Harmonic MediaGrid

SHARED STORAGE

Release 4.3

Installation Guide

Revision A

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⚠️ **CAUTION:** The Caution symbol indicates information that, if ignored, can adversely affect the performance of your Harmonic product, or that can make a procedure needlessly difficult.

📝 **NOTE:** The Note symbol indicates especially important information you need, or it may provide additional information that applies in only some carefully delineated circumstances.

⚠️ **IMPORTANT:** The Important symbol indicates information that should stand out when you are reading product details and procedural information.

ℹ️ **TIP:** The Tip symbol indicates parenthetical information that is not necessary for performing a given procedure, but which, if followed, makes the procedure easier, smoother, or more efficient.

In addition to these symbols, this guide may use the following text conventions:

Convention	Explanation
`Typed Command`	Indicates the text that you type in at the keyboard prompt.
Ctrl, **Ctrl + Shift**	A key or key sequence to press.
http://www.harmonicinc.com	The italics in blue text to indicate Cross-references, and hyperlinked cross-references in online documents.
Bold	Indicates a button to click, or a menu item to select.
`Screen Output`	The text that is displayed on a computer screen.
Emphasis	The italics text used for emphasis and document references.

Table of Contents

Chapter 1

Introduction

This guide provides information on how to install and configure a Harmonic MediaGrid system.

⚠️ **IMPORTANT:** Several Harmonic MediaGrid installation procedures, as well as detailed information about the SystemManager platform and application, are covered in the *Harmonic SystemManager Installation Guide* and the *Harmonic SystemManager User Guide*. Make sure to download these accompanying guides prior to installing the Harmonic MediaGrid.

- *Harmonic MediaGrid documentation suite*
- *Documentation terms and abbreviations*

Harmonic MediaGrid documentation suite

All documents are available for download from the *Harmonic software downloads website*.

This source...	Provides this information.
Harmonic MediaGrid Installation Guide (this guide)	- Overview of the complete system - Details about each system component - Hardware and software installation procedures - Hardware and software configuration procedures

This source...	Provides this information.
Harmonic MediaGrid Component Replacement Guides	• Component replacement instructions (for example, power supply units and disk drives). Each type of device in the Harmonic MediaGrid system has its own Component Replacement Guide.
Harmonic MediaGrid Quick Reference Guides	• Detailed front and rear panel illustrations, as well as button and LED descriptions for each Harmonic MediaGrid device.
Harmonic MediaGrid File System Driver User Guide	• Instructions for accessing the Harmonic MediaGrid file system from the client computer using the Harmonic MediaGrid File System Driver for Windows, Macintosh, and Linux.
Harmonic SystemManager User Guide	• New features in the SystemManager release • Harmonic MediaGrid system operations procedures • Harmonic MediaGrid system configuration procedures
Harmonic SystemManager Installation Guide	• Software installation and upgrade details
Release Notes	• Last-minute information regarding the product release

Documentation terms and abbreviations

Terms and abbreviations that are used throughout this guide.

CIFS (Common Internet File System)
An interface used by a computer user to exchange files between computers.

Configuration Assistant
An on-screen method of configuring a Harmonic MediaGrid system.

cluster
A collection of one or more Volumes and their associated ContentDirector and ContentServer nodes.

ContentDirector
The device that manages operation of the Harmonic MediaGrid, including load balancing. It is the primary point of contact for clients and determines the ContentServer availability.

ContentBridge
An optional device that provides standard interfaces to the Harmonic MediaGrid for clients that do not have the Harmonic MediaGrid File System Driver (FSD) installed, or where an FSD is not available. The supported protocols are CIFS, FTP, and NFS.

ContentServer
Provides storage capacity for holding user data, processing for file serving functions, and network bandwidth for client access. Can also attach to and manage additional storage nodes.

ContentStore	A storage device that can be connected to a ContentServer to provide additional storage bandwidth and capacity for holding user data.
controller	The node within a ContentServer which performs processing for file serving functions. If one controller is down, the second controller takes over the processes.
CX4	A copper-based interface cable used to connect the Network Switches. The 10GbE connections use CX4 and multi-mode fiber cables. These cables have a limit of 15 meters.
domain	A group of computers running the same Windows operating system that also share the same directories.
domain controller	The server that responds to authentication requests and manages access to resources within a Windows domain.
file system	A way of storing data, making the data accessible to client computers.
File System Driver	Software installed on a client platform to allow standard file system access to the Harmonic MediaGrid.
FTP	An interface used by a computer user to exchange files between computers.
group	A collection of one or more ContentServer units and their managed ContentStore nodes.
NFS	A protocol that allows access to files from a client computer over a network.
slice	A segment of a file. Each file splits into one or more slices when stored, with each slice stored on a different ContentServer. Each slice carries information indicating to which file and where in that file it belongs.
stretch cluster	A cluster stretched across two sites, which uses replication to provide an additional level of data protection.
subnet	A smaller network within a network.
SystemManager	A hardware and software platform that communicates with the Harmonic MediaGrid network over Ethernet, providing software update capability, network management, configuration, security and fault monitoring services. See the *Harmonic SystemManager Installation Guide* and the *Harmonic SystemManager User Guide*.
volume	The file system, one Group, and its associated ContentServer and ContentStore nodes.
VLAN	A network of computers that behave as if physically connected, even though they may connect to different segments of a LAN.

System overview and requirements

Harmonic MediaGrid is a powerful disk storage server system specifically designed with the needs of large file storage and access in mind. It boasts unique capabilities to meet the most demanding capacity, performance and data availability requirements.

The storage system is configured in a single VLAN and single subnet architecture. This configuration is designed for easier configuration, and provides faster failover response time in the event of a switch failure, ensuring data protection and reliable system operation. The software RAID implementation is tightly integrated into the File System delivering high performance and fast RAID rebuilds.

- *Harmonic MediaGrid components*
- *About Jumbo Frames support*
- *About naming files and system elements*
- *About clusters, volumes and groups*
- *Supported RAID configurations*
- *Network configuration*
- *Required information for network configuration*
- *Required information for a Windows Domain Controller*

Harmonic MediaGrid components

A Harmonic MediaGrid system consists of several components.

Network switches

The network switches interconnect the many components both within a rack and to the client network.

The Harmonic MediaGrid 4000 Series and 3000 Series require multi-port network switches with both 1 GbE and 10 GbE modules.

Harmonic provides one network switch, which can only be used for systems with the ContentServer 3000. However, Harmonic MediaGrid supports several switches. For information on switches that are currently Harmonic MediaGrid-qualified, contact your Harmonic representative.

Switches may be qualified for Harmonic MediaGrid based on specifications or testing. If you wish to have a new switch qualified, please make an effort to obtain data on latency, throughput, non-blocking fabric, and port buffering from the manufacturer and include it with a qualification request to your Harmonic representative.

⚠ **IMPORTANT:** The ContentServer 3000 Series and 4000 Series cannot be connected directly to CX4 ports.

If you are supplying a switch for a Harmonic MediaGrid system with the ContentServer 3000 or 4000, the following switch functionality is required:

- Full wire-speed, non-blocking architecture
- Latency of less than 5uS
- Port buffers of 10 MB per port

ContentDirector

The ContentDirector acts as the overall file system controller, managing the distribution of data throughout the system and providing data maps to clients for writing and retrieval of media from the system.

In addition, the ContentDirector performs storage management and file housekeeping functions.

ContentServer

The ContentServer stores data on disk drives and deliver files upon request from desktop clients or from legacy clients through a ContentBridge.

A ContentServer with RAID support has dual active-active controllers and redundant data paths to protect against any storage node failures.

- ContentServer 3000 (16-drive, 3RU server): The ContentServer 3000 is available with ether 1 GbE or 10 GbE Ethernet ports for connections to the network switch.
- ContentServer 4000 (24-drive, 4RU server): The ContentServer 4000 is equipped with 10 GbE Ethernet ports.

ContentStore

The ContentStore is a storage array that can be connected to a ContentServer to provide additional bandwidth and capacity.

- ContentStore 3160 (16-drive, 3RU server)：In single stack, up to 5 ContentStore 3160 nodes can connect to the ContentServer 3000.
- ContentStore 4240 (24-drive, 4RU server): In a single stack, up to 4 ContentStore 4240 nodes can connect to the ContentServer 4000.
- ContentStore 5840 (84-drive 5RU server): At this time, a single ContentStore 5840 can connect to the ContentServer 3000.
- ContentStore 5840/5840A (84-drive 5RU server): At this time, up to four ContentStore 5840/5840A can connect to the ContentServer 4000.

⚠ **IMPORTANT:** Harmonic MediaGrid 3000 series and 4000 series units cannot be combined in a single stack.

ContentBridge

The ContentBridge is an optional server that provides access to a Harmonic MediaGrid system for client platforms that do not have the File System Driver (FSD) installed or do not use the Harmonic MediaGrid API.

The ContentBridge also supports active file transfers. This server provides a translation function for the following protocols:

- CIFS (Common Internet File System)
- FTP (File Transfer Protocol)
- NFS (Network File System)

SystemManager

The SystemManager platform is comprised of both hardware and software components that communicate with the Harmonic MediaGrid network over Ethernet, providing software update capability, network management, configuration, security and fault monitoring services.

Harmonic MediaGrid features that are enabled, modified, or part of the SystemManager application are described in the SystemManager documentation. See the *Harmonic SystemManager User Guide* for more information.

Harmonic MediaGrid ContentManager

ContentManager is a separate application (provided by Harmonic) that is used for setting, reviewing and changing attributes on associated files, directories, and user permissions of Harmonic MediaGrid.

Refer to the *ContentManager User Guide* for more information.

Harmonic MediaGrid File System Driver Software

Harmonic MediaGrid file system driver software, installed on customer supplied desktops, communicates with the Harmonic MediaGrid system to store and retrieve files.

See the *Harmonic MediaGrid Release Notes* for your particular client platform for the latest supported client operating systems.

About Jumbo Frames support

Jumbo frames are a feature that allows for larger transmission sizes of Ethernet frames over a network.

Harmonic MediaGrid supports jumbo frames; however, every device on your network between Harmonic MediaGrid and the client (including the client itself) must also support jumbo frames, with a common packet size, to take advantage of this feature. Network performance is severely impaired otherwise.

Jumbo frames may improve transfer performance between Harmonic MediaGrid and other devices on the network in some cases. However, an improvement will not always be obtained, depending on the devices' ability to process data relative to the maximum network transfer speed available.

The Network Switches are enabled by default. Refer to "Configuring a ContentServer" to enable jumbo frames on the remaining Harmonic MediaGrid devices.

Harmonicstrongly recommends that, before enabling jumbo frames, you initially set up and test the Harmonic MediaGrid with all other parts of the system infrastructure with jumbo frames disabled, to ensure correct functionality.

About naming files and system elements

Review important notes about naming files and other system elements in a Harmonic MediaGrid network.

Element	Notes
Filename Clip Name	Naming conventions follow Windows32™ rules. In general, names can be quite long. Standard alphanumerics are allowed: a-z, A-Z, 0-9. Most characters, including spaces, are valid except: / \ : * ? < >	and the double quote character (").
Device Name Host Name	Maximum name length is *fifteen* characters. Standard alphanumerics are allowed: a-z, A-Z, 0-9 also _ (underscore) and -(dash). 9 special characters are allowed for Device or Host names: ! ^ ( ) { } - _ ~ No spaces are allowed.
File system Name	Maximum name length is *eight* characters. Standard alphanumerics are allowed: a-z, A-Z, 0-9 also _ (underscore) and -(dash). 9 special characters are allowed: ! ^ ( ) { } - _~ No spaces are allowed.

For a Harmonic MediaGrid system with an Omnibus automation system, clip names are usually generated on the Omnibus side. To create clips for use on an Omnibus system, follow these guidelines:

- Avoid creating long Harmonic clip names that only differ in the last few characters as long Harmonic clip names are truncated to 25 characters when Omnibus clip names are generated.
- Avoid creating file (or clip) names that differ only in uppercase/lowercase iteration. Harmonic MediaGrid correctly preserves the case of the file names and treats the files as separate. However, some operating systems (Windows most notably) and some applications do not properly handle file names that are identical except for differences in case.

About clusters, volumes and groups

When setting up a Harmonic MediaGrid system, generally, there will be one cluster, one volume, and one group, all of which are generated automatically by the Configuration Assistant.

Term	Description
Cluster	Includes a volume and its associated ContentDirector, ContentServer and ContentStore nodes within a Harmonic MediaGrid.

Term	Description
Volume	Includes the file system, one Group, and its associated ContentServer and ContentStore nodes in a Harmonic MediaGrid.
Group	A collection of one or more ContentServer units and their attached ContentStore nodes.

About stretch clusters

A stretch cluster provides an additional level of data protection by allowing you to set up a Harmonic MediaGrid system across two different sites and replicate data across sites.

In the event of a site failure, replication ensures that the data will be available at the second site. Because of the added redundancy in a stretch cluster, note that storage capacity will be reduced. Make sure to work with your Harmonic representative to size your system appropriately. Also note that although this configuration results in faster read operations, write operations are slowed.

Stretch cluster configurations have the following requirements:

- This cluster must have at least six nodes. This means each of the two sites in the cluster must include at least one ContentServer with two ContentStore units connected to it.
- The two sites in a stretch cluster must be no more than 20 kilometers apart.
- Each ContentDirector in your system must have a fiber optic network card installed. For assistance, contact your Harmonic representative.
- Systems must be configured with two groups, one for each site.
- Each group in the cluster must have the same amount of storage with exactly the same combination of ContentServer and ContentStore units.
- The replication factor for the cluster must be set to 2.
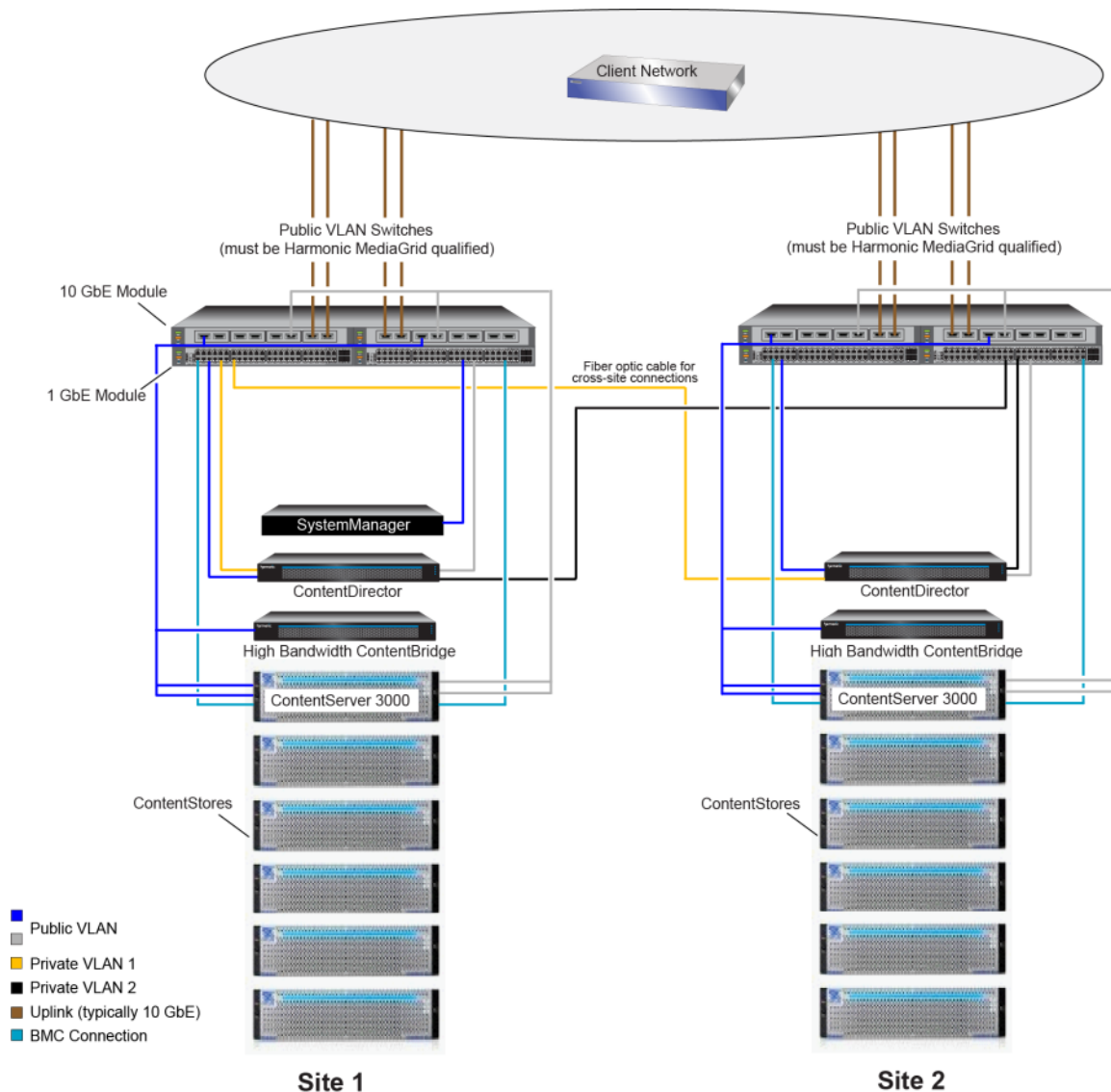
Figure 2-1: Harmonic MediaGrid stretch cluster

📝   **NOTE:** The dark blue lines and gray lines represent different connections on the same Public VLAN.

📝   **NOTE:** For cross-site connections, you must use fiber optic cable attached to a fiber optic card installed on the ContentDirector.

Supported RAID configurations

RAID configurations can be optimized for either capacity or performance.

In the capacity optimized RAID configuration, the disk drives are configured in a Dual Parity (DP) RAID array, ensuring that the system can continue to function despite the failure of any two disk drives. This configuration optimizes storage capacity at the cost of bandwidth. A capacity optimized RAID set typically uses a 6+2 configuration.

📝 **NOTE:** In the ContentStore 5840/5840A, capacity optimized RAID sets use a 5+2 configuration.

In the performance optimized RAID configuration, each RAID set has a single redundant disk drive, and each enclosure has N total number of hot spares. This configuration optimizes bandwidth at the cost of storage capacity.

⚠ **IMPORTANT:** If using SystemManager to create RAID sets, make sure that all ContentServer and ContentStore nodes in a stack are configured with the same RAID geometry.

📝 **NOTE:** No other disk drive configurations are supported.

Table 2-1: RAID Configurations for the ContentServer 4000 and ContentStore 4240

# Drives	RAID Sets	Capacity per Drive	Storage Capacity
24	3 x (6+2)	2 TB	36 TB
24	3 x (6+2)	4 TB	72 TB
24	3 x (6+2)	6 TB	108 TB
24	7 x (2+1) +3	2 TB	28 TB
24	7 x (2+1) +3	4 TB	56 TB
24	7 x (2+1) +3	6 TB	84 TB

Table 2-2: RAID Configurations for the ContentServer 3000 and ContentStore 3160

# Drives	RAID Sets	Capacity per Drive	Storage Capacity
16	2 x (6+2)	1 TB	12 TB
16	2 x (6+2)	2 TB	24 TB
16	2 x (6+2)	3 TB	36 TB
16	2 x (6+2)	4 TB	48 TB
16	2 x (6+2)	6 TB	72 TB
16	5 x (2+1) +1	1 TB	10 TB
16	5 x (2+1) +1	2 TB	20 TB
16	5 x (2+1) +1	3 TB	30 TB
16	5 x (2+1) +1	4 TB	40 TB
16	5 x (2+1) +1	6 TB	60 TB

Table 2-3: RAID Configurations for the ContentStore 5840/5840A

# Drives	RAID Sets	Capacity per Drive	Storage Capacity
84	12 x (5+2)	4 TB	240 TB
84	12 x (5+2)	6 TB	360 TB
84	26 x (2+1) +6	4 TB	208 TB

# Drives	RAID Sets	Capacity per Drive	Storage Capacity
84	26 x (2+1) +6	6 TB	312 TB

Network configuration

Some site-specific information is required in order to join a Harmonic MediaGrid system to a Windows domain and an existing network.

This information is provided for both customers and the installers. This information must be available prior to Harmonic MediaGrid installation.

Public VLAN

Before installing your system, you must allocate an IP address range for the Harmonic MediaGrid Public VLAN. The Public VLAN is an IP subnet, which will be visible by all parts of the network that access the system. Make sure the Public VLAN is dedicated to Harmonic MediaGrid components, and accessible by clients that will access the system.

⚠️ **IMPORTANT:** You must allocate a dedicated IP address range for your Harmonic MediaGrid Public VLAN, advertise it to all routers on your network, and know this range before configuring your Harmonic MediaGrid system or switches.

⚠️ **IMPORTANT:** The Public VLAN should include Harmonic MediaGrid devices ONLY. Adding non-Harmonic MediaGrid devices to the Public VLAN may cause unpredictable problems with the Harmonic MediaGrid system.

Private VLANs

Before installing your Harmonic MediaGrid system, you must also allocate IP address ranges for two Private VLANs. The Private VLANs are private IP subnets that create redundant paths between the ContentDirector nodes, allowing them to communicate information and keeping them synchronized. Make sure each Private VLAN is accessible by both ContentDirector nodes, and isolated from the other Private VLAN.
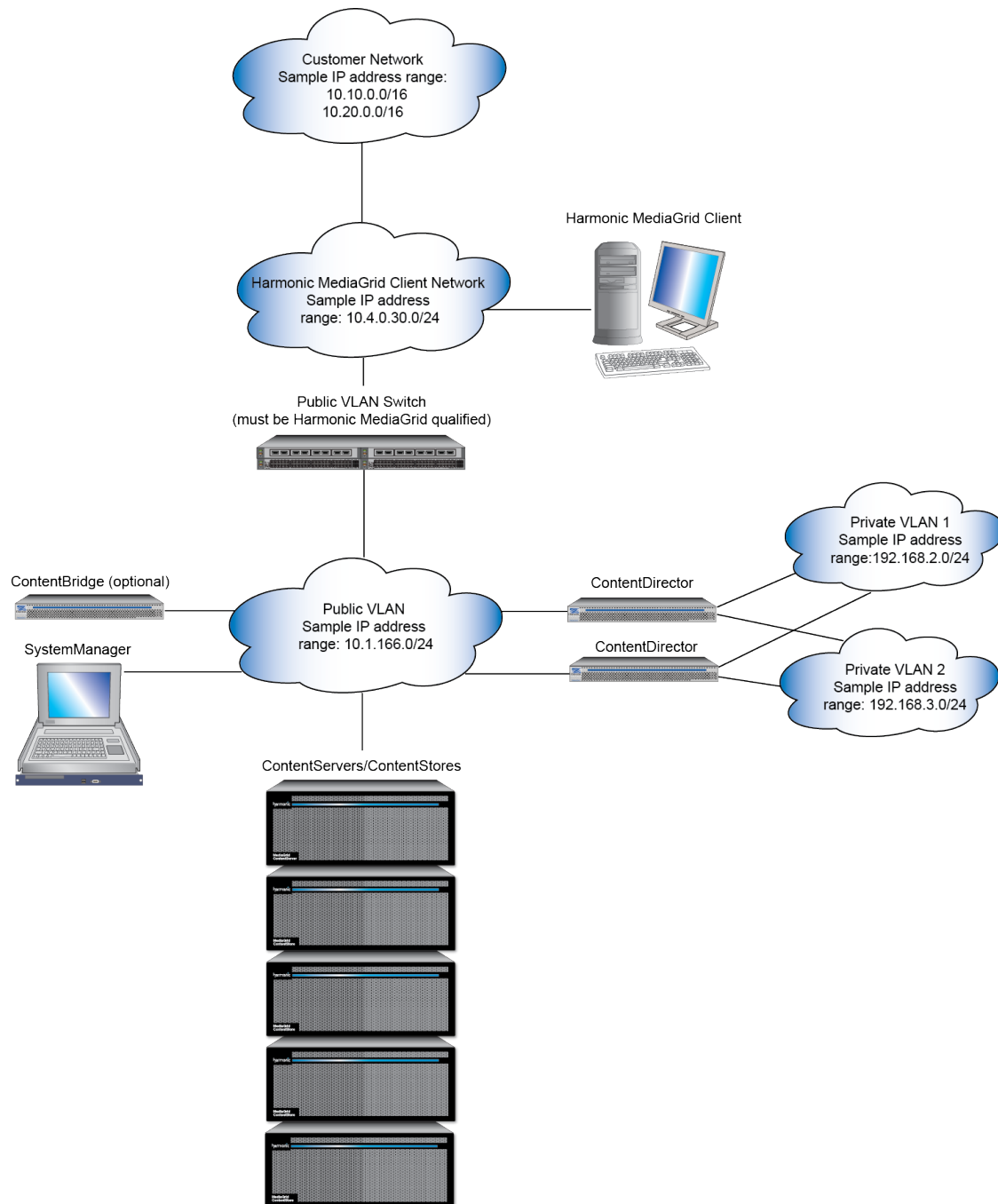
Figure 2-2: Network configuration diagram

📝　**NOTE:** The connections shown above do not necessarily represent the number of IP addresses needed per device.

Network diagram with 10 GbE network

A basic network configuration using the ContentServer 4000.
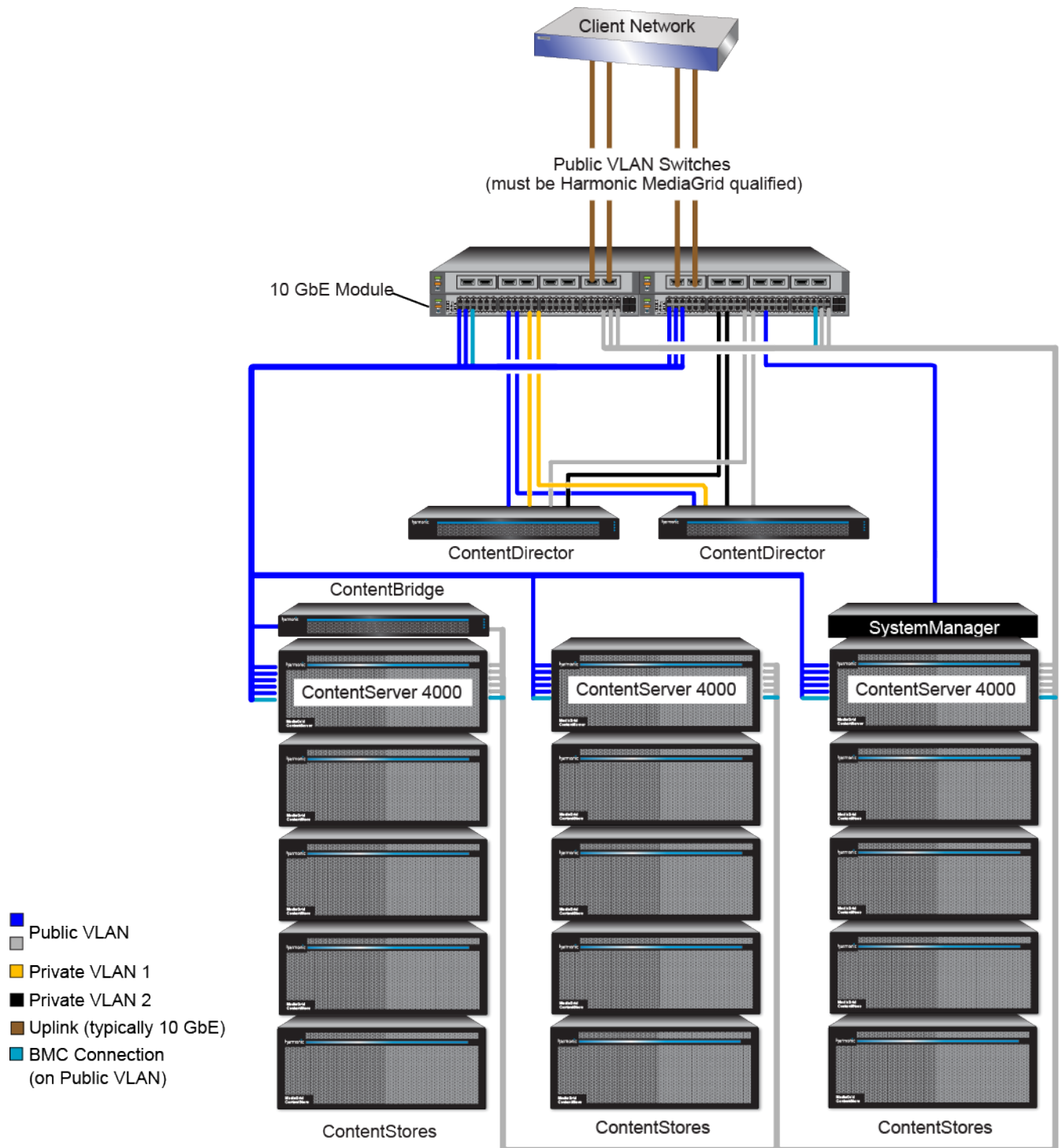
Figure 2-3: Harmonic MediaGrid System with 10 GbE Network

- Private VLAN 1 is a dedicated VLAN defined on the 1 GbE switch module on the left. Private VLAN 2 is a dedicated VLAN defined on the 1 GbE switch module shown on the right. The ContentDirector nodes must communicate on both private VLANs.
- The blue cables and the gray cables represent different connections on the same Public VLAN.
- To allow failover, the Public VLAN indicated with the blue cables must also be connected to the switch or module from the Public VLAN indicated with the gray cables. The separate colors indicate failover configuration only; in reality these are the same VLAN.
- The BMC connection indicated by turquoise cables is used for a troubleshooting utility called the Baseboard Management Controller (BMC). This requires a 1 GbE connection from each controller on a ContentServer to the 1 GbE switch. The BMC cables should be connected to the Public VLAN.
- The ContentStore connects to a ContentServer via SAS cables.

Network diagram with 1 GbE network

A basic network configuration using the ContentServer 3000 with 1 GbE NIC cards.
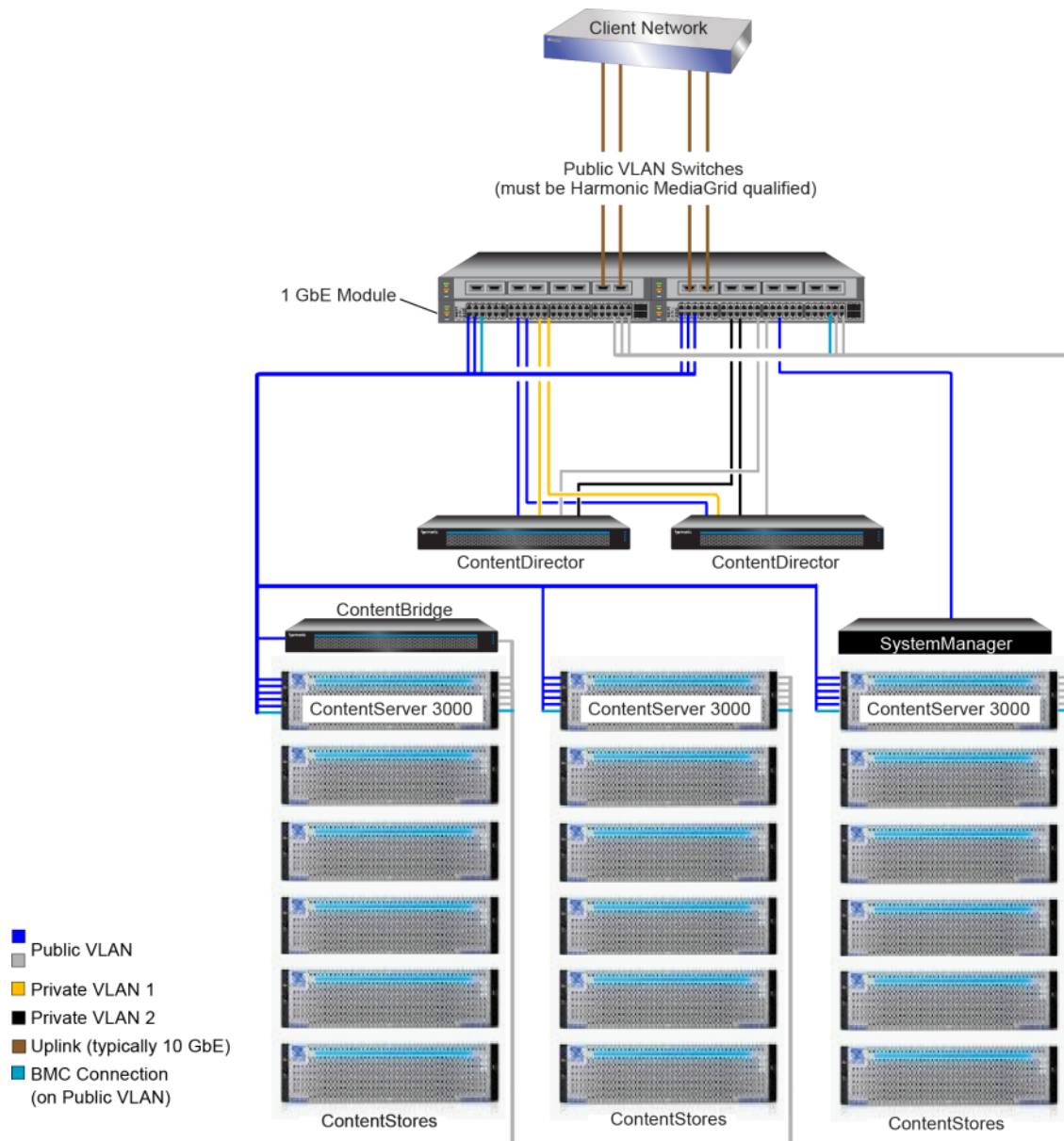
Figure 2-4: Harmonic MediaGrid 3000 Series and 1 GbE Network

- Private VLAN 1 is a dedicated VLAN defined on the 1 GbE switch module on the left. Private VLAN 2 is a dedicated VLAN defined on the 1 GbE switch module on the right. The ContentDirector nodes must communicate on both private VLANs.
- The blue cables and the gray cables represent different connections on the same Public VLAN.
- To allow failover, the Public VLAN indicated with the blue cables must also be connected to the switch or module from the Public VLAN indicated with the gray cables. The separate colors indicate failover configuration only; in reality these are the same VLAN.

- The connection indicated by turquoise cables is used for a troubleshooting utility called the Baseboard Management Controller (BMC). This requires a 1 GbE connection from each controller on a ContentServer to the 1 GbE switch. This connection can be used for data transfer in addition to the BMC. The BMC cables should be connected to the Public VLAN.
- At this time, Harmonic supports connecting only one ContentStore 5840 to a ContentServer 3000.

Required information for network configuration

A range of IP addresses must be reserved for integrating Harmonic MediaGrid into the customer network.

Harmonic MediaGrid is a network storage system, running its own DHCP server for management of the subnets within the system. The ContentDirector that runs the DHCP server assigns IP addresses to each ContentServer.

> **NOTE:** Instructions on how to design a network infrastructure are not included in this guide. The network should be set up before installing Harmonic MediaGrid.

The following information is required for network configuration of the Harmonic MediaGrid system. You will need this information when you run the Configuration Assistant to configure your system:

- The total number of each Harmonic MediaGrid device.

  > **NOTE:** The Harmonic MediaGrid Configuration Assistant asks for the maximum number of devices you wish to allow for in your system. If you select a number that is too low for future expansion, you may be forced to incur system down-time in order to reconfigure the system at a later time.

- Cluster names and device names
- For the Harmonic MediaGrid 3000 Series only: Type of network (1GbE or 10 GbE)
- MTU (maximum transmission unit) size per ContentBridge
- Device user names and passwords
- Networking details, including:

  ◦ Base Network address and Subnet Mask for the public subnet or VLAN
  ◦ Default Router IP address
  ◦ Base Network address and Subnet Mask for the first private subnet (private VLAN 1)
  ◦ Base Network address and Subnet Mask for the second private subnet (private VLAN 2)

- Site specific details, including:

  ◦ Site Timezone
  ◦ NTP Server IP address
  ◦ Domain Suffix
  ◦ Primary DNS Server IP address
  ◦ Secondary DNS Server IP address
  ◦ File System Name

- ActiveDirectory Server authentication details (if using ActiveDirectory), including:

  ◦ Whether or not you wish to enable authentication on both the ContentDirector and ContentBridge or just the ContentDirector.

    > **NOTE:** ActiveDirectory authentication on the ContentDirector is required in order to enable it on a ContentBridge.

  ◦ ActiveDirectory Realm
  ◦ ActiveDirectory Workgroup

○ ActiveDirectory server Hostname
○ ActiveDirectory server FQDN (Fully Qualified Domain Name)
○ ActiveDirectory server IP address
○ ActiveDirectory server Administrator Username and Password

Required information for a Windows Domain Controller

A domain controller server, which manages access to resources within a Windows domain, is required at the installation site.

Harmonic MediaGrid must be "joined" to the site's Windows domain for user authentication and security when clients attempt to access Harmonic MediaGrid file systems.

📝 **NOTE:** Instructions on how to configure a Windows Domain Controller are not included in this guide. The domain controller should be set up before installing Harmonic MediaGrid.

The following information is required to join Harmonic MediaGrid to a Windows domain:

• The type of Windows domain controller (Windows Server 2012, Windows Server 2008).
• The name of the Windows domain controller.
• The IP address and the name of the Windows Active Directory controller machine.
• A domain administrator's user name and password for the Windows Active Directory controller.
• The site's Active Directory domain name. The Active Directory domain name must be a Fully Qualified Domain Name (FQDN), which is a domain name containing three or four parts, (for example, "ahost.example.com").
• The site's Windows NT domain name. This may often be the first word of the Active Directory domain name.
• The IP address of the DNS (Domain Name System) server that contains entries for the Windows Active Directory controller machine.

System installation with the ContentServer 4000 Series

Review step-by-step installation instructions for a Harmonic MediaGrid system with the ContentServer 4000 series.

- *Site preparation*
- *Hardware Installation overview*
- *Racking precautions*
- *Rack mounting the Harmonic MediaGrid system*
- *Connecting system components: Overview*

Site preparation

Review environmental, power, and site requirements before installing your system.

Environmental

Harmonic MediaGrid equipment is designed to operate in a clean, air-conditioned control room environment. Care must be taken to avoid temperature and humidity extremes.

Power

When connecting equipment, care must be taken to avoid power lines that are subject to noise and voltage spikes. Do *not* install units on a power circuit that is common to such equipment as air conditioners and refrigeration units. For optimum protection, AC noise filters and surge protectors are recommended if unstable power conditions are present.

Site

Harmonic MediaGrid equipment is designed for rack mounting. Be sure to read racking precautions before you begin unpacking system components.

Be aware of the weight of the ContentServer and ContentStore so that you may safely move and lift devices.

- An unpopulated ContentStore 5840/5840A weighs approximately 46 kg (101 lb), and 131 kg (288 lb) with all disk drives installed.
- A fully populated ContentServer 4000 weighs approximately 47 kg (104 lb).
- A fully populated ContentStore 4240 weighs approximately 29 kg (64 lb).
- A fully populated ContentServer 3000 and ContentStore 3160 each weighs approximately 34 kg (75 lb).

Required components

Both a client computer and SystemManager platform are required for installation.

See the *Harmonic MediaGrid Release Notes* for your particular client platform for the latest supported client operating systems.

A SystemManager platform including keyboard, monitor and mouse, is also required. The latest version of the SystemManager application should be installed. See the Release Notes accompanying this release for the exact version required. See the *Harmonic SystemManager Installation Guide* for more information.

Unpacking the system

Inspect each shipping container for signs of damage. Contact your local Harmonic representative and the carrier *immediately* if you suspect any damage has occurred during shipping.

Check the contents of each box against the packing list to ensure that all parts are included. If any items are missing, contact your local Harmonic representative immediately.

A rack mounting kit is provided with each Harmonic MediaGrid component, which provides the items needed to mount each component on a rack. Mounting instructions are also included.

The type, quantity and length of the cables depends on the customer site and will likely differ for each separate installation.

⚠️ **IMPORTANT:** CX4 cables have a limit of 15 meters. The cables must be factory terminated and ordered in appropriate lengths to meet specifications.

Unpacking the ContentStore 5840/5840A

Position the shipping case within 6 feet (2m) of the site where you intend to use your storage system.

Ensure the site where you intend to set up and use your storage system has the following:

*   Standard power from an independent source or a rack power distribution unit with a UPS.
*   Host computer with the correct firmware, BIOS and drivers. Contact your supplier for the correct software levels.

Inspect the packaging for crushes, cuts, water damage or any other evidence of mishandling during transit. If there is any damage, photograph the packaging for future reference before opening.

Ensure that the accessory box contains the following:

*   SAS host bus adapter (HBA).
*   Mini SAS to host cable (only for ContentStore 5840).
*   Power cord.
*   Rack kit.

⚠️ **IMPORTANT:** Read all racking precautions for the ContentStore 5840/5840A before proceeding with rack mounting the device.

📝 **NOTE:** The SAS cable required for ContentStore 5840A is sold separately by Harmonic which can be ordered same time as the ContentStore. The cable required is mini-SAS HD to mini-SAS HD.

Hardware Installation overview

Before you begin, ensure that the site is properly prepared, with adequate power, ventilation and rack space.

⚠ **IMPORTANT:** Make sure to leave a space for the SystemManager keyboard/monitor tray. It is recommended that you mount the keyboard monitor and tray 71.12 cm (28.0 in.) off the floor. This height is ideal for using the platform while seated or standing.

1. Read all rack mounting precautions.
2. Rack the devices from the bottom of the rack in the following order:

   a. ContentServer and ContentStore units
   b. SystemManager unit
   c. ContentBridge units, followed by ContentDirector units
   d. Network switches

   Refer to the network switch product manual for rack mounting instructions.
3. Connect the network cables, SAS cables, and power cables.

Racking precautions

Read these general precautions before racking the Harmonic MediaGrid system.

- Safe handling of this system requires at least TWO people. Harmonic recommends that you use THREE people to rack mount a system; two to lift and one to help guide the system onto the rack rails.
- When lifting the system, two people at either end should lift slowly with their feet spread out to distribute the weight. When lifting, always keep your back straight and lift with your legs.
- Ensure that the leveling jacks on the bottom of the rack are fully extended to the floor with the full weight of the rack resting on them.
- In single rack installation, stabilizers should be attached to the rack. In multiple rack installations, the racks should be coupled together.
- Load the rack from the bottom to the top, with the heaviest component at the bottom of the rack.
- Always make sure the rack is stable before extending a component from the rack.
- You should extend only one component at a time. Extending two or more simultaneously may cause the rack to become unstable.
- To eliminate any possibility of tipping over, ensure that the equipment rack is securely fastened to the floor or wall.

Racking precautions for the Harmonic MediaGrid 4000 Series

The ContentServer 4000 and ContentStore 4240 have additional racking precautions.

- The rack design should take into consideration the maximum operating ambient temperature, which is 35°C.
- Disconnect power cords from your system before rack mounting.
- Do not open the system's top cover. If opening the cover for maintenance is a must, only a trained technician should do so.
- The openings on the enclosure are for air convection to protect the equipment from overheating. DO NOT COVER THE OPENINGS.

- The ContentServer 4000 must only be operated from a power supply input voltage range of 100 to 240 VAC, 47 to 63 Hz.
- Place power cords out of the way of foot traffic. Do not place anything over the power cord.
- Make sure the voltage of the power source is within the specification on the label when connecting the equipment to the power outlet. The current load and output power of loads shall be within the specification.

⚠ **IMPORTANT:** Use only the power cables provided by Harmonic.

⚠ **IMPORTANT:** The ContentServer and ContentStore 4000 series must be connected to reliable grounding before applying power.

⚠ **IMPORTANT:** The ContentServer and ContentStore 4000 series will not receive sufficient airflow or cooling if it is operated with any of the front or rear modules missing. It is essential that every module bay is filled either with a module or a blank module.

Racking precautions for the ContentStore 5840/5840A

This unit has additional rack mounting precautions.

⚠ **CAUTION:** A fully configured ContentStore 5840/5840A weighs up to 131kg (288lb). An unpopulated ContentStore 5840/5840A weighs 46kg (101lb). Use appropriate lifting methods.

Lifting and handling

- Before lifting the unit, unplug all cords and cables.
- Make sure all disk drives from both drawers are removed, and the drawers are closed firmly and locked shut. Additionally, you may wish to remove other modules from the chassis before lifting. For component removal and installation instructions, see the ContentStore Component Replacement Guide
- It is recommended that a minimum of *three* people lift the ContentStore 5840/5840A using the lifting straps supplied with the unit.
- Do not lift the unit by the handles on the power supply units, cooling modules or I/O modules. They are not designed to take the weight.
- Do not lift the unit higher than 20U. Use mechanical assistance to lift above this height.

Rack system safety

⚠ **CAUTION:** The ContentStore 5840/5840A must only be mounted into a rack using the supplied rail kit. Due to its weight and length, the unit must not be flange mounted.

⚠ **CAUTION:** Never move more than one unit out of the rack at any one time: there is a danger of the rack falling over.

- The ContentStore 5840/5840A must be mounted in a rack before use.
- The rack must be capable of supporting the total weight of the installed units. A fully populated unit weighs up to 131kg (288lb). The design should incorporate stabilizing features suitable to prevent the rack from tipping or being pushed over during installation or in normal use.
- When loading devices, fill the rack from the bottom up. When removing the devices, empty from the top down.
- The system must be operated with low pressure rear exhaust installation. The back pressure created by the rack doors and obstacles is not to exceed 5 pascals (0.5mm water gauge).
- The minimum open area for the rack doors is 70%.

- The rack design should take into consideration the maximum operating ambient temperature for the unit, which is 35°C.
- The rack must have a safe electrical distribution system. It must provide over-current protection for the ContentStore 5840/5840A and must not be overloaded by the total number of ContentStore enclosures installed in the rack. When addressing these concerns, consideration should be given to the electrical power consumption rating shown on the nameplate.
- The electrical distribution system must provide a reliable ground for each unit and for the rack.
- Each PSU in each ContentStore 5840/5840A has an ground leakage current of 1.6mA. The design of the electrical distribution system must take into consideration the total ground leakage current from all the PSUs in all the ContentStore enclosures. The rack must be labeled with the words: "HIGH LEAKAGE CURRENT. Ground connection essential before connecting supply."
- The rack must meet the safety requirements of UL 60950-1 and IEC 60950-1.

Electrical safety

⚠ **CAUTION:** It is recommended that you fit and check a suitable anti-static wrist or ankle strap and observe all conventional ESD precautions when handling plug-in modules and components. Avoid contact with backplane components and module connectors, etc.

- The ContentStore 5840/5840A must only be operated from a power supply input voltage range of 200 to 240 VAC, 50 to 60 Hz.
- A suitable power source with electrical overload protection must be provided in order to meet the requirements in the technical specification.
- All power supply cords must have a safe electrical ground connection. Check the connection to ground of the unit before you switch on the power supply.

⚠ **IMPORTANT:** The ContentStore 5840/5840A must be grounded before applying power.

- The plug on the power supply cord is used as the main disconnect device. Ensure that the socket outlets are located near the equipment and are easily accessible.

⚠ **CAUTION:** When powered by multiple AC sources, disconnect all supply power for complete isolation.

⚠ **CAUTION:** Do not remove covers from the ContentStore 5840/5840A or any of the modules – there is a danger of electric shock inside. Do not attempt to disassemble the rear sub-chassis from the unit. Return any damaged components to your supplier for repair.

⚠ **CAUTION:** The PSUs contain double pole/neutral fusing. Ensure that your electrical installation can support this.

⚠ **IMPORTANT:** The optional RJ45 socket on the I/O module is for Ethernet connection only and must not be connected to a telecommunications network.

Regional safety

- For North American use, the branch circuit must be rated for 20A.
- This equipment is suitable for connection to an IT power system (Norway).

Operating safety

⚠ **IMPORTANT:** All rear modules are part of the fire ContentStore 5840/5840A and must only be removed when a replacement can be immediately inserted.

⚠ **IMPORTANT:** The ContentStore 5840/5840A will not receive sufficient airflow or cooling if it is operated with any of the rear modules missing. It is essential that every module bay is filled either with a module or a blank module.

• Replace any defective module with a fully operational unit as soon as possible. Do not remove cooling modules, PSUs or I/O modules unless you have a replacement model of the correct ready for insertion.

⚠ **CAUTION:** To prevent overturning, drawer interlocks stop users from opening both drawers at the same time. Do not attempt to force open a drawer when the other drawer in the ContentStore 5840/5840A is already open. In a rack containing more than one ContentStore 5840/5840A, do not open more than one drawer per rack at a time.

⚠ **CAUTION:** Operating temperatures inside the ContentStore 5840/5840A drawers can reach up to 60°C. Take care when opening drawers and removing drive carriers.

⚠ **CAUTION:** Due to product acoustics it is recommended that users wear ear protection for any prolonged exposure.

Rack mounting the Harmonic MediaGrid system

Each device should be placed on the rack and then secured to the rails before mounting the next device.

⚠ **IMPORTANT:** For each device, always follow the instructions in the mounting kit and use the screws that are included with the mounting hardware.

⚠ **IMPORTANT:** If the ContentStore 5840 is part of your system, rack mount this unit first.

Rack mounting the ContentServer 4000 and ContentStore 4240

Due to the weight of the enclosure, these units should be rack mounted before drive carriers are installed.

1. Start at the bottom of the rack with a ContentServer if this is the first device you are mounting.

2. Install the inner rack rails as follows:
   a. Extend the inner rail toward the front of the rail assembly as far as possible.
   b. Depress the locking tab and then continue to pull the inner rail until it separates from the middle rail.
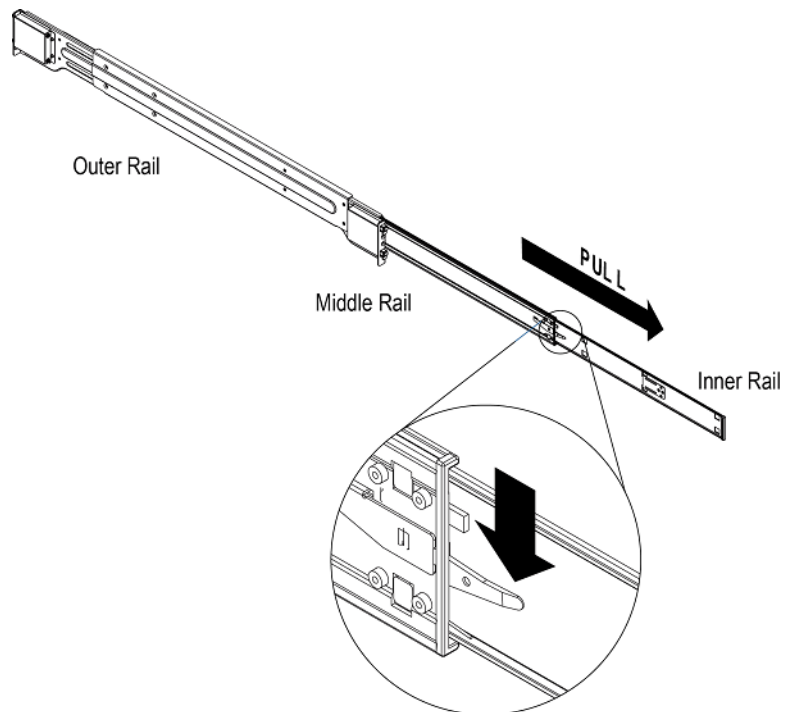
Figure 3-1:

c. Place the inner rail on the side of the chassis, aligning the hooks of the chassis with the rail extension holes.

d. Slide the inner rail toward the front of the chassis until it clicks into the locked position.

e. Secure the inner rail to the chassis with the provided screws.
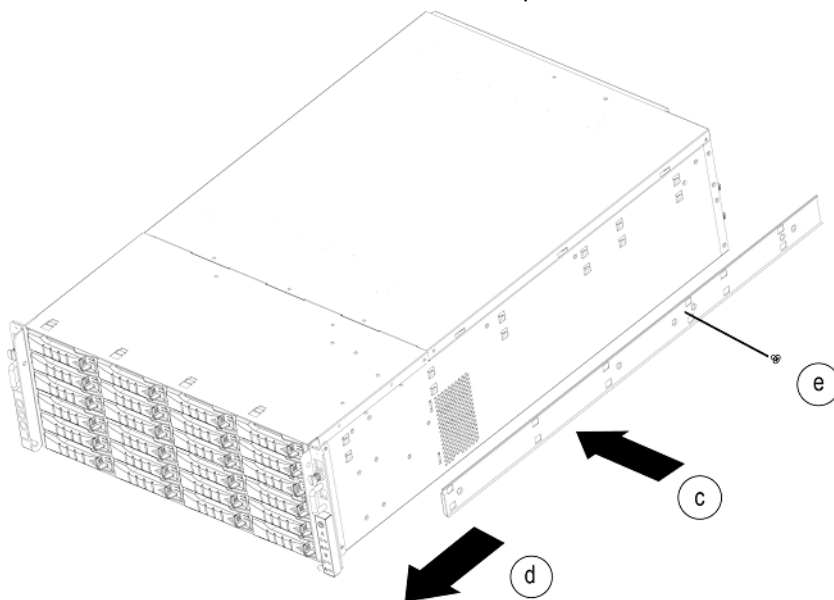
Figure 3-2:

f. Repeat Step a through Step e to install the other inner rail.

3. On each outer rail, press the locking tab and push the middle rail toward the back of the rail to collapse the rail assembly.

> 📝 **NOTE:** If your rack system has round holes, follow instructions provided in the mounting kit to install adapters and then mount the rails to the rack. Then, continue to Step 6.

4. Install the left outer rail onto the racking unit as follows:

   a. Push the front bracket to unlock it.
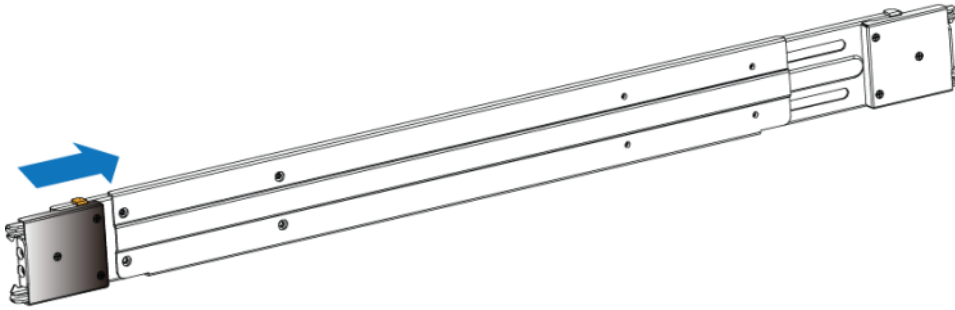
Figure 3-3:

   b. Guide the bracket hooks through the rack holes, and then press down firmly.

   c. Secure the rail to the front of the rack with two screws.
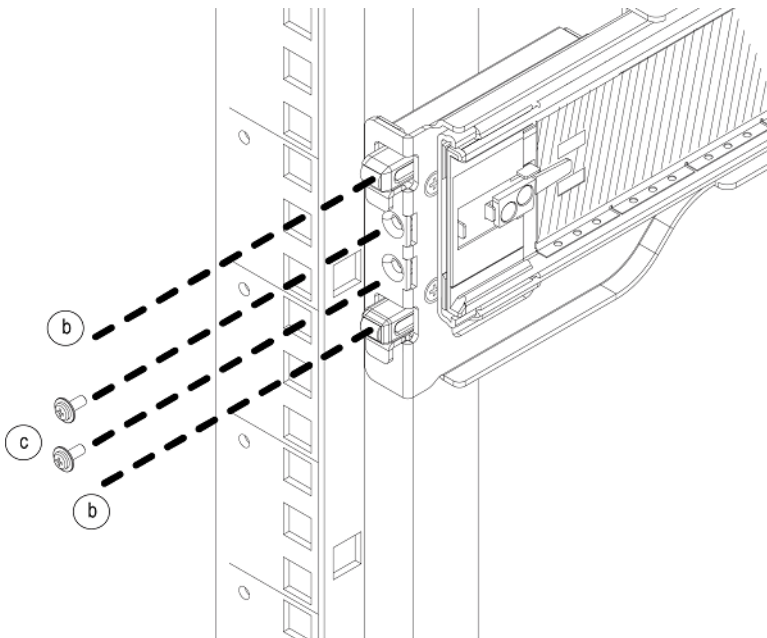
Figure 3-4:

   d. Repeat Step a through Step c to install the back end of the rail, extending the rail as needed.
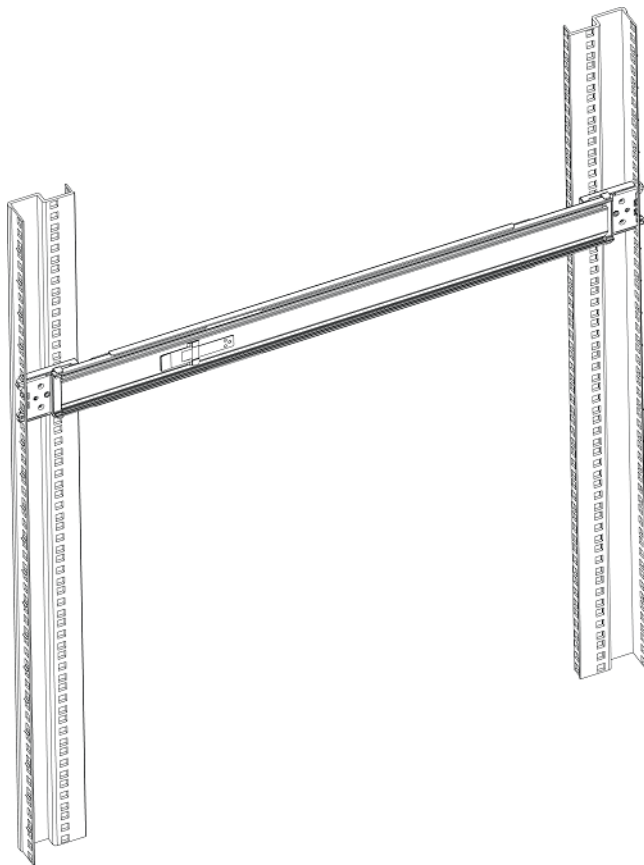
Figure 3-5:

5. Repeat Step 4 to install the right outer rail.

6. Install the chassis into the rack as follows:

    a. Confirm that the inner and outer rails are properly installed.
    b. Fully extend the middle rails, making sure that the ball bearing shuttle is locked at the front of each middle rail.
    c. With two people holding the chassis level and a third guiding the chassis, line up the inner (chassis) rails with the front of the middle (rack) rails so that the chassis is square with the rack rails.
    d. Slide the chassis rails into the rack rails, applying pressure evenly on both sides until it clicks into the fully extended position.
    e. Simultaneously depress the locking tabs on both sides of the chassis, and then push the chassis all the way into the rack.
    f. Secure the chassis handles to the front of the rack with two screws.
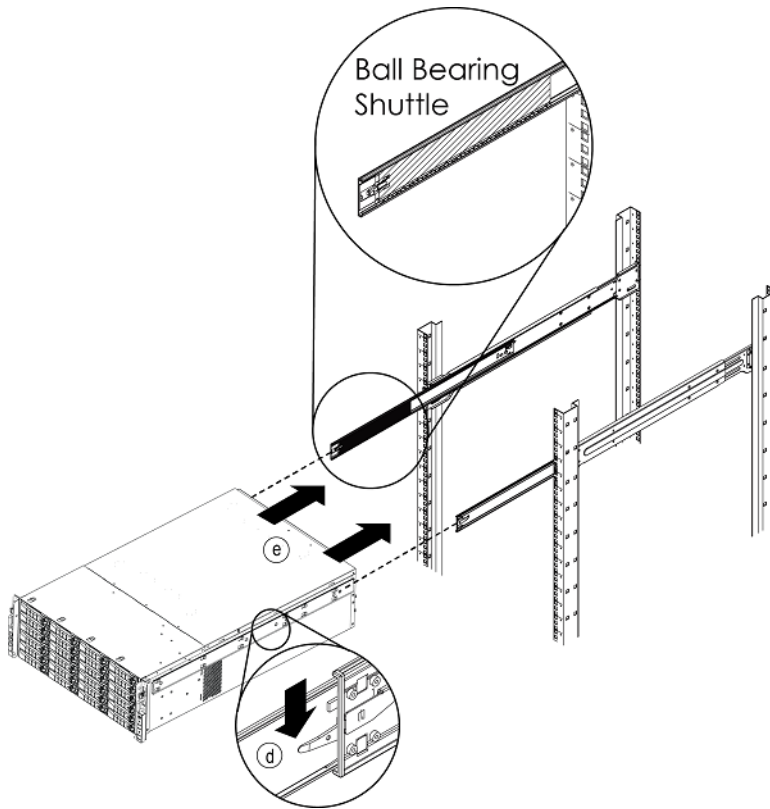
Figure 3-6:

Installing drives

Install drives after the ContentServer and ContentStore have been rack mounted.

> 📝 **NOTE:** To maintain proper system cooling, all externally accessible drive bays must be populated with a drive carrier.

1. Press the blue release button on the replacement drive to open the lever.

2. Insert the drive carrier into the bay, sliding the drive until it contacts the backplane.

> 📝 **NOTE:** The drive tray is in the correct position when its front edge lines up with the edge of the drive bay.

3. Close the drive carrier release handle to lock the drive into place.

Example:
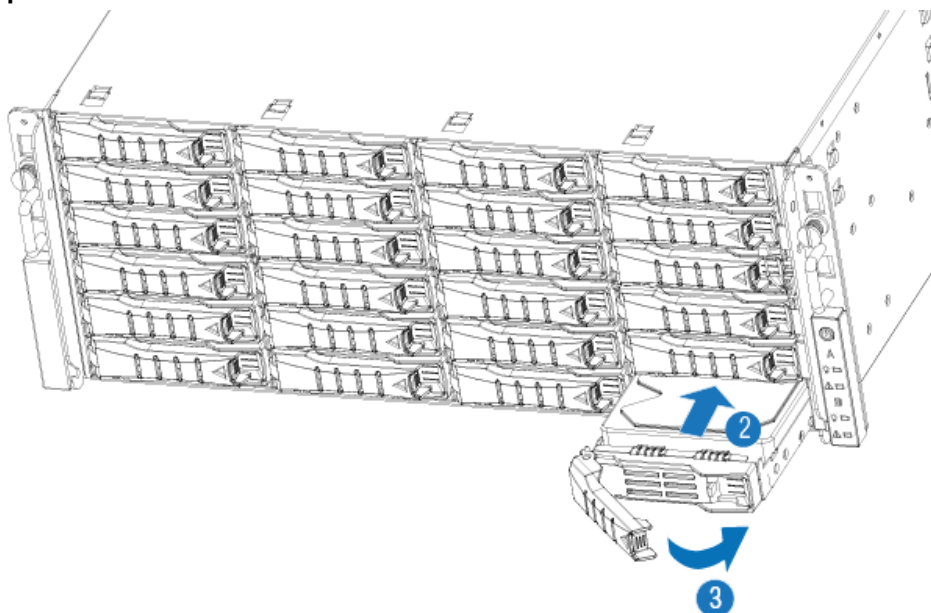
Figure 3-7:

Installing the bezel

Before you install the bezel, ensure that the server is mounted on the rack and that all disk drives are installed.

📝 **NOTE:** For optimum airflow, do not obstruct the air vents on the bezel after it is installed.

1. Connect the cable inside the bezel to the 4-pin connector on the right side of the front panel.

2. Fit the two posts on the right side of the bezel into the holes in the rack ear on the right side of the chassis.

   Result: The bezel cable should form a loop that fits inside the metal panel of the bezel.

3. Press in the release button on the left side of the bezel while pushing the left side of the bezel straight onto the chassis, and then release the button.
   The posts on the left side of the bezel will fit into the holes in the rack ear and secure the bezel on the chassis.

Example:

Rack mounting the ContentStore 5840/5840A

Due to the weight of the enclosure, this unit should be rack mounted before the drive carriers are installed.

The adjustment range of the rail kit, from the inside of the front post to the inside of the rear post is 660mm - 840mm. This suits a one-meter deep rack within Rack Specification IEC 60297.

⚠ **CAUTION:** It is recommended that you fit and check a suitable anti-static wrist or ankle strap and observe all conventional ESD precautions when handling plug-in modules and components. Avoid contact with backplane components and module connectors, etc.

⚠ **CAUTION:** An unpopulated enclosure can weigh up to 46kg (101lb). Do not try to lift it by yourself.

📝 **NOTE:** A screwdriver with a Torx T20 tip is needed to lock and unlock the drawers.

1. To facilitate access, remove the door from the rack.

2. Ensure the pre-assembled rails are at their shortest length.

3. Locate the rail location pins inside the front of the rack and extend the length of the rail assembly to enable the rear location pins to locate. Ensure the pins are fully located in the square or round holes in the rack posts.

Figure 3-8: Rack Mounting the System (left hand rail only shown for clarity)

4. Fully tighten all clamping screws and middle slide-locking screws.

5. Ensure the rear spacer clips (x4) are fitted tight to the edge of the rack post.

6. Slide the enclosure fully home on its rails.

7. Fasten the front of the enclosure using the enclosure fastening screws (x4).

8. Fix the rear of the enclosure to the hold down bracket with the rear enclosure fixing screws (x2).

> **NOTE:** Use the long or short hold-down bracket depending on the distance from the rack post to the enclosure hold-down slot. Ensure the sliding nut is at the rear of the slot prior to fitting the bracket to the post, then slide the nut along the slot to enable the rear enclosure fastening screw to be fitted.

9. For rack depths where the rack posts are behind the enclosure hold-down slots:
   a. Swap the left and right hold-down brackets.
   b. Insert the long flange between the rack post and chassis side.
   c. The sliding nut head must always face away from the enclosure, whichever configuration is used.

Figure 3-9:

⚠ **CAUTION:** Use only the power cords supplied.

⚠ **CAUTION:** Once the enclosure is installed in the rack, dispose of the lifting straps. Due to the difficulty in attaching the straps once the enclosure is installed in the rack, the straps are not suitable for removing the enclosure from the rack.

Precautions when opening a drawer

Read and understand these precautions before opening a drawer in the ContentStore 5840/5840A.

⚠ **CAUTION:** To prevent overturning, drawer interlocks stop users from opening both drawers at the same time. Do not attempt to force open a drawer when the other drawer in the enclosure is already open. In a rack containing more than one enclosure, do not open more than one drawer per rack at a time.

⚠ **CAUTION:** Operating temperatures inside the enclosure drawers can reach up to 60°C. Take care when opening drawers and removing drive carriers.

📝 **NOTE:** To reduce the possibility of toppling, only one drawer can be open at any time.

⚠ **IMPORTANT:** The drawer must not be left open for more than two minutes while the enclosure is powered.

Note the following important points before opening a drawer:

- Opening a drawer does not interrupt the functioning of the system, and disk drives can be hot-swapped while the enclosure continues to operate. However, drawers must not be left open for longer than two minutes, otherwise airflow and cooling will be compromised.
- To reduce the possibility of toppling, only one drawer can be open at any one time.
- The drawer locks into place when opened all the way. To reduce pinching hazards, two latches must be released before the drawer can be pushed back in.
- Each drawer can be locked shut by turning both anti-tamper locks clockwise using a screwdriver with a Torx T20 bit.

Opening a drawer

A drawer must not be left open for more than two minutes while the enclosure is powered on.

⚠️ **CAUTION:** To prevent overturning, drawer interlocks stop users from opening both drawers at the same time. Do not attempt to force open a drawer when the other drawer in the enclosure is already open. In a rack containing more than one enclosure, do not open more than one drawer per rack at a time.

⚠️ **CAUTION:** Operating temperatures inside the enclosure drawers can reach up to 60°C. Take care when opening drawers and removing drive carriers.

Before you begin
Be sure that you have read the precautions for opening a drawer.

1. Make sure the anti-tamper locks are not engaged.
   The red arrows on the locks will point inwards if the locks are disengaged.

2. If necessary, unlock the anti-tamper locks by rotating them counterclockwise using a screwdriver with a Torx T20 bit.

3. Push the drawer latches inward and hold them.

4. Pull the drawer all the way out until it locks open.

   ⚠️ **IMPORTANT:** The drawer must not be left open for more than two minutes while the enclosure is powered on.

Example:

Installing a drive

When installing drives, populate drawers from the front to the rear of the enclosure.

📝 **NOTE:** Failed drives must be replaced with approved drives. Contact your storage vendor for details.

📝 **NOTE:** The drawers must be populated with drives in whole rows at a time (there are three rows of 14 drives per drawer). The minimum number of drives in an enclosure is 14. The number of rows must not differ by more than one between top and bottom drawers.

1. Orient the drive such that the drive capacity label is facing toward you.

2. Lower the drive into the slot.

3. Push the drive downwards and hold it down while sliding the drive carrier plate in the direction shown.
   Example:

   Figure 3-10:

   Result: The drive is now locked into place.

4. Check that the release latch has returned to a locked position.

Closing a drawer

During normal operation, drawers must be kept shut to ensure correct airflow and cooling.

1. Pull and hold both of the white latches on the sides of the drawer.

2. Push the drawer in slightly.

3. Release the white latches and check they have returned to their original position.

4. Push the drawer all the way back into the enclosure, making sure it clicks home.

Rack mounting the ContentDirector 1000F/2000C and ContentBridge 2010F

The ContentDirector 1000F/2000C and ContentBridge 2010F (an optional system component) ship with the Intel AXXVRAIL Mounting Rail Kit.

📝 **NOTE:** The figures in this section show a two-rack unit server; however, the same rack rails are used for the ContentDirector 1000F/2000C and ContentBridge 2010F.

1. Pull the blue release button (component F) to remove inner member (D) from the slides.

Figure 3-11: AXXVRAIL mounting railside-mount

2. Install the slides to the rack.
   a. Align the brackets to desired vertical position on the rack.
   b. Using the screws provided, fasten the rear brackets to the rear rack posts. Use two screws for each bracket.
   c. Fasten the front brackets to the front rack posts. Use one screw for each bracket and place it in the topmost hole. Leave the other holes open for the chassis.
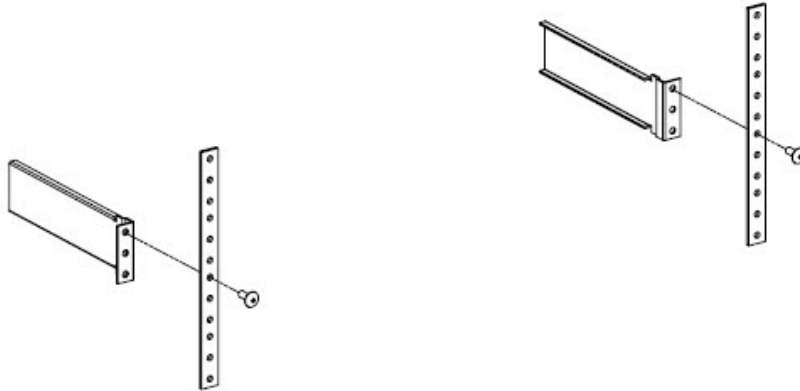
Figure 3-12: Fastening slides to front rack posts

    d. Move the ball retainer to the front of the rack.

3. Install the inner member (component D in the "AXXVRAIL Mounting Railside-mount" diagram) to the chassis.

    a. Align inner member key holes to the standoffs on the chassis.

    b. Move the inner member in the direction shown in the example below.
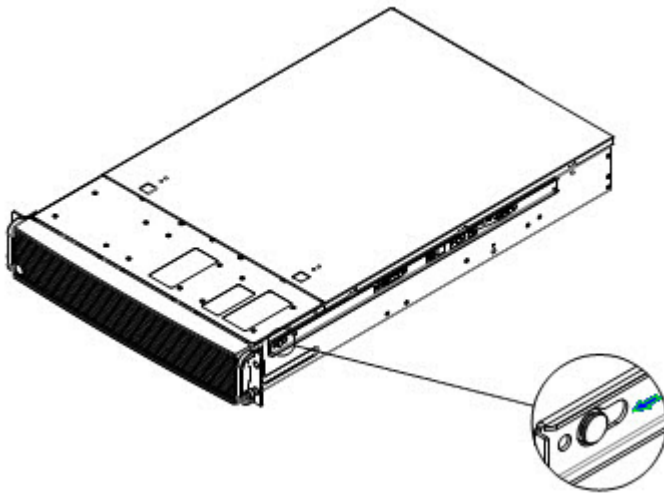
Figure 3-13: Installing inner member to chassis

4. Install the chassis to the fixed slides by pulling the release button in the inner member to release the lock and allow the chassis to close.
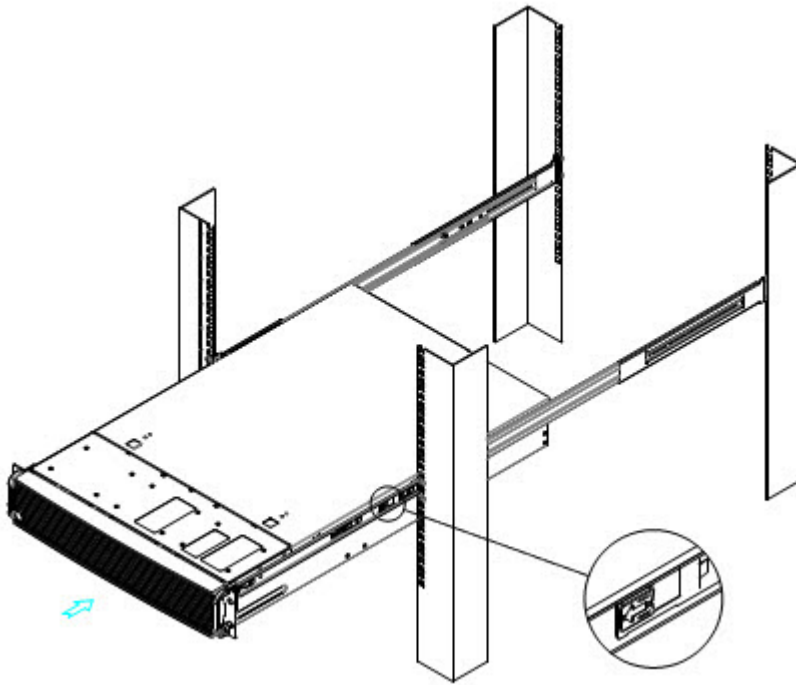
Figure 3-14: Installing chassis to fixed slides

5. Pull the blue release button in the inner member to release the lock and allow the chassis to slide into the rack.

6. Install the bottom-most screw at the front to secure the chassis to the rack.

Installing the bezel

Align the bezel in front of the chassis so that the Harmonic logo appears on the top left corner.

1. Connect the USB cable inside the bezel to the right-hand USB port on the front panel. (The other USB port is covered.)

2. Keeping the corners aligned, press the bezel straight onto the chassis.

   Result: The USB cable will form a loop that fits inside the metal panel of the bezel.

3. Hand-tighten the two captive thumb screws to secure the bezel in place.

Example:

Figure 3-15:

Rack mounting the network switches

Refer to the product manuals provided with network switch for more information about rack mounting.

📝 **NOTE:** If the network switches are not deep enough to be attached to the front rails, it is recommended that you attach the rear brackets just above the previous device's brackets so the network switch rests on top of the device below it, as shown below.
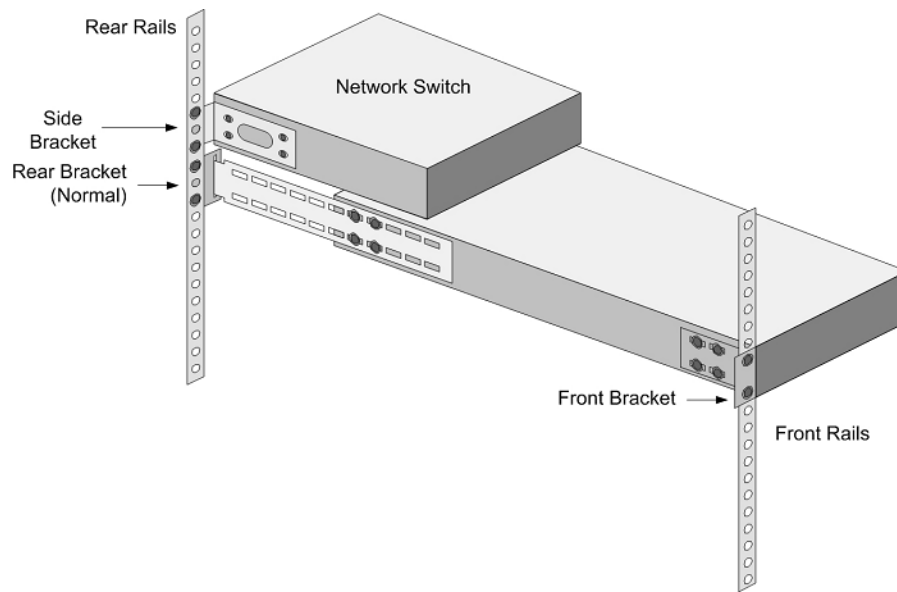
Figure 3-16: Rack mounting the network switch

Connecting system components: Overview

Connect Ethernet cables, SAS cables, and power cables in the given order.

The network cable colors used in the following sections are provided for example only. Other colors can be used instead as long as the connections correspond to the blue, white, and red network cables shown in this section.

1. Connect Harmonic MediaGrid system components to the network switches in the following order:
   a. ContentDirector nodes
   b. SystemManager
   c. ContentServer nodes
   d. ContentBridge nodes (optional component)

   > **NOTE:** Once you have completed the network connections, group the cables and then secure them to the rear side rails.

2. Using SAS cables, connect each ContentStore to the ContentServer.

3. Connect the Harmonic MediaGrid network switch to the client network.

4. Connect power cables to each system component.

   > **IMPORTANT:** After connecting power cables, do not power on the system. You must configure the network switches before powering on the system.

Network switch connections diagram

An overview of network switch connections for a 10 GbE network. Note that not all connections are shown.

> ⚠ **IMPORTANT:** Make sure to use only Harmonic MediaGrid-qualified switches in your Harmonic MediaGrid system. To find out if a switch is Harmonic MediaGrid-qualified, contact your Harmonic representative.

> 📝 **NOTE:** The switches shown in this section are example only. Your switch may vary from those shown.
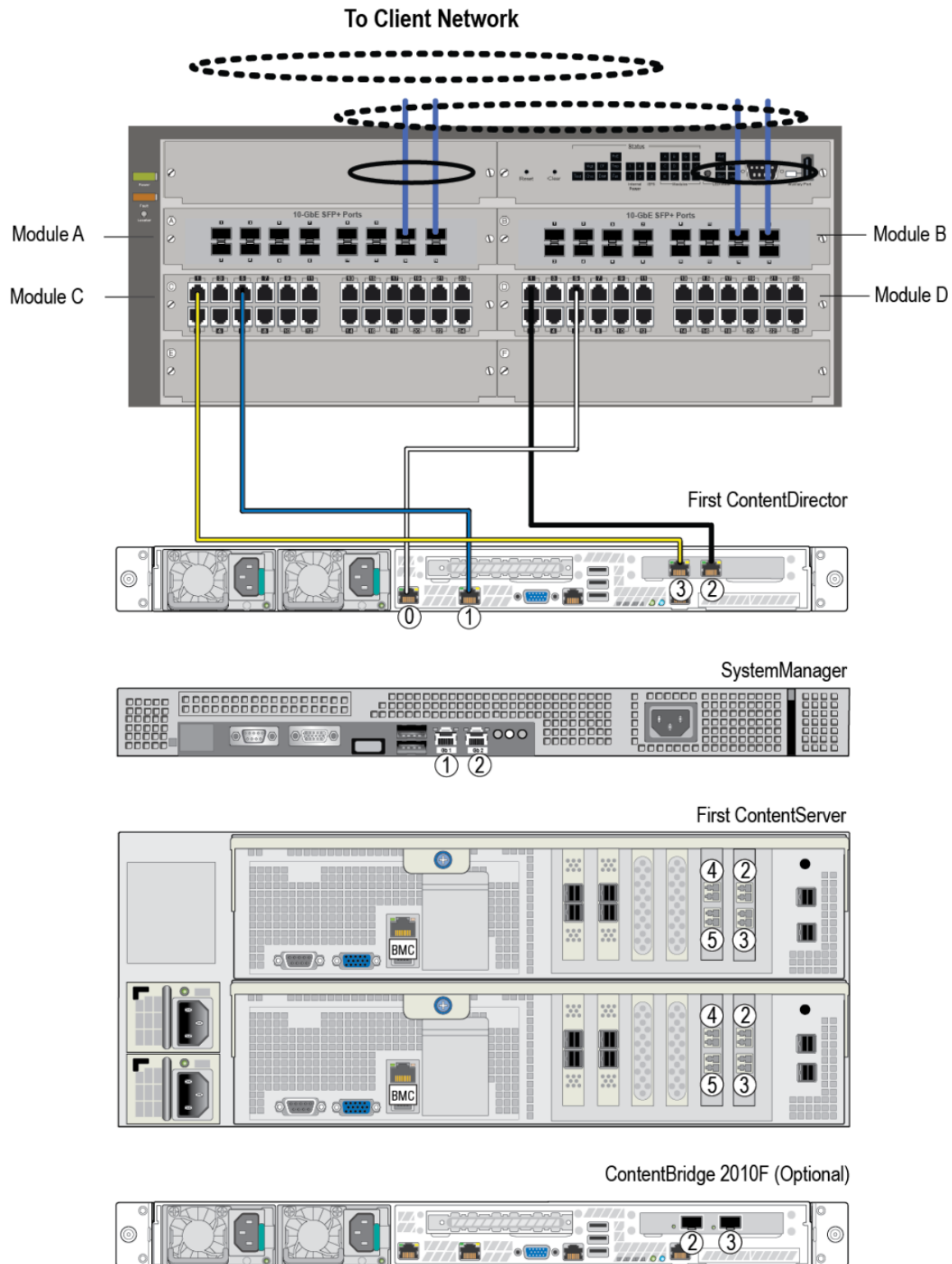
Figure 3-17: Harmonic MediaGrid 4000 Series and network switch connections

About BMC connectivity

Each controller on the ContentServer contains a troubleshooting utility called the Baseboard Management Controller (BMC), which can be accessed in the event of system failure.

The BMC requires a connection from the BMC port on each controller on a ContentServer to the network switch.

Connecting the ContentDirector 1000F/2000C to the network switch

Follow these instructions for single-site Harmonic MediaGrid systems.

⚠️   **IMPORTANT:** Ports 1-4 on switch modules C and D are reserved for ContentDirector private interface (ports 2 and 3) connections only.

1. Connect the ContentDirector private interfaces (ports 2 and 3) to the switch as follows:
   a. Connect port 2 on the first ContentDirector to port 1 on switch module D.
   b. Connect port 3 on the first ContentDirector to port 1 on switch module C.

2. Connect the ContentDirector public interfaces (ports 1 and 0) to the switch as follows:
   a. Connect port 1 on the first ContentDirector to port 5 on switch module C.
   b. Connect port 0 on the first ContentDirector to port 5 on switch module D.

3. Continue connecting each remaining ContentDirector in the same manner, starting with port 2 on the switch for the private interfaces and port 6 on the switch for the public interfaces.

Figure 3-18:

Connecting ContentDirector nodes in a stretch cluster

For assistance with configuring a stretch cluster, contact Technical Support.

⚠ **IMPORTANT:** Make sure to connect the devices as described below. Incorrect connections may result in problems with your Harmonic MediaGrid system.

1. Starting with the ContentDirector at Site 1, connect a yellow fiber optic cable to NIC 3. Connect the other end of the cable to an open port on the first network switch module at Site 2. This will be used for Private VLAN 1.

2. Connect a black fiber optic cable to NIC 2 on the ContentDirector at Site 1. Connect the other end of the cable to an open port on the second network switch module at Site 1. This will be used for Private VLAN 2.

3. Connect a white Ethernet cable to NIC 0 on the ContentDirector at Site 1. Connect the other end of the cable to an open port on the first network switch module at Site 1. This will be used for the Public VLAN.

4. Connect a blue Ethernet cable to NIC 1 on the ContentDirector at Site 1. Connect the other end of the cable to an open port on the second network switch module at Site 1. This will also be used for the Public VLAN.

5. For the ContentDirector at Site 2, connect a yellow fiber optic cable to NIC 3. Connect the other end of the cable to an open port on the first network switch module at Site 2. This will be used for Private VLAN 1.

6. Connect a black fiber optic cable to NIC 2 on the ContentDirector at Site 2. Connect the other end of the cable to an open port on the second network switch module at Site 1. This will be used for Private VLAN 2

7. Connect a white Ethernet cable to NIC 0 on the ContentDirector at Site 2. Connect the other end of the cable to an open port on the first network switch module at Site 2. This will be used for the Public VLAN.

8. Connect a blue Ethernet cable to NIC 1 on the ContentDirector at Site 2. Connect the other end of the cable to an open port on the second network switch module at Site 2. This will also be used for the Public VLAN.

Figure 3-19:

Connecting the SystemManager to the network switch

The SystemManager connects to a 1 GbE network switch module.

For details about the SystemManager platform included in your Harmonic MediaGrid system, refer to the *Harmonic SystemManager Installation Guide.*

⚠ **IMPORTANT:** vDHCP must be disabled in the SystemManager application *before* connecting the SystemManager device to the 1 GbE network switch. Refer to "Disabling vDHCP" in the *Harmonic SystemManager User Guide* for instructions.

1. Connect a CAT-6 Ethernet cable to port 1 on the SystemManager.

2. Connect the other end of the Ethernet cable to port 8 on switch module D.

SystemManager Rear Panel
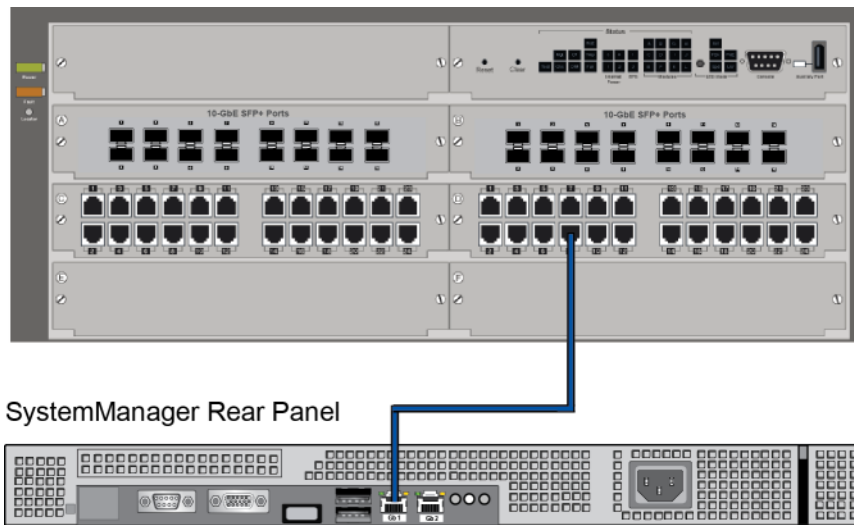
Figure 3-20:

Connecting the ContentServer 4000 to the network switch

The ContentServer connects to the 10 GbE network switch module.

⚠ **IMPORTANT:** To ensure redundancy and proper failover in the event of a failure, you must connect each controller to a separate switch or switch module.

1. Starting with Controller A, connect a red CAT-6 Ethernet cable to the BMC port (maximum data rate 100Mb/s). Connect the other end of the cable to an open port on the first 1 GbE switch module.

2. Using white 10 GbE SFP+ cables, connect NIC 4 and NIC 5 on Controller A to open ports on the first 10 GbE switch module.

3. Using white 10 GbE SFP+ cables, connect NIC 2 and NIC 3 on Controller A to open ports on the second 10 GbE switch module.

4. On Controller B, connect a red CAT-6 Ethernet cable to the BMC port (maximum data rate 100Mb/s). Connect the other end of the cable to an open port on the second 1 GbE switch module.

5. Using blue 10 GbE SFP+ cables, connect NIC 4 and NIC 5 on Controller B to open ports on the second 10 GbE switch module.

6. Using blue 10 GbE SFP+ cables, connect NIC 2 and NIC 3 on Controller B to open ports on the first 10 GbE switch module.

7. Continue connecting the remaining each ContentServer in the same manner.

Figure 3-21:

Connecting the ContentServer 4000 to the network switch (lower ports)

The ContentServer connects to the 10 GbE network switch module.

⚠ **IMPORTANT:** To ensure redundancy and proper failover in the event of a failure, you must connect each controller to a separate switch or switch module.

1. Starting with Controller A, connect a red CAT-6 Ethernet cable to the BMC port (maximum data rate 100Mb/s). Connect the other end of the cable to an open port on the first 1 GbE switch module.

2. Using white 10 GbE SFP+ cables, connect NIC 4 on Controller A to an open port on the first 10 GbE switch module.

3. Using white 10 GbE SFP+ cables, connect NIC 2 on Controller A to an open port on the second 10 GbE switch module.

4. On Controller B, connect a red CAT-6 Ethernet cable to the BMC port (maximum data rate 100Mb/s). Connect the other end of the cable to an open port on the second 1 GbE switch module.

5. Using blue 10 GbE SFP+ cables, connect NIC 5 on Controller B to an open port on the second 10 GbE switch module.

6. Using blue 10 GbE SFP+ cables, connect NIC 3 on Controller B to an open port on the first 10 GbE switch module.

7. Continue connecting the remaining each ContentServer in the same manner.

8. If you are using a ContentStore 5840 or 5840A, connect all 8 10 GbE ports.
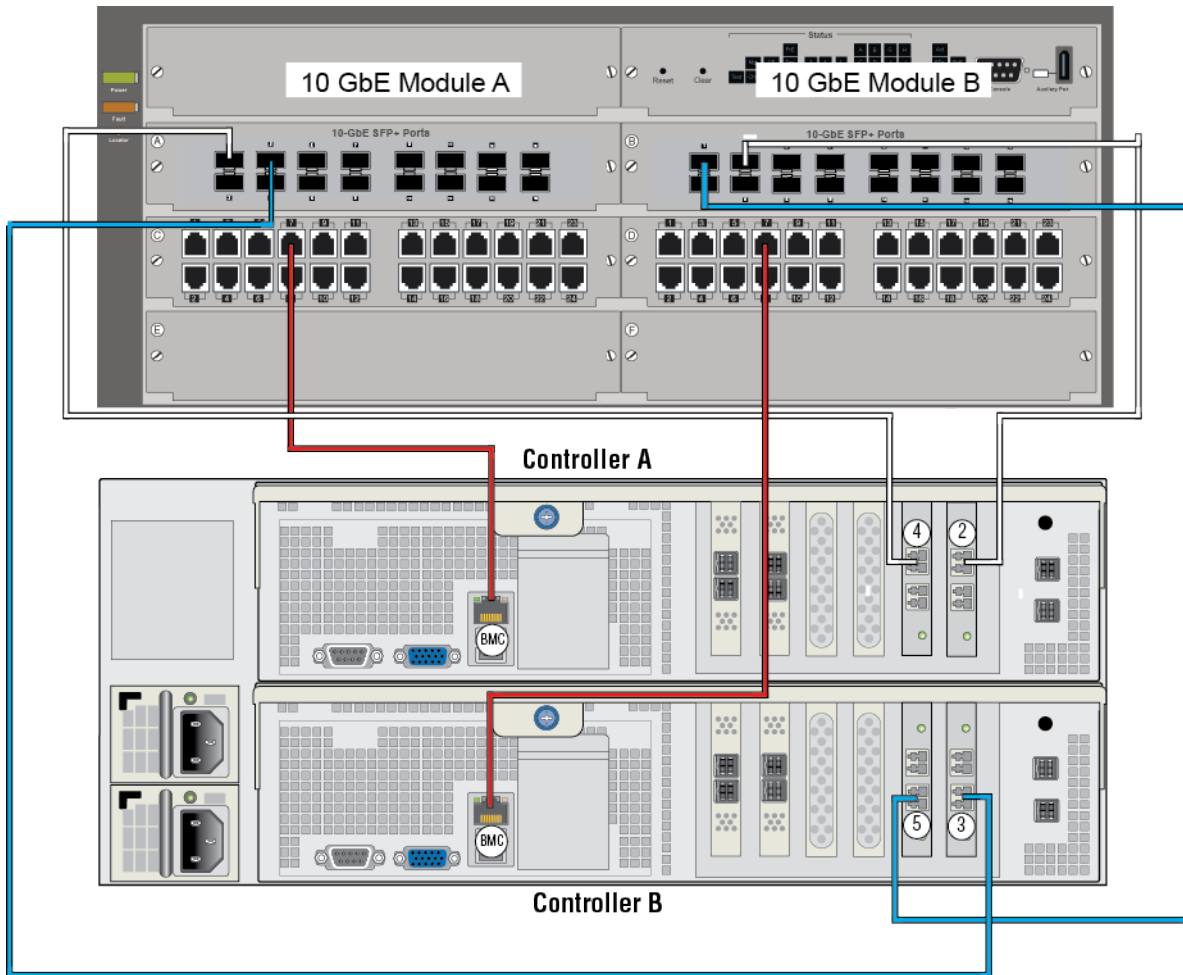
Figure 3-22:

Connecting the High Bandwidth ContentBridge to the network switch

Follow these instructions for systems with a single High Bandwidth ContentBridge.

📝 **NOTE:** The ContentBridge 2010F can be on either the Public VLAN or the client VLAN. However, if you wish to use the Configuration Assistant to configure the ContentBridge, it must on the Public VLAN.

📝 **NOTE:** Both 10 GbE ports on the ContentBridge 2010F must be on the same VLAN and subnet.

1. Connect 10 Gigabit Ethernet port 2 on first ContentBridge to the first available port on switch module A.

2. Connect 10 Gigabit Ethernet port 3 on first ContentBridge to the first available port on switch module B.

3. Continue connecting any remaining ContentBridge nodes in the same manner.

Connecting a High Bandwidth ContentBridge to the customer core switch

Follow these instructions for systems with a single High Bandwidth ContentBridge.

📝   **NOTE:** The ContentBridge 2010F can be on either the Public VLAN or the client VLAN. However, if you wish to use the Configuration Assistant to configure the ContentBridge, it must on the Public VLAN.

📝   **NOTE:** Both 10 GbE ports on the ContentBridge 2010F must be on the same VLAN and subnet.

1. Connect the appropriate network cable (CX4 or MMF) to 10 GbE port 2 on the ContentBridge, then connect the other end of the cable to an available port on the customer core switch.

2. Connect the appropriate network cable (CX4 or MMF) to 10 GbE port 3 on the ContentBridge, then connect the other end of the cable to an available port on the customer core switch.

3. Connect the customer core switch to the Harmonic MediaGrid network switches.

Figure 3-23:

Connecting the High Bandwidth ContentBridge in a High Availability (HA) pair

This section provides instructions for connecting two High Bandwidth ContentBridge nodes in an HA pair to a network switch.

📝   **NOTE:** The ContentBridge 2010F/2010 can be on either the Public VLAN or the client VLAN. However, if you wish to use the Configuration Assistant, each ContentBridge must be on the Public VLAN.

📝 **NOTE:** Both 10 GbE ports on the ContentBridge 2010F must be on the same VLAN and subnet.

1. Connect the appropriate network cable (CX4 or MMF) to 10GbE port 2 on the first ContentBridge, then connect the other end of the cable to an available port on the customer core switch.

2. Connect the appropriate network cable (CX4 or MMF) to 10GbE port 3 on the first ContentBridge, then connect the other end of the cable to an available port on the customer core switch.

3. Connect the appropriate network cable (CX4 or MMF) to 10GbE port 2 on the second ContentBridge, then connect the other end of the cable to an available port on the customer core switch.

4. Connect the appropriate network cable (CX4 or MMF) to 10GbE port 3 on the second ContentBridge, then connect the other end of the cable to an available port on the customer core switch.

5. Connect a 1 GbE cable to the right-hand NIC (Eth 1) on the first ContentBridge, then connect the other end of the cable to the right-hand NIC (Eth 1) on the second ContentBridge.

6. Connect the customer core switch to the Harmonic MediaGrid network switches.

Figure 3-24:

Connecting the ContentServer 4000 to the ContentStore 4240

You can connect up to four ContentStore 4240 storage arrays to a single ContentServer 4000. Each ContentStore attaches directly to the ContentServer.

> 📝 **NOTE:** When connecting the ContentServer to the ContentStore, be careful to not twist the SAS cables, bundle them with power cables, or inadvertently braid the cables together.

1. On Controller A on the ContentServer, connect a SAS cable to an open SAS port. Connect the other end of the cable to SAS-1 on the top expander module on the ContentStore 4240.

2. On Controller B of the ContentServer, connect a SAS cable to an open SAS port. Connect the other end of the cable to SAS-1 on the bottom expander module of the ContentStore 4240.

3. Continue to connect the remaining ContentStore nodes to the ContentServer in the same manner.

ContentServer 4000

Controller A

Controller B

ContentStore 4240

Figure 3-25: Harmonic MediaGrid 4.3 Installation Guide
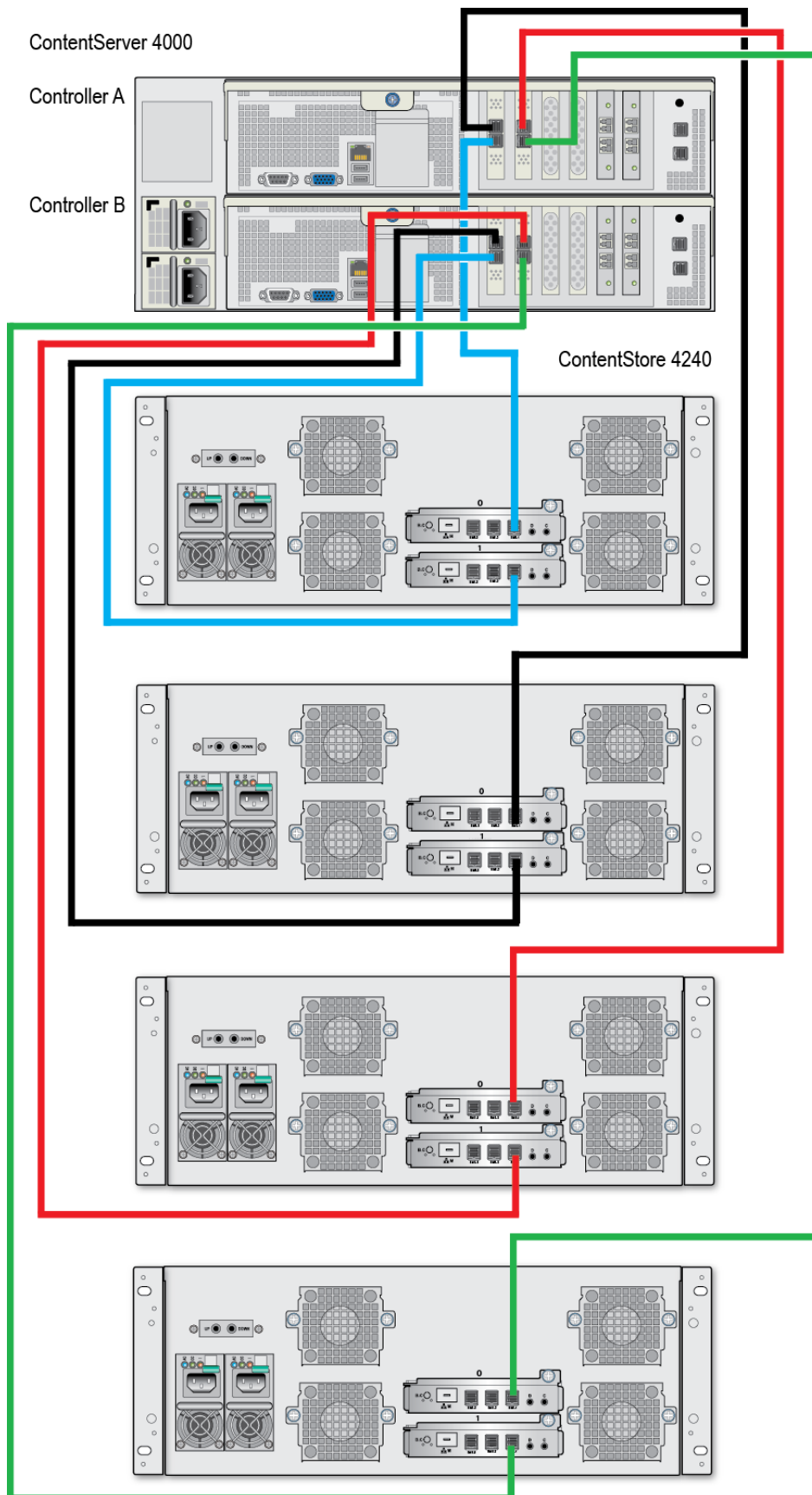
Connecting the ContentServer 4000 to the ContentStore 5840/5840A

At this time, Harmonic supports connecting up to four ContentStore 5840/5840A storage arrays to a ContentServer 4000.

The ContentStore 5840/5840A may not be intermixed with the ContentStore 4240.

Harmonic MediaGrid Server version 4.3 or later is required if your system uses two or more ContentStore 5840/5840A storage arrays.

NOTE: When connecting the ContentServer to the ContentStore, be careful to not twist the SAS cables, bundle them with power cables, or inadvertently braid the cables together.

1. Starting with Controller A on the ContentServer, connect a SAS cable to an open SAS port. Connect the other end of the cable to the left-hand SAS port on the left-hand I/O module of the ContentStore 5840/5840A/5840A.

2. On Controller B of the ContentServer, connect a SAS cable to an open SAS port. Connect the other end of the cable to the right-hand SAS port on the right-hand I/O module of the ContentStore 5840/5840A.
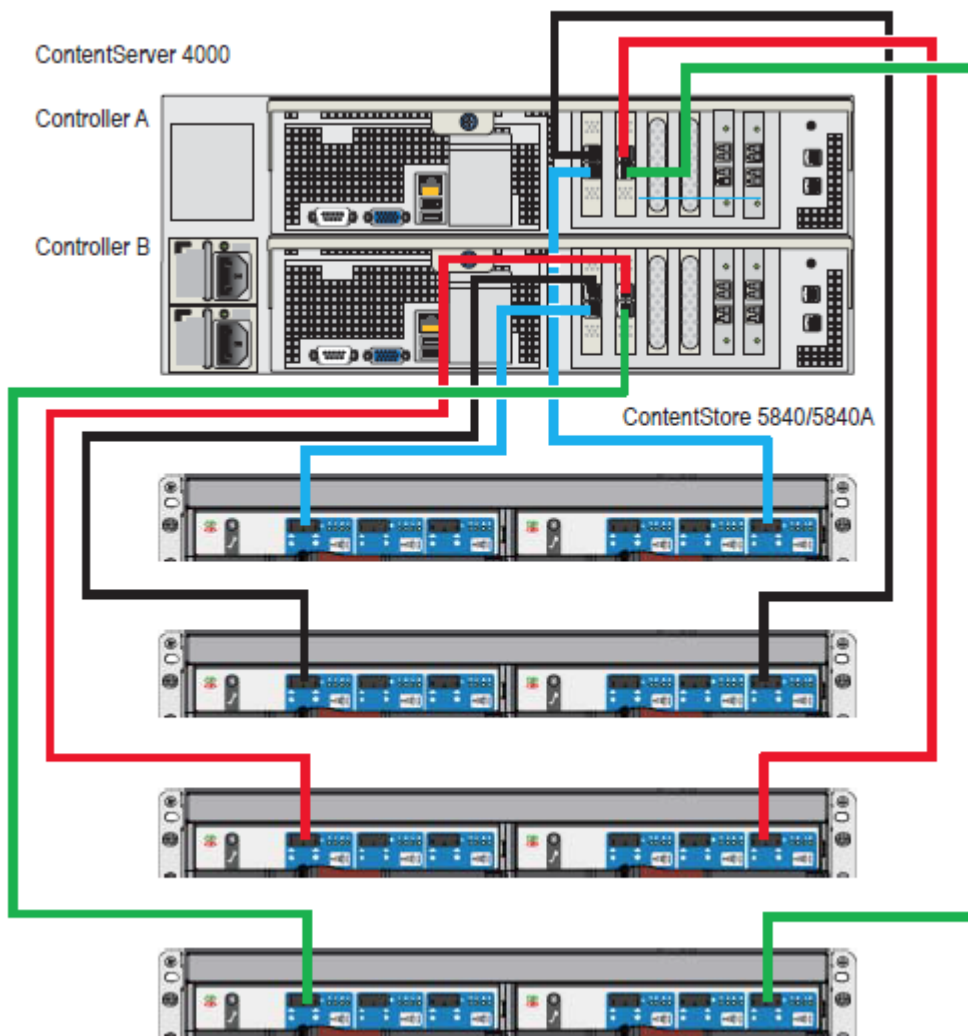
Figure 3-26:

Connecting network switches to the client network: One-rack system

Connect the network switches in a one-rack Harmonic MediaGrid system to the client network.

Refer to the figure below when connecting the network switches to the client network.

> **NOTE:** The switches shown below are provided as examples only. Your switches may vary from the ones shown.

> **IMPORTANT:** Make sure to use only Harmonic MediaGrid-qualified switches in your Harmonic MediaGrid system. To find out if a switch is Harmonic MediaGrid-qualified, contact your Harmonic representative.

1. Connect CX4 cables to Port A2 and to Port A3 on the first switch. Push in the locking device on both ends of the CX4 cable to ensure the cable connector is locked in place. Connect the other end of each cable to the client network.

   📝 **NOTE:** Use ports A1 and A4 on the switch for fiber optic-cable connections.

2. Connect CX4 cables to Port A2 and to Port A3 on the second switch. Push in the locking device on both ends of the CX4 cable to ensure the cable connector is locked in place. Connect the other end of each cable to the client network.

Connecting network switches to the client network: Two-rack system

Connect a two-rack Harmonic MediaGrid system.

📝 **NOTE:** The switches shown below are provided as examples only. Your switches may vary from the ones shown.

⚠️ **IMPORTANT:** Make sure to use only Harmonic MediaGrid-qualified switches in your Harmonic MediaGrid system. To find out if a switch is Harmonic MediaGrid-qualified, contact your Harmonic representative.

1. Connect the components in rack one as follows:

   a. Connect CX4 cables to the two 10 GbE ports on the back of rack one's first switch. Connect the other end of the cables to available 10GbE ports on rack two's switch that connects to the client network.

   b. Connect CX4 cables to the two 10 GbE ports on the back of rack one's second switch. Connect the other end of the cables to available 10 GbE ports on rack one's switch that connects to the client network.

    c. Connect the top network switch to the client network.

2. Connect the components in rack two as follows:

    a. Connect CX4 cables to the two 10GbE ports on the back of rack two's first switch. Connect the other end of the cables to available 10GbE ports on rack two's switch that connects to the client network.

    b. Connect CX4 cables to the two 10 GbE ports on the back of rack two's second switch. Connect the other end of the cables to available 10 GbE ports on the back of rack one's switch that connects to the client network.

    c. Connect the top network switch to the client network.

Connecting the power cables in a system with ContentServer 4000 Series

With all of the network cable connections completed, connect the power cables.

⚠️   **IMPORTANT:** Do not turn on any equipment yet.

1. Ensure that all power switches are off. *Do not* plug the cords into power sources yet.

   The ContentServer and ContentStore 4000 series have power buttons on the front panel. The ContentStore 5840/5840A has power switches on the rear panel. To take advantage of the redundant power supplies, ensure that separate, isolated power sources are available for each PSU.

2. The SystemManager has a power connector on the back. Connect the power cable to the SystemManager power connector.

3. If one or more ContentBridge nodes are part of the system, connect the power cable to the ContentBridge power connector.

4. To take full advantage of the dual redundant power supplies on the ContentDirector, ensure that separate, isolated power sources are available. Connect the power cords to the two power connectors on each ContentDirector. *Do not* plug the cords into power sources yet.

5. Connect the power cords to the network switches' power connectors. *Do not* plug the cords into power sources yet.

System installation with the ContentServer 3000 Series

Install a Harmonic MediaGrid system with the ContentServer 3000 Series.

- *Site preparation*
- *Hardware Installation overview*
- *Racking precautions*
- *Rack mounting the Harmonic MediaGrid system*
- *Connecting system components: Overview*

Site preparation

Review environmental, power, and site requirements before installing your system.

Environmental

Harmonic MediaGrid equipment is designed to operate in a clean, air-conditioned control room environment. Care must be taken to avoid temperature and humidity extremes.

Power

When connecting equipment, care must be taken to avoid power lines that are subject to noise and voltage spikes. Do *not* install units on a power circuit that is common to such equipment as air conditioners and refrigeration units. For optimum protection, AC noise filters and surge protectors are recommended if unstable power conditions are present.

Site

Harmonic MediaGrid equipment is designed for rack mounting. Be sure to read racking precautions before you begin unpacking system components.

Be aware of the weight of the ContentServer and ContentStore so that you may safely move and lift devices.

- An unpopulated ContentStore 5840/5840A weighs approximately 46 kg (101 lb), and 131 kg (288 lb) with all disk drives installed.
- A fully populated ContentServer 4000 weighs approximately 47 kg (104 lb).
- A fully populated ContentStore 4240 weighs approximately 29 kg (64 lb).
- A fully populated ContentServer 3000 and ContentStore 3160 each weighs approximately 34 kg (75 (lb).

Required components

Both a client computer and SystemManager platform are required for installation.

See the *Harmonic MediaGrid Release Notes* for your particular client platform for the latest supported client operating systems.

A SystemManager platform including keyboard, monitor and mouse, is also required. The latest version of the SystemManager application should be installed. See the Release Notes accompanying this release for the exact version required. See the *Harmonic SystemManager Installation Guide* for more information.

Hardware Installation overview

Before you begin, ensure that the site is properly prepared, with adequate power, ventilation and rack space.

> ⚠️ **IMPORTANT:** Make sure to leave a space for the SystemManager keyboard/monitor tray. It is recommended that you mount the keyboard monitor and tray 71.12 cm (28.0 in.) off the floor. This height is ideal for using the platform while seated or standing.

1. Read all rack mounting precautions.
2. Rack the devices from the bottom of the rack in the following order:

    a. ContentServer and ContentStore units
    b. SystemManager unit
    c. ContentBridge units, followed by ContentDirector units
    d. Network switches

    Refer to the network switch product manual for rack mounting instructions.
3. Connect the network cables, SAS cables, and power cables.

Racking precautions

Read these general precautions before racking the Harmonic MediaGrid system.

- Safe handling of this system requires at least TWO people. Harmonic recommends that you use THREE people to rack mount a system; two to lift and one to help guide the system onto the rack rails.
- When lifting the system, two people at either end should lift slowly with their feet spread out to distribute the weight. When lifting, always keep your back straight and lift with your legs.
- Ensure that the leveling jacks on the bottom of the rack are fully extended to the floor with the full weight of the rack resting on them.
- In single rack installation, stabilizers should be attached to the rack. In multiple rack installations, the racks should be coupled together.
- Load the rack from the bottom to the top, with the heaviest component at the bottom of the rack.
- Always make sure the rack is stable before extending a component from the rack.
- You should extend only one component at a time. Extending two or more simultaneously may cause the rack to become unstable.
- To eliminate any possibility of tipping over, ensure that the equipment rack is securely fastened to the floor or wall.

Racking precautions for the ContentStore 5840/5840A

This unit has additional rack mounting precautions.

⚠ **CAUTION:** A fully configured ContentStore 5840/5840A weighs up to 131kg (288lb). An unpopulated ContentStore 5840/5840A weighs 46kg (101lb). Use appropriate lifting methods.

Lifting and handling

- Before lifting the unit, unplug all cords and cables.
- Make sure all disk drives from both drawers are removed, and the drawers are closed firmly and locked shut. Additionally, you may wish to remove other modules from the chassis before lifting. For component removal and installation instructions, see the ContentStore Component Replacement Guide
- It is recommended that a minimum of *three* people lift the ContentStore 5840/5840A using the lifting straps supplied with the unit.
- Do not lift the unit by the handles on the power supply units, cooling modules or I/O modules. They are not designed to take the weight.
- Do not lift the unit higher than 20U. Use mechanical assistance to lift above this height.

Rack system safety

⚠ **CAUTION:** The ContentStore 5840/5840A must only be mounted into a rack using the supplied rail kit. Due to its weight and length, the unit must not be flange mounted.

⚠ **CAUTION:** Never move more than one unit out of the rack at any one time: there is a danger of the rack falling over.

- The ContentStore 5840/5840A must be mounted in a rack before use.
- The rack must be capable of supporting the total weight of the installed units. A fully populated unit weighs up to 131kg (288lb). The design should incorporate stabilizing features suitable to prevent the rack from tipping or being pushed over during installation or in normal use.
- When loading devices, fill the rack from the bottom up. When removing the devices, empty from the top down.
- The system must be operated with low pressure rear exhaust installation. The back pressure created by the rack doors and obstacles is not to exceed 5 pascals (0.5mm water gauge).
- The minimum open area for the rack doors is 70%.
- The rack design should take into consideration the maximum operating ambient temperature for the unit, which is 35°C.
- The rack must have a safe electrical distribution system. It must provide over-current protection for the ContentStore 5840/5840A and must not be overloaded by the total number of ContentStore enclosures installed in the rack. When addressing these concerns, consideration should be given to the electrical power consumption rating shown on the nameplate.
- The electrical distribution system must provide a reliable ground for each unit and for the rack.
- Each PSU in each ContentStore 5840/5840A has an ground leakage current of 1.6mA. The design of the electrical distribution system must take into consideration the total ground leakage current from all the PSUs in all the ContentStore enclosures. The rack must be labeled with the words: "HIGH LEAKAGE CURRENT. Ground connection essential before connecting supply."
- The rack must meet the safety requirements of UL 60950-1 and IEC 60950-1.

Electrical safety

⚠️ **CAUTION:** It is recommended that you fit and check a suitable anti-static wrist or ankle strap and observe all conventional ESD precautions when handling plug-in modules and components. Avoid contact with backplane components and module connectors, etc.

- The ContentStore 5840/5840A must only be operated from a power supply input voltage range of 200 to 240 VAC, 50 to 60 Hz.
- A suitable power source with electrical overload protection must be provided in order to meet the requirements in the technical specification.
- All power supply cords must have a safe electrical ground connection. Check the connection to ground of the unit before you switch on the power supply.

⚠️ **IMPORTANT:** The ContentStore 5840/5840A must be grounded before applying power.

- The plug on the power supply cord is used as the main disconnect device. Ensure that the socket outlets are located near the equipment and are easily accessible.

⚠️ **CAUTION:** When powered by multiple AC sources, disconnect all supply power for complete isolation.

⚠️ **CAUTION:** Do not remove covers from the ContentStore 5840/5840A or any of the modules – there is a danger of electric shock inside. Do not attempt to disassemble the rear sub-chassis from the unit. Return any damaged components to your supplier for repair.

⚠️ **CAUTION:** The PSUs contain double pole/neutral fusing. Ensure that your electrical installation can support this.

⚠️ **IMPORTANT:** The optional RJ45 socket on the I/O module is for Ethernet connection only and must not be connected to a telecommunications network.

Regional safety

- For North American use, the branch circuit must be rated for 20A.
- This equipment is suitable for connection to an IT power system (Norway).

Operating safety

⚠️ **IMPORTANT:** All rear modules are part of the fire ContentStore 5840/5840A and must only be removed when a replacement can be immediately inserted.

⚠️ **IMPORTANT:** The ContentStore 5840/5840A will not receive sufficient airflow or cooling if it is operated with any of the rear modules missing. It is essential that every module bay is filled either with a module or a blank module.

- Replace any defective module with a fully operational unit as soon as possible. Do not remove cooling modules, PSUs or I/O modules unless you have a replacement model of the correct ready for insertion.

⚠️ **CAUTION:** To prevent overturning, drawer interlocks stop users from opening both drawers at the same time. Do not attempt to force open a drawer when the other drawer in the ContentStore 5840/5840A is already open. In a rack containing more than one ContentStore 5840/5840A, do not open more than one drawer per rack at a time.

⚠️ **CAUTION:** Operating temperatures inside the ContentStore 5840/5840A drawers can reach up to 60°C. Take care when opening drawers and removing drive carriers.

⚠ **CAUTION:** Due to product acoustics it is recommended that users wear ear protection for any prolonged exposure.

Rack mounting the Harmonic MediaGrid system

Each device should be placed on the rack and then secured to the rails before mounting the next device.

⚠ **IMPORTANT:** For each device, always follow the instructions in the mounting kit and use the screws that are included with the mounting hardware.

⚠ **IMPORTANT:** If the ContentStore 5840 is part of your system, rack mount this unit first.

Rack mounting the ContentServer 3000 and ContentStore 3160

Start at the bottom of the rack with a ContentServer if this is the first device you are mounting.

1. Install the inner rack rails as follows:
   a. Extend the inner rail toward the front of the rail assembly as far as possible, then depress the locking tab to pull it completely out.
   b. Place the inner rail on the side of the chassis aligning the hooks of the chassis with the rail extension holes.
   c. Slide the extension toward the front of the chassis.
   d. Secure the chassis to the rails with screws.
   e. Repeat steps 1-3 for the other inner rail.
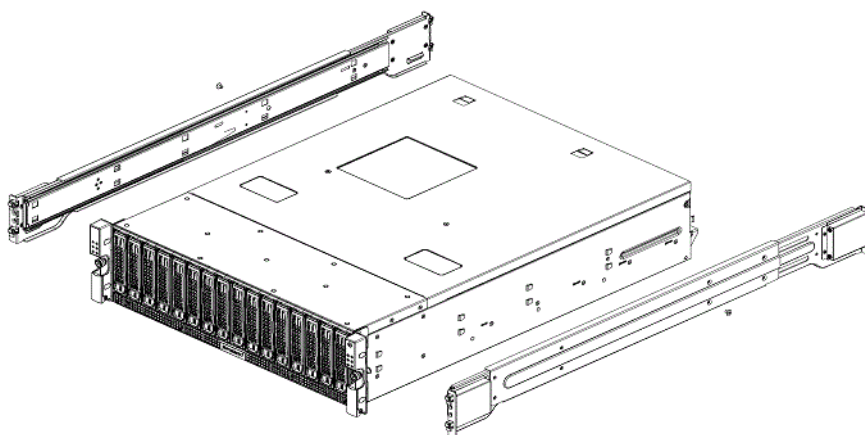
Figure 4-1:

2. Outer rails attach to the server rack and hold the server in place. The outer rails for the chassis extend between 30 inches and 33 inches. Install the outer rack rails as follows:
   a. Attach the right outer rail to the rack by inserting the hooks included on the rails into the holes provided on the rack.
   b. Repeat these steps for the left outer rail.
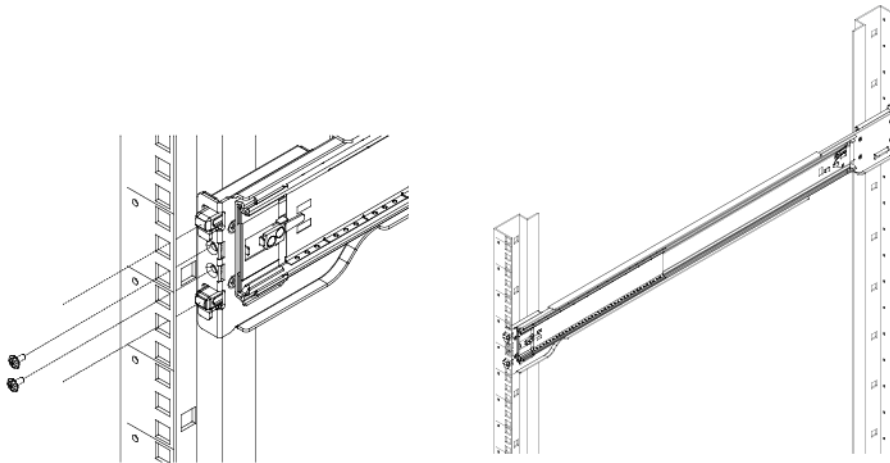
Figure 4-2:

3. Install the chassis into a rack as follows:

   a. Confirm that the inner and outer rails are properly installed.
   b. With two people holding the chassis level and a third guiding the chassis, line up the inner (chassis) rails with the front of the outer (rack) rails so that the chassis is square with the rack rails.
   c. Slide the chassis rails into the rack rails, keeping the pressure even on both sides (you may have to depress the locking tabs when inserting). When the server has been pushed completely into the rack, you should hear the locking tabs "click" into position.
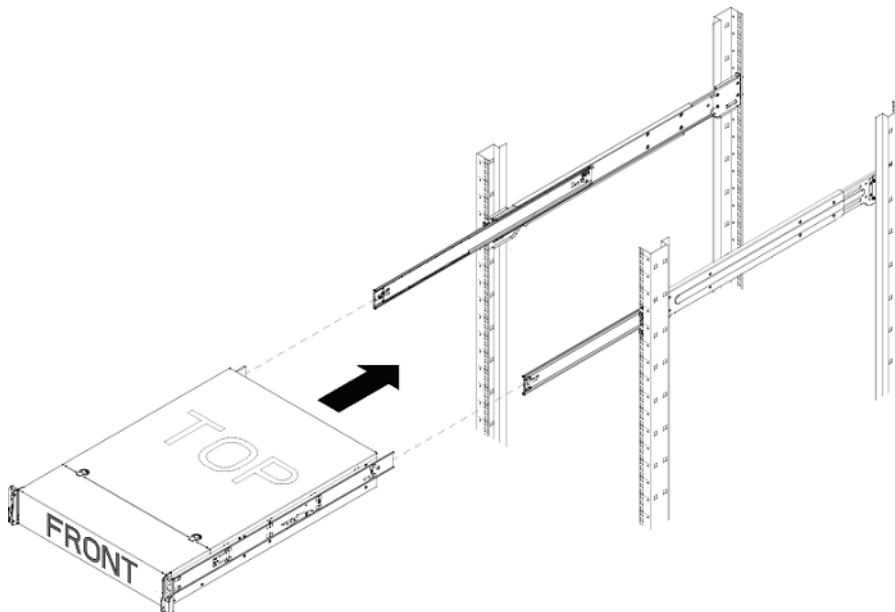
Figure 4-3:

   d. Insert and tighten the thumbscrews that hold the front of the server to the rack.

Installing the bezel

The bezel ships separately from the ContentServer and ContentStore. You should rack mount the devices prior to installing the bezel, and the disk drives should already be inserted.

1. Fit the two posts on the left side of the bezel into the holes in the rack ear on the left side of the chassis.

2. Press in the release button on the right side of the bezel while pushing the right side of the bezel straight onto the chassis, and then release the button.

   The posts on the right side of the bezel will fit into the holes in the right-hand rack ear and secure the bezel on the chassis.

   Example:
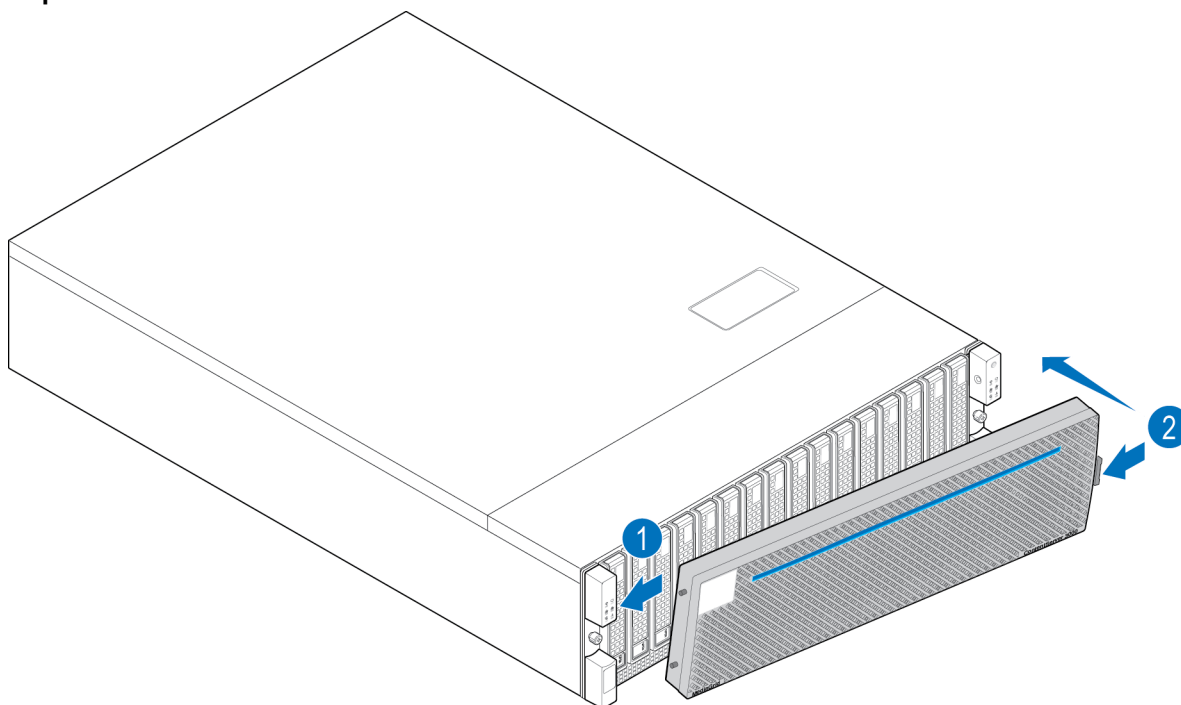
Figure 4-4:

Unpacking the ContentStore 5840/5840A

Position the shipping case within 6 feet (2m) of the site where you intend to use your storage system.

Ensure the site where you intend to set up and use your storage system has the following:

- Standard power from an independent source or a rack power distribution unit with a UPS.
- Host computer with the correct firmware, BIOS and drivers. Contact your supplier for the correct software levels.

Inspect the packaging for crushes, cuts, water damage or any other evidence of mishandling during transit. If there is any damage, photograph the packaging for future reference before opening.

Ensure that the accessory box contains the following:

- SAS host bus adapter (HBA).
- Mini SAS to host cable (only for ContentStore 5840).

- Power cord.
- Rack kit.

⚠️   **IMPORTANT:** Read all racking precautions for the ContentStore 5840/5840A before proceeding with rack mounting the device.

📝   **NOTE:** The SAS cable required for ContentStore 5840A is sold separately by Harmonic which can be ordered same time as the ContentStore. The cable required is mini-SAS HD to mini-SAS HD.

Rack mounting the ContentStore 5840/5840A

Due to the weight of the enclosure, this unit should be rack mounted before the drive carriers are installed.

The adjustment range of the rail kit, from the inside of the front post to the inside of the rear post is 660mm - 840mm. This suits a one-meter deep rack within Rack Specification IEC 60297.

⚠️   **CAUTION:** It is recommended that you fit and check a suitable anti-static wrist or ankle strap and observe all conventional ESD precautions when handling plug-in modules and components. Avoid contact with backplane components and module connectors, etc.

⚠️   **CAUTION:** An unpopulated enclosure can weigh up to 46kg (101lb). Do not try to lift it by yourself.

📝   **NOTE:** A screwdriver with a Torx T20 tip is needed to lock and unlock the drawers.

1. To facilitate access, remove the door from the rack.

2. Ensure the pre-assembled rails are at their shortest length.

3. Locate the rail location pins inside the front of the rack and extend the length of the rail assembly to enable the rear location pins to locate. Ensure the pins are fully located in the square or round holes in the rack posts.

Figure 4-5: Rack Mounting the System (left hand rail only shown for clarity)

4. Fully tighten all clamping screws and middle slide-locking screws.

5. Ensure the rear spacer clips (x4) are fitted tight to the edge of the rack post.

6. Slide the enclosure fully home on its rails.

7. Fasten the front of the enclosure using the enclosure fastening screws (x4).

8. Fix the rear of the enclosure to the hold down bracket with the rear enclosure fixing screws (x2).

> **NOTE:** Use the long or short hold-down bracket depending on the distance from the rack post to the enclosure hold-down slot. Ensure the sliding nut is at the rear of the slot prior to fitting the bracket to the post, then slide the nut along the slot to enable the rear enclosure fastening screw to be fitted.

9. For rack depths where the rack posts are behind the enclosure hold-down slots:
   a. Swap the left and right hold-down brackets.
   b. Insert the long flange between the rack post and chassis side.
   c. The sliding nut head must always face away from the enclosure, whichever configuration is used.

Figure 4-6:

⚠ **CAUTION:** Use only the power cords supplied.

⚠ **CAUTION:** Once the enclosure is installed in the rack, dispose of the lifting straps. Due to the difficulty in attaching the straps once the enclosure is installed in the rack, the straps are not suitable for removing the enclosure from the rack.

Precautions when opening a drawer

Read and understand these precautions before opening a drawer in the ContentStore 5840/5840A.

⚠ **CAUTION:** To prevent overturning, drawer interlocks stop users from opening both drawers at the same time. Do not attempt to force open a drawer when the other drawer in the enclosure is already open. In a rack containing more than one enclosure, do not open more than one drawer per rack at a time.

⚠ **CAUTION:** Operating temperatures inside the enclosure drawers can reach up to 60°C. Take care when opening drawers and removing drive carriers.

📝 **NOTE:** To reduce the possibility of toppling, only one drawer can be open at any time.

⚠ **IMPORTANT:** The drawer must not be left open for more than two minutes while the enclosure is powered.

Note the following important points before opening a drawer:

- Opening a drawer does not interrupt the functioning of the system, and disk drives can be hot-swapped while the enclosure continues to operate. However, drawers must not be left open for longer than two minutes, otherwise airflow and cooling will be compromised.
- To reduce the possibility of toppling, only one drawer can be open at any one time.
- The drawer locks into place when opened all the way. To reduce pinching hazards, two latches must be released before the drawer can be pushed back in.
- Each drawer can be locked shut by turning both anti-tamper locks clockwise using a screwdriver with a Torx T20 bit.

Opening a drawer

A drawer must not be left open for more than two minutes while the enclosure is powered on.

⚠ **CAUTION:** To prevent overturning, drawer interlocks stop users from opening both drawers at the same time. Do not attempt to force open a drawer when the other drawer in the enclosure is already open. In a rack containing more than one enclosure, do not open more than one drawer per rack at a time.

⚠ **CAUTION:** Operating temperatures inside the enclosure drawers can reach up to 60°C. Take care when opening drawers and removing drive carriers.

Before you begin
Be sure that you have read the precautions for opening a drawer.

1. Make sure the anti-tamper locks are not engaged.
   The red arrows on the locks will point inwards if the locks are disengaged.

2. If necessary, unlock the anti-tamper locks by rotating them counterclockwise using a screwdriver with a Torx T20 bit.

3. Push the drawer latches inward and hold them.

4. Pull the drawer all the way out until it locks open.

   ⚠ **IMPORTANT:** The drawer must not be left open for more than two minutes while the enclosure is powered on.

Example:

Installing a drive

When installing drives, populate drawers from the front to the rear of the enclosure.

📝 **NOTE:** Failed drives must be replaced with approved drives. Contact your storage vendor for details.

📝 **NOTE:** The drawers must be populated with drives in whole rows at a time (there are three rows of 14 drives per drawer). The minimum number of drives in an enclosure is 14. The number of rows must not differ by more than one between top and bottom drawers.

1. Orient the drive such that the drive capacity label is facing toward you.

2. Lower the drive into the slot.

3. Push the drive downwards and hold it down while sliding the drive carrier plate in the direction shown.
   Example:

   Figure 4-7:

   Result: The drive is now locked into place.

4. Check that the release latch has returned to a locked position.

Closing a drawer

During normal operation, drawers must be kept shut to ensure correct airflow and cooling.

1. Pull and hold both of the white latches on the sides of the drawer.

2. Push the drawer in slightly.

3. Release the white latches and check they have returned to their original position.

4. Push the drawer all the way back into the enclosure, making sure it clicks home.

Rack mounting the ContentDirector 1000F/2000C and ContentBridge 2010F

The ContentDirector 1000F/2000C and ContentBridge 2010F (an optional system component) ship with the Intel AXXVRAIL Mounting Rail Kit.

> 📝 **NOTE:** The figures in this section show a two-rack unit server; however, the same rack rails are used for the ContentDirector 1000F/2000C and ContentBridge 2010F.

1. Pull the blue release button (component F) to remove inner member (D) from the slides.

Figure 4-8: AXXVRAIL mounting railside-mount

2. Install the slides to the rack.

    a. Align the brackets to desired vertical position on the rack.

    b. Using the screws provided, fasten the rear brackets to the rear rack posts. Use two screws for each bracket.

    c. Fasten the front brackets to the front rack posts. Use one screw for each bracket and place it in the topmost hole. Leave the other holes open for the chassis.
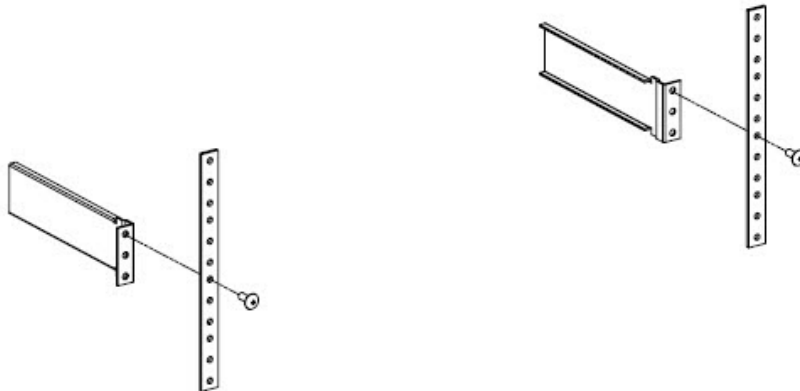
Figure 4-9: Fastening slides to front rack posts

    d. Move the ball retainer to the front of the rack.

3. Install the inner member (component D in the "AXXVRAIL Mounting Railside-mount" diagram) to the chassis.

    a. Align inner member key holes to the standoffs on the chassis.

    b. Move the inner member in the direction shown in the example below.
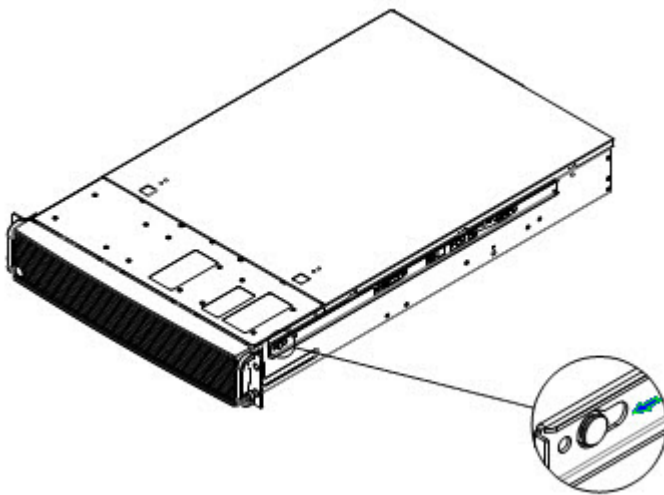
Figure 4-10: Installing inner member to chassis

4. Install the chassis to the fixed slides by pulling the release button in the inner member to release the lock and allow the chassis to close.
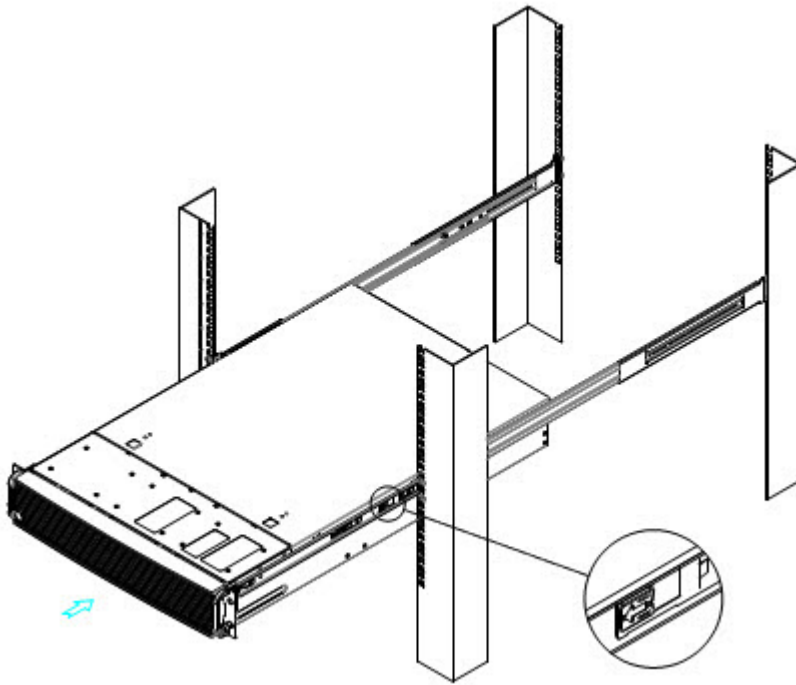
Figure 4-11: Installing chassis to fixed slides

5. Pull the blue release button in the inner member to release the lock and allow the chassis to slide into the rack.

6. Install the bottom-most screw at the front to secure the chassis to the rack.

Installing the bezel

Align the bezel in front of the chassis so that the Harmonic logo appears on the top left corner.

1. Connect the USB cable inside the bezel to the right-hand USB port on the front panel. (The other USB port is covered.)

2. Keeping the corners aligned, press the bezel straight onto the chassis.

   Result: The USB cable will form a loop that fits inside the metal panel of the bezel.

3. Hand-tighten the two captive thumb screws to secure the bezel in place.

Example:

Figure 4-12:

Rack mounting the network switches

Refer to the network switch product manuals for complete rack mounting instructions.

📄 **NOTE:** The network switches are not deep enough to be attached to the front rails. It is recommended that you attach the rear brackets just above the previous device's brackets so the network switch rests on top of the device below it.

1. Unpack the network switch.

2. Unpack the rack mount kit that includes the two side mounting brackets.

⚠ **IMPORTANT:** For all installation steps, always follow the instructions in the mounting kit and use the screws that are included with the mounting hardware.

3. Locate the screws included in the rack mount kit for the side brackets. Using a Phillips screwdriver, attach both side brackets to the switch.
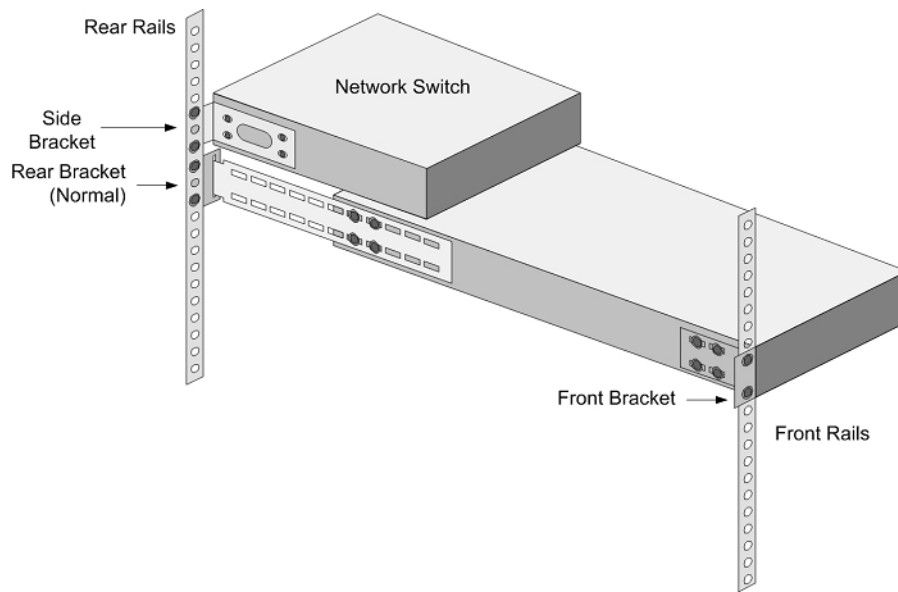
Figure 4-13:

4. With the side brackets attached to the switch, attach the side brackets to the cabinet's rear rails.

5. Repeat the previous steps to install the remaining network switches.

Connecting system components: Overview

Connect Ethernet cables, SAS cables, and power cables in the given order.

The network cable colors used in the following sections are provided for example only. Other colors can be used instead as long as the connections correspond to the blue, white, and red network cables shown in this section.

1. Connect Harmonic MediaGrid system components to the network switches in the following order:
   a. ContentDirector nodes
   b. SystemManager
   c. ContentServer nodes
   d. ContentBridge nodes (optional component)

   > **NOTE:** Once you have completed the network connections, group the cables and then secure them to the rear side rails.

2. Using SAS cables, connect each ContentStore to the ContentServer.

3. Connect the Harmonic MediaGrid network switch to the client network.

4. Connect power cables to each system component.

   > **IMPORTANT:** After connecting power cables, do not power on the system. You must configure the network switches before powering on the system.

Network switch connections diagrams

See overviews of network switch connections for a 10 GbE network and a 1 GbE network. Note that not all connections are shown.

> ⚠ **IMPORTANT:** Make sure to use only Harmonic MediaGrid-qualified switches in your system. To find out if a switch is Harmonic MediaGrid-qualified, contact your Harmonic representative.

> 📝 **NOTE:** The switches shown in this section are example only. Your switch may vary from those shown.
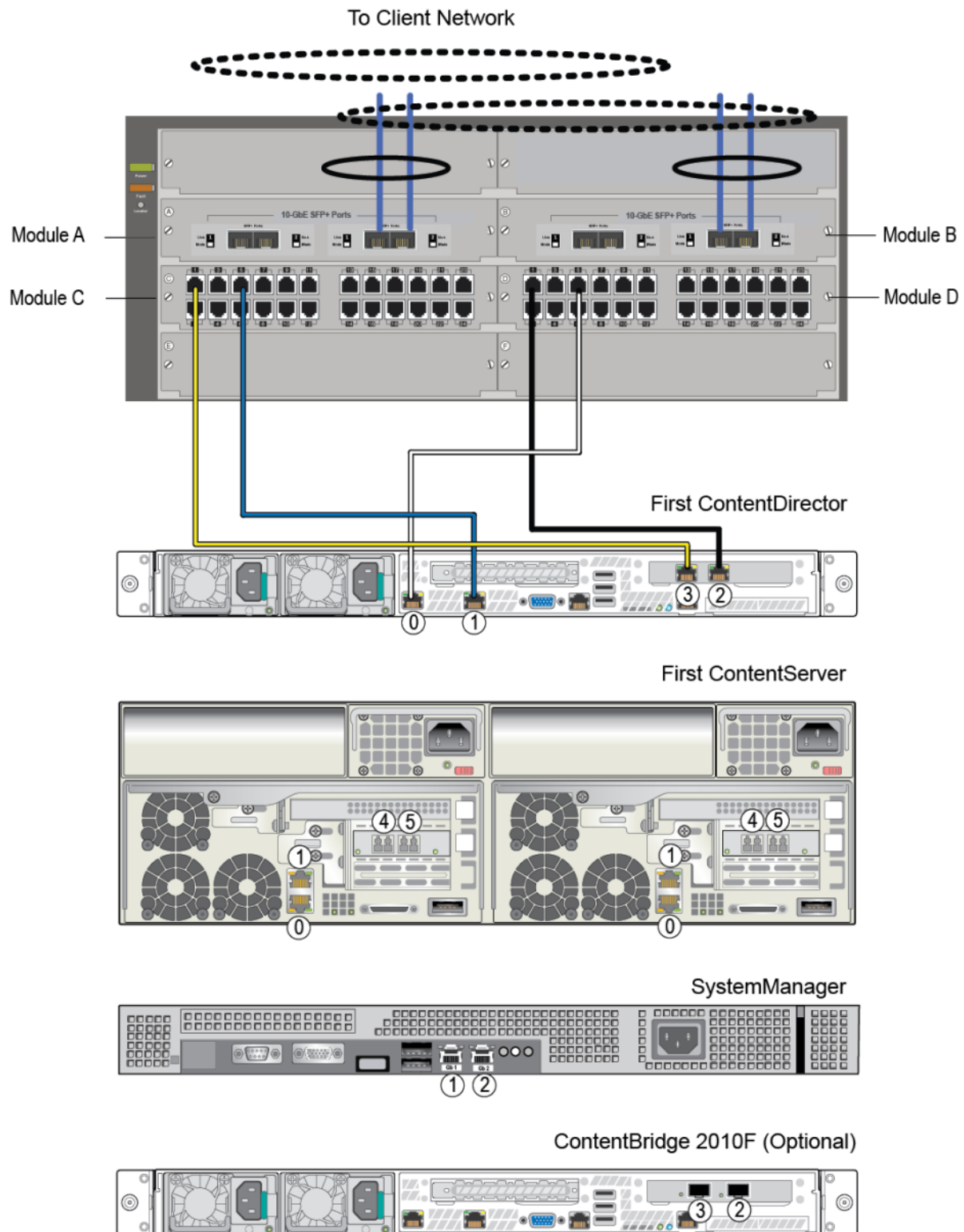
Figure 4-14: Harmonic MediaGrid 3000 and 10 GbE network switch connections
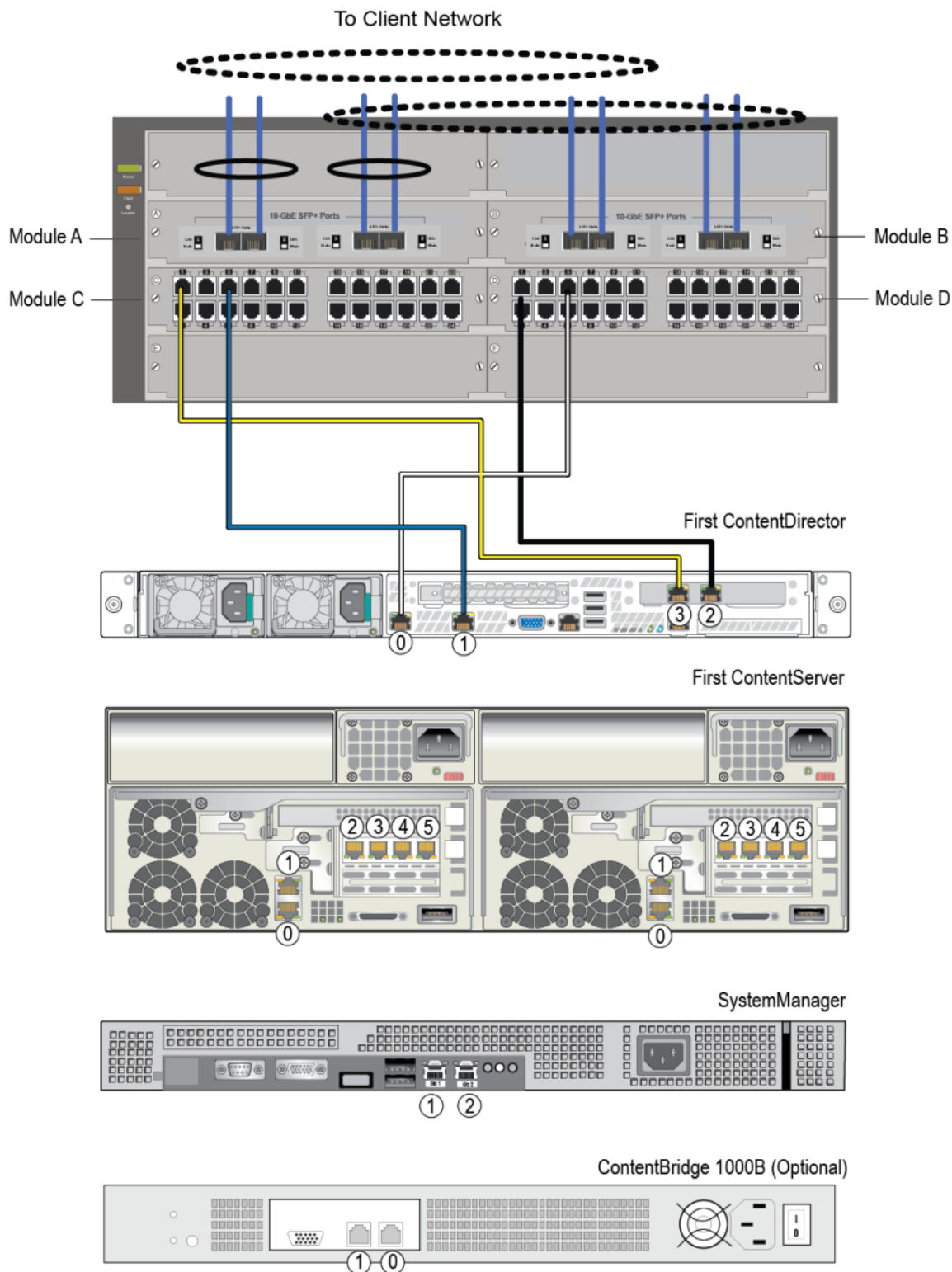
Figure 4-15: Harmonic MediaGrid 3000 and 1 GbE network switch connections

About BMC connectivity

Each controller on the ContentServer contains a troubleshooting utility called the Baseboard Management Controller (BMC), which can be accessed in the event of system failure.

The BMC requires a connection from the BMC port on each controller on a ContentServer to the network switch.

Connecting the ContentDirector 1000F/2000C to the network switch

Follow these instructions for single-site Harmonic MediaGrid systems.

⚠️ **IMPORTANT:** Ports 1-4 on switch modules C and D are reserved for ContentDirector private interface (ports 2 and 3) connections only.

1. Connect the ContentDirector private interfaces (ports 2 and 3) to the switch as follows:
   a. Connect port 2 on the first ContentDirector to port 1 on switch module D.
   b. Connect port 3 on the first ContentDirector to port 1 on switch module C.

2. Connect the ContentDirector public interfaces (ports 1 and 0) to the switch as follows:
   a. Connect port 1 on the first ContentDirector to port 5 on switch module C.
   b. Connect port 0 on the first ContentDirector to port 5 on switch module D.

3. Continue connecting each remaining ContentDirector in the same manner, starting with port 2 on the switch for the private interfaces and port 6 on the switch for the public interfaces.

Figure 4-16:

Connecting ContentDirector nodes in a stretch cluster

For assistance with configuring a stretch cluster, contact Technical Support.

⚠️ **IMPORTANT:** Make sure to connect the devices as described below. Incorrect connections may result in problems with your Harmonic MediaGrid system.

1. Starting with the ContentDirector at Site 1, connect a yellow fiber optic cable to NIC 3. Connect the other end of the cable to an open port on the first network switch module at Site 2. This will be used for Private VLAN 1.

2. Connect a black fiber optic cable to NIC 2 on the ContentDirector at Site 1. Connect the other end of the cable to an open port on the second network switch module at Site 1. This will be used for Private VLAN 2.

3. Connect a white Ethernet cable to NIC 0 on the ContentDirector at Site 1. Connect the other end of the cable to an open port on the first network switch module at Site 1. This will be used for the Public VLAN.

4. Connect a blue Ethernet cable to NIC 1 on the ContentDirector at Site 1. Connect the other end of the cable to an open port on the second network switch module at Site 1. This will also be used for the Public VLAN.

5. For the ContentDirector at Site 2, connect a yellow fiber optic cable to NIC 3. Connect the other end of the cable to an open port on the first network switch module at Site 2. This will be used for Private VLAN 1.

6. Connect a black fiber optic cable to NIC 2 on the ContentDirector at Site 2. Connect the other end of the cable to an open port on the second network switch module at Site 1. This will be used for Private VLAN 2

7. Connect a white Ethernet cable to NIC 0 on the ContentDirector at Site 2. Connect the other end of the cable to an open port on the first network switch module at Site 2. This will be used for the Public VLAN.

8. Connect a blue Ethernet cable to NIC 1 on the ContentDirector at Site 2. Connect the other end of the cable to an open port on the second network switch module at Site 2. This will also be used for the Public VLAN.

Figure 4-17:

Connecting the SystemManager to the network switch

The SystemManager connects to a 1 GbE network switch module.

For details about the SystemManager platform included in your Harmonic MediaGrid system, refer to the *Harmonic SystemManager Installation Guide.*

⚠️ **IMPORTANT:** vDHCP must be disabled in the SystemManager application *before* connecting the SystemManager device to the 1 GbE network switch. Refer to "Disabling vDHCP" in the *Harmonic SystemManager User Guide* for instructions.

1. Connect a CAT-6 Ethernet cable to port 1 on the SystemManager.

2. Connect the other end of the Ethernet cable to port 8 on switch module D.

SystemManager Rear Panel
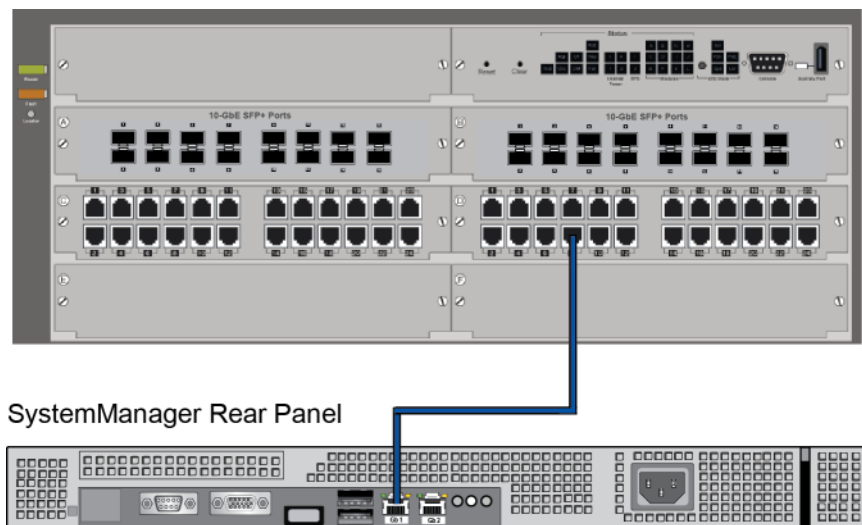
Figure 4-18:

Connecting the ContentServer 3000 to 10 GbE network switch modules

Each controller on the ContentServer has two 10 GbE NIC ports, plus one 1 GbE NIC port which serves as the BMC connection.

⚠️ **IMPORTANT:** To ensure redundancy and proper failover in the event of a failure, you must connect each controller to a separate switch or switch module.

1. Starting with the left-hand controller, connect a red CAT-6 Ethernet cable to NIC 0. Connect the other end of the cable to an open port on the first 1 GbE switch module. This will serve as the BMC connection.

2. Using a white 10 GbE SFP+ cable, connect one of the 10 GbE ports on the left-hand controller to an open port on the first 10 GbE switch module.

3. Using a white 10 GbE SFP+ cable, connect the remaining 10 GbE port on the left-hand controller to an open port on the second 10 GbE switch module.

4. On the right-hand controller, connect a red CAT-6 Ethernet cable to NIC 0. Connect the other end of the cable to an open port on the second 1 GbE switch module. This will serve as the BMC connection for this controller.

5. Using a blue 10 GbE SFP+ cable, connect one of the 10 GbE ports on the right-hand controller to an open port on the second 10 GbE switch module.

6. Using a blue 10 GbE SFP+ cable, connect the remaining 10 GbE port on the right-hand controller to an open port on the first 10 GbE switch module.

7. Continue connecting each remaining ContentServer in the same manner.

📝 **NOTE:** The switch shown below is provided as an example only. Your switch may vary from the one shown.
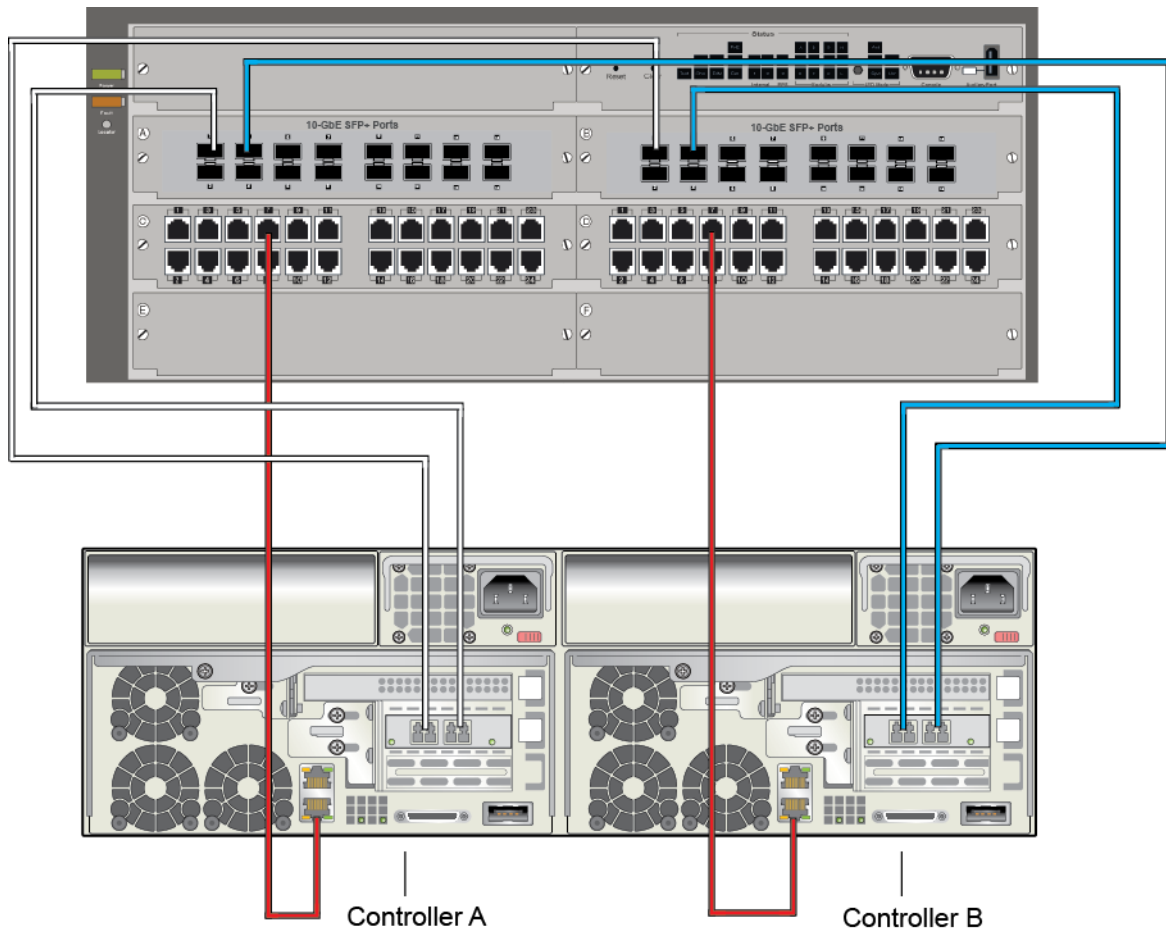
Figure 4-19:

Connecting the ContentServer 3000 to 1 GbE network switch modules

Each controller on the ContentServer 3000 has four 1 GbE NIC ports, and an additional 1 GbE NIC port for the BMC.

⚠ **IMPORTANT:** To ensure redundancy and proper failover in the event of a failure, you must connect each controller to a separate switch or switch module.

1. Starting with the left-hand controller, connect a red CAT-6 Ethernet cable to NIC 0. Connect the other end of the cable to an open port on the first 1 GbE switch module. This will serve as the BMC connection.

2. Using white CAT-6 Ethernet cables, connect two of the open NICs on the left-hand controller to open ports on the first 1 GbE switch module.

3. Using white CAT-6 Ethernet cables, connect the remaining three NICs on the left-hand controller to open ports on the second 1 GbE switch module.

4. On the right-hand controller, connect a red CAT-6 Ethernet cable to NIC 0. Connect the other end of the cable to an open port on the second 1 GbE switch module. This will serve as the BMC connection for this controller.

5. Using blue CAT-6 Ethernet cables, connect two of the open NICs on the right-hand controller to open ports on the second 1 GbE switch module.

6. Using blue CAT-6 Ethernet cables, connect the remaining three NICs on the right-hand controller to open ports on the first 1 GbE switch module.

7. Continue connecting each remaining ContentServer in the same manner.

   NOTE: The switch shown below is provided as an example only. Your switch may vary from the one shown.
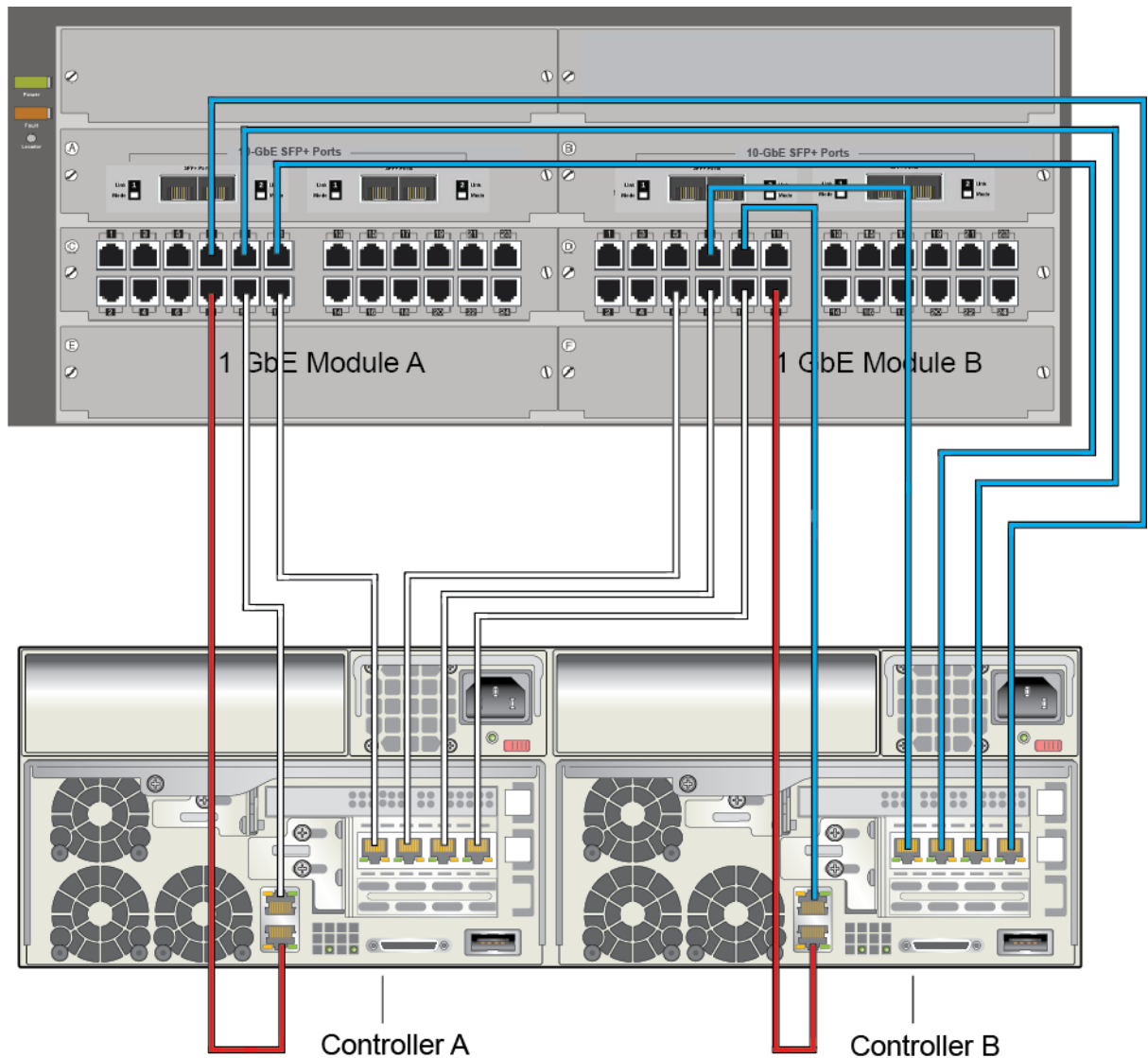
Figure 4-20:

Connecting the High Bandwidth ContentBridge to the network switch

Follow these instructions for systems with a single High Bandwidth ContentBridge.

📝 **NOTE:** The ContentBridge 2010F can be on either the Public VLAN or the client VLAN. However, if you wish to use the Configuration Assistant to configure the ContentBridge, it must on the Public VLAN.

📝 **NOTE:** Both 10 GbE ports on the ContentBridge 2010F must be on the same VLAN and subnet.

1. Connect 10 Gigabit Ethernet port 2 on first ContentBridge to the first available port on switch module A.

2. Connect 10 Gigabit Ethernet port 3 on first ContentBridge to the first available port on switch module B.

3. Continue connecting any remaining ContentBridge nodes in the same manner.

Connecting a High Bandwidth ContentBridge to the customer core switch

Follow these instructions for systems with a single High Bandwidth ContentBridge.

📝 **NOTE:** The ContentBridge 2010F can be on either the Public VLAN or the client VLAN. However, if you wish to use the Configuration Assistant to configure the ContentBridge, it must on the Public VLAN.

📝 **NOTE:** Both 10 GbE ports on the ContentBridge 2010F must be on the same VLAN and subnet.

1. Connect the appropriate network cable (CX4 or MMF) to 10 GbE port 2 on the ContentBridge, then connect the other end of the cable to an available port on the customer core switch.

2. Connect the appropriate network cable (CX4 or MMF) to 10 GbE port 3 on the ContentBridge, then connect the other end of the cable to an available port on the customer core switch.

3. Connect the customer core switch to the Harmonic MediaGrid network switches.

Figure 4-21:

Connecting the High Bandwidth ContentBridge in a High Availability (HA) pair

This section provides instructions for connecting two High Bandwidth ContentBridge nodes in an HA pair to a network switch.

> **NOTE:** The ContentBridge 2010F/2010 can be on either the Public VLAN or the client VLAN. However, if you wish to use the Configuration Assistant, each ContentBridge must be on the Public VLAN.

> **NOTE:** Both 10 GbE ports on the ContentBridge 2010F must be on the same VLAN and subnet.

1. Connect the appropriate network cable (CX4 or MMF) to 10GbE port 2 on the first ContentBridge, then connect the other end of the cable to an available port on the customer core switch.

2. Connect the appropriate network cable (CX4 or MMF) to 10GbE port 3 on the first ContentBridge, then connect the other end of the cable to an available port on the customer core switch.

3. Connect the appropriate network cable (CX4 or MMF) to 10GbE port 2 on the second ContentBridge, then connect the other end of the cable to an available port on the customer core switch.

4. Connect the appropriate network cable (CX4 or MMF) to 10GbE port 3 on the second ContentBridge, then connect the other end of the cable to an available port on the customer core switch.

5. Connect a 1 GbE cable to the right-hand NIC (Eth 1) on the first ContentBridge, then connect the other end of the cable to the right-hand NIC (Eth 1) on the second ContentBridge.

6. Connect the customer core switch to the Harmonic MediaGrid network switches.

Figure 4-22:

Connecting the ContentBridge 1000B to the network switch

The ContentBridge 1000B must be connected to the public VLAN.

1. Connect port 1 on the first ContentBridge to the first available port on switch module C.

2. Connect port 0 on the first ContentBridge to the first available port on switch module D.

3. Continue connecting any remaining ContentBridge nodes in the same manner.

Connecting the ContentServer 3000 to the ContentStore 3160

You can connect a maximum of five ContentStore 3160 nodes to the ContentServer 3000.

📝 **NOTE:** Do not twist SAS cables or bundle them with power cables.

1. Starting with the left-hand controller on the ContentServer, connect a SAS cable to the SAS port. Connect the other end of the cable to the left-hand SAS port on the left-hand controller of the first ContentStore.

2. On the right-hand controller of the ContentServer, connect a SAS cable to the SAS port. Connect the other end of the cable to the left-hand SAS port on the right-hand controller of the first ContentStore.

3. Starting with the left-hand controller on the first ContentStore, connect a SAS cable to the open right-hand SAS port. Connect the other end of the cable to the left-hand SAS port on the left-hand controller of the second ContentStore.

4. On the right-hand controller of the first ContentStore, connect a SAS cable to the open right-hand SAS port. Connect the other end of the cable to the left-hand SAS port on the right-hand controller of the second ContentStore.

5. Continue connecting ContentStore nodes together in this manner.
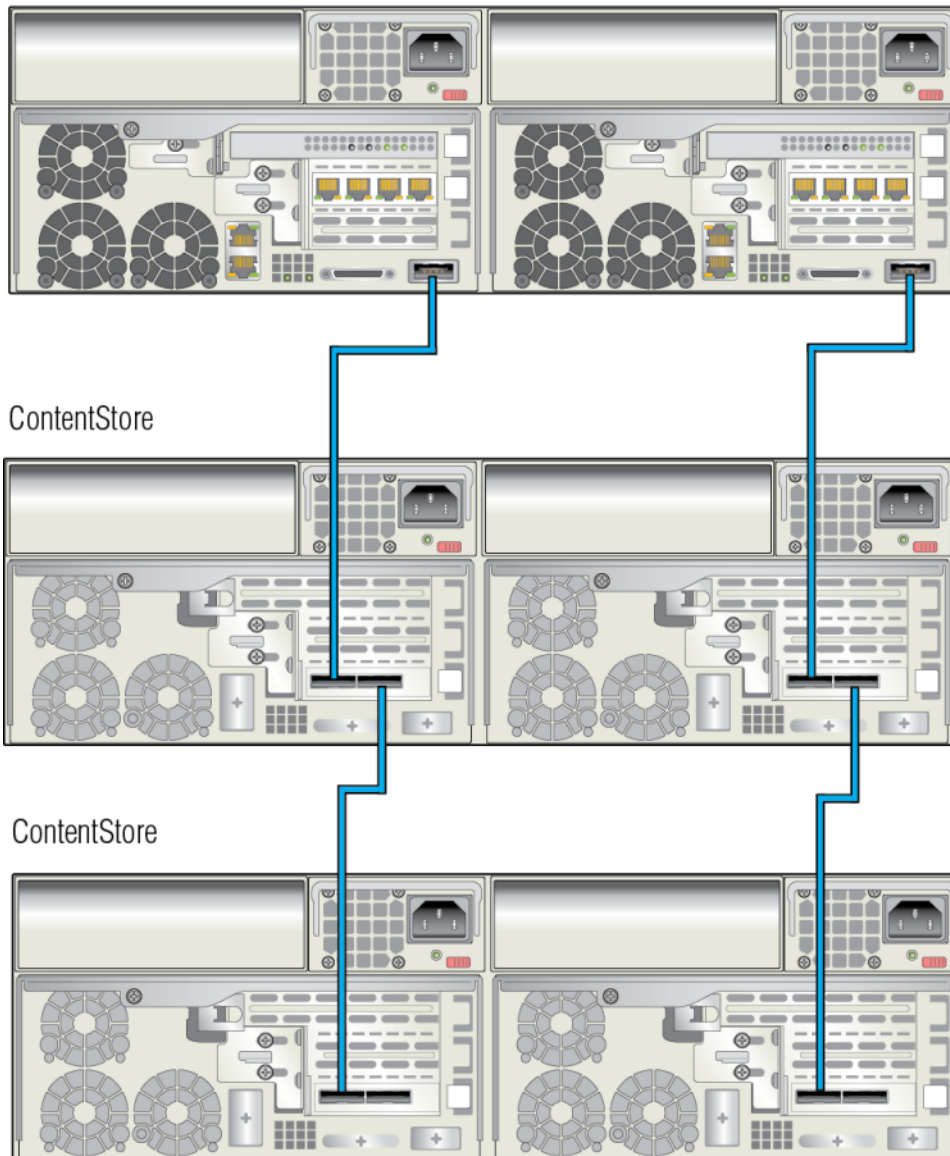
Figure 4-23:

Connecting the ContentServer 3000 to the ContentStore 5840/5840A

Use the SAS host bus adapters (HBAs) supplied with the ContentStore 5840 for connections.

At this time, Harmonic supports connecting no more than one ContentStore 5840/5840A to a ContentServer 3000.

📝   **NOTE:** Do not twist SAS cables or bundle them with power cables.

1. Starting with the left-hand controller on the ContentServer, connect a SAS cable to the SAS port. Connect the other end of the cable to the right-hand SAS port on the left-hand I/O module of the ContentStore 5840/5840A.
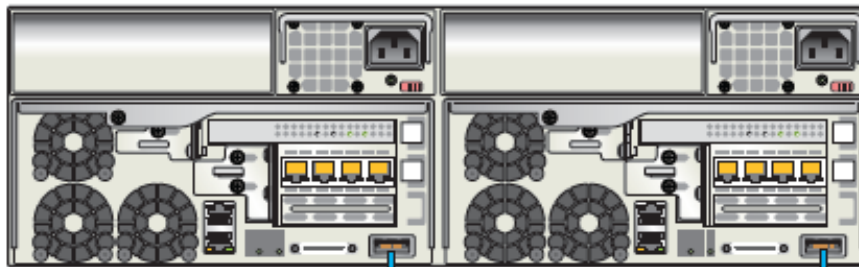
2. On the right-hand controller of the ContentServer, connect a SAS cable to the SAS port. Connect the other end of the cable to the right-hand SAS port on the right-hand I/O module of the ContentStore 5840/5840A.
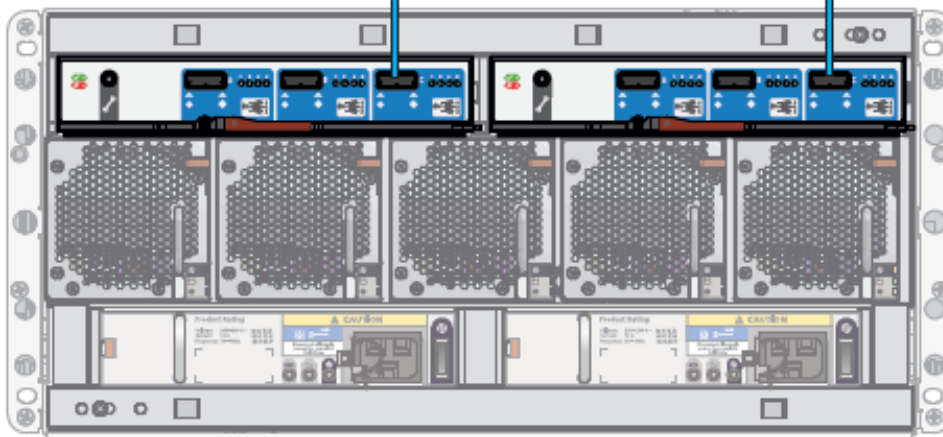
Figure 4-24:

Connecting network switches to the client network: One-rack system

Connect the network switches in a one-rack Harmonic MediaGrid system to the client network.

Refer to the figure below when connecting the network switches to the client network.

📝 **NOTE:** The switches shown below are provided as examples only. Your switches may vary from the ones shown.

⚠ **IMPORTANT:** Make sure to use only Harmonic MediaGrid-qualified switches in your Harmonic MediaGrid system. To find out if a switch is Harmonic MediaGrid-qualified, contact your Harmonic representative.

1. Connect CX4 cables to Port A2 and to Port A3 on the first switch. Push in the locking device on both ends of the CX4 cable to ensure the cable connector is locked in place. Connect the other end of each cable to the client network.

   📝 **NOTE:** Use ports A1 and A4 on the switch for fiber optic-cable connections.

2. Connect CX4 cables to Port A2 and to Port A3 on the second switch. Push in the locking device on both ends of the CX4 cable to ensure the cable connector is locked in place. Connect the other end of each cable to the client network.

Connecting network switches to the client network: Two-rack system

Connect a two-rack Harmonic MediaGrid system.

📝 **NOTE:** The switches shown below are provided as examples only. Your switches may vary from the ones shown.

⚠ **IMPORTANT:** Make sure to use only Harmonic MediaGrid-qualified switches in your Harmonic MediaGrid system. To find out if a switch is Harmonic MediaGrid-qualified, contact your Harmonic representative.

1. Connect the components in rack one as follows:

a. Connect CX4 cables to the two 10 GbE ports on the back of rack one's first switch. Connect the other end of the cables to available 10GbE ports on rack two's switch that connects to the client network.

b. Connect CX4 cables to the two 10 GbE ports on the back of rack one's second switch. Connect the other end of the cables to available 10 GbE ports on rack one's switch that connects to the client network.

c. Connect the top network switch to the client network.

2. Connect the components in rack two as follows:

a. Connect CX4 cables to the two 10GbE ports on the back of rack two's first switch. Connect the other end of the cables to available 10GbE ports on rack two's switch that connects to the client network.

b. Connect CX4 cables to the two 10 GbE ports on the back of rack two's second switch. Connect the other end of the cables to available 10 GbE ports on the back of rack one's switch that connects to the client network.

c. Connect the top network switch to the client network.

Connecting the power cables in a system

With all of the network cable connections completed, connect the power cables.

⚠️ **IMPORTANT:** Do not turn on any equipment yet.

1. Ensure that all power switches are off. *Do not* plug the cords into power sources yet.

   The 3000 series ContentServer and ContentStore have power switches on the front panel. The ContentStore 5840 has power switches on the rear panel. To take advantage of the redundant power supplies, ensure that separate, isolated power sources are available for each PSU.

2. The SystemManager has a power connector on the back. Connect the power cable to the SystemManager power connector.

3. If one or more ContentBridge nodes are part of the system, connect the power cable to the ContentBridge Power connector.

4. To take full advantage of the dual redundant power supplies on the ContentDirector, ensure that separate, isolated power sources are available. Connect the power cords to the two power connectors on each ContentDirector. *Do not* plug the cords into power sources yet.

5. Connect the power cords to the network switches' power connectors. *Do not* plug the cords into power sources yet.

System configuration

Configure the Harmonic MediaGrid 3000 or 4000 Series system after the devices have been physically connected.

> **NOTE:** The procedures outlined in this section are written for qualified technical personnel, skilled at advanced networking procedures. If you have any questions, please consult with your facility's network administrator or contact Technical Support.

- *About configuration*
- *Running the Network Configuration Assistant*
- *Getting started with the Configuration Assistant*
- *Powering on a Harmonic MediaGrid system*
- *Running the Configuration Assistant*
- *Initializing clusters*
- *Setting the system time*
- *Creating a volume and a group file system*
- *Creating a RAID set*
- *Joining a cluster to a Windows Domain*
- *Joining a cluster to an LDAP Domain*
- *Joining a cluster to an Apple Open Directory Domain*
- *Joining a cluster to a Local User Authentication (LUA) Domain*
- *Authentication configuration parameters*
- *Verifying ContentServer and ContentDirector services*
- *ContentBridge configuration*
- *ContentServer configuration*
- *Accessing the file system*

About configuration

You configure your Harmonic MediaGrid system primarily through the SystemManager and the Configuration Assistant.

Much of the Harmonic MediaGrid system configuration is done by editing configuration files using the SystemManager application. You are directed to the *Harmonic SystemManager User Guide* for complete instructions when customizing these configuration files.

Before configuring your Harmonic MediaGrid system, you must first configure your network switches. If you have purchased your switches from Harmonic then you may configure them by running a utility called the Network Configuration Assistant. If you did not purchase switches from Harmonic then contact Technical Support or your network administrator for assistance with configuring your network switches.

If you are using 1GbE switches provided by Harmonic for an all-1GbE network, you can use the Network Configuration Assistant, a stand-alone utility. The Network Configuration Assistant asks a number of configuration questions and uses the information to populate switch configuration files located on the ContentDirector. These files can then be copied to your switches.

Note the following:

- The Network Configuration Assistant cannot be used for any non-Harmonic MediaGrid-qualified switches or for any 10GbE switches. For help with configuring those, contact Technical Support or your network administrator.
- The Network Configuration Assistant generates all switch configurations based upon a /24 (Class C) address-space. If you need any other address type, the IP/Netmask values must be modified manually after the configuration file is generated. For assistance, contact Technical Support or your network administrator.

Once you have configured your network switches, you can use the Configuration Assistant to configure your Harmonic MediaGrid system. The Configuration Assistant is a Q&A script that prompts you for information specific to your site. The Configuration Assistant files are located on the ContentDirector.

Running the Network Configuration Assistant

You may configure your network switches using this utility if you are using 1GbE switches provided by Harmonic for an all-1GbE network.

Before you begin:

- Make sure you have reviewed the *Harmonic MediaGrid Installation Planning Guide* and completed the configuration worksheet included in that document before running the Network Configuration Assistant.
- Make sure the system is cabled completely.
- Make sure you have a USB drive on hand.

1. Connect a monitor and keyboard to the first ContentDirector.

2. Log on using the following user name and password:

   > User name: `ovnuser`
   > Password: `OVN@SvCaUsa`

3. Enter the following at the command prompt:
   `cd /home/ovnuser/scripts/networking`

4. Start the configuration script using the following command:
   `sudo ./Network_cfg`

5. Complete the assistant using the information from the *Harmonic MediaGrid Installation Planning Guide*.

   Result: When complete, the switch configuration files will be copied to the USB drive and generated under the following directory: `/home/ovnuser/scripts/legacy/configfiles`.

Uploading configuration files to HP switches (Harmonic-provided)

Configure the Harmonic-provided HP switches. These procedures require the use of HyperTerminal, which is supplied with Microsoft Windows, to connect to the switches.

About Cisco switches

The Network Configuration Assistant creates configuration files for the Cisco switches. Provide these configuration files to the Cisco switch administrator when configuring a Cisco switch.

The files created by the Network Configuration Assistant work as generated once they are copied to the Cisco switch.

Note that uploading a configuration file to a Cisco switch is different from uploading files to HP switches. Once you have connected your laptop to the Cisco switch through the serial port, and enabled the configuration operation, you may copy and paste the configuration file into the session to configure the switch. There are other ways to upload configuration files to the Cisco switch; these methods may be used by the Cisco administrator if they so choose.

Configuring Switch A

Configure Switch A first.

1. Insert the USB drive containing the configuration files to the SystemManager.

2. Connect a serial cable from the SystemManager to the serial port on the back of switch A.

3. From the **Programs** menu, click **Accessories** > **Communications** > **HyperTerminal** to start HyperTerminal.

4. Connect to the switch using the following port settings:
   - Bits Per Second = `19200`
   - Data Bits = `8`
   - Parity = `None`
   - Stop Bits = `1`
   - Flow Control = `Xon` / `Xoff`

5. Press the **Enter** key twice for the switch to respond (repeat if the switch does not respond).

   Result: Copyright information displays when the switch responds.

6. Press the **Enter** key to reach the command prompt.

7. Enter the following command:
   ```
   copy xmodem startup-config
   ```
   Result: The following prompt appears:

   ```
   Device may be rebooted, do you want to continue [y/n]?
   ```

8. Type `y`.

   Result: The following prompt appears:

   ```
   Press 'Enter' and start xmodem on your host…
   ```

9. Press the **Enter** key.

10. Select **Send File** from the **Transfer** menu on the HyperTerminal menu bar.

    Result: A **Send File** window appears.

11. Click the `Browse` button to locate the switch configuration files on the USB drive in one of the following directories (depending on which switch you are configuring):

- ◦ `configfiles/switches/HP3400`
- ◦ `configfiles/switches/HP2900`
- ◦ `configfiles/switches/HP5400`

12. Double-click the file `HP[model#]_subA1.cfg`, where [model#] is the switch model number (3400, 2900).

13. If you are configuring an HP5400 switch, select the configuration file for the type of connections, as follows:

- ◦ For all-1GbE port connections (regardless of the number of ports), use the `HP5400_all_1G.cfg` file
- ◦ For the CX4 10GbE connections (both four and eight) on the top row of the switch, use the `HP5400_CX4.cfg` file
- ◦ For the fiber 10GbE connections (both four and eight) on the top row of the switch, use the `HP5400_MMF.cfg` file

14. Verify that `Xmodem` is selected as the transfer protocol.

15. Click the `Send` button to send the file.

   Result: The switch reboots and then closes the HyperTerminal connection.

   > **NOTE:** The HP5400 combines switch A and switch B, so this completes configuration for this switch. Contact Technical Support for configuration instructions if you are installing more than one HP5400 switch.

Configuring switch B

Configure switch B after you have configured switch A.

> **NOTE:** If you are configuring an HP5400 switch, you can skip this section.

1. Remove the serial cable from switch A.

2. Connect the serial cable to switch B.

3. Repeat the steps in "Configuring switch A", using the file `HP<model#>_subB1.cfg` for Step 12.

4. If you are configuring a 1010 network switch (HP6400), repeat the steps in "Configuring switch A" and "Configuring switch B" using the HP6400 configuration files found in the HP6400 subdirectory (that is, `HP6400_subA1.cfg`, `HP6400_subB1.cfg`).

Getting started with the Configuration Assistant

The Configuration Assistant asks a series of questions to determine your network settings. It also allows you to initialize clusters, create a RAID set and default file system, and set up authentication using Windows Active Directory.

Note that if you choose not to initialize the cluster, create a default RAID set and file system, or set up authentication through the Configuration Assistant, each of those procedures can be done at a later time.

Before beginning the Configuration Assistant

- Make sure you have reviewed the *Harmonic MediaGrid Installation Planning Guide* and completed the configuration worksheet included in that document before starting the Configuration Assistant.
- Make sure the switches have been installed and configured.
- Make sure you have the following:

  ◦ Straight-through serial cable.
  ◦ Monitor and keyboard. The rack-mounted monitor and keyboard supplied with the SystemManager platform may be used. However, it must be connected to each ContentDirector and the SystemManager during the configuration.

Setting Up Windows Active Directory Authentication

If you decide to set up authentication for Active Directory at this time, you will need the following:

- The Active Directory "realm" for this system
- The Active Directory "workgroup" for this system
- The "hostname" for the Active Directory server
- The Active Directory Server's FQDN (Fully Qualified Domain Name)
- The IP address for the Active Directory server
- The user name and password for a valid user account with administrative privileges

Avoiding IP Address Conflicts when Running the Configuration Assistant

The Configuration Assistant assumes that the Harmonic MediaGrid subnets (private and public) do not contain any pre-existing devices within the final IP-addressing scheme.

⚠ **CAUTION:** To avoid IP address conflicts, do NOT connect or use SystemManager, or ANY third-party devices within the Harmonic MediaGrid subnets until after the Configuration Assistant has completed.

Powering on a Harmonic MediaGrid system

Make sure all Harmonic MediaGrid devices are connected before continuing.

⚠ **IMPORTANT:** The steps must be followed in the order described below.

1. Apply power to the network switches by plugging the power cords into power sources.

2. Apply power to the SystemManager by connecting the power cord to a power source, and then pressing the power button on the front panel.

   📝 **NOTE:** If you have already configured the SystemManager with an IP address ending in "dot-10," wait until after the Configuration Assistant is complete before powering on this device.

3. Apply power to each ContentDirector by connecting both power cords to separate, isolated power sources, and then press the power button on the front panel.

   Result: The ContentDirector takes approximately five minutes to start. Wait for the power-on indicator to light before continuing.

4. If the ContentBridge with Harmonic MediaGridServer software 4.x or earlier is part of your system, apply power by connecting both power cords to separate, isolated power sources, and then press the power button on the front control panel.
Wait for the power-on indicator to light before continuing.

5. If the ContentBridge 1000B is part of your system, apply power by connecting the power cord to a power source, and then press the power switch on the rear panel.

6. Apply power to each ContentServer and ContentStore as follows:

Option	Description
ContentServer 4000	Connect the power cords to power sources, and then press the power button on the front panel.
ContentStore 4240	Connect the power cords to power sources, and then press the power button on the control panel.
ContentServer 3000	Connect the power cords to power sources. Press the power button on the control panel on the front of the server.
ContentStore 3160	Connect the power cords to power sources, and then press the power button on the front panel.
ContentStore 5840/5840A	Connect the power cords to the power supplies and to power sources. Move all power supply switches to the "on" position.

Running the Configuration Assistant

The Configuration Assistant creates a directory structure in the `/omneon/sharedsys/configfiles` directory with the configuration parameters for every ContentDirector.

The configuration script asks a series of questions requiring information specific to the customer site. Use the information from the *Harmonic MediaGrid Installation Planning Guide* to complete the answers. Note that the assistant displays suggested responses in brackets. During the assistant, you can use the up or down arrow keys to tab to previous responses.

⚠ **IMPORTANT:** Make sure that the completed *Harmonic MediaGrid Installation Planning Guide* is available before continuing.

⚠ **CAUTION:** Do not attempt to run the Configuration Assistant remotely (for example, via SSH). You must run the Configuration Assistant directly from the ContentDirector in order for it to successfully configure the system.

1. Connect a monitor and keyboard to the first ContentDirector in the system.

2. Log on using the following user name and password:

   User name: `ovnuser`
   Password: `OVN@SvCaUsa`

3. Run the discover command to verify that the Configuration Assistant will be able to detect all of the devices in your system:
   `sudo discover -c`

   Depending on the number of devices in your system, this process may take up to 10 minutes. Once all devices have been detected and are listed on screen, continue to the next step.

Example:

Figure 5-1:

4. Enter the following to ensure all devices adopt the same date and time:

```
sudo initconfig --datesync
```

5. Enter the following at the command prompt:

```
cd /home/ovnuser/scripts
```

6. Start the configuration script using the following command:

```
sudo ./autoconfig
```

7. As you complete the Configuration Assistant, note the following:

   ◦ The Configuration Assistant asks for the *maximum* number of devices you wish to allow in your system. If you select a number that is too low for future expansion, you may be forced to incur system down-time in order to reconfigure the system at a later time.
   ◦ If you wish to have High Bandwidth ContentBridge nodes configured in High Availability (HA) pairs, make sure to specify number of nodes for a cluster as +1 for every HA pair. For example, if you have *two* nodes that you wish to be an HA pair, specify the maximum number of nodes as *three*.
   ◦ When entering the timezone, you can use the Tab key to select a region, and then double-click the Tab key to select from a list of options.
   ◦ A ContentBridge 1000B or High Bandwidth ContentBridge in the same subnet as the Harmonic MediaGrid cluster (Public VLAN) can be configured in Active Directory authentication mode with the Configuration Assistant.

8. If you wish to join a ContentBridge to a Windows Active Directory domain at this time, please note the following:

   NOTE: If you wish to join a ContentBridge 1000B to an Active Directory domain, you must do so when configuring the Harmonic MediaGrid system with the Configuration Assistant.

- ◦ The High Bandwidth ContentBridge can be joined to an Active Directory domain either while configuring the Harmonic MediaGrid system or at a later time.
- ◦ When completing the Configuration Assistant, you must join ContentDirector nodes to the Active Directory domain in order to join the ContentBridge 1000B or High Bandwidth ContentBridge.
- ◦ User names and passwords are not stored in clear text on the ContentBridge 1000B or High Bandwidth ContentBridge
- ◦ When a ContentBridge 1000B or High Bandwidth ContentBridge is configured for Active Directory, "CB" mount points that provide access for individual users are NOT supported.

9. If you wish to create RAID sets and the file system at this time, note the following:

- ◦ If, for some reason, the RAID set creation utility or file system creation utility times out while attempting to create a RAID set or file system, contact Technical Support for assistance.
- ◦ Note that the Configuration Assistant refers to a 2+1 RAID configuration as "Performance Optimized," and the 6+2 or 5+2 RAID configurations as "Capacity Optimized."

Verifying startup processes

Verify startup processes after you have completed the Configuration Assistant.

1. If not already, log on to the ContentDirector using the following credentials:

  User name: `ovnuser`
  Password: `OVN@SvCaUsa`

2. Type the following at the command prompt:
`sudo service omcld status`

3. Enter the following password once again:
`OVN@SvCaUsa`

  Result: The processes have started if you see the following. "pid" is a process ID number, which will vary. A few seconds after cluster initialization, the other processes (oujf, ouse, ssmd, mdscore) will start.

```
mdsstartup (pid 22950) is running...
oujfh is stopped
ousd is stopped
ssmd is stopped
mdscore is stopped
trapmond (pid 22947) is running...
```

4. If the message displayed in the prior step is `mdsstartup is stopped`, type the command below to start the ContentDirector service:
`sudo service omcld start`

Result:

If you did not initialize clusters as part of the Configuration Assistant, you must do so next. If you already initialized clusters as part of the configuration assistant, continue to setting the Harmonic MediaGrid system time.

Initializing clusters

Each ContentDirector in your system must be initialized to a cluster. Every ContentDirector in the cluster must have the same Cluster ID.

> 📝 **NOTE:** If you already initialized clusters as part of the Configuration Assistant, you may continue to setting the Harmonic MediaGrid system time.

> ⚠️ **IMPORTANT:** The following steps must also be performed after replacing a ContentDirector.

1. Make sure you are logged on to the ContentDirector with the following credentials:
   ◦ User name: `ovnuser`
   ◦ Password: `OVN@SvCaUsa`

2. Type the following at the command prompt:
   `cd /home/ovnuser/scripts`

3. Start the initialization script with the following command:
   `sudo ./initialize`

4. Follow the prompts to initialize the cluster(s).

   Result: Output similar to the following should appear:

   ```
   Connecting to host "localhost", protocol "tcp", prog 0x20000004

   Initializing the cluster
   The cluster was initialized successfully
   ```
   The cluster ID should now be set on the ContentDirector, and the programs should begin to execute in sequence.

Verifying cluster connectivity

After initializing clusters, verify important cluster information, such as device serial numbers and IP addresses.

1. Make sure that all ContentServer nodes have been acquired by typing the following:
   `sudo /opt/omcld/bin/ssmdiag -s`

   Result: Output similar to the following should appear:

   ```
   SSID=0 SN=S00007E6A1.0 MGRAID3000 10.4.252.12 10.4.252.15 GB=253/9264
    SC=47229
   SSID=1 SN=J00007E6A2.0 MGRAID3000 10.4.252.13 10.4.252.16 GB=253/9264
    SC=47241
   SSID=2 SN=S0000FE6B1.0 MGRAID3000 10.4.252.32 10.4.252.35 GB=253/9264
    SC=45606
   SSID=3 SN=J0000FE6B2.0 MGRAID3000 10.4.252.33 10.4.252.36 GB=253/9264
    SC=47188
   ```

2. Verify the output, by doing the following:
   a. Verify that the correct number of ContentServer nodes have been discovered.
   b. Verify that each ContentServer has a serial number in the **SN=0XXXX** column.
   c. Verify that each ContentServer has a non-zero pair of IP addresses.

If a single IP address is all zeros (0.0.0.0), check the Ethernet connections on that ContentServer.

Verify that there are no "x"s in the left-most column of the listing. An x indicates that a ContentServer is not responding and is an error condition. If any ContentServer is marked with an "x", check the physical connections to the ContentServer and that it is powered on. Reissue the "ssmdiag" command. Contact Technical Support for troubleshooting help if the "x" persists.

d. Verify that each ContentServer has 0GB allocated in the **GB=0/XXXX** column.

e. Verify that each ContentServer has 0 slices allocated in the **SC=0** column.

If a ContentServer does not appear to be empty, contact Technical Support for instructions on clearing the data on it.

Setting the system time

All system components require a common time reference, which is important for file stamps and log messages.

> **NOTE:** You should set the system time only after you have completed the Configuration Assistant.

Perform the following steps on each ContentDirector to set the system time and to synchronize the components. This command forces the system time to be set against an external NTP server.

1. Log on to the ContentDirector using the following credentials:

> User name: `ovnuser`
> Password: `OVN@SvCaUsa`

2. Enter the following at the command prompt:
   `ntpdate -u IP_ADDRESS`

   where *IP_ADDRESS* is the IP address of a valid NTP server (if none is available, then use the IP address of the SystemManager).

Creating a volume and a group file system

Use the SystemManager application to create a volume and then organize the ContentServer nodes into groups.

> **NOTE:** If you already created a volume and a group file system as part of the Configuration Assistant, you can proceed with joining the Harmonic MediaGrid cluster to a Windows Domain.

See "Creating or Deleting Volumes" and "Creating or Deleting Groups" in the *Harmonic SystemManager User Guide* for instructions.

Creating a RAID set

Use the SystemManager application to create the RAID set.

> **NOTE:** If you already created a RAID set as part of the Configuration Assistant, you can proceed with joining the Harmonic MediaGrid cluster to a Windows Domain.

See "MediaGrid RAID Configuration and Maintenance" in the *Harmonic SystemManager User Guide* for instructions.

Joining a cluster to a Windows Domain

Harmonic MediaGrid supports both Active Directory (AD) and Lightweight Directory Access Protocol (LDAP) for authentication and directory services.

📝 **NOTE:** If you already set up Active Directory authentication as part of the Configuration Assistant, you can proceed with verifying ContentServer and ContentDirector services.

Related information

Choosing an authentication method

Choose between two Windows authentication interfaces.

Authentication Type	Primarily for	Requirements
Active Directory (Samba)	Active Directory Windows Servers in simple configurations	Active Directory on Windows Server 2008 and 2003
Windows Domain or Active Directory Windows 2000 Server (Samba)	Connecting Harmonic MediaGrid to older Windows servers	Windows Domain Controller or Active Directory on Windows Server 2000 only

Configuring for Active Directory

Set up the standard method of Active Directory authentication to authenticate and authorize users and computers in a Windows domain type network

The Active Directory Domain name must be a Fully Qualified Domain Name (FQDN), which is a domain name containing three or four parts (for example, ahost.example.com).

📝 **NOTE:** The following steps must also be performed after replacing a ContentDirector.

⚠ **IMPORTANT:** The entries in this section are case-sensitive. The specific entries are in bold/italic text in the following sections and must be entered as shown, in either UPPERCASE or lowercase letters (using the actual names) to successfully join a Windows domain.

📝 **NOTE:** The following sections provide instructions for supporting one or more domain controllers. Entries for adding a secondary domain controller are identified as "optional." Only complete the optional steps if you are adding a secondary domain controller. The optional entries can be added at any time (before or after the ContentDirector has joined the domain).

Required information

You will need the following information before beginning:

- The ACTIVE_DIRECTORY_DOMAIN_NAME from the facility's network domain administrator.
- The WINDOWS_NT_DOMAIN_NAME. This may often be the first word of the ACTIVE_DIRECTORY_DOMAIN_NAME.

- The IP address and the name of the Windows Active Directory controller machine. Replace the name in the steps below where you see "windows_domain_controller_name".
- The Administrator account password on the Active Directory controller.

Note that a Windows Active Directory controller is also called a Windows Domain Controller.

Verifying authentication configuration parameters

Before you join a cluster to Active Directory, verify that all of your system authentication points (nsswitch.conf, PAM, Samba, mdscore) refer to the same configuration.

/etc/pam.d/mdscore

```
auth required pam_ldap.so
account required pam_ldap.so
session required pam_ldap.so
password required pam_ldap.so
```

/etc/nsswitch.conf

```
passwd: compat ldap
group: compat ldap
shadow: compat ldap
```

/omneon/config/ mdscore[-local]

auth_method = ads

Creating a Kerberos configuration file

Remove the default configuration file and create a new file with the required entries.

1. From your SSH terminal, remove `/etc/krb5.conf` by entering the following command:
   ```
   sudo rm -f /etc/krb5.conf
   ```

2. Create a new file using the same file name (`krb5.conf`) and then add the following entries:

```
[libdefaults]
default_realm = ACTIVE_DIRECTORY_DOMAIN_NAME
[realms]
ACTIVE_DIRECTORY_DOMAIN_NAME = {
kdc = windows_domain_controller_name.active_directory_domain_name
kdc = secondary_domain_controller_name.active_directory_domain_name (optional)
}
domain_realm
.kerberos.server = ACTIVE_DIRECTORY_DOMAIN_NAME
```

> **NOTE:** The *ACTIVE_DIRECTORY_DOMAIN_NAME* must be typed in UPPERCASE letters.

Adding the Domain controller address

Add the Domain controller IP address to `/etc/hosts` following the format provided.

Before you begin
Creating a Kerberos configuration file

1. From your SSH terminal, edit `/etc/hosts` using the following command:
   ```
   sudo vi /etc/hosts
   ```

2. Add a line at the end to specify the IP address of the Windows Active Directory controller and, optionally, another line to specify the IP address of the secondary domain controller.

    Use the following format:

    IP address windows_domain_controller_name.active_directory_domain_name windows_domain_controller_name

    Example: In the following example, the windows domain controller name is pdc1, and the active directory domain name is facility2.company.tv. The secondary domain controller name is pdc2.

    ```
    10.30.1.25 pdc1.facility2.company.tv pdc1
    10.30.1.26 pdc2.facility2.company.tv pdc2
    ```

Adding a workgroup and realm entry

Workgroup and realm entries are needed to specify the Windows NT Domain name and the active Directory Domain name in `smb.conf`.

Before you begin
Creating a Kerberos configuration file
Adding the Domain controller address

For example, if the Windows NT domain name is Harmonic.local, then the realm is Harmonic.

1. From your SSH terminal, edit `/etc/samba/smb.conf` using the following command:
    `sudo vi /etc/samba/smb.conf`

2. Change the default configuration values as follows:

    ```
    # Global parameters
    [global]
    workgroup = WINDOWS_NT_DOMAIN_NAME
    realm = ACTIVE_DIRECTORY_DOMAIN_NAME
    security = ADS
    password server =
    windows_domain_controller_name.active_directory_domain_name
    secondary_domain_controller_name.active.directory_domain_name (optional)
    encrypt passwords = yes
    preferred master = no
    server string = Omneon Content Director
    ```

3. To run the `testparm` test program (which verifies the correctness of the `smb.conf` file), type the following:
    `sudo testparm`

    Result: Notifications are returned if any errors are found.

Related information
Creating a Kerberos configuration file *on page 111*

Joining the cluster to a Windows domain

Complete these steps to join the cluster to a Windows domain.

Before you begin
Creating a Kerberos configuration file
Adding the Domain controller address
Adding a workgroup and realm entry

1. Type the following command to join the domain:

   ```
   sudo net ads join -U Administrator -S windows_domain_controller_name
   ```

2. Enter the password for the Administrator user on the Windows Active Directory server.

   Result: The following message displays if the password is accepted and the configuration files are correct:

   ```
   Joined 'CLD' to realm active_directory_domain_name
   ```

Related information

Starting the winbind service

The winbind service enables communication between the ContentDirector and Active Directory.

Before you begin
Creating a Kerberos configuration file
Adding the Domain controller address
Adding a workgroup and realm entry
Joining the cluster to a Windows domain

1. Type the following to start the service:

   ```
   sudo service winbind start
   ```

2. Type the following so that the service starts each time the ContentDirector starts up:

   ```
   sudo chkconfig winbind on
   ```

   > **NOTE:** SystemManager provides winbind status (running or not) on the **ContentDirector Properties** page. See the *Harmonic SystemManager User Guide* for details.

Related information

Verifying communication with the domain controller

After starting the winbind service, verify the connection and communication with the domain controller.

Before you begin

Creating a Kerberos configuration file
Adding the Domain controller address
Adding a workgroup and realm entry
Joining the cluster to a Windows domain
Starting the winbind service

1. Type the following to verify communication:

   ```
   sudo wbinfo -u | less
   ```

   Result: After a few seconds, a list of users in the domain displays, such as the following:

   ```
   [ovnuser@cld-1 ~]$ sudo wbinfo -u | less
   SNV-ENG\eng-sysadmin
   SNV-ENG\guest
   SNV-ENG\support_388945a0
   SNV-ENG\snv-eng-dc1$
   SNV-ENG\krbtgt
   SNV-ENG\admin
   SNV-ENG\snv-eng-dc2$
   SNV-ENG\qa1
   SNV-ENG\qa2
   SNV-ENG\qa3
   SNV-ENG\qa4
   ```

2. Once this is verified, restart the omcld service so it can pick up the new domain configuration by typing the following:

   ```
   sudo service omcld restart
   ```

Related information

Configuring for Windows authentication

Configure a unit for Windows Domain or Active Directory Windows Server 2000 authentication. Be sure that you have obtained the required information for joining a cluster to a Windows Domain controller before beginning this procedure.

You will also need the following:

- Administrator privileges. Contact the system administrator for site-specific information, including user names, domain names and passwords.
- The *Windows_NT_domain_name* from the facility's network domain administrator.
- The name of the Windows domain controller. Use it in place of *domain_controller_name*.

The site-specific entries in the following procedures are shown in bold-italic text. The following steps must be performed on each ContentDirector.

Related information
Configuring for Active Directory *on page 110*

Connecting to the ContentDirector

Use an SSH client, such as PuTTY, to connect to each ContentDirector.

1. Start the SSH client.

2. In the **Host Name** box, enter the host name of the ContentDirector.

3. Select a login protocol from the protocol buttons. Select SSH for the login session.

4. Click the `Open` button to connect to the ContentDirector.

Editing the Samba configuration file

Editing the Samba configuration file is required if you are joining a Windows NT domain.

Before you begin
Connecting to the ContentDirector

1. From your SSH terminal, open the following file using `vi` text editor:
   ```
   sudo vi /etc/samba/smb.conf
   ```

2. Make the following changes:

   ◦ workgroup = *Windows_NT_domain_name*
   ◦ password server = *domain_controller_name*
   ◦ security = *DOMAIN*

3. Enter the following to join the Windows domain:
   ```
   sudo net rpc join --workgroup=Windows_NT_domain_name --
   server=domain_controller_name --user=_adminuser_
   ```

   Result: The following message should appear:

   ```
   Joined domain domain_name
   ```

4. Type the following two lines to complete the installation:

   ```
   sudo chkconfig winbind on
   sudo service winbind start
   ```

Starting the winbind service

The winbind service enables communication between the ContentDirector and Active Directory.

Before you begin
Connecting to the ContentDirector
Editing the Samba configuration file

1. Type the following to start the service:
   ```
   sudo service winbind start
   ```

2. Type the following so that the service starts each time the ContentDirector starts up:

   ```
   sudo chkconfig winbind on
   ```

   > 📝 **NOTE:** SystemManager provides winbind status (running or not) on the **ContentDirector Properties** page. See the *Harmonic SystemManager User Guide* for details.

Related information

Connecting to the ContentDirector *on page 115*

Verifying communication with the domain controller

After starting the winbind service, verify the connection and communication with the domain controller.

Before you begin

Connecting to the ContentDirector
Editing the Samba configuration file
Starting the winbind service

1. Type the following to verify communication:

   ```
   sudo wbinfo -u | less
   ```

   Result: After a few seconds, a list of users in the domain displays, such as the following:

   ```
   [ovnuser@cld-1 ~]$ sudo wbinfo -u | less
   SNV-ENG\eng-sysadmin
   SNV-ENG\guest
   SNV-ENG\support_388945a0
   SNV-ENG\snv-eng-dc1$
   SNV-ENG\krbtgt
   SNV-ENG\admin
   SNV-ENG\snv-eng-dc2$
   SNV-ENG\qa1
   SNV-ENG\qa2
   SNV-ENG\qa3
   SNV-ENG\qa4
   ```

2. Once this is verified, restart the omcld service so it can pick up the new domain configuration by typing the following:

   ```
   sudo service omcld restart
   ```

Related information

Creating a Kerberos configuration file *on page 111*
Adding the Domain controller address *on page 111*
Adding a workgroup and realm entry *on page 112*
Joining the cluster to a Windows domain *on page 113*
Connecting to the ContentDirector *on page 115*
Editing the Samba configuration file *on page 115*

Joining a High Bandwidth ContentBridge to an Active Directory Domain

There are different methods for joining a High Bandwidth ContentBridge to an Active Directory Domain. One method involves the Configuration Assistant and the other involves manually modifying configuration files.

Joining a High Bandwidth ContentBridge to an Active Directory Domain

A High Bandwidth ContentBridge can be added to an Active Directory domain for Windows 2003 or Windows 2008 using the Configuration Assistant.

To add a single High Bandwidth ContentBridge to an Active Directory domain, run the Configuration Assistant in manual mode. This allows you to configure the ContentBridge without affecting other devices, and enter the necessary Active Directory domain information.

The configuration script asks a series of questions requiring information specific to the customer site. Use the information from the *Harmonic MediaGrid Installation Planning Guide* to complete the answers. Note that the assistant will display suggested responses in brackets. During the assistant, you can use the up or down arrow keys to tab to previous responses.

Before you begin

- Make sure you have reviewed the *Harmonic MediaGrid Installation Planning Guide* and have a completed copy of the configuration worksheet included in that document on hand.
- Make sure you have a USB drive on hand.
- Make sure you have the following Active Directory information:

  ◦ The Active Directory "realm" for this Harmonic MediaGrid system
  ◦ The Active Directory "workgroup" for this Harmonic MediaGrid
  ◦ The "hostname" for the Active Directory server
  ◦ The Active Directory Server's FQDN (Fully Qualified Domain Name)
  ◦ The IP address for the Active Directory server
  ◦ The user name and password for a valid user account with administrative privileges

> ⚠ **CAUTION:** Entering incorrect information in the Configuration Assistant could result in a loss of connection to the High Bandwidth ContentBridge. For assistance, contact Technical Support.

1. Connect a monitor and keyboard to the High Bandwidth ContentBridge you wish to add to the Active Directory domain.

2. Log on to the ContentBridge using the following user name and password:

   User name: `ovnuser`
   Password: `OVN@SvCaUsa`

3. Type the following command to set the FIRSTBOOT mode on the ContentBridge:
   ```
   sudo initconfig --setflag
   ```

   In some cases, running this command can result in the following message, which can be ignored:

   ```
   [root@hbcb1-1 ~]# initconfig --setflag
   Setting Firstboot flags (local)
   sh: /tftpboot/config/FIRSTBOOT: No such file or directory
   ```

4. If you wish to verify that FIRSTBOOT mode was set, you can check that the following files are now available on the ContentBridge:

```
/tmp/FIRSTBOOT
/omneon/sharedsys/FIRSTBOOT
```

5. Type the following commands to run the Configuration Assistant:

```
cd /home/ovnuser/scripts
sudo ./autoconfig -m
```

6. When prompted, insert a USB drive.

    Result: The Configuration Assistant copies the configuration information to the USB drive.

7. Type the following command to copy the configuration information to this High Bandwidth ContentBridge:

```
sudo ./copyconfigs -m
```

8. When prompted to enter the ID of the High Bandwidth ContentBridge in the specified range, select **0** as the ID.

9. Once copying is complete, remove the USB drive from the High Bandwidth ContentBridge.

10. Type the following command to remove the High Bandwidth ContentBridge from the FIRSTBOOT mode:

```
sudo initconfig --rmflag
```

11. Type the following commands to join this High Bandwidth ContentBridge to the Active Directory domain and restart services:

```
sudo service gateway stop
sudo net ads join -U admin_username%admin_password -S ActiveDirectory
server FQDN
sudo service gateway start
```

12. If you wish to add additional High Bandwidth ContentBridge nodes to the Active Directory domain at this point, perform the following steps on each additional High Bandwidth ContentBridge:

    NOTE: The total number of High Bandwidth ContentBridge nodes selected for configuration must match the total number of nodes selected when running the Configuration Assistant in *step 5* above.

    a. Insert the USB drive that contains the configuration information.
    b. Log on to the High Bandwidth ContentBridge using the same credentials as above.
    c. Type: `sudo initconfig --setflag`.
    d. Type: `sudo ./copyconfigs -m`.
    e. Select the ID(s), starting from **1**, in increasing order for each additional High Bandwidth ContentBridge.
    f. Type: `sudo initconfig --rmflag`.
    g. Perform the commands in *step 11* above to join the High Bandwidth ContentBridge to the Active Directory domain and restart services.

13. As a final step, for each High Bandwidth ContentBridge, you must remove any "CB" entries that provide access to individual users from the `/etc/gateway.conf` and `etc/passwd` files.

    NOTE: When the High Bandwidth ContentBridge is configured for Active Directory, "CB" mount points that provide access for individual users are NOT supported.

    a. Open `/etc/gateway.conf` and delete entries for individual users beginning with "CB."

b. Open `etc/passwd` and delete entries for the same individual users (the entries do not contain "CB" in this file).

c. Restart gateway services by running the following command:

```
sudo service gateway restart
```

> 📝 **NOTE:** In order to access the Harmonic MediaGrid, the individual users must be added to the Active Directory domain.

About changes to the default mount point

When you configure the ContentBridge for Active Directory, the Configuration Assistant adds a NATIVE line to the configuration file. the following line:

```
NATIVE <Cluster IP or DNS name> <file system name>
```

For example:

```
NATIVE 10.4.102.200 testfs
```

This mount point can be modified directly in the configuration file. However, note that the cluster used in the NATIVE line must be configured to authenticate against the same Active Directory domain as the ContentBridge.

For instructions on editing the configuration file, refer to "Editing the High Bandwidth ContentBridge Configuration File" in the *Harmonic SystemManager User Guide*.

Verifying communication with the domain controller

Perform these steps to verify communication between the ContentBridge or the High Bandwidth ContentBridge and the domain controller.

1. Use `wbinfo` to do a domain user lookup using the following commands.

   Example: For a High Bandwidth ContentBridge with hostname "hbcb205" for test user "lqa1":

   ```
   [root@hbcb205 ~]# service winbind start

   [root@hbcb205 ~]# wbinfo -n lqa1
   [root@hbcb205 ~]# service winbind stop
   ```
   Result: Output similar to the following should appear:

   ```
   S-1-5-21-3782130030-2455357663-1162092550-2004 User (1)
   ```

   > 📝 **NOTE:** Make sure that winbind service is stopped after testing connectivity with the domain server. If you do not stop the winbind service on the ContentBridge, it will interfere with authentication when you attempt to access the Harmonic MediaGrid using CIFS.

2. If the ContentBridge configuration file contains a valid NATIVE line and the Harmonic MediaGrid is mounted on the ContentBridge, use smbclient on the ContentBridge to connect to the local CIFS share.
   The syntax for the `smbclient` command is:

   `smbclient-U`*username* `-W`*domain_name*`\\\\\localhost\\`*FS_name*

   Example: A `smbclient` command for a High Bandwidth ContentBridge with hostname "hbcb205":

   ```
   [root@hbcb205 ~]# smbclient -U lqa2 -W SNV-ENG \\\\localhost\\testfs
   ```

Result: The expected result is:

```
Domain=[SNV-ENG] OS=[Unix] Server=[Samba 3.4.7-58.fc7.om2]
smb: \>
```

Result: At the prompt, you will be able to list the file system, and perform other operations.

📝   **NOTE:** Make sure the Harmonic MediaGrid cluster is also joined to the domain.

📝   **NOTE:** In order to access the Harmonic MediaGrid, the individual users must be added to the domain.

Configuring a High Bandwidth ContentBridge for Active Directory (manual method)

Follow the procedures in this section in order.

Configuring Samba settings on the High Bandwidth ContentBridge

This procedure requires you to edit `smb.conf` on the High Bandwidth ContentBridge.

1. Connect a monitor and keyboard to the High Bandwidth ContentBridge you wish to add to the Active Directory domain.

2. Log on to the High Bandwidth ContentBridge using the following user name and password:

   User name: `ovnuser`
   Password: `OVN@SvCaUsa`

3. Type the following command to stop the smb service:
   `sudo service smb stop`

4. Update `/opt/omclb/conf/smb.conf` as follows:

   ```
   security = ADS
   workgroup = AD Workgroup
   realm = AD Realm
   password server = ADS Domain Controller FQDN
   add user script = /opt/omutils/bin/omadduser %u
   winbind use default domain = no
   ```

   ◦ Replace *AD Workgroup* with the name of the ActiveDirectory Workgroup.
   ◦ Replace *AD Realm* with the name of the ActiveDirectory Realm.
   ◦ Replace *ADS Domain Controller FQDN* with the Fully Qualified Domain Name of the ActiveDirectory server.

5. Copy `/opt/omclb/conf/smb.conf` to `/etc/samba/smb.conf`.

6. Update `/etc/krb5.conf` as follows:

   ```
   [libdefaults]
   default_realm = <AD Realm in UPPERCASE>
   :
   [realms]
   <AD Realm in UPPERCASE> = {
   kdc = ADS Domain Controller FQDN
   }
   :
   .kerberos_server = AD Realm in UPPERCASE
   ```

- ◦ Replace instances of *AD Realm in UPPERCASE* with the name of the ActiveDirectory Realm in all uppercase letters.
- ◦ Replace instances of *ADS Domain Controller FQDN* with the Fully Qualified Domain Name of the ActiveDirectory server.

Joining the High Bandwidth ContentBridge to the Active Directory Domain

Use the `net` command to join the High Bandwidth ContentBridge to the Active Directory domain.

Before you begin
Configuring Samba settings on the High Bandwidth ContentBridge

1. Make sure you are logged on to the High Bandwidth ContentBridge, and then enter the following command:

   ```
   sudo net ads join -UAD_Admin%password -S ADS_Domain_Controller_FQDN
   ```

   Result: Upon joining the AD domain, the Samba server creates a local temporary database on the High Bandwidth ContentBridge at: `/var/lib/samba/private/secrets.tdb`.

2. As a final step, you must remove any "CB" entries that provide access to individual users from the `/etc/gateway.conf` and `/etc/passwd` files, as follows:
   a. Open `/etc/gateway.conf` and delete entries for individual users beginning with "CB."
   b. Open `/etc/passwd` and delete entries for the same individual users (the entries do not contain "CB" in this file).

   > 📝 **NOTE:** In order to access the Harmonic MediaGrid, the individual users must be added to the Active Directory domain.

3. Restart the gateway service.

   ```
   sudo service gateway restart
   ```

About changes to the default mount point

When you configure the ContentBridge for Active Directory, the Configuration Assistant adds a NATIVE line to the configuration file. the following line:

```
NATIVE <Cluster IP or DNS name> <file system name>
```

For example:

```
NATIVE 10.4.102.200 testfs
```

This mount point can be modified directly in the configuration file. However, note that the cluster used in the NATIVE line must be configured to authenticate against the same Active Directory domain as the ContentBridge.

For instructions on editing the configuration file, refer to "Editing the High Bandwidth ContentBridge Configuration File" in the *Harmonic SystemManager User Guide*.

Verifying communication with the domain controller

Perform these steps to verify communication between the ContentBridge or the High Bandwidth ContentBridge and the domain controller.

Before you begin

Configuring Samba settings on the High Bandwidth ContentBridge
Joining the High Bandwidth ContentBridge to the Active Directory Domain

1. Use `wbinfo` to do a domain user lookup using the following commands.

   Example: For a High Bandwidth ContentBridge with hostname "hbcb205" for test user "lqa1":

   ```
   [root@hbcb205 ~]# service winbind start

   [root@hbcb205 ~]# wbinfo -n lqa1
   [root@hbcb205 ~]# service winbind stop
   ```
   Result: Output similar to the following should appear:

   ```
   S-1-5-21-3782130030-2455357663-1162092550-2004 User (1)
   ```

   > 📝 **NOTE:** Make sure that winbind service is stopped after testing connectivity with the domain server. If you do not stop the winbind service on the ContentBridge, it will interfere with authentication when you attempt to access the Harmonic MediaGrid using CIFS.

2. If the ContentBridge configuration file contains a valid NATIVE line and the Harmonic MediaGrid is mounted on the ContentBridge, use smbclient on the ContentBridge to connect to the local CIFS share.

   The syntax for the `smbclient` command is:

   smbclient-U*username* -W*domain_name*\\\\\localhost*FS_name*

   Example: A `smbclient` command for a High Bandwidth ContentBridge with hostname "hbcb205":

   ```
   [root@hbcb205 ~]# smbclient -U lqa2 -W SNV-ENG \\\\localhost\\testfs
   ```

   Result: The expected result is:

   ```
   Domain=[SNV-ENG] OS=[Unix] Server=[Samba 3.4.7-58.fc7.om2]
   smb: \>
   ```

Result: At the prompt, you will be able to list the file system, and perform other operations.

> 📝 **NOTE:** Make sure the Harmonic MediaGrid cluster is also joined to the domain.

> 📝 **NOTE:** In order to access the Harmonic MediaGrid, the individual users must be added to the domain.

Related information

Configuring Samba settings on the High Bandwidth ContentBridge *on page 120*

Joining a ContentBridge 1000B to an Active Directory Domain (manual method)

Follow the procedures in this section in order.

📝 **NOTE:** Configuring different ContentBridge nodes in a Harmonic MediaGrid cluster with different directory access authentication protocols (for example, ADS, LDAP, and OpenDirectory) is not supported. The following set of steps will reset the authentication mechanism for all ContentBridge nodes in the cluster.

Configuring Samba settings

Configure Samba settings by modifying the required files on the ContentDirector.

1. Log on to the first ContentDirector in your system using the following user name and password:

   User name: `ovnuser`
   Password: `OVN@SvCaUsa`

2. Remove samba private files stored on the ContentDirector with the following command:
   `sudo rm -f /tftpboot/config/gateway/secrets/*`

3. Generate the file `/tftpboot/config/gateway/smb.conf`, as shown below.

```
           This is the main Samba configuration file. You should read
           the
           # smb.conf(5) manual page in order to understand the
           options listed
           # here. Samba has a huge number of configurable options
           (perhaps too
           # many!) most of which are not shown in this example
           #
           # Any line which starts with a ; (semi-colon) or a # (hash)
           # is a comment and is ignored. In this example we will use
           a #
           # for commentry and a ; for parts of the config file that
           you
           # may wish to enable
           #
           # NOTE: Whenever you modify this file you should run the
           command "testparm"
           # to check that you have not made any basic syntactic
           errors.
           #
           #======================= Global Settings==================
           [global]
                   log file = /var/log/samba/%m.log
                   max log size = 50
                   socket options = TCP_NODELAY SO_SNDBUF=32768
SO_RCVBUF=32768
                   server string = Omneon Content Bridge Samba Server
                   security = user
                   encrypt passwords = yes
                   preferred master = no
                   local master = no
                   domain master = no
                   printcap name = /etc/printcap
                   load printers = no
                   printing =
```

Figure 5-2:

4. Modify the file as follows:

```
security = ADS
workgroup = AD Workgroup
realm = AD Realm
password server = ADS Domain Controller FQDN
add user script = /opt/omutils/bin/omadduser %u
winbind use default domain = no
```

   ◦ Replace *AD Workgroup* with the name of the Active Directory Workgroup.
   ◦ Replace *AD Realm* with the name of the Active Directory Realm.
   ◦ Replace *ADS Domain Controller FQDN* with the Fully Qualified Domain Name of the ActiveDirectory server.

5. Generate the file `/tftpboot/config/gateway/krb5.conf`, as shown below:

```
[logging]
 default = FILE:/var/log/krb5libs.log
 kdc = FILE:/var/log/krb5kdc.log
 admin_server = FILE:/var/log/kadmind.log

[libdefaults]
 default_realm = EXAMPLE.COM
 dns_lookup_realm = false
 dns_lookup_kdc = false
 ticket_lifetime = 24h
 forwardable = yes

[realms]
 EXAMPLE.COM = {
  kdc = kerberos.example.com:88
  admin_server = kerberos.example.com:749
  default_domain = example.com
 }

[domain_realm]
 .example.com = EXAMPLE.COM
 example.com = EXAMPLE.COM

[kdc]
 profile = /var/kerberos/krb5kdc/kdc.conf

[appdefaults]
 pam = {
   debug = false
   ticket_lifetime = 36000
   renew_lifetime = 36000
   forwardable = true
   krb4_convert = false
 }
```

Figure 5-3:

6. Modify the file as follows:

```
[libdefaults]
default_realm = AD Realm in UPPERCASE
:
[realms]
AD Realm in UPPERCASE = {
kdc = ADS Domain Controller FQDN
}
:
.kerberos_server = AD Realm in UPPERCASE
```

- ◦ Replace instances of *AD Realm in UPPERCASE* with the name of the Active Directory Realm in all uppercase letters.
- ◦ Replace instances of *ADS Domain Controller FQDN* with the Fully Qualified Domain Name of the Active Directory server.

7. Repeat *step 1* through *step 6* for all remaining ContentDirector nodes in the Harmonic MediaGrid cluster.

Joining the ContentBridge 1000B to the Active Directory Domain

Perform the following procedure on each ContentBridge in the cluster.

Before you begin
Configuring Samba settings

1. Log on to the ContentBridge 1000B using the following user name and password:

   User name: `root`
   Password: `omneon`

2. Stop smb service as follows:
   ```
   service smb stop
   ```

3. Remove samba private files on the ContentBridge:
   ```
   rm -f /var/lib/samba/private/*
   ```

4. Copy the Samba configuration files that you previously modified, `/tftpboot/config/gateway/smb.conf` and `/tftpboot/config/gateway/krb5.conf` to the ContentDirector.

   You might be required to enter `sudo` when copying files over.

5. Run the following command:
   ```
   net ads join -UAD_Admin%password -S ADS_Domain_Controller_FQDN
   ```

   > **NOTE:** Upon joining the AD domain, the Samba server creates a local temporary database on the ContentBridge 1000B at: `/var/lib/samba/private/secrets.tdb`.

6. Remove any "CB" entries that provide access to individual users:
   a. Open `/etc/passwd` file locally on the ContentBridge and delete "CB" entries.
   b. Delete `CLBHOSTNAME` file under `/tftpboot/config/gateway` on every ContentDirector.
   c. Open `/etc/passwd` and delete entries for the same individual users (the entries do not contain "CB" in this file).

      > **NOTE:** In order to access the Harmonic MediaGrid, the individual users must be added to the Active Directory domain.

7. Add the following line to the ContentBridge configuration file:
   ```
   NATIVE Cluster IP or DNS name file system name
   ```

   This can be done via SystemManager or by editing `/tftpboot/config/gateway/hostname` manually on every ContentDirector (replace *hostname* with the hostname of the ContentBridge).

8. Restart the gateway service:
   ```
   service gateway restart
   ```

9. Repeat *step 1* through *step 8* for all remaining ContentBridge nodes in the Harmonic MediaGrid cluster.

Verifying communication with the domain controller

Perform these steps to verify communication between the ContentBridge or the High Bandwidth ContentBridge and the domain controller.

Before you begin
Configuring Samba settings
Joining the ContentBridge 1000B to the Active Directory Domain

1. Use `wbinfo` to do a domain user lookup using the following commands.

   Example: For a High Bandwidth ContentBridge with hostname "hbcb205" for test user "lqa1":

   ```
   [root@hbcb205 ~]# service winbind start

   [root@hbcb205 ~]# wbinfo -n lqa1
   [root@hbcb205 ~]# service winbind stop
   ```
   Result: Output similar to the following should appear:

   ```
   S-1-5-21-3782130030-2455357663-1162092550-2004 User (1)
   ```

   > 📝 **NOTE:** Make sure that winbind service is stopped after testing connectivity with the domain server. If you do not stop the winbind service on the ContentBridge, it will interfere with authentication when you attempt to access the Harmonic MediaGrid using CIFS.

2. If the ContentBridge configuration file contains a valid NATIVE line and the Harmonic MediaGrid is mounted on the ContentBridge, use smbclient on the ContentBridge to connect to the local CIFS share.
   The syntax for the `smbclient` command is:

   smbclient-U*username* -W*domain_name*\\\\\localhost*FS_name*

   Example: A `smbclient` command for a High Bandwidth ContentBridge with hostname "hbcb205":

   ```
   [root@hbcb205 ~]# smbclient -U lqa2 -W SNV-ENG \\\\\localhost\\testfs
   ```

   Result: The expected result is:

   ```
   Domain=[SNV-ENG] OS=[Unix] Server=[Samba 3.4.7-58.fc7.om2]
   smb: \>
   ```

Result: At the prompt, you will be able to list the file system, and perform other operations.

> 📝 **NOTE:** Make sure the Harmonic MediaGrid cluster is also joined to the domain.

> 📝 **NOTE:** In order to access the Harmonic MediaGrid, the individual users must be added to the domain.

Related information
Configuring Samba settings *on page 123*

Adding DNS entries for Harmonic MediaGrid devices

An entry for each of the Harmonic MediaGrid devices below must be added to the customer's DNS for client access. This will result in the DNS providing a round-robin allocation of the IP addresses when requested.

Contact the customer network administrator to complete these procedures.

The following entries must be added to the local DNS:

- The ContentDirector names as well as the IP addresses of each *public* interface.
- The ContentBridge (if present in the system) name and IP address.
- The SystemManager name and IP address.
- The Harmonic MediaGrid name, which should be associated with the public IP addresses of all the ContentDirector nodes. This name is distinct from the individual ContentDirector names.

The ContentDirector nodes work together in a manner similar to a cluster. Because of this clustering type of operation, clients can connect to any ContentDirector in the system. In order for this to happen, the customer's DNS must have the IP addresses of each ContentDirector added (with the same name). These address records (type A) should have a low TTL value (60 second range) due to caching considerations.

Note that each ContentDirector has two ports for client access, which means that there will be two address entries in the DNS for each ContentDirector. Since the DNS uses a round robin allocation technique, the address records should be in the DNS in the following order:

Harmonic MediaGrid name	ContentDirector 1 name port 1 IP address
Harmonic MediaGrid name	ContentDirector 2 name port 1 IP address
Harmonic MediaGrid name	ContentDirector 3 name port 1 IP address
Harmonic MediaGrid name	ContentDirector 1 name port 2 IP address
Harmonic MediaGrid name	ContentDirector 2 name port 2 IP address
Harmonic MediaGrid name	ContentDirector 3 name port 2 IP address
And so on for any additional ContentDirector nodes	
	ContentBridge 2 name port 1 IP address
	ContentBridge 1 name port 2 IP address
	ContentBridge 2 name port 2 IP address
And so on for any additional ContentBridge nodes	
	SystemManager name IP address

It is also recommended that every DNS entry have a reverse DNS entry. The entries above associate an IP address with its host name (forward DNS entry). A reverse entry allows the identification of a host name from an IP address.

You can use the `nslookup` command to find an IP address associated with a host name, for example:

```
$ nslookup contentdirector-3
Server: mediagrid-3.company.local
Addresses: 10.30.3.200, 10.30.7.200
```

Setting up reverse DNS lookups

Follow these steps to configure reverse DNS entries for Harmonic MediaGrid devices on a Microsoft Windows-based DNS server.

For other types of DNS servers, consult the appropriate documentation or Network Administrator to set up reverse DNS entries.

These instructions are an overview of setting up reverse DNS lookups. Refer to the appropriate Windows documentation for complete instructions.

> 📝 **NOTE:** The following instructions apply only to a simple DNS/network configuration in which there is a single DNS server.

1. Log in to the console of your Microsoft Windows DNS computer.

2. From the Manage Your Server window, click **Manage this DNS server.**

3. In the left panel of the DNS management window, click the **Reverse Lookup Zones** folder that is associated with the DNS server.

   There might already be reverse zones defined for the DNS server.

4. Right-click to select the **Reverse Lookup Zones** folder and then select **New Zone** from the menu.

   Result: The **New Zone Wizard** displays.

5. In the **New Zone Wizard**, select **Primary zone** as the Zone Type from the list of options.

6. On the **Active Directory Zone Replication Scope** screen, select the option **To all DNS servers in the Active Directory domain** *YOUR DOMAIN***.**

7. On the **Reverse Lookup Zone Name** screen, select the **Network ID** option and then enter the Harmonic MediaGrid subnet.

8. On the **Dynamic Update** screen, select the option **Allow both non-secure and secure dynamic updates**.

9. Finish the **New Zone Wizard**.

10. Display again the DNS management window and then expand the **Reverse Lookup Zones** folder to see the sub-entries. Verify that the newly created reverse zone is shown.

11. Repeat the steps above on each Harmonic MediaGrid subnet.

Joining a cluster to an LDAP Domain

In addition to supporting Active Directory Services (ADS), Harmonic MediaGrid supports Lightweight Directory Access Protocol (LDAP). The LDAP protocol manages authentication when querying and modifying directory services running over TCP/IP.

It is not recommended that you switch between ADS and LDAP once an authentication method is chosen. Doing so requires resetting all Access Control Lists (ACLs), as the Security Identifiers (SIDs) differ between the two methods.

> ⚠️ **IMPORTANT:** You must be familiar with setting up LDAP clients to complete these steps.

Verifying authentication configuration parameters

Before you join a cluster to a Lightweight Directory Access Protocol (LDAP), verify that all of your system authentication points (nsswitch.conf, PAM, Samba, mdscore) refer to the same configuration.

Task step.

Editing the LDAP configuration file

A configuration file is present on each ContentDirector, which can be edited to set up LDAP authentication.

📝 **NOTE:** You may also use the preferred Linux LDAP client configuration method prescribed by your Linux system administrator.

1. Open the `/etc/ldap.conf` file on both the primary and secondary ContentDirector and edit the following lines:

   a. Specify the LDAP server by changing `host 127.0.0.1` to the Fully Qualified Domain Name (FQDN) of the customer LDAP server.

      Example: `ahost.example.com`

      Another way to specify the LDAP server is to provide a Uniform Resource Identifier (URI) with the server name. For example, `uri ldap://example-ldap/`.

   b. Change the entry `base dc=example,dc=com` to the distinguished name of the search base, which is the name that uniquely identifies an entry in the directory.

   c. Edit the line `pam_password md5` to add the password encryption function crypt.

      ◦ For Windows, edit as follows: `pam_password crypt`
      ◦ For Apple Open Directory, edit as follows: `pam_password exop`

   d. Save and close `/etc/ldap.conf`.

2. Open `/omneon/config/mdscore-local` on both the primary and secondary ContentDirector and add the following line to set the authentication method:
   `auth_method = pam`

3. Create a symbolic link between the two LDAP configuration files as follows:

   ```
   mv /etc/openldap/ldap.conf /etc/openldap/ldap.conf.old
   ln -s /etc/ldap.conf /etc/openldap/ldap.conf
   ```

4. Test the configuration by typing the following:
   `id admin`

   where *admin* is a user who is only in ldap and not in the local `/etc/passwd` file.

   Result: You should see the following if the configuration is set up properly:

   `uid=5001(admin) gid=5001(admin) groups=5001(admin)`

5. If you see the following output, LDAP is not configured properly, and you must trace the problem:
   `id: admin: No such user`

6. Once LDAP is configured correctly, restart the omcld service by typing the following:
   `service omcld restart`

Tracing an LDAP Problem

If you edited the LDAP configuration file as instructed and an error occurred, follow these steps to trace the problem.

1. Check the LDAP entries to ensure that all information is entered correctly.

2. Check the LDAP error logs for any hints.

3. Compare the entries to a current database entry.

4. Check the UIDs and GIDs of the LDAP entries.

    These IDs must be greater than 500 for the ContentDirector to recognize users and groups in the LDAP database.

5. Verify that the following attributes are present for users:

    > inetorgperson
    > posixAccount

6. Verify that the following attribute is present for groups:

    > posixgroup

Joining a High Bandwidth ContentBridge to an LDAP Domain

Follow the procedures in this section in order.

> 📝 **NOTE:** In order to join a High Bandwidth ContentBridge to an LDAP domain, an LDAP or Open Directory server must already be configured to serve as Samba Primary Domain Controller for the LDAP or Open Directory domain.

> 📝 **NOTE:** It is not recommended that you switch between Active Directory and LDAP once an authentication method is chosen. Before continuing, make sure the High Bandwidth ContentBridge is not configured for Active Directory.

Creating a ContentBridge account on the LDAP server

This procedure is required for joining a High Bandwidth ContentBridge to an LDAP domain.

In the examples that follow, the hostname of the High Bandwidth ContentBridge is hbcb205.

1. On the LDAP server, login as root.

2. Check whether the ContentBridge account with the hostname of the ContentBridge exists.
    Example: `[root@eng-ldap ~]# /var/lib/samba/sbin/smbldap-usershow hbcb205$`

    > 📝 **NOTE:** Make sure to add "$" at the end of the hostname.

    If the account does not exist, the following message appears:

    `user hbcb205$ doesn't exist`

3. Create a local user account with the host name of the High Bandwidth ContentBridge.
    Example: `[root@eng-ldap ~]# adduser hbcb205`

4. Create a Samba machine account with the hostname of the ContentBridge.

    You will need to provide the password for the user.

    Example: `[root@eng-ldap ~]# /var/lib/samba/sbin/smbldap-useradd -w -i hbcb205`

5. Check if the account is created.
    Example: `[root@eng-ldap ~]# /var/lib/samba/sbin/smbldap-usershow hbcb205$`

    > 📝 **NOTE:** Configuring different ContentBridge nodes in a Harmonic MediaGrid cluster with different directory access authentication protocols (for example, ADS, LDAP, and OpenDirectory) is not supported. The following set of steps will reset the authentication mechanism for every ContentBridge in the cluster.

Configuring Samba settings on the High Bandwidth ContentBridge

To configure Samba settings, modify the required files on the device.

Before you begin
Creating a ContentBridge account on the LDAP server

1. Connect a monitor and keyboard to the High Bandwidth ContentBridge.

2. Log on to the High Bandwidth ContentBridge using the following user name and password:

   > User name: `ovnuser`
   > Password: `OVN@SvCaUsa`

3. Stop smb service by entering the following:
   ```
   service smb stop
   ```

4. Update `/opt/omclb/conf/smb.conf` as follows:

   ```
   security = DOMAIN
   workgroup = domain_name
   password server = ldap_FQDN
   add user script = /opt/omutils/bin/omadduser %u
   ```

   ◦ Replace *domain_name* with the LDAP domain using the distinguished name of the search base in the LDAP server configuration, which is the name that uniquely identifies an entry in the directory.
   ◦ Replace *ldap_FQDN* with the Fully Qualified Domain Name of the LDAP server.

5. Copy `/opt/omclb/conf/smb.conf` to `/etc/samba/smb.conf`.

Joining the High Bandwidth ContentBridge to the LDAP Domain

Use the net command to join High Bandwidth ContentBridge to the LDAP domain. Be sure to restart gateway services after doing so.

Before you begin
Creating a ContentBridge account on the LDAP server
Configuring Samba settings on the High Bandwidth ContentBridge

1. Make sure you are logged in to the High Bandwidth ContentBridge, and then enter the following command:
   ```
   net rpc join –Uldap_admin%ldap_admin_password –S ldap_FQDN
   ```

   Result: The following output should appear:

   ```
   Joined domain SNV-ENG.
   [root@hbcb205 ~]#
   ```

2. Remove any "CB" entries that provide access to individual users from `/etc/gateway.conf` and `/etc/passwd`:
   a. Open `/etc/gateway.conf` and delete entries for individual users beginning with "CB."
   b. Open `/etc/passwd` and delete entries for the same individual users (the entries do not contain "CB" in this file).

3. Restart the gateway service by entering the following:
   ```
   service gateway restart
   ```

4. Add an entry for the LDAP server to `/etc/hosts` on the High Bandwidth ContentBridge.

   Example: `10.4.224.100 OmneonServer omneonserver.opendir.local`

Related information

Creating a ContentBridge account on the LDAP server *on page 131*

Verifying communication with the domain controller

Perform these steps to verify communication between the ContentBridge or the High Bandwidth ContentBridge and the domain controller.

Before you begin

Creating a ContentBridge account on the LDAP server
Configuring Samba settings on the High Bandwidth ContentBridge
Joining the High Bandwidth ContentBridge to the LDAP Domain

1. Use `wbinfo` to do a domain user lookup using the following commands.

   Example: For a High Bandwidth ContentBridge with hostname "hbcb205" for test user "lqa1":

   ```
   [root@hbcb205 ~]# service winbind start

   [root@hbcb205 ~]# wbinfo -n lqa1
   [root@hbcb205 ~]# service winbind stop
   ```
   Result: Output similar to the following should appear:

   ```
   S-1-5-21-3782130030-2455357663-1162092550-2004 User (1)
   ```

   > **NOTE:** Make sure that winbind service is stopped after testing connectivity with the domain server. If you do not stop the winbind service on the ContentBridge, it will interfere with authentication when you attempt to access the Harmonic MediaGrid using CIFS.

2. If the ContentBridge configuration file contains a valid NATIVE line and the Harmonic MediaGrid is mounted on the ContentBridge, use smbclient on the ContentBridge to connect to the local CIFS share.
   The syntax for the `smbclient` command is:

   `smbclient-U`*username* `-W`*domain_name*`\\\\localhost\\`*FS_name*

   Example: A `smbclient` command for a High Bandwidth ContentBridge with hostname "hbcb205":

   ```
   [root@hbcb205 ~]# smbclient -U lqa2 -W SNV-ENG \\\\localhost\\testfs
   ```

   Result: The expected result is:

   ```
   Domain=[SNV-ENG] OS=[Unix] Server=[Samba 3.4.7-58.fc7.om2]
   smb: \>
   ```

Result: At the prompt, you will be able to list the file system, and perform other operations.

> **NOTE:** Make sure the Harmonic MediaGrid cluster is also joined to the domain.

> **NOTE:** In order to access the Harmonic MediaGrid, the individual users must be added to the domain.

Joining a ContentBridge 1000B to an LDAP Domain

Follow the procedures in this section in order.

> 📝 **NOTE:** In order to join a ContentBridge 1000B to an LDAP domain, an LDAP or Open Directory server must already be configured to serve as Samba Primary Domain Controller for the LDAP or Open Directory domain.

> 📝 **NOTE:** It is not recommended that you switch between ActiveDirectory and LDAP once an authentication method is chosen. Before continuing, make sure the ContentBridge 1000B is not configured for ActiveDirectory.

Configuring Samba settings for the ContentBridge 1000B

Configure Samba settings by editing the required files on the ContentBridge.

1. Log on to the first ContentDirector in your system using the following user name and password:

   User name: `ovnuser`
   Password: `OVN@SvCaUsa`

2. Remove samba private files stored on the ContentDirector with the following command:
   `sudo rm -f /tftpboot/config/gateway/secrets/*`

3. Generate the file, `/tftpboot/config/gateway/smb.conf,` as shown below:

Example:

```
                    This is the main Samba configuration file. You should read
                    the
                    # smb.conf(5) manual page in order to understand the
                    options listed
                    # here. Samba has a huge number of configurable options
                    (perhaps too
                    # many!) most of which are not shown in this example
                    #
                    # Any line which starts with a ; (semi-colon) or a # (hash)
                    # is a comment and is ignored. In this example we will use
                    a #
                    # for commentry and a ; for parts of the config file that
                    you
                    # may wish to enable
                    #
                    # NOTE: Whenever you modify this file you should run the
                    command "testparm"
                    # to check that you have not made any basic syntactic
                    errors.
                    #
                    #======================== Global Settings===================
                    [global]
                            log file = /var/log/samba/%m.log
                            max log size = 50
                            socket options = TCP_NODELAY SO_SNDBUF=32768
SO_RCVBUF=32768
                            server string = Omneon Content Bridge Samba Server
                            security = user
                            encrypt passwords = yes
                            preferred master = no
                            local master = no
                            domain master = no
                            printcap name = /etc/printcap
                            load printers = no
                            printing =
```

Figure 5-4:

4. Modify the file as follows:

```
security = DOMAIN
workgroup = domain name
password server = ldap_FQDN
add user script = /opt/omutils/bin/omadduser %u
```

- ◦ Replace *domain_name* with the LDAP domain using the distinguished name of the search base in the LDAP server configuration, which is the name that uniquely identifies an entry in the directory.
- ◦ Replace *ldap_FQDN* with the Fully Qualified Domain Name of the LDAP server.

5. Repeat the steps above for each remaining ContentDirector in the Harmonic MediaGrid cluster.

Joining the ContentBridge 1000B to the LDAP domain

Perform the following procedure on each ContentBridge in the cluster.

Before you begin
Configuring Samba settings for the ContentBridge 1000B

1. Log on to the ContentBridge using the following user name and password:

   > User name: `root`
   > Password: `omneon`

2. Stop smb services as follows:
   ```
   service smb stop
   ```

3. Remove samba private files on the ContentBridge by entering the following:
   ```
   rm -f /var/lib/samba/private/*
   ```

4. Copy `/tftpboot/config/gateway/smb.conf` from the ContentDirector to `/etc/samba/smb.conf` on the ContentBridge.

   You might be required to enter `sudo` when copying files over.

5. Run the following command:
   ```
   net rpc join -Uldap_admin%ldap_admin_password -S ldap_FQDN
   ```

   > 📝 **NOTE:** Upon joining the LDAP domain, the Samba server creates a local temporary database on the ContentBridge at: `/var/lib/samba/private/secrets.tdb`.

6. Remove any "CB" entries that provide access to individual users:
   a. Remove any "CB" entries from `/etc/passwd` locally on the ContentBridge.
   b. Delete *CLBHOSTNAME* file under `/tftpboot/config/gateway` on every ContentDirector.
   c. Open `/etc/passwd` and delete entries for the same individual users (the entries do not contain "CB" in this file).

   > 📝 **NOTE:** In order to access the Harmonic MediaGrid, the individual users must be added to the LDAP domain.

7. Add the following line to the ContentBridge configuration file.
   ```
   NATIVE <Cluster IP or DNS name> <file system name>
   ```

   This can be done via SystemManager or by editing `/tftpboot/config/gateway/hostname` manually on ALL ContentDirector nodes.

8. Restart the gateway service:
   ```
   service gateway restart
   ```

9. Repeat the steps above for each ContentBridge in the Harmonic MediaGrid cluster.

Verifying communication with the domain controller

Perform these steps to verify communication between the ContentBridge or the High Bandwidth ContentBridge and the domain controller.

Before you begin
Configuring Samba settings for the ContentBridge 1000B
Joining the ContentBridge 1000B to the LDAP domain

1. Use `wbinfo` to do a domain user lookup using the following commands.

   Example: For a High Bandwidth ContentBridge with hostname "hbcb205" for test user "lqa1":

   ```
   [root@hbcb205 ~]# service winbind start

   [root@hbcb205 ~]# wbinfo -n lqa1
   [root@hbcb205 ~]# service winbind stop
   ```
   Result: Output similar to the following should appear:

   ```
   S-1-5-21-3782130030-2455357663-1162092550-2004 User (1)
   ```

   > **NOTE:** Make sure that winbind service is stopped after testing connectivity with the domain server. If you do not stop the winbind service on the ContentBridge, it will interfere with authentication when you attempt to access the Harmonic MediaGrid using CIFS.

2. If the ContentBridge configuration file contains a valid NATIVE line and the Harmonic MediaGrid is mounted on the ContentBridge, use smbclient on the ContentBridge to connect to the local CIFS share.

   The syntax for the `smbclient` command is:

   smbclient-U*username* -W*domain_name*\\\\\localhost*FS_name*

   Example: A `smbclient` command for a High Bandwidth ContentBridge with hostname "hbcb205":

   ```
   [root@hbcb205 ~]# smbclient -U lqa2 -W SNV-ENG \\\\localhost\\testfs
   ```

   Result: The expected result is:

   ```
   Domain=[SNV-ENG] OS=[Unix] Server=[Samba 3.4.7-58.fc7.om2]
   smb: \>
   ```

Result: At the prompt, you will be able to list the file system, and perform other operations.

> **NOTE:** Make sure the Harmonic MediaGrid cluster is also joined to the domain.

> **NOTE:** In order to access the Harmonic MediaGrid, the individual users must be added to the domain.

Related information
Configuring Samba settings for the ContentBridge 1000B *on page 134*

Joining a cluster to an Apple Open Directory Domain

Harmonic MediaGrid supports Apple Open Directory for authentication and directory services. If you have enabled LDAP Bind Authentication on your Mac OS X server, you can join the Harmonic MediaGrid to Apple Open Directory.

⚠ **IMPORTANT:** As of OS X Server 10.7, Apple discontinued support for Primary Domain Controller (PDC). With Harmonic MediaGrid version 3.5.2 and earlier, the High Bandwidth ContentBridge and ContentBridge 1000B require PDC support for directory services with Apple Open Directory. With Harmonic MediaGrid version 4.0 or later, PDC support is not required to connect a High Bandwidth ContentBridge to an Open Directory server (OS X 10.11 and later).

For general information on Apple Open Directory, refer to the Apple website: *http://images.apple.com/server/macosx/docs/Open_Directory_Admin_v10.5.pdf*.

⚠ **IMPORTANT:** You must be familiar with setting up LDAP clients to complete these steps.

1. On the client computer, launch the Server utility.

2. From the left-hand column, select **Open Directory**.

3. Ensure that the dialog indicates Open Directory is **Master**, and verify that the name and IP address are correct. Refer to the figure below for an example.

Example:
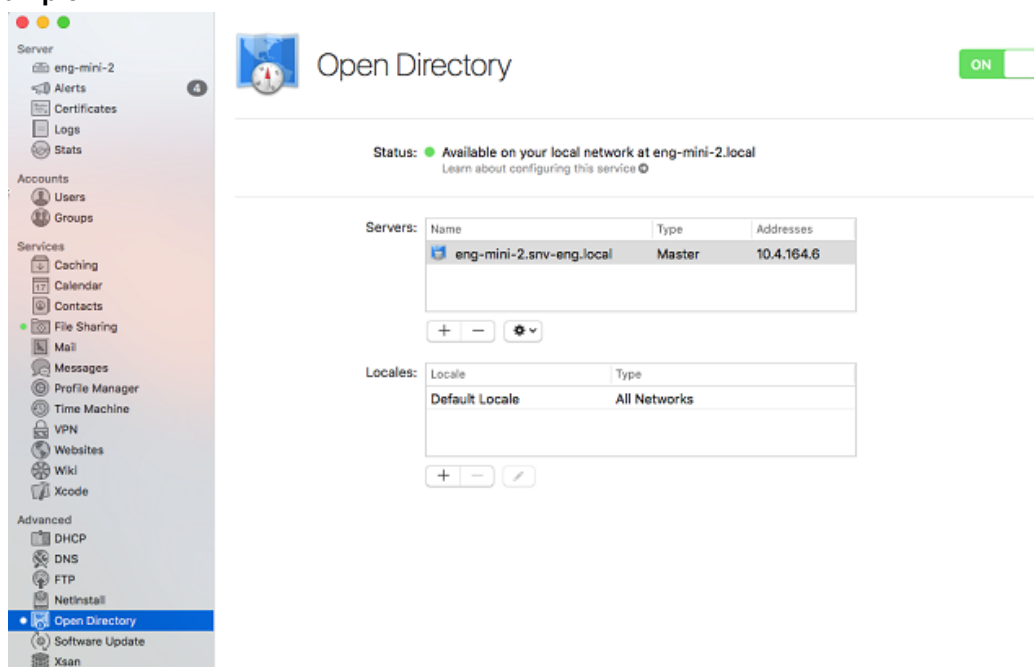
Figure 5-5:

If you are using an earlier version of OS X Server on the client computer, access the Open Directory settings through **Server Admin**. From the **Overview** tab, ensure that the Open Directory is set to **Open Directory Master**, and verify that the **LDAP Search Base** settings are correct. Refer to the following figure for an example.
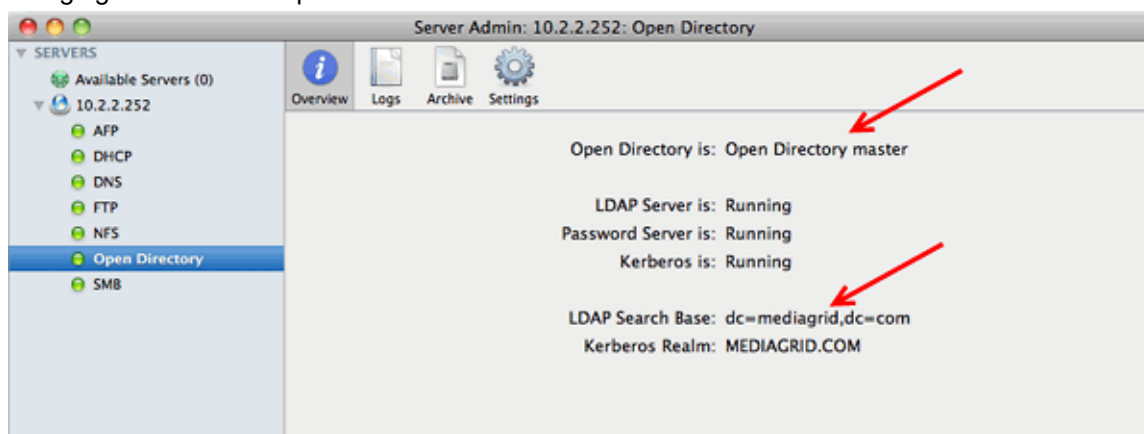
Figure 5-6:

4. On each ContentDirector, use SSH to edit `/etc/ldap.conf` as follows:

   a. Change the value for `HOST` to the IP address of the Open Directory Server.

   b. Change the entry `Base dc=example,dc=com` to the distinguished name of the search base, which is the name that uniquely identifies an entry in the directory.

   c. Edit the line `pam_password md5` as follows: `pam_password exop`.

Example:

Based on the previous figure, the values in `/etc/ldap.conf` should be as follows:

```
HOST 10.2.2.252
URI ldap://10.2.2.252
BASE dc=mediagrid,dc=com
pam_password exop
```

5. Save and close `/etc/ldap.conf`.

6. If there is a firewall, ensure that TCP and UDP ports 389 and 636 are opened in the firewall.

7. Open the `/omneon/config/mdscore-local` file on both the primary and secondary ContentDirector, and then edit the following lines:

```
admin_group_name = "diradmin"
auth_meth = pam
```

The following is an example of the `mdscore-local` file:

```
#============================================================================= #
#              MDS coremain program local configuration file
Any options specified in here will override the same-named options in the  #
# main configuration file.
#=============================================================================#


#superuser_name = omneon
#superuser_password = usm


admin_group_name = "diradmin"
#admin_name = mgadmin
#admin_password = 1234
#auth_method = enh-ad
auth_method = pam
```

Figure 5-7:

8. Create a symbolic link between the two LDAP configuration files as follows:

```
mv /etc/openldap/ldap.conf /etc/openldap/ldap.conf.old
ln -s /etc/ldap.conf /etc/openldap/ldap.conf
```

9. Type the following to test the configuration:
```
id diradmin
```
   where "admin" is a user who is only in ldap and not in the local `/etc/passwd` file.

   Result: You should see the following if the configuration is set up properly:

```
   uid=1000(diradmin) gid=20(games) groups=20(games),80(admin)
```

10. If you see the following output, LDAP is not configured properly, and you must trace the problem:
```
id: diradmin: No such user
```

11. Once LDAP is configured properly, restart the omcld service by typing the following:
```
service omcld restart
```

12. Run mdsclientn, as shown below, to verify that you can authenticate successfully against any valid user account in the Open Directory:

```
/opt/omcld/bin/mdsclientn localhost
sess get-users
sess get-groups
sess auth [username] [password]
```

Result: The following is sample output from mdsclientn:

```
[root@mds3 ~]# /opt/omcld/bin/mdsclientn localhost
mdsclientn: built by lsasaki on 2010-May-28 03:18 (TOT)
Connecting to host "localhost", protocol "tcp", prog 0x20000003
New client is 0x1273b970
Connected to "localhost"
Opening default session...
Found 4 IP addresses
10.2.4.204
10.2.5.205
10.2.3.204
10.2.3.205
Retrieving keys
Retrieved keys successfully, mdslen=140, sslen=140
sessionID = 0x9279a20
key = 78 56 34 12 f0 de bc 9a 44 33 22 11 88 77 66 55
currentTime = 2010/07/09 15:22:37
idleTime = 300 sec
*host 0 = 2@10.2.3.204/10.2.3.205 id=0xa9b0bff35b416be3
host 1 = 4@10.2.3.200/10.2.3.201 id=0xbf0674ccd8bd5456
host 2 = 4@10.2.3.203/10.2.3.202 id=0x3e4a87f91abd5b43
Opened default session of 0x9279a20

=> sess get-users
nfsnobody: S-1-22-1-0-1-2--2
diradmin: S-1-22-1-0-1-2-1000
jeremy: S-1-22-1-0-1-2-5000
peter: S-1-22-1-0-1-2-5001
chew: S-1-22-1-0-1-2-5002
percy: S-1-22-1-0-1-2-1025

=> sess get-groups
nfsnobody: S-1-22-2-3-4-5--2
workgroup: S-1-22-2-3-4-5-1025

=> sess auth jeremy omneon
Authenticated successfully
Session id=0x9279a20, uservalid=1, admin=0, superuser=0, guest=0,
 cluster=0
curTime = 2010/07/09 15:22:58
idleTime = 300 sec
user = "jeremy", sid=S-1-22-1-0-1-2-5000
group = "games", sid=S-1-22-2-3-4-5-20
=>
```

Verifying authentication configuration parameters

Before you join a cluster to an Apple Open Directory Domain, verify that all of your system authentication points (nsswitch.conf, PAM, Samba, mdscore) refer to the same configuration.

Context for the current task

Task step.

Editing LDAP idle time limit on the ContentDirector

During authentication, the connection between the ContentDirector and Open Directory server might time out. This occurs when the LDAP idle time limit on the Open Directory server is less than the LDAP time limit on the ContentDirector.

To prevent or correct the errors, you must change the LDAP idle time limit on the ContentDirector to a value lower than the idle time limit on the Open Directory server. By default, the idle time limit on the ContentDirector is 3600 seconds. On the Open Directory server, the idle time limit is usually 300 seconds.

NOTE: The idle time limit on your ContentDirector may differ from the default value.

1. Determine the LDAP idle time limit on the Open Directory server by opening `/etc/openldap/slapd_macosxserver.conf` and finding the value for `idletimeout`.

2. Log on to the ContentDirector and do the following:
   a. Open `/etc/ldap.conf` and find the value for `idle_timelimit`.
   b. If this value is greater than the `idletimeout` value on the Open Directory server, change `idle_timelimit` to `100`.

3. Repeat Step 2 for each ContentDirector in the cluster.

Joining a High Bandwidth ContentBridge to an Open Directory server with OS X 10.11 or later

Follow the procedures in this section in order.

NOTE: This procedure requires Harmonic MediaGrid Server version 4.0 or later.

IMPORTANT: Before you can perform this procedure, you must install **MediaGridOSXServer-omauthchk.dmg** onto the Open Directory server. This file is available with the Harmonic MediaGrid software downloads on the Harmonic website. Contact Technical Support for your login information.

NOTE: It is not necessary to manually create a ContentBridge account on the Apple Open Directory server.

Creating passwordless SSH access

Passwordless SSH access is required to join the High Bandwidth ContentBridge to the Open Directory domain.

1. Create a service account on the Open Directory server for running omauthchk.

   Harmonic recommends that you name the service account "omauthchk".

2. Log in to the Open Directory server using the service account.

3. From the home directory, make an `.ssh` subdirectory, if needed, and then verify permissions and enter the `.ssh` directory.

   Example:

   ```
   mkdir -p .ssh
   chmod 700 .ssh
   cd .ssh
   ```

4. In the `.ssh` directory, generate private and public authentication keys and then press **Enter** twice to set up passwordless access.

   Harmonic suggests that you use the following key names:

   > id_omauthchk
   > id_omauthchk.pub

   Example: `ssh-keygen -f id_omauthchk`

5. Append the public key to the `authorized_keys` file, as follows:

   ```
   chmod 644 authorized_keys (if present)
   cat id_omauthchk.pub >> authorized_keys
   chmod 444 authorized_keys
   ```

6. Connect a monitor and keyboard to the High Bandwidth ContentBridge, and then log in with the following user name and password:

   > User name: `root`
   > Password: `omneon`

7. From `/opt/omclb/conf`, connect interactively to the Open Directory server using SSH, as follows:
   `ssh -l omauthchk OD_server_IP_addrress`

8. Exit back to the High Bandwidth ContentBridge, and then securely copy the private key, as follows:
   `scp omauthchk@OD server:.ssh/id_omauthchk /opt/omclb/conf/id_omauthchk`

9. Verify passwordless SSH access, as follows:
   `ssh -l omauthchk -i /opt/omclb/conf/id_omauthchk OD server hostname`

Configuring omauthremote.conf

Add the IP address or host name of the Open Directory server to the configuration file.

Before you begin

Creating passwordless SSH access

1. From the High Bandwidth ContentBridge, copy `omauthremote.conf` to `/etc`, as follows:
   `cp /opt/omclb/conf/omauthremote.conf /etc/omauthremote.conf`

2. Add the following setting(s) to `/etc/omauthremote.conf`:

   ```
   primary_server=IP_address_or_hostname_of_OD_server
   ```

   > 📄 **NOTE:** If the service account name on the Open Directory server is not "omauthchk," then you must also add the following:
   >
   > ```
   > ssh_login=server_account_name_used
   > ```

3. Verify that you have correctly configured access to the Open Directory server, as follows:

    ```
    echo "." | /opt/omclb/sbin/omauthremote
    ```

    Result: The following shows the expected result:

    ```
    omauthchk version <x.x>
    .
    ```

Configuring Samba settings

To configure Samba settings, modify the required file on the High Bandwidth ContentBridge.

Before you begin
Creating passwordless SSH access
Configuring omauthremote.conf

⚠ **IMPORTANT:** Before editing `/opt/omclb/conf/smb.conf`, Harmonic recommends that you first save a copy.

⚠ **IMPORTANT:** With OS X 10.11 and later, SMB signing on the High Bandwidth ContentBridge is not supported and is disabled by default. When editing `/opt/omclb/conf/smb.conf`, do not set server signing to "required" or "auto." When editing `/etc/gateway.conf`, do not set **SERVER_SIGNING** to "mandatory" or "auto."

1. Ensure that the heartbeat service (for High Availability pairs only) and gateway service are stopped by entering the following commands:

    ```
    service heartbeat stop
    service gateway stop
    ```

2. In `/opt/omclb/conf/smb.conf`, modify the following options:

    ```
    security = DOMAIN
    workgroup = domain_name
    encrypt passwords = yes
    add user script = /opt/omutils/bin/omadduser %u
    auth methods = script2
    auth_script2: script = /opt/omclb/sbin/omauthremote
    ntlm auth = no
    lanman auth = no
    ```

    The password server option is not needed.

3. Verify that `/etc/resolv.conf` is pointing to the correct nameserver and domain.

4. Configure `/etc/gateway.conf` for native access to the Harmonic MediaGrid, as follows:
    ```
    NATIVE Cluster_IP_address_or_DNS_name file system name
    ```

5. Enter the following command to restart gateway services:
    ```
    service gateway start
    ```

    ⚠ **IMPORTANT:** After restarting gateway services, test the output of `/etc/samba/smb.conf` by running `testparm` and verify that server signing is not set to "required" or "auto," or is not present.

6. Enter the following command to restart heartbeat services (for High Availability pairs only):
    ```
    service heartbeat start
    ```

Related information

Verifying communication using smbclient

You can verify communication with the Open Directory server from the client computer or from the High Bandwidth ContentBridge.

Before you begin

Creating passwordless SSH access
Configuring omauthremote.conf
Configuring Samba settings

- To verify communication from the client computer, type the following:

  `smbclient -U `*`username`*` -W `*`domain_name`*` \\\\`*`IP_address_of_HBCB`*`\\`*`fs_share`*
- To verify communication from the High Bandwidth ContentBridge, type the following:

  `smbclient -U `*`username`*` -W `*`domain_name`*` \\\\localhost\\`*`fs_share`*

Result: If successful, smbclient will respond with the following prompt:

`smb: \>`

> 📝 **NOTE:** Make sure the Harmonic MediaGrid cluster is also configured with Apple Open Directory.

> 📝 **NOTE:** Make sure that winbind service is stopped. If you do not stop the winbind service on the High Bandwidth ContentBridge, it will interfere with authentication when you attempt to access the Harmonic MediaGrid using CIFS.

> 📝 **NOTE:** In order to access the Harmonic MediaGrid, the individual users must be added to the Apple Open Directory domain.

> 📝 **NOTE:** If you have previously modified the following configuration files for use with a different directory service, and you are unable to join the High Bandwidth ContentBridge
>
> to the Open Directory server (OS X 10.11 or later), please contact Technical Support for assistance: `/etc/nsswitch.conf, /etc/krb5.conf, /etc/ldap.conf`.

Related information

Joining a High Bandwidth ContentBridge to an Open Directory server with OS X 10.6.8 or earlier

Follow the procedures in this section in order.

> 📝 **NOTE:** In order to join a High Bandwidth ContentBridge to an Open Directory with OS X 10.6.8 or earlier, an LDAP or Open Directory server must already be configured to serve as Samba Primary Domain Controller for the LDAP or Open Directory domain.

> 📝 **NOTE:** It is not necessary to manually create a ContentBridge account on the Apple Open Directory server.

Configuring Samba settings

To configure Samba settings, modify the required file on the High Bandwidth ContentBridge.

1. Connect a monitor and keyboard to the High Bandwidth ContentBridge.

2. Log on to the ContentBridge using the following user name and password:

   User name: `ovnuser`
   Password: `OVN@SvCaUsa`

3. Type the following command to stop the smb service:
   `service smb stop`

4. Edit `/opt/omclb/conf/smb.conf` as follows:

   ```
   security = DOMAIN
   workgroup = domain_name
   password server = opendir_FQDN
   add user script = /opt/omutils/bin/omadduser %u
   client ntlmv2 auth = yes
   ```

   ◦ Replace *domain_name* with the Open Directory domain using the distinguished name of the search base in Open Directory server configuration, which is the name that uniquely identifies an entry in the directory.
   ◦ Replace *opendir_FQDN* with the Fully Qualified Domain Name of the Apple Open Directory server.

5. Copy `/opt/omclb/conf/smb.conf` to `/etc/samba/smb.conf`.

Adding the Open Directory server address to configuration files

Add entries for the Open Directory server in `/etc/hosts` and `/etc/resolv.conf`.

Before you begin
Configuring Samba settings

The first configuration file, `/etc/hosts`, contains the IP address for the Open Directory Server, the fully qualified domain name and any aliases. The second configuration file, `/etc/resolv.conf`, contains the IP address of the Open Directory server which has been configured with a DNS record.

1. Add an entry for the Apple Open Directory server to `/etc/hosts` on the High Bandwidth ContentBridge:
   a. From your SSH terminal, type the following command:
      `sudo vi /etc/hosts`
   b. Add a line at the end to specify the IP address of the Open Directory Server. Use the following format:
      IP address open_directory_server_FQDN open_directory_server_ name

      Example: `10.20.9.52 odserver.support.local odserver`

2. Add an entry for the Apple Open Directory server to `/etc/resolv.conf` as follows:
   DNS name IP address

   Example: `odserver 10.20.9.52`

Joining the High Bandwidth ContentBridge to the Apple Open Directory domain

Use the `net` command to join the High Bandwidth ContentBridge to the Open Directory domain.

Before you begin
Configuring Samba settings
Adding the Open Directory server address to configuration files

1. Make sure you are logged in to the ContentBridge, and then enter the following command:

   `net rpc join -U`*opendir_admin*`%`*opendir_admin_password* `-S` *opendir_FQDN*

   Result: You should see output similar to the following:

   ```
   Joined domain SNV-ENG
   [root@hbcb205 ~]#
   ```

2. Remove any "CB" entries that provide access to individual users from the `/etc/gateway.conf` and `/etc/passwd` files.

   a. Open `/etc/gateway.conf` and delete entries for individual users beginning with "CB."
   b. Open `/etc/passwd` and delete entries for the same individual users (the entries do not contain "CB" in this file).

3. Restart the gateway service by entering the following:

   `service gateway restart`

Related information
Configuring Samba settings *on page 146*

Verifying communication with the domain controller

Perform these steps to verify communication between the ContentBridge or the High Bandwidth ContentBridge and the domain controller.

Before you begin
Configuring Samba settings
Adding the Open Directory server address to configuration files
Joining the High Bandwidth ContentBridge to the Apple Open Directory domain

1. Use `wbinfo` to do a domain user lookup using the following commands.

   Example: For a High Bandwidth ContentBridge with hostname "hbcb205" for test user "lqa1":

   ```
   [root@hbcb205 ~]# service winbind start

   [root@hbcb205 ~]# wbinfo -n lqa1
   [root@hbcb205 ~]# service winbind stop
   ```
   Result: Output similar to the following should appear:

   ```
   S-1-5-21-3782130030-2455357663-1162092550-2004 User (1)
   ```

   > 📄 **NOTE:** Make sure that winbind service is stopped after testing connectivity with the domain server. If you do not stop the winbind service on the ContentBridge, it will interfere with authentication when you attempt to access the Harmonic MediaGrid using CIFS.

2. If the ContentBridge configuration file contains a valid NATIVE line and the Harmonic MediaGrid is mounted on the ContentBridge, use smbclient on the ContentBridge to connect to the local CIFS share.

   The syntax for the `smbclient` command is:

   `smbclient`-U*username* -W*domain_name*\\\\\localhost*FS_name*

   Example: A `smbclient` command for a High Bandwidth ContentBridge with hostname "hbcb205":

   ```
   [root@hbcb205 ~]# smbclient -U lqa2 -W SNV-ENG \\\\localhost\\testfs
   ```

   Result: The expected result is:

   ```
   Domain=[SNV-ENG] OS=[Unix] Server=[Samba 3.4.7-58.fc7.om2]
   smb: \>
   ```

Result: At the prompt, you will be able to list the file system, and perform other operations.

📝 **NOTE:** Make sure the Harmonic MediaGrid cluster is also joined to the domain.

📝 **NOTE:** In order to access the Harmonic MediaGrid, the individual users must be added to the domain.

Related information

Joining a ContentBridge 1000B to an Open Directory Server with OS X 10.6.8 or earlier

Perform the following procedures in order.

📝 **NOTE:** As of OS X Server10.7, support for Primary Domain Controller (PDC) is no longer provided. The ContentBridge 1000B requires PDC support for directory service with Apple Open Directory.

📝 **NOTE:** In order to join a ContentBridge 1000B to an Open Directory, an LDAP or Open Directory server must already be configured to serve as Samba Primary Domain Controller for the LDAP or Open Directory domain.

📝 **NOTE:** It is not necessary to manually create a ContentBridge account on the Apple Open Directory server.

📝 **NOTE:** Configuring different ContentBridges in a Harmonic MediaGrid cluster with different directory access authentication protocols (for example, ADS, LDAP, and OpenDirectory) is not supported. The following set of steps will reset the authentication mechanism for every ContentBridge in the cluster.

Configuring Samba settings

To configure Samba settings, modify the required files on each ContentDirector in the cluster.

1. Log on to the first ContentDirector in your system using the following user name and password:

   User name: `ovnuser`
   Password: `OVN@SvCaUsa`

2. Remove samba private files stored on the ContentDirector with the following command:

```
sudo rm -f /tftpboot/config/gateway/secrets/*
```

3. Generate the file `/tftpboot/config/gateway/smb.conf,` as shown below:

```
This is the main Samba configuration file. You should read
the
# smb.conf(5) manual page in order to understand the
options listed
# here. Samba has a huge number of configurable options
(perhaps too
# many!) most of which are not shown in this example
#
# Any line which starts with a ; (semi-colon) or a # (hash)
# is a comment and is ignored. In this example we will use
a #
# for commentry and a ; for parts of the config file that
you
# may wish to enable
#
# NOTE: Whenever you modify this file you should run the
command "testparm"
# to check that you have not made any basic syntactic
errors.
#
#======================= Global Settings==================
[global]
        log file = /var/log/samba/%m.log
        max log size = 50
        socket options = TCP_NODELAY SO_SNDBUF=32768
SO_RCVBUF=32768
        server string = Omneon Content Bridge Samba Server
        security = user
        encrypt passwords = yes
        preferred master = no
        local master = no
        domain master = no
        printcap name = /etc/printcap
        load printers = no
        printing =
```

Figure 5-8:

4. Modify the settings as follows:

```
security = DOMAIN
workgroup = domain_name
password server = opendir_FQDN
add user script = /opt/omutils/bin/omadduser %u
client ntlmv2 auth = yes
```

◦ Replace *domain_name* with the OpenDirectory domain using the distinguished name of the search base in Open Directory server configuration, which is the name that uniquely identifies an entry in the directory.

◦ Replace *opendir_FQDN* with the Fully Qualified Domain Name of the Apple Open Directory server.

5. Repeat all previous steps for each remaining ContentDirector in the cluster.

Adding the Open Directory server address to configuration files

Add entries for the Open Directory server in `/etc/hosts` and `/etc/resolv.conf.`

Before you begin
Configuring Samba settings

The first configuration file, `/etc/hosts`, contains the IP address for the Open Directory Server, the fully qualified domain name and any aliases. The second configuration file, `/etc/resolv.conf`, contains the IP address of the Open Directory server which has been configured with a DNS record.

1. Add an entry for the Apple Open Directory server to `/etc/hosts` on the High Bandwidth ContentBridge:

   a. From your SSH terminal, type the following command:

      `sudo vi /etc/hosts`

   b. Add a line at the end to specify the IP address of the Open Directory Server. Use the following format:

      IP address open_directory_server_FQDN open_directory_server_ name

      Example: `10.20.9.52 odserver.support.local odserver`

2. Add an entry for the Apple Open Directory server to `/etc/resolv.conf` as follows:

   DNS name IP address

   Example: `odserver 10.20.9.52`

Joining the ContentBridge 1000B to the Apple Open Directory Domain

Use the `net` command to join the ContentBridge to the Open Directory domain.

Before you begin
Configuring Samba settings
Adding the Open Directory server address to configuration files

1. Log on to the ContentBridge using the following user name and password:

   User name: `root`
   Password: `omneon`

2. Stop smb service by entering the following:

   `service smb stop`

3. Remove samba private files on the ContentBridge by entering the following:

   `rm -f /var/lib/samba/private/*`

4. Copy `/tftpboot/config/gateway/smb.conf` from the ContentDirector to `/etc/samba/ smb.conf` on the ContentBridge.

   You might be required to enter `sudo` when copying files over.

5. Run the following command:

   `net rpc join -U`*opendir_admin*`%`*opendir_admin_password* `-S` *opendir_FQDN*

   > **NOTE:** Upon joining the OpenDirectory domain, the Samba server creates a local temporary database on the ContentBridge at: `/var/lib/samba/private/ secrets.tdb.`

6. Remove any "CB" entries that provide access to individual users:

a. Remove any "CB" entries from the `/etc/passwd` file locally on the ContentBridge
b. Delete the `CLBHOSTNAME` file under `/tftpboot/config/gateway` on each ContentDirector.
c. Open `/etc/passwd` and delete entries for the same individual users (the entries do not contain "CB" in this file).

> 📝 **NOTE:** In order to access the Harmonic MediaGrid, the individual users must be added to the Open Directory domain.

7. Add the following line to the ContentBridge configuration file:

```
NATIVE Cluster IP or DNS name file system name
```

This can be done via SystemManager or by editing `/tftpboot/config/gateway/ContentBridge_hostname` manually on ALL ContentDirector nodes.

8. Restart the gateway service:
```
service gateway restart
```

9. Repeat all previous steps for each ContentBridge in the cluster.

Related information
Configuring Samba settings *on page 148*

Verifying communication with the domain controller

Perform these steps to verify communication between the ContentBridge or the High Bandwidth ContentBridge and the domain controller.

Before you begin
Configuring Samba settings
Adding the Open Directory server address to configuration files
Joining the ContentBridge 1000B to the Apple Open Directory Domain

1. Use `wbinfo` to do a domain user lookup using the following commands.
   Example: For a High Bandwidth ContentBridge with hostname "hbcb205" for test user "lqa1":

   ```
   [root@hbcb205 ~]# service winbind start

   [root@hbcb205 ~]# wbinfo -n lqa1
   [root@hbcb205 ~]# service winbind stop
   ```
   Result: Output similar to the following should appear:
   ```
   S-1-5-21-3782130030-2455357663-1162092550-2004 User (1)
   ```

   > 📝 **NOTE:** Make sure that winbind service is stopped after testing connectivity with the domain server. If you do not stop the winbind service on the ContentBridge, it will interfere with authentication when you attempt to access the Harmonic MediaGrid using CIFS.

2. If the ContentBridge configuration file contains a valid NATIVE line and the Harmonic MediaGrid is mounted on the ContentBridge, use smbclient on the ContentBridge to connect to the local CIFS share.
   The syntax for the `smbclient` command is:

   smbclient-U*username* -W*domain_name*\\\\\localhost*FS_name*

Example: A `smbclient` command for a High Bandwidth ContentBridge with hostname "hbcb205":

```
[root@hbcb205 ~]# smbclient -U lqa2 -W SNV-ENG \\\\localhost\\testfs
```

Result: The expected result is:

```
Domain=[SNV-ENG] OS=[Unix] Server=[Samba 3.4.7-58.fc7.om2]
smb: \>
```

Result: At the prompt, you will be able to list the file system, and perform other operations.

📝 **NOTE:** Make sure the Harmonic MediaGrid cluster is also joined to the domain.

📝 **NOTE:** In order to access the Harmonic MediaGrid, the individual users must be added to the domain.

Related information

Joining a cluster to a Local User Authentication (LUA) Domain

Create local user accounts and authenticate them across devices without requiring an external directory service such as Microsoft Active Directory or Lightweight Directory Access Protocol (LDAP).

Local User Authentication (LUA) supports multiple network file sharing protocols—Samba/CIFS, FTP, NFS, and FSD—and is a convenient way to support small to mid-size Harmonic MediaGrid implementations.

Verifying authentication configuration parameters for LUA

Before you join a cluster to a Local User Authentication (LUA) Domain, verify that all of your system authentication points (mdscore, nsswitch.conf, PAM, Samba) have been correctly configured.

This task uses the following UNIX commands.

cat *filename*
  Displays the contents of a file.

cp *filename filename.bak*
  Creates a copy of a source file (*filename*) with a new name (*filename.bak*).

vi *filename*
  Opens a file in a screen editor where you can make changes.

scp ovnuser@*IP address*:/etc/pam.d/mdscore
  Creates a local copy of a source file from a remote location (IP address).

Before you begin
Back up any files before you edit them.

1. Log into the ContentDirector using the following case-sensitive user name and password:

   User name: `ovnuser`
   Password: `OVN@SvCaUsa`

2. Turn your terminal session into a root session using the following command and password.

```
$ sudo -s
Password: OVN@SvCaUsa
```

3. Type the following commands to view the contents of `/etc/pam.d/mdscore` and update the required configuration parameters to match the example.

```
# cd /etc/pam.d
# vi mdscore
```

Example:

```
auth        sufficient pam_unix.so
auth        required    pam_ldap.so
account     sufficient pam_unix.so
account     required    pam_ldap.so
session     sufficient pam_unix.so
session     required    pam_ldap.so
password    sufficient pam_unix.so md5 shadow nullok try_first_pass use_authtok
password    required    pam_ldap.so
```

4. Type the following commands to update the contents of `/etc/nsswitch.conf` and update the required configuration parameters to match the example.

```
# cd /etc
# vi nsswitch.conf
```

Example:

```
passwd: files
group: files
shadow: files
```

5. Type the following commands to update the contents of `/omneon/config/mdscore[-local]` and verify that the only authentication method is the one in the example.

```
# cd /omneon/config/
# vi mdscore-local
```

Example:

```
auth_method = pam
```

6. Restart the ContentDirector.

```
# service omcld restart
```

7. Type the following commands to view the contents of `/etc/samba/smb.conf (/opt/omclb/conf/smb.conf)` and verify that the required configuration parameters match the example.

The values here are the default configuration.

```
# cd /omneon/config/
# cat smb.conf
```

> ℹ️ **TIP:** To remove all comments and view only the default configuration, enter the command `# sed -i '/^\s*$/d;/\;/d;/\#/d' smb.conf`

Example:

```
[global]
        workgroup = MYGROUP
        server string = Samba Server Version %v
        log file = /var/log/samba/log.%m
        max log size = 50
        security = user
        passdb backend = tdbsam
        load printers = yes
        cups options = raw
[homes]
        comment = Home Directories
        browseable = no
        writable = yes
[printers]
        comment = All Printers
        path = /var/spool/samba
        browseable = no
        guest ok = no
        writable = no
        printable = yes
```

What to do next

Repeat this process on the second ContentDirector in your network. Alternately, you can copy the files from the first ContentDirector using the scp command.

Creating the administrator password for ContentDirector

An administrator logon is required to access Webmin, the web-based system configuration tool used to create Local User Authentication.

1. Log into the ContentDirector using the following case-sensitive user name and password:

   > User name: `ovnuser`
   > Password: `OVN@SvCaUsa`

2. Type the following command to change the admin password.

   ```
   sudo passwd admin
   ```

   Result: You will be prompted to enter a password.

What to do next

Repeat this process on the second ContentDirector in your network.

Creating a Webmin server index

Create a master index of all the associated devices within Harmonic MediaGrid. A master index is required to manage local users across a cluster.

1. Log on as an administrator at `https://ip address:8080/`. The HTTPS connection secures SSL over the wire and port 8080 provides the Webmin service.

- ◦ To configure the entire cluster for local user authentication, use the IP address of the ContentDirector.
- ◦ Otherwise, use the IP address of the High Bandwidth ContentBridge.

2. Go to **Cluster** > **Webmin Servers Index** and click **Register a new server**.

3. Enter the IP address and other details of the server. Use the same administrator credentials for username and password that you used to log in to Webmin.

Figure 5-9:

4. Save the record and then repeat the steps above for each additional server. Include the server you are currently using.

Result: The **Managed Servers** list displays each server that you added and its connection status between it and the current device.

Adding groups and users to a cluster

Create groups and associated user accounts that you can use across all clustered devices. You must have at least one group.

You must create groups for any given user before you create that user.

1. Add a group to the cluster.

   a. As an administrator, log on to High Bandwidth ContentBridge or ContentDirector at `https://` *ip address*`:8080/`.
   The HTTPS connection secures SSL over the wire and port 8080 provides the Webmin service.

   b. Go to **Cluster** > **Cluster Users and Groups** > **Common Groups** > and click **Create a new group**.
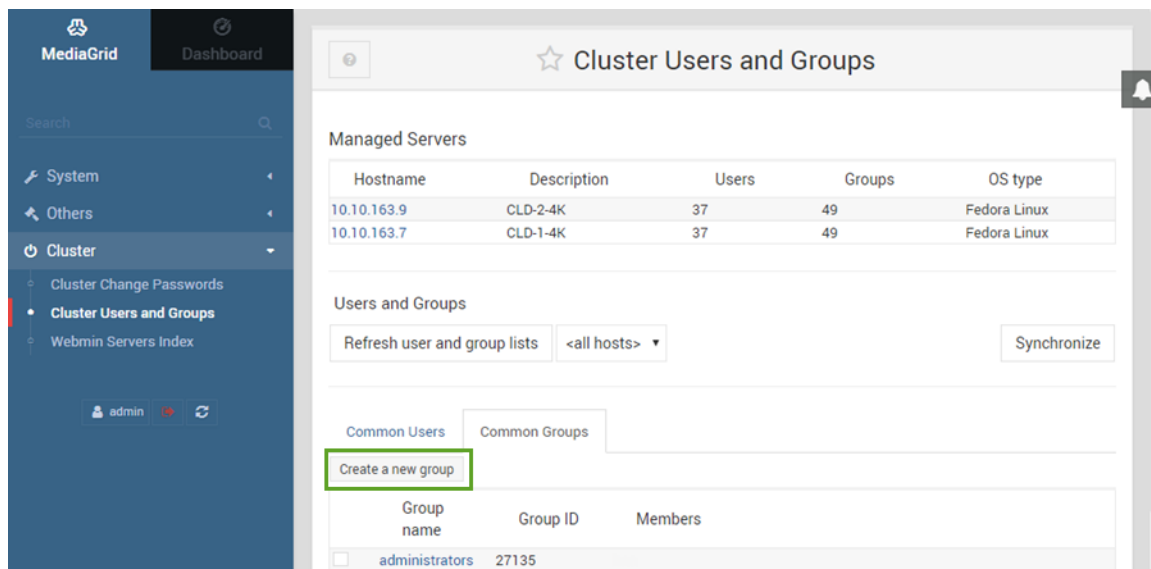
Figure 5-10:

c. Enter the group name and click **Create**.

2. Add a user to the cluster.

   a. As an administrator, log on to High Bandwidth ContentBridge or ContentDirector at `https:// ip address:8080/`.

   b. Go to **Cluster** > **Cluster Users and Groups** > **Common Users** > and click **Create a new user**.

   c. Enter the details of the user such as name, password, primary group membership, and click **Create**.

Figure 5-11:

What to do next

Log on to the ContentDirector and verify that new user records were created. Use the command `#` `pdbedit -L`.

If you find an unexpected user record, you can delete it using the command `# pdbedit -x -u` `username`

Synchronizing users and groups to an RMA system

Resynchronize all user and group accounts across all clustered devices.

> 📝 **NOTE:** The **Common Users** and **Common Groups** tabs will be empty until after the synchronization (because the RMA system has none of the common users or groups).

Synchronizing if you have changed the username or password for the RMA

1. As an administrator, log on to High Bandwidth ContentBridge or ContentDirector at `https://ip` `address:8080/`. The HTTPS connection secures SSL over the wire and port 8080 provides the Webmin service.

2. Go to **Cluster** > **Webmin Servers Index**.

3. Mouse-over the RMA system, and click on the (Edit) link.

4. Enter the new details of the administrative user (username and password), and click **Save**.

Resynchronizing users and groups across the cluster

1. As an administrator, log on to High Bandwidth ContentBridge or ContentDirector at `https://ip address:8080/`.
   Note the HTTPS connection (secure SSL over the wire), and port 8080, which provides the Webmin service.

2. Go to **Cluster** > **Cluster Users and Groups** and click **Synchronize**.

3. From the **Synchronize Servers** page, select **All missing users** and **All missing groups** to associate records stored in one device with all associated devices.

4. Click **Create Users and Groups**.

Authentication configuration parameters

When you choose an authentication type you need to make sure that all of your system authentication points (nsswitch.conf, PAM, Samba, mdscore, etc) are referring to the same configuration.

Active Directory

/etc/pam.d/mdscore

```
auth required pam_ldap.so
account required pam_ldap.so
session required pam_ldap.so
password required pam_ldap.so
```

/etc/nsswitch.conf

```
passwd: compat ldap
group: compat ldap
shadow: compat ldap
```

/omneon/config/ mdscore[-local]

auth_method = ads

Open Directory

/etc/pam.d/mdscore

```
auth required pam_ldap.so
account required pam_ldap.so
session required pam_ldap.so
password required pam_ldap.so
```

/etc/nsswitch.conf

```
passwd: compat ldap
group: compat ldap
shadow: compat ldap
```

LDAP

This PAM configuration for mdscore accounts for the identical (local files then LDAP) ordering. In either order, the ability for the first to provide faulty information overwriting the second is possible.

⚠ **CAUTION:** You must have unique users and groups between your authentication server and MediaGrid components to prevent faulty information overwriting.

```
auth sufficient pam_unix.so
auth required pam_ldap.so
account sufficient pam_unix.so
account required pam_ldap.so
session sufficient pam_unix.so
session required pam_ldap.so
password sufficient pam_unix.so md5 shadow nullok try_first_pass use_authtok
password required pam_ldap.so
```

Local User Authentication

/etc/pam.d/mdscore

```
auth required pam_unix.so
account required pam_unix.so
session required pam_unix.so
password required pam_unix.so
```

/etc/nsswitch.conf

```
passwd: files
group: files
shadow: files
```

/omneon/config/ mdscore[-local]

auth_method = pam

/etc/samba/smb.conf (/opt/omclb/conf/ smb.conf)

```
security = USER
workgroup = MYGROUP
```

No Authentication

/etc/pam.d/mdscore

```
auth required pam_unix.so
account required pam_unix.so
session required pam_unix.so
password required pam_unix.so
```

/etc/nsswitch.conf

```
passwd: compat
group: compat
shadow: compat
```

/omneon/config/ mdscore[-local]

```
auth_method = none
```

/etc/samba/smb.conf (/opt/omclb/conf/ smb.conf)

```
security = USER
workgroup = MYGROUP
```

Verifying ContentServer and ContentDirector services

Perform the following procedures to verify that the relevant services are running on the ContentServer and ContentDirector.

Verifying DHCP settings

DHCP is a client/server protocol that automatically provides an Internet Protocol (IP) host with its IP address and other related configuration information.

1. Type the following at the command prompt:
   ```
   sudo /sbin/chkconfig --list dhcpd
   ```

   Result: If DHCP is configured to be on, you will see output similar to the following:

   ```
   dhcpd 0:off 1:off 2:on 3:on 4:on 5:on 6:off
   ```

   If DHCP is configured to be off, you will see output similar to the following:

   ```
   dhcpd 0:off 1:off 2:off 3:off 4:off 5:off 6:off
   ```

2. If DHCP is OFF, type the following:
   ```
   sudo /sbin/chkconfig dhcpd on
   ```

3. Synchronize the time between the ContentDirector nodes by typing the following:
   ```
   ntpdate -u IP_ADDRESS
   ```

   where *IP_ADDRESS* is the IP address of a valid NTP server (preferably the SystemManager).

4. Apply the settings by typing the following:
   ```
   sudo service dhcpd restart
   ```

   Result: You should see output similar to the following:

   ```
   Internet Systems Consortium DHCP Server V3.0.2
   Copyright 2004 Internet Systems Consortium.
   All rights reserved.
   For info, please visit http://www.isc.org/sw/dhcp/
   ```

5. Type the following to verify that DHCP is running:
   ```
   sudo service dhcpd status
   ```

   Result: You should see output similar to the following:

   ```
   sudo service dhcpd status
   ```

   ```
   dhcpd (pid 2365) is running...
   ```
   Note that the "pid" is a process ID number, which will vary.

   > 📝 **NOTE:** SystemManager provides DHCP status (running or not), as well as failover mode on the **ContentDirector Properties** page. See the *Harmonic SystemManager User Guide* for details.

Verifying ContentDirector and ContentServer communication

Check the status of the ssmd service, which enables communication between the ContentDirector and ContentServer.

1. Start the ContentDirector services by typing the following at the command prompt:
   ```
   sudo service omcld start
   ```

2. Wait a few seconds and then type the following:
   ```
   ps -C ssmd
   ```

Result: You should see a reply similar to the following, which verifies ssmd is running:

```
PID TTY TIME CMD
23361 ? 00:25:48 ssmd
```

Verifying the metadata maintenance service

The metadata maintenance service, mdscore, maintains all of the file system metadata, such as names, directories, dates, and permissions.

1. Type the following at the command prompt:

   `ps -C mdscore`

   Result: You should see a reply similar to the following:

   ```
   PID TTY TIME CMD

   23452 ? 00:14:39 mdscore
   ```
   If mdscore is not running, the times may not be synchronized between ContentDirector nodes.

2. Check the actual current time on each ContentDirector by typing the following:

   `date`

3. If the times do not match, restart the services, and then repeat the steps above.

Related information

Verifying the mdscore service connection

1. Type the following at the command prompt to verify connection to the mdscore service:

   `sudo /opt/omcld/bin/mdsclientn localhost`

Result: If the connection is successful, you will see the following output:

```
mdsclientn: built on 2006-Jun-11 01:36 (USM_Branch_1_0)

Connecting to host "localhost", protocol "tcp", prog 0x20000003
New client is 0x56f8f0
Connected to "localhost"
Opening default session...
Found 4 IP addresses
     192.168.0.200
     192.168.1.200
     10.31.6.200
     10.31.7.200
Retrieving keys
Retrieved keys successfully, mdslen=140, sslen=140
     sessionID = 0x7dafec9c
     key = 78 56 34 12 f0 de bc 9a 44 33 22 11 88 77 66 55
     currentTime = Tue Jun 13 10:42:17 2006
     idleTime = 300 sec
    *host 0 = 2@10.31.6.200/10.31.7.200 id=0x7cc464a9b842dea
     host 1 = 4@10.31.7.201/10.31.6.201 id=0xaae24951f45af6df
Opened default session of 0x7dafec9c
```

If the connection is unsuccessful, you will see the following output:

```
mdsclientn: built on 2006-Jun-11 01:36 (USM_Branch_1_0)
Connecting to host "localhost", protocol "tcp", prog 0x20000003
Unable to reconnect to "localhost": RPC: Remote system error - Connection
 refused
Unable to connect to "localhost": RPC: Remote system error - Connection
 refused
```

2. If the connection was unsuccessful, wait 15 minutes and then try connecting again.

3. Type the following command to exit the mdsclientn program:
    ```
    exit
    ```

Verifying ContentServer disk space

In SystemManager, verify that each ContentServer has 100% space availability.

1. From the **Configuration** tab, click the **Servers** icon to access the **Servers List** page.

2. Locate the **Total Disk Space** and **Free Disk Space** for each ContentServer.

    Result: The total disk space will vary according to your RAID configuration and drive type. The **Free Disk Space** should be 100%. Refer to the *Harmonic SystemManager User Guide* for more information.

Related information
Supported RAID configurations *on page 19*

Verifying NFS share is exported by ContentBridge

From the Linux client, use the `showmount` command to verify the NFS share is exported by the ContentBridge.

1. Type the following command using the client Linux machine:

```
showmount -e (ContentBridge IP address or host name)
```

Result: You should see the following output (cb1.mediagrid.com is an example host name):

```
Export list for cb1.mediagrid.com:
/mnt/omfs/mds/csloh/omfs/fs0 0.0.0.0/0.0.0.0
/mnt/omfs/mds/omneon/omfs/fs0 0.0.0.0/0.0.0.0
```

2. If you wish to mount the file system, type the following:

```
mount -t nfs cb1.mediagrid.com:
/mnt/omfs/mds/omneon/omfs/fs0 /mnt
```

Opening network ports to enable client access

Specific network ports must be open to enable client access to Harmonic MediaGrid. This is particularly important if any security measures, including firewalls, are in place.

Harmonic MediaGrid clients must connect to and communicate on TCP ports 10600-10604; UDP port 111 must be open as well. Note that these ports must be open for the entire subnet in which Harmonic MediaGrid is contained.

Contact the customer network administrator for assistance.

ContentBridge configuration

This section includes configuration procedures, such as configuring a high-availability (HA) pair and adding a new ContentBridge or High Bandwidth ContentBridge to an existing system.

A configuration file exists for each ContentBridge, in which you can set up user access to files and directories, set up file transfers (including transfer of growing files), and tune performance. See the *Harmonic SystemManager User Guide* for instructions on editing the ContentBridge configuration file.

Configuring the Remote Media API on a ContentBridge

If you would like to initiate transfers of clips using the Remote Media API on a ContentBridge, you will need to edit the ContentBridge configuration file.

The Remote Media API version can be selected by editing the MEDIA_API_VERSION parameter in the ContentBridge configuration file. For information on supported versions, refer to the *Harmonic MediaGrid Release Notes*. For information on editing the configuration file, refer to "Editing the ContentBridge Configuration File" in the *Harmonic SystemManager User Guide*.

1. Obtain copies of `ommcp.exe` and `ommedia.dll` from Harmonic.

2. Ensure that the ContentBridge is configured correctly.

Example:

```
Spectrum Server hostname (or IP): om-spect Filesystem name /fs0

Content Director hostname (or IP): om-cld Filesystem name /mg0
Content Bridge hostname (or IP): 10.3.1.40 serial number: CLB01523
```

> 📝 **NOTE:** Short hostnames are supported in the ContentBridge configuration file if the hostname has the same domain name as the Harmonic MediaGrid system being configured. Otherwise, a fully qualified domain name (FQDN) must be specified in the configuration file if you wish to use hostnames. Note that remote ommcp's will only work using the exact hostname or IP address specified in the configuration file.

3. Make sure that the desired mount type(s) is specified in the ContentBridge configuration boot file `/tftpboot/config/gateway/`*serial_number* for each ContentDirector.

Note that on a ContentBridge there are three different types of remote mounts utilized. "CB" (ContentBridge) mounts are used for configuring a ContentBridge to share out a file system from a specific Harmonic MediaGrid cluster via CIFS, FTP, and NFS. The other two types of mount points are utilized only for the Remote Media API. They define remote systems that will be used to transfer media files. "MG" (Harmonic MediaGrid) mounts are for configuring remote Harmonic MediaGrid file systems. "CI" (CIFS) mounts are for configuring remote Spectrum servers, or other generic CIFS servers. The following shows the syntax for the configuration boot file:

```
MEDIA_API=YES
MG hostname filesystem_name username password
CI hostname share_name username password
```

> 📝 **NOTE:** Username and password are required parameters for Harmonic MediaGrid (MG) mounts. Username and password are optional for CIFS (CI) mounts to Spectrum systems, or other servers that allow anonymous CIFS access. If a hostname is specified, a mount will be made, however, a remote ommcp works solely on the hostname or IP address specified in the config file on the ContentDirector. Multiple MG and CI mounts are allowed.

4. Once you have edited the configuration file, save it and reboot the ContentBridge.

5. Using a client such as PuTTY, start an SSH session to the ContentBridge and type the following command:
```
df
```

Result: You should see output similar to the following:

```
Filesystem----------Mounted on

//om-spect/fs0------/mnt/om-spect/fs0
/om-cld/mg0--------/mnt/om-cld/mg0
```
> 📝 **NOTE:** Harmonic MediaGrid mounts have a single slash and CIFS/Spectrum mounts have double slashes under the file system column.

6. Type the following command:
```
service ommedia status
```

Result: Your response should be similar to:

```
[root@CLB04130 ~]# service ommedia status ommedia_remote_svc (pid 4552)
 is running...
ommedia_mon.sh (pid 4549 4548) is running...
[root@CLB04130 ~]#
```

7. On any Windows XP PC, copy `ommcp.exe` and `ommedia.dll` to the same directory.

8. Open a DOS Command prompt and type the following single command line to transfer a clip from Spectrum (10.2.1.15) to Harmonic MediaGrid (10.3.1.100) via ContentBridge (10.3.1.40).

   Example: `ommcp -in//om-spect/fs0/clip.dir/abc.mov -out//om-cld/mg0/clip.dir/`
   `abc.mov -host 10.3.1.40 -replace -progress`

   Result: As the transfer occurs, you will see the following transfer progress count, frame by frame, and also the transfer speed in frames per second (fps):

```
0 of 15000 frames copied (0.0 fps)
5 of 15000 frames copied (1.7 fps)
76 of 15000 frames copied (19.0 fps)
138 of 15000 frames copied (27.6 fps)
191 of 15000 frames copied (31.8 fps)
```

Configuring a high availability (HA) pair

Harmonic provides an HA Pair utility that you can run to create an HA pair configuration or remove one.

In a high availability (HA) pair, one High Bandwidth ContentBridge is the "active" node and one is the "shadow" node. If the CIFS processes, FTP, network connectivity, or power fails on the "active" node, the "shadow" node then becomes "active" and takes over operations.

When you run the HA Pair utility, you must specify an IP address for each node, an additional IP address to be *shared* by both nodes in the HA pair, a private subnet for the HA pair to use, and indicate which node will be the *preferred* node. If both peers fail, in the event of recovery, the preferred node becomes the "active" node first in order to avoid conflicts resulting from two active nodes.

⚠ **IMPORTANT:** Do not run the HA pair utility until you have identified the required IP addresses.

📝 **NOTE:** If you are configuring large numbers of HA pairs, you may wish to use separate power sources for some "preferred" nodes to plan for possible power outages.

Note that a client must be connected to the *shared* IP address of a High Bandwidth ContentBridge in an HA pair in order to remain connected in the event of a failover.

Before you begin:

• Make sure both nodes are running MediaGrid 3.2 or later.
• Make sure both nodes are connected to each other via the eth1 NIC.

Related information

Identifying the IP addresses for HA pairs

Before running the HA pair utility, determine the public (eth2) IP address for each node in the HA pair, the IP address that you wish to be *shared* by both nodes, and a private subnet to be used by the HA pair.

1. Identify the existing (eth 2) IP address in SystemManager:

    a. From the **Configuration** tab in SystemManager, click the **Servers & Switches** icon.

    b. In the **High Bandwidth ContentBridges** section of the page, view a list of devices and their (eth 2) IP addresses.

    > ⚠ **CAUTION:** Please consult with Technical Support before proceeding.

2. Determine the shared IP address as follows:

    a. Consult your network administrator to identify an available IP address.

    b. Make sure no device in your Harmonic MediaGrid system is using the desired IP address.

    You can log in to the ContentDirector and run one of the following commands to find all the IP addresses in use:

    - ◦ nmap -sP *network_address subnet_mask*
    - ◦ nmap -sP *network_address/subnet_prefix*

    c. If a device is using the desired IP address, shut down that device.

    d. Edit the DHCP configuration file on the ContentDirector to exclude DHCP from handing out the desired address.

    Example: The following example shows a DHCP configuration file that has been edited to free up the IP addresses 10.4.250.125 and 10.4.250.126. This assumes no other devices are using these IP addresses.

```
# 10.4.250.96/27 Public Network (single subnet configuration)
subnet 10.4.250.96 netmask 255.255.255.224 {
    option subnet-mask 255.255.255.224;
    option routers 10.4.250.97;
    pool {
        failover peer "Public";
        filename "pxelinux.0";
        range 10.4.250.105 10.4.250.126;
        next-server 10.4.250.101;
        deny dynamic bootp clients;
    }
}
```

Figure 5-12: Before editing the DHCP configuration file

```
# 10.4.250.96/27 Public Network (single subnet configuration)
subnet 10.4.250.96 netmask 255.255.255.224 {
    option subnet-mask 255.255.255.224;
    option routers 10.4.250.97;
    pool {
        failover peer "Public";
        filename "pxelinux.0";
        range 10.4.250.105 10.4.250.124;
        next-server 10.4.250.101;
        deny dynamic bootp clients;
    }
}
```

Figure 5-13: After editing the DHCP configuration file

When you run the HA pair utility and specify the shared IP address for your HA pair, the utility will statically assign that IP address to the HA pair.

3. Determine the private subnet for the HA pair.

The private subnet for an HA pair cannot be in use by any external client system. Because the private VLANs used by the ContentDirector nodes have the same requirements, Harmonic recommends that you specify the same subnet used by one of your ContentDirector private VLANs for your HA pair subnet.

If you choose to use a subnet outside your Harmonic MediaGrid system, make sure to modify your DHCP server to use the *shared* public address for your HA pair, rather than the public address for a stand-alone High Bandwidth ContentBridge.

Running the HA pair utility

Be sure that you have identified the required IP addresses for the HA pair before running the utility.

Before you begin
Identifying the IP addresses for HA pairs

1. Connect to one High Bandwidth ContentBridge directly or via SSH, or connect to one ContentDirector via SSH.

2. Log on using the following user name and password:

   User name: `ovnuser`
   Password: `OVN@SvCaUsa`

3. Enter the following command:
   ```
   run /home/ovnuser/scripts/utils/hapair
   ```

   Result: The HA pair utility provides the following options:

-h or --help	Displays a help message and exits.
--debug	Enables debug mode to test the configuration without enacting any system changes.
-f or --force	Specifies that the HA pairing mechanism should force the end nodes to re-configure regardless of their current state.
-c or --create	Specifies that you want to create an HA pair. This is the default function of this utility, and does not need to be explicitly specified.
-d or --destroy	Specifies that you want to destroy an HA pair. Note that destroying an HA pair does not affect the operation of either High Bandwidth ContentBridge that was previously paired.

4. Follow the prompts given by the utility to create the HA pair.
   The utility allows you to select which High Bandwidth ContentBridge will be the preferred node and which will be the shadow node. Once configuration is complete, you may veiw the status of the HA pair in SystemManager.

Viewing an HA pair in SystemManager

Once you have configured an HA pair, you can view the status of each device in the pair using SystemManager.

Before you begin
Identifying the IP addresses for HA pairs
Running the HA pair utility

1. From the **Configuration** tab, click the **Servers & Switches** icon.

2. In the **High Bandwidth ContentBridges (in HA mode)** section, you can view the active/shadow/ preferred node, the HA status, and other information.

   Example:

Name	IP Address	Shared IP	Preferred	HA State	Status	System Up Time	Config	System Management	Wink Status	Select
eng-hbcb5	10.4.250.14	10.4.250.22	eng-hbcb3	shadow	Connected -- Warning Alarm	27 days, 22:40:20.71	Edit	System Management	Off	☐
eng-hbcb3	10.4.250.12			active	Connected	14 days, 19:20:49.16		System Management	Off	☐

   [Wink On] [Wink Off] [Select all] [Clear]

   Figure 5-14:

Changing the preferred node in an HA pair

You can change the preferred node using the HA pair utility.

Before you begin
Identifying the IP addresses for HA pairs
Running the HA pair utility
Viewing an HA pair in SystemManager

1. Enter the following:

   ```
   ./hapair --force --create
   ```

2. When the HA Pair utility runs, specify a different preferred node.

Removing an HA pair configuration

You can remove an HA pair configuration using the HA pair utility.

Before you begin
Identifying the IP addresses for HA pairs
Running the HA pair utility
Viewing an HA pair in SystemManager
Changing the preferred node in an HA pair

Note that destroying an HA pair does not affect the operation of either High Bandwidth ContentBridge that was previously paired.

1. Enter the following:

   ```
   ./hapair --force --destroy
   ```

2. When the HA Pair utility runs, specify the HA pair you wish to destroy.

Adding a High Bandwidth ContentBridge to the Harmonic MediaGrid system

You can use the Configuration Assistant to add or replace a High Bandwidth ContentBridge.

The configuration script asks a series of questions requiring information specific to the customer site. Use the information from the *Harmonic MediaGrid Installation Planning Guide* specific to your Harmonic MediaGrid system to complete the answers. Note that the assistant will display suggested responses in brackets. During the assistant, you can use the up or down arrow keys to tab to previous responses.

The Configuration Assistant could provide a different IP address for the High Bandwidth ContentBridge than the one you wish to use. If so, when the configuration script asks you to confirm the system configuration, indicate NO. Then you can enter the desired IP address.

⚠ **CAUTION:** If you do not understand the procedures or recommendations described here, please consult with Technical Support before proceeding.

1. Connect a monitor and keyboard to the High Bandwidth ContentBridge you wish to add.

2. Log on to the High Bandwidth ContentBridge using the following user name and password:

   User name: `ovnuser`
   Password: `OVN@SvCaUsa`

3. Type the following command to set the FIRSTBOOT mode on the ContentBridge:
   ```
   sudo initconfig --setflag
   ```

   Note that, in some cases, running this command can result in the following message, which can be ignored:

   ```
   [root@hbcb1-1 ~]# initconfig --setflag
   Setting Firstboot flags (local)
   sh: /tftpboot/config/FIRSTBOOT: No such file or directory
   ```

4. If you wish to verify that FIRSTBOOT mode was set, you can check that the following files are now available on the ContentBridge:

   ```
   /tmp/FIRSTBOOT
   /omneon/sharedsys/FIRSTBOOT
   ```

5. Type the following commands to run the Configuration Assistant:

   ```
   cd /home/ovnuser/scripts
   sudo ./autoconfig -m
   ```

6. When prompted, insert a USB drive.

   Result: The Configuration Assistant automatically copies the configuration information to the USB drive.

7. Type the following command to copy the configuration information to this High Bandwidth ContentBridge:
   ```
   sudo ./copyconfigs -m
   ```

8. When prompted to enter the ID of the High Bandwidth ContentBridge in the specified range, make sure to select the ID of the device you are adding or replacing.

   If you are unsure of the correct ID, you may consider re-running the Configuration Assistant and manually setting the IP address of the High Bandwidth ContentBridge during the configuration.

9. Once copying is complete, remove the USB drive from the High Bandwidth ContentBridge.

10. Type the following command to remove the High Bandwidth ContentBridge from the FIRSTBOOT mode:
```
sudo initconfig --rmflag
```

Configuring a ContentBridge

Only perform these steps if you add a ContentBridge to an already-configured Harmonic MediaGrid system.

The ContentBridge must have a fixed (static) IP address. It is recommended that you assign an IP address from the bottom of the dynamic range and that those addresses be removed from the range. The DHCP server must also recognize the MAC address of the ContentBridge and assign it a reserved IP address during startup. The ContentBridge MAC address is located on the outside of the unit.

Follow these steps to assign a static IP address to the ContentBridge. Additionally, a DNS entry must exist in the domain server for the ContentBridge. Use the following IP address range when assigning the addresses: xx.xx.xx.50-99.

In the examples used below, "CLB0F118" is the ContentBridge host name. Make sure that the hardware Ethernet addresses match the port numbers (eth0 or eth1) and the public network addresses.

1. Open the `/etc/dhcpd.conf` file for the primary ContentDirector by typing the following:
```
sudo vi /etc/dhcpd.conf
```

2. Add two entries for each ContentBridge, including the following information:
   ○ domain-name-servers
   ○ domain-name
   ○ subnet-mask
   ○ routers
   ○ hardware Ethernet MAC address and fixed IP address (an entry is needed for each Ethernet port on the ContentBridge)

   Example: Note that your site-specific entries will be different that the example provided.
```
# Gateway CLB0F118 eth0
host CLB0F118-eth0 {
option subnet-mask 255.255.255.0;
option routers 172.16.1.1;
filename "pxelinux.0";
hardware ethernet 00:11:11:9f:d6:05;
fixed-address 172.16.1.99;
}

# Gateway CLB0F118 eth1
host CLB0F118-eth1 {
option subnet-mask 255.255.255.0;
option routers 172.16.2.1;
filename "pxelinux.0";
hardware ethernet 00:00:5a:72:8d:ee;
fixed-address 172.16.2.99;
}
```

3. Type the following to synchronize the time between the ContentDirector nodes:
```
ntpdate -u IP_ADDRESS
```

where *IP_ADDRESS* is the IP address of a valid NTP server (preferably the SystemManager).

4. Enter the following commands after editing the file:

```
sudo service dhcpd configtest
sudo service dhcpd restart
```

Enabling or disabling CIFS oplocks

Disabling CIFS oplocks improves data integrity for highly concurrent applications that use file locking. The setting is disabled by default.

You can set this option from the ContentDirector or ContentBridge. This option only affects the operation of CIFS on a ContentBridge. You must configure this option on each ContentDirector or ContentBridge in the cluster.

1. Open one of the following configuration files:

   ◦ On the ContentDirector, `/tftpboot/config/config`
   ◦ On the High Bandwidth ContentBridge, `/etc/gateway.conf`

2. Add the following line to the configuration file:
   `CIFS_OPLOCKS=NO`

   The acceptable values are "YES", "NO".

ContentServer configuration

You can configure a ContentServer by editing the configuration file in SystemManager.

A configuration file exists for every ContentServer in a cluster. The file is located on the ContentDirector at `/tftpboot/config/config`.

You can edit this file to enable certain settings and features, such as:

• Add the IP address of the log host
• Set the ContentServer to reboot after a kernel panic
• Set the ContentServer to reboot if they stop working
• Set the amount of detail included in logs
• Enable/disable jumbo frames on the ContentServer and ContentBridge
• Set the time zone

To access the configuration file in SystemManager, from the **Cluster Properties** page click **View/Edit ContentServer Config**. See the *Harmonic SystemManager User Guide* for complete instructions.

Slice size configuration

Slice sizes for individual audio and video files can be 256 KB, 512 KB, 1 MB, 2 MB, 4 MB or 8 MB.

⚠ **CAUTION:** Do not edit the Slice Size configuration file unless instructed by Technical Support. Using a smaller-than-recommended slice size can result in an unexpected loss of disk space.

Support of variable slice sizes allows more simultaneous file transfers and enables latency reduction in read operations.

Changing slice sizes is done by editing the Slice Size configuration file using the SystemManager application. This file also includes a buffer hint value, a reserved field that should always be 0 (zero).

See "Editing the Slice Size Configuration File" in the *Harmonic SystemManager User Guide* for instructions.

Accessing the file system

For clients that do not have the File System Driver (FSD) installed, the ContentBridge provides access to the file system via CIFS (Common Internet File System), FTP (File Transfer Protocol) or NFS (Network File System).

For instructions on using the File System Driver to access the file system, refer to the *Harmonic MediaGrid FSD User Guide*.

NOTE: Before accessing the Harmonic MediaGrid, you must edit the ContentBridge configuration file to support authentication and user access. See "Editing the ContentBridge Configuration File" in the *Harmonic SystemManager User Guide* for details.

About the share name

The Harmonic MediaGrid file system is exported using a "share name." This share name is created using the file system name and the account name used to access the file system, as specified in the ContentBridge configuration file.

The two are joined together with an underscore to create the share name, as follows:

FS_NAME_USERNAME

For example, if the ContentBridge configuration file contained the following line:

```
CB MG1 mgfs2 user3 passwd4
```

Then the share name would be mgfs2_user3.

See "Editing the ContentBridge Configuration File" in the *Harmonic SystemManager User Guide* for more information about adding valid usernames and passwords.

Using FTP on a Windows client

A valid user name and password must exist in the ContentBridge configuration file before you can access the file system.

1. Start an FTP application.

2. Enter the domain name of the ContentBridge.

3. Enter a valid user name and password.

    Result:

    The FTP client is placed in a directory two levels above the actual Harmonic MediaGrid mount point.

4. To access the Harmonic MediaGrid files, change to the following directory, where *FS_NAME* is the name of the file system: `/omfs/FS_NAME`

    NOTE: The maximum path length for any file in a Harmonic MediaGrid file system is 1025 characters (1024 + 1 for the NULL character).

Using CIFS on a Windows client

A valid user name and password must exist in the ContentBridge configuration file before you can access the file system.

1. On the taskbar, click the **Start** menu and then click **Run**.

2. In the **Open** text box, type the DNS name of the ContentBridge and the share name, preceded by two backslashes, as follows:
   ```
   \\DNS name\SHARE NAME
   ```

3. Enter a user name and password when prompted.
   The username and password must be the same as those specified in the ContentBridge configuration file for the particular Harmonic MediaGrid file system.

Using CIFS on a Macintosh client

A valid user name and password must exist in the ContentBridge configuration file before you can access the file system.

* To access the file system using the Macintosh GUI:
   a. Select **Connect to Server** from the **Go** menu on the desktop.
   b. Type the following:
      ```
      smb://ContentBridge_FQDN
      ```
      Example: `smb://clb01220.mediagrid.com`
   c. Enter a user name and password.
   d. Select the volumes you wish to mount.
* If you prefer to access the file system using the command line interface, enter one of the following commands:
   ◦ To specify the password in the command:
      ```
      mount -t smbfs //username:password@ContentBridge/share_name
      path_to_mount_point
      ```
   ◦ For interactive mode (enter a password when prompted):
      ```
      mount -t smbfs //username@ContentBridge/share_name path_to_mount_point
      ```

   The username and password must be the same as those specified in the ContentBridge configuration file used to export the particular Harmonic MediaGrid file system.

Using CIFS on a Linux client

A valid user name and password must exist in the ContentBridge configuration file before you can access the file system using this method.

1. Type the following at the command prompt:
   ```
   mount -t cifs -o username=USERNAME\\\\\CLB\\SHARE NAME /PATH/TO/MOUNT/POINT
   ```
   Example: `mount -t cifs -o username=aau \\\\\domain name\\testfs_aau /mnt/omfs`

2. When prompted for a password, enter the password associated with the user name in the ContentBridge configuration file.

Using NFS on a Linux client

When accessing the file system using NFS on a Linux client, you are not prompted for a user name or password.

- Type the following at the command prompt:

  `mount -t nfs CLB:/mnt/omfs/CLD/USER_NAME/omfs/FS_NAME /PATH/TO/MOUNT/POINT`

  Example: `mount -t nfs bridge:/mnt/omfs/director/aau/omfs/testfs /mnt/omfs`

Chapter 6

Administrative procedures

This section includes procedures for powering off the system, setting switch and ContentDirector passwords, upgrading software, and so on.

- *Logging on to a ContentDirector*
- *Enabling deep directories*
- *Balancing the ContentServer controllers*
- *Setting the ContentStore 5840/5840A identification number*
- *Expanding a Harmonic MediaGrid system (online)*
- *Drive capacity expansion in a Harmonic MediaGrid RAID system*
- *Upgrading Harmonic MediaGrid firmware*
- *Restarting a Harmonic MediaGrid device*
- *Powering down a Harmonic MediaGrid system*
- *Powering on a Harmonic MediaGrid system*
- *Changing the network switch default user name and password*
- *Upgrading the network switches*
- *Installing Harmonic MediaGrid and ContentDirector software*
- *Harmonic MediaGrid Recycle Bin*
- *Changing the default passwords*

Logging on to a ContentDirector

Making changes to certain configuration files and completing the Configuration Assistant requires logging on to a ContentDirector.

Once you have logged on to a ContentDirector, each command that changes or saves files must be preceded by `sudo`.

📝 **NOTE:** Entries requiring the `sudo` command are identified in this guide. Once the password is entered, you may complete these commands without a password for five minutes.

- Log into the ContentDirector using the following case-sensitive user name and password:

  User name: `ovnuser`

Password: `OVN@SvCaUsa`

Enabling deep directories

Perform this procedure to enable support for directories of more than 15 levels on all members of the cluster.

Support will be automatically enabled on any members which are added to a running cluster at a later time.

⚠ **IMPORTANT:** Make sure every ContentDirector in your Harmonic MediaGrid system is up and running. If a ContentDirector starts up while the current cluster members are down, it will not receive the required changes.

1. Log in to one ContentDirector as root.

2. Use the `mdsclientn` command in a running cluster to add a config file, which enables deeper directories.

   Example:

   ```
    # echo 1 > /tmp/yes
   # /opt/omcld/bin/mdsclientn localhost
   mdsclientn: built by mgrid-builds on 2014.... ......
   Opened default session of ......

   => session authenticate username password
   Authenticated successfully
   Session = .....

   => configfile add /tmp/yes no_dir_depth_limit
   The add was successful (2 bytes)
   ```

3. Optionally, use the `configfile` list command to check whether the config file is present.

   Example:

   ```
   => configfile list
   2 names were returned:
        clusteruid
        no_dir_depth_limit
   ```

About deep directories

With version 3.4 and later, you may enable your Harmonic MediaGrid file system to contain directories with more than 15 levels.

With deep directories enabled, client applications can create directories whose depth is only limited by the overall path limit (1024 bytes, which will be fewer than 1024 characters for non-ASCII character sets).

⚠ **CAUTION:** Before enabling this support, please note that moving to an earlier release after having created directories deeper than 15 levels is *not* supported. Harmonic recommends that you confirm your overall satisfaction with release 3.4 before enabling this feature.

⚠ **CAUTION:** Every ContentDirector in your system must be running release 3.4 before enabling deeper directories.

⚠ **CAUTION:** The client FSD must be running 3.4 in order to use this feature. There are known issues with all file system drivers (Windows, Mac, and Linux) running version 3.3 or

earlier when path names exceed 1000 bytes. Please keep file paths below this length until you have version 3.4 or later installed on your FSD clients.

⚠ **CAUTION:** If you do not understand the procedures or recommendations described in this section, please consult with Technical Support before proceeding.

If the client accesses the storage through an updated ContentDirector (that is, with deeper directories enabled), it will be able to create directories with more than 15 levels on all ContentDirector nodes.

However, if a client attempts to access those directories via a ContentDirector that has not been updated to enable deeper directories, you will see odd behavior, such as the following:

```
[root@localhost d]# pwd
/tmp/omneon/d/d/d/d/d/d/d/d/d/d/d/d/d/d/d
[root@localhost d]# find .
.
./d
./d/d
[root@localhost d]# cd d/d
-bash: cd: d/d: No such file or directory
```

Disabling deep directories

To disable deep directories, remove the config file that was added to enable it.

In this disabled state, you can access and move the contents in directories deeper than 15 levels, but you cannot create contents at this depth.

⚠ **IMPORTANT:** Make sure every ContentDirector in your Harmonic MediaGrid system is up and running. If a ContentDirector starts up while the current cluster members are down, it will not receive the required changes.

1. Log in to one ContentDirector as root.

2. Use the `mdsclientn` command to remove the config file.

   Example:

   ```
    # /opt/omcld/bin/mdsclientn localhost
   mdsclientn: built by mgrid-builds on 2014....
   ......
   Opened default session of ......

   => session authenticate username password
   Authenticated successfully
   Session = .....

   => configfile delete no_dir_depth_limit
   The file was deleted
   ```

Balancing the ContentServer controllers

Harmonic recommends that you balance the Slice Server processes across controllers to improve performance after certain situations.

Any time one controller on a ContentServer goes down, the active Slice Server processes on that controller fail over to the remaining controller. Harmonic recommends that you balance both controllers

following any of the events listed below. If you fail to do so, it can negatively affect the performance of the ContentServer.

- Capacity expansion
- ContentServer upgrade
- Controller replacement
- Controller fail-over
- If the **Managed ContentServers and ContentStores** field on the ContentServer Properties page shows all, or a large majority, of ContentStore and ContentServer nodes being managed by one controller (for example, five out of six).

> 📝 **NOTE:** Harmonic recommends that you schedule balancing during times when the system is not loaded. For example, this may be late at night. System performance may be affected while balancing is occurring.

1. Click the **Servers & Switches** icon on the **Configuration** tab to access the **Servers & Switches** page.

2. In the **ContentServers/ContentStores** section, click the **Name** hyperlink for the required ContentServer to access the **Properties** page.

3. Click the **Failback** button.

> 📝 **NOTE:** You may also use the **Failback** button on any ContentStore being managed by the ContentServer you wish to balance.

4. Verify that all ContentServer and ContentStore nodes appear in the **Managed ContentServers and ContentStores** field on the ContentServer **Properties** page. If they are not all listed, contact Harmonic technical support for assistance.

   After clicking **Failback**, you may observe on the ContentServer **Properties** page that some ContentStore or ContentServer nodes in the **Managed ContentServers and ContentStores** field for one controller now appear under a different controller, in which case, balancing was successful.

Setting the ContentStore 5840/5840A identification number

Use the Input switch on the operator's panel to set the ID number. Values of "01" to "99" are valid.

The ID number is not set before the first system power on. The display is set to "00" (flashing). The unit continues to power up even if the unit identification number is not set.

1. Press and hold the Input switch on the operator's panel for five seconds.

   Result: The left-hand digit flashes.

2. Press and release the Input switch to increment the number until the required digit is reached.

3. Press and hold the Input switch for five seconds.

   Result: The right-hand digit flashes.

4. Press and release the Input switch to increment the number until the required digit is reached.

5. Press and hold the Input switch for five seconds to finish setting the number.

Expanding a Harmonic MediaGrid system (online)

Follow this procedure when you wish to connect an additional ContentStore to an existing Harmonic MediaGrid while the system remains powered on.

You can connect up to four ContentStore 4240 or 5840/5840A nodes to the ContentServer 4000, and up to five ContentStore 3160 nodes to the ContentServer 3000.

> ⚠ **IMPORTANT:** In order to prevent a temporary loss of service, you must power down the associated ContentServer controllers, one at a time, before you connect the SAS cable(s) in each SAS domain.

> 📝 **NOTE:** On the ContentServer 4000, the top controller corresponds with **Controller 0** in SystemManager, and the bottom controller corresponds with **Controller 1**.

> 📝 **NOTE:** On the ContentServer 3000, when looking at the rear panel, the left-hand controller corresponds with **Controller 0** in SystemManager, and the right-hand controller corresponds with **Controller 1**.

1. Rack mount the new ContentStore.

2. Ensure that separate, isolated power sources are available for each power supply module, then connect the power cables to the new ContentStore and to their power sources.

   > ⚠ **IMPORTANT:** Do not power on the ContentStore or connect any SAS cables at this time.

3. Using SystemManager, power down Controller 0 on the ContentServer as follows:
   a. From the **Configuration** tab, click **Servers & Switches** to access the **Servers & Switches** page.
   b. In the **ContentServers/ContentStores** section, click the **Name** of the associated ContentServer.
   c. From the **Properties** page, scroll to the **ContentServer Controllers** section and then click the **Shutdown** button for **Controller 0**.
   d. Click **OK** to confirm.

4. Connect the SAS cable as follows:

   ◦ For the Harmonic MediaGrid 4000 series, connect one end of the SAS cable to an open SAS port on the top controller of the ContentServer, and then connect the other end of the cable to SAS-1 on the top expander module on the ContentStore.
   ◦ For the Harmonic MediaGrid 3000 Series, connect one end of the SAS cable to the right-hand SAS port on the left-hand controller on the last ContentStore in the daisy chain, and then connect the other end of the cable to the left-hand SAS port on the left-hand controller on the new ContentStore.

5. Apply power to the new ContentStore by pressing the power button on the front panel.

6. Power on Controller 0 on the ContentServer by pressing the power button on the front panel of the ContentServer.
   Note that the Controller 1, which is already powered on, will not be affected.

7. On the **ContentServer Properties** page, verify that the **Status** field for Controller 0 changes to **Connected**.

8. Power down Controller 1 on the ContentServer by clicking the **Shutdown** button, and then click **OK** to confirm.

9. Connect the SAS cable as follows:

- ◦ For the Harmonic MediaGrid 4000 Series, connect one end of the SAS cable to an open SAS port on the bottom controller of the ContentServer, and then connect the other end of the cable to SAS-1 on the bottom expander module on the ContentStore.
- ◦ For the Harmonic MediaGrid 3000 Series, connect one end of the SAS cable to the right-hand SAS port on the right-hand controller on the last ContentStore in the daisy chain, and then connect the other end of the cable to the left-hand SAS port on the right-hand controller on the new ContentStore.

10. Power on Controller 1 by pressing the power button on the front panel of the ContentServer.

11. On the **ContentServer Properties** page, verify that the **Status** field for Controller 1 changes to **Connected**.

12. Add the new ContentStore to the associated group as follows:
    a. From the **Cluster Properties** page, click the associated **Group ID**.
    b. From the **Group Properties** page, select the device you wish to add to the group, and then click **Add Server(s) to this Group**.
    c. Click **OK** to confirm, and then click **Done**.

13. Navigate to the **ContentServer Properties** page and click the **Failback** button to balance the ContentServer controllers.

Drive capacity expansion in a Harmonic MediaGrid RAID system

Expanding drive capacity in your Harmonic MediaGrid RAID system requires significant planning. An integral component of this process is shelf evacuation, which can take many hours, or even days, for each ContentServer or ContentStore involved.

Please read the following sections carefully and plan accordingly.

> **NOTE:** Capacity expansion requires Harmonic MediaGrid version 3.5 or later (on all components in your Harmonic MediaGrid system) and SystemManager 6.2.3 or later.

About shelf evacuation

Shelf evacuation involves transferring data, one shelf at a time, to other shelves in the volume or, for stretch cluster configurations, to other shelves in the same group.

This allows you to maintain uninterrupted access to data while expanding capacity, or while reconfiguring, replacing, or retiring a shelf.

In a Harmonic MediaGrid RAID system, a shelf is one ContentServer 3000 or 4000, one ContentStore 3160 or 4240, or one *drawer* in a ContentStore 5840/5840A. The shelf being evacuated is automatically set to read-only mode. It can still service client read requests, however this capability will diminish as data is removed from the shelf after being copied to another shelf.

Note that, if the balancer is enabled when an evacuation begins, it will be suspended throughout the evacuation process and will resume once all shelves return to normal service. After capacity expansion, Harmonic recommends running the balancer on high priority in order to rebalance the system as quickly as possible.

About write bandwidth during shelf evacuation

Although the Harmonic MediaGrid system can still service read and write requests during shelf evacuation, note that write bandwidth will be reduced both by the portion represented by the shelf being evacuated and by the overhead of copying slices to the other shelves.

During evacuation, you can set the priority level to either "normal" or "high", depending on your write bandwidth requirements. When planning for capacity expansion, consider the impact that each priority level will have on the entire time needed for expansion..

Priority Level	Description
Normal	If the Harmonic MediaGrid cluster will be in use during the evacuation process (reads and writes are taking place), you should set the priority level to normal. Note that this setting increases the amount of time required to complete the evacuation.
High	If the Harmonic MediaGrid cluster will be idle during the evacuation process (reads or writes will not be taking place), then you can set the priority level to high. Note that this setting decreases the amount of time required to complete the evacuation.

Reviewing available space

To prepare for capacity expansion, determine the amount of disk space that will be available in the volume or group after a shelf has been evacuated.

Free up as much space as possible! When expanding capacity in multiple shelves, data is repeatedly moved from one shelf to another. The less data there is to move, the faster the process will go.

1. In SystemManager, navigate to the **Cluster Properties** page, and then click **Shelf Evacuation Control/Status** to open the **Shelf Evacuation** page for the cluster.

2. In the **Total Disk Space** column, find the shelf with the least amount of space. If each shelf has the same total disk space, look in the **Free Space (%)** column and find the shelf with the greatest amount of free space.

Figure 6-1:

3. For the same shelf, note the **Estimated free space in group/volume after evacuation**.

The following table will help you determine if there is enough free space for evacuation:

Color	Status
Green	Sufficient space is available, even if the Harmonic MediaGrid cluster will be in use (reads or writes are taking place) during the evacuation.
Yellow	Sufficient space is available if the Harmonic MediaGrid cluster will have limited use during the evacuation.
Red	Sufficient space is available if the Harmonic MediaGrid cluster will be idle (no reads or writes are taking place) during the evacuation.
Dark Red	Insufficient space available; the **Write Disable** and **Evacuate** buttons are grayed out. You must free up space or add storage in order to proceed.

About setting shelves to read-only mode

To prevent data from migrating to the next shelf to be evacuated in the same volume or group, you can manually set this shelf to read-only.

⚠ **CAUTION:** Manually setting a ContentServer or ContentStore to read-only mode is intended to facilitate capacity expansion ONLY. Do not set a shelf as read-only for any other purpose.

By default, Harmonic MediaGrid distributes content that has been evacuated from one shelf equally across all remaining shelves in the volume or group. This has the advantage of maintaining maximum

possible read bandwidth. However, it increases the total amount of time required for evacuation by moving data to the shelf that will be evacuated next.

If any of the following is true, DO NOT configure the additional shelf as read-only:

- The volume, or each group in the stretch cluster, has fewer than 10 shelves.
- The system has less than 20% available disk space.
- You cannot tolerate further reduction in write bandwidth.

⚠️ **IMPORTANT:** Harmonic recommends that you set no more than 2 shelves to read-only, which includes the shelf being evacuated, in a volume or group of 10 shelves.

If you find during the evacuation process that your users require more writable space than anticipated, you can return a shelf to read-write duty at any time.

After you have expanded drive capacity in the first or second shelf, the volume or group should have enough free space to support setting all of the unexpanded shelves to read-only during subsequent evacuations. Note that doing so concentrates the migrated content on the few remaining writable servers. This, in turn, reduces the effective read bandwidth for files that contain these slices. If the system is not in use, this will speed up the expansion process. However, it will take longer to balance the cluster after all shelves have been expanded.

Expanding drive capacity

Begin this procedure only after you have determined that your system has sufficient free space and you have planned accordingly.

1. In SystemManager, navigate to the **Cluster Properties** page, and then click **Shelf Evacuation Control/Status** to open the **Shelf Evacuation** page for the cluster.

2. From the **Priority** drop-down menu, select the priority level for evacuation:

   ◦ **Normal**: Select if the Harmonic MediaGrid cluster will be in use (reads or writes are taking place) during shelf evacuation.
   ◦ **High**: Select if the Harmonic MediaGrid cluster will be idle (no reads or writes are taking place) during shelf evacuation.

   📝 **NOTE:** You may change the priority level at any time during the evacuation.

3. If your system meets the criteria specified in *About setting shelves to read-only mode*, you may set the first two shelves to be evacuated in the volume or group as read-only. If your system does not meet the criteria, skip this step.

   a. Select **Write Disable** for the shelf that will be evacuated first, and then click **OK** to confirm.

      Result: The **CS Status** changes to `ReadOnly`.

   b. Select **Write Disable** for the shelf that will be evacuated next, and then click **OK** to confirm.

      📝 **NOTE:** For a stretch cluster configuration, select the next shelf that will be evacuated *in the same group*.

      Result: The **CS Status** field changes to `ReadOnly` and SystemManager updates the **Estimated free space in group/volume after evacuation**.

   c. Note the updated estimated free space after evacuation and consider the anticipated load during the evacuation process.

   d. If there is limited or insufficient free space, or you anticipate heavy load during the evacuation process, return the shelf to normal service by clicking **Write Enable**.

4. For the shelf you intend to evacuate first, select **Evacuate**, and then click **OK** to confirm.

    Result: Within a short while, the **Write Disable** and **Evacuate** buttons change to **Write Enable** and **Cancel Evacuation**. The **CS Status** field changes to `Evacuating`, which also appears on the **Properties** page and the **Servers & Switches** page.

    Lastly, after a short delay, SystemManager shows an estimated time of completion. This estimate is based on the rate at which the Harmonic MediaGrid has copied slices so far, and the number of slices remaining, without regard to slice sizes. This estimate will change with increased/decreased load on the system or network, or with significant variation in the size of slices to be moved.

5. Monitor the progress of the evacuation.

    ◦ If the evacuation appears to be stuck at 99% or 100%, this may mean the shelf has not yet reported that it is done deleting the last few slices that were copied to other shelves. Wait a few minutes for the **CS Status** to update.

    ◦ If an error occurs, refer to "Possible errors during shelf evacuation," and follow the instructions for troubleshooting the particular error that occurred.

    ◦ If necessary, you may cancel the evacuation by clicking **Cancel Evacuation**. Note that canceling an evacuation does not return the data, which has already been transferred, back to the original shelf.

    Following a cancellation, you must return the shelf to normal service (see *step 10*) and rebalance the ContentServer and ContentStore nodes in the cluster (see *step 12*).

    Result: When evacuation is complete, the **CS Status** changes to `Evacuated` and the following message appears:

    ```
    Data migration for component name has completed. The component may be
     retired.
    ```

    📝   **NOTE:** After a shelf is evacuated, the value for **Free Space (%)** may be slightly less than 100. This is expected following a successful evacuation.

    Proceed to the next step only after the evacuation has successfully completed.

6. Navigate to the **Properties** page and click **Wink On** to identify the physical ContentServer or ContentStore that was evacuated.

    📝   **NOTE:** The ContentStore 5840 appears as two devices in SystemManager. Be sure to navigate to the correct **Properties** page.

7. From the **RAID Sets** section of the **Properties** page, destroy all of the RAID sets for the shelf that was evacuated.
    For instructions, refer to "Destroying a RAID Set" in the *Harmonic SystemManager User Guide*.

8. For the shelf that was evacuated, replace the original drives with higher capacity drives.
    For instructions, refer to the *ContentServer Component Replacement Guide* or *ContentStore Component Replacement Guide*.

9. Using SystemManager, create new RAID sets for the shelf that was expanded.
    For instructions, refer to "Creating a RAID Set with Auto Create" or "Creating a RAID Set" in the *Harmonic SystemManager User Guide*.

10. From the **Shelf Evacuation Control/Status** page in SystemManager, click **Write Enable** for the shelf that was evacuated to return the shelf to normal service.

11. Repeat *step 3* through *step 10* to expand capacity in the remaining shelves, one at a time.

> 📝 **NOTE:** For a stretch cluster configuration, alternate between groups with each shelf expansion. If you have write-disabled an additional shelf, leave this shelf in read-only mode (if possible) while expanding a shelf in the other group.

12. Once all the shelves have been returned to normal service, navigate to the **View/Edit Balancer Scheduling** page for the cluster, and balance the ContentServer and ContentStore nodes. Harmonic recommends that you select **Start balancer(high) now** to start the balancer immediately. If that is not possible, configure your balancing shedule to complete as quickly as possible. Refer to "Enabling and Configuring Scheduled Balancing" in the *Harmonic SystemManager User Guide*.

Possible errors during shelf evacuation

Some errors, such as network outages and shelf failover, may interfere with the shelf evacuation process. Check the View Alarms page for any errors that were generated during the evacuation.

If you see any of the following errors, check for network connectivity, shelf status (online/offline), and free space on the shelf:

- `SSID=SSID Evacuation canceled due to excessive errors.`

  > 📝 **NOTE:** This message refers to errors in retrieving status from the shelf being evacuated.

- `SSID=SSID Evacuation canceled due to inaccessible server.`
- `Unable to migrate slice: SID. Evacuation canceled.`
- `Unable to migrate slice: SID. Evacuation of SSID=SSID canceled.`

Once the Harmonic MediaGrid is stable, confirm that there is still sufficient space to evacuate the shelf and then resume the procedure for expanding drive capacity.

If the error persists for the same slice ID, wait 10 minutes and try again.

In some cases, particularly on live systems, you may see the following error:

```
Data migration for ContentServer=SSID was not able to complete after X
 retries.
```

If this occurs, contact Harmonic technical support for assistance.

Upgrading Harmonic MediaGrid firmware

Upgrade firmware using SystemManager. To ensure a smooth system upgrade, upgrade devices in the given order.

> 📝 **NOTE:** To avoid loss of service, upgrade ContentDirector nodes one at a time, as described in the steps that follow.

1. From the left-hand column on the **Home** tab, click the **Firmware Selection** icon to display the **Firmware Version Selection** page, shown below.
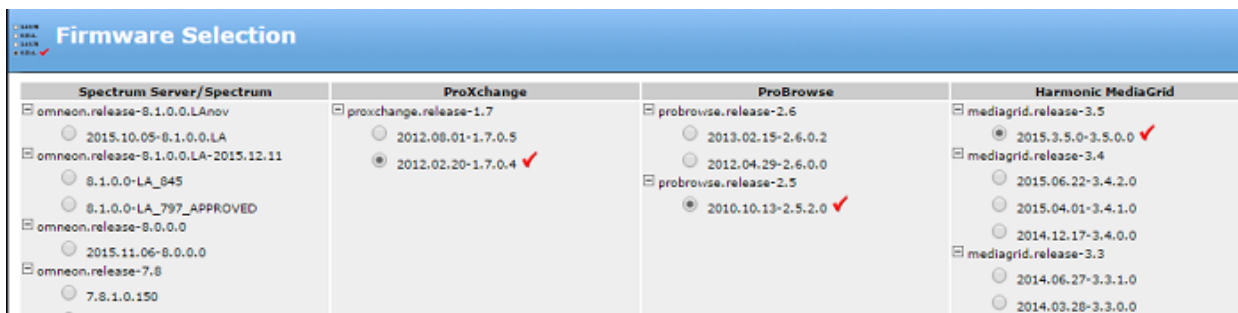
Figure 6-2:

2. In the **Harmonic MediaGrid** column, click the radio button for the desired firmware version. The red check mark indicates the selected version.

3. When the confirmation dialog appears, click **OK** to accept.

4. Click the **Upgrade Firmware** icon in the left-hand column to display the **Upgrade Firmware** page.

5. In the **ContentDirectors** section, click in the **Select** column to specify the ContentDirector you want to upgrade.
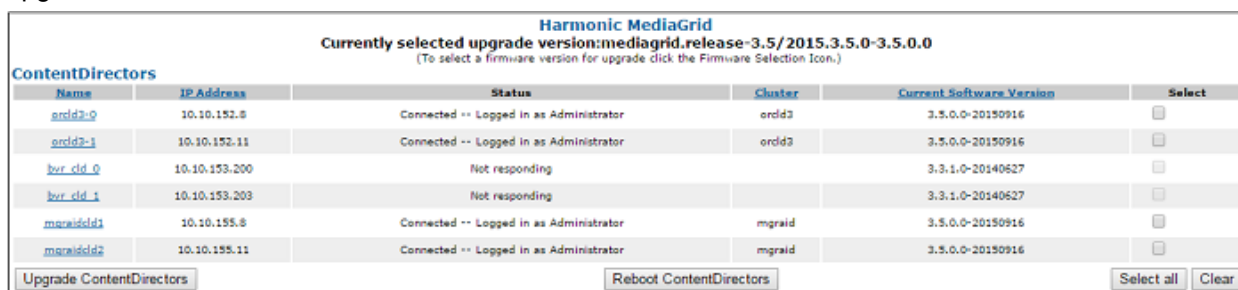
Figure 6-3:

6. Click **Upgrade ContentDirectors** to start upgrading the firmware of the selected ContentDirector.

   ⚠ **IMPORTANT:** When upgrading or rebooting Harmonic MediaGrid devices, do not upgrade or reboot two different device types at the same time. Consult with your Harmonic representative if you need assistance.

7. Wait for the **Status** column to show `Connected`.

8. Once the status of the first ContentDirector returns to `Connected`, proceed with upgrading the remaining ContentDirector nodes, one a time, by repeating steps 5-7.

9. Clear or delete the alarms and monitor them for a few minutes to ensure that no new alarms are generated after each ContentDirector is upgraded.

10. Restart the ContentDirector nodes in your system, one by one, by clicking **Reboot ContentDirector**.

    ⚠ **IMPORTANT:** When upgrading to version 3.4.x or later, restart each ContentDirector node a second time in the same order as used during the first series of restarts except for the last node in your system. This will enable the improved space reporting provided in 3.4.x and later.

11. Return to the **ContentDirectors** section of the **Upgrade Firmware** page to verify the version number for each node that was upgraded.

12. Upgrade the firmware for the ContentServer nodes in your system.

> ⚠️ **IMPORTANT:** Downgrading the ContentServer 4000 firmware to versions earlier than 4.3.0.0 when more than oneContentStore 5840 is attached to the system is not permitted and is prevented by the SystemManager.

a. In the **Controllers** section of the page, select one controller per ContentServer to upgrade by clicking in the **Select** column for the corresponding controller and then clicking **Upgrade Controllers**.

> ⚠️ **IMPORTANT:** Upgrading both controllers on a ContentServer at the same time will cause the system to be unavailable during reboot and is not recommended.

You can upgrade multiple controllers from different ContentServer enclosures in parallel by selecting one controller from each ContentServer you wish to upgrade.

b. Once the firmware has been downloaded to the controllers, return to the **Controllers** section of the **Upgrade Firmware** page, select each controller that was upgraded and click **Reboot Controllers**.

Result: The updated firmware version displays when the reboot is complete.

c. Select the second controller for each ContentServer you are upgrading by clicking in the **Select** column for the corresponding controller and then clicking **Upgrade Controllers**.

d. Select each controller that was upgraded and click **Reboot Controllers**.

Result: The updated firmware version displays when the reboot is complete.

e. Once you have upgraded both controllers on a ContentServer, Harmonic recommends that you balance the ContentServer.

13. Upgrade the firmware for the ContentBridges in your system. In the **High Bandwidth ContentBridges** section, select one or more units for upgrade, and then click **Upgrade High Bandwidth ContentBridges**.

Related information
Balancing the ContentServer controllers *on page 177*

Restarting a Harmonic MediaGrid device

Safely restart a device from the **Properties** page in SystemManager.

1. From the **Properties** page for the device you wish to restart, click the **Reboot** button located at the bottom of the **General Properties** section.

2. Click **OK** to confirm.

Result: The device restarts.

3. Verify that the **Status** field changes to **Not Responding**, and then returns to its previous state.

> 📝 **NOTE:** It might take a few minutes for the status to change, depending on the length of the discovery cycle and the status of other devices in your network.

Powering down a Harmonic MediaGrid system

Power down the entire system only when directed to do so by Harmonic support.

This procedure requires that you shut down all ContentDirector nodes first, then all ContentBridge nodes, and then all ContentServer nodes. Wait for each group of devices to change to **Not Responding** before powering down the next group of devices. It may take a few minutes for the status to change to **Not Responding**, depending on the length of the discovery cycle and the status of other devices in your network.

⚠️ **IMPORTANT:** Only perform the following steps if directed to do so by Harmonic technical support.

1. From the **Configuration** tab in SystemManager, click the **Servers & Switches** icon.

2. From the **Servers & Switches** page, click the link for the cluster that you wish to shut down.

3. From the **Cluster Properties** page, in the **Shutdown cluster** section, click **Shutdown all ContentDirectors in a cluster**.

4. Click **OK** to confirm.

5. Scroll to the **ContentDirectors** section of the page and confirm that the **Network Status** indicates **Not Responding**.

6. Disconnect the power cables from each ContentDirector.

After each ContentDirector has shut down, the **Shutdown all ContentBridges in a cluster** button will be activated.

7. Click **Shutdown all ContentBridges in a cluster**.

8. Click **OK** to confirm.

9. Scroll to the **ContentBridges** section of the page and confirm that the **Network Status** has changed to **Not Responding**.

10. Disconnect the power cables from each ContentBridge.

After each ContentBridge has shut down, the **Shutdown all ContentServers in a cluster** button will be activated.

11. Click **Shutdown all ContentServers in a cluster**.

12. Click **OK** to confirm.

13. Scroll down to the **ContentServers/ContentStores** section of the page and confirm that the **Network Status** indicates **Not Responding**.

14. Physically power down each ContentServer and ContentStore in the cluster as follows:

Option	Description
ContentServer 4000	Press the power button on the control panel and hold for four seconds. Once the disk drive LEDs are off, disconnect the two power cords from the back of the server.
ContentServer 3000	Press the red power button on the control panel on the front of the server and hold for five seconds. Once the disk drive LEDs are off, disconnect the two power cords from the back of the server.

Option	Description
ContentStore 5840/5840A	Move all power supply switches to the "off" position. Once the front panel LEDs are off, disconnect the power cables from the power supplies.
ContentStore 4240	Press the power button on the control panel and hold for four seconds. Once the disk drive LEDs are off, disconnect the two power cords from the back of the server.
ContentStore 3160	Press the red power button on the control panel on the front of the device and hold for five seconds. Once the disk drive LEDs are off, disconnect the two power cords from the back of the device.

15. Shut down the SystemManager platform:
    a. Click the **Start** button on the task bar, and then click **Shut Down**.
    b. Disconnect the power cable if necessary.

16. Power down each network switch by disconnecting the power cords.

Powering down a single ContentDirector

Safely power down the device from SystemManager.

1. From the **Configuration** tab, click the **Servers & Switches** icon.

2. From the **Servers & Switches** page, in the **ContentDirector** section, click the name of the ContentDirector you wish to power down.

3. From the **Properties** page, click the **Shutdown** button located at the bottom of the **General Properties** section.

4. Click **OK** to confirm.

5. Verify that the **Status** field indicates **Not Responding**.

   📝 **NOTE:** It might take a few minutes for the status to change, depending on the length of the discovery cycle and the status of other devices in your network.

6. Disconnect the power cables.

Powering down a single ContentBridge

Safely power down the device from SystemManager.

1. From the **Configuration** tab, click the **Servers & Switches** icon.

2. From the **Servers & Switches** page, in the **ContentBridge** section, click the name of the ContentBridge you wish to power down.

3. From the **Properties** page, click the **Shutdown** button located at the bottom of the **General Properties** section.

4. Click **OK** to confirm.

5. Verify that the **Status** field indicates **Not Responding**.

   📝 **NOTE:** It might take a few minutes for the status to change, depending on the length of the discovery cycle and the status of other devices in your network.

6. Disconnect the power cables.

Powering down a single ContentServer

Use SystemManager to safely power down the device.

1. From the **Configuration** tab, click the **Servers & Switches** icon.

2. From the **Servers & Switches** page, in the **ContentServers/ContentStores** section, click the name of the device you wish to power down.

3. From the **Properties** page, click **Shutdown All Enclosures** to shut down both controllers.

   📝　　**NOTE:** This also shuts down all managed ContentServer and ContentStore nodes.

4. Click **OK** to confirm.

5. Verify that the **Status** field indicates **Not Responding**.

   📝　　**NOTE:** It might take a few minutes for the status to change, depending on the length of the discovery cycle and the status of other devices in your network.

6. Physically power down the device as follows:

Option	Description
ContentServer 3000	Press the power button on the control panel and hold for five seconds.
ContentServer 4000	Press and hold the power button on the control panel for four seconds.

7. Once all disk drive LEDs are off, disconnect both power cables from the rear of the chassis.

Powering down a single ContentStore

Safely power down the device from SystemManager.

1. From the **Configuration** tab, click the **Servers & Switches** icon.

2. From the **Servers & Switches** page, in the **ContentServers/ContentStores** section, click the name of the device you wish to power down.

3. From the **Properties** page, click the **Shutdown** button located at the top of the page.

4. Click **OK** to confirm.

5. Verify that the **Status** field indicates **Not Responding**.

   📝　　**NOTE:** It might take a few minutes for the status to change, depending on the length of the discovery cycle and the status of other devices in your network.

6. Physically power down the device as follows:

Option	Description
ContentStore 3160	Press the red power button on the control panel on the front of the device and hold for five seconds. Once the disk drive LEDs are off, disconnect the two power cords from the back of the device.
ContentStore 4240	Press and hold the power button on the control panel for four seconds. Once all disk drive LEDs are off, disconnect the power cables from the power supplies.
ContentStore 5840/5840A	Move all power supply switches to the "off" position. Once the front panel LEDs are off, disconnect the power cables from the power supplies.

Powering on a Harmonic MediaGrid system

Make sure all Harmonic MediaGrid devices are connected before continuing.

⚠️ **IMPORTANT:** The steps must be followed in the order described below.

1. Apply power to the network switches by plugging the power cords into power sources.

2. Apply power to the SystemManager by connecting the power cord to a power source, and then pressing the power button on the front panel.

   📝 **NOTE:** If you have already configured the SystemManager with an IP address ending in "dot-10," wait until after the Configuration Assistant is complete before powering on this device.

3. Apply power to each ContentDirector by connecting both power cords to separate, isolated power sources, and then press the power button on the front panel.

   Result: The ContentDirector takes approximately five minutes to start. Wait for the power-on indicator to light before continuing.

4. If the ContentBridge with Harmonic MediaGridServer software 4.x or earlier is part of your system, apply power by connecting both power cords to separate, isolated power sources, and then press the power button on the front control panel.
   Wait for the power-on indicator to light before continuing.

5. If the ContentBridge 1000B is part of your system, apply power by connecting the power cord to a power source, and then press the power switch on the rear panel.

6. Apply power to each ContentServer and ContentStore as follows:

Option	Description
ContentServer 4000	Connect the power cords to power sources, and then press the power button on the front panel.
ContentStore 4240	Connect the power cords to power sources, and then press the power button on the control panel.
ContentServer 3000	Connect the power cords to power sources. Press the power button on the control panel on the front of the server.
ContentStore 3160	Connect the power cords to power sources, and then press the power button on the front panel.
ContentStore 5840/5840A	Connect the power cords to the power supplies and to power sources. Move all power supply switches to the "on" position.

Changing the network switch default user name and password

This procedure allows you to change the default user name and password on Harmonic-provided HP ProCurve switches.

Each network switch is preset with the following user name and password:

   User name: Administrator
   Password: omneon

1. Connect to the switch using HyperTerminal.

2. Enter the following at the command prompt to edit the configuration file:
   ```
   HP ProCurve Switch 6400cl-6XG# config
   ```

3. Enter the following command to specify the new user name (including the quotation marks):
   ```
   HP ProCurve Switch 6400cl-6XG(config)# password manager user-name
   "username"
   ```

4. Enter the following to specify a new password of up to 16 characters:
   ```
   New password for Manager: your password
   ```

5. Retype the password to confirm.

6. Type the following to save the configuration file:
   ```
   HP ProCurve Switch 6400cl-6XG(config)# write memory
   ```

7. Type the following to exit HyperTerminal:
   ```
   HP ProCurve Switch 6400cl-6XG(config)# logout
   ```

   > **TIP:** If you happen to forget the user name and password, press the **Clear** button on the front of the switch to clear the current user name and password. Repeat the steps above to create a new user name and password.

Upgrading the network switches

Harmonic-provided network switches are shipped with the required firmware version installed. Only perform the procedures in this section if directed to do so by Technical Support.

Upgrading the network switch firmware

Use HyperTerminal to connect to the switch. The required firmware file must be saved to the local machine.

1. Connect to the switch using HyperTerminal.

2. Type the following at the command prompt:
   ```
   copy xmodem flash
   ```

   Result: The following response appears:

   ```
   The Primary OS Image will be deleted, continue [y/n]?
   ```

3. Type y to continue.

   Result: The following response appears:

   ```
   Press 'Enter' and start XMODEM on your host...
   ```

4. Press **Enter** to continue.

5. Select **Send File** from the **Transfer** menu on the HyperTerminal menu bar.

6. On the **Send File** window, set the **Protocol** field to **Xmodem** and select the firmware file from the local machine.

7. Click the **Send** button to upgrade the firmware.

   Result: The switch verifies the file once the transfer is complete.

8. Reboot the switch when the prompt appears to apply the new firmware.

Saving the configuration file

While still connected to the switch using HyperTerminal, save the startup configuration file.

Before you begin
Upgrading the network switch firmware

1. While connected to the switch using HyperTerminal, go to the Main Menu.

2. Select **Command Line (CLI)** from the Main Menu.

3. Type the following two lines at the command prompt:

   ```
   HP ProCurve Switch 3400cl-48G(config)# write memory
   ```

   ```
   HP ProCurve Switch 3400cl-48G(config)# copy startup-config xmodem pc
   ```

   The first command saves the configuration file in flash memory. The second command copies the configuration file.

4. Press **Enter** when prompted.

5. Select **Receive File** from the **Transfer** menu on the HyperTerminal menu bar.

   Result: A **Receive File** window appears.

6. Select the folder in which the configuration file will reside.

7. Change the **Use receiving protocol** field to **Xmodem**.

8. Click the **Receive** button to download the configuration file.

9. Name the configuration file when prompted.

   > **TIP:** Use the serial number or the location of the switch for easy reference. For example, use "switch1rack1" as part of the configuration file name.

Uploading the Configuration File

While connected to the switch using HyperTerminal, upload the startup configuration file.

Before you begin
Upgrading the network switch firmware
Saving the configuration file

1. While still connected to the switch using HyperTerminal, go to the Main Menu.

2. Select **Command Line (CLI)** from the Main Menu.

3. Type the following at the command prompt:
   ```
   HP ProCurve Switch 3400cl-48G(config)# copy xmodem startup-config
   ```

   Result: The following response appears:

   ```
   Device may be rebooted, do you want to continue [y/n]?
   ```

4. Type y to continue.

Result: The following response appears:

```
Press 'Enter' and start XMODEM on your host...
```

5. Press **Enter** to continue.

6. Select **Send File** from the **Transfer** menu on the HyperTerminal menu bar.

   Result: A **Send File** window appears.

7. Type the name of the configuration file in the **Filename** text box or click the **Browse** button to search for the file.

8. Set the **Protocol** field to **Xmodem**.

9. Click the **Send** button to upload the configuration file.

   Result: The switch reboots after the file is loaded.

10. Return to the Main Menu and then log out of HyperTerminal before removing the serial cable.

Related information
Upgrading the network switch firmware *on page 192*

Installing Harmonic MediaGrid and ContentDirector software

The Harmonic MediaGrid operating system software and the ContentDirector software are both pre-installed prior to shipment. Refer to the installation procedures only if you are installing the software for the first time.

Before you begin

⚠️ **IMPORTANT:** Perform the following steps to first verify if the operating system and ContentDirector software are installed.

1. Attach a keyboard and monitor to the serial connector on the back of the ContentDirector, and then power on the ContentDirector.

   Result:

   ◦ If the Dell license agreement displays on the ContentDirector followed by a prompt to install an operating system, then the operating system software needs to be installed.
   ◦ If the ContentDirector boots up in Linux, the Harmonic MediaGrid operating system software is installed. Continue to the next step.

2. To determine if the ContentDirector software is installed, log on to the ContentDirector and then type the following command:
   ```
   [cld ~] $ sudo rpm -q omneon_cld
   ```

   Result:

   ◦ If the software is installed, package information about the CLD services is displayed, along with the current version of the software, for example: `omneon_cld-1.1-200609014`.
   ◦ If the ContentDirector software is not installed, the following displays: `package omneon_cld not installed`. If this happens, you will need to install the ContentDirector Platform Support Package and the ContentDirector software.

Installing the Harmonic MediaGrid operating system software

Perform this procedure only after you have determined that the Harmonic MediaGrid OS software was not pre-installed on the ContentDirector.

📝 **NOTE:** Only perform the following functions if directed by Technical Support.

Repeat the software installation and configuration steps below for each ContentDirector.

1. Make sure the disk drives are fully seated in each ContentDirector and ContentServer.

2. Attach a keyboard and monitor to the serial connector on the back of the ContentDirector.

3. If the ContentDirector is currently powered on, hold down the Power button on the front panel for approximately 10 seconds to shut it down.

4. Once the ContentDirector is powered down, press the Power button to boot the ContentDirector.

5. Insert the Harmonic MediaGrid OS DVD into the DVD-ROM drive.

   Result: The Fedora Core4 Installation screen appears.

6. If the operating system installation does not begin, type the following at the command prompt, and then press **Enter**.
   ```
   boot: linux ks=cdrom:/ks.cfg
   ```

   Result: After 30 seconds, the installer automatically partitions the hard drive and installs all necessary packages. Once complete, the DVD automatically ejects and the ContentDirector reboots.

   📝 **NOTE:** It can take up to 15 minutes for the operating system installation to complete.

Installing the ContentDirector Platform Support Package

This package installs the software to support the latest ContentDirector hardware. Perform this procedure only when directed by Technical Support.

1. Attach a keyboard and monitor to the ContentDirector.

2. Insert the Harmonic MediaGrid Platform Support Package CD-ROM into the DVD drive.

3. Log on to the ContentDirector using the following credentials:

   Username: `ovnuser`
   Password: `OVN@SvCaUsa`

4. On the Linux command line, mount the CD-ROM onto the `/mnt` directory by typing the following:
   ```
   [ovnuser@cld ~]$ sudo mount /dev/cdrom /mnt/
   ```

   If the `mounting read-only` warning displays, you can ignore it.

5. Change to the directory `/mnt`, as shown below:
   ```
   [ovnuser@cld ~]$ cd /mnt
   ```

6. Execute the installation script by typing the following:
   ```
   [ovnuser@cld mnt]$ sudo ./install_hw.sh
   ```

   Result: A series of output lines display, showing the progress of the installation sequence.

7. Once the command prompt returns, eject the CD by typing the following commands:
   ```
   [ovnuser@cld ~]$ cd /[ovnuser@cld ~]$ sudo eject
   ```

Installing the ContentDirector software

Follow these steps when installing the complete ContentDirector software for the first time, or if you need to reinstall the complete ContentDirector software.

1. Attach a keyboard and monitor to the ContentDirector.

2. Insert the Harmonic MediaGrid Software Installation CD-ROM into the DVD drive.

3. Log on to the ContentDirector with the following credentials:

   Username: `ovnuser`
   Password: `OVN@SvCaUsa`

4. On the Linux command line, mount the CD-ROM onto the `/mnt` directory by typing the following:
   ```
   [ovnuser@cld ~]$ sudo mount /dev/cdrom /mnt/
   ```

   If the `mounting read-only` warning displays, you can ignore it.

5. Change directory to `/mnt`, as shown below:
   ```
   [ovnuser@cld ~]$ cd /mnt
   ```

6. Execute the installation script by typing the following:
   ```
   [ovnuser@cld mnt]$ sudo ./install.sh
   ```

   Result: A series of output lines display, showing the progress of the installation sequence.

7. Press **ENTER**.

8. Once the command prompt returns, reboot the ContentDirector by typing the following:
   ```
   [ovnuser@cld mnt]$ sudo reboot
   ```

   Result: The ContentDirector reboots in approximately 5 minutes.

Harmonic MediaGrid Recycle Bin

When you turn on the Recycle Bin, files deleted from Harmonic MediaGrid are temporarily stored. You can then restore these files to their original locations or permanently remove them.

This feature uses a command-line interface and is intended for Harmonic MediaGrid administrators. Note that multiple directory entries to the same file (hard links) are not supported.

Turning on the Recycle Bin

A setting in the `mdscore-local` configuration file controls the Recycle Bin, which is turned off by default. To use the Recycle Bin you must turn it on for each ContentDirector in a cluster.

1. Using an SSH client, connect to the ContentDirector as an administrator.

2. Open `/omneon/config/mdscore-local`.

3. Set values for each of the Recycle Bin attributes:

recyclebin_on = on	Recycle bin status. The default value is off.
recyclebin_max_space = 3	The maximum amount of storage space assigned to the Recycle Bin. The default value is 3% of file system space.

recyclebin_retention_hint = 168	The retention time, in hours, before the contents of the recycle bin are permanently removed. Files are removed in the order they arrive (first in, first out). The default value is 168 hours, or 7 days.

4. Restart the ContentDirector.

Verifying the Recycle Bin has been turned on

You can review the Recycle Bin status of every ContentDirector in the cluster using the `rbadmin` live command.

- Enter the following command: `# rbadmin live --getattributes --user=`*username*` --pass=`*password*.

   Result:

   ```
   success, 2 hosts
   CLD-2-4K/0xf896a83673b61f1e userecyclebin=1 retentionhint=maxspace=3
   CLD-1-4K/0x427cf6e724ac112d userecyclebin=1 retentionhint=maxspace=3%
   ```

Checking the Recycle Bin properties

The Recycle Bin uses a retention time limit to keep the hard drive space optimized, while giving you enough time to recover deleted files. Use the `rbadmin live ---cleanerstatus` to see how much space is used and which ContentDirector is deleting files.

- Enter the following command: `# rbadmin live --cleanerstatus --user=`*username*` --pass=`*password*.

   Result:

   ```
   Volume space: 231.90T, Cleaner: CLD-1-4K, Recycle Bin: Max space -
   3.0% (6.96T) and Used space - 0.0%
   ```

Recovering a file from the Recycle Bin

The `rbadmin restore` command allows you to restore a file to its original location.

1. Using an SSH client, connect to a ContentDirector as an administrator.

2. To review the contents of the Recycle Bin, enter the following: `# rbadmin list --sort=opath`. The `sort` parameter is optional.

   Result:

   ```
   396318224 /mg4/dir01 0 2017.09.27 20:01:06.371 +0000
   396318336 /mg4/dir01/file01.mov 512000000 2017.09.27 20:01:06.370 +0000
   395378960 /mg4/dir02 0 2017.09.27 20:01:13.012 +0000
   395567576 /mg4/dir02/file01.mov 512000000 2017.09.27 20:01:13.011 +0000
   396334568 /mg4/dir03/file01.mov 512000000 2017.09.27 20:12:56.327 +0000
   69484800 /mg4/omlogs/CLD-1-4K/mdscore.20170827.210257.gz 41791032
    2017.09.27 19:02:56.021 +0000
   31020712 /mg4/omlogs/CLD-1-4K/
   mgraid-16471289RN00080-0.log.20170826.150252.gz 1313983 2017.09.27
    19:02:55.949 +0000
   66771560 /mg4/omlogs/CLD-1-4K/ssmd.20170827.190257.gz 20657286 2017.09.27
    19:02:55.996 +0000
   ```

3. To restore a file to its original location, enter the following: `# rbadmin restore` *`filepath`* `-- user=`*`username`* `-- pass=`*`password`* `--verbose`.
   The `verbose` parameter is optional. It can be used to view additional details about the restore.

   Result:

   ```
   /mg4/dir03/file01.mov: restored
   countDone 1, countFail 0
   ```

Permanently deleting a file from the Recycle Bin

The `rbadmin delete` command allows you to permanently delete a file from the Recycle Bin.

1. Using an SSH client, connect to a ContentDirector as an administrator.

2. To review the contents of the Recycle Bin, enter the following: `# rbadmin list --sort=opath`.
   The `sort` parameter is optional.

   Result:

   ```
   396318224 /mg4/dir01 0 2017.09.27 20:01:06.371 +0000
   396318336 /mg4/dir01/file01.mov 512000000 2017.09.27 20:01:06.370 +0000
   395378960 /mg4/dir02 0 2017.09.27 20:01:13.012 +0000
   395567576 /mg4/dir02/file01.mov 512000000 2017.09.27 20:01:13.011 +0000
   396334568 /mg4/dir03/file01.mov 512000000 2017.09.27 20:12:56.327 +0000
   69484800 /mg4/omlogs/CLD-1-4K/mdscore.20170827.210257.gz 41791032
    2017.09.27 19:02:56.021 +0000
   31020712 /mg4/omlogs/CLD-1-4K/
   mgraid-16471289RN00080-0.log.20170826.150252.gz 1313983 2017.09.27
    19:02:55.949 +0000
   66771560 /mg4/omlogs/CLD-1-4K/ssmd.20170827.190257.gz 20657286 2017.09.27
    19:02:55.996 +0000
   ```

3. To delete the file, enter the following: `# rbadmin delete` *`filepath`* `--user=omneon -- pass=usm -- verbose`.
   The `verbose` parameter is optional. It can be used to view additional details about the deletion.

   Result:

   ```
   Will permanently delete 1 file. Continue? [Yes/No]
   ```

4. Enter `Y` to confirm the deletion.

   Result:

   ```
   /mg4/dir01/file01.mov: permanently deleted
   countDone 1, countFail 0
   ```

Recovering a directory and its contents from the Recycle Bin

Use the `rbadmin restore` command with the recursive parameter to restore a directory and its contents.

1. Using an SSH client, connect to a ContentDirector as an administrator.

2. To review the contents of the Recycle Bin, enter the following: `# rbadmin list --sort=opath`.
   The `sort` parameter is optional.

Result:

```
396318224 /mg4/dir01 0 2017.09.27 20:01:06.371 +0000
396318336 /mg4/dir01/file01.mov 512000000 2017.09.27 20:01:06.370 +0000
395378960 /mg4/dir02 0 2017.09.27 20:01:13.012 +0000
395567576 /mg4/dir02/file01.mov 512000000 2017.09.27 20:01:13.011 +0000
396334568 /mg4/dir03/file01.mov 512000000 2017.09.27 20:12:56.327 +0000
69484800 /mg4/omlogs/CLD-1-4K/mdscore.20170827.210257.gz 41791032
 2017.09.27 19:02:56.021 +0000
31020712 /mg4/omlogs/CLD-1-4K/
mgraid-16471289RN00080-0.log.20170826.150252.gz 1313983 2017.09.27
 19:02:55.949 +0000
66771560 /mg4/omlogs/CLD-1-4K/ssmd.20170827.190257.gz 20657286 2017.09.27
 19:02:55.996 +0000
```

3. To restore the entire folder and its contents, enter the following: `# rbadmin restore` *`directory`* `--recursive=1 --user=`*`username`* `-- pass=`*`password`* `--verbose`.
The `verbose` parameter is optional. It can be used to view additional details.

   Result:

```
/mg4/dir02: restored
/mg4/dir02/file01.mov: restored
countDone 2, countFail 0
```

Permanently deleting a directory and its contents from the Recycle Bin

Use the `rbadmin delete` command with the recursive parameter to permanently delete a directory and its contents.

1. Using an SSH client, connect to a ContentDirector as an administrator.

2. To review the contents of the Recycle Bin, enter the following: `# rbadmin list --sort=opath`.
The `sort` parameter is optional.

   Result:

```
396318224 /mg4/dir01 0 2017.09.27 20:01:06.371 +0000
396318336 /mg4/dir01/file01.mov 512000000 2017.09.27 20:01:06.370 +0000
395378960 /mg4/dir02 0 2017.09.27 20:01:13.012 +0000
395567576 /mg4/dir02/file01.mov 512000000 2017.09.27 20:01:13.011 +0000
396334568 /mg4/dir03/file01.mov 512000000 2017.09.27 20:12:56.327 +0000
69484800 /mg4/omlogs/CLD-1-4K/mdscore.20170827.210257.gz 41791032
 2017.09.27 19:02:56.021 +0000
31020712 /mg4/omlogs/CLD-1-4K/
mgraid-16471289RN00080-0.log.20170826.150252.gz 1313983 2017.09.27
 19:02:55.949 +0000
66771560 /mg4/omlogs/CLD-1-4K/ssmd.20170827.190257.gz 20657286 2017.09.27
 19:02:55.996 +0000
```

3. To delete the entire folder and its contents, enter the following: `# rbadmin delete` *`directory`* `--recursive=1 --user=`*`username`* `-- pass=`*`password`* `--verbose`.
The `verbose` parameter is optional. It can be used to view additional details.

   Result:

```
Will permanently delete 2 files. Continue? [Yes/No]
```

4. Type `Y` to confirm the deletion.

Result:

```
/mg4/dir01/file01.mov: permanently deleted
/mg4/dir01: permanently deleted
countDone 2, countFail 0
```

Recycle Bin command-line parameters

Use the parameters below to extend the Recyle Bin commands. From the command prompt you can view this information when you enter `rbadmin --help`.

Table 6-1: rbadmin list

Parameter	Description	Example
src = *filter*	Locate a system by its path and an additional attribute. Attributes include: ctime, mtime, atime, size, name, path, ouid, pouid, opath, oname, dtime, type, osid, dsid. See `rbadmin --help` for details.	`--src=opath:/mg4/dir01 dtime:newer-2d12h`
fmt	Format the order of the list attributes. The default format is ouid, opath, size, and dtime.	`--fmt=ouid,size`
showtags	Include attribute tags for the list attributes. For example, `ouid=396318224 opath=/mg4/dir01`. Values are 0 and 1.	`--showtags=1`

Table 6-2: rbadmin restore

Parameter	Description	Example
src = *filter*	Locate a system by its path and an additional attribute. Attributes include: ctime, mtime, atime, size, name, path, ouid, pouid, opath, oname, dtime, type, osid, dsid. See `rbadmin --help` for details.	`--src=opath:/mg4/dir01 dtime:newer-2d12h`
dst	Restore the file or directory to a new location.	`--dst=/mg4/dir04`

Table 6-3: rbadmin delete

Option	Description	Example
src = *filter*	Locate a system by its path and an additional attribute. Attributes include: ctime, mtime, atime, size, name, path, ouid, pouid, opath, oname, dtime, type, osid, dsid. See `rbadmin --help` for details.	`--src=opath:/mg4/dir01 dtime:newer-2d12h`
force	Force delete a file or directory to prevent the system prompt `Continue? [Yes/No]` from appearing. Values are 0 and 1.	`--force=1`

Table 6-4: rbadmin live

Option	Description	Example
getattributes	Get the current configuration from every ContentDirector.	`N/A`
cleanerstatus	Get information on the disk space usage of the Recycle Bin.	`N/A`
emptynow	Remove all current Recycle Bin contents.	`N/A`
maxspace	Update the maximum amount of storage space assigned to the Recycle Bin. Values are of percentage of the file system space. Note that changes made with the `rbadmin live` command are temporary. When a service is stopped, started or restarted, this option returns to its original value in the `mdscore-local` configuration file.	`--maxspace=4`
retentionhint	Update the retention time, in hours, before the contents of the Recycle Bin are permanently removed. Note that changes made with the `rbadmin live` command are temporary. When a service is stopped, started or restarted, this option returns to its original value in the `mdscore-local` configuration file.	`--retentionhint=72`
stopempty	Stop removing files from the Recycle Bin when --emptynow is in progress.	`N/A`
userecyclebin	Turn the Recycle Bin on or off for each ContentDirector in a cluster. Values are 0 and 1. Note that changes made with the `rbadmin live` command are temporary. When a service is stopped, started or restarted, this option returns to its original value in the `mdscore-local` configuration file.	`--userecyclebin=1`

Changing the default passwords

To change the superuser ("omneon") and/or administrator ("mgadmin") password, follow the procedure below.

1. Edit on each ContentDirector `/omneon/config/mdscore-local` to add one (or both) of these lines:

   ```
   superuser_password = XXXX
   admin_password = YYYY
   ```

   ⚠ **IMPORTANT:** Default passwords are also specified in `/omneon/config/mdscore`. However, this file is replaced after a system update or upgrade. Edit only the file with –local in order for changes to persist across system upgrades.

2. Restart services on ContentDirector.

3. Edit on each ContentBridge `/etc/gateway.conf` to specify the new password:

   ◦ for High Bandwidth ContentBridge running MG Server 4.x or 3.x with authentication mechanism "AD", "LDAP", or "OD":

     NATIVE *cld filesys* password=XXXX

   ◦ for High Bandwidth ContentBridge 4.x or 3.x without user directory services configured:

     CB *cld filesys* mgadmin YYYY
     CB *cld filesys* omneon XXXX

   ◦ for ContentBridge running CLB 5.0 and above with authentication mechanism "AD" or "LUA":

     NATIVE *cld filesys* password=XXXX

   ◦ for ContentBridge running CLB 5.0 and above with authentication mechanism "AS" with one or both of:

     CBADMIN *cld filesys* password=YYYY
     CBSUPER *cld filesys* password=XXXX

   ⚠ **IMPORTANT:** A default password for superuser omneon is also specified in `/etc/init.d/gateway`. However, this file is replaced after a system update or upgrade. Edit only `/etc/gateway.conf` in order for changes to persist across system upgrades.

   📝 **NOTE:**

   For old diskless ContentBridge-1000: Config is similar to the High Bandwidth ContentBridge, but the content of `gateway.conf` is stored on the ContentDirector in `/tftpboot/config/gateway/`ContentBridgexxxxx.

4. Restart High Bandwidth ContentBridge or ContentBridge services after editing `gateway.conf`.

Hardware reference

This chapter provides hardware reference information, such as front and rear panel views, and LED indicators, of the devices used in a Harmonic MediaGrid system.

For information about any of the following hardware platforms, please refer to version 4.0 of the *Harmonic MediaGrid Installation and Configuration Guide*: ContentDirector 1000B/C/D/E; High Performance ContentDirector 2000, 2000B; ContentBridge 1000, 1000B; High Bandwidth ContentBridge 2010B/C/D/E.

- *ContentDirector 2000C/1000F hardware reference*
- *ContentBridge 2010F hardware reference*
- *ContentServer 3000 hardware reference*
- *ContentServer 4000 hardware reference*
- *ContentStore 3160 hardware reference*
- *ContentStore 4240 hardware reference*
- *ContentStore 5840 hardware reference*
- *ContentStore 5840A hardware reference*
- *5406 Network Switch*
- *Power and cooling specifications*

ContentDirector 2000C/1000F hardware reference

These devices have the same front and rear panel components and the same functionality. However, the ContentDirector 2000C, also called the High Performance ContentDirector, includes additional memory and two solid-state drives to increase performance.

Bezel components

The bezel on the ContentDirector 2000C/1000F consists of a power indicator, air vents, and status LEDs.
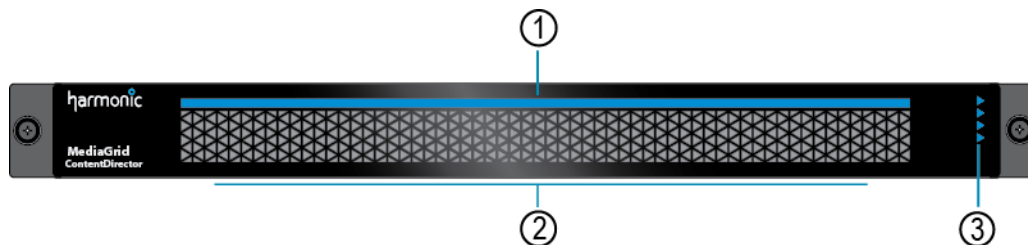

Figure 7-1: Bezel components

Component	Description
1. Power Indicator	A bright blue power indicator is provided across the top of the front panel. This indicator also provides a "wink" function, which allows you to identify a unit from the SystemManager application.
2. Air vents	Allows airflow through the unit. For optimum airflow, do not obstruct the air vents.
3. Status LEDs	An array of four status LEDs is provided on the front panel.

Bezel status LED indicators

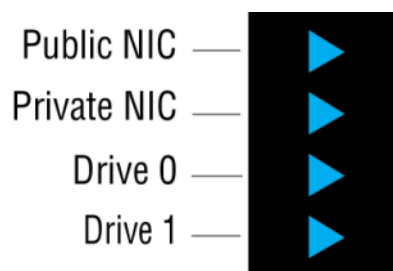There are four status indicators on the ContentDirector 2000C/1000F bezel.

Figure 7-2: ContentDirector 2000C/1000F bezel status indicators

LED	Color/State	Description
Public VLAN	White	Both connections are working normally.
	Yellow	NIC 0 connection is non-functional.
	Magenta	NIC 1 connection is non-functional.
	Red	Both connections are non-functional.
Private VLAN	White	Both connections are working normally.
	Yellow	NIC 2 connection is non-functional.
	Magenta	NIC 3 connection is non-functional.
	Red	Both connections are non-functional.
Solid State Drive 0	White	The drive is online.
	Yellow	The drive needs to be replaced.
Solid State Drive 1	Red	The drive has failed.

Front panel components

Find important information about the components on the front panel of the ContentDirector 2000C/1000F.

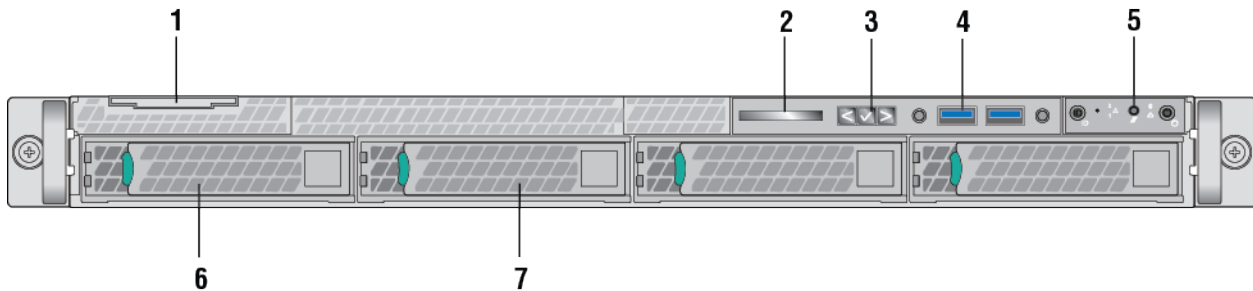Figure 7-3: Front panel components

Indicator, Button, or Connector	Description
1. System label pull-out tab	Use to apply a product number and/or serial number label.
2. Optical drive	Use for software installation.
3. LCD panel	Displays system ID, status information, and system error messages. • Blue indicates normal system operation. • Amber indicates a system error; an error code is also displayed, followed by descriptive text.
4. LCD menu buttons	Allow you to navigate the LCD panel menu.
5. USB connector	Use to connect the front bezel.
6. Control panel	Contains system status LEDs, hard reset button, and other system controls.
7. Drive 0	The High Performance ContentDirector 2000C uses two solid-state drives.
8. Drive 1	

Control panel buttons and LED indicators

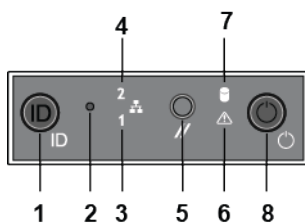Some control panel buttons on the ContentDirector 2000C/1000F are recessed and require a tool to use them.

Figure 7-4: Control panel buttons and indicators

| Component	Description
1. System ID button with integrated LED	The identification button can be used to locate a particular system within a rack. When this button is pressed, the ID LEDs on the front panel and on the back edge of the server board (viewable from the rear panel) flash until the button is pressed again.
2. Non-maskable interrupt (NMI) button (recessed, tool required for use)	The NMI button can be used to put the server into a halt state when diagnosing an issue. To prevent an accidental system halt, the physical button is located behind the Control Panel and is only accessible with the use of a small tipped tool.
3. NIC 0 Activity LED	When a network link is detected, the LED will turn on solid. The LED blinks when data is being sent or received over the network.
4. NIC 1 Activity LED	
5. System cold reset button (recessed, tool required for use)	When pressed, this button initializes a hard system reset. To prevent an accidental reset, the physical button is located behind the Control Panel and is only accessible with the use of a small tipped tool.
6. System status LED	Shows the current health of the server system. A second system status LED is located on the back edge of the server board and is viewable from the rear panel. Both LEDs will show the same state.
7. Power/Sleep button with integrated LED	Toggles the power on and off. The power-on indicator lights green when the system power is on. When the power-on indicator is off, this indicates that no power is supplied to the system.
8. Drive activity LED	Indicates drive activity.

Table 7-1: System status LED indicators

Color	State	Description
Off		System is off.
Green	Solid	System is on and operating normally.
	Blink	Non-critical warning: The system is operating in a redundant or degraded state but still functional. A loss of redundancy may have occurred, such as a power supply unit or fan.
Amber	Blink	Non-fatal warning: The system is likely to fail, but is still working. A critical threshold may have been crossed, such as temperature or voltage, or a disk drive failure has occurred.
	Solid	Fatal alarm: The system has failed or shut down.

Drive LED indicators

Learn the LED patterns for both the Status and Activity indicators on the ContentDirector 2000C/1000F.

Drive status (amber)
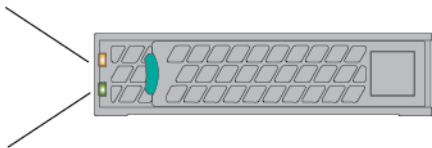
Drive activity (green)

Figure 7-5: ContentDirector 2000C/1000F drive LED indicators

⚠️ **IMPORTANT:** If replacing a drive, do not turn off power. As soon as the new drive is inserted, the system will begin replicating the data from the other drives.

Indicator	State	Description
Status	Off	No access and no fault.
	Solid (amber)	Drive fault has occurred.
	Blink (amber)	RAID rebuilt in progress.
Activity	Off	Power on with no drive activity, drive spun down or drive spinning up.
	Blinks on (green) when processing a command	Power on with drive activity.

Rear panel components

Learn how each port on the rear panel of the ContentDirector 2000C/1000F is used.
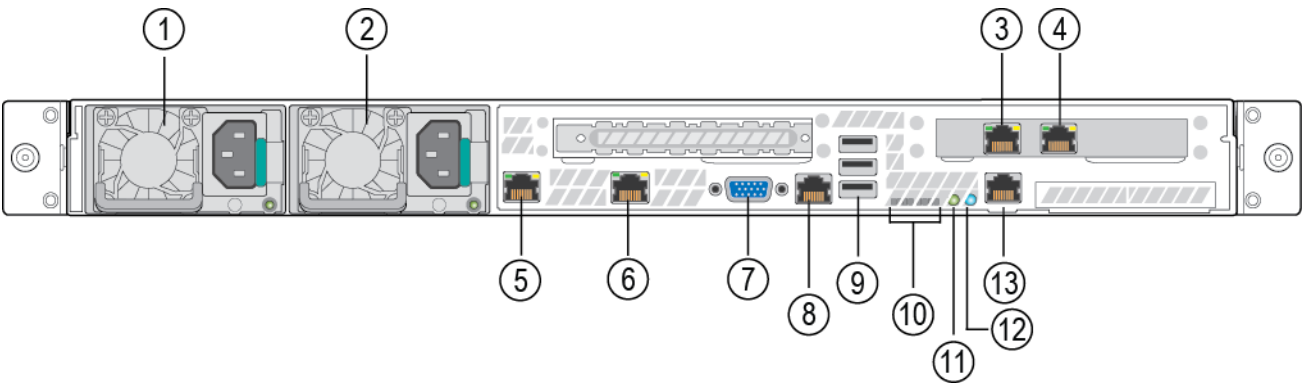

Figure 7-6: Rear panel components

Component	Description
1. Power supply 1	Dual redundant power supplies provide power to the system.
2. Power supply 2	

Component	Description
3. ETH 3 connector	Use for Gigabit Ethernet connection to switch (private VLAN).
4. ETH 2 connector	
5. ETH 0 connector	Use for Gigabit Ethernet connection to switch (public VLAN).
6. ETH 1 connector	
7. Video connector	Use to connect a monitor to the system (for maintenance only).
8. RJ-45 serial port	Serial cable is not provided.
9. USB ports (3)	Used for maintenance purposes only.
10. Diagnostic LEDs	For Service only.
11. System status LED	Located on the back edge of the server board, this LED matches the state of the System Status LED on the front Control Panel.
12. System ID LED	Located on the back edge of the server board, this LED matches the state of the System ID LED on the front Control Panel. When that button is pushed, this LED flashes blue until the button is pressed again.
13. Baseboard Management Controller (BMC) connector	Do not use.

NIC 0 and NIC 1 LED indicators

The onboard 1 GbE ports (NIC 0 and NIC 1) on the ContentDirector 2000C/1000F have two LED indicators, one for link/activity and the other for connection speed.
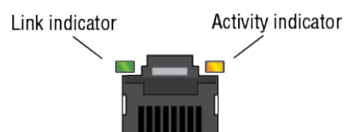

Figure 7-7: Onboard NIC LED indicators

NIC 2 and NIC 3 LED indicators

The add-in 1 GbE ports (NIC 2 and NIC 3) on the ContentDirector 2000C/1000F have two LED indicators, one for link/activity and the other for connection speed.
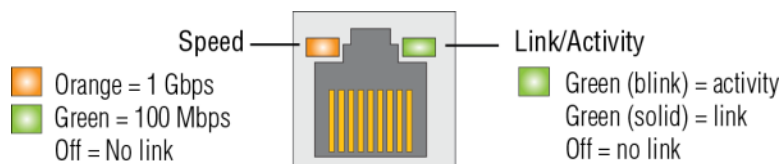

Figure 7-8: Add-in NIC LED indicators

Power supply LED indicator

Each power supply module on the ContentDirector 2000C/1000F has a single LED indicator.
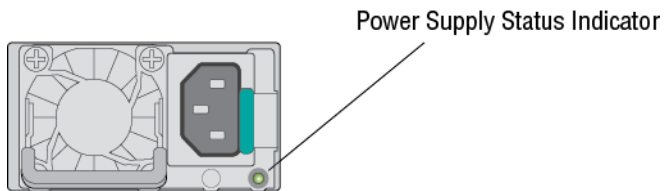

Figure 7-9: ContentDirector 2000C/1000F power supply indicator

⚠ **CAUTION:** When correcting a power supply mismatch, replace only the power supply with the flashing indicator. Swapping the opposite power supply to make a matched pair can result in an error condition and unexpected system shutdown. To change from a High Output configuration to a Low Output configuration or vice versa, you must power down the system.

⚠ **CAUTION:** AC power supplies support both 220 V and 110 V input voltages. When two identical power supplies receive different input voltages, they can output different wattages, and trigger a mismatch.

State	Description
Off	AC power is not connected.
Steady green	A valid power source is connected to the power supply and the power supply is operational.
Blinks green (1Hz)	AC power is connected but operating in a cold redundant state.
Blinks green (2Hz)	Power supply firmware is updating.
Blinks amber	A problem with the power supply has occurred but the power supply is still functional. ⚠ **CAUTION:** If two power supplies are used, they must be of the same type and have the same maximum output power.
Steady amber	A power supply failure has occurred, causing it to shut down.

ContentBridge 2010F hardware reference

This device, also called the High Bandwidth ContentBridge, provides access to Harmonic MediaGrid for those client platforms that do not have the FSD installed or do not use the Harmonic MediaGrid API. This model provides the highest throughput of all of the ContentBridge models.

Bezel components

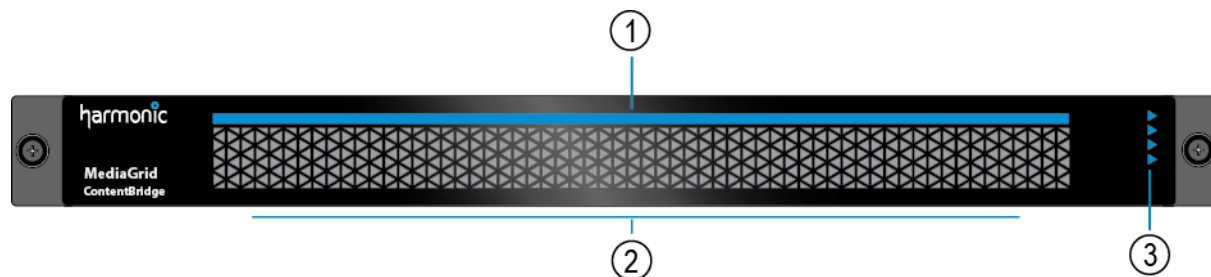The bezel on the ContentBridge 2010F consists of a power indicator, air vents, and status LEDs.

Figure 7-10: Bezel components

Component	Description
1. Power Indicator	A bright blue power indicator is provided across the top of the front panel. This indicator also provides a "wink" function, which allows you to identify a unit from the SystemManager application.
2. Air vents	Allows airflow through the unit. For optimum airflow, do not obstruct the air vents.
3. Status LEDs	An array of four status LEDs is provided on the front panel.

Bezel status LED indicators

The status indicators on the ContentBridge 2010F bezel provide information about network connectivity and disk drive status.

Figure 7-11: ContentBridge 2010F status indicators

LED	Color/State	Description
10 Gbe NIC	White	Both ports are working normally.
	Yellow	10 GbE port 2 is non-functional.

LED	Color/State	Description
	Magenta	10 GbE port 3 is non-functional.
	Red	Both 10 GbE connections have failed.
HA Pair	White	Indicates normal operation.
	Red	A local failure has occurred.
	Yellow	A peer failure has a occurred.
	Off/Blue	HA Pair has not been configured.
Drive 0 Drive 1	White	Drive is online
	Yellow	Drive replacement warning.
	Red	A drive failure has occurred.

Front panel components

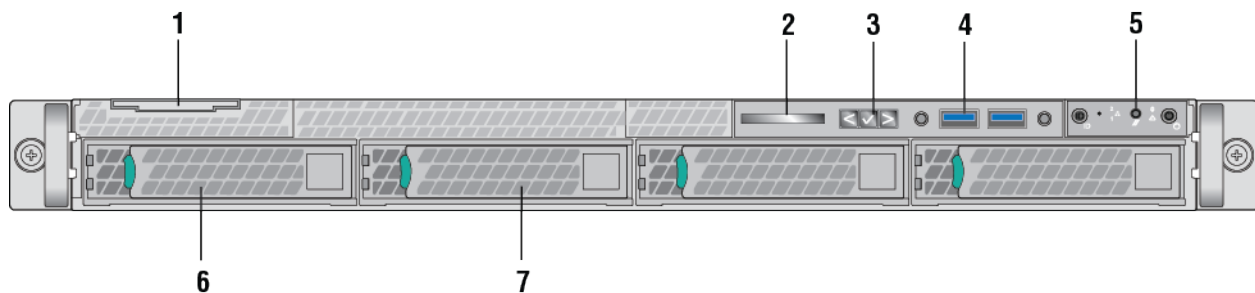Find important information about the components on the front panel of the ContentBridge 2010F.

Figure 7-12: Front panel components

Indicator, Button, or Connector	Description
1. System label pull-out tab	Use to apply a product number and/or serial number label.
2. Optical drive	Use for software installation.
3. LCD panel	Displays system ID, status information, and system error messages. • Blue indicates normal system operation. • Amber indicates a system error; an error code is also displayed, followed by descriptive text.
4. LCD menu buttons	Allow you to navigate the LCD panel menu.
5. USB connector	Use to connect the front bezel.
6. Control panel	Contains system status LEDs, hard reset button, and other system controls.

Indicator, Button, or Connector	Description
7. Drive 0	The High Bandwidth ContentBridge 2010F uses two solid-state drives.
8. Drive 1	

Control panel buttons and LED indicators

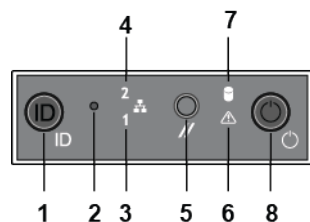Some control panel buttons on the ContentBridge 2010F are recessed and require a tool to use them.

Figure 7-13: Control panel buttons and indicators

| Component	Description
1. System ID button with integrated LED	The identification button can be used to locate a particular system within a rack. When this button is pressed, the ID LEDs on the front panel and on the back edge of the server board (viewable from the rear panel) flash until the button is pressed again.
2. Non-maskable interrupt (NMI) button (recessed, tool required for use)	The NMI button can be used to put the server into a halt state when diagnosing an issue. To prevent an accidental system halt, the physical button is located behind the Control Panel and is only accessible with the use of a small tipped tool.
3. NIC 0 Activity LED	When a network link is detected, the LED will turn on solid. The LED blinks when data is being sent or received over the network.
4. NIC 1 Activity LED	
5. System cold reset button (recessed, tool required for use)	When pressed, this button initializes a hard system reset. To prevent an accidental reset, the physical button is located behind the Control Panel and is only accessible with the use of a small tipped tool.
6. System status LED	Shows the current health of the server system. A second system status LED is located on the back edge of the server board and is viewable from the rear panel. Both LEDs will show the same state.
7. Power/Sleep button with integrated LED	Toggles the power on and off. The power-on indicator lights green when the system power is on. When the power-on indicator is off, this indicates that no power is supplied to the system.
8. Drive activity LED	Indicates drive activity.

Table 7-2: System status LED indicators

Color	State	Description
Off		System is off.
Green	Solid	System is on and operating normally.
	Blink	Non-critical warning: The system is operating in a redundant or degraded state but still functional. A loss of redundancy may have occurred, such as a power supply unit or fan.
Amber	Blink	Non-fatal warning: The system is likely to fail, but is still working. A critical threshold may have been crossed, such as temperature or voltage, or a disk drive failure has occurred.
	Solid	Fatal alarm: The system has failed or shut down.

Drive LED indicators

Learn the LED patterns for both the Status and Activity indicators on the ContentBridge 2010F.

Drive status (amber)
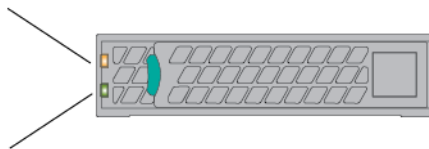
Drive activity (green)

Figure 7-14: ContentBridge 2010F drive LED indicators

IMPORTANT: If replacing a drive, do not turn off power. As soon as the new drive is inserted, the system will begin replicating the data from the other drives.

Indicator	State	Description
Status	Off	No access and no fault.
	Solid (amber)	Drive fault has occurred.
	Blink (amber)	RAID rebuilt in progress.
Activity	Off	Power on with no drive activity, drive spun down or drive spinning up.
	Blinks on (green) when processing a command	Power on with drive activity.

Rear panel components

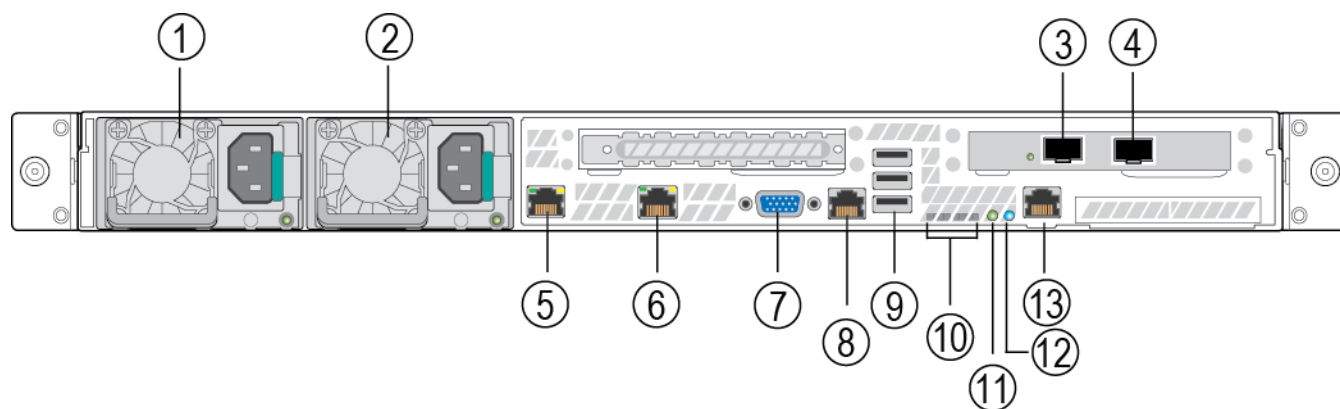Learn how each port on the rear panel of the ContentBridge 2010F is used.

Figure 7-15: Rear panel components

Component	Description
1. Power supply 1	Dual redundant power supplies provide power to the system.
2. Power supply 2	Dual redundant power supplies provide power to the system.
3. 10 GbE port 3	Use to connect to the network switch.
4. 10 GbE port 2	Use to connect to the network switch.
5. Video connector (VGA port)	Use to connect a monitor to the system (for maintenance only).
6. RJ-45 serial port	Serial cable is not provided.
7. USB ports (3)	Used for maintenance purposes only.
8. Diagnostic LEDs	For Service only. LEDs are located on the back edge of the server board.
9. System status LED	Located on the back edge of the server board, this LED matches the state of the System Status LED on the front Control Panel.
10. System ID LED	Located on the back edge of the server board, this LED matches the state of the System ID LED on the front Control Panel. When that button is pushed, this LED flashes blue until the button is pressed again.
11. Baseboard Management Controller (BMC) connector	Connect for BMC access.

NIC 0 and NIC 1 LED indicators

The onboard 1 GbE ports (NIC 0 and NIC 1) on the ContentBridge 2010F have two LED indicators, one for link/activity and the other for connection speed.
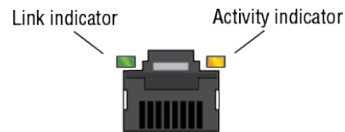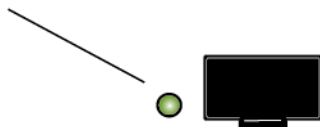
Figure 7-16: Onboard NIC LED indicators

10 Gigabit Ethernet NIC Indicator

Ethernet ports 2 and 3 on the ContentBridge 2010F have a single LED indicator.

NOTE: During setup, the indicator does not light until you have completed the Configuration Assistant for the ContentBridge.

State	Description
Steady on	NIC is connected to a valid network link.
Blinking	NIC is connected and data is being sent or received.
Green	Link speed is 10 Gbps.
Yellow	Link speed is 1 Gbps.

Power supply LED indicator

Each power supply module on the ContentBridge 2010F has a single LED indicator.
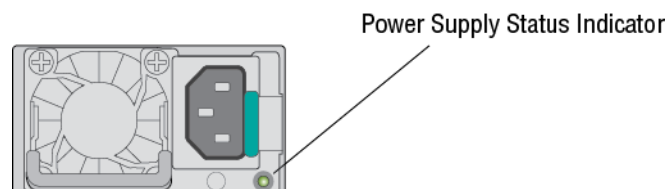
Figure 7-17: ContentBridge 2010F power supply indicator

CAUTION: When correcting a power supply mismatch, replace only the power supply with the flashing indicator. Swapping the opposite power supply to make a matched pair can result in an error condition and unexpected system shutdown. To change from a High Output configuration to a Low Output configuration or vice versa, you must power down the system.

⚠️ **CAUTION:** AC power supplies support both 220 V and 110 V input voltages. When two identical power supplies receive different input voltages, they can output different wattages, and trigger a mismatch.

State	Description
Off	AC power is not connected.
Steady green	A valid power source is connected to the power supply and the power supply is operational.
Blinks green (1Hz)	AC power is connected but operating in a cold redundant state.
Blinks green (2Hz)	Power supply firmware is updating.
Blinks amber	A problem with the power supply has occurred but the power supply is still functional. ⚠️ **CAUTION:** If two power supplies are used, they must be of the same type and have the same maximum output power.
Steady amber	A power supply failure has occurred, causing it to shut down.

ContentServer 3000 hardware reference

The ContentServer 3000 presents data to clients, managing the actual data on the hard drives.

Bezel

The bezel on the ContentServer 3000 provides a bright blue power indicator and vents for air flow.
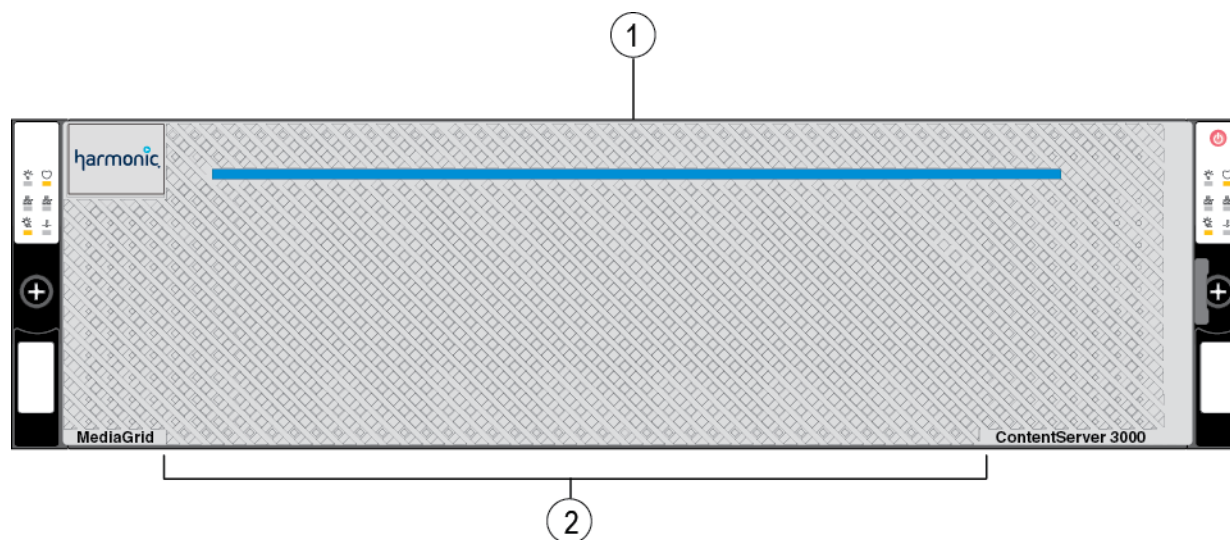

Figure 7-18: Bezel components

Component	Description
1. Power indicator	A bright blue **power indicator** is provided across the top of the front panel. This indicator also provides a "wink" function, which allows you to identify a unit from the SystemManager application.
2. Air vents	Allows airflow through the unit. For optimum airflow, do not obstruct the air vents.

Front panel components

The front panel on the ContentServer 3000 contains 16 hot-swappable disk drives, power button, and left/ right control panels.
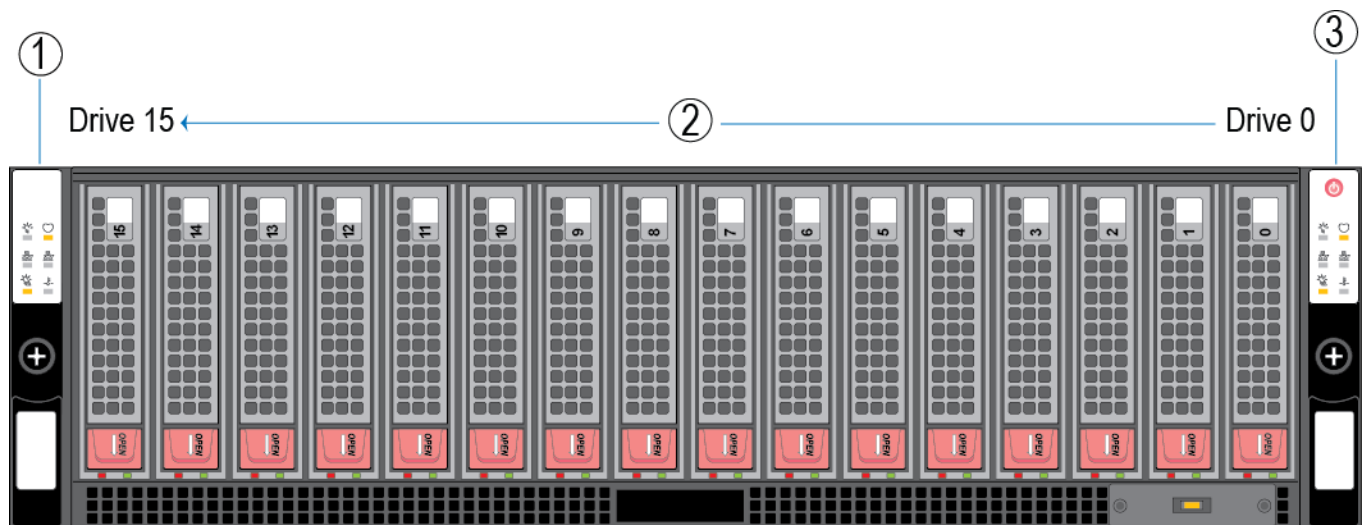

Figure 7-19: Front panel components

Component	Description
1. Left Control Panel	The control panel included on the left side provides system monitoring and control for the controller on the same side of the chassis. LEDs indicate system power, network (NIC) activity, system overheat and power supply failure for the controller on the left side.
2. Disk drives	The server contains 16 SATA or SAS disk drives. Drives are numbered from right to left when facing the front panel.

Component	Description
3. Power button and Right Control Panel	There is a single, shared power button located on the right control panel. Note the following behaviors when powering on/off with the shared power button: • When both nodes are powered on, depressing this button will power both nodes off. • When both nodes are powered off, pressing this button will power both nodes on. • If one node is powered on, pressing this button will power on a single node with no impact on the node that is already powered on. • Powering off with this button removes the main power but keeps standby power supplied to the system. The control panel included on the right side provides system monitoring and control for the controller on the same side of the chassis. LEDs indicate system power, network (NIC) activity, system overheat and power supply failure for the controller on the right side.

Control panel LEDs

The two control panels located on the front of the ContentServer 3000 chassis have LEDs, which provide you with critical information related to the node on the same side of the chassis.
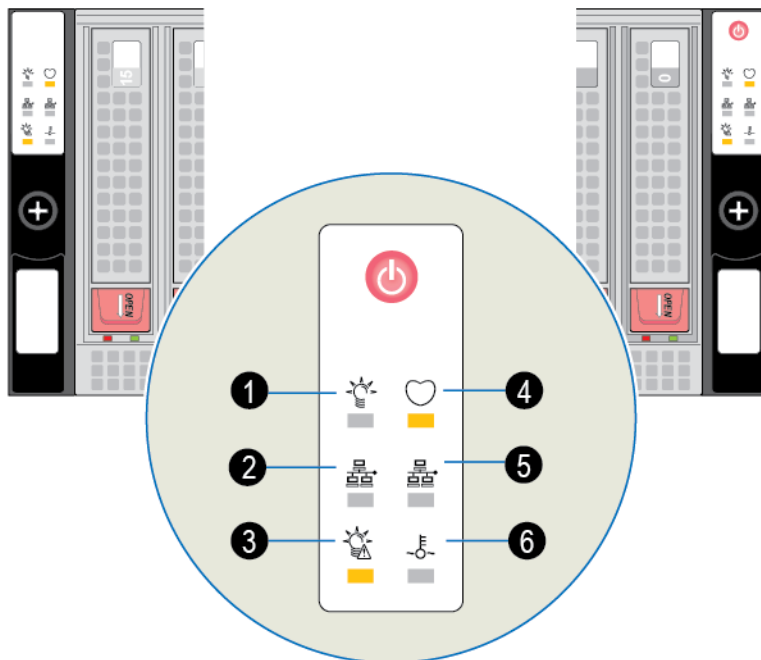

Figure 7-20: Control panel LEDs

LED	Color/State	Description
1. Power	Solid	Power is being supplied to the power supply units.
2. NIC 1	Flashing	Network activity on the NIC 1 port.
3. Power Fail	Solid	A power supply module has failed.
4. Heartbeat	Flashing	Power is being supplied to the server board.
5. NIC 0	Flashing	Network activity on the NIC 0 port.
6. Overheat/ Fan Fail	Flashing	A fan failure has occurred.
	Solid	Overheat condition, which may be caused by cables obstructing the airflow in the system or the ambient room temperature being too warm. Check the routing of the cables and make sure all fans are present and operating normally. Also check to make sure that the chassis covers are installed.

Disk drive status LEDs

Each disk drive on the ContentServer 3000 provides two LEDs to indicate status and activity.

Figure 7-21: Disk drive status LEDs

LED	Color/State	Description
Green	Solid	Drive is powered on
	Off	No power is being provided to the drive
	Blinking	Drive is in use.
Red	Solid	Drive is not being used by the ContentServer.

LED	Color/State	Description
	Rapid blink	Drive failed
	Slow blink	Drive is being winked
	Two rapid blinks then pause repeatedly	RAID set is being rebuilt, repaired, or is under maintenance
	Off	Drive state is normal. Drive is being used by the ContentServer.

Rear panel components

The ContentServer 3000 includes two separate controllers, and two power supplies to provide redundancy in the case of a failure.
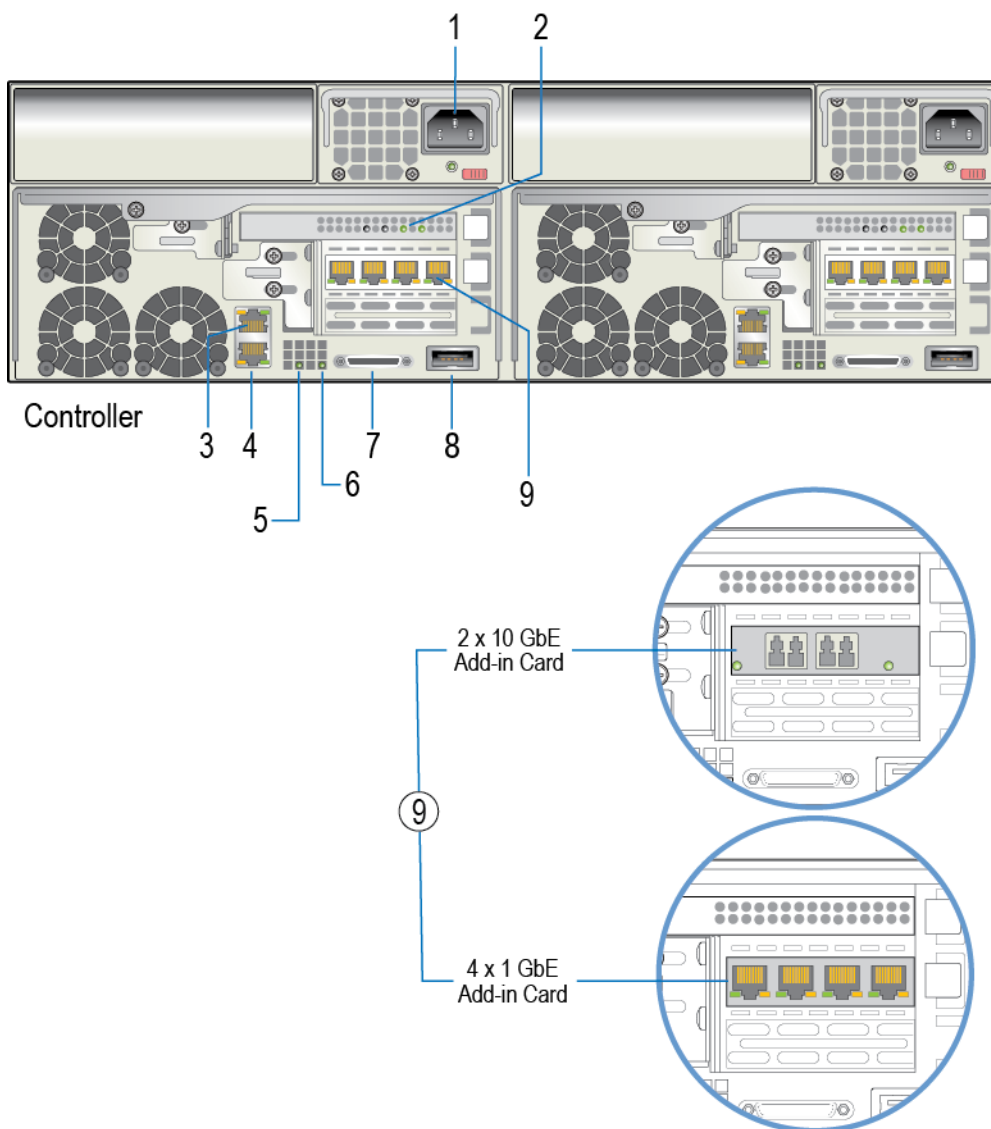

Figure 7-22: Rear panel components

⚠ **IMPORTANT:** Note that, when facing the rear of the chassis, the controller on the left side of the chassis corresponds to Controller 0 in SystemManager, and the controller on the right side of the chassis corresponds to Controller 1 in SystemManager.

Component	Description
1. Power supplies	Dual, redundant power supplies provide power to the system.
2. NVRAM card LEDs	The NVRAM indicators provide information about the status of the NVRAM card.
3. Ethernet port: NIC 1	NIC 1 provides Gigabit Ethernet connectivity.
4. Ethernet port: NIC 0	NIC 0 provides Gigabit Ethernet connectivity as well as a connection for the Baseboard Management Controller (BMC).
5. System Heartbeat LED	Blinks to indicate power and normal functionality
6. BMC Heartbeat LED	Blinks to indicate that Baseboard Management Controller (BMC) is functioning normally. The BMC is a troubleshooting utility, which can be accessed in the event of system failure.
7. KVM port	Allows you to connect a keyboard, video, and mouse switch.
8. SAS port	A Serial Attached SCSI port on each controller allows you to connect to multiple ContentStore nodes.
9. Optional Ethernet cards: • Optional 2x10GbE Add in Card • Optional 4x1 GbE Add-in Card	An optional 10 Gigabit Ethernet card with two ports is available from Harmonic. An optional Gigabit Ethernet card with four ports is available from Harmonic.

Gigabit Ethernet port LEDs (LAN1 and LAN2)

On each Ethernet port on the ContentServer 3000, the Activity LED flashes to indicate activity while the Link LED may be green, amber or off to indicate the speed of the connection.

Figure 7-23: Gigabit Ethernet port status LEDs (LAN1 and LAN2)

LED	State	NIC State
Link (left)	Off	Power off, network cables unplugged
	Green (solid)	Power off, network cables plugged in. Active connection at 100 Mb/s

LED	State	NIC State
	Amber (solid)	Power on, network cables plugged in. Active connection at 1 Gb/s
Activity (right)	Off	Power off, network cables unplugged
	Yellow (solid)	Power on, active connection
	Yellow (blink)	Power on, network data being sent or received

NVRAM card LEDs

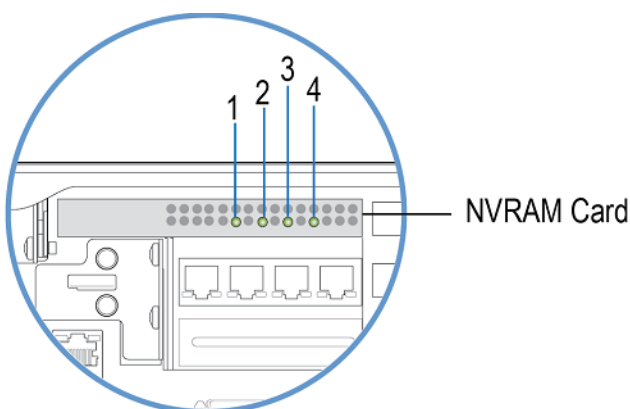The NVRAM card LEDs on the ContentServer 3000 provide information about the state of the NVRAM card.

Figure 7-24: NVRAM Card LEDs

LED	State	Description
1. Restore	On	Data from the NVRAM is being restored to DRAM.
	Off	No activity.
2. Save	On	Save operation is in progress. LED turns on during power-down.
	Off	No activity.
3. PCIe Link	On	PCIe communications link within the system is up. Turns on within 60 seconds after system power-up.
	Off	PCIe link issue. Needs attention.
4. Charged	On	NVRAM capacitor is fully charged. LED turns on within 60 seconds after system power-up.
	Off	NVRAM capacitor issue. Needs attention.

Gigabit Ethernet add-in card LEDs

On each Ethernet port on the ContentServer 3000, the left LED flashes green to indicate activity while the right LED may be green, yellow or off to indicate the speed of the connection.
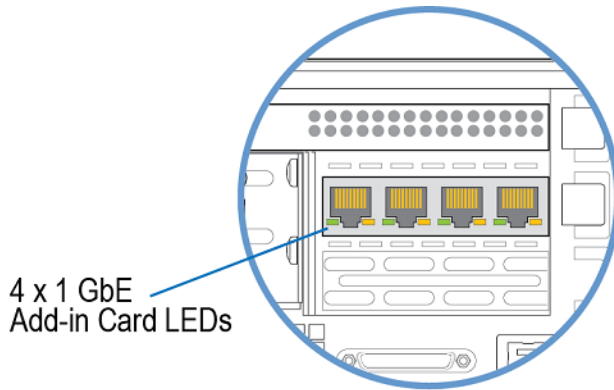

Figure 7-25: Gigabit Ethernet Add-in Card LEDs

LED	LED State	NIC State
Link (right)	Off	Power off, network cables unplugged
	Green (solid)	Power off, network cables plugged in. Active connection at 100 Mb/s
	Yellow (solid)	Power on, network cables plugged in. Active connection at 1 Gb/s
Activity (left)	Off	Power off, network cables unplugged
	Green (solid)	Power on, active connection
	Green (blink)	Power on, network data being sent or received

10-Gigabit Ethernet add-in card LED

Oon the ContentServer 3000, the two LEDs on the 10 Gigabit Ethernet add-in card indicate connection and network activity for the right and left connector respectively.

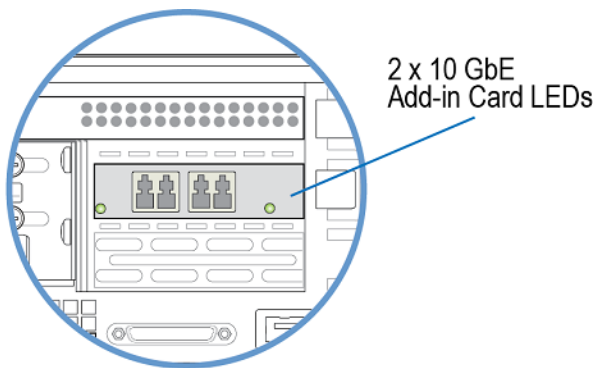📄   **NOTE:** The left LED is not readily visible when viewing the rear panel.

Figure 7-26: 10 Gigabit Ethernet add-in card LEDs

LED State	NIC State
Off	Power off, network cable unplugged.
Green (solid)	Active connection at 10 Gb/s.
Green (blink)	Network data being sent or received.

Power supply LED

A power supply LED is located directly beneath each AC power connector on the ContentServer 3000.

LED State	Description
Off	AC power not connected
Green	System on
Amber	System is in power down state, or power cord has been removed.

ContentServer 4000 hardware reference

This ContentServer is a 4RU storage array that delivers files upon request. It has dual active-active controllers and redundant data paths to protect against any storage node failures.

Bezel components

The bezel on the ContentServer 4000 has a bright blue power indicator and air vents.
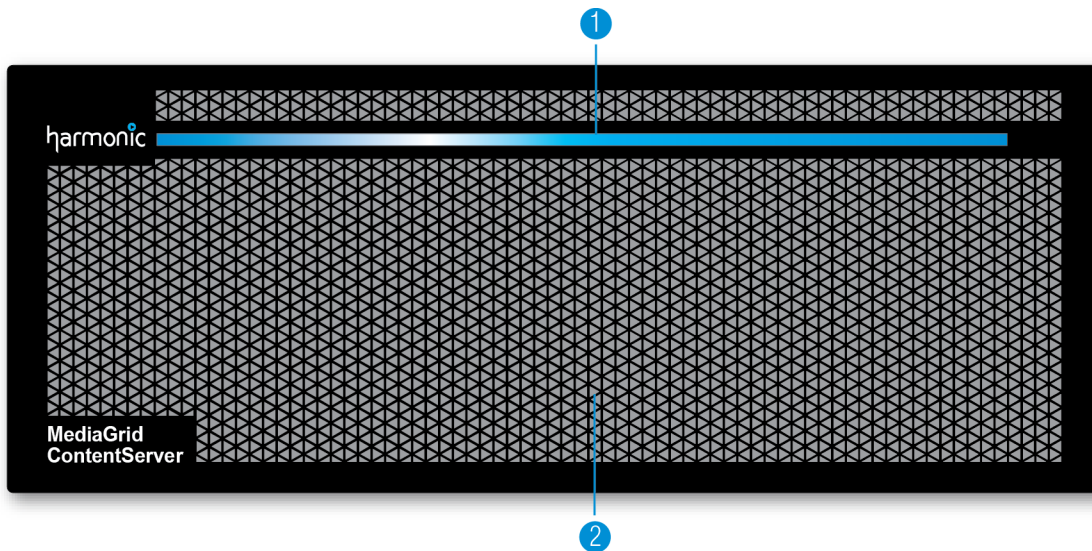

Figure 7-27: ContentServer 4000 bezel

Component	Description
1. Power indicator	A bright blue power indicator is provided across the top of the front panel. This indicator also provides a "wink" function, which allows you to identify a unit from the SystemManager application.
2. Air vents	Allows airflow through the unit. For optimum airflow, do not obstruct the air vents.

Front panel components

The front panel on the ContentServer 4000 contains 24 hot-swappable disk drives, a power button, a connector for the bezel, and control panel with system status LEDs.

Figure 7-28: ContentServer 4000 front panel

Component	Description
1. Bezel LED control connector	Powers the light bar on the bezel.
2. Power button	Depress this button to power both nodes on or off. Powering off with this button removes the main power but keeps standby power supplied to the system.
3. Control panel	Shows Operational State and Fault indicators for both Controller A and Controller B.

Control panel indicators

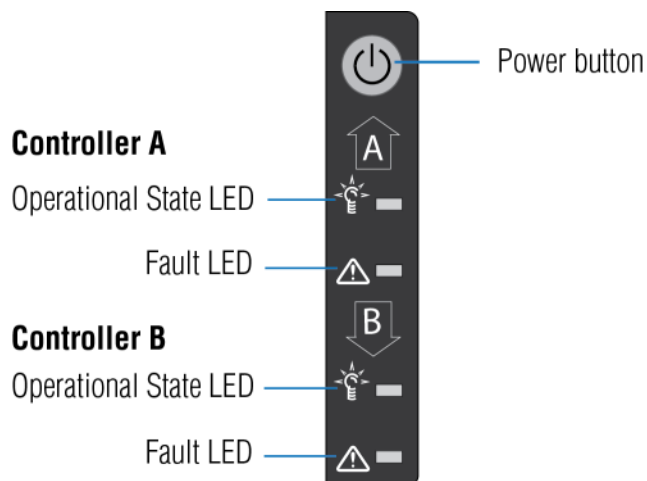The control panel on the ContentServer 4000 contains operational state and fault LED indicators.

Figure 7-29: Control panel indicators

Indicator	State	Description
Operational State	Green	System is powered on.
	Off	System is powered off.
Fault	Yellow	A critical error has occurred.
	Off	No critical errors have occurred.

Disk drive LED indicators

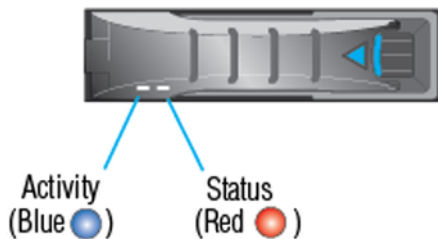Each disk drive on the ContentServer 4000 has an Activity LED and a Status LED.

Figure 7-30: ContentServer 4000 disk drive LED indicators

Drive State	Activity LED (Blue)	Status LED (Red)
Drive is powered on	Solid	Off
Drive activity	Blink	Off
RAID rebuild in progress	Blink	Slow blink (1 Hz)
Drive failure	Solid	Rapid blink (2 Hz)
Drive is being winked	Slow blink (1 Hz)	Off

Rear panel components

The rear panel on the ContentServer 4000 includes mini-SAS HD ports for connecting to multiple storage nodes.
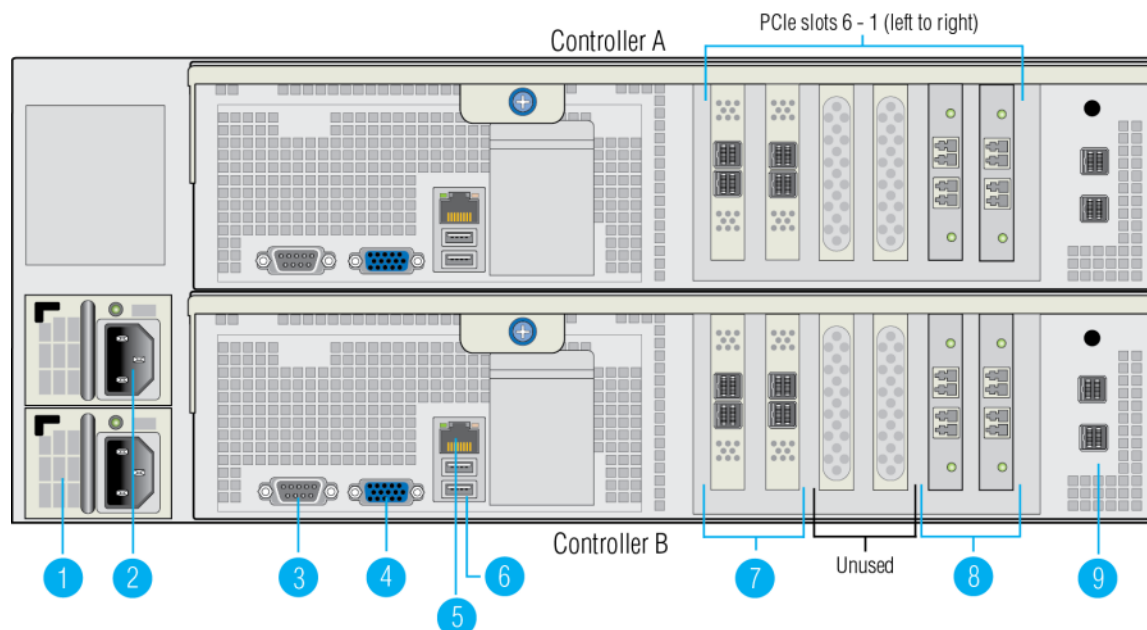

Figure 7-31: Rear panel components

Table 7-3:

Component	Description
1. Power supply 1	Dual redundant power supplies.
2. Power supply 2	
3. Serial port	Use to connect a serial device to the system.
4. VGA port	Use to connect a monitor to the system (for maintenance only).
5. BMC port	Baseboard Management Controller port (used for troubleshooting purposes). Maximum data rate 100Mb/s.
6. USB ports (2)	Used for maintenance purposes only.
7. Mini-SAS HD connectors (4)	Used for connecting the ContentServer to ContentStores.
8. 10 GbE NIC ports (4)	Use for connecting the ContentServer to the network switch: • Upper right: NIC 2 • Lower right: NIC 3 • Upper left: NIC 4 • Lower right: NIC 5

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Component	Description
9. Onboard Mini-SAS HD connectors (2)	Currently unused.

10 GbE NIC indicator

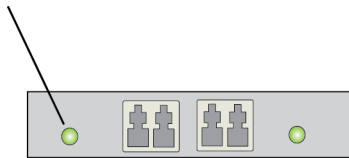Each 10 GbE NIC on the ContentServer 4000 has a single LED.

Figure 7-32: ContentServer 10 GbE NIC indicator

State		Description
Green	Solid	Active connection at 10 Gb/s
	Blink	Network activity
Off		Power off (network cable unplugged)

Power supply unit LED indicator

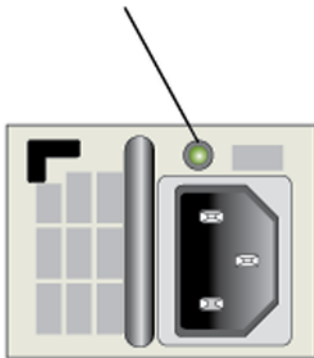Each power supply module on the ContentServer 4000 has a single LED indicator.

Figure 7-33: ContentServer 4000 PSU indicator

State	Description
Green	AC power is present and at least one controller is operating.
Red	AC power is present and one of the following is true: • both controllers are stopped • a fault has occurred in the power supply unit

ContentStore 3160 hardware reference

The ContentStore 3160 presents data to the client, managing the actual data on the hard drives.

Bezel

The bezel on the ContentStore 3160 provides a bright blue power indicator and vents for air flow.
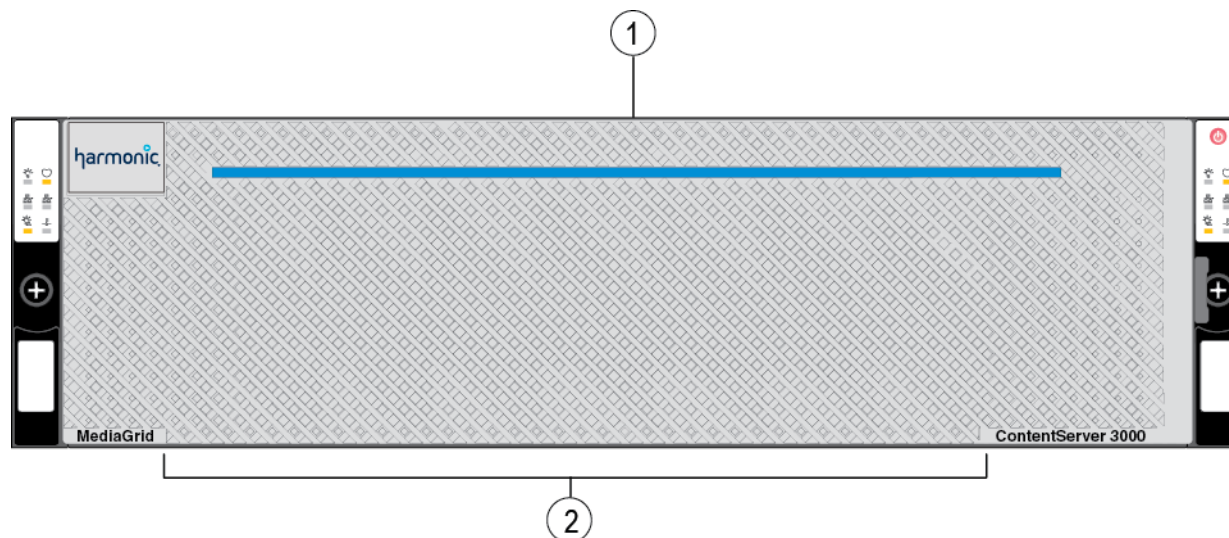

Figure 7-34: Bezel components

Component	Description
1. Power indicator	A bright blue **power indicator** is provided across the top of the front panel. This indicator also provides a "wink" function, which allows you to identify a unit from the SystemManager application.
2. Air vents	Allows airflow through the unit. For optimum airflow, do not obstruct the air vents.

Front panel components

The front panel on the ContentStore 3160 contains 16 hot-swappable disk drives, power button, and left/ right control panels.
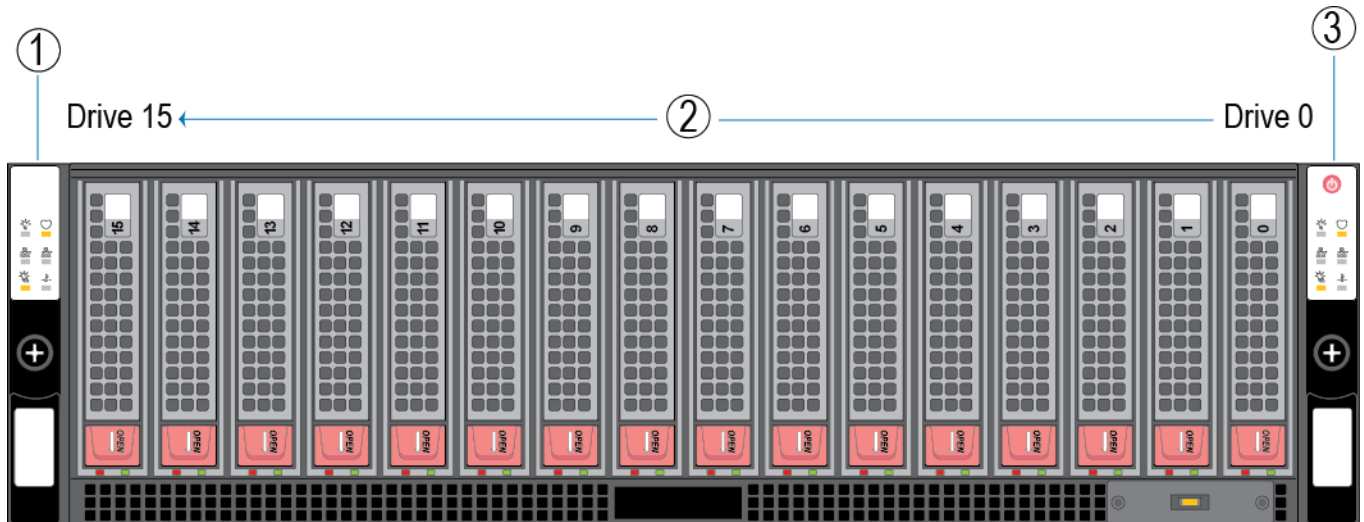

Figure 7-35: Front panel components

Component	Description
1. Left Control Panel	The control panel included on the left side provides system monitoring and control for the controller on the same side of the chassis. LEDs indicate system power, network (NIC) activity, system overheat and power supply failure for the controller on the left side.
2. Disk drives	The server contains 16 SATA or SAS disk drives. Drives are numbered from right to left when facing the front panel.

Component	Description
3. Power button and Right Control Panel	There is a single, shared power button located on the right control panel. Note the following behaviors when powering on/off with the shared power button: • When both nodes are powered on, depressing this button will power both nodes off. • When both nodes are powered off, pressing this button will power both nodes on. • If one node is powered on, pressing this button will power on a single node with no impact on the node that is already powered on. • Powering off with this button removes the main power but keeps standby power supplied to the system. The control panel included on the right side provides system monitoring and control for the controller on the same side of the chassis. LEDs indicate system power, network (NIC) activity, system overheat and power supply failure for the controller on the right side.

Control panel LEDs

The two control panels located on the front of the ContentStore 3160 chassis have LEDs, which provide you with critical information related to the node on the same side of the chassis.
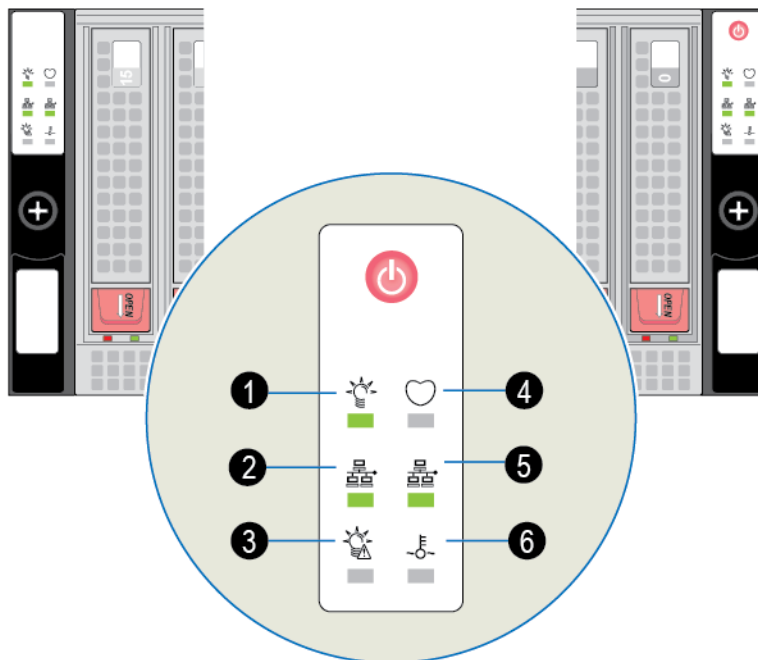

Figure 7-36: Control panel LEDs

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LED	Color/State	Description
1. Power	Solid	Power is being supplied to the power supply units.
2. SAS-Out	Solid	SAS output port is connected.
3. Power Fail	Solid	A power supply module has failed.
4. Heartbeat	Unused	Unused
5. SAS-In	Solid	SAS input port is connected.
6. Overheat/ Fan Fail[1]	Flashing	Fan failure has occurred. Requires immediate attention.
	Solid	Overheat condition, which may be caused by cables obstructing the airflow in the system or the ambient room temperature being too warm. Check the routing of the cables and make sure all fans are present and operating normally. Also check to make sure that the chassis covers are installed.

Disk drive status LEDs

Each disk drive on the ContentStore 3160 provides two LEDs to indicate status and activity.

Figure 7-37: Disk drive status LEDs

LED	Color/State	Description
Green	Solid	Drive is powered on
	Off	No power is being provided to the drive
	Blinking	Drive is in use.

....

[1] This LED applies only to fans controlled by the chassis.

LED	Color/State	Description
Red	Solid	Drive is not being used by the ContentServer.
	Rapid blink	Drive failed
	Slow blink	Drive is being winked
	Two rapid blinks then pause repeatedly	RAID set is being rebuilt, repaired, or is under maintenance
	Off	Drive state is normal. Drive is being used by the ContentServer.

Rear panel components

The ContentStore 3160 includes two separate controllers, and two power supplies to provide redundancy in the case of a failure.
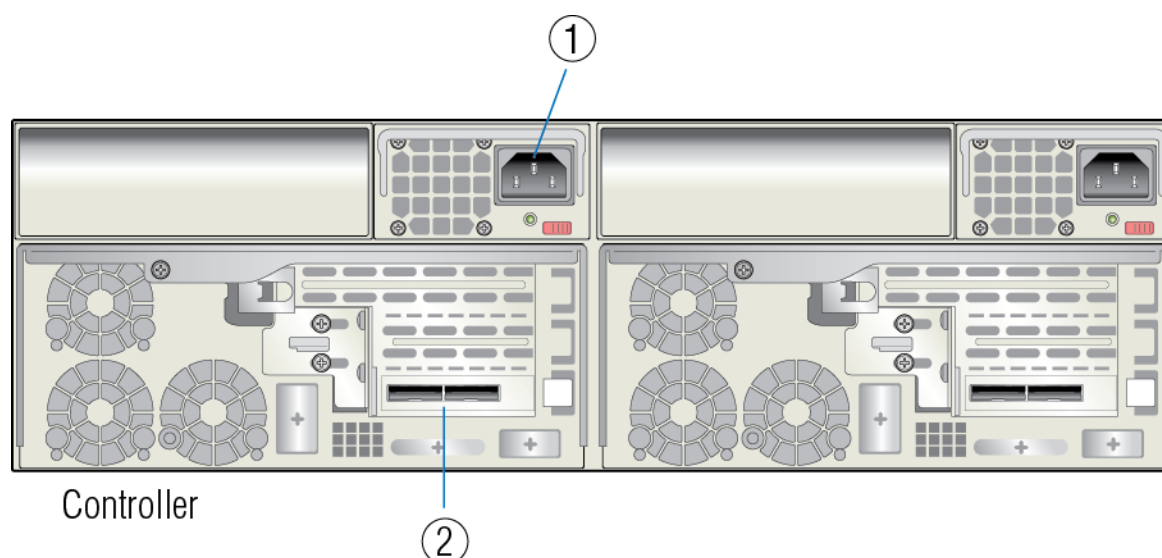

Figure 7-38: Rear panel components

Component	Description
1. Power supplies	Dual, redundant power supplies provide power to the system.
2. SAS ports (2)	Two Serial Attached SCSI ports on each controller provide a connection to a ContentServer and other ContentStore nodes. Left port: Input Right port: Output

Power supply LED

A power supply LED is located directly beneath each AC power connector on the ContentStore 3160.

LED State	Description
Off	AC power not connected
Green	System on
Amber	System is in power down state, or power cord has been removed.

ContentStore 4240 hardware reference

The ContentStore 4240 is a 4-rack unit storage array which connects to the ContentServer 4000 via SAS cables. It contains 24 drives in 2 TB, 4 TB, or 6 TB capacity.

Bezel components

The bezel on the ContentStore 4240 has a bright blue power indicator and air vents.
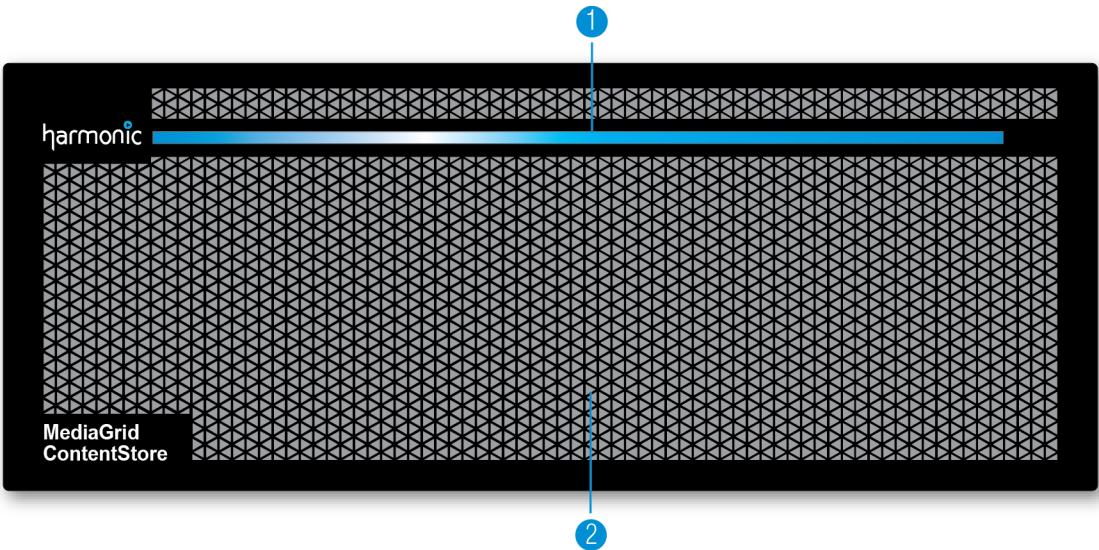

Figure 7-39: ContentStore 4240 bezel

Component	Description
1. Power indicator	A bright blue power indicator is provided across the top of the front panel. This indicator also provides a "wink" function, which allows you to identify a unit from the SystemManager application.
2. Air vents	Allows airflow through the unit. For optimum airflow, do not obstruct the air vents.

Front panel components

The front panel on the ContentStore 4240 contains 24 hot-swappable disk drives, a bezel connector, and a control panel with power button and system status LEDs.

Figure 7-40: Front panel components

Component	Description
1. Power button	Depress this button to power both nodes on or off. Powering off with this button removes the main power but keeps standby power supplied to the system.
2. Control panel	Displays power, temperature, fan, and system status LED indicators.
3. System alarm mute button	Unused (alarm disabled).
4. Bezel LED control connector	Powers the light bar on the bezel.

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Control panel indicators

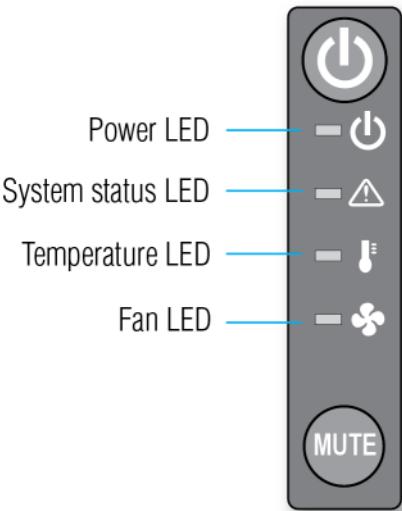The control panel on the ContentStore 4240 provides LED indicators for power, system status, temperature, and fans.

Figure 7-41: Control panel LEDs

LED	State	Description
Power	Blue	Power is being supplied to both power supply units.
	Red	Power supply fault detected.
	Off	Power is off.
System status	Off	System is operating normally.
	Red	System fault detected.
Temperature	Off	Temperature is normal.
	Red	System is overheating.
Fan	Off	Fans are operating normally.
	Red	Fan fault detected.

Disk drive LED indicators

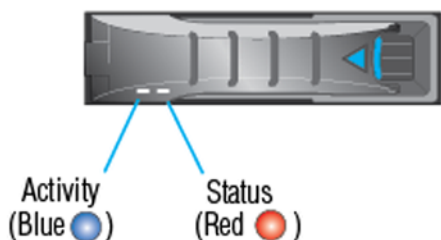Each disk drive on the ContentStore 4240 has an Activity LED and a Status LED.

Figure 7-42: ContentStore 4240 disk drive LED indicators

Drive State	Activity LED (Blue)	Status LED (Red)
Drive is powered on	Solid	Off
Drive activity	Blink	Off
RAID rebuild in progress	Blink	Slow blink (1 Hz)
Drive failure	Solid	Rapid blink (2 Hz)
Drive is being winked	Slow blink (1 Hz)	Off

Rear panel components

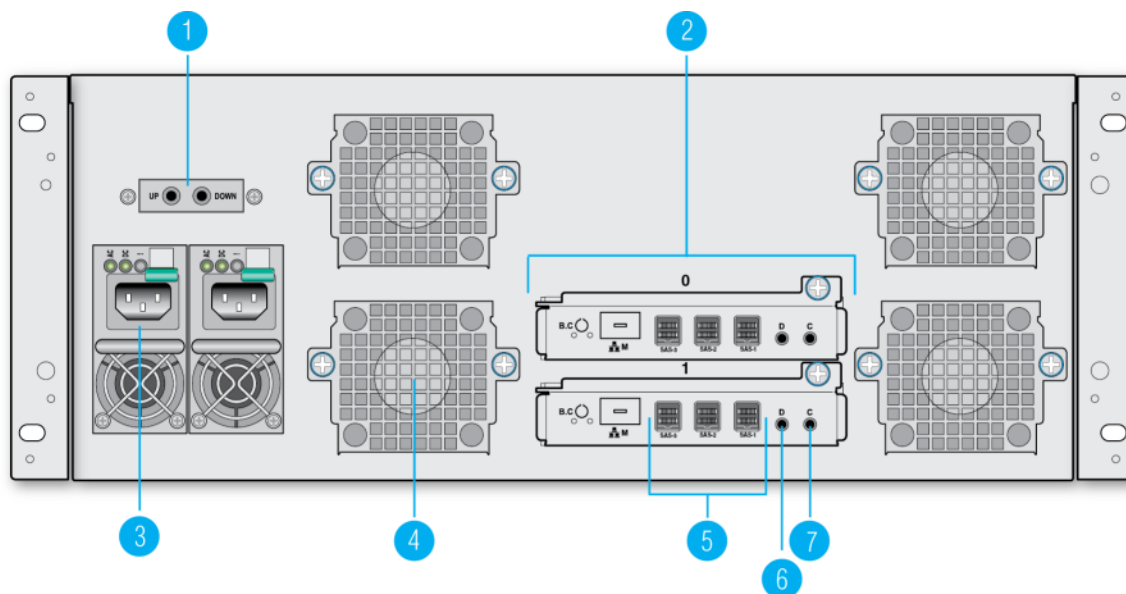The rear panel on the ContentStore 4240 includes dual redundant power supplies and SAS expander modules.

Figure 7-43: ContentStore 4240 rear panel

Component	Description
1. Serial port for remote power on/off	Do not use.
2. Expander modules	Provides SAS I/O ports. May be replaced in the event of a failure.
3. Power supply units	Dual redundant power supplies.
4. Fan modules	Four fan modules maintain all system components below their maximum temperature, assuming the ambient temperature is below 35 degrees Celsius.
5. SAS I/O ports	Used for connecting the ContentStore to the ContentServer.
6. Debug port	Unused.
7. Console port	Unused.

Power supply unit LED indicators

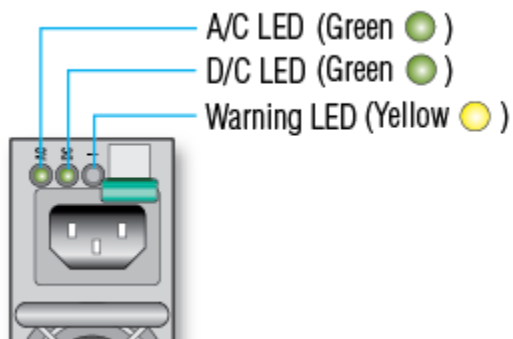Each power supply module on the ContentStore 4240 has an AC, DC, and Warning LED indicator.

Figure 7-44: ContentStore 4240 PSU indicators

PSU state	AC LED	DC LED	Warning LED
PSU normal, AC present	Solid	Solid	Off
No AC to PSU	Slow blink (1 Hz)	Off	Solid
PSU Warning	Solid	Off	Slow blink (1 Hz)
PSU failure	Off	Off	Solid
No AC input	Off	Off	Off

ContentStore 5840 hardware reference

The ContentStore 5840 is a high capacity storage unit containing two drawers of 42 drives each (84 drives in total).

Front panel components

The front panel on the ContentStore 5840 provides an operator's panel, drawer status LEDs, drawer latches and anti-tamper locks.
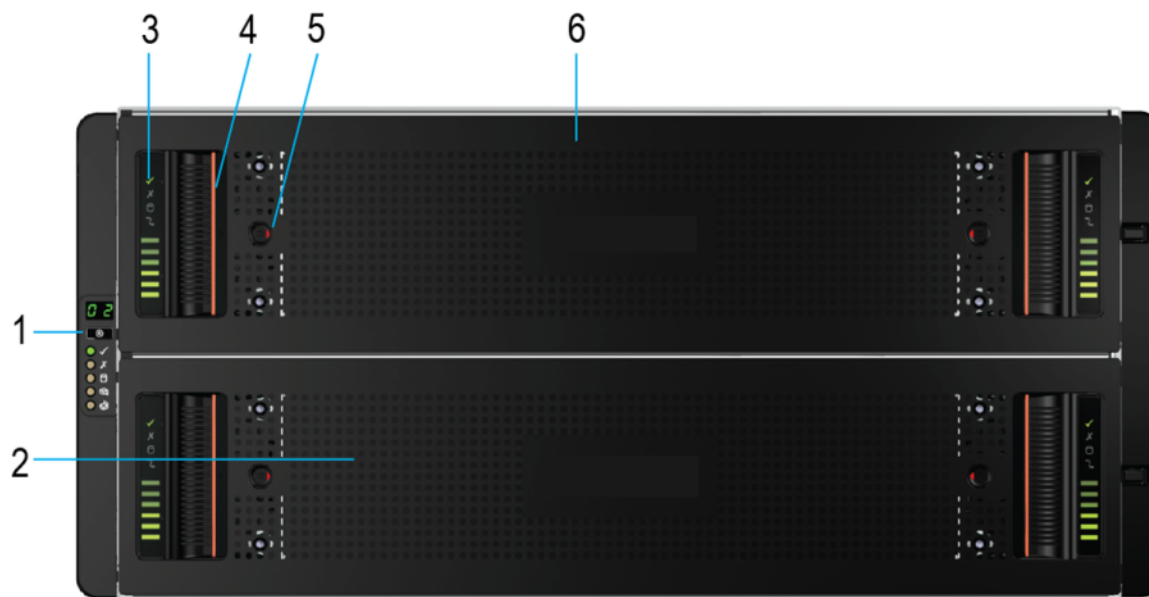

Figure 7-45: Front panel components

Component	Description
1. Operator's panel	Displays the aggregated status of all the modules.
2. Drawer 2	The bottom drawer. Each drawer contains 42 drive slots.
3. Drawer LEDs	Displays status for an individual drawer.
4. Drawer latch	Drawer latches on either side of the drawer are used to pull the drawer out.
5. Anti-tamper lock	Each drawer can be locked shut by turning both anti-tamper locks clockwise using a screwdriver with a Torx T20 bit.
6. Drawer 1	The top drawer. Each drawer contains 42 drive slots.

Drive slot map

Before removing a drive from the ContentStore 5840, use this map to locate the correct drive slot.
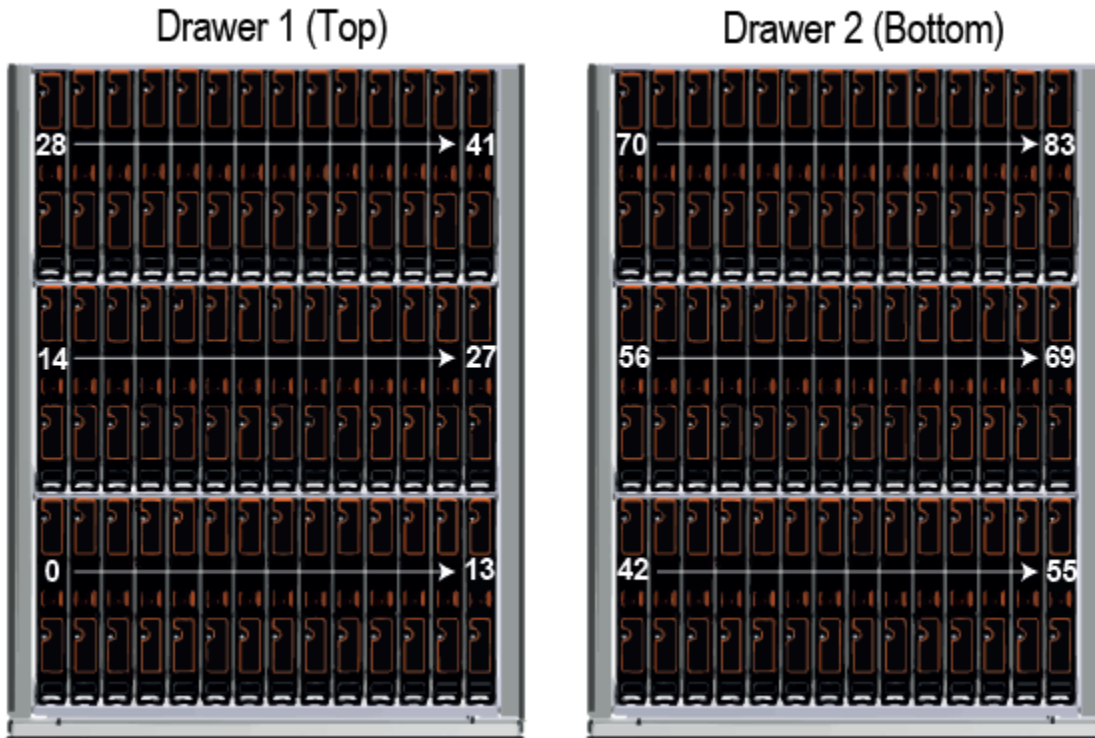
Figure 7-46: Drive slot numbers

Operator's panel LEDs

The operator's panel on the ContentStore 5840 displays the aggregated status of all the modules.
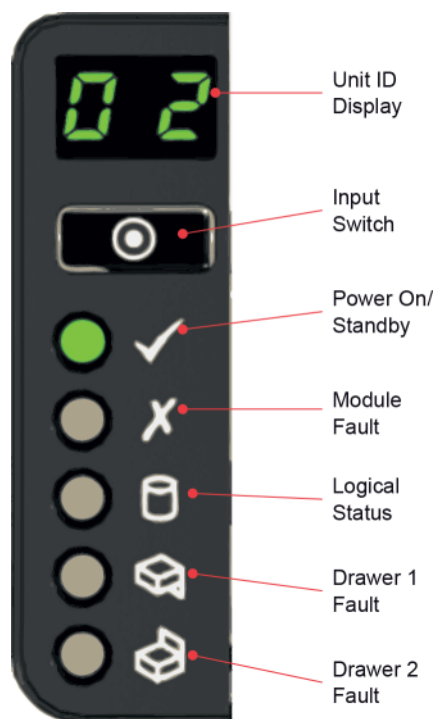

Figure 7-47: Operator's panel LEDs

Component	Description
Unit ID display	Usually shows the identification number (ID) for the ContentStore. When the wink state is on, this flashes "88" at a rate of approximately 1 Hz.
Input switch	Use to set the ID number.
Power on/Standby	• Green: Power is on. • Amber: System is in standby.
Module fault	Amber indicates a fault in a PSU, cooling module or SBB I/O module. Check the drawer LEDs to see if a drive fault is indicated.
Logical status	Amber indicates a fault from something such as a disk drive, a SAS cable, or an internal or external RAID controller. Check the drawer LEDs to see if a drive fault is indicated.
Drawer 1/Drawer 2 fault	Amber indicates a fault in a drive, cable, or sideplane for the specified drawer.

Drawer LEDs

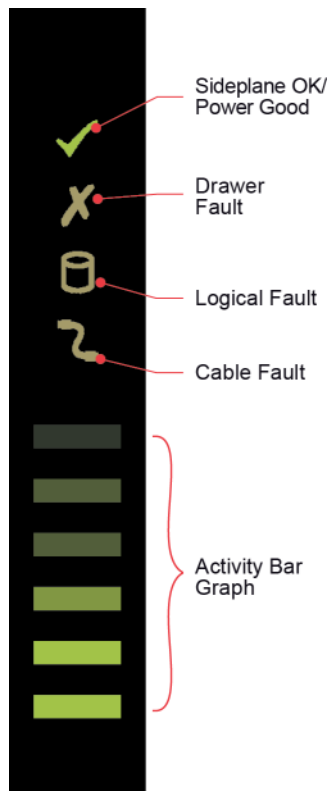The drawer LEDs on the ContentStore 5840 display status for individual drawers.

Figure 7-48: Drawer LEDs

Component	Description
Sideplane OK/Power Good	Green if the sideplane card is working and there are no power problems.
Drawer fault	Amber if a drawer component has failed. If a drive has failed, an amber LED will be lit on the failed drive, and the drive should be replaced. If the drives are OK, contact Harmonic technical support to identify the failure.
Logical fault	Amber if there is a drive fault. Flashes amber if one or more arrays are in an affected state.
Cable fault	Amber if the cabling between the drawer and the back of the enclosure has failed. Contact Harmonic technical support to resolve the problem.
Activity bar graph	Shows the amount of data I/O from zero segments lit (no I/O) to all six segments lit (maximum I/O).

Disk drive fault indicator

Each disk drive on the ContentStore 5840 has a single fault LED, which lights amber when a drive has failed.

📝 **NOTE:** If a disk drive has failed, the respective drawer fault LED on the operator's panel will also display amber. The drive should be replaced as soon as possible.
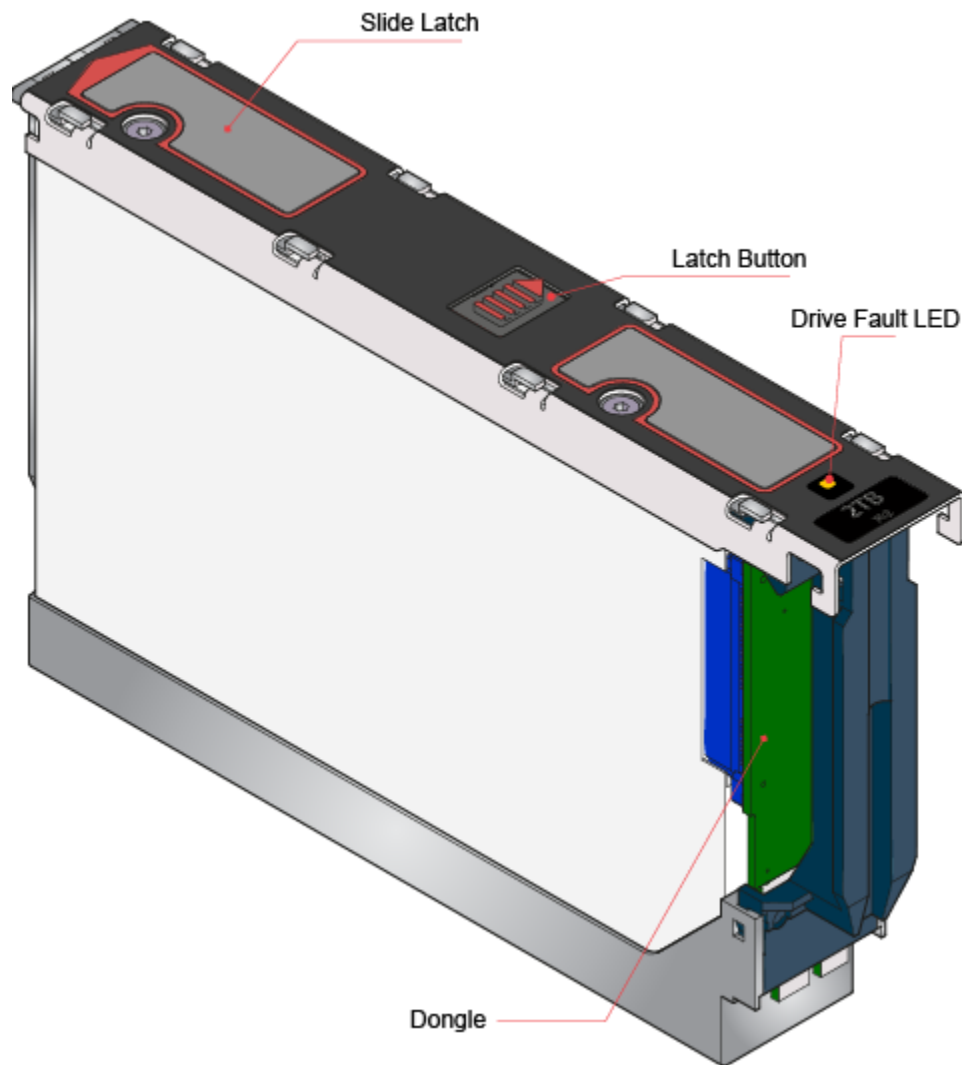
Figure 7-49: ContentStore 5840 disk drive fault indicator

Rear panel components

The rear panel on the ContentStore 5840 includes a power switch, dual redundant SAS I/O modules, power supply modules, and cooling modules.
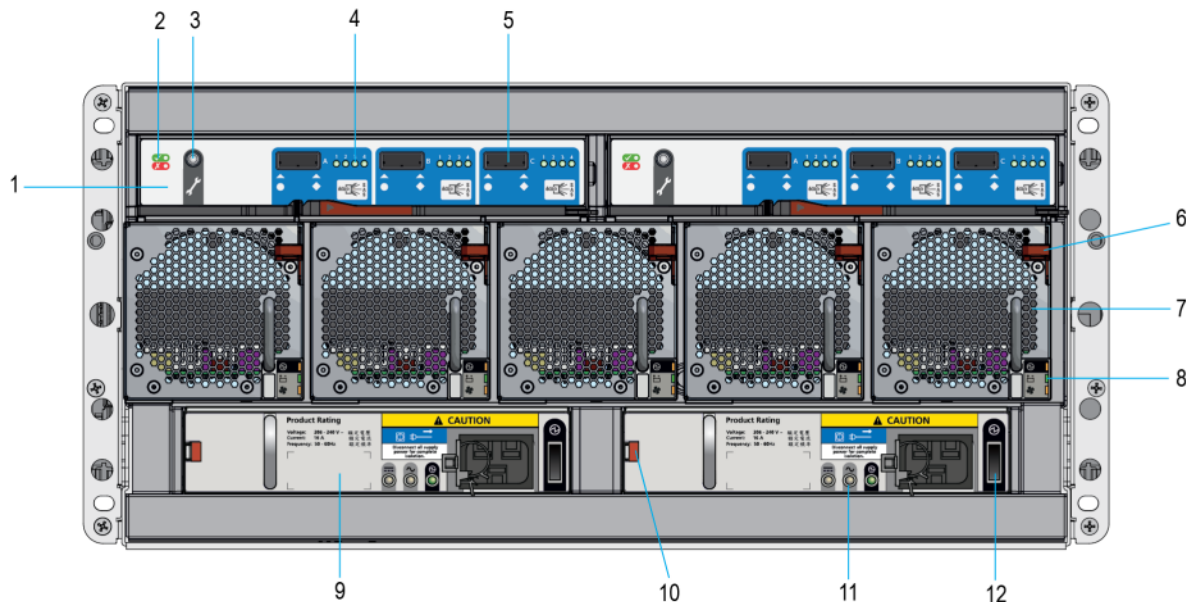

Figure 7-50: Rear panel components

Component	Description
1. I/O modules (2)	Two I/O modules (6 Gb/s SAS EBOD) provide connectivity to the ContentServer. The system can operate with one or two modules. If one of the modules fails in a two module system, the other module will continue to operate. If the ContentStore is run with a single module, the other I/O module bay must be filled with a blank module.
2. I/O Module Power and Fault LEDs	Indicate the status of the I/O module.
3. For factory use only.	
4. External Host Port Activity LEDs	Indicate the status of the host port connection/activity.
5. SAS Connectors	Used for connecting to the ContentServer.
6. Cooling Module Release Latch	Releases the cooling module during replacement.
Cooling Module (5)	Five cooling modules at the rear of the enclosure maintain all system components below their maximum temperature, assuming the ambient temperature is below 35°C. Cooling modules can be hot-swapped while the enclosure is still running, assuming that only one module is removed at a time and the swap takes no longer than two minutes.
Cooling Module LEDs	Indicate the status of the cooling module.

Component	Description
Power Supply Unit (PSU)	Dual PSUs provide redundant power for the system. If one PSU fails, the other will keep the system running while you replace the faulty module.
PSU Release Latch	Releases the power supply unit during replacement.
PSU LEDs	Indicate the status of the power supply unit.
PSU Power Switch	Powers the enclosure on/off.

I/O module LED indicators

Each I/O module on the ContentStore 5840 has three LED indicators.

Figure 7-51: I/O module LED indicators

LED	Description
1. I/O Module OK	• Constant green: the I/O module is operating correctly. • Flashing green: indicates an I/O module VPD error.
2. I/O Module Fault	Constant amber if the I/O module is faulty.
3. External Host Port Activity	• Constant green: indicates that there is a host port connection but no activity. • Flashing green: indicates that there is a host port connection, and data is being transferred.

Power supply unit LED indicators

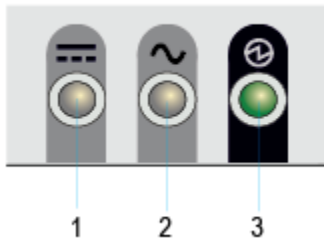Each power supply unit in the ContentStore 5840 has a PSU failure LED, an AC failure LED, and a power LED.

Figure 7-52: Power supply unit indicators

1. PSU Fail (Amber)	2. AC Fail (Amber)	3. Power (Green)	Status
Off	Off	Off	No power to either PSU.
On	On	Off	PSU present, but not supplying power or PSU alert state (usually due to critical temperature.
Off	Off	On	Main AC present, switch on. This PSU is providing power.
Off	Off	Flashing	AC power present, PSU in standby (other PSU is providing power.)
Flashing	Flashing	Off	PSU firmware download.
Off	On	Off	AC power missing, PSU in standby (other PSU is providing power).
On	On	On	Harmonic MediaGrid software has lost communication with the PSU.
On	Disregard	Off	PSU has failed.

Cooling module LED indicators

Each cooling module in the ContentStore 5840 has a status LED, battery fault LED (unused), and a fan fault LED.
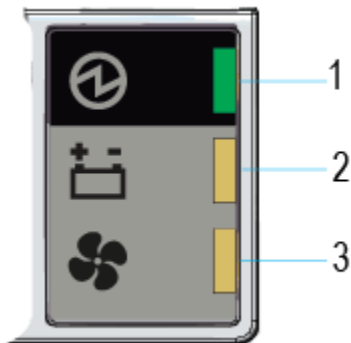
Figure 7-53: Cooling module LED indicators

LED	Description
1. Module OK	• Constant green: indicates that the fan is working correctly. • Off: the fan has failed.
2. Battery Fault	Not currently used.
3. Fan Fault	Amber indicates that a fan has failed.

ContentStore 5840A hardware reference

The ContentStore 5840A is a high capacity storage unit containing two drawers of 42 drives each (84 drives in total).

Front panel components

The front panel on the ContentStore 5840A provides an operator's panel, drawer status LEDs, drawer latches and anti-tamper locks.
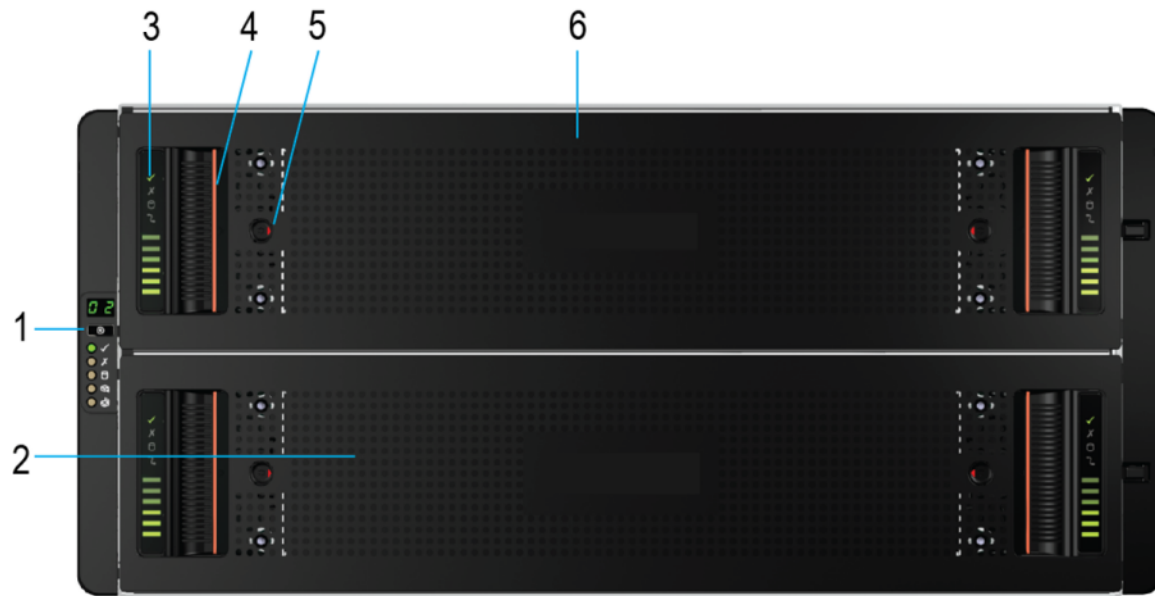

Figure 7-54: Front panel components

Component	Description
1. Operator's panel	Displays the aggregated status of all the modules.
2. Drawer 2	The bottom drawer. Each drawer contains 42 drive slots.
3. Drawer LEDs	Displays status for an individual drawer.
4. Drawer latch	Drawer latches on either side of the drawer are used to pull the drawer out.
5. Anti-tamper lock	Each drawer can be locked shut by turning both anti-tamper locks clockwise using a screwdriver with a Torx T20 bit.
6. Drawer 1	The top drawer. Each drawer contains 42 drive slots.

Drive slot map

Before removing a drive from the ContentStore 5840A, use this map to locate the correct drive slot.
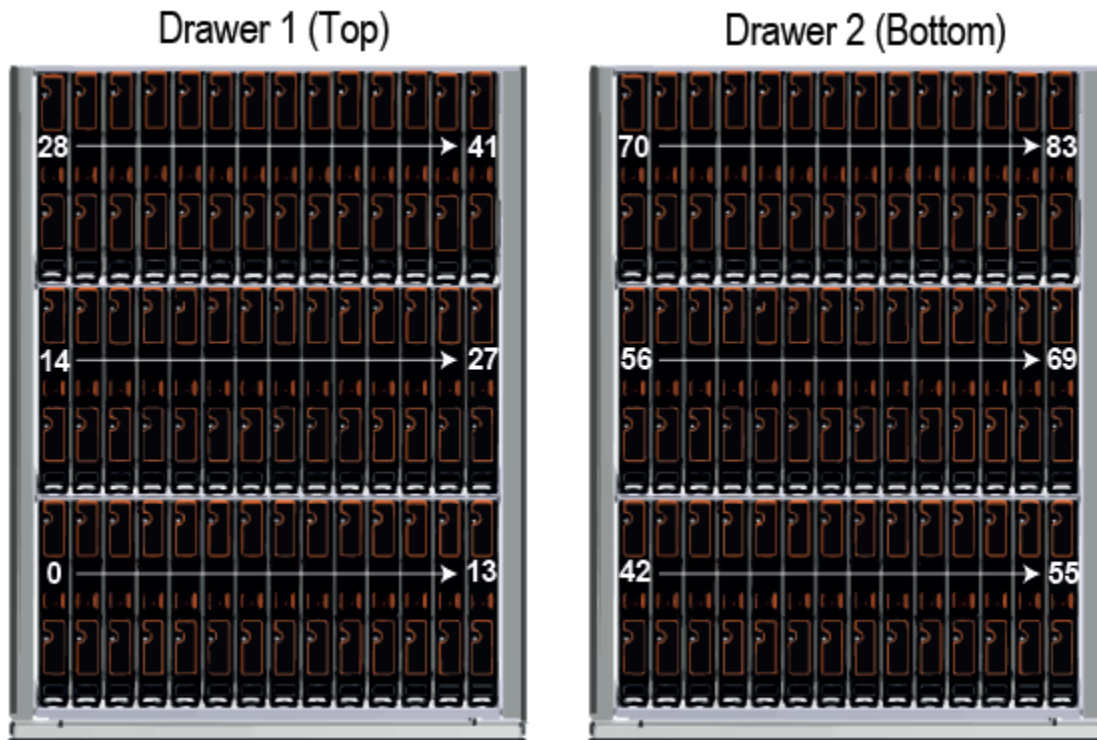

Figure 7-55: Drive slot numbers

Operator's panel LEDs

The operator's panel on the ContentStore 5840A displays the aggregated status of all the modules.
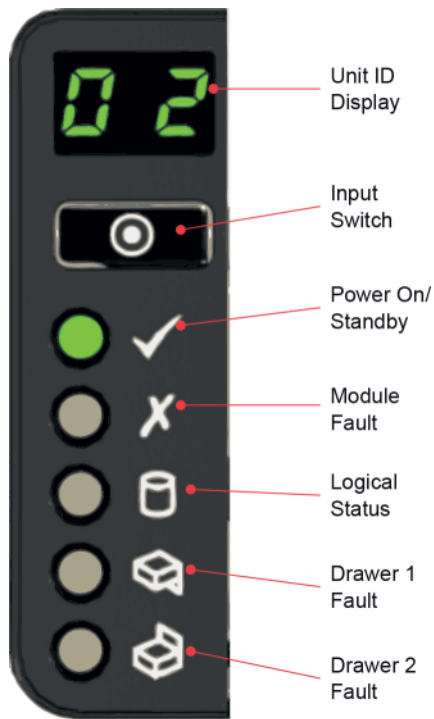

Figure 7-56: Operator's panel LEDs

Component	Description
Unit ID display	Usually shows the identification number (ID) for the ContentStore. When the wink state is on, this flashes "88" at a rate of approximately 1 Hz.
Input switch	Use to set the ID number.
Power on/Standby	• Green: Power is on. • Amber: System is in standby.
Module fault	Amber indicates a fault in a PSU, cooling module or SBB I/O module. Check the drawer LEDs to see if a drive fault is indicated.
Logical status	Amber indicates a fault from something such as a disk drive, a SAS cable, or an internal or external RAID controller. Check the drawer LEDs to see if a drive fault is indicated.
Drawer 1/Drawer 2 fault	Amber indicates a fault in a drive, cable, or sideplane for the specified drawer.

Drawer LEDs

The drawer LEDs on the ContentStore 5840A display status for individual drawers.
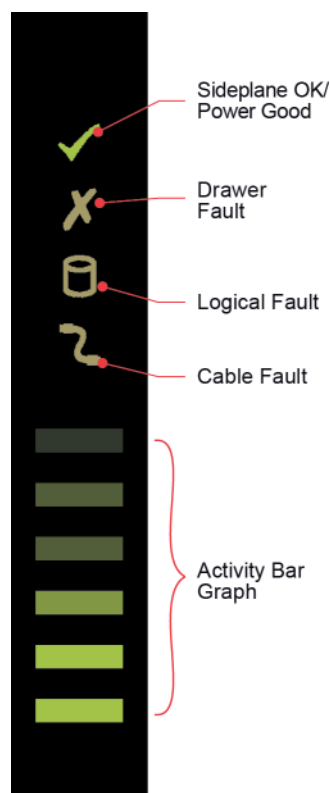
Figure 7-57: Drawer LEDs

Component	Description
Sideplane OK/Power Good	Green if the sideplane card is working and there are no power problems.
Drawer fault	Amber if a drawer component has failed. If a drive has failed, an amber LED will be lit on the failed drive, and the drive should be replaced. If the drives are OK, contact Harmonic technical support to identify the failure.
Logical fault	Amber if there is a drive fault. Flashes amber if one or more arrays are in an affected state.
Cable fault	Amber if the cabling between the drawer and the back of the enclosure has failed. Contact Harmonic technical support to resolve the problem.
Activity bar graph	Shows the amount of data I/O from zero segments lit (no I/O) to all six segments lit (maximum I/O).

Disk drive fault indicator

Each disk drive on the ContentStore 5840A has a single fault LED, which lights amber when a drive has failed.

📝 **NOTE:** If a disk drive has failed, the respective drawer fault LED on the operator's panel will also display amber. The drive should be replaced as soon as possible.
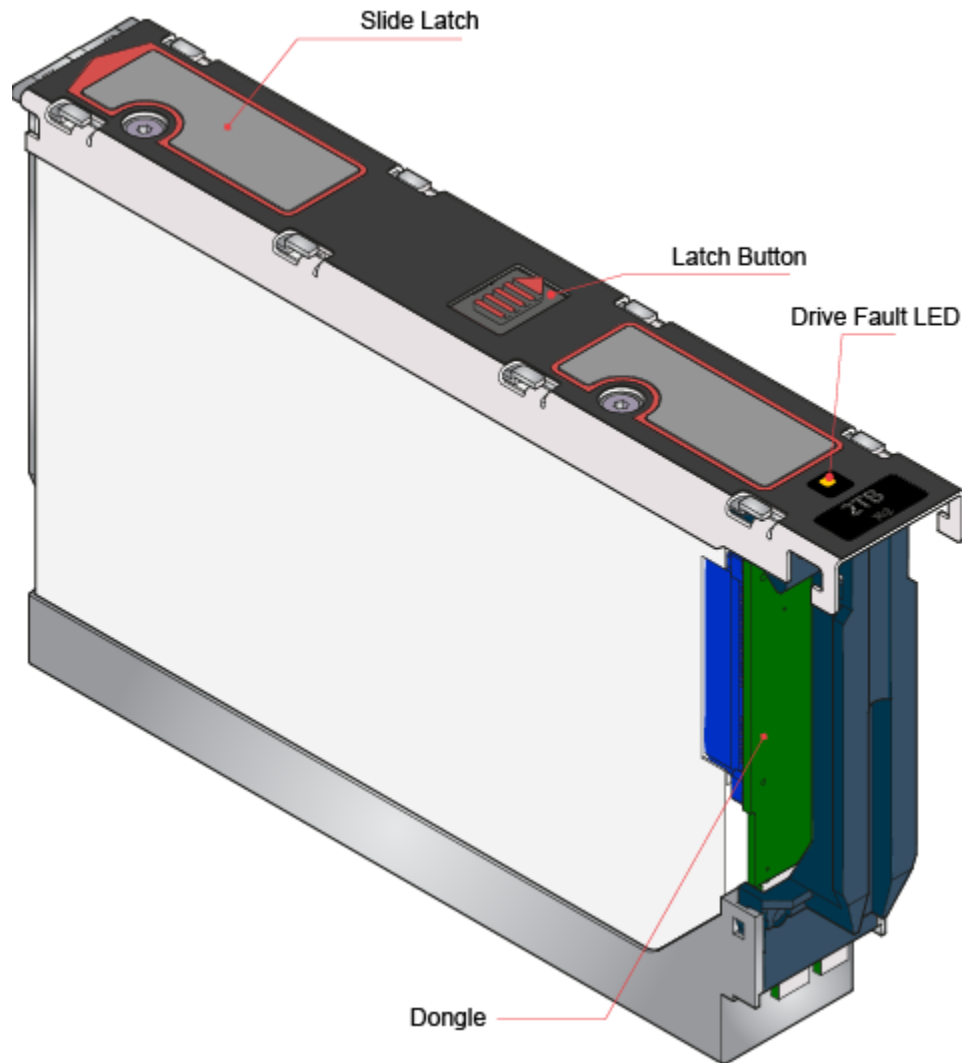

Figure 7-58: ContentStore 5840A disk drive fault indicator

Rear panel components

The rear panel on the ContentStore 5840A includes a power switch, dual redundant SAS I/O modules, power supply modules, and cooling modules.
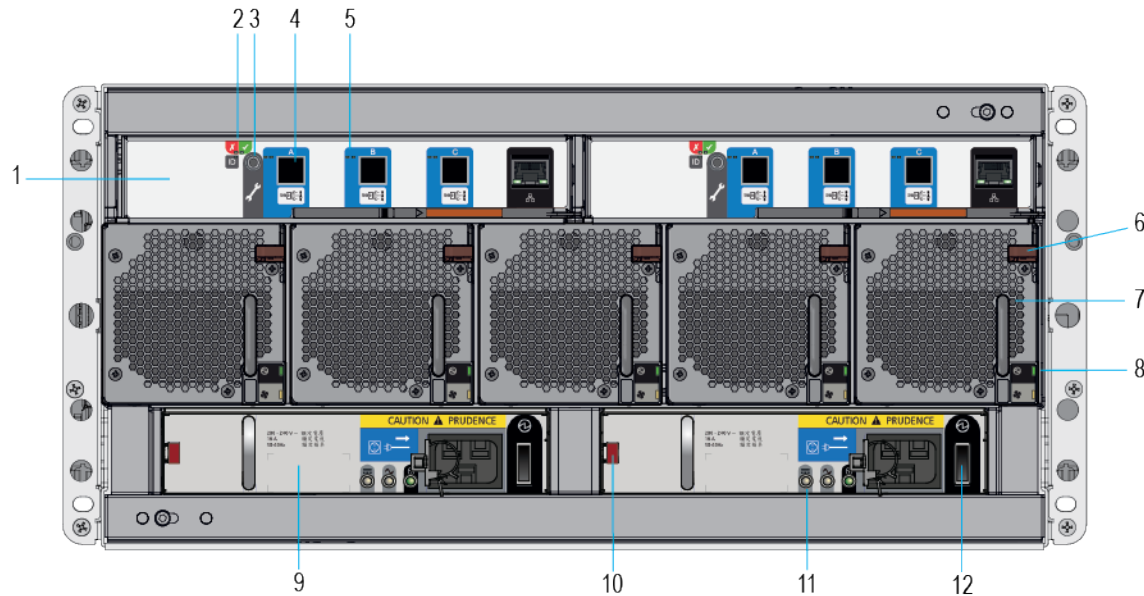
Figure 7-59: Rear panel components

Component	Description
1. I/O modules (2)	Two I/O modules (12 Gb/s SAS EBOD) provide connectivity to the ContentServer. The system can operate with one or two modules. If one of the modules fails in a two module system, the other module will continue to operate. If the ContentStore is run with a single module, the other I/O module bay must be filled with a blank module.
2. I/O Module Power and Fault LEDs	Indicate the status of the I/O module.
3. For factory use only.	
4. 12Gb SAS Connectors	Used for connecting to the ContentServer.
5. External Host Port Activity LEDs	Indicate the status of the host port connection/activity.
6. Cooling Module Release Latch	Releases the cooling module during replacement.

Component	Description
7. Cooling Module (5)	Five cooling modules at the rear of the enclosure maintain all system components below their maximum temperature, assuming the ambient temperature is below 35°C. Cooling modules can be hot-swapped while the enclosure is still running, assuming that only one module is removed at a time and the swap takes no longer than two minutes.
8. Cooling Module LEDs	Indicate the status of the cooling module.
9. Power Supply Unit (PSU)	Dual PSUs provide redundant power for the system. If one PSU fails, the other will keep the system running while you replace the faulty module.
10. PSU Release Latch	Releases the power supply unit during replacement.
11. PSU LEDs	Indicate the status of the power supply unit.
12. PSU Power Switch	Powers the enclosure on/off.

I/O module LED indicators

Each I/O module on the ContentStore 5840A has three LED indicators.
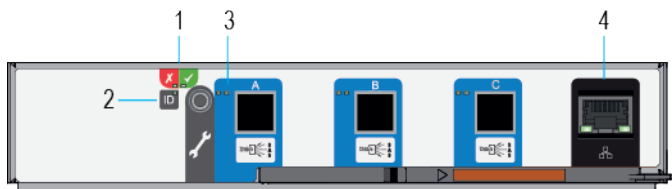
Figure 7-60: I/O module LED indicators

Display	LED Description
Fault and OK	• Fault: Constant amber if the I/O module is faulty. For replacement instructions, see *ContentStore Component Replacement Guide*. • OK: Constant green if the I/O moduing green indicates an I/O module VPD error.
ID	Blue when the module is being identified.
External Host Port Activity	• Constant green: indicates that there is a host port connection but no activity. • Flashing green: indicates that there is a host port connection, and data is being transferred.
Ethernet Connector	Not in use.

Power supply unit LED indicators

Each power supply unit in the ContentStore 5840A has a PSU failure LED, an AC failure LED, and a power LED.
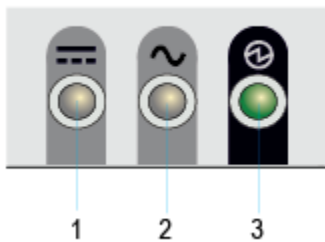
Figure 7-61: Power supply unit indicators

1. PSU Fail (Amber)	2. AC Fail (Amber)	3. Power (Green)	Status
Off	Off	Off	No power to either PSU.
On	On	Off	PSU present, but not supplying power or PSU alert state (usually due to critical temperature.
Off	Off	On	Main AC present, switch on. This PSU is providing power.
Off	Off	Flashing	AC power present, PSU in standby (other PSU is providing power.)
Flashing	Flashing	Off	PSU firmware download.
Off	On	Off	AC power missing, PSU in standby (other PSU is providing power).
On	On	On	Harmonic MediaGrid software has lost communication with the PSU.
On	Disregard	Off	PSU has failed.

Cooling module LED indicators

Each cooling module in the ContentStore 5840A has a status LED, battery fault LED (unused), and a fan fault LED.
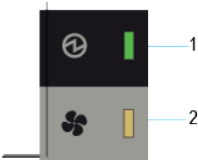
Figure 7-62: Cooling module LED indicators

Display	LED Description
1. Module OK	
2. Fan Fault	Off means the fan is working correctly. Amber indicates that communication has been lost with the fan module controller or the reported fan speed is out of tolerance. For replacement instructions, see ContentStore Component Replacement Guide.

5406 Network Switch

The 5406 Network Switch, a Harmonic-provided network switch, supports 1 GbE and 10 GbE (CX4) modules.

📄 **NOTE:** The 5406 Network Switch may be used in a Harmonic MediaGrid 3000 Series system, but not in a 4000 Series system.

Figure 7-63: Front view of 5406 Network Switch (10GbE and 1GbE ports)

Figure 7-64: Front view of 5406 Network Switch (all-1GbE ports)
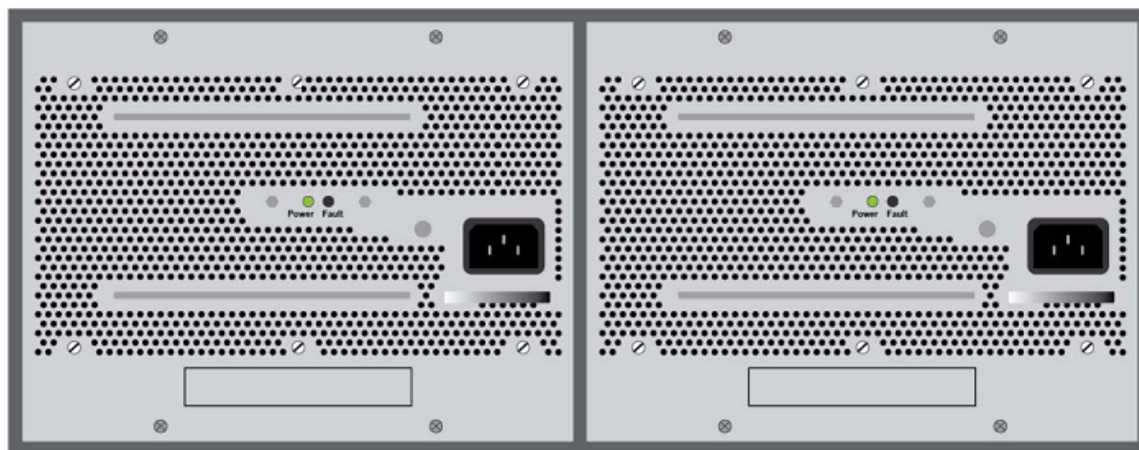
Figure 7-65: Rear view of 5406 Network Switch

For more information about the switches, including LED and port descriptions, refer to the documentation that ships with the product.

⚠ **IMPORTANT:** Hot swapping of the cl modules is not supported on the 1010 switches. A switch reset occurs if you install or remove modules after the switch has been powered on. Only install or remove modules during scheduled downtime.
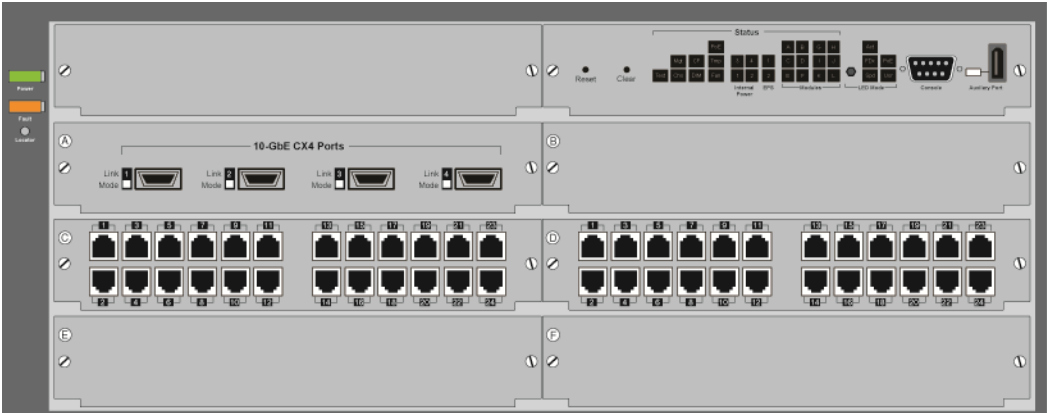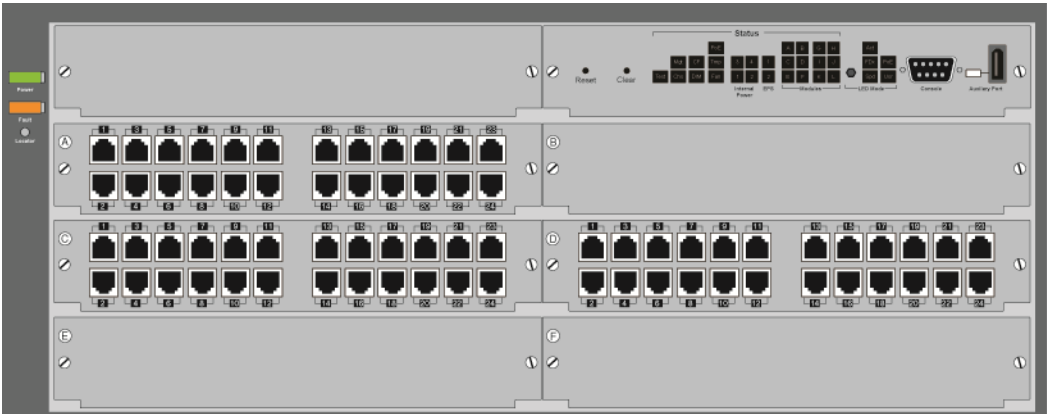
📝 **NOTE:** The ContentServer 3000/4000 series cannot be connected directly to CX4 ports.

Power and cooling specifications

Note the following power and cooling specifications for Harmonic MediaGrid devices.

Device	Input Power	Cooling
ContentBridge 1000B	100-240V, 60-50Hz	558 BTU/hr @ 164 W
ContentBridge 2010E	100-240V, 60-50Hz	797 BTU/hr @ 234 W
ContentBridge 2010F	100-240V, 60-50Hz	900 BTU/hr @ 264 W
ContentDirector 1000E and 2000B	100-240V, 60-50Hz	797 BTU/hr @ 234 W
ContentDirector 1000F and 2000C	100-240V, 60-50Hz	900 BTU/hr @ 264 W
ContentServer 3000	100-240V, 60-50Hz	2912 BTU/hr @ 854 W
ContentServer 4000	100-240V, 60-50Hz	3047 BTU/hr @ 893 W
ContentStore 3160	100-240V, 60-50Hz	718 BTU/hr @ 210 W
ContentStore 4240	100-240V, 60-50Hz	1436 BTU/hr @ 421 W
ContentStore 5840	200-240, 60-50Hz	6510 BTU/hr @ 1908 W
ContentStore 5840A	200-240, 60-50Hz	5797 BTU/hr @ 1700 W

Troubleshooting

This section provides some troubleshooting information for the Harmonic MediaGrid.

⚠️ **CAUTION:** If you do not understand the procedures or recommendations described in this section, please consult with Technical Support before proceeding

Log files

The Harmonic MediaGrid provides log files for all of the core services. Utilizing these logs will assist in determining the root cause of problems or assist engineering in determining problems in the code.

The path to the log files is `/var/log/omneon/remote`. Log files include:

ssmd
　　SliceServer Manager

mdscore
　　MetaData Server

startup
　　Core Harmonic MediaGrid Services Startup and Shutdown

mdsckschedule
　　Checkpoint Schedule

oujfh
　　Provide at support/engineering request

ousd
　　Social director

ssmgc
　　SliceServer Manager Garbage Collector

The first three log files (ssmd, mdscore, and startup) are the most commonly utilized log files when troubleshooting Harmonic MediaGrid problems. The logs will rotate and be archived when they approach or reach 250MB depending upon the system check which is performed hourly. The files are archived with the format of filename.1.gz, filename.2.gz, etc. The exception to this is the remotelogs files. The archive depth is presently 13 files deep but can be configured to archive more files.

Harmonic MediaGrid breaks the log files out by IP address for each of the devices in the cluster. Each ContentServer has two log files so long as the IP interfaces are up and active.

Note that the information in log files is structured such that the information at the top of the file is the most current and supersedes anything below it. For example, there may be multiple lease entries for the same IP address, but the ones at the top of the file supersede the ones below it.

`Remotelogs` directory listing

```
[root@CDL1 remote]# pwd
/var/log/omneon/remote
[root@CDL1 remote]# ll
total 59152
-rw------- 1 root root 8518 Jan 17 15:37 10.35.134.104.log
-rw------- 1 root root 3026816 Jan 17 15:28 10.35.134.111.log
-rw------- 1 root root 1457561 Jan 17 15:27 10.35.134.113.log
-rw------- 1 root root 49846 Jan 17 15:32 10.35.134.114.log
-rw------- 1 root root 1172860 Jan 8 16:01 10.35.134.114.log.1.gz
-rw------- 1 root root 3250421 Jan 8 15:01 10.35.134.114.log.2.gz
-rw------- 1 root root 3261527 Jan 8 14:01 10.35.134.114.log.3.gz
-rw------- 1 root root 3212298 Jan 8 13:01 10.35.134.114.log.4.gz
-rw------- 1 root root 3229006 Jan 8 12:01 10.35.134.114.log.5.gz
-rw------- 1 root root 1697018 Jan 17 15:15 10.35.134.115.log
-rw------- 1 root root 1642107 Jan 17 15:28 10.35.134.118.log
-rw------- 1 root root 1459076 Jan 17 15:28 10.35.134.120.log
-rw------- 1 root root 1605260 Jan 17 15:28 10.35.134.121.log
```

Log rotation for remotelog files is also based upon filesize and is set to 5MB. The archive depth is set to 5 files and is also configurable.

Verifying the DHCP Server is running

The first two ContentDirector nodes in a Harmonic MediaGrid system have DHCP servers running on them and they are configured as peers.

This means that either ContentDirector can respond to a DHCP request and the servers should communicate the IP address that they have assigned to a request to the other DHCP server. This communication between the DHCP servers ensures that the dhcp-leases files that reside on both ContentDirector nodes are synchronized and have the same information about client MAC address, etc.

The dhcp-leases file resides in the `/var/lib/dhcp` directory on the first two ContentDirector nodes and is a text file that can be viewed with the `cat`, `less`, or `more` commands.

Configuration parameters, including the address pools and reservations, are stored in the `/etc/dhcpd.conf` file. Other parameters in the `dhcpd.conf` file include lease-time, and ntp-servers for devices requesting an IP address. In the case of the Harmonic MediaGrid, the ContentServer and ContentBridge are the devices that request IP addresses from the ContentDirector. The ntp-server parameter in the `dhcpd.conf` file ideally points to the same NTP server as configured in ntp.com.

Two ways to confirm that DHCP is running are shown below. In both cases the process id is the same, and in example two, the process id existing is the only confirmation that the process is running.

dhcpd status example 1:

```
[root@CDL1 dhcp]# service dhcpd status
dhcpd (pid 3027) is running...
```

dhcpd status example 2:

```
[root@CDL1 dhcp]# pgrep dhcpd
3027
```

As mentioned before, the DHCP servers in the Harmonic MediaGrid are configured in a peer relationship. Both servers have to be up or one must timeout and wait for the other to come online. In the output of `/var/log/messages` below, the communication between ContentDirector1 (shown as CLD1) and ContentDirector2 (shown as CLD2) has been interrupted. In the following example, DHCP has been stopped on ContentDirector1, and the output messages are from ContentDirector2. Note the "communications-interrupted" message:

```
Feb 9 13:30:57 CDL2 dhcpd: failover peer Public B: I move from normal to
 communications-interrupted
Feb 9 13:30:57 CDL2 dhcpd: peer Public A: disconnected
Feb 9 13:30:57 CDL2 dhcpd: failover peer Public A: I move from normal to
 communications-interrupted
```

Also shown in the output below is the services being restarted on ContentDirector1. Shortly after restarting services on ContentDirector1, ContentDirector2 logs a message to `/var/log/message` that communications have moved from interrupted to normal:

```
Feb 9 13:31:38 CDL2 dhcpd: failover peer Public B: I move from communications-
interrupted to normal
Feb 9 13:31:38 CDL2 dhcpd: Sending updates to Public B.
Feb 9 13:31:38 CDL2 dhcpd: pool 5555557d5ba0 10.35.135/24 total 150 free 63
 backup 71 lts -4
Feb 9 13:31:38 CDL2 dhcpd: failover peer Public A: peer moves from normal to
 normal
Feb 9 13:31:38 CDL2 dhcpd: failover peer Public A: I move from communications-
interrupted to normal
Feb 9 13:31:38 CDL2 dhcpd: Sending updates to Public A.
Feb 9 13:31:38 CDL2 dhcpd: pool 55555578f400 10.35.134/24 total 150 free 59
 backup 66 lts -3
```

Looking for startup errors in the mdscore log file

The number one cause of services not starting on ContentDirector is that the times are not synchronized across ContentDirector nodes.

Times must be synchronized so that journaling and sync files across nodes have the same timestamps. The times must be within about 4/10 (0.4 sec) of a second or less for the services to run. Below is a portion of the mdscore log file that shows the error message for a ContentDirector that does not have its time synchronized with another running ContentDirector.

Sample omcld status error:

```
[root@CDL1 ~]# service omcld status
mdsstartup (pid 27118) is running...
oujfh (pid 27144) is running...
ousd (pid 27134) is running...
ssmd (pid 27153) is running...
mdscore dead but pid file exists ****
```

Sample output from mdscore log file:

```
2000-12-12 00:00:07.918|D|outoktDropOut|[18..41cf] 1389332264079,
2000.12.12 00:00:07.918779
2000-12-12 00:00:07.918|D|outoktNotifyLiaisonOfExclusion|[18..41cf]
notifying liaison of exclusion
0000-12-12 00:00:07.918|D|outoktFree|(18) drop out
2000-12-12 00:00:07.919|D|outoktFree|(18) closing receive socket 22
2000-12-12 00:00:07.919|D|outoktFree|(18) closing send socket 31
2000-12-12 00:00:10.932|E|startFsCore|Unable to start core: MDS not time
 synch'ed ****
2000-12-12 00:00:10.932|E|main|Unable to initialize fs core: MDS not time
 synch'ed ****
```

Network Time Protocol (NTP)

Network Time Protocol, or NTP, is a way of updating the time on a computer to a known time reference.

For the Harmonic MediaGrid, this is essential because while all the computers in the cluster function as a system, they are still autonomous. To synchronize time between ContentDirector nodes, the `ntp.conf` file on each ContentDirector in the Harmonic MediaGrid is configured to point to the same NTP reference, which is typically provided by the SystemManager but could also be a separate NTP server.

The NTP services that run on the ContentDirector are powerful and many utilities are provided for troubleshooting problems. A few useful commands and options can help resolve some NTP problems. One is the `ntpdate` command.

The two most important options to the `ntpdate` command are the -q (for query) and the -u (for update). A time source can be queried to determine what the delta time is between the source being queried and current time on the computer where the command is being run.

`ntpdate query` example:

```
[root@CDL1 ~]# ntpdate -q 10.35.99.210
server 10.35.99.210, stratum 2, offset -110.121850, delay 0.02573
20 Jan 11:27:16 ntpdate[32306]: step time server 10.35.99.210 offset
 -110.121850 sec
```

Synchronizing times on ContentDirector nodes is a straight forward operation that uses a simple command. However, when the "omcld" service is restarted, if the `ntp.conf` file in the `/etc` directory is not properly configured for every ContentDirector in the cluster, it is likely that one or more of the ContentDirector nodes will not start properly. The following examples show how to manually update time on a ContentDirector by synchronizing the time from one ContentDirector to another.

`ntpdate update` example:

```
[root@CDL1 ~]# ntpdate -u 10.35.134.201
20 Jan 10:19:37 ntpdate[29958]: step time server 10.35.99.100 offset
 224239754.222613 sec
```

Note that because the `ntpdate -u` command forces a jump in the system clock, it could also potentially cause problems for DHCPD and authentication. The primary way to avoid such problems is to have NTP configured properly, and have stable NTP servers that keep accurate time. In addition, when running the `ntpdate` command, ideally the affected services should not be running on the ContentDirector. This should minimize potential clock jumps if the ntpdate command is run against an active ContentDirector. The following procedure shows the recommended order of events:

1. `# service omcld stop`
2. `# service dhcpd stop`
3. `# ntpdate -u` *IP_address* (where *IP_address* is the IP address of running ContentDirector)
4. `# service dhcpd start`
5. `# service omcld start`

`ntpdate` syslog message:

```
[root@CDL1 log]# less /var/log/messages
Jan 20 11:47:18 CDL1 ntpd[3008]: time reset -0.553542 s
Jan 20 11:51:35 CDL1 ntpd[3008]: synchronized to LOCAL(0), stratum 10
Jan 20 11:52:40 CDL1 ntpd[3008]: synchronized to 10.35.135.201, stratum 11
```

Possible error message:

```
mdscore dead but pid file exists
```

If all other services are running, then the likely cause is that time is not synchronized on ContentDirector nodes.

Resolution: `ntpdate -u` *time_source*

`ntpdate` should be initiated on any ContentDirector nodes that are running first so that the time source is known. `ntpdate -u` can then be initiated on ContentDirector nodes that are receiving the above error message.

Troubleshooting on the ContentBridge

The ContentBridge provides access to the Harmonic MediaGrid for clients not running the FSD or clients that need to access the Harmonic MediaGrid via FTP.

ContentBridge mounts to the Harmonic MediaGrid

The primary problem experienced with the ContentBridge occurs when the Harmonic MediaGrid file system has not been mounted.

To determine that the file system has been mounted, use one or both of the following commands.

`mount` command on the ContentBridge:

```
[root@CLB01649 ~]# mount
  /dev/ram0 on / type ext2 (rw)
  /dev/proc on /proc type proc (rw)
 /dev/sys on /sys type sysfs (rw)
  /dev/devpts on /dev/pts type devpts (rw,gid=5,mode=620)
  /dev/shm on /dev/shm type tmpfs (rw)
  sunrpc on /var/lib/nfs/rpc_pipefs type rpc_pipefs (rw)
  //10.35.99.180/SBOD on /mnt/10.35.99.180/SBOD type cifs (rw,mand)
  /10.35.134.200/mg0 on /mnt/omfs/10.35.134.200/omneon/omfs/mg0 type omfs
  (rw,username=omneon,password=xxx)
```

`df` command on the ContentBridge

```
[root@CLB01649 ~]# df
  Filesystem 1K-blocks Used Available Use% Mounted on
  /dev/ram0 249551 124082 125469 50% /
  /dev/shm 1037296 0 1037296 10% /dev/shm
  //10.35.99.180/SBOD 5161484288 2706030592 2455453696 53%
  /mnt/10.35.99.180/SBOD
  /10.35.134.200/mg0 12975695328 2651456296 10324239032 21%
  /mnt/omfs/10.35.134.200/omneon/omfs/mg0
```

Note the line starting with `/10.35.134.200`. This is the mount for the ContentBridge to the Harmonic MediaGrid. Depending on the gateway configuration file, there may be multiple mount points. The number of mount points will vary depending on the number of mount points defined in the gateway file for different users.

ContentBridge configuration files

The second most common problem on the ContentBridge is that the config file or the gateway file has not been configured correctly.

The "config" file is the same for all ContentBridge nodes in the Harmonic MediaGrid system. This file is located in the `/tftpboot/config` directory on the first two ContentDirector nodes. To edit this file, use the SystemManager, which pushes the configuration file to all ContentDirector nodes. This ensures that, when the ContentBridge downloads this file from the ContentDirector, the configuration information is the same across ContentDirector nodes. Refer to "Editing the ContentBridge Configuration File" in the *Harmonic SystemManager User Guide* for instructions.

Example: ContentServer and ContentBridge config file

```
[root@CLB01649 tmp]# cat config
LOGHOST=10.35.134.200
REBOOT_ON_PANIC=YES
SLICE_TIMEZONE=Etc/GMT+8
ENABLE_JUMBO_SERVER=NO
ENABLE_JUMBO_BRIDGE=NO
```

In addition to the config file, there is a gateway file for each ContentBridge in the Harmonic MediaGrid. The file name for the gateway file is `CLBnnnnn` and is case sensitive. The five n's reflect the last five digits of the serial number of the ContentBridge. Again, any changes to this gateway file must be done in the `/tftpboot/config/gateway` directory on both ContentDirector nodes.

When the `CLBnnnnn` file is downloaded to the gateway, it is stored in the `/tmp` directory with the file name gateway. This file can be examined using the `cat`, `less`, and `more` commands, or your preferred editor to ensure that the parameters in the file on the ContentBridge match the parameters on the ContentDirector. The most common problem is that the changes to the gateway file are made on one ContentDirector but are never made on the file on the second ContentDirector.

The output below is a listing of the files on one ContentDirector and shows the CLBnnnnn notation of the file name.

```
[root@CDL1 gateway]# ll
total 8
-rwxr-xr-x 1 root root 58 Jan 29 18:33 CLB01634
-rwxr-xr-x 1 root root 81 Jan 30 16:14 CLB01649
```

The next output sample is of the file contents being displayed using the `cat` command. These contents can be compared to the gateway file on the ContentBridge to indicate if the gateway file has been downloaded or that the latest changes should be downloaded by rebooting the ContentBridge.

```
[root@CDL1 gateway]# cat CLB01649
CB 10.35.134.200 mg0 omneon usm
MEDIA_API=YES
MG 10.35.134.200 mg0 omneon usm
CI 10.35.99.180 fs0
```

`cat` of file on actual ContentBridge CLB01649:

```
[root@CLB01649 ~]# cat /tmp/gateway
CB 10.35.134.200 mg0 omneon usm
MEDIA_API=YES
MG 10.35.134.200 mg0 omneon usm
CI 10.35.99.180 fs0
```

> **NOTE:** If you are using a name instead of an IP address for the ContentBridge, make sure you can ping the name. If not, DNS is not configured correctly.

> **NOTE:** Lines starting with "MG" or "CI" are for access via the Harmonic Media API, and lines starting with "CB" are for access via CIFS/SMB or FTP.

ContentBridge services

Determine if the necessary services are running on the ContentBridge by issuing the `service gateway status` command.

For example:

```
[root@CLB01649 ~]# service gateway status
Gateway Network Monitor:
gateway_mon.sh (pid 2772) is running...
wdog_set is stopped

File Server Status:
ommedia_remote_svc is stopped
ommedia_mon.sh is stopped
vsftpd (pid 2725) is running...
smbd (pid 2735 2734) is running...
nmbd (pid 2737) is running...
afpd (pid 2769) is running...
```

You will also note that the current Harmonic MediaGrid mount is shown under "Mounted File Systems."

Security with Microsoft Domain Controllers

Security for the Harmonic MediaGrid is achieved by joining a Windows Domain Controller/Active Directory for user authentication.

The Domain Controller sends the positive or negative response to the authentication challenge back to the ContentDirector. ContentManager allows you to set user and group-level security for the various Harmonic MediaGrid files and directories by using Access Control Lists (ACLs).

Security command reference

Use the following ContentDirector and Windows commands to display security settings and perform security related operations.

Table 8-1: Wbinfo commands

Command	Description
wbinfo -u	Displays users
wbinfo -g	Displays groups
wbinfo -authenticate= - domain.name\\username %password	Authenticate a user Example: ``` [root@cld1-1 ~]# wbinfo -- authenticate=domain.name\\username%password plaintext password authentication succeeded challenge/response password authentication succeeded ```
wbinfo -n	Look up SID of a specific user or group Example: ``` [root@cld1-1 ~]# wbinfo -n testuser1 S-1-5-21-3652892210-2598600654-3378788821-1148 User (1) ```
wbinfo -s	Look up name of a specific SID Example: ``` [root@cld1-1 ~]# wbinfo -s S-1-5-21-3652892210-2598600654-3378788821-1148 SNV-ENG\ testuser1 1 [root@cld1-1 ~]# ```

Table 8-2: Net "use/view' commands for Windows systems

The following commands apply only to Microsoft Windows systems.

Command	Description
net use	Displays current drive mappings
net use <drive letter:> /delete	Deletes drive mapping
net view	Displays a list of computers in a specified workgroup

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Command	Description
net help /help	Connects or disconnects your computer from a shared resource or displays information about your connections.
	Usage Syntax:
	[devicename | *] [\\computername\sharename[\volume]
	[password | *]]
	[/USER:[domainname\]username]
	[/USER:[dotted domain name\]username]
	[/USER:[username@dotted domain name]
	[/SMARTCARD]
	[/SAVECRED]
	[[/DELETE] | [/PERSISTENT:{YES | NO}]]
	NET USE {devicename | *} [password | *] /HOME
	NET USE [/PERSISTENT:{YES | NO}]

Authentication commands

The `mdsclientn` and `wbinfo` commands allow you to authenticate to the Harmonic MediaGrid.

`mdsclientn` command:

`/opt/omcld/bin/mdsclientn localhost`

`mdsclientn` dialog output:

```
mdsclientn: built by lsasaki on 2007-Aug-29 14:08 (USM_Branch_2_0)
Connecting to host "localhost", protocol "tcp", prog 0x20000003
New client is 0x590910
Connected to "localhost"
Opening default session...
Found 4 IP addresses
    10.35.134.200
    10.35.135.200
    192.168.1.200
    192.168.2.200
Retrieving keys
Retrieved keys successfully, mdslen=140, sslen=140
    sessionID = 0x6e0a75f8
    key = 78 56 34 12 f0 de bc 9a 44 33 22 11 88 77 66 55
    currentTime = 2008/01/07 11:04:29
    idleTime = 300 sec
    *host 0 = 2@10.35.134.200/10.35.135.200 id=0xb0b7ca3c30102cf6
    host 1 = 4@10.35.135.201/10.35.134.201 id=0xf7a5e9af3e76a9b
Opened default session of 0x6e0a75f8
=> sess auth ddoyle ddoyle snv-tac.local
Authenticated successfully
Session id=0x6e0a75f8, uservalid=1, admin=0, superuser=0, guest=0, cluster=0
    curTime = 2008/01/07 11:04:40
    idleTime = 300 sec
```

```
    user = "ddoyle", sid=S-1-5-21-2926562709-1155807970-2578703657-1219
=>
```

`wbinfo` user authentication command:

The `wbinfo` can be used to authenticate a domain user.

📝　　**NOTE:**　The \\ between domain name and user are required.

```
wbinfo --authenticate=snv-tac.local\\ddoyle%ddoyle
plaintext password authentication succeeded
challenge/response password authentication succeeded
```

Log file for winbind

This log file can be utilized to view failures of a join or to view success messages for the join.

The output of a `net join` command is captured into a file named `log-wb[domain name]`. The following is an example of one such log file:

```
less /var/log/samba/log.wb-SNV-TAC
```

Using sessions to determine a client IP address

If necessary, a session ID can be used to determine the IP address of a client.

The session ID can be identified in the mdscore log file. Then, by searching the output of the command `cat /var/omneon/mdscore/sessions`, the client IP address associated with that session can be identified.

It is important to understand that the session ID can change or the client may not have an active connection to the Harmonic MediaGrid. Under these circumstances, this method for identifying the client IP would not work.

Active connections to the Harmonic MediaGrid: MDS Sessions

Issue the sessions command on the ContentDirector to determine what clients are connected to the Harmonic MediaGrid.

The response will display each connection, which includes IP information as well as duration and the User Session ID. This Session ID can be seen in the mdscore log files and all associated activity on the Harmonic MediaGrid.

The mdscore log file can be used to identify an active session ID and then associate that ID with an IP address by using the cat command to view the sessions file in the `/var/omneon/mdscore` directory. Commands like `more` and `less` will not work on this file directly.

`cat` of sessions:

```
cat /var/omneon/mdscore/sessions
```

sessions output:

```
      *** 1/64 RPC sessions are in use
*** Sessions ***
There are 2 session(s)

Session ID 0x1e2a219c
    ref/close/dflt: 1/false/false
```

```
    clientrpcaddr: 10.35.134.98
    close: 0
    domain name: (none)
    user vld/adm/god: omneon/true/true/true
    current (real): 2008/01/08 10:24:22
    open time (real): 2008/01/04 08:16:08
    current (mono): 358435
    lastacces (mono): 358336 (delta 99)
    max idle time : 300 sec
    watchq count: 0
    user sid: omsuperuser
    sid #0 : omsuperuser

Session ID 0x46508681
    ref/close/dflt: 1/false/false
    clientrpcaddr: 10.35.134.98
    close: 0
    domain name: (none)
    user vld/adm/god: omneon/true/true/true
    current (real): 2008/01/08 10:24:22
    open time (real): 2008/01/04 06:52:49
    current (mono): 358435
    lastacces (mono): 358435 (delta 0)
    max idle time : 300 sec
    watchq count: 1
    qID=0x2, waiting=1, nextWakeup=2008/01/08 10:24:24
    user sid: omsuperuser
    sid #0 : omsuperuser
```

Understanding Device, USM, and SNMP errors

Device, USM, and SNMP errors in SystemManager are associated with specific processes on the ContentServer.

Alarm	Process
Device: UP/DOWN	omserver
USM: UP/DOWN	sliced
SNMP: UP/DOWN	snmpd

In the example shown below, the "sliced" process was not running, which resulted in `USM: Down`.

Figure 8-1: Device: USM: SNMP error in SystemManager

Troubleshooting the ContentStore 5840

Review potential alarm conditions on the ContentStore 5840 and how to troubleshoot them.

Alarm conditions

All of the alarm conditions described here will cause the module fault LED on the operator's panel to turn amber, indicating a fault.

Status	Severity
PSU alert – loss of DC power from a single PSU	Fault – loss of redundancy
Cooling module fan failure	Fault – loss of redundancy
I/O module detected - PSU fault	Fault
PSU removed	Configuration error
Enclosure configuration error (VPD)	Fault – critical
Low temperature warning	Warning
High temperature warning	Warning
Over-temperature alarm	Fault – critical
Under-temperature alarm	Fault – critical
I^2C bus failure	Fault – loss of redundancy
Operator's panel communication error (I^2C)	Fault – critical
RAID error	Fault – critical
SBB I/O module fault	Fault – critical
SBB I/O module removed	Warning
Drive power control fault	Warning – no loss of drive power
Drive power control fault	Fault – critical: loss of drive power
Insufficient power available	Warning

Related information

Thermal monitoring and control

The ContentStore 5840 uses extensive thermal monitoring and takes a number of actions to ensure component temperatures are kept low and to minimize acoustic noise.

Air flow is from the front to the rear of the enclosure.

Table 8-3: Symptom, cause, and action

Symptom	Cause	Action
If the ambient air is below 25 degrees Celsius and the fans are observed to increase in speed then some restriction on airflow may be causing additional internal temperature rise. **Note**: This is not a fault condition.	The first stage in the thermal control process is for the fans to automatically increase in speed when a thermal threshold is reached. This may be caused by higher ambient temperatures in the local environment and may be perfectly normal. **Note**: This threshold changes according to the number of drives and power supplies fitted.	• Check the installation for any airflow restrictions at either the front or rear of the enclosure. A minimum gap of 25 mm at the front and 50 mm at the rear is recommended. • Check for restrictions due to dust buildup. Clean as appropriate. • Check for excessive re-circulation of heated air from rear to the front. Use of the enclosure in a fully enclosed rack is not recommended. • Check that all blank modules are in place. Reduce the ambient temperature.

Table 8-4: Thermal alarm

Symptom	Cause	Action
• Operator's panel module fault LED is amber. • Fan fail LED is lit on one or more cooling modules.	The internal temperature has exceeded a pre-set threshold.	• Check that the local ambient environment temperature is below the specification. • Check the installation for any airflow restrictions at either the front or rear of the enclosure. A minimum gap of 25 mm at the front and 50 mm at the rear is recommended. • Check for restrictions due to dust buildup. Clean as appropriate. • Check for excessive re-circulation of heated air from rear to the front. Use of the enclosure in a fully enclosed rack is not recommended. • If possible shutdown the enclosure and investigate the problem before continuing.

Table 8-5: Temperature and humidity ranges

	Operating	Non-operating
Temperature range	5° C to 35° C	-40° C to 70° C
Relative humidity	20% rh to 80% rh non-condensing	5% rh to 100% rh non-condensing
Maximum wet bulb temperature	28° C	29° C

Useful information for Harmonic technical support

In order to expedite diagnosis and remediation, please gather helpful information about your Spectrum™ system as well as your SystemManager platform before contacting Harmonic technical support.

Information about the SystemManager client PC

Please gather information about the SystemManager client PC, as well as the SystemManager database file, before contacting Harmonic technical support.

Harmonic technical support may request the following information:

- SystemManager version

  You can find the version here: **Help** > **Server Software**.
- Windows operating system installed on the SystemManager client PC

  The run command `winver` shows the Windows operating system running on the client PC.
- Amount of memory installed on the SystemManager platform

  Open the **System Properties** dialog on the client PC to find the amount of memory installed.
- The SystemManager database file from the SystemManager platform or client PC

  This file is located on the SystemManager platform at `D:\Omneon\Manager\omdb\manager.oda`. Or, if you are using a client PC with a single C: partition, it will be in the same directory on the C: drive.

Related information

Information about a component failure

Information that is specific to your Harmonic MediaGrid device, as well device-specific alarms, can be found on the **Properties** page in SystemManager.

In the event of a component failure, Harmonic technical support will request the following information:

- Site location
- Firmware version
- Device name and serial number
- Date and time of failure
- Description of failure

Related information

Information about a Harmonic MediaGrid cluster failure

Please provide relevant error messages, log files, and a description of the problem you're experiencing with the Harmonic MediaGrid device.

Harmonic technical support will request the following information:

- The name of the device that experienced the failure
- An error message and/or description of the symptom
- Other clients or systems this issue is affecting
- The appropriate log file (or remote access to the device)

The following three log files are used most often when troubleshooting. They are located on the ContentDirector at `/var/log/omneon`:

- ∘ ssmd: SliceServer Manager
- ∘ mdscore: MetaData Server
- ∘ startup: Core Harmonic MediaGrid Services Startup and Shutdown

Related information

Information about a Harmonic MediaGrid client failure

Please provide information about the client operating system and FSD version, as well as relevant error messages and log files.

Harmonic technical support will request the following information:

- The operating system running on the client computer
- Other applications in use
- The Harmonic MediaGrid FSD version
- An error message, screen capture, or description of the symptom
- If the issue is reproducible, the sequence of steps that will reproduce the problem
- Log files for the client FSD
- Log files for the ContentBridge FSD

  These can be found at `/var/log/system.log` and `/var/log/kernel.log`
- The time of the failure

  Check the corresponding SystemManager alarm to find the time of the failure.

Related information

Determining the FSD version

Learn how to find the FSD version running on your Windows, Macintosh, or Linux client.

Related information

Determining the FSD version on Windows

Navigate to the Programs section of the Control Panel to find the FSD version.

1. From the Control Panel dialog, click **Add/Remove Programs**.

2. Locate the **Harmonic MediaGrid File System Driver** entry.

3. Click the link which says **Click here for support information**.

   Result: The version is displayed.

Determining the FSD version on Macintosh

Navigate to the Applications section of the Finder to determine the FSD version.

1. From the **File** menu, select **Find**.

2. In the Finder sidebar of the **Searching "This Mac"** window, click **Applications**.

3. Double-click the **Connect to MediaGrid** icon to open the **Connect to Harmonic MediaGrid** dialog box.

Determining the FSD version on Linux

You can determine the FSD version by entering the following command: `tail /proc/sys/omfs*`.

Collecting log files

To assist with troubleshooting, Technical Support may ask you to reproduce the problem, then collect log files from the client computers and/or the ContentBridge.

⚠ **IMPORTANT:** Do not collect log files unless directed to do so by Technical Support.

Related information

Collecting log files on a Linux client

In addition to log messages, you may also need to collect the current configured Linux FSD parameters.

- Collect log messages on a Linux client at `/var/log/messages`.
- To collect the current configured Linux FSD parameters, enter the following command to access them: `cat /proc/sys/omfs*`.

Collecting log files on a Windows client

For a Windows client, you must first enable logging on the client FSD, then reproduce the issue, before collecting log files.

1. Add two registry parameters to the OmRdr registry key: `HKEY_LOCAL_MACHINE\SYSTEM \CurrentControlSet\Services\OmRdr\Parameters`

   ◦ DWORD "debug" with value 1
   ◦ DWORD "LogTofile" with value 1

2. For debug to take effect, make sure the client is mounted to the Harmonic MediaGrid system.

3. For LogToFile to take effect, do the following:
   a. Run the "tailog" executable and redirect the output to a file.
   b. From the **Start** menu, click **Run**, and paste the location of tailog.exe and desired location of the log file into the **Open** field, as shown in this example:

      Example: `"C:\Program Files\Omneon\Omneon MediaGrid\taillog.exe" > c: \clxxxxxx-1.log`

      In the example above, the log file will be created at the C:\ directory.

4. Reproduce the issue.

5. Collect all log files from tailog and the omxxx.log from the WinFSD installed directory.

6. After collecting log files, delete the LogToFile parameter from the registry.

   > 📝 **NOTE:** Not deleting the LogToFile parameter from the registry may have a negative impact on performance.

Collecting log files on a Macintosh client

For a Macintosh client, you must first enable logging on the client FSD, then reproduce the issue, before collecting log files.

1. Run the following command to ensure that the debug level is set to default:
   Example: `sudo sysctl -w debug.omfs=3`

2. Reproduce the problem.

3. Collect the following log files:
   Example:

   ◦ `/var/log/system.log`
   ◦ `/var/log/kernel.log`

Collecting log messages on the ContentBridge

Log messages on the ContentBridge are located at `/var/log/omneon/ remote/IP_address_of_ContentBridge>`.

Harmonic Technical Assistance Center contact information

A list of phone numbers, e-mail addresses, and important links for the Harmonic Technical Assistance Center (TAC).

Table A-1: Harmonic Technical Assistance Center phone numbers and email addresses

Region	Telephone Technical Support	Email
Americas	888.673.4896 (888.MPEG.TWO) 408.490.6477	*support@harmonicinc.com*
Europe, the Middle East and Africa (EMEA)	+44.1252.555.450	*emeasupport@harmonicinc.com*
India	+91.120.498.3199	*apacsupport@harmonicinc.com*
Russia	+7.495.926.4608	*rusupport@harmonicinc.com*
China	+86.10.6569.5580	*chinasupport@harmonicinc.com*
Japan	+81.3.5614.0524	*japansupport@harmonicinc.com*
Asia Pacific (APAC) – Other Territories	+852.3184.0045 +65.6542.0050	*apacsupport@harmonicinc.com*

Report an issue online

https://www.harmonicinc.com/service-support/support/

Harmonic support website

http://www.harmonicinc.com/content/technical-support

Software download location for Cable Edge products

ftp://ftp.harmonicinc.com

Contact Harmonic Technical Publications

techdocs@harmonicinc.com

- *Harmonic corporate contact information*

Harmonic corporate contact information

Phone numbers and addresses for the corporate office.

Harmonic corporate address

4300 North First Street
San Jose, CA 95134
U.S.A.

Harmonic corporate telephone numbers

Tel. 1.800.788.1330 (from the U.S. and Canada)
Tel. +1.408.542.2500 (outside the U.S. and Canada)
Fax.+1.408.542.2511

Harmonic MediaGrid release 3.1 introduced enforced limits on file system capacities in the ContentDirector in order to provide graceful handling when limits are reached as well as advanced notification via SystemManager alerts as limits are approached.

ContentDirector limits are fixed based upon the hardware model and set automatically during installation of or upgrade to Harmonic MediaGrid release 3.1 and later.

This section provides an explanation of the implementation of ContentDirector limits as well as information needed to plan the capacity and monitor resource consumption of Harmonic MediaGrid system.

⚠ **CAUTION:** If you do not understand the procedures or recommendations described in this chapter, please consult with Technical Support before proceeding.

- *Capacity specifications*
- *Resource limits*
- *Capacity planning*
- *Monitoring resource consumption*

Capacity specifications

Capacity specifications are useful for choosing the model of ContentDirector needed for a system and for estimating the capacity of the system.

The specifications included in this section have been made using conservative and realistic assumptions regarding things like the distribution of file name lengths, average numbers of files per directory, number of concurrently open files, number and length of ACLs, etc.

In terms of capacity, Harmonic MediaGrid systems are specified by:

- Storage capacity: the amount of usable data that can be stored.
- File count: the number of files that can be stored in the file system. In Harmonic MediaGrid this includes regular files and symlinks but not hard links.
- Directory count: the number of directories that can be stored in the file system.
- Node count: the number of named nodes in the file system, including regular files, directories, symlinks, and hard links.
- Slice count: the number of slices used to hold user file data.

📝 **NOTE:** A standard ContentDirector with a file count of greater than 1 million is supported when upgraded to Harmonic MediaGrid 3.1 or later, provided that the other limits are met. However, load and restart times will increase as file counts increase beyond the

recommended limit. To improve load and restart times with file counts beyond the recommended limit, upgrade to the High Performance ContentDirector.

Table B-1: ContentDirector capacity specifications by model

ContentDirector Model	Max File Count Recommended (Files + Symlinks)	Max Node Count Supported (Files + Directories + Links)	Directory Count Supported	Slice Count Supported	Storage Size Supported
ContentDirector 1000B (8 GB RAM)	1 million	4 million	240,000	125 million	250 TB
ContentDirector 1000C (12 GB RAM)	1 million	10 million	600,000	250 million	500 TB
ContentDirector 1000D/1000E/1000F (16 GB RAM)	1 million	10 million	600,000	500 million	1 PB
High Performance ContentDirector 2000C (64 GB RAM)	50 million	50 million	1.5 million	2 billion	4 PB

Table B-2: Additional ContentDirector specifications

ContentDirector Type	Max files within a directory	Max subdirectories within a directory	Max connections to Harmonic MediaGrid server from FSD/ContentDirector	Max File name length	Max directory name length	Max hardlinks to file
ContentDirector 1000 series	100,000 optimally (250,000 max)	30,000	1000	254	249	1024
High Performance ContentDirector	100,000 optimally (250,000 max)	30,000	1000	254	249	1024

Resource limits

Resource limits are tied to the resources needed (memory, disk, internal data structures, etc.) under the actual workload. Resource limits are enforced upon actual usage and it is most useful to monitor actual resource consumption.

The Harmonic MediaGrid factory settings for resource limits are determined to provide enough resources to reach the capacity specifications under the same conservative assumptions

> **NOTE:** Harmonic MediaGrid does not restrict file counts to the limits described in this section but does generate alerts. If a new file or directory fits within the number of FileTable nodes and there is room for the resources needed within the dynamic memory pools, then new files and directories can be created.

Table B-3: Resource limit factory settings

ContentDirector Type	Max Node Count Supported	Slice Count	Dynamic Memory Pools (Total)
ContentDirector 1000B (8GB RAM)	4 million	125 million	1 GB
ContentDirector 1000C (12GB RAM)	10 million	250 million	2 GB
ContentDirector 1000D/1000E/1000F (16GB RAM)	10 million	500 million	2 GB
High Performance ContentDirector 2000C (64GB RAM)	50 million	2 billion	6 GB

FileTable nodes

FileTable node resources are used for named objects in the file system including files, directories, hard links, and symlinks.

Typical named objects with modestly long names and ACLs take 1 node per object.

> **NOTE:** Directories typically consume 1 node plus additional data structures allocated from the dynamic memory pools. This is different than earlier releases where directories consumed more FileTable space.

SliceTable slices

Harmonic MediaGrid manages the size of its SliceTable in terms of the count of distinct slices. In systems using replication, the SliceTable only counts 1 for all copies of a slice.

Dynamic memory pools

ContentDirector software makes use of a number of internal data structures. These are dynamically allocated from separate pools of memory.

The total amount of memory across all pools is limited and the total amount used determines when to send a SystemManager alarm. Both the total memory across all pools and the usage of each pool is reported periodically in the mdscore log.

Capacity planning

For detailed capacity planning, work with your Harmonic representative to examine the anticipated workload, estimate the resource consumption of each type of resource, and use the resource limit settings for your model of ContentDirector to determine maximum capacity in workload-specific terms.

You should refer to the ContentDirector capacity specifications for rough capacity planning. When calculating resource consumption based upon workload, note the following guidelines:

- Under typical circumstances each file, directory, symlink, and hard link will fit in 1 node. Files with long file names, large ACLs, or File User Data may consume more than one node.
- Slice count can be determined by estimating the length and slice size of files. Note that the limit settings are probably high enough not to be an issue.
- The number of files, directories, and symlinks (not hard links) will affect service load time and restart time. Estimate the number as part of planning for whether you need to consider upgrading to a High Performance ContentDirector.
- In Harmonic MediaGrid 3.1 or later, the largest uses of dynamic memory are:

  ◦ Dynamic per-node structure (namebind)
  ◦ Directories
  ◦ Open files
  ◦ UID hash

- Accordingly, dynamic memory usage can be estimated as follows:

  ◦ For each node (directory, file, hardlink, or symlink), 48 bytes for namebind.
  ◦ For directories (in addition to 48 bytes for namebind):

    ◦ 2136 bytes each for directories with up to 1100 entries
    ◦ 5720 bytes each for directories with up to 9000 entries
    ◦ 68 KB each for directories with more than 9000 entries

  ◦ Estimate a fixed 240 MB for up to 128K open files and the UID hash.

Monitoring resource consumption

You can monitor resource consumption using SystemManager and the mdscore log files.

Monitoring via SystemManager

If your ContentDirector reaches 90% or 100% of the recommended file count limit, SystemManager will provide a "Warning" alert indicating that you must delete files or consider upgrading to a High Performance ContentDirector, otherwise restart times will increase as file count increases.

SystemManager will also provide alerts when the ContentDirector reaches 90% of the recommended limit for FileTable nodes, SliceTable slice count, or Dynamic memory pool usage.

Monitoring via Log Files

You can monitor resource consumption from the mdscore log. At each mdscore sync, the current resource consumption is shown. You can access the mdscore log at `/var/log/omneon/mdscore`.

Note the following:

- The FT "total entries" value is not necessarily the maximum.
- "Max memory allowed" refers to the total dynamic memory pool and excludes FT entries (that is, nodes).
- For each pool, "Total Allocated" is represented in bytes and "Available" is represented in units of data structure instances.

```
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024|
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| Number of files: 419620, directories: 502509, hardLinks:
5714078
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| Number of FT entries allocated 6636532, total entries 7000000
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| Max memory allowed 2040109468, allocated 1387577344, or 68%
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024|
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024|     Pool        Total Allocated     Available
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| FileHandles           98304          1024
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| FileDescritors     193069056          275
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| SliceIdsList         540672          1024
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| FileDataPages      514850816          274
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| FileLock              98304          1024
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| FileIOvec0         64487424          1299
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| FileIOvec1           524288           512
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| FileIOvec2           262144            64
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| FileIOvec3          4194304            16
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| FileShortNames     11108352          1362
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| FileMediumNames     1966080           699
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| FileLargeNames        98304             6
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| FileMagnumNames       65536           256
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| NameBind          319291392         15495
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| DirSpec            16080896            19
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| DirHashSmall      257425408           855
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| DirHashMedium       2621440            60
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| DirHashLarge         262144             4
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| DirIterator            8192           512
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024| SliceCache           524288          1024
2012-04-26 21:07:07.253|I|resourcesStats|5024|5024|
```

Figure B-1: Example of mdscore log file

Safety and regulatory compliance information

Legal disclaimer: Information in this document is provided in connection with Harmonic products. Unless otherwise agreed in writing Harmonic products are not designed nor intended for any application in which the failure of the product could cause personal injury or death.

📝 **NOTE:** The information in this appendix may apply to purchased products only.

- *Important safety instructions*
- *Safety symbols & safety, warning & caution instructions*
- *Symboles de sécurité de sécurité, d'avertissement et Attention Instructions*
- *Sicherheit Symbole und Sicherheit, Achtung & Vorsicht Anleitung*
- *Preparing the site*
- *Disassembling an end-of-life product*
- *Safety rules (English)*
- *Règles de sécurité*
- *EU manufacturer's Declaration of Conformity*
- *Electromagnetic compatibility notices – Class A*
- *Product regulatory compliance*
- *Product regulatory compliance markings*
- *Product environmental compliance*
- *Compliance with country specific environmental, safety and EMC standards*

Important safety instructions

Review important safety guidelines for operators and service personnel.

Specific warnings and cautions are found throughout the guide where they apply, but may not appear here. Please read and follow the important safety information, noting especially those instructions related to risk of fire, electric shock or injury to persons. You must adhere to the guidelines in this document to ensure and maintain compliance with existing product certifications and approvals. In this document, we use "product," "equipment," and "unit" interchangeably.

This equipment generates, uses, and can radiate radio frequency energy. It may cause harmful interference to radio communications if it is not installed and used in accordance with the instructions in this manual. Operation of this equipment in a residential area is likely to cause harmful interference If this occurs, the user will be required to correct the interference at his or her own expense.

In event of conflict between the information in this document and information provided with the product or on our website for a particular product, this product documentation takes precedence.

- *Safety symbols (English)*
- *Symboles de sécurité (français)*
- *Sicherheit symbole (Deutsch)*

Safety symbols & safety, warning & caution instructions

Understand the meaning of different safety symbols.

To avoid personal injury or property damage, before you begin installing or replacing the product, read, observe, and adhere to all the following safety instructions and information. Harmonic products and/or product packaging may be marked with the safety symbols used throughout this document, when it is necessary to alert operators, users, and service providers to pertinent safety instructions in the manuals.

Mark	Notes
Warning	**Installing or replacing the product unit warning** • Only trained and qualified service personnel should be allowed to install, replace, or service this unit (refer AS/NZS 3260 Clause 1.2.14.3 Service Personnel). • Read the installation instructions before connecting the system to the power source. • When installing or replacing the unit, always make the ground connection first and disconnect it last. • Installation of the unit must comply with local and national electrical codes. • This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of special tool, lock and key or other means of security. • Use only specified replacement parts. • Do not use this unit in or near water. Disconnect all AC power before installing any options or servicing the unit unless instructed to do so by this manual.
Warning	**Rack mount warning** To prevent bodily injury when mounting or servicing this unit in a rack, special precautions must be taken to ensure your safety and stability of system: • Conform to local occupational health and safety requirements when moving and lifting the equipment. • Ensure that mounting of the unit by mechanical loading tools should not induce hazardous conditions. • To avoid risk of potential electric shock, a proper safety ground must be implemented for the rack and each piece of equipment installed on it.

Mark	Notes
 Warning	**Chassis warning** • Before connecting or disconnecting ground or power wires to the chassis, ensure that power is removed from the DC circuit. • To prevent personal injury or damage to the chassis, lift the unit only by using handles that are an integral part of the chassis, or by holding the chassis underneath its lower edge. • Any instructions in this guide that require opening the chassis or removing a board should be performed by qualified service personnel only. • Slots and openings in the chassis are provided for ventilation. Do not block them. Leave the back of the frame clear for air exhaust cooling and to allow room for cabling - a minimum of 6 inches (15.24 cm) of clearance is recommended.
 Warning	**Electric shock warning** • This unit might have more than one power cord. To reduce the risk of electric shock, disconnect the two power supply cords before servicing the unit. • Before working on a chassis or working near power supplies, unplug the power cord on AC units. • Do not work on the system or connect or disconnect cables during periods of lightning activity. • This unit is grounded through the power cord grounding conductor. To avoid electric shock, plug the power cord into a properly wired receptacle before connecting the product input or outputs. • Route power cords and other cables so that they are not likely to be damaged. Disconnect power input to unit before cleaning. Do not use liquid or aerosol cleaners; use only a damp cloth to clean chassis. • Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on. Do not insert anything into either of the system's two power supply cavities with power connected. • Never install an AC power module and a DC power module in the same chassis. • Do not wear hand jewelry or watch when troubleshooting high current circuits, such as the power supplies. • To avoid fire hazard, use only the specified correct type voltage and current ratings as referenced in the appropriate parts list for this unit. Always refer fuse replacement to qualified service personnel. • This unit relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors). • To avoid electrocution ensure that the rack has been correctly grounded before switching on the unit. When removing the unit remove the grounding connection only after the unit is switched off and unplugged.

Mark	Notes
Caution	**Electrostatic Discharge (ESD) caution** • Follow static precaution at all times when handling this unit. • Always wear an ESD-preventive wrist or ankle strap when handling electronic components. Connect one end of the strap to an ESD jack or an unpainted metal component on the system. • Handle cards by the faceplates and edges only; avoid touching the printed circuit board and connector pins. • Place any removed component on an antistatic surface or in a static shielding bag. • Avoid contact between the cards and clothing. • Periodically check the resistance value of the antistatic strap. Recommended value is between 1 and 10 mega-ohms (Mohms).
Warning	**Laser radiation warning** Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Never operate a unit with a broken fibre or with a separated fiber connector.
Warning	**Lithium battery handling safety instructions** • CALIFORNIA PERCHLORATE ADVISORY: Some lithium batteries may contain perchlorate material. The following advisory is provided: "Perchlorate Material - special handling may apply, see: *http://www.dtsc.ca.gov/hazardouswaste/perchlorate/* for information."
Caution	• Risk of explosion if battery is replaced incorrectly or with an incorrect type. • Dispose of used batteries according to the manufacturer's instructions. • There are no user-serviceable batteries inside Harmonic products. Refer to Harmonic qualified personnel only to service the replaceable batteries.

Symboles de sécurité de sécurité, d'avertissement et Attention Instructions

Comprendre la signification des différents symboles de sécurité .

Pour éviter des blessures ou des dommages matériels, avant de commencer l'installation ou le remplacement du produit, lire, observer, et de respecter toutes les instructions et informations de sécurité suivantes. Produits harmoniques et / ou l'emballage du produit peuvent être marqués avec les symboles

de sécurité utilisés dans le présent document, lorsque cela est nécessaire pour alerter les opérateurs, les utilisateurs et les fournisseurs de services de consignes de sécurité pertinentes dans les manuels.

Mark	Notes
Avertissement	**Installation ou remplacement de l'unité de produit avertissement** • Il est vivement recommandé de confier l'installation, le remplacement et la maintenance de ces équipements à des personnels qualifiés et expérimentés. (voir AS / NZS 3260 article 1.2.14.3 du personnel de service). • Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation. • Lors de l'installation ou le remplacement de l'appareil, la mise à la terre doit toujours être connectée en premier et déconnectée en dernier. • L'équipement doit être installé conformément aux normes électriques nationales et locales. • Cet appareil est à installer dans des zones d'accès réservé. Ces dernières sont des zones auxquelles seul le personnel de service peut accéder en utilisant un outil spécial, un mécanisme de verrouillage et une clé, ou tout autre moyen de sécurité. • Utilisez uniquement des pièces de rechange spécifiées. • Ne pas utiliser ce produit dans l'eau ni à proximité de l'eau. Débrancher toutes les prises d'alimentation secteur avant d'installer des options ou d'effectuer l'entretien de l'unité, à moins d'instructions contraires dans le présent manuel.
Avertissement	**Rack monture avertissement** Pour éviter les blessures corporelles lors du montage ou l'entretien de cet appareil dans un rack, des précautions particulières doivent être prises pour assurer votre sécurité et la stabilité du système: • Conformez-vous aux exigences de médecine du travail et de sécurité lorsque vous déplacez et soulevez le matériel. • Assurez-vous que le montage de l'appareil par des outils de chargement mécaniques ne doit pas induire des conditions dangereuses. • Pour éviter tout risque d'électrocution, le rack et chaque élément de l'équipement installé dans le rack doivent être correctement reliés à la terre.
Avertissement	**Châssis avertissement** • Avant de connecter ou de déconnecter les câbles d'alimentation (pôles et terre) du châssis, vérifiez que le circuit de courant continu est hors tension. • Pour éviter toute blessure ou des dommages au châssis, soulevez l'unité uniquement par les poignées du châssis lui-même ou en portant celui-ci par le bord inférieur. • Toutes les opérations du présent guide nécessitant l'ouverture du châssis ou le retrait d'une carte doivent être uniquement effectuées par du personnel d'entretien qualifié. • Le châssis est muni de fentes et d'ouvertures d'aération. Ne pas les bloquer. Dégager l'arrière du cadre pour permettre le refroidissement de l'évacuation d'air et laisser de la place au câblage; un dégagement d'au moins 15.24 cm (6 po) est recommandé.

Mark	Notes
  Avertissement	**Choc électrique avertissement** • Il est possible que cette unité soit munie de plusieurs cordons d'alimentation. Pour éviter les risques d'électrocution, débrancher les deux cordons d'alimentation avant de réparer l'unité. • Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher le cordon d'alimentation des unités en courant alternatif. • Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage. • Ce unité est mis à la terre par le conducteur de protection intégré au cordon d'alimentation. Pour éviter les chocs électriques, brancher le cordon d'alimentation dans une prise correctement cable avant de raccorder les entrées ou sorties du unité. • Installer les cordons d'alimentation et autres cables de sorte qu'ils ne risquent pas d'être endommagés. Couper l'alimentation avant nettoyage. Ne pas utilizer de nettoyant liquide ou en aérosol; utiliser seulement un linge humide. • Des courants électriques dangereux circulent dans cet appareil. Afin d'éviter les lessures, ne pas toucher les connexions et composants exposés lorsque l'appareil est sous tension. Ne rien insérer dans l'une ou l'autre des cavités des prises de courant du système lorsque l'appareil est sous tension. • N'installez jamais un module d'alimentation AC et un module d'alimentation DC dans le même châssis. • Ne pas porter de bijoux aux mains ni de montre durant le dépannage des circuits à haute tension, comme les transformateurs. • Pour prévenir les risques d'incendie, n'utiliser que le type, la tension et le courant nominal spécifiés dans la nomenclature des pièces de ce unité. Toujours confier le remplacement des fusibles à du personnel d'entretien qualifié. • Pour ce qui est de la protection contre les courts-circuits (surtension), ce produit dépend de l'installation électrique du local. Vérifier qu'un fusible ou qu'un disjoncteur de 120 V alt., 15 A U.S. maximum (240 V alt., 10 A international) est utilisé sur les conducteurs de phase (conducteurs de charge). • Pour éviter l'électrocution, assurez-vous que le rack a bien été mis à la terre avant de mettre l'unité en marche. Lors du retrait de l'unité, retirer le raccordement de terre seulement après avoir mis l'unité à l'arrêt et l'avoir débranchée.

Mark	Notes
 Attention	**Les décharges électrostatiques (ESD) attention** • Respecter systématiquement les precautions relatives aux charges électrostatiques durant la manipulation de cet unité. • Portez toujours un poignet ou la cheville bracelet antistatique préventive lors de la manipulation des composants électroniques. Branchez une extrémité de la sangle à une prise ESD ou d'un composant métallique non peinte sur le système. • Manipulez les cartes en les faces avant et les bords seulement; éviter de toucher la carte de circuit imprimé et les broches du connecteur. • Placer un composant retiré sur une surface antistatique ou dans un sac de protection statique. • Éviter tout contact entre les cartes et les vêtements. • Vérifier périodiquement la valeur de résistance de la sangle antistatique. Valeur recommandée est comprise entre 1 et 10 méga-ohms (Mohms).
 Avertissement	**Rayonnement laser attention** Rayonnement laser invisible peut être émis à partir de fibres ou les connecteurs débranchés. Ne pas regarder en faisceaux ou regarder directement avec des instruments optiques. Ne jamais faire fonctionner une unité en cas de bris d'une fibre ou de séparation d'un connecteur de fibre.
 Avertissement	**Batterie au lithium manipulation instructions de sécurité** • Perchlorate pour la Californie Consultatif: Certaines batteries au lithium, peuvent contenir du perchlorate. le texte qui suit consultatif est prévu: "Présence de perchlorate - une manipulation spéciale peut s'appliquer, voir: *http://www.dtsc.ca.gov/hazardouswaste/perchlorate/* for information."
 Attention	• Il y a danger d'explosion si la batterie est remplacée de manière incorrecte ou par une batterie de type incorrect. • Mettre au rebut les batteries usagees conformement aux instructions du fabricant. • Les batteries des produits Harmonic ne peuvent pas être réparées ni entretenues par l'utilisateur. Ne confier l'entretien des batteries remplaçables qu'à du personnel compétent de Harmonic.

Sicherheit Symbole und Sicherheit, Achtung & Vorsicht Anleitung

Verstehen Sie die Bedeutung der verschiedenen Sicherheitssymbole .

Um Verletzungen oder Sachschäden zu vermeiden, bevor Sie mit der Installation oder Austausch des Produkts zu beginnen, zu lesen, zu beobachten, und sich an all den folgenden Sicherheitshinweise und Informationen. Harmonic Produkte und / oder Produktverpackungen können mit den Sicherheitssymbole

in diesem Dokument verwendet werden, markiert, wenn es notwendig ist für die Betreiber, Anwender und Dienstleister, um relevante Sicherheitsanweisungen in den Handbüchern zu alarmieren.

Mark	Notes
Warnung	**Installation oder den Austausch des Produkts Einheit Warnung** • Das Installieren, Ersetzen oder Bedienen dieser Ausrüstung sollte nur geschultem, qualifiziertem Personal gestattet warden (siehe AS / NZS 3260 Clause 1.2.14.3 Servicepersonal) • Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen. • Der Erdanschluß muß bei der Installation der Einheit immer zuerst hergestellt und zuletzt abgetrennt werden. • Die Installation der Geräte muss den Sicherheitsstandards entsprechen. • Diese Einheit ist zur Installation in Bereichen mit beschränktem Zutritt vorgesehen. Ein Bereich mit beschränktem Zutritt ist ein Bereich, zu dem nur Wartungspersonal mit einem Spezialwerkzeugs, Schloß und Schlüssel oder anderer Sicherheitsvorkehrungen Zugang. • Verwenden Sie nur die angegebenen Ersatzteile • Das Gerät in oder in der Nähe von Wasser verwenden. Trennen Sie vor der Installation von Optionen oder Wartung des Gerätes, es sei denn, dies wurde von diesem Handbuch alle Netz.
Warnung	**Rack-Montage-Warnung** Zur Vermeidung von Körperverletzung beim Anbringen oder Warten dieser Einheit in einem Gestell müssen Sie besondere Vorkehrungen treffen, um sicherzustellen, daß das System stabil bleibt: • Entsprechen den lokalen Arbeitsschutzanforderungen beim Bewegen und Heben der Ausrüstung. • Stellen Sie sicher, dass die Montage des Gerätes durch mechanische Belastung Werkzeuge sollten nicht gefährlichen Bedingungen zu induzieren. • Um das Risiko von möglichen elektrischen Schlag zu vermeiden, muss mit einer angemessenen Erdung für Rack und jedes Gerät installiert ist implementiert werden.

Mark	Notes
 Warnung	**Chassis Warnung** • Gleichstrom-Unterbrechung Bevor Sie Erdungs- oder Stromkabel an das Chassis anschließen oder von ihm abtrennen, ist sicherzustellen, daß der Gleichstrom-Stromkreis unterbrochen ist. • Um Verletzungen und Beschädigung des Chassis zu vermeiden, sollten Sie das Chassis nicht an den Henkeln auf den Elementen (wie z.B. Stromanschlüsse, Kühlungen oder Karten) heben oder kippen; oder indem Sie es unterhalb der Unterkante packen. • Alle Hinweise in diesem Handbuch, die das Öffnen benötigen Sie das Gehäuse oder das Entfernen eines Board sollte nur von qualifiziertem Fachpersonal durchgeführt werden. • Für Schlitze und Öffnungen im Chassis vorgesehen. Blockieren Sie sie nicht. Lassen Sie die Rückseite des Rahmens frei für Abluftkühlung und um Platz für die Verkabelung ermöglichen - ein Minimum von 6 Zoll (15,24 cm) Abstand wird empfohlen

Mark	Notes
  Warnung	**Elektroschock-Warnung** • Diese Einheit hat möglicherweise mehr als ein Netzkabel. Zur Verringerung der Stromschlaggefahr trennen Sie beide Netzgerätekabel ab, bevor Sie die Einheit warten. • Vor der Arbeit an einem Chassis für Arbeiten in der Nähe Stromversorgung, ziehen Sie das Netzkabel mit Netzeinheiten. • Arbeiten Sie nicht am System und schließen Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert. • Dieses Gerät ist über das Netzkabel Erdungsleiter geerdet. Um einen Stromschlag zu vermeiden, stecken Sie das Netzkabel in eine Steckdose richtig verdrahtet, bevor Sie das Produkt Eingang oder Ausgänge. • Verlegen Sie Netzkabel und andere Kabel, so dass sie wahrscheinlich nicht beschädigt werden. Trennen Eingangsleistung Einheit vor der Reinigung. Verwenden Sie keine flüssigen oder Aerosolreiniger; nur mit einem feuchten Tuch zu reinigen Chassis. • Gefährliche Spannungen vorhanden sind an mehreren Stellen in diesem Produkt. Um Verletzungen zu vermeiden, berühren Sie nicht freiliegenden Anschlüsse und Komponenten während schaltet ist. Sie keine Gegenstände in einem der beiden Stromversorgungs Hohlräume des Systems mit Strom verbunden einführen. • Ein Wechselstromsmodul und ein Gleichstrommodul dürfen niemals in demselben Chassis installiert werden. • Tragen Sie keine Hand Schmuck oder schauen Sie bei der Fehlersuche hohen Stromkreise, wie beispielsweise die Stromversorgung. • Um die Brandgefahr zu vermeiden, verwenden Sie nur den genannten richtige Art von Spannung und Strom Ratings als in der entsprechenden Stückliste für diese Einheit verwiesen. Beziehen sich immer auf Austausch der Sicherung von qualifiziertem Fachpersonal. • Dieses Produkt ist darauf angewiesen, daß im Gebäude ein Kurzschluß- bzw. Überstromschutz installiert ist. Stellen Sie sicher, daß eine Sicherung oder ein Unterbrecher von nicht mehr als 240 V Wechselstrom, 10 A (bzw. in den USA 120 V Wechselstrom, 15 A) an den Phasenleitern (allen stromführenden Leitern) verwendet wird. • Um einen Stromschlag zu vermeiden, sicherzustellen, dass die Zahnstange wurde korrekt vor dem Einschalten des Gerätes geerdet. Beim Entfernen der Einheit entfernen Sie die Masseverbindung nur, nachdem das Gerät ausgeschaltet und der Netzstecker gezogen.

Mark	Notes
Vorsich	**Elektrostatische Entladung (ESD) Vorsicht** • Folgen Sie statische vorsorglich zu jeder Zeit beim Umgang mit diesem Gerät. • Tragen Sie immer einen ESD-präventive Handgelenk oder Knöchel-Riemen beim Umgang mit elektronischen Komponenten. Schließen Sie ein Ende des Bandes an einem ESD-Buchse oder ein unlackiertes Metallteil auf dem System. • Hand Karten nur durch die Faceplates und Kanten; Berühren Sie die bedruckte Leiterplatte und Steckerstifte. • Legen Sie alle entfernten Komponenten auf eine antistatische Oberfläche oder in einem Statik-Beutel. • Kontakt zwischen den Karten und Kleidung vermeiden. • Den Widerstandswert der gegen statische Gurt in regelmäßigen Abständen überprüfen. Empfohlener Wert ist zwischen 1 und 10 Mega-Ohm (MOhm).
Warnung	**Laserstrahlungen Warnung.** Unsichtbare Laserstrahlung kann von getrennten Fasern oder Stecker emittiert werden. Nicht in die Strahlen blicken oder direkt mit optischen Instrumenten. Niemals ein Gerät mit einem gebrochenen Faser oder mit einem Glasfaseranschluss getrennt.
Warnung	**Lithium-Batterie Handhabung Sicherheitshinweise** • CALIFORNIA PERCHLORATE ADVISORY: Einige Lithium-Batterien kann Perchlorat enthalten. Die folgende Beratungs gesetzt: "Perchlorat - Sonderbehandlung kann erforderlich sein, finden Sie unter: *http://www.dtsc.ca.gov/hazardouswaste/perchlorate/* for information."
Vorsich	• Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr • Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers. • Es gibt keine zu wartenden Akkus im Harmonic Produkte. Siehe Harmonic qualifiziertes Personal, um die austauschbare Batterien Service

Preparing the site

Make the equipment site ready for installation and use.

📝 **NOTE:** Only trained and qualified service personnel (as defined in IEC 60950 and AS/NZS 3260) should install, replace, or service the equipment. Install the system in accordance with the U.S. National Electric Code if you are in the United States.

1. Preparing & choosing a site for installation.

   ◦ To ensure normal system operation, plan your site configuration and prepare the site before installation.
   ◦ Install the unit in a restricted access area.
   ◦ Choose a site with a dry, clean, well-ventilated and air-conditioned area.
   ◦ Choose a site that maintains an ambient temperature of 32 to 104oF (0 to 40oC).

2. Creating a safe environment.

   ◦ Connect AC-powered systems to grounded power outlets or as per local regulations.
   ◦ Do not move or ship equipment unless it is correctly packed in its original wrapping and shipping containers.
   ◦ Only allow Harmonic trained personnel to undertake equipment service and maintenance. Do not permit unqualified personnel to operate the unit.
   ◦ Wear ear protection when working near an NSG Pro platform for a longer period of time.

3. Rack mounting the unit.

   ◦ Install the system in an open rack whenever possible. If installation in an enclosed rack is unavoidable, ensure that the rack has adequate ventilation.
   ◦ Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips). This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
   ◦ When mounting this unit in the partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
   ◦ If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.
   ◦ The rack must be anchored to an immovable support to prevent it from tipping when the unit is mounted on it. The rack must be installed according to the rack manufacturer's instructions.
   ◦ Disconnect all power and external cables before lifting the unit. Depending on the weight of the unit, more than one person might be required to lift it.

4. Power considerations

Option	Description
AC power	◦ Adding to the system a UPS (Uninterrupted Power Supply) and an AVR (Automated Voltage Regulator) is highly recommended. ◦ Installing the main power supply by a qualified electrician, according to power authority regulations. Make sure all powering are wired with an earth leakage, according to local regulations. ◦ It is recommended to install the encoder within 1.5m (approximately 5 feet) from an easily accessible grounded AC outlet. ◦ When the encoder is rack-mounted, ensure that the rack is correctly grounded.
DC power	◦ Ensure a suitable over-current device is in-line between the equipment and the power source. ◦ Connect DC-input power supplies only to a DC power source that complies with the safety extra-low voltage (SELV) requirements in the UL60950-1, CAN/CSA-C22.2 No. 60950-1-03, AS/NZS 60950-1, EN/IEC 60825-1, 21 CFR 1040, EN 60950-1, and IEC 60950-1 standards.

Option	Description
	◦ Ensure that power is removed from the DC circuit before installing or removing power supplies.

5. Handling Fiber Channel cables

   ◦ Always read and comply with the handling instructions on the shipping container.
   ◦ Follow all ESD precautions and approved fiber cleaning procedures.
   ◦ The fiber is made of a very pure, expensive glass and should be treated with great care. Handle fibers only in areas that are very clean and do not contain sharp objects.
   ◦ Wear finger cots or gloves as dirt and oils can damage the fiber and contaminate connectors.
   ◦ Do not allow kinks or knots to develop in the fiber. If tangles occur, carefully work out the tangles avoiding pulling or bending the fibre beyond its bend radius.
   ◦ Always use the correct tools for stripping and cleaving the fiber. It will save time and reduce breakage caused by scratches.
   ◦ If you must secure a bundle of fiber cables together, avoid plastic and metal tie wraps; secure with Velcro instead.

6. Disposing of the unit

   ◦ Dispose of the unit and its components (including batteries) as specified by all national laws and regulations.

Disassembling an end-of-life product

Review guidance on responsible product disposal and recycling of a product.

For disassembly instructions, please call the technical support in order to remove components requiring selective treatment, as defined by the EU WEEE Directive (2012/19/EU). See *Harmonic Technical Assistance Center contact information* .

1. Disassemble equipment at a dedicated area only, gather the needed tools for disassembly.

2. Remove covers, housing, etc.

3. Remove and separate sub-assemblies (i.e. cables, metals, displays, fans, etc.).

4. Separate hazardous materials from the remainder of the material.
   a. Sort hazardous materials into their different types (i.e., batteries, hazardous liquids, hazardous solids, fiberglass, etc.).
   b. Proceed with hazardous waste management processes only.

5. Identify re-usable materials/sub-assemblies and separate these from the rest of the material.

6. Identify and separate recyclable materials as per below examples:
   a. Scrap material to be sent to smelter(s).
   b. E-waste such as displays, CPU's, cables and wires, hard drives, keyboards, etc.
   c. Metals such as steel, brass, and aluminum.
   d. Plastics such as fan casings, housings, covers, etc.
   e. Fiber optics and plastic tubing not containing electrical or data wiring.

Safety rules (English)

Observe the rules for safe product disposal and recycling.

Recycler personnel are to wear personal protective equipment including proper eye protection, proper hand protection, and proper breathing protection if needed.

Recycler personnel shall be experienced with using the proper tools required for disassembling equipment. Untrained personnel shall not disassemble Harmonic products. Unfamiliarity with tools can cause damage and injury.

Règles de sécurité

Respecter les règles d'élimination du produit en toute sécurité et le recyclage.

Le personnel du recycleur doit porter de l'équipement de protection individuelle, y compris des lunettes, des gants et un masque de protection appropriés au besoin.

Le personnel du recycleur doit avoir de l'expérience des outils de démontage de l'appareil. Les produits Harmonic ne doivent pas être démontés par du personnel non qualifié. Une mauvaise connaissance des outils peut causer des dommages et des blessures.

EU manufacturer's Declaration of Conformity

Learn more about Harmonic product regulatory compliance.

This equipment is in compliance with the essential requirements and other provisions of Directives 73/23/EEC and 89/336/EEC as amended by Directive 93/68/EEC.

> **NOTE:** For specifics, about which standards have been applied, refer to the Declaration of Conformity of the product on Harmonic website at *Product Regulatory Compliance* or contact Harmonic Compliance Team at *regulatory.compliance@harmonicinc.com*.

Electromagnetic compatibility notices – Class A

Learn more about Harmonic product electromagnetic compatibility.

1. FCC verification statement (USA)

   This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

   This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their own expense.

   Connections between the Harmonic equipment and other equipment must be made in a manner that is consistent with maintaining compliance with FCC radio frequency emission limits. Modifications to this equipment not expressly approved by Harmonic may void the authority granted to the user by the FCC

to operate this equipment and you may be required to correct any interference to radio or television communications at your own expense.

2. ICES–003 statement (Canada)

   English: This Class A digital apparatus complies with Canadian ICES-003.

   French: Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

3. CE Declaration of Conformity (European Union)

   This product has been tested in accordance too, and complies with the Low Voltage Directive (2014/35/EU) and EMC Directive (2014/30/EU). The product has been marked with the CE Mark to illustrate its compliance.

4. VCCI Class A warning (Japan)

   この装置は、情報処理装置等電波障害白主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

   English translation of the notice above: This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI) from Information Technology Equipment. If this equipment is used in a domestic environment, it may cause radio interference. When such trouble occurs, the user may be required to take corrective actions.

5. BSMI EMC notice (Taiwan)

   警告使用者：
   這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策

   English translation of the notice above: This is a Class A Information Product, when used in residential environment, it may cause radio frequency interference, under such circumstances, the user may be requested to take appropriate counter measures.

6. Class A warning (Korea)

   주의 A급 기기 이 기기는 업무용으로 전자파 적합 등록을 한 기기이
   오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 만약
   잘못 판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

   English translation of the notice above: This is a Class A device and is registered for EMC requirements for industrial use. The seller or buyer should be aware of this. If this was sold or purchased by mistake, it should be replaced with a residential-use type.

7. Class A statement (China)

中华人民共和国"A类"警告声明

声　明

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

English translation of the notice above: When labeled with the CCC marking, the product meets the applicable safety and EMC requirements for China. This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

8. Class A warning – CISPR 22 (AS/NZS)

Warning (English) This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Attention (French) Il s'agit d'un produit de classe A. Dans un environnement local, ce produit peut entraîner des perturbations radioélectriques, auquel cas l'utilisateur devra éventuellement prendre des mesures adéquates.

Product regulatory compliance

Harmonic products are typically tested to the latest safety and electromagnetic compatibility (EMC) specifications and test methods, and are marked with one or more of the following regulatory/certification markings. Some of the certification markings will vary depending on what certifier was used to obtain a certification.
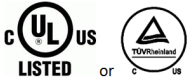
Please visit Harmonic *Product Regulatory Compliance* page to view information on applied safety & EMC standards and regulatory marks on Harmonic products. You can also email us at *regulatory.compliance@harmonicinc.com* for assistance on regulatory compliance for Harmonic products.

Product regulatory compliance markings

Understand the meaning of different product regulatory compliance markings.

Country/ region	Testing standard/ specification	Certification type	Regulatory mark name	Product marks
USA/ Canada	EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013; CAN/CSA C22.2 No. 60950-1-07 +A1:2011/UL 60950-1:2011	Safety	NRTL (National Recognized Test Laboratory)	
USA/ Canada	FCC CFR 47 Part 15, Class A ICES-003: Issue 6, 2016; Class A	EMC	FCC Class A Statement	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Country/ region	Testing standard/ specification	Certification type	Regulatory mark name	Product marks
European Union	RoHS: EN 50581:2012; EN55032:2012/ CISPR 22:2008; EN55024:2010/ CISPR 24:2010; EN61000-3-2:2014 EN61000-3-3:2013 Class A	Safety and EMC	CE / Low Voltage Directive	
Germany	EN 60950-1; EN60825-1 (for laser)	Safety	GS	
Mexico	NOM-019-SCFI-1998	Safety	NOM	
Taiwan	BSMI standard CNS15663 CNS 14336-1:2010 CNS 13438:2006; Class A	Safety and EMC	BSMI Certification (RPC) Number & Class A Warning	
Japan	VCCI V-3/2015.04; CISPR 22:2008, Class A	EMC	VCCI	
Australia and New Zealand	AS/NZS CISPR22:2009 +A1:2010; Class A	Safety	C-Tick	
Korea	KN32 Class A and KN 35	EMC	KC	

Country/ region	Testing standard/ specification	Certification type	Regulatory mark name	Product marks
Russia	TR CU 004/2011 TR CU 020/2011	Safety and EMC	EAC	
China	GB4943.1-2011 GB9254-2008 GB17625.1-2012	Safety and EMC	CCC	
India	IS 13252 (Part 1): 2010	Safety	BIS Compulsory Registration	"Self Declaration - Conforming to IS 13252 (Part 1):2010, R-XXXXXXXX"

Product environmental compliance

Harmonic manufactures high quality and innovative IT and telecommunications equipment, video delivery infrastructure solutions and services for its customers worldwide.

Harmonic is committed to providing our customers with safe and environmentally friendly products that are compliant with all relevant regulations, customer specifications, and environmental legislation, including the directives described below.

EU RoHS

Review the European Union's Restriction of Hazardous Substances Directive.

In July 2006, the European Union's (EU) Directive (2002/95/EC) on the Restriction of the use of certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment (EEE) went into effect, and in July, 2011, the European Union's RoHS Recast Directive (2011/65/EU) also known as RoHS II entered into force.

Harmonic understands the environmental risks associated with the substances covered by the RoHS Directive and has committed to eliminating or reducing the use of these, as well as other environmentally sensitive substances in our products. Harmonic also continues to comply with the requirements under RoHS II.

For more information, please visit EU RoHS directive page at official EU website.

http://ec.europa.eu/environment/waste/rohs_eee/legis_en.htm

Restricted substance statement

Harmonic products contain less than the permitted limits for the six restricted substances except where exemptions published in the RoHS2 Directive are applicable. This statement is based on vendor-supplied analysis or material certifications, and/or lab test results of the component raw materials used in the manufacture of Harmonic products.

Table C-1: Restricted substances

Restricted substance	Permitted limit
Cadmium (Cd)	< 0.01%[2]
Lead (Pb)	< 0.1%
Chromium (VI) (Cr (VI))	< 0.1%
Mercury (Hg)	< 0.1%
Polybrominated biphenyls (PBBs)	< 0.1%
Polybrominated diphenyl ether (PBDE)	< 0.1%

EU REACH

REACH (Registration, Evaluation, Authorization and restriction of Chemicals) (EC 1907/2006) is a European Union regulation on chemicals and their safe use which came into force in June, 2007.

Harmonic supports the basic aim of REACH in improving the protection of human health and environment through the better and earlier identification of intrinsic properties of chemical substances. Harmonic products are considered "articles" under REACH; therefore, we are required to provide recipients of our products with information on Substance of Very High Concern (SVHC) present in concentration above 0.1% (w/w).

Substances in our products are not intended to be released under normal or reasonably foreseeable conditions of use; therefore, the registration requirement in REACH Article 7(1) does not apply to our products.

For more information, please visit REACH regulation page at official EU website.

http://ec.europa.eu/environment/chemicals/reach/reach_en.htm

China RoHS

Review China's Restriction of Hazardous Substances Directive.

China's regulation on restriction of the use of certain hazardous substances commonly (China RoHS), is applicable to all Electronic and Information Products (EIPs) and parts sold in China after March 01, 2007. China RoHS regulation restricts the use of the same six substances as the European Union's ROHS, but has requirements for product labeling and regulated substance information disclosure.

Harmonic complies with China RoHS Phase I for labeling and information disclosure requirements and continues to monitor new developments in China RoHS Phase II towards substance restriction and certification program.

For more information, please visit China RoHS regulation page at official US export website.

http://www.export.gov/china/doingbizinchina/

China RoHS Disclosure report

Below table shows the presence of hazardous substances, or elements in Harmonic products, if the part is present.

....
[2] Homogeneous material definition as per the EU Directive.

该表显示哈雷公司产品中可能含有的有毒有害物质元配件的信息，除了来源于元配件供应商的物料成分资料，亦来自其它相关的机构与资料。哈雷产品不一定使用这些元配件。

This table shows those components where hazardous substances may be found in Harmonic products based on, among other things, material content information provided by third party suppliers. These components may or may not be part of the product.

除非特殊注明，哈雷公司产品的环保使用期限 均为 20 年。该环保使用期限的有效条件为：必须遵循该产品使用手 册的规定，对该产品进行使用或存储。

The Environmental Protective Use Period (EPUP) for Harmonic products is 20 years unless displayed otherwise on the product. The EPUP period is valid only when the products are operated or stored as per the conditions specified in the product manual.

####	######### (Hazardous substance)					
(Part name)	# (PB)	# (Hg)	# (Cd)	### (CrVI)	#### (PBB)	##### (PBDE)
##### (Printed circuit assemblies)	X	O	O	O	O	O
#### (Mechanical subassemblies)	X	O	O	O	O	O
#### (Optical subassemblies)	X	O	O	O	O	O
## (Power supplies)	X	O	O	O	O	O
## / ## (Cables, harnesses)	X	O	O	O	O	O
## / ### (Screens, monitors)	X	O	O	O	O	O
#### (Metal parts)	X	O	O	O	O	O
##/ #### (Plastics, foams)	O	O	O	O	O	O
## (Batteries)	O	O	O	O	O	O

O: 表示在该部件的所有均质材料中，此类有毒有害物质的含量均小于SJ/T11363-2006标准所规定的限量。

O: Indicates the content of the toxic and hazardous substances at the homogeneous material level of the parts is below the limit defined in SJ/T11363 2006 standard.

X: 表示至少在该部件的某一均质材料中，此类有毒有害物质的含量超出SJ/T11363-2006标准规定的限量。

X: Indicates that the content of the toxic and hazardous substances in at least one of the homogeneous materials of the parts is above the limit defined in SJ/T11363 2006 standard.

Taiwan BSMI RoHS

Review Taiwan's Restriction of Hazardous Substances Directive.

## Unit	########## Restricted substances and its chemical symbol					
	# Lead (Pb)	# Mercury (Hg)	# Cadmium (Cd)	### Hexavalent chromium (Cr^{+6})	#### Polybrominated biphenyls (PBB)	##### Polybrominated diphenyl ethers (PBDE)
##	–	O	O	O	O	O
### (#####)	O	O	O	O	O	O
#####	O	O	O	O	O	O
###	–	O	O	O	O	O
#### (##### ####)	O	O	O	O	O	O

##1.###0.1 wt %#####0.01 wt %#######################

Note 1: "Exceeding 0.1 wt %" and "exceeding 0.01 wt %" indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

##2.#O# ####################### #

Note 2: "O" indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

##3.#–###############

Note 3: The "–" indicates that the restricted substance corresponds to the exemption.

Other RoHS and REACH type regulations

Harmonic will comply with RoHS and REACH type regulations evolving in other countries, if they become relevant to our products or in markets where we sell our products.

Waste Electrical and Electronic Equipment (WEEE)

Review the European Union's Waste Electrical and Electronic Equipment Directive.

European Parliament and the Council of the European Union's WEEE Directive (2002/96/EC) came into force on August, 2005 and, were more recently amended in July, 2012. This directive encourages the reuse, recycling, and recovery of WEEE and to improve the environmental performance of all operators

involved in the life cycle of electrical and electronic equipment, especially those dealing with WEEE. Harmonic ensures that all requirements for registration, reporting, design and data tracking are complied with to meet the objectives of the WEEE directive.

For more information, please visit WEEE directive page at official EU website: *http://ec.europa.eu/environment/waste/weee/legis_en.htm*

Battery directive

Review the European Union legislation on waste batteries.

In September 2006, the European Union's Directive 2006/66/EC (Battery Directive) came into force with an aim to prohibit the sale of batteries and accumulators containing hazardous substances and to set rules and promote collection, treatment, recycling and disposal of waste batteries and accumulators. This directive applies to spent batteries collected together with WEEE and requires their removal and separate collection. Once removed from WEEE, spent batteries are governed by the Battery Directive. Harmonic uses lithium batteries in its products and our responsibility under the Battery Directive is taken care of under our WEEE Take-Back program.

For more information, please visit Batteries and Accumulators directive page at official EU website.

http://ec.europa.eu/environment/waste/batteries/

Harmonic is committed to manufacturing environmentally safe products for the community, and will make reasonable efforts and required adjustments to its practices, if necessary, to comply with various environmental directives and industry initiatives on the elimination of hazardous substances, labeling, marking, certification and registration as required in markets where we sell our products.

Download Harmonic Environmental Compliance Statement at the following location:

*http://www.harmonicinc.com/content/green-policy*

WEEE Take-Back Request Program

In order to assist EU member states to preserve, protect and improve the quality of the environment, protect human health and utilize natural resources prudently and rationally, Harmonic strives to recycle in compliance with the WEEE Directive any of its products that cannot be re-used.

Harmonic's customers should:

- Not discard equipment in household or office garbage
- Arrange proper recycling of unneeded equipment. For the take-back of Harmonic equipment, customers must:

  ◦ Collect the information required to complete Harmonic's WEEE Take-Back Request form
  ◦ Complete and submit the online WEEE Take-Back Request form. Please note that forms must be fully completed in order to prevent process delays
  ◦ Receive instant online confirmation indicating the reference number
  ◦ Receive the End of Life (EOL) asset return authorization number and instruction for EOL asset return

- Not ship EOL product to Harmonic without a Harmonic-provided EOL asset return authorization number

The crossed-out wheeled bin symbol on a Harmonic-branded commercial product indicates that the product should not be disposed of along with municipal waste, but invites our customers to return the product to us under Harmonic's WEEE Take-Back program for product disposal.
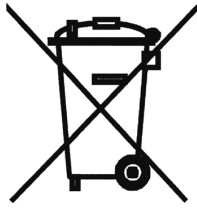
Harmonic will pay for the cost of shipping and will provide a Certificate of Recycling or a Certificate of Destruction upon request. For more information on collection, reuse and recycling or to initiate the WEEE take-back process, please complete the form at *http://www.harmonicinc.com/webform/weee-takeback-request* or contact *Harmonic Technical Assistance Center (TAC)* or email RMA team at *rma.emea@harmonicinc.com*.

Compliance with country specific environmental, safety and EMC standards

In addition to above listed standards and compliance regulations, Harmonic products may also be compliant with other country specific environmental, safety and EMC requirements.

Please contact Harmonic Compliance Team at *regulatory.compliance@harmonicinc.com* or your local sales representative for more information about compliance with particular country or standard.