



# GigaVUE-HC3 Hardware Installation Guide

**GigaVUE H Series**

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# Change Notes

When a document is updated, the document version number on the cover page will indicate a new version and will provide a link to this Change Notes table, which will describe the updates.

Product Version	Document Version	Date Updated	Change Notes
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# About the GigaVUE H Series and TA Series

The Gigamon Visibility and Analytics Fabric delivers unprecedented switching capacity, port density, and 1Gb/10Gb/40Gb/100Gb support. The GigaVUE H Series and TA Series include the following models that run GigaVUE-OS:

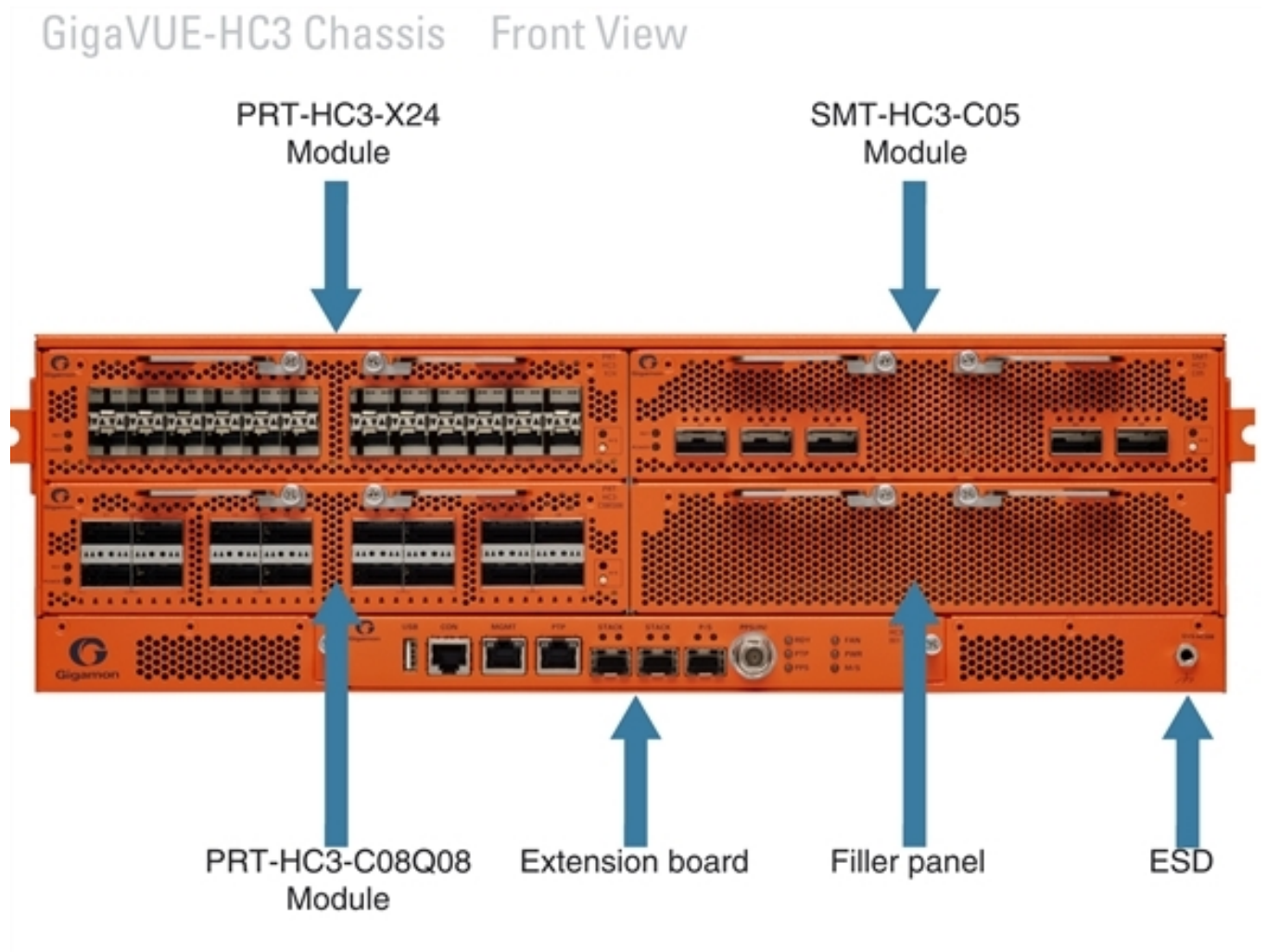
- GigaVUE-HC1
- GigaVUE-HC1-Plus
- GigaVUE-HC2
- GigaVUE-HC3
- GigaVUE-TA25
- GigaVUE-TA25E
- GigaVUE-TA100
- GigaVUE-TA200
- GigaVUE-TA200E
- GigaVUE-TA400
- Certified Traffic Aggregation White Boxes



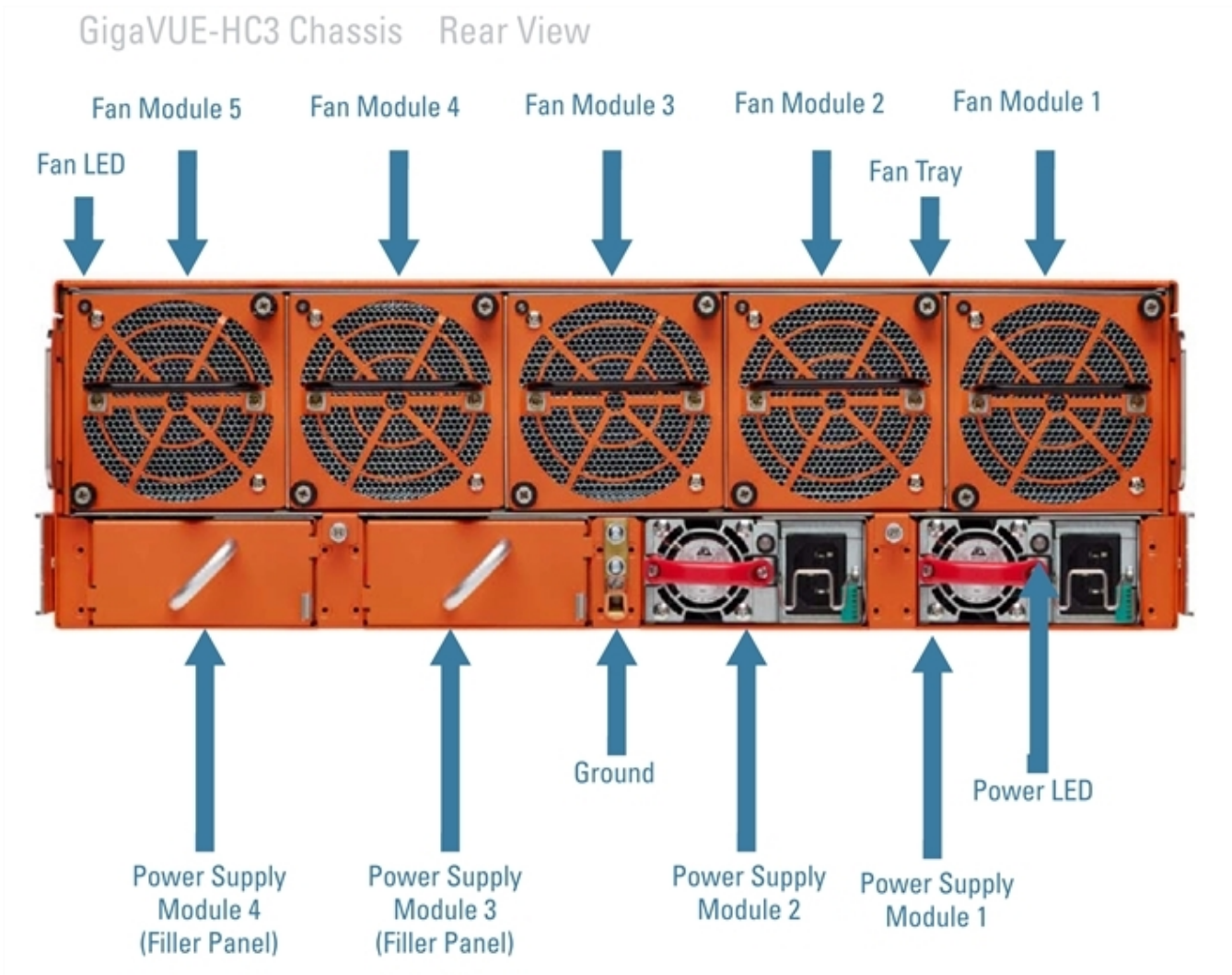
# Introducing the GigaVUE-HC3 Chassis

The fully-assembled GigaVUE-HC3 chassis consists of a 3RU, rack-mountable, 19in-wide chassis with management, network, and tool ports at the front and power connections, fans, and access to the control card at the rear. GigaSMART is available with SMT-HC3-C05 installed in the chassis. [Figure 1 Front View of the GigaVUE-HC3 Chassis](#) [Introducing the GigaVUE-HC3 Chassis](#) summarizes the bays on the front including modules and extension board, and [Rear View of the GigaVUE-HC3 Chassis](#) summarizes the rear of the GigaVUE-HC3 chassis including fans and power supply modules.

**NOTE:** Refer to [Unpacking the GigaVUE-HC3 Shipment](#) for assembly instructions.



**Figure 1** Front View of the GigaVUE-HC3 Chassis



**Figure 2** Rear View of the GigaVUE-HC3 Chassis



Table 1: GigaVUE-HC3 Chassis Bays and Components

Front Components on the GigaVUE-HC3 Chassis	
<b>Module Bays</b>	There are four module bays. They are numbered from 1 to 4, starting with top left, then bottom left; top right, then bottom right. (Refer to <a href="#">Introducing the GigaVUE-HC3 Chassis</a> .) The numbering of the module bays also determines the priority of the modules for power management. For information about power management, refer to <a href="#">Power Management</a> .
<b>Modules</b>	<a href="#">Introducing the GigaVUE-HC3 Chassis</a> shows three different GigaVUE-HC3 modules. Refer to <a href="#">GigaVUE-HC3 Modules</a> for descriptions of the modules.
<b>Cable Management</b>	The GigaVUE-HC3 provides optional cable management. Use it to securely route cables from ports to the left and right side of the node. Refer to <a href="#">Installing Cable Management Left and Right</a> for more information.
<b>Extension Board</b>	There is an extension board installed at the front of the node. The extension

Front Components on the GigaVUE-HC3 Chassis	
	board provides a USB port, console port, a management port, a PTP port, two stack ports, a P/S port and a PPS (IN) port, as well as status LEDs. Refer to <a href="#">GigaVUE-HC3 Extension Board</a> for more information.
Rear Components on the GigaVUE-HC3 Chassis	
<b>Power Supply Modules</b>	The GigaVUE-HC3 has load sharing power supply modules (PSMs). The node ships with two PSMs, but can be upgraded to four, thus offering 1+1 or 2+2 power redundancy. Both AC and DC power supply modules are available. Refer to <a href="#">Power Requirements</a> for information on power characteristics of the GigaVUE-HC3.
<b>Fan Tray</b>	The fan tray is installed at the rear of the node provide system cooling. The fan tray contains five fan modules with two fans per module. Each fan module can be removed separately from the fan tray. Refer to <a href="#">Fan Tray Procedures</a> for more information.
<b>Control Card</b>	The GigaVUE-HC3 includes a control card installed inside the node, accessible from the rear of the chassis, behind the fan tray. The control card provides switching and processing resources for the entire chassis. It also controls the Mgmt port and console port on the front of the node for network and local administrative access to the GigaVUE-OS command-line interface (CLI). The Mgmt port and console port are on the extension board. Starting in software version 5.4, Control Card version 2 (CCv2) is available. Refer to <a href="#">GigaVUE-HC3 Control Cards</a> for more information.

## GigaVUE-HC3 Overview

The GigaVUE-HC3 node delivers the next generation fabric visibility and security delivery platform. It offers high capacity in a modular 3RU footprint. It is optimized for 40Gb and 100Gb connectivity and offers port modules and high performance GigaSMART.

<b>GigaVUE-HC3</b>	<ul style="list-style-type: none"> <li>▪ <b>3RU Footprint</b></li> <li>▪ <b>Four Module Slots (Bays)</b></li> <li>▪ <b>Internal Control Card</b></li> <li>▪ <b>Extension Board</b></li> <li>▪ <b>Dedicated Cluster Management Port</b></li> <li>▪ <b>Supports all GigaVUE-HC3 Modules</b></li> <li>▪ <b>Cluster with GigaVUE H Series and GigaVUE TA Series Nodes</b></li> <li>▪ <b>All ports, excluding BPS ports, of same type and speed can be used to create GigaStream.</b></li> </ul>	<p style="text-align: center;">GigaVUE-HC3</p> <div style="text-align: center;"> <p>Front</p>  <p>Rear</p>  </div>
--------------------	---	--

## GigaVUE-HC3 Control Cards

The GigaVUE-HC3 includes a control card installed inside the node, accessible from the rear of the chassis, behind the removable fan tray. The control card provides switching and processing resources for the entire chassis.

The control card connects up to four modules. It is also referred to as the main board. The control card controls the Mgmt port and console port of the node for network and local administrative access to the GigaVUE-OS command-line interface (CLI). The ports are located on the extension board installed in the front of the chassis. For more information, refer to [GigaVUE-HC3 Extension Board](#).

There are two versions of control card. Refer to [Control Card Version 1 \(CCv1\)](#) and [Control Card Version 2 \(CCv2\)](#).

### Control Card Version 1 (CCv1)

Control card version 1 (CCv1) supports the following modules:

- PRT-HC3-X24
- PRT-HC3-C08Q08
- SMT-HC3-C05
- BPS-HC3-C25F2G
- BPS-HC3-Q35C2G
- BPS-HC3-C35C2G

## Control Card Version 2 (CCv2)

Control card version 2 (CCv2) supports the same modules as CCv1, as well as the following module:

- PRT-HC3-C16
- SMT-HC3-C08

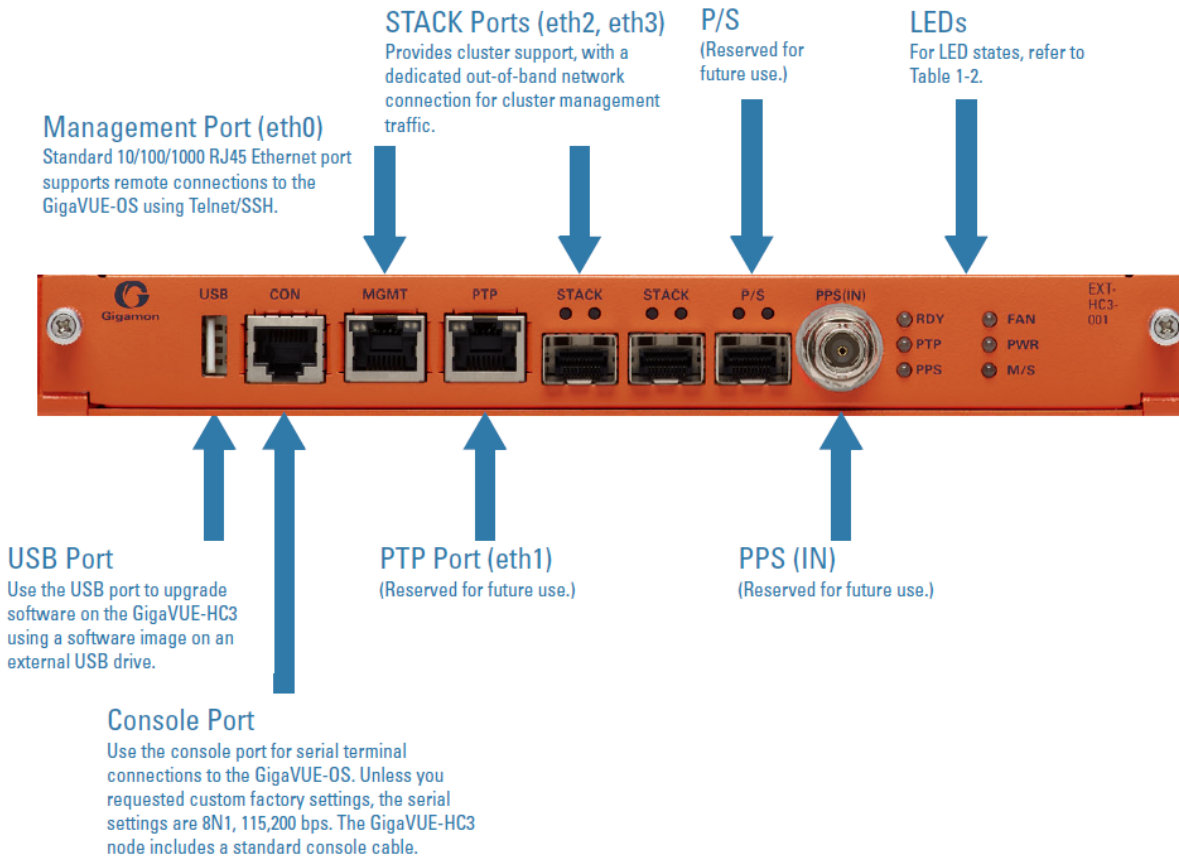
In addition, CCv2 supports the following:

- 25Gb optics on the 10Gb ports on the PRT-HC3-X24, BPS-HC3-C25F2G, BPS-HC3-Q35C2G, and BPS-HC3-C35C2G modules
- 25Gb port breakout on the PRT-HC3-C16, PRT-HC3-C08Q08, SMT-HC3-C05 and SMT-HC3-C08 modules

## GigaVUE-HC3 Extension Board

The GigaVUE-HC3 extension board is installed in the front of the chassis, providing the Mgmt and console ports for network and administrative access. It is an extension of the main board or control card.

The extension board also provides status LEDs and other ports, such as stack ports for cluster management. For further details about the extension board, refer to [Figure 3GigaVUE-HC3 Extension Board](#). The status LEDs on the extension board are described in [Table 2: Extension Board Ports and LEDs](#).



**Figure 3** GigaVUE-HC3 Extension Board

*Table 2: Extension Board Ports and LEDs*

LED	LED Color	Description
CON Port	—	Configure the GigaVUE-HC3 locally over a serial terminal connection (RJ-45 console port).
MGMT Port	—	Configure the GigaVUE-HC3 remotely over a SSH connection (RJ-45 management port, 10/100/1000BASE-T).

LED	LED Color	Description
PTP Port	—	In GigaVUE-HC3 Control Card Version 1 (CCv1), the PTP port is used a eth1. In GigaVUE-HC3 Control Card Version 2 (CCv2), the PTP port is reserved for future use.
STACK Ports (3)	—	Use to connect to other nodes for cluster management.  <b>NOTE:</b> The cluster management stack port link will be displayed as “up” in the output of the <b>show interfaces</b> command, even after the cable was disconnected. View the link on/off LED on the front panel of the node to check the state of the cluster management stack port link.
P/S	—	Reserved for future use.
PPS(IN)	—	Reserved for future use.
MGMT Port LEDs	Solid Amber	Link up
	Blinking Green	Activity
STACK Port LEDs	Solid Green	Link up/activity
	Solid Amber	Disabled port
	OFF	Port is administratively enabled, but the link is down
RDY	OFF	No power to system
	Solid Green	Normal operation
	Solid Red	Critical alarm
PPS	OFF	PPS clock not locked
	Solid Green	PPS clock locked
	Solid Red	Fault
FAN	OFF	No power to system
	Solid Green	Normal operation
	Solid Red	Fault
PWR	OFF	Power is disconnected
	Solid Green	Normal operation

LED	LED Color	Description
	Solid Red	Fault
M/S	OFF	Node is member node (standby or normal node) in a cluster  <b>NOTE:</b> When a GigaVUE-HC3 node is a standalone node, the M/S LED could be OFF or Solid Green, depending on whether or not it was ever the leader in a cluster previously.
	Solid Green	Node is a leader in a cluster

## Dual BIOS Images

The GigaVUE-HC3 has a dual Basic Input/Output System (BIOS). The BIOS image is packaged with the software image, starting in software version 5.0. The BIOS contents are stored in flash memory, allowing the BIOS to be upgraded. There are two flash components, a primary and a secondary.

The following CLI command displays the two flash components and indicates the BIOS image from which the system booted using asterisks:

```
(config) show version
...
1st flash version: coreboot-genesis-1.0.4 Wed May 17 03:02:21 UTC 2017 **
2nd flash version: coreboot-genesis-1.0.4 Wed May 17 03:02:21 UTC 2017
SW BIOS version:  coreboot-genesis-1.0.3 Thu Oct 6 08:15:33 UTC 2016
...
```

If there is a component failure in the primary flash, the GigaVUE-HC3 boots from a backup golden BIOS image in the secondary flash. An SNMP trap can be configured to be sent when the system has booted from the secondary flash. The trap may indicate that the primary flash component needs to be serviced. The trap is as follows:

```
2ndflashboot: Secondary flash boot notification
```

If a BIOS upgrade is needed for enhancements in future releases, the BIOS can be manually upgraded from the CLI using the **coreboot install** command.

## Chassis Cooling

The fans on the GigaVUE-HC3 run at 50% of their maximum speed on power up, then drop to approximately 30% during normal operations. The temperatures of five components are monitored: transceivers, exhaust, CPU, switch CPU, and GigaSMART CPU (e1/e2). When a component crosses a pre-defined threshold, the fan speed is adjusted dynamically, in increments of approximately 15% (from 30% to 45% to 60% to 75%, and finally to a maximum of 80% for CCv1 and CCv2).

An SNMP trap is sent when a component reaches the threshold for warning, alert, or critical temperature conditions. Refer to [Table 3: Component Temperature Thresholds and Actions](#) for the temperatures at which the warning, alert, and critical traps are sent and any additional action that occurs at a threshold.



Table 3: Component Temperature Thresholds and Actions

Transceiver Temperature	Exhaust Temperature	CPU Temperature	Switch CPU Temperature	GigaSMART CPU (e1/e2) Temperature
70°C Fan's speed increases	70°C Fan's speed increases	95°C Fan's speed increases	105°C Fan's speed increases	85°C Fan's speed increases
80°C SNMP trap sent; Transceiver power disabled and link goes down	75°C SNMP trap sent	100°C SNMP trap sent	110°C SNMP trap sent	90°C SNMP trap sent
85°C Link stays down	80°C System goes to halt	105°C System goes to halt	115°C System goes to halt	95°C SMT-HC3-C05 card shuts down

The output of the following CLI command for CCv1 displays the current exhaust, CPU, and switch CPU temperatures, as well as the intake temperature. For the GigaSMART card, SMT-HC3-C05, the temperatures of two GigaSMART CPUs are displayed under e1 CPU temperature and e2 CPU temperature, as follows:

```
(config) show environment type temperature
```

```
*** Box 1 (GVS-HC300) ***
```

```
-----
```

```
Card cc1 (CTL-HC3-001):
```

```
Intake temperature :      26 C
Exhaust temperature :      25 C
CPU temperature :         24 C
Switch CPU temperature :  45 C
```

```
-----
```

```
Card 1 (PRT-HC3-C08Q08):
```

```
Intake temperature :      28 C
Exhaust temperature :      26 C
```

```
-----
```

```
Card 2 (BPS-HC3-C25F2G):
```

```
Intake temperature :      31 C
Exhaust temperature :      40 C
```

```
-----
```

```
Card 3 (SMT-HC3-C05):
```

```
Intake temperature :      33 C
Exhaust temperature :      43 C
e1 CPU temperature :      38 C
e2 CPU temperature :      37 C
```

```
-----
```

```
Card 4 (PRT-HC3-X24):
```

```
Intake temperature :      27 C
Exhaust temperature :      28 C
```

```
=====
```

The output of the following CLI command for CCv2 displays the current exhaust, CPU, and switch CPU temperatures, as well as the intake temperature, as follows:

```
(config) show environment type temperature
*** Box 1 (GVS-HC300) ***
-----
Card cc1 (CTL-HC3-002):
Intake temperature :          28 C
Exhaust temperature :          28 C
CPU temperature :            28 C
Switch CPU temperature :      44 C
-----
Card 1 (PRT-HC3-C16):
Intake temperature :          33 C
Exhaust temperature :          38 C
-----
Card 2 (PRT-HC3-C08Q08):
Intake temperature :          31 C
Exhaust temperature :          35 C
-----
Card 4 (BPS-HC3-C25F2G):
Intake temperature :          32 C
Exhaust temperature :          31 C
=====
```

The output of the following CLI command displays the temperature of transceivers:

```
(config) show port params port-list 1/1/c5
          Parameter          1/1/c5
=====
...
          SFP type:          qsfp28 sr
...
SFP Power (1-2) (dBm):      -40.00 -40.00
SFP Power (3-4) (dBm):      -40.00 -40.00
SFP Power (5-6) (dBm):      -         -
SFP Power (7-8) (dBm):      -         -
SFP Power (9-10) (dBm):     -         -
          SFP Temperature (C):          20.94
...

```

The output of the following CLI command displays the fan speed in RPM:

```
(config) show environment type fan
*** Box 1 (GVS-HC300) ***
-----
Fan tray 1 (FAN-HC3-001):
1st fan :                    4593 RPM
2nd fan :                    4028 RPM
-----
Fan tray 2 (FAN-HC3-001):
1st fan :                    4593 RPM
2nd fan :                    4045 RPM
-----
Fan tray 3 (FAN-HC3-001):
```

1st fan : 4593 RPM

2nd fan : 4028 RPM

-----  
Fan tray 4 (FAN-HC3-001) :

1st fan : 4615 RPM

2nd fan : 4028 RPM

-----  
Fan tray 5 (FAN-HC3-001) :

1st fan : 4593 RPM

2nd fan : 4012 RPM  
=====

## Air Flow Direction

The air flow direction is from the front of the GigaVUE H Series chassis to the rear. The rear-mounted fans pull air from the front to the back of the chassis. For environments with hot/cold aisles, install the chassis so the intake air at the front of the chassis is cold.

## AC- and DC-Powered GigaVUE-HC3

Gigamon provides both AC- and DC-powered versions of the GigaVUE-HC3. Both models support the same control modules and can be populated with the modules of your choice. Refer to [Installing Power Supply Modules in GigaVUE-HC3](#) for information on connecting DC power supply modules.

## Breakout Panels

Breakout panels let you connect ports on a GigaVUE H Series node to a tool or network port or TAP for port breakout or aggregation.

The following breakout panels are available:

- PNL-M341/PNL-M341T
- PNL-M343/PNL-M343T

Refer to [G-TAP M Series Hardware Guide](#) for details.

## GigaVUE-HC3 Modules

With a variety of interchangeable modules and 3.2Tb throughput for CCv1 and 6.4Tb throughput for CCv2, GigaVUE-HC3 nodes are ready to grow with your needs. The following modules offer port speeds of 10Gb, 25Gb, 40Gb, and 100Gb:

<b>PRT-HC3-X24</b>	<ul style="list-style-type: none"> <li>● CCv1 - <b>Twenty-four</b> 10Gb (SFP+ and SFP+ Copper) Ports</li> <li>● CCv2 - <b>Twenty-four</b> 10Gb/25Gb (SFP+, SFP28, and SFP+ Copper) Ports</li> </ul>	<a href="#">PRT-HC3-X24 Module</a>
<b>PRT-HC3-C08Q08</b>	<ul style="list-style-type: none"> <li>● <b>Eight</b> 100Gb (QSFP28) Ports</li> <li>● <b>Sixteen</b> 40Gb (QSFP+) Ports</li> </ul>	<a href="#">PRT-HC3-C08Q08 Module</a>

<b>PRT-HC3-C16</b>	<ul style="list-style-type: none"> <li>● <b>Sixteen</b> 100Gb/40Gb (QSFP28) Ports</li> </ul>	<a href="#">PRT-HC3-C16 Module</a>
<b>SMT-HC3-C05</b>	<ul style="list-style-type: none"> <li>● GigaSMART module with <b>Five</b> 100Gb/40Gb (QSFP28) Ports</li> </ul>	<a href="#">SMT-HC3-C05 Module</a>
<b>BPS-HC3-C25F2G</b>	<ul style="list-style-type: none"> <li>● CCv1 - Bypass Combo Module with <b>Two</b> 100Gb/40Gb SR4 MPO BPS Port Pairs and <b>Sixteen</b> 10Gb SFP+ and SFP+ Copper Port Cages</li> <li>● CCv2 - Bypass Combo Module with <b>Two</b> 100Gb/40Gb/4x25Gb/4x10Gb SR4 MPO BPS Port Pairs and <b>Sixteen</b> 10Gb/25Gb SFP+, SFP28, and SFP+ Copper Port Cages</li> </ul>	<a href="#">BPS-HC3-C25F2G Module</a>
<b>BPS-HC3-C35C2G</b>	<ul style="list-style-type: none"> <li>● CCv1 - Bypass Combo Module with <b>Two</b> 100Gb LR BPS Port Pairs and <b>Sixteen</b> 10Gb SFP+ and SFP+ Copper Port Cages</li> <li>● CCv2 - Bypass Combo Module with <b>Two</b> 100Gb LR BPS Port Pairs and <b>Sixteen</b> 10Gb/25Gb SFP+, SFP28, and SFP+ Copper Port Cages</li> </ul>	<a href="#">BPS-HC3-Q35C2G and BPS-HC3-C35C2G Modules</a>
<b>BPS-HC3-Q35C2G</b>	<ul style="list-style-type: none"> <li>● CCv1 - Bypass Combo Module with <b>Two</b> 40Gb LR BPS Port Pairs and <b>Sixteen</b> 10Gb SFP+ and SFP+ Copper Port Cages</li> <li>● CCv2 - Bypass Combo Module with <b>Two</b> 40Gb LR BPS Port Pairs and <b>Sixteen</b> 10Gb/25Gb SFP+, SFP28, and SFP+ Copper Port Cages</li> </ul>	<a href="#">BPS-HC3-Q35C2G and BPS-HC3-C35C2G Modules</a>
<b>SMT-HC3-C08</b>	<ul style="list-style-type: none"> <li>● GigaSMART module with <b>Eight</b> 100Gb/40Gb (QSFP28) Ports</li> </ul>	<a href="#">SMT-HC3-C08 Module</a>

Modules are hot-swappable and can be installed in any of the available front bays in a GigaVUE-HC3 node. **However, refer to [Module Removal and Replacement Procedure \(Hot Removal\)](#) for instructions – you must follow a specific procedure when removing modules to preserve node stability.**

Before installing modules in the node, the GigaVUE-HC3 node must be running software version 5.0 or higher. Before installing the PRT-HC3-C16 module, the node must be running software version 5.4 or higher and be equipped with Control Card version 2 (CCv2).

Before installing the SMT-HC3-C08 module, the node must be running software version 5.13.xx or higher and be equipped with Control Card version 2 (CCv2).

## Module Numbering

Modules use standard conventions for identifying network and tool ports, both on the modules themselves, as well as in the CLI:

### 100Gb Ports

- Numbered with a leading **C**. For example, the SMT-HC3-C05 includes five 100Gb ports **C1** to **C5**.

<b>40Gb Ports</b>	<ul style="list-style-type: none"> <li>Numbered with a leading <b>Q</b>.</li> </ul>
<b>25Gb Ports</b>	<ul style="list-style-type: none"> <li>Numbered with a leading <b>X</b>. For example, the PRT-HC3-X24 includes twenty-four 25Gb ports <b>X1</b> to <b>X24</b>.</li> </ul>
<b>10Gb Ports</b>	<ul style="list-style-type: none"> <li>Numbered with a leading <b>X</b>. For example, the PRT-HC3-X24 includes twenty-four 10Gb ports <b>X1</b> to <b>X24</b>.</li> </ul>

**NOTE:** When referring to ports in the CLI, the format is **box ID/slot ID/port ID**. For example, **1/1/x6** refers to box 1, slot 1, port X6.

- GigaVUE-HC3:** Slots (bays) are numbered 1-4 from left upper, left lower, right upper to right lower. The numbering of the module bays also determines the priority of the modules for power management. Refer to [Power Management](#).

**NOTE:** The port labels on the module faceplate use upper-case C, Q, and X characters to identify ports. However, the CLI uses lowercase notation to refer to ports (for example, c1, q1, and x1).

## PRT-HC3-X24 Module

The PRT-HC3-X24 module provides a total 240Gb/600Gb of connectivity with line rate on-board switching across twenty-four 10Gb/25Gb SFP+, SFP28, and SFP+ Copper ports. Refer to [Figure 4PRT-HC3-X24 Module](#).

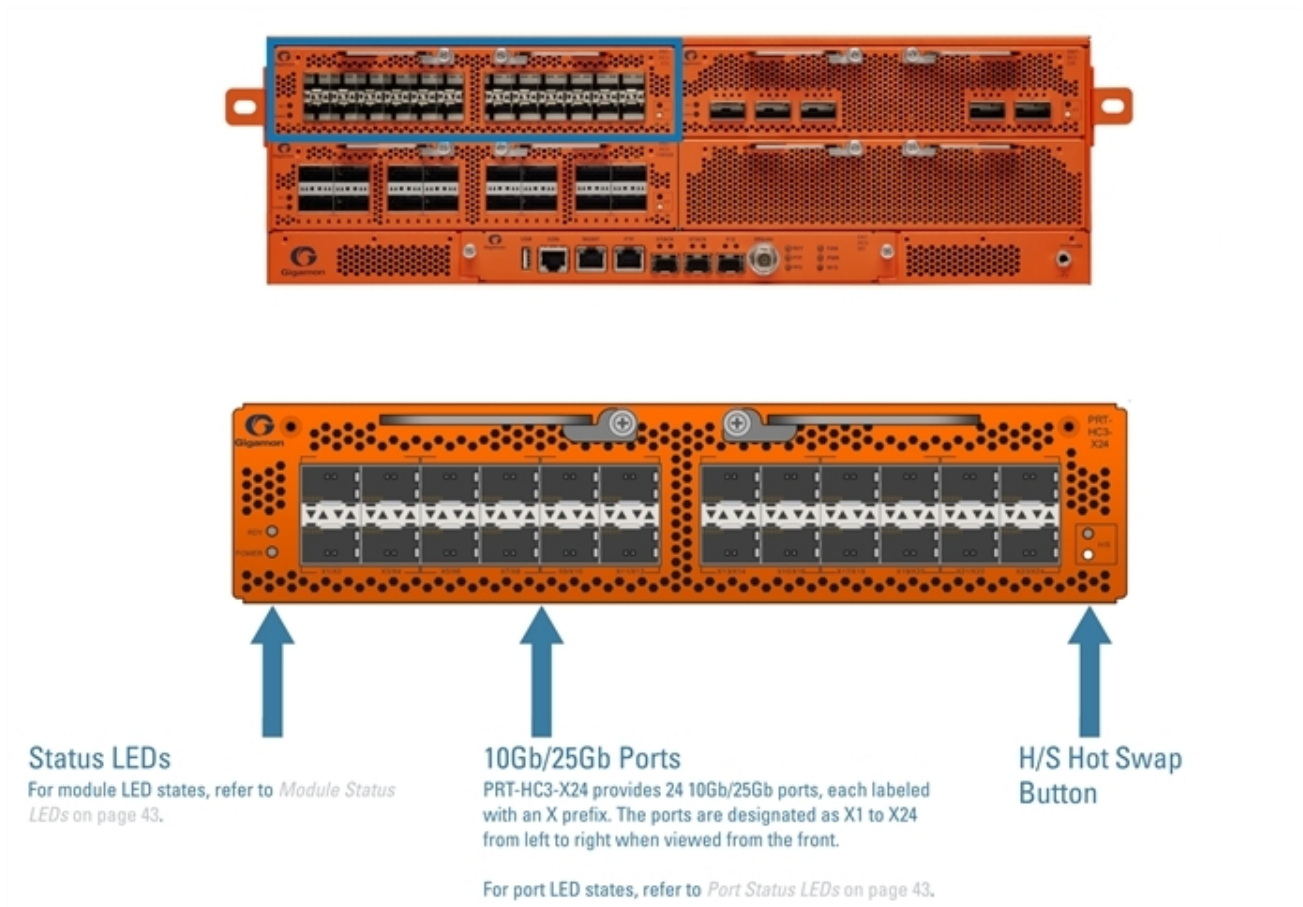
When four PRT-HC3-X24 modules are installed in the node, the GigaVUE-HC3 provides ninety-six 10Gb ports.

**NOTE:** The PRT-HC3-X24 module does not support 1Gb.

All ports in the PRT-HC3-X24 module can be used as network, tool, inline or hybrid ports. Moreover, the 25Gb and 10Gb ports can be used as stack-link ports. Starting in software version 5.4, SFP28 transceivers support 25Gb.

**NOTE:** To support 25Gb functionality, the GigaVUE-HC3 node must be equipped with Control Card version 2 (CCv2).

For details about the supported transceiver, cable type, fanout, inline ports, and clusters, refer to “*GigaVUE-OS Compatibility and Interoperability Matrix*”.



**Figure 4** PRT-HC3-X24 Module

## PRT-HC3-X24 Notes and Rules

Keep in mind the following notes and rules when using the PRT-HC3-X24 module:

PRT-HC3-X24 Notes	
<b>Transceivers</b>	For details about the supported transceiver, cable type, and connectivity specifications, refer to “ <i>GigaVUE-OS Compatibility and Interoperability Matrix</i> ”.
<b>Maximum PRT-HC3-X24 Modules Per Chassis</b>	The maximum number of PRT-HC3-X24 modules per chassis is four. Each module can support up to twenty-four 10Gb/25Gb ports, for a total of 96.
<b>Inline Ports</b>	The ports on the PRT-HC3-X24 module can be configured as inline network or inline tool ports, supporting logical bypass at 10Gb speed. Starting from software version 6.4, Inline ports support logical bypass at 25Gb speed. For details about the supported inline ports, refer to “ <i>GigaVUE-OS Compatibility and Interoperability Matrix</i> ”.

## PRT-HC3-C08Q08 Module

The PRT-HC3-C08Q08 module provides eight 100Gb QSFP28 ports for a maximum capacity of 800Gb or sixteen 40Gb QSFP+ ports for a maximum capacity of 640Gb.

The module has 16 physical ports. By default, the upper eight ports are enabled as 100Gb ports and accept QSFP28 transceivers. The lower eight ports are disabled. The upper eight ports can accept QSFP+ transceivers. Then the upper eight ports operate at 40Gb. These ports can be used as network, tool, hybrid, inline or stack ports.

With a QSFP+ transceiver inserted in any of the upper eight ports, a 40Gb port can be broken out into four (4) times 10Gb ports, called **4x10Gb** mode. Or, with QSFP+ transceivers inserted in the upper and lower eight port pairs, a port can be broken out into two (2) times 40Gb ports, called **2x40Gb** mode. In **2x40Gb** mode, the upper eight ports as well as the lower eight ports on the PRT-HC3-C08Q08 module are enabled.

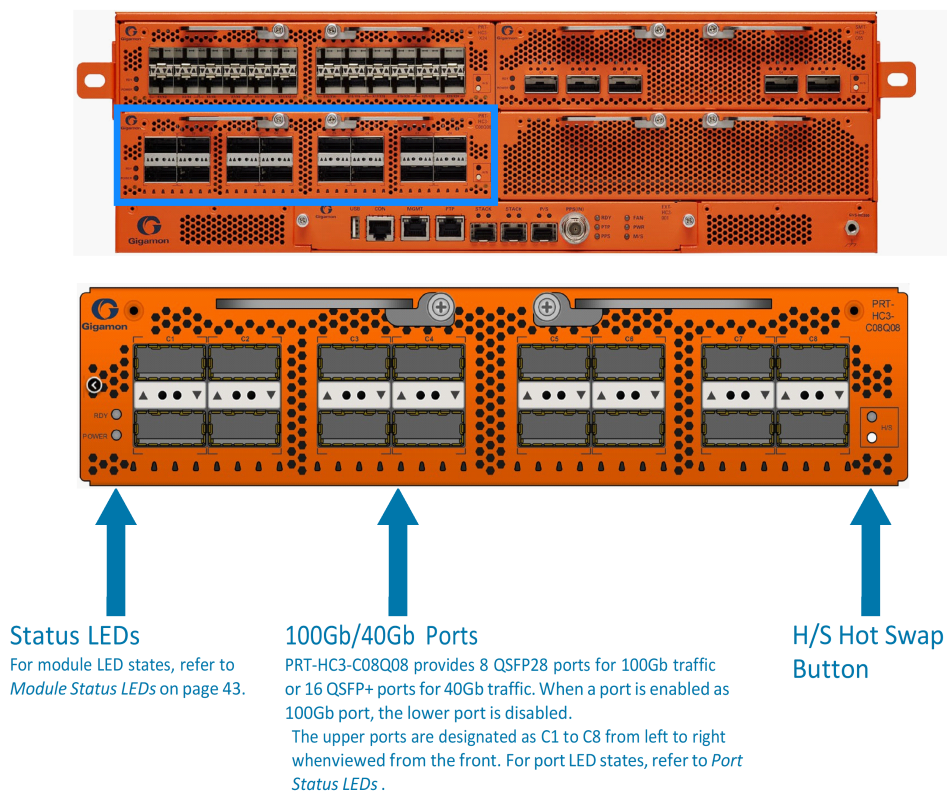
Subports created from **2x40Gb** mode can function as network, tool, hybrid, inline or stack ports. For Control Card version 1 (CCv1), the subports when they function as stack ports must be of the same port type. Subports created from **4x10Gb** mode can function as network, tool, hybrid, or stack ports.

Starting in software version 5.4, the 100Gb QSFP28 top row ports on the PRT-HC3-C08Q08 module can be broken out into four times 25Gb ports, called **4x25Gb** mode.

**NOTE:** To support 25Gb functionality, the GigaVUE-HC3 node must be equipped with Control Card version 2 (CCv2).

For details about the supported transceiver, cable type, fanout, inline ports, and clusters, refer to “GigaVUE-OS Compatibility and Interoperability Matrix”.

Refer to [Figure 5 PRT-HC3-C08Q08 Module](#).



**Figure 5** PRT-HC3-C08Q08 Module

## PRT-HC3-C08Q08 Notes and Rules

Keep in mind the following notes and rules when using the PRT-HC3-C08Q08 module:

PRT-HC3-C08Q08 Notes	
<b>Transceivers</b>	For details about the supported transceiver, cable type, and connectivity specifications, refer to <i>"GigaVUE-OS Compatibility and Interoperability Matrix"</i> .
<b>Maximum PRT-HC3-C08Q08 Modules Per Chassis</b>	<p>The maximum number of PRT-HC3-C08Q08 modules per chassis is four. Each module can support up to eight 100Gb ports or sixteen 40Gb ports. When a port is configured as a 100Gb port, the lower port is disabled.</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <p><b>NOTE:</b> If all modules in the chassis are 100Gb, there are no 10Gb or 25Gb ports with which to connect tools. 10Gb/25 Gb ports are only available when ports are in <b>4x10Gb</b> and <b>4x25Gb</b> mode and require a QSFP+ and QSFP28 transceiver.</p> </div> <p>Refer to <a href="#">Port Modes for PRT-HC3-C08Q08</a>.</p>
<b>Network, Tool, Hybrid, or Stack Ports</b>	<p>The upper eight 100Gb/40Gb/4x25Gb/4X10Gb ports on the PRT-HC3-C08Q08 module can function as network, tool, hybrid, or stack ports.</p> <p>Subports created from <b>2x40Gb</b> mode, <b>4x10Gb</b> mode, and <b>4x25Gb</b> on the PRT-HC3-C08Q08 module can function as network, tool, hybrid, or stack ports.</p> <p>For details about the clustering support, refer to <i>"GigaVUE-OS Compatibility and Interoperability Matrix"</i>.</p>
<b>Stack-Links</b>	<p>The PRT-HC3-C08Q08 module on GigaVUE-HC3 can connect to all GigaVUE H Series nodes that support both 100Gb/40Gb/4x25Gb/4X10Gb stack-links.</p> <p>For details about the clustering support, refer to <i>"GigaVUE-OS Compatibility and Interoperability Matrix"</i>.</p>
<b>Inline Ports</b>	<p>The upper ports on the PRT-HC3-C08Q08 module can be configured as inline network or inline tool ports, supporting logical bypass on 40Gb, 100Gb, 4x10Gb and 4x25Gb breakout ports.</p> <p>For details about the supported inline ports, refer to <i>"GigaVUE-OS Compatibility and Interoperability Matrix"</i>.</p>
<b>Port Combinations</b>	<p>A PRT-HC3-C08Q08 module supports a maximum of eight 100Gb ports or a maximum of sixteen 40Gb ports. The supported combinations are as follows:</p> <ul style="list-style-type: none"> <li>● eight 100Gb</li> <li>● seven 100Gb and two 40Gb</li> <li>● six 100Gb and four 40Gb</li> <li>● five 100Gb and six 40Gb</li> <li>● four 100Gb and eight 40Gb</li> <li>● three 100Gb and ten 40Gb</li> <li>● two 100Gb and twelve 40Gb</li> <li>● one 100Gb and fourteen 40Gb</li> <li>● sixteen 40Gb</li> <li>● thirty-two 10Gb or 25Gb ports.</li> </ul>



Ports c1..c8  
or c1q1..c1q2, c2q2..c2q2  
...or  
c1x1..c1x4, c2x1..c2x4...

The PRT-HC3-C08Q08 module includes eight 100Gb ports (c1..c8). These ports also support 40Gb speeds.

Any of the upper 100Gb/40Gb ports on the PRT-HC3-C08Q08 module can be broken out into **4x25Gb / 4x10Gb** ports called subports. The subports will all have the same speed (25Gb/10Gb). Subports will have x1 to x4 appended to their port ID, for example, 1/1/c2x1.

With QSFP+ transceivers at 40Gb, ports can be configured in **2x40Gb** mode so the lower 40Gb ports are enabled, bringing the total number of 40Gb ports to sixteen. The ports will all have the same speed (40Gb). They will have q1 to q2 appended to their port ID, for example, 1/1/c1q1. When the port mode is **2x40Gb**, all the upper ports are odd numbered (c1q1, c2q1, .. c8q1) and all the lower ports are even numbered (c1q2, c2q2, .. c8q2).

Once a port has been broken out into subports, cable it to an optical patch panel or breakout panel, such as PNL-M341, which takes input from the PRT-HC3-C08Q08 module and splits it to four independent output ports. Refer to [Breakout Panels](#).

## Port Modes for PRT-HC3-C08Q08

The port breakout modes are as follows:

- **none**—Specifies no port breakout mode. This is the default mode for GigaVUE H Series nodes.
- **4x10Gb**—Specifies the **4x10Gb** port breakout mode. This mode provides a 4x10Gb breakout option for upper ports with 40Gb transceivers.
- **4x25Gb**—Specifies the **4x25Gb** port breakout mode. This mode provides a 4x25Gb breakout option for upper ports with 100Gb transceivers.
- **2x40Gb**—Specifies the **2x40Gb** port breakout mode. This mode provides a 2x40Gb breakout option for upper ports with 40Gb transceivers.

The default port mode for the PRT-HC3-C08Q08 module is **none**.

The maximum number of 10Gb ports on a PRT-HC3-C08Q08 module is 32 (8 ports per module x 4 subports per port). If four PRT-HC3-C08Q08 modules are inserted in GigaVUE-HC3, the maximum number of 10Gb ports is 128 (32 x 4).

The maximum number of 40Gb ports on a PRT-HC3-C08Q08 module is 16 (8 upper + 8 lower).

**NOTE:** Each port can only have one mode.

For more information, refer to the **port** command in the reference section of the *GigaVUE-OS CLI Reference Guide*.

Once the port breakout mode has been configured, refer to [Breakout Panels](#).

## PRT-HC3-C16 Module

The PRT-HC3-C16 module provides sixteen 100Gb QSFP28 ports for a maximum capacity of 1600Gb.

**NOTE:** The PRT-HC3-C16 module can only function on a GigaVUE-HC3 node equipped with Control Card version 2 (CCv2).

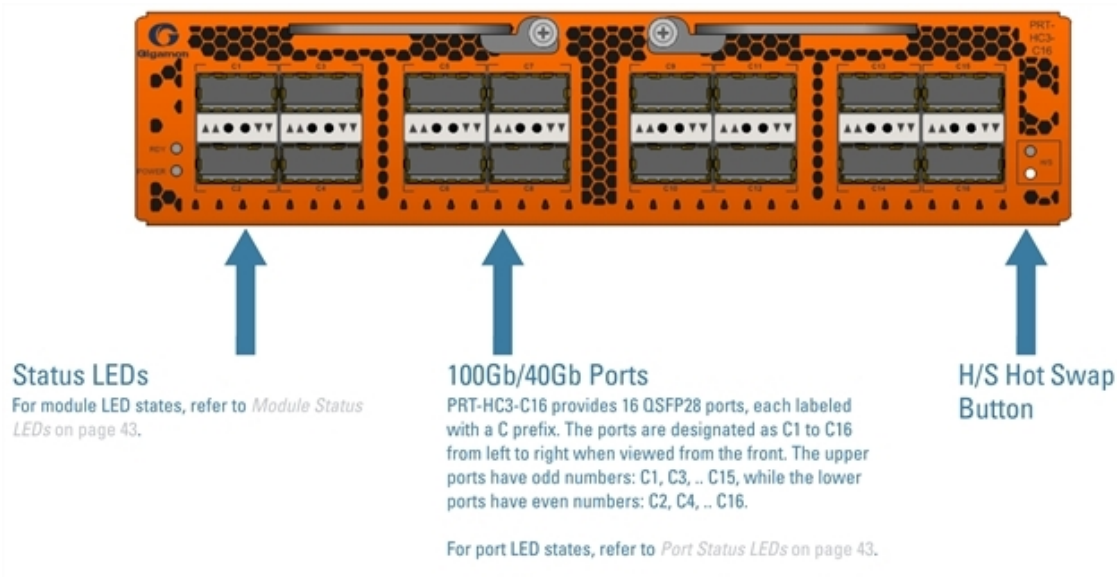
On the PRT-HC3-C16 module:

- QSFP28 transceivers support 100Gb ports.
- QSFP+ transceivers can be inserted to provide 40Gb ports.
- A 100Gb port can be broken out into four (4) times 25Gb ports, called **4x25Gb** mode.
- A 40Gb port can be broken out into four (4) times 10Gb ports, called **4x10Gb** mode.

**NOTE:** Port breakout is only supported on the upper eight ports. If an upper port is broken out, the lower port is disabled.

For details about the supported transceiver, cable type, fanout, inline ports, and clusters, refer to “GigaVUE-OS Compatibility and Interoperability Matrix”.

Refer to [Figure 6 PRT-HC3-C16 Module](#).



**Figure 6** PRT-HC3-C16 Module

## PRT-HC3-C16 Notes and Rules

Keep in mind the following notes and rules when using the PRT-HC3-C16 module:

### PRT-HC3-C16 Notes

#### Transceivers

For details about the supported transceiver, cable type, and connectivity specifications, refer to “GigaVUE-OS Compatibility and Interoperability Matrix”.

<b>Maximum PRT-HC3-C16 Modules Per Chassis</b>	The maximum number of PRT-HC3-C16 modules per chassis is four. Each module can support up to sixteen 100Gb ports, for a total of 64.
<b>Network, Tool, Hybrid, or Stack Ports</b>	The 100Gb/40Gb ports on the PRT-HC3-C16 module can function as network, tool, hybrid, or stack ports.
<b>Stack-Links</b>	For details about the clustering support, refer to “ <i>GigaVUE-OS Compatibility and Interoperability Matrix</i> ”.
<b>Inline Ports</b>	The ports on the PRT-HC3-C16 module can be configured as inline network or inline tool ports, supporting logical bypass on 40Gb, 100Gb, 4x10Gb and 4x25Gb ports. For details about the supported inline ports, refer to “ <i>GigaVUE-OS Compatibility and Interoperability Matrix</i> ”.
<b>Ports c1..c16 or c1x1..c1x4, c3x1..c3x4, c15x1..c15x4 (odd-numbered ports)</b>	The PRT-HC3-C16 module includes sixteen 100Gb ports (c1..c16). These ports also support 40Gb speeds. Any of the 100Gb ports on the PRT-HC3-C16 module can operate at 40Gb with a QSFP+ transceiver. A 40Gb port can be broken out into 4 times 10Gb ports, called subports. The subports will all have the same speed (10Gb). Subports will have x1 to x4 appended to their port ID, for example, 1/1/c2x1. The upper, odd-numbered eight 100Gb ports on the PRT-HC3-C16 module can be broken out into four times 25Gb ports, called subports. The parent port must be configured to have a port breakout mode of <b>4x25Gb</b> . The subports will all have the same speed (25Gb). Subports will have x1 to x4 appended to their port ID, for example, when port 1/1/c1 on the PRT-HC3-C16 module is configured to <b>4x25Gb</b> mode, the subports will be: 1/1/c1x1, 1/1/c1x2, 1/1/c1x3, and 1/1/c1x4. In <b>4x25Gb</b> mode, the subports can function as network, tool, or hybrid ports, as well as GigaStream port members. Once a port has been broken out into subports, cable it to an optical patch panel or breakout panel, such as PNL-M341, which takes input from the SMT-HC3-C05 module and splits it to four independent output ports. Refer to <a href="#">Breakout Panels</a> .

## Port Modes for PRT-HC3-C16

The port breakout modes are as follows:

- **4x10Gb**—Specifies the **4x10Gb** port breakout mode. This mode provides a 4 x 10Gb breakout option for 40Gb ports.
- **4x25Gb**—Specifies the **4x25Gb** port breakout mode. This mode provides a 4 x 25Gb breakout option for 100Gb ports.
- **none**—Specifies no port breakout mode. This is the default mode for GigaVUE H Series nodes.

The maximum number of 10Gb ports on a PRT-HC3-C16 module is 32 (8 ports per module x 4 subports per port).

The maximum number of 25Gb subports on a PRT-HC3-C16 module is 32 (8 ports per module x 4 subports per port).

**NOTE:** Each port can only have one mode.

There are rules for configuring parent ports and subports. For more information, refer to the **port** command in the reference section of the *GigaVUE-OS CLI Reference Guide*. Once the port breakout mode has been configured, refer to [Breakout Panels](#).

## SMT-HC3-C05 Module

The SMT-HC3-C05 module is a GigaVUE-HC3 module blending GigaSMART intelligence and port capabilities into a single module. GigaSMART licenses enable a variety of capabilities. GigaVUE-HC3 nodes with a GigaSMART module installed can take advantage of GigaSMART's advanced processing features, including slicing, masking, source port features, de-duplication, header stripping, advanced tunneling, FlowVUE, Adaptive Packet Filtering (APF), Application Session Filtering (ASF), NetFlow generation, SSL decryption for out-of-band tools, GTP filtering and correlation. Refer to the **GigaVUE-OS CLI Reference Guide** for more information on the GigaSMART features.

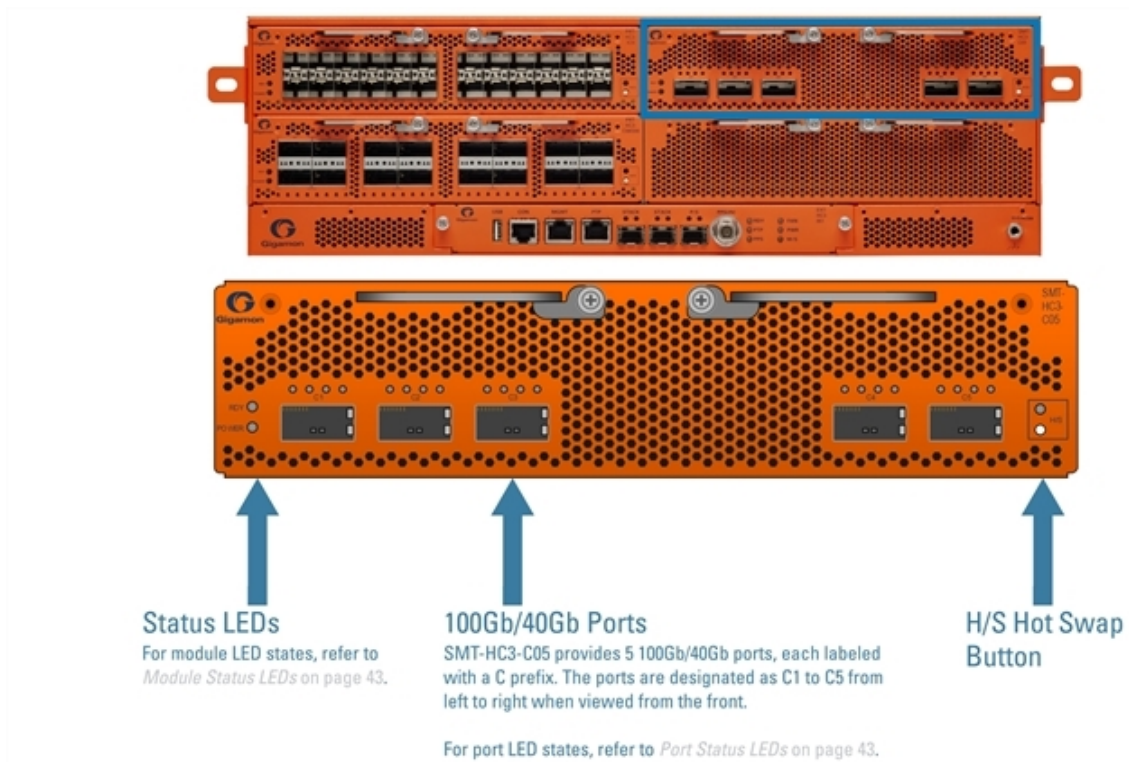
The SMT-HC3-C05 module can be used standalone, or combined with other GigaSMART modules in a cluster. Because each GigaSMART module has its own compute engine, additional modules may be added as more compute power is required. The processing is not limited to the ports on the module. GigaSMART functionality is available to all ports within a clustered environment.

In addition to GigaSMART capabilities and two GigaSMART engine ports, the SMT-HC3-C05 module also has five 100Gb/40Gb ports.

The 100Gb ports with QSFP28 transceiver on the SMT-HC3-C05 module can be broken out into four times 25Gb ports, called **4x25G** mode.

**NOTE:** To support 25Gb functionality, the GigaVUE-HC3 node must be equipped with Control Card version 2 (CCv2).

For details about the supported transceiver, cable type, fanout, inline ports, and clusters, refer to "*GigaVUE-OS Compatibility and Interoperability Matrix*".



**Figure 7** SMT-HC3-C05 Module

## SMT-HC3-C05 Notes and Rules

Keep in mind the following notes and rules when using the SMT-HC3-C05 module:

SMT-HC3-C05 Notes	
<b>Transceivers</b>	For details about the supported transceiver, cable type, and connectivity specifications, refer to “ <i>GigaVUE-OS Compatibility and Interoperability Matrix</i> ”.
<b>Maximum SMT-HC3-C05 Modules Per Chassis</b>	The maximum number of SMT-HC3-C05 modules per chassis is four if power is available. Refer to <a href="#">Power Management</a> . Each module can support up to five 100Gb ports, for a total of 20.  <b>NOTE:</b> If all modules in the chassis are 100Gb, there are no 10Gb/25Gb ports with which to connect tools. 10Gb/25Gb ports are only available when ports are in <b>4x10Gb/4x25Gb</b> mode and require a QSFP+ transceiver.  Refer also to <a href="#">Port Modes for SMT-HC3-C05</a> .
<b>Network, Tool, Hybrid, or Stack Ports</b>	The 100Gb/40Gb/4x25Gb/4x10Gb ports on the SMT-HC3-C05 module can function as network, tool, hybrid, or stack ports.
<b>Stack-Links</b>	The SMT-HC3-C05 module on GigaVUE-HC3 can connect to all GigaVUE H Series nodes that support 40Gb/100Gb through a 40Gb/100Gb stack-link. For details about the clustering support, refer to “ <i>GigaVUE-OS Compatibility and Interoperability Matrix</i> ”.

<b>Inline Ports</b>	<p>The ports on the SMT-HC3-C05 module can be configured as inline network or inline tool ports, supporting logical bypass on 40Gb, 100Gb, 4x10Gb and 4x25Gb ports.</p> <p>For details about the supported inline ports, refer to “<i>GigaVUE-OS Compatibility and Interoperability Matrix</i>”.</p>
<b>Ports c1..c5or c1x1..c1x4 toc5x1..c5x4</b>	<p>The SMT-HC3-C05 module includes five 100Gb ports (c1..c5). These ports also support 40Gb speeds.</p> <p>Any of the 100Gb ports on the SMT-HC3-C05 module can be broken out into <b>4x25Gb</b> ports, called subports. The subports will all have the same speed (25Gb). Subports will have x1 to x4 appended to their port ID, for example, 1/1/c2x1. The parent port must be configured to have a port breakout mode of <b>4x25Gb</b></p> <p>Any of the 100Gb ports on the SMT-HC3-C05 module can operate at 40Gb with a QSFP+ transceiver. A 40Gb port can be broken out into <b>4x10Gb</b> ports, called subports. The subports will all have the same speed (10Gb). Subports will have x1 to x4 appended to their port ID, for example, 1/1/c2x1. The parent port must be configured to have a port breakout mode of <b>4x10G</b>.</p> <p>Once a port has been broken out into subports, cable it to an optical patch panel or breakout panel, such as PNL-M341, which takes input from the SMT-HC3-C05 module and splits it to four independent output ports. Refer to <a href="#">Breakout Panels</a>.</p>

## Port Modes for SMT-HC3-C05

The port breakout modes are as follows:

- **4x10Gb**—Specifies the **4x10Gb** port breakout mode. This mode provides a 4 x 10Gb breakout option for 40Gb ports.
- **4x25Gb**—Specifies the **4x25Gb** port breakout mode. This mode provides a 4 x 25Gb breakout option for 100Gb ports.
- **none**—Specifies no port breakout mode. This is the default mode for GigaVUE H Series nodes.

In **4x10Gb/4x25Gb** mode, the subports can function as network, tool, hybrid, or stack ports, as well as GigaStream port members.

The maximum number of 10Gb ports on a SMT-HC3-C05 module is 20 (5 ports per module x 4 subports per port). If four SMT-HC3-C05 modules are inserted in GigaVUE-HC3, the maximum number of 10Gb ports is 80 (20 x 4).

The maximum number of 25Gb subports on a SMT-HC3-C05 module is 20 (5 ports per module x 4 subports per port).

**NOTE:** Each port can only have one mode.

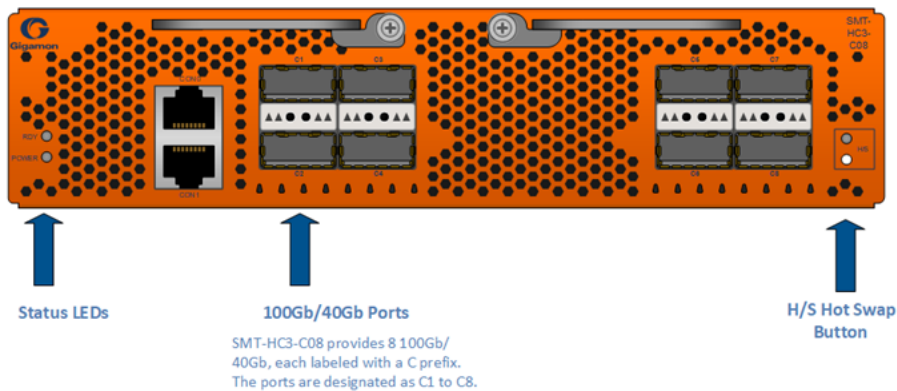
There are rules for configuring parent ports and subports. For more information, refer to the **port** command in the reference section of the *GigaVUE-OS CLI Reference Guide*.

Once the port breakout mode has been configured, refer to [Breakout Panels](#).

## SMT-HC3-C08 Module

The SMT-HC3-C08 is a GigaVUE-HC3 GigaSMART module. This module is compatible only with Control Card version 2 (CCv2) and has two GigaSMART engines which would provide a variety of capabilities with necessary GigaSMART licenses. Refer to GigaVUE-OS CLI Reference Guide for more information on the GigaSMART features.

SMT-HC3 -C08 has eight 100Gb/40Gb ports. For details about the supported transceiver, cable type, fanout, inline ports, and clusters, refer to GigaVUE-OS Compatibility and Interoperability Matrix.



### SMT-HC3-C08 Notes and Rules

Keep in mind the following notes and rules when using the SMT-HC3-C08 module:

SMT-HC3-C08 Notes	
<b>Transceivers</b>	For details about the supported transceiver, cable type, and connectivity specifications, refer to <i>"GigaVUE-OS Compatibility and Interoperability Matrix"</i> .
<b>Maximum SMT-HC3-C08 Modules Per Chassis</b>	<p>The maximum number of SMT-HC3-C08 modules per chassis is four if power is available. Refer to <a href="#">Power Management</a>. Each module can support up to eight 100Gb or 40Gb ports, for a total of 32.</p> <p><b>NOTE:</b> If all modules in the chassis are 100Gb, then 10Gb/25Gb ports will not be available to connect with tools. The 10Gb/25Gb ports are only available when ports are in <b>4x10G/4x25Gb</b> mode and require a QSFP+ transceiver.</p> <p>Refer also to <a href="#">SMT-HC3-C08 Module</a>.</p>
<b>Network, Tool, Hybrid, or Stack Ports</b>	The 100Gb/40Gb/4x25Gb/4x10Gb ports on the SMT-HC3-C08 module can function as network, tool, hybrid, or stack ports.

<b>Stack-Links</b>	<p>The SMT-HC3-C08 module on GigaVUE-HC3 can connect to all GigaVUE H Series nodes that support 40Gb/100Gb stack-links.</p> <p>For details about the clustering support, refer to “<i>GigaVUE-OS Compatibility and Interoperability Matrix</i>”.</p>
<b>Inline Ports</b>	<p>The ports on the SMT-HC3-C08 module can be configured as inline network or inline tool ports, supporting logical bypass on 40Gb, 100Gb, 4x10Gb and 4x25Gb ports.</p> <p>For details about the supported inline ports, refer to “<i>GigaVUE-OS Compatibility and Interoperability Matrix</i>”.</p>
<b>Ports c1..c8</b>	<p>The SMT-HC3-C08 module includes eight 40Gb /100Gb ports (c1..c8).</p> <div data-bbox="513 552 1461 667" style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>NOTE: The ports c7 and c8 will not support breakout mode due to restriction in port numbering. These ports will continue to be used as 100Gb ports.</b></p> </div> <p>Any of the 100Gb ports on the SMT-HC3-C08 module can be broken out into <b>4x25Gb</b> ports, called subports. The subports will all have the same speed (25Gb). Subports will have x1 to x4 appended to their port ID, for example, 1/1/c2x1.</p> <p>Any of the 100Gb ports on the SMT-HC3-C08 module can operate at 40Gb with a QSFP+ transceiver. A 40Gb port can be broken out into <b>4x10Gb</b> ports, called subports. The subports will all have the same speed (10Gb). Subports will have x1 to x4 appended to their port ID, for example, 1/1/c2x1. The parent port must be configured to have a port breakout mode of <b>4x10Gb</b>.</p> <p>For more information, refer to <a href="#">SMT-HC3-C08 Module</a></p> <p>Once a port has been broken out into subports, cable it to an optical patch panel or breakout panel, such as PNL-M341, which takes input from the SMT-HC3-C08 module and splits it to four independent output ports. Refer to <a href="#">Breakout Panels</a>.</p>

**SMT-HC3-C08 with serial number 1FP0-xxxx is supported from 5.14 release.**  
**SMT-HC3-C08 with serial number 1H30-xxxx is supported only in 6.0 release and in the Hot-patch 5.14.00.02, 5.15.01.02 and 5.16.00.05.**

P

## Port Modes for SMT-HC3-C08

The port breakout modes are as follows:

- **4x10Gb**—Specifies the **4x10Gb** port breakout mode. This mode provides a 4 x 10Gb breakout option for 40Gb ports.
- **4x25Gb**—Specifies the **4x25Gb** port breakout mode. This mode provides a 4 x 25Gb breakout option for 100Gb ports.
- **none**—Specifies no port breakout mode. This is the default mode for GigaVUE H Series nodes.

In the **4x10Gb** and **4x25Gb** modes, the subports can function as a network, tool, stack, circuit, and hybrid ports. GigaStream port members can be activated in the tool, stack, and hybrid port types.



The maximum number of 10Gb ports on a SMT-HC3-C08 module is 24 (6 ports per module x 4 subports per port). If four SMT-HC3-C08 modules are inserted in GigaVUE-HC3, the maximum number of 10Gb ports is 96 (24 x 4).

The maximum number of 25Gb subports on a SMT-HC3-C08 module is 24 (6 ports per module x 4 subports per port).

**NOTE:** Each port can only have one mode.

There are rules for configuring parent ports and subports. For more information, refer to the **port** command in the reference section of the *GigaVUE-OS CLI Reference Guide*.

Once the port breakout mode has been configured, refer to [Breakout Panels](#).

## BPS-HC3-C25F2G Module

The BPS-HC3-C25F2G module is a bypass combo module with two 100Gb/40Gb SR4 inline network port pairs and sixteen 25Gb/10Gb SFP+ and SFP28 port cages. The inline network ports support physical bypass at speeds of 100Gb or 40Gb. A 4x10Gb and 4x25Gb port breakout mode is supported offering physical bypass at 10Gb/25Gb.

Security tools such as firewall and intrusion detection/protection systems are often connected inline on production networks, with traffic flowing from the network segment through the tool and then back onto the production network.

The GigaVUE-HC3 offers physical and logical inline bypass. Physical bypass provides automatic failover protection in the case of a power failure. The bypass combo module provide the physical bypass function. As it applies to a single pair of inline network ports, the physical bypass function is as follows:

- When the module is not powered, (either the entire node is powered down or the module is removed from the node), the inline network port pair is in the physical bypass mode. That means that traffic is exchanged directly between network Port A and network Port B of the inline network pair.
- When the module is powered, the mode (inline or bypass) of the inline network port pair is controlled through software. In the physical bypass mode, the inline network port pair behaves exactly as if the module was not powered. In the inline mode, the inline network port pair behaves as any other inline network port pair configured for working with an inline tool. For information about configuring inline modes, refer to the “inline-network” section of the *GigaVUE-OS CLI Reference Guide*.

Before installing the BPS-HC3-C25F2G module, the GigaVUE-HC3 must be running software version 5.1.01 or higher. Dual speed (100Gb or 40Gb) support is added starting in software version 5.2. The 4x10Gb port breakout mode is added starting in software version 5.3. The 4x25Gb port breakout mode is added starting in software version 5.5.01 in GigaVUE-HC3 CCV2.

**NOTE:** The BPS-HC3-C25F2G module does not support 1Gb.

The sixteen 10Gb ports in the BPS-HC3-C25F2G module can be used as network, tool, hybrid, stack, inline-network, or inline-tool ports.

Starting in software version 5.4, SFP28 transceivers support 25Gb.

**NOTE:** To support 25Gb functionality, the GigaVUE-HC3 node must be equipped with Control Card version 2 (CCv2).

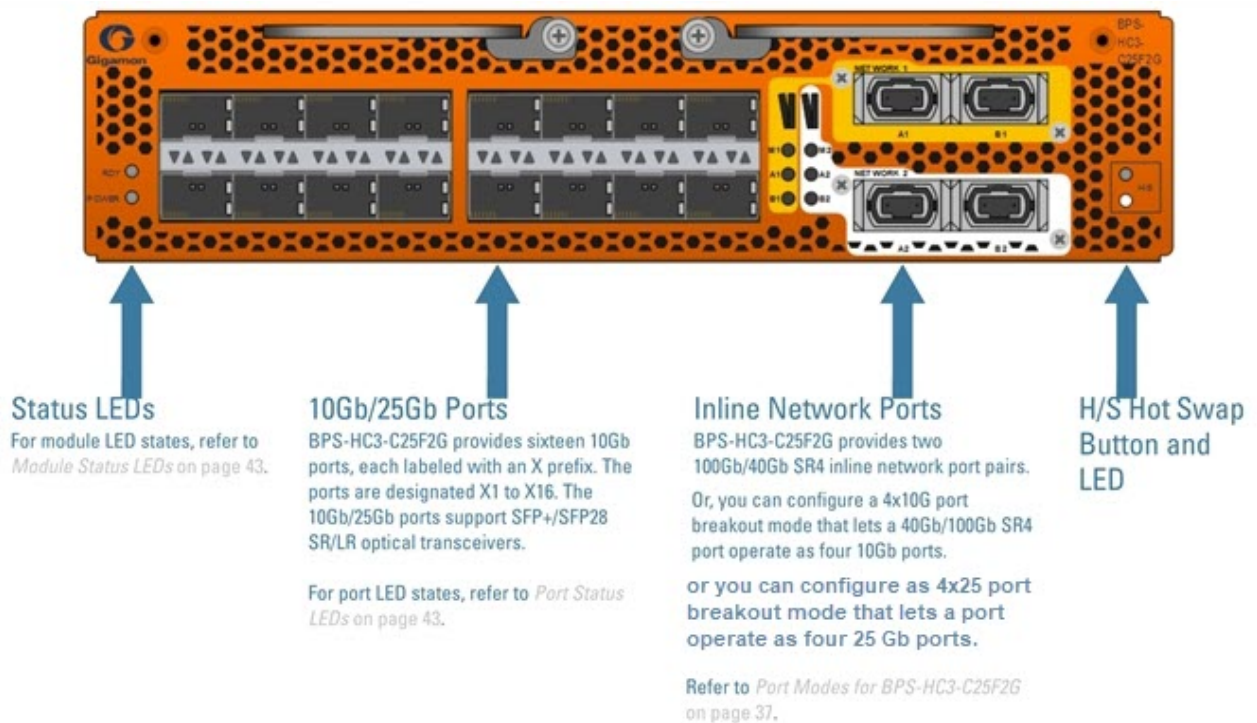
For loss summary specifications, refer to [Loss Summary Specifications](#).

For details about the supported transceiver, cable type, fanout, inline ports, and clusters, refer to “[GigaVUE-OS Compatibility and Interoperability Matrix](#)”.

## Features of 100Gb Bypass Combo Module

The 100Gb bypass combo module has the following features:

- Two inline network port pairs that pass traffic bi-directionally.
- Port pairs that offer optical protection switch for physical bypass.
- Sixteen regular 10Gb/25Gb ports that operate with SFP+/SFP28 transceivers.
- A mode to select either bypass or inline.
- A module that is hot swappable. Refer to procedures in [Removing GigaVUE-HC3 Modules](#).



**Figure 8** BPS-HC3-C25F2G Module

## BPS-HC3-C25F2G Notes and Rules

Keep in mind the following notes and rules when using the BPS-HC3-C25F2G module:

BPS-HC3-C25F2G Notes	
<b>Transceivers</b>	For details about the supported transceiver, cable type, and connectivity specifications, refer to “ <i>GigaVUE-OS Compatibility and Interoperability Matrix</i> ”.
<b>Maximum BPS-HC3-C25F2G Modules Per Chassis</b>	The maximum number of BPS-HC3-C25F2G modules per chassis is four. Each module can support up to two 100Gb/40Gb inline network port pairs, for a total of eight, and sixteen 10Gb ports for a total of sixty-four.
<b>Network, Tool, Hybrid or Stack Ports</b>	The sixteen 10Gb/25Gb ports on the BPS-HC3-C25F2G module can be used as a network, tool, hybrid, or stack ports.
<b>Inline Ports</b>	The ports on the BPS-HC3-C25F2G module can be configured as inline network or inline tool ports, supporting logical bypass at 10Gb speed. Starting from software version 6.4, Inline ports support logical bypass at 25Gb speed.
<b>10Gb and 25Gb Ports</b>	Every group of four ports (quad) can be configured as 25Gb. In one quad, there cannot be a mix of 10Gb and 25Gb ports. By default, all sixteen ports are configured as 10Gb ports. To configure 25Gb, you must configure the port speed as follows:  <b>(config) # port x1..x4 params admin enable</b> <b>(config) # port x1..x4 params speed 25000</b>
<b>100Gb/40Gb Inline Network Ports</b>	By default, the inline network ports are 100Gb, but can be configured as either 100Gb or 40Gb, supporting physical bypass at 100Gb or 40Gb port speeds. Each port pair (c1 and c2 or c3 and c4) must be configured with the same port speed. For changing the port speed, refer to the <b>port &lt;port&gt; params speed</b> command in the <i>GigaVUE-OS CLI Reference Guide</i> .
<b>Inline Network Ports c1..c4 or c1x1..c1x4, c2x1..c2x4, c3x1..c3x4, c4x1..c4x4</b>	The BPS-HC3-C25F2G module includes four 100Gb ports (c1..c4). These ports also support 40Gb speeds.  The 40Gb/100Gb ports on the BPS-HC3-C25F2G module can be broken out into 4 times 10Gb ports or 25Gb ports, called subports. The subports will all have the same speed (10Gb or 25Gb). Subports will have x1 to x4 appended to their port ID, for example, 1/1/c2x1.  For more information, refer to <a href="#">Port Modes for BPS-HC3-C25F2G</a> .  Once a port has been broken out into subports, cable it to an optical patch panel or breakout panel, such as PNL-M341, which takes input from the BPS-HC3-C25F2G module and splits it to four independent output ports. Refer to <a href="#">Breakout Panels</a> .

## Inline Network Ports

Connect inline networks to the inline network ports. The inline network ports have built-in protection for power down.

The inline network ports have the following labels:

- A1—Inline network port A (for network 1)
- B1—Inline network port B (for network 1)
- M1—Inline network mode (for network 1)
- A2—Inline network port A (for network 2)
- B2—Inline network port B (for network 2)

- M2—Inline network mode (for network 2)

The inline network port status LEDs (A1, B1, A2, B2) have the following states:

- OFF indicates that the port link is down
- GREEN indicates that the link is established

The physical bypass mode LEDs (M1, M2) have the following states:

- GREEN indicates inline
- OFF indicates bypass

In the CLI, the inline network ports are referred to as c1 to c4. [Table 4: Port Mapping](#) lists the port mapping.

Table 4: Port Mapping

Port	CLI Port
A1	c1
B1	c2
A2	c3
B2	c4

For example, if the box ID is 1 and the BPS-HC3-C25F2G module is in slot 3, [Table 5: Default Inline Networks](#) lists the default inline networks:

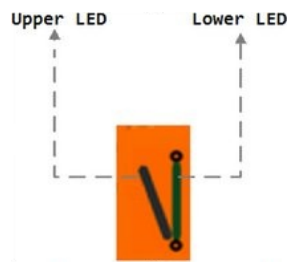
Table 5: Default Inline Networks

Default Inline Network	Network A Connected To	Network B Connected To
default_inline_net_1_3_1	1/3/c1	1/3/c2
default_inline_net_1_3_2	1/3/c3	1/3/c4

**NOTE:** Default inline networks cannot be deleted.

## BPS Forwarding LED

Each BPS-HC3-C25F2G inline network port has two LEDs, an upper and a lower, that represent the inline network forwarding state. The upper LED indicates tool flow. The lower LED indicates network flow. Refer to [Figure 9BPS Forwarding LEDs, Upper and Lower](#).



**Figure 9** BPS Forwarding LEDs, Upper and Lower

Table 6: [Inline Network Forwarding States and LED Descriptions](#) lists the inline network forwarding states and the color of the upper and lower LEDs for each state.

Table 6: *Inline Network Forwarding States and LED Descriptions*

Physical Bypass	Traffic Path	Forwarding State of Inline Network	Upper LED	Lower LED
enable	bypass, drop, monitoring, or to-inline-tool	PHYSICAL BYPASS	OFF	GREEN
disable	bypass	FORCED BYPASS	OFF	GREEN
disable	monitoring	FORCED BYPASS WITH MONITORING	GREEN	GREEN
disable	drop	DISABLED	OFF	AMBER BLINK
disable	to-inline-tool	NORMAL	GREEN	OFF
disable	bypass, monitoring, or to-inline-tool	DISCONNECTED	AMBER BLINK	AMBER BLINK
disable	to-inline-tool	FAILURE-INTRODUCED BYPASS	OFF	AMBER
disable	to-inline-tool	FAILURE-INTRODUCED DROP	AMBER BLINK	OFF
disable	to-inline-tool	NETWORK PORTS FORCED DOWN	AMBER BLINK	OFF
disable	to-inline-tool	ABNORMAL	AMBER	OFF

### Port Modes for BPS-HC3-C25F2G

The port breakout modes are as follows:

- **4x10G**—Specifies the **4x10G** port breakout mode. This mode provides a 4 x 10Gb breakout option for 40Gb/100Gb ports.
- **4x25Gb**- Specifies the **4x25G** port breakout mode. This mode provides a 4 x 25Gb breakout option for 40Gb/100Gb ports

- **none**—Specifies no port breakout mode. This is the default mode for GigaVUE H Series nodes.

Each of the 40Gb/100Gb inline network protected port pairs (c1 and c2, or c3 and c4) can be broken out into four times 10Gb ports, called subports.

The port speed will be automatically configured to 40Gb/100Gb when the parent port is configured to a port breakout mode of **4x10G** and **4x25Gb**. The subports will all have the same speed (10Gb/25Gb). Subports will have x1 to x4 appended to their port ID, for example, when port 1/1/c2 is configured to **4x10G** mode, the subports will be: 1/1/c2x1, 1/1/c2x2, 1/1/c2x3, and 1/1/c2x4.

The subports on the BPS-HC3-C25F2G module will only have a port type of inline-network. After configuring the **4x10G** and **4x25Gb** mode, there will be a maximum of sixteen 10Gb/25Gb ports (eight inline network protected port pairs). Refer to [Table 7: Default Inline Networks in 4x10G or 4x25Gb Mode](#).

For example, if the box ID is 1, the BPS-HC3-C25F2G module is in slot 3, and both port pairs are broken out, [Table 7: Default Inline Networks in 4x10G or 4x25Gb Mode](#) lists the default inline networks:

Table 7: Default Inline Networks in 4x10G or 4x25Gb Mode

Default Inline Network	Network A Connected To	Network B Connected To
default_inline_net_1_3_1_1	1/3/c1x1	1/3/c2x1
default_inline_net_1_3_1_2	1/3/c1x2	1/3/c2x2
default_inline_net_1_3_1_3	1/3/c1x3	1/3/c2x3
default_inline_net_1_3_1_4	1/3/c1x4	1/3/c2x4
default_inline_net_1_3_2_1	1/3/c3x1	1/3/c4x1
default_inline_net_1_3_2_2	1/3/c3x2	1/3/c4x2
default_inline_net_1_3_2_3	1/3/c3x3	1/3/c4x3
default_inline_net_1_3_2_4	1/3/c3x4	1/3/c4x4

**NOTE:** Default inline networks cannot be deleted.

Since there is only a single pair of LEDs for the inline networks on the BPS-HC3-C25F2G module, when a port is broken out, the BPS forwarding LED only represents the first inline network protected port pair. Refer to [BPS Forwarding LED](#).

**NOTE:** Each port can only have one mode.

There are rules for configuring parent ports and subports. For more information, refer to the **port** command in the reference section of the *GigaVUE-OS CLI Reference Guide*.

## BPS-HC3-Q35C2G and BPS-HC3-C35C2G Modules

The BPS-HC3-Q35C2G and BPS-HC3-C35C2G modules are a bypass combo module with two 40Gb and 100Gb LR4 inline network port pairs respectively, and sixteen 10Gb/25Gb port cages. The inline network ports support physical bypass at speeds of 40Gb or 100Gb based on the respective module.

Security tools such as firewall and intrusion detection/protection systems are often connected inline on production networks, with traffic flowing from the network segment through the tool and then back onto the production network.

The GigaVUE-HC3 offers physical and logical inline bypass. Physical bypass provides automatic failover protection in the case of a power failure. The bypass combo module provide the physical bypass function. As it applies to a single pair of inline network ports, the physical bypass function is as follows:

- When the module is not powered, (either the entire node is powered down or the module is removed from the node), the inline network port pair is in the physical bypass mode. That means that traffic is exchanged directly between network Port A and network Port B of the inline network pair.
- When the module is powered, the mode (inline or bypass) of the inline network port pair is controlled through software. In the physical bypass mode, the inline network port pair behaves exactly as if the module was not powered. In the inline mode, the inline network port pair behaves as any other inline network port pair configured for working with an inline tool.

Before installing the BPS-HC3-Q35C2G and BPS-HC3-C35C2G modules, the GigaVUE-HC3 must be running software version 5.5.00 or higher.

The BPS-HC3-Q35C2G and BPS-HC3-C35C2G modules do not support 1Gb.

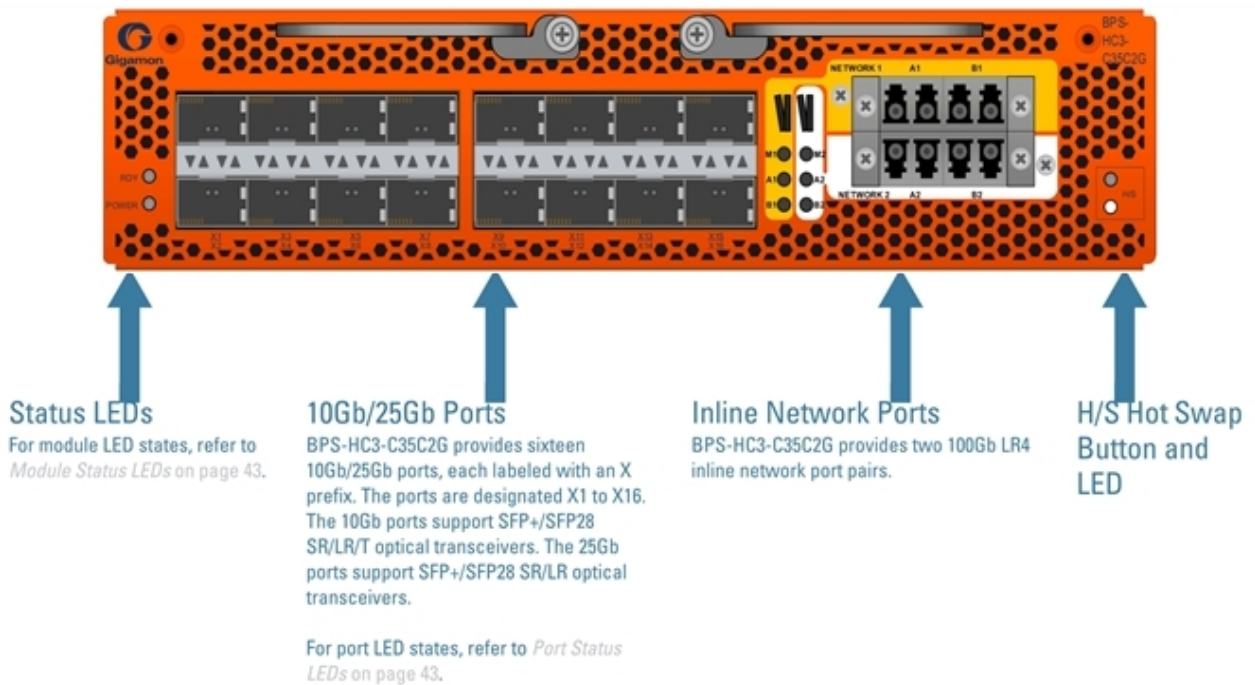
The sixteen 10Gb ports in the BPS-HC3-Q35C2G and BPS-HC3-Q35C2G modules can be used as network, tool, hybrid, stack, inline-network, or inline-tool ports.

SFP28 transceivers support 25Gb on both the modules.

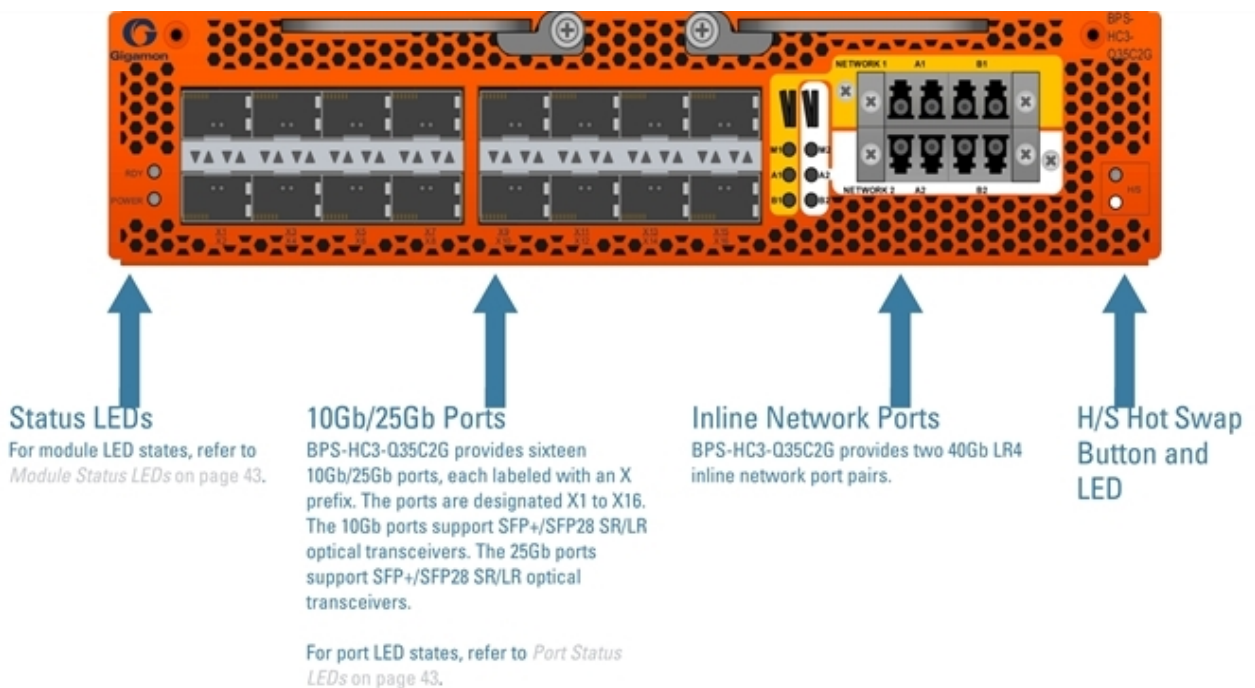
**NOTE:** To support 25Gb, 4x25Gb functionality, the GigaVUE-HC3 node must be equipped with Control Card version 2 (CCv2).

For loss summary specifications, refer to [Loss Summary Specifications](#).

For details about the supported transceiver, cable type, fanout, inline ports, and clusters, refer to “*GigaVUE-OS Compatibility and Interoperability Matrix*”.



**Figure 10** BPS-HC3-C35C2G Module



**Figure 11** BPS-HC3-Q35C2G Module

### BPS-HC3-Q35C2G and BPS-HC3-C35C2G Notes and Rules

Keep in mind the following notes and rules when using the BPS-HC3-C35C2G and BPS-HC3-Q35C2G modules:



BPS-HC3-Q35C2G and BPS-HC3-C35C2G Notes	
<b>Transceivers</b>	For details about the supported transceiver, cable type, and connectivity specifications, refer to “GigaVUE-OS Compatibility and Interoperability Matrix”.
<b>Maximum BPS-HC3-Q35C2G and BPS-HC3-C35C2G Modules Per Chassis</b>	The maximum number of BPS-HC3-Q35C2G and BPS-HC3-C35C2G modules per chassis is four. Each module can support up to two 40Gb or 100Gb inline network port pairs respectively, and sixteen 10Gb ports per module for a total of sixty-four.
<b>Network, Tool, Hybrid, or Stack Ports</b>	The sixteen 10Gb and 25Gb ports on the BPS-HC3-Q35C2G and BPS-HC3-C35C2G modules can be used as a network, tool, hybrid, or stack ports.
<b>Inline Ports</b>	The ports on the BPS-HC3-C35C2G and BPS-HC3-Q35C2G modules can be configured as inline network or inline tool ports, supporting logical bypass at 10Gb speed. Starting from software version 6.4, Inline ports support logical bypass at 25Gb speed.
<b>10Gb and 25Gb Ports</b>	Every group of four ports (quad) can be configured as 25Gb. In one quad, there cannot be a mix of 10Gb and 25Gb ports. By default, all sixteen ports are configured as 10Gb ports. To configure 25Gb, you must configure the port speed as follows:  <b>(config) # port x1..x4 params admin enable(config) # port x1..x4 params speed 25000</b>
<b>100Gb or 40Gb Inline Network Ports</b>	By default, the inline network ports are 40Gb and 100Gb on BPS-HC3-Q35C2G and BPS-HC3-C35C2G modules respectively. Speed change is not allowed on inline network ports.

## Inline Network Ports

Connect inline networks to the inline network ports. The inline network ports have built-in protection for power down.

The inline network ports have the following labels:

- A1—Inline network port A (for network 1)
- B1—Inline network port B (for network 1)
- M1—Inline network mode (for network 1)
- A2—Inline network port A (for network 2)
- B2—Inline network port B (for network 2)
- M2—Inline network mode (for network 2)

The inline network port status LEDs (A1, B1, A2, B2) have the following states:

- OFF indicates that the port link is down
- GREEN indicates that the link is established

The physical bypass mode LEDs (M1, M2) have the following states:

- GREEN indicates inline
- OFF indicates bypass

In the CLI, the inline network ports are referred to as c1 to c4. [Table 4: Port Mapping](#) lists the port mapping.

Table 8: Port Mapping

Port	CLI Port (BPS-HC3-C35C2G)	CLI Port (BPS-HC3-Q35C2G)
A1	c1	q1
B1	c2	q2
A2	c3	q3
B2	c4	q4

For example, if the box ID is 1, and the BPS-HC3-C35C2G and BPS-HC3-Q35C2G modules are in slot 3, [Table 5: Default Inline Networks](#) lists the default inline networks:

Table 9: Default Inline Networks

Default Inline Network	Network A Connected To	Network B Connected To
default_inline_net_1_3_1	1/3/c1	1/3/c2
default_inline_net_1_3_2	1/3/c3	1/3/c4
default_inline_net_1_3_1	1/3/q1	1/3/q2
default_inline_net_1_3_2	1/3/q3	1/3/q4

**NOTE:** Default inline networks cannot be deleted.

## BPS Forwarding LED

BPS forwarding LED for each BPS-HC3-Q35C2G and BPS-HC3-C35C2G inline network port has two LEDs, an upper and a lower, that represent the inline network forwarding state. For more information, refer to [BPS Forwarding LED](#).

## Gigamon Resiliency for Inline Protection

Gigamon Resiliency for Inline Protection (GRIP)<sup>™</sup> is an inline bypass solution that connects two GigaVUE-HC3 nodes together so that one node provides high availability to the other node when there is a loss of power. This redundant arrangement of two GigaVUE-HC3 nodes maintains traffic monitoring by inline tools when one of the nodes is down.

GRIP<sup>™</sup> makes use of the bypass protection switch relays for protected inline networks on GigaVUE-HC3 nodes. The bypass combo module can provide physical protection for protected pairs of optical inline network ports required by the GRIP solution.

To configure the GRIP solution on BPS-HC3-C25F2G module, the GigaVUE-HC3 must be running GigaVUE-OS version 5.2.00 or higher. To configure the GRIP solution on BPS-HC3-Q35C2G and BPS-HC3-C35C2G modules, the GigaVUE-HC3 must be running GigaVUE-OS version 5.5.00 or higher. For solution and configuration information, refer to the chapter “Configuring Inline Bypass Solutions” in the *GigaVUE-OS CLI Reference Guide*.

**NOTE:** GRIP is supported on GigaVUE-HC3 only when there are other modules installed in the node that can provide the stack link. The GRIP solution synchronizes the nodes through a signaling link using a stack link between two stack ports.

## Module Status LEDs

The LEDs on the GigaVUE-HC3 modules indicate the current operational status. [Table 10: Module LED Descriptions](#) lists the operational states indicated by the color of Power (PWR), Ready (RDY), and Hot Swap (H/S) LEDs.

Table 10: Module LED Descriptions

LED	Color	Description
PWR	OFF	Module power is off
	Solid Green	Module power is on
RDY	OFF	Module inserted and not configured
	Solid Green	Module is ready and online
	Solid Red	Module failed (any module failure, including power)
H/S (Hot Swap)	OFF	Normal operation
	Solid Blue	Ready to remove module/module inserted. LED turns on at insertion of module.

## Port Status LEDs

Each 100Gb port on a module has four LEDs. [Table 11: 100Gb Port LED Descriptions](#) lists the port and link status indicated by the color of the port LEDs.

Table 11: 100Gb Port LED Descriptions

LED	Color	Description
L1	OFF	Port is administratively enabled, but the link is down
	Solid Green	Link up/activity
	Solid Amber	Disabled port
L2-L4	OFF	OFF in non-breakout mode. L2-L4 are used in port breakout mode.
	Solid Green	Link up/activity
	Solid Amber	Disabled port

Each 10Gb/25Gb port on a module has two LEDs. [Table 12: 10Gb Port LED Descriptions](#) lists the port and link status indicated by the color of the port LEDs.

Table 12: 10Gb Port LED Descriptions

Color	Description
OFF	Port is administratively enabled, but the link is down
Solid Green	Link up/activity
Solid Amber	Disabled port

## Breakout Panels

Breakout panels let you connect ports on a GigaVUE H Series node to a tool or network port or TAP for port breakout or aggregation.

The following breakout panels are available:

- PNL-M341
- PNL-M343

Refer to *G-TAP M Series Hardware Guide* for details.

## Upgrading PLDs

Use the **pld** CLI command to perform an upgrade of programmable logic devices (PLDs) on GigaVUE-HC3 nodes. These devices include field programmable gate arrays (FPGAs). The following components have an FPGA:

- PRT-HC3-X24 module
- PRT-HC3-C08Q08 module
- PRT-HC3-C16 module
- SMT-HC3-C05 module
- SMT-HC3-C08 module
- BPS-HC3-C25F2G module

- BPS-HC3-Q35C2G module
- BPS-HC3-C35C2G module
- control card (also referred to as the main board)

FPGA images are bundled with the software image and upgraded with the software image upgrade, however, the **pld** command provides the ability to upgrade each FPGA individually. After a PLD upgrade, the node requires a hard reboot.

Issue the **show pld** command to display the PLDs that need to be upgraded, then only upgrade those. Refer to the following example for CCv1:

```
(config) # show pld
Box ID: 1
Slot      HW Type           Cur Rev    Need Upgrade
-----
cc1      HC3-Main-Board    2017/02/03:6  no
1        PRT-HC3-C08Q08   2017/01/23:5  no
2        BPS-HC3-C16      2017/09/25:1  no
3        SMT-HC3-C05      2017/02/03:5  no
4        PRT-HC3-X24      2017/01/23:5  no
```

Refer to the following example for CCv2:

```
(config) # show pld
Box ID: 2
Slot      HW Type           Cur Rev    Need Upgrade
-----
cc1      HC3-Main-Board-v2 2018/01/03:2  no
1        PRT-HC3-C16      2017/09/27:1  yes
2        PRT-HC3-C08Q08   2017/01/23:5  no
4        BPS-HC3-C25F2G   2017/07/17:2  no
```

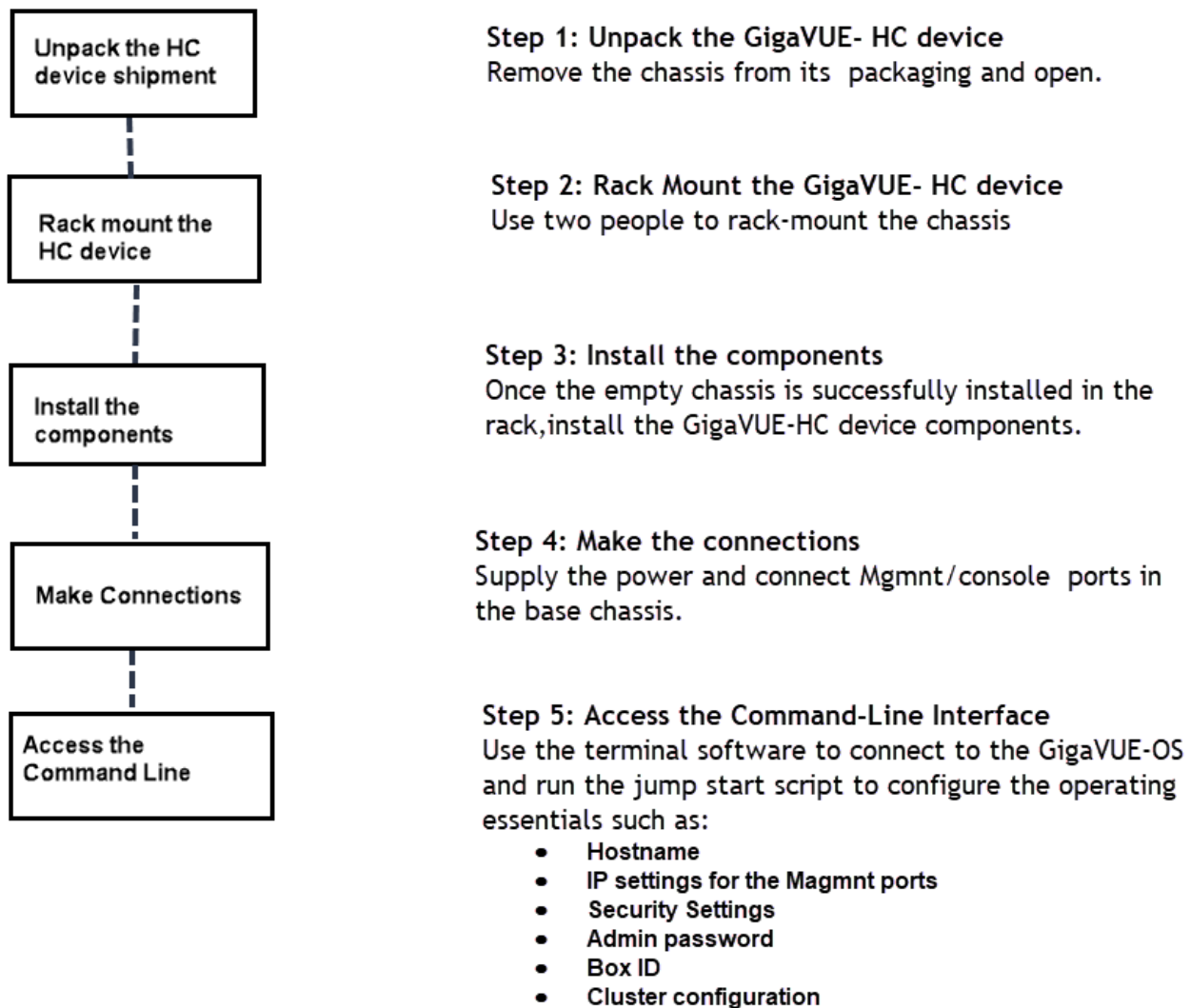
# GigaVUE-HC3 Installation Roadmap

This section provides a flow chart of the major steps you need to perform to get a GigaVUE-HC3 node unpacked, rack-mounted, installed, and connected. It also describes what you should do once you have completed the initial setup of the node.

Topics:

## First Steps – Getting Unpacked, Racked, Installed and Connected

You have received your GigaVUE-HC3 node and now you are ready to get up and running. [Figure 1Getting Started Roadmap](#) shows the major steps you need to perform to get the GigaVUE-HC3 chassis out of the box, into a rack, installed with modules, plugged in, and running on your network.



**Figure 1** Getting Started Roadmap

## Next Steps

Once you have performed the initial configuration of the GigaVUE-HC3 node, installing, connecting, and configuring the node, you are ready to get started mapping traffic between network and tool ports.

Refer to the *GigaVUE-OS CLI Reference Guide*, **GigaVUE Fabric Management Guide**, and online help for information.

# Assembling the GigaVUE-HC3 Node

This section explains how to unpack, rack-mount, and assemble the GigaVUE-HC3 node using the components that came with your shipment.

Separate sections are provided for unpacking and rack-mounting the GigaVUE-HC3 nodes. However, the instructions for installing modules are covered in other sections.

Topics:

## Unpacking the GigaVUE-HC3 Shipment

The GigaVUE-HC3 node is shipped assembled, except for the modules. The extension board is already installed in the front of the chassis. The control card, fan tray, and two power supply modules (PSMs) are already installed in the rear of the chassis. Filler panels occupy the four front module slots and two remaining rear PSM slots.

The shipping package includes the chassis, an accessory kit containing standard cables and screws, a rack mounting rail kit, and the left and right sides of the optional cable management assembly.

The modules are shipped in separate boxes.

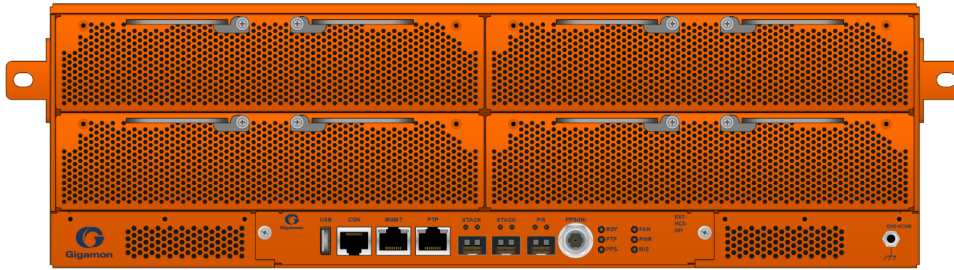
Use the following procedure to unpack the node:

1. Inspect the shipping boxes. If any of the cartons were damaged, file a claim with the carrier who delivered them.
2. Open the box containing the GigaVUE-HC3 chassis and remove the accessory kit from the top of the shipment. The accessory kit contains the power cords, console cable and adapter, and the left and right sides of the optional cable management assembly.

If you plan on installing the optional cable management assembly, set aside the two parts.

3. Open the module boxes and set them aside.
4. Leave all protective filler panels in place in the chassis. **DO NOT** install the modules yet. Gigamon recommends rack-mounting the GigaVUE-HC3 chassis without the modules because of its weight (~88lb).





**Figure 1** GigaVUE-HC3 with Filler Panels

## Rack-Mounting the GigaVUE-HC3 Chassis

This section describes how to rack-mount the GigaVUE-HC3 chassis in a standard 3RU rack space using the rack mount slide hardware included with the chassis. You can install the GigaVUE-HC3 chassis in two-post or four-post racks with a minimum depth of 16in.

### Safety Precautions

Before you get started rack-mounting the GigaVUE-HC3 chassis, make sure you have read the following safety precautions:

- There are a wide variety of racks available on the market. Make sure you consult the instructions provided by your rack vendor for detailed mounting instructions before installing the GigaVUE-HC3 chassis.
- Make sure you install any stabilizers provided for the rack before installing the chassis. Unsecured racks can tip over and cause injury or death.
- Make sure you install devices in the rack from the bottom up with the heaviest devices at the bottom.
- Make sure you provide adequate ventilation to the nodes installed in the rack.

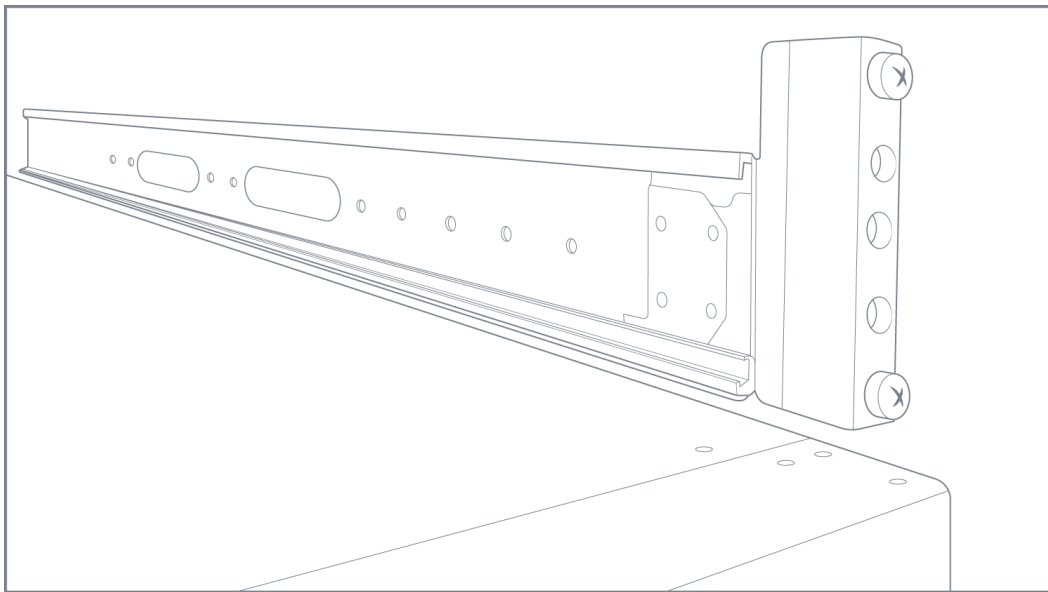
### Rack-Mounting Procedure

Use the following procedure to rack-mount the GigaVUE-HC3 chassis:

1. Determine whether you need to center-mount the HC3 chassis in the rack. Front-mounted nodes sit flush with the front of the rack while center-mounted nodes will extend in front of it. However, it is not recommended to flush-mount the GigaVUE-HC3. GigaVUE-HC3 will partially extend in front of the rack when properly mounted in a four post rack. For two post racks, center mount the chassis.
2. Make sure you have not installed any modules in the chassis yet. Gigamon recommends rack-mounting the GigaVUE-HC3 chassis before installing these items to make it easier to handle during the installation.
3. Select a suitable location for the rack that will hold the GigaVUE-HC3 chassis. Choose a location that is clean, dust free, and well-ventilated. You will need access to grounded power sources. Avoid areas where heat, electrical wire, and electromagnetic fields are generated.

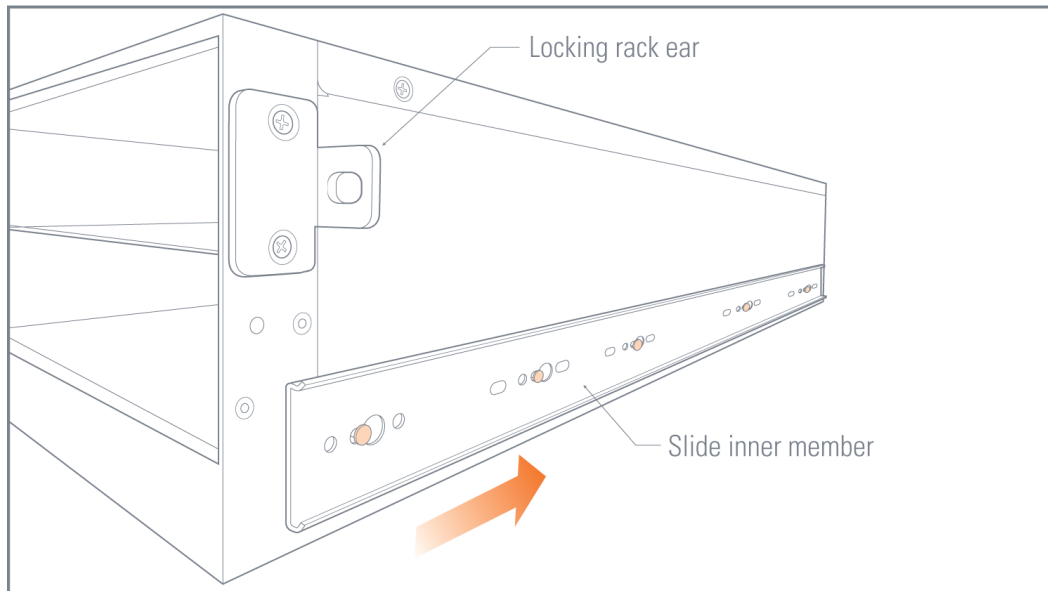
Plan for enough clearance in front of a rack so you can access the modules easily (approximately 25in) and enough clearance in the back of the rack to allow sufficient airflow and installation of the rear components such as power supply modules. Also, if you plan to install the optional cable management assembly, allow another 3.5in of clearance at the front of the node.

4. Follow the instruction included with the slide to properly assembly the slide. The assembly for mounting in a four post rack differs from the assembly for center mounting in a two post rack.
5. Locate an open 3RU rack space and install the left and right rails of the mounting slide in the rack. The assembly for a four-post rack differs from the assembly for a two-post rack. Refer to [Figure 2 Slide Rail Installed in Four Post Rack](#).



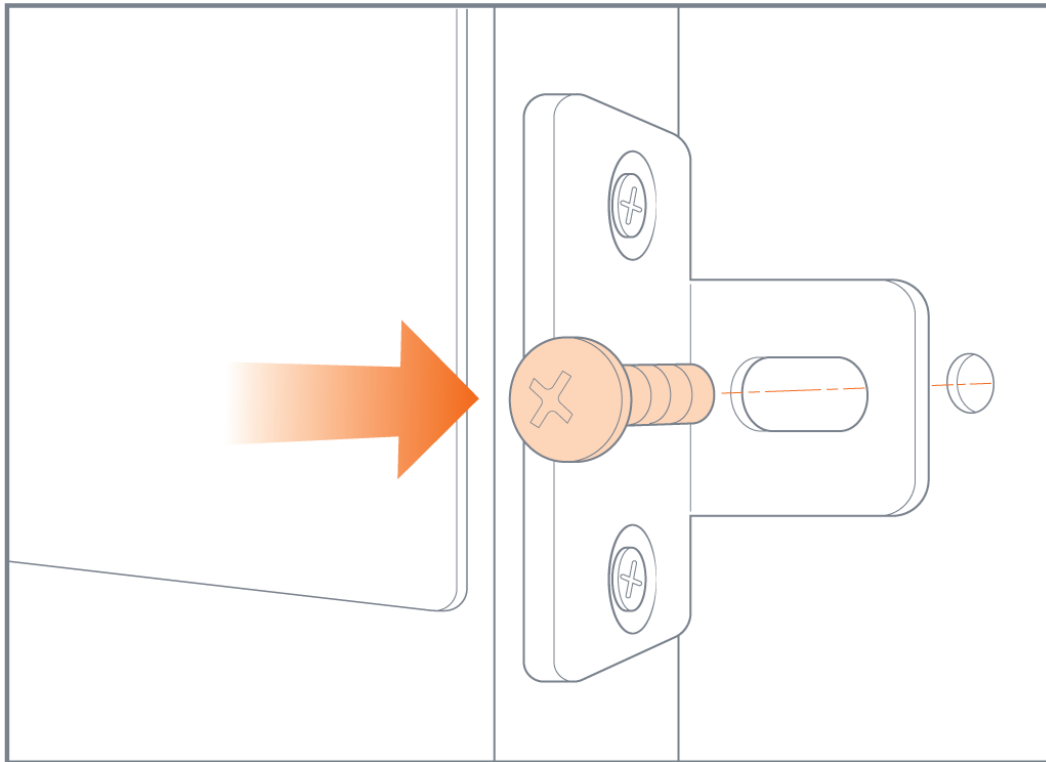
**Figure 2** Slide Rail Installed in Four Post Rack

6. Attach the left and right inner members of the mounting slide to the chassis and attached the locking rack ear to the chassis. Refer to [Figure 3 Slide Inner Member and Locking Rack Ear Installed on Chassis](#).



**Figure 3** Slide Inner Member and Locking Rack Ear Installed on Chassis

7. Locate the 3RU rack space where you installed the left and right slide rails and lift the node into place. It takes two people or a scissor lift to place the GigaVUE-HC3 in the rack.
8. Carefully lift the chassis and slide the inner members of the slide attached to the chassis into the slide rails attached to the rack posts
9. Insert the screw through the locking rack ear on the chassis to secure the node in place and keep it from sliding out of the slide rail. Tighten the screw. Refer to [Figure 4 Locking Rack Ear Attached to Rack](#).



**Figure 4** Locking Rack Ear Attached to Rack

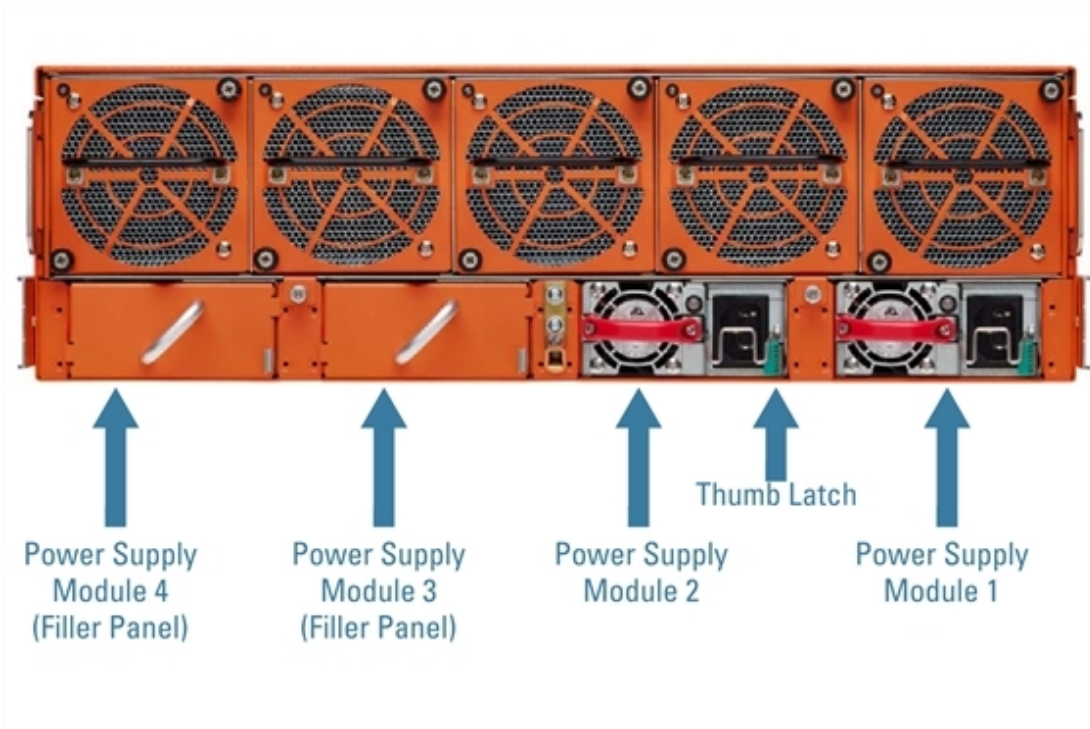
## Installing Power Supply Modules in GigaVUE-HC3

The GigaVUE-HC3 chassis is shipped with two power supply modules (PSMs) installed. However, you can order and install additional PSMs. Up to four PSMs can be installed for 2+2 redundancy. The GigaVUE-HC3 also has a power management feature that makes sure that there is enough power available for the modules installed in the chassis. For more information about power management, refer to [Power Management](#).

**NOTE:** If you are installing DC power supply modules, you will need to wire power to the screw terminals on the PSMs before installing them in the chassis. There is not enough room to service the screw terminals once the modules are installed in the chassis. Refer to [Connecting -48V DC Power Supply Modules](#) for instructions on connecting DC power supply modules.

Use the following procedure to install power supply modules:

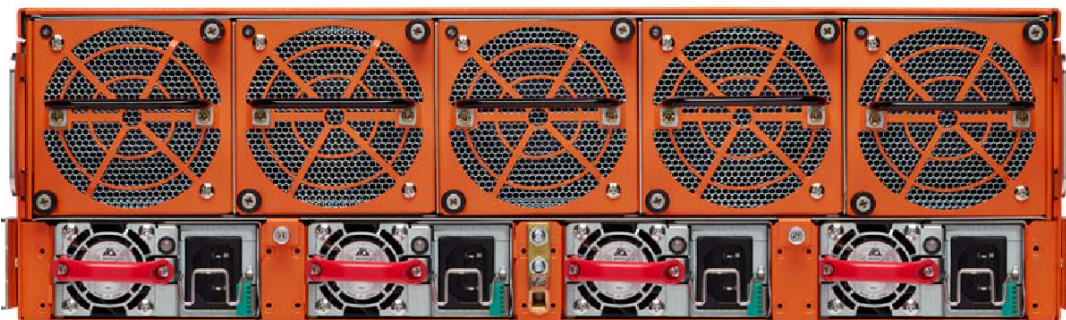
1. Make sure you are wearing an ESD-preventive wrist or ankle strap.
2. Locate the power supply modules and remove them from their packaging. Each PSM is shipped in its own box.
3. Carefully slide the first PSM into the matching receptacles at the lower rear of the node ([Figure 5 Power Supply Modules \(AC Version Shown\)](#)). Push gently to seat the PSM firmly in the chassis until the thumb latch snaps into place.



**Figure 5** Power Supply Modules (AC Version Shown)

**NOTE:** If using two PSMs, leave filler panels in as shown in [Figure 5 Power Supply Modules \(AC Version Shown\)](#). The filler panels aid in air flow distribution. If a PSM fails, leave it in the chassis.

- Repeat the previous steps for the next PSM. [Figure 6 Four Power Supply Modules Installed](#) shows the GigaVUE-HC3 node with all four power supply modules installed.



**Figure 6** Four Power Supply Modules Installed

## Power Management

Power management controls power up/down of the modules in the GigaVUE-HC3 node through software. It determines the priority of the modules to power up or down based on the total PSMs present.

All four of the slots on the GigaVUE-HC3 are assigned a power priority. Slot 1 defaults to the highest priority of 1. Slot 2 defaults to a priority of 2. Slot 3 defaults to a priority of 3. Slot 4 defaults to the lowest priority of 4.

A GigaVUE-HC3 chassis can have up to four PSMs. The power supply modules can be either AC or DC. Two or four PSMs are recommended for 1+1 redundancy (two PSMs) or 2+2 redundancy (four PSMs). A mix of AC and DC power supply modules is not recommended. When all PSMs are plugged in and are up (LED status light is green), their power is pooled and used to calculate the *available power*. Available power is the total power available to power up the modules in the GigaVUE-HC3. The modules present and configured in the chassis are used to calculate *needed power*. The modules are powered up based on the available power. If the needed power is more than the available power, only the modules in the higher priority slots are powered up.

For example, when the available power falls below the needed power due to a PSM failing or being unplugged or removed, the module in the lowest priority slot is powered down first.

When additional power is added, power management powers up the modules present in the higher priority slots before it powers up the modules in the lower priority slots.

When a module is powered down by power management, the operational status of the module is shown as **nopower** in the output of the **show cards** command, which indicates that it was powered down by power management.

**NOTE:** Power management does not control power up/down of the control card.

## Defining Power Attributes

The following attributes for power computation are defined as follows:

- Total power—the total power available in the system, based on the PSMs
- Base power—the power needed for the control card and base system
- Power allocated—the power allocated to the modules by power management
- Power available—the power remaining and available after power has been allocated
- Power redundant—the status of yes/no of whether or not the system currently has redundant power
- Total redundant power—the total redundant power in the system

## Calculating Available Power

Every PSM has maximum rated Watts. [Table 1: Input Voltage and Maximum Watts](#) lists the PSMs with their input voltage and maximum rated Watts. The maximum Watts is the available power for each AC or DC power supply module.

Table 1: Input Voltage and Maximum Watts

Power Supply Module	AC/DC Input Voltage	Maximum Watts per PSM
DC PSM -48V	40V-72V	1500W
AC PSM	100V-115V / 120V / 200V-240V	1200W / 1350W / 1600W

For a PSM to be included in available power, the PSM must be plugged in and have a status of *on*. Power management adds the eligible rated Watts to the available power and subtracts any removed, failed, or no input voltage power supply module from the available power.

**NOTE:** The AC PSM can operate in either 100-115V, 120V, or 200-240V input voltages. Depending on the AC input voltage, the PSU wattage changes.

[Table 2: Total Available Power with Three PSMs](#) shows the calculation for total available power, where there are three PSMs and one empty slot.

Table 2: Total Available Power with Three PSMs

PSM	Slot	AC Input Voltage	Power (Watts)	Status
AC PSM	1	220V	1500W	on
AC PSM	2	220V	1500W	on
	3			Empty
AC PSM	4	220V	1500W	on
Total Available Power			4500W	

[Table 3: Total Available Power with Four PSMs](#) shows the calculation for the total available power, where a PSM is present in all slots.

Table 3: Total Available Power with Four PSMs

PSM	Slot	AC Input Voltage	Power (Watts)	Status
AC PSM	1	220V	1500W	on
AC PSM	2	220V	1500W	on
AC PSM	3	220V	1500W	on
AC PSM	4	220V	1500W	on
Total Available Power			6000W	

## Calculating Needed Power

Every module for the GigaVUE-HC3 has a rated maximum Watts. The maximum Watts of each module is used to calculate the total needed power. [Table 4: Needed Power Per Module](#) lists the maximum power for each module, which you can use to calculate the maximum needed power.

Table 4: Needed Power Per Module

Module	Maximum Power (Watts)
Base Chassis Hardware with CCv1	820W
Base Chassis Hardware with CCv2	940W
PRT-HC3-C08Q08	160W
PRT-HC3-X24	60W
SMT-HC3-C05	200W
SMT-HC3-C08	260W
BPS-HC3-C25F2G	60W
BPS-HC3-C35C2G	60W
BPS-HC3-Q35C2G	60W
PRT-HC3-C16	130W

A minimum of one PSM powers the base chassis hardware, including the main board, the extension board, and the fan modules. All the present modules that are not yet powered up are calculated as needed power.

When a module is shutdown or removed from the system, it is not immediately subtracted from the needed power. To subtract the module from the needed power, unconfigure the module from the slot using the **no card <slot ID>** command.

If the module is shutdown and removed without unconfiguring, the needed power will not be subtracted.

If there is a power failure or if a PSM is removed when there is insufficient power, the module will be powered down.

## Calculating Redundant Power

The power redundancy of the system is calculated based on the number of PSMs currently available that are in an *up and running* state.

The GigaVUE-HC3 has a total of four PSMs. A system is declared power redundant if there are a minimum of two PSMs in an up and running state and if the power from one of the PSMs can keep the current system fully up.

If two PSMs are up and running, a system is declared power redundant if the required power of the modules and the base power can be addressed by one of the PSMs.

In summary, redundant power is calculated based on the total power needed by the modules and the PSMs available in the system and their capacity.



While a single PSM can power the entire chassis, the GigaVUE-HC3 can be configured with up to four PSMs for power redundancy. To be considered redundant power, there must be more than one PSM. Two PSMs can provide 1+1 power redundancy. Four PSMs can provide 2+2 power redundancy.

Power management scans all four power slots and stores the lowest rated Watts by product code and input voltage. The lowest rated Watts for each group of two PSMs is used to determine the redundant power pool. To be determined for the redundant power pool, the PSM must be present and have a status of *on*.

[Table 5: Total Redundant Power with Three PSMs](#) shows the total redundant power with three eligible PSMs, where there is one group of two PSMs for 1+1 redundancy and a single third PSM. The lowest rated module is 1100W in slot 1. Therefore, the total redundant power is 1100W.

Table 5: Total Redundant Power with Three PSMs

PSM	Slot	Power (Watts)	Status
AC PSM	1	1100W	on
AC PSM	2	1500W	on
	3		Empty
AC PSM	4	1500W	on
Total Redundant Power		1100W	

[Table 6: Total Redundant Power with Four PSMs](#) shows the total redundant power with four eligible PSMs, where there are two groups of two PSMs for 2+2 redundancy. The lowest rated module is 1100W, one in slot 1 and one in slot 3. Therefore, the total redundant power is 2200W.

Table 6: Total Redundant Power with Four PSMs

PSM	Slot	Power (Watts)	Status
AC PSM	1	1100W	on
AC PSM	2	1500W	on
AS PSM	3	1100W	on
AC PSM	4	1500W	on
Total Redundant Power		2200W	

## Displaying Power and Voltage Information

The output of the following CLI command displays power information on a GigaVUE-HC3:

```

(config) show environment type psu
*** Box 1 (GVS-HC300) ***
-----
Power Module 1 (PSM-HC3-001):
Product Code          132-00DU
Serial Num            1DU0-0001
HW Rev                1.0
Status                on output=1500W
Capacity              1500W
-----
Power Module 2 (PSM-HC3-001):
Product Code          132-00DU
Serial Num            1DU0-0002
HW Rev                1.0
Status                on output=1500W
Capacity              1500W
=====
Total Power: 3000W
Total Base Power: 820W
Power Allocated: 220W
Power Available: 1960W
Power Redundant: Yes
Total Redundant power: 1500W

```

The output of the following CLI command displays voltage information on a GigaVUE-HC3 CCV1:

```

(config) show environment type voltage
*** Box 1 (GVS-HC300) ***
-----
Card cc1 (CTL-HC3-001):
12v voltage :          12.402V
-----
Card 1 (PRT-HC3-C08Q08):
12v voltage :          12.402V
-----
Card 2 (BPS-HC3-C25F2G):
12v voltage :          12.342V
-----
Card 3 (SMT-HC3-C05):
12v voltage :          12.342V
-----
Card 4 (PRT-HC3-X24):
12v voltage :          12.342V
=====

```

The output of the following CLI command displays voltage information on a GigaVUE-HC3 CCV2:

```

(config) show environment type voltage
*** Box 2 (GVS-HC300) ***
-----
Card cc1 (CTL-HC3-002):
12v voltage :          12.281V

```

```
-----
Card 1 (PRT-HC3-C16) :
12v voltage :          12.160V
-----
```

```
Card 2 (PRT-HC3-C08Q08) :
12v voltage :          12.281V
-----
```

```
Card 4 (BPS-HC3-C25F2G) :
12v voltage :          12.281V
=====
```

The output of the following CLI command displays power requirement and priority information on a GigaVUE-HC3 CCv1:

```
(config) show card
```

```
Box ID: 1
Slot  Config  Oper Status      HW Type      Product Code  Serial Num  HW Rev  PowerReq  PowerPriority
-----
ccl   yes      up              HC3-Main-Board  132-00DR     1DR0-0008   1.0-00  N/A      N/A
1     yes      up              PRT-HC3-C08Q08  132-00DW     1DW0-0005   1.0-0   160      1
2     yes      up              BPS-HC3-C25F2G  132-00E9     1E90-0138   2.0-0   60       2
3     yes      up              SMT-HC3-C05     132-00DX     1DX0-0020   A1-0    200      3
4     yes      up              PRT-HC3-X24     132-00DY     1DY0-0028   A1-0    60       4
```

The output of the following CLI command displays power requirement and priority information on a GigaVUE-HC3 CCv2:

```
(config) show card
```

```
Box ID: 2
Slot  Config  Oper Status      HW Type      Product Code  Serial Num  HW Rev  PowerReq  PowerPriority
-----
---
ccl   yes      up              HC3-Main-Board-v2  132-00ER     1ER0-001C   1.1-00  N/A      N/A
1     yes      up              PRT-HC3-C08Q08    132-00DW     1DW0-0132   B0-0    160      1
2     yes      up              PRT-HC3-C16       132-00ET     1ET0-000B   A0-0    130      2
4     yes      up              BPS-HC3-C25F2G    132-00E9     1E90-0161   A0-0    60       4
```

## Installing Cable Management and Air Filter

The GigaVUE-HC3 chassis includes cable management for installation on the front and sides of the node. The cable management assembly also includes an external air filter.

Installing the cable management assembly is optional. However, because of the high number of ports potentially available on the GigaVUE-HC3 node, Gigamon recommends installing cable management.

Use the following procedure:

1. Remove the cable management parts from the packaging.
2. To install cable management on the GigaVUE-HC3 node, first attach the sides to the left and right of the chassis. Attach two screws on each side of the chassis as shown in [Figure 3-7](#).

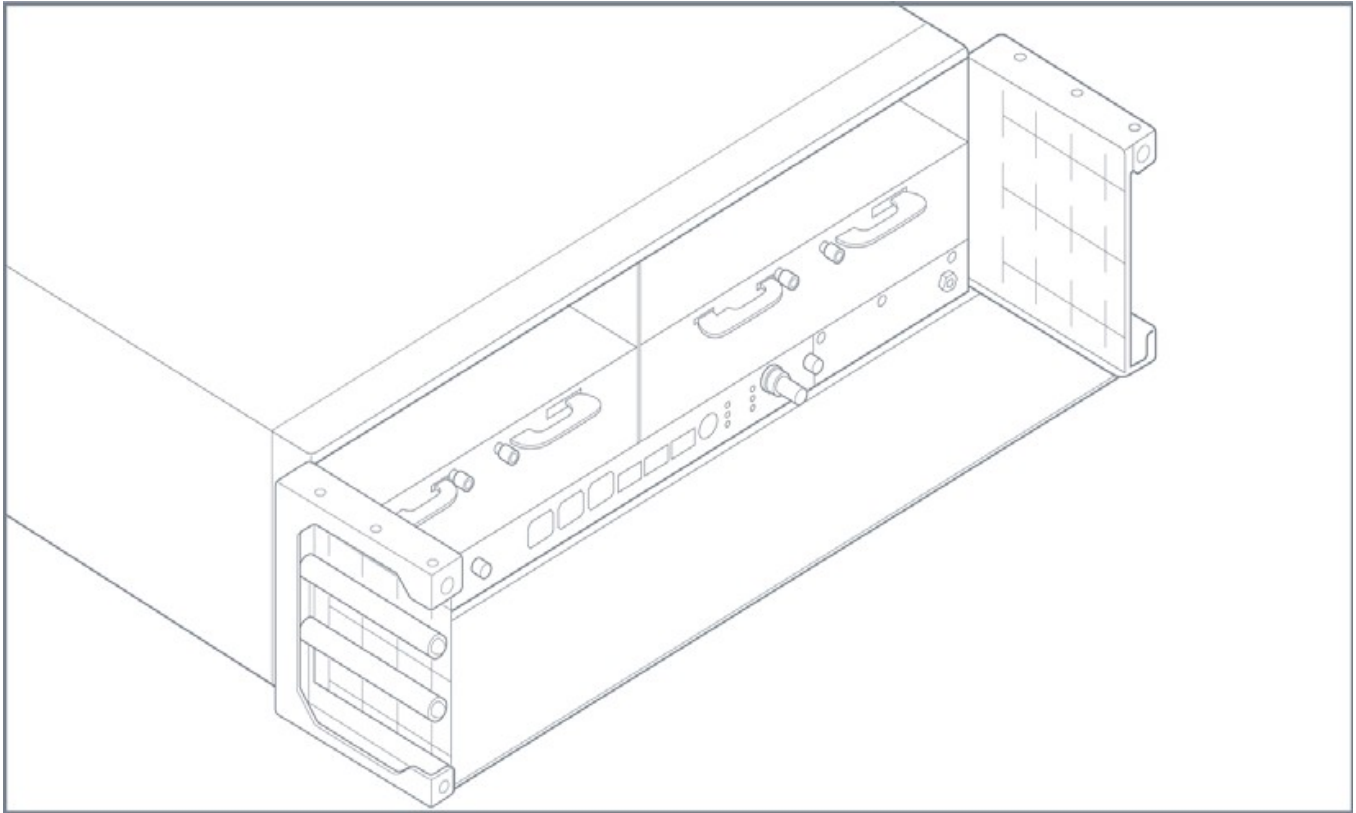


Figure 3-7: Cable Management Sides and Bottom Plate

3. Slide the bottom plate onto the two sides as shown in [Figure 3-7](#).
4. Install cables into cable management assembly. Push cables through the material on the sides.
5. Slide the top and front, which contains the external air filter, onto the cable management assembly. Refer to [Figure 3-8](#).

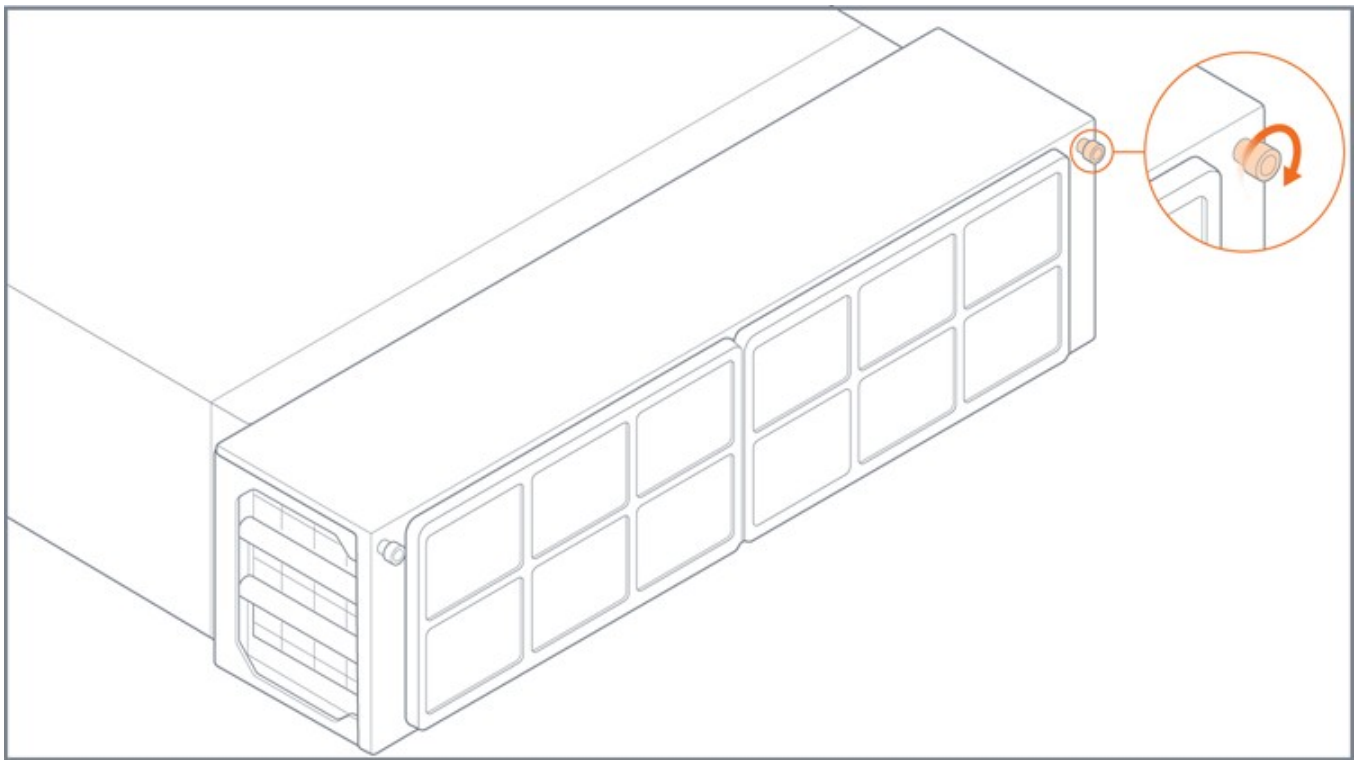


Figure 3-8: External Air Filter

6. Tighten the two screws at the front on the cable management assembly as shown in [Figure 3-7](#).

## Air Filter Replacement Schedule

Replace the air filter every six months. However, the optimal filter replacement schedule varies with the environment in which the equipment is located. For example, in dusty conditions, replace the air filter every three months. If there are temperature alarms, inspect the air filter.

## Ordering Air Filter Replacements

The GigaVUE-HC3 filter kit, FIL-HC300, can be ordered. It contains two filter assemblies.

## Installing and Removing Modules

The procedure for installing modules is to remove the filler panels, and install the module. Then fasten with the two ejector levers at the top of the module and tighten the thumb screw on top of the levers. The following procedure has the details.

## Avoid Electrostatic Damage!

**IMPORTANT:** Always take precautions to avoid electrostatic damage during control card and module installation:

- Always use an ESD-preventive wrist or ankle strap and ensure that it makes good skin contact. The strap can be connected to one of the following:
  - ESD wrist strap connector. The GigaVUE-HC3 chassis provides a connector at the front of the chassis for this purpose labeled with a ground symbol.
  - Captive installation screws on an installed module or power supply module.
  - Any unpainted surface on the chassis.
- Handle cards by the edges only.
- Avoid contact between the cards and clothing. The wrist strap protects only the module from ESD voltages on the body. ESD voltages on clothing can still cause damage.

## Hot Swapping Modules

Modules are hot-swappable – they can be installed or removed from the chassis with the power on. **To remove a module safely with the power on, you must follow the procedure in [Module Removal and Replacement Procedure \(Hot Removal\)](#).**

**Install proper software versions prior to inserting any new modules.**

Gigamon often makes new modules available for GigaVUE-HC3 nodes. New modules are usually introduced starting with a new software release. Make sure you install the supporting software release before physically installing the new module.

If you do install a new module before its supporting release, the module will appear in **show cards** output with an **Operational Status** of **unsupported**.

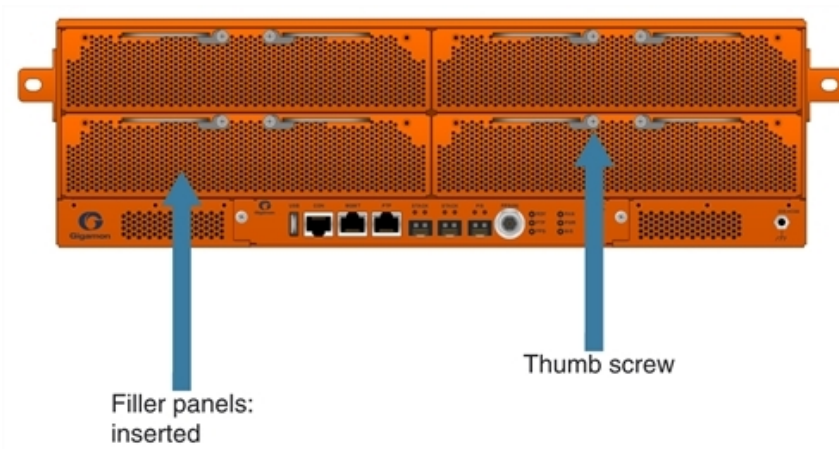
In some cases, if you subsequently upgrade the node to the release that does support the new module, it can appear persistently in the **show cards** output with an **Operational Status** of **inserted**. To make the module operational, you must unconfigure it with the **no card slot x** command, followed by configuring the module with **card slot x**.

## Module Installation Procedure

Install at least one module in the GigaVUE-HC3 node.

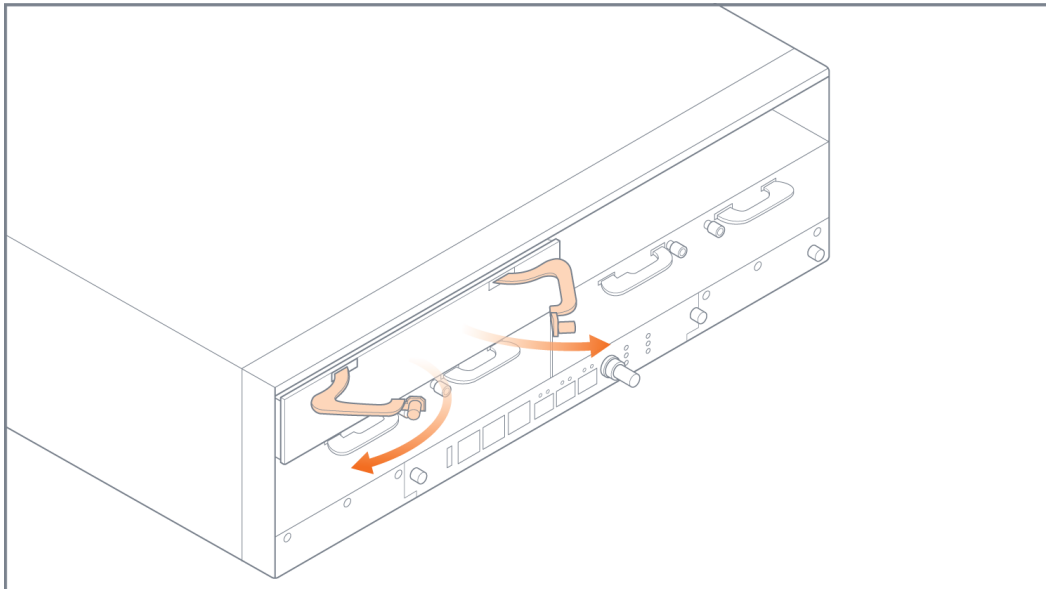
To install GigaVUE-HC3 modules:

1. Make sure you are wearing an ESD-preventive wrist or ankle strap.
2. Locate the modules and remove them from their packaging.
3. Locate the protective filler panels in the bays. Refer to [Figure 7 Filler Panels Inserted](#).



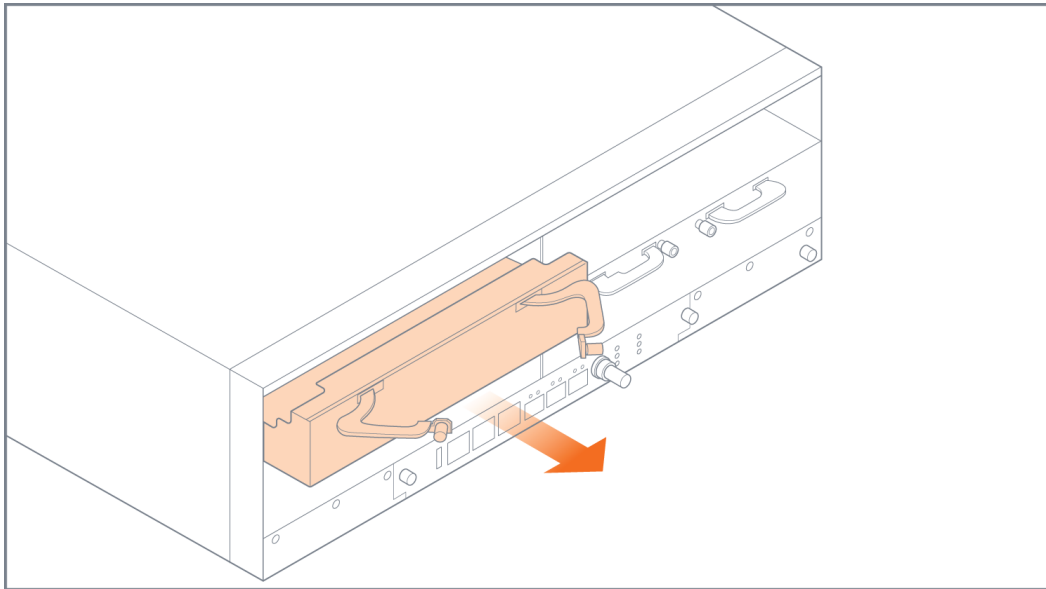
**Figure 7** *Filler Panels Inserted*

4. Use a Phillips screwdriver to loosen the screws on the ejector levers, then loosen the thumb screws.
5. Open the levers on a filler panel as shown in [Figure 8 Filler Panel Levers](#).



**Figure 8** *Filler Panel Levers*

6. Remove a filler panel as shown in [Figure 9 Filler Panel Removal](#).



**Figure 9** Filler Panel Removal

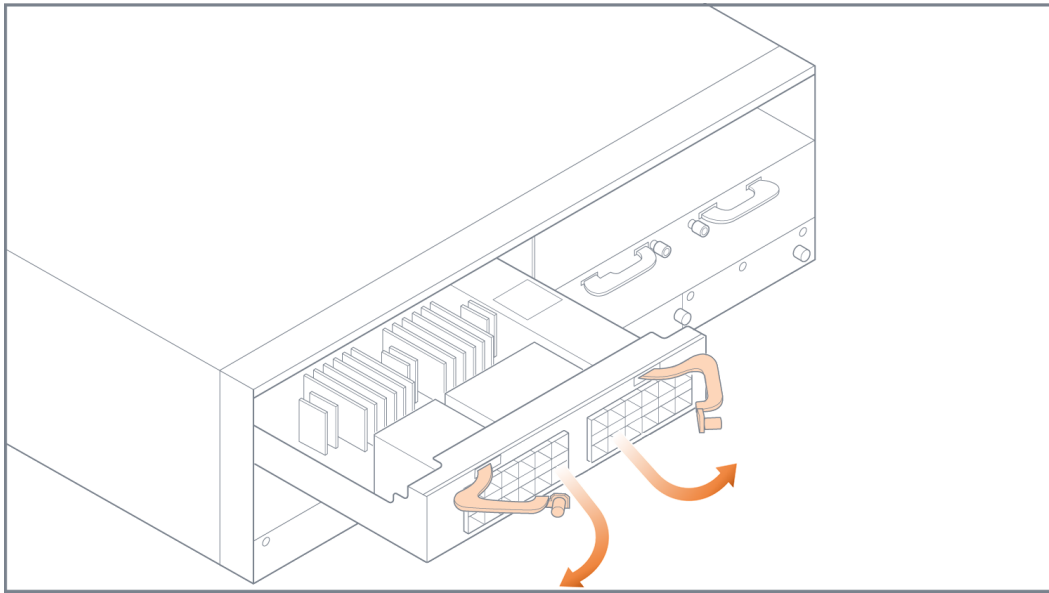
7. Keep the filler panels so they can be reinserted if the module is ever removed.

**NOTE:** To prevent any improper air flow and overheating the node, do not leave any bays uncovered. It is always recommended to install a filler panel when a module is removed.

You can install modules in any of the four available front bays on the GigaVUE-HC3. However, order is important because power management of the modules is based on the priority of the module, with the module in bay 1 having the highest priority and the module in bay 4 having the lowest priority. For more information on power management, refer to [Power Management](#).

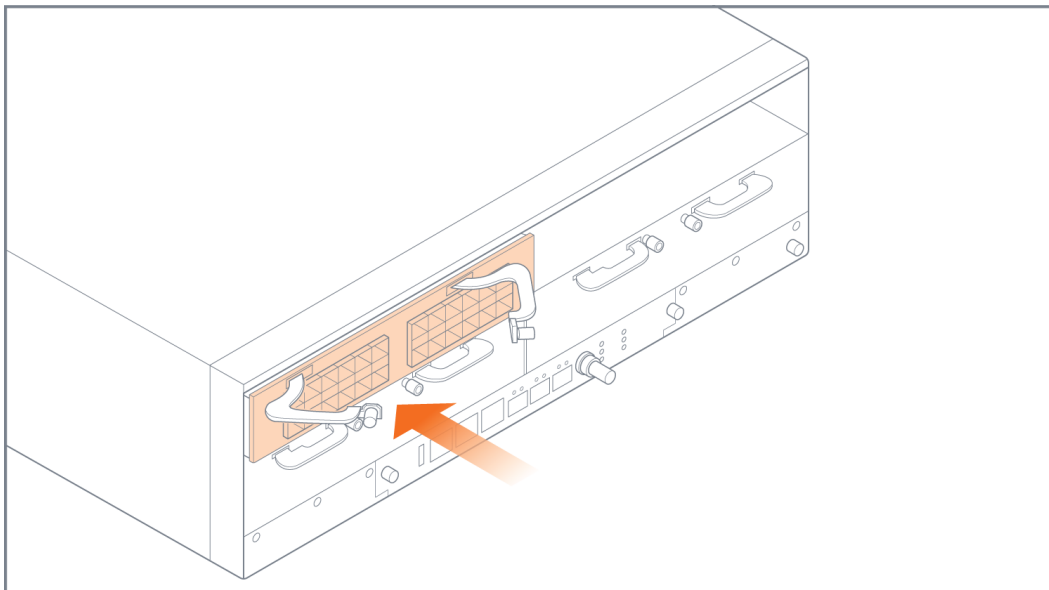
1. Pull out the two levers at the top of the module as shown in [Figure 10Module Levers](#).





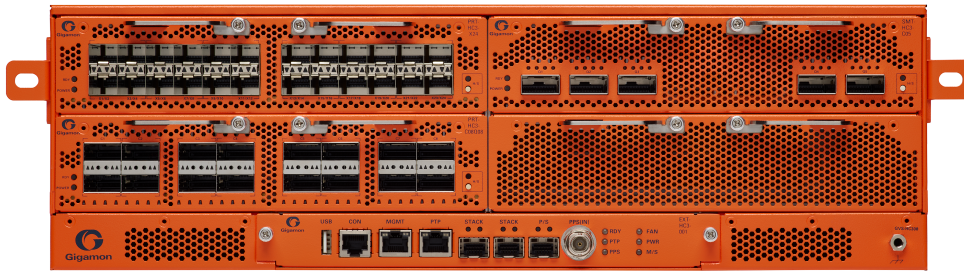
**Figure 10** *Module Levers*

2. Carefully slide the module into the bay until it mates with the mid-plane as shown in [Figure 11](#) *Module Insertion*.



**Figure 11** *Module Insertion*

3. Push the ejector levers back in.
4. Tighten the thumb screws on the levers, then use a Phillips screwdriver to tighten the screws. Refer to [Figure 12](#) *Modules Installed*.



**Figure 12** *Modules Installed*

8. Install any additional modules by repeating the previous steps.

**NOTE:** The first time you install a module in the node, you need to configure the node to recognize it with the **card** command and save your changes with **write memory**. Refer to [Configure Modules and Enable Ports](#) for more information.

**This completes the installation of the modules on the GigaVUE-HC3.**

## Removing GigaVUE-HC3 Modules

Use the following procedure to remove a GigaVUE-HC3 module from the node with the power on. The procedure shuts down the ports on the module.

For other removal procedures, refer to [Module Removal and Replacement Procedure \(Hot Removal\)](#).

**IMPORTANT:** Hot removal of the module without following the listed steps can cause system instability and require a reboot.

Before starting, make sure you are wearing an ESD-preventive wrist or ankle strap.

1. Save map rules with the following CLI command:  

```
(config) # config text generate active running save <name.txt>
```

Refer also to [Backing Up Running Configuration](#).
2. To prepare the module for removal, press and hold the hot swap on/off button, then release it. The LED will blink for a few seconds.

**NOTE:** Pressing the on/off button is the same as issuing the following CLI command:

```
(config) # card slot <slot ID> down
```

3. Wait for the module to shut down: RDY LED goes red; H/S LED goes solid blue.
4. Slide the module out of the chassis and store it in a static-safe location.
5. Insert the new module.
6. Wait for the module to come back up: RDY LED goes green; H/S LED goes off.
7. To verify the module is operationally up, issue the following two CLI commands:

**(config) # show cards**(config) # show card slot <slot ID>

**NOTE:** The output of the **show cards** command displays the operational status of the module as *up* in the Oper Status field, as follows:

```
(config) # show cards
Slot  Config  Oper Status      HW Type      Product Code  Serial Num  HW Rev  PowerReq  PowerPriority
-----
cc1   yes      up              HC3-Main-Board  132-00DR     1DR0-0010   1.0-00  N/A       N/A
1     yes      up              SMT-HC3-C05    132-00DX     1DX0-002A   1.0-0   390       1
2     yes      up              SMT-HC3-C05    132-00DX     1DX0-0021   A1-0    390       2
3     yes      up              SMT-HC3-C05    132-00DX     1DX0-0020   A1-0    390       3
4     yes      up              PRT-HC3-X24    132-00DY     1DY0-0002   1.0-0   110       4
```

The processor on the SMT-HC3-C05 module may take a minute to become operationally up. The **show card slot <slot ID>** command displays the status of the card as well as the status of the processor. Issue the **show card slot <slot ID>** command to verify the processor state in the e1 State field. You may have to issue the command a few times to watch the e1 State transition from down to up, as follows:

```
(config) # show card slot 3
Slot  Config  Oper Status      HW Type      e1 State  e2 State
-----
3     yes      up              SMT-HC3-C05  down      down
(config) # show card slot 3
Slot  Config  Oper Status      HW Type      e1 State  e2 State
-----
3     yes      up              SMT-HC3-C05  up        up
```

8. Apply licenses with the following CLI command:

**license install box id <box-id> key <license-key>**

## Backing Up Running Configuration

Use the information in this section to back up the running configuration.

Use the following command to back up to a SCP/TFTP/HTTP server:

**(config) # configuration text generate active running upload <upload URL> <filename>**

This command uses FTP, TFTP, or SCP to upload the running configuration to a text file on remote storage. The format for the **<upload URL>** is as follows:

**[protocol]://username[:password]@hostname/path/filename**

For example, the following command uploads a text configuration file based on the active running configuration and uploads it to an FTP server at 192.168.1.49 with the name

**config.txt:**

```
(config) # configuration text generate active running upload
ftp://myuser:mypass@192.168.1.49/ftp/config.txt
```

## Module Removal and Replacement Procedure (Hot Removal)

Modules can be removed from the node with the power on.

**IMPORTANT:** Hot removal of modules without following the listed steps can cause system instability and require a reboot.

Before starting, make sure you are wearing an ESD-preventive wrist or ankle strap.

## Replacing a Module with the Same Type of Module

1. Shut down the module to prepare for removal with the following CLI command:  
**(config) # card slot <slot ID> down**
2. Slide the module out of the chassis and store it in a static-safe location.
3. Insert the new module of the same type.

## Replacing a Module with a Different Type of Module

1. Remove all packet distribution configuration related to the module using the following CLI command:  
**(config) # no card slot <slot ID>**
2. Slide the module out of chassis and store it in a static-safe location.
3. Insert the new module of the different type.
4. Issue the following CLI command to make the card available for configuration:  
**(config) # card slot <slot ID>**

## Next Steps

Refer to [Configuring Basic GigaVUE H Series Settings](#) for information on getting connected with the GigaVUE-OS to make your initial configuration settings.

# Basic GigaVUE HC Series Connections and Configuration

This section describes how to establish your first configuration session with the GigaVUE-HC3 and set the basic initial configuration options necessary to get the node up and running.

Topics:

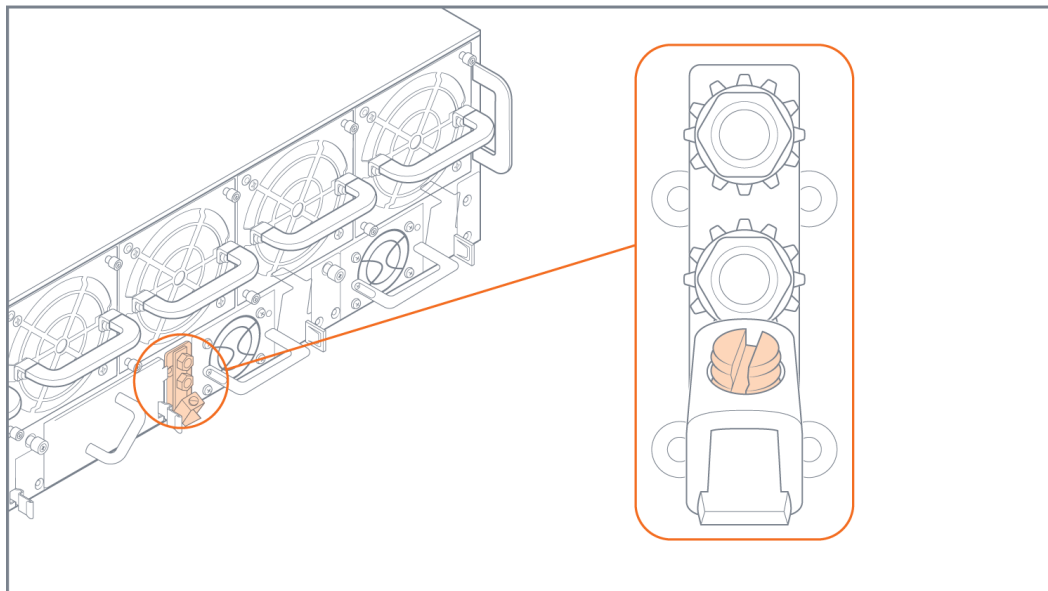
## Grounding the GigaVUE-HC3 Chassis



The GigaVUE-HC3 chassis has a grounding lug located at the center rear of the chassis. Connect grounding wire to the grounding lug on the chassis using the following procedure.

The equipment(GigaVUE-HC3) must be connected to an earthed main socket-outlet

- In **Finland** : "Laitte on liitettävä suojakoskettimilla varustettuun pistorasiaan"
  - In **Norway** : "Apparatet må tilkoples jordet stikkontakt"
  - In **Sweden** : "Apparaten skall anslutas till jordat uttag"
  - In **Denmark** : "Apparatets stikprop skal tilsluttes en stikkontakt med jord, som giver forbindelse til stikproppens jord."
1. Locate the grounding lug at the center rear of the chassis. Refer to [Figure 1Grounding Lug on Rear of GigaVUE-HC3](#) (or [Figure 2Rear View of the GigaVUE-HC3 Chassis](#)) for the location on a GigaVUE-HC3 node.



**Figure 1** Grounding Lug on Rear of GigaVUE-HC3

2. Insert the grounding wire into the lug. The specifications for the ground wire is as follows:  
**6 (AWG)**
3. Tighten the grounding lug screw to secure the grounding wire.

## Connecting Power to the GigaVUE-HC3

The GigaVUE-HC3 supports AC and DC power in a 1+1 or 2+2 redundant configuration. In all cases, only a single power supply module (PSM) is required to operate the node. However, connecting PSMs in a 1+1 or 2+2 configuration provides redundant power.

**NOTE:** It is recommended not to insert different product codes PSU in the same chassis. Doing so will give an SNMP mismatch trap. For example, PSU AC-132-00DU and PSU AC-132-00H6 must not coexist in the PSU slots.

### Behavior for the PSU AC-132-00H6

When the power cord is removed on PSU AC-132-00H6, PSU slots LEDs will be OFF instead of amber. The details of that particular PSU will be shown as absent.

The procedure for connecting power to the GigaVUE-HC3 is similar to the other GigaVUE H Series nodes:

GigaVUE H Series Chassis Type	Number of PSMs
GigaVUE-HC3	2 (1+1)
	4 (2+2)

1. Plug an approved C13 power cable into each of the PSMs at the rear of the GigaVUE-HC3 chassis.

**NOTE:** For information on the optional DC power supply modules, refer to [Figure 4DC Power Supply Module](#).



**Figure 2** *Connecting AC Power*

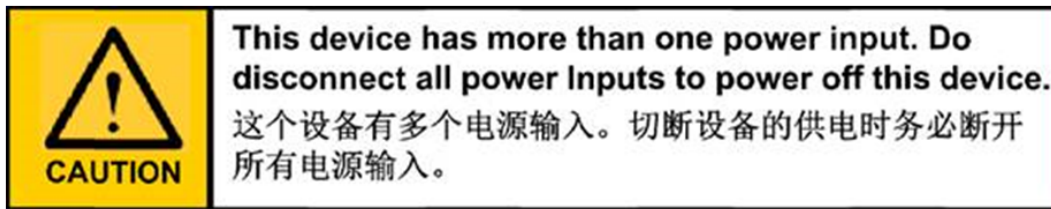
2. Plug the other end of the power cables into a power source that can supply adequate power. For optimal power protection, plug the PSMs into separate circuits. When connecting to the external AC power source, ensure that a Surge Protective Device (SPD) is installed at the AC power inlet.

For information on GigaVUE-HC3 power requirements, refer to [AC- and DC-Powered GigaVUE-HC3](#).

3. Power is turned on when the node is plugged in, and turned off when the node is unplugged. To remove a PSM, refer to [Removing a Power Supply Module](#).

## Removing a Power Supply Module

When removing a power supply module, refer to the following label on the chassis:



**Figure 3** Power Caution Label

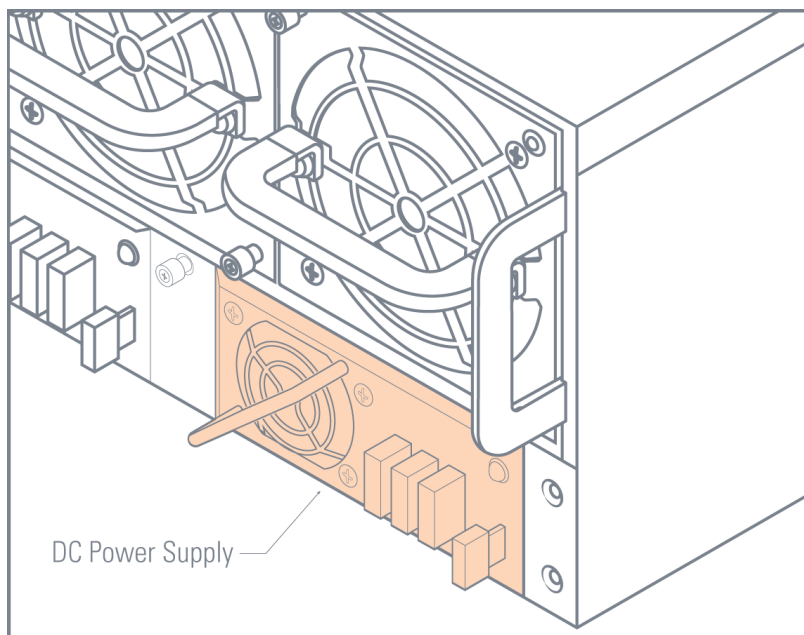
To remove a power supply module:

1. Power down the power supply module by disconnecting the power inputs.
2. Wait about 90 seconds for the node to stabilize.
3. Remove the power supply module.

**NOTE:** Do not remove a power supply module while inputs are still connected. This device has more than one power input. Do disconnect all power inputs to power off this device

## Connecting -48V DC Power Supply Modules

The GigaVUE-HC3 is available with DC power supply modules. This section provides instructions for connecting a -48V DC power source to the DC PSMs. [Figure 4DC Power Supply Module](#) shows a DC power supply module.



**Figure 4** DC Power Supply Module

To connect a -48V DC input to the screw terminal DC power supply module:

1. Remove the safety cover from the power terminals.
2. Connect the power supply module ground terminal ( $\perp$ ) to earth ground.



3. Connect the positive and negative power cables to the screw terminals using a Phillips screwdriver.
  - o The top connector on the DC power supply module is the **0V** connector.
  - o The bottom connector on the DC power supply module is the **-48V** connector.
4. Replace the safety cover over the power terminals.
5. Connect the neutral and negative power cables to the DC power source as follows:
  - o Connect the neutral wire to the 0V (RTN) connector on the DC power source.
  - o Connect the negative wire to the -48V connector on the DC power source.
6. Repeat [Step 2](#) through [Step 5](#) for the other PSMs in the GigaVUE-HC3 chassis:
  - o **GigaVUE-HC3** – Four DC power supply modules

**NOTE:** DC Power Electrical Safety Guidelines – For Permanently Connected Equipment, a readily accessible disconnect device shall be incorporated external to the equipment

## Fan Tray Procedures

The fan tray contains five fan modules with two fans per module. The fan modules are field-replaceable and hot swappable, which allows you to replace a fan module without removing the entire fan tray. You can also replace the entire fan tray. Refer to the following sections for details:

- [Checking Fan Status](#)
- [Configuring SNMP Notification](#)
- [Removing a Fan Module](#)
- [Inserting a Fan Module](#)
- [Removing a Fan Tray](#)
- [Inserting a Fan Tray](#)

### Checking Fan Status

A FAN LED is located on the front of the GigaVUE-HC3 chassis and provides global fan status. Refer to [Figure 5 Global Fan LED Location on GigaVUE-HC3 Front](#) for the location of the LED.



**Figure 5** Global Fan LED Location on GigaVUE-HC3 Front

Individual FAN LEDs are located on the rear of the GigaVUE-HC3 chassis. Refer to [Figure 6 Individual Fan LED Location on GigaVUE-HC3 Rear](#) for the location of the LED.

**Figure 6** Individual Fan LED Location on GigaVUE-HC3 Rear

Refer to [Table 1: FAN Status](#) for a description of the fan LED status.

Table 1: FAN Status

LED	Fan Status
OFF	No power to system
Green	Normal operation
Amber	Fan failed or fan is missing

## Configuring SNMP Notification

Use the following CLI command to configure a notification that will be sent when the fan status changes:

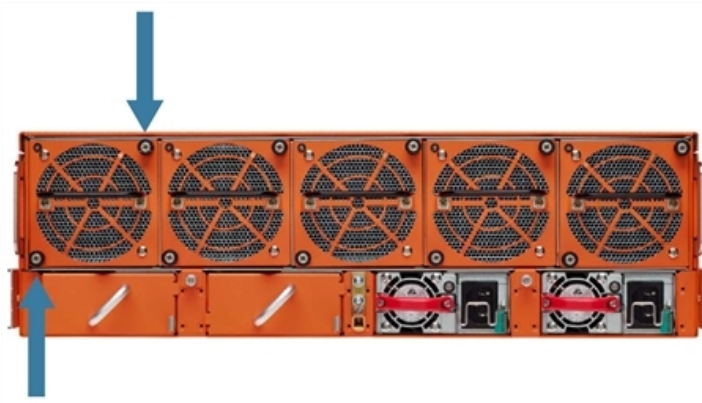
```
(config) # snmp-server notify event fanchange
```

## Removing a Fan Module

The GigaVUE-HC3 fan tray contains five fan modules. If a fan module fails, you should replace it, however the GigaVUE-HC3 node will function with one failed fan module. You can remove individual fan modules using the following procedure.

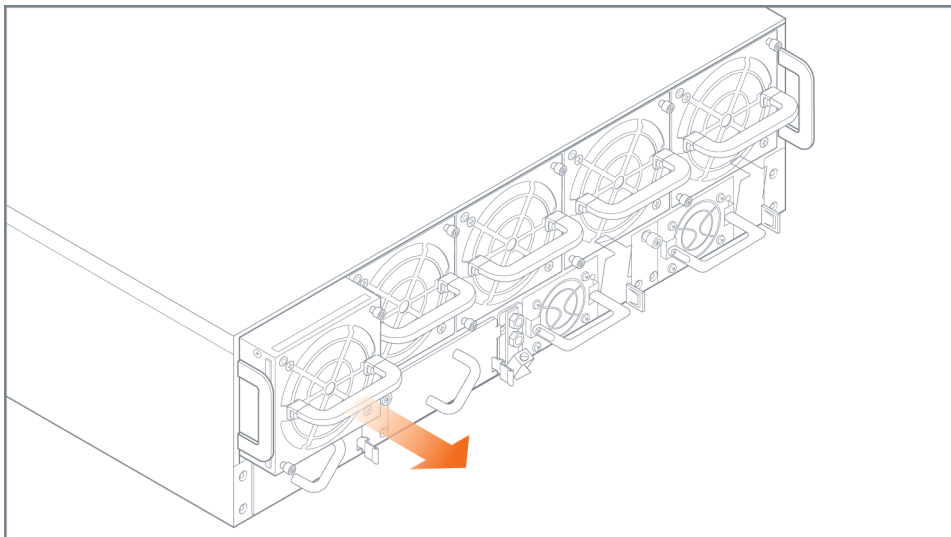
**NOTE:** It is recommended that you only remove a fan module when you have another one available with which to replace it. Otherwise, leave the failed fan module in the chassis.

1. Locate the two thumb screws on the fan module as shown in [Figure 7 Fan Module Screw Location on GigaVUE-HC3 Rear](#).



**Figure 7** Fan Module Screw Location on GigaVUE-HC3 Rear

2. Use a Phillips screwdriver to loosen the screws on the fan module, then loosen the thumb screws.
3. Pull the failed fan module out of the slot and set it aside. Refer to [Figure 8 Fan Module Removal](#).

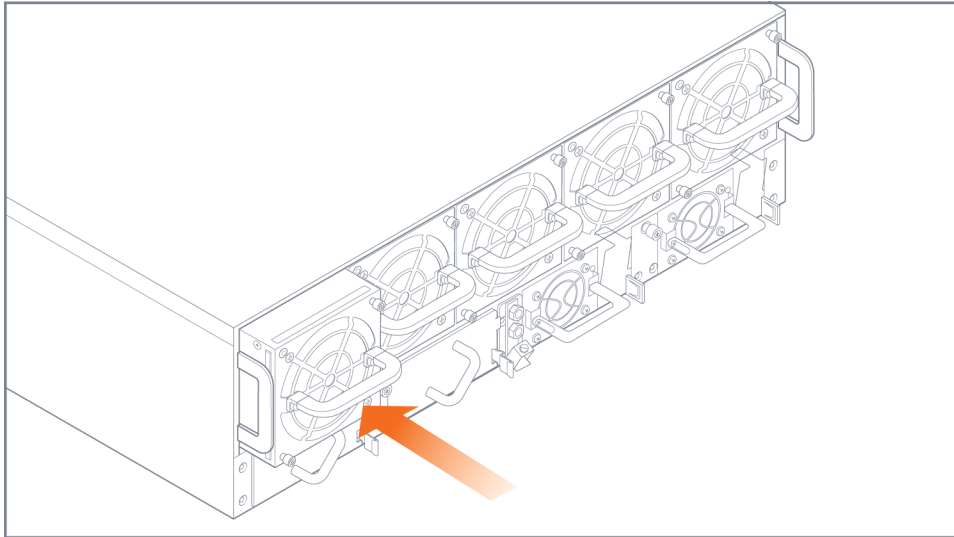


**Figure 8** Fan Module Removal

## Inserting a Fan Module

To insert a fan module:

1. Place the working fan module into the empty fan module slot and slide it in until it is flush with the chassis rear and will not slide in any further. Refer to [Figure 9 Fan Module Insertion](#).



**Figure 9** Fan Module Insertion

2. Tighten the thumb screws on the fan module, then use a Phillips screwdriver to tighten the screws.

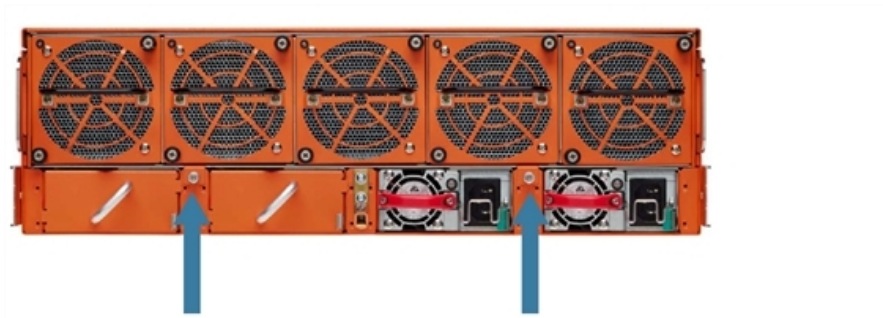
## Removing a Fan Tray

You can remove the entire fan tray using the following procedure.

**NOTE:** If the node is powered, work quickly to remove the fan tray and insert another one. The GigaVUE-HC3 should not be without cooling for more than 60 seconds.

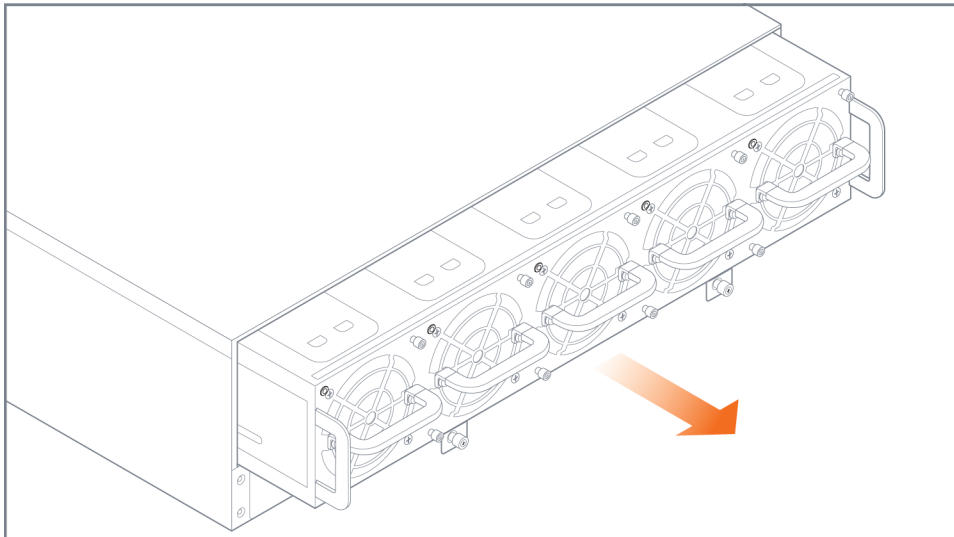
To remove the entire fan tray:

1. Locate the two thumb screws at the bottom of the fan tray as shown in [Figure 10 Fan Tray Screw Location on GigaVUE-HC3 Rear](#).



**Figure 10** Fan Tray Screw Location on GigaVUE-HC3 Rear

2. Use a Phillips screwdriver to loosen the screws on the fan tray, then loosen the thumb screws.
3. Pull the failed fan tray out of the slot and set it aside. Refer to [Figure 11 Fan Tray Removal](#).



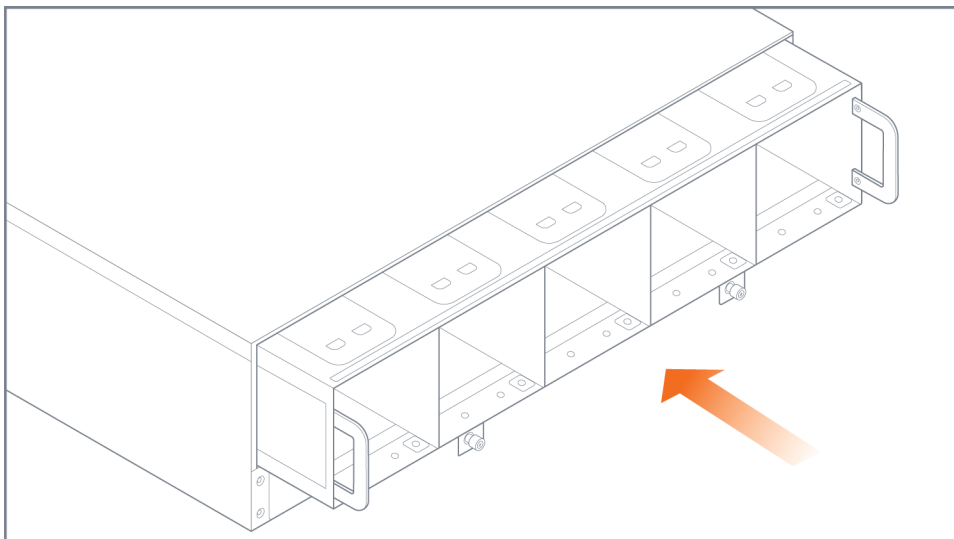
**Figure 11** Fan Tray Removal

## Inserting a Fan Tray

You can insert the entire fan tray using the following procedure.

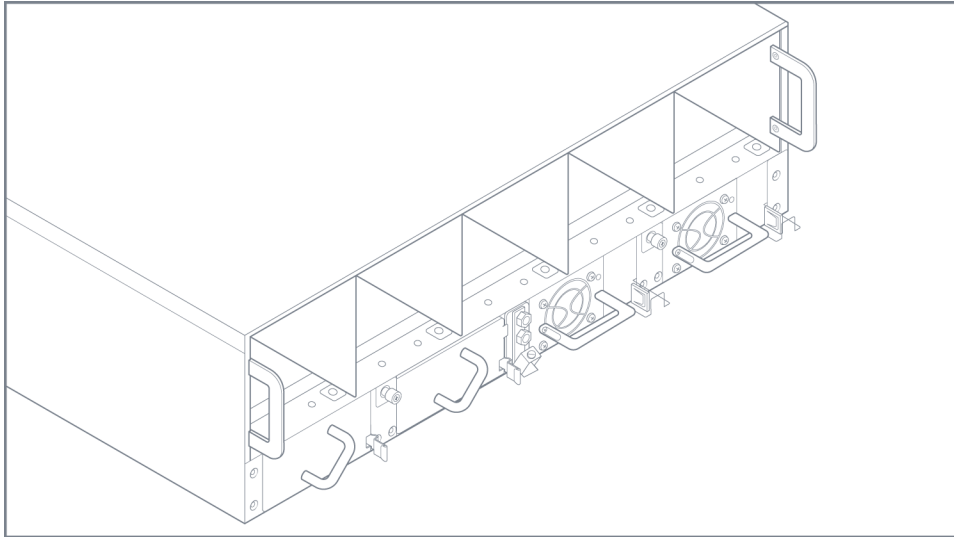
To insert a fan tray:

1. Remove all fan modules from the fan tray. Refer to the procedure for [Removing a Fan Module](#).
2. Place the empty fan tray into the slot and slide it in. Refer to [Figure 12 Fan Tray Insertion](#).



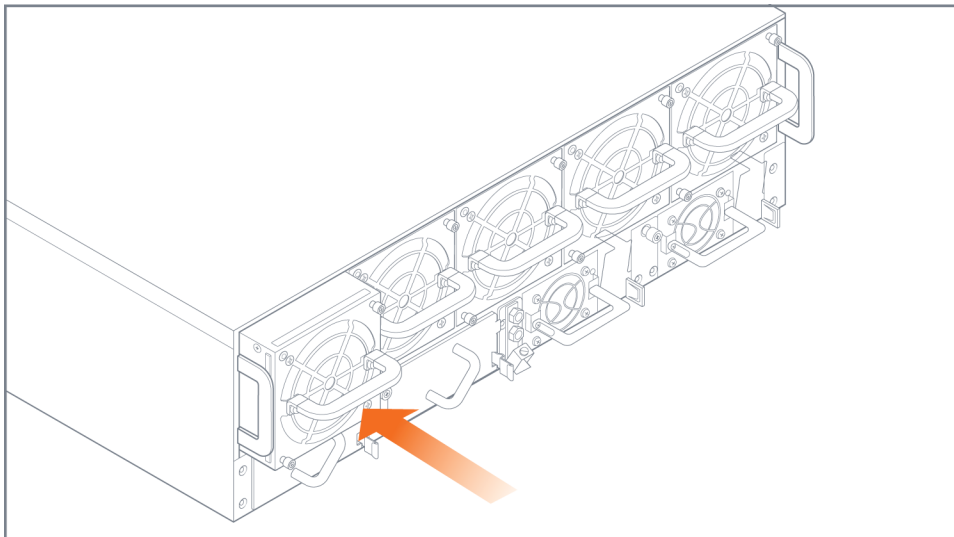
**Figure 12** Fan Tray Insertion

3. Slide the fan tray in until it is flush with the chassis rear and will not slide in any further as shown in [Figure 13 Fan Tray Inserted](#).



**Figure 13** Fan Tray Inserted

4. Insert the fan modules into the fan tray one at a time as shown in [Figure 14 Fan Module Insertion](#).



**Figure 14** Fan Module Insertion

5. Tighten the thumb screws on each fan module, then use a Phillips screwdriver to tighten the screws. Refer to [Figure 7 Fan Module Screw Location on GigaVUE-HC3 Rear](#).
6. Tighten the thumb screws on the fan tray, then use a Phillips screwdriver to tighten the screws. Refer to [Figure 10 Fan Tray Screw Location on GigaVUE-HC3 Rear](#).

## Removing the Extension Board

The GigaVUE-HC3 extension board is located in the front of the chassis. It is field replaceable, however, the node must be powered down. Hot swapping is not possible.

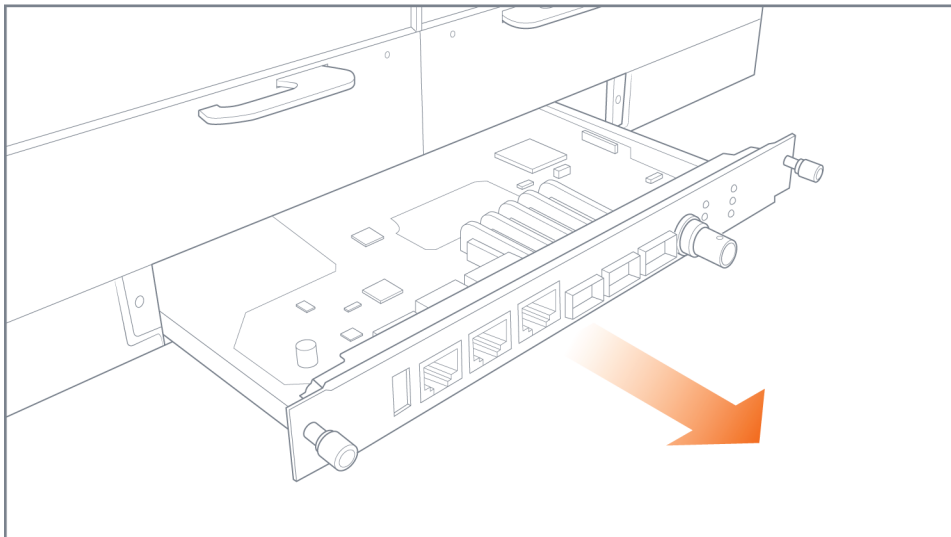
To remove the extension board:

1. Power down the node.
2. Locate the two thumb screws on the extension board as shown in [Figure 15 Extension Board Screw Location on GigaVUE-HC3 Front](#).



**Figure 15** Extension Board Screw Location on GigaVUE-HC3 Front

3. Use a Phillips screwdriver to loosen the screws on the extension board, then loosen the thumb screws.
4. Pull out the extension board as shown in [Figure 16 Extension Board Removal](#).



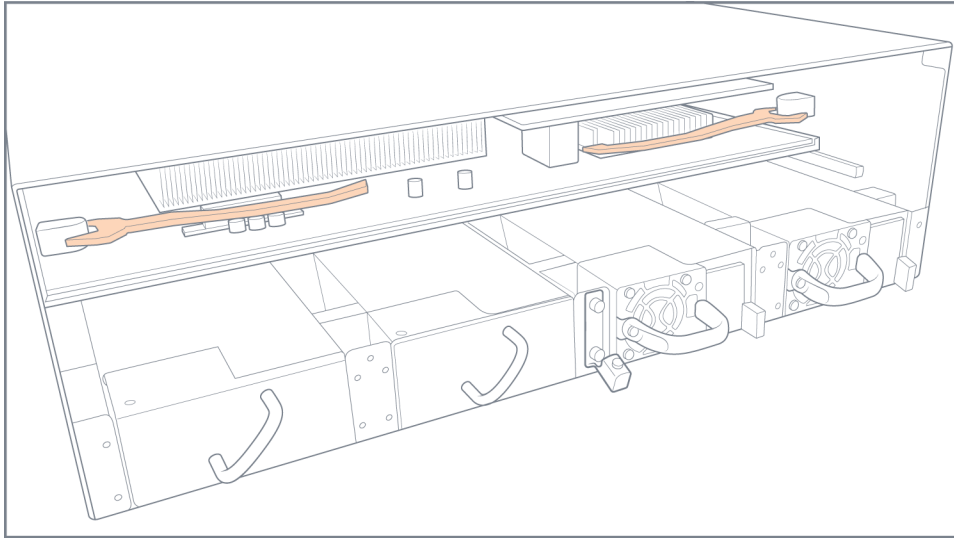
**Figure 16** Extension Board Removal

## Removing the Control Card

The GigaVUE-HC3 control card is located in the rear of the chassis behind the fan tray. It is field replaceable. Since there is only one control card and it is internal, the node must be powered down. Hot swapping is not possible.

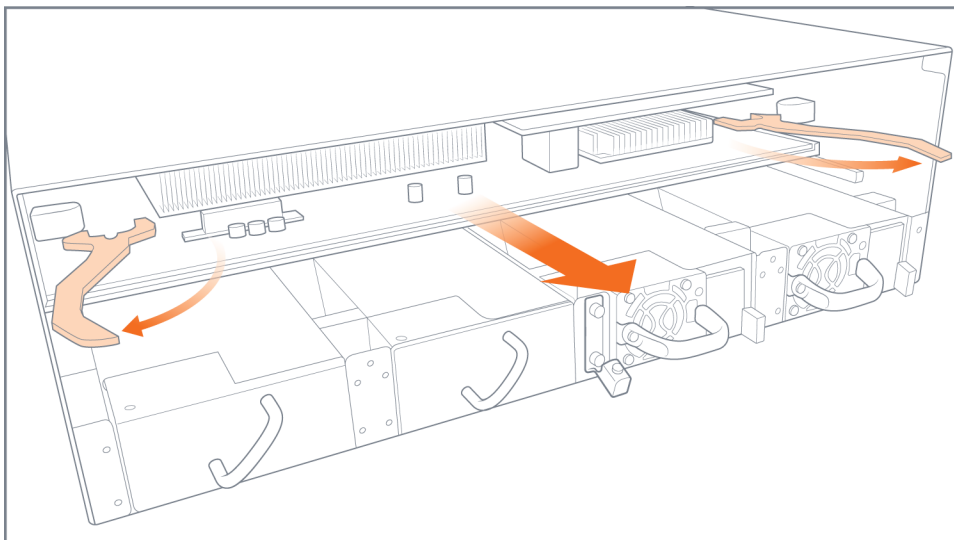
To remove the control card:

1. If the node is powered on, log in to the serial console port on the node and power it down gracefully with the **reload halt** command.
2. Power down the node by unplugging the power cable.
3. Remove the fan tray as described in [Removing a Fan Tray](#). The control card is located behind the fan tray as shown in [Figure 17 Control Card Location](#).



**Figure 17** Control Card Location

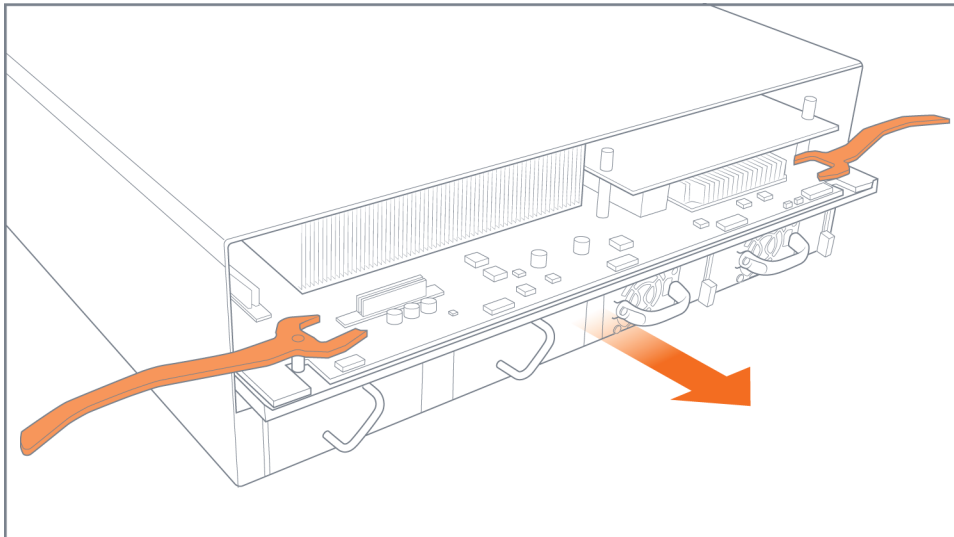
4. Swing both ejector handles outward as shown in [Figure 18 Control Card Ejector Handles](#).



**Figure 18** Control Card Ejector Handles

5. Pull out the control card. Refer to [Figure 19 Control Card Removal](#).





**Figure 19** Control Card Removal

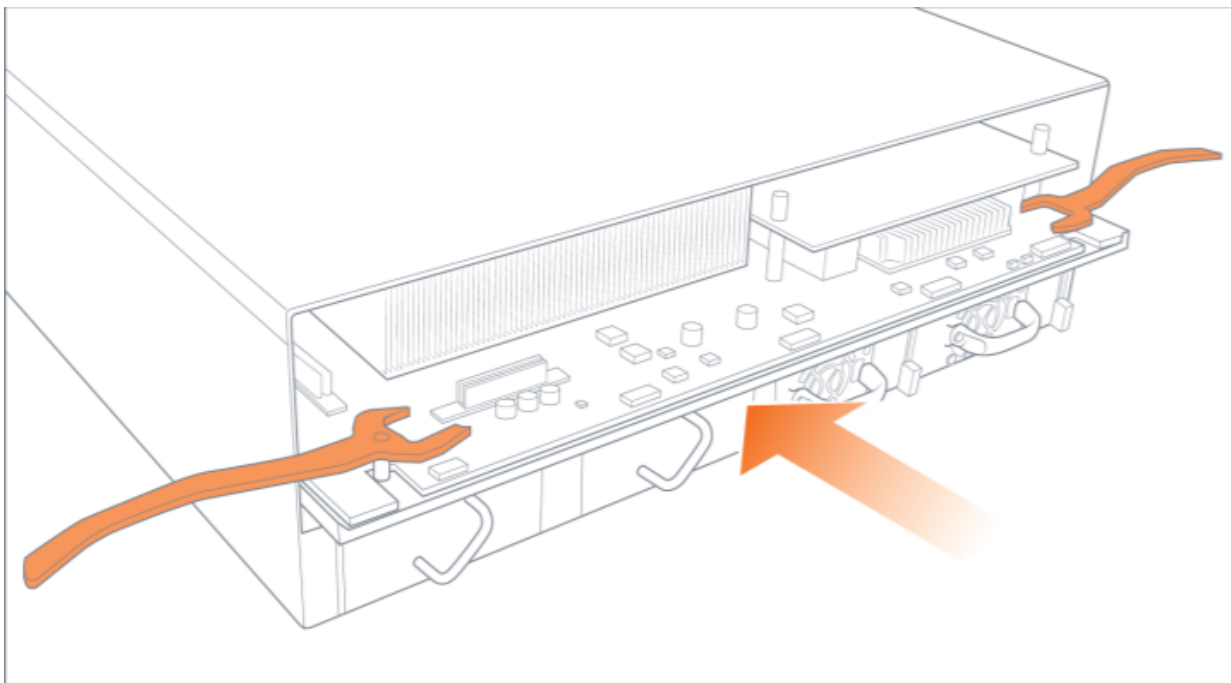
For procedures to replace a control card, refer to [Replacing Control Card](#). There are separate procedures for standalone nodes, nodes in an out-of-band cluster, and nodes in an inband cluster.

To insert the control card, refer to [Inserting the Control Card](#).

## Inserting the Control Card

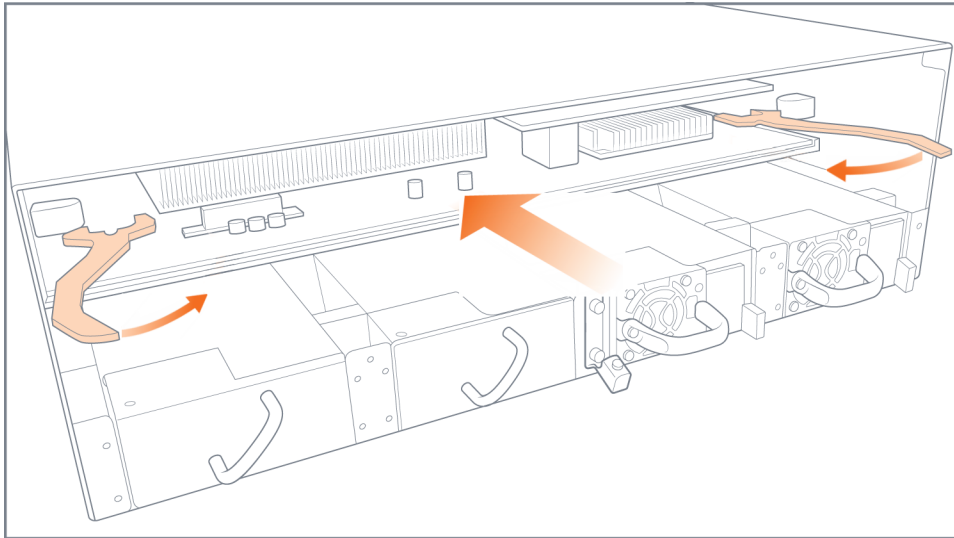
To insert the control card:

1. Push the control card into the chassis. Refer to [Inserting the Control Card](#).



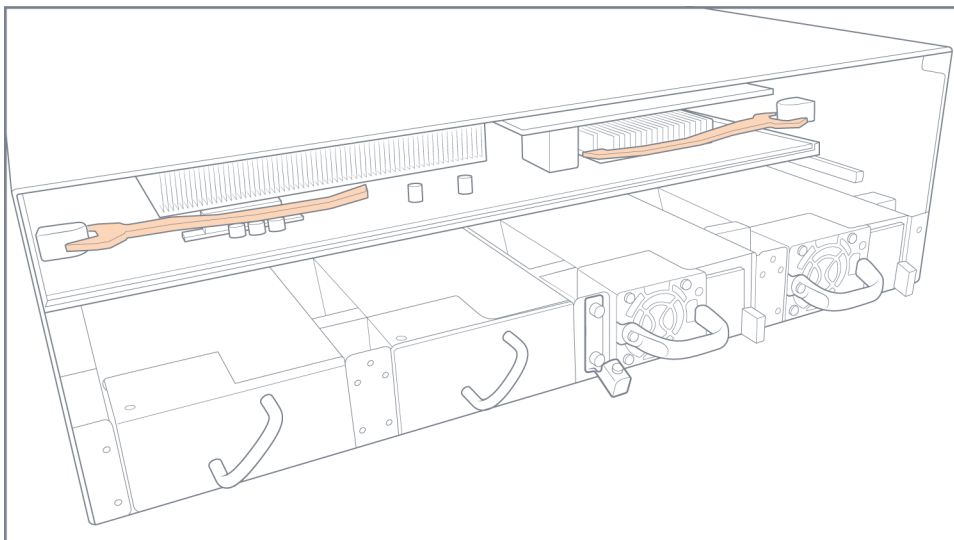
**Figure 20** Control Card Insertion

2. Swing both ejector handles inward as shown in [Figure 21Control Card Ejector Handles](#).



**Figure 21** Control Card Ejector Handles

3. Seat the control card as shown in [Figure 22Control Card Seated](#).



**Figure 22** Control Card Seated

4. Insert the fan tray and all the fan modules as described in [Inserting a Fan Tray](#).

## Connecting Serial Console and Mgmt Ports

### To make basic GigaVUE-HC3 connections (serial console and Mgmt ports):

1. Locate the DB9-to-RJ45 serial cable provided with the GigaVUE-HC3. This cable is called a *console cable*.

**NOTE:** This cable is Cisco-compatible. Refer to [Appendix D, Console Port Signaling and Cabling](#) for pinout details.

2. Connect the RJ45 end of the console cable to the **console** port on the left of the extension board.
3. Connect the DB9 end of the console cable to a PC's COM port.
4. Connect a standard Ethernet cable (Cat5e or better) to the 10/100/1000 **Mgmt** port on the extension board.
5. Connect the other end of the Ethernet cable to an Ethernet network.

## Configuring Basic GigaVUE H Series Settings

This section describes how to perform the initial configuration of basic GigaVUE H Series node settings over a serial terminal connection to the console port.

The system administrator must initially log in with a default **admin** account using a default password, and then must immediately change the password through the **jump-start** script. Refer to [Access the Command-Line Interface over the Console Port](#).

Once you have used the console port to configure the Mgmt port's network properties, you can configure the GigaVUE H Series node remotely using the Mgmt port's network connection.

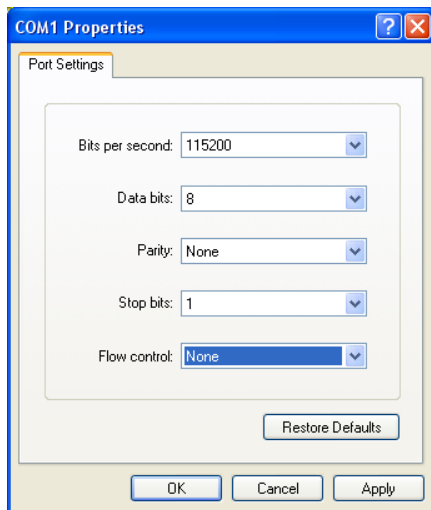
The same commands are available in the GigaVUE-OS command-line interface regardless of whether you are connected over the Mgmt or console port.

### Access the Command-Line Interface over the Console Port

Access to the control card is through the console port on the left side of the extension board of the GigaVUE-HC3.

1. Make the basic power and console cable connections described in [Connecting Serial Console and Mgmt Ports](#) and power on GigaVUE-HC3.
2. Start a terminal application on the PC. Common terminal applications include TeraTerm, PuTTY, and Hyperterminal.
3. Select the COM port connected to the console cable attached to control module. For example, **COM1**.
4. Configure the port settings for the console connection as follows:
  - o **Bits per second** – 115,200
  - o **Data bits** – 8
  - o **Parity** – None
  - o **Stop bits** – 1
  - o **Flow control** – None

[Figure 23Setting COM Port Properties for the Console Connection](#) shows an example of how these settings are configured in Hyperterminal.



**Figure 23** Setting COM Port Properties for the Console Connection

5. Start the terminal connection. You may need to press **Enter** a few times before you see the **login:** prompt.
6. Log in to the command-line interface with the following default user account and password:

**User:admin**

**Password:admin123A!**

The **configuration jump-start** automatically starts and forces a password change. The system administrator must change the password on the default **admin** account through the **jump-start** script. The default password (admin123A!) is no longer allowed. Refer to [Run the Jump-Start Script](#) for more information.

A password must meet the following standards:

- include 8-64 characters
- include at least one numeral
- include at least one upper case letter
- include at least one lower case letter
- include at least one special character (for example, !, @, #, \$, %, ^, &, or \* – ASCII 0x21, 0x2F, 0x3A, 0x40, 0x5B, 0x5F, 0x7B, 0x7E)

At the Admin password? prompt in the **jump-start** script, enter a new password that meets the standards, then confirm the password.

You will also configure some Admin and Monitor level users with the procedure described in [Initial User Account Configuration](#).

## Run the Jump-Start Script

Gigamon provides GigaVUE H Series nodes with a **jump-start** script that walks you through the process of configuring basic settings. Run this script as follows:

1. Switch to **Configure** mode.

The GigaVUE H Series provides three command entry modes, each with increasingly powerful rights – **Standard**, **Enable**, and **Configure**. The jump-start script is only available in Configure mode:

- a. Type **en <Enter>** to switch to Enable mode.

The system prompt changes from **[hostname] >** to **[hostname] #**.

- b. Type **config t <Enter>** to switch to Configure mode.

The system prompt changes from **[hostname] #** to **[hostname] (config) #**.

2. Run the jump-start script with the following command:

**(config) # config jump-start**

3. Follow the jump-start script's prompts to configure each of the settings listed in the following table.

**NOTE:** If you change your mind about a particular setting, you will have a chance to change it at the end of the script.

<b>Hostname</b>	The hostname appears in the system prompt and is used to identify the chassis in SNMP traps.
<b>Management Port Network Settings</b>	Use either DHCP or specify a static IP address and netmask. If you do not use DHCP, you are prompted to configure the following additional options: <ul style="list-style-type: none"> <li>■ <b>Default Gateway</b> Supply the IP address of the default gateway for the node.</li> <li>■ <b>DNS Server</b> Supply the IP address of the DNS server for the node. A valid DNS server is required for successful use of TACACS+.</li> <li>■ <b>Domain Name</b> Supply the domain name for the node (for example, mycompany.com).</li> </ul>
<b>Enable IPv6?</b>	You can enable the use of IPv6 for the management port. IPv6 is used in addition to IPv4 if you enable this option. If you enable the IPv6 you have the option of enabling IPv6 auto-configuration or specifying a static address.
<b>Security Settings</b>	Enable the following security settings: <ul style="list-style-type: none"> <li>■ <b>secure cryptography mode</b></li> <li>■ <b>secure passwords mode</b></li> <li>■ <b>minimum password length</b></li> </ul> Refer to the <b>GigaVUE-OS CLI Reference Guide</b> for information on security.
<b>Admin Password</b>	The password for the <b>admin</b> account must be changed to a non-default password.

<b>Cluster Enable?</b>	<p>Enable cluster support if this node will be a part of a cluster of connected GigaVUE H Series nodes. If you enable cluster support, the jump-start script prompts you to supply the <b>Cluster ID</b>, <b>Cluster Name</b>, and <b>Cluster Mgmt Virtual IP Address</b>. You can join an existing cluster by supplying values that match existing settings.</p> <div data-bbox="537 365 1330 548" style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <p><b>NOTE:</b> For clustered nodes configured to use the eth1 port on control card version 1 as both the Mgmt and Cluster Management port, keep in mind that NTP is also used over the eth0 Mgmt port on the GigaVUE H Series node. In a case like this, you can only use one or the other.</p> </div> <div data-bbox="537 558 1330 617" style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <p><b>NOTE:</b> The eth1 port is not available on control card version 2.</p> </div> <p>If clustering is enabled, you will not be prompted for a box ID in the next step.</p> <p>Refer to the <i>GigaVUE-OS CLI Reference Guide</i> for information on setting up a cluster.</p>
<b>Box ID for the Node</b>	<p>Supply a numerical box ID for the node. This box ID is used to identify network/tool ports in the node – the format is box ID/ slot ID/port ID.</p> <p>You will be prompted for a box ID only if clustering was not enabled in the previous step.</p>

4. Review your settings. You can change a setting by specifying its listed line number and re-entering the setting.
5. When you are satisfied with your settings, exit the script as prompted. GigaVUE H Series automatically saves your settings.
6. Restart the node with the **reload** command.

### Need to Change Any Settings?

If you need to change any of the settings you made in the jump-start script, you can either run the script again or change individual settings using the following commands in the Configure command mode:

- Use the **hostname** command to change the node's hostname.
- Use the **interface eth0** command to reconfigure or fine-tune Mgmt port settings, including basic IP settings (DHCP or static address and subnet mask) and physical parameters (duplex, MTU, and speed).
- Use the **ip** command to change the default gateway, DNS server, and domain name.
- You can also use the **username admin password <password>** command to change the **admin** user's password. Refer to [Changing the admin Account Password](#).

Refer to [The Basic Commands](#) for a quick summary of the available GigaVUE H Series commands.

## Configure Modules and Enable Ports

Modules must be configured and ports enabled before they can be used on the GigaVUE-HC3. Use the following procedure to bring up all modules and enable ports before starting to issue commands in the CLI:

1. Connect to console port as described in the previous section.
2. Wait at least two minutes after the system prompt appears for the modules to be initialized and then switch to **Configure** mode.

The GigaVUE H Series provides three command entry modes, each with increasingly powerful rights – **Standard**, **Enable**, and **Configure**. The jump-start script is only available in Configure mode:

- a. Type **en <Enter>** to switch to Enable mode.

The system prompt changes from **[hostname] >** to **[hostname] #**.

- b. Type **config t <Enter>** to switch to Configure mode.

The system prompt changes from **[hostname] #** to **[hostname] (config) #**.

3. Reset the terminal settings to match the current window with the following command:

**(Config) # terminal resize**

4. Use the following command to check module status:

**(Config) # show cards**

5. Verify the following in the **show cards** output:

- o **Box ID** is not empty.
- o **Config** shows **yes** for all cards.
- o **Oper Status** shows **up** (or **inserted**) for all modules.

6. If **Config** does not show **yes** for all modules after two minutes, take the action corresponding to your **show cards** output, as follows:

show cards Output:	Corrective Action
<b>Config</b> does not show <b>yes</b> for any modules (including control cards)	<b>(config) # chassis box-id &lt;integer&gt;(config) # card all</b>
<b>Config</b> shows <b>yes</b> for control cards but not one or more modules	<b>(config) # card all</b>

The **card all** command configures the node for all currently unconfigured modules. However, it can only be used after the node's box ID has been configured as reported at the top of the **show cards** output in [Figure 24 Successful show cards Output](#).

7. Use the **show cards** command again to verify the following:
  - o **Box ID** is not empty.
  - o **Config** shows **yes** for all modules.
  - o **Oper Status** shows **up** (or **inserted**) for all modules.

Figure 24 Successful show cards Output illustrates the **show cards** output for a GigaVUE-HC3 with properly configured modules.

```
(config) # show cards
Box ID: 1
Slot  Config  Oper Status  HW Type  Product Code  Serial Num  HW Rev  PowerReq  PowerPriority
-----
cc1   yes     up          HC3-Main-Board  132-00DR  1DR0-0029  1.0-00  N/A      N/A
1     yes     up          PRT-HC3-C08Q08  132-00DW  1DX0-0001  A1-0    200     1
2     yes     up          PRT-HC3-C08Q08  132-00DW  1DX0-0001  A1-0    200     2
3     yes     up          SMT-HC3-C05     132-00DX  1DX0-0010  1.0-0    200     3
4     yes     up          PRT-HC3-X24     132-00DY  1DY0-0029  A1-0    60      4
```

**Figure 24** Successful show cards Output

8. Issue a **show port** command to determine the port numbers that need to be enabled.
9. Use the **port** command with the **admin** argument to enable ports on modules. For example, the following command enables all ports on a PRT-HC3-X24 module:
 

```
(config) # port 1/1/x1..x24 params admin enable
```
10. Save your changes so that the cards and ports come up automatically at the next reboot:

```
(config) # write memory
```

## Command-Line Basics

This section provides a quick orientation to the GigaVUE-OS command-line interface – how to enter commands, how to get help, and so on.

### Command-Line Modes

The GigaVUE-OS can operate in one of three modes, each with its own set of available commands – Standard, Enable, and Configure. When you first launch the CLI, you start in Standard mode with access to a limited amount of commands used to review node status. As you move from **Standard** mode to **Enable** mode to **Configure** mode, both the power and the number of commands available increase, as summarized in [Figure 25GigaVUE-OS Command-Line Modes](#).

#### Differences in Commands for admin and default Level Users

The commands available in the GigaVUE-OS are also different depending on whether you are logged in as **admin** or **default** level user. Commands listed in bold in [Figure 25GigaVUE-OS Command-Line Modes](#) are only available to **admin** level users.





Figure 25 GigaVUE-OS Command-Line Modes

**NOTE:** If you are working simultaneously with multiple GigaVUE H Series nodes, you may want to assign each a separate hostname so its easy to identify separate terminal sessions from the system prompt. Admin users can do this in Configure mode with the **hostname <name>** command; refer to [Configuring the GigaVUE H Series Host Name](#).

## Entering Commands in the CLI

The GigaVUE-OS provides several conventions that make it easy to identify available commands and enter them quickly:

Technique	Description
Context-Sensitive Help	<p>The <b>?</b> symbol is the key to receiving help wherever you are in the CLI:</p> <ul style="list-style-type: none"> <li>Type <b>?</b> by itself to see a list of all available commands.</li> <li><b>Word Help</b> – Type a partial word with <b>?</b> mark immediately following the partially-typed word to see a list of all possible commands using the word entered so far.</li> </ul> <p>For example, if you typed <b>r?</b> in Configure mode, the CLI would return the following possible commands based on what you have entered so far:</p> <p><b>radius-server Configure RADIUS server settingsreload Reboot or shut down the systemreset Reset this system to its factory state</b></p> <ul style="list-style-type: none"> <li><b>Command Help</b> – Type a command followed by a question mark to see all possible arguments for the command as entered. If the node returns <b>&lt;cr&gt;</b>, that means the command can be entered as-is.</li> </ul> <p>For example, if you entered <b>gigastream ?</b>, you would see <b>alias</b>. You can build your way through the entire command tree by entering <b>?</b> after each new argument. For example, after entering <b>gigastream alias myalias ?</b>, you would see the next valid argument – <b>port-list</b>.</p> <p><b>NOTE:</b> Typing <b>?</b> accesses the help system immediately – you do not need to press <b>&lt;Enter&gt;</b>.</p>
Partial Command Entry	<p>For all GigaVUE H Series commands and arguments, you only need to enter enough characters to distinguish the command from all other available commands. So, for example, you do not have to enter the full command <b>debug</b> – there is only one command starting with the letter <b>d</b>, so you only have to enter <b>d</b>.</p>
Command Completion	<p>If you have partially typed a command, you can press <b>Tab</b> and the CLI will attempt to complete the command for you based on what has been entered so far.</p> <p>Use the command completion feature together with partial command entry – you can press <b>Tab</b> while entering a command to see a list of all available commands matching what you have entered so far. For example, you can press <b>p&lt;Tab&gt;</b> and the node will return:</p> <p><b>ping ping6 port port-group port-pair ptp</b></p>

Technique	Description
	Based on this information, you know that you only need to enter <b>pt</b> to distinguish the <b>ptp</b> command from the other commands beginning with the letter <b>p</b> .

## Command-Line Syntax – Entering Commands

You enter all configuration commands for the GigaVUE-OS in the command-line interface. Enter commands by typing enough characters to uniquely identify the command and pressing **<Enter>**.

When entering commands, keep in mind the following rules:

- Successful commands return no response in the CLI; commands with errors return an error response beginning with **%**, followed by a short error description.
- All commands are case-sensitive.
- Aliases are case-sensitive and accept both lower and upper case – for example, **my\_alias** and **My\_Alias** refer to two separate maps.
- The **no** command is used to remove configuration settings. For example **no connect alias myconnect** deletes the named **myconnect**.
- Port numbers are entered in **<chassis ID>/<slot ID>/<port ID>** format. For example, **1/1/x1** identifies the 10Gb port x1 in slot 1 on box 1.
- Strings must consist entirely of alphanumeric characters with no spaces. The only exceptions are the underscore (**\_**) and hyphen (**-**) characters. Those are allowed.

For example, in Configure mode, **port 1/1/g1 alias My\_Alias** is legal, but **port 1/1/g1 alias My Alias** is not.

**NOTE:** Some string fields do accept spaces provided the input is made inside quotation marks (for example, the **banner login** command described in [Using a Custom Banner](#)).

### Configure Mode Syntax

Users of GigaVUE H Series nodes may be accustomed to entering the word **config** before many commands – **config map**, **config port-filter**, and so on. When using the GigaVUE-OS, the “config” part of the command is implied whenever you are working in Configure mode. The system prompt helps you remember this by including the word **(config)** in parentheses. For example:

**(config) #**

So, instead of entering **config gigastream** to set up a GigaStream consisting of multiple ports, you just enter **gigastream** followed by the necessary arguments. The **config** part is implied because you are already working in the Configure mode. For example:

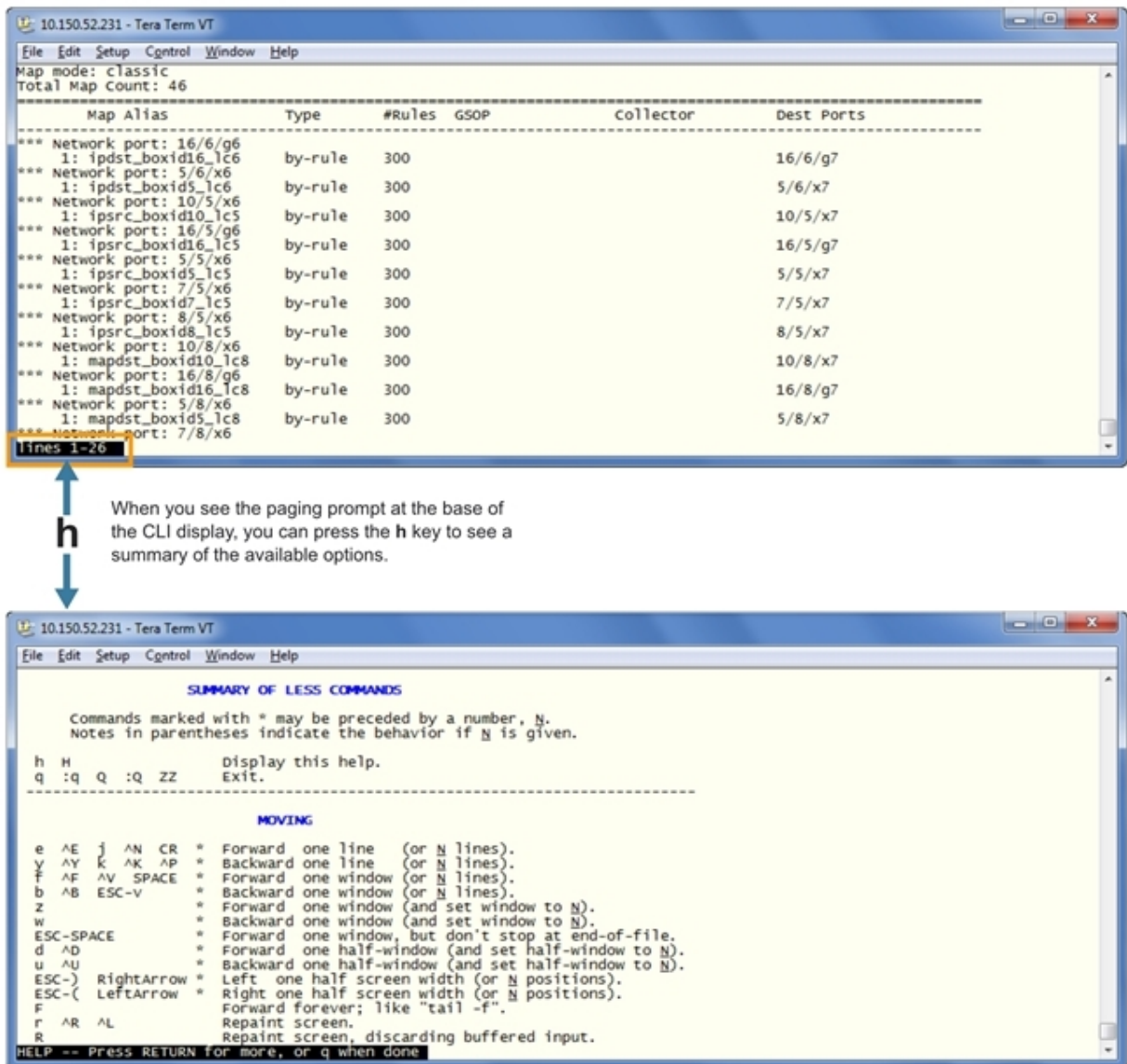
**(config) # gigastream alias mystream port-list 1/1/x1..x4**

## Paging through CLI Output

By default, the CLI returns output exceeding the configured terminal length in pages. The CLI provides the same features for working through the paged output as the Linux programs **less** and **more**. Press the **h** key when presented with the paging prompt at the base of the display to see paging options – [Figure 26 Viewing Paging Options](#) provides an example of how to do this.

If you prefer, you can disable paging either for the current session or by default:

- **Disable for Current Session(config) # no cli session paging enable**
- **Disable for All Sessions (Default)(config) # no cli default paging enable**



**Figure 26** Viewing Paging Options

## The Basic Commands

The following table lists each of the top level commands for the GigaVUE-OS in Configure mode. As described in [Entering Commands in the CLI](#), the commands available in Configure mode are a superset of those available in Standard and Enable modes.

Most commands have multiple supported arguments. You can see the exact arguments available at any point of command entry by typing it into the CLI followed by **?**.

Table 2: CLI Commands

Command	Description
<b>aaa</b>	Configures authentication, authorization, and accounting settings.
<b>apps</b>	Enables access to Gigamon Applications, such as Application Session Filtering (ASF), GTP backup, GTP whitelisting, inline SSL decryption, keystore, NetFlow, SIP whitelisting, and Passive SSL decryption. GigaSMART applications are not supported on GigaVUE H Series and GigaVUE TA Series.
<b>banner</b>	Sets a node login banner. Enables access to Gigamon Applications, such as Application Session Filtering (ASF), GTP backup, GTP whitelisting, inline SSL decryption, keystore, NetFlow, SIP whitelisting, and Passive SSL decryption. GigaSMART applications are not supported on GigaVUE H Series and GigaVUE TA Series.
<b>bond</b>	Configures bonded interface settings.
<b>boot</b>	Configures node boot parameters.
<b>card</b>	Configures a line card or module.
<b>chassis</b>	Configures the GigaVUE H Series chassis.
<b>clear</b>	Resets statistics or clears caches.
<b>cli</b>	Configures CLI shell options.
<b>clock</b>	Sets the node clock or timezone.
<b>cluster</b>	Configures a cluster of connected GigaVUE-OS nodes.
<b>configuration</b>	Manages configuration files.
<b>configure</b>	Enters Configure mode. .
<b>coreboot</b>	Upgrades the BIOS image on GigaVUE-TA100, GigaVUE-HC1, and GigaVUE-HC3.
<b>crypto</b>	Manages X.509 certificates for the GigaVUE H Series node's Web server.
<b>debug</b>	Generates a dump file for use in debugging issues with Gigamon Technical Support.
<b>disable</b>	Exits Enable mode and returns to Standard mode.
<b>email</b>	Configures email and event notification via email.
<b>enable</b>	Enters Enable mode.

Command	Description
<b>exit</b>	Exits Configure mode and returns to Enable mode or logs out of the CLI.
<b>file</b>	Manages TCP and debug dump files on disk.
<b>filter-template</b>	Configures flexible filter templates on GigaVUE-HC3 and GigaVUE-TA100.
<b>gigasmart</b>	Configures an interface address to a GigaSMART card or module.
<b>gigastream</b>	Configures a GigaStream—a group of ports acting as a single addressable tool port destination or stack-link.
<b>gsgroup</b>	Configures a GigaSMART group consisting of one or more internal GigaSMART ports.
<b>gsop</b>	Configures a GigaSMART operation consisting of one or more advanced processing applications.
<b>gsparams</b>	Configures GigaSMART parameters.
<b>halt</b>	Shuts down the node without powering it off.
<b>hb-profile</b>	Configures a heartbeat profile on GigaVUE H Series nodes.
<b>help</b>	Views a description of the interactive help system.
<b>hostname</b>	Specifies the node's hostname. The hostname appears in the system prompt and in SNMP traps.
<b>ib-pathway</b>	Reserved for future use.
<b>image</b>	Manages node software images.
<b>inline-network</b>	Configures an inline network on GigaVUE H Series nodes.
<b>inline-network-group</b>	Configures an inline network group on GigaVUE H Series nodes.
<b>inline-serial</b>	Configures an inline tool series on GigaVUE H Series nodes.
<b>inline-tool</b>	Configures an inline tool on GigaVUE H Series nodes.
<b>inline-tool-group</b>	Configures an inline tool group on GigaVUE H Series nodes.
<b>interface</b>	Configures network interfaces.
<b>ip</b>	Configures IP settings for the eth0 Mgmt port.
<b>ipv6</b>	Configures IPv6 settings for the eth0 Mgmt port.
<b>job</b>	Configures scheduled jobs.
<b>ldap</b>	Configures LDAP server settings for authentication.
<b>license</b>	Activates features using license keys. Licensing is used for GigaSMART, Port, or Advanced Features License.
<b>logging</b>	Configures event logging.
<b>map</b>	Configures maps and map rules to manage GigaVUE H Series traffic distribution.

Command	Description
<i>map-group</i>	Configures map groups for GTP forward listing and GTP flow sampling.
<i>map-passall</i>	Creates a pass-all map to send all traffic on a network port to a tool port irrespective of the other packet distribution in place on the port.
<i>map-scollector</i>	Configures shared collector map parameters.
<i>map-template</i>	Configures a map template.
<i>nhb-profile</i>	Configures a negative heartbeat on GigaVUE H Series nodes.
<i>no</i>	Deletes or clears certain configuration options.
<i>notifications</i>	Configures notification settings.
<i>ntp</i>	Enables and disables the use of NTP, as well as adds NTP servers.
<i>ntpdate</i>	Sets node clock once from a remote server using NTP.
<i>ping</i>	Sends ICMP echo requests to a specified host.
<i>ping6</i>	Sends IPMPv6 echo requests to a specified IPv6 host.
<i>pld</i>	Upgrades programmable logic devices (PLDs) on GigaVUE-HC3 nodes.
<i>policy</i>	Configures an active visibility policy.
<i>port</i>	Configures port type, parameters, and filters.
<i>port-group</i>	Creates a group of ports.
<i>port-pair</i>	Configures a port-pair on a pair of network ports within the same GigaVUE H Series node. A port-pair is a bidirectional connection in which traffic arriving on one port in the pair is transmitted out the other (and vice-versa) as a pass-through TAP.
<i>ptp</i>	Enables and disables the use of PTP.
<i>radius-server</i>	Configures RADIUS server settings for authentication.
<i>redundancy-profile</i>	Configures an inline redundancy profile on GigaVUE H Series nodes.
<i>reload (reboot)</i>	Reboots or shuts down the node.
<i>reset</i>	Resets specified portions of the node configuration to their factory states.
<i>serial</i>	Sets options for the serial console port.
<i>sfp</i>	Reserved for future use.
<i>show</i>	Displays configuration and status information for GigaVUE H Series settings and entities.
<i>sleep</i>	Sleeps for a specified number of seconds.
<i>snmp-server</i>	Configures SNMP settings, including the local SNMP server, notification events, and notification

Command	Description
	destinations. C
<i>spine-link</i>	Configures spine links in a cluster with a leaf and spine architecture.
<i>ssh</i>	Enables and disables SSH access, as well as manages settings.
<i>stack-link</i>	Configures a stack-link between two GigaVUE H Series nodes in a cluster. Stack-links are used to carry data traffic between nodes in a GigaVUE H Series cluster.
<i>sync</i>	Enables dynamic control card synchronization for a GigaVUE H Series-HD8 node.
<i>system</i>	Changes system settings.
<i>system-health</i>	Configures system health behaviors.
<i>tacacs-server</i>	Configures TACACS+ server settings for authentication.
<i>terminal</i>	Sets terminal parameters, including width and length.
<i>timestamp</i>	Configures the timestamp source.
<i>tool-mirror</i>	Configures a tool-mirror connection between two tool ports. A tool-mirror connection sends all packets arriving on one tool port to a second tool port on the same node.
<i>traceroute</i>	Traces the route packets take to a destination.
<i>tunnel</i>	Reserved for future use.
<i>tunnel-endpoint</i>	Configures a tunnel endpoint, which is a destination for load balanced traffic from a L2GRE encapsulation tunnel.
<i>tunneled-port</i>	Configures a tunnel port to be used for GigaSMART encapsulation/decapsulation operations.
<i>uboot</i>	Installs new uboot software.
<i>username</i>	Manages user accounts.
<i>vport</i>	Configures a virtual port.
<i>web</i>	Configures the Web server used for GigaVUE-FM GUI support on the GigaVUE H Series node.
<i>write</i>	Saves the running configuration to persistent storage.

## Completing the Initial GigaVUE H Series Setup

At this point, you have logged in to the GigaVUE-OS command-line interface using the **admin** account, configured the **Mgmt** port's network properties for SSH access, and have explored the command-line interface structure.

There are a few more steps you should perform to complete the initial configuration before you get to the fun stuff – setting up network ports, tool ports, and mapping traffic. These tasks include:

- Switch to the Configure mode. Refer to [Enter the Configure Command-Line Mode](#).



- Configure SSH access to the node. Refer to [SSH2](#).
- Enable the GigaVUE H Series Web server for Web-based GUI access. Refer to [Enabling the GigaVUE H Series Web Server](#).
- Configure some basic user accounts. Refer to [Initial User Account Configuration](#).
- Configure the GigaVUE H Series name. Refer to [Configuring the GigaVUE H Series Host Name](#).
- Configure the GigaVUE H Series time and date options. Refer to [Configuring GigaVUE H Series Time Options](#).
- Configure automatic email notifications for node events. Refer to [Configuring Automatic Email Notifications](#).
- Configure a custom login banner. Refer to [Using a Custom Banner](#).
- Save your changes! Refer to [Saving Changes](#).

## Enter the Configure Command-Line Mode

Keep in mind that the GigaVUE-OS has three different command modes for the CLI – **Standard**, **Enable**, and **Configure**. The commands described in the following sections are all only available in Configure mode. Switch to Configure mode as follows:

Command	Notes
> <b>enable</b>	You only need to supply enough of each command to positively identify it among the other available commands. So, in this example, you could just type <b>ena</b> and press Enter.
# <b>configure terminal</b>	Similarly, this command can be entered as <b>co t</b> .
( <b>config</b> ) #	Notice how the system prompt changes with each command mode. Command modes offer greater control over the node as you ascend from <b>Standard</b> to <b>Enable</b> to <b>Configure</b> .

## SSH2

SSH2 is available for remote connections to the GigaVUE-HC3's **Mgmt** port. By default, SSH2 is enabled. Use the **ssh** commands in Configure mode to enable or disable the corresponding connections. To disable the corresponding connection, you include **no** before the command, as demonstrated in the following table. For example:

Command	Notes
Enable: ( <b>config</b> ) # <b>ssh server enable</b> Disable: ( <b>config</b> ) # <b>no ssh server enable</b>	When SSH2 is enabled, use any compliant SSH2 client to connect to the command-line interface remotely. For example, to connect using the popular SSH2 client, PuTTY: <ol style="list-style-type: none"> <li>Start PuTTY and enter the GigaVUE H Series node's IP address in the Host Name field.</li> <li>Click the <b>SSH</b> protocol radio button.</li> <li>Click <b>Open</b> to open a connection.</li> </ol>

Command	Notes
	<p>If this is your first connection PuTTY warns you that the host key presented by the GigaVUE H Series node is not in your cache. You can add the key, connect without adding the key, or cancel the connection. Refer to <a href="#">Verifying Host Keys During Connection</a> for information on how to verify that the host key shown is the correct one.</p> <p><b>d.</b> Log in with GigaVUE H Series credentials.</p>

## Advantages of SSH2

SSH2 is a secure choice for remote connections, providing an encrypted channel instead of relying on clear text. It also provides stronger user authentication capabilities, including the use of a public **host key**. Host keys uniquely identify a server, helping guarantee that the server you are connecting to is the server you think it is.

GigaVUE H Series includes default RSA v1/v2 and DSAv2-encrypted public host keys (SSH2 supports both RSA and DSA encryption algorithms). The first time you connect to GigaVUE H Series with an SSH2 client, the client will warn you that the host keys are not in your local cache and show you the actual host key presented by the GigaVUE-HC3. Your client will most likely give you the option of trusting the key, adding it to your local cache. Once you have trusted the key, your client will alert you during connection if a different key is presented.

**IMPORTANT:** Telnet server functionality is no longer supported as of GigaVUE-OS 5.7.00.

### Verifying Host Keys During Connection

To verify that the host key presented during an SSH2 connection is in fact the GigaVUE H Series node's, you can connect over the console port (refer to [Access the Command-Line Interface over the Console Port on page 37](#)) and use the **show ssh server host-keys** command to see the current public host keys and fingerprints for the GigaVUE-HC3. Paste these in a file and keep them nearby when you connect via SSH2 the first time. This way, you will be able to compare the actual host key to what your SSH2 client says is being presented. Once you have verified that they are the same, you can choose to trust the host key, allowing future connections to take place seamlessly.

### Changing Host Keys

Use the **ssh server host-key generate** command to change the default host keys provided with the GigaVUE-HC3. The command has the following syntax:

```
ssh server host-key <rsa1 | rsa2 [dsa2]> <private-key | public-key> generate
```

For example, to configure a new RSAv1 public hostkey, you could use the following command:

```
(config) # ssh server host-key rsa1 public-key generate
```

## Enabling the GigaVUE H Series Web Server

GigaVUE-FM is Gigamon's Web-based management interface for the GigaVUE H Series. Use GigaVUE-FM for many node configuration, management, and operations tasks.

To use GigaVUE-FM with a GigaVUE H Series node, you must enable its Web server with the **web enable** command. For example:

```
(config) # web enable
```

Check the status of the Web server using the **show web** command. Make sure that **Web-based management console enabled:** is set to **yes**, indicating that the Web server is enabled. For example:

```
(config) # show web
Web-based management console enabled: yes

HTTP enabled:                yes
HTTP port:                    80
HTTP redirect to HTTPS:      yes
HTTPS enabled:                yes
HTTPS port:                   443
Require certificates from DoD CA: no
HTTPS certificate name:       default-cert
Listen enabled:               yes
No Listen Interfaces.

Inactivity timeout:           15 min
Session autologout:           2 hr 30 min
Session renewal:              30 min

Web client (for file transfers)
Proxy enabled: no
HTTPS server cert verify: yes
HTTPS supplemental CA list: default-ca-list
```

Once the Web server is enabled, you can use GigaVUE-FM for GigaVUE H Series connections, as described in [Connecting to the GigaVUE H Series Node from GigaVUE-FM](#). Refer to the **GigaVUE-OS CLI Reference Guide** for information on other Web server settings you can configure.

### Connecting to the GigaVUE H Series Node from GigaVUE-FM

After you enable the Web server on the GigaVUE H Series node, it automatically listens for connections from GigaVUE-FM using either HTTP on port 80 or HTTPS on port 443. Use the following procedure to connect to a GigaVUE H Series node using GigaVUE-FM.

**NOTE:** You can configure whether the GigaVUE H Series node redirects all incoming HTTP connections to the HTTPS port with the **web http redirect** command.

1. Open a supported browser. Refer to the **GigaVUE Fabric Management Guide**.
2. Enter one of the following URLs:

**https://<GigaVUE H Series Node IP Address>http://<GigaVUE H Series Node IP Address>**

- The first time you connect to GigaVUE-FM, your browser will prompt you regarding an invalid security certificate. Depending on the browser you are using, you can avoid these warnings either by installing a certificate or adding an exception. The following table has the details:

Browser	Add Exception?	Install Certificate?
Mozilla Firefox	Y	Y
Windows Internet Explorer	N	Y

**NOTE:** Gigamon provides the GigaVUE H Series with self-signed certificates for use with GigaVUE-FM; you can also create and install a third-party certificate on these nodes.

Add an exception in Firefox as follows:

- Click the **Or you can add an exception** link.
- Click the **Add Exception** button.
- Click the **Get Certificate** button.
- Click the **Confirm Security Exception** button.

The GigaVUE-FM login page appears.

- Enter a valid user name and password and click **Login**.

#### Configuring Internet Explorer for Use with GigaVUE-FM

GigaVUE-FM works best in Internet Explorer when the browser is configured to check for newer versions of stored pages every time pages are visited. Enable this option as follows:

- Open Internet Explorer.
- Select the **Tools > Internet Options** command.
- In the **General** tab, locate the **Browsing history** section and click its **Settings** button.
- Set the **Check for newer version of stored pages:** option to **Every time I visit the webpage**.
- Click **OK** on the Temporary Internet Files and History Settings dialog.
- Click **OK** on the Internet Options dialog.

#### Next Steps

Refer to the online help for details on configuring and operating the GigaVUE-HC3 from the GigaVUE-FM interface. Keep in mind that each of the initial configuration settings described in the rest of this chapter can also be set in GigaVUE-FM.

## Initial User Account Configuration

Before you start mapping traffic, you must change the password for the **admin** account and add a few other accounts for use by different level users. (You may have already used the jump-start script to change the password for the **admin** account.)

### Changing the admin Account Password

1. To change the password for the **admin** account using the **username** command, refer to the following:

```
(config) # username admin password <password>
```

Passwords must meet the following standards:

- o Include 8-64 characters.
- o Include at least one numeral
- o Include at least one capital letter
- o Include at least one special character (for example, **!**, **@**, **#**, **\$**, **%**, **^**, **&**, or **\*** – ASCII 0x21, 0x2F, 0x3A, 0x40, 0x5B, 0x5F, 0x7B, 0x7E).

Enter a new password that meets the standards and confirm the password.

### Setting Up Some Basic Accounts

1. Next, you will probably want to set a few user accounts with different access levels.

The GigaVUE H Series node has a local account database that can optionally integrate with an LDAP, RADIUS, or TACACS+ server for authentication. Any account you want to authenticate using an external AAA server must have a matching account name in the local database.

Authentication, user levels, and roles are discussed in detail in the **GigaVUE-OS CLI Reference Guide**. For now, however, it is easiest to simply create a few basic user accounts with different privilege levels. In general, user privileges are as follows:

- o **Admin** users have access to all command modes, including Standard, Enable, and Configure. They also have full permissions for all network, tool, and stack ports.
- o **Operator** users have access to all command modes, including Standard, Enable, and Configure. However, they only have access to the network and tool ports associated with their user group.

New users are created with the operator role by default. You can add additional roles with the **username <username> roles add <roles>** command.

- o **Monitor** users have access to the Standard and Enable command modes. They cannot configure packet distribution (or any other global GigaVUE H Series node options), but they can use the **show** command to review many of the settings in place on the node.

The following **username** commands create a new **admin** user and a new **operator** user:

Command	Comments
<pre>(config) # username psandoval password Nine9.Eight8! (config) # username psandoval roles add admin</pre>	Creates a new account named <b>psandoval</b> with a password, and grants it admin privileges.
<pre>(config) # username bcrawford password Seven7.Six6!</pre>	Creates a new account named <b>bcrawford</b> with a password. New users are automatically created with default operator level privileges, so there is no need to grant an additional role.

- Once you have configured these basic user accounts, use the **show usernames** and **show roles** commands to review your settings.

## Configuring the GigaVUE H Series Host Name

It is generally a good idea to configure the GigaVUE H Series node's name, date, and time as part of your initial configuration. The following command shows how to set the node name. Refer to [Configuring GigaVUE H Series Time Options](#) for information on setting options related to time and date.

### Setting the Node Name

- Use the **hostname** command to specify the node name. For example:

```
(config) # hostname GigaVUE H Series-QA
```

## Configuring GigaVUE H Series Time Options

The GigaVUE H Series node includes a variety of features for setting the time, including:

Method	CLI Command	For more information:
System Clock	<b>clock set hh:mm:ss yyyy/mm/dd</b>	<a href="#">Setting Time Manually</a> on page 59
One-Time NTP Synchronization	<b>ntpdate &lt;ntpserver address&gt;</b>	<a href="#">Performing One-Time NTP Server Synchronization</a> on page 60
Persistent NTP Synchronization	Add server using <b>ntp server</b> command. Enable use of ntp with <b>ntp enable</b> command.	<a href="#">Using NTP Time Server for Clock Synchronization</a> on page 60

### Setting Time Manually

The easiest way to set the GigaVUE H Series node's time is manually with the **clock set** command. For example:

```
(config) # clock set 05:18:38 2015/01/06
```

**NOTE:** Even if you are using NTP, configure time manually as well. The GigaVUE H Series node will automatically fall back to the manual time setting if it is unable to synchronize with the specified time server.

The **show ntp** will show the current state of the NTP server in use; the **show clock** command shows the current GigaVUE H Series node's time.

### Performing One-Time NTP Server Synchronization

You can perform a one-time synchronization with an NTP server using the **ntpdate** command. For example:

```
(config) # ntpdate time.nist.gov
```

**NOTE:** This method does not provide updates to correct clock drift over time. It is generally preferable to use persistent NTP synchronization with the **ntp** commands.

### Using NTP Time Server for Clock Synchronization

The GigaVUE H Series node can optionally use one or more NTP servers for its time setting. Use the following procedure to add an NTP server to the GigaVUE H Series node's list and enable the use of NTP.

1. Specify the address of the time server. For example, if the time server is on 192.168.1.10, you would use the following command:

```
(config) # ntp server 192.168.1.10
```

**NOTE:** There are many public NTP servers available on the Internet.

2. Turn on NTP with the following command:
 

```
(config) # ntp enable
```
3. The GigaVUE H Series node connects to the specified NTP server and synchronizes to its time.
4. NTP reports times in UTC. Because of this, it is a good idea to specify the GigaVUE H Series node's timezone so that UTC can be converted to the local timezone.

You specify the timezone either in terms of the offset from UTC (either plus or minus) or with a particular location's name, depending on the argument you choose for the **clock timezone** command:

- o **Offset from UTC** – Set the timezone as an offset from UTC with the **UTC-offset** argument. For example, the following command sets the timezone as eight hours earlier than UTC:
 

```
(config) # clock UTC-offset UTC-8
```
- o **Location** – You can specify a particular location's timezone to use. The easiest way to do this is to build the available list of cities by adding a space and a question mark after each subsequent zone word. For example, enter **(config) # clock timezone ?**

to see the list of available locations. Select a location and use the same question mark technique to see the next available zone words. This way, you can build out to the exact location you need. For example:

```
(config) # clock timezone America North United_States Pacific
(config) # clock timezone Asia Eastern Hong_Kong
```

Once you have finished configuring NTP options, use the **show ntp** command to check the status of clock synchronization (Figure 27 Checking NTP Status and Configuration).

```
GigaVUE (config) # show ntp
NTP is enabled.
Clock is synchronized. Reference: 69.25.96.13. Offset: -4.846 ms.
Active servers and peers:
-----
Address          Status      Stratum  Offset  Ref  Poll  Last
                (msec)      (msec)  (msec)  Clock Interval Response
                (sec)      (sec)
-----
69.25.96.13     sys.peer (*) 1        -4.846 .ACTS. 64     24
GigaVUE (config) #
```

Figure 27 Checking NTP Status and Configuration

## Configuring Automatic Email Notifications

The GigaVUE H Series node provides powerful email notification capabilities, automatically sending emails to specified addresses when any of a wide variety of events take place on the node. Gigamon strongly recommends that you configure this feature so you have immediate visibility of events affecting node health.

You configure automatic email notifications with the **email** command and its arguments. Start by making sure the CLI is in Configure mode. If the **(config)** entry appears in the system prompt, you are in Configure mode. If not, use the **enable** and **configure terminal** commands sequentially to change to Configure mode. Then, configure email notifications as follows:

Description	Command
First, use the <b>email mailhub</b> command to specify the mail server to use for notification emails. In this example, we are using the email server named <b>smtp.emailsrvr.com</b> . You could also supply an IP address instead of a hostname.	<b>(config) # email mailhub smtp.emailsrvr.com</b>
Next, use the <b>email auth</b> command to supply the email account username and password. In this example, we are using <b>alerts@mycompany.com</b> with a password of <b>mypassword123</b> .	<b>(config) # email auth username alerts@mycompany.com</b> <b>(config) # email auth password mypassword123</b>
Now that we have set up the account to use, we will turn on email authentication.	<b>(config) # email auth enable</b>



Description	Command
<p>Now that we have configured the settings that let the node send emails, set up who to send them to and when to send them. Use <b>email notify recipient</b> to configure the destinations for event notification emails. You can specify multiple destinations separated by commas with no spaces.</p>	<pre><b>(config) # email notify recipient cday@mycompany.com,mfelton@mycompany.com</b></pre>
<p>The <b>email notify event</b> command lets you configure which events will trigger automatic emails. There are quite a few events available – start by entering <b>email notify event ?</b> to see the list of available events. You can either enable individual events, or, use the <b>all</b> argument to enable them all. We are going to start with the <b>all</b> setting and tune settings as necessary later on.</p>	<pre><b>(config) # email notify event all</b></pre>
<p>It is a good idea to check your settings and make sure emails are sent successfully. You can do that with the <b>email send-test</b> command. If you do not receive the email, check the <b>show log</b> output to make sure the email was sent. Then, reconfigure email settings, if necessary.</p>	<pre><b>(config) # email send-test</b></pre>
<p>You may also want to configure and enable <b>autosupport</b> emails. Autosupport emails are sent directly to Gigamon's Technical Support department when specified events take place, enabling proactive problem resolution. The GigaVUE H Series node is preconfigured with the correct destination address – you just need to enable the feature with the following command.</p> <p>Use <b>show email events</b> to see the list of events for which autosupport emails will be sent. You can change the list with the <b>(no) email autosupport event</b> command.</p>	<pre><b>(config) email autosupport enable</b></pre>
<p>Emails will now be sent automatically to the configured addresses when any of the selected events take place.</p> <p>There are many other options for fine-tuning automatic email settings, including how to handle “dead letters” (emails that did not reach their recipient), how the email address of the GigaVUE H Series node should appear, the port for the email server, the reply-to address, and so on. Refer to the <b>GigaVUE-OS CLI Reference Guide</b> for more information.</p>	

## Using a Custom Banner

The GigaVUE H Series node can display a customizable text banner at node startup before a user logs in. This way, users connecting to the node see the banner before they log in, giving them an idea of which node they are logging in to. The banner also appears after a user logs

outs.

Use the **banner login** “<string>” command to configure the login banner. For example:

```
(config) # banner login "Pacific Call Center"
```

**NOTE:** You only need to use quotation marks for the <string> if it includes spaces.

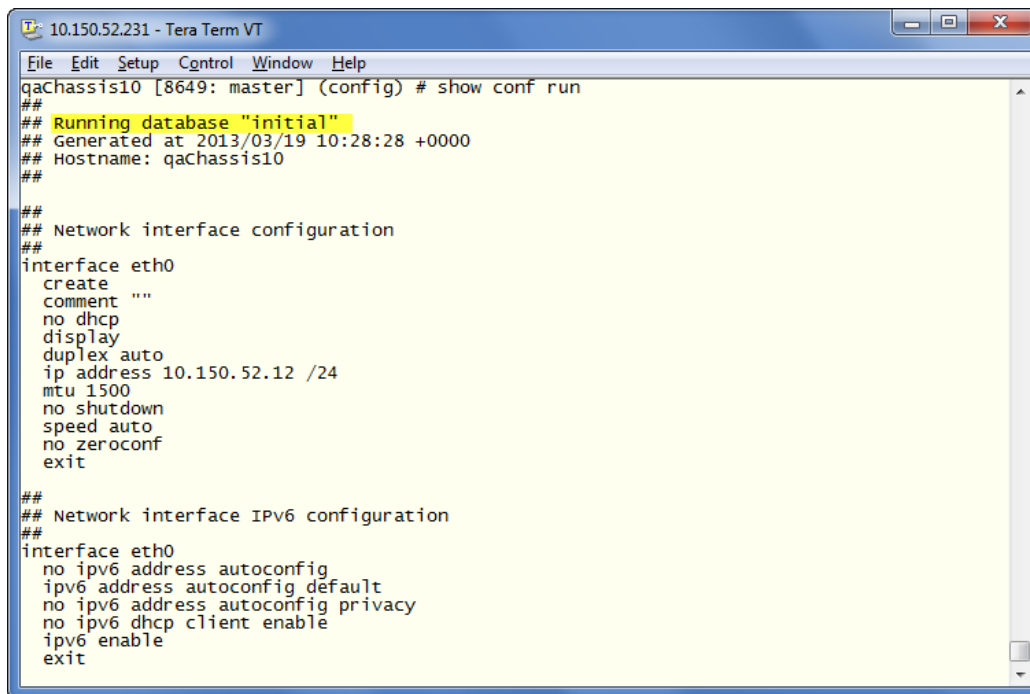
The next time you log in or out of the GigaVUE H Series node, you will see the customizable banner.

## Saving Changes

It is a good idea to use the **write memory** command to save changes as you make them. Later on, when you start setting up packet distribution with connections and maps, your changes will be added to the active configuration right away but will not be saved across a node reboot unless you use the **write memory** command to save your changes to flash.

**NOTE:** The name of the factory-provided configuration file is **initial**. You can see the name of the most recently booted configuration file by using the **show running-configuration** command (or **show configuration**) and look for the **## Running database** entry. In [Figure 28 Showing the Current Configuration File](#), you can tell that the GigaVUE H Series node is currently operating with the **initial** configuration file.

Refer to the **GigaVUE-OS CLI Reference Guide** for information on using configuration files.



```
10.150.52.231 - Tera Term VT
File Edit Setup Control Window Help
qaChassis10 [8649: master] (config) # show conf run
##
## Running database "initial"
## Generated at 2013/03/19 10:28:28 +0000
## Hostname: qaChassis10
##
##
## Network interface configuration
##
interface eth0
  create
  comment ""
  no dhcp
  display
  duplex auto
  ip address 10.150.52.12 /24
  mtu 1500
  no shutdown
  speed auto
  no zeroconf
  exit
##
## Network interface IPv6 configuration
##
interface eth0
  no ipv6 address autoconfig
  ipv6 address autoconfig default
  no ipv6 address autoconfig privacy
  no ipv6 dhcp client enable
  ipv6 enable
  exit
```

**Figure 28** Showing the Current Configuration File

# Connecting GigaVUE-HC3 Ports

This section describes transceivers and port connections. In general, connecting GigaVUE-HC3 module ports to the network is as simple as installing a transceiver and connecting the correct cable to data sources or destinations.

Topics:

## Transceiver—Rules and Notes

Keep in mind the following rules and notes when you connect and use GigaVUE-HC3 nodes with transceivers:

- Always use transceivers purchased from Gigamon to ensure interoperability and performance. Gigamon does not support transceivers purchased from other vendors.
- After removing an optical transceiver, the best practice is to wait seventeen (17) or more seconds before re-inserting the same or different optical transceiver. This includes the intervals between removal/insertion/re-insertion..
- Use the **show port params all** command to see transceiver type information for each of the network/tool ports in the GigaVUE-HC3 node. Check the value of the **SFP type** field for the ports in question.
- Following are the nomenclatures for the GigaVUE-HC3 node port numbers:
  - Port numbers starting with c (for example, c1) are 100Gb. These ports can also support 40Gb depending on the SFP type utilized.
  - Port numbers starting with q (for example, q1) are 40Gb.
  - Port numbers starting with x (for example, x10) are 10Gb/25Gb.
- For details about the supported transceivers, cable types, and connectivity specifications, refer to “*GigaVUE-OS Compatibility and Interoperability Matrix*”.

## BiDi Optics Considerations

There are several nuances to consider due to the complexity in 40Gb BiDi technology. Because of the nature of 40Gb BiDi technology, the same BiDi optic (Full Duplex or RX-only) cannot be used in all of the following situations. For example:

- On SPAN sessions, RX-only BiDi optics cannot be used. Full Duplex BiDi optics must be used.
- When receiving traffic from network links, RX-only BiDi optics must be used due to the way traffic is multiplexed over the fiber pair in 40Gb BiDi technology.
- When deploying over inline 40Gb BiDi links, Full Duplex BiDi optics must be used.

- When connecting two GigaVUE H Series nodes through a cascade connection, Full Duplex BiDi optics must be used for the tool port. The network port may be either Full Duplex or RX-only BiDi optics.
- When stacking multiple GigaVUE H Series nodes, 40Gb BiDi optics must not be used on stack links because the 40Gb BiDi technology is not compatible with the Gigamon stack protocol.

## Transceiver Installation Instructions

Gigamon transceivers are keyed and can only be installed in one direction. Transceivers are hot-swappable – they can be installed or removed with the power on or off. Use the following procedures to install and remove transceivers from GigaVUE H Series modules.

**IMPORTANT:** Always use an ESD-preventive wrist or ankle strap and ensure that it makes good skin contact when installing or removing transceivers. The strap can be connected to one of the following:

- ESD wrist strap connector. The GigaVUE-HC3 chassis provides a connector at the front of the chassis for this purpose labeled with a ground symbol. The connector is located at the front of the chassis on the lower right.
- Captive installation screws on an installed module or power supply module.
- Any unpainted surface on the chassis.

### Installing Transceivers

1. Remove the dust cap from the port and set it aside for future use.
2. Orient the transceiver with the opening in the module and insert it into the slot.
3. Push gently but firmly until the transceiver is seated in the slot.
4. Close the latch on the transceiver to lock it into the slot.

### Removing Transceivers

1. Disconnect the cable (if any) from the transceiver.
2. If you are removing a fiber-optic transceiver, install dust caps in the transceiver to protect the optical interfaces.
3. Open the latch on the transceiver and gently remove it from the slot.
4. If you are not installing a new transceiver, install a dust cap in the open slot on the module.

## Module Transceiver Support

Refer to [GigaVUE-OS Compatibility and Interoperability Matrix](#) for transceiver support for GigaVUE-HC3 modules.

## Loss Summary Specifications

Refer to [Table 1: Loss Summary for Bypass Combo Module](#) for loss summary for Bypass Combo Module.

Table 1: Loss Summary for Bypass Combo Module

Type	@	Operating Wavelength (nm)			Cable Type	Max Fiber Length	Max Receiver Sensitivity	Insertion Loss (dB)
		Min	Typical	Max				MPO to MPO
BPS-HC3-C25F2G	100Gb	840	850	860	MPO	30m	-10.3	1.0
	40Gb	840	850	860	MPO	30m	-9.5	1.0

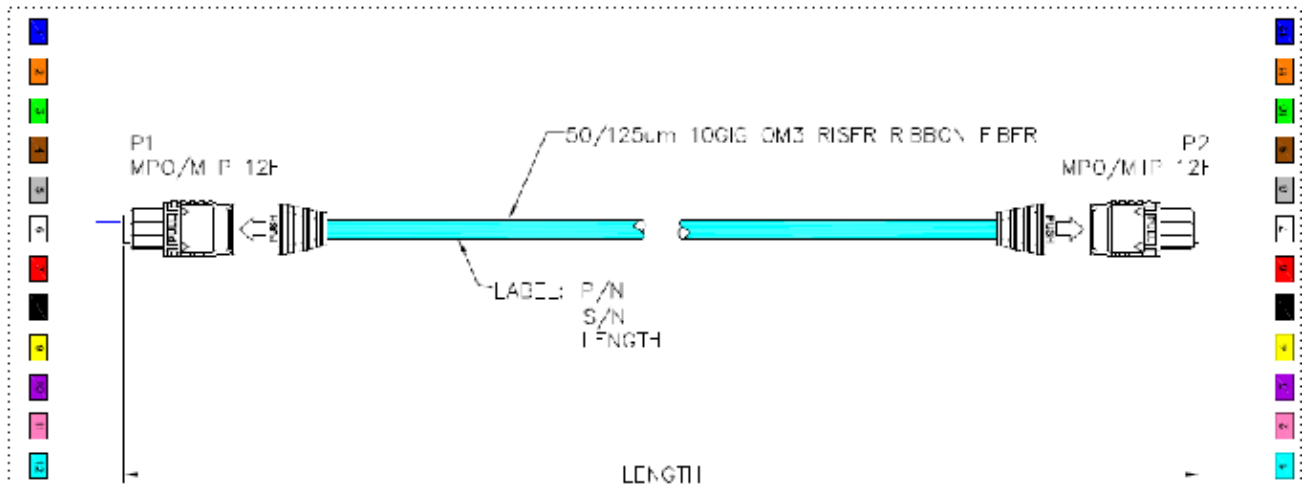
## Cabling

Refer to the following sections for cabling:

- [MPO/MTP 12 Position Fiber Cable for Use with SR4 Transceivers](#)
- [MTP/APC 12 Position Fiber Cable for Use with QSFP+ PLR4 Transceivers](#)
- For details about the supported transceiver, cable type, and connectivity specifications, refer to *“GigaVUE-OS Compatibility and Interoperability Matrix”*.
- For details about how to cable GigaVUE H Series nodes, refer to *“GigaVUE-OS Cabling Quick Reference Guide”*.

### MPO/MTP 12 Position Fiber Cable for Use with SR4 Transceivers

This is a female to female Multi-fiber Push On (MPO) / Ultra Polished Connector (UPC) of cable type B. [Figure 1MPO/MTP 12 Position Fiber Cable](#) provides cabling details for MPO/MTP 12 position fiber cable for use with 40Gb SR4 QSFP+, 40Gb ESR4 QSFP+, and 100Gb SR4 QSFP28 transceivers on GigaVUE-HC3 modules.

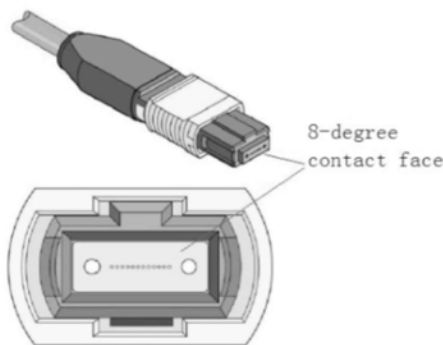


**Figure 1** MPO/MTP 12 Position Fiber Cable

**NOTE:** Refer to the *G-TAP M Series Hardware Guide* for information about G-TAP M Series connections.

## MTP/APC 12 Position Fiber Cable for Use with QSFP+ PLR4 Transceivers

The MTP cable is a high performance MPO connector. This is a female to female Angled Polished Connector (APC) of cable type B with an 8-degree angled end-face and a diameter of 9/125µm. [Figure 2 MTP/APC Cable](#) provides details for MTP/APC 12 position fiber cable for use with 40Gb QSFP+ PLR4 transceivers on GigaVUE-HC3 modules.



**Figure 2** MTP/APC Cable

## Connecting GigaVUE-HC3 Module Ports

Connecting network and tool ports on GigaVUE-HC3 modules is generally as simple as connecting a cable between the source/destination device and the GigaVUE-HC3 module port. You just need to make sure that the modules and ports on the GigaVUE-HC3 node are enabled and their parameters are configured correctly. Refer to the following sections for details:

- [Enabling Modules and Ports](#) – Make sure that the modules and ports you want to use are enabled. Newly installed modules must be configured with the **card** command and their ports enabled with **port <port-list> params admin enable**.
- [Setting Port Parameters Manually](#) – If both ends of the connection are using autonegotiation, no manual configuration is typically necessary. However, if autonegotiation is not used (or is not successful), you can use these instructions to configure port parameters manually.

## Enabling Modules and Ports

Use the following procedure to ensure that all modules are configured and ports enabled:

1. Connect to console port as described in [Access the Command-Line Interface over the Console Port](#).
2. Wait at least two minutes after the system prompt appears and then switch to **Configure** mode.

The GigaVUE-HC3 node provides three command entry modes, each with increasingly powerful rights – **Standard**, **Enable**, and **Configure**. Module and port configuration commands are only available in Configure mode:

- a. Type **en <Enter>** to switch to Enable mode.

The system prompt changes from **[hostname] >** to **[hostname] #**.

- b. Type **config t <Enter>** to switch to Configure mode.

The system prompt changes from **[hostname] #** to **[hostname] (config) #**.

3. Use the following command to check module status:  
**(config) # show cards**
4. Check the values in the **Config Status** and **Oper Status** columns for all modules and verify that they read **Yes** for configured and **Up** for inserted. This is your indication that the node is ready for further configuration.
5. If the **Config Status** does not show **Configured** for all modules after two minutes, take the action corresponding to your **show cards** output, as follows:

show cards Output:	Corrective Action
<b>Config Status</b> does not show <b>Configured</b> for any cards (including control cards)	<b>(config) # chassis box-id &lt;integer&gt;(config) # card all</b>
<b>Config Status</b> shows <b>Configured</b> for control cards but not one or	<b>(config) # card slot x</b> <b>NOTE:</b> If all modules are unconfigured, you can also use

show cards Output:	Corrective Action
more modules	the <b>card all</b> command. If some cards are already configured, however (for example, because you just installed a new card), it is better to use <b>slot x</b> for the unconfigured cards.

The **card** command initializes unconfigured module. However, it can only be used after the node's box ID has been configured, as reported at the top of the **show cards** output in [Figure 3 Successful show cards Output](#).

- Use the **show cards** command again to verify the following:
  - Box ID** is not empty.
  - Config Status** shows **configured** for all modules.
  - Oper Status** shows **up** for all modules.

[Figure 3 Successful show cards Output](#) highlights the **show cards** output for a node with properly configured modules.

```
(config) # show cards
```

Box ID: 1									
Slot	Config	Oper Status	HW Type	Product Code	Serial Num	HW Rev	PowerReq	PowerPriority	
ccl	yes	up	HC3-Main-Board	132-00DR	1DR0-0029	1.0-00	N/A	N/A	
1	yes	up	PRT-HC3-C08Q08	132-00DW	1DX0-0001	A1-0			1
2	yes	up	PRT-HC3-C08Q08	132-00DW	1DX0-0001	A1-0			2
3	yes	up	SMT-HC3-C05	132-00DX	1DX0-0010	1.0-0	200		3
4	yes	up	PRT-HC3-X24	132-00DY	1DY0-0029	A1-0	60		4

**Figure 3** Successful show cards Output

- Use the **port** command with the **admin** argument to enable the ports on the module. For example, the following two commands enable all ports on a PRT-HC3-X24 module:
 

```
(config) # port 1/1/x1..x24 params admin enable
```
- Save your changes so that the modules and ports come up automatically at the next reboot:
 

```
(config) # write memory
```

## Setting Port Parameters Manually

If autonegotiation is not enabled on the other end of the connection, you must manually configure the **port params** of the GigaVUE-HC3 module port to match, followed by a **write** to save the current settings.

The **port params** commands are available in the Configure mode. The syntax is as follows:

```
port <port-list> params admin <disable | enable> autoneg <disable |
enable> discovery <cdp | lldp | all | disable> duplex
<full> forcelinkup <disable | enable> speed <10 | 100 | 1000 | 10000>
```

The following table summarizes these options:



Argument	Description
<b>admin &lt;disable   enable&gt;</b>	<p>Enables/disables ports administratively. Use the <b>show port params</b> command to see which ports are enabled and disabled.</p> <p>Refer to <i>Forcelinkup and Enabling/Disabling Ports for a summary of how this argument interacts with the admin argument.</i></p>
<b>autoneg &lt;disable   enable&gt;</b>	<p>Enables and disables autonegotiation for a port. When autonegotiation is enabled, duplex and speed settings are ignored (they are set via autonegotiation).</p> <p>Refer to <i>Forcelinkup and Enabling/Disabling Ports for a summary of how this argument interacts with the admin argument.</i></p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>NOTE:</b> Autonegotiation is always disabled for 10Gb ports.</p> </div>
<b>discovery &lt;cdp   lldp   all   disable&gt;</b>	<p>Configures port discovery options, as follows:</p> <ul style="list-style-type: none"> <li>▪ cdp—Enables CDP port discovery.</li> <li>▪ lldp—Enables LLDP port discovery.</li> <li>▪ all—Enables all port discovery protocols (meaning both CDP and LLDP).</li> <li>▪ disable—Disables port discovery.</li> </ul> <p>Discovery is disabled by default. To enable discovery, configure one or more protocols.</p>
<b>duplex &lt;full&gt;</b>	<p>Specifies the port's duplex configuration. Only full duplex is supported.</p> <p>Starting in software version 5.2, half duplex support is removed from all GigaVUE H Series nodes. If half duplex was configured in a previous software version, it will remain intact following the upgrade to 5.2 or higher release. Update to full duplex, if required.</p>
<b>forcelinkup &lt;disable   enable&gt;</b>	<p>Forces connection on an optical port. Use this option when an optical tool port is connected to a legacy optical tool that does not transmit light.</p> <p>Available as follows:</p> <ul style="list-style-type: none"> <li>▪ Optical 10Gb tool ports</li> <li>▪ 10Gb-capable optical tool ports only support <b>forcelinkup</b> when a 10Gb SFP+ is installed.</li> </ul>
<b>speed &lt;10   100   1000   10000&gt;</b>	<p>Sets the port speed in Mbps if autonegotiation is off.</p>

### Autonegotiation and External Fiber TAPs

When connecting a fiber port on the GigaVUE-HC3 node to an external TAP, autonegotiation is disabled on the node's fiber port, and cannot change.

### Forcelinkup and Enabling/Disabling Ports

The GigaVUE-HC3 node includes both **forcelinkup** and **admin** arguments for the **port params** command. The **forcelinkup** argument forces the link state on an optical tool port connected to a legacy tool that does not transmit the light required to bring the link up. The

following table summarizes how traffic flows for different combinations of **port params admin** and **port params forcелinkup** applied to an optical tool port.

	<b>forcелinkup = disable</b>	<b>forcелinkup = enable</b>
<b>admin = enable</b>	No traffic passed if autonegotiation is not successful.	Traffic is passed.
<b>admin = disable</b>	No traffic passed.	No traffic passed.

# GigaVUE-HC3 Specifications

This section provides the physical specifications, power requirements, and environmental specifications for GigaVUE-HC3 nodes. Compliance for safety, emissions, and immunity are also provided.

Topics:

## Physical Dimensions and Weight

The following table summarizes the dimensions and weight for the GigaVUE-HC3 nodes and its modules:

Node	Height	Width	Depth	Weight
GigaVUE-HC3 (with power supply modules and fans)	3RU5.25in (13.34cm)	19.0in (48.26cm)	29.1in (74.0cm) without cable management 33.5in (85.0cm) with cable management	88.0lb (40.00kg)
PRT-HC3-X24	1.9in(4.7cm)	8.5in(21.7cm)	16.1in(41.0cm)	2.12lb(0.96kg)
PRT-HC3-C08Q08	1.9in(4.7cm)	8.5in(21.7cm)	16.1in(41.0cm)	2.40lb(1.09kg)
PRT-HC3-C16	1.9in(4.7cm)	8.5in(21.7cm)	16.1in(41.0cm)	6.30lb(2.85kg)
SMT-HC3-C05	1.9in(4.7cm)	8.5in(21.7cm)	16.1in(41.0cm)	4.40lb(2.00kg)
SMT-HC3-C08	1.9in(4.7cm)	8.5in(21.7cm)	16.1in(41.0cm)	9.36lb (4.25kg)
BPS-HC3-C25F2G	1.9in(4.7cm)	8.5in(21.7cm)	16.1in(41.0cm)	6.28lb(2.85kg)
BPS-HC3-C35C2G	1.9in(4.7cm)	8.5in(21.7cm)	16.1in(41.0cm)	6.05lb(2.74kg)
BPS-HC3-Q35C2G	1.9in(4.7cm)	8.5in(21.7cm)	16.1in(41.0cm)	6.05lb(2.74kg)

## Battery Caution

A disposable, non-rechargeable, Real Time Clock (RTC) Lithium metal coin cell battery is in the GigaVUE-HC3. Note the following:

- There is a risk of fire if the battery is replaced with an incorrect type.
- Use only CR-2032L type Lithium metal coin cell battery and replace with the same.

## Power Requirements

The following table summarizes the electrical characteristics of GigaVUE-HC3 nodes.

**NOTE:** Refer to [Connecting Power to the GigaVUE-HC3](#) for instructions on how to connect the AC and DC power supply modules.

Power Specification	Specification
<b>Power Configurations</b>	1+1 Power: 2 Power Supply Modules 2+2 Power: 4 Power Supply Modules
Max Power Consumption/Heat Output	<ul style="list-style-type: none"> <li>1850 Watts; 6312.4 BTU/hr (Control Card version 1)</li> <li>2000 Watts; 6824.3 BTU/hr (Control Card version 2)</li> <li>Fully populated system with all ports at 100% traffic load</li> </ul>
<b>AC Power Supply Modules</b>	<ul style="list-style-type: none"> <li>Min/Max Voltage: 100V–115V AC, 200V–240V AC, 50/60Hz</li> <li>Max PSM Input Current: 14A@100V, 10A@200V</li> </ul>
<b>DC Power Supply Modules</b>	<ul style="list-style-type: none"> <li>Min/Max Voltage: -40V to -72V DC</li> <li>Max PSM Input Current: 48A@ -40V</li> </ul>

## Environmental Specifications

The following table summarizes the environmental specifications for GigaVUE-HC3 nodes.

Specification	GigaVUE-HC3 Node
<b>Operating Temperature</b>	32°F to 104°F (0°C to 40°C)
<b>Operating Relative Humidity</b>	20% to 80%, non-condensing
<b>Recommended Storage Temperature</b>	-4°F to 158°F (-20°C to 70°C)
<b>Recommended Storage Relative Humidity</b>	15% to 85%, non-condensing
<b>Altitude</b>	Up to 10,000ft (3.05km)

## Standards and Protocols

IEEE 802.3-2012, IEEE 802.1Q VLAN, IEEE 802.3 10BASE-T, IEEE 802.3u 100BASE-TX, IEEE 802.3ab 1000BASE-T, IEEE 802.3z 1000BASE-X, IEEE 802.3ae 10000BASE-X, IEEE 802.3ba, RFC 783 TFTP, RFC 791 IP, RFC 793, TCP, RFC 826 ARP, RFC 768 UDP, RFC 792 ICMP, SNMP v1/v2c, RFC 2131 DHCP client, RFC 1492 TACACS+, and support for IPv4 and IPv6.

## Compliance

This section provides compliance information for GigaVUE-HC3.

## Safety

GigaVUE-HC3 is compliant with the following safety regulations:

- UL 60950-1, 2nd Edition
- CAN/CSA C22.2 No. 60950-1-07, 2nd Edition
- EN 60950-1:2006/A11:2009/A1:2010/A12:2011/A2:2013
- IEC 60950-1:2005 (2nd Edition) + Am 1:2009 + Am 2:2013

## Emissions

GigaVUE-HC3 is compliant with the following emissions regulations:

- FCC Part 15, Class A
- VCCI Class A. Refer to [Class A Information Technology Equipment \(ITE\)](#).
- EN55022/CISPR-22 Class A
- Australia/New Zealand AS/NZS CISPR-22 Class A
- EU:CE Mark EN 55022 Class A
- BSMI Taiwan
- KCC Korea
- EAC Russia

## Class A Information Technology Equipment (ITE)

The following caution applies to Class A VCCI-certified equipment:

<p>この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。</p> <p style="text-align: right;">V C C I - A</p>
---

Translation of Statement for Class A VCCI-certified equipment:

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may occur, in which case, the user may be required to take corrective action.

## Class A Korea Caution

The following caution applies to Korea Class A equipment:

이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Translation of Caution Statement for Korea Class A Equipment:

This equipment is Industrial (Class A) electromagnetic wave suitability equipment and seller or user should take notice of it, and this equipment is to be used in the places except for home.

### Immunity

GigaVUE-HC3 is compliant with the following immunity regulations:

- ETSI EN300 386 V1.6.1:2012
- EN61000-3-2
- EN61000-3-3
- EN61000-4-2
- EN61000-4-3
- EN61000-4-4
- EN61000-4-5
- EN61000-4-6
- EN61000-4-8
- EN61000-4-11

### Environmental

GigaVUE-HC3 is compliant with the following environmental certifications:

- REACH 2006/1907/EC
- EU RoHS 6, EU directive 2011/65/EU
- Taiwan RoHS. (Refer to [Figure 1Taiwan RoHS Table.](#))

設備名稱：乙太網交換機 ，型號（型式）：GigaVUE-HC3 Equipment name Type designation (Type)						
單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (Pb)	汞 Mercury (Hg)	鎘 Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr <sup>6+</sup> )	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominate d diphenyl ethers (PBDE)
金屬部件 (Metal Parts)	—	○	○	○	○	○
電路模組 (Circuit Modules)	—	○	○	○	○	○
塑膠和聚合物部件 (Plastic and Polymeric parts)	○	○	○	○	○	○
電源元件 (Power Assemblies)	—	○	○	○	○	○
<p>備考1. “超出0.1 wt %”及“超出0.01 wt %”係指限用物質之百分比含量超出百分比含量基準值。 Note 1 : “Exceeding 0.1 wt %” and “exceeding 0.01 wt %” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.</p> <p>備考2. “○”係指該項限用物質之百分比含量未超出百分比含量基準值。 Note 2 : “○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.</p> <p>備考3. “—”係指該項限用物質為排除項目。 Note 3 : The “—” indicates that the restricted substance corresponds to the exemption.</p>						

Figure 1 Taiwan RoHS Table

## Security

GigaVUE-HC3 is compliant with the following security certifications:

- FIPS 140-2. Refer to “FIPS 140-2 Compliance” in the *GigaVUE-OS CLI User's Guide*.

## Warranty

Gigamon offers a range of premium support and extended services. For details regarding warranty, visit: <https://www.gigamon.com/support-and-services/warranty>

# Replacing Control Card

This appendix describes how to replace an existing GigaVUE-HC3 control card. There are separate procedures for the following:

- [Standalone Node](#)
- [Node in Out-of-Band Cluster](#)
- [Node in Inband Cluster](#)

**PREREQUISITE:** Software version 5.0 or higher must be running on the GigaVUE-HC3 node. Before starting the procedures in this appendix, backup the entire configuration on the node to a text file. This will later be used to reconfigure the GigaVUE-HC3 node.

```
(config) # configuration text generate active running upload <ftp | tftp | scp |
sftp>://<upload URL>/<filename.txt>
```

**NOTE:** Be sure to use an ESD grouping strap on your wrist or ankle before touching any cards.

## Standalone Node

The following procedure is to replace the control card on a standalone GigaVUE-HC3 node. To replace a control card on a standalone GigaVUE-HC3 node:

1. Follow the procedure in [Removing the Control Card](#) to remove the existing control card.
2. Insert the new control card and slide it into place.
3. Turn both latches inward.
4. Insert the fan tray following the procedure in [Inserting a Fan Tray](#).
5. Plug in the power cable.
6. When the node powers up, log on to it over the console port.
7. Switch to **Configure** mode.
  - a. Type **en <Enter>** to switch to Enable mode.
  - b. Type **config t <Enter>** to switch to Configure mode.
8. Run the jump-start script with the following command if it does not appear automatically:
 

```
(config) # config jump-start
```
9. Follow the prompts for the jump-start script.



10. When the jump-start script has completed, run the following command to make sure the node has an IP address:

```
(config) # show interface eth0
```

11. Log into the node and run the **show cards** command. Refer to the following sample output. Initially, the other cards will be down and only the control card will be operationally up.

```
(config) # show cards
```

```
Box ID: 1
```

Slot	Config	Oper	Status	HW Type	Product Code	Serial Num	HW Rev	PowerReq	PowerPriority
ccl	yes	up		HC3-Main-Board	132-00DR	1DR0-0010	1.0-00	N/A	N/A
1	yes	down		SMT-HC3-C05	132-00DX	1DX0-002A	1.0-0	200	1
2	yes	down		PRT-HC3-C08Q08	132-00DW	1DW0-0001	1.0-0	160	2
3	yes	down		PRT-HC3-X24	132-00DY	1DY0-0002	1.0-0	60	3

12. Apply the previously saved configuration, using the following command:

```
(config) # configuration text fetch <http | https | ftp | tftp | scp | sftp>://<download URL>/<filename.txt> apply fail-continue verbose
```

13. Verify that the information on the GigaVUE-HC3 matches the previously saved configuration for chassis, cards, and traffic using the following CLI commands or others, depending on your configuration:

```
(config) # show version
(config) # show chassis
(config) # show cards
(config) # show map
(config) # show map stats all
```

## Node in Out-of-Band Cluster

The following procedure is to replace the control card on a GigaVUE-HC3 node in an out-of-band cluster.

Use the **show chassis** command to record the GigaVUE-HC3 chassis box ID and the **show cluster config** command to record the cluster ID, cluster name, cluster leader address vip, cluster leader preference, and cluster interface.

To replace a control card in a GigaVUE-HC3 that is in an out-of-band cluster:

1. On the cluster leader, backup the entire configuration on the cluster to a text file.

```
(config) # configuration text generate active running upload <ftp | tftp | scp | sftp>://<upload URL>/<filename.txt>
```

2. On the cluster leader, remove the configuration of the GigaVUE-HC3 node from the cluster database. The commands may vary depending on your configuration.

```
(config) # no map all
(config) # no gsop all
(config) # no vport all
(config) # no tunnel all
(config) # no gsgroup all
(config) # no stack alias <alias>
```

3. On the GigaVUE-HC3 node, issue the following commands:

```
(config) # no cluster enable
(config) # write memory
```

4. On the cluster leader node, remove the GigaVUE-HC3 node information from the cluster database. Answer YES when prompted. This removes the GigaVUE-HC3 from the cluster.

```
(config) # no chassis box-id <box ID>
```

WARNING !! All the cards, ports, and traffic configuration will be lost.

Enter 'YES' to confirm this operation: YES

5. Replace the control card by following the procedure for [Standalone Node](#) up to and including [Step 11](#). (Since the GigaVUE-HC3 has been removed from the cluster, it is a standalone node.)
6. When the GigaVUE-HC3 is back up, reinstate the cluster configuration including the cluster ID, cluster name, cluster leader address vip, cluster leader preference, and cluster interface, as well as the chassis box ID.

```
(config) # cluster id <cluster ID>(config) # cluster name <cluster name>(config) #
cluster leader address vip <cluster leader vip>(config) # cluster interface eth<x>(config)
# cluster leader preference <preference number for leader, standby, or normal>
```

7. On the cluster leader, configure chassis information on the GigaVUE-HC3, including the chassis box ID, serial number, and new node type.

```
(config) # chassis box-id <box ID> serial-num <serial number> type hc3
```

8. On the GigaVUE-HC3 node, issue the following command for the node to rejoin the cluster:

```
(config) # cluster enable
```

9. When the GigaVUE-HC3 node is in the cluster, from the cluster leader apply the previously saved configuration:

```
(config) # configuration text fetch <http | https | ftp | tftp | scp | sftp>://<download
URL>/<filename.txt> apply fail-continue verbose
```

10. Verify that the information on the cluster matches the previously saved configuration for chassis, cards, and traffic using the following CLI commands or others, depending on your configuration:

```
(config) # show version(config) # show cluster global(config) # show chassis(config) #
show cards(config) # show map(config) # show map stats all
```

## Node in Inband Cluster

The following procedure is to replace the control card on a GigaVUE-HC3 node in an inband cluster.

Use the **show chassis** command to record the GigaVUE-HC3 chassis box ID and the **show cluster config** command to record the cluster ID, cluster name, cluster leader address vip, cluster leader preference, and cluster interface.

To replace a control card in a GigaVUE-HC3 that is in an inband cluster:

1. On the cluster leader, backup the entire configuration on the cluster to a text file.

```
(config) # configuration text generate active running upload <ftp | tftp | scp |
sftp>://<upload URL>/<filename.txt>
```

2. On the cluster leader, remove the configuration of the GigaVUE-HC3 node from the cluster database. The commands may vary depending on your configuration.

```
(config) # no map all(config) # no gsop all(config) # no vport all(config) # no tunnel all
(config) # no gsgroup all(config) # no stack alias <alias>
```

3. On the GigaVUE-HC3 node, issue the following commands:

```
(config) # no cluster enable(config) # write memory
```

4. On the cluster leader, remove the GigaVUE-HC3 node information from the cluster database. Answer YES when prompted. This removes the GigaVUE-HC3 from the cluster.

```
(config) # no chassis box-id <box ID>
```

WARNING !! All the cards, ports, and traffic configuration will be lost.

Enter 'YES' to confirm this operation: YES

5. Replace the control card by following the procedure for [Standalone Node](#) up to and including [Step 11](#). (Since the GigaVUE-HC3 has been removed from the cluster, it is a standalone node.)
6. When the GigaVUE-HC3 is back up, reinstate the original cluster configuration including the cluster ID, cluster name, cluster leader address vip, cluster leader preference, and cluster interface, as well as the chassis box ID. Then reinstate the interface configuration, chassis and card configuration, and GigaStream configuration used for the inband cluster stack links.

The cluster configuration is as follows:

```
(config) # cluster id <cluster ID>(config) # cluster name <cluster name>(config) #
cluster leader address vip <cluster leader vip>(config) # cluster interface <interface>
(config) # cluster leader preference <preference number for leader, standby, or
normal>
```

The interface configuration is as follows:

```
(config) # no interface eth1 zeroconf(config) # no interface eth2 zeroconf(config) #
interface inband zeroconf
```

The chassis and card configuration is as follows:

```
(config) # chassis box-id <box ID>(config) # card slot <slot number>
```

The GigaStream configuration is as follows:

```
(config) # port <box ID>/<slot number>/<stack ports> params admin enable
(config) # port <box ID>/<slot number>/<stack ports> type stack
(config) # gigastream alias <GigaStream alias>
port-list <box ID>/<slot number>/<stack ports>
```

- On the cluster leader, configure the GigaVUE-HC3. The offline provisioning includes chassis, card, port, and GigaStream stack port configuration. The chassis configuration includes the chassis box ID, serial number, and GigaVUE-HC3 with node type of hc3.

```
(config) # chassis box-id <box ID> serial-num <serial number> type hc3
(config) # card slot <box ID>/<slot number> product-code <card product code>
(config) # port <box ID>/<slot number>/<stack ports> params admin enable
(config) # port <box ID>/<slot number>/<stack ports> type stack
(config) # gigastream alias <GigaStream alias>
port-list <box ID>/<slot number>/<stack ports>
```

**NOTE:** [Step](#) configures the GigaVUE-HC3 node. [Step](#) configures the cluster leader. The stack ports in [Step](#) are the same as those in [Step](#), under GigaStream configuration.

- On the GigaVUE-HC3 node, issue the following command for the node to rejoin the cluster:

```
(config) # cluster enable
```

- When the GigaVUE-HC3 node is in the cluster, from the cluster leader apply the previously saved configuration:

```
(config) # configuration text fetch <http | https | ftp | tftp | scp | sftp>://<download URL>/<filename.txt>
apply fail-continue verbose
```

- Verify that the information on the cluster matches the previously saved configuration for chassis, cards, and traffic using the following CLI commands or others, depending on your configuration:

```
(config) # show version
(config) # show cluster global
(config) # show chassis
(config) # show cards
(config) # show map
(config) # show map stats all
```

# NEBS Level 3 Compliance for GigaVUE-HC3

This topic provides installation guidelines for GigaVUE-HC3 Network Equipment-Building System (NEBS) Level 3 compliance.

## Intrabuilding or Intra-connection

**WARNING:** The intra-building ports:

- BNC Coaxial PPS
- RJ45: PTP-1588, Management port, Console port, Stack ports, P/S port (Reserved for future use)
- PRT-HC3-X24
  - 10G SFP+: X1 - X24
  - 25G SFP28: X1 - X24 (Only for GigaVUE-HC3 control card version 2)
- PRT-HC3-C08Q08
  - 100Gb QSFP28: C1 - C8 or 40Gb QSFP+: Q1 - Q16
- SMT-HC3-C05
  - 100Gb QSFP28: C1 - C5
- BPS-HC3-C25F2G
  - 10G SFP+: X1 - X16
  - 25G SFP28: X1 - X16 (Only for GigaVUE-HC3 control card version 2)
  - BPS SR4 2 pairs: C1 - C4
- BPS-HC3-C35C2G
  - 10G SFP+: X1 - X16
  - 25G SFP28: X1 - X16 (Only for GigaVUE-HC3 control card version 2)
  - BPS LR4 2 pairs: C1 - C4
- BPS-HC3-Q35C2G
  - 10G SFP+: X1 - X16
  - 25G SFP28: X1 - X16 (Only for GigaVUE-HC3 control card version 2)
  - BPS LR4 2 pairs: Q1 - Q4
- SMT-HC3-C08
  - 100Gb QSFP28: C1 - C8 or 40Gb QSFP+: C1 - C8

GigaVUE-HC3 equipment or subassembly are suitable for connection to intrabuilding or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly **MUST NOT** be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or

Type 4 ports as described in GR-1089-CORE, Issue 6) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallicity to OSP wiring.

## Intrabuilding Ports (RJ45)

**WARNING:** The intrabuilding ports (RJ45) shall be connected to shielded and grounded cables at both ends.

## Class A2 Voltage Accessibility

The GigaVUE-HC3 shall be located in a restricted access location where only crafts personnel are allowed access.

## Class B Voltage Accessibility

The GigaVUE-HC3 shall be located in a restricted access location where only crafts personnel are allowed access.

## Equipment Grounding Systems

The GigaVUE-HC3 shall be installed and connected to the (CBN).

## Communication Equipment Grounding

The GigaVUE-HC3 is suitable for connection to the (Central Office and CPE).

## Bonding of Battery Return (BR) Input Terminals

The battery returns of the GigaVUE-HC3 shall be connected as (DC-I).

## Connections

- a. The GigaVUE-HC3 shall be grounded via a copper ground conductor #6 AWG for CPE installation.
- b. All bare grounding connection points to the GigaVUE-HC3 shall be cleaned and coated with an antioxidant solution before connections are made.
- c. All surfaces on the GigaVUE-HC3 that are unplated shall be brought to a bright finish and treated with an antioxidant solution before connections are made.
- d. All non-conductive surfaces on the GigaVUE-HC3 shall be removed from all threads and connection points to ensure electrical continuity.

- e. Multiple connectors shall not be secured by the same bolt assemblies.
- f. Unplated connection surfaces that are to be intentionally joined to form a bonding or grounding path shall be brought to a bright finish and then coated with an antioxidant before they are joined (electrical connections).
- g. Listing fastening hardware shall be compatible with materials being joined and shall preclude loosening deterioration, and electrochemical corrosion of the hardware and joined materials.
- h. Non-conductive coatings (such as paint, lacquer, and enamel) on the equipment to be bonded or grounded shall be removed from threads and other contact surfaces to assure electrical continuity.
- i. GigaVUE-HC3 utilizes a Spade width 0.32in/.81cm with a Standard Wire 12-16 (AWG) that utilizes 5in-lbs of torque to secure it to the frame and EUT. Only listed two-hole compression-type connectors shall be used in making connection to flat surfaces (such as bus bars, frames, racks, or cabinets). Torquing and bolts assembly requirements for securing the connector shall be as specified by the connector supplier.

## Input AC/DC Voltage

The GigaVUE-HC3 is capable of operating input 100-115V/120V/200-240V AC, 14A/12A/10A, 50/60Hz (for each power supply), -48V to -60V DC, 40A Max (for each power supply)

## Maintenance

### Coin battery replacement

The coin cell battery/lithium battery can only be replaced by skilled/qualified service personnel.

**CAUTION:** Remove all power sources before servicing. (TO COMPLETELY REMOVE POWER FROM THE UNIT, FIRST TURN OFF THE POWER SWITCH AND REMOVE BOTH POWER CABLES).

# Additional Sources of Information

This appendix provides additional sources of information. Refer to the following sections for details:

- [Documentation](#)
- [Documentation Feedback](#)
- [Contact Technical Support](#)
- [Contact Sales](#)
- [The VUE Community](#)

## Documentation

This table lists all the guides provided for GigaVUE H Series software and hardware. The first row provides an All-Documents Zip file that contains all the guides in the set for the release.

**NOTE:** In the online documentation, view [What's New](#) to access quick links to topics for each of the new features in this Release; view [Documentation Downloads](#) to download all PDFs.

Table 1: Documentation Set for Gigamon Products

GigaVUE H Series 6.4 Hardware and Software Guides
<p><b>DID YOU KNOW?</b> If you keep all PDFs for a release in common folder, you can easily search across the doc set by opening one of the files in Acrobat and choosing <b>Edit &gt; Advanced Search</b> from the menu. This opens an interface that allows you to select a directory and search across all PDFs in a folder.</p>
<p><b>Hardware</b></p> <p>how to unpack, assemble, rack-mount, connect, and initially configure ports the respective GigaVUE H Series devices; reference information and specifications for the respective GigaVUE H Series devices</p>
<b>GigaVUE-HC1 Hardware Installation Guide</b>
<b>GigaVUE-HC2 Hardware Installation Guide</b>
<b>GigaVUE-HC3 Hardware Installation Guide</b>
<b>GigaVUE-HC1-Plus Hardware Installation Guide</b>
<b>GigaVUE-TA25 Hardware Installation Guide</b>
<b>GigaVUE-TA25E Hardware Installation Guide</b>
<b>GigaVUE-TA100 Hardware Installation Guide</b>
<b>GigaVUE-TA200 Hardware Installation Guide</b>



<b>GigaVUE H Series 6.4 Hardware and Software Guides</b>	
<b>GigaVUE-TA200E Hardware Installation Guide</b>	
<b>GigaVUE-TA400 Hardware Installation Guide</b>	
<b>GigaVUE-OS Installation Guide for DELL S4112F-ON</b>	
<b>G-TAP A Series 2 Installation Guide</b>	
<b>GigaVUE M Series Hardware Installation Guide</b>	
<b>GigaVUE-FM Hardware Appliance Guide for GFM-HW1-FM010 and and GFM-HW1-FM001-HW</b>	
<b>Software Installation and Upgrade Guides</b>	
<b>GigaVUE-FM Installation, Migration, and Upgrade Guide</b>	
<b>GigaVUE-OS Upgrade Guide</b>	
<b>GigaVUE V Series Migration Guide</b>	
<b>Fabric Management and Administration Guides</b>	
<b>GigaVUE Administration Guide</b>	covers both GigaVUE-OS and GigaVUE-FM
<b>GigaVUE Fabric Management Guide</b>	how to install, deploy, and operate GigaVUE-FM; how to configure GigaSMART operations; covers both GigaVUE-FM and GigaVUE-OS features
<b>Cloud Guides</b>	
	how to configure the GigaVUE Cloud Suite components and set up traffic monitoring sessions for the cloud platforms
<b>*GigaVUE V Series Applications Guide</b>	
<b>GigaVUE V Series Quick Start Guide</b>	
<b>GigaVUE Cloud Suite Deployment Guide - AWS</b>	
<b>GigaVUE Cloud Suite Deployment Guide - Azure</b>	
<b>GigaVUE Cloud Suite Deployment Guide - OpenStack</b>	
<b>*GigaVUE Cloud Suite Deployment Guide - Nutanix</b>	
<b>GigaVUE Cloud Suite Deployment Guide - VMware</b>	
<b>*GigaVUE Cloud Suite Deployment Guide - Third Party Orchestration</b>	
<b>GigaVUE Cloud Suite for AnyCloud Guide</b>	
<b>Universal Cloud Tap - Container Guide</b>	
<b>Gigamon Containerized Broker Deployment Guide</b>	

## GigaVUE H Series 6.4 Hardware and Software Guides

**GigaVUE Cloud Suite for AWS–GigaVUE V Series 1 Guide**

**GigaVUE Cloud Suite for Azure–GigaVUE V Series 1 Guide**

**GigaVUE Cloud Suite for OpenStack–GigaVUE V Series 1 Guide**

**GigaVUE Cloud Suite for Nutanix Guide—GigaVUE-VM Guide**

**GigaVUE Cloud Suite for VMware—GigaVUE-VM Guide**

GigaVUE Cloud Suite Deployment Guide - AWS Secret Regions

### Reference Guides

**GigaVUE-OS CLI Reference Guide**

library of GigaVUE-OS CLI (Command Line Interface) commands used to configure and operate GigaVUE HC Series and TA Series devices

**GigaVUE-OS Security Hardening Guide**

**GigaVUE Firewall and Security Guide**

**GigaVUE Licensing Guide**

**GigaVUE-OS Cabling Quick Reference Guide**

guidelines for the different types of cables used to connect Gigamon devices

**GigaVUE-OS Compatibility and Interoperability Matrix**

compatibility information and interoperability requirements for Gigamon devices

**GigaVUE-FM REST API Reference in GigaVUE-FM User's Guide**

samples uses of the GigaVUE-FM Application Program Interfaces (APIs)

### Release Notes

**GigaVUE-OS, GigaVUE-FM, GigaVUE-VM, G-TAP A Series, and GigaVUE Cloud Suite Release Notes**

new features, resolved issues, and known issues in this release ;  
important notes regarding installing and upgrading to this release

**NOTE:** Release Notes are not included in the online documentation.

**NOTE:** Registered Customers can log in to [My Gigamon](#) to download the Software and Release Notes from the Software & Docs page on to [My Gigamon](#). Refer to [How to Download Software and Release Notes from My Gigamon](#).

### In-Product Help

**GigaVUE-FM Online Help**

how to install, deploy, and operate GigaVUE-FM.

## How to Download Software and Release Notes from My Gigamon

Registered Customers can download software and corresponding Release Notes documents from the **Software & Release Notes** page on to [My Gigamon](#). Use the My Gigamon Software & Docs page to download:

- Gigamon Software installation and upgrade images,
- Release Notes for Gigamon Software, or
- Older versions of PDFs (pre-v5.7).

### To download release-specific software, release notes, or older PDFs:

1. Log in to [My Gigamon](#)
2. Click on the **Software & Release Notes** link.
3. Use the **Product** and **Release** filters to find documentation for the current release. For example, select Product: "GigaVUE-FM" and Release: "5.6," enter "pdf" in the search box, and then click **GO** to view all PDF documentation for GigaVUE-FM 5.6.xx.

**NOTE:** My Gigamon is available to registered customers only. Newer documentation PDFs, with the exception of release notes, are all available through the publicly available online documentation.

## Documentation Feedback

We are continuously improving our documentation to make it more accessible while maintaining accuracy and ease of use. Your feedback helps us to improve. To provide feedback and report issues in our documentation, send an email to:

[documentationfeedback@gigamon.com](mailto:documentationfeedback@gigamon.com)

Please provide the following information in the email to help us identify and resolve the issue. Copy and paste this form into your email, complete it as able, and send. We will respond as soon as possible.

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	<b>Any other comments?</b>	

## Contact Technical Support

For information about Technical Support: Go to **Settings**  > **Support** > **Contact Support** in GigaVUE-FM.

You can also refer to <https://www.gigamon.com/support-and-services/contact-support> for Technical Support hours and contact information.

Email Technical Support at [support@gigamon.com](mailto:support@gigamon.com).

## Contact Sales

Use the following information to Gigamon channel partner or Gigamon sales representatives.

**Telephone:** +1.408.831.4025

**Sales:** [inside.sales@gigamon.com](mailto:inside.sales@gigamon.com)

**Partners:** [www.gigamon.com/partners.html](http://www.gigamon.com/partners.html)

## Premium Support

Email Gigamon at [inside.sales@gigamon.com](mailto:inside.sales@gigamon.com) for information on purchasing 24x7 Premium Support. Premium Support entitles you to round-the-clock phone support with a dedicated Support Engineer every day of the week.

## The VÜE Community

The **VÜE Community** is a technical site where Gigamon users, partners, security and network professionals and Gigamon employees come together to share knowledge and expertise, ask questions, build their network and learn about best practices for Gigamon products.

Visit the VÜE site to:

- Find knowledge base articles and documentation
- Ask and answer questions and learn best practices from other members.
- Join special-interest groups to have focused collaboration around a technology, use-case, vertical market or beta release
- Take online learning lessons and tutorials to broaden your knowledge of Gigamon products.
- Open support tickets (Customers only)
- Download the latest product updates and documentation (Customers only)

The VÜE Community is a great way to get answers fast, learn from experts and collaborate directly with other members around your areas of interest.

**Register today at** [community.gigamon.com](http://community.gigamon.com)

**Questions?** Contact our Community team at [community@gigamon.com](mailto:community@gigamon.com).

# Glossary

## D

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### decrypt list

need to decrypt (formerly blacklist)

### decryptlist

need to decrypt - CLI Command (formerly blacklist)

### drop list

selective forwarding - drop (formerly blacklist)

## F

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### forward list

selective forwarding - forward (formerly whitelist)

## L

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### leader

leader in clustering node relationship (formerly master)

## M

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### member node

follower in clustering node relationship (formerly slave or non-master)

## N

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### no-decrypt list

no need to decrypt (formerly whitelist)

**nodecryptlist**

no need to decrypt- CLI Command (formerly whitelist)

**P**

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**primary source**

root timing; transmits sync info to clocks in its network segment (formerly grandmaster)

**R**

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**receiver**

follower in a bidirectional clock relationship (formerly slave)

**S**

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**source**

leader in a bidirectional clock relationship (formerly master)