Hewlett Packard Enterprise

HPE Apollo k6000 Chassis

User Guide

Abstract

This document contains setup, installation, and configuration information for the HPE Apollo Chassis. This document is for the person who installs, administers, and troubleshoots the system. Hewlett Packard Enterprise assumes that you are qualified in the servicing of computer equipment and trained in using safe practices when dealing with hazardous energy levels.

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Acknowledgments

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Contents

Planning the installation

Safety and regulatory compliance

For important safety, environmental, and regulatory information, see *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise website (**http://www.hpe.com/support/Safety-Compliance-EnterpriseProducts**).

Configuration guidelines

Operate the chassis only when a device or blank is installed in all device bays. Before powering up the chassis, be sure to do the following:

- Install fan modules into all fan module bays.
- Install power supplies into all power supply bays.
- Install a device or a blank into the following bays:
  - I/O module bays
  - Server tray bays
  - Switch bays

For additional switch installation requirements, see the following sections:

- **Installing data switch options** on page 32
- **Installing high-speed fabric switch options** on page 36

Determining power and cooling configurations

Validate power and cooling requirements based on location and installed components.

Power requirements

Installation of this equipment must comply with local and regional electrical regulations governing the installation of IT equipment by licensed electricians. This equipment is designed to operate in installations covered by NFPA 70, 1999 Edition (National Electric Code) and NFPA-75, 1992 (code for Protection of Electronic Computer/Data Processing Equipment). For electrical power ratings on options, refer to the product rating label or the user documentation supplied with that option.

WARNING: To reduce the risk of personal injury, fire, or damage to the equipment, do not overload the AC supply branch circuit that provides power to the rack. Consult the electrical authority having jurisdiction over wiring and installation requirements of your facility.

CAUTION: Protect the server from power fluctuations and temporary interruptions with a regulating UPS. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the server in operation during a power failure.

HPE Apollo Platform Manager

HPE Apollo Platform Manager is an optional point of contact for system administration. HPE Apollo Platform Manager allows you to manage and regulate power at a rack level by connecting the chassis that contains chassis controllers.

To configure and access APM, see the *HPE Apollo Platform Manager User Guide* on the Hewlett Packard Enterprise website (**http://www.hpe.com/support/APM_UG_en**).

Hot-plug power supply calculations

For more information on the hot-plug power supply and calculators to determine server power consumption in various system configurations, see the Hewlett Packard Enterprise Power Advisor website (**http://www.hpe.com/info/poweradvisor/online**).

Compiling the documentation

The documentation, while delivered individually and in various formats, works as a solution. Consult the following documents before attempting installation:

- *HPE Apollo k6000 Chassis Quick Setup Instructions*
- *HPE Apollo k6000 Chassis Rail Kit for HPE and Third Party Racks Installation Instructions*

These documents provide required important safety information and decision-making steps for configuration. To access these documents, see the Hewlett Packard Enterprise website (**http://www.hpe.com/info/Apollok6000-docs**).

Warnings and cautions

WARNING: To reduce the risk of personal injury or damage to equipment, heed all warnings and cautions throughout the installation instructions.

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The rack is bolted to the floor using the concrete anchor kit.
- The leveling feet extend to the floor.
- The full weight of the rack rests on the leveling feet.
- The racks are coupled together in multiple rack installations.
- Only one component is extended at a time. If more than one component is extended, a rack might become unstable.

WARNING: The chassis is very heavy. To reduce the risk of personal injury or damage to the equipment:

- Observe local occupational health and safety requirements and guidelines for manual material handling.
- Remove all servers from the chassis before installing or moving the chassis.
- Use caution and get help to lift and stabilize the chassis during installation or removal, especially when the chassis is not fastened to the rack.

WARNING: To reduce the risk of personal injury or damage to the equipment, you must adequately support the chassis during installation and removal.

WARNING: Install the chassis starting from the bottom of the rack and work your way up the rack.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

WARNING: To reduce the risk of electric shock or damage to the equipment:

- Never reach inside the chassis while the system is powered up.
- Perform service on system components only as instructed in the user documentation.

CAUTION: Always be sure that equipment is properly grounded and that you follow proper grounding procedures before beginning any installation procedure. Improper grounding can result in ESD damage to electronic components. For more information, refer to "**Electrostatic discharge** on page 48."

CAUTION: When performing non-hot-plug operations, you must power down the server and/or the system. However, it may be necessary to leave the server powered up when performing other operations, such as hot-plug installations or troubleshooting.

CAUTION: Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

Space and airflow requirements

Installation of the chassis is supported in 1200 mm Gen10 racks.

To allow for servicing and adequate airflow, observe the following space and airflow requirements when deciding where to install a rack:

- Leave a minimum clearance of 63.5 cm (25 in) in front of the rack.
- Leave a minimum clearance of 76.2 cm (30 in) behind the rack.
- Leave a minimum clearance of 121.9 cm (48 in) from the back of the rack to the back of another rack or row of racks.

Front and rear rack doors must be adequately ventilated to allow ambient room air to enter the cabinet, and the rear door must be adequately ventilated to allow the warm air to escape from the cabinet.

CAUTION: To prevent improper cooling and damage to the equipment, do not block the ventilation openings.

When vertical space in the rack is not filled by a chassis or rack component, the gaps between the components cause changes in airflow through the rack and across the components. Cover all gaps with blanking panels to maintain proper airflow.

CAUTION: Always use blanking panels to fill empty vertical spaces in the rack. This arrangement ensures proper airflow. Using a rack without blanking panels results in improper cooling that can lead to thermal damage.

CAUTION: If a third-party rack is used, observe the following additional requirements to ensure adequate airflow and to prevent damage to the equipment:

- Front and rear doors—If the 42U rack includes closing front and rear doors, you must allow 5,350 sq cm (830 sq in) of holes evenly distributed from top to bottom to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).
- Side—The clearance between the installed rack component and the side panels of the rack must be a minimum of 7 cm (2.75 in).

Temperature requirements

To ensure continued safe and reliable equipment operation, install or position the rack in a well-ventilated, climate-controlled environment.

The operating temperature inside the rack is always higher than the room temperature and is dependent on the configuration of equipment in the rack. Check the TMRA for each piece of equipment before installation.

CAUTION: To reduce the risk of damage to the equipment when installing third-party options:

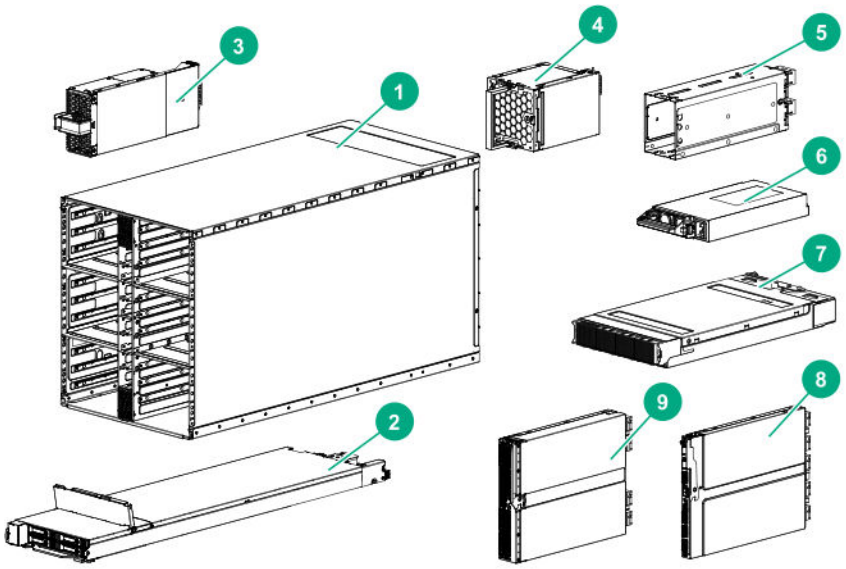
- Do not permit optional equipment to impede airflow around the chassis or to increase the internal rack temperature beyond the maximum allowable limits.
- Do not exceed the manufacturer’s TMRA.

Grounding requirements

- The building installation must provide a means of connection to protective earth.
- The equipment must be connected to that means of connection.
- A service person must check whether the socket-outlet from which the equipment is to be powered provides a connection to the building protective earth. If the outlet does not provide a connection, the service person must arrange for the installation of a protective earthing conductor from the separate protective earthing terminal to the protective earth wire in the building.

Identifying components and LEDs

System components



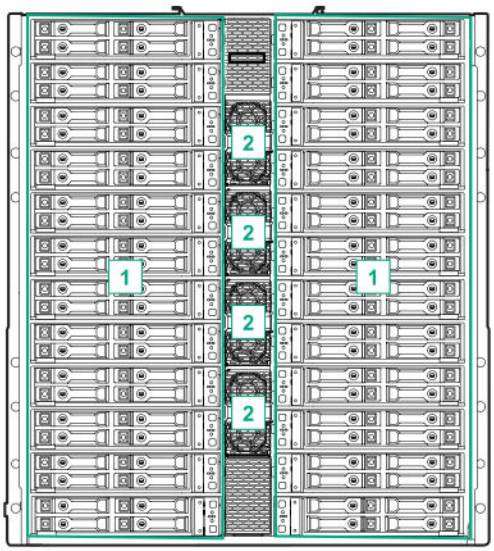
Item	Description
1	HPE Apollo k6000 Chassis
Front chassis components	
2	Server trays [1]
3	Front chassis fan modules (4)
Rear chassis components	
4	HPE Apollo 6000 dual-rotor hot-plug fan modules (12)
5	Chassis I/O modules in module cage or rear I/O blanks[1]
6	Chassis power supplies [2]
7	Chassis controller or chassis controller with optional HPE Apollo Platform Manager
8	Data switches [2]
9	High-speed fabric switches[2]
—	HPE Apollo k6000 Chassis Rail kit [3]
—	Cables (per chassis) [2, 3] • Power supply cables • 2.5M 20 Pin Consolidated Management w/Latch Cable • APM USB to DB9 cable[1]

[1] The quantity depends on the configuration ordered.

[2] The quantity and type depend on the configuration ordered.

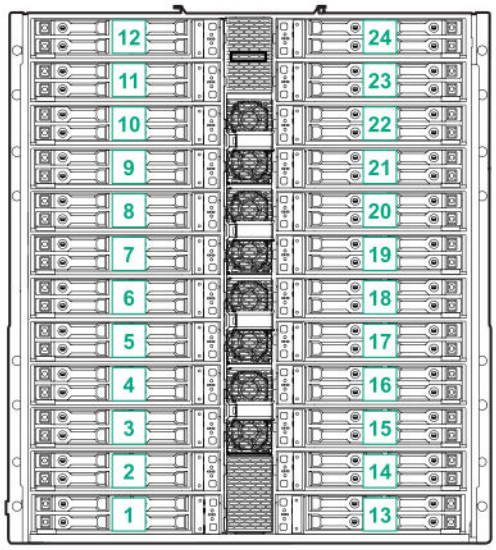
[3] Not shown.

Front chassis components

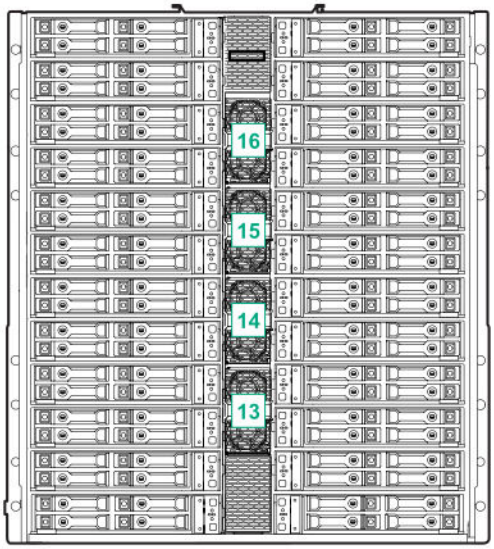


Item	Description
1	Server bays
2	Front chassis fan module bays

Server bay numbering

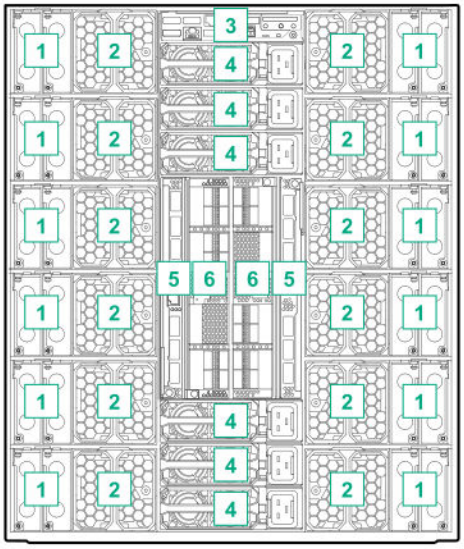


Front chassis fan module numbering



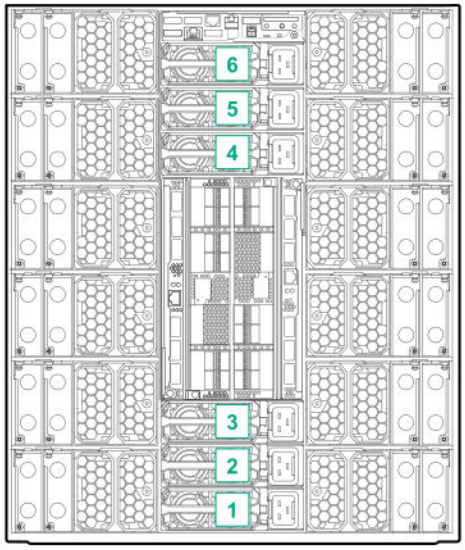
Before powering up the chassis, install fan modules into all front and rear fan module bays, and install power supplies into all power supply bays.

Rear panel components

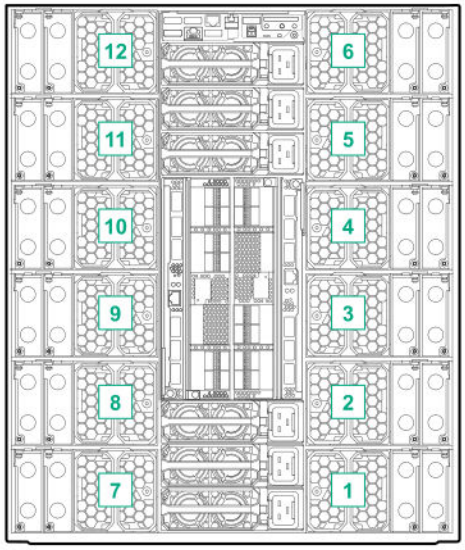


Item	Description
1	I/O module bays
2	Rear dual-rotor fan modules
3	Chassis controller or HPE Apollo Platform Manager
4	Power supply bays
5	Data switch bays
6	High-speed fabric switch bays

Power supply numbering

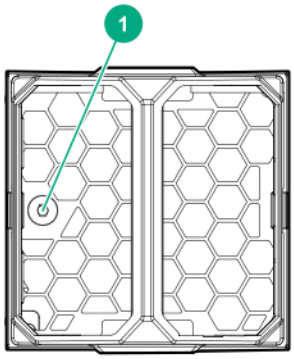


Rear fan module numbering



Before powering up the chassis, install fan modules into all front and rear fan module bays, and install power supplies into all power supply bays.

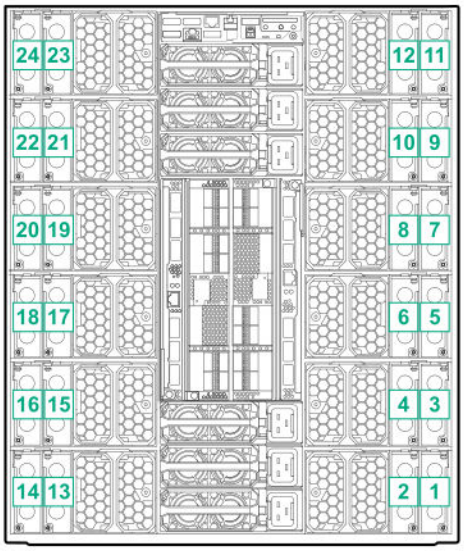
Rear fan module LED



Status	Description
Off	The fan module is working or the power is off.
Solid amber	The fan module has failed.

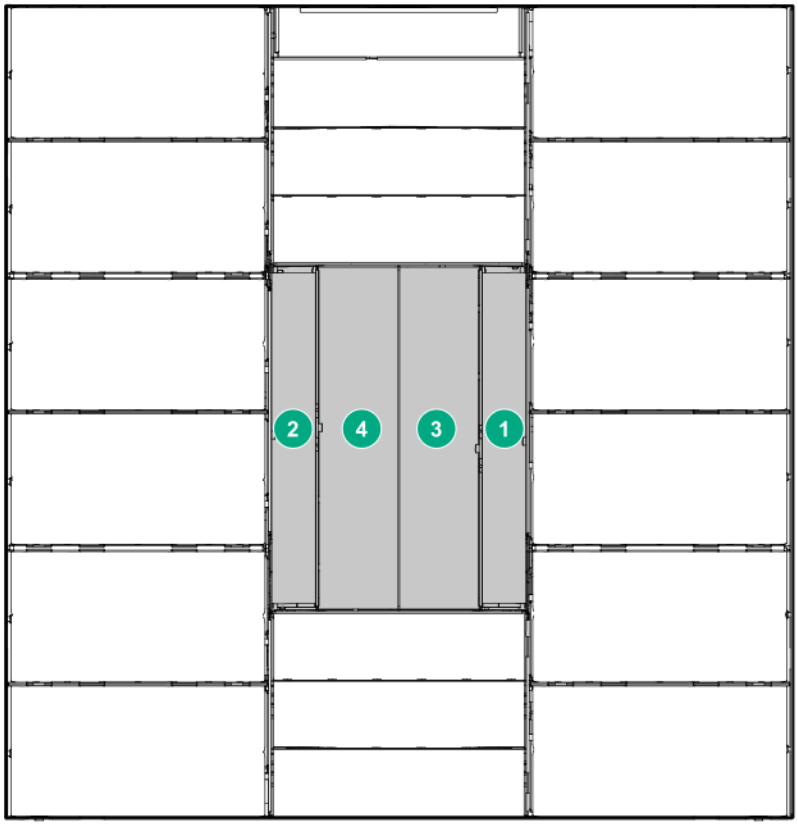
I/O module bay numbering

I/O modules are installed in the rear of the chassis in the bay that corresponds to its server tray.



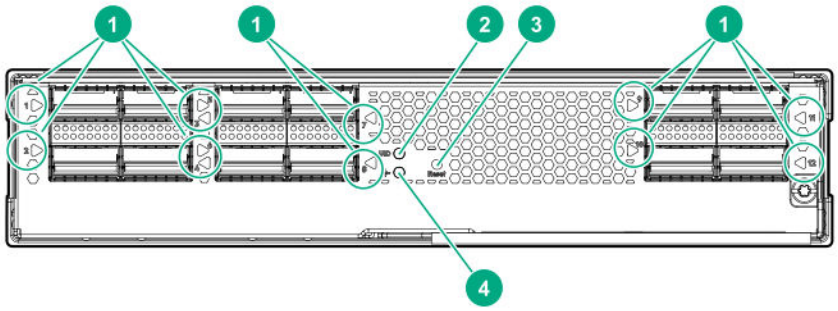
If an I/O bay is populated, an I/O-enabled server must be installed in the corresponding bay.

Switch bay numbering



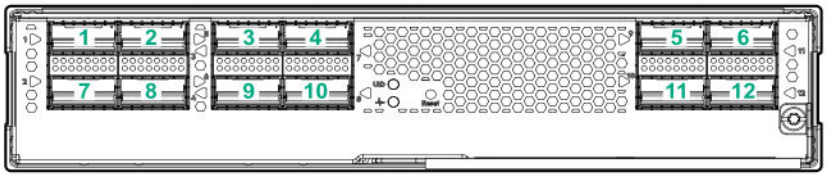
Item	Description
1	Data switch bay (A)
2	Data switch bay (B)
3	High-speed fabric switch bay (A)
4	High-speed fabric switch bay (B)

HPE Apollo InfiniBand EDR 36-port Unmanaged Switch buttons and LEDs



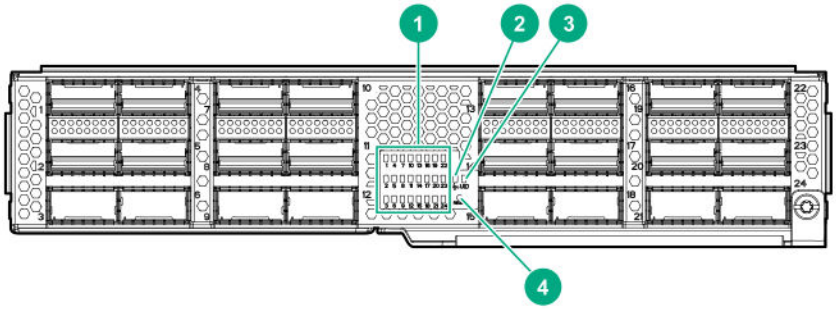
Item	Description
1	**Link Status LEDs** The LED illuminates when there is a valid link connection.
2	**UID LED/button** Solid blue = Activated Off = Deactivated
3	**Reset button** Depress for three seconds for a soft reset.
4	**Health LED** Solid green = Normal Solid amber = Module degraded Off = No power present

HPE Apollo InfiniBand EDR 36-port Unmanaged Switch components



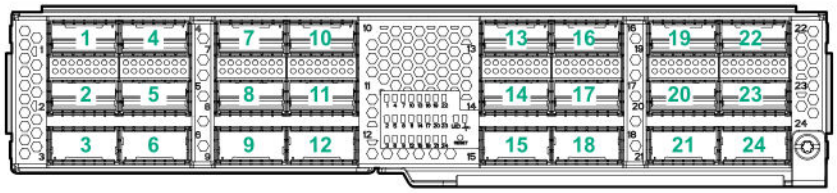
Item	Description
1-12	QSFP28 ports

HPE Apollo 100Gb 48-port Intel Omni-Path Architecture Unmanaged Switch buttons and LEDs



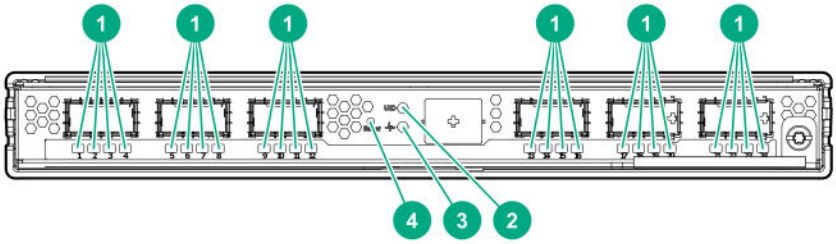
Item	Description
1	**Link Status LEDs** The LED illuminates when there is a valid link connection.
2	**UID LED/button** Solid blue = Activated Off = Deactivated
3	**Reset button** Depress for three seconds for a soft reset.
4	**Health LED** Solid green = Normal Solid amber = Module degraded Off = No power present

HPE Apollo 100Gb 48-port Intel Omni-Path Architecture Unmanaged Switch components



Item	Description
1-24	QSFP28 ports

HPE Apollo Ethernet 10GbE Pass-thru Module buttons and LEDs

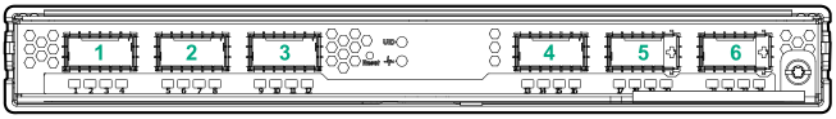


Item	Description
1	**Link status LEDs** Each LED is numbered 1 through 24 and illuminates when there is a valid link to the corresponding tray on the front of the chassis.

Table Continued

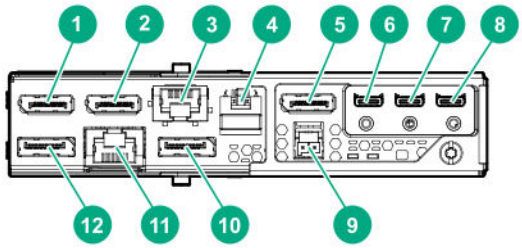
2	**UID LED/button** Solid blue = Activated Off = Deactivated
3	**Health LED** Solid green = Normal Solid amber = Module degraded Off = No power present
4	**Reset button** Depress for three seconds for a soft reset.

HPE Apollo Ethernet 10GbE Pass-thru Module components



QSFP+ (4x10Gb) Port	Server bay mapping
Port 1	• Bay 1—Server bays 13, 1, 14, 2 • Bay 2—Server bays 24, 12, 23, 11
Port 2	• Bay 1—Server bays 15, 3, 16, 4 • Bay 2—Server bays 22, 10, 21, 9
Port 3	• Bay 1—Server bays 17, 5, 18, 6 • Bay 2—Server bays 20, 8, 19, 7
Port 4	• Bay 1—Server bays 19, 7, 20, 8 • Bay 2—Server bays 18, 6, 17, 5
Port 5	• Bay 1—Server bays 21, 9, 22, 10 • Bay 2—Server bays 16, 4, 15, 3
Port 6	• Bay 1— Server bays 23, 11, 24, 12 • Bay 2—Server bays 14, 2, 13, 1

Chassis controller or HPE Apollo Platform Manager components

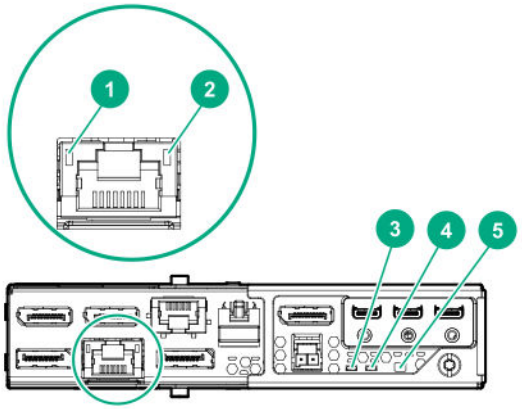


Item	Description
1	Reserved
2	Consolidated Management Port (chassis 3)[1]
3	APM Ethernet port connector[1]
4	Serial console port[1]
5	Consolidated Management Port (chassis 2)[1]
6	Power Distribution Module (PDM) ports 5, 6[1]
7	Power Distribution Module (PDM) ports 3, 4[1]
8	Power Distribution Module (PDM) ports 1, 2[1]
9	12V power connector port
10	Environmental controller port
11	iLO port[2]
12	Consolidated Management Port[2]

[1] Available only on the HPE Apollo Platform Manager.

[2] If you have a display port cable connected to each chassis controller module (up to three modules per rack) from the HPE Apollo Platform Manager, do not connect the iLO Ethernet port on the standalone chassis controller module. When using an APM in the rack, rack level iLO connectivity to the network is through the APM iLO port.

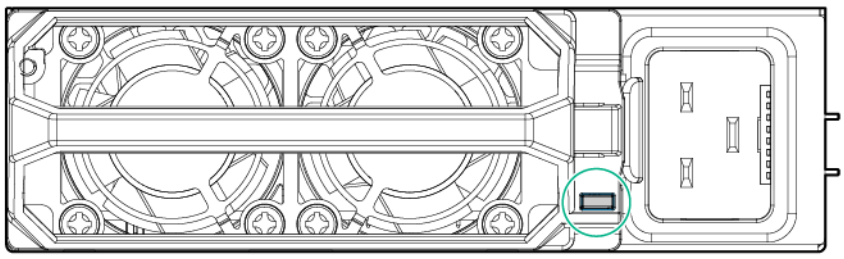
Chassis controller or HPE Apollo Platform Manager LEDs and buttons



Item	Description
1	iLO network 1 link LED
2	iLO network 1 activity LED
3	Health LED
4	UID LED
5	HPE Apollo Platform Manager reset button[1]

[1] To reset the HPE Apollo Platform Manager, press the button. If you press and hold the button for five seconds or longer, the APM enters recovery mode. For more information, see the *HPE Apollo Platform Manager User Guide* on the Hewlett Packard Enterprise website (**http://www.hpe.com/support/apm_ug_en**).

Power supply LED



Power LED	Condition
Off[1]	• No input power to the power supply • Power supply failure
Solid green	Normal operation
Flashing amber[1]	Warning

[1]Log in to the APM or the server iLO to check for power supply error messages.

Installing the chassis

Installation overview

To set up and install the chassis:

1. Unpack the system (**Unpacking the system** on page 20).
2. Determine the chassis rack spacing (**Determining the chassis rack spacing** on page 20).
3. Install the rack rails (**Installing the rack rails** on page 20).
4. Install the chassis into the rack (**Installing the chassis in the rack** on page 24).
5. Install the system components (**Installing the system components** on page 28).
6. Connect power to the chassis (**Cabling the chassis** on page 41).

Unpacking the system

Unpack the following hardware and prepare for installation:

- HPE Apollo k6000 Chassis
- HPE Apollo k6000 Chassis Rack Rail Kit
- Chassis components and cabling

The following documents also ship with the HPE Apollo k6000 Chassis:

- Start Here for Important Setup Information
- Safety, Compliance, and Warranty Information

Determining the chassis rack spacing

The HPE 1.2 m standard rack supports installation of up to three chassis.

For more information on installing the chassis into the rack, see the *HPE Apollo k6000 Chassis Rail Kit for HPE and Third Party Racks Installation Instructions*.

Installing the rack rails

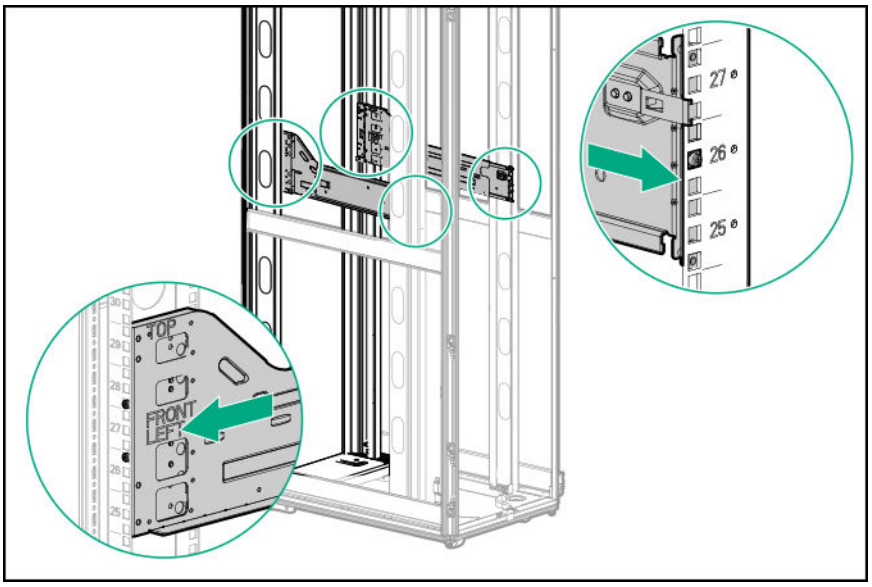
WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizing feet are attached to the rack if it is a single-rack installation.
- The racks are coupled together in multiple-rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

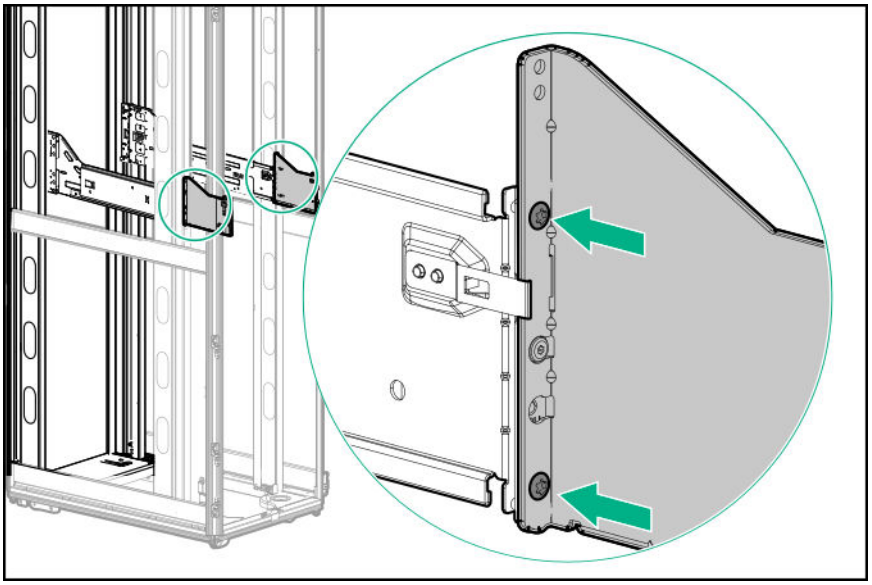
WARNING: If you are going to use a lift, be sure to use a lift that can handle the load of the component.

Procedure

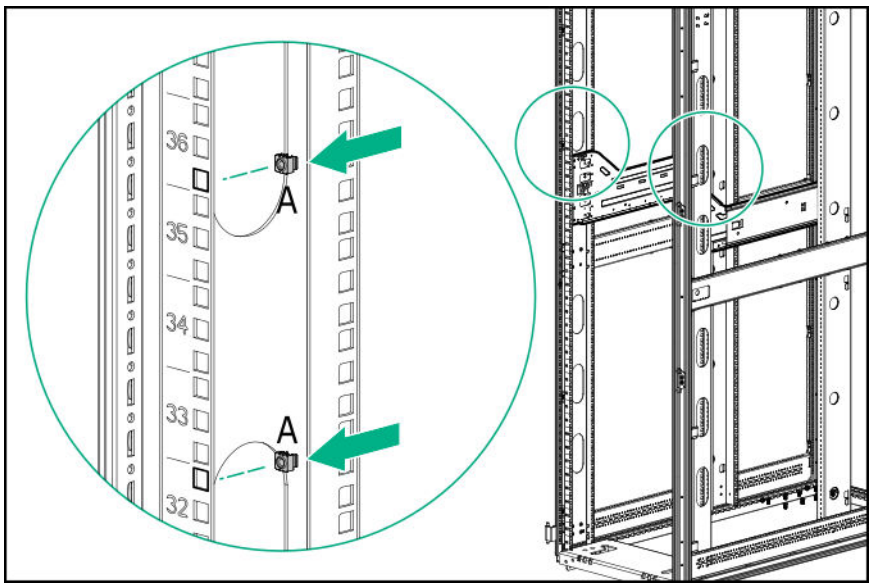
1. Install the rails onto the rack paying attention to the labeling on the rails (Front Left and Front Right).



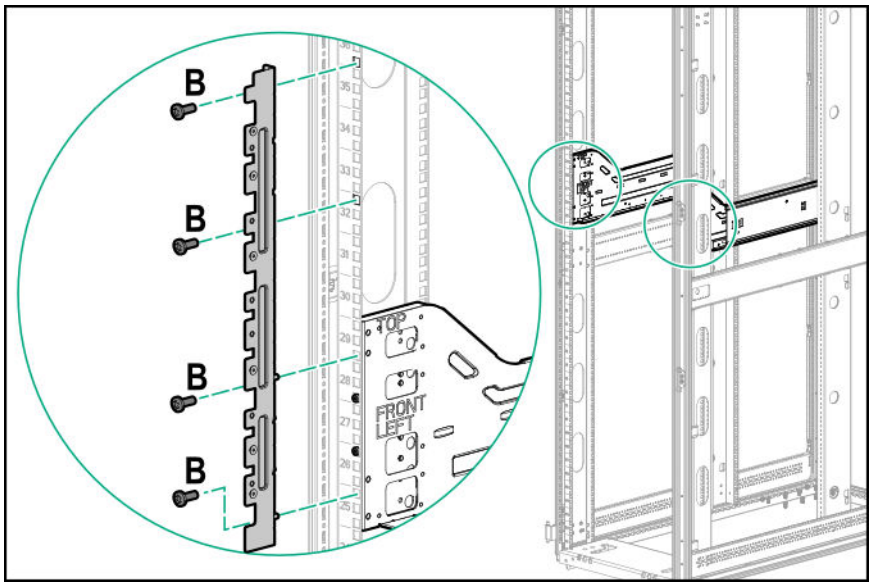
2. Install the screws through the rear extension and the vertical brace, attaching the screws to the threaded holes in the rear of the rail.



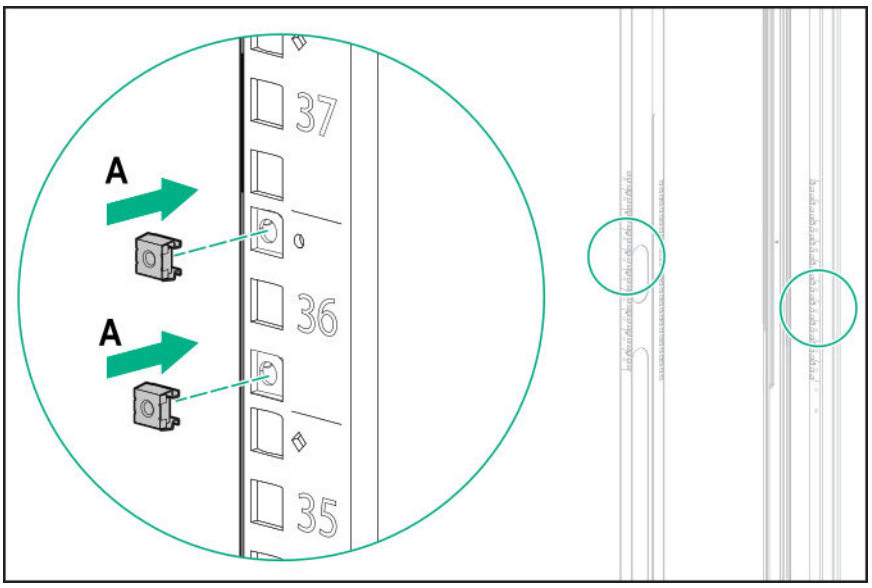
3. Install the cage nuts for the front brackets.



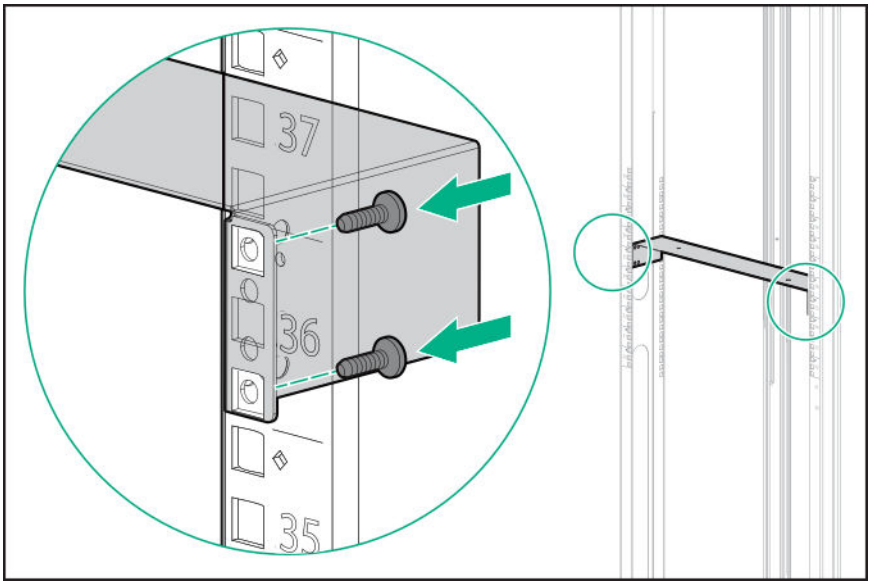
4. Secure the front brackets to the rack.
   a. Secure the top two screws to the cage nuts (A) installed in the previous step.
   b. Secure the bottom two screws to the threaded holes of the rail.



5. Install the cage nuts for the rear brace.



6. Secure the rear brace to the rack.



Installing the chassis in the rack

WARNING: The chassis is heavy. To reduce the risk of personal injury or damage to the equipment:

- Observe local occupational health and safety requirements and guidelines for manual material handling.
- Use a hydraulic lift to remove the chassisfrom the rack.
- Disconnect all cabling and remove all servers from the chassis before installing or moving the chassis.
- Use caution and get help to lift and stabilize the product during installation or removal, especially when the product is not fastened to the rails. The chassis weighs more than 113.39 kg (250.00 lb), and is back heavy, so at least four people must lift the chassis into the rack together. An additional person might be required to help align the chassis if the chassis is installed higher than chest level.

WARNING: To avoid risk of personal injury or damage to the equipment, do not stack anything on top of rail-mounted equipment or use it as a work surface when extended from the rack.

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The rack is bolted to the floor using the concrete anchor kit.
- The leveling feet extend to the floor.
- The full weight of the rack rests on the leveling feet.
- The racks are coupled together in multiple rack installations.
- Only one component is extended at a time. If more than one component is extended, a rack might become unstable.

WARNING: To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before installing the chassis.

CAUTION: Always plan the rack installation so that the heaviest item is on the bottom of the rack. Install the heaviest item first, and continue to populate the rack from the bottom to the top.

CAUTION: Be sure to keep the product parallel to the floor when installing the chassis. Tilting the product up or down could result in damage to the slides.

CAUTION: Hewlett Packard Enterprise has not tested or validated this chassis with any third-party racks. Before installing the chassis in a third-party rack, be sure to properly scope the limitations of the rack. Before proceeding with the installation, consider the following:

- You must fully understand the static and dynamic load carrying capacity of the rack and be sure that it can accommodate the weight of the chassis.
- Be sure sufficient clearance exists for cabling, installation and removal of the chassis, and actuation of the rack doors.

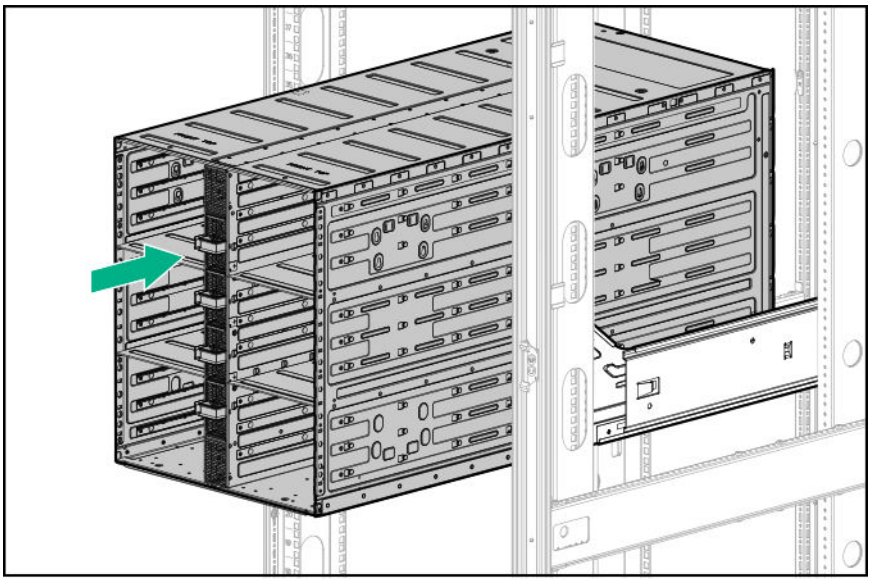
IMPORTANT: When installing each chassis into the rack, be sure that the HPE Apollo Platform Manager is at the top of the chassis to ensure proper orientation in the rack.

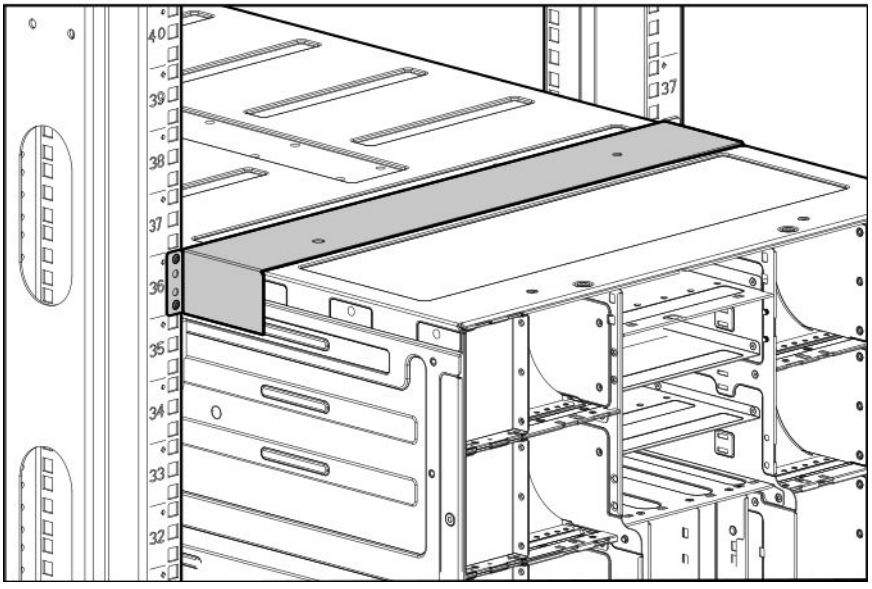
Prerequisites

Install the HPE Apollo k6000 Chassis Rail Kit into the rack (**Installing the rack rails** on page 20).

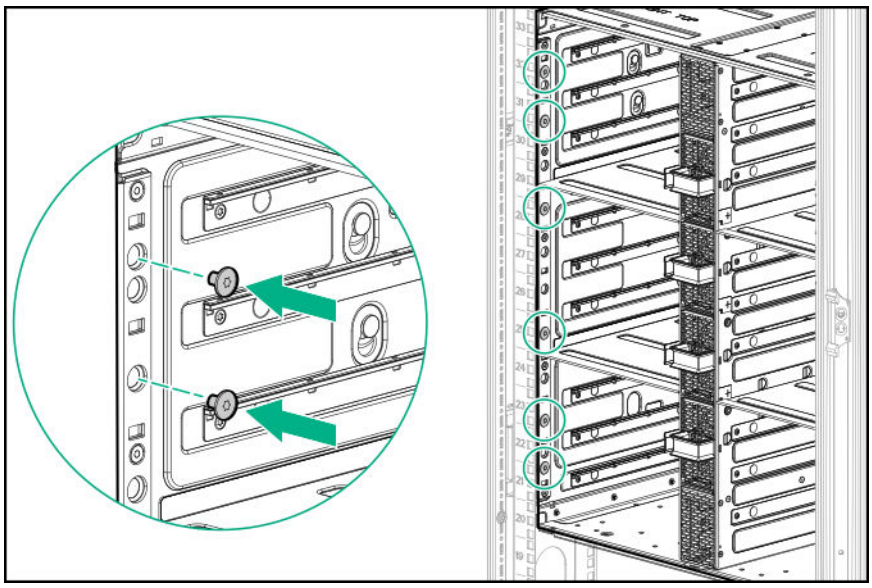
Procedure

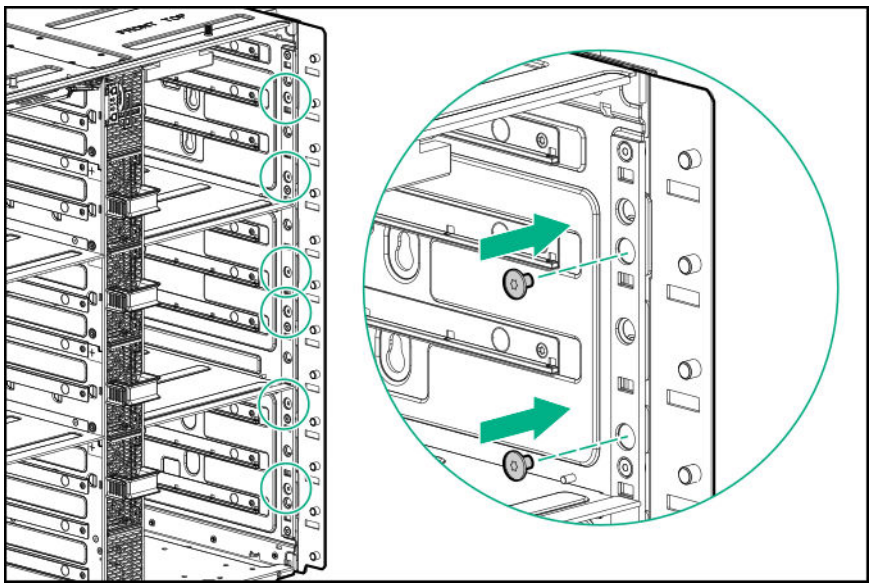
1. Install the chassis into the rack.



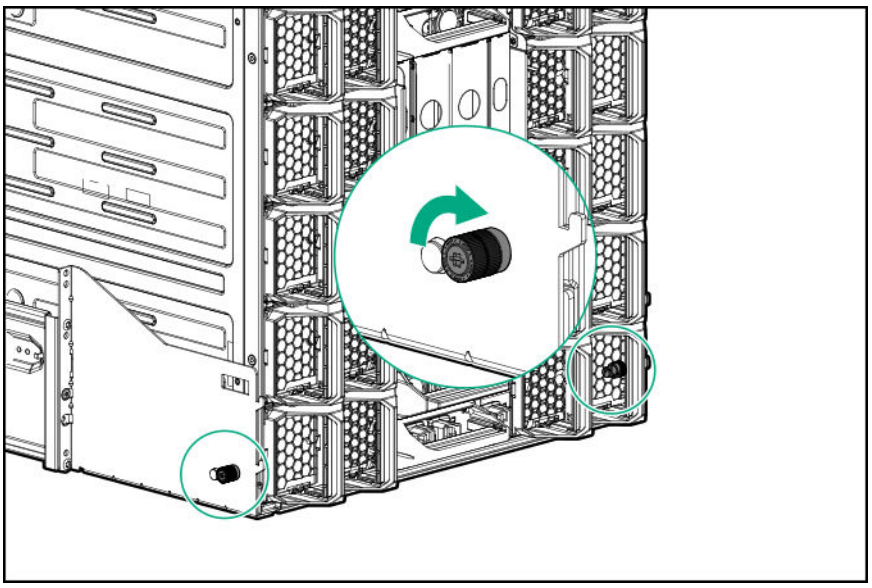


2. Secure the chassis to the front of the rack.





3. Tighten the thumbscrew at the rear of the chassis.

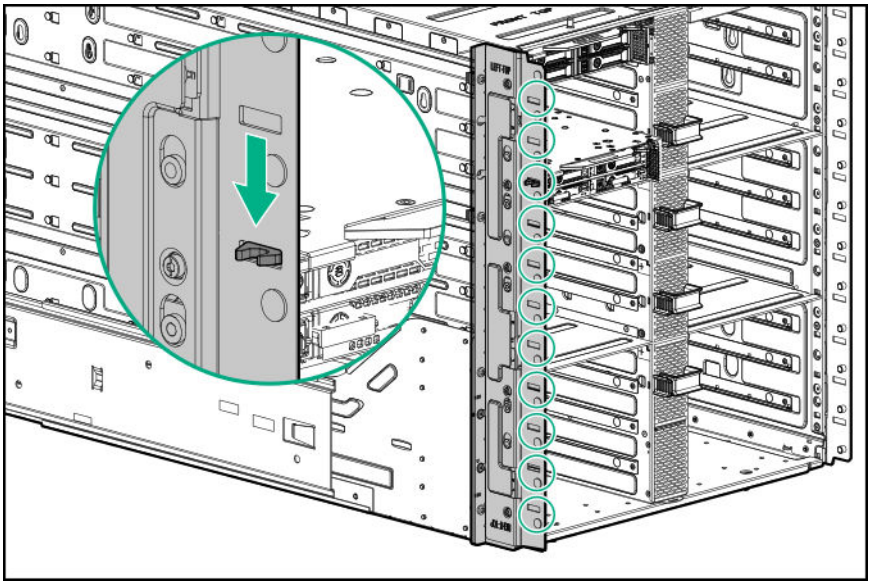


Installing the shipping bracket

IMPORTANT: Before you prepare the populated rack for shipping, you must install shipping brackets. You will need to install a shipping bracket on each side of each chassis to secure all the servers.

Procedure

1. Eject the servers but do not remove them from the chassis.
2. Line up the slots on the shipping bracket with the server release levers.
3. Insert the end of the server release level into the corresponding slot on the shipping bracket.



4. Secure the shipping bracket to the chassis by tightening the thumbscrews on the bracket.

Installing the system components

If components were removed during the chassis installation or additional components were ordered, install each device using the procedures in this section.

If you perform any of the procedures in this section after powering on the chassis, ensure proper airflow by ensuring that each bay inside the chassis and at the rear of the chassis is populated with either a component or a blank.

For component-specific replacement information, see the *HPE Apollo k6000 Chassis Maintenance and Service Guide* or the server-specific maintenance and service guides on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/Apollok6000-docs**).

Installing a server

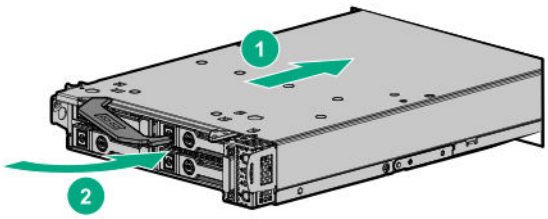
To ensure proper air flow, always populate the chassis from bottom to top, beginning with bay 1.

CAUTION: To prevent improper cooling and thermal damage, do not operate the chassis unless all bays are populated with a component or a blank.

Procedure

Install the server.

When seated properly, the server will be flush with the front of the chassis and the release lever will close completely without resistance.

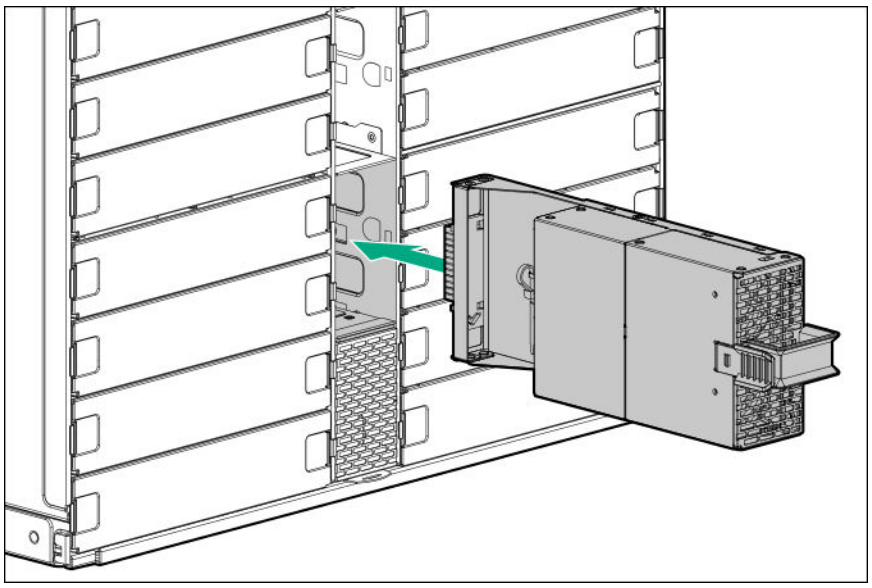


Installing the front chassis fan modules

Before powering up the chassis, populate all front and rear fan module bays with a fan module.

Procedure

Install the front fan module.



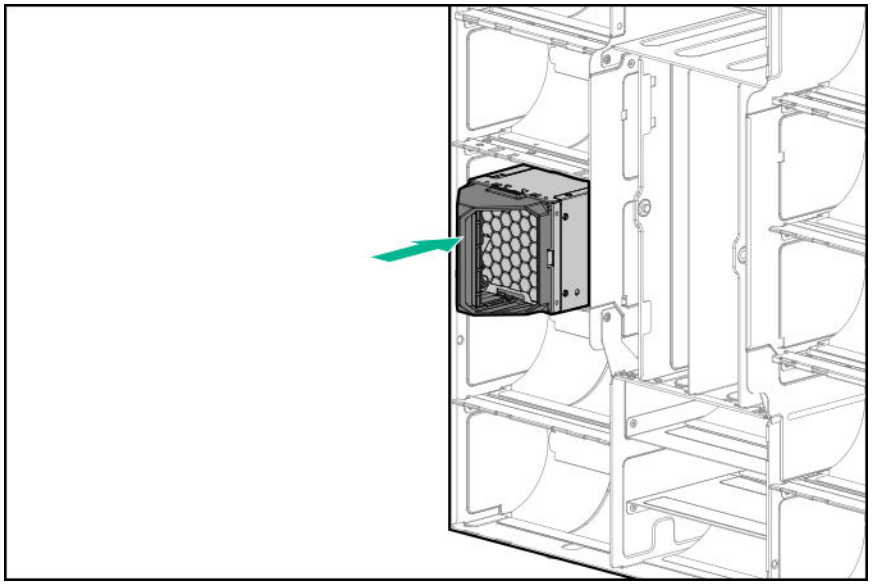
Installing the rear chassis fan modules

To ensure proper airflow, install fan modules into all fan module bays before powering up the chassis.

IMPORTANT: The left and right sides of the chassis are oriented 180° from each other. Components that are installed on one side of the chassis must be turned 180° when they are installed on the opposite side.

Procedure

Install the rear fan module.

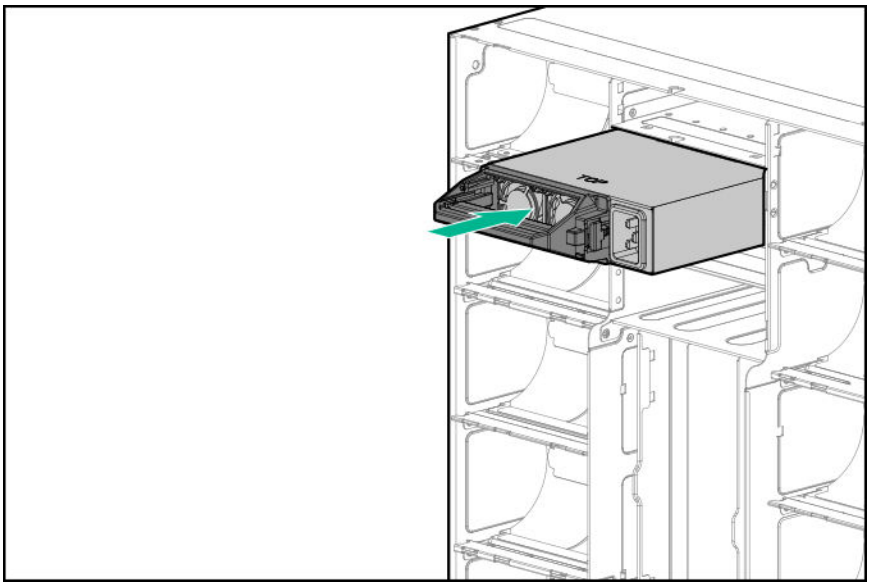


Installing the power supplies

Before powering up the chassis, populate all power supply bays with a power supply.

Procedure

Install the power supply.



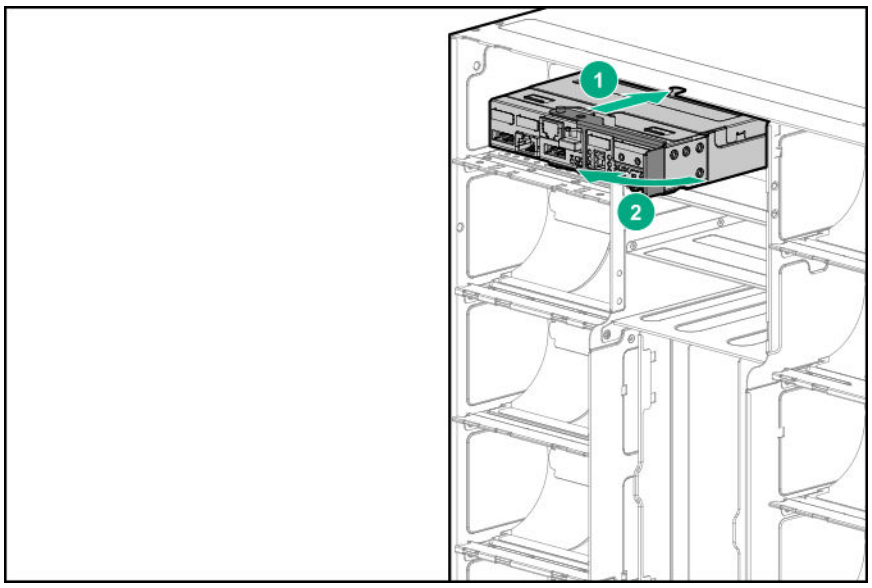
Installing the chassis controller or HPE Apollo Platform Manager

The chassis controller or APM must be installed in the chassis and working for the switch modules to power on from a cold boot for the first time. If the chassis controller is not installed, the switches will not power on.

After the chassis controller or APM power on the switches, the chassis controller can be removed.

Procedure

Install the chassis controller or HPE Apollo Platform Manager.



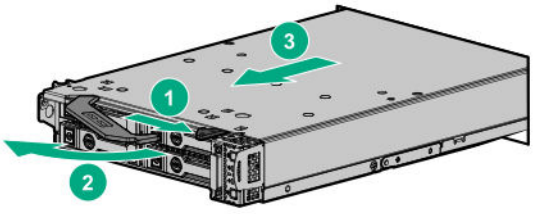
Installing an I/O module

CAUTION: To prevent electrical damage, always power down the server associated with the I/O module before installing the I/O module.

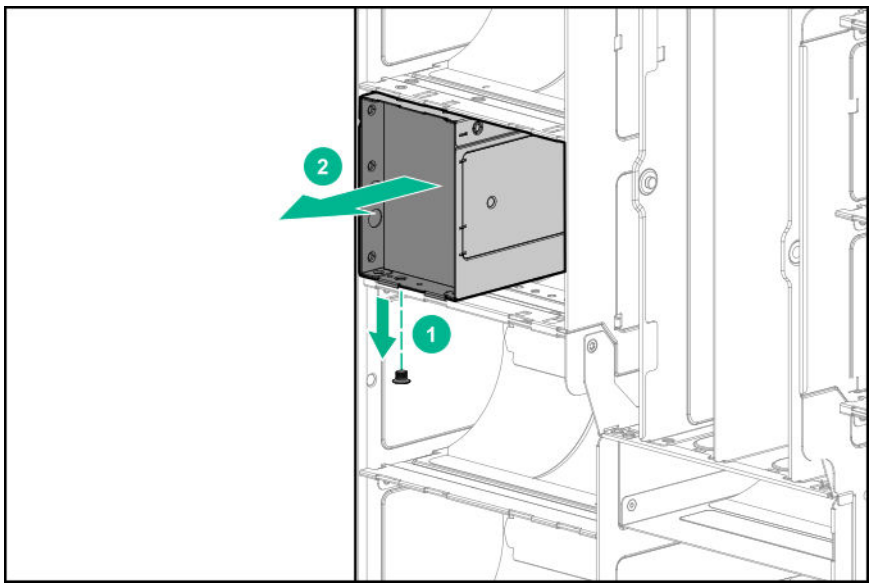
CAUTION: Remove the server from the chassis before installing the I/O module. Failure to do so can result in damage to both components. After the I/O module is installed, install the server.

Procedure

1. Power down the server associated with the I/O module.
2. Remove the server from the chassis.

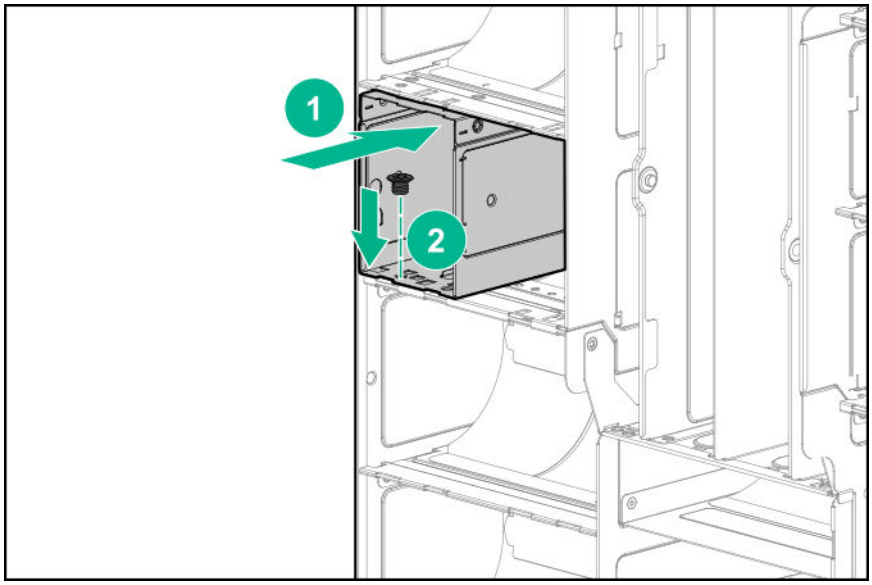


3. Remove the I/O module blank.



IMPORTANT: The left and right sides of the chassis are oriented 180° from each other. Components that are installed on one side of the chassis must be turned 180° when they are installed on the opposite side.

4. Install the I/O module into the bay that corresponds to the server bay. For more information, see **I/O module bay numbering** on page 13.



5. If not installed, install the dual-rotor fan module (**Installing the rear chassis fan modules** on page 29).

Installing data switch options

The chassis supports installation of the following data switches:

- 10GbE Integrated Switch
- HPE Apollo Ethernet 10GbE Pass-Thru Module

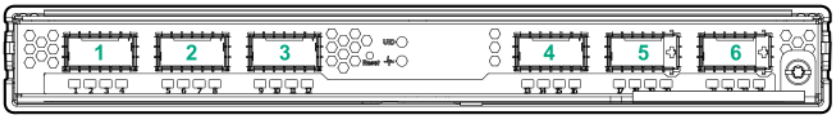
Population guidelines (10GbE Integrated Switch)

Install the data switch in bay 1 for the default configuration. If redundancy or a higher bandwidth is required, install a second data switch in bay 2.

Population guidelines (HPE Apollo Ethernet 10GbE Pass-Thru Module)

Install the pass-thru module in bay 1 for the default configuration. If redundancy or a higher bandwidth is required, install a second pass-thru module in bay 2.

When the pass-thru module is installed in bay 1, the ports and LEDs map to specific server bays as shown in the following table.



QSFP+ Port	LED-to-Server bay mapping
Port 1	LED 1–Server bay 13 LED 2–Server bay 1 LED 3–Server bay 14 LED 4–Server bay 2
Port 2	LED 5–Server bay 15 LED 6–Server bay 3 LED 7–Server bay 16 LED 8–Server bay 4
Port 3	LED 9–Server bay 17 LED 10–Server bay 5 LED 11–Server bay 18 LED 12–Server bay 6
Port 4	LED 13–Server bay 19 LED 14–Server bay 7 LED 15–Server bay 20 LED 16–Server bay 8

Table Continued

QSFP+ Port	LED-to-Server bay mapping
Port 5	LED 17–Server bay 21 LED 18–Server bay 9 LED 19–Server bay 22 LED 20–Server bay 10
Port 6	LED 21–Server bay 23 LED 22–Server bay 11 LED 23–Server bay 24 LED 24–Server bay 12

When the pass-thru module is installed in bay 2, the ports and LEDs map to specific server bays as shown in the following table.

QSFP+ Port	LED-to-Server bay mapping
Port 1	LED 1–Server bay 24 LED 2–Server bay 12 LED 3–Server bay 23 LED 4–Server bay 11
Port 2	LED 5–Server bay 22 LED 6–Server bay 10 LED 7–Server bay 21 LED 8–Server bay 9
Port 3	LED 9–Server bay 20 LED 10–Server bay 8 LED 11–Server bay 19 LED 12–Server bay 7
Port 4	LED 13–Server bay 18 LED 14–Server bay 6 LED 15–Server bay 17 LED 16–Server bay 5

Table Continued

QSFP+ Port	LED-to-Server bay mapping
Port 5	LED 17–Server bay 16 LED 18–Server bay 4 LED 19–Server bay 15 LED 20–Server bay 3
Port 6	LED 21–Server bay 14 LED 22–Server bay 2 LED 23–Server bay 13 LED 24–Server bay 1

Installing a data switch

CAUTION: To prevent improper cooling and thermal damage, do not operate the chassis unless all device bays are populated with either a component or a blank.

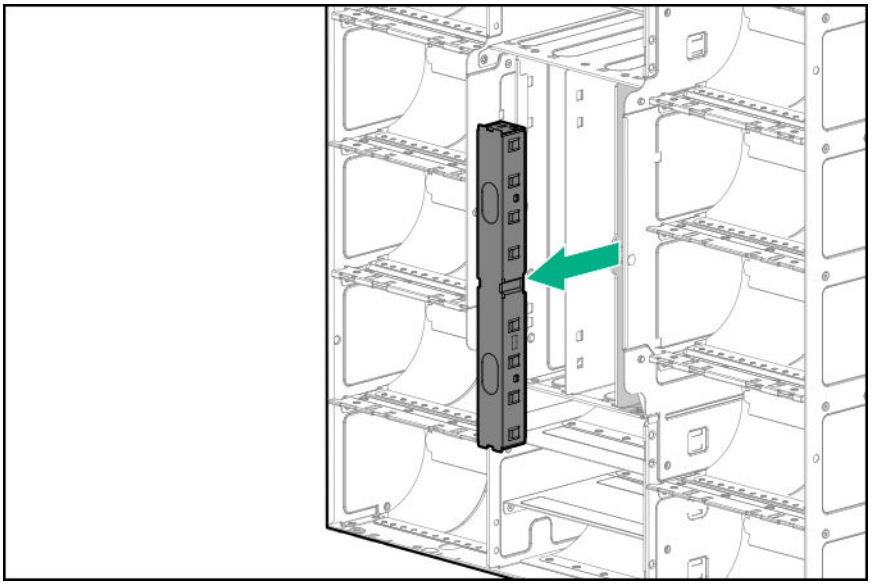
CAUTION: To prevent damage to the connectors, carefully note the orientation in the following diagrams before you install the switch.

IMPORTANT: The chassis controller or HPE Apollo Platform Manager must be installed for a switch to power on for the first time. Once the switch is powered on by the chassis controller or HPE Apollo Platform Manager, you can remove the chassis controller, if needed.

Always install the data switch in bay 1. If redundancy is required, install a second data switch in bay 2.

Procedure

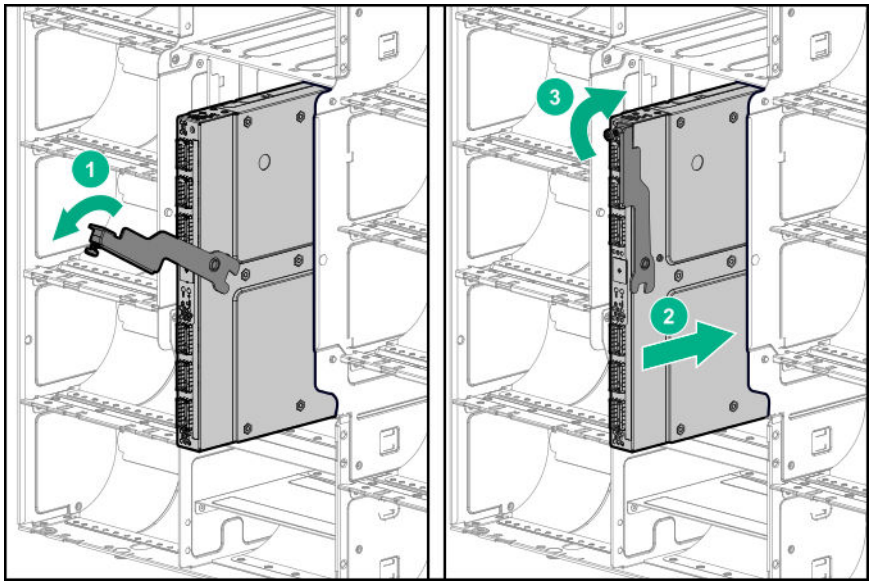
1. Remove the plastic protective cover from the rear of the switch.
2. Remove the blank, if needed.



3. To install the data switch in bay 1:

a. Make sure that the orientation of the release lever is correct for installation in bay 1 and is fully open.

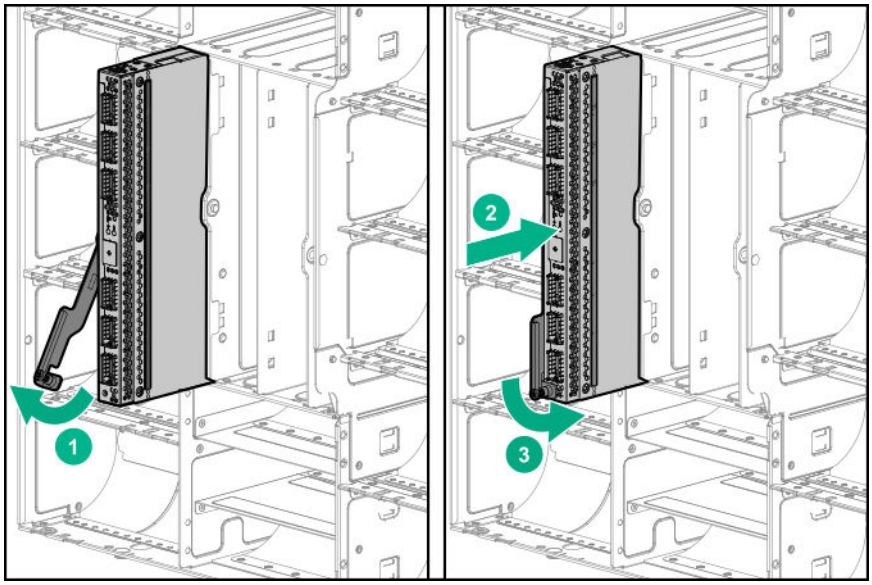
b. Install the data switch, close the release lever, and then tighten the captive screw.



4. To install the data switch in bay 2:

a. Make sure that the orientation of the release lever is correct for installation in bay 2 and is fully open.

b. Install the data switch, close the release lever, and then tighten the captive screw.



Installing high-speed fabric switch options

The chassis supports installation of the following high-speed fabric switches:

- HPE Apollo InfiniBand EDR 36-port Unmanaged Switch
- HPE Apollo 100 Gb 48-port Intel Omni-Path Architecture Unmanaged Switch

Population guidelines

High-speed fabric switches can be installed in bays 3 and 4. Populating the high-speed fabric switch bays depends on the configuration of the installed servers in the chassis. This configuration includes:

- Mezzanine cards
  - The number of mezzanine cards installed in the servers.
  - The type of mezzanine card installed in the servers (EDR or OPA).
  - How the mezzanine card is cabled.
- Processors
  - The number of processors installed in the servers.
  - The type of processor installed in the servers (standard socket or -F processor).
  - How the -F processor is cabled.

Use the following table to determine bay population requirements.

Server configuration	Switch bay population
1 OPA mezzanine card installed in slot 1*, connected by a single mezzanine cable	Bay 3 = HPE Apollo 100 Gb 48-port Intel Omni-Path Architecture Unmanaged Switch
2 OPA mezzanine cards, connected by a dual mezzanine cable	Bay 3 = HPE Apollo 100 Gb 48-port Intel Omni-Path Architecture Unmanaged Switch Bay 4 = HPE Apollo 100 Gb 48-port Intel Omni-Path Architecture Unmanaged Switch
1 EDR mezzanine card, connected by a single mezzanine cable	Bay 3 = HPE Apollo InfiniBand EDR 36-port Unmanaged Switch Bay 4 = HPE Apollo InfiniBand EDR 36-port Unmanaged Switch (optional)
2 EDR mezzanine cards, connected by a dual mezzanine cable	Bay 3 = HPE Apollo InfiniBand EDR 36-port Unmanaged Switch Bay 4 = HPE Apollo InfiniBand EDR 36-port Unmanaged Switch
1 EDR mezzanine card installed in slot 1* 1 OPA mezzanine card installed in slot 2* Connected individually by a dual mezzanine cables	Bay 3 = HPE Apollo InfiniBand EDR 36-port Unmanaged Switch Bay 4 = HPE Apollo 100 Gb 48-port Intel Omni-Path Architecture Unmanaged Switch

Table Continued

Server configuration	Switch bay population
1 -F processor installed in socket 1, connected by a single-socket Omni-Path cable	Bay 3 = HPE Apollo 100 Gb 48-port Intel Omni-Path Architecture Unmanaged Switch
2 -F processors, connected by a dual-socket Omni-Path cable	Bay 3 = HPE Apollo 100 Gb 48-port Intel Omni-Path Architecture Unmanaged Switch Bay 4 = HPE Apollo 100 Gb 48-port Intel Omni-Path Architecture Unmanaged Switch

* For more information on mezzanine slot numbering, see the server-specific user guide on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/enterprise/docs**).

Installing a high-speed fabric switch

CAUTION: To prevent improper cooling and thermal damage, do not operate the chassis unless all device bays are populated with either a component or a blank.

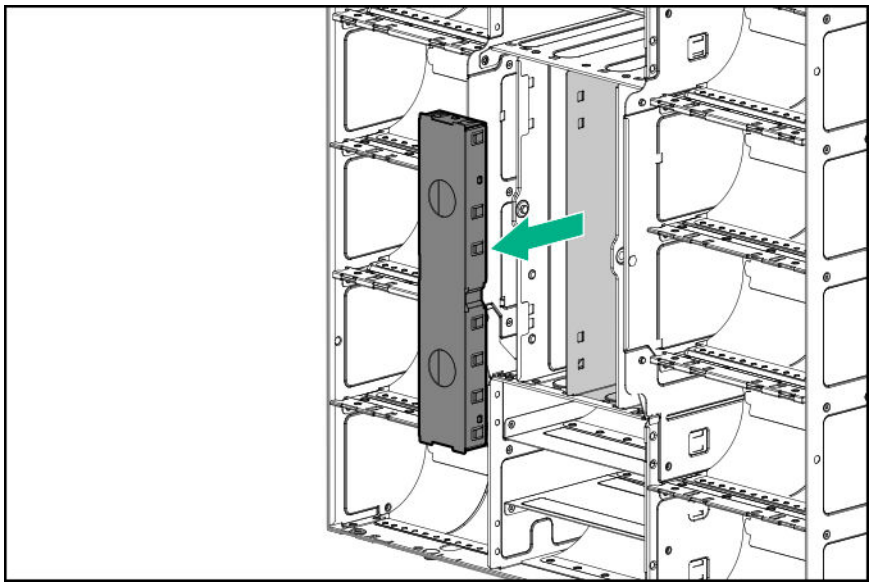
CAUTION: To prevent damage to the connectors, carefully note the orientation in the following diagrams before you install the switch.

IMPORTANT: The chassis controller or HPE Apollo Platform Manager must be installed for a switch to power on for the first time. Once the switch is powered on by the chassis controller or HPE Apollo Platform Manager, you can remove the chassis controller, if needed.

High-speed fabric switches can be installed in bays 3 and 4. Populating the high-speed fabric switch bays depends on the configuration of the installed servers. For more information, see "**Installing high-speed fabric switch options** on page 36."

Procedure

1. Remove the blank, if needed.

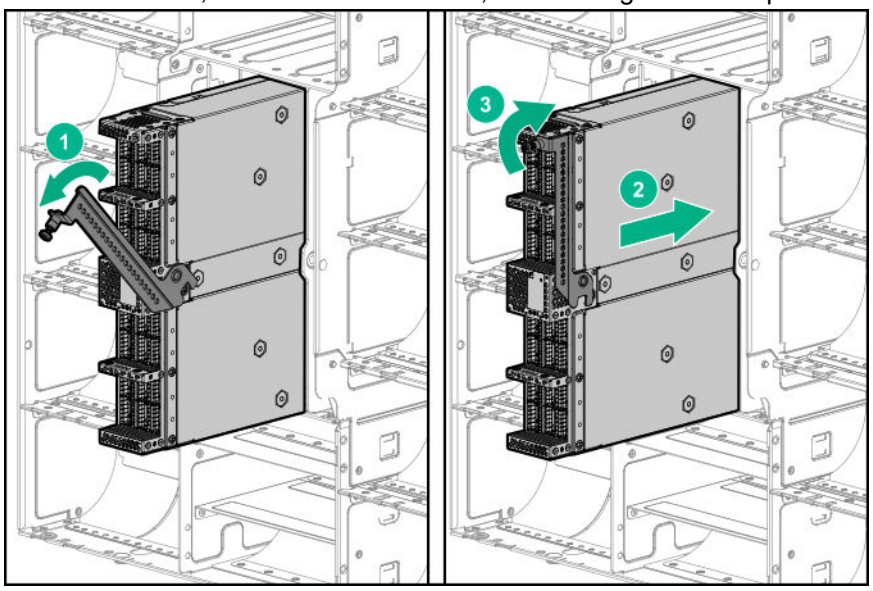


2. To install the switch in bay 3:

a. Make sure that the orientation of the release lever is correct for installation in bay 3.

b. Prepare the switch for installation. Make sure that the release lever is fully open.

c. Install the switch, close the release lever, and then tighten the captive screw.



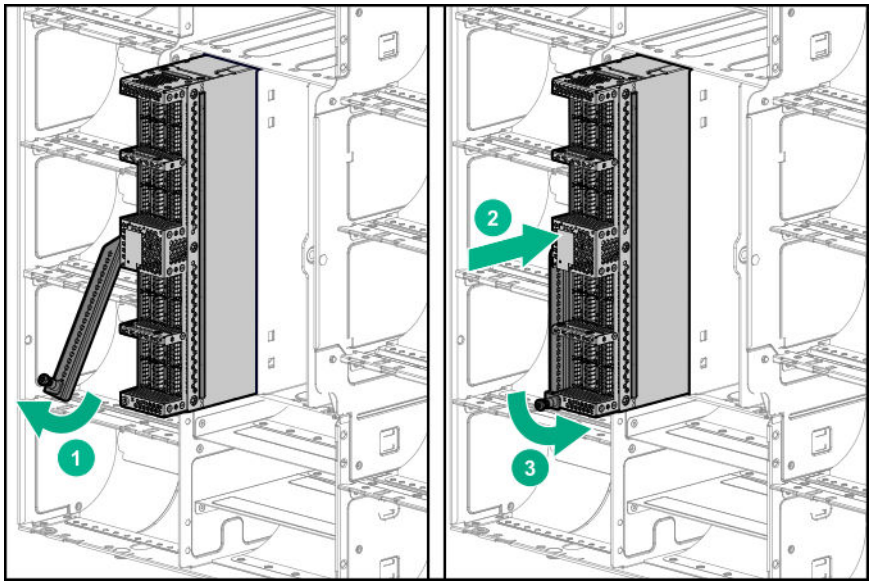
CAUTION: The switch will slide smoothly into the slot and connect to the backplane. Forcing the switch into the slot or into the connector will damage components.

3. To Install the switch in bay 4:

a. Make sure that the orientation of the release lever is correct for installation in bay 4.

b. Prepare the switch for installation. Make sure that the release lever is fully open.

c. Install the switch, close the release lever, and then tighten the captive screw.



CAUTION: The switch will slide smoothly into the slot and connect to the backplane. Forcing the switch into the slot or into the connector will damage components.

Cabling

Cabling requirements

The following cables are required for all configurations:

Chassis power cabling

Six power cables per chassis, one per power supply, to the PDU.

Network cabling

One Ethernet cable per iLO port on each chassis controller in a rack (remove this cable when APM is present in the rack).

For configurations that include the HPE Apollo Platform Manager, the following **additional cables** are required:

- One HPE Apollo Platform Manager USB to MicroDB9 Cable to the PDM ports on each HPE Apollo Platform Manager.
- One consolidated management cable per chassis to the APM input ports on each chassis controller or HPE Apollo Platform Manager.
- One Ethernet cable per APM in a rack.
- One HPE Apollo Platform Manager serial to DB9 cable for initial APM setup (869324-001).
- One Ethernet cable per rack for iLO connectivity.

Cabling the chassis

WARNING: Be sure that all circuit breakers are in the off position before connecting any power components.

CAUTION: To avoid damaging the fiber cables, do not drape cables from one side of the rack to the other and do not run cables over a hard corner or edge.

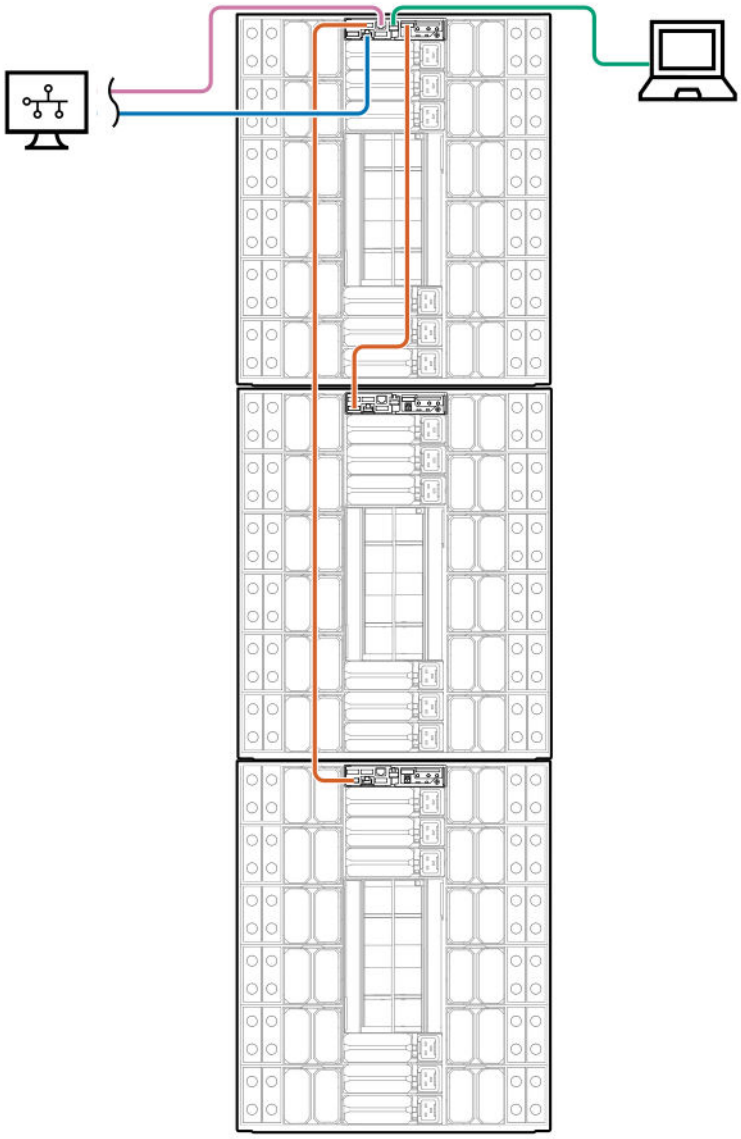
CAUTION: To avoid damaging the cable, squeeze the thermal boot on the cable before disconnecting from the connector.

CAUTION: To prevent loss of data and damage to the PDU, each power supply must be connected to a dedicated circuit breaker. Do not connect multiple power supplies to a single circuit breaker.

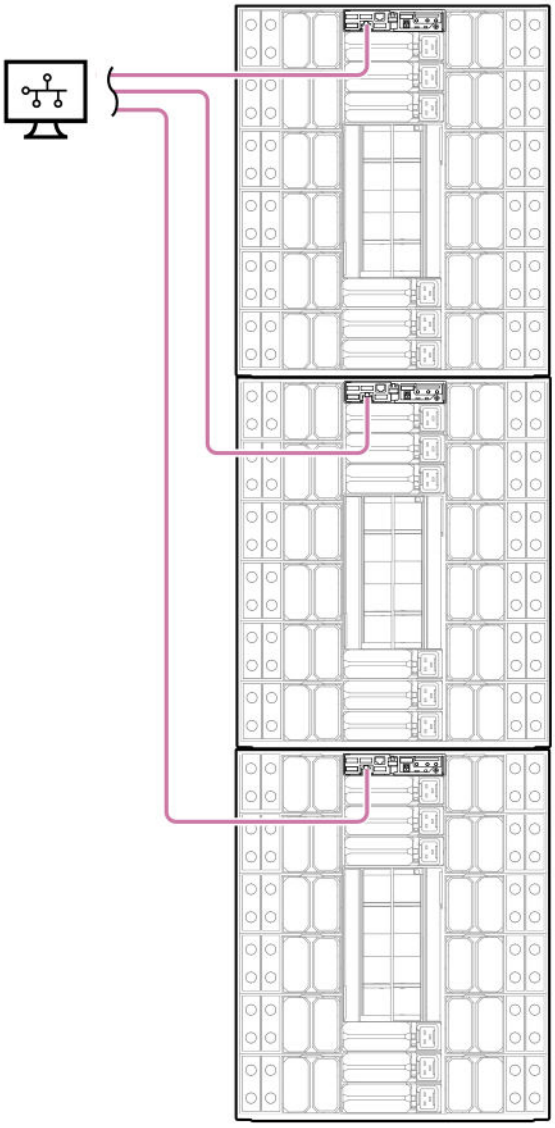
Procedure

1. Cable the chassis controller or HPE Apollo Platform Manager:
   - Chassis with HPE Apollo Platform Manager (top) and two chassis controllers:

- HPE Apollo Platform Manager to consolidated management ports on the chassis controllers (orange)
- HPE Apollo Platform Manager to network (pink)
- iLO connection to network (blue)
- HPE Apollo Platform Manager serial cable (used for initial APM setup) (869324-001) (green)

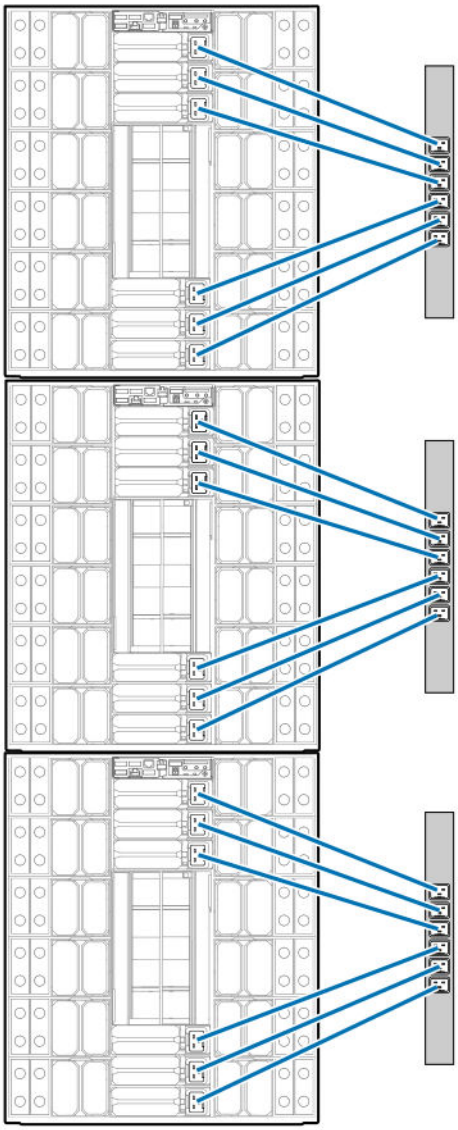


- Chassis with standard chassis controllers
  - Chassis controllers to network (pink)



2. Connect the chassis power supply cables (blue) to a PDU.

CAUTION: The following illustration assumes that you are using one PDU per chassis that has a minimum capacity of 17.28 kVA and a dedicated circuit breaker for each power supply in the chassis. Connecting two or more power supplies to a single breaker will cause the breaker to trip. You might need to add PDUs to your configuration to meet the requirement of one breaker per power supply to avoid loss of data or damage to the PDU.



3. Apply power to the chassis.

Configuring the system

Power capping

The HPE ProLiant XL family of products provides a power capping feature that operates at the server enclosure level. The capping feature can be activated using the HPE Apollo Platform Manager. After a power cap is set for the enclosure, all the resident servers in the enclosure will have the same uniform power cap applied to them until the cap is either modified or canceled.

Using APM, the enclosure-level power capping feature can be expanded, or different caps can be applied to user-defined groups by using flexible zones within the same rack. A global power cap can also be applied to all enclosures with one APM command. For more information on using the APM, see the *HPE Apollo Platform Manager User Guide* on the Hewlett Packard Enterprise website (**http://www.hpe.com/support/APM_UG_en**).

Power capping modes

The following Power Management modes are standard and are configurable in the power management controller:

NOTE: Mode 4 is only supported through APM.

- Mode 0: No Redundancy

  All power-capping is disabled. This mode can be used to minimize any possible performance impact of power-capping logic.

- Mode 1: Max Performance with Redundancy

  This is the default power capping mode. This mode allows the maximum number of nodes to run by engaging power-capping if the power draw from the chassis attempts to exceed the load supported by the active power supplies. In this mode, the system is expected to survive (with the possibility of degraded performance) an unexpected power loss to one or more of the power supplies.

- Mode 3: User Configurable Mode

  The user can specify a valid power cap value from a pre-defined range. A cap cannot be set below a minimum or above a maximum. The cap includes all server nodes, fans, and drives. User configurable mode requires an iLO Scale Out or iLO Advanced license.

- Mode 4: Rack Level Dynamic Power Capping Mode

  In conjunction with APM, the user can specify a maximum power capacity for the entire rack. The APM dynamically allocates power to the applicable chassis within the rack to maximize performance given the available power. For more information, see the *HPE Apollo Platform Manager User Guide* on the Hewlett Packard Enterprise website (**http://www.hpe.com/support/APM_UG_en**).

- Mode 5: Power Feed Redundancy Mode

  When used with an A+B power feed configuration, Power Feed Redundancy Mode throttles the system 100%, bringing the nodes to a complete stop if a power feed loss is deduced. Full throttling continues until the power feed is brought back online. In this mode, the system is expected to survive an unexpected loss of an entire power feed to half of the power supplies.

Configuring a power cap

To configure power capping, you can use the HPE Apollo Platform Manager, a rack level device that can control power caps for all enclosures in the rack. For more information, see the *HPE Apollo Platform Manager User Guide* (**http://www.hpe.com/support/APM_UG_en**) on the Hewlett Packard Enterprise website.

Setting the chassis power cap mode with HPE APM

Procedure

1. Log in to APM.
   a. When the system boots, a Login prompt appears.
   b. At the prompt, enter **`Administrator`**.
2. Before setting the power cap, enter the following command to review the power baseline:

   `>show power baseline`

   The information displayed provides the minimum cap value, the maximum cap value, and the chassis that meet the requirements for power capping.
3. To set the power cap for eligible chassis connected to the APM, enter the following command at the prompt:

   `>SET POWER CAP<wattage>|NONE[zone_name]`

   The wattage value, if provided, represents the total wattage to be allocated among all the chassis that are part of the baseline or partial baseline of a zone, if specified. This value is divided by the total maximum wattage established by the baseline to calculate a percentage cap value. This percentage is then multiplied against each chassis maximum wattage value to arrive at an appropriate cap value for that individual chassis.

   If **`NONE`** is specified instead of a cap wattage value, then APM removes all (or the specified zone) of the power caps.

   To remove baseline data from the EEPROM and to remove the power cap setting, enter the following command:

   `>SET POWER BASELINE NONE`

   After this command is issued, the only way to re-establish a power baseline is to issue the **`SET POWER BASELINE`** command. The system returns to the default power cap mode (mode 1).

Troubleshooting

Troubleshooting resources

Troubleshooting resources are available for HPE Gen10 server products in the following documents:

- *Troubleshooting Guide for HPE ProLiant Gen10 servers* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, issue resolution, and software maintenance.
- *Error Message Guide for HPE ProLiant Gen10 servers and HPE Synergy* provides a list of error messages and information to assist with interpreting and resolving error messages.
- *Integrated Management Log Messages and Troubleshooting Guide for HPE ProLiant Gen10 and HPE Synergy* provides IML messages and associated troubleshooting information to resolve critical and cautionary IML events.

To access the troubleshooting resources, see the Hewlett Packard Enterprise Information Library (**http://www.hpe.com/info/gen10-troubleshooting**).

Electrostatic discharge

Preventing electrostatic discharge

To prevent damaging the system, be aware of the precautions you must follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

Procedure

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

Grounding methods to prevent electrostatic discharge

Several methods are used for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ±10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

For more information on static electricity or assistance with product installation, contact an authorized reseller.

Specifications

Chassis environmental specifications

Specification	Value
Temperature range [1]	
Operating	10°C to 35°C (50°F to 95°F)
Nonoperating	-30°C to 60°C (-22°F to 140°F)
Maximum wet bulb temperature	
Operating	28ºC (82.4ºF)
Nonoperating	38.7ºC (101.7ºF)
Relative humidity (non condensing) [2]	
Operating	10% to 90%
Nonoperating	5% to 95%

[1] All temperature ratings shown are for sea level. An altitude derating of 1°C per 304.8 m (1.8°F per 1000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed. Upper operating limit is 3,048 m (10,000 ft) or 70 kPa/10.1 psia. Upper nonoperating limit is 9,144 m (30,000 ft).

[2] Storage maximum humidity of 95% is based on a maximum temperature of 45°C (113°F). Altitude maximum for storage corresponds to a pressure minimum of 70 kPa (10.1 psia).

Chassis specifications

Specification	Value
Height	53.14 cm (20.92 in)
Depth	102.60 cm (40.39 in)
Width	44.80 cm (17.64 in)
Weight, fully loaded	301.64 kg (665.00 lb)
Weight, empty	66.68 kg (147.00 lb)

Power specifications

The power requirements for the HPE Apollo k6000 Chassis are met by the following components:

- HPE 2650W Hot Plug Titanium Plus Power Supply
- HPE 2650W 277VAC Hot Plug Power Supply
- HPE 3400W 1U Hot Plug Power Supply

DC power

Specification	Value
Output	12V from power supplies to chassis
Minimum (V)	+11.907
Nom (V)	+12.25
Maximum (V)	+12.593
% Reg	+2.8%/-2.8%

Single-phase power

HPE 2650W Hot Plug Titanium Plus Power Supply

Specification	HPE 2650W Hot Plug Titanium Plus Power Supply
Power cord	IEC-320 C19-C20 2 m (6.5 ft)
Output	2650 W per power supply
Input requirements	
Rated input voltage	200 VAC to 240 VAC
Rated input frequency	50 Hz to 60 Hz
Rated input current per power supply (maximum)	14.4 A at 200 VAC 13.8 A at 208 VAC 13.1 A at 220 VAC 12.5 A at 230 VAC 12.0 A at 240 VAC
Rated input power per power supply (maximum)	2880 VA

HPE 2650W 277VAC Hot Plug Power Supply

Specification	HPE 2650W 277VAC Hot Plug Power Supply
Power cord	Anderson Power Products SDG-300 dual-ended 2 m (6.5 ft)
Output	2650 W per power supply
Input requirements	
Rated input voltage	200 VAC to 277 VAC
Rated input frequency	50 Hz to 60 Hz

Table Continued

Specification	HPE 2650W 277VAC Hot Plug Power Supply
Rated input current per power supply (maximum)	14.4 A at 200 VAC 13.8 A at 208 VAC 13.1 A at 220 VAC 12.5 A at 230 VAC 12.0 A at 240 VAC 10.4 A at 277 VAC
Rated input power per power supply (maximum)	2880 VA

HPE 3400W 1U Hot Plug Power Supply

Specification	HPE 3400W 1U Hot Plug Power Supply
Power cord	IEC-320 C19-C20 2 m (6.5 ft)
Output	3400 W per power supply
Input requirements	
Rated input voltage	200 VDC to 240 VDC
Rated input frequency	50 to 60 Hz
Rated input current per power supply (maximum)	15.8 A at 200 VDC 15.6 A at 208 VDC 15.7 A at 220 VDC 15.9 A at 230-240 VDC 15.2 A at 240 VDC
Rated input power per power supply (maximum)	3620 VA

Hot-plug power supply calculations

For hot-plug power supply specifications and calculators to determine electrical and heat loading for the server, see the Hewlett Packard Enterprise Power Advisor website (**http://www.hpe.com/info/poweradvisor/online**).

Websites

General websites

Hewlett Packard Enterprise Information Library

www.hpe.com/info/EIL

Single Point of Connectivity Knowledge (SPOCK) Storage compatibility matrix

www.hpe.com/storage/spock

Storage white papers and analyst reports

www.hpe.com/storage/whitepapers

For additional websites, see **Support and other resources**.

Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:

  http://www.hpe.com/assistance

- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:

  http://www.hpe.com/support/hpesc

Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates:

  Hewlett Packard Enterprise Support Center

  www.hpe.com/support/hpesc

  Hewlett Packard Enterprise Support Center: Software downloads

  www.hpe.com/support/downloads

  Software Depot

  www.hpe.com/support/softwaredepot

- To subscribe to eNewsletters and alerts:

  www.hpe.com/support/e-updates

- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:

  www.hpe.com/support/AccessToSupportMaterials

IMPORTANT: Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HPE Passport set up with relevant entitlements.

Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website:

http://www.hpe.com/support/selfrepair

Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

Remote support and Proactive Care information

HPE Get Connected

www.hpe.com/services/getconnected

HPE Proactive Care services

www.hpe.com/services/proactivecare

HPE Proactive Care service: Supported products list

www.hpe.com/services/proactivecaresupportedproducts

HPE Proactive Care advanced service: Supported products list

www.hpe.com/services/proactivecareadvancedsupportedproducts

Proactive Care customer information

Proactive Care central

www.hpe.com/services/proactivecarecentral

Proactive Care service activation

www.hpe.com/services/proactivecarecentralgetstarted

Warranty information

To view the warranty for your product or to view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products* reference document, go to the Enterprise Safety and Compliance website:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional warranty information

HPE ProLiant and x86 Servers and Options

www.hpe.com/support/ProLiantServers-Warranties

HPE Enterprise Servers

www.hpe.com/support/EnterpriseServers-Warranties

HPE Storage Products

www.hpe.com/support/Storage-Warranties

HPE Networking Products

www.hpe.com/support/Networking-Warranties

Regulatory information

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise Support Center:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

www.hpe.com/info/reach

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

www.hpe.com/info/ecodata

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

www.hpe.com/info/environment

Documentation feedback

Hewlett Packard Enterprise is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (**docsfeedback@hpe.com**). When submitting your feedback, include the document title, part number, edition, and publication date located on the front cover of the document. For online help content, include the product name, product version, help edition, and publication date located on the legal notices page.