shutting down, do not allow the chassis to operate for an extended period of time with only a single cooling module. Keep the failed cooling module installed in the chassis until you have a replacement module or keep a replacement cooling module available for immediate replacement.

Chapter 5: Cooling module installation and removal for the VSP 9012

This section describes how to install and remove the cooling modules for the Virtual Services Platform 9012.

Install a cooling module to provide cooling to the interface, Switch Fabric (SF), and Control Processor (CP) modules. Installation takes 2 to 5 minutes.

Installing the I/O cooling module for the VSP 9012

Install the I/O cooling module in the front of the chassis to provide cooling to the interface and CP modules. You must install two I/O cooling modules in the chassis. You can hot swap the cooling modules.

Before you begin

Determine which of the following two types of I/O cooling modules you require for the Virtual Services Platform 9012:

- 9012FC cooling module: Use with first generation modules.
- 9012FCHS cooling module: Required for second generation modules and can use with first generation modules.

Note:

The Virtual Services Platform 9000 supports the 9048XS-2 module in first generation mode and second generation mode. The Virtual Services Platform 9012 requires the 9012FCHS I/O cooling module to be installed before you install the 9048XS-2 module.

Procedure

1. Locate the bay where you want to install the cooling module.
2. Slide the cooling module into the chassis.

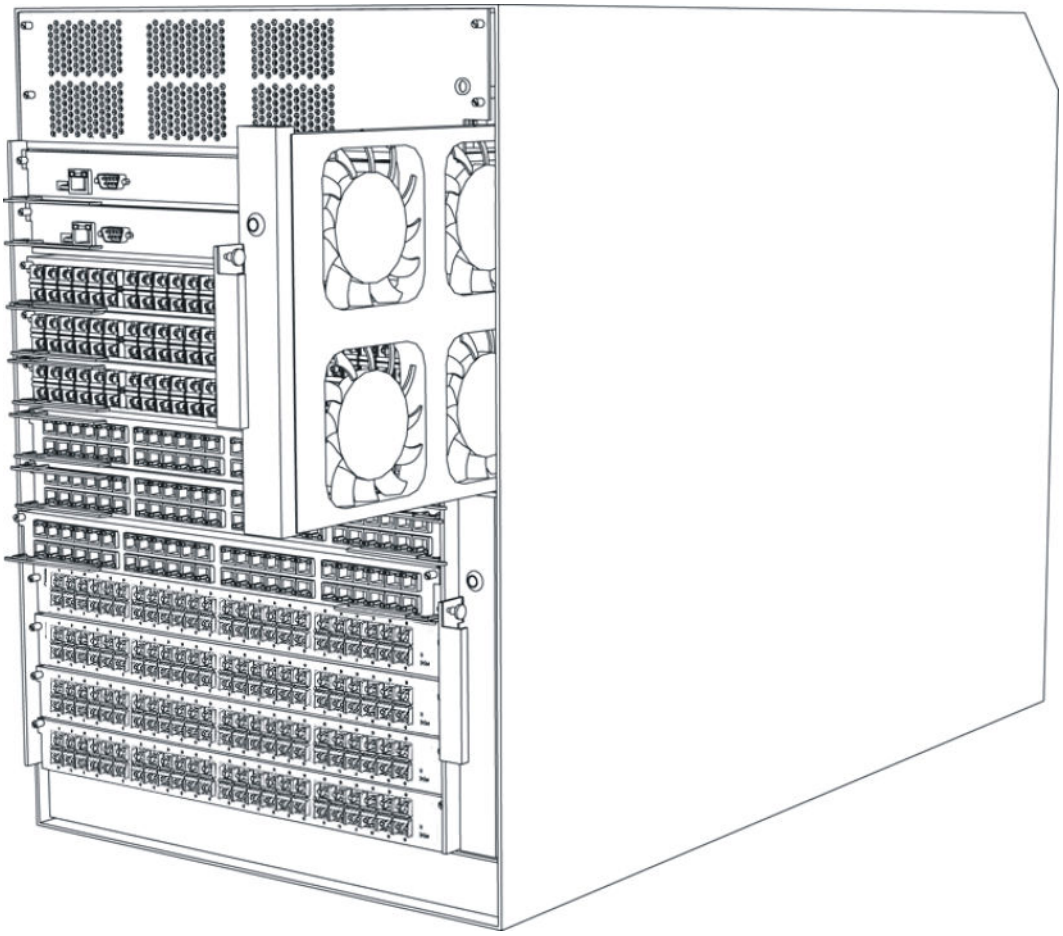


Figure 15: I/O cooling module partially removed

Note:

When using the 9048XS-2 I/O module, both fan tray bays must be installed with 9012FCHS cooling modules.

3. With one hand, pull the pin on the cooling module to the right, and then hold it in place.
4. Slide the cooling module into the chassis until the cooling module is flush with the chassis side.

   The connector at the rear of the cooling module must connect to the midplane.
5. Release the pin on the cooling module.
6. Verify that the cooling module LED light is green.

Removing the I/O cooling module for the VSP 9012

Remove the I/O cooling module from the slot at the front of the chassis to replace it. You can hot swap the cooling modules.

Before you begin

Acquire the following items:

- Phillips #2 screwdriver
- Antistatic wrist strap

Electrostatic alert:

ESD can damage electronic circuits. Do not touch electronic hardware unless you wear a grounding wrist strap or other static-dissipating device.

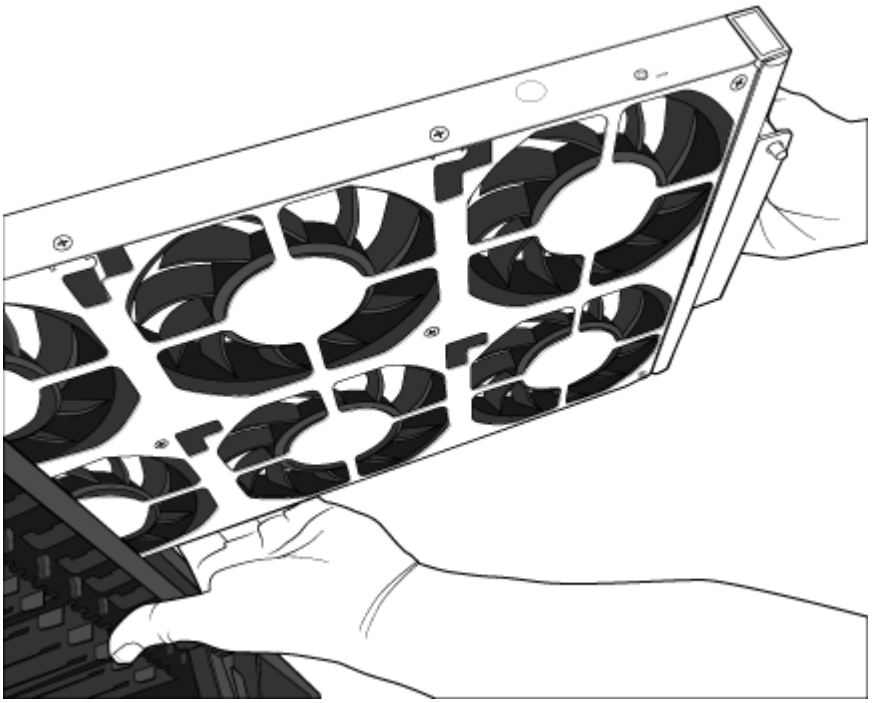
Procedure

1. With one hand, pull the pin on the cooling module to the right and hold it in place.

   Danger:

   Risk of personal injury

   When you remove a cooling module, allow time for the fans to spin down before you fully withdraw the cooling module. Be careful to keep your fingers out of the fan blades, as shown in the following figure.



2. Pull the module out of the chassis until it is partially removed, as shown in the following figure. Allow time for the fans to spin down.

Comments? infodev@avaya.com

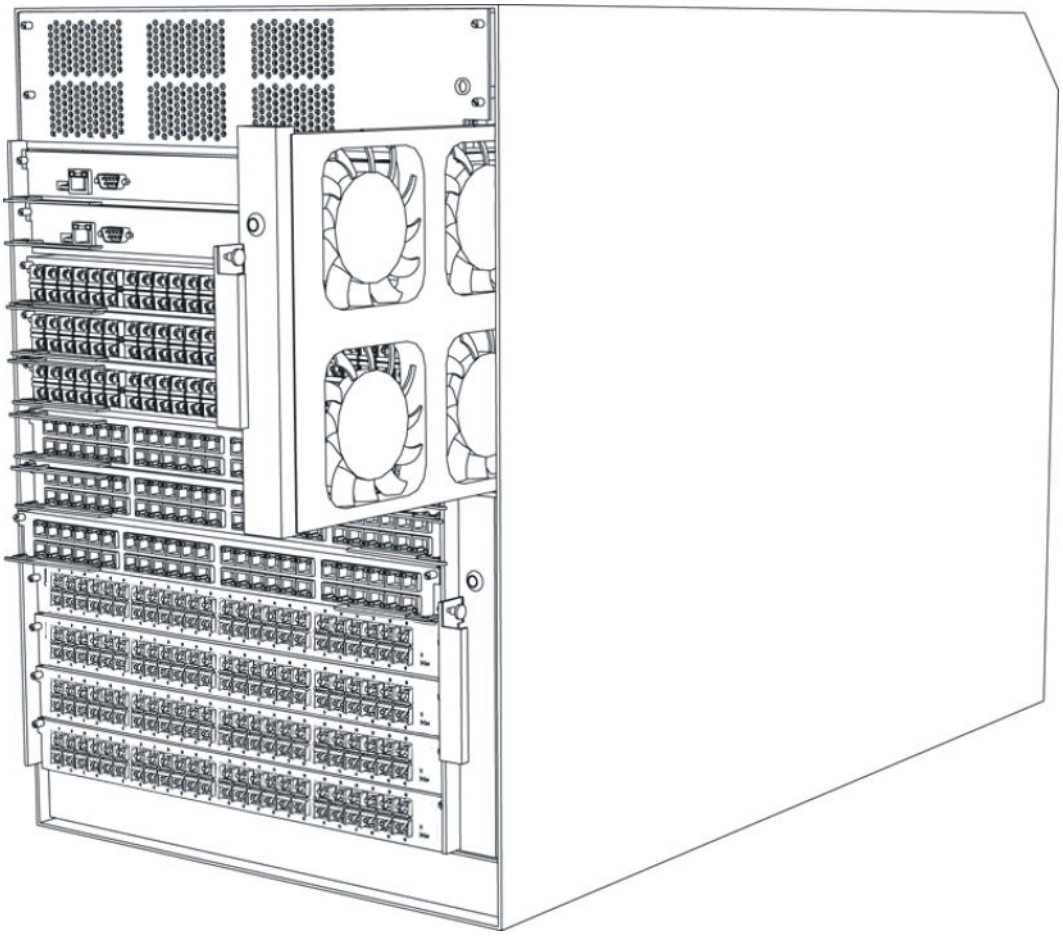


Figure 16: I/O cooling module partially removed

3. Continue to slide the module out of the chassis and use your free hand to support the weight at the rear of the module.

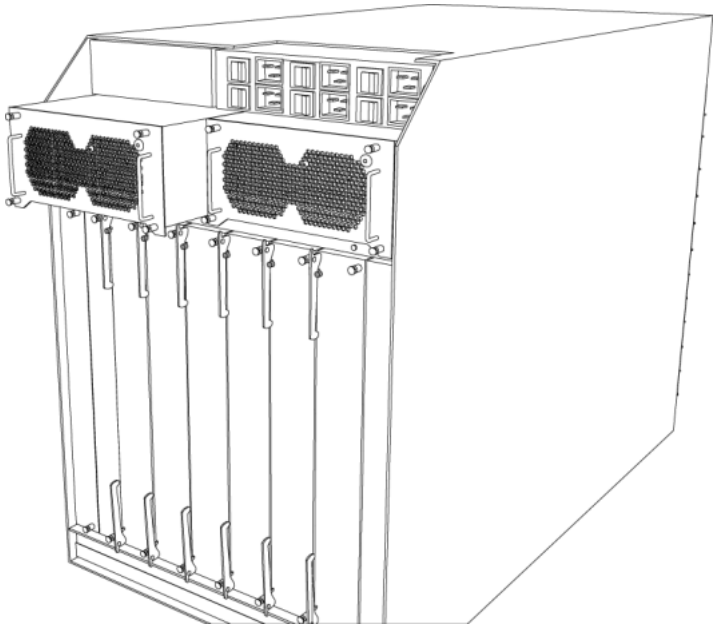
Installing the SF cooling module for the VSP 9012

Install the SF cooling module in the back of the chassis to provide cooling to the SF modules. You must install two SF cooling modules in the chassis. You can hot swap the cooling modules.

Procedure

1. Locate the bay where you want to install the cooling module.
2. Grasp the handle on the cooling module and slide the module into the chassis until the module is flush with the side of the chassis.

   The connector at the rear of the cooling module must connect to the midplane.



3. Tighten the captive screws on the bottom of the cooling module to fasten the cooling module to the chassis.
4. Verify that the cooling module LED light is green.

Removing the SF cooling module for the VSP 9012

Before you begin

Acquire the following items:

- Phillips #2 screwdriver
- Antistatic wrist strap

Electrostatic alert:

ESD can damage electronic circuits. Do not touch electronic hardware unless you wear a grounding wrist strap or other static-dissipating device.

About this task

Remove the SF cooling module from the slot to remove it. You can hot swap the cooling modules.

Procedure

1. Loosen the captive screws that secure the cooling module to the midplane.

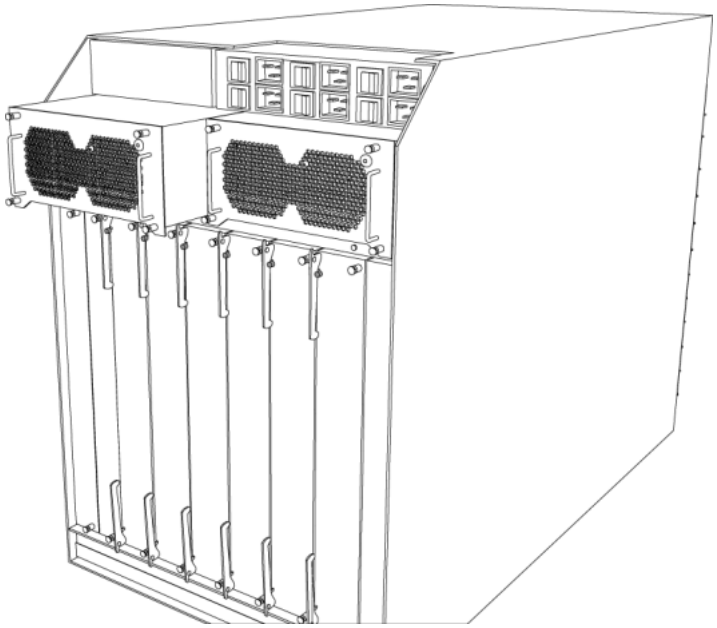
   Danger:

   Risk of personal injury

Comments? infodev@avaya.com

When you remove a cooling module, allow time for the fans to spin down before you fully withdraw the cooling module. Be careful to keep your fingers out of the fan blades.

2. Grasp the handle and slide the module out of the chassis until it is partially removed, as shown in the following figure. Allow time for the fans to spin down.



3. Continue to slide the module out of the chassis and use your free hand to support the weight at the rear of the module.

Chapter 6: Translations of safety messages

This chapter provides the translation of precautionary notices that you must read and follow for safe operation of the Avaya Virtual Services Platform 9000.

Class A electromagnetic interference warning statement

Warning:

Risk of electromagnetic interference

This device is a Class A product. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users are required to take appropriate measures necessary to correct the interference at their own expense.

Warning:

AVERTISSEMENT

Le périphérique est un produit de Classe A. Le fonctionnement de cet équipement dans une zone résidentielle risque de causer des interférences nuisibles, auquel cas l'utilisateur devra y remédier à ses propres frais.

Warning:

WARNUNG

Dies ist ein Gerät der Klasse A. Bei Einsatz des Geräts in Wohngebieten kann es Störungen des Radio- und Fernsehempfangs verursachen. In diesem Fall muss der Benutzer alle notwendigen Maßnahmen ergreifen, die möglicherweise nötig sind, um die Störungen auf eigene Rechnung zu beheben.

Warning:

ADVERTENCIA

Este es un producto clase A. El uso de este equipo en áreas residenciales puede causar interferencias nocivas, en cuyo caso, se requerirá que los usuarios tomen cualquier medida necesaria para corregir la interferencia por cuenta propia.

Warning:

AVISO

Este dispositivo é um produto Classe A. Operar este equipamento em uma área residencial provavelmente causará interferência prejudicial; neste caso, espera-se que os usuários tomem as medidas necessárias para corrigir a interferência por sua própria conta.

Warning:

AVVISO

Questo dispositivo è un prodotto di Classe A. Il funzionamento di questo apparecchio in aree residenziali potrebbe causare interferenze dannose, nel cui caso agli utenti verrà richiesto di adottare tutte le misure necessarie per porre rimedio alle interferenze a proprie spese.

Electrostatic discharge caution statement

Electrostatic alert:

ELECTROSTATIC ALERT

ESD can damage electronic circuits. Do not touch electronic hardware unless you wear a grounding wrist strap or other static-dissipating device.

Electrostatic alert:

ELEKTROSTATIKWARNUNG

Elektronische Schaltkreise können durch elektrostatische Entladung beschädigt werden. Berühren Sie elektronische Hardware nur, wenn Sie ein Erdungsarmband oder ein anderes Statik ableitendes Medium tragen.

Electrostatic alert:

ALERTA DE ELECTROESTÁTICA

Una descarga electroestática puede dañar los circuitos eléctrónicos. No toque el hardware electrónico a no ser que utilicé una muñequera antiestática u otro dispositivo disipador de estática.

Electrostatic alert:

ALERTA CONCERNANT LES DÉCHARGES ÉLECTROSTATIQUES

Une décharge électrostatique (DES) peut endommager les circuits électroniques. Ne touchez pas le matériel électronique, à moins de mettre à votre poignet une bande de mise à la masse ou autre dispositif dissipant l'électricité statique.

Electrostatic alert:

ALERTA DE ELETROSTÁTICA

ESD pode danificar circuitos eletrônicos. Não toque em equipamentos eletrônicos a menos que esteja utilizando pulseira de aterramento ou outro dispositivo para dissipação de energia estática.

Electrostatic alert:

AVVISO ELETTROSTATICO

Le scariche elettrostatiche (ESD) possono danneggiare i circuiti elettronici. Non toccare i componenti elettronici senza aver prima indossato un braccialetto antistatico o un altro dispositivo in grado di dissipare l'energia statica.

Cooling module fan safety danger statement

Danger:

Risk of personal injury

When you remove a cooling module, allow time for the fans to spin down before you fully withdraw the cooling module. Be careful to keep your fingers out of the fan blades.

Danger:

DANGER

Risque de blessures corporelles

Lorsque vous retirez un module de refroidissement, prenez le temps de laisser le ventilateur ralentir avant de retirer complètement le module de refroidissement. Veillez à tenir vos doigts à l’écart des pales du ventilateur.

Danger:

GEFAHR

Verletzungsgefahr

Wenn Sie ein Kühlmodul entfernen, warten Sie, bis die Lüfter zum Stillstand gekommen sind, bevor Sie das Modul komplett herausnehmen. Achten Sie darauf, dass Ihre Finger nicht die Lüfterflügel berühren.

Danger:

PELIGRO

Riesgo de lesiones

Cuando retire un módulo de refrigeración, espere a que las aspas disminuyan sus revoluciones antes de retirar completamente el módulo de refrigeración. Tenga cuidado y mantenga los dedos fuera de las aspas del ventilador.

Danger:

PERIGO

Risco de ferimentos

Quando remover um módulo de refrigeração, espere um pouco para que as pás parem de girar antes de retirar totalmente o módulo de refrigeração. Tome cuidado para manter os dedos longe das pás do ventilador.

Danger:

PERICOLO

Rischio di lesion personali

In fase di rimozione del modulo di raffreddamento, prima di estrarlo completamente, attendere che le ventole rallentino. Fare attenzione a non avvicinare le dita alle lame della ventola.

Glossary

cooling module (9010CM)	The cooling module is a hot swappable fan tray used to cool the Control Processor, I/O, and Switch Fabric modules in the Virtual Services Platform 9010. Two cooling modules are installed horizontally in the front of the chassis.
Electrostatic Discharge (ESD)	The discharge of stored static electricity that can damage electronic equipment and impair electrical circuitry that results in complete or intermittent failures.
I/O cooling module (9012FC)	The I/O cooling module is a hot swappable fan tray used to cool the I/O and CP modules in the Virtual Services Platform 9012.
I/O cooling module (9012FCHS)	The I/O cooling module is a hot swappable fan tray used to cool the I/O and CP modules in the Virtual Services Platform 9012. The 9012FCHS is a high speed cooling module for second generation I/O modules.
light emitting diode (LED)	A semiconductor diode that emits light when a current passes through it.
Switch Fabric (SF) cooling module (9012RC)	The SF cooling module is a hot swappable fan tray used to cool the Switch Fabric (SF) modules in the Virtual Services Platform 9012.