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Preface

This book is the final on-site setup guide for single-rack **Hitachi Content Platform (HCP)** systems that run on a SAN-attached array of independent nodes (**SAIN**). It provides all the information you need to deploy an assembled and configured HCP SAIN system at your site. Additionally, it explains how to configure Hi-Track® to monitor the nodes in the HCP system.

Intended audience

This book is intended for the people at a customer site who are responsible for the on-site setup of an HCP SAIN system. It assumes you have experience working with computer hardware, as well as a basic understanding of HCP systems.

Product version

This book applies to release 7.3.3 of HCP G10 Node.

Related documents

The following documents contain additional information about Hitachi Content Platform:

- *Administering HCP* — This book explains how to use an HCP system to monitor and manage a digital object repository. the book describes the capabilities and the hardware and software components of the system. The book presents both the concepts and instructions you need to configure the system, including creating the tenants that administer access to the repository. The book also covers the processes that maintain the integrity and security of the repository contents.

- *Managing a Tenant and Its Namespaces* — This book contains complete information for managing the HCP tenants and namespaces created in an HCP system. The book provides instructions for creating namespaces, setting up user accounts, configuring the protocols that allow access to namespaces, managing search and indexing, and downloading installation files for HCP Data Migrator. The book also explains how to work with retention classes and the privileged delete functionality.
- *Managing the Default Tenant and Namespace* — This book contains complete information for managing the default tenant and namespace in an HCP system. The book provides instructions for changing tenant and namespace settings, configuring the protocols that allow access to the namespace, managing search and indexing, and downloading the installation files for HCP Data Migrator. The book also explains how to work with retention classes and the privileged delete functionality.
- *Replicating Tenants and Namespaces* — This book covers all aspects of tenant and namespace replication. Replication is the process of keeping selected tenants and namespaces in two or more HCP systems in sync with each other to ensure data availability and enable disaster recovery. The book describes how replication works, contains instructions for working with replication links and erasure coding topologies and explains how to manage and monitor the replication process.
- *HCP Management API Reference* — This book contains the information you need to use the HCP management API. This RESTful HTTP API enables you to create and manage tenants and namespaces programmatically. The book explains how to use the API to access an HCP system, specify resources, and update and retrieve resource properties.
- *Using a Namespace* — This book describes the properties of objects in HCP namespaces. This book provides instructions for using the HTTP, WebDAV, CIFS, and NFS protocols for the purpose of storing, retrieving, and deleting objects, as well as changing object metadata such as retention and shred settings. The book also explains how to manage namespace content and view namespace information in the Namespace Browser.
- *Using the HCP HS3 API* — This book contains the information you need to use the HCP HS3 API. This S3™-compatible, RESTful, HTTP-based API enables you to work with buckets and objects in HCP. The book introduces the HCP concepts you need to understand in order to use

HS3 effectively and contains instructions and examples for each of the bucket and object operations you can perform with HS3.

- *Using the HCP HSwift API* — This book contains the information you need to use the HCP HSwift API. This OpenStack Swift compatible, RESTful, HTTP-based API enables you to work with containers and objects in HCP. The book introduces the HCP concepts you need to understand in order to use HSwift effectively and contains instructions and examples for each of the container and object operations you can perform with HSwift.
- *Using the Default Namespace* — This book describes the file system HCP uses to present the contents of the default namespace. This book provides instructions for using HCP-supported protocols to store, retrieve, and deleting objects, as well as changing object metadata such as retention and shred settings.
- *HCP Metadata Query API Reference* — This book describes the HCP metadata query API. This RESTful HTTP API enables you to query namespaces for objects that satisfy criteria you specify. The book explains how to construct and perform queries and describes query results. It also contains several examples, which you can use as models for your own queries.
- *Searching Namespaces* — This book describes the HCP Search Console (also called the Metadata Query Engine Console). It explains how to use the Console to search namespaces for objects that satisfy criteria you specify. It also explains how to manage and manipulate queries and search results. The book contains many examples, which you can use as models for your own searches.
- *Using HCP Data Migrator* — This book contains the information you need to install and use HCP Data Migrator (HCP-DM), a utility that works with HCP. This utility enables you to copy data between local file systems, namespaces in HCP, and earlier HCAP archives. It also supports bulk delete operations and bulk operations to change object metadata. Additionally, it supports associating custom metadata and ACLs with individual objects. The book describes both the interactive window-based interface and the set of command-line tools included in HCP-DM.
- *Installing an HCP System* — This book provides the information you need to install the software for a new HCP system. It explains what you

need to know to successfully configure the system and contains step-by-step instructions for the installation procedure.

- *Deploying an HCP-VM System on ESXi* — This book contains all the information you need to install and configure an HCP-VM system. The book also includes requirements and guidelines for configuring the VMWare® environment in which the system is installed.
- *Deploying an HCP-VM System on KVM* — This book contains all the information you need to install and configure an HCP-VM system. The book also includes requirements and guidelines for configuring the KVM environment in which the system is installed.
- *Third-Party Licenses and Copyrights* — This book contains copyright and license information for third-party software distributed with or embedded in HCP.
- *HCP-DM Third-Party Licenses and Copyrights* — This book contains copyright and license information for third-party software distributed with or embedded in HCP Data Migrator.
- *Installing an HCP RAIN System - Final On-site Setup* — This book contains instructions for deploying an assembled and configured HCP RAIN system at a customer site. It explains how to make the necessary physical connections and reconfigure the system for the customer computing environment. The book also provides instructions for assembling the components of an HCP RAIN system that was ordered without a rack and for configuring Hi-Track Monitor to monitor the nodes in an HCP system.

Accessing product documentation

Product documentation is available on Hitachi Vantara Support Connect: <https://knowledge.hitachivantara.com/Documents>. Check this site for the most current documentation, including important updates that may have been made after the release of the product.

Getting help

[Hitachi Vantara Support Portal](http://portal.hitachivantara.com) is the destination for technical support of products and solutions sold by Hitachi Vantara. To contact technical support, log on to Hitachi Vantara Support Connect for contact information: <http://portal.hitachivantara.com>

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Note: If you purchased G10 Node from a third party, please contact your authorized service provider.

Comments

Please send us your comments on this document:

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Include the document title and number, including the revision (for example, -01), and refer to specific sections and paragraphs whenever possible. All comments become the property of Hitachi Vantara.

Thank you!

HCP SAIN system overview

Hitachi Content Platform (HCP) is the distributed, fixed-content, data storage system from Hitachi Vantara®. An HCP system consists of both hardware and software.

An SAIN system, also referred to for this current generation of hardware as an HCP G10 with Attached Storage, is delivered to a customer site as either a racked appliance or unracked components. In either case, all the components are preconfigured, and the HCP software is already installed. However, once the system is delivered and, for unracked components, assembled, it needs some final on-site setup.

This chapter contains:

- An introduction to HCP
- A description of the hardware architecture of HCP SAIN systems
- An overview of the final setup activities required to make your G10 with Attached Storage operational at your site



Note: In this book, a system that delivered in a rack is referred to as **preassembled system**. A system that delivered without a rack is referred to as a **rackless system**, even though, when assembled, it includes a rack.

Introduction to Hitachi Content Platform

HCP is a combination of hardware and software that provides an object-based data storage environment. An HCP repository stores all types of data, from simple text files to medical images to multigigabyte database images.

HCP provides easy access to the repository for adding, retrieving, and, when allowed, deleting the stored data. HCP uses write-one, read-many (WORM) storage technology and a variety of policies and internal processes to ensure the integrity of the stored data and the efficient use of storage capacity.

HCP nodes

An HCP system includes multiple servers, called **nodes**, that are networked together. Nodes are the essential part of an HCP system. They manage the data that resides in the system storage.

Each node runs the complete HCP software. HCP runtime operations are distributed among the nodes. If a node fails, the system adapts by redirecting processing to other nodes.

RAIN and SAIN systems

Hitachi Vantara offers three HCP products: HCP G10 with Local Storage, HCP G10 with Attached Storage, and HCP-VM:

- HCP G10 with Local Storage systems run on a redundant array of independent nodes (RAIN) and use storage that's internal to those nodes.
- HCP G10 with Attached Storage systems run on a SAN-attached array of independent nodes (SAIN) and use storage in Fibre Channel SAN arrays. SAN stands for storage area network.

To optimize performance for certain usage patterns, nodes in an HCP G10 with Attached Storage system can have internal storage in addition to being connected to SAN storage.

- HCP-VM systems run on virtual machines in a VMware® environment.

HCP SAIN systems support larger repositories than HCP RAIN systems.

HCP System Management Console

HCP includes a web application called the **System Management Console**. Your HCP system administrator uses this Console to configure, monitor, and manage the system. The Console reports certain hardware problems as they occur, so the system administrator can take appropriate action to initiate repairs.

HCP SAIN system hardware

HCP SAIN system hardware consists of:

- Nodes with external storage (a typical starter system has four nodes). The nodes are numbered from 101 through 104 for a four-node system. The node numbers increase by one for each additional node.

The nodes in an HCP SAIN system are Quanta D51B-2U servers.

- HCP S Series Nodes. The possible node models are:
 - S10
 - S30
- One or more SAN-attached storage arrays (a typical starter system has one array). Each storage array has one controller tray and one or more expansion trays. Arrays are not always included with the delivered HCP SAIN system. You may need to supply them yourself.

Storage can be running storage or spindown storage. Running storage is storage on continuously spinning disks. Spindown storage is storage on disks that can be spun down and spun up as needed. All systems have running storage. Only some systems have spindown storage.

- Ethernet switches and cables for networking. The switches in an HCP G10 with Attached Storage can be for one or ten gigabyte back-end network configurations. The possible switch models are:
 - Supported one gigabyte switches:
 - Brocade ICX 6430
 - HP ProCurve 4208VL
 - Supported ten gigabyte switches:
 - Brocade VDX 6740
 - Cisco Nexus 5548UP
 - Cisco Nexus 5596UP

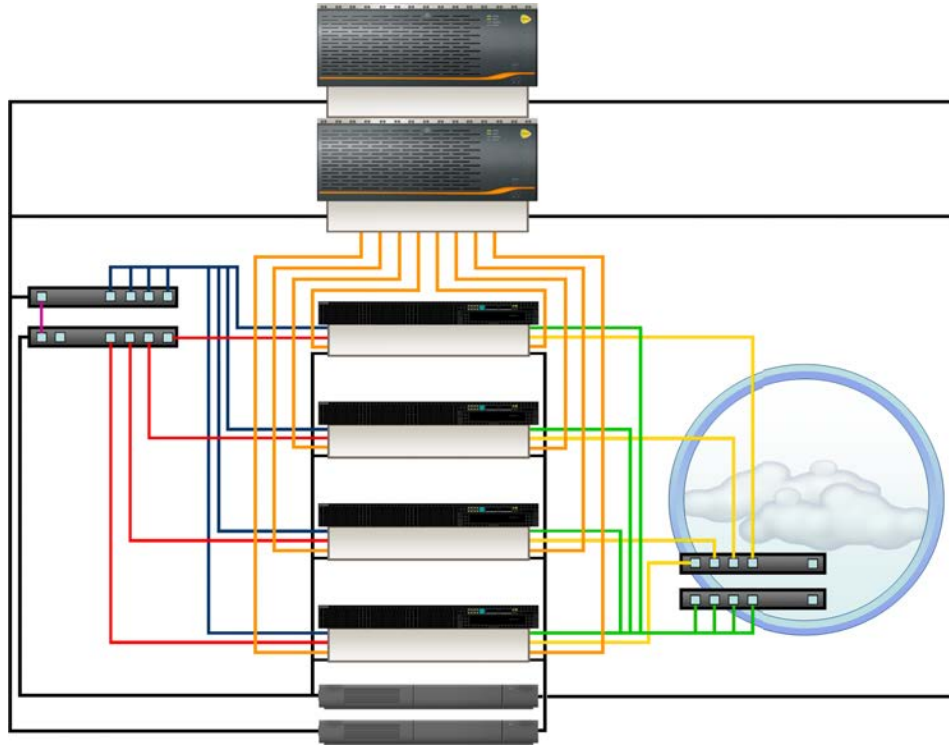
- Fibre Channel cables that connect the nodes to the storage arrays (Some systems use Fibre Channel switches to connect nodes and the storage arrays). The possible Fibre Channel switch models are:
 - Brocade 6510
 - Cisco MDS 9148S
- Additional infrastructure items such as a rack and power distribution units (PDUs).

An HCP system uses both back-end and front-end networks. The isolated back-end network connects the HCP nodes to each other through one or two Ethernet switches, depending on your network configuration and switch model. Each node has a pair of bonded Ethernet ports for connecting to these switches. Node port locations vary, depending on the network configuration the node was constructed for.

Each node is configured with an additional pair of bonded Ethernet ports that allows external applications to access the system. The recommended setup includes either two independent Ethernet switches that connect these ports to the front-end network (that is, your corporate network) or one Ethernet switch with both HCP and the switch configured for active-active bonding.

The front-end network switches and the cables for connecting them to the HCP nodes are not included with the delivered HCP SAIN system. The cables are customer supplied. You can use any supported HCP switches for the Front-end network.

The figure below shows the traditional architecture of an HCP SAIN system. This system has four nodes, a Fibre Channel SAN array that consists of one controller tray and one expansion tray, two back-end switches (on the left), and two front-end switches (on the right).



The table below describes the cables in this figure.

| Cable | Connects from | Connects to |
|---------------------------|--|--------------------|
| Red and blue Ethernet | Back-end network interface cards (NICs) in each node | Back-end switches |
| Green and yellow Ethernet | Front-end NICs in each node | Front-end switches |
| Purple Ethernet | Back-end switches | Each other |
| Orange Fibre Channel | Each node | SAN array |
| Black power | Each node | Two PDUs |
| | Each back-end switch | One PDU |
| | Tray in the SAN-attached storage array | Two PDUs |

The figures below show the port locations on an HCP SAIN system node with the different possible network configurations. In the figures below ports with red frames indicate the front-end network connections, ports with blue frames depict the back-end network connection, and ports with orange frames are for Fibre Channel switches.

10G BaseT network configuration



10 Base T and SFP+ network configuration



All SFP+ network configuration



Final on-site setup activities

An HCP SAIN system arrives with the HCP software already installed and configured with various default settings.

To get the system up and running, you perform the activities outlined in the table below.

| Step | Activity | More information |
|------|---|---|
| 1 | Verify that your site is ready for the HCP system to be installed. | Chapter 2: "Site preparation" on page 23 |
| 2 | For a preassembled system, remove the racked HCP system from the packing crate and position it in your data center. | N/A |
| | For a rackless system, assemble the HCP system components in a rack that you supply. | Chapter 3: "Assembling rackless components" on page 41 |
| 3 | Connect the HCP PDUs to your power sources. | "Connecting to the power sources" on page 145 |
| 4 | Reconfigure the HCP system for your environment. | Chapter 5: "Reconfiguring the HCP system for your site" on page 149 |
| 5 | Connect the HCP system to your corporate network. Note: If the preconfigured front-end IP addresses do not work for your environment, perform step 6 below before performing this step. | "Connecting to your corporate network" on page 146 |
| 6 | Configure the HCP system as a subdomain in the DNS. Be sure to use your site-specific node IP addresses and not the default IP addresses the system arrives with. If you don't use DNS at your site, skip this step. | <i>Administering HCP</i> |
| 7 | Optionally, configure Hi-Track Monitor to monitor the HCP nodes. | Chapter 6: "Configuring HCP monitoring with Hi-Track Monitor" on page 165 |

Site preparation

Before an HCP SAIN system can be deployed, you need to ensure that the intended location for the system meets certain environmental requirements. If the location does not already meet these requirements, you should wait to deploy the system until the necessary changes have been made.

You also need to have on hand the additional components that enable you to complete the connections between the HCP system and your environment.

This chapter describes the conditions and components required for the successful installation and operation of an HCP SAIN system.

Server specifications

An HCP G10 with Attached Storage Node consist of the following components:

- 2U enclosure with mounting rail kit
- 2 hot-swappable 750W power supplies
- 2 IEC C13/C14 power cords
- 4 replaceable cooling fans
- 1 motherboard with two Intel 10G BASE-T ports and BMC with 1G BASE-T port
- 1 airflow baffle
- 1 PCIe riser card

- 2 Intel E5-2620v3 CPUs with heat sinks
- 4-16 16GB DIMMs or 2-8 32GB DIMMs (64GB-256GB)
- 1 Intel i350 dual-port 1G OCP card
- 1 LSI 3108 RAID mezzanine card
- 1 LSI CacheVault module
- 6 or 12 4TB 3.5" enterprise SAS hard disk drives
- 1 SATA 2.5" drive cage
- 1 Emulex LPe12002 8G FC HBA card

Conditionally, the server may contain one or more of the following items depending on the Ethernet networking and SSD options chosen:

- 1 Intel X540 dual-port PCI 10G BASE-T Ethernet card
- 1 or 2 Intel X520 dual-port PCI 10G SFP+ Ethernet card
- 2 800GB or 1.9TB 2.5" enterprise SATA SSDs

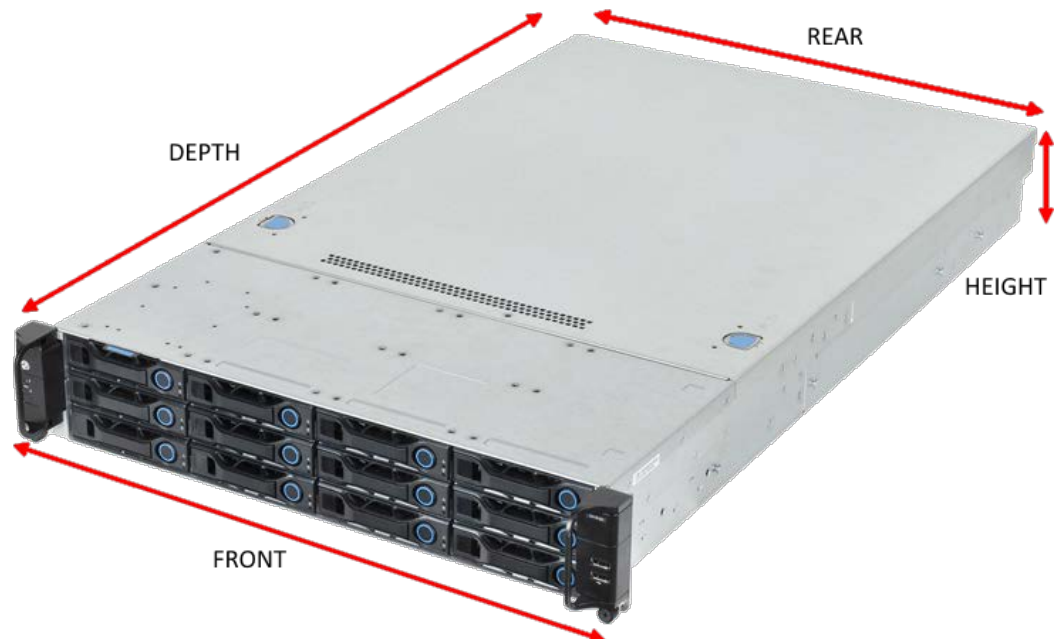
Mechanical Requirements

The following sections describe the mechanical specifications and requirements for an HCP G10 Node.

Dimensions

The table below shows the physical dimensions of the HCP G10 Node.

The labels in the figure below identify the faces of the HCP G10 Node. Use this figure as a reference for the table of dimensions that follows.



The table below shows the physical dimensions of the server module.

| Parameter | Inches | Millimeters |
|--|--------|-------------|
| Server module depth — rack mounting surface to rear connectors surface | 29.33 | 745 |
| Total depth — front surface of handles to rear tab on power supply | 32.28 | 820 |
| Front width | 17.6 | 447 |
| Front width with rack ears | 18.9 | 480 |
| Rear width | 17.6 | 447 |
| Height (2U) | 3.44 | 87.5 |

Weight

The table below shows the weights of the various components of an HCP G10 Node and HCP G10 system.

| Item | Quantity | Unit weight lbs. (kg) | Extended weight lbs. (kg) |
|---|----------|--------------------------|------------------------------|
| <i>Servers</i> | | | |
| HCP G10 Node attached storage base unit—includes enclosure, mounting rails, motherboard, drive backplane, riser card, two power supplies, four cooling fans, airflow baffle, two CPUs, four 16GB DIMMs or two 32GB DIMMs, six 4TB HDDs, six empty drive carriers, rear drive cage, 1Gb dual-port Ethernet OCP card, RAID mezzanine card, and 10Gb dual-port Ethernet PCIe card, 8Gb dual-port Fibre Channel card, and two power cables. | | 54.76 (24.89) | 54.76 (24.89) |
| 16GB DIMM or 32GB DIMM | 2 | 0.15 (0.0675) | 0.3 (0.135) |
| 800GB SSD or 1.9TB SSD | 2 | 0.17 (0.0756) | 0.34 (0.1512) |
| Dual-port 10Gb Ethernet PCIe card — optional | 1 | 0.59 (0.27) | 0.59 (0.27) |
| <i>Ethernet Switches</i> | | | |
| Brocade ICX 6430 (1Gb small) | 2 | 7.57 (3.44) | 15.14 (6.88) |
| HP 4208VL (1Gb large) | 1 | 37.58 (17.08) | 37.58 (17.08) |
| Brocade VDX 6740 (10Gb small) | 2 | 19.05 (8.66) | 38.1 (17.32) |
| Cisco Nexus 5548 (10Gb small) | 2 | 34.97 (15.88) | 69.94 (31.76) |

(Continued)

| Item | Quantity | Unit weight lbs. (kg) | Extended weight lbs. (kg) |
|--|----------|--------------------------|------------------------------|
| Cisco Nexus 5596 (10Gb large) | 2 | 47.41 (21.55) | 94.82 (43.1) |
| Fibre Channel Switches | | | |
| Brocade 6510 | 2 | 20.15 (9.16) | 40.3 (18.32) |
| Cisco MDS 9148S | 2 | 19.8 (9) | 39.6 (18) |
| Cables | | | |
| Two meter AC power cable — two required for each switch except the Brocade ICX 6430 which requires one | 2 | 0.5 (0.227) | 1.0 (0.454) |
| Seven foot 1Gb Ethernet cable harness | 2 | 3.08 (1.4) | 6.16 (2.8) |
| Twenty-five foot 1Gb Ethernet cable harness | 2 | 11 (5) | 22 (10) |
| Three meter 10Gb Ethernet cable (Twinax) | 2 | 0.1 (0.22) | 0.2 (0.44) |
| Five meter 10Gb Ethernet cable (Twinax) | 2 | 0.18 (0.4) | 0.36 (0.8) |
| Ten meter 10Gb Ethernet cable (Twinax) | 2 | 0.36 (0.79) | 0.72 (1.58) |
| Three meter 8Gb Fibre Channel cable | 2 | 0.022 (0.05) | 0.044 (0.1) |
| Rack & PDU | | | |
| Hitachi Universal V2 rack — includes two side panels, rear door, and accessory kit | 1 | 225 (102.3) | 225 (102.3) |
| 1P32A-9C13-3C19CE.P | 6 | 7.05 (3.2) | 42.3 (10.24) |
| 3P16A-9C13-3C19CE.P | 6 | 7.05 (3.2) | 42.3 (10.24) |
| 1P30A-8C13-3C19UL.P | 6 | 7.94 (3.6) | 47.64 (21.6) |
| 1P32A-18C13-3C19CE.P | 4 | 7.94 (3.6) | 31.76 (14.4) |

(Continued)

| Item | Quantity | Unit weight lbs. (kg) | Extended weight lbs. (kg) |
|----------------------|----------|--------------------------|------------------------------|
| 3P16A-15C13-3C19CE.P | 4 | 8.38 (3.8) | 33.52 (15.2) |
| 3P30A-8C13-3C19UL.P | 6 | 8.82 (4.0) | 52.92 (24) |
| 1P30A-15C13-3C19UL.P | 4 | 9.70 (4.4) | 38.8 (17.6) |
| 3P30A-15C13-3C19UL.P | 4 | 10.58 (4.8) | 42.32 (19.2) |
| 3P32A-24C13-6C19CE.P | 2 | 11.90 (5.4) | 23.8 (10.8) |
| 3P30A-24C13-6C19UL.P | 2 | 12.35 (5.6) | 24.7 (11.2) |

Hitachi Universal V2 rack

The table below shows the physical dimensions of the Hitachi Universal V2 rack used when the HCP G10 Node is purchased with rack.

| Parameter | Inches | mm |
|-----------|--------|------|
| Width | 23.6 | 600 |
| Depth | 47.2 | 1200 |
| Height | 79.1 | 2008 |

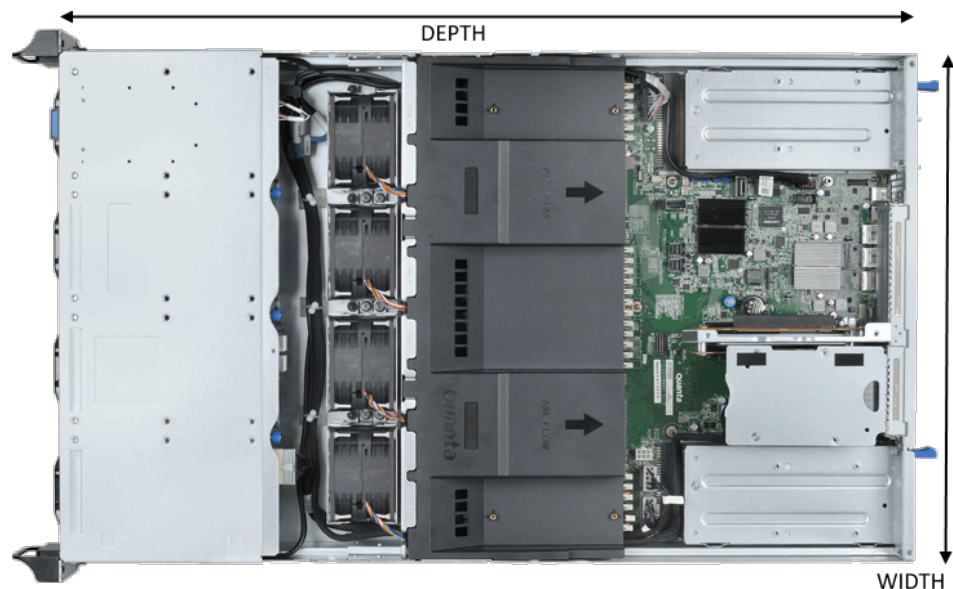
The weight of the empty rack, including the accessory kit, is 225.53 pounds (102.3 kg).

Customer supplied rack

You can purchase HCP G10 Nodes without a rack and then install the servers into a rack you supply. If you are supplying the rack(s) for the HCP system, you are responsible for the components shown below:

- A rack that meets these requirements:
 - The rack must be a standard 19-inch rack.
 - The rack must have square holes in the vertical EIA rails.

- The rack depth must be at least 43.3 inches (1,100mm). The depth of the server, depth of Ethernet switches, and necessary room for cable management necessitates this depth requirement.
- The server depth shown in the following figure is 29.33 inches (745mm). The power supply tab adds about another inch (25mm). An HCP system requires approximately ten inches (250mm) in the rear of the rack for cable management. Since most racks have a setback from the front of the rack to the vertical EIA rails the total depth required exceeds that of a 39.3 inch rack (1000mm).
- The width shown in the following figure is 17.6 inches (447mm) and the customer rack must accommodate this dimension. The width shown includes the rail kit required space.



- The distance between the outer surfaces of the front and rear vertical EIA rails should be a minimum of 29 inches (736.6mm). While the server rail kit is able to mount with a shorter depth, some of the Ethernet switch equipment, particularly Cisco Nexus 5548 or Cisco Nexus 5596 require this minimum distance.
- PDUs. Power distribution units need to provide the appropriate number of IEC 60320 C13 and C19 outlets and appropriate amperage to power the equipment installed in the rack. For proper redundancy, components in the rack should be connected to two PDUs, one for each of the power supplies provided. If a component only has one power supply it should

be connected to the first PDU and its redundant counterpart should be connected to the second PDU.

- Please refer to the following table for the appropriate outlets required for each HCP system component.

| Component | # of U | # of Outlets | Outlet Type |
|------------------------------------|--------|--------------|-------------|
| HCP G10 Node | 2 | 2 | C13 |
| Brocade ICX 6430 1Gb Ethernet | 1 | 1 | C13 |
| HP 4208VL 1Gb Ethernet | 5 | 2 | C13 |
| Brocade VDX 6740 10Gb Ethernet | 1 | 2 | C13 |
| Cisco Nexus 5548 10Gb Ethernet | 1 | 2 | C13 |
| Cisco Nexus 5596 10Gb Ethernet | 2 | 2 | C13 |
| Brocade 6510 16Gb Fibre Channel | 1 | 2 | C13 |
| Cisco MDS 9148S 16Gb Fibre Channel | 1 | 2 | C13 |

- For power requirements of each device, please see ["Electrical requirements"](#) on page 36.
- For storage components, including HCP S10, HCP S30, or Hitachi storage arrays, please see the appropriate documentation for those devices to determine the appropriate rack space, outlet quantity, outlet type, and power capacity requirements.
- Velcro straps and/or cable ties for bundling and securing cables.
- Screws and cage nuts for installing equipment into the rack(s).

Electrical requirements

The following sections describe the power requirements and electrical specifications for an HCP G10 Node and other required HCP system components.

RoHS compliance

An HCP G10 Node, including all of its components, is compliant with the European Union Restriction of Hazardous Substances (RoHS) Directive (Directive 2002/95/EC), with no exceptions or exemptions.

BNST compliance

Benzenamine, N-phenyl-, Reaction Products with Styrene and 2,4,4-Trimethylpentene (BNST) is an antioxidant used as an additive in many industrial lubricants. Its use has been restricted in Canada under the Prohibition of Certain Toxic Substances Regulations, 2012, which went into effect on March 14, 2013. The Regulations include a two-year exemption for BNST used in small-application lubricants in the electrical and electronics engineering industry.

Temperature, humidity, and altitude

The table below shows the acceptable ranges for temperature, humidity, and altitude for the various HCP system components as well as an aggregate for the entire system. Operating and non-operating cases are included in the table below.

| Component | * Operating temperature | Operating humidity (non-condensing) | Altitude | Non-operating temperature | Non-operating humidity (non-condensing) |
|---|--------------------------------|--|----------------------------|-----------------------------------|--|
| HCP system (not including storage components) | 5°C to 40°C (41°F to 104°F) | 50%-85% | 0-3000m (0-10,000 feet) | -25°C to 70°C (-13°F to 158°F) | 20%-90% |

(Continued)

| Component | * Operating temperature | Operating humidity (non-condensing) | Altitude | Non-operating temperature | Non-operating humidity (non-condensing) |
|--|--------------------------------|--|---------------------------------|-----------------------------------|--|
| HCP G10 Node | 5°C to 40°C (41°F to 104°F) | 50%-85% | 0-3000m (0-10,000 feet) | -40°C to 70°C (-40°F to 158°F) | 20%-90% |
| Brocade ICX 6430 | 0°C to 40°C (32°F to 104°F) | 5%-95% | 0-3000m (0-10,000 feet) | -40°C to 70°C (-40°F to 158°F) | 0%-95% |
| HP 4208VL | 0°C to 40°C (32°F to 104°F) | 15%-95%- | 0-4600m (0-15,000 feet) | -40°C to 70°C (-40°F to 158°F) | 15%-95% |
| Brocade VDX 6740 | 0°C to 40°C (32°F to 104°F) | 10%-85%- | 0-3048m (0-10,000 feet) | -25°C to 70°C (-13°F to 158°F) | 10%-90% |
| Cisco Nexus 5548 | 0°C to 40°C (32°F to 104°F) | 5%-95%- | 0-3000m (0-10,000 feet) | -40°C to 70°C (-40°F to 158°F) | 5%-95% |
| Cisco Nexus 5596 | 0°C to 40°C (32°F to 104°F) | 5%-95%- | 0-3000m (0-10,000 feet) | -40°C to 70°C (-40°F to 158°F) | 5%-95% |
| Brocade 6510 | 0°C to 40°C (32°F to 104°F) | 10%-90%- | -60-3000m (-197-10,000 feet) | -25°C to 70°C (-13°F to 158°F) | 10%-95% |
| Cisco MDS 9148S | 0°C to 40°C (32°F to 104°F) | 10%-90%- | 0-3000m (0-10,000 feet) | -40°C to 70°C (-40°F to 158°F) | 10%-95% |
| *The maximum operating temperature value is specified at sea level and is derated 2.0% per 1,000 feet of increased altitude. | | | | | |

Shock and vibration

The table below shows the tested limits for shock and vibration for an HCP system and its components where this information is available.

| Component | Operating shock | Non-operating shock | Operating vibration | Non-operating vibration |
|---|---|---|--|--|
| HCP system (not including storage components) | 20G, 6ms, half-sine | 33G, 11ms, half-sine, 3/eg axis | 0.2Grms on z axis, 2 minutes | 1.87Grms on 3 axes, 30 minutes |
| HCP G10 Node | 31G, 2.6ms, $\pm 5\%$, shock pulse 20in/sec or 51cm/sec, bottom side | 71G (2ms) $\pm 5\%$, shock pulse 35in/sec or 89cm/sec, 6 sides | 0.2Grms on z axis, 2 minutes | 1.87Grms on 3 axes, 30 minutes |
| Brocade ICX 6430 | IEC 68-2-36, IEC 68-2-6 | | | |
| HP 4208VL | N/A | N/A | N/A | N/A |
| Brocade VDX 6740 | 20G, 11ms, half-sine | 44G, 15ms, square wave | 0.5G peak, 0.7Grms random, 5 to 500 Hz | 2.0G sine, 1.4Grms random, 5 to 500 Hz |
| Cisco Nexus 5548 | N/A | N/A | N/A | N/A |
| Cisco Nexus 5596 | N/A | N/A | N/A | N/A |
| Brocade 6510 | 20G, 6ms, half-sine | 33G, 11ms, half-sine, 3/eg axis | 0.5G sine, 0.5Grms random, 5 to 500Hz | 2.0G sine, 1.1Grms random, 5 to 500Hz |
| Cisco MDS 9148S | N/A | N/A | N/A | N/A |

Cooling and airflow

The airflow in of all components of an HCP system is designed to go from front to rear and is driven by fans on the various components. Air is pulled through the front of the rack and exhausted out the rear of the rack.

Components mounted in the rack, such as Ethernet or Fibre Channel switches, have port side exhaust in keeping with the overall rack airflow. Customers should not reorient the devices in the rack or the airflow may be compromised.

The following table shows the heat dissipation for each of the components, allowing a customer to calculate the heat load and required cooling for their HCP system based on the components installed. It also includes the acoustic noise level of the fans in the units which are providing the airflow, where this information is available.

| Component | Heat Dissipation (BTU/h) | Acoustic Noise Level (dB) |
|------------------|--------------------------|---------------------------|
| HCP G10 Node | 894 | N/A |
| Brocade ICX 6430 | 67 | 0 (Fanless) |
| HP 4208VL | 2152 | 64.2 |
| Brocade VDX 6740 | 597 | 63.1 |
| Cisco Nexus 5548 | 1331 | N/A |
| Cisco Nexus 5596 | 2252 | N/A |

When a number of the HCP system components are powered on, the fans run at full speed for a short time to ensure that they are fully operational. After that, under normal conditions, the fans run at lower speeds as required by the device for maintaining appropriate airflow and cooling to the components. The cooling they provide is sufficient to prevent the hard disk drives and other components from exceeding the manufacturer's rated specifications throughout the range of the operating conditions. If over-temperature conditions occur, some of the devices have automatic shutdown capability, but not in all cases.

If a single fan fails in any of the HCP system components, the device continues to operate. However, this fault condition forces the remaining fans to run at higher speed until the condition is corrected.

Required tools and supplies

When assembling, deploying, or maintaining an HCP system, you may need certain tools and supplies. The items you need for any given procedure are listed before the instructions for that procedure.

These are all the tools and supplies that may be required:

- **Lift** — Depending on the type of storage devices used in conjunction with the HCP system, a lift may be required to install or maintain disk storage trays into a rack. The lift must be rated at a minimum of 400 pounds (182kg).
- **Tools** — For installation and maintenance procedures on an HCP system, the following tools may be required:
 - #1 Phillips screwdriver
 - #2 Phillips screwdriver
 - Quarter-inch slotted screwdriver
 - Caged nut tool
 - Wire cutter
- **Keyboard and monitor** — For the installation of the HCP G10 software, or to perform diagnostics and recover the HCP G10 software, you need a USB keyboard and VGA monitor.
- **Laptop computer** — To upload an HCP G10 software update file, license file, or to use the management console you will need to use a browser on a laptop computer.
- **1Gb CAT6 Ethernet cable** — To connect the laptop computer to the back-end network switch, you need a 1Gb CAT6 Ethernet cable. For 10Gb systems, a 1Gb adapter for the switch will be provided.
- **PDU's with C13/C19 power outlets** — To provide power to the HCP system during installation, you need two PDUs with C13 and/or C19 outlets as appropriate for the system being configured. You need these PDUs only if the HCP system will be shipped without a rack.
- **One 4GB or larger USB flash drives** — For the HCP G10 software installation, you need one 4GB or greater USB flash drive. For the best results, use the certified Hitachi Vantara part number DTI4GL.P

Electrical requirements

The following sections describe the power requirements and electrical specifications for an HCP G10 Node and other required HCP system components.

Power system

For redundancy, an HCP G10 Node has two. These power supplies should be connected to two different PDUs, which should be plugged into two separate power sources. This setup ensures that the entire power system has no single point of failure.

If only one power source is available, the two PDUs should be plugged into different circuits. If only one circuit is available, the two power supplies can be connected to the same PDU as a last resort, assuming the PDU has two available outlets and enough power capacity.

The power system input can be either single-phase or three-phase with single phase on the outlets. The table below shows the power system requirements for the Hitachi Universal V2 PDU.

| Hitachi Vantara part number | Geography | Phase | Length | Voltage | Amperage |
|-----------------------------|-----------|--------|-------------------|---------|----------|
| 1P30A-8C13-3C19UL.P | Americas | Single | 24.49in (622mm) | 208 | 30 |
| 1P30A-15C13-3C19UL.P | Americas | Single | 35.24in (895mm) | 208 | 30 |
| 3P30A-8C13-3C19UL.P | Americas | Three | 24.49in (622mm) | 208 | 30 |
| 3P30A-15C13-3C19UL.P | Americas | Three | 35.24in (895mm) | 208 | 30 |
| 3P30A-24C13-6C19UL.P | Americas | Three | 51.85in (1,317mm) | 208 | 30 |
| 1P32A-9C13-3C19CE.P | EMEA/APAC | Single | 23.46in (596mm) | 230 | 32 |
| 1P32A-18C13-3C19CE.P | EMEA/APAC | Single | 35.16in (893) | 230 | 32 |
| 3P16A-9C13-3C19CE.P | EMEA/APAC | Three | 23.46in (596mm) | 400 | 16 |
| 3P16A-15C13-3C19CE.P | EMEA/APAC | Three | 33.62in (854mm) | 400 | 16 |
| 3P32A-24C13-6C19CE.P | EMEA/APAC | Three | 54.09in (1,374mm) | 400 | 32 |

Power connections

The power connections required for the Hitachi Universal V2 PDU differ by geography and input phase:

- For the Americas:
 - The single-phase, 208V, 30A PDUs have a NEMA L6-30P three-wire plug, as shown below.



- The three-phase, 208V, 30A PDUs have a NEMA L15-30 four-wire plug, as shown below.



- For EMEA/APAC:
 - The single-phase, 230V, 32A PDUs have an IEC 309 three-wire plug, as shown below.



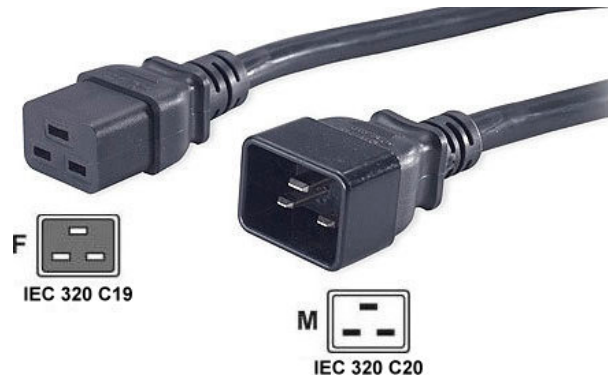
- The three-phase, 400V, 32A PDUs have an IEC309 five-wire power plug, as shown below.



Each HCP system comes with multiple PDUs with IEC 320 C13 and IEC 320 C19 outlets. Each HCP G10 Node has two power supplies with IEC 320 C14 power inlet connectors. Each power supply connects to a PDU using a two meter IEC 320 C13 to IEC 320 C14 power cable, as shown below. Optional Fibre Channel switches and Ethernet switches use two meter IEC 320 C13 to IEC 320 C14 power cables. External storage array options require appropriate power connections using two meter IEC 320 C13 to IEC 320 C14 power cables.



Optional S10 nodes that come in the same rack as an HCP system plug into the IEC 320 C19 power outlets on the PDUs. Each S10 storage node has two power and cooling modules which should be connected to the PDUs using two meter IEC 320 C19 to IEC 320 C20 power cables as shown below.



Electrical specifications

In an HCP system, all electrical components are designed to be redundant. For each device in the system, there are either two power supplies or two of the devices so that there is no single point of failure if a power supply or PDU fails. In addition, since all components are redundant, the PDUs on different sides of the rack connect to different power systems, providing power system redundancy.

When an HCP system component with two power supplies is operating normally, each power supply contributes half the power that the device requires. If one power supplies fails, the HCP component continues to run on the single available power supply.

The table below describes the amperages and voltages of the different PDU models.

| PDU model | Amperage | Voltage |
|----------------------|----------|---------|
| 3P30A-24C13-6C19UL.P | 30 | 208 |
| 3P32A-24C13-6C19CE.P | 32 | 400 |
| 3P30A-15C13-3C19UL.P | 30 | 208 |
| 1P30A-15C13-3C19UL.P | 30 | 208 |
| 3P16A-15C13-3C19CE.P | 16 | 400 |

(Continued)

| PDU model | Amperage | Voltage |
|----------------------|-----------------|----------------|
| 1P32A-18C13-3C19CE.P | 32 | 230 |
| 3P30A-8C13-3C19UL.P | 30 | 208 |
| 1P30A-8C13-3C19UL.P | 30 | 208 |
| 3P16A-9C13-3C19CE.P | 16 | 400 |
| 1P32A-9C13-3C19CE.P | 32 | 230 |

The table below describes the nominal amperage and wattage of each possible component in an HCP system.

| Component | Nominal amperage @ 208V (A) | Nominal wattage @ 208V (W) |
|------------------|------------------------------------|-----------------------------------|
| HCP G10 Node | 1.26 | 262 |
| Brocade ICX 6430 | 0.20 | 41.6 |
| HP 4208VL | 1.68 | 349 |
| Brocade VDX 6740 | 0.86 | 179 |
| Cisco Nexus 5548 | 1.88 | 391 |
| Cisco Nexus 5596 | 2.14 | 445 |
| Brocade 6510 | 0.39 | 81.1 |
| Cisco MDS 9148S | 0.88 | 183 |

Assembling rackless components

The components of a rackless HCP G10 with Attached Storage system are delivered configured but unassembled. You need to provide some additional components and assemble the system at your site. This chapter provides instructions for doing this.

Components that come with a rackless system

For a rackless HCP G10 with Attached Storage system, the components are shipped to your site:

- The required numbers of nodes, with the HCP software already installed.
- The required number of storage arrays, with the HCP software already installed.
- One or Two Ethernet switches for the back-end network. The type and quantity of Ethernet switches you receive depends on your system network configuration. The possible switch types are:
 - **Brocade ICX 6430** — is a small, 1 GB Ethernet switch. You receive two Brocade ICX 6430 switches with your system.
 - **HP ProCurve 4208VL** — is a large, 1 GB switch. You receive one HP 4208VL switches with your system.
 - **Brocade VDX 6740** — is a small, 10 GB Ethernet switch. You receive two Brocade VDX 6740 switches with your system.
 - **Cisco Nexus 5548UP** — is a small, 10 GB Ethernet switch. You receive two Cisco Nexus 5548 switches with your system.

- **Cisco Nexus 5596UP** — is a large, 10 GB Ethernet switch. You receive two Cisco Nexus 5596 switches with your system.
- Depending on your order, you might receive two Fibre Channel switches. The possible switch types are:
 - **Cisco MDS 9148S** — is a small, 8 GB switch. You receive two Cisco 9148S switches with your system.
 - **Brocade 6510** — is a small, 8 GB switch. You receive two Brocade 6510 switches with your system.
- If you use a 1G network configuration, you are supplied with the required number of Ethernet cables harnesses, half red and half blue. If you use a 10G network configuration, you are supplied the required amount of Ethernet cables to connect your nodes to the back-end network.
- The required amount of Fibre Channel cables to connect your nodes to the Fibre Channel switches or storage array.
- The required amount of Power cords for the nodes, storage array, Fibre Channel switches, and back-end switches.
- An Ethernet cable for connecting back-end switches to each other if you are using a network configuration that supports two back-end switches — one purple cable for a 1 G network configuration or one black cable for a 10 G network configuration.
- The required number of perforated blanking plates for covering the back-end switches.
- One serial number label per system. This label is on the lower left side of the lowest node.
- The license-key packet. If the HCP software was installed with encryption enabled, this packet also includes the Encryption Key form.



Caution: Store the Encryption Key form in a secure location. The key recorded on this form is not retrievable through the HCP System Management Console or management API. Loss of this key will most likely result in unrecoverable data in the case of catastrophic system failure.

Hardware assembly procedure

To assemble the HCP SAIN system, follow the steps outlined in the table below.

| Step | Activity | More information |
|------|---|--|
| 1 | Prepare the rack for installation of the HCP system components. | Step 1: "Prepare the racks" on page 60 |
| 2 | Attach the HCP G10 System serial number sticker | Step 2: "Attach the HCP G10 system serial number" on page 61 |
| 3 | Install the PDUs in the rack. | Install the PDUs |
| 4 | Rack the HCP S10 Nodes | Step 4 (conditional): "Rack the HCP S10 Nodes" on page 62 |
| 5 | Optionally, rack the VSP-G storage array | Step 5 (conditional): "Rack the VSP-G" on page 62 |
| 6 | Optionally, rack the HUS storage array | "Rack the HUS" on page 1 |
| 7 | Rack the HCP G10 Nodes | Step 6: "Rack the HCP G10 Nodes" on page 63 |
| 8 | Rack the Fibre Channel switches | Step 7 (conditional): "Rack the Fiber switches" on page 73 |
| 9 | Rack the Ethernet switches | Step 8: "Rack the Ethernet Switches" on page 97 |
| 10 | Reassemble the rack. | Step 10: "Reassemble the racks" on page 143 |

Considerations for HCP racking and PDU connections

This section describes the possible HCP system racking configurations and how to connect HCP hardware components to PDUs.

Considerations for racking an HCP system

An HCP G10 system includes a minimum of four HCP G10 Nodes and a maximum of eighty HCP G10 Nodes. The nodes can be racked in a base configuration with Ethernet switches and optional Fibre Channel switches or in an appliance configuration with Ethernet switches, optional Fibre Channel switches, a VSP-G storage array, and optional HCP S10 Nodes.

In a base configuration, an HCP system can have up to five racks — one base configuration rack and, optionally, one through four expansion racks. A base configuration does not include a VSP-G or S10 Nodes.

In an appliance configuration, an HCP system can have only one rack but can be expanded with additional storage in secondary racks. An appliance configuration includes one or more VSP-G storage arrays or S10 Nodes.

If the HCP system in a base configuration uses expansion racks, those racks must be positioned on the right and left of the base or appliance configuration rack in alternating order so that all HCP G10 Nodes can connect to the back-end Ethernet switches.

The figure below shows how to position the racks.



Tip: For ease of access, remove and set aside the rack side panels and doors before racking and cabling components.

Hitachi Universal V2 PDUs

HCP uses Hitachi Universal V2 PDUs.

Outlet layout

A Hitachi Universal V2 PDU has three color-coded sections: blue, red, and yellow. The power inlet cable is attached to the blue end of the PDU.

Each colored-coded section has:

- One or two circuit breakers
- Some number of C19 outlets
- Some number of C13 outlets

In a section with two circuit breakers, the circuit breaker closer to the power inlet cable is number one.

The C19 and C13 outlets are counted separately for each circuit breaker within each section. For each type of outlet, the outlet closest to the applicable circuit breaker is number one.

Each outlet is identified by these properties, in order:

- The section color: B (blue), R (red), or Y (yellow)
- The breaker number: 1 or 2
- The outlet type: C19 or C13
- The number of the outlet within its section, preceded by a hyphen (-)

For example, the second C13 outlet for circuit breaker one in the red section is R1C13-2.

PDU part numbers

Hitachi Universal V2 PDU part numbers describe the PDU model by its hardware characteristics and geographic distribution. Each PDU part number consists of these properties, in order:

- Phase: 1P or 3P
- Amperage: 16A, 30A, or 32A
- Number of C13 outlets: 8C13, 9C13, 15C13, 18C13, or 24C13
- Number of C19 outlets: 3C19 or 6C19
- Geographic distribution: UL (Americas) or CE (EMEA/APAC)
- Suffix: .P

For example, a three phase, EMEA/APAC PDU with an amperage of 32, 24 C13 outlets, and six C19 outlets is 3P24C13-6C19CE.P.

Not all possible part numbers are used. For example, no PDU has the part number 1P16A12C13-3C19UL.P.

Considerations for connecting PDUs

A rack can have one, two, or three pairs of PDUs. In each pair, one PDU is installed on the left side of the rack. The other PDU is installed on the right side of the rack. For redundancy, the PDUs in each pair should, if possible,

be connected to two separate power sources.

If a hardware component has two power supplies. The left power supply connects to the left PDU. The right power supply connects to the right PDU.

To balance the HCP system electrical requirements across the PDU breakers and phases, the system hardware components connect to specific PDU outlets. These outlets are determined by the HCP system racking configuration and the PDU model.

HCP racking and connection diagrams

The diagrams in this section show the possible HCP system racking configurations, how to rack the hardware components, and how to connect the hardware components to the PDUs.

Selecting a diagram

To determine which racking and connection diagram to use, you need the HCP system packing list. If the packing list includes more than one HCP G10 system, select the diagram for each system individually.

To select a diagram for an HCP system:

1. In the packing list, check the "Configuration Parameters" section for the HCP system configuration. If the system configuration is:
 - "G10 rack: Non-appliance configuration," see [HCP G10 Base and Expansion diagrams](#) on page 48
 - "G10 rack: Appliance configuration (combine G10 and S10/VSP)" and the system does not include any HCP S10 Nodes, see [HCP G10 Appliance with VSP-G](#) on page 49
 - "G10 rack: Appliance configuration (combine G10 and S10/VSP)" and system includes one, two, or three HCP S10 Nodes, see [HCP G10 Appliance with S10 and Optional VSP-G](#) on page 49
2. From the diagrams in the applicable section, select the diagram that includes the PDU part number listed for the applicable system configuration in the packing list.
3. If the system configuration is "G10 rack: Non-appliance configuration," the PDU part number is 3P30A-24C13-6C19UL.P or 3P32A-24C13-6C19CE.P, and the system configuration description in the packing list is:

- "G10 rack: Install PDU with cables orientated towards ceiling," use [HCP G10 Base and Expansion with Three-phase Americas \(3P30A-24C13-6C19UL\) – Top power](#) on page 51.
- "G10 rack: Install PDU with cables orientated towards floor," use [Three-phase Americas \(3P30A-24C13-6C19UL\) – Bottom power](#) on page 52

For example, use [HCP G10 Base and Expansion with Three-phase Americas \(3P30A-24C13-6C19UL\) – Top power](#) on page 51 if, in the packing list:

- The HCP system is "G10 rack: Non-appliance configuration"
- The PDU model number is 3P30A-24C13-6C19UL.P
- The description is "G10 rack: Install PDU with cables orientated towards ceiling"

Each diagram shows the hardware configuration for a single rack. If the HCP system includes additional components that don't fit in the rack, ensure that you have additional racks, as needed.

Reading the diagrams

Each racking and connection diagram shows a single rack. The view is from the rear of the rack.

Each diagram has:

- Three or four columns that show possible hardware configurations
- Left and right U# columns that show the rack units in which each hardware component is installed
- Left and right PDU outlet columns that show only the outlets used with the hardware configurations in the diagram
- Left and right PDU configuration columns that show the number of PDUs installed on each side of the rack and the orientation of each PDU

Each hardware component connects to the outlets that correspond to the bottom or only rack unit occupied by that component.

Diagram legend

In each diagram:

- Hardware components that span columns are used in all the configurations shown in the diagram.
- Sections labeled "Empty" do not contain any hardware components for the applicable configuration.
- Rack units in italics with a gray background in the U# column show the PDU bracket locations.
- Outlets with darker background colors are C13 outlets. Outlets with lighter background colors are C19 outlets.
- Outlet background colors (blue, red, and yellow) correspond to the circuits on the PDUs.
- Outlets with black text are always used with the applicable component. Outlets with white text are used only if the applicable component has two power supplies.
- The "PWR" label on each PDU shows which end of the PDU has the power inlet cable.

The PDUs in the diagrams are not drawn to scale.

Diagrams

The diagrams in this section are:

- HCP G10 Base and Expansion
 - [Single-phase Americas \(1P30A-15C13-3C19UL\) and EMEA/APAC \(1P32A-18C13-3C19CE\)](#) on page 50
 - [Three-phase Americas \(3P30A-24C13-6C19UL\) – Top power](#) on page 51
 - [Three-phase Americas \(3P30A-24C13-6C19UL\) – Bottom power](#) on page 52
 - [Three-phase EMEA/APAC \(3P32A-24C13-6C19CE\) – Top power](#) on page 53

- [Three-phase EMEA/APAC \(3P32A-24C13-6C19CE\) – Bottom power](#) on page 54
- HCP G10 Appliance with VSP-G
 - [Single-phase Americas \(1P30A-8C13-3C19UL\) and EMEA/APAC \(1P32A-9C13-3C19CE\)](#) on page 55
 - [Three-phase Americas \(3P30A-8C13-3C19UL\) and EMEA/APAC \(3P16A-9C13-3C19CE\)](#) on page 56
- HCP G10 Appliance with S10 and Optional VSP-G
 - [Single-phase Americas \(1P30A-8C13-3C19UL\) and EMEA/APAC \(1P32A-9C13-3C19CE\)](#) on page 57
 - [Three-phase Americas \(3P30A-8C13-3C19UL\) and EMEA/APAC \(3P16A-9C13-3C19CE\)](#) on page 58

| HCP G10 Base and Expansion | | | | | | | | | |
|--|----------|-------------------------|---|-------------------------|-------|-----------|------------|-------|---------|
| 1P30A-15C13-3C19UL PDUs (Single-phase AMER) | | | | | | | | | |
| 1P32A-18C13-3C19CE PDUs (Single-phase EMEA/APAC) | | | | | | | | | |
| | | Base 1/10G 1U Switch | | Base 1/10G 2U Switch | | Expansion | | | |
| Left PDUs | | U# | HARDWARE | | | U# | Right PDUs | | |
| UPPER | | U42 | Empty | Empty | Empty | U42 | | UPPER | |
| | | U41 | | | | U41 | | | |
| | | U40 | | Ethernet Switch | | Empty | U40 | | |
| | Y1C13-5 | U39 | | | | | U39 | | Y1C13-5 |
| | | U38 | | | | | U38 | | |
| | Y1C13-4 | U37 | | Ethernet Switch | | U37 | Y1C13-4 | | |
| | | U36 | (If present) HCP G10 or FCS | | U36 | | | | |
| | Y1C13-3 | U35 | (If present) HCP G10 or FCS | | U35 | Y1C13-3 | | | |
| | | U34 | (If present) HCP G10 or FCS | | U34 | | | | |
| | Y1C13-2 | U33 | (If present) HCP G10 or FCS | | U33 | Y1C13-2 | | | |
| | | U32 | (If present) HCP G10 or FCS | | U32 | | | | |
| | Y1C13-1 | U31 | (If present) HCP G10 or FCS | | U31 | Y1C13-1 | | | |
| | | U30 | (If present) HCP G10 or FCS | | U30 | | | | |
| | R1C13-4 | U29 | (If present) HCP G10 or FCS | | U29 | R1C13-4 | | | |
| | R1C13-3* | U28 | Ethernet Switch | Empty | Empty | U28 | R1C13-3 | | |
| | R1C13-2 | U27 | Ethernet Switch | | | U27 | R1C13-2* | | |
| | R1C13-1 | U26 | (If present) Fibre Channel Switch | | | U26 | R1C13-1 | | |
| | B1C19-1 | U25 | (If present) Fibre Channel Switch — C13-C20 Cable | | | U25 | B1C19-1 | | |
| | | U24 | (If present) HCP G10 or FCS | | | U24 | | | |
| | B1C13-3 | U23 | (If present) HCP G10 or FCS | | | U23 | B1C13-3 | | |
| | | U22 | (If present) HCP G10 or FCS | | | U22 | | | |
| | B1C13-2 | U21 | (If present) HCP G10 or FCS | | | U21 | B1C13-2 | | |
| | | U20 | (If present) HCP G10 or FCS | | | U20 | | | |
| PWR | B1C13-1 | U19 | (If present) HCP G10 or FCS | | | U19 | B1C13-1 | PWR | |
| PWR | | U18 | (If present) HCP G10 or FCS | | | U18 | | PWR | |
| LOWER | B1C13-3 | U17 | (If present) HCP G10 or FCS | | | U17 | B1C13-3 | LOWER | |
| | | U16 | (If present) HCP G10 or FCS | | | U16 | | | |
| | B1C13-4 | U15 | (If present) HCP G10 or FCS | | | U15 | B1C13-4 | | |
| | | U14 | (If present) HCP G10 or FCS | | | U14 | | | |
| | B1C13-5 | U13 | (If present) HCP G10 or FCS | | | U13 | B1C13-5 | | |
| | | U12 | (If present) HCP G10 or FCS | | | U12 | | | |
| | R1C13-3 | U11 | (If present) HCP G10 or FCS | | | U11 | R1C13-3 | | |
| | | U10 | (If present) HCP G10 or FCS | | | U10 | | | |
| | R1C13-4 | U09 | (If present) HCP G10 or FCS | | | U09 | R1C13-4 | | |
| | | U08 | HCP G10 | | | U08 | | | |
| | R1C13-5 | U07 | HCP G10 | | | U07 | R1C13-5 | | |
| | | U06 | HCP G10 | | | U06 | | | |
| | Y1C13-3 | U05 | HCP G10 | | | U05 | Y1C13-3 | | |
| | | U04 | HCP G10 | | | U04 | | | |
| | Y1C13-4 | U03 | HCP G10 | | | U03 | Y1C13-4 | | |
| | | U02 | HCP G10 | | | U02 | | | |
| | Y1C13-5 | U01 | HCP G10 | | | U01 | Y1C13-5 | | |

* This outlet is used only when the Ethernet switch has two power supplies.

| HCP G10 Base and Expansion | | | | | | | | |
|---|----------|-------------------------|---|-----------------|---------|-----------|-----|----------|
| 3P30A-24C13-6C19UL PDU (Three-phase AMER) — Top Power | | | | | | | | |
| | | Base 1/10G 1U Switch | Base 1/10G 2U Switch | Expansion | | | | |
| Left PDU | | U# | HARDWARE | | U# | Right PDU | | |
| PDU | PWR | U42 | Empty | Empty | U42 | | PWR | |
| | | U41 | | | U41 | | | |
| | | U40 | | U40 | | | | |
| | B1C13-1 | U39 | | Ethernet Switch | U39 | B1C13-1 | | |
| | | U38 | | Ethernet Switch | U38 | | | |
| | B1C13-2 | U37 | U37 | | B1C13-2 | | | |
| | | U36 | (If present) HCP G10 or FCS | | U36 | | | |
| | B1C13-3 | U35 | (If present) HCP G10 or FCS | | U35 | B1C13-3 | | |
| | | U34 | (If present) HCP G10 or FCS | | U34 | | | |
| | B1C13-4 | U33 | (If present) HCP G10 or FCS | | U33 | B1C13-4 | | |
| | | U32 | (If present) HCP G10 or FCS | | U32 | | | |
| | B1C13-5 | U31 | (If present) HCP G10 or FCS | | U31 | B1C13-5 | | |
| | | U30 | (If present) HCP G10 or FCS | | U30 | | | |
| | B1C13-6 | U29 | (If present) HCP G10 or FCS | | U29 | B1C13-6 | | |
| | B1C13-7* | U28 | Ethernet Switch | Empty | Empty | U28 | | B1C13-7 |
| | B1C13-8 | U27 | Ethernet Switch | | | U27 | | B1C13-8* |
| | R1C13-1 | U26 | (If present) Fibre Channel Switch | | U26 | R1C13-1 | | |
| | R1C19-1 | U25 | (If present) Fibre Channel Switch — C13-C20 Cable | | U25 | R1C19-1 | | |
| | | U24 | (If present) HCP G10 or FCS | | U24 | | | |
| | R1C13-3 | U23 | (If present) HCP G10 or FCS | | U23 | R1C13-3 | | |
| | | U22 | (If present) HCP G10 or FCS | | U22 | | | |
| | R1C13-4 | U21 | (If present) HCP G10 or FCS | | U21 | R1C13-4 | | |
| | | U20 | (If present) HCP G10 or FCS | | U20 | | | |
| | R1C13-5 | U19 | (If present) HCP G10 or FCS | | U19 | R1C13-5 | | |
| | | U18 | (If present) HCP G10 or FCS | | U18 | | | |
| | R1C13-6 | U17 | (If present) HCP G10 or FCS | | U17 | R1C13-6 | | |
| | | U16 | (If present) HCP G10 or FCS | | U16 | | | |
| | R1C13-7 | U15 | (If present) HCP G10 or FCS | | U15 | R1C13-7 | | |
| | | U14 | (If present) HCP G10 or FCS | | U14 | | | |
| | R1C13-8 | U13 | (If present) HCP G10 or FCS | | U13 | R1C13-8 | | |
| | | U12 | (If present) HCP G10 or FCS | | U12 | | | |
| | Y1C13-3 | U11 | (If present) HCP G10 or FCS | | U11 | Y1C13-3 | | |
| | | U10 | (If present) HCP G10 or FCS | | U10 | | | |
| | Y1C13-4 | U09 | (If present) HCP G10 or FCS | | U09 | Y1C13-4 | | |
| | | U08 | HCP G10 | | U08 | | | |
| | Y1C13-5 | U07 | HCP G10 | | U07 | Y1C13-5 | | |
| | U06 | HCP G10 | | U06 | | | | |
| Y1C13-6 | U05 | HCP G10 | | U05 | Y1C13-6 | | | |
| | U04 | HCP G10 | | U04 | | | | |
| Y1C13-7 | U03 | HCP G10 | | U03 | Y1C13-7 | | | |
| | U02 | HCP G10 | | U02 | | | | |
| Y1C13-8 | U01 | HCP G10 | | U01 | Y1C13-8 | | | |

* This outlet is used only when the Ethernet switch has two power supplies.

| HCP G10 Base and Expansion | | | | | | | | |
|--|----------|-------------------------|---|-----------------|---------|-----------|---------|----------|
| 3P30A-24C13-6C19UL PDU (Three-phase AMER) — Bottom Power | | | | | | | | |
| | | Base 1/10G 1U Switch | Base 1/10G 2U Switch | Expansion | | | | |
| Left PDU | | U# | HARDWARE | | U# | Right PDU | | |
| PDU | | U42 | Empty | Empty | Empty | U42 | PDU | |
| | | U41 | | | | U41 | | |
| | | U40 | | U40 | | | | |
| | Y1C13-8 | U39 | | Ethernet Switch | | U39 | | Y1C13-8 |
| | | U38 | | Ethernet Switch | | U38 | | |
| | Y1C13-7 | U37 | U37 | | Y1C13-7 | | | |
| | | U36 | (If present) HCP G10 or FCS | | | U36 | | |
| | Y1C13-6 | U35 | (If present) HCP G10 or FCS | | | U35 | | Y1C13-6 |
| | | U34 | (If present) HCP G10 or FCS | | | U34 | | |
| | Y1C13-5 | U33 | (If present) HCP G10 or FCS | | | U33 | | Y1C13-5 |
| | | U32 | (If present) HCP G10 or FCS | | | U32 | | |
| | Y1C13-4 | U31 | (If present) HCP G10 or FCS | | | U31 | | Y1C13-4 |
| | | U30 | (If present) HCP G10 or FCS | | | U30 | | |
| | Y1C13-3 | U29 | (If present) HCP G10 or FCS | | | U29 | | Y1C13-3 |
| | Y1C13-2✱ | U28 | Ethernet Switch | Empty | Empty | U28 | | Y1C13-2 |
| | Y1C13-1 | U27 | Ethernet Switch | | | U27 | | Y1C13-1✱ |
| | R1C13-8 | U26 | (If present) Fibre Channel Switch | | | U26 | | R1C13-8 |
| | R1C19-1 | U25 | (If present) Fibre Channel Switch — C13-C20 Cable | | | U25 | | R1C19-1 |
| | | U24 | (If present) HCP G10 or FCS | | | U24 | | |
| | R1C13-6 | U23 | (If present) HCP G10 or FCS | | | U23 | | R1C13-6 |
| | | U22 | (If present) HCP G10 or FCS | | | U22 | | |
| | R1C13-5 | U21 | (If present) HCP G10 or FCS | | | U21 | | R1C13-5 |
| | | U20 | (If present) HCP G10 or FCS | | | U20 | | |
| | R1C13-4 | U19 | (If present) HCP G10 or FCS | | | U19 | | R1C13-4 |
| | | U18 | (If present) HCP G10 or FCS | | | U18 | | |
| | R1C13-3 | U17 | (If present) HCP G10 or FCS | | | U17 | | R1C13-3 |
| | | U16 | (If present) HCP G10 or FCS | | | U16 | | |
| | R1C13-2 | U15 | (If present) HCP G10 or FCS | | | U15 | | R1C13-2 |
| | | U14 | (If present) HCP G10 or FCS | | | U14 | | |
| | R1C13-1 | U13 | (If present) HCP G10 or FCS | | | U13 | | R1C13-1 |
| | | U12 | (If present) HCP G10 or FCS | | | U12 | | |
| | B1C13-8 | U11 | (If present) HCP G10 or FCS | | | U11 | | B1C13-8 |
| | | U10 | (If present) HCP G10 or FCS | | | U10 | | |
| | B1C13-7 | U09 | (If present) HCP G10 or FCS | | | U09 | | B1C13-7 |
| | | U08 | HCP G10 | | | U08 | | |
| | B1C13-6 | U07 | HCP G10 | | | U07 | | B1C13-6 |
| | | U06 | HCP G10 | | | U06 | | |
| | B1C13-5 | U05 | HCP G10 | | | U05 | | B1C13-5 |
| | | U04 | HCP G10 | | | U04 | | |
| | B1C13-4 | U03 | HCP G10 | | | U03 | | B1C13-4 |
| | | U02 | HCP G10 | | | U02 | | |
| PWR | B1C13-3 | U01 | HCP G10 | | | U01 | B1C13-3 | PWR |

* This outlet is used only when the Ethernet switch has two power supplies.

| HCP G10 Base and Expansion | | | | | | | |
|--|-----|---|-------------------------|-----------|-----|-----------|-----|
| 3P32A-24C13-6C19CE PDU (Three-phase EMEA/APAC) — Top Power | | | | | | | |
| | | Base 1/10G 1U Switch | Base 1/10G 2U Switch | Expansion | | | |
| Left PDU | U# | HARDWARE | | | U# | Right PDU | |
| PWR | U42 | Empty | Empty | Empty | U42 | | PWR |
| | U41 | | | | U41 | | |
| | U40 | | Ethernet Switch | | U40 | | |
| B1C13-1 | U39 | | Ethernet Switch | | U39 | B1C13-1 | |
| | U38 | | | | U38 | | |
| B1C13-2 | U37 | | | | U37 | B1C13-2 | |
| | U36 | (If present) HCP G10 or FCS | | | U36 | | |
| B1C13-3 | U35 | (If present) HCP G10 or FCS | | | U35 | B1C13-3 | |
| | U34 | (If present) HCP G10 or FCS | | | U34 | | |
| B1C13-4 | U33 | (If present) HCP G10 or FCS | | | U33 | B1C13-4 | |
| | U32 | (If present) HCP G10 or FCS | | | U32 | | |
| B2C13-5 | U31 | (If present) HCP G10 or FCS | | | U31 | B2C13-5 | |
| | U30 | (If present) HCP G10 or FCS | | | U30 | | |
| B2C13-6 | U29 | (If present) HCP G10 or FCS | | | U29 | B2C13-6 | |
| B1C13-7* | U28 | Ethernet Switch | Empty | Empty | U28 | B1C13-7 | |
| B1C13-8 | U27 | Ethernet Switch | | | U27 | B1C13-8* | |
| R1C13-1 | U26 | (If present) Fibre Channel Switch | | | U26 | R1C13-1 | |
| R1C19-1 | U25 | (If present) Fibre Channel Switch — C13-C20 Cable | | | U25 | R1C19-1 | |
| | U24 | (If present) HCP G10 or FCS | | | U24 | | |
| R1C13-3 | U23 | (If present) HCP G10 or FCS | | | U23 | R1C13-3 | |
| | U22 | (If present) HCP G10 or FCS | | | U22 | | |
| R1C13-4 | U21 | (If present) HCP G10 or FCS | | | U21 | R1C13-4 | |
| | U20 | (If present) HCP G10 or FCS | | | U20 | | |
| R2C13-5 | U19 | (If present) HCP G10 or FCS | | | U19 | R2C13-5 | |
| | U18 | (If present) HCP G10 or FCS | | | U18 | | |
| R2C13-6 | U17 | (If present) HCP G10 or FCS | | | U17 | R2C13-6 | |
| | U16 | (If present) HCP G10 or FCS | | | U16 | | |
| R2C13-7 | U15 | (If present) HCP G10 or FCS | | | U15 | R2C13-7 | |
| | U14 | (If present) HCP G10 or FCS | | | U14 | | |
| R2C13-8 | U13 | (If present) HCP G10 or FCS | | | U13 | R2C13-8 | |
| | U12 | (If present) HCP G10 or FCS | | | U12 | | |
| Y1C13-3 | U11 | (If present) HCP G10 or FCS | | | U11 | Y1C13-3 | |
| | U10 | (If present) HCP G10 or FCS | | | U10 | | |
| Y1C13-4 | U09 | (If present) HCP G10 or FCS | | | U09 | Y1C13-4 | |
| | U08 | HCP G10 | | | U08 | | |
| Y2C13-5 | U07 | HCP G10 | | | U07 | Y2C13-5 | |
| | U06 | HCP G10 | | | U06 | | |
| Y2C13-6 | U05 | HCP G10 | | | U05 | Y2C13-6 | |
| | U04 | HCP G10 | | | U04 | | |
| Y2C13-7 | U03 | HCP G10 | | | U03 | Y2C13-7 | |
| | U02 | HCP G10 | | | U02 | | |
| Y2C13-8 | U01 | HCP G10 | | | U01 | Y2C13-8 | |

* This outlet is used only when the Ethernet switch has two power supplies.

| HCP G10 Base and Expansion | | | | | | | | | | |
|---|----------|-------------------------|---|-------------------------|--|-----------|---------|-----------|-----|--|
| 3P32A-24C13-6C19CE PDU (Three-phase EMEA/APAC) — Bottom Power | | | | | | | | | | |
| | | Base 1/10G 1U Switch | | Base 1/10G 2U Switch | | Expansion | | | | |
| Left PDU | | U# | HARDWARE | | | | U# | Right PDU | | |
| PDU | | U42 | Empty | Empty | | Empty | U42 | | PDU | |
| | | U41 | | | | | U41 | | | |
| | | U40 | | | | | U40 | | | |
| | Y2C13-8 | U39 | | Ethernet Switch | | | U39 | Y2C13-8 | | |
| | | U38 | | | | | U38 | | | |
| | Y2C13-7 | U37 | Ethernet Switch | | | U37 | Y2C13-7 | | | |
| | | U36 | (If present) HCP G10 or FCS | | | | U36 | | | |
| | Y2C13-6 | U35 | | | | | U35 | Y2C13-6 | | |
| | | U34 | (If present) HCP G10 or FCS | | | | U34 | | | |
| | Y2C13-5 | U33 | | | | | U33 | Y2C13-5 | | |
| | | U32 | (If present) HCP G10 or FCS | | | | U32 | | | |
| | Y1C13-4 | U31 | | | | | U31 | Y1C13-4 | | |
| | | U30 | (If present) HCP G10 or FCS | | | | U30 | | | |
| | Y1C13-3 | U29 | | | | | U29 | Y1C13-3 | | |
| | Y1C13-2✱ | U28 | Ethernet Switch | Empty | | Empty | U28 | Y1C13-2 | | |
| | Y1C13-1 | U27 | Ethernet Switch | | | | U27 | Y1C13-1✱ | | |
| | R2C13-8 | U26 | (If present) Fibre Channel Switch | | | | U26 | R2C13-8 | | |
| | R2C19-1 | U25 | (If present) Fibre Channel Switch — C13-C20 Cable | | | | U25 | R2C19-1 | | |
| | | U24 | (If present) HCP G10 or FCS | | | | U24 | | | |
| | R2C13-6 | U23 | | | | | U23 | R2C13-6 | | |
| | | U22 | (If present) HCP G10 or FCS | | | | U22 | | | |
| | R2C13-5 | U21 | | | | | U21 | R2C13-5 | | |
| | | U20 | (If present) HCP G10 or FCS | | | | U20 | | | |
| | R1C13-4 | U19 | | | | | U19 | R1C13-4 | | |
| | | U18 | (If present) HCP G10 or FCS | | | | U18 | | | |
| | R1C13-3 | U17 | | | | | U17 | R1C13-3 | | |
| | | U16 | (If present) HCP G10 or FCS | | | | U16 | | | |
| | R1C13-2 | U15 | | | | | U15 | R1C13-2 | | |
| | | U14 | (If present) HCP G10 or FCS | | | | U14 | | | |
| | R1C13-1 | U13 | | | | | U13 | R1C13-1 | | |
| | | U12 | (If present) HCP G10 or FCS | | | | U12 | | | |
| | B2C13-8 | U11 | | | | | U11 | B2C13-8 | | |
| | | U10 | (If present) HCP G10 or FCS | | | | U10 | | | |
| | B2C13-7 | U09 | | | | | U09 | B2C13-7 | | |
| | | U08 | HCP G10 | | | | U08 | | | |
| | B2C13-6 | U07 | | | | | U07 | B2C13-6 | | |
| | | U06 | HCP G10 | | | | U06 | | | |
| | B2C13-5 | U05 | | | | | U05 | B2C13-5 | | |
| | | U04 | HCP G10 | | | | U04 | | | |
| | B1C13-4 | U03 | | | | | U03 | B1C13-4 | | |
| | | U02 | HCP G10 | | | | U02 | | | |
| PWR | B1C13-3 | U01 | | | | | U01 | B1C13-3 | PWR | |

* This outlet is used only when the Ethernet switch has two power supplies.

| HCP G10 Appliance with VSP-G | | | | | | | | | |
|--|----------|-----------------|---|-------------------------|---------------------|-------------------------|---------|---------------------|--------|
| 1P30A-8C13-3C19UL PDU (Single-phase AMER) | | | | | | | | | |
| 1P32A-9C13-3C19CE PDU (Single-phase EMEA/APAC) | | | | | | | | | |
| | | G200 w/DBS/L | | G400/G600 w/DBS/L | | G200 w/DB60 | | G400/G600 w/DB60 | |
| Left PDUs | | U# | HARDWARE | | | | U# | Right PDUs | |
| UPPER | Y1C13-2 | U42 | VSP-G SVP | | | | U42 | | UPPER |
| | | U41 | (If present) 2nd VSP-G SVP | | | | U41 | Y1C13-2 | |
| | | U40 | (If present) HCP G10 or FCS | | | | U40 | | |
| | Y1C13-1 | U39 | (If present) HCP G10 or FCS | | | | U39 | Y1C13-1 | |
| | | U38 | (If present) HCP G10 or FCS | | | | U38 | | |
| | R1C13-3 | U37 | (If present) HCP G10 or FCS | | | | U37 | R1C13-3 | |
| | | U36 | HCP G10 | | | | U36 | | |
| | R1C13-2 | U35 | HCP G10 | | | | U35 | R1C13-2 | |
| | | U34 | HCP G10 | | | | U34 | | |
| | R1C13-1 | U33 | HCP G10 | | | | U33 | R1C13-1 | |
| | | U32 | HCP G10 | | | | U32 | | |
| | | B1C13-3 | U31 | HCP G10 | | | | U31 | |
| | | U30 | HCP G10 | | | | U30 | | |
| | B1C13-2 | U29 | HCP G10 | | | | U29 | B1C13-2 | |
| PWR | B1C13-1* | U28 | Ethernet Switch | | | | U28 | B1C13-1 | PWR |
| MIDDLE | Y1C13-2 | U27 | Ethernet Switch | | | | U27 | Y1C13-2* | MIDDLE |
| | Y1C13-1 | U26 | (If present) Fibre Channel Switch | | | | U26 | Y1C13-1 | |
| | Y1C19-1 | U25 | (If present) Fibre Channel Switch — C13-C20 Cable | | | | U25 | Y1C19-1 | |
| | | U24 | Empty | DBS/L Tray | Empty | Empty | U24 | | |
| | R1C13-3 | U23 | | DBS/L Tray | | | U23 | R1C13-3 | |
| | | U22 | | DBS/L Tray | | | U22 | | |
| | R1C13-2 | U21 | | | | | U21 | R1C13-3 | |
| | | U20 | DBS/L Tray | | | | U20 | | |
| | R1C13-1 | U19 | DBS/L Tray | | | | U19 | R1C13-2 | |
| | | U18 | DBS/L Tray | | DB60 Tray | | U18 | | |
| | B1C13-3 | U17 | DBS/L Tray | | | | U17 | B1C13-3 | |
| | | U16 | DBS/L Tray | | | | U16 | | |
| | B1C13-2 | U15 | DBS/L Tray | | | U15 | B1C13-2 | | |
| | | U14 | DBS/L Tray | | DB60 Tray | | U14 | | |
| PWR | B1C13-1 | U13 | DBS/L Tray | | | | U13 | B1C13-1 | PWR |
| PWR | | U12 | DBS/L Tray | | | | U12 | | PWR |
| LOWER | | B1C13-1 | U11 | DBS/L Tray | | | U11 | B1C13-1 | LOWER |
| | | | U10 | DBS/L Tray | | | U10 | | |
| | B1C13-2 | U09 | DBS/L Tray | | | U09 | B1C13-2 | | |
| | | U08 | DBS/L Tray | | | U08 | | | |
| | R1C13-1 | U07 | DBS/L Tray | | | U07 | R1C13-1 | | |
| | | U06 | Empty | 4U VSP-G400/600 CBLM | Empty | 4U VSP-G400/600 CBLM | U06 | | |
| | | U05 | | | | | U05 | | |
| | | U04 | 2U VSP-G200 CBSL | | 2U VSP-G200 CBSL | | U04 | | |
| | Y1C13-1 | U03 | CBSL | | | | U03 | Y1C13-1 | |
| | | U02 | Empty | | | | U02 | | |
| | | U01 | Empty | | | | U01 | | |

* This outlet is used only when the Ethernet switch has two power supplies.

| HCP G10 Appliance with VSP-G | | | | | | | | | | |
|--|----------|------------------|---|-----------------------------|-------|-----------------------------|-----|---------------------|-------|---------|
| 3P30A-15C13-3C19UL PDU (Three-phase AMER) | | | | | | | | | | |
| 3P16A-15C13-3C19CE PDU (Three-phase EMEA/APAC) | | | | | | | | | | |
| | | G200 w/DBS(L) | | G400/G600 w/DBS(L) | | G200 w/DB60 | | G400/G600 w/DB60 | | |
| Left PDUs | | U# | HARDWARE | | | | U# | Right PDUs | | |
| UPPER | Y1C13-5 | U42 | VSP-G SVP | | | | U42 | | UPPER | |
| | | U41 | (If present) 2nd VSP-G SVP | | | | U41 | Y1C13-5 | | |
| | | U40 | (If present) HCP G10 or FCS | | | | U40 | | | |
| | Y1C13-4 | U39 | (If present) HCP G10 or FCS | | | | U39 | Y1C13-4 | | |
| | | U38 | (If present) HCP G10 or FCS | | | | U38 | | | |
| | Y1C13-3 | U37 | (If present) HCP G10 or FCS | | | | U37 | Y1C13-3 | | |
| | | U36 | HCP G10 | | | | U36 | | | |
| | Y1C13-2 | U35 | HCP G10 | | | | U35 | Y1C13-2 | | |
| | | U34 | HCP G10 | | | | U34 | | | |
| | Y1C13-1 | U33 | HCP G10 | | | | U33 | Y1C13-1 | | |
| | | U32 | HCP G10 | | | | U32 | | | |
| | R1C13-5 | U31 | HCP G10 | | | | U31 | R1C13-5 | | |
| | | U30 | HCP G10 | | | | U30 | | | |
| | R1C13-4 | U29 | HCP G10 | | | | U29 | R1C13-4 | | |
| | R1C13-3* | U28 | Ethernet Switch | | | | U28 | R1C13-3 | | |
| | R1C13-2 | U27 | Ethernet Switch | | | | U27 | R1C13-2* | | |
| | R1C13-1 | U26 | (If present) Fibre Channel Switch | | | | U26 | R1C13-1 | | |
| | R1C19-1 | U25 | (If present) Fibre Channel Switch — C13-C20 Cable | | | | U25 | R1C19-1 | | |
| | | U24 | Empty | DBS/L Tray | Empty | Empty | U24 | | | |
| | B1C13-5 | U23 | | DBS/L Tray | | | U23 | B1C13-5 | | |
| | | U22 | | DBS/L Tray | | | U22 | | | |
| | | B1C13-4 | U21 | | | | | U21 | | B1C13-4 |
| | | | U20 | DBS/L Tray | | | | U20 | | |
| | | B1C13-3 | U19 | DBS/L Tray | | | | U19 | | B1C13-3 |
| | | | U18 | DBS/L Tray | | | | U18 | | |
| | | B1C13-2 | U17 | DBS/L Tray | | | | U17 | | B1C13-2 |
| | | | U16 | DBS/L Tray | | | | U16 | | |
| PWR | B1C13-1 | U15 | DBS/L Tray | | | | U15 | B1C13-1 | PWR | |
| PWR | | U14 | DBS/L Tray | | | | U14 | | PWR | |
| LOWER | B1C13-1 | U13 | DBS/L Tray | | | | U13 | B1C13-1 | LOWER | |
| | | U12 | DBS/L Tray | | | | U12 | | | |
| | B1C13-2 | U11 | DBS/L Tray | | | | U11 | B1C13-2 | | |
| | | U10 | DBS/L Tray | | | | U10 | | | |
| | R1C13-4 | U09 | DBS/L Tray | | | | U09 | R1C13-4 | | |
| | | U08 | DBS/L Tray | | | | U08 | | | |
| | R1C13-5 | U07 | DBS/L Tray | | | | U07 | R1C13-5 | | |
| | | U06 | Empty | 4U VSP- G400/600 CBLM | Empty | 4U VSP- G400/600 CBLM | U06 | | | |
| | | U05 | | | | | U05 | | | |
| | | Y1C13-5 | U04 | 2U VSP-G200 CBSL | | 2U VSP-G200 CBSL | | U04 | | Y1C13-5 |
| | | U03 | | | | | U03 | | | |
| | | U02 | Empty | | | | U02 | | | |
| | | U01 | Empty | | | | U01 | | | |

* This outlet is used only when the Ethernet switch has two power supplies.

| HCP G10 Appliance with S10 and Optional VSP-G | | | | | | | | | |
|--|----------|----------------|---|----------------------|--------------------|----------------------|------------|--------|---------|
| 1P30A-8C13-3C19UL PDU (Single-phase AMER) | | | | | | | | | |
| 1P32A-9C13-3C19CE PDU (Single-phase EMEA/APAC) | | | | | | | | | |
| | | S10/G200 DBS/L | S10/G400/G600 DBS/L | S10/G200 DB60 | S10/G400/G600 DB60 | | | | |
| Left PDUs | | U# | HARDWARE | | | U# | Right PDUs | | |
| UPPER | Y1C13-2 | U42 | VSP-G SVP | | | U42 | | UPPER | |
| | | U41 | (If present) 2nd VSP-G SVP | | | U41 | Y1C13-2 | | |
| | | U40 | (If present) HCP G10 or FCS | | | U40 | | | |
| | Y1C13-1 | U39 | (If present) HCP G10 or FCS | | | U39 | Y1C13-1 | | |
| | | U38 | (If present) HCP G10 or FCS | | | U38 | | | |
| | R1C13-3 | U37 | | | | U37 | R1C13-3 | | |
| | | U36 | HCP G10 | | | U36 | | | |
| | R1C13-2 | U35 | | | | U35 | R1C13-2 | | |
| | | U34 | HCP G10 | | | U34 | | | |
| | R1C13-1 | U33 | | | | U33 | R1C13-1 | | |
| | | U32 | HCP G10 | | | U32 | | | |
| | | B1C13-3 | U31 | | | | U31 | | B1C13-3 |
| | | U30 | HCP G10 | | | U30 | | | |
| | B1C13-2 | U29 | | | | U29 | B1C13-2 | | |
| PWR | B1C13-1* | U28 | Ethernet Switch | | | U28 | B1C13-1 | PWR | |
| MIDDLE | Y1C13-2 | U27 | Ethernet Switch | | | U27 | Y1C13-2* | MIDDLE | |
| | Y1C13-1 | U26 | (If present) Fibre Channel Switch | | | U26 | Y1C13-1 | | |
| | Y1C19-1 | U25 | (If present) Fibre Channel Switch — C13-C20 Cable | | | U25 | Y1C19-1 | | |
| | | U24 | DBS/L Tray | | Empty | Empty | U24 | | |
| | R1C13-3 | U23 | | | | U23 | R1C13-3 | | |
| | | U22 | DBS/L Tray | | DB60 Tray | | U22 | | |
| | R1C13-2 | U21 | | | | U21 | R1C13-2 | | |
| | | U20 | DBS/L Tray | | DB60 Tray | | U20 | | |
| | R1C13-1 | U19 | | | | U19 | R1C13-1 | | |
| | | U18 | DBS/L Tray | 4U VSP-G400/600 CBLM | DB60 Tray | 4U VSP-G400/600 CBLM | U18 | | |
| | B1C13-3 | U17 | | | | | U17 | | B1C13-3 |
| | | U16 | 2U VSP G200 CBSL | | VSP G200 CBSL | | U16 | | |
| | B1C13-2 | U15 | | | | U15 | B1C13-2 | | |
| | | U14 | | | | U14 | | | |
| PWR | B1C13-1 | U13 | HCP S10 4U 60 HDD | | | U13 | B1C13-1 | PWR | |
| PWR | | U12 | | | | U12 | | PWR | |
| LOWER | B1C19-1 | U11 | | | | U11 | B1C19-1 | LOWER | |
| | | U10 | | | | U10 | | | |
| | | U09 | HCP S10 4U 60 HDD | | | U09 | | | |
| | | U08 | | | | U08 | | | |
| | R1C19-1 | U07 | | | | U07 | R1C19-1 | | |
| | | U06 | | | | U06 | | | |
| | | U05 | HCP S10 4U 60 HDD | | | U05 | | | |
| | | U04 | | | | U04 | | | |
| | Y1C19-1 | U03 | | | | U03 | Y1C19-1 | | |
| | | U02 | Empty | | | U02 | | | |
| | | U01 | | | | U01 | | | |

* This outlet is used only when the Ethernet switch has two power supplies.

| HCP G10 Appliance with S10 and Optional VSP-G | | | | | | | | | |
|--|----------|----------------|---|-----------------------|---------------------|-----------------------|------------|---------|--|
| 1P30A-8C13-3C19UL PDU (Single-phase AMER) | | | | | | | | | |
| 1P32A-9C13-3C19CE PDU (Single-phase EMEA/APAC) | | | | | | | | | |
| | | S10/G200 DBS/L | S10/G400/ G600 DBS/L | S10/G200 DB60 | S10/G400/ G600 DB60 | | | | |
| Left PDUs | | U# | HARDWARE | | | U# | Right PDUs | | |
| UPPER | Y1C13-2 | U42 | VSP-G SVP | | | U42 | | | |
| | | U41 | (If present) 2nd VSP-G SVP | | | U41 | Y1C13-2 | | |
| | | U40 | (If present) HCP G10 or FCS | | | U40 | | | |
| | Y1C13-1 | U39 | (If present) HCP G10 or FCS | | | U39 | Y1C13-1 | | |
| | | U38 | (If present) HCP G10 or FCS | | | U38 | | | |
| | R1C13-3 | U37 | (If present) HCP G10 or FCS | | | U37 | R1C13-3 | | |
| | | U36 | HCP G10 | | | U36 | | | |
| | R1C13-2 | U35 | HCP G10 | | | U35 | R1C13-2 | | |
| | | U34 | HCP G10 | | | U34 | | | |
| | R1C13-1 | U33 | HCP G10 | | | U33 | R1C13-1 | | |
| | | U32 | HCP G10 | | | U32 | | | |
| | B1C13-3 | U31 | HCP G10 | | | U31 | B1C13-3 | | |
| | U30 | HCP G10 | | | U30 | | | | |
| B1C13-2 | U29 | HCP G10 | | | U29 | B1C13-2 | | | |
| PWR | B1C13-1* | U28 | Ethernet Switch | | | U28 | B1C13-1 | PWR | |
| MIDDLE | Y1C13-2 | U27 | Ethernet Switch | | | U27 | Y1C13-2* | | |
| | Y1C13-1 | U26 | (If present) Fibre Channel Switch | | | U26 | Y1C13-1 | | |
| | Y1C19-1 | U25 | (If present) Fibre Channel Switch — C13-C20 Cable | | | U25 | Y1C19-1 | | |
| | | U24 | DBS/L Tray | | Empty | Empty | U24 | | |
| | R1C13-3 | U23 | DBS/L Tray | | | U23 | R1C13-3 | | |
| | | U22 | DBS/L Tray | | DB60 Tray | | U22 | | |
| | R1C13-2 | U21 | DBS/L Tray | | | U21 | R1C13-2 | | |
| | | U20 | DBS/L Tray | | DB60 Tray | | U20 | | |
| | R1C13-1 | U19 | DBS/L Tray | | | U19 | R1C13-1 | | |
| | | U18 | DBS/L Tray | 4U VSP- G400/600 CBLM | DB60 Tray | | U18 | | |
| | B1C13-3 | U17 | | | | 4U VSP- G400/600 CBLM | U17 | B1C13-3 | |
| | | U16 | 2U VSP G200 | VSP G200 CBSL | DB60 Tray | | U16 | | |
| B1C13-2 | U15 | CBSL | 4U VSP- G400/600 CBLM | | | U15 | B1C13-2 | | |
| | U14 | | | | | U14 | | | |
| PWR | B1C13-1 | U13 | HCP S10 4U 60 HDD | | | U13 | B1C13-1 | PWR | |
| PWR | | U12 | HCP S10 4U 60 HDD | | | U12 | | PWR | |
| | B1C19-1 | U11 | HCP S10 4U 60 HDD | | | U11 | B1C19-1 | | |
| | | U10 | HCP S10 4U 60 HDD | | | U10 | | | |
| | | U09 | HCP S10 4U 60 HDD | | | U09 | | | |
| | | U08 | HCP S10 4U 60 HDD | | | U08 | | | |
| | R1C19-1 | U07 | HCP S10 4U 60 HDD | | | U07 | R1C19-1 | | |
| | | U06 | HCP S10 4U 60 HDD | | | U06 | | | |
| | | U05 | HCP S10 4U 60 HDD | | | U05 | | | |
| | | U04 | HCP S10 4U 60 HDD | | | U04 | | | |
| | Y1C19-1 | U03 | HCP S10 4U 60 HDD | | | U03 | Y1C19-1 | | |
| | | U02 | Empty | | | U02 | | | |
| | | U01 | Empty | | | U01 | | | |

* This outlet is used only when the Ethernet switch has two power supplies.

Considerations for racking S10 Nodes

An HCP G10 system can be racked with up to three HCP S10 Nodes in a single rack. If you are racking HCP S10 Nodes, you need to rack the S10 Nodes first at the bottom of the rack.

If the HCP system has more than three HCP S10 Nodes, the extra HCP S10 Nodes need to be racked in separate expansion racks. For more information on racking an HCP S10 Node expansion rack, see the *HCP S10 Node Assembly and Configuration* manual.

If the HCP system uses HCP S30 Nodes, the HCP S30 Nodes need to be racked in separate expansion racks. For more information on racking an HCP S30 Node rack, see the *HCP S30 Node Assembly and Configuration* manual.

Considerations for racking VSP-G storage arrays

An HCP G10 system can be racked with five models of Hitachi Virtual Storage Platform G (VSP-G) array controllers: G200, G400, G600, G800, and G1000. This manual only shows racking configurations that use VSP-G G200, G400, and G600 storage array controller models. For more information on VSP-G G800 and G1000 racking configurations, see the appropriate VSP-G documentation.

A VSP-G storage array can be racked so that it directly connects to a maximum of eight HCP G10 Nodes. If the HCP system uses more than eight HCP G10 Nodes, you need to rack the storage array in a separate expansion rack and install Fibre Channel switches in each rack. The Fibre Channel switches connect additional nodes to the storage array.

If there are no HCP S10 Nodes in the rack, the VSP-G storage array components are racked on the bottom of the rack and need to be racked first. If there are HCP S10 Nodes in the rack, the storage array components are racked above the HCP S10 Nodes and need to be racked second.

If the HCP system uses multiple storage arrays, the extra arrays need to be racked in separate expansion racks and connected to the HCP G10 Nodes using Fibre Channel switches. For more information on racking storage array expansion racks, see the appropriate VSP-G documentation.

Power cords

Each type of Ethernet switch comes with either one or two power cords depending on its needs. The power cords provided with the switches require PDUs with C13 IEC receptacles. Quanta D51B-2U servers come with two power cords each that also require PDUs with C13 IEC receptacles.

If your PDUs are not compatible with either of these types of power cords, you need to provide alternative power cords as applicable. The power cords you provide must have a C13 IEC plug at the end that connects to the server or switch.

Rackless assembly recommendation

The following rackless assembly procedure assumes you obey the HCP recommended rack and network setup configurations. If you deviate from the recommended configurations, you are responsible for providing all extra equipment and modifying the HCP system environment to accommodate for your changes. If you do not follow the recommended rack and network setups, it may cause future system expansion complications.

Ensure that you use blanking panels to cover all unused spaces in the front of the rack and that you use perforated panels where an airflow is required.

Tools and accessories you need

To assemble an HCP G10 with Attached Storage system, you need these tools:

- #2 Phillips screwdriver
- Cage-nut tool
- Wire cutter for trimming any cable ties you use



Tip: Assembling the server rails is easiest with a magnetic screwdriver.

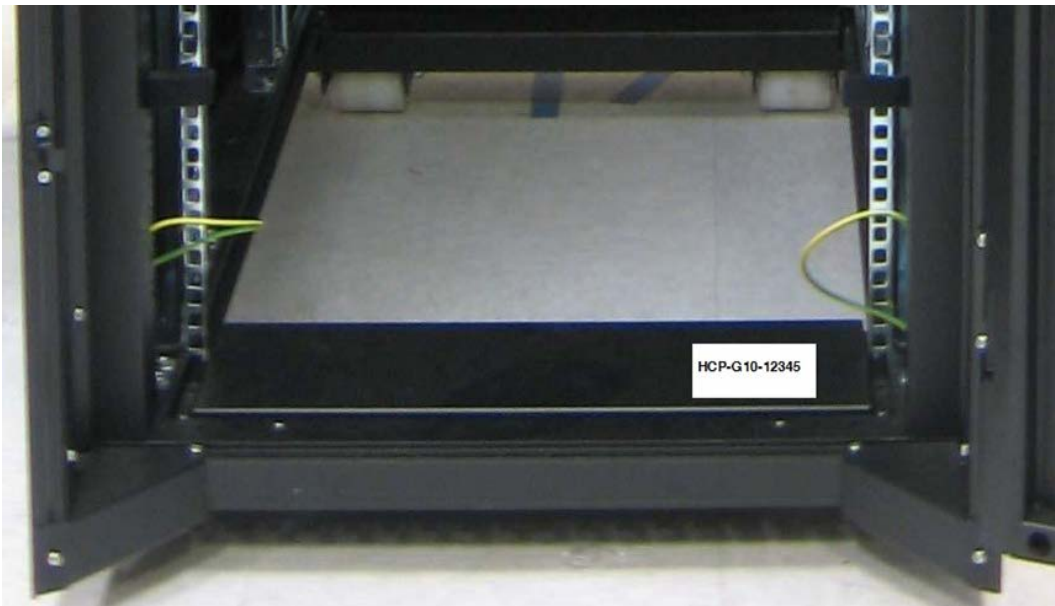
Step 1: Prepare the racks

To facilitate the system assembly, remove the doors and sides from your racks.

Step 2: Attach the HCP G10 system serial number

Each HCP G10 system is identified with a system serial number. This serial number is printed on a white rectangular sticker that needs to be affixed to the rear of the Appliance or Base rack. Serial number stickers are not applied to Expansion racks.

HCP G10 system serial number stickers are applied to the bottom right of the front side of Appliance or Base racks.



To attach an HCP G10 serial number sticker to the rack:

1. Locate the area where the sticker will be applied and clean it. The surface needs to be dry. If you feel it's necessary, use alcohol to clean the surface.
2. Remove the serial number sticker from the backing liner without touching the adhesive side.
3. Attach the serial number sticker by sticking it on the rack and sliding your finger across it from left to right.

Step 3: Install the PDUs

Install the PDUs in the rack.

For instructions on installing PDUs, see the *Hitachi Universal V2 PDU Installation, Replacement, and Removal* manual.

Step 4 (conditional): Rack the HCP S10 Nodes

If the HCP system uses HCP S10 Nodes, you need to rack the S10 Nodes. This section describes how to rack the HCP S10 Nodes and connect them to the PDUs.

Step 4a: Rack the HCP S10 Nodes

Rack the HCP S10 Nodes in the rack.

For more information on which rack units to rack the HCP S10 Nodes in, see ["Considerations for HCP racking and PDU connections"](#) on page 43.

For more information about HCP S10 Node racking, see ["Considerations for racking S10 Nodes"](#) on page 59.

For more information on how to rack the HCP S10 Nodes, see the *HCP S10 Assembly and Configuration* documentation.

Step 4b: Connect the HCP S10 Nodes to the PDUs

Connect the power cables of the HCP S10 Nodes to the PDUs.

For more information on which PDU outlets to plug the power cables of each HCP S10 Node into, see ["Considerations for HCP racking and PDU connections"](#) on page 43.

Step 5 (conditional): Rack the VSP-G

If the HCP system uses a VSP-G storage array, you need to rack the storage array. This section describes how to rack a VSP-G storage array and connect it to the PDUs.

Step 5a: Rack the VSP-G storage array

Rack the VSP-G storage array in the rack.

For more information on which rack units to rack the VSP-G storage array, see ["Considerations for HCP racking and PDU connections"](#) on page 43.

For more information about , see ["Considerations for racking VSP-G storage arrays"](#) on page 59.

For more information on how to rack the VSP-G storage array, see the appropriate VSP-G documentation.

Step 5b: Connect the VSP-G to the PDUs

Connect the VSP-G power cables to the PDUs.

For more information on which PDU outlets to plug the VSP-G power cables into, see ["Considerations for HCP racking and PDU connections"](#) on page 43.

Step 6: Rack the HCP G10 Nodes

This section describes how to rack the HCP G10 Nodes and connect them to the PDUs.

If you are building an HCP G10 system in a base configuration with optional expansion racks, the HCP G10 nodes are the first components to be racked. A base configuration supports up to eighty HCP G10 Nodes.

If you are racking an HCP G10 system in an appliance configuration, all of the other storage components need to be installed in the rack before you rack the G10 Nodes. An appliance configuration supports up to six HCP G10 Nodes in the rack.

For more information on which rack units to rack the HCP G10 Nodes, see ["Considerations for HCP racking and PDU connections"](#) on page 43.

Step 6a: Separate the inner and outer server rails

A server rail kit consists of two sets of inner and outer rails. The rails are universal; that is, each set of rails can be used for either the left or right side of the server.

In a new server rail kit, the inner rails are nested inside the outer rails. You need to separate them so that you can attach the inner rails to the server and the outer rails in the rack.

Step 6: Rack the HCP G10 Nodes

The figure below shows an inner rail nested inside an outer rail.



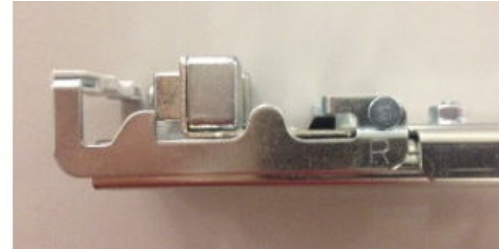
The figure below shows the inner and outer rails separated from each other. The outer rail is on top.



The word FRONT is stamped on the top and bottom lips of each outer rail at the front of the rail. The word REAR is stamped on the top and bottom of each rail at the rear of the rail.



At the rear of each outer rail, the letter L is stamped on one lip and the letter R is stamped on the other lip. With the letter L facing up, the rail goes on the left side of the rack, when viewed from the front of the rack. With the letter R facing up, the rail goes on the right side of the rack.



To separate the inner and outer server rails:

1. Slide the inner rail out of the outer rail toward the front until it locks into place.

The inner part of the outer rail slides also slides out.

2. While pulling forward the white tab on the side of the inner rail that faces the outer rail, slide the inner rail forward to release it from the outer rail. Then slide the inner rail all the way out of the outer rail.



3. Slide the inner part of the outer rail back into the outer rail. To do this, while pressing down on the metal tab on the inner part of the outer rail, slide the inner part toward the back to release it. Then slide the inner part all the way back into the outer rail.



Step 6b: Attach the inner rails to the server

The two inner rails in the server rail kit attach to the sides of the server. Each rail can attach to either side of the server .

To attach an inner rail to a server:

1. Position the rail on the side of the server so that the white tab on the rail faces out and the studs on the server fit into the holes in the rail.



2. While pushing the rail against the server, slide the rail toward the back of the server until the rail locks into place.

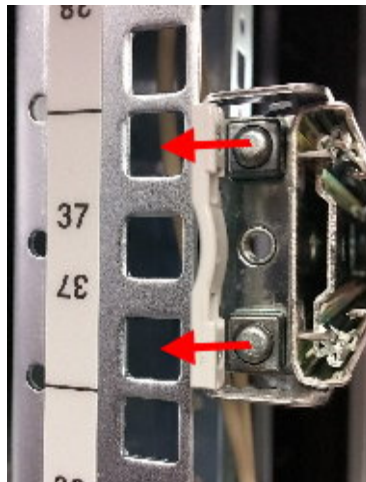
Step 6c: Install the outer server rails in the rack

The two outer rails in the server rail kit attach to the sides of the rack. Each rail can attach to either side of the rack.

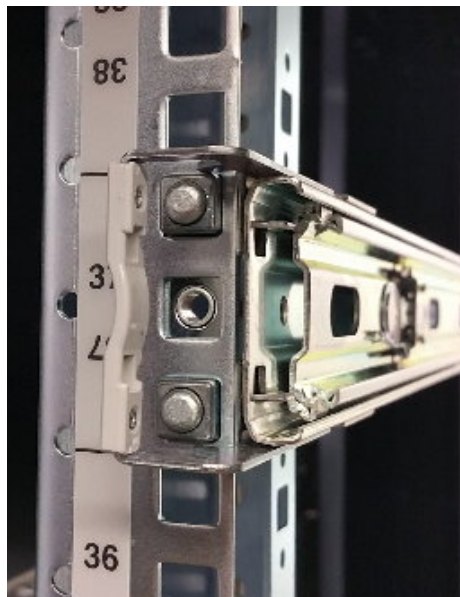
The outer rails are installed in the lower of the two rack units the server will occupy. For example, if the server will occupy rack units 37 and 38, the outer rails are installed in rack unit 37.

To install an outer rail in the rack:

1. At the rear of the rack, with the inside of the outer rail facing into the rack, align the two square studs at the rear of the rail with the back of the top and bottom square holes for the applicable rack unit in the cage rail.

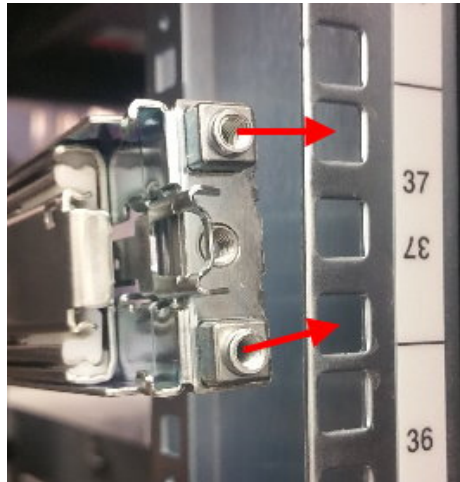


2. Fit the studs into the holes in the cage rail and pull the outer rail toward the rear of the rack until the back of the outer rail locks into place.



Step 6: Rack the HCP G10 Nodes

3. At the front of the rack, align the two square studs at the front of the outer rail with the back of the top and bottom square holes for the applicable rack unit in cage rail.



4. Fit the studs into the holes in the cage rail and pull the outer rail toward the front of the rack until the front of the outer rail locks into place.



Step 6d: Mount the server in the rack

To mount a server in a rack:

1. Ensure that the inner part of each outer rail for the server is pushed all the way back into the rack.
2. At the front of the rack, align the rear of the inner rails on the server with the front of the outer rails on the rack.

3. Fit each inner rail into the inside of the inner part of the corresponding outer rail. Then push the server back into the rack as far as the server goes.
4. While pushing back or pulling forward the purple tabs on the outsides of both inner rails on the server, push back on the server to release it. Then slide the server all the way back into the rack.



5. Using the #1 Phillips screwdriver, screw in the black locking screw below the handle on each side of the front of the server.



Step 6e: Attach the labels to the front panel

The front panel for each server takes two labels — one that says "Hitachi" and one that identifies the product. You need to attach these labels to the front panel.



To attach the labels to the front panel:

1. Peel the protective backing off the back of the "Hitachi" label.
2. Position the "Hitachi" label in the middle of the upper left rectangle on the front of the panel.



3. Press the "Hitachi" label firmly into place.
4. Peel the protective backing off the back of the product label.
5. Place the product label on the upper righthand square on the front of the panel, aligning the four sides of the label with the edges of the square.



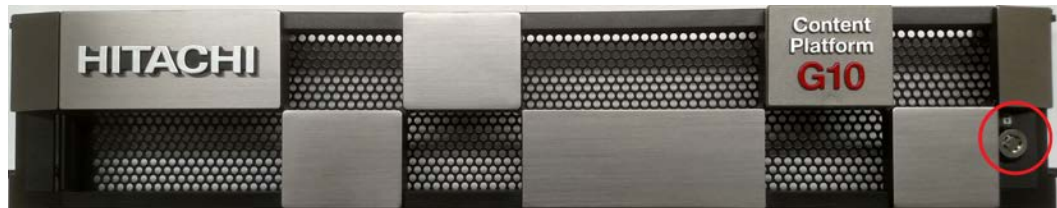
6. Press the product label firmly into place.

Step 6f: Attach the front panel to the server

The front panel has two pins on either side that fit into holes in the server handles.

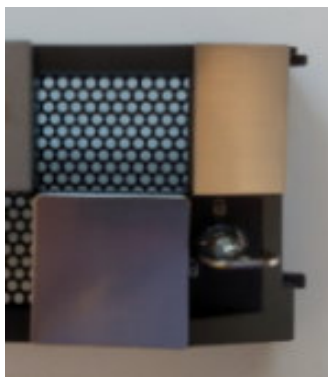


The front panel has a lock in the bottom right corner. The lock secures the panel to the server. Each panel comes with two keys. While the lock is unlocked, you cannot remove the key from it.



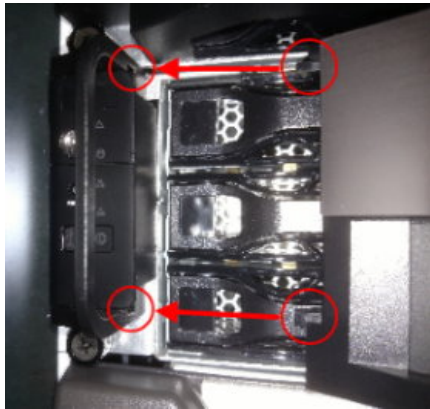
To attach the front panel to the server:

1. Insert one of the front panel keys into the front panel lock. The key goes into the lock horizontally.

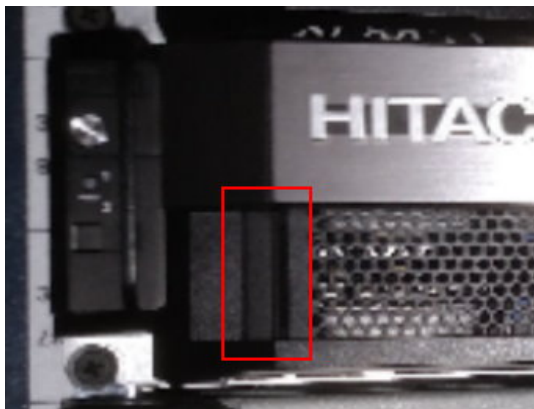


2. Turn the key one quarter turn clockwise so that the key is vertical.
3. Align the front panel with the front of the server.

4. Slide the two pins on the left side of the front panel into the two holes in the left server handle.



5. Press the tab on the front panel to the left to retract the pins on the right side of the panel.



6. While pressing the front panel against the server, release the tab so that the pins on the right side of the panel slide into the holes in the right server handle.
7. Pull gently on the right side of the front panel to ensure that pins on the right are set in the holes. If the right side of the panel moves away from the front of the server, perform step 6 again.
8. Turn the front panel key one quarter turn counterclockwise so that the key is horizontal.
9. Remove the key from the lock.
10. Store both front panel keys in a secure location.

Step 6g: Connect the HCP G10 Nodes to the PDUs

Connect the power cables of the HCP G10 Nodes to the PDUs.

For more information on which PDU outlets to plug the power cables of the HCP G10 Nodes into, see "[Considerations for HCP racking and PDU connections](#)" on page 43.

Step 7 (conditional): Rack the Fiber switches

If the HCP G10 system includes Fibre Channel switches, you need to rack the switches. If the HCP system does not use Fibre Channel switches, the HCP G10 Nodes are directly connected to the storage arrays.

HCP supports Brocade 6510 and Cisco MDS 9148s switches for Fibre Channel connections. Two Fibre Channel switches of the same model need to be installed in each rack for redundancy.

This section describes how to rack Fibre Channel switches and connect them to the PDUs.



Note: When racking and mounting switches, this manual assumes you are using M5 caged nuts and screws. If you intend to use a different type of caged nut or screw, provide your own variant for the procedure.

Connecting HCP G10 Nodes to Fibre Channel switches or storage arrays

An HCP G10 system can use Fibre Channel switches when you need to connect more than eight server nodes to a single storage array or when you need to connect nodes to external storage arrays contained in separate racks. If the ordered HCP system has Fibre Channel switches included with the order, the switches need to be installed in positions U25 and U26 for every HCP G10 rack.

There are two types of Fibre Channel switches offered with the HCP G10 system, each with forty eight 16Gbps ports, the Brocade 6510 and the Cisco MDS 9148S. Follow the installation steps for the switch type included in the order and mount them in all applicable racks. When finished, proceed to the fiber optic cabling section to connect the switches to the HCP G10 nodes and the storage arrays.

An HCP G10 system can also have the HCP G10 Nodes directly connected to the storage arrays without the use of Fibre Channel switches.

Based on whether or not Fibre Channel switches have been included in the order and what type of switches were included, select the appropriate racking and cabling section from the following table and follow the appropriate instructions.

| Switch | More information |
|---|---|
| Direct connect between HCP G10 Nodes and storage arrays | "Fiber optic cabling between HCP G10 Nodes and storage arrays (direct connect)" below |
| Racking the Brocade 6510 | "Racking the Brocade 6510" on page 76 |
| Racking the Cisco MDS 9148 | "Racking the Cisco MDS 9148S" on page 87 |

Fiber optic cabling between HCP G10 Nodes and storage arrays (direct connect)

Follow the instructions outlined below to attach fiber optic jumper cables directly from HCP G10 Nodes to storage arrays. The HCP G10 Nodes and the storage arrays must be in the same rack in an Appliance configuration in order to set up a direct connection without Fibre Channel switches. You can connect up to eight HCP G10 Nodes to a storage array.

In order to cable the HCP G10 Nodes to storage arrays:

1. Select a 3m fiber optic jumper cable and locate the label sheet containing pairs of numbered decals.
2. Starting at label 01 and proceeding sequentially, peel off the first of the pair and attach it to one end of the fiber optic cable. Peel off the second of the pair and attach it to the other end of the fiber optic cable.
3. Attach one end of the fiber optic cable to a port on the storage array. Attach the other end of the cable to a port on one the HCP G10 Nodes according to the following list of port pairs. The pairs are defined as the port on the storage array (controller-port) and port on the HCP G10 Node (node#-port). The information presented in the following table applies to VSP-G storage arrays. If the storage array included on the order is not VSP-G, substitute the appropriate ports on the storage array for the ones shown in the table.

| Primary | Secondary |
|-------------------|-------------------|
| C0-P1A to N01-PRI | C1-P2A to N01-SEC |
| C0-P1B to N02-PRI | C1-P2B to N02-SEC |
| C0-P1C to N03-PRI | C1-P2C to N03-SEC |
| C0-P1D to N04-PRI | C1-P2D to N04-SEC |
| C0-P1E to N05-PRI | C1-P2E to N05-SEC |
| C0-P1F to N06-PRI | C1-P2F to N06-SEC |
| C0-P1G to N07-PRI | C1-P2G to N07-SEC |
| C0-P1H to N08-PRI | C1-P2H to N08-SEC |

Below is an image of the back side of an HCP G10 Node with Attached Storage. The orange frames in the picture indicate the Fibre Channel ports. The Fibre Channel ports are in the same location for any other attached storage network configuration.

PRI denotes primary ports and SEC denotes secondary ports.



4. Repeat steps 1 through 3 for each cable to be connected between the storage array and the HCP G10 Nodes. The number of cables is always an even number and all HCP G10 Nodes have two connections. Not all ports on the array may be utilized and fewer than eight nodes may be present.
5. Neatly organize the fiber optic cables and use Velcro to neatly attach them to the cable organizer in the rack. Make sure the cables meet a minimum bend radius of four inches (100mm) and are not crimped

when organized as this can damage the fiber optic cable and render the path unusable.

Racking the Brocade 6510

Brocade 6510 switches are Fibre Channel switches with 48 ports. 24 ports are active per switch. A pair of Brocade 6510 switches can connect up to sixteen G10 Nodes.

Brocade 6510 switches are 1U switches. An HCP system comes with two Brocade 6510 switches per rack. Each switch takes up one rack unit. The switches should be mounted in rack units 25 and 26.

Step 7a: Unpack the Brocade 6510

To unpack the Brocade 6510 switch:

1. Locate the following items in the switch container:
 - Brocade 6510 switch
 - Rack mounting kit
2. Provide the following items
3. Supply the following items (per switch):
 - Eight M5 racking screws
 - Eight M5 caged nuts
4. Locate the following items in separate packaging:
 - 8Gbps SFP optical transceivers
 - Power cables
5. Set the required items aside in an easy-to-reach location.
6. Leave the unused items in the switch container, and set the container aside.

The rest of items included in the switch container are not necessary for installation. You don't need the original power cords for the switches.

Do not discard the additional items. Pack them together and set them aside.

7. To install the SFP (small form factor pluggable) modules into the switch, remove the required number of SFPs (small form factor pluggable) from their packaging, observing standard static electricity protection measures.



8. Insert each SFP into the switch with the proper orientation. SFP orientation on the top row of ports is opposite from the bottom row of ports. Close the clasp latch by pushing it up and over the SFP, and gently insert the SFP into the port until it clicks in place.



Step 7b: Install the Brocade 6510 rails

To attach the rails to the Brocade 6510 switches:

Step 7 (conditional): Rack the Fiber switches

1. Attach the inner pieces of the rail kit to each side of the switch using the three screws below.



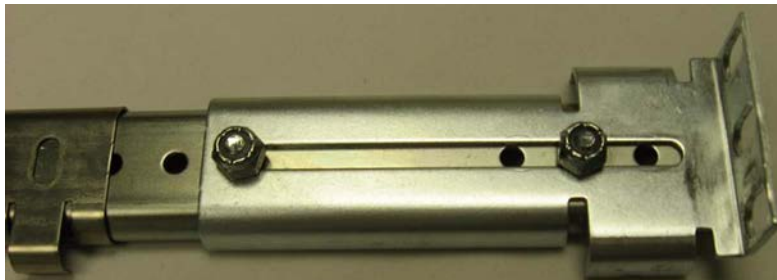
2. Attach the two mounting ears to the front sides of the switch (2 screws each).



3. Install M5 caged nuts in all three square holes of U25 and U26 on the front of the rack on the left and right sides.
4. Using the top and bottom cage nuts on the left and right front of rack unit U25, secure the back ends of the outer rails to the racks.



The image below is the back end of an outer rail. Mount the end at the front of the rack.



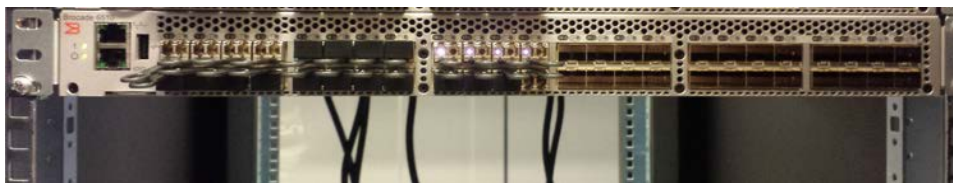
5. Repeat step 5 to secure the mounting rails for the switch to be mounted in rack position U26.

Step 7c: Mount the Brocade 6510 into the rack

To mount the switches in the racks:

1. Line up and slide the Brocade 6510 switch into the rails that are installed in the rack. Push the switch all the way into the rack.
2. Secure the port side of the switch using a screw in the middle square hole on both sides of rack unit U25.

Step 7 (conditional): Rack the Fiber switches



3. Repeat steps 1 and 2 for the other switch at rack unit U26.
4. Install two vented panels in the front of the rack at rack units U25 and U26 using M5 screws. The panels do not sit flush to the front of the rack since they are set on top of the screws for the mounting rail kit. Do not over-tighten the screws holding the perforated blanking panels.



Step 7d: Connect the Brocade 6510 to the PDUs

Connect the power cables of the Brocade 6510 switches to the PDUs.

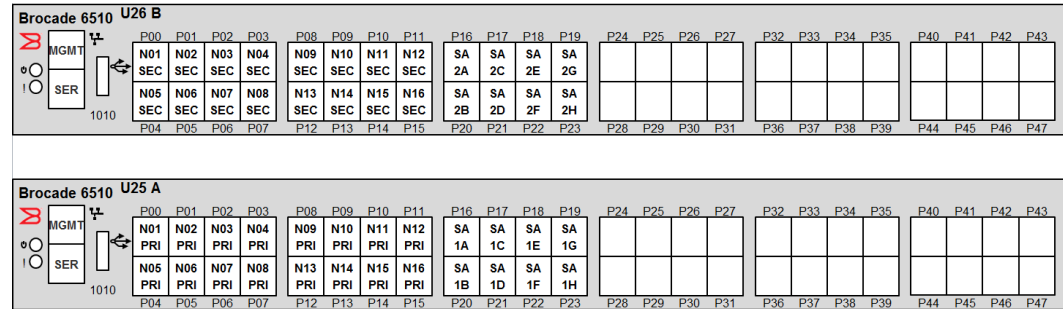
For more information on which PDU outlets to plug the power cables of the Brocade 6510 switches into, see ["Considerations for HCP racking and PDU connections"](#) on page 43.

Step 7e: Brocade 6510 port diagram

An HCP system with Fibre Channel switches includes the proper number of fiber optic jumper cables needed to connect the HCP G10 Nodes and the storage arrays to the Fibre Channel switches. The order includes labels that need to be applied to the ends of the fiber optic cables to identify them for support purposes.

Dedicate one set of jumper cables to connecting the HCP G10 Nodes to the top Fibre Channel switch, labeled *B*. Dedicate the other set of jumper cables to connecting the HCP G10 Nodes to the bottom Fibre Channel switch, labeled *A*. A third set of jumper cables is used to connect the Fibre Channel switches to the storage arrays.

The diagrams below show the port layout for connecting the HCP G10 Nodes and storage arrays to the Brocade 6510 Fibre Channel switches.



There are two ports on the left side of the switches reserved for functions outside of communicating with the node and storage array. The ports are labeled:

- **SER** — the serial port used to set the initial configuration of the switch.
- **MGMT** — the Ethernet management port of the Fibre Channel switch used to configure the zoning on the switch.

Fibre Channel ports 1-16 on the switches are reserved for connections to the HCP G10 nodes. Fibre Channel ports 17-24 on the switches are reserved for connections to the storage arrays.

All connections between the HCP G10 Nodes and the Fibre Channel switches have redundant paths for fault tolerance. All connections between the storage arrays and the Fibre Channel switches have redundant paths across controllers for fault tolerance.

Only twenty-four of the ports on the switch are licensed by default. If you intend to connect more than one storage array to the switches, ensure the total number of ports required for the storage and servers does not exceed twenty-four. It's possible for the switches to be configured with additional port licenses to expand the number of available ports per switch, but this is generally not required.

Step 7f: Cabling a Fibre Channel switch to a storage array

Follow the instructions outlined below to attach fiber optic jumper cables between the Fibre Channel switches and the storage array.

1. If the HCP system being built is an Appliance configuration:

Step 7 (conditional): Rack the Fiber switches

- a. Select a 3 meter fiber optic jumper cable and locate the label sheet containing pairs of numbered decals.
- b. Starting at label 01 and proceeding sequentially, peel off the first of the pair and attach it to one end of the fiber optic cable. Peel off the second of the pair and attach it to the other end of the fiber optic cable.
- c. Attach one end of the fiber optic cable to a port on the storage array. Attach the other end of the cable to a port on one the switches in rack position U25 or U26 according to the following list of port pairs. The pairs are defined as the port on the storage array (controller-port) and port on the switch (rack position-port). The information in the following table applies to a VSP-G storage array. If the storage array included on the order is not one of these types, substitute the appropriate ports on the storage array for the ones shown in the table.

| Primary | Secondary |
|-------------------|-------------------|
| C0-P0A to U25-P17 | C1-P1A to U26-P17 |
| C0-P0B to U25-P18 | C1-P1B to U26-P18 |
| C0-P0C to U25-P19 | C1-P1C to U26-P19 |
| C0-P0D to U25-P20 | C1-P1D to U26-P20 |
| C0-P0E to U25-P21 | C1-P1E to U26-P21 |
| C0-P0F to U25-P22 | C1-P1F to U26-P22 |
| C0-P0G to U25-P23 | C1-P1G to U26-P23 |
| C0-P0H to U25-P24 | C1-P1H to U26-P24 |

- d. Repeat steps 1a through 1c for each cable to be connected between the storage array and the Fibre Channel switches. The number of cables you connect is always be an even number, but you may not use all of the ports defined above. See the HCP system configuration sheet uploaded with the order for more information.
- e. Neatly organize the fiber optic cables and use Velcro to attach them to the cable organizer in the rack. Make sure the cables meet a minimum bend radius of four inches (100mm) and are not crimped when organized as this can damage the fiber optic cable.

2. If the HCP system being built is a Base/Expansion configuration:
 - a. Based on the number of storage arrays attached to the system, determine which HCP G10 nodes will be attached to which storage array. Divide the number of HCP G10 nodes by the number of storage arrays. Since there are sixteen HCP G10 Nodes per HCP rack, determine the number of storage arrays that will be connected to the Fibre Channel switches in each HCP rack. If the number of nodes plus half of the number of storage array ports exceeds twenty-four, stop and contact HCP Product Management or HCP Engineering for further instructions on cabling for this order.
 - b. Select a fiber optic jumper cable of the appropriate length to reach from the Fibre Channel switches in the HCP rack and the storage controllers in the separate storage rack. Also, locate the label sheet containing pairs of numbered decals.
 - c. Starting at label 01 and proceeding sequentially, peel off the first of the pair and attach it to one end of the fiber optic cable. Peel off the second of the pair and attach it to the other end of the fiber optic cable.
 - d. Attach one end of the fiber optic cable to a port on the storage array. Attach the other end of the cable to a port on one the switches in rack position U25 or U26 according to the list of port pairs shown in step 1c above. The pairs are defined as the port on the storage array (controller-port) and port on the switch (rack position-port). The information presented in the following table applies to VSP-G storage arrays. If the storage array included on the order is not VSP-G, substitute the appropriate ports on the storage array for the ones shown in the table.

| Primary | Secondary |
|-------------------|-------------------|
| C0-P0A to U25-P17 | C1-P1A to U26-P17 |
| C0-P0B to U25-P18 | C1-P1B to U26-P18 |
| C0-P0C to U25-P19 | C1-P1C to U26-P19 |
| C0-P0D to U25-P20 | C1-P1D to U26-P20 |
| C0-P0E to U25-P21 | C1-P1E to U26-P21 |

(Continued)

| Primary | Secondary |
|-------------------|-------------------|
| C0-P0F to U25-P22 | C1-P1F to U26-P22 |
| C0-P0G to U25-P23 | C1-P1G to U26-P23 |
| C0-P0H to U25-P24 | C1-P1H to U26-P24 |

- e. Repeat steps 2b through 2d for each cable to be connected between the storage array and the Fibre Channel switches. The number of cables is always an even number, but may not use all of the ports defined above. See the HCP system configuration sheet uploaded with the order for more information.
- f. If there is more than one array, repeat steps 2b through 2e for each storage array on the order.
- g. Neatly organize the fiber optic cables and use Velcro to attach them to the cable organizer in the rack. Make sure the cables meet a minimum bend radius of four inches (100mm) and are not crimped when organized as this can damage the fiber optic cable.

Step 7g: HCP G10 Node Fibre port diagram

An HCP G10 Node with attached storage has a primary Fibre Channel port and a secondary Fibre Channel port. Both of the ports are located on the HBA card. Before connecting them to the switches, make sure an SFP transceiver is present in both the primary and secondary Fibre Channel ports on each node.

The picture below shows a G10 Node with four 10G Base-T ports for the front-end and back-end Ethernet ports and two Fibre Channel ports. The orange frames in the picture below indicate the Fibre Channel ports. The Fibre Channel ports are in the same location for any other attached storage network configuration.

PRI denotes primary ports and *SEC* denotes secondary ports.



If the ordered HCP system has no Fibre Channel switches, the HCP G10 Nodes are cabled directly to the storage arrays. If the ordered HCP system has Fibre Channel switches, the HCP G10 Nodes are cabled to the Fibre Channel switches. Follow the cabling instructions in the appropriate section below for the HCP system you are building.

Step 7h: Cabling HCP G10 Nodes to Fibre Channel switches

Follow the instructions outlined below to attach fiber optic jumper cables between the HCP G10 Nodes and the Fibre Channel switches. All of the HCP G10 Nodes in a given rack are connected to the Fibre Channel switches in the same rack. Each HCP rack contains two Fibre Channel switches. To connect the nodes to the switches:

- 1. Select a 3 meter fiber optic jumper cable and locate the label sheet containing pairs of numbered decals.
- 2. Starting at label 01 and proceeding sequentially, peel off the first of the pair and attach it to one end of the fiber optic cable. Peel off the second of the pair and attach it to the other end of the fiber optic cable.
- 3. Attach one end of the fiber optic cable to a port on the Fibre Channel switch. Attach the other end of the cable to a port on one the HCP G10 Node according to the following list of port pairs. The pairs are defined as the port on the switch (rack position-port) and port on the HCP G10 Node (node#-port).

| Primary | Secondary |
|--------------------|--------------------|
| U25-P01 to N01-PRI | U26-P01 to N01-SEC |
| U25-P02 to N02-PRI | U26-P02 to N02-SEC |

(Continued)

| Primary | Secondary |
|--------------------|--------------------|
| U25-P03 to N03-PRI | U26-P03 to N03-SEC |
| U25-P04 to N04-PRI | U26-P04 to N04-SEC |
| U25-P05 to N05-PRI | U26-P05 to N05-SEC |
| U25-P06 to N06-PRI | U26-P06 to N06-SEC |
| U25-P07 to N07-PRI | U26-P07 to N07-SEC |
| U25-P08 to N08-PRI | U26-P08 to N08-SEC |
| U25-P09 to N09-PRI | U26-P09 to N09-SEC |
| U25-P10 to N10-PRI | U26-P10 to N10-SEC |
| U25-P11 to N11-PRI | U26-P11 to N11-SEC |
| U25-P12 to N12-PRI | U26-P12 to N12-SEC |
| U25-P13 to N13-PRI | U26-P13 to N13-SEC |
| U25-P14 to N14-PRI | U26-P14 to N14-SEC |
| U25-P15 to N15-PRI | U26-P15 to N15-SEC |
| U25-P16 to N16-PRI | U26-P16 to N16-SEC |

4. Repeat steps 1 through 3 for each cable to be connected between the Fibre Channel switches and the HCP G10 Nodes. The number of cables is always an even number and all HCP G10 Nodes have two connections. Not all ports on the switches may be utilized and fewer than sixteen nodes may be present.
5. If there are more than sixteen nodes in the HCP system, proceed to the second rack and repeat the process in steps 1 through 4 for the next set of HCP G10 Nodes. For each Expansion rack in the system, add sixteen to the node count shown in the table.
6. Neatly organize the fiber optic cables and use Velcro to neatly attach them to the cable organizer in the rack. Make sure the cables meet a minimum bend radius of four inches (100mm) and are not crimped when organized as this will damage the fiber optic cable and render the path unusable.

Racking the Cisco MDS 9148S

Cisco MDS 9148S switches are Fibre Channel switches with 48 ports. 24 of the ports are active per switch. A pair of Cisco MDS 9148S switches can connect up to sixteen G10 Nodes and up to sixteen storage array ports.

Cisco MDS 9148S switches are 1U switches. An HCP system comes with two Cisco MDS 9148S switches per rack. Each switch takes up one rack unit. The switches should be mounted in rack units 25 and 26.

Step 7a: Unpack the Cisco MDS 9148S

To unpack the Cisco MDS 9148S switch:

1. Locate the following items in the switch container:
 - Cisco MDS 9148 switch
 - Rack mounting kit
2. Supply the following items (per switch):
 - Eight M5 racking screws
 - Eight M5 caged nuts
3. Locate the following items in separate packaging:
 - 8Gbps SFP optical transceivers
 - Power cables
4. Set the required items aside in an easy-to-reach location.
5. Leave the unused items in the switch container, and set the container aside.

The rest of items included in the switch container are not necessary for the installation. You do not need the original power cords for the switches.

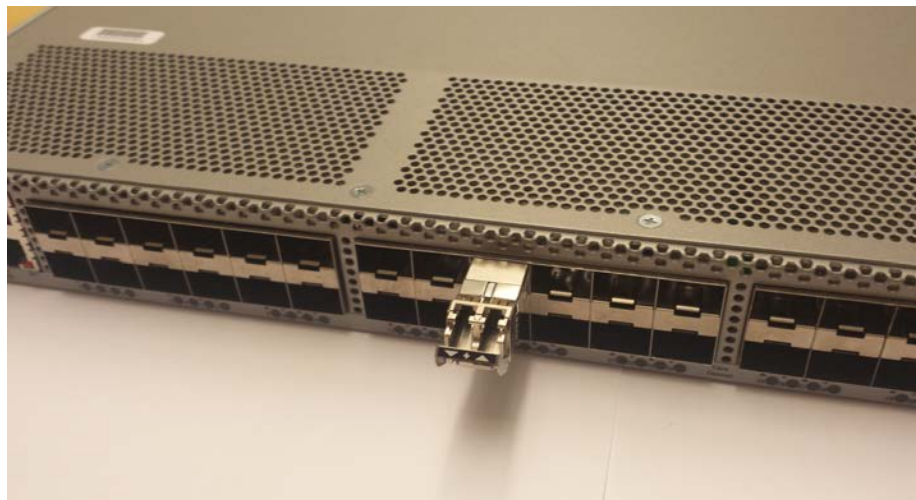
Do not discard additional items. Pack them together and set them aside.

6. To install the SFP (small form factor pluggable) modules into the switch, remove the required number of SFPs from their packaging, observing standard static electricity protection measures.

The number of required SFP transceivers per switch is the number of server nodes plus eight for each storage array. The Cisco SFPs may be packed in individual static bags instead of the packaging shown below.



7. Insert each SFP into the switch with the proper orientation. SFP orientation on the top row of ports is the opposite of the bottom row of ports. Close the clasp latch by pushing it up and over the SFP, and gently insert the SFP into the port until it clicks in place.



Important: Be gentle when inserting the modules. The switches are fragile.

Step 7b: Install the Cisco MDS 9148S mounting rails

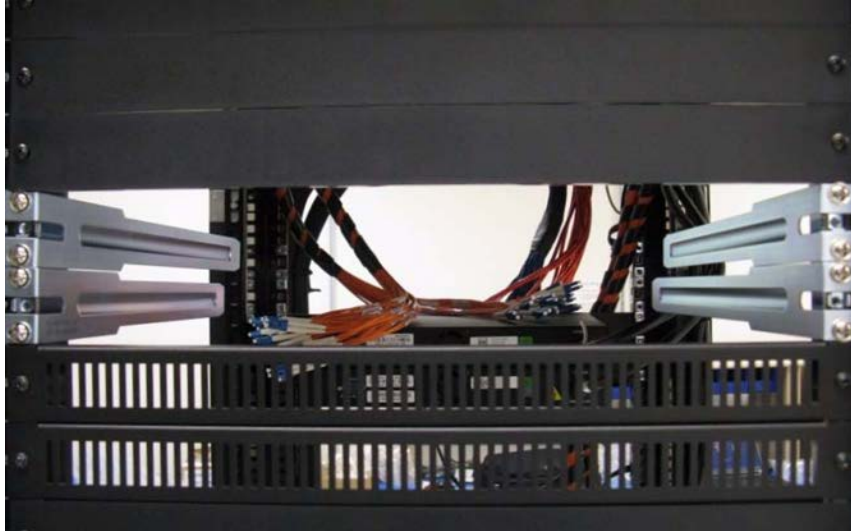
To attach rails to the switches and install the outer rails:

1. Attach the two mounting ears to the front sides of the switch using the three M4 screws that came with each bracket.



2. Attach the rear mounting bracket to the switch using M4 screws provided with the mounting kit.
3. On the front side of the rack, install three M5 caged nuts (from the rack accessory kit) in the top, middle, and bottom square holes of the left and right sides of U25 and U26.
4. On the rear side of the rack, install two M5 caged nuts (from the rack accessory kit) in the top and bottom square holes of the left and right sides of U25 and U26.
5. Connect the two long halves of the mounting rail kits to the front of the rack using two M5 screws per bracket as shown in the following image.

Step 7 (conditional): Rack the Fiber switches



Step 7c: Mount the Cisco MDS 9148 into the rack

To mount the Cisco MDS 9148 switches in the rack:

1. Slide the Cisco switch into the rack unit that has the mounting brackets on the front side. Make sure the 'C' shaped brackets attached to the sides of the switch properly catch on the mounting rails inside the rack.



Note: When inserting the Cisco switch into the rack, make sure the ports for Ethernet and Fibre channel switches face the rear of the rack.

2. Slide the switch all the way in, and secure it to the rear vertical EIA rails using two M5 screws on the top and bottom square holes of each side of the switch.



3. Install two vented panels in the front of the rack at rack units U25 and U26 using M5 screws. The panels do not sit flush to the front of the rack since they are set on top of the screws for the mounting rail kit. Do not over-tighten the screws holding the perforated blanking panels.



Step 7d: Connect the Cisco MDS 9148S switches to the PDUs

Connect the power cables of the Cisco MDS 9148S switches to the PDUs.

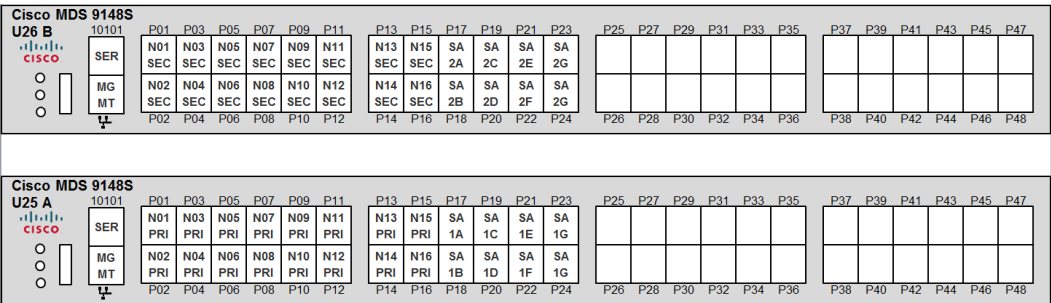
For more information on which PDU outlets to plug the power cables of the Cisco MDS 9148S into, see ["Considerations for HCP racking and PDU connections"](#) on page 43.

Step 7e: Cisco MDS 9148S port diagram

An HCP system with Fibre Channel switches includes the proper number of fiber optic jumper cables needed to connect the HCP G10 Nodes and the storage arrays to the Fibre Channel switches. The order includes labels to that need to be applied to the ends of the fiber optic cables to identify them for support purposes.

Dedicate one set of jumper cables to connecting the HCP G10 Nodes to the top Fibre Channel switch, labeled *B*. Dedicate the other set of jumper cables to connecting the HCP G10 Nodes to the bottom Fibre Channel switch, labeled *A*. A third set of jumper cables is used to connect the Fibre Channel switches to the storage arrays.

The diagrams below show the port layout for connecting the HCP G10 Nodes and storage arrays to the Cisco MDS 9148S Fibre Channel switches.



There are two ports on the left side of the switches reserved for functions outside of communicating with the node and storage array. The ports are labeled:

- **SER** — the serial port used to set the initial configuration of the switch.
- **MGMT** — the Ethernet management port of the Fibre Channel switch used to configure the zoning on the switch.

Fibre Channel ports 1-16 on the switches are reserved for connections to the HCP G10 nodes. Fibre Channel ports 17-24 on the switches are reserved for connections to the storage arrays.

All connections between the HCP G10 Nodes and the Fibre Channel switches have redundant paths for fault tolerance. All connections between the storage arrays and the Fibre Channel switches have redundant paths across controllers for fault tolerance.

Only twenty-four of the ports on the switch are licensed by default. If you intend to connect more than one storage array to the switches, ensure the total number of ports required for the storage and servers does not exceed twenty-four. It's possible for the switches to be configured with additional port licenses to expand the number of available ports per switch, but this is generally not required.

Step 7f: Cabling a Fibre Channel switch to a storage array

Follow the instructions outlined below to attach fiber optic jumper cables between the Fibre Channel switches and the storage array.

1. If the HCP system being built is an Appliance configuration:
 - a. Select a 3 meter fiber optic jumper cable and locate the label sheet containing pairs of numbered decals.
 - b. Starting at label 01 and proceeding sequentially, peel off the first of the pair and attach it to one end of the fiber optic cable. Peel off the second of the pair and attach it to the other end of the fiber optic cable.
 - c. Attach one end of the fiber optic cable to a port on the storage array. Attach the other end of the cable to a port on one of the switches in rack position U25 or U26 according to the following list of port pairs. The pairs are defined as the port on the storage array (controller-port) and port on the switch (rack position-port). The information in

the following table applies to a VSP-G storage array. If the storage array included on the order is not one of these types, substitute the appropriate ports on the storage array for the ones shown in the table.

| Primary | Secondary |
|-------------------|-------------------|
| C0-P0A to U25-P17 | C1-P1A to U26-P17 |
| C0-P0B to U25-P18 | C1-P1B to U26-P18 |
| C0-P0C to U25-P19 | C1-P1C to U26-P19 |
| C0-P0D to U25-P20 | C1-P1D to U26-P20 |
| C0-P0E to U25-P21 | C1-P1E to U26-P21 |
| C0-P0F to U25-P22 | C1-P1F to U26-P22 |
| C0-P0G to U25-P23 | C1-P1G to U26-P23 |
| C0-P0H to U25-P24 | C1-P1H to U26-P24 |

- d. Repeat steps 1a through 1c for each cable to be connected between the storage array and the Fibre Channel switches. The number of cables you connect is always be an even number, but you may not use all of the ports defined above. See the HCP system configuration sheet uploaded with the order for more information.
 - e. Neatly organize the fiber optic cables and use Velcro to attach them to the cable organizer in the rack. Make sure the cables meet a minimum bend radius of four inches (100mm) and are not crimped when organized as this can damage the fiber optic cable.
2. If the HCP system being built is a Base/Expansion configuration:
 - a. Based on the number of storage arrays attached to the system, determine which HCP G10 nodes will be attached to which storage array. Divide the number of HCP G10 nodes by the number of storage arrays. Since there are sixteen HCP G10 Nodes per HCP rack, determine the number of storage arrays that will be connected to the Fibre Channel switches in each HCP rack. If the number of nodes plus half of the number of storage array ports exceeds twenty-four, stop and contact HCP Product Management or HCP Engineering for further instructions on cabling for this order.

- b.** Select a fiber optic jumper cable of the appropriate length to reach from the Fibre Channel switches in the HCP rack and the storage controllers in the separate storage rack. Also, locate the label sheet containing pairs of numbered decals.
- c.** Starting at label 01 and proceeding sequentially, peel off the first of the pair and attach it to one end of the fiber optic cable. Peel off the second of the pair and attach it to the other end of the fiber optic cable.
- d.** Attach one end of the fiber optic cable to a port on the storage array. Attach the other end of the cable to a port on one the switches in rack position U25 or U26 according to the list of port pairs shown in step 1c above. The pairs are defined as the port on the storage array (controller-port) and port on the switch (rack position-port). The information presented in the following table applies to VSP-G storage arrays. If the storage array included on the order is not VSP-G, substitute the appropriate ports on the storage array for the ones shown in the table.

| Primary | Secondary |
|-------------------|-------------------|
| C0-P0A to U25-P17 | C1-P1A to U26-P17 |
| C0-P0B to U25-P18 | C1-P1B to U26-P18 |
| C0-P0C to U25-P19 | C1-P1C to U26-P19 |
| C0-P0D to U25-P20 | C1-P1D to U26-P20 |
| C0-P0E to U25-P21 | C1-P1E to U26-P21 |
| C0-P0F to U25-P22 | C1-P1F to U26-P22 |
| C0-P0G to U25-P23 | C1-P1G to U26-P23 |
| C0-P0H to U25-P24 | C1-P1H to U26-P24 |

- e.** Repeat steps 2b through 2d for each cable to be connected between the storage array and the Fibre Channel switches. The number of cables is always an even number, but may not use all of the ports defined above. See the HCP system configuration sheet uploaded with the order for more information.
- f.** If there is more than one array, repeat steps 2b through 2e for each storage array on the order.

- g. Neatly organize the fiber optic cables and use Velcro to attach them to the cable organizer in the rack. Make sure the cables meet a minimum bend radius of four inches (100mm) and are not crimped when organized as this can damage the fiber optic cable.

Step 7g: HCP G10 Node Fibre port diagram

An HCP G10 Node with attached storage has a primary Fibre Channel port and a secondary Fibre Channel port. Both of the ports are located on the HBA card. Before connecting them to the switches, make sure an SFP transceiver is present in both the primary and secondary Fibre Channel ports on each node.

The picture below shows a G10 Node with four 10G Base-T ports for the front-end and back-end Ethernet ports and two Fibre Channel ports. The orange frames in the picture below indicate the Fibre Channel ports. The Fibre Channel ports are in the same location for any other attached storage network configuration.

PRI denotes primary ports and *SEC* denotes secondary ports.



If the ordered HCP system has no Fibre Channel switches, the HCP G10 Nodes are cabled directly to the storage arrays. If the ordered HCP system has Fibre Channel switches, the HCP G10 Nodes are cabled to the Fibre Channel switches. Follow the cabling instructions in the appropriate section below for the HCP system you are building.

Step 7h: Cabling HCP G10 Nodes to Fibre Channel switches

Follow the instructions outlined below to attach fiber optic jumper cables between the HCP G10 Nodes and the Fibre Channel switches. All of the HCP

G10 Nodes in a given rack are connected to the Fibre Channel switches in the same rack. Each HCP rack contains two Fibre Channel switches. To connect the nodes to the switches:

1. Select a 3 meter fiber optic jumper cable and locate the label sheet containing pairs of numbered decals.
2. Starting at label 01 and proceeding sequentially, peel off the first of the pair and attach it to one end of the fiber optic cable. Peel off the second of the pair and attach it to the other end of the fiber optic cable.
3. Attach one end of the fiber optic cable to a port on the Fibre Channel switch. Attach the other end of the cable to a port on one the HCP G10 Node according to the following list of port pairs. The pairs are defined as the port on the switch (rack position-port) and port on the HCP G10 Node (node#-port).

| Primary | Secondary |
|--------------------|--------------------|
| U25-P01 to N01-PRI | U26-P01 to N01-SEC |
| U25-P02 to N02-PRI | U26-P02 to N02-SEC |
| U25-P03 to N03-PRI | U26-P03 to N03-SEC |
| U25-P04 to N04-PRI | U26-P04 to N04-SEC |
| U25-P05 to N05-PRI | U26-P05 to N05-SEC |
| U25-P06 to N06-PRI | U26-P06 to N06-SEC |
| U25-P07 to N07-PRI | U26-P07 to N07-SEC |
| U25-P08 to N08-PRI | U26-P08 to N08-SEC |
| U25-P09 to N09-PRI | U26-P09 to N09-SEC |
| U25-P10 to N10-PRI | U26-P10 to N10-SEC |
| U25-P11 to N11-PRI | U26-P11 to N11-SEC |
| U25-P12 to N12-PRI | U26-P12 to N12-SEC |
| U25-P13 to N13-PRI | U26-P13 to N13-SEC |
| U25-P14 to N14-PRI | U26-P14 to N14-SEC |
| U25-P15 to N15-PRI | U26-P15 to N15-SEC |
| U25-P16 to N16-PRI | U26-P16 to N16-SEC |

4. Repeat steps 1 through 3 for each cable to be connected between the Fibre Channel switches and the HCP G10 Nodes. The number of cables is always an even number and all HCP G10 Nodes have two connections. Not all ports on the switches may be utilized and fewer than sixteen nodes may be present.
5. If there are more than sixteen nodes in the HCP system, proceed to the second rack and repeat the process in steps 1 through 4 for the next set of HCP G10 Nodes. For each Expansion rack in the system, add sixteen to the node count shown in the table.
6. Neatly organize the fiber optic cables and use Velcro to neatly attach them to the cable organizer in the rack. Make sure the cables meet a minimum bend radius of four inches (100mm) and are not crimped when organized as this will damage the fiber optic cable and render the path unusable.

Step 8: Rack the Ethernet Switches

The Ethernet switches described in this section are all back-end switches. You are responsible for providing front-end network connectivity to the HCP G10 Nodes and optional HCP S10 Nodes. When you rack the Ethernet switches, the Ethernet switches need to be installed facing the back of the racks. When mounting a pair of switches, mount the lower one first and the upper one second.



Note: When racking and mounting switches, this manual assumes you are using M5 caged nuts and screws. If you intend to use a different type of caged nut or screw, provide your own variant for the procedure.

There are five possible back-end Ethernet switches that can be ordered with an HCP system. Choose the switch ordered from the following table and proceed to that section for racking, cabling, and configuration instructions.

| Switch Type | Installation and cabling instructions |
|-----------------------|---|
| Brocade ICX6430 (1G) | "Racking the Brocade ICX 6430" on the next page |
| HP 4208VL (1G) | "Racking the HP ProCurve 4208VL" on page 104 |
| Brocade VDX6740 (10G) | "Racking the Brocade VDX 6740" on page 112 |

(Continued)

| Switch Type | Installation and cabling instructions |
|--------------------------|--|
| Cisco Nexus 5548UP (10G) | "Racking the Cisco Nexus 5548UP" on page 121 |
| Cisco Nexus 5596UP (10G) | "Racking the Cisco Nexus 5596UP" on page 131 |

Racking the Brocade ICX 6430

Brocade ICX 6430 switches are 1G Ethernet switches which come with 24 or 48 ports per switch. A pair of Brocade ICX 6430-24 switches can connect up to 22 G10 Nodes. A pair of ICX 6430-48 switches can connect up to 44 G10 Nodes. Each switch takes up one rack unit. The switches are mounted in rack positions U27 and U28.

Items you need to rack the Ethernet switches include:

- #1 and #2 Phillips screwdrivers
- Caged-nut insertion and removal tool

Step 8a: Unpack the Brocade ICX 6430

To unpack the Brocade ICX 6430 switch:

1. Locate the following items in the switch container:
 - Brocade ICX 6430 switch
 - Rack mounting kit containing two L-shaped mounting brackets and #6 flat-head screws.
2. Supply the following items (per switch):
 - Four racking screws
 - Four Caged nuts
3. Set the required items aside in an easy-to-reach location.
4. Leave the unused items in the switch container, and set the container aside.

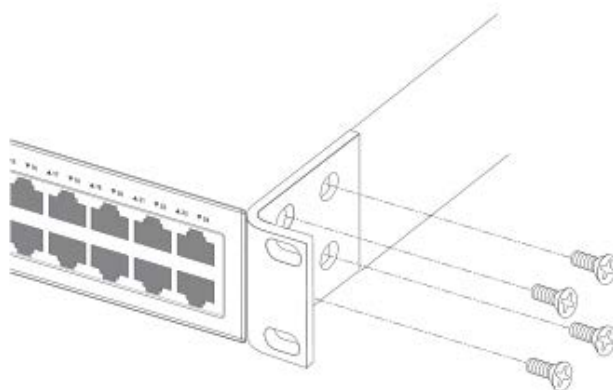
The rest of items included in the switch container are not necessary for installation. You don't need the original power cords for the switches.

Do not discard additional items. Pack them together and set them aside.

Step 8b: Mount the Brocade ICX 6430 in the rack

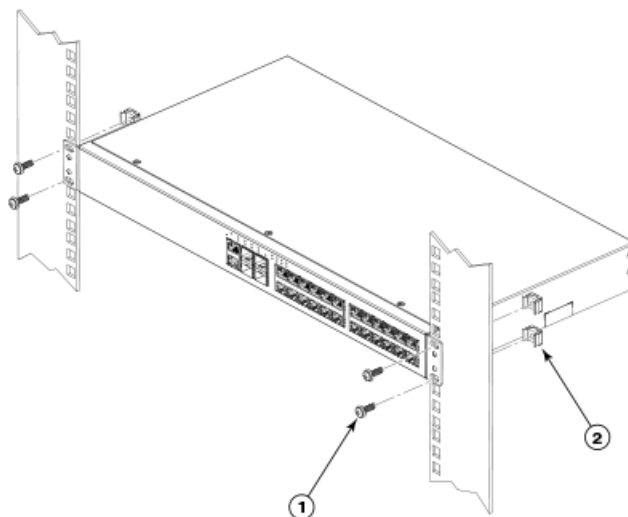
To mount the Brocade ICX 6430 switches into the rack:

1. Using a #2 Phillips screwdriver, attach the L shaped mounting brackets to the sides of the device using four flat-head screws provided in the kit.



2. Insert four cage nuts in the top and bottom square holes on the left and right sides of the rear of the rack in position U27.
3. Using a #2 Phillips screwdriver, mount the device in a two-post rack using four rack-mounting screws for each switch.

Step 8: Rack the Ethernet Switches



4. Repeat steps 1 through 3 to install the other Brocade ICX 6430 switch into rack position U28.
5. Install two venting panels in the front of the rack in positions U27 and U28. Insert a single caged nut in the center square hole of the left and right side of the rack at positions U27 and U28. Use rack mounting screws to secure the perforated blanking panels to the front of the rack.



Step 8c: Connect the Brocade ICX 6430 switches to the PDUs

Connect the power cables of the Brocade ICX 6430 switches to the PDUs.

For more information on which PDU outlets to plug the power cables of the Brocade ICX 6430 switches into, see ["Considerations for HCP racking and PDU connections"](#) on page 43.

Step 8d: HCP G10 Node 1 GB port diagram

For HCP systems with 1G back-end switches (Brocade ICX 6430 or HP 4208VL), the HCP G10 Node Ethernet ports can be set up for two different 1GbE back-end configurations. The pictures below show both of the possible ways to configure Ethernet ports on a HCP G10 Node with attached storage.

In the following pictures, ports with red frames indicate the front-end network connections, ports with blue frames in the pictures are for the back-end network connection, and ports with orange frames are for Fibre Channel switches. The port with the purple frame is the management port.



Note: The purple port should not be used unless you are configuring the system to have a [hcp_management] network.

The blue PRI label denotes the primary port of the back-end network, which should be connected to the Brocade ICX 6430 switch in rack position U27 or the left half of the HP 4208VL switch in rack position U37. The blue SEC label denotes the secondary port of the back-end network, which should be connected to the Brocade ICX 6430 switch in rack position U28 or the right half of the HP4208VL switch in rack position U37.

The following image shows an HCP G10 Node with 10G BASE-T ports for both front-end and back-end connections. The 10G ports used for the back-end Ethernet networking run at 1G when connected to either the Brocade ICX 6430 or HP 4208VL switches.



The following image shows an HCP G10 Node with 10G BASE-T ports for back-end connection and 10G SFP+ ports for the front-end connection. The 10G ports used for the back-end Ethernet networking run at 1G when connected to either the Brocade ICX6430 or HP 4208VL switches.



The bonding of the ports on the back-end Ethernet networking are different for the two configurations. Pay close attention to the network configuration when performing the Ethernet cabling.

Step 8e: Brocade ICX 6430 port diagram

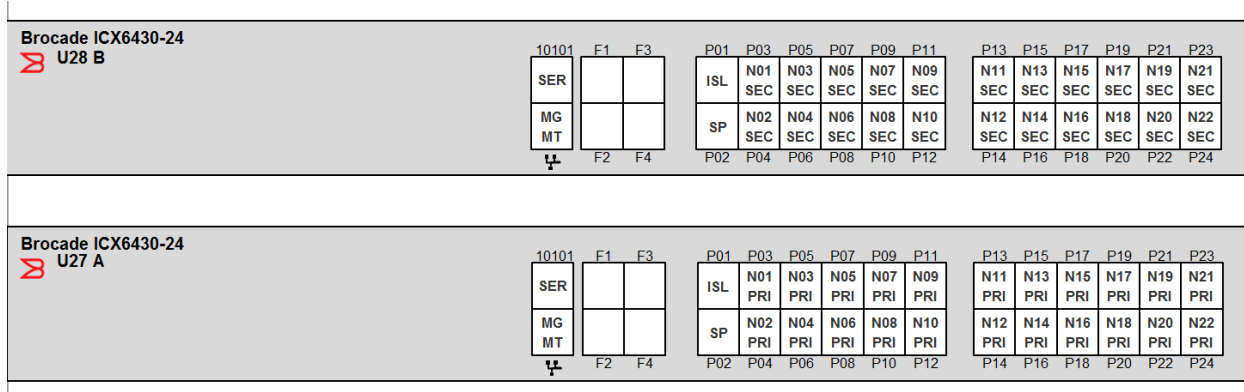
An HCP system comes with all the CAT-6 cable harnesses needed to connect the ordered number of nodes to the switch. The system comes with one or more red and one or more blue Ethernet cable harness when the Brocade ICX 6430 switches are included. In order to connect the cables to the Brocade ICX 6430 back-end network switches, follow the instructions below.

The red cable harnesses are devoted exclusively to the Brocade ICX 6430 switch in rack position U27. The blue cable harnesses are devoted exclusively to the Brocade ICX 6430 switch in rack position U28.

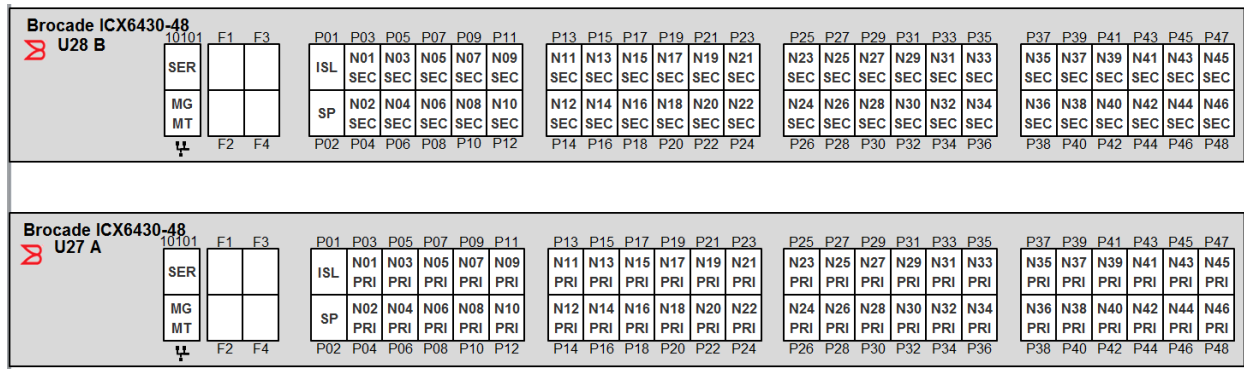
The diagrams below show the port configuration for the Brocade ICX 6430-24 switches and the Brocade ICX 6430-48 switches. In each type of switch, four ports reserved for functions outside of communicating with the nodes. Do not plug Ethernet cables into these ports during this step. The ports are labeled:

- **SER** — the serial port used to configure the switch
- **MGMT** — the management port used to configure the switch
- **ISL** — the inter-switch link used to connect the two back-end switches to one another, which was already attached.
- **SP** — the service port used by Hitachi Vantara service personnel in the field.

The following image shows the Brocade ICX6430-24 port diagram.



The following image shows the Brocade ICX6430-48 port diagram.



Note: The management port on the switch does not correspond to the management port on the node. The management port on the node attaches connects to a normal switch port if you want to configure an [hcp_management] network.

Step 8f: Connect the Brocade ICX 6430 Ethernet cables

To connect the Ethernet cables to their respective ports:

1. Locate the purple one foot CAT-6 Ethernet cable (541-145-001.P) and connect it from port 1 on the switch in position U27 to port 1 on the switch in position U28.
2. Locate one red and one blue Ethernet cable harness. The first two CAT-6 cable harnesses are 7 feet in length. If there is a third set of cable harnesses, the harnesses are 25 feet in length and are used for nodes 17 through 22.

3. Connect the short end of the red cable harness cables to the Brocade ICX 6430 switch in rack position U27. Connect cables 01 through 08 to the proper ports on the switch corresponding to node numbers 1 through 8.
4. Connect the short end of the blue cable harness cables to the Brocade ICX 6430 switch in rack position U28. Connect cables 01 through 08 to the proper ports on the switch corresponding to node numbers 1 through 8.
5. Tie off the short end of the remaining red and blue cables (cables 09-12 and EXTRA) neatly.
6. Connect the long end of the red cable harness cables to the HCP G10 Nodes 1 through 8 using the back-end network port marked PRI. Not all of the cables are used if the number of nodes is less than eight.
7. Connect the long end of the blue cable harness cables to the HCP G10 Nodes 1 through 8 using the back-end network port marked SEC. Not all of the cables are used if the number of nodes is less than eight.
8. Tie off the long end of the remaining red and blue cables (cables 09-12, EXTRA, and any other unused cables) neatly.
9. Attach the cable harnesses to the cable management trays at the rear of the rack on the left or right side of the rack.
10. If there are more than eight nodes in the HCP system, repeat steps 1 through 8, incrementing the node numbers by eight.
11. If there are more than sixteen nodes in the HCP system, repeat steps 1 through 8, incrementing the node numbers by sixteen.

Racking the HP ProCurve 4208VL

A HP ProCurve 4208VL switch is a 1G Ethernet switch with up to 192 ports. The switch connects to a maximum of 80 HCP G10 Nodes. The 1G back-end switch is used in HCP systems with more than 22 G10 Nodes or 1G HCP systems where the number of nodes is expected to grow beyond 22 nodes.

The HP ProCurve 4208LV switch comes with one chassis and, depending on number of nodes on the order, multiple 24 port extended port modules. The chassis is mounted in rack unit 37 and takes the space of 5 racking units.

Items you need to rack the Ethernet switches include:

- A #2 Phillips screwdriver
- A Caged-nut insertion and removal tool

Step 8a: Unpack the HP ProCurve 4208VL

To unpack the HP ProCurve 4208VL switch:

1. Locate the following items in the switch container:
 - 2 switch mounting brackets
 - 6 small black screws for switch mounting brackets
2. Locate the 2U Universal rail kit, and the 8 cage nuts and 8 screws that come with it.
3. Supply the following items:
 - 8 M5 cage nuts
 - 8 M5 screws
4. Locate any additional 24 port switch expansion modules
5. Set the required items aside in an easy-to-reach location.
6. Leave the unused items in the switch container, and set the container aside.

The rest of items included in the switch container are not necessary for installation. You don't need the original power cords for the switches.

Do not discard additional items. Pack them together and set them aside.

7. If the HP 4208VL switch requires the installation of port expansion modules, follow the remaining steps below, otherwise, skip forward to the mounting of the switch in the rack.
8. Unscrew and remove the blank panel covering up slots C and D (or E and F, or G and H) on the HP ProCurve 4208VL switch.
9. Insert the two 24-port expansion modules into the vacant slots as shown in the following image.

Step 8: Rack the Ethernet Switches



- 10.** Using a screwdriver, screw the two new expansion modules into place.
- 11.** Repeat steps 7 through 9 for each remaining pair of port expansion modules.

Step 8b: Install the HP ProCurve 4208 VL rails

To install the two mounting brackets:

- 1.** Align a bracket with the front of the switch (the side with no port).
- 2.** Secure the two brackets to the sides of the switch using three of the provided mounting screws for each bracket as shown in the image below.



- 3.** Install the caged nuts from the 2U universal rail kit in the top of U38 and bottom of U37 on both the right and left, front and rear of the rack.
- 4.** Install two additional caged nuts from the rack accessory kit in the front left and right of the rack in bottom of U39 and the top of U37.
- 5.** Install the left and right 2U universal rail kit brackets and secure them with the screws from the 2U universal mounting rail kit as shown in the following image. The brackets in the image shown are an older model, but the current brackets function the same way.

Step 8: Rack the Ethernet Switches



6. On the front of the rack, install a 3U blanking panel using four screws from the rack accessory kit. The perforated blanking plate shown in the image above is an older model, but the current perforated blanking plate function the same way.

Step 8c: Mount the HP ProCurve 4208VL in the rack

To install the HP ProCurve Ethernet switch in the rack:

1. From the rear of the rack, set the switch onto the 2U universal rail kit installed in the previous step.
2. Push the switch into the rack on the universal rails until it's fully pushed in. The front of the switch should be flush with the rear of the rack.
3. Using the four M5 screws, secure the mounting brackets to the rear of the rack in the following locations:
 - Top square cage nut in rack unit 37 (both sides)
 - Bottom square cage nut in rack unit 39.



Step 8d: Connect the HP ProCurve 4208 VL switch to the PDUs

Connect the HCP ProCurve 4208VL power cables to the PDUs.

For more information on which PDU outlet to plug the HP ProCurve 4208 VL power cables into, see ["Considerations for HCP racking and PDU connections"](#) on page 43.

Step 8e: HCP G10 Node 1 GB port diagram

For HCP systems with 1G back-end switches (Brocade ICX 6430 or HP 4208VL), the HCP G10 Node Ethernet ports can be set up for two different 1GbE back-end configurations. The pictures below show both of the possible ways to configure Ethernet ports on a HCP G10 Node with attached storage.

In the following pictures, ports with red frames indicate the front-end network connections, ports with blue frames in the pictures are for the back-end network connection, and ports with orange frames are for Fibre Channel switches. The port with the purple frame is the management port.



Note: The purple port should not be used unless you are configuring the system to have a [hcp_management] network.

The blue PRI label denotes the primary port of the back-end network, which should be connected to the Brocade ICX 6430 switch in rack position U27 or the left half of the HP 4208VL switch in rack position U37. The blue SEC label denotes the secondary port of the back-end network, which should be connected to the Brocade ICX 6430 switch in rack position U28 or the right half of the HP4208VL switch in rack position U37.

The following image shows an HCP G10 Node with 10G BASE-T ports for both front-end and back-end connections. The 10G ports used for the back-end Ethernet networking run at 1G when connected to either the Brocade ICX 6430 or HP 4208VL switches.

Step 8: Rack the Ethernet Switches



The following image shows an HCP G10 Node with 10G BASE-T ports for back-end connection and 10G SFP+ ports for the front-end connection. The 10G ports used for the back-end Ethernet networking run at 1G when connected to either the Brocade ICX6430 or HP 4208VL switches.



The bonding of the ports on the back-end Ethernet networking are different for the two configurations. Pay close attention to the network configuration when performing the Ethernet cabling.

Step 8f: HP ProCurve 4208VL port diagram

An HCP system comes with all the CAT-6 cable harnesses needed to support the ordered number of nodes. There are multiple red and multiple blue Ethernet cable harnesses that come with the HCP system when the HP 4208VL switch is included. In order to connect the cables to the HP 4208VL back-end network switch, follow the instructions below.

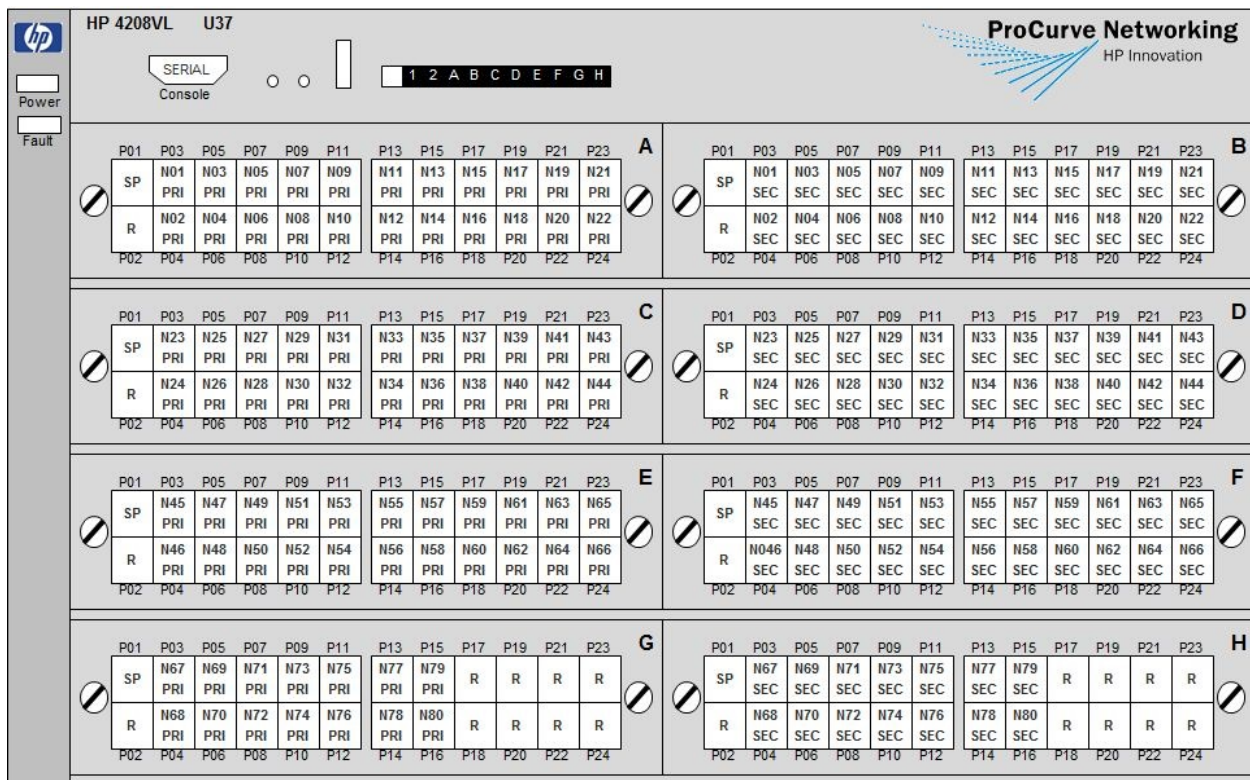
Primary HCP G10 Node ports connect to ports on the left side modules of the switch. Secondary HCP G10 Node ports connect to ports on the right side modules of the switch. Each new rack you add to the HCP system requires two additional 24-port modules to be installed in the switch, one

for each side of the switch. There are no red and blue Ethernet cable harnesses included with the HCP G10 Nodes in the Expansion racks to the HP 4208VL switch in the Base rack.

When connecting with nodes in another rack, the harnesses can be routed over the tops of the racks or under the floor depending on your system environment.

The diagram below shows two ports per port module reserved for functions outside of communicating with the nodes. Do not plug Ethernet cables into these ports during this step. The ports are labeled:

- **SP** — a service port used by Hitachi Vantara service personnel.
- **R** — a reserved port.



Step 8g: Connect the HP ProCurve 5208VL Ethernet cables

In order to connect the cables:

1. Locate one red and one blue Ethernet cable harness. The first two CAT-6 cable harnesses are 7 feet in length. If there are additional sets of cable

harnesses, they are 25 feet in length and are used for nodes 17 through 80.

2. Connect the short end of the red cable harness cables to the HP4208VL switch in rack position U37 on the proper left hand switch module. Connect cables 01 through 08 to the proper ports on the switch corresponding to node numbers 1 through 8.
3. Connect the short end of the blue cable harness cables to the HP 4208VL switch in rack position U37 on the proper right hand switch module. Connect cables 01 through 08 to the proper ports on the switch corresponding to node numbers 1 through 8.
4. Tie off the short end of the remaining red and blue cables (cables 09-12 and EXTRA) neatly.
5. Connect the long end of the red cable harness cables to the HCP G10 Nodes 1 through 8 using the back-end network port marked PRI. Not all of the cables may be used if the number of nodes is less than eight.
6. Connect the long end of the blue cable harness cables to the HCP G10 Nodes 1 through 8 using the back-end network port marked SEC. Not all of the cables may be used if the number of nodes is less than eight.
7. Tie off the long end of the remaining red and blue cables (cables 09-12, EXTRA, and any other unused cables) neatly.
8. Attach the cable harnesses to the cable management trays at the rear of the rack on the left or right side of the rack.
9. If there are more than eight nodes in the HCP system, repeat steps 1 through 8, incrementing the node numbers by eight.
10. If there are more than sixteen nodes in the HCP system, repeat steps 1 through 8, incrementing the node numbers by sixteen.

Racking the Brocade VDX 6740

Brocade VDX 6740 switches are 10G Ethernet switches with 48 ports per switch. A pair of Brocade VDX 6740 switches can connect up to 44 G10 Nodes. Each switch takes up one rack unit. The switches are mounted in rack positions U27 and U28.

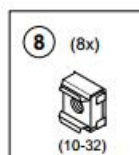
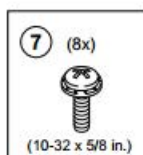
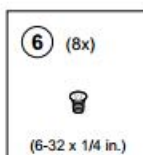
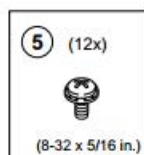
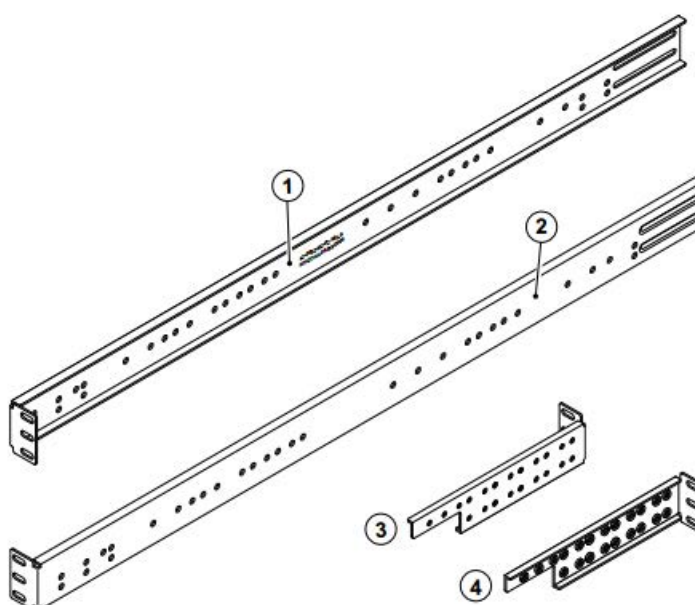
Items you will need to rack the Ethernet switches include:

- #1 and #2 Phillips screwdrivers
- Caged-nut insertion and removal tool

Step 8a: Unpack the Brocade VDX 6740

To unpack the Brocade VDX 6740 switch:

1. Unpack the following items in the switch container:
 - Brocade VDX 6740 switch
 - Serial cable for Brocade switches
2. Locate the four-post fixed rack mount kit (24 inch-32 inch), containing the items shown in the following figure.



- | | |
|------------------------|--|
| 1 Bracket, front right | 5 Screw, 8-32 x 5/16-in., panhead Phillips |
| 2 Bracket, front left | 6 Screw, 6-32 x 1/4-in., flathead Phillips |
| 3 Bracket, rear left | 7 Screw, 10-32 x 5/8-in., panhead Phillips |
| 4 Bracket, rear right | 8 Retainer nut, 10-32 |

3. Supply the following items (per switch):
 - Eight M5 caged nuts
 - Eight M5 screws
4. Locate a single 10G SFP+ to 1G RJ-45 adapter module, Brocade part number XBR-000190.P.
5. Set the required items aside in an easy-to-reach location.
6. Leave the unused items in the switch container, and set the container aside.

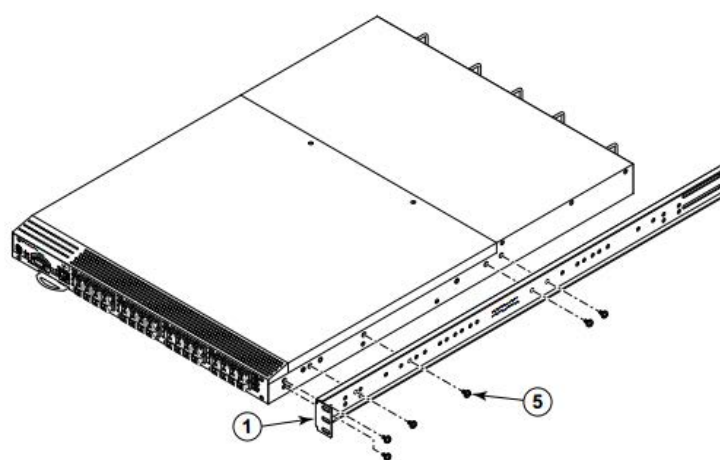
The rest of items included in the switch container are not necessary for installation. You don't need the original power cords for the switches.

Do not discard additional items. Pack them together and set them aside.

Step 8b: Install the Brocade VDX 6740 rails

To install Brocade VDX 6740 rails:

1. Position the front right bracket with the flat side against the right side of the switch. Make sure to have the back half of the rail is detached.



- 1 Bracket, front right
- 5 Screw, 8-32 x 5/16-in., panhead Phillips

2. Screw five 8-32 x 5/16-inch screws into the holes in the bracket.



3. Repeat the previous steps to attach the front left bracket to the left side of the switch.
4. Tighten all of the 8-32 x 5/16-inch screws to a torque of 15 in-lbs. (17 cm-kgs).

Step 8c: Mount the Brocade VDX 6740 in the rack

To mount the Brocade VDX 6740 in the rack:

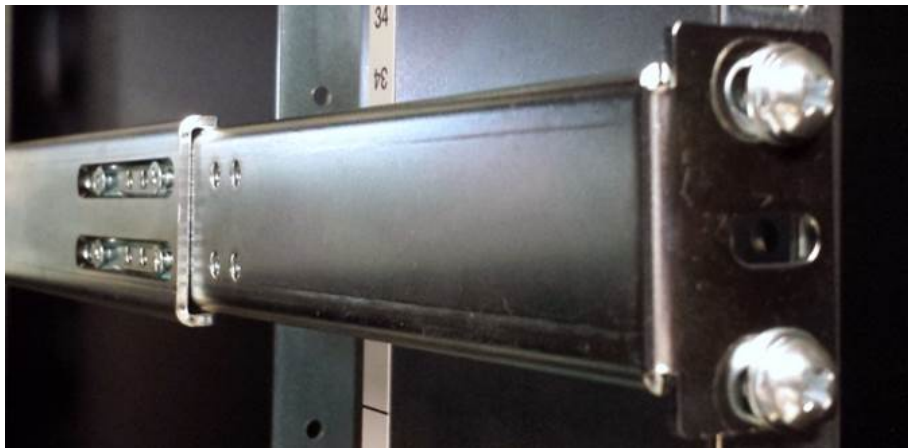
1. Set the M5 cage nuts in all three positions in U27 (switch A) and U28 (switch B) on both sides in the front of the rack. Use the caged nuts from the rack accessory kit, not the ones from the Brocade rail kit.
2. On the rear side of the rack, install cage nuts in the top and bottom positions in U27 and U28 on the left and right side of the rack. Use the caged nuts from the rack accessory kit, not the ones from the Brocade rail kit.
3. Position the switch in the rear cabinet, providing temporary support under the switch until the rail kit is secured to the cabinet.
4. Attach the left and right rails of the switch into the rear of the rack by screwing two screws into the caged nuts on the left and right. Use the screws from the rack accessory kit, not the screws from the Brocade rail kit.



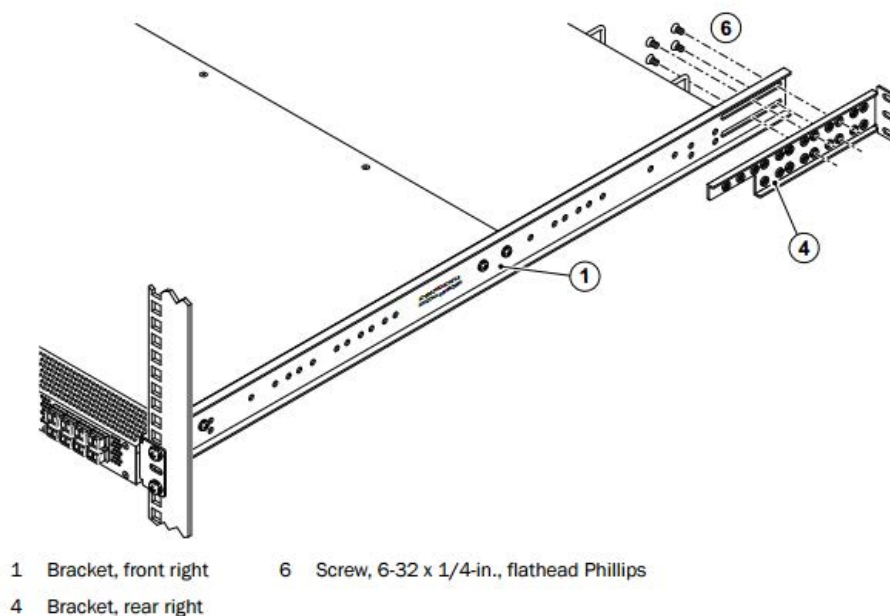
5. Once the four rear screws have been secured, you should be able move to the front of the cabinet to secure the rear of the rails. Position the right rear bracket inside the right front bracket and install two rack screws to hold it to the front of the rack. Repeat the process for the left rear bracket.



Important: If the rails do not appear to be secure, get help keeping them in place until they have been tightened.



6. Attach the brackets using four 6-32 x 1/4-inch screws.



7. Install two vented panels in the front of the rack in rack units U27 and U28.



Step 8d: Connect the Brocade VDX 6740 switches to the PDUs

Connect the power cables of the Brocade VDX 6740 switches to the PDUs.

For more information on which PDU outlets to plug the power cables of the Brocade VDX 6740 switches into, see ["Considerations for HCP racking and PDU connections"](#) on page 43.

Step 8e: Install the SFP+ to RJ-45 adapter

Insert the 10G SFP+ to 1G RJ-45 adapter module into port 03 of the lower of the two switches.



Step 8f: HCP G10 Node 10G port diagrams

For HCP systems with 10G back-end switches (Brocade VDX 6740, Cisco Nexus 5548UP, or Cisco Nexus 5596UP), the HCP G10 Node Ethernet ports can be set up for two different 10GbE back-end configurations. The pictures below show all of the possible ways to configure Ethernet ports on a HCP G10 Node with attached storage.

In the following pictures, ports with red frames indicate the front-end network connections. Ports with blue frames in the pictures are for the back-end network connection, and ports with orange frames are for Fibre Channel switches. The port with the purple frame is the management port.



Note: The purple port should not be used unless you are configuring the system to have a [hcp_management] network.

The blue PRI label denotes the primary port of the back-end network, which should be connected to the Brocade VDX 6740 switch in rack position U27, or the Cisco Nexus 5548UP switch in rack position U27, or the Cisco Nexus 5596UP switch in rack position U37. The blue SEC label denotes the secondary port of the back-end network, which should be connected to the Brocade VDX 6740 switch in rack position U28, or the Cisco Nexus 5548UP switch in rack position U28, or the Cisco Nexus 5596UP switch in rack position U39.

The following image shows an HCP G10 Node with 10G SFP+ ports for back-end network connections.



The following image shows an HCP G10 Node with 10G SFP+ ports for both front-end and back-end connections.



Step 8g: Brocade VDX 6740 port diagram

An HCP system comes with all the Twinax cables needed to connect the ordered number of nodes to the switches. Individual Twinax cables are used to connect the Ethernet switches together as well as the individual nodes to the Ethernet switches. Please follow the instructions below to connect the Twinax cables.






Note: Twinax cables from Brocade and Cisco are not compatible with one another. Please ensure you only use the vendor specific cables with the switches.




The diagrams below show six ports reserved for functions outside of communicating with the HCP G10 Nodes. Do not plug Ethernet cables into these ports during this step. The ports are labeled:

- **SER** — the serial port used to configure the switch.

Step 8: Rack the Ethernet Switches

- **MGMT** — the management port used to configure the switch.
- **ISL** — the inter-switch link used to connect the two back-end switches to one another.
- **SP** — the service port used by Hitachi Vantara service personnel.
- **R** — the port is reserved.

| Brocade VDX6740 | | | | U28 B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------|-----|-----|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|--------|--|--|--|--|--|--|--|--|
| | 10101 | P01 | P03 | P05 | P07 | P09 | P11 | P13 | P15 | P17 | P19 | P21 | P23 | P25 | P27 | P29 | P31 | P33 | P35 | P37 | P39 | P41 | P43 | P45 | P47 | P49-52 | P57-60 | | | | | | | | |
|  | SER | ISL | SP | N01 SEC | N03 SEC | N05 SEC | N07 SEC | N09 SEC | N11 SEC | N13 SEC | N15 SEC | N17 SEC | N19 SEC | N21 SEC | N23 SEC | N25 SEC | N27 SEC | N29 SEC | N31 SEC | N33 SEC | N35 SEC | N37 SEC | N39 SEC | N41 SEC | N43 SEC | | | | | | | | | | |
|  | MG | ISL | R | N02 SEC | N04 SEC | N06 SEC | N08 SEC | N10 SEC | N12 SEC | N14 SEC | N16 SEC | N18 SEC | N20 SEC | N22 SEC | N24 SEC | N26 SEC | N28 SEC | N30 SEC | N32 SEC | N34 SEC | N36 SEC | N38 SEC | N40 SEC | N42 SEC | N44 SEC | | | | | | | | | | |
|  | MT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | P02 | P04 | P06 | P08 | P10 | P12 | P14 | P16 | P18 | P20 | P22 | P24 | P26 | P28 | P30 | P32 | P34 | P36 | P38 | P40 | P42 | P44 | P46 | P48 | P53-56 | P61-64 | | | | | | | | |

| Brocade VDX6740 | | | | | | | | | | U27 A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------|-----|-----|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------|--|--------|--|--|--|--|--|--|--|--|--|--|--|
| | 10101 | P01 | P03 | P05 | P07 | P09 | P11 | P13 | P15 | P17 | P19 | P21 | P23 | P25 | P27 | P29 | P31 | P33 | P35 | P37 | P39 | P41 | P43 | P45 | P47 | P49-52 | | P57-60 | | | | | | | | | | | |
|  | SER | ISL | SP | N01 PRI | N03 PRI | N05 PRI | N07 PRI | N09 PRI | N11 PRI | N13 PRI | N15 PRI | N17 PRI | N19 PRI | N21 PRI | N23 PRI | N25 PRI | N27 PRI | N29 PRI | N31 PRI | N33 PRI | N35 PRI | N37 PRI | N39 PRI | N41 PRI | N43 PRI | | | | | | | | | | | | | | |
|  | MG | ISL | R | N02 PRI | N04 PRI | N06 PRI | N08 PRI | N10 PRI | N12 PRI | N14 PRI | N16 PRI | N18 PRI | N20 PRI | N22 PRI | N24 PRI | N26 PRI | N28 PRI | N30 PRI | N32 PRI | N34 PRI | N36 PRI | N38 PRI | N40 PRI | N42 PRI | N44 PRI | | | | | | | | | | | | | | |
|  | MT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | P02 | P04 | P06 | P08 | P10 | P12 | P14 | P16 | P18 | P20 | P22 | P24 | P26 | P28 | P30 | P32 | P34 | P36 | P38 | P40 | P42 | P44 | P46 | P48 | P53-56 | | P61-64 | | | | | | | | | | | |



Note: The management port on the switch does not correspond to the management port on the node. The management port on the node attaches connects to a normal switch port if you want to configure an [hcp_management] network.

Step 8h: Connect the Brocade VDX 6740 Ethernet cables

To connect the cables to the ports:

1. Locate two one meter Brocade Twinax cables. Connect the first cable from port 1 on the switch in position U27 to port 1 on the switch in position U28. Connect the second cable from port 2 on the switch in position U27 to port 2 on the switch in position U28.
2. Locate and separate the three meter and five meter Twinax cables. The three meter cables are used to connect the Brocade VDX 6740 switches in the Base or Appliance rack to the HCP G10 Nodes. If there are five meter Twinax cables, they are used to connect nodes 17-44 in the Expansion racks to the back-end switches in the Base rack.
3. Locate the label sheets containing pairs of numbered decals.

4. Starting at label 01 and proceeding sequentially, peel off the first of the pair and attach it to one end of the Twinax cable. Peel off the second of the pair and attach it to the other end of the Twinax cable.
5. Connect one end of the Twinax cable to the Brocade VDX 6740 switch in rack position U27 using the port for the node with the corresponding cable number. Connect the other end of the Twinax cable to the blue PRI port corresponding node number in the Appliance or Base rack.
6. Starting at label 01 and proceeding sequentially, peel off the first of the pair and attach it to one end of the Twinax cable. Peel off the second of the pair and attach it to the other end of the Twinax cable.
7. Connect one end of the Twinax cable to the Brocade VDX 6740 switch in rack position U28 using the port for the node with the corresponding cable number. Connect the other end of the Twinax cable to the blue SEC port corresponding node number in the Appliance or Base rack.
8. Repeat steps 3 through 6 for each of the nodes in the Appliance or Base rack.
9. Neatly bundle and tie off the Twinax cables to the cable management attachments in the rear of the rack.
10. If there are additional nodes in the system housed in Expansion racks, repeat steps 3 through 8 for each Expansion rack adding 16 to the base node number. For all Expansion racks, ensure you are using the five meter Twinax cables.

Racking the Cisco Nexus 5548UP

Cisco Nexus 5548UP switches are 10G Ethernet switches with 32 ports per switch. The switches can be expanded to 48 ports per switch using a pair of sixteen port expansion modules. A pair of Cisco Nexus 5548UP switches can connect up to 44 G10 Nodes. Each switch takes up one rack unit. The switches are mounted in rack positions U27 and U28.

Items you need to rack the Ethernet switches include:

- #1 and #2 Phillips screwdrivers
- Caged-nut insertion and removal tool

Step 8a: Unpack the Cisco Nexus 5548

To unpack the Cisco Nexus 5548 switch:

- 1.** Locate the following items in the switch container:
 - Cisco Nexus 5548 switch
 - 2 slider rails
 - 2 rear switch mounting brackets
 - 2 port side mounting ears
 - 12 M4 x 0.7 x 8-mm Phillips countersunk screws
- 2.** Supply the following items (per switch):
 - Eight M5 screws
 - Eight M5 caged nuts
- 3.** Locate a single 10G SFP+ to 1G RJ-45 adapter module, Cisco part number GLC-T=.P.
- 4.** Set the required items aside in an easy-to-reach location.
- 5.** Leave the unused items in the switch container, and set the container aside.

The rest of items included in the switch container are not necessary for installation. You don't need the original power cords for the switches.

Do not discard additional items. Pack them together and set them aside.

- 6.** If the system is ordered with more than 28 nodes, the switches arrive with sixteen port expansion modules. Optionally, to install the expansion modules in both switches:
 - a.** Locate the boxes containing the sixteen port Universal Port Expansion modules.



- b.** Unscrew the dummy plate from the front of the Cisco Nexus 5548UP 10G Ethernet switch with a Philips screwdriver.
- c.** Release the dummy plate locking lever.



- d.** Carefully install the Port Expansion module by aligning the module in the switch and locking the lever into place.
- e.** Screw the module in place using the screw attached to the lever. Do not over-tighten.

Step 8: Rack the Ethernet Switches



- f. Repeat steps a through e for the sixteen port expansion module in the second Cisco Nexus 5548UP switch.

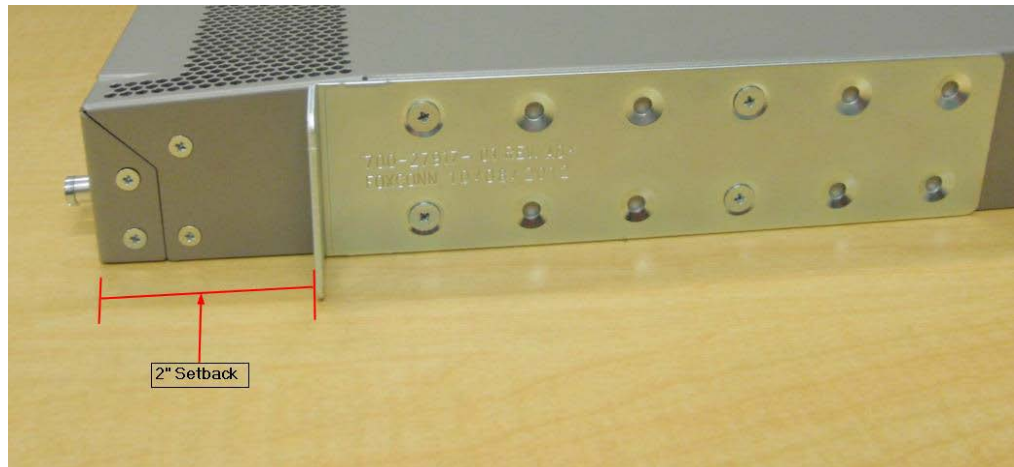
Step 8b: Install the Cisco Nexus 5548UP rails

The following image shows the M4 screws, mounting rails, mounting rail guides, and mounting ears.

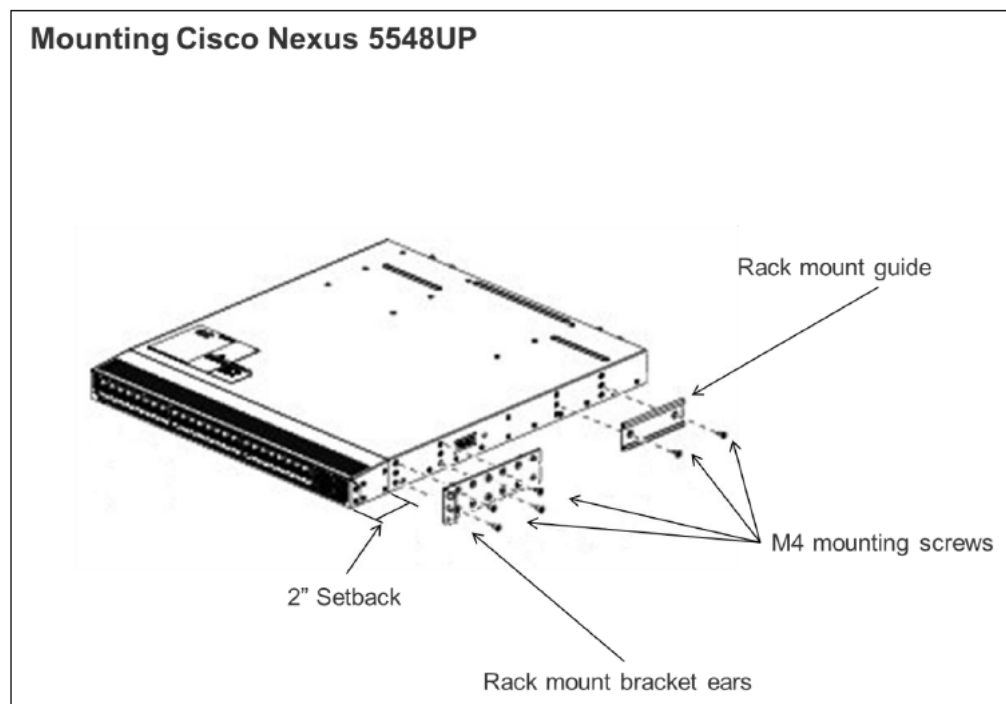


1. Orient the brackets with the mounting bracket ears to the port side of the switch.

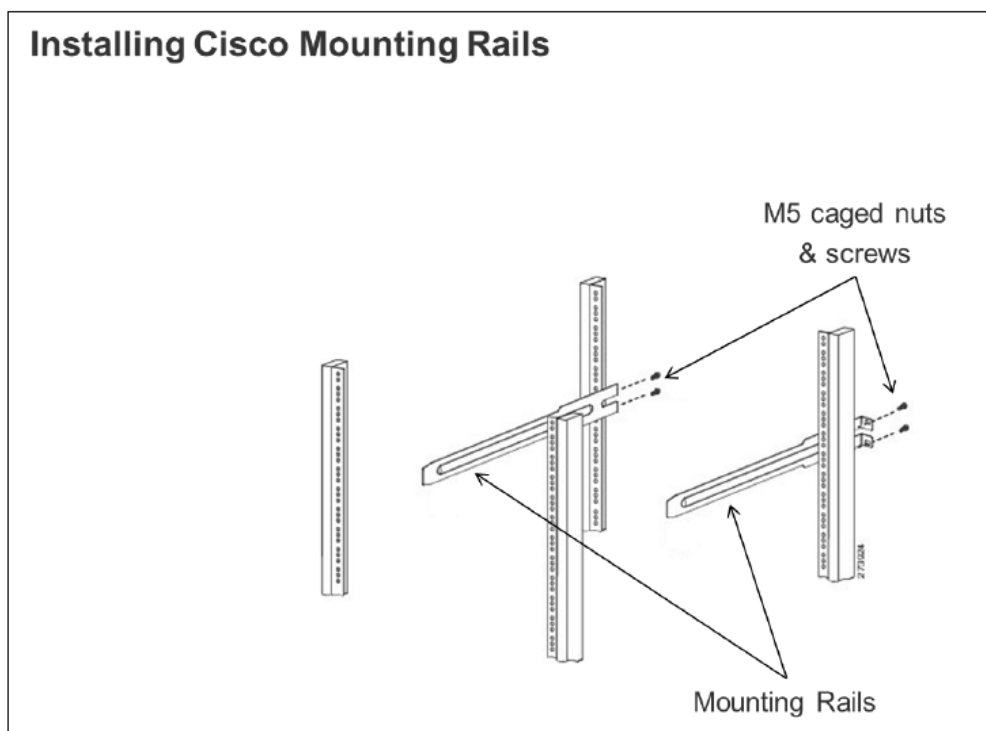
2. Attach the ears to the sides of the switch with four M4 screws per bracket so that the face of the switch is mounted with a 2 inch setback as shown in the image below. This way the switch extends 2 inches past the rear EIA rails.



3. Install the rear mounting bracket to the rear of the switch with two M4 mounting screws as shown below.



4. Repeat steps 1 through 3 for the other side of the switch and the other Cisco Nexus 5548UP 10G Ethernet switch.
5. Install M5 cage nuts in the front of the rack in the bottom, middle, and upper square holes of rack positions U27 and U28 on both the left and right side of the rack.



Important: Be sure to install the caged nuts on the front of the rack in the center positions of each rack unit that will be occupied by a switch prior to installing the switches. It is not possible to do so later in the process.

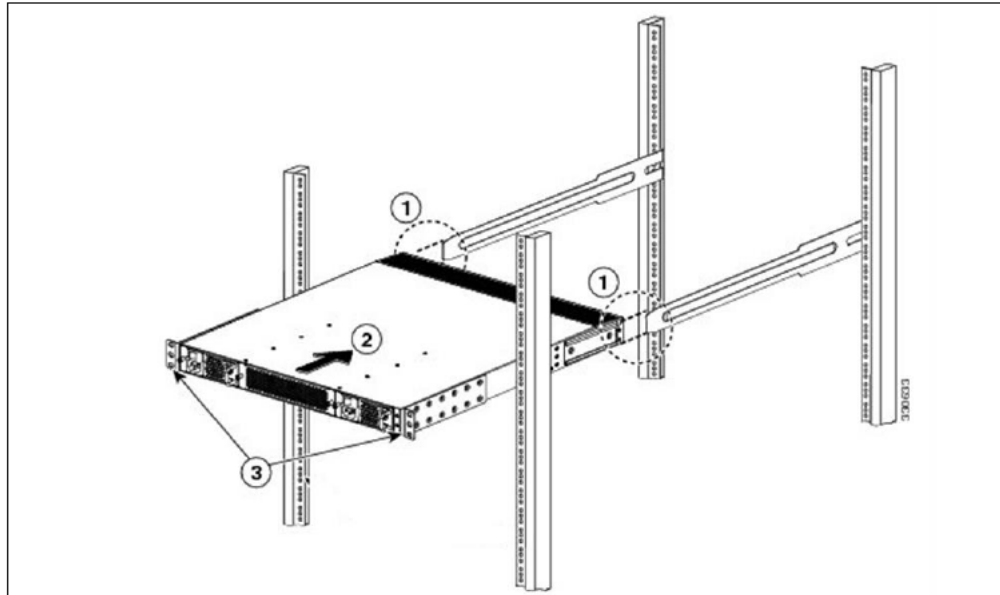
Step 8c: Mount the Cisco Nexus 5548 in the rack

To install the Cisco Nexus 5548UP switches in the rack:

1. Install M5 caged nuts in the rear of the rack in the top and bottom square holes of rack positions U27 and U28 on both the left and right side of the rack.
2. Slide the first switch into place in U27, taking care to align the rear mounting brackets on the switch with the mounting rails attached to the front of the rack.
3. Secure the switch to the rack using four M5 screws.



Note: Although the graphic below shows the switch backwards, the principal is the same, and the general procedure should be followed.



| | |
|---|--|
| 1 | Align the two rear rack-mount guides with the slider rails installed in the rack. |
| 2 | Slide the rack-mount guides onto the slider rails until the front rack-mount brackets come in contact with the front rack-mount rails. |
| 3 | Mount switch using four M5 screws with plastic washers per switch. |

4. Repeat steps 2 and 3 for the second switch. Install the second switch in rack position U28.
5. Use two M5 screws with plastic washers to install two 1U perforated blanking panels in the front of rack units 27 and 28.



Important: Due to the height of the screws holding the rail kit to the rack, the panels do not sit flat on the vertical EIA rails of the rack. Do not over-tighten the screws to compensate.

Step 8d: Connect the Cisco Nexus 5548UP switches to the PDUs

Connect the power cables of the Cisco Nexus 5548UP switches to the PDUs.

Step 8: Rack the Ethernet Switches

For more information on which PDU outlets to plug the power cables of the Cisco Nexus 5548UP into, see ["Considerations for HCP racking and PDU connections"](#) on page 43.

Step 8e: Install the SFP+ to RJ-45 adapter

Insert the 10G SFP+ to 1G RJ-45 adapter module into port 03 of the lower of the two switches.



Step 8f: HCP G10 Node 10G port diagrams

For HCP systems with 10G back-end switches (Brocade VDX 6740, Cisco Nexus 5548UP, or Cisco Nexus 5596UP), the HCP G10 Node Ethernet ports can be set up for two different 10GbE back-end configurations. The pictures below show all of the possible ways to configure Ethernet ports on a HCP G10 Node with attached storage.

In the following pictures, ports with red frames indicate the front-end network connections. Ports with blue frames in the pictures are for the back-end network connection, and ports with orange frames are for Fibre Channel switches. The port with the purple frame is the management port.



Note: The purple port should not be used unless you are configuring the system to have a [hcp_management] network.

The blue PRI label denotes the primary port of the back-end network, which should be connected to the Brocade VDX 6740 switch in rack position U27, or the Cisco Nexus 5548UP switch in rack position U27, or the Cisco Nexus 5596UP switch in rack position U37. The blue SEC label denotes the secondary port of the back-end network, which should be connected to the Brocade VDX 6740 switch in rack position U28, or the Cisco Nexus 5548UP switch in rack position U28, or the Cisco Nexus 5596UP switch in rack position U39.

The following image shows an HCP G10 Node with 10G SFP+ ports for back-end network connections.



The following image shows an HCP G10 Node with 10G SFP+ ports for both front-end and back-end connections.



Step 8g: Cisco Nexus 5548UP port diagram

An HCP system comes with all the Twinax cables needed to support the ordered number of nodes. Individual Twinax cables are used to connect the Ethernet switches together as well as the individual nodes to the Ethernet switches. Please follow the instructions below to connect the Twinax cables.



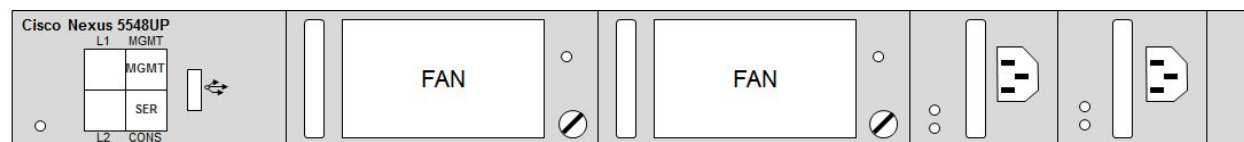
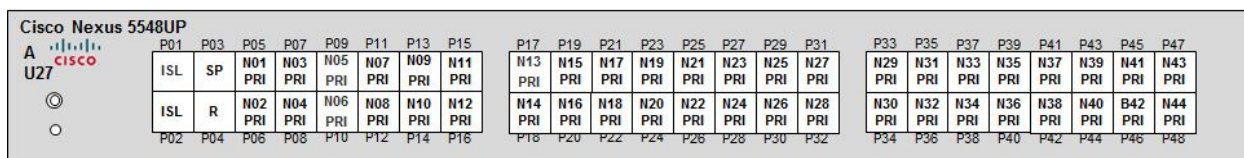
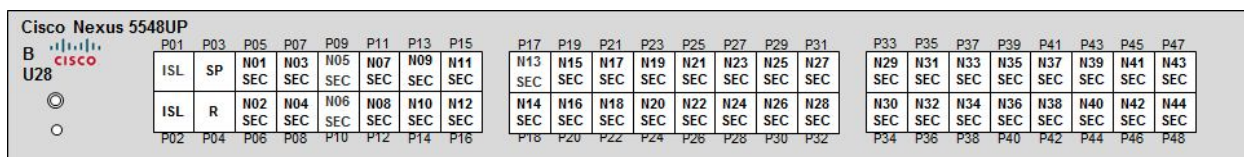
Note: Twinax cables from Brocade and Cisco are not compatible with one another. Please ensure you only use the vendor specific cables with the switches.

The diagrams below show six ports reserved for functions outside of communicating with the node. Do not plug Ethernet cables into these ports during this step. The ports are labeled:

- **SER** — the serial port used to configure the switch later in the assembly process next to the management console

Step 8: Rack the Ethernet Switches

- **MGMT** — the management port used to configure the switch later in the assembly process
- **ISL** — the inter-switch link used to connect the two back-end switches to one another
- **SP** — the service port used by Hitachi Vantara service personnel
- **R** — a reserved port



Note: The management port on the switch does not correspond to the management port on the node. The management port on the node attaches connects to a normal switch port if you want to configure an [hcp_ management] network.

Step 8h: Connect the Cisco Nexus 5548UP Ethernet cables

To connect the cables:

1. Locate two one meter Cisco Twinax cables. Connect the first cable from port 1 on the switch in position U27 to port 1 on the switch in position U28. Connect the second cable from port 2 on the switch in position U27 to port 2 on the switch in position U28.
2. Locate and separate the three meter and five meter Twinax cables. The three meter cables are used to connect the Cisco Nexus 5548UP switches in the Base or Appliance rack to the HCP G10 Nodes. If there are five

meter Twinax cables, they are used to connect nodes 17-44 in the Expansion racks to the back-end switches in the Base rack.

3. Locate the label sheets containing pairs of numbered decals.
4. Starting at label 01 and proceeding sequentially, peel off the first of the pair and attach it to one end of the Twinax cable. Peel off the second of the pair and attach it to the other end of the Twinax cable.
5. Connect one end of the Twinax cable to the Cisco Nexus 5548UP switch in rack position U27 using the port for the node with the corresponding cable number. Connect the other end of the Twinax cable to the blue PRI port corresponding node number in the Appliance or Base rack.
6. Starting at label 01 and proceeding sequentially, peel off the first of the pair and attach it to one end of the Twinax cable. Peel off the second of the pair and attach it to the other end of the Twinax cable.
7. Connect one end of the Twinax cable to the Cisco Nexus 5548UP switch in rack position U28 using the port for the node with the corresponding cable number. Connect the other end of the Twinax cable to the blue SEC port corresponding node number in the Appliance or Base rack.
8. Repeat steps 3 through 6 for each of the nodes in the Appliance or Base rack.
9. Neatly bundle and tie off the Twinax cables to the cable management attachments in the rear of the rack.
10. If there are additional nodes in the system housed in Expansion racks, repeat steps 3 through 8 for each Expansion rack adding 16 to the base node number. For all Expansion racks, ensure you are using the five meter Twinax cables.

Racking the Cisco Nexus 5596UP

Cisco Nexus 5596UP switches are 10G Ethernet switches with 48 ports per switch. The switches can be expanded to 96 ports per switch using three pairs of sixteen port expansion modules. A pair of Cisco Nexus 5596UP switches can connect up to 80 G10 Nodes. Each switch takes up two rack units. They switches are mounted in rack positions U37 and U39.

The items you need to rack the Ethernet switches include:

- #1 and #2 Phillips screwdrivers

- Caged-nut insertion and removal tool

Step 8a: Unpack the Cisco Nexus 5596UP

To unpack the Cisco Nexus 5596 switch:

1. Locate the following items in the switch container:
 - Cisco Nexus 5596 switch
 - 2 slide rails
 - 2 rear switch mounting brackets
 - 2 port side mounting ears
 - 16 M4 x 0.7 x 8-mm Phillips flat-head screws
2. Supply the following items (per switch):
 - Eight M5 screws
 - Eight M5 caged nuts
3. Locate a single 10G SFP+ to 1G RJ-45 adapter module, Cisco part number GLC-T=.P.
4. Set the required items aside in an easy-to-reach location.
5. Leave the unused items in the switch container, and set the container aside.

The rest of the items included in the switch container are not necessary for installation. You don't need the original power cords for the switches.

Do not discard additional items. Pack them together and set them aside.

6. By default, the Cisco Nexus 5596UP 10G Ethernet switches come with 48 ports. Optionally, if the system is ordered with more than 44 nodes, the switches arrive with sixteen port expansion modules. To install the expansion modules in both switches:
 - a. Locate the boxes containing the sixteen port Universal Port Expansion modules.



- b.** Unscrew the dummy plate from the front of the Cisco Nexus 5596UP 10G Ethernet switch with a Philips screwdriver.
- c.** Release the dummy plate locking lever. The image shows a Cisco Nexus 5548 switch for example purposes.



- d.** Carefully install the Port Expansion module by aligning the module in the switch and lock the lever into place.

Step 8: Rack the Ethernet Switches

- e. Screw the module in place using the screw attached to the lever. Do not over-tighten. The image shows a Cisco Nexus 5548 switch for example purposes.



- f. Repeat steps a through e for the sixteen port expansion module in the second Cisco Nexus 5596UP switch. The following figure shows a Cisco Nexus 5596UP switch with two expansion modules installed.

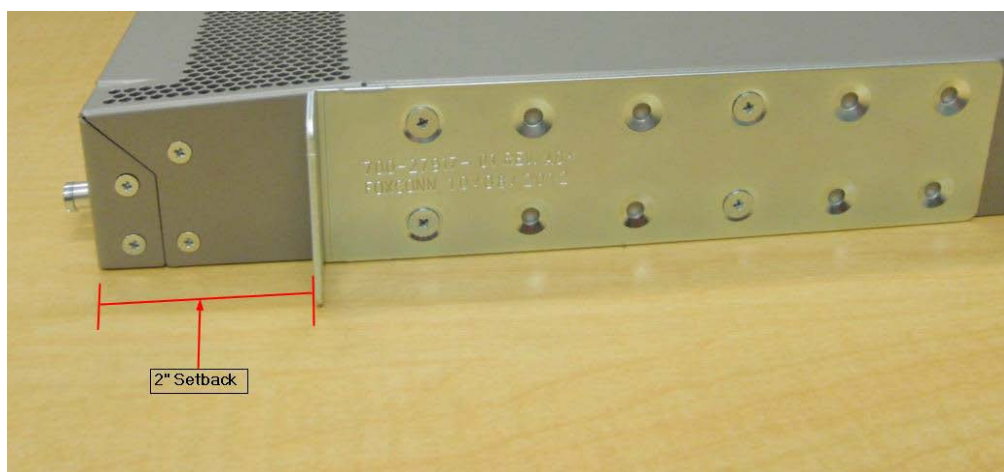


Step 8b: Install the Cisco Nexus 5596UP rails

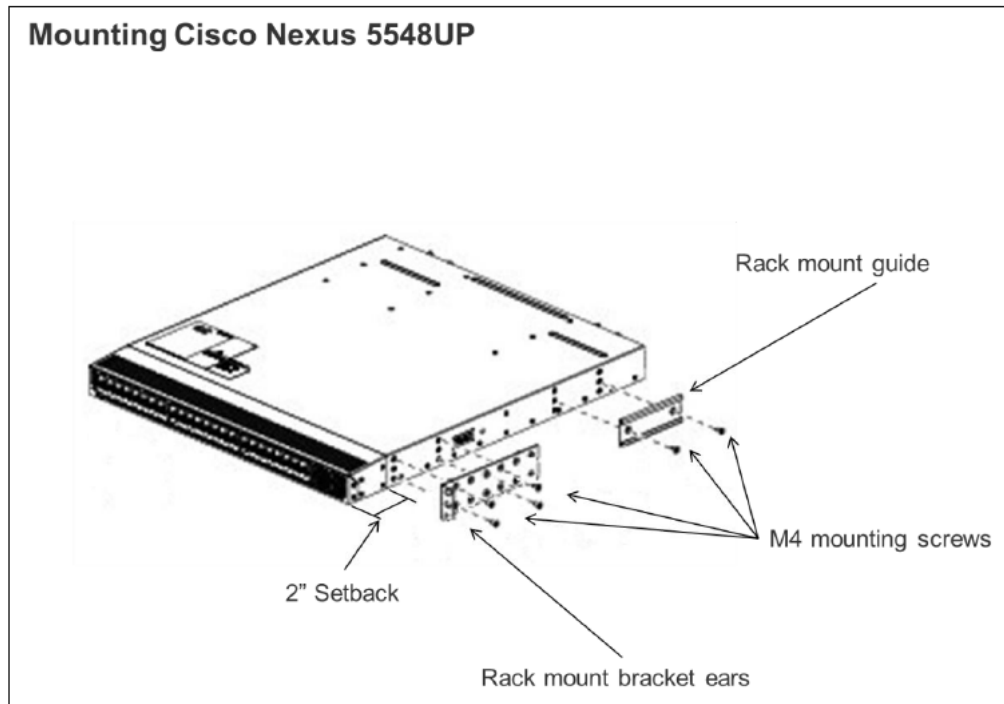
The following image shows the M4 screws, mounting rails, mounting rail guides, and mounting ears. The image depicts the components for the Cisco Nexus 5548UP switch. As such, the brackets are slightly larger than the ones shown here in the image.



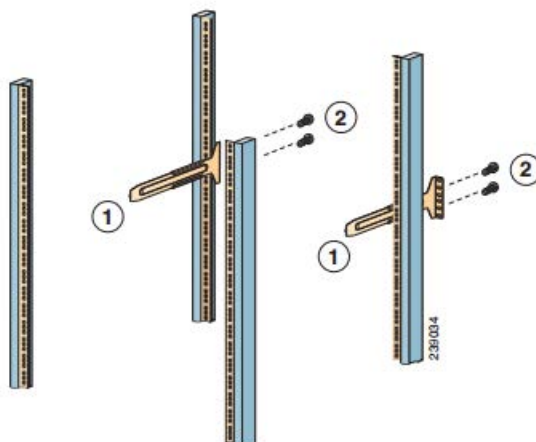
1. Orient the brackets with the mounting ears to the port side of the switch.
2. Attach the ears to the sides of the switch with four M4 screws per bracket so that the face of the switch is mounted with a 2 inch setback as shown in the image below. This way the switch extends 2 inches past the rear EIA rails. The switch shown in the image is a Cisco Nexus 5548UP, but the mounting of the bracket is almost identical.



3. Install the rear mounting bracket to the rear of the switch with four M4 mounting screws as shown below. The diagram shows a Cisco Nexus 5548UP switch, but the mounting is nearly identical.



4. Repeat steps 1 through 3 for the other side of the switch and the other Cisco Nexus 5596UP 10G Ethernet switch.
5. Install M5 cage nuts in the front of the rack in the bottom and middle square holes of rack positions U37 and U39 and the middle and top square holes of rack positions U38 and U40 on both the left and right side of the rack.
6. Attach the first set of slide rails to the front of the rack in positions U37 and U38 using M5 screws.
7. Attach the second set of slide rails to the front of the rack in positions U39 and U40 using M5 screws.



Important: Be sure to install the caged nuts on the front of the rack in the center positions of each rack unit that will be occupied by a switch prior to installing the switches. It's not possible to do so later.

Step 8c: Mount the Cisco Nexus 5596UP in the rack

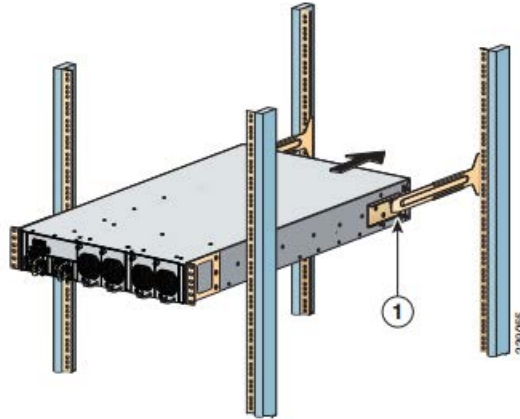
To install the Cisco Nexus 5596UP switches in the rack:

1. Install M5 caged nuts in the rear of the rack in the bottom square holes of rack positions U37 and U39 and the top square hole of rack positions U38 and U40 on both the left and right side of the rack.
2. Slide the first switch into place in U37, taking care to align the rear mounting bracket on the switch with the mounting rails attached to the front of the rack.
3. Secure the switch to the rack using four M5 screws.

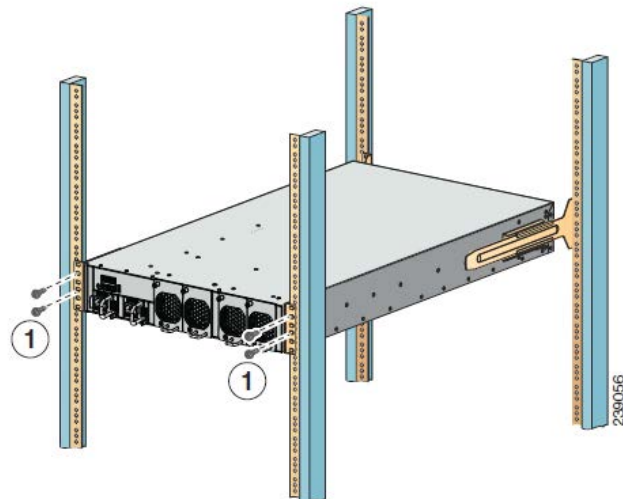


Note: Although the graphic below shows the switch backwards, the principal is the same, and the general procedure should be followed.

Step 8: Rack the Ethernet Switches



4. Once the switch is all the way in the rack, secure the front rack-mount brackets to the rack using M5 rack screws (2 in each bracket).



5. Repeat steps 2-4 to mount the other Cisco Nexus 5596UP switch in rack unit 39.
6. Use M5 screws with plastic washers to install perforated blanking panels in the front of the switch rack units.

Step 8d: Connect the Cisco Nexus 5596UP switches to the PDUs

Connect the power cables of the Cisco Nexus 5596UP switches to the PDUs.

For more information on which PDU outlets to plug the Cisco Nexus 5596UP switches into, see ["Considerations for HCP racking and PDU connections"](#) on page 43.

Step 8e: Install the SFP+ to RJ-45 adapter

Insert the 10G SFP+ to 1G RJ-45 adapter module into port 03 of the lower of the two switches.



Step 8f: HCP G10 Node 10G port diagrams

For HCP systems with 10G back-end switches (Brocade VDX 6740, Cisco Nexus 5548UP, or Cisco Nexus 5596UP), the HCP G10 Node Ethernet ports can be set up for two different 10GbE back-end configurations. The pictures below show all of the possible ways to configure Ethernet ports on a HCP G10 Node with attached storage.

In the following pictures, ports with red frames indicate the front-end network connections. Ports with blue frames in the pictures are for the back-end network connection, and ports with orange frames are for Fibre Channel switches. The port with the purple frame is the management port.



Note: The purple port should not be used unless you are configuring the system to have a [hcp_management] network.

The blue PRI label denotes the primary port of the back-end network, which should be connected to the Brocade VDX 6740 switch in rack position U27, or the Cisco Nexus 5548UP switch in rack position U27, or the Cisco Nexus 5596UP switch in rack position U37. The blue SEC label denotes the secondary port of the back-end network, which should be connected to the Brocade VDX 6740 switch in rack position U28, or the Cisco Nexus 5548UP switch in rack position U28, or the Cisco Nexus 5596UP switch in rack position U39.

The following image shows an HCP G10 Node with 10G SFP+ ports for back-end network connections.

Step 8: Rack the Ethernet Switches



The following image shows an HCP G10 Node with 10G SFP+ ports for both front-end and back-end connections.



Step 8g: Cisco Nexus 5596UP port diagram

An HCP system comes with all the Twinax cables needed to support the ordered number of nodes. Individual Twinax cables are used to connect the Ethernet switches together as well as the individual nodes to the Ethernet switches. Please follow the instructions below to connect the Twinax cables.

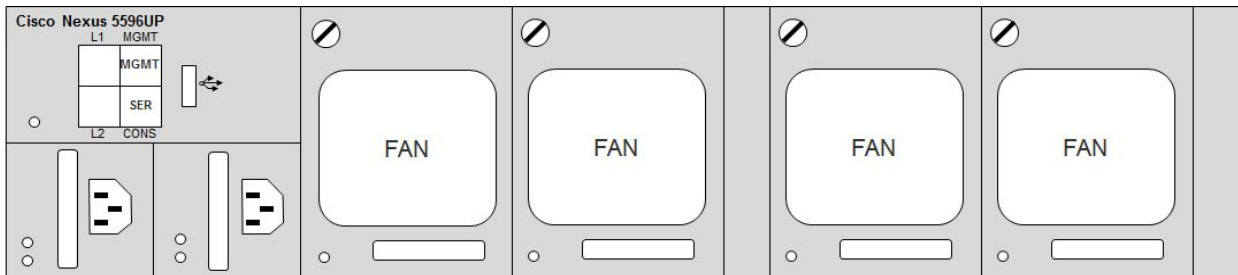
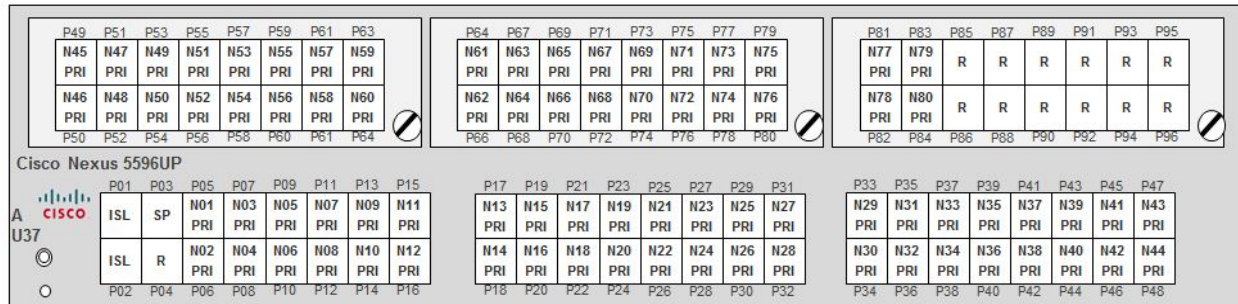
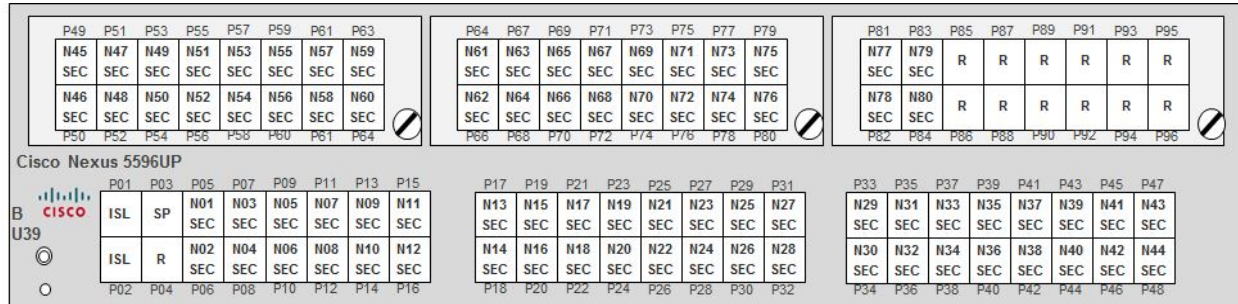


Note: Twinax cables from Brocade and Cisco are not compatible with one another. Please ensure you only use the vendor specific cables with the switches.

The diagrams below show six ports reserved for functions outside of communicating with the node. Do not plug Ethernet cables into these ports during this step. The ports are labeled:

- **SER** — the serial port used to configure the switch later in the assembly process to the management console

- **MGMT** — the management port used to configure the switch later in the assembly process
- **ISL** — the inter-switch link used to connect the two back-end switches to one another
- **SP** — the service port used by Hitachi Vantara service personnel
- **R** — a reserved port



Note: The management port on the switch does not correspond to the management port on the node. The management port on the node attaches connects to a normal switch port if you want to configure an [hcp_management] network.

Step 8h: Connect the Cisco Nexus 5596UP Ethernet cables

To connect the cables:

1. Locate two one meter Cisco Twinax cables. Connect the first cable from port 1 on the switch in position U27 to port 1 on the switch in position U28. Connect the second cable from port 2 on the switch in position U27 to port 2 on the switch in position U28.
2. Locate and separate the three meter and five meter Twinax cables. The three meter cables are used to connect the Cisco Nexus 5596UP switches in the Base or Appliance rack to the HCP G10 Nodes. If there are five meter Twinax cables, they are used to connect nodes 17-80 in the Expansion racks to the back-end switches in the Base rack.
3. Locate the label sheet(s) containing pairs of numbered decals.
4. Starting at label 01 and proceeding sequentially, peel off the first of the pair and attach it to one end of the Twinax cable. Peel off the second of the pair and attach it to the other end of the Twinax cable.
5. Connect one end of the Twinax cable to the Cisco Nexus 5596UP switch in rack position U27 using the port for the node with the corresponding cable number. Connect the other end of the Twinax cable to the blue PRI port corresponding node number in the Appliance or Base rack.
6. Starting at label 01 and proceeding sequentially, peel off the first of the pair and attach it to one end of the Twinax cable. Peel off the second of the pair and attach it to the other end of the Twinax cable.
7. Connect one end of the Twinax cable to the Cisco Nexus 5596UP switch in rack position U28 using the port for the node with the corresponding cable number. Connect the other end of the Twinax cable to the blue SEC port corresponding node number in the Appliance or Base rack.
8. Repeat steps 3-6 for each of the nodes in the Appliance or Base rack.
9. Neatly bundle and tie off the Twinax cables to the cable management attachments in the rear of the rack.
10. If there are additional nodes in the system housed in Expansion racks, repeat steps 3-8 for each Expansion rack adding 16 to the base node number. For all Expansion racks, ensure you are using the five meter Twinax cables.

Step 9 (conditional): Install the blanking plates

If there are unused rack units in the rack, you need to cover the empty spaces with blanking plates. The blanking plates are solid plastic pieces that snap onto the front of the rack. Each blanking plate covers one rack unit.



To install a blanking plate:

1. Hold the plate up to the rack unit. The blanking plate edges should cover the square holes on the sides of the rack in the rack unit.



2. Gently press on the sides of the blanking plate until it snaps into place.

Step 10: Reassemble the racks

Using Velcro straps and/or cable ties, bundle any excess length of the cable harnesses and power cords and secure them to the racks. Then replace the doors and sides on the racks.

Connecting the HCP system at your site

A preassembled HCP SAIN system arrives with its internal physical connections complete:

- The nodes are connected to the back-end switches.
- The back-end switches are connected to each other.
- The trays in the storage array are connected to each other.
- All the components are plugged into the PDUs.

For a system ordered without a rack, the instructions in [Chapter 3: "Assembling rackless components"](#) on page 41, tell you how to make all the internal connections.

To get the system up and running in your environment, you need to make the external physical connections. You need to connect:

- The PDUs to the power sources
- The HCP system to your corporate network

This chapter provides instructions for these activities.

Connecting to the power sources

An HCP SAIN system includes four PDUs. Each PDU has a fixed power cable of the applicable type for the location for which the system was ordered.

Each node is connected to two PDUs for redundancy.

You need to connect each PDU to a different power source at your site. If possible, these should be uninterruptible power sources (UPSs).



Important: Before connecting the PDUs to the power sources, ensure that all the power cables connecting the system components to the PDUs are firmly seated at both ends. These can sometimes come loose during shipping.

Once you've connected the PDUs to the power sources, you can power on the system:

1. Power on the controller tray (that is, the bottommost tray) in each storage array. This causes the other trays in the array to power on automatically.
2. Wait for the arrays to be online and ready to serve requests from the HCP nodes.
3. Power on the nodes.

The back-end switches power on automatically when the PDUs are connected to the power sources.

Connecting to your corporate network

An HCP SAIN system should be connected to your corporate network through two front-end switches or through a single front-end switch using active/active bonding. You need to use the Ethernet cables you supply to connect each of these switches to a separate Ethernet switch in your corporate network.

There are different types of cables and adapters that can be used to configure a front-end connection. The possible cable types are:

- **Fiber optic cables** — The cables used with optical transceivers.
- **Twinax cables** — The cables used with 10G SFP+ to 1G RJ-45 adapters.

The possible adapter types are:

- **Optical transceivers** — The transceivers should be installed into the front end ports of each HCP G10 node.

- **10G SFP+ to 1G RJ-45 adapters** — The adapters connect 10G SFP+ ports to a 1G network. The adapters should be installed into the front end ports of each HCP G10 node. These should not be confused with the single adapter provided with all 10G systems that is used by support personnel to perform switch maintenance.

In order to connect your system to the corporate network you need to cable your front-end switches to the nodes. An HCP G10 Node can have multiple network configurations. For more information on connecting your front-end network to your HCP G10 nodes, see [Step 8e: "HCP G10 Node 1 GB port diagram"](#) on page 109 or [Step 8f: "HCP G10 Node 10G port diagrams"](#) on page 139 and connect your cables to the red ports in the appropriate node diagram.



Important: The default front-end IP addresses for the HCP nodes go from 192.168.100.101 through 192.168.100.104 (or higher for a system with more than four nodes). If these IP addresses don't work for your computing environment, you need to change them *before* you connect the HCP nodes to your corporate network. For information on doing this, see ["Chapter 5: Reconfiguring the HCP system for your site"](#) on page 149.



Note: Make sure that you connect to your front-end switches, not your back-end.

Reconfiguring the HCP system for your site

To reconfigure an HCP system for your computing environment, you need to:

- Verify that the serial number is correct in the system and, if it isn't, correct it
- Change the HCP network settings to match your computing environment
- Change the HCP DNS settings to match your computing environment
- Change the time settings for the HCP system to match your computing environment
- Make the back-end switches known to HCP

To perform these activities, you use the HCP System Management Console. You can do them in any order.

This chapter explains how to:

- Give yourself a System Management Console user account with the service role
- Perform the reconfiguration activities listed above



Note: To perform the reconfiguration activities in this chapter before connecting the HCP system to your corporate network, you need to use a computer directly connected to one of the back-end switches.



Important: This chapter describes activities to be performed when you first set up the HCP system at your site. Before performing these activities at any other time, be sure to consult your authorized HCP service provider.

Preparing to reconfigure the system

To reconfigure an HCP system for your computing environment, you first need to create a user account that has the service role. To do this, follow the steps outlined in the table below.

| Step | Activity | More information |
|------|---|---|
| 1 | Connect a client computer to the HCP default back-end network. | Step 1: "Connect to the HCP default back-end network" below below |
| 2 | Log into the System Management Console with the initial user account. | Step 2: "Log in with the initial user account" on the facing page |
| 3 | Check the health of the HCP system. | Step 3: "Check the health of the HCP system" on page 152 |
| 4 | Create a new user account with the service role. | Step 4: "Create a service account" on page 153 |
| 5 | Log into the System Management Console with the new user account. | Step 5: "Log in with the service account" on page 154 |



Tip: Do not create additional user accounts until you're sure the HCP system is fully operational.

For more information on user accounts and roles, see *Administering HCP*.

Step 1: Connect to the HCP default back-end network

For you to use the HCP System Management Console, you need a client computer with connectivity to the default back-end subnet to which the HCP nodes belong. To connect a client computer to this subnet:

1. Ensure that the client computer has a physical connection to one of the back-end switches used by the HCP system.
2. If the client computer is not in the HCP default back-end subnet:

- a. Make a note of the current IP address and subnet mask for the client computer so you can reset them after you change the network settings for the HCP system.
- b. On the client computer, set the IP address for the local area network to 10.1.1.100.
- c. On the client computer, set the subnet mask to 255.255.255.0.

Step 2: Log in with the initial user account

To log into the HCP System Management Console for the first time:

1. On a computer connected to the HCP back-end network, open a browser window.
2. In the address field, enter:

`https://10.1.1.101:8000`

The IP address in this URL is the preconfigured back-end IP address of one of the nodes in the HCP system.

3. When prompted, accept the HCP SSL server certificate temporarily for the current session.

The System Management Console login page appears.

4. In the **Username** field, type this case-sensitive username: *security*
5. In the **Password** field, type this case-sensitive password: *Chang3Me!*
6. Click on the **Log In** button.

The Console displays the **Change Password** page.

7. On the **Change Password** page:
 - In the **Existing Password** field, type: *Chang3Me!*
 - In the **New Password** field, type a new password for the *security* account.

Passwords must be from six through 64 characters long, are case sensitive, and can contain any valid UTF-8 characters, including white space. The minimum password length is six characters.

To be valid, a password must include at least one character from two of these three groups: alphabetic, numeric, and other.

- In the **Confirm New Password** field, type the new password again.



Tip: Remember this password. You will need it later to set up additional user accounts. For more information on setting up user accounts, see *Administering HCP*.

8. Click on the **Update Password** button.

Step 3: Check the health of the HCP system

At this point, you need to ensure that the HCP system is running properly. To do this:

1. In the top-level menu in the HCP System Management Console, click on **Hardware**.
2. On the **Hardware** page, for each node, check that:
 - The node status is **Available**
 - The status of each logical volume is **Available** or, for spindown volumes (if the system has any), either **Available** or **Spun down**



Tip: To see the status of a logical volume, mouse over the volume icon.

If all the nodes and logical volumes are available, you can safely continue with the HCP system reconfiguration.

If any nodes have a status other than **Available** or if any logical volumes for available nodes have a status other than **Available** or **Spun down**, please contact your authorized HCP service provider for help. Also contact your service provider if the number of logical volume icons for each node does not match your expected number of logical volumes for the node.

Step 4: Create a service account

To create a user account that you can use to reconfigure the HCP system, in the System Management Console:

1. In the top-level menu, mouse over **Security** to display a secondary menu.
2. In the secondary menu, click on **Users**.
3. On the **Users** page, click on **Create User Account**.
4. In the **Create User Account** panel:
 - In the **Username** field, type a username for the user account. Usernames must be from one through 64 characters long and can contain any valid UTF-8 characters, but cannot start with an opening square bracket ([). White space is allowed.
 - In the **Full Name** field, type a full name for the user account. This name must be from one through 64 characters long and can contain any valid UTF-8 characters, including white space.
 - In the **Password** field, type a password for the user account. Passwords must be from six through 64 characters long, are case sensitive, and can contain any valid UTF-8 characters, including white space. The minimum password length is six characters.

To be valid, a password must include at least one character from two of these three groups: alphabetic, numeric, and other.

 - In the **Confirm Password** field, type the password again.



Note: Remember this password. You will need it for the reconfiguration activities in this chapter.

- In the **Roles** section, select **Service**.
5. Click on the **Create User Account** button.
 6. In the upper right corner of the Console, click on **Log Out**.

The Console returns to the login page.

Step 5: Log in with the service account

Now that you've created a user account with the service role, you can use that account to log into the HCP System Management Console and perform system reconfiguration activities. This time, when you log in, the Console displays the **Overview** page.



Caution: The service role lets you take additional actions that are not described in this book. Some of these actions can have a significant impact on the HCP system. Before taking any other service role actions, be sure you understand their consequences.



Tip: After you complete the last reconfiguration activity, log out of the System Management Console and close the browser window to ensure that no one can return to the Console on your computer without a fresh login.

Verify the serial number

Each HCP system is assigned a unique five-digit serial number. With a preassembled system, this number is on a label that's attached to the side of the system rack at the bottom, just inside the left rear door. With a rackless system, this number is on a label taped to the top of the first node you mount when you assemble the system.

When the HCP system software is installed, the serial number is entered as part of the system configuration. You need to verify that the serial number in the system configuration matches the serial number of the label attached to the rack. If the serial numbers don't match, you need to change the serial number in the system configuration.

To verify and, if necessary, change the serial number in the HCP system configuration:

1. In the top-level menu in the System Management Console, mouse over **Configuration** to display a secondary menu.
2. In the secondary menu, click on **Miscellaneous**.
3. Verify that the serial number in the **Serial Number from Rack Label** field is the same as the serial number on the label delivered with the system.

4. If the serial numbers are not the same:
 - a. In the `Serial Number from Rack Label` field, type the serial number from the label attached to the rack.
 - b. Click on the **Update Settings** button.

Changing network settings

The HCP system is installed with default network settings. You need to change these settings to match your computing environment. Before you can do this, you need to know:

- The IP address to use for the front-end gateway router. Typically, the first three octets in this address are the same as the first three octets in the IP address of the front-end network.
- The subnet mask for the front-end IP addresses.
- If the corporate network is configured to support virtual networking and you want to tag the HCP front-end network, the VLAN ID to use for that network. For information on virtual networking, see *Administering HCP*.
- The front-end IP address to use for each HCP node.



Note: Node numbers don't change when you change IP addresses.

- Whether HCP should hide the IP addresses of the master name servers for the front-end network and allow client access to HCP over the network only through specified downstream DNS servers. A DNS configuration that functions in this way is called **hidden master**.

A **downstream DNS server** is a DNS server through which client requests are routed to HCP.

For more information on this and the next two properties, see *Administering HCP*.

- Whether HCP should notify specified downstream DNS servers about changes to the zone definition for the front-end network.

- The rate at which the downstream DNS servers should query HCP for updates to the zone definition for the front-end network domain. The default is three hours.

For the refresh rate for the [hcp_system] network, you can specify any combination of weeks (W), days (D), hours (H), minutes (M), and seconds (S), using this syntax:

#W#D#H#M#S

These considerations apply to specifying the refresh rate:

- In each case, # must be an integer greater than or equal to one.
 - If an integer is specified without a time unit, the time unit is assumed to be seconds.
 - Time units can be specified in any order.
 - Any given time unit can be specified only once.
 - Time units are not case sensitive.
 - The total time specified must be in the range one through 2,147,483,647 seconds.
- The back-end IP address to use for each HCP node. You can change only the first three octets of the back-end IP addresses. You cannot change the fourth octet.



Important: Change the default back-end IP addresses only if they conflict with existing front-end IP addresses at your site.

After you've made all the necessary changes to the front-end and back-end network settings, you can safely connect the HCP system to your corporate network.

Changing the front-end network settings

To change the HCP front-end network settings:

1. In the top-level menu in the System Management Console, mouse over **Configuration** to display a secondary menu.
2. In the secondary menu, click on **Networks** to display the **Networks** page.

3. In the list of networks, click on [hcp_system].
4. In the panel for the [hcp_system] network:
 - To change the gateway IP address, in the **Gateway** field, type the new IP address.
 - To change the subnet mask, in the **Netmask** field, type the new subnet mask.
 - To make the front-end network tagged, select the **Make tagged network** option. Then, in the **VLAN ID** field, type a unique VLAN ID for the network. Valid values are integers in the range one through 4,095.
 - To change the DNS settings for the network, click on the **Downstream DNS Configuration** link. Then:
 - To enable or disable hidden master, select or deselect, respectively, the **Enable hidden master** option.
 - To enable or disable notify, select or deselect, respectively, the **Enable notify** option.
 - If you are enabling hidden master or notify, in the **Downstream DNS Servers** field, type a comma-separated list of the IP addresses of one through ten downstream DNS servers. Spaces are not allowed.
 - To change the refresh rate, in the **Refresh Rate** field, type the new refresh rate. For valid values for the refresh rate, see ["Changing network settings"](#) on page 155 above.
 - To change the node IP addresses, in the **Node IP Addresses** section, type new front-end IP addresses for the nodes in the HCP system.



Important: Do not change the value in the **MTU** field.

5. Click on the **Update Settings** button.

A warning message appears asking you to confirm the changes you've made.

6. In the field in the message window, type **YES**. This is case sensitive.

7. Click on the **Update Settings** button.

The HCP system restarts with the new settings. This takes a few minutes.

8. If you do not need to change the back-end settings, you can now safely connect the HCP system to your corporate network.
9. Log back into the System Management Console after the system restarts. Then proceed to the next configuration activity.

Changing the back-end network settings

To change the HCP back-end network node IP address settings:

1. In the top-level menu in the System Management Console, mouse over **Configuration** to display a secondary menu.
2. In the secondary menu, click on **Networks** to display the **Networks** page.
3. In the list of networks, click on [hcp_backend].
4. In the **Node IP Addresses** section in the [hcp_backend] panel, type new backend IP addresses for the nodes in the HCP system.



Important: Do not change the values of the **Multicast Address** or **Netmask** field.

5. Click on the **Update Settings** button.

A warning message appears asking you to confirm the changes you've made.

6. In the field in the message window, type *YES*. This is case sensitive.
7. Click on the **Update Settings** button.

The HCP system restarts with the new settings. This takes a few minutes.



Note: If you changed the back-end IP addresses of the HCP nodes:

1. Change the IP address of the client computer to match the new HCP back-end subnet.
2. Change the IP address of the HCP system switches to match the new HCP back-end subnet.
3. Change the IP address of the HCP system SNMP trap receiver addresses to match the new HCP back-end subnet.
4. Log into the System Management Console again after the system restarts. Remember to use one of the new back-end IP addresses in the Console URL.

Changing DNS settings

For the HCP system to use DNS services, you need to enable the use of DNS in HCP and specify the IP addresses of all the DNS servers in your environment that are upstream from HCP. An **upstream DNS server** is a DNS server to which HCP routes the outbound communications it initiates (for example, for sending log messages to syslog servers or for communicating with Active Directory).

Specifying all the DNS servers ensures that the HCP system can be addressed by hostname as long as at least one of those servers is available. To specify the DNS servers, you need to know their IP addresses.



Note: If you have not yet configured HCP as a subdomain in the DNS, do so now. For information on doing this, see *Administering HCP*.

When changing DNS settings, you can also change the hostname prefix used to name the nodes in the HCP system. You need to do this if you have two HCP systems and:

- You use Active Directory® authentication for access to HCP
- The two systems have one or more node numbers in common

If you don't use DNS at your site, you need to disable the use of DNS in HCP.

To change the HCP system DNS settings:

1. In the top-level menu in the System Management Console, mouse over **Configuration** to display a secondary menu.

2. In the secondary menu, click on **DNS**.
3. On the **DNS Settings** page:
 - Do either of these:
 - If you want to use DNS with HCP, select the **Use DNS** option.
 - If you don't want to use DNS with HCP, deselect the **Use DNS** option and skip to Step 4.
 - Optionally, in the **Hostname Prefix** field, type a new hostname prefix. The hostname prefix can be from one through 12 characters long and can contain only lowercase letters, numbers, and hyphens (-).



Tip: To make node names easier to read, end the hostname prefix with a hyphen (-).

- In the **Upstream DNS Servers** field, type a comma-separated list of the IP addresses of all the upstream DNS servers. Spaces are not allowed.
4. Click on the **Update Settings** button.
- A warning message appears asking you to confirm the changes you've made.
5. In the field in the message window, type **YES**. This is case sensitive.
 6. Click on the **Update Settings** button.

The Console confirms that you have successfully updated the DNS settings, and HCP restarts. Wait a few minutes for the system to finish restarting. Then proceed to the next reconfiguration activity.

Changing time settings

The internal time of the delivered HCP system may not exactly match the time in your computing environment. You can choose to leave the HCP time as is, reset it to match your environment and still have the system use its own internal time, or use one or more external time servers.

If you choose to use external time servers, you need to know the IP addresses or hostnames of those servers. Additionally, you need to know the time zone you want HCP to use.



Note: For you to specify an external time server, the HCP system must have connectivity to the time server through the front-end network.

In any case, you need to know the time zone you want HCP to use. HCP stores all times (such as creation dates and retention settings) in Coordinated Universal Time (UTC) and uses its time zone setting only for presentation purposes.



Note: HCP systems can be configured not to allow changes to time settings through the System Management Console. If your system is configured this way, you cannot make the changes described in this section.

To change the time settings for the HCP system:

1. In the top-level menu in the System Management Console, mouse over **Configuration** to display a secondary menu.
2. In the secondary menu, click on **Time**.
3. On the **Time Settings** page:
 - Optionally, in the **Time Servers** field, type a comma-separated list of the IP addresses or hostnames of one or more time servers. Spaces are allowed.
 - Optionally, if the time source is internal, in the **Current Time** field, type the current time. The format for the time is *MMDDhhmmYYYY*, where *MM* is the two-digit month, *DD* is the two-digit day, *hh* is hours on a 24-hour clock, *mm* is minutes, and *YYYY* is the four-digit year. The time you specify cannot be more than one year in the future or 23 hours and 45 minutes in the past.

If the time source is internal and you leave this field blank, the current system time doesn't change.

 - Optionally, in the **Time Zone** field, select the new time zone.
4. Click on the **Update Settings** button.

A warning message appears asking you to confirm the changes you've made.

5. In the field in the message window, type *YES*. This is case sensitive.
6. Click on the **Update Settings** button.

The Console confirms that you have successfully updated the time settings, and HCP restarts. Wait a few minutes for the system to finish restarting. Then proceed to the next reconfiguration activity.

Making the back-end switches known to HCP


You can choose to have HCP report the status of the back-end switches in the System Management Console. For HCP to do this, you need to make each switch known to HCP. You do this by telling HCP about the model and IP address of the switch.

By default, the IP addresses of the back-end switches are 10.1.1.252 and 10.1.1.253. If you changed the back-end IP addresses of the HCP nodes, the switch IP addresses need to change as well. For help with this, contact your authorized HCP service provider.

To make the back-end switches known to HCP:

1. In the top-level menu in the System Management Console, mouse over **Configuration** to display a secondary menu.
2. In the secondary menu, click on **Monitored Components**.
3. On the **Monitored Components** page, for each switch:
 - a. Click on **Add**.

A new row appears in the **Components** list. The row is highlighted in green.

If you inadvertently add an extra row, click on the delete control () for the row to remove it.

- b. In the **Model** field in the new row, select the model of the switch that's supplied with the system.
- c. In the **IP Address** field, type a valid IPv4 address for the switch.

4. Click on the **Update Settings** button.

Configuring the BMC to monitor servers

You can configure the HCP system baseboard management controller (BMC) to your corporate network to monitor the health of your servers. If you want to enable this feature, contact your HCP sales representative.

Configuring HCP monitoring with Hi-Track Monitor

Hi-Track Monitor is a Hitachi Vantara product that enables remote monitoring of the nodes and storage in an HCP SAIN system. With Hi-Track Monitor, you can view the status of these components in a web browser. You can also configure Hi-Track Monitor to notify you by email of error conditions as they occur. Additionally, you can configure Hi-Track Monitor to report error conditions to Hitachi Vantara support personnel. It is recommended to set up Hi-Track monitoring on all new HCP systems.

Hi-Track Monitor is for monitoring and error notification purposes only. It does not allow any changes to be made to the system.

Hi-Track Monitor is installed on a server that is separate from the HCP system. The program uses SNMP to retrieve information from HCP, so SNMP must be enabled in HCP.



Note: HCP supports IPv4 and IPv6 network connections to Hi-Track servers. However, Hi-Track support for IPv6 network connections varies based on the Hi-Track server operating system. For information on requirements for Hi-Track servers that support IPv6 networks, see the applicable Hi-Track documentation.

This chapter explains how to set up monitoring of HCP nodes with Hi-Track Monitor. For information on setting up storage monitoring, see the Hi-Track Monitor documentation.

The chapter assumes that Hi-Track Monitor is already installed and running according to the documentation that comes with the product.

Enabling SNMP in HCP

To enable Hi-Track Monitor to work with HCP, you need to enable SNMP in the HCP System Management Console. When you enable SNMP, you can select version 1 or 2c or version 3.

By default, Hi-Track Monitor is configured to support SNMP version 1 or 2c with the community name *public*. If you change the community name in HCP or if you select version 3, you need to configure a new SNMP user in Hi-Track Monitor to match what you specify in HCP. For more information on this, see the Hi-Track Monitor documentation.

Once SNMP is enabled, the first four nodes in the HCP system monitor for switch SNMP traps. If there are more than four HCP nodes in the system, additional HCP node back-end addresses can be added to the SNMP trap receivers list on the back-end switches. For more information on adding extra nodes back-end address to the SNMP trap receivers list, contact your HCP customer support.

To enable SNMP in HCP for use with Hi-Track Monitor:

1. Log into the HCP System Management Console using the initial user account, which has the security role.
2. In the top-level menu in the System Management Console, mouse over **Monitoring** to display a secondary menu.
3. In the secondary menu, click on **SNMP**.
4. In the **SNMP Settings** section on the **SNMP** page:
 - Select the **Enable SNMP at snmp.hcp-domain-name** option.
 - Select either **Use version 1 or 2c** (recommended) or **Use version 3**.

If you select **Use version 3**, specify a username and password in the **Username**, **Password**, and **Confirm Password** fields.
 - Optionally, in the **Community** field, type a different community name.
5. Click on the **Update Settings** button.

6. In the entry field in the **Allow** section, type the IP address that you want HCP to use to connect to the server on which Hi-Track Monitor is installed. Then click on the **Add** button.
7. Log out of the System Management Console and close the browser window.

Configuring Hi-Track Monitor

To configure Hi-Track Monitor to monitor the nodes in the HCP system, follow the steps outlined in the table below.

| Step | Activity | More information |
|------|--|--|
| 1 | Log into Hi-Track Monitor. | Step 1: "Log into Hi-Track Monitor" below |
| 2 | Set the Hi-Track Monitor base configuration, including the email addresses to which email about error conditions should be sent. | Step 2: "Set the base configuration" on the next page |
| 3 | Optionally, configure transport agents for reporting error conditions to Hitachi Vantara support personnel. | Step 3 (conditional): "Configure transport agents" on page 169 |
| 4 | Identify the HCP system to be monitored. | Step 4: "Identify the HCP system" on page 170 |

Step 1: Log into Hi-Track Monitor

To log into Hi-Track Monitor:

1. Open a web browser window.
2. In the address field, enter the URL for the Hi-Track Monitor server (using either the hostname or a valid IP address for the server) followed by the port number 6696; for example:

`http://hitrack:6696`

3. In the **Select one of the following UserIds** field, select **Administrator**.
4. In the **Enter the corresponding password** field, type the case-sensitive password for the Administrator user. By default, this password is *hds*.

If Hi-Track Monitor is already in use at your site for monitoring other devices, this password may have been changed. In this case, see your Hi-Track Monitor administrator for the current password.

5. Click on the **Logon** button.

Step 2: Set the base configuration

The Hi-Track Monitor base configuration specifies information such as the customer site ID, how frequently to scan devices, and whether to report communication errors that occur between Hi-Track Monitor and monitored devices. The base configuration also specifies the addresses to which Hi-Track Monitor should send email about error conditions.

If Hi-Track Monitor is already in use at your site, the base configuration may already be set. In this case, you can leave it as is, or you can make changes to accommodate the addition of HCP to the devices being monitored.

To set the Hi-Track Monitor base configuration:

1. In the row of tabs at the top of the Hi-Track Monitor interface, click on **Configuration**.

The **Base** page is displayed by default. To return to this page from another configuration page, click on **Base** in the row of tabs below **Configuration**.

2. In the **Device Monitoring** section:
 - In the **Site ID** field, type your Hitachi Vantara customer ID. If you don't know your customer ID, contact your authorized HCP service provider for help.
 - Optionally, specify different values in the other fields to meet the needs of your site. For information on these fields, click on the **Help on this table's entries** link above the fields.
3. In the **Notify Users by Email** section:
 - In the **eMail Server** field, type the fully qualified hostname or a valid IP address of the email server through which you want Hi-Track Monitor to send email about error conditions.

- In the **Local Interface** field, select the Ethernet interface that has connectivity to the specified email server. (This is the interface on the Hi-Track Monitor server.)
- In the **User List** field, type a comma-separated list of the email addresses to which Hi-Track Monitor should send email about error conditions.
- In the **Sender's Email Address** field, type a well-formed email address to be used in the From line of each email.

Some email servers require that the value in the From line be an email address that is already known to the server.

4. Click on the **Submit** button.
5. Optionally, to send a test email to the specified email addresses, click on the **Test Email** button.

Step 3 (conditional): Configure transport agents

A Hi-Track Monitor transport agent transfers notifications of error conditions to a target location where Hitachi Vantara support personnel can access them. The transfer methods available are HTTPS, FTP, or dial up. For the destinations for each method, contact your authorized HCP service provider.

You can specify multiple transport agents. Hi-Track tries them in the order in which they are listed until one is successful.

To configure a transport agent:

1. In the row of tabs below **Configuration**, click on **Transport Agents**.
2. In the field below **Data Transfer Agents**, select the transfer method for the new transport agent.
3. Click on the **Create** button.

The new transport agent appears in the list of transport agents. A set of configuration fields appears below the list.

4. In the configuration fields, specify the applicable values for the new transport agent. For information on what to specify, see the Hi-Track Monitor documentation.
5. Click on the **Submit** button.

You can change the order of multiple transport agents by moving them individually to the top of the list. To move a transport agent to the top of the list:

1. In the **Move to Top?** column, select the transport agent you want to move.
2. Click on the **Submit** button.

Step 4: Identify the HCP system

To identify the HCP system to be monitored:

1. In the row of tabs at the top of the Hi-Track Monitor interface, click on **Summary**.

The **Summary** page displays up to four tables that categorize the devices known to Hi-Track Monitor — Device Errors, Communication Errors, Devices Okay, and Not Monitored. To show or hide these tables, click in the checkboxes below the table names at the top of the page to select or deselect the tables, as applicable. Then click on the **Refresh** button.

While no tables are shown, the page contains an **Add a device** link.

2. Take one of these actions:
 - If the **Summary** page doesn't display any tables, click on the **Add a device** link.
 - If the **Summary** page displays one or more tables, click on the **Item** column heading in any of the tables.
3. In the **Select Device Type** field, select **Hitachi Content Platform (HCP)**.

A set of configuration fields appears.

4. Optionally, in the **Name** field, type a name for the HCP system. The name can be from one through 40 characters long. Special characters and spaces are allowed.

Typically, this is the hostname of the system.

5. Optionally, in the **Location** field, type the location of the HCP system. The location can be from one through 40 characters long. Special characters and spaces are allowed.

6. Optionally, in the **Group** field, type the name of a group associated with the HCP system (for example, Finance Department). The group name can be from one through 40 characters long. Special characters and spaces are allowed.
7. In the **Site ID** field, type your Hitachi Vantara customer ID. If you don't know your customer ID, contact your authorized HCP service provider for help.
8. In the **IP Address or Name (1)** field, type a valid front-end IP address for the lowest-numbered storage node in the HCP system. In the **Local Interface** field, leave the value as **-any-**.
9. In the **IP Address or Name (2)** field, type a valid front-end IP address for the highest-numbered storage node in the HCP system. In the **Local Interface** field, leave the value as **-any-**.
10. In the **SNMP Access ID** field, select the SNMP user that corresponds to the SNMP configuration in HCP. Typically, this is **public**.

For information on configuring SNMP in HCP, see ["Enabling SNMP in HCP"](#) on page 166.

11. In the **Comms Error Reporting?** field, select one of these options to specify whether Hi-Track should report communication errors that occur between Hi-Track Monitor and the HCP system:
 - **Yes** — Report communication errors.
 - **No** — Don't report communication errors.
 - **Local** — Report communication errors only to the email addresses specified in the base configuration and not through the specified transport agents.
 - **Default** — Use the setting in the base configuration.
12. Leave **Enabled?** selected.
13. Leave **Trace?** unselected.
14. Click on the **Add** button.

If the operation is successful, the interface displays a message indicating that the HCP system has been added. Do not click on the **Add** button again. Doing so will add the system a second time.



Configuring DNS for HCP

Domain name system (DNS) is a network service that translates, or **resolves**, domain names (for example, example.com) into IP addresses for client access. The service is provided by one or more servers, called **name servers**, that share responsibility for resolving client requests.

An HCP system can exist as multiple domains in the DNS — one for each front-end network defined in the system. Each of these domains must be a subdomain of a DNS domain to which you have administrative access, such as your corporate domain. All nodes that have IP addresses defined for a given front-end network belong to the HCP domain defined for that network.

To enable access to HCP by domain name on any given network, you need to configure the HCP domain for that network in your DNS. To do this, you can use either secondary zones (also called slave zones) or stub zones.

This chapter contains:

- A discussion of the advantages of using DNS
- A description of zones, secondary zones, and stub zones
- Windows and Unix instructions for configuring HCP domains in the DNS
- Instructions for verifying the HCP domain definitions
- DNS considerations for implementing HCP service by remote systems



Note: When communicating with a DNS server, HCP may send packets that are larger than 512 bytes. You need to ensure that these packets can pass through your corporate firewall.

DNS advantages

Using DNS provides several advantages over using IP addresses for access to the HCP system. For example:

- When you use a domain name for namespace access, the HCP DNS manager, which runs on all storage nodes, is responsible for distributing client requests among those nodes. If you use IP addresses, you are responsible for ensuring that the processing load is balanced across the HCP nodes.
- If an application uses a domain name for access to the HCP system and you change the IP addresses of the HCP nodes, you don't need to change the application. If the application uses IP addresses and you change the node IP addresses, you need to update the application to specify the new IP addresses.
- If both IPv4 and IPv6 addresses are defined for a front-end network, an application can use the domain name associated with that network to access the HCP system from client computers that have IPv4 addresses *and* from client computers that have IPv6 addresses. If an application uses IP addresses to access the HCP system over a front-end network with multiple IP addresses defined for each node, you need to be able to configure that application to access the HCP system using *only* the IP addresses that are routable from the client computer on which the application is running.
- If you use a domain name to identify the other system when you create a replication link and the IP addresses for that domain are changed on that system, replication continues without interruption. If you use IP addresses to identify the system and the IP addresses for the system change, replication stops until you change the IP addresses in the definition of the replication link.
- If you use domain names to identify the systems in a replication topology and you enable DNS failover on those systems, client requests can be automatically redirected to other systems in the topology if the target system fails. If you use IP addresses to identify a system in a replication topology and that system fails, client requests that target that system cannot be automatically redirected to other systems.

Zones

The domain names resolved by DNS are divided into **zones**, where each zone is defined by set of related hostnames. A corporate domain, for example, is associated with a zone.

Each domain you define in HCP is a subdomain of a higher-level domain. In the DNS, you need an HCP domain definition for each combination of network and domain you define in HCP. The IP addresses for each HCP domain in the DNS make up a zone within the zone for the applicable higher-level domain.

For example, suppose that you configure HCP to define two domains, hcp-ma.example.com and hcp-ca.example.com. Suppose also that you configure HCP to define three user-defined networks, net1, net2, and net3, and you configure these three networks to associate net1 and net2 with domain hcp-ma.example.com and associate net3 with domain hcp-ca.example.com. In this case, you need to add three zones to the DNS, one for each of these domain and network combinations:

Domain name: hcp-ma.example.com
Node IP addresses defined for network net1

Domain name: hcp-ma.example.com
Node IP addresses defined for network net2

Domain name: hcp-ca.example.com
Node IP addresses defined for nodes in network net3

Secondary zones and stub zones

In the DNS, you configure each HCP domain as a **secondary zone** (also called a **slave zone**) or as a **stub zone**. A DNS server in which a given HCP domain is configured as a secondary zone maintains a full copy of the HCP DNS information for that domain and can, therefore, satisfy requests for resolution of the HCP domain name by itself. You might use secondary zones, for example, if the firewall that HCP sits behind is configured to allow client requests for DNS name resolution to go only to a corporate DNS server.

A DNS server in which a given HCP domain is configured as a stub zone gets only partial DNS information for that domain from HCP. Stub zones minimize zone replication and are less resource intensive for the DNS server.

If you enable hidden master or notify for a network, the HCP domain for that network must be configured as a secondary zone, not a stub zone, on each DNS server specified in the network configuration.

Secondary zone and stub zone definitions are basically the same. Each definition lists the IP addresses of master name servers for a domain but does not include individual records for those servers. Those records are stored on the master name servers themselves. The DNS servers get the individual name server records from the master name servers listed in the zone definition.

For each network defined in HCP, HCP automatically generates name server records for all storage nodes that have IP addresses in that network. Each of those storage nodes stores a copy of these records, thereby making each storage node eligible to be a master name server for the applicable domain.

Before HCP can accept client requests that identify the system by a domain name, you need to register some or all of the eligible nodes as master name servers for the applicable HCP secondary zone or stub zone. You register a node by listing its IP addresses in the secondary zone or stub zone definition.

For any given HCP domain, all storage nodes with IP addresses defined for the applicable network can act as name servers for the HCP DNS manager, regardless of whether they're registered as master name servers. However, for HCP to be accessible over that network, at least one registered node must be running. Therefore, you need to register a sufficient number of nodes for each network to minimize the risk that all registered nodes for a given network will fail at the same time.



Tip: If HCP has a small number of storage nodes, consider registering them all as master name servers. The more nodes you register, the more distributed the DNS queries will be.

When defining a secondary zone or stub zone for an HCP domain, you specify a fully qualified domain name for the HCP system. This is the name of the domain associated with the network that is defined in HCP.

Configuring an HCP secondary zone or stub zone in Windows

You can use either the GUI or a command line to configure a secondary zone or stub zone in Windows. The following sections present the GUI configuration procedure for Windows 2008. The procedures for Windows 2003 and Windows 2012 are basically the same.

Configuring an HCP secondary zone in Windows

To configure an HCP domain as a secondary zone in Windows:

1. Open the DNS manager:
 - a. In the Windows Control Panel, double-click on **Administrative Tools**.
 - b. In the **Administrative Tools** window, double-click on **DNS**.

The **DNS Manager** window shows the hierarchy of zones currently defined in the DNS.

2. In the **DNS Manager** window, right-click on **Forward Lookup Zones** under the higher-level zone within which you want to configure the HCP secondary zone. On the dropdown menu, select **New Zone**.

The **New Zone Wizard** window opens.

3. In the **New Zone Wizard** window, click on the **Next** button.
4. On the **Zone Type** page, select the **Secondary zone** option. Then click on the **Next** button.
5. In the **Zone name** field on the **Zone Name** page, type the applicable fully qualified domain name for the HCP system. Then click on the **Next** button.
6. On the **Master DNS Servers** page, for each HCP storage node you want to register as a master name server, in the list box, type the IPv4 and IPv6 addresses assigned to the node for the applicable network. Then press Enter.

When you're finished adding all the node IP addresses, click on the **Next** button.

7. Click on the **Finish** button.

The HCP new secondary zone appears in the zone hierarchy in the DNS manager window.

Configuring an HCP stub zone in Windows

To configure an HCP domain as a stub zone in Windows:

1. Open the DNS manager:
 - a. In the Windows Control Panel, double-click on **Administrative Tools**.
 - b. In the **Administrative Tools** window, double-click on **DNS**.

The **DNS Manager** window shows the hierarchy of zones currently defined in the DNS.

2. In the **DNS Manager** window, right-click on **Forward Lookup Zones** under higher-level zone within which you want to configure the HCP stub zone. On the dropdown menu, select **New Zone**.

The **New Zone Wizard** window opens.

3. In the **New Zone Wizard** window, click on the **Next** button.
4. On the **Zone Type** page, select the **Stub zone** option.
5. Take one of these actions:

- To configure the stub zone with Windows Active Directory integration:
 - a. Select the **Store the zone in Active Directory** option.
 - b. On the **Active Directory Zone Replication Scope** page, select the option for the way in which you want DNS data to be replicated throughout your network.

Then click on the **Next** button.



Note: You need to configure the stub zone with Windows Active Directory integration if you plan to enable HCP support for AD. For information on doing that, see [Configuring Active Directory or Windows workgroup support](#).

- To configure the stub zone without Windows Active Directory integration, click on the **Next** button.
- 6. In the **Zone name** field on the **Zone Name** page, type the applicable fully qualified domain name for the HCP system. Then click on the **Next** button.
- 7. On the **Zone File** page, select the **Create a new file with this file name** option and leave the default file name in the option field. Then click on the **Next** button.
- 8. On the **Master DNS Servers** page, for each HCP storage node you want to register as a master name server, in the list box, type the IPv4 and IPv6 addresses assigned to the node for the applicable network. Then press Enter.

When you're adding all the node IP addresses, click on the **Next** button.

- 9. Click on the **Finish** button.

The HCP new stub zone appears in the zone hierarchy in the DNS manager window.

Configuring an HCP secondary zone or stub zone in Unix

With BIND in Unix, zones are defined in the `/etc/named.conf` file on the DNS servers. In the definition of a secondary zone or stub zone for an HCP domain, you specify:

- The applicable fully qualified domain name for the HCP system
- The zone type (**slave** for a secondary zone or **stub** for a stub zone)
- The name of the file you want the system to use to cache DNS query results for faster lookup
- A list of the IP addresses of the master name servers for the secondary zone or stub zone (be sure to use all of the node IP addresses assigned to each node for the applicable network)

Here's a sample zone statement that defines a secondary zone for an HCP domain with the domain name `hcp-ma.example.com` and four registered master name servers:

```
zone "hcp-ma.example.com" IN {  
  type slave;  
  file "/var/named/slave/hcp-ma.example.com";  
  masters  
  {192.168.210.15;192.168.210.16;192.168.210.17;192.168.210.18;2001:0db8::101;  
  2001:0db8::102;2001:0db8::103;2001:0db8::104; };  
};
```

Here's a sample zone statement that defines a stub zone for the same domain:

```
zone "hcp-ma.example.com" IN {  
  type stub;  
  file "/var/named/stub/hcp-ma.example.com";  
  masters  
  {192.168.210.15;192.168.210.16;192.168.210.17;192.168.210.18;2001:0db8::101;  
  2001:0db8::102;2001:0db8::103;2001:0db8::104;};  
};
```

Verifying the configuration

You can verify that an HCP secondary zone or stub zone is working properly from either a Windows command-prompt window or a Unix shell. In both cases, you use either the **dig** or **nslookup** command, depending on which is available. The syntax for this is:

```
dig|nslookup (admin|nfs|cifs|www) .hcp-domain-name
```

The response to this command should be a list of the IP addresses of all the HCP storage nodes that have IP addresses defined for the network for which the secondary zone or stub zone is defined.

Here's an example of the output from the nslookup command when six out of the ten nodes in the network are registered as master name servers for the secondary zone or stub zone:

```
# nslookup www.hcp-ma.example.com  
Server: adc1850.example.com  
Addresses: 192.168.80.45  
2001:0db8::201
```

Name: www.hcp-ma.example.com

Addresses: 192.168.210.11, 2001:0db8::101, 192.168.210.12, 2001:0db8::102, 192.168.210.13, 2001:0db8::103, 192.168.210.14, 2001:0db8::104, 192.168.210.15, 2001:0db8::105, 192.168.210.16, 2001:0db8::106, 192.168.210.17, 2001:0db8::107, 192.168.210.18, 2001:0db8::108, 192.168.210.19, 2001:0db8::109, 192.168.210.20, 2001:0db8::10a

If you don't see the expected node list, the secondary zone or stub zone is not defined correctly.

DNS considerations for service by remote systems

When you configure a secondary zone or stub zone for an HCP system, you specify a domain name and the IP addresses of the master name servers for the applicable HCP domain. This causes client requests that identify the system by that domain name to be forwarded to those master name servers.

Namespaces can be configured to accept client requests on HCP systems other than the system targeted by the request when that system is unavailable. To enable this redirection to occur automatically for a namespace:

- DNS failover must have been enabled on the target system.
- The applicable replication link must be failed over. The applicable replication link is the link between the target system and the system to which requests should be redirected.
- The applicable secondary zone or stub zone for the target system must include the IP addresses of the applicable master name servers for the system to which requests should be redirected, where:
 - The applicable secondary zone or stub zone on the target system is the one defined for the data network for the tenant that owns the namespace
 - The applicable master name servers for the system to which requests should be redirected are the ones included in the secondary zone or stub zone for the network with the same name as the tenant data network on the target system

For example, suppose:

- The data network for a tenant is the network named net1.

- The system targeted by a client request has master name servers with IPv4 addresses 192.168.210.15, 16, 17, and 18 and with IPv6 addresses 2001:0db8::101, 102, 103, and 104 for net1.
- The system to which requests should be redirected has master name servers with IPv4 addresses 192.168.24.72, 73, 74, and 75 and with IPv6 addresses 2001:0db8::201, 202, 203, and 204 for net1.

In this case, the secondary zone or stub zone for net1 on the target system would have these IP addresses:

```
192.168.210.15
2001:0db8::101
192.168.210.16
2001:0db8::102
192.168.210.17
2001:0db8::103
192.168.210.18
2001:0db8::104
192.168.24.72
2001:0db8::201
192.168.24.73
2001:0db8::202
192.168.24.74
2001:0db8::203
192.168.24.75
2001:0db8::204
```

The secondary zone or stub zone for net1 on the system to which requests should be redirected would have these IP addresses:

```
192.168.24.72
2001:0db8::201
192.168.24.73
2001:0db8::202
192.168.24.74
2001:0db8::203
192.168.24.75
2001:0db8::204
```

To enable redirection in both directions between two HCP systems that participate in an active/active replication link, the secondary zone or stub zone for each of the systems must include the IP addresses of the master name servers for the other system.

To enable client requests targeted to one system to be serviced by any of the other systems in a replication topology, the secondary zone or stub zone for that system must include the IP addresses of the master name servers for each of the other systems.

For example, suppose a replication topology includes systems A, B, C, and D. For systems B, C, and D to be able to service requests targeted to system A, the secondary zone or stub zone for system A must include the IP addresses of the master name servers for systems B, C, and D. For systems C, D, and A to be able to service requests targeted to system B, the secondary zone or stub zone for system B must include the IP addresses of the master name servers for systems C, D, and A.



Note: If you are not enabling DNS failover on an HCP system, do not include IP addresses for the master name servers for other systems in the secondary zones or stub zones for that system.

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