Spectrum System

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Every reasonable attempt has been made to comply with all licensing requirements for all components used in the system. Any oversight is unintentional and will be remedied if brought to the attention of Harmonic at *support@harmonicinc.com*.

Documentation conventions

In Harmonic documents, special symbols and fonts to call your attention to important information.

⚠ **DANGER:** The Danger symbol indicates information that, if ignored, can cause physical harm to you.

◆ **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.

ⓘ **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

Review the system overview for your Spectrum server to help plan your system before installing.

- *MediaDirector 2252B/2251B and 2252/2251 system overview*
- *MediaCenter system overview*
- *Spectrum X system overview*
- *MediaDeck 7000 system overview*

MediaDirector 2252B/2251B and 2252/2251 system overview

Review the MediaDirector system overview to help plan your system before installing.

A basic Spectrum system with the MediaDirector 2252B/2251B or 2252/2251 consists of the following components:

- One SystemManager Platform or the SystemManager application installed on a customer-supplied PC.
- One MediaDirector and up to four MediaStores 5000 series that can optionally be connected to a redundant. MediaDirector in an extended file system (EFS) configuration. Note the EFS configuration requires a separate license.
- Three Spectrum Xs in a shared storage configuration or three MediaPort7000 series with I/O modules installed, rack trays, Cat-6 Ethernet cables, and rack mounting kits (mounting kits for the MediaPort chassis must be ordered separately).
- Serial-attached SCSI (SAS) cables.
- Latest version of the Spectrum system software and the SystemManager software.
- One DHCP server or a system with DHCP enabled.
- (Optional) one controlling application (for example, program automation system).
- (Optional) one EAS system (for use with ChannelPort modules only).

The following figure illustrates a Spectrum system layout with two MediaDirectors , connected via an EFS Ethernet connection, with shared storage across four MediaStore 5000 series devices, and three Spectrum Xs or MediaPort 7000 series.
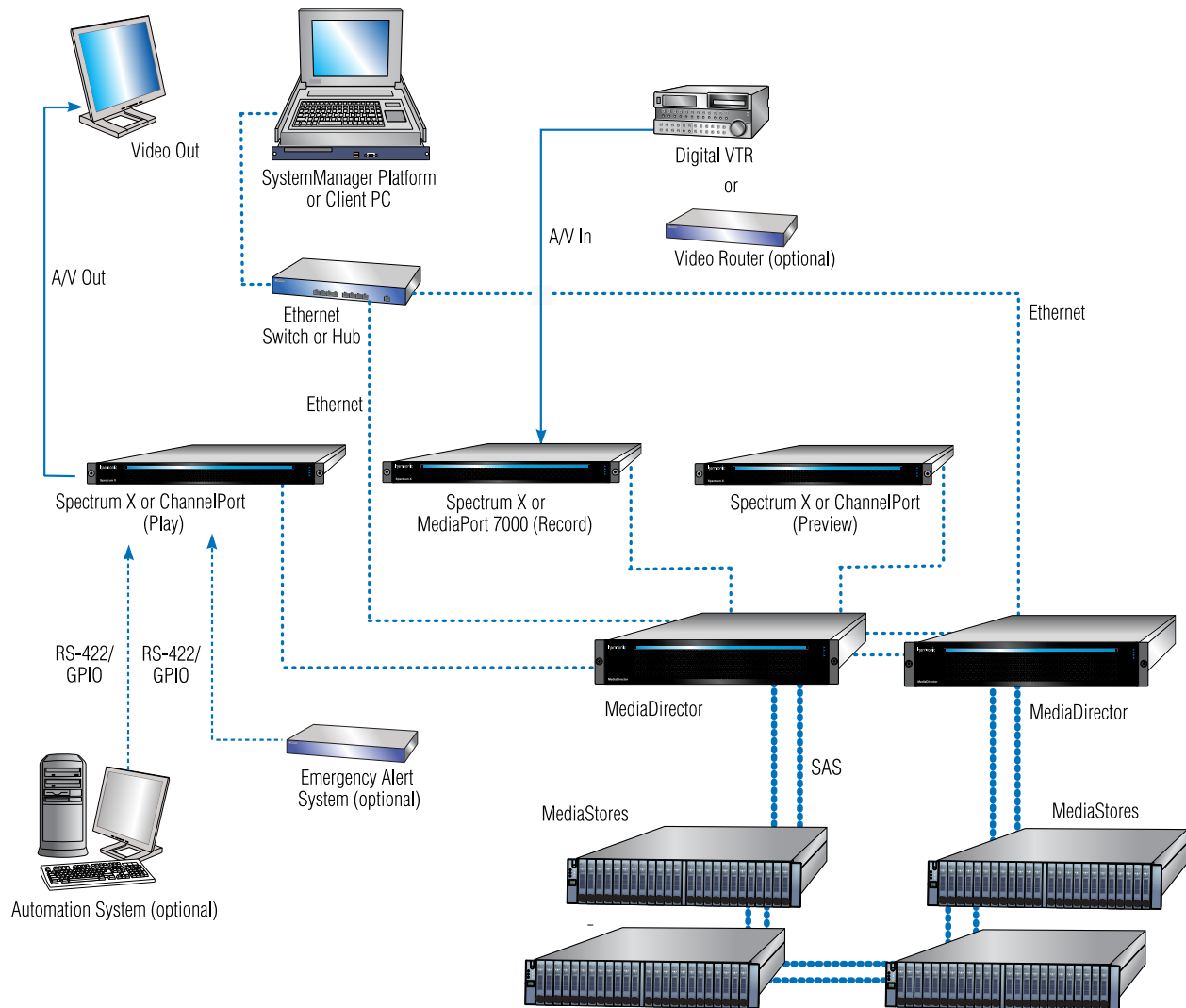
Figure 1-1: MediaDirector system layout

Note that, in this sample system diagram, the following are not supplied by Harmonic:

• Digital VTR (If an Analog VTR is used, external A-D converters are required.)
• VGA Monitors
• RS-422 interconnection cables (DB-9 Male to DB-9 Male)
• Audio/Video interconnection cables and monitoring equipment
• Cables to interconnect to an automation system, if an automation system is part of the basic system
• Cables to interconnect to an EAS, if an EAS system is part of the basic system

📝 **NOTE:** The MediaDirector 2252B/2251B requires a different SAS cable than previous MediaDirector models. To make sure you have the correct SAS cable, contact your Harmonic sales representative.

📝 **NOTE:** For all coaxial cable requirements, always use 75-ohm cable that is specifically designed for digital video, and which meets the precise transport standards for SD video at 270 Mbps and HD video at 3.0 Gbps.

MediaDirector 2252B/2251B or 2252/2251installation overview

Make sure to install and cable your Spectrum system in the order provided.

1. Rack mount the system. See *Rack mounting instructions on page 23*.
2. Install components such as I/O modules (for the ChannelPort or MediaPort 7000) or bezels (for the Spectrum X). See *Installing I/O modules in the MediaPort or MediaDeck 7000 chassis on page 45* or *Installing the Spectrum X bezel on page 40*.
3. Connect MediaDirectors and MediaStores using SAS. See *Connecting MediaDirectors and MediaStores using SAS on page 49*.
4. Connect MediaDirectors in EFS configuration (optional). *Connecting MediaDirectors in an EFS configuration on page 58*
5. Connect Spectrum X, MediaPorts, or ChannelPorts to the MediaDirector. See *Connecting I/O modules to a MediaDirector 2252B/2251B or MediaCenter 2200B on page 65*.
6. Connect to SystemManager. See *Connecting to SystemManager on page 68*.
7. Connect to a client system for file transfers. See *Connecting to a client system or Harmonic MediaGrid for file transfers on page 72*.
8. Connect to an automation system (optional). See *Connecting to an automation system on page 75*.
9. Connect reference video. See *Connecting reference video on page 78*.
10. Connect audio and video I/O. See *Connecting audio and video I/O on page 80*.
11. Connect to an EAS (optional). See *Connecting to an Emergency Alert System (EAS) on page 83*.
12. Connect AC power and power up the system. See *Connecting AC power on page 92* and *Powering up on page 94*.

MediaCenter system overview

Review the MediaCenter system overview to help plan your system before installing.

The most basic MediaCenter system installation consists of the following components:

- One SystemManager Platform or the SystemManager application installed on a customer-supplied PC.
- One MediaCenter with drives.
- One long Rack Mounting Kit, shipped with each MediaCenter (a short rail kit may be ordered separately).
- Three Spectrum Xs in a shared storage configuration or three MediaPort 7000 series with I/O modules installed, rack trays, Cat-6 Ethernet cables, and rack mounting kits (mounting kits for MediaPort chassis must be ordered separately).
- Latest version of the Spectrum system software and the SystemManager software.
- (Optional) one controlling application (for example, program automation system).
- (Optional) Monitor/keyboard.
- DHCP server or a system with DHCP enabled.

The following figure illustrates a Spectrum system layout with one MediaCenter, three Spectrum Xs or MediaPort 7000 series and ChannelPorts, a SystemManager Platform or client PC with SystemManager installed, and an optional automation system.

Figure 1-2: MediaCenter system layout

Note that, in this sample system diagram, the following are not supplied by Harmonic:

- Digital VTR (If an Analog VTR is used, external A-D converters are required.)
- VGA Monitors
- RS-422 interconnection cables (DB-9 Male to DB-9 Male)
- Audio/Video interconnection cables and monitoring equipment

> **NOTE:** For all coaxial cable requirements, always use 75-ohm cable that is specifically designed for digital video, and which meets the precise transport standards for SD video at 270 Mbps and HD video at 3.0 Gbps.

MediaCenter installation overview

Make sure to install and cable your MediaCenter system in the order provided.

1. Rack mount the system. See *Rack mounting instructions on page 23*.
2. Install components such as drives, power supplies, I/O modules (for the ChannelPort or MediaPort 7000), or bezels (for the Spectrum X). See *Installing MediaCenter components on page 41*, *Installing I/O modules in the MediaPort or MediaDeck 7000 chassis on page 45*, and *Installing the Spectrum X bezel on page 40*.
3. Connect to the MediaStore 7200 for additional storage (optional). See *Connecting the MediaCenter 2200B to the MediaStore 7200*.
4. Connect Spectrum X, MediaPort, or ChannelPorts to the MediaCenter. See *Connecting I/O modules to a MediaDirector 2252B/2251B or MediaCenter 2200B on page 65*.
5. Connect to SystemManager. See *Connecting to SystemManager on page 68*.
6. Connect to a client system for file transfers. See *Connecting to a client system or Harmonic MediaGrid for file transfers on page 72*.
7. Connect to an automation system (optional). See *Connecting to an automation system on page 75*.
8. Connect reference video. See *Connecting reference video on page 78*.
9. Connect audio and video I/O. See *Connecting audio and video I/O on page 80*.
10. Connect to an EAS (optional). See *Connecting to an Emergency Alert System (EAS) on page 83*.
11. Connect AC power and power up the system. See *Connecting AC power on page 92* and *Powering up on page 94*.

Spectrum X system overview

Review the system overview of the Spectrum X with internal storage to help plan your system before installing.

A basic Spectrum X system with internal storage consists of the following components:

- One Spectrum X in internal storage configuration with up to two SDI cards and four SAS drives (2 TB or 4 TB) installed.
- Interconnection Cables
- One Rack Mounting Kit
- One of the following management options:

  ◦ One SystemManager Platform or the software-only version of SystemManager installed on a customer-supplied computer
  ◦ Spectrum Management, which runs on the Spectrum X, and is accessed from a customer-supplied client computer.
- Latest version of the Spectrum system software
- One Ethernet switch
- (Optional) one controlling application (for example, program automation system).
- (Optional) Monitor/keyboard.
- DHCP server or a system with DHCP enabled.

The following figure illustrates a Spectrum system layout with one Spectrum X.
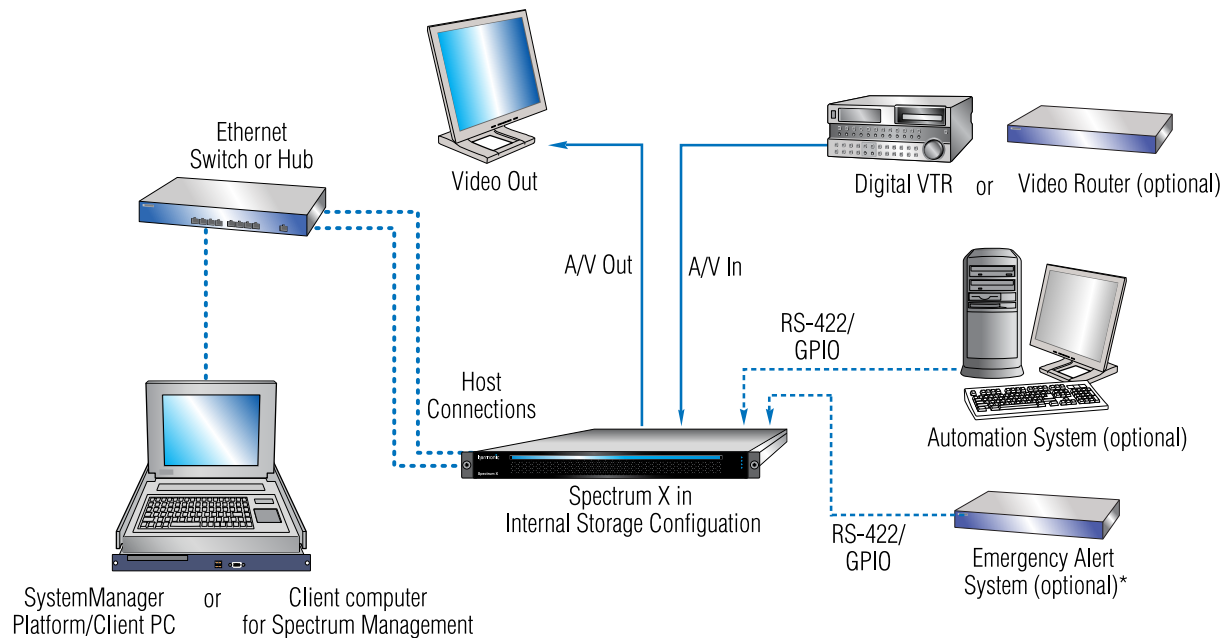
Figure 1-3: Spectrum X system layout

Note that, in this sample system diagram, the following are not supplied by Harmonic:

- Digital VTR (If an Analog VTR is used, external A-D converters are required.)
- Video Monitors
- RS-422 interconnection cables (DB-9 Male to DB-9 Male)
- Audio/Video interconnection cables and monitoring equipment
- Gigabit Ethernet switch
- Automation System (optional) Emergency Alert System (optional)
- Video router (optional)

NOTE: An Ethernet switch is required if your Harmonic system includes applications (such as archiving and editing) that would be optimized by Gigabit Ethernet connectivity. In systems that do not include these types of applications (such as the automation system described above) an Ethernet hub is sufficient.

NOTE: For all coaxial cable requirements, always use 75-ohm cable that is specifically designed for digital video, and which meets the precise transport standards for SD video at 270 Mbps and HD video at 3.0 Gbps.

Spectrum X installation overview (internal storage configuration)

Make sure to install and cable your Spectrum X system in the order provided.

1. Rack mount the system. See *Rack mounting instructions* on page 23.
2. Install the bezel. See *Installing the Spectrum X bezel* on page 40.
3. Connect to SystemManager. See *Connecting to SystemManager* on page 68.
4. Connect to a client system for file transfers. See *Connecting to a client system or Harmonic MediaGrid for file transfers* on page 72.
5. Connect to an automation system (optional). See *Connecting to an automation system* on page 75.

6. Connect reference video. See *Connecting reference video on page 78*.
7. Connect audio and video I/O. See *Connecting audio and video I/O on page 80*.
8. Connect to an EAS (optional). See *Connecting to an Emergency Alert System (EAS) on page 83*.
9. Connect AC power and power up the system. See *Connecting AC power on page 92* and *Powering up on page 94*.

MediaDeck 7000 system overview

Review the system overview of the MediaDeck7000 to help plan your system before installing.

A basic MediaDeck7000 system with internal storage consists of the following components:

- One MediaDeck 7000 chassis
- Up to two MediaPort 7000 or ChannelPort modules, which can be installed in either slot.
- Four 4-TB SATA hard disk drives, four 2-TB SATA hard disk drives, or four 480-GB solid-state drives.
- Interconnection cables
- One Rack Mounting Kit
- One of the following management options:

  ◦ One SystemManager platform or the software-only version of SystemManager installed on a customer-supplied computer
  ◦ Spectrum Management, which runs on the MediaDeck7000, and is accessed from a customer-supplied client computer.
- Latest version of the Spectrum system software
- One Ethernet switch
- (Optional) one controlling application (for example, program automation system).
- (Optional) Monitor/keyboard.
- DHCP server or a system with DHCP enabled.

The following figure illustrates a Spectrum system layout with one MediaDeck7000.
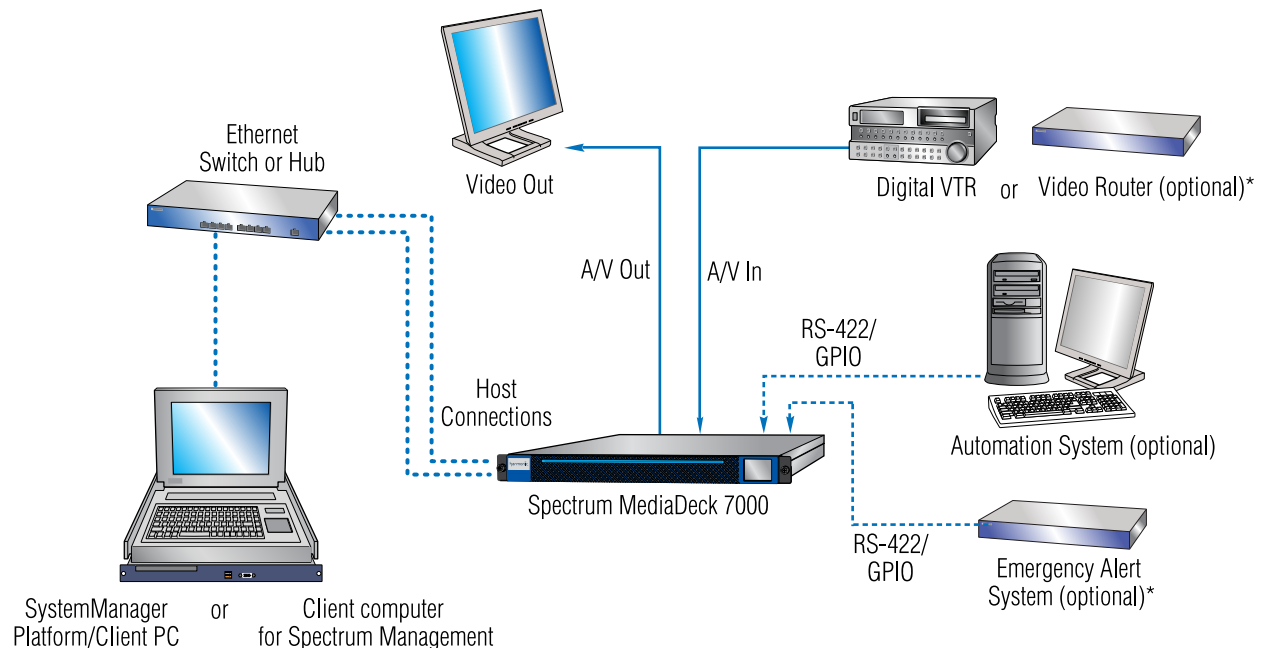
Figure 1-4: MediaDeck 7000 system layout

Note that, in this sample system diagram, the following are not supplied by Harmonic:

- Digital VTR (If an Analog VTR is used, external A-D converters are required.)
- Video Monitors
- RS-422 interconnection cables (DB-9 Male to DB-9 Male)
- Audio/Video interconnection cables and monitoring equipment
- Gigabit Ethernet switch
- Automation System (optional) Emergency Alert System (optional)
- Video router (optional)

> 📝 **NOTE:** An Ethernet switch is required if your Harmonic system includes applications (such as archiving and editing) that would be optimized by Gigabit Ethernet connectivity. In systems that do not include these types of applications (such as the automation system described above) an Ethernet hub is sufficient.

> 📝 **NOTE:** For all coaxial cable requirements, always use 75-ohm cable that is specifically designed for digital video, and which meets the precise transport standards for SD video at 270 Mbps and HD video at 3.0 Gbps.

MediaDeck 7000 installation overview

Make sure to install and cable your MediaDeck7000 system in the order provided.

1. Rack mount the system. See *Rack mounting instructions on page 23*.
2. Install components such as the drives, I/O modules, and bezel. See *Installing I/O modules in the MediaPort or MediaDeck 7000 chassis on page 45* and *Installing MediaDeck 7000 components on page 43*.
3. Connect to SystemManager. See *Connecting to SystemManager on page 68*.
4. Connect to a client system for file transfers. See *Connecting to a client system or Harmonic MediaGrid for file transfers on page 72*.

5. Connect to an automation system (optional). See *Connecting to an automation system on page 75*.

6. Connect reference video. See *Connecting reference video on page 78*.

7. Connect audio and video I/O. See *Connecting audio and video I/O on page 80*.

8. Connect to an EAS (optional). See *Connecting to an Emergency Alert System (EAS) on page 83*.

9. Connect AC power and power up the system. See *Connecting AC power on page 92* and *Powering up on page 94*.

Chapter 2

Spectrum system installation

Follow the installation procedures that apply to your Spectrum components.

Important background information about each component's front and rear panel connectors, displays, and indicators is available in the Hardware Reference sections of this guide. Familiarize yourself with this information before connecting the components in a Spectrum system.

- *Unpacking and inspecting the system*
- *Spectrum system environmental and power requirements*
- *Rack mounting instructions*
- *Installing the Spectrum X bezel*
- *Installing MediaCenter components*
- *Installing MediaDeck 7000 components*
- *Installing I/O modules in the MediaPort or MediaDeck 7000 chassis*
- *Installing MediaStore 7200 components*
- *Connecting the MediaCenter 2200B to the MediaStore 7200*
- *Connecting MediaDirectors and MediaStores using SAS*
- *Connecting MediaDirectors in an EFS configuration*
- *Connecting I/O modules to a MediaDirector or MediaCenter*
- *Connecting to your Ethernet network*
- *Connecting to an automation system*
- *Connecting reference video*
- *Connecting audio and video I/O*
- *Connecting to an Emergency Alert System (EAS)*
- *Connecting AC power*
- *Powering up*
- *Using the color bar generator to verify connectivity on a MediaPort 7000 or MediaDeck 7000*
- *Powering down*
- *Managing and configuring your Spectrum system*

Unpacking and inspecting the system

When you receive the component of a Spectrum 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 be sure that all parts are included. If any items are missing, contact your local Harmonic representative immediately.

NOTE: A Spectrum system uses SAS connections between MediaDirectors and the MediaStore 5000 series. One, two, and five meter SAS cables must be ordered separately.

IMPORTANT: The MediaDirector 2252B/2251B requires a different SAS cable than previous MediaDirector models. To make sure you have the correct SAS cable, contact your Harmonic sales representative.

Spectrum system environmental and power requirements

Review the environmental and power requirements for your site before installing a Spectrum system.

Environmental requirements

Spectrum equipment is designed to operate in a clean, air-conditioned control room environment. Care must be taken to avoid temperature and humidity extremes. Interior temperature of the rack cabinet should be maintained at ambient temperatures but must not exceed 40°C (104°F) during normal operation.

Power requirements

When connecting the MediaStore 5000 series, care must be taken to avoid power lines that are subject to noise and voltage spikes. Do *not* install the units on a circuit that is common to such equipment as air conditioners and refrigeration units. AC noise filters and surge protectors are recommended if unstable power conditions are present. Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits.

Refer to the power requirements for each Spectrum device as follows:

Rack mounting instructions

Follow the rack mounting procedure that applies to your Spectrum video server(s).

🛑 **Warning:** Safe rack mounting of the systems in this guide requires TWO people.

Note the following important points regarding rack layout:

- To eliminate any possibility of tipping over, ensure that the equipment rack is securely fastened to the floor or wall.
- Because of their weight, the MediaCenter, MediaStore, and the (optional) automation system should be installed at the bottom of the equipment rack.
- The SystemManager Keyboard/Monitor Tray is placed 71.12 cm (28.0 in.) off the floor. This tabletop height is ideal for using the SystemManager while seated or standing.

Spectrum racking requirements

Review the racking requirements before rack mounting your Spectrum system.

For MediaDirectors and MediaCenters

For rack mounting, you will need 8.9 cm (3.5 in.) of vertical rack space (2 RU).

For the MediaStore 5000 series

The MediaStore 5000 series is designed for installation into an industry standard 19-inch cabinet capable of holding the unit—up to 50 kg (81 lb).

For rack mounting a MediaStore 5000 series you will need:

- 8.9 cm (3.5 in.) of vertical rack space (2 RU), plus a minimum 79.66 cm (31.36 in.) rack depth to allow for cabling and connectors.
- A minimum gap of 25 mm (1 inch) clearance between the rack cover and the front of the drawer.
- 50 mm (2 inches) rear clearance between the rear of the drawer and rear of rack in order to maintain the correct airflow around the enclosure.
- A rack that presents a maximum back pressure of 5 pascals (0.5 mm water gauge).

Note the following safety requirements when the unit is mounted in a rack:

- The rack design should incorporate stabilizing features suitable to prevent the rack from tipping during installation and in normal use.
- When loading a rack with the MediaStores, fill the rack from the bottom up and empty from the top down.
- The rack should comply with the airflow requirements detailed in the technical specification. The rack design should take into consideration the maximum operating ambient temperature for the unit, which is 40°C.
- The rack should have a safe electrical distribution system that provides a reliable earth for each unit and the rack. It must provide over-current protection for the unit and must not be overloaded by the total number of units installed.
- Depending on MediaStore model, each power supply in each unit has an earth leakage current of 1.7mA to 1.8mA. The design of the electrical distribution system must take into consideration the total earth leakage current from all the power supplies in all the units. The rack will require the following label:

HIGH LEAKAGE CURRENT
Earth connection essential before connecting supply

- The rack when configured with the units must meet the safety requirements of UL 1950, UL 60950-1, IEC 60950 and/or IEC 60950-1, depending on MediaStore model.

For Spectrum X, MediaDeck 7000 and the MediaPort 7000 series

MediaPorts can be installed in "tabletop" fashion or they can be rack mounted using the Rack Mount Hardware Kit (recommended method).

The following safety requirements must be considered when the unit is mounted in a rack:

⚠ **IMPORTANT:** For optimum airflow, do not obstruct the air vents on the front or rear panel of the units.

📝 **NOTE:** Disconnect all power cords before servicing the units. MediaPort units should only be serviced by qualified service technicians.

- The rack design should incorporate stabilizing features suitable to prevent the rack from tipping during installation and in normal use. To eliminate any possibility of tipping over, ensure that the equipment rack is securely fastened to the floor or wall.
- When loading a rack with MediaPort units fill the rack from the bottom up and empty from the top down.
- The rack should comply with the airflow requirements detailed in the technical specification. The rack design should take into consideration the maximum operating ambient temperature for the unit, which is 40°C.
- The ground should have a safe electrical distribution system that provides a reliable earth for each unit and the rack. It must provide over current protection for the unit and must not be overloaded by the total number of units installed. Attention should be given to supply connections other than direct connections to the branch circuit such as power strips.

Rack mounting a Spectrum system with a MediaDirector 2252B/2251B or 2252/2251

Rack your Spectrum components in the recommended order. For detailed instructions and diagrams, refer to the individual rack kits for each device.

1. Install the MediaStores at the bottom of the equipment rack.

   📝 **NOTE:** Ensure that MediaStores units are racked so the Operator Panel is on the left when viewed from the front.

2. Install the MediaDirectors above the MediaStores. Refer to the instructions which ship with the MediaDirector rail kit for instructions.

3. Install the Spectrum X and MediaPort chassis above the MediaDirectors. The MediaPort 7002 is the chassis for both the MediaPort MediaPort and ChannelPort modules. Refer to the instructions which ship with the rail kit for instructions on rack mounting the chassis.

4. Label each of the three Spectrum X or MediaPort units with temporary labels for easy identification throughout the remainder of the installation procedures:

- Top Spectrum X/MediaPort/ChannelPort: **Record**
- Middle Spectrum X/MediaPort/ChannelPort: **Play**
- Bottom Spectrum X/MediaPort/ChannelPort: **Preview**

5. Rack mount the SystemManager keyboard/monitor tray and platform. Refer to the documentation included with the SystemManager Platform for racking details.
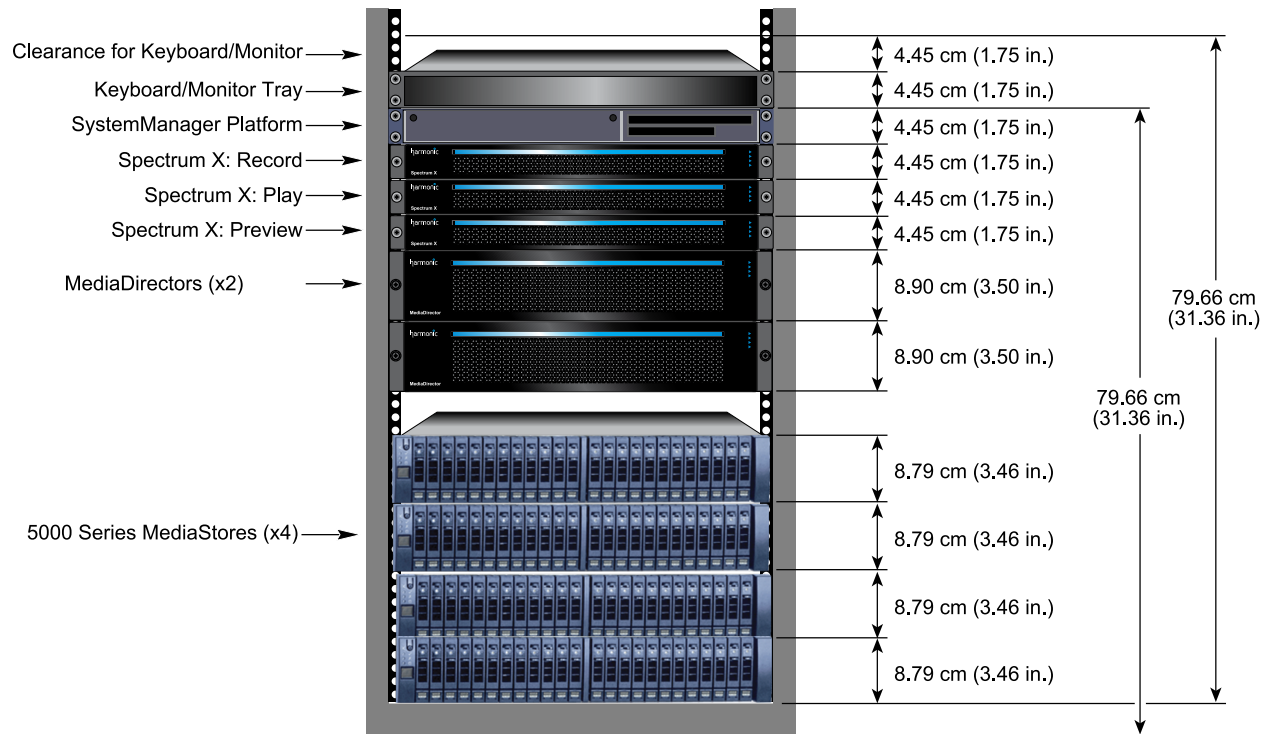
Figure 2-1: Sample rack mount layout with two MediaDirector s

Rack mounting a Spectrum system with a MediaCenter

Rack your MediaCenter system components in the recommended order. For detailed instructions and diagrams, refer to the individual rack kits for each device.

1. Install the MediaCenter at the bottom of the equipment rack. Follow the instructions included with the rack mounting kit to mount the MediaCenter.

   📝 **NOTE:** If you are installing a MediaStore 7200, install the MediaStore at the bottom of the rack and the MediaCenter directly above it.

2. Install the Spectrum X and MediaPort chassis above the MediaCenter. The MediaPort 7002 is the chassis for both the MediaPort 7000 series and ChannelPort modules. Refer to the instructions which ship with the rail kit for instructions on rack mounting the chassis.

3. Label each of the three Spectrum X or MediaPort units with temporary labels for easy identification throughout the remainder of the installation procedures:

   - Top Spectrum X/MediaPort/ChannelPort: **Record**
   - Middle Spectrum X/MediaPort/ChannelPort: **Play**

Spectrum System 8.2 Installation Guide

- Bottom Spectrum X/MediaPort/ChannelPort: **Preview**

4. (Optional) If an Automation System is part of your MediaCenter system, install the Automation System above the MediaCenter. Refer to the documentation supplied with your automation system for rack mounting details.

5. Rack mount the SystemManager keyboard/monitor tray and platform. Refer to the documentation included with the SystemManager Platform for racking details.
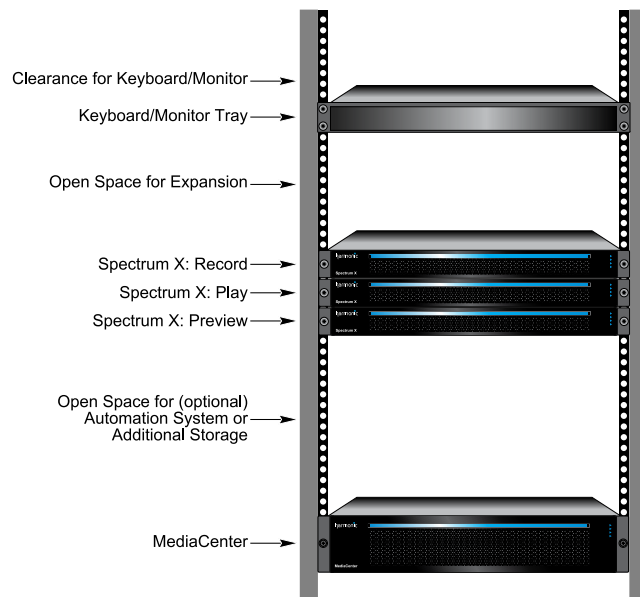
Figure 2-2: Sample rack mount layout with a MediaCenter 2200B
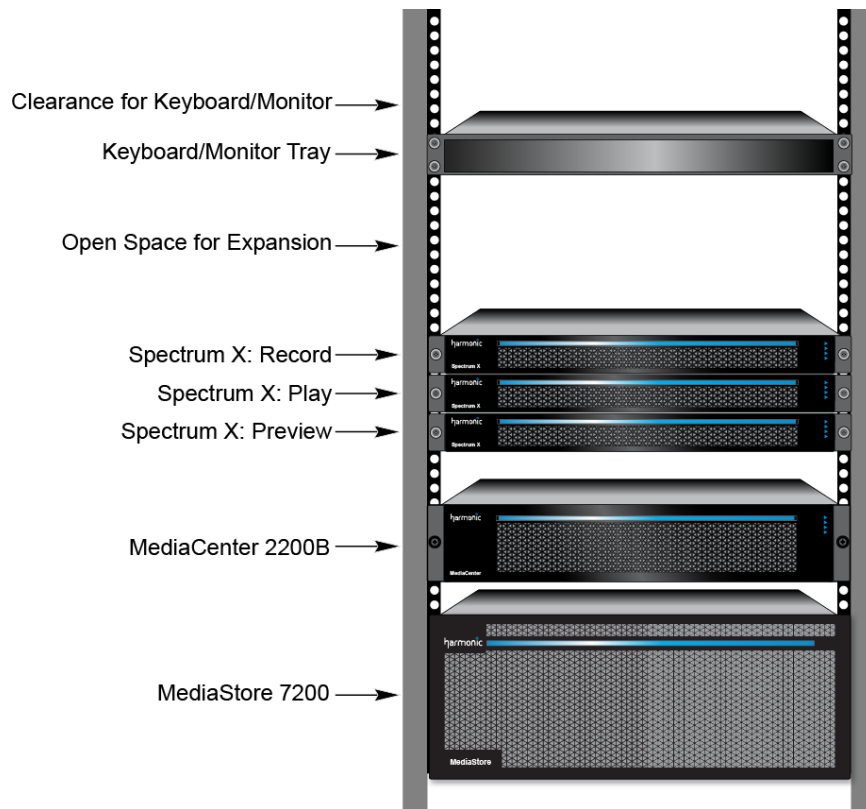
Figure 2-3: Sample rack mount layout with a MediaCenter 2200B and MediaStore 7200

Rack mounting a Spectrum system with Spectrum X with internal storage or MediaDeck 7000

Rack your Spectrum X or MediaDeck 7000 system components in the recommended order.

5 RU (17.8 cm [7 in.]) of vertical rack space are required. This dimension includes 1 RU (4.45 cm [1.75 in.]) of clearance above the SystemManager Keyboard/Manager Tray. The SystemManager Keyboard/Monitor Tray is placed 71.12 cm (28.0 in.) off the floor. This tabletop height is ideal for using the SystemManager while seated or standing.

If the depth of your rack is less than 30 in. from front to rear between the rack vertical rails, Harmonic recommends that before racking you trial fit the Spectrum X or MediaDeck in your rack to verify that there will be no interference at the rear when the system chassis is slid fully into the rails.

1. Install the Spectrum X or MediaDeck in the equipment rack. Follow the instructions included with the rack mounting kit.

2. (Optional) If using the SystemManager platform, rack mount the SystemManager keyboard/monitor tray and platform above the Spectrum X or MediaDeck. Refer to the documentation included with the SystemManager Platform for rack mounting details.

3. (Optional) If using an Automation System, install the Automation System below the Spectrum X. Refer to the documentation supplied with your automation system for rack mounting details.

4. Install the Ethernet switch (or Ethernet hub) in the equipment rack, or in a location within close proximity of the rack.

Clearance for Keyboard/Monitor ⟶
Keyboard/Monitor Tray ⟶
SystemManager Platform ⟶
Spectrum X ⟶
or MediaDeck 7000

4.45 cm (1.75 in.)
4.45 cm (1.75 in.)
4.45 cm (1.75 in.)
4.45 cm (1.75 in.)
4.45 cm (1.75 in.)

75.57 cm
(29.75 in.)

71.12 cm
(28.00 in.)

Open space for ⟶
automation system
(optional)
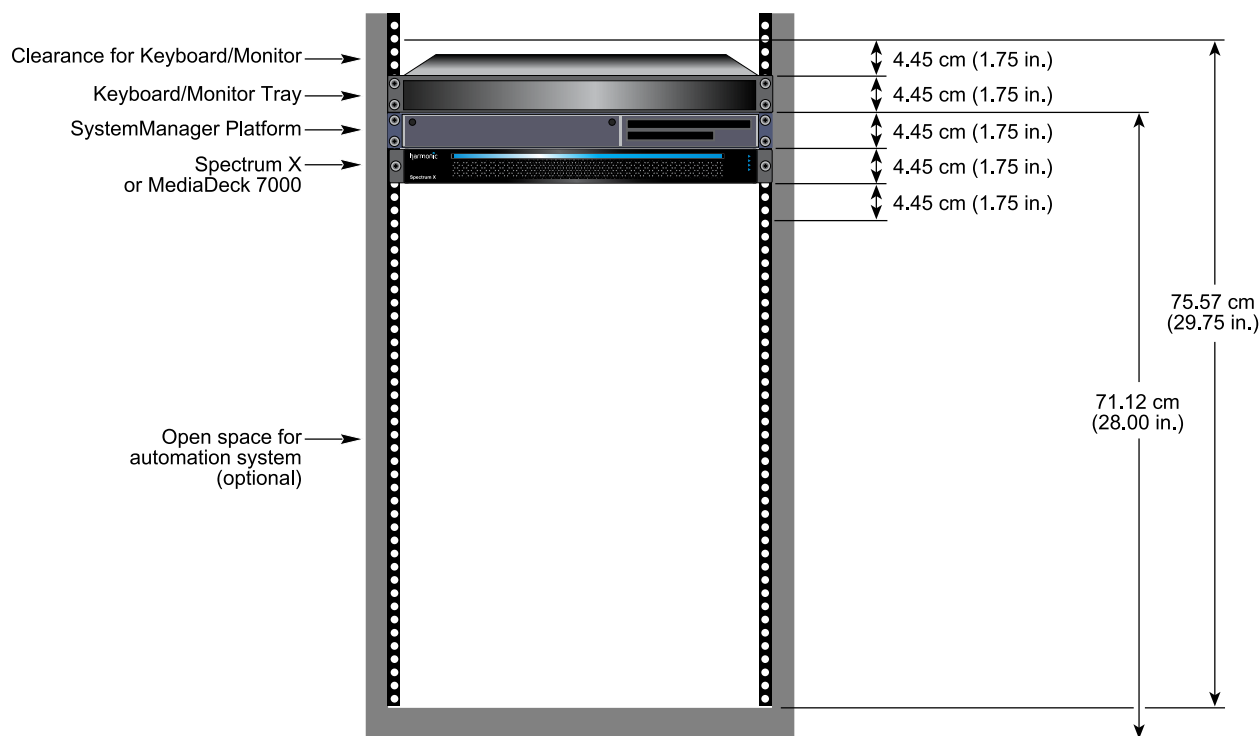
Figure 2-4: Sample rack mount layout with a Spectrum X or MediaDeck 7000

Rack mounting a MediaStore 5000 series

With all its component parts installed, the MediaStore 5000 series can be difficult to install a rack cabinet. Make sure to note any critical requirements and good handling practices in the installation procedure.

⚠ **CAUTION:** Make that you have fitted and checked a suitable anti-static wrist or ankle strap and observe all conventional ESD precautions when handling modules and components. Avoid contact with the internal backplane components and module connectors.

The MediaStore 5000 series ships with its own rail kit that must be used to install the unit. A set of mounting rails is supplied for use in 19-inch rack cabinets. These rails have been designed and tested to handle the maximum enclosure weight and to ensure that multiple MediaStore 5000 series units can be installed without the loss of space within the rack. Use of other mounting hardware may cause some loss of rack space. The rack mounting rail kit also incorporates a rear hold down mechanism to ensure shock and vibration immunity.

To install a MediaStore 5000 series chassis:

1. Check for damage. Report any damage to your Harmonic Sales Representative.

2. Install the rack mounting rails at the desired location in your rack. Refer to the detailed drawings supplied with the rail kit for assembly details. Refer to the detailed drawings supplied with the rail kit for assembly details.

3. On the rack mount assembly, set the location pin at the rear of the rail into a rear rack post hole. Attach the bracket to the rear rack post using the washer and screws supplied. Leave the screws loose.

4. Extend the rail to fit between the front and rear rack posts.

5. Attach the bracket to the front rack post using the washers and screws supplied. Leave the screws loose.

6. Tighten the two clamping screws located along the inside of the rear section of the rack bracket, as shown in the following figures.
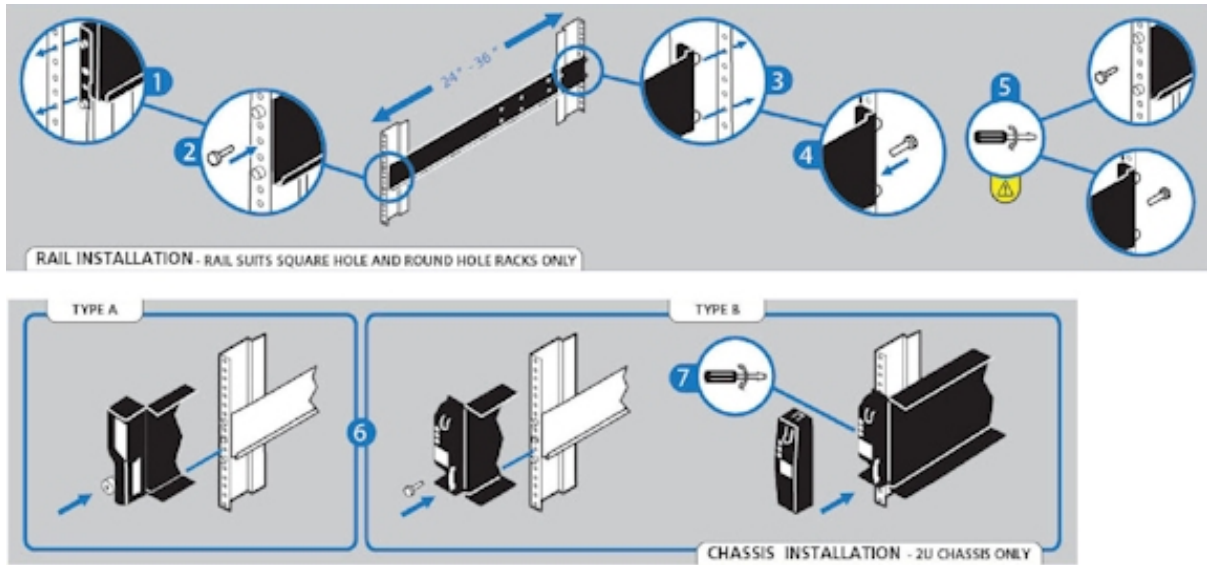
Figure 2-5: Rack mount assembly
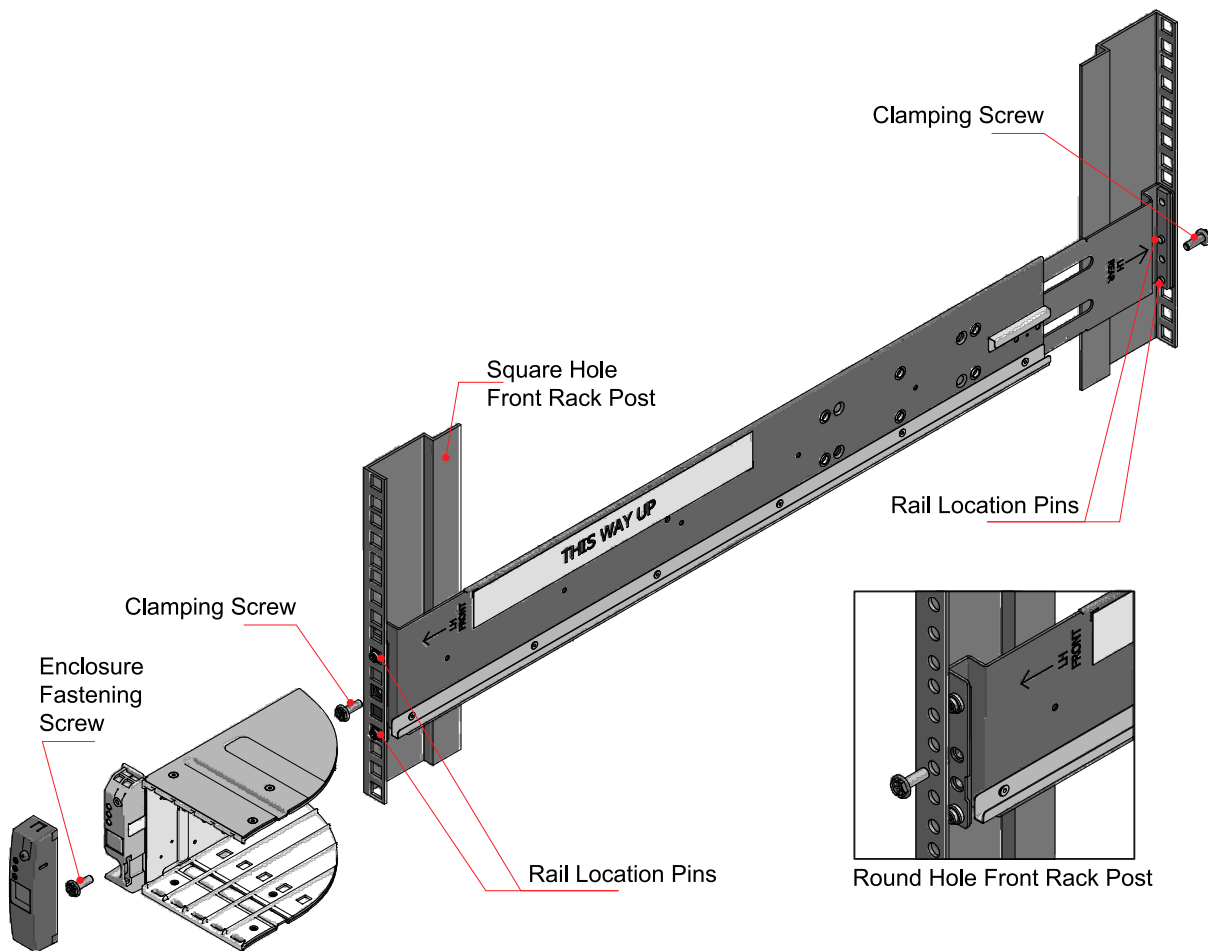
Figure 2-6: Rack mount assembly, detailed view

7. Lift the MediaStore and align the slides with the rack rails.

8. Carefully slide the MediaStore onto the rack rails and push it firmly in.

9. Tighten the mounting screws in the rear rack bracket.

10. Remove the MediaStore until it reaches the hard stops (approximately 400 mm) and tighten the mounting screws in the front rack bracket.

11. Return the enclosure to the fully home position.

What to do next

After the MediaStore has been mounted, do not pull the MediaStore more than a few inches from the rack.

Rack mounting the MediaStore 7200

A rack mounting kit is provided with the MediaStore 7200, which includes the necessary hardware along with detailed mounting instructions. Make sure to follow the instructions in the mounting kit and use the screws that are included with the mounting hardware.

Racking precautions for the MediaStore 7200

Follow the necessary precautions when racking the MediaStore 7200.

- 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.
- The MediaStore 7200 weighs approximately 29 kg (64 lb) without disk drives installed. The design should incorporate stabilizing features suitable to prevent the rack from tipping or being pushed over during installation or in normal use.
- 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 MediaStore 7200 must only be operated from a power supply input voltage range of 100 to 240 VAC, 47 to 63 Hz. Make sure the voltage of the power source is within the specification on the label when connecting the equipment to the power outlet.
- 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.
- The MediaStore must be connected to reliable grounding before applying power.
- The MediaStore 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.

Attaching the rack rails for the MediaStore 7200

Attach the rack rails for the MediaStore.

1. 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.

Outer Rail

Middle Rail

PULL
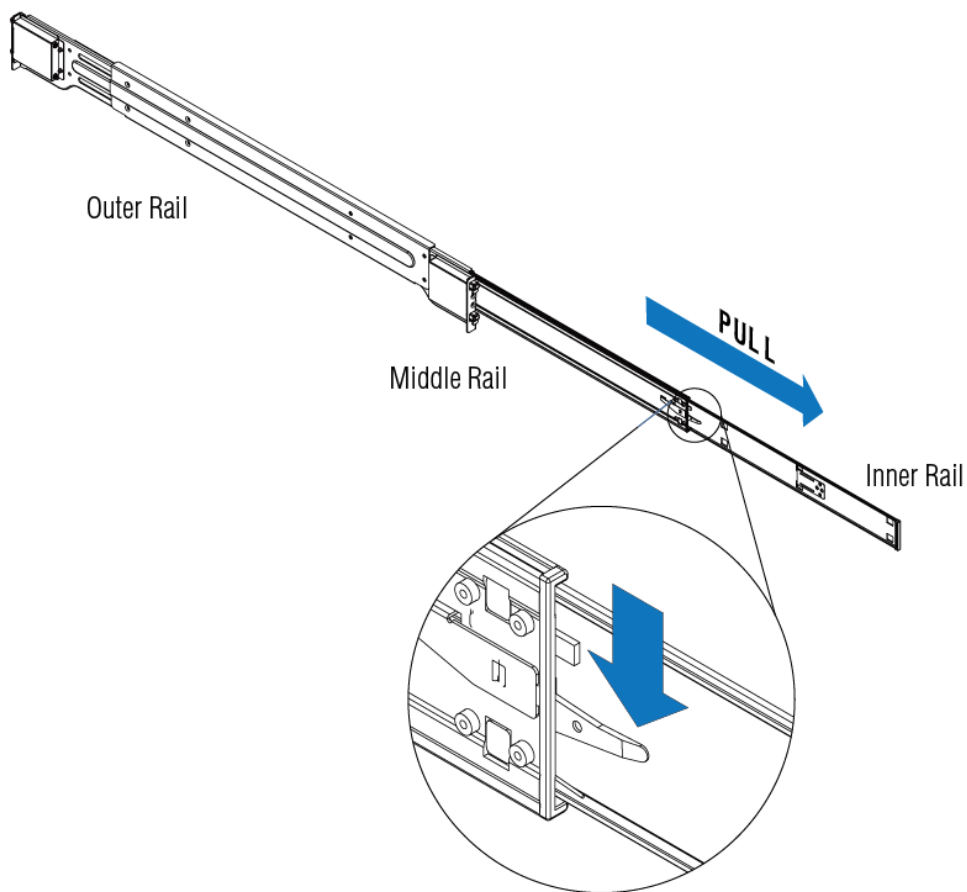
Inner Rail

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.

f.   Repeat steps 1a through 1e to install the other inner rail.

2.   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 *Installing the MediaStore 7200 in the rack* .

3.   Install the outer rails onto the rack as follows:

a.   Push the front bracket to unlock it.
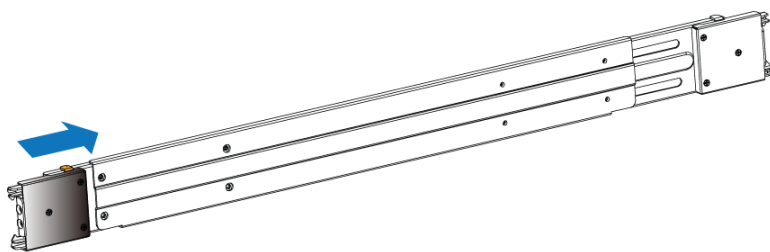
b. Guide the bracket hooks through the rack holes, and then press down firmly.

c. Secure the rail to the front of the rack with two screws.
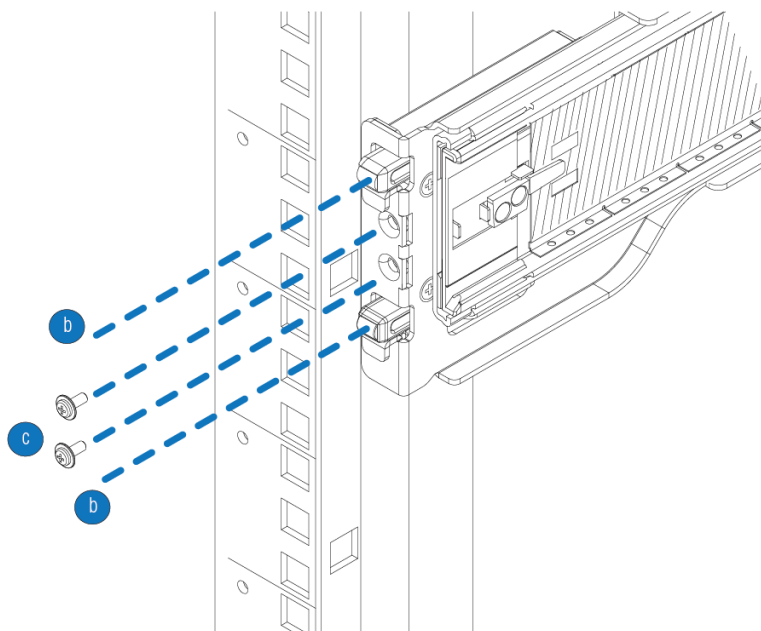
d. Repeat step 3a through step 3c to install the back end of the rail, extending the rail as needed.
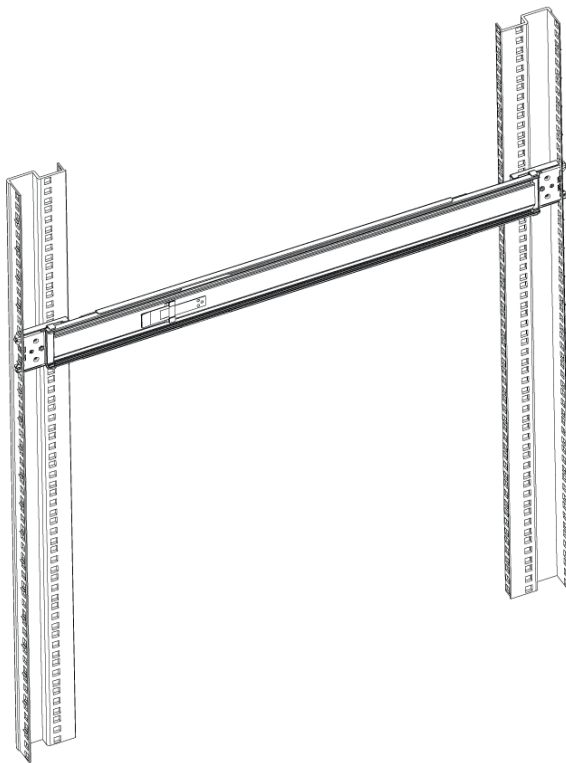
e.   Repeat steps 3a through 3d to install the other outer rail.

Installing the MediaStore 7200 in the rack

Install the MediaStore chassis into the rack.

⚠   **IMPORTANT:** Harmonic recommends that a minimum of three people lift the MediaStore
7200 when performing this procedure.

Before you begin
Confirm that the inner and outer rails are properly installed.

1.   Fully extend the middle rails, making sure that the ball bearing shuttle is locked at the front of each
     middle rail.

2.   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.

3.   Slide the chassis rails into the rack rails, applying pressure evenly on both sides until it clicks into the
     fully extended position.

4.   Simultaneously depress the locking tabs on both sides of the chassis, and then push the chassis all
     the way into the rack.

5.   Secure the chassis handles to the front of the rack with two screws.
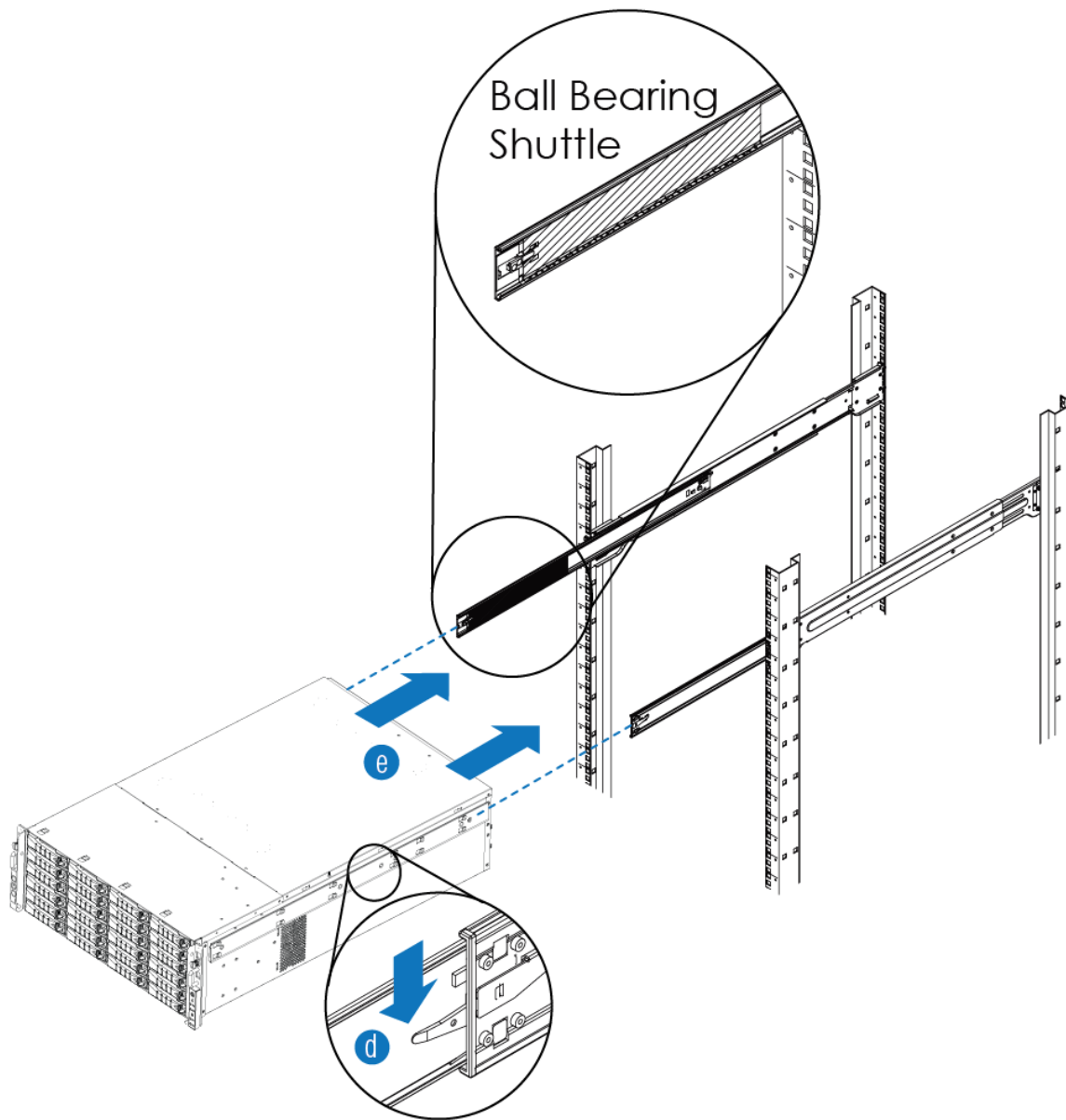
Rack mounting a Spectrum X, MediaDirector 2252B/2251B, or MediaCenter 2200B

Rack mount your Spectrum server as follows.

Attaching the rack rails for the Spectrum X, MediaDirector 2252B/2251B, or MediaCenter 2200B

Attach the rails that hold the Spectrum server in place to the server rack. The Spectrum X, MediaDirector 2252B/2251B, and MediaCenter 2200B ship with the Intel AXXVRAIL Mounting Rail Kit.

1. Pull the blue release button (component F) to remove inner member (D) from the slides.
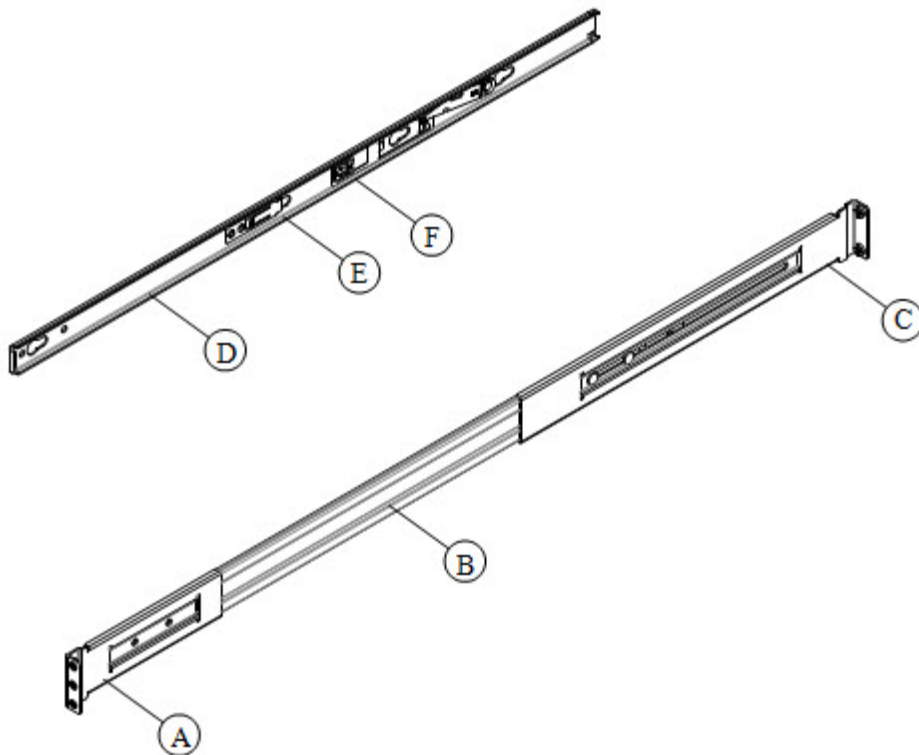
Figure 2-7: AXXVRAIL mounting railside-mount

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 encoder.
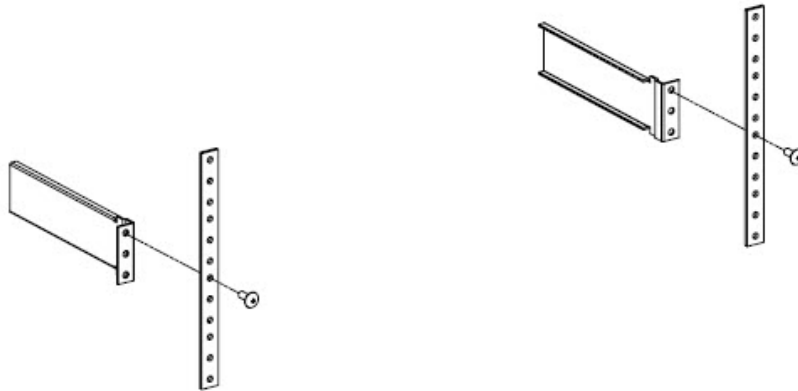
Figure 2-8: Fastening slides to front rack posts

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

Chassis warnings for rack mounting and servicing Spectrum X, MediaDirector 2252B/2251B, and MediaCenter 2200B

Review the following warnings before rack mounting the Spectrum X, MediaDirector 2252B/2251B or MediaCenter 2200B chassis.

⚠ **CAUTION:** To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety.

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- If the rack will hold a number of units, 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.

Installing a Spectrum X, MediaDirector 2252B/2251B, or MediaCenter 2200B in the rack

Install your Spectrum server in the equipment rack.

⚠ **CAUTION:** The front panel is susceptible to electrostatic discharge (ESD) when the bezel is removed. Wear the appropriate ESD protection when the bezel is removed.

📝 **NOTE:** The following figures show a two rack unit server. The same rack rails are used for the Spectrum X, which is one rack unit in height.

1. 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.
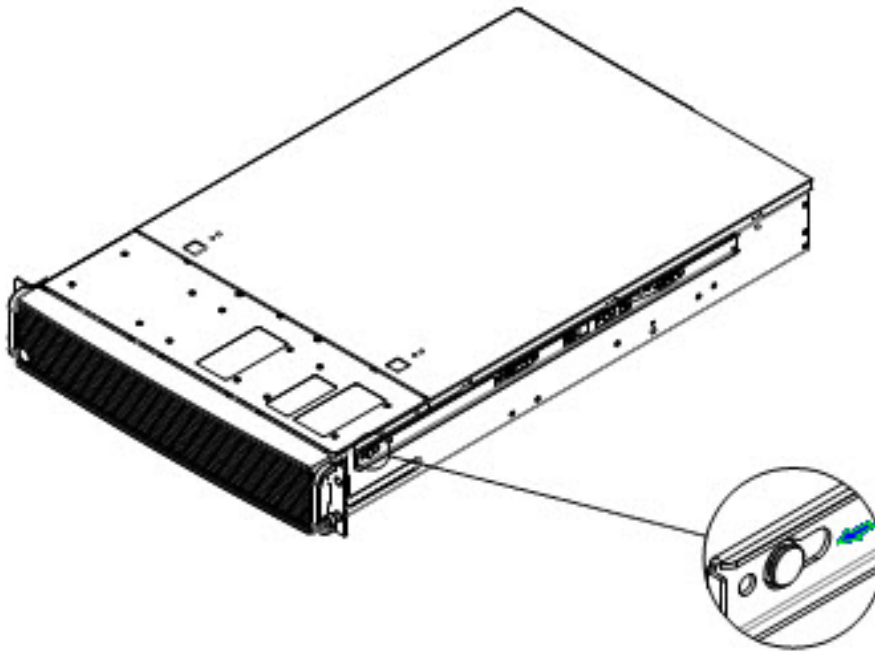
Figure 2-9: Installing inner member to chassis

2. 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.
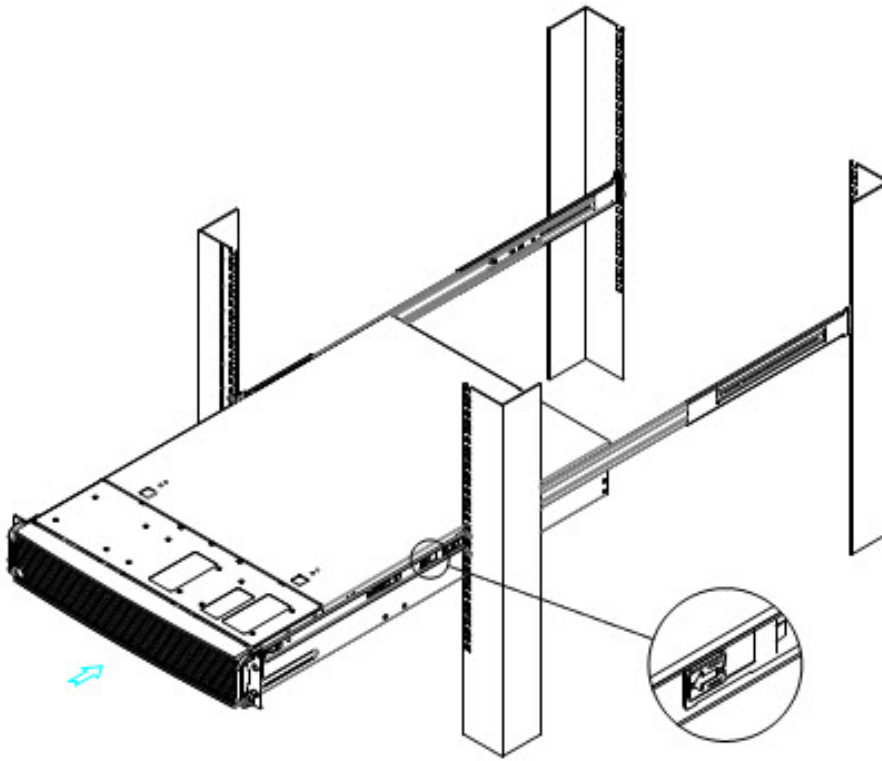
Figure 2-10: Installing chassis to fixed slides

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

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

What to do next

Ensure that the following guidelines are met before operating the device in the rack:

- The ambient temperature around the unit (which may be higher than room temperature) is within the limit specified for the unit.
- There is sufficient airflow around the unit.
- Electrical circuits are not overloaded; consider the nameplate rating of all the connected equipment.
- There is over-current protection.
- The equipment is properly grounded.
- No objects are placed directly on top of the unit.

Rack mounting a MediaDirector 2252/2251, MediaCenter 2200A/2200, or MediaDeck 7000

Rack mount your Spectrum server as follows.

1. Ensure that the installation site is properly prepared with adequate power, ventilation and rack space.

2. Ensure that you have a rack mounting kit for your Spectrum server. Follow the instructions included with the rack mounting kit to mount the Spectrum server.

> **NOTE:** Pay careful attention to the assembly instructions in the rack mounting kit, particularly if the depth of your rack is less than 30 in.

Installing the Spectrum X bezel

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

> **CAUTION:** The front panel on the Spectrum server is susceptible to electrostatic discharge (ESD) when the bezel is removed. Wear the appropriate ESD protection when you remove the bezel.

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. 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.

> **NOTE:** After installing the bezel, it may take up to 30 seconds for the front panel LEDs to return to their previous state.

Backside View of Bezel

Captive
Fastener
(2)
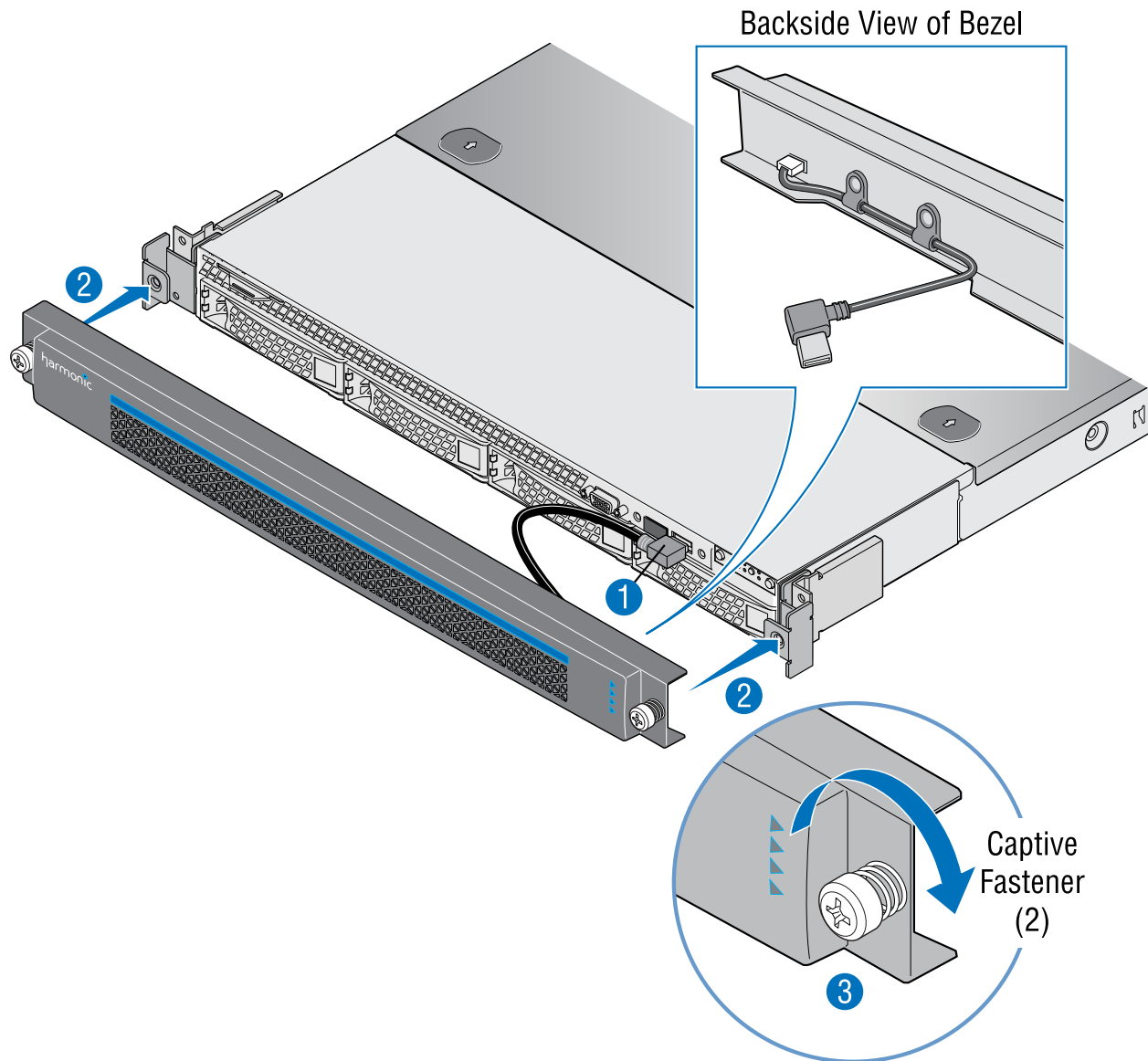
Installing MediaCenter components

Install MediaCenter power supplies and drives before connecting the system.

Installing power supplies

Install both power supplies to take advantage of the 1+1 redundant configuration.

1. Unpack a power supply unit.

2. Using the handle, insert the power supply module into the power supply bay.

3. Push the power supply module into the bay until it locks into place.

4. Repeat the previous steps for the second power supply.
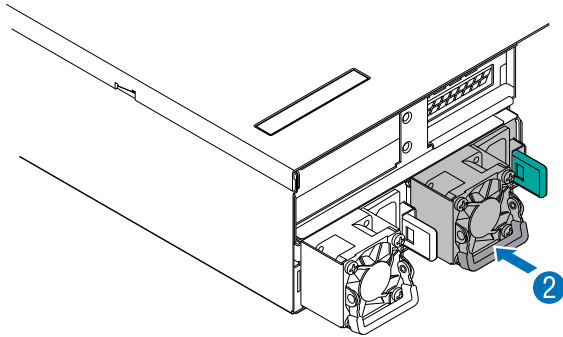
Installing the drives

Use only Harmonic-supplied drives.

1. Unpack a disk drive.

2. Press the green button on the drive carrier to open the lever.

3. With the lever open, insert the drive assembly into the drive bay.

4. Push in the lever to lock the drive into place.

5. Repeat the previous steps for all remaining drives.
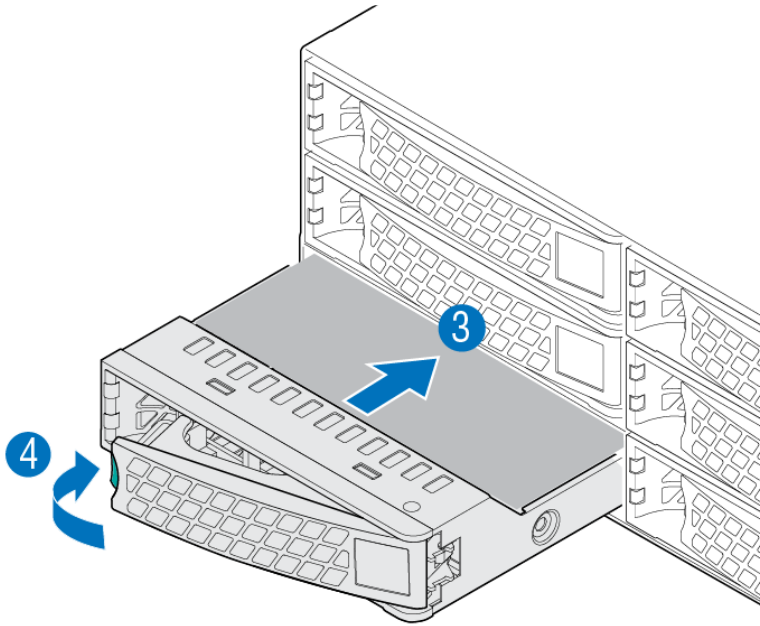
Figure 2-11: Installing a disk drive

Installing MediaDeck 7000 components

Install MediaDeck7000 power supplies and drives before connecting the system.

Installing the drives

Install the MediaDeck 7000 drives.

1. Unpack a disk drive.

2. Press the red release button on the right side of the disk drive to release the handle, as shown in the following figure.

3. Push the drive into the chassis until the handle begins to close, and then press the handle until it closes. The handle will click as it closes.
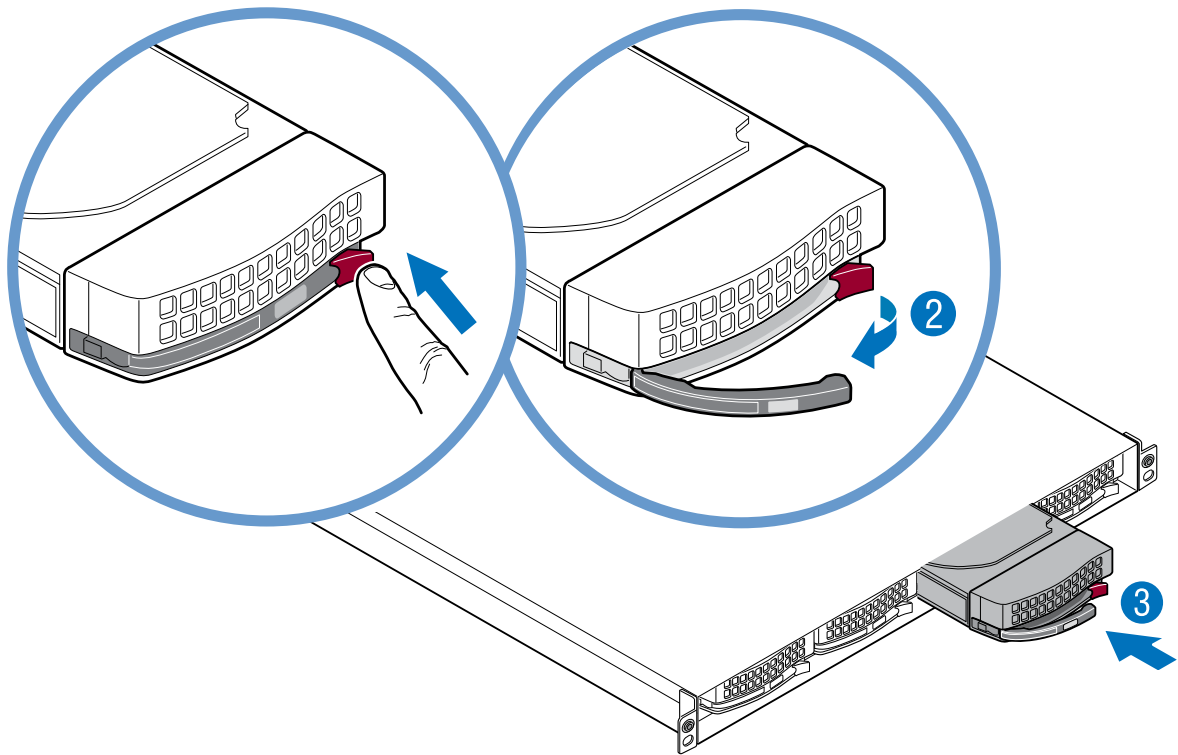
4. Install the remaining disk drives. Disk drives can be installed in any order

Installing the bezel

When securing the bezel to the chassis, be careful to not over-tighten the thumb screws.

1. Unpack the bezel.

2. Align the bezel in front of the chassis so that the front panel display appears in the top-right corner, and the metal corners of the bezel are level with the rack ears of the chassis.

3. Keeping the corners aligned, press the bezel straight onto the chassis. See the following figure.
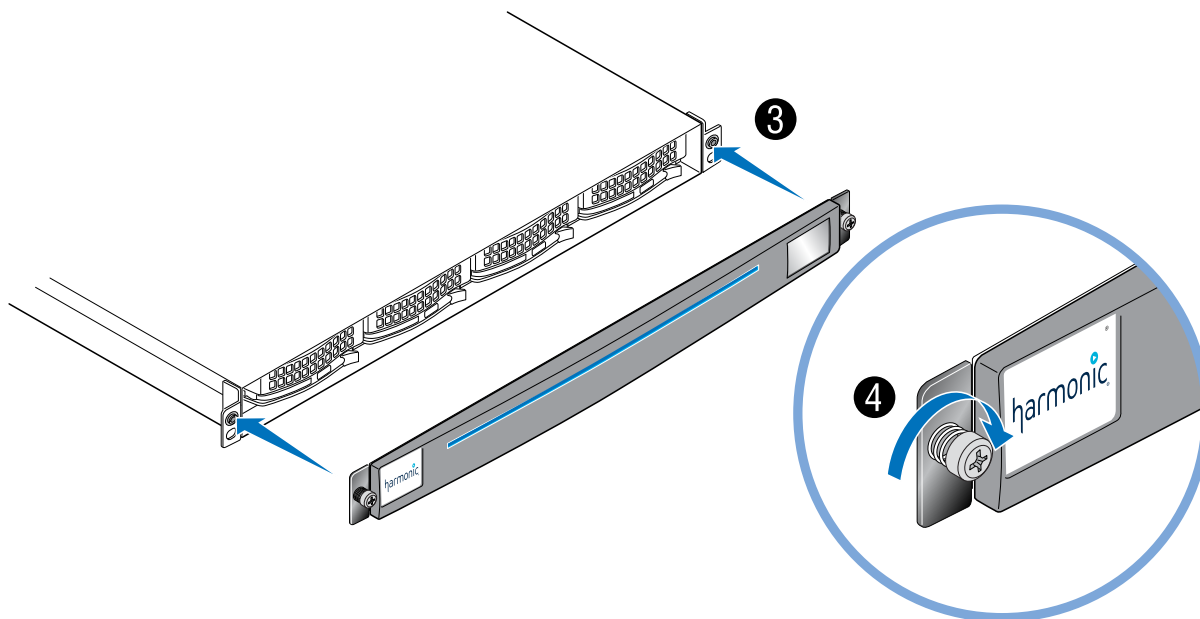
4. Hand-tighten the two captive thumb screws to secure the bezel in place.

> **NOTE:** Do not over-tighten the thumb screws.

Installing I/O modules in the MediaPort or MediaDeck 7000 chassis

The MediaPort 7002 and MediaDeck chassis accommodates two MediaPort or ChannelPort modules, or one of each. Install the modules as needed.

1. Unpack the module.

2. From the rear of the chassis, unscrew the two screws that hold the filler panel on and remove the filler panel.
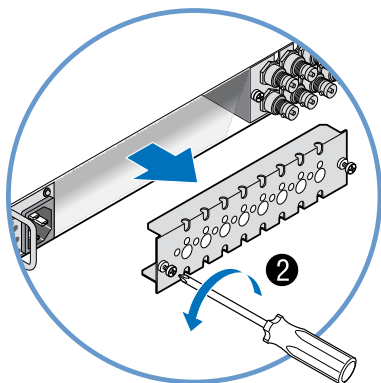
3. Grasp the module handle and push firmly into the slot. Ensure the module is fully inserted by pressing on the connectors with the palm of your hand.

⚠ **CAUTION:** Do not use the two lock screws on the rear panel of the module to pull it into position. Tighten the screws only after the module is fully inserted.

4. Fully tighten the two lock screws on the rear panel of the module to secure it to the chassis.
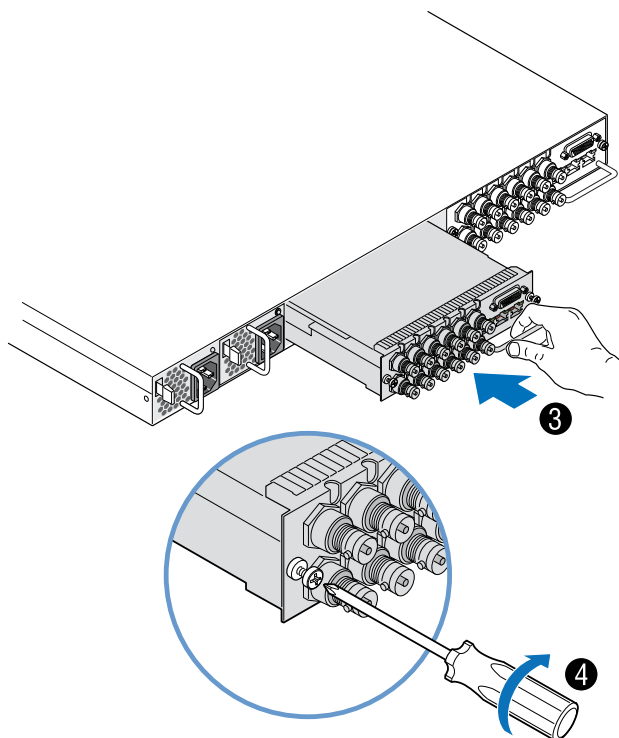
Figure 2-12: Install module

If installing two modules, repeat steps 1-4 for the second module.

Installing MediaStore 7200 components

Install MediaStore drives and bezel before connecting the system.

Installing the drives

Install the MediaStore drives.

📝 **NOTE:** When installing a drive, ensure that the adjacent drive is fully installed. Inserting a drive carrier and attempting to lock its handle next to a partially installed carrier can damage the partially installed carrier's shield spring and make it unusable.

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

1. Press the blue release button inward to unlatch the drive carrier, and then pull 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.
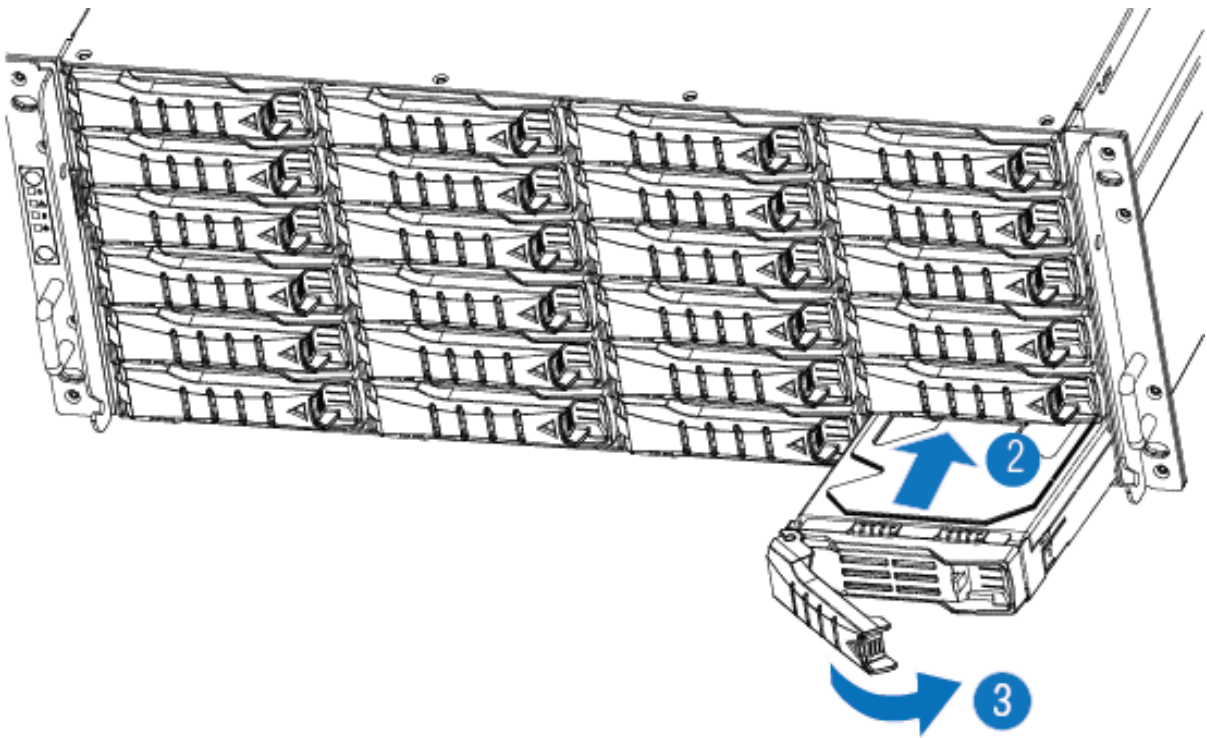
Installing the bezel

The bezel ships separately from the MediaStore. Install the bezel before connecting to your system.

Before you begin

Make sure the MediaStore is mounted on the rack and the drives are installed prior to installing the bezel.

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.
   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.

⚠ **IMPORTANT:** For optimum airflow, do not obstruct the air vents on the bezel.
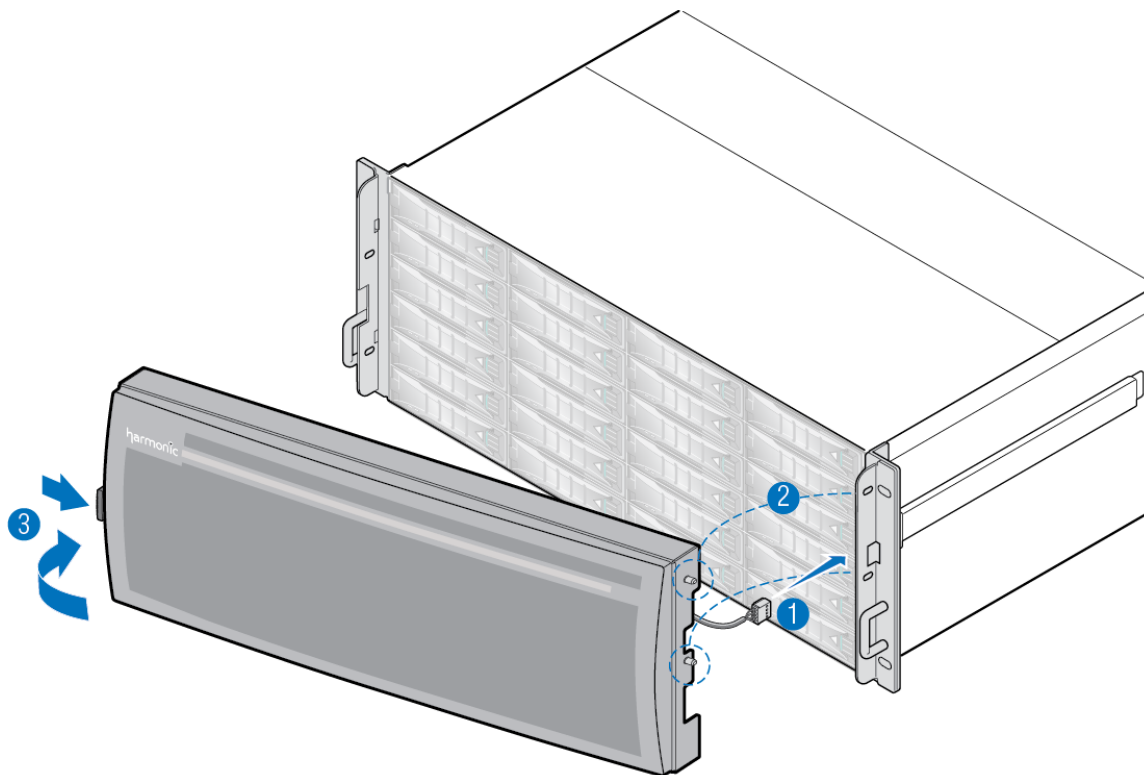
Figure 2-13: Installing the bezel on the MediaStore 7200

Connecting the MediaCenter 2200B to the MediaStore 7200

Connect the MediaCenter 2200B to the MediaStore 7200 by cabling via SAS connections.

⚠ **CAUTION:** Make sure each Spectrum component is running the same version of software before connecting SAS cables.

Please note the following about cabling the MediaCenter and MediaStore:

- Do not twist SAS cables or bundle them with power cables—doing so will affect performance.
- Make sure there is no lateral or vertical strain on the SAS connectors when connected to devices, as contact problems may not appear immediately.

⚠ **IMPORTANT:** The MediaCenter 2200B provides one SAS connection to the MediaStore 7200. As there is not a redundant connection, make sure to follow all necessary precautions.
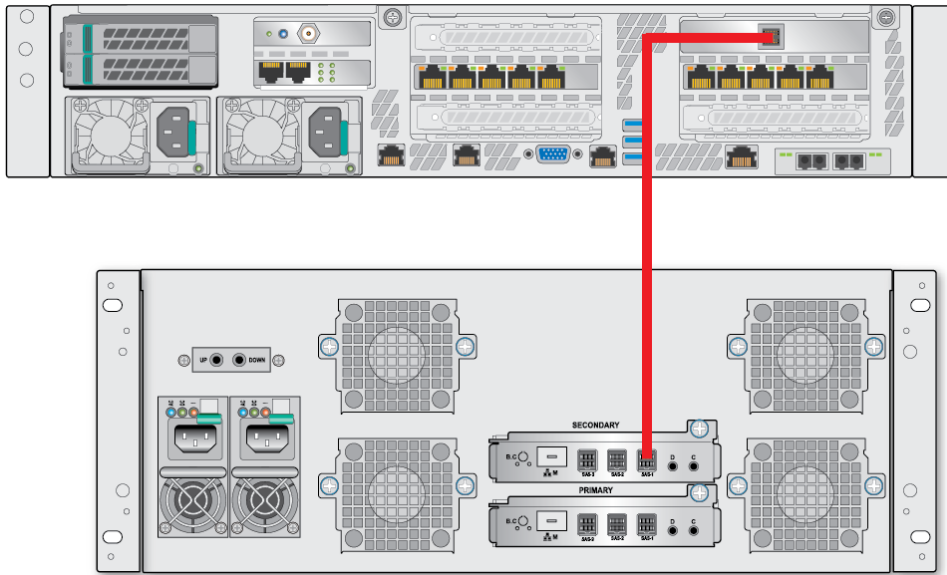
Figure 2-14: Connecting the MediaCenter 2200B to the MediaStore 7200 using SAS

1. Connect one end of a SAS cable to the SAS port on the MediaCenter.

2. Connect the other end of the SAS cable to an open SAS port on the MediaStore 7200.

Connecting MediaDirectors and MediaStores using SAS

Connect the MediaDirector to the MediaStore 5000 series by cabling via SAS connections.

Connecting MediaDirectors 2252B/2251B and MediaStores using SAS

Connect the MediaDirector to the MediaStore 5000 series by cabling via SAS connections.

The sample diagrams in this section show the recommended cabling for a system that uses oneMediaDirector with storage across a maximum of four MediaStores.

⚠️ **CAUTION:** Make sure each MediaDirector is running the same version of Spectrum software and each has an EFS license installed BEFORE connecting the EFS Ethernet or shared storage cables.

⚠️ **IMPORTANT:** The MediaDirector 2252B/2251B requires a different SAS cable than previous MediaDirector models. To make sure you have the correct SAS cable, contact your Harmonic sales representative.

Please note the following about cabling the MediaDirectors and MediaStores:

•   When cabling the SAS connections between MediaStores, be sure to connect primary I/O modules (top module) to primary I/O modules and secondary I/O modules (bottom modules) to secondary I/O modules.

•   Do not twist SAS cables or bundle them with power cables—doing so will affect performance.

•   Make sure there is no lateral or vertical strain on the SAS connectors when connected to devices, as contact problems may not appear immediately.

Figure 2-15: MediaDirector 2252B/2251B and MediaStore connection with SAS

📋 **NOTE:** For the following procedure, refer to the above diagram. P=Primary module and S=Secondary module.

Using SAS cables, make the following connections:

1. MCP-1: A to MS-1 P: C

2. MS-1 P: B to MS-2 P: C

3. MS-2 P: B to MS-3 P: C

4. MS-3 P: B to MS-4 P: C

5. MCP-1: B to MS-1 S: A

6. MS-1 S: B to MS-2 S: C

7. MS-2 S: B to MS-3 S: C

8. MS-3 S: B to MS-4 S: C

Connecting MediaDirectors 2252/2251 and MediaStores using SAS

Connect the MediaDirector to the MediaStore 5000 series by cabling via SAS connections.

The sample diagrams in this section show the recommended cabling for a system that uses oneMediaDirector with storage across a maximum of four MediaStores.

⚠ **CAUTION:** Make sure each MediaDirector is running the same version of Spectrum software and each has an EFS license installed BEFORE connecting the EFS Ethernet or shared storage cables.

⚠ **IMPORTANT:** The MediaDirector 2252B/2251B requires a different SAS cable than previous MediaDirector models. To make sure you have the correct SAS cable, contact your Harmonic sales representative.

Please note the following about cabling the MediaDirectors and MediaStores:

• When cabling the SAS connections between MediaStores, be sure to connect primary I/O modules (top module) to primary I/O modules and secondary I/O modules (bottom modules) to secondary I/O modules.
• Do not twist SAS cables or bundle them with power cables—doing so will affect performance.
• Make sure there is no lateral or vertical strain on the SAS connectors when connected to devices, as contact problems may not appear immediately.

Figure 2-16: MediaDirectors 2252/2251 and MediaStore connection with SAS

📝 **NOTE:** For the following procedure, refer to the above diagram. P=Primary module and S=Secondary module.

Using SAS cables, make the following connections:

1. MCP-1: A to MS-1 P: C

2. MS-1 P: B to MS-2 P: C

3. MS-2 P: B to MS-3 P: C

4. MS-3 P: B to MS-4 P: C

5. MCP-1: B to MS-1 S: A

6. MS-1 S: B to MS-2 S: C

7. MS-2 S: B to MS-3 S: C

8. MS-3 S: B to MS-4 S: C

Connecting three MediaDirectors 2252B/2251B (EFS) and MediaStores using SAS

(For the MediaDirector 2252B/2251B only) Connect MediaDirectors in an EFS configuration to the MediaStore 5000 series by cabling via SAS connections.

The sample diagram in this section shows the recommended cabling for a system that uses three MediaDirector 2252B/2251B units configured for EFS, with storage across a maximum of four MediaStores.

Before you begin

⚠️ **CAUTION:** Make sure each MediaDirector is running the same version of Spectrum software and each has an EFS license installed BEFORE connecting the EFS Ethernet or shared storage cables.

Please note the following about cabling the MediaDirectors and MediaStores:

* When cabling the SAS connections between MediaStores, be sure to connect primary I/O modules (top module) to primary I/O modules and secondary I/O modules (bottom modules) to secondary I/O modules.
* Do not twist SAS cables or bundle them with power cables—doing so will affect performance.
* Make sure there is no lateral or vertical strain on the SAS connectors when connected to devices, as contact problems may not appear immediately.

📝 **NOTE:** For the following procedure, refer to the diagram in this section. P=Primary module and S=Secondary module.

Figure 2-17: Three MediaDirectors 2252B/2251B and MediaStore connection with SAS

Using SAS cables, make the following connections.

1. MCP-1: A to MS-1 S: C
2. MS-1 S: B to MS-2 S: C
3. MS-2 S: B to MS-3 S: C
4. MS-3 S: B to MS-4 S: C
5. MS-4 S: B to MCP-3: A
6. MCP-1: B to MS-1 P: A
7. MS-1 P: B to MS-2 P: C
8. MS-2 P: B to MS-3 P: C
9. MS-3 P: B to MS-4 P: C
10. MS-4 P: B to MCP-3: B
11. MCP-2: A to MS-1 S: A

12. MCP-2: B to MS-1 P: C

Connecting three MediaDirectors 2252/2251(EFS) and MediaStores using SAS

(For the MediaDirector 2252/2251 only) Connect MediaDirectors in an EFS configuration to the MediaStore 5000 series by cabling via SAS connections.

The sample diagram in this section shows the recommended cabling for a system that uses three MediaDirector 2252B/2251B units configured for EFS, with storage across a maximum of four MediaStores.

⚠️ **CAUTION:** Make sure each MediaDirector is running the same version of Spectrum software and each has an EFS license installed BEFORE connecting the EFS Ethernet or shared storage cables.

Please note the following about cabling the MediaDirectors and MediaStores:

• When cabling the SAS connections between MediaStores, be sure to connect primary I/O modules (top module) to primary I/O modules and secondary I/O modules (bottom modules) to secondary I/O modules.
• Do not twist SAS cables or bundle them with power cables—doing so will affect performance.
• Make sure there is no lateral or vertical strain on the SAS connectors when connected to devices, as contact problems may not appear immediately.

📝 **NOTE:** For the following procedure, refer to the diagram in this section. P=Primary module and S=Secondary module.

Figure 2-18: Three MediaDirectors 2252/2251 and MediaStore connection with SAS

📝 **NOTE:** For the following procedure, refer to the above diagram. P=Primary module and S=Secondary module.

Using SAS cables, make the following connections:

1. MCP-1: A to MS-1 S: C

2. MS-1 S: B to MS-2 S: C

3. MS-2 S: B to MS-3 S: C

4. MS-3 S: B to MS-4 S: C

5. MS-4 S: B to MCP-3: A

6. MCP-1: B to MS-1 P: A

7. MS-1 P: B to MS-2 P: C

8. MS-2 P: B to MS-3 P: C

9. MS-3 P: B to MS-4 P: C

10. MS-4 P: B to MCP-3: B

11. MCP-2: A to MS-1 S: A

12. MCP-2: B to MS-1 P: C

Connecting four MediaDirectors 2252B-DS (EFS) and MediaStores using SAS

(For the MediaDirector 2252B-DS only) Connect MediaDirectors in an EFS configuration to the MediaStore 5000 series by cabling via SAS connections.

The sample diagram in this section shows the recommended cabling for a system that uses four MediaDirector 2252B-DS units configured for EFS, with storage across a maximum of six MediaStores.

Before you begin

⚠ **CAUTION:** Make sure each MediaDirector is running the same version of Spectrum software and each has an EFS license installed BEFORE connecting the EFS Ethernet or shared storage cables.

Please note the following about cabling the MediaDirectors and MediaStores:

- When cabling the SAS connections between MediaStores, be sure to connect primary I/O modules (top module) to primary I/O modules and secondary I/O modules (bottom modules) to secondary I/O modules.
- Do not twist SAS cables or bundle them with power cables—doing so will affect performance.
- Make sure there is no lateral or vertical strain on the SAS connectors when connected to devices, as contact problems may not appear immediately.

📝 **NOTE:** For the following procedure, refer to the diagram in this section. P=Primary module and S=Secondary module.

Figure 2-19: Four MediaDirectors 2252B-DS and MediaStore connection with SAS

Using SAS cables, make the following connections.

1. Connect the first MediaDirector to MediaStores 1 and 4

    a. MCP-1: A to MS-1 P: A
    b. MCP-1 B: to MS-4 P: A
    c. MCP-1 C: to MS-1 S: C
    d. MCP-1 D: to MS-4 S: B

2. Connect the second MediaDirector to MediaStores 1 and 4

    a. MCP-2 A: to MS-1 P: B
    b. MCP-2 B to MS-4 P: B
    c. MCP-2 C: to MS-1 S: B
    d. MCP-2 D to MS-4 S: C

3. Connect MediaStores to each other.

    a. MS-1 P: C to MS-2 P: C
    b. MS-1 S: A to MS-2 S: A
    c. MS-4 P: C to MS-5 P: C
    d. MS-4 S: A to MS-5 S: A
    e. MS-2 P: B to MS-3 P: B
    f. MS-2 S: B to MS-3 S: B

    g. MS-5 P: B to MS-6 P: B

    h. MS-5 S: B to MS-6 S: B

4. Connect the third MediaDirector to MediaStores 3 and 6

    a. MCP-3 A to MS-3 P: A

    b. MCP-3 B to MS-6 P: A

    c. MCP-3 C to MS-3 S: C

    d. MCP-3 D to MS-6 S: C

5. Connect the fourth MediaDirector to MediaStores 3 and 6

    a. MCP-4 A to MS-3 P: C

    b. MCP-4 B to MS-6 P: C

    c. MCP-4 C to MS-3 S: A

    d. MCP-4 D to MS-6 S: A

Connecting MediaDirectors in an EFS configuration

If you have purchased an extended file system (EFS) license from Harmonic, you may connect up to three MediaDirectors 2252B/2251B or 2252/2251 in an EFS configuration.

For the MediaDirector 2252B-DS, you can configure four servers in an extended file system (EFS) configuration using the EFS Ethernet ports.

📝   **NOTE:** With Spectrum 8.2 and later, when configuring two or three MediaDirectors in an EFS, you can mix MediaDirector 2252B/2251B series and 2252/2251 series in the same EFS.

Connecting two MediaDirectors 2252B/2251B in an EFS configuration

If you are configuring two MediaDirectors in an extended file system (EFS) configuration, connect your MediaDirectors using the EFS Ethernet ports.

Please note the following about cabling the MediaDirectors with EFS Ethernet:

• EFS is a feature that requires a license. Consult with your Harmonic Sales Representative for more information.

• When setting up an EFS Ethernet, you must connect your Ethernet cable between corresponding EFS Ethernet ports on the MediaDirectors. Do not user any other Ethernet ports for this purpose.

• Refer to the *Harmonic SystemManager User Guide* for instructions on configuring a Spectrum system with EFS.

⚠️   **CAUTION:** Make sure each MediaDirector is running the same version of Spectrum software and each has an EFS license installed BEFORE connecting the EFS Ethernet or shared storage cables

Figure 2-20: Two MediaDirectors 2252B/2251B in an EFS configuration

1. Make sure the MediaStores are connected via SAS.

2. On the Ethernet card assigned to EFS on the first MediaDirector, connect an Ethernet cable to an EFS Ethernet port. Connect the other end of the cable to the corresponding EFS Ethernet port on the second MediaDirector.

3. On the Ethernet card assigned to EFS on the first MediaDirector, connect an Ethernet cable to a second EFS Ethernet port. Connect the other end of the cable to the corresponding EFS Ethernet port on the second MediaDirector.

Connecting two MediaDirectors 2252/2251 in an EFS configuration

If you are configuring two MediaDirectors in an extended file system (EFS) configuration, connect your MediaDirectors using the EFS Ethernet ports.

Please note the following about cabling the MediaDirectors with EFS Ethernet:

• EFS is a feature that requires a license. Consult with your Harmonic Sales Representative for more information.

- When setting up an EFS Ethernet, you must connect your Ethernet cable between corresponding EFS Ethernet ports on the MediaDirectors. Do not user any other Ethernet ports for this purpose.

- Refer to the *Harmonic SystemManager User Guide* for instructions on configuring a Spectrum system with EFS.

⚠ **CAUTION:** Make sure each MediaDirector is running the same version of Spectrum software and each has an EFS license installed BEFORE connecting the EFS Ethernet or shared storage cables.

Figure 2-21: Two MediaDirectors 2252/2251 in an EFS configuration

1. Make sure the MediaStores are connected via SAS.

2. On the Ethernet card assigned to EFS on the first MediaDirector, connect an Ethernet cable to an EFS Ethernet port. Connect the other end of the cable to the corresponding EFS Ethernet port on the second MediaDirector.

3. On the Ethernet card assigned to EFS on the first MediaDirector, connect an Ethernet cable to a second EFS Ethernet port. Connect the other end of the cable to the corresponding EFS Ethernet port on the second MediaDirector.

Connecting three MediaDirectors 2252B/2251B in an EFS configuration

If you are configuring three MediaDirectors in an extended file system (EFS) configuration, connect your MediaDirectors using the EFS Ethernet ports.

Please note the following about cabling the MediaDirectors with EFS Ethernet:

- EFS is a feature that requires a license. Consult with your Harmonic Sales Representative for more information.
- When setting up an EFS Ethernet, you must connect your Ethernet cable between corresponding EFS Ethernet ports on the MediaDirectors. Do not user any other Ethernet ports for this purpose.
- Refer to the *Harmonic SystemManager User Guide* for instructions on configuring a Spectrum system with EFS.

⚠ **CAUTION:** Make sure each MediaDirector is running the same version of Spectrum software and each has an EFS license installed BEFORE connecting the EFS Ethernet or shared storage cables

📝 **NOTE:** For ease of explanation, the diagram in this section does not show the MediaStores or SAS cabling. EFS requires SAS cabling between MediaDirectors and MediaStores.
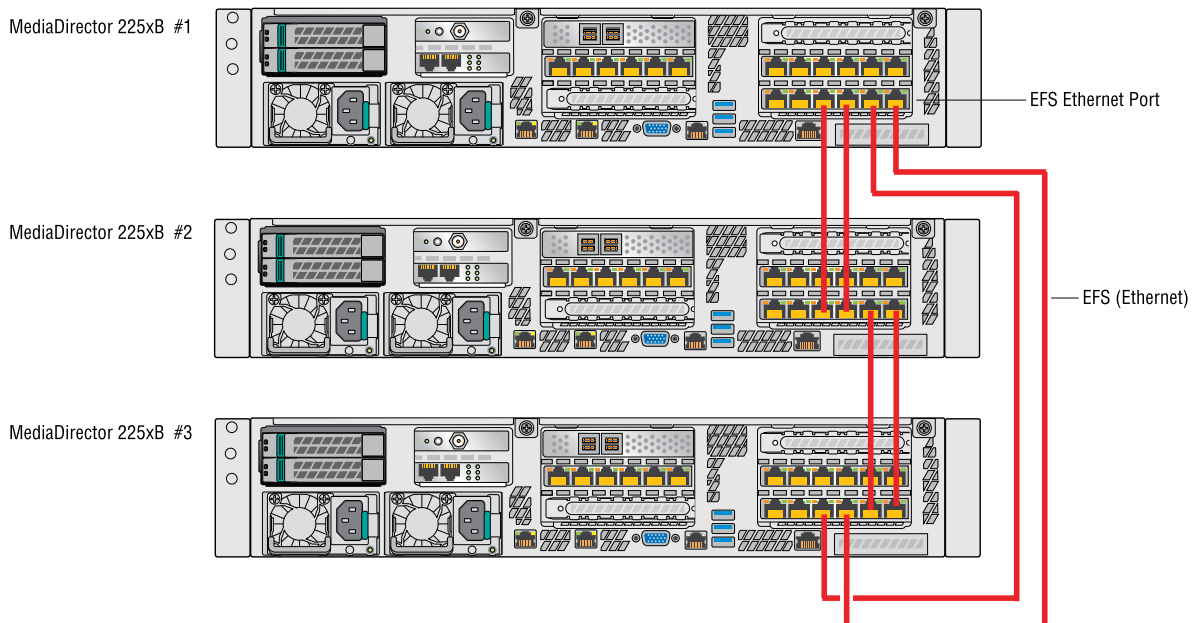
Figure 2-22: Three MediaDirectors 2252B/2251B in an EFS configuration

1. Make sure the MediaStores are connected via SAS.

2. On the Ethernet card assigned to EFS on the first MediaDirector, connect Ethernet cables to the first two EFS Ethernet ports. Connect the other ends of the cables to the corresponding EFS Ethernet ports on the second MediaDirector.

3. On the Ethernet card assigned to EFS on the first MediaDirector, connect Ethernet cables to the last two EFS Ethernet ports. Connect the other ends of the cables to the first two EFS Ethernet ports on the third MediaDirector.

4. On the Ethernet card assigned to EFS on the second MediaDirector, connect Ethernet cables to the last two Ethernet ports. Connect the other ends of the cables to the last two Ethernet ports on the third MediaDirector.

Connecting three MediaDirectors 2252/2251 in an EFS configuration

If you are configuring three MediaDirectors in an extended file system (EFS) configuration, connect your MediaDirectors using the EFS Ethernet ports.

Please note the following about cabling the MediaDirectors with EFS Ethernet:

- EFS is a feature that requires a license. Consult with your Harmonic Sales Representative for more information.
- When setting up an EFS Ethernet, you must connect your Ethernet cable between corresponding EFS Ethernet ports on the MediaDirectors. Do not user any other Ethernet ports for this purpose.
- Refer to the *Harmonic SystemManager User Guide* for instructions on configuring a Spectrum system with EFS.

⚠ **CAUTION:** Make sure each MediaDirector is running the same version of Spectrum software and each has an EFS license installed BEFORE connecting the EFS Ethernet or shared storage cables.

📝 **NOTE:** For ease of explanation, the diagram in this section does not show the MediaStore or SAS cabling. EFS requires SAS cabling between MediaDirectors and MediaStores.
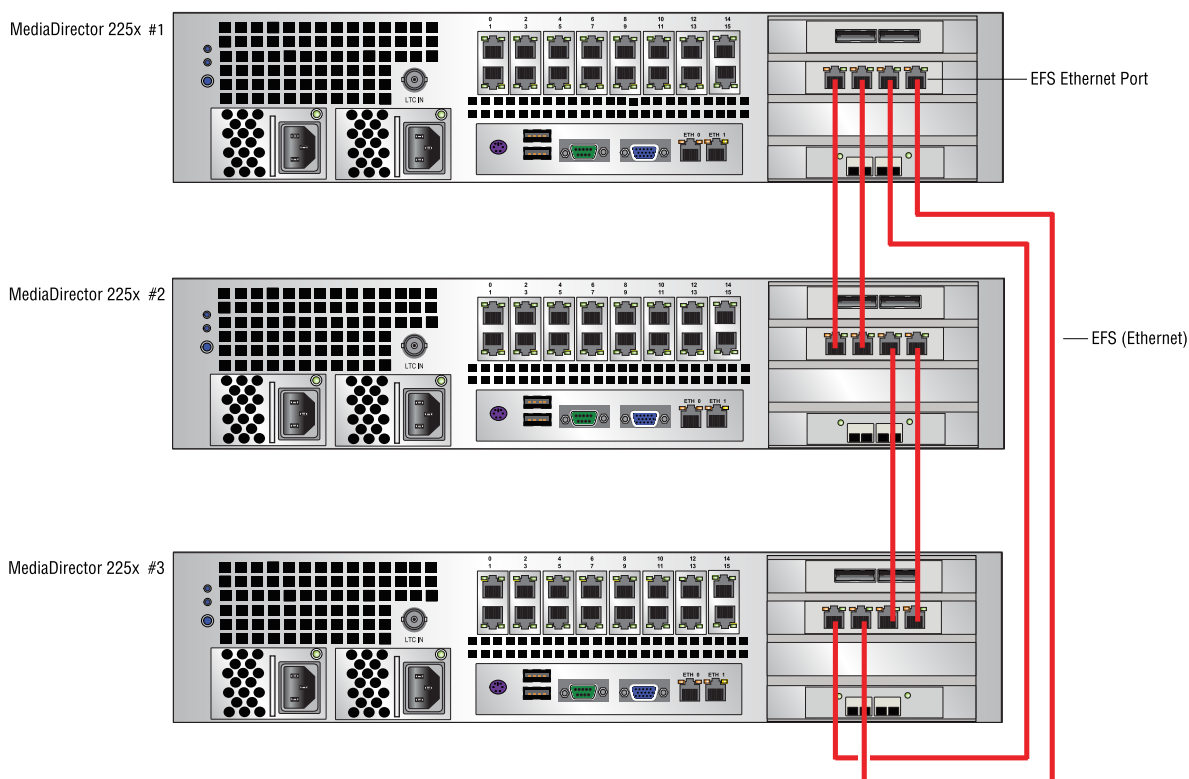
Figure 2-23: Three MediaDirectors 2252/2251 in an EFS configuration

1. Make sure the MediaStores are connected via SAS.

2. On the Ethernet card assigned to EFS on the first MediaDirector, connect Ethernet cables to the first two EFS Ethernet ports. Connect the other ends of the cables to the corresponding EFS Ethernet ports on the second MediaDirector.

3. On the Ethernet card assigned to EFS on the first MediaDirector, connect Ethernet cables to the last two EFS Ethernet ports. Connect the other ends of the cables to the first two EFS Ethernet ports on the third MediaDirector.

4. On the Ethernet card assigned to EFS on the second MediaDirector, connect Ethernet cables to the last two Ethernet ports. Connect the other ends of the cables to the last two Ethernet ports on the third MediaDirector.

Connecting four MediaDirectors 2252B-DS in an EFS configuration

For the MediaDirector 2252B-DS, you can configure four servers in an extended file system (EFS) configuration using the EFS Ethernet ports.

Please note the following about cabling the MediaDirectors with EFS Ethernet:

*   EFS is a feature that requires a license. Consult with your Harmonic Sales Representative for more information.
*   When setting up an EFS Ethernet, you must connect your Ethernet cable between corresponding EFS Ethernet ports on the MediaDirectors. Do not user any other Ethernet ports for this purpose.
*   Refer to the *Harmonic SystemManager User Guide* for instructions on configuring a Spectrum system with EFS.

⚠ **CAUTION:** Make sure each MediaDirector is running the same version of Spectrum software and each has an EFS license installed BEFORE connecting the EFS Ethernet or shared storage cables

Figure 2-24: Four MediaDirectors 2252B-DS in an EFS configuration

Before you begin

Make sure the MediaStores are connected via SAS.

1. From the first MediaDirector, on the Ethernet card assigned to EFS, connect Ethernet cables as follows.

   a. Connect the first two EFS Ethernet ports to the corresponding EFS Ethernet ports on the second MediaDirector.
   b. Connect the third and fourth EFS Ethernet ports to the corresponding EFS Ethernet ports on the third MediaDirector.
   c. Connect the fifth and sixth EFS Ethernet ports to the corresponding EFS Ethernet ports on the fourth MediaDirector

2. From the second MediaDirector, on the Ethernet card assigned to EFS, connect Ethernet cables as follows

   a. Connect the third and fourth EFS Ethernet ports to the first and second EFS Ethernet ports on the third MediaDirector.
   b. Connect the fifth and sixth EFS Ethernet ports to the third and fourth EFS Ethernet ports on the fourth MediaDirector.

3. From the third MediaDirector, on the Ethernet card assigned to EFS, connect the fifth and sixth Ethernet cables to the corresponding ports on the fourth MediaDirector.

Connecting I/O modules to a MediaDirector or MediaCenter

Connect your ChannelPorts, MediaPorts, or Spectrum X units in shared storage configuration to the MediaPort Ethernet array on the MediaDirector or MediaCenter.

Connecting I/O modules to a MediaDirector 2252B/2251B or MediaCenter 2200B

Connect your ChannelPorts, MediaPorts, or Spectrum X units in shared storage configuration to the MediaPort Ethernet array on the MediaDirector 2252B/2251B or MediaCenter 2200B.

The diagram in this section illustrates a small system with three Spectrum X/ChannelPorts/MediaPorts and a MediaDirector 2252B/2251B.
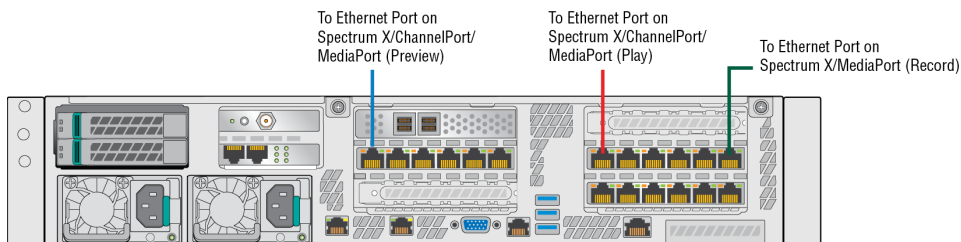
Figure 2-25: Connecting to I/O modules

- Connect one of the Ethernet ports from the MediaPort Ethernet array on the MediaDirector or MediaCenter to the Ethernet port on the Record MediaPort or Spectrum X.
- Connect one of the Ethernet ports from the MediaPort Ethernet array on the MediaDirector or MediaCenter to the Ethernet port on the Play MediaPort, ChannelPort, or Spectrum X.
- Connect one of the Ethernet ports from the MediaPort Ethernet array on the MediaDirector or MediaCenter to the Ethernet port on the Preview MediaPort, ChannelPort, or Spectrum X.

Connecting I/O modules to a MediaDirector 2252/2251

Connect your I/O modules to the MediaPort Ethernet array on the MediaDirector 2252/2251.

The diagram in this section illustrates a small system with three I/O modules and a MediaDirector 2252/2251.

To Ethernet Port on
I/O Module (Play)

To Ethernet Port on
I/O Module (Preview)

To Ethernet Port on
I/O Module (Record)
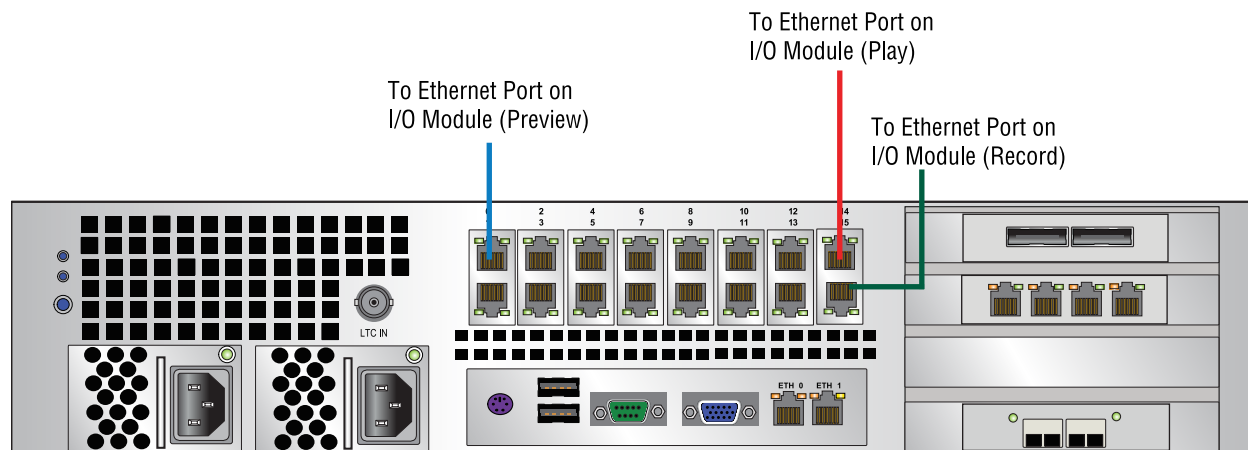
Figure 2-26: Connecting to I/O modules

- Connect one of the Ethernet ports from the MediaPort Ethernet array on the MediaDirector to the Ethernet port on the Record MediaPort or Spectrum X.
- Connect one of the Ethernet ports from the MediaPort Ethernet array on the MediaDirector to the Ethernet port on the Play MediaPort, ChannelPort, or Spectrum X.
- Connect one of the Ethernet ports from the MediaPort Ethernet array on the MediaDirector to the Ethernet port on the Preview MediaPort, ChannelPort, or Spectrum X.

Connecting I/O modules to a MediaCenter 2200 or 2200A

Connect your I/O modules to the MediaPort Ethernet array on the MediaCenter 2200 or 2200A.

The diagram in this section illustrates a small system with three I/O modules and a MediaCenter 2200 .

To Ethernet Port on
I/O Module (Preview)

To Ethernet Port on
I/O Module (Play)

To Ethernet Port on
I/O Module (Record)
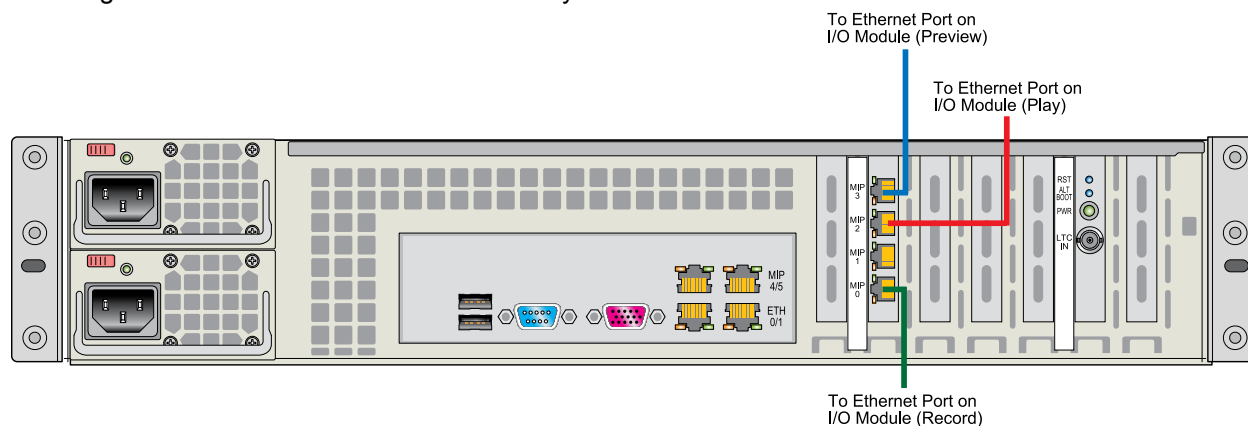
Figure 2-27: Connecting to I/O modules

- Connect one of the Ethernet ports from the MediaPort Ethernet array on the MediaCenter to the Ethernet port on the Record MediaPort or Spectrum X.
- Connect one of the Ethernet ports from the MediaPort Ethernet array on the MediaCenter to the Ethernet port on the Play MediaPort, ChannelPort, or Spectrum X.

- Connect one of the Ethernet ports from the MediaPort Ethernet array on the MediaCenter to the Ethernet port on the Preview MediaPort, ChannelPort, or Spectrum X.

Connecting to your Ethernet network

Connect the public Ethernet ports on your Spectrum video server to your Ethernet network to connect to SystemManager, and to connect to a client system for file transfers.

⚠️ **IMPORTANT:** Check with your network administrator before connecting to your Ethernet network.

About planning your Ethernet network

Plan your Ethernet network before connecting and configuring it.

Spectrum video servers allow you to configure public Ethernet interfaces in fail-over pairs to provide added reliability in the event of a hardware failure. When a pair of Ethernet interfaces are configured in fail-over mode and one of the interfaces experiences a failure, the remaining interface takes over the Ethernet traffic of the failed interface in addition to its own packets. Take note of the following:

- If both interfaces in a fail-over pair are up, you will get two interfaces worth of incoming and outgoing bandwidth.
- Once a fail-over has occurred, the total bandwidth (both the incoming and outgoing bandwidth) is limited to one interface worth of packets.
- Spectrum servers do not ship with Ethernet interfaces configured for fail-over. Interface fail-over must be configured using SystemManager.
- You can assign multiple Ethernet interfaces on your Spectrum server to the same IP subnet. To a great extent, you can use those interfaces independently and the maximum bandwidth will be limited by the number of interfaces.
- To maximize bandwidth, you must connect to the Spectrum server in such a way that each client PC points to a different interface on the Spectrum video server. If multiple client PCs are connected to all the different Ethernet interfaces on the Spectrum server, then bandwidth can be distributed across the different interfaces. Whereas, if the client PCs are all connected to one interface, bandwidth is limited by that one interface. Therefore, distributing the network traffic is your responsibility when setting up the network.
- If you initiate a file transfer from a given Ethernet interface on a client PC to a specific interface on the Spectrum video server, it will always use the same interface to return packets, and will send them directly to the same interface on the client PC that initiated the transfer.

For more details and configuration instructions, refer to "Configuring Network Settings" in the *Harmonic SystemManager User Guide*.

Connecting to SystemManager

If you are using SystemManager, connect your Spectrum video server to the SystemManagerplatform or client PC. Note that Spectrum X can be operated and configured using SystemManager or the Spectrum Management application that runs on the Spectrum X

Before you begin

If you are using SystemManager, refer to the *Harmonic SystemManager Installation Guide*for instructions on installing the SystemManager Platform or installing the software-only version of SystemManager on a client PC.

- Follow the connection instructions for your Spectrum video server.
- Optionally, once you have connected to SystemManager you may power on the SystemManager platform and log in. Refer to the *Harmonic SystemManager User Guide* for log in instructions.

Connecting a MediaDirector 2252B/2251B or MediaCenter 2200B to SystemManager

Connect to SystemManager to begin monitoring your Spectrum system.

⚠ **IMPORTANT:** For the following connections, use only a CAT 6 Ethernet cable or better. For lengths between 37m and 100m, or greater, use CAT 6a.
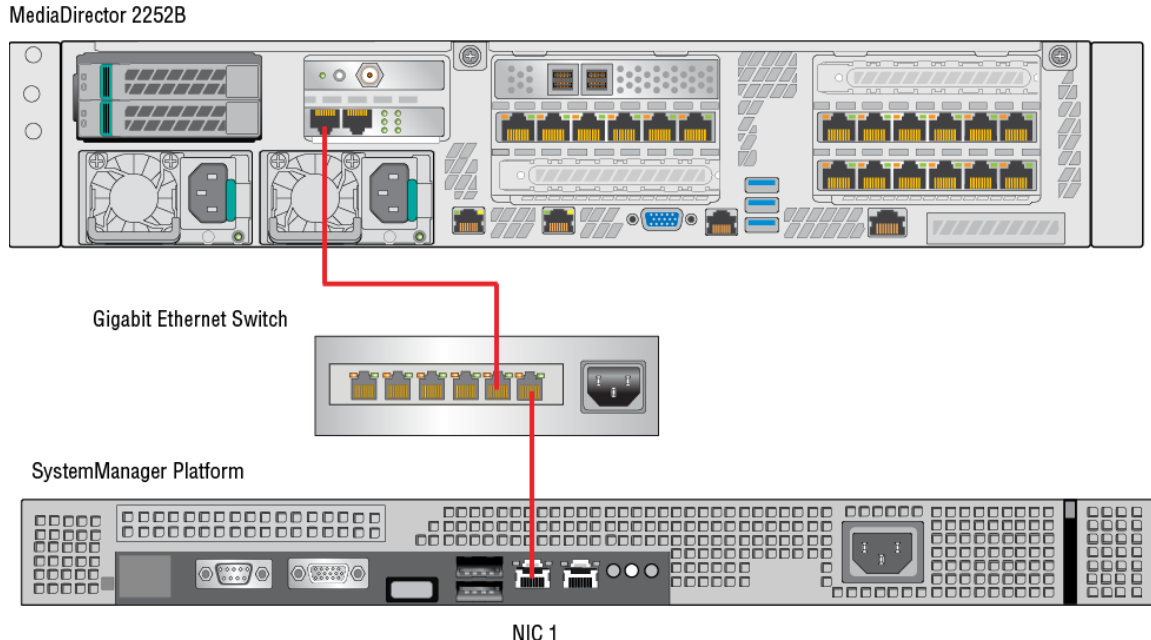
Figure 2-28: Connecting to SystemManager

1. Ensure that an Ethernet switch with Gigabit uplink capability has been installed in your equipment rack.

2. Locate the Gigabit Ethernet cable (RJ-45) which ships with each SystemManager Platform. Do not use a crossover cable or adapter.

3. Connect one end of the cable to the LAN 1 port on the SystemManager, and the other end to the Gigabit Ethernet switch. Do not use the SystemManager's LAN 2 port.

4. Connect one end of a Gigabit Ethernet cable (RJ-45) to either of the two Ethernet ports located above the power supply on the MediaDirector or MediaCenter, and then connect the other end to an open port on the Gigabit Ethernet switch.

Connecting a MediaDirector 2252/2251 to SystemManager

Connect to SystemManager to begin monitoring your Spectrum system.

⚠ **IMPORTANT:** For the following connections, use only a CAT 6 Ethernet cable or better.
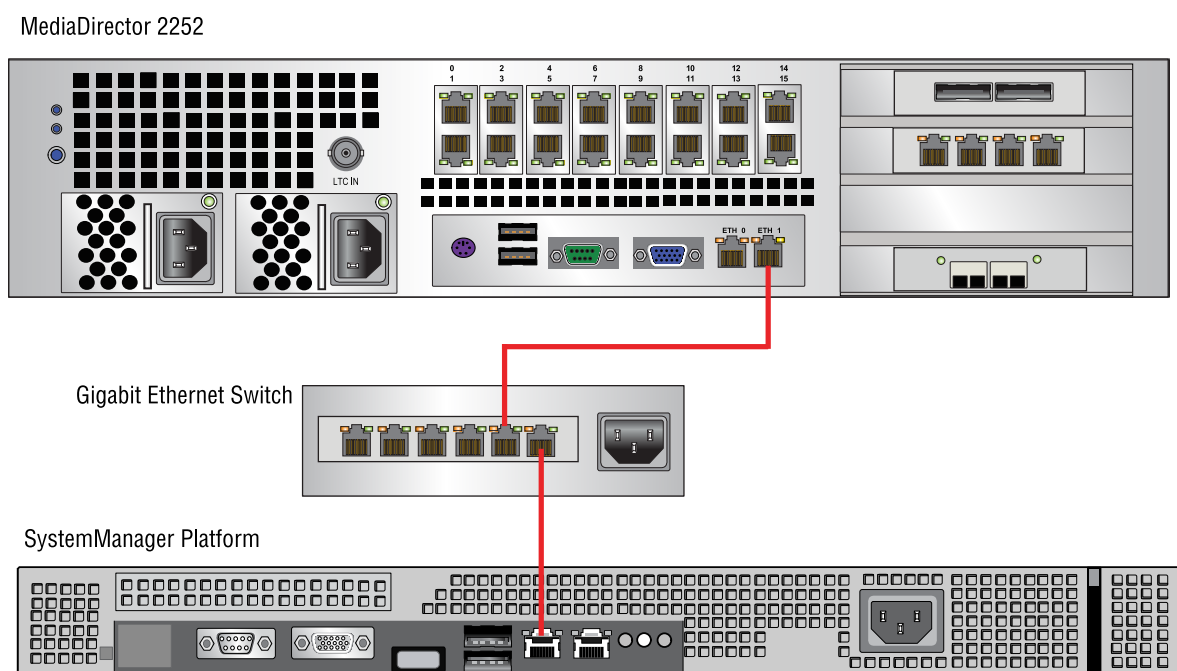
Figure 2-29: Connecting to SystemManager

1. Ensure that an Ethernet switch with Gigabit uplink capability has been installed in your equipment rack.

2. Locate the Gigabit Ethernet cable (RJ-45) which ships with each SystemManager Platform. Do not use a crossover cable or adapter.

3. Connect one end of the cable to the LAN 1 port on the SystemManager, and the other end to the Gigabit Ethernet switch. Do not use the SystemManager's LAN 2 port.

4. Connect one end of a Gigabit Ethernet cable (RJ-45) to either of the two Ethernet ports located above the power supply on the MediaDirector, and then connect the other end to an open port on the Gigabit Ethernet switch.

Connecting a MediaCenter 2200 or 2200A to SystemManager

Connect to SystemManager to begin monitoring your Spectrum system.

> ⚠ **IMPORTANT:** For the following connections, use only a CAT 6 Ethernet cable or better.

MediaCenter 2200

Gigabit Ethernet Switch
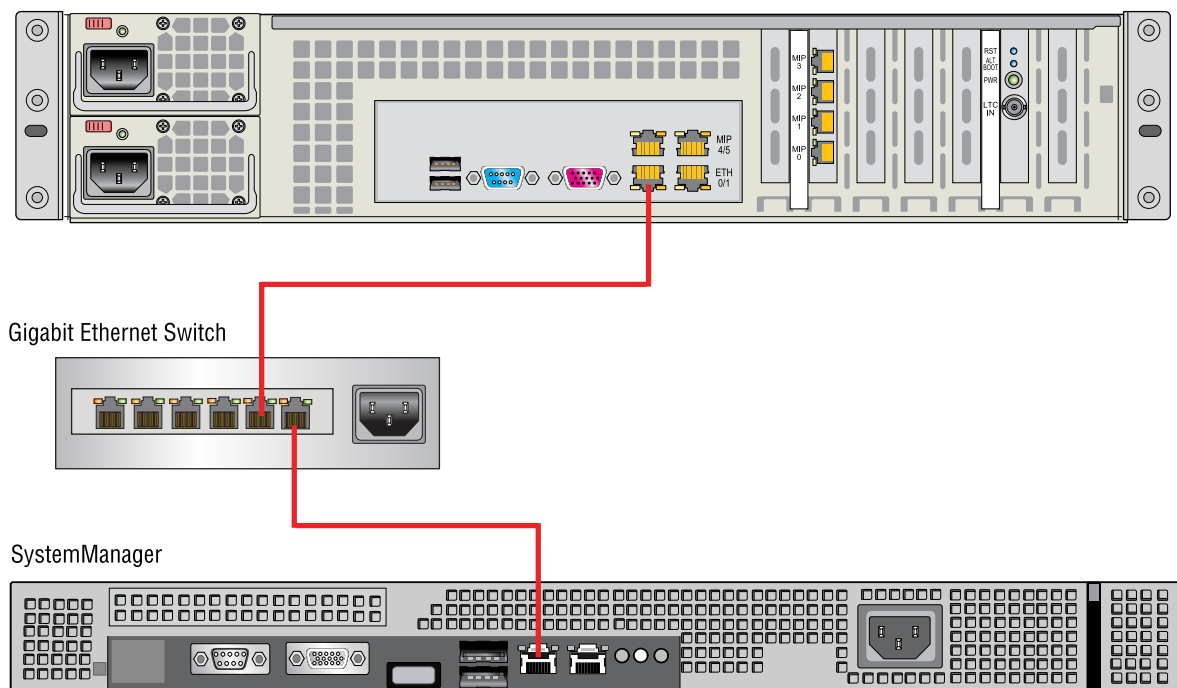
SystemManager

Figure 2-30: Connecting to SystemManager

1. Ensure that an Ethernet switch with Gigabit uplink capability has been installed in your equipment rack.

2. Locate the Gigabit Ethernet cable (RJ-45) which ships with each SystemManager Platform. Do not use a crossover cable or adapter.

3. Connect one end of the cable to the LAN 1 port on the SystemManager, and the other end to the Gigabit Ethernet switch. Do not use the SystemManager's LAN 2 port.

4. Connect one end of a Gigabit Ethernet cable (RJ-45) to either of the two Ethernet ports located above the power supply on the MediaCenter, and then connect the other end to an open port on the Gigabit Ethernet switch.

Connecting Spectrum X to SystemManager

Connect to SystemManager via your Ethernet network.

If you are using the management application on the Spectrum X instead of SystemManager, simply connect your client computer directly to your Ethernet switch.

> ⚠ **IMPORTANT:** For the following connections, use only a CAT 6 Ethernet cable or better.
> For lengths between 37m and 100m, or greater, use CAT 6a.
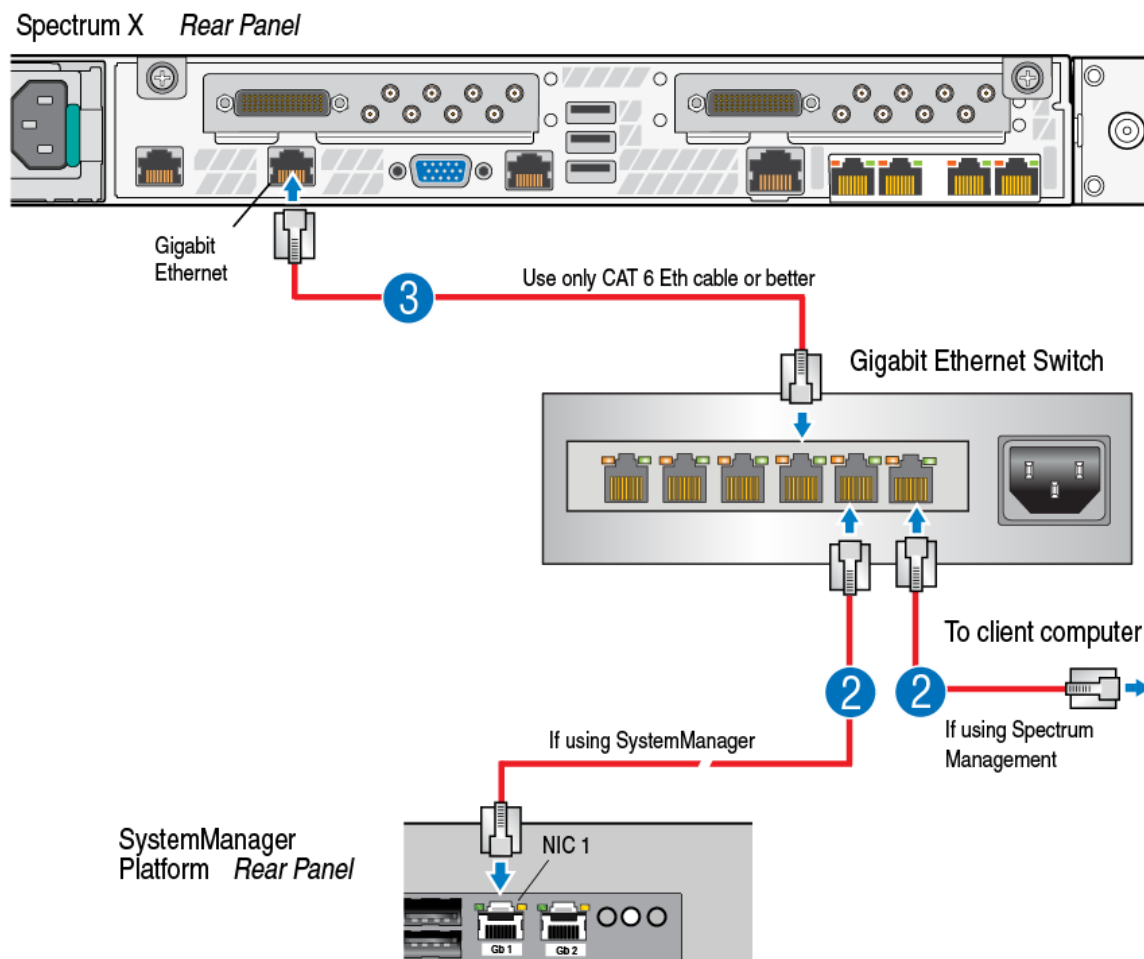
Figure 2-31: Connecting to SystemManager

1. Ensure that an Ethernet switch with Gigabit uplink capability has been installed in your equipment rack.

2. Choose one of the following:

   • If using SystemManager, attach an Ethernet cable to the LAN1 port on the SystemManager Platform or an open LAN port on your client PC. Attach the other end of the Ethernet cable to the Gigabit Ethernet switch. Do not use the LAN2 port on the SystemManager Platform

   • If using , attach an Ethernet cable to an open Ethernet port on your client system, and then attach the other end of the Ethernet cable to the Gigabit Ethernet switch.

3. Attach an Ethernet cable to one of the two Gigabit Ethernet ports on the rear panel of the Spectrum X. Attach the other end to an open port on your Gigabit Ethernet switch.

Connecting to a client system or Harmonic MediaGrid for file transfers

Connect your Spectrum video server to your Ethernet network for file transfers with a client system or Harmonic MediaGrid.

When planning your Ethernet network, it is important to understand that Ethernet ports on your Spectrum server can be configured to optimize bandwidth or provide fail-over support, but not both. For details, refer to "About Ethernet Failover and Bandwidth" in the *Harmonic SystemManager User Guide*.

Before you begin

📝 **NOTE:** Ensure that a network switch with adequate uplink capability has been installed in your equipment rack.

Note that support for Jumbo Frames (Ethernet packets larger than 1500 bytes) on Spectrum video servers is disabled. You can enable Jumbo Frames using SystemManager by accessing the network settings of your Spectrum system. For instructions on accessing the network settings, refer to "Configuring Network Settings" in the *Harmonic SystemManager User Guide*.

Connecting a MediaDirector or MediaCenter to a client system for file transfers

Use one of the 10 Gb Ethernet ports on the MediaDirector 2252B/2251B or MediaCenter 2200B rear panel for file transfers.

⚠ **IMPORTANT:** For the following connections, use only a CAT 6 Ethernet cable or better.

MediaDirector 2252B

Network Switch (10 Gb)

Network Client
or Harmonic MediaGrid
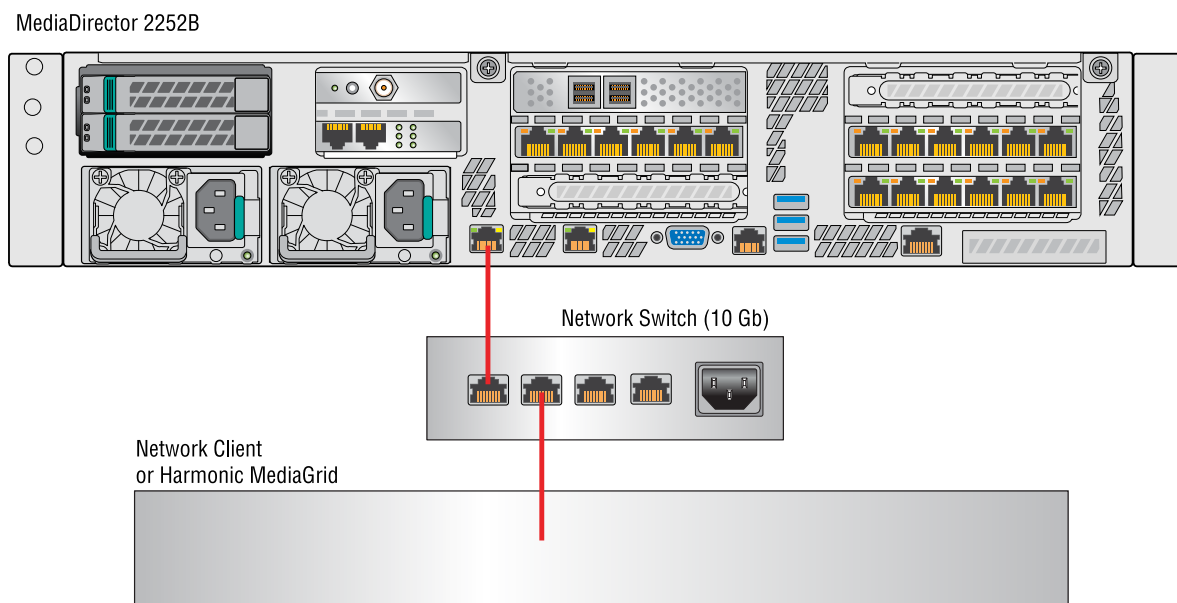
Figure 2-32: Connecting to a client system for file transfers

1. Attach a 10 Gb Ethernet cable to one of the 10 Gb Ethernet ports on the rear panel of the MediaDirector 2252B/2251B or MediaCenter 2200B. Attach the other end to your network switch.

2. Attach one end of an Ethernet cable to your network client or your Harmonic MediaGrid client. Attach the other end to your network switch. For Harmonic MediaGrid connection details and hardware reference, see the *Harmonic MediaGridInstallation and Configuration Guide*.

Connecting a MediaDirector 2252/2251 to a client system for file transfers

Use the ports on the 1 Gb or 10 Gb Ethernet expansion cards on the MediaDirector 2252/2251 rear panel for file transfers.

Harmonic offers 1 Gb and 10 Gb expansion cards to provide connectivity for file based workflows, IT infrastructure and/or additional network clients including an Harmonic MediaGrid. The following expansion cards are offered according to model number:

• 1-Gb Quad Port Ethernet Card (MCP-225x-41C)
• 10-Gb Dual Port Optical Fibre Card (MCP-225x-2XO)

An expansion card is typically ordered at the time you purchase a MediaDirector and is installed at the factory. The following figure shows a sample connection made with a 10 Gb dual port expansion card and an Harmonic MediaGrid.

⚠ **IMPORTANT:** For the following connections, use only a CAT 6 Ethernet cable or better.

Figure 2-33: Connecting to a client system for file transfers

1. Attach an Ethernet cable to one of the 1 Gb or 10 Gb expansion card Ethernet ports on the rear panel of the MediaDirector. Attach the other end to your network switch.

2. Attach one end of an Ethernet cable to your network client or your Harmonic MediaGrid client. Attach the other end to your network switch. For Harmonic MediaGrid connection details and hardware reference, see the *Harmonic MediaGrid Installation and Configuration Guide*.

Connecting a MediaCenter 2200 or 2200A to a client system for file transfers

Use the ETH 0/1 or MIP 4/5 ports on the MediaCenter 2200 or 2200A rear panel for file transfers.

the MIP 4/5 Ethernet ports on the MediaCenter rear panel can be configured for either file transfers or connection to I/O modules. For details on how to configure these ports, see "Configuring Ethernet Interfaces" in the *Harmonic SystemManager User Guide*.

⚠ **IMPORTANT:** For the following connections, use only a CAT 6 Ethernet cable or better.
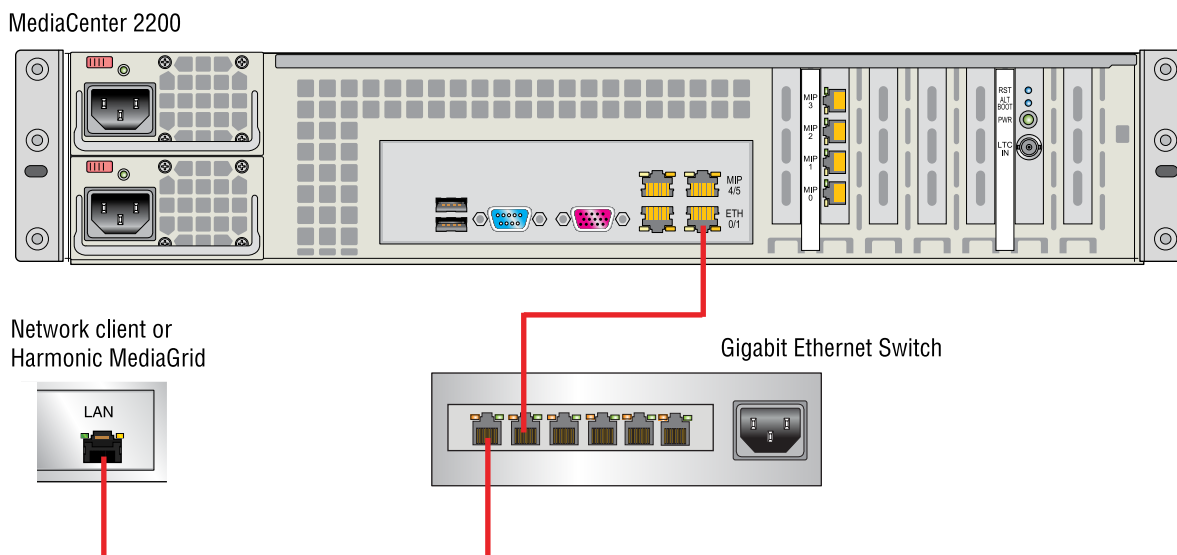
MediaCenter 2200

Figure 2-34: Connecting to a client system for file transfers

1. Attach an Ethernet cable to one of the ETH 0/1 or MIP 4/5 Ethernet ports on the rear panel of the MediaCenter. Attach the other end to your network switch.

2. Attach one end of an Ethernet cable to your network client or your Harmonic MediaGrid client. Attach the other end to your network switch. For Harmonic MediaGrid connection details and hardware reference, see the *Harmonic MediaGrid Installation and Configuration Guide*.

Connecting Spectrum X to a client system for file transfers

Use one of the Gigabit Ethernet ports on the Spectrum X rear panel for file transfers.

⚠ **IMPORTANT:** For the following connections, use only a CAT 6 Ethernet cable or better.
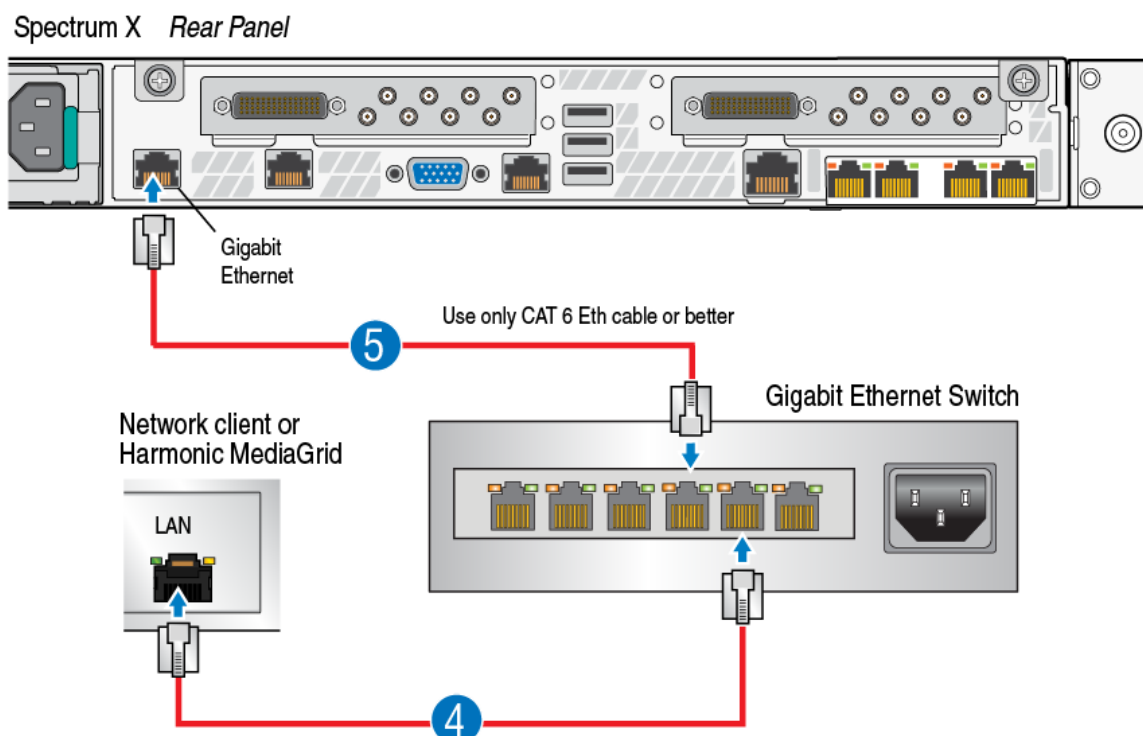
Figure 2-35: Connecting to a client system for file transfers

1. Attach an Ethernet cable to one of the Gigabit Ethernet ports on the rear panel of the Spectrum X. Attach the other end to your network switch.

2. Attach one end of an Ethernet cable to your network client or your Harmonic MediaGrid client. Attach the other end to your network switch. For Harmonic MediaGrid connection details and hardware reference, see the *Harmonic MediaGrid Installation and Configuration Guide*.

Connecting to an automation system

If you are using an automation system for control, connect your MediaPorts, ChannelPorts, or Spectrum X to the automation system.

Follow the procedure that applies to your Spectrum device.

📝 **NOTE:** All automation systems differ in their array of control connectors and their methods of interfacing with the Spectrum system. The following section provides one example. Refer to your automation system's installation guide for interconnection details

Connecting Spectrum X to an automation system

If you are using an automation system, connect any Spectrum X units you wish to control with automation.

📝 **NOTE:** All automation systems differ in their array of control connectors and their methods of interfacing with the Spectrum system. The following steps provide one example. Refer to your automation system's installation guide for interconnection details
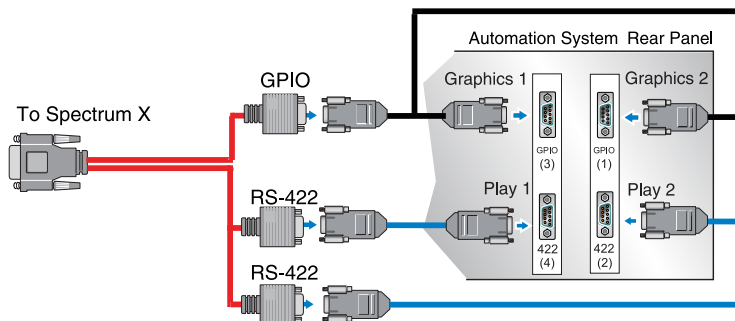
Figure 2-36: Connecting Spectrum X to an automation system

1. Locate the DSUB 60 cable supplied with the Spectrum X.

2. Attach the 60 pin connector of the DSUB cable to the DSUB connector on the Spectrum X.

3. Attach two DB-9 connectors from the DSUB cable to customer-supplied DB-9 Male to Male extension cables. These will be used for playout. Then connect the other ends of the extension cable to Play ports of the automation system chassis.

4. Attach the GPIO connector on the DSUB cable to a DB-9 splitter cable.

5. Connect the DB-9 connections to the graphics control ports on the automation system.

Additional information

Breakout cable *on page 125*

Connecting a MediaPort 7000 module to an automation system

If you are using an automation system, connect any MediaPort 7000 modules you wish to control with automation.

📝 **NOTE:** All automation systems differ in their array of control connectors and their methods of interfacing with the Spectrum system. The following steps provide one example. Refer to your automation system's installation guide for interconnection details
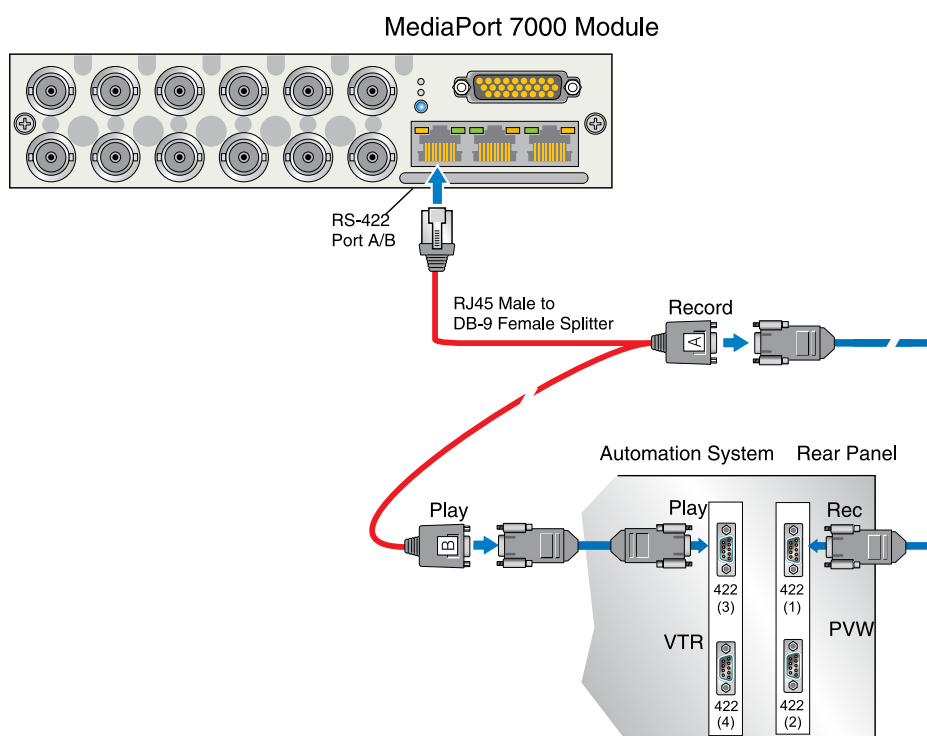
Figure 2-37: Connecting a MediaPort 7000 module to an automation system

1. On the automation system chassis, ensure that you have properly connected the mouse, the keyboard, and the SVGA monitor (all customer-supplied, or supplied with the automation system).

2. Connect your facility LAN to the Automation System's Ethernet port if applicable.

3. Locate the RJ45/DB-9 Splitter Cable supplied with the Spectrum system list of accessories. Customer-supplied cables include two DB-9 Male to DB-9 Male extension cables.

4. Attach the RJ45 connector of the RJ45/DB-9 Splitter Cable to the RS-422 A/B port on the MediaPort 7000 module. This will be the **Record** and **Play** port.

5. Attach the DB-9 connector (labeled A in the preceding figure) from the RJ45/DB-9 Splitter Cable to a customer-supplied DB-9 Male to Male extension cable. Then connect the other end of the extension cable to the **Record** port of the automation system chassis.

6. Attach the other DB-9 connector (labeled B in the preceding figure) from the same RJ45/DB-9 Splitter Cable to a customer-supplied DB-9 Male to Male extension cable. Then connect the other end of the extension cable to the **Play** port of the Automation System chassis..

7. Repeat the previous steps for any additional MediaPorts.

8. Using a customer-supplied DB-9 Male to DB-9 Male extension cable, connect the **VTR** port on the Automation System chassis to the RS-422 Remote port on your acquisition VTR.

Connecting a ChannelPort module to an automation system

If you are using an automation system, connect any ChannelPort modules you wish to control with automation.

📝 **NOTE:** All automation systems differ in their array of control connectors and their methods of interfacing with the Spectrum system. The following steps provide one example. Refer to your automation system's installation guide for interconnection details
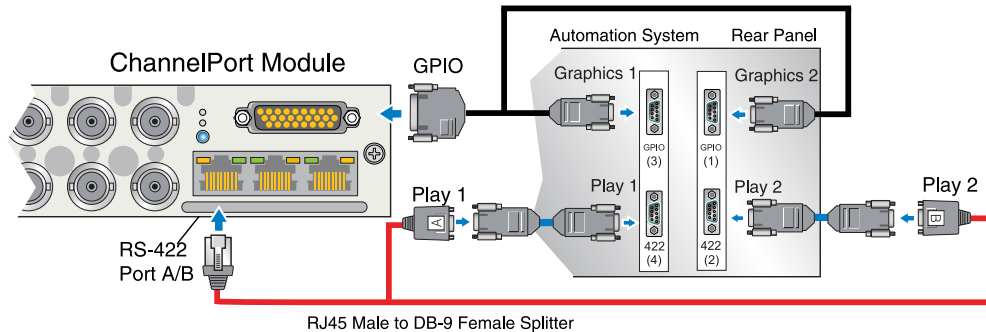
Figure 2-38: Connecting ChannelPort to an automation system

1. On the automation system chassis, ensure that you have properly connected the mouse, the keyboard, and the SVGA monitor (all customer-supplied, or supplied with the automation system).

2. Connect your facility LAN to the Automation System's Ethernet port if applicable.

3. Locate the RJ45/DB-9 Splitter Cable supplied with the Spectrum system list of accessories. Customer-supplied cables include two DB-9 Male to DB-9 Male extension cables.

4. Attach the RJ45 connector of the RJ45/DB-9 Splitter Cable to the RS-422 A/B port on the ChannelPort module. This will be the **Play 1** and **Play 2** port.

5. Attach the DB-9 connector (labeled A in the preceding figure) from the RJ45/DB-9 Splitter Cable to a customer-supplied DB-9 Male to Male extension cable. Then connect the other end of the extension cable to the **Play 1** port of the automation system chassis.

6. Attach the other DB-9 connector (labeled B in the preceding figure) from the same RJ45/DB-9 Splitter Cable to a customer-supplied DB-9 Male to Male extension cable. Then connect the other end of the extension cable to the **Play 2** port of the Automation System chassis.

7. Using a GPIO cable, connect the GPIO on the ChannelPort module to a DB-9 splitter cable. Connect the DB-9 connections to the graphics control ports on the automation system (**Graphics 1** and **Graphics 2** in the preceding).

Connecting reference video

Make sure to connect reference video to at least one MediaPort or ChannelPort module in a MediaPort 7000 series, and at least one SDI I/O card in a Spectrum X.

Follow the procedure that applies to your Spectrum device.

📝 **NOTE:** Failure to connect reference video may result in errors. Note that two MediaPort 7000 or ChannelPort modules can share reference video as long as it is connected to one module. Also note that reference can be shared across two SDI I/O cards in a units to the automation system..

Connecting reference video to a MediaPort 7000 or ChannelPort module

Connect reference video to at least one MediaPort or ChannelPort module in a MediaPort 7000 series chassis.

Note that you may connect a different type of reference (525 or 625) to each module in a MediaPort 7000 serieschassis and the system will automatically select the correct reference type for each attached player.

⚠ **IMPORTANT:** Failure to connect reference video may result in errors.
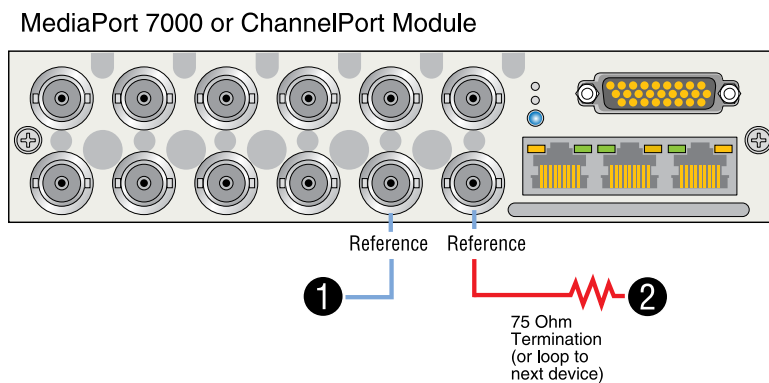
Figure 2-39: Connecting to reference video

1. Connect reference video to one of the Reference connectors on the MediaPort or ChannelPort module.

2. Connect a75 Ohm BNC terminator to the other Reference connector to terminate it, or connect it to the next device in line that requires reference video. Termination must be applied to the last device in the loop.

3. If required, configure VITC lines using SystemManager. For certain automation systems, VITC timecode on the reference video line allows the system to run accurately. For complete instructions, refer to "Changing MediaDirector Clock Reference VITC Lines" in the *Harmonic SystemManager User Guide*.

Connecting reference video to Spectrum X

Make sure to always connect reference video to at least one SDI I/O card on the Spectrum X. If your Spectrum X includes two SDI I/O cards, one card passes reference through to the other.

Note that you may connect a different type of reference (525 or 625) to each SDI I/O card. However, note that each player attached to a given SDI I/O card must be configured for the same reference.

⚠ **IMPORTANT:** Failure to connect reference video may result in errors.
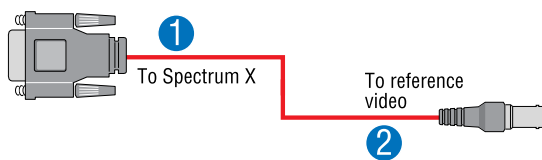
Figure 2-40: Connecting Spectrum X to reference video

1. Connect the breakout cable to the 60 pin connector on one of the SDI I/O cards on the Spectrum X.

2. Connect the Reference connector on the breakout cable to reference video.

3. If required, configure VITC lines using the SystemManager. For details, refer to "Changing MediaDirector Clock Reference VITC Lines" in the *Harmonic SystemManager User Guide*.

Additional information

Breakout cable *on page 125*

Connecting audio and video I/O

Connect audio and video I/O to your Spectrum system as needed.

📝 **NOTE:** The connections in the following sections are recommendations only. Your system configuration and specific audio/video requirements may differ.

Connecting audio and video I/O to Spectrum X

Connect the SDI I/O connectors on the rear panel of the Spectrum X as needed.

📝 **NOTE:** Spectrum X supports embedded audio. Separate connections to AES audio as described below are optional. For details on embedded audio, see "Recording Embedded and Non-Embedded Audio" in the *Harmonic SystemManager User Guide*.

1. For the Record Spectrum X, make the following connections to record audio and video and monitor the recording process.

    a. Connect video from a VTR or Routing Switcher to the SDI IN connector.
    b. Connect one of the two SDI OUT connectors to an SDI monitor.
    c. Connect AES audio from a VTR or Routing Switcher to the AES IN connectors on the DSUB connector.
    d. Connect AES audio from the AES OUT connectors on the DSUB connector to AES audio monitors.

2. For the Play Spectrum X, make the following connections to play audio and video and monitor the playback process.

    a. Connect the first SDI OUT connector to an SDI monitor.
    b. Connect the second SDI OUT connector to your Master Control Switcher or Routing Switcher.
    c. Using the DSUB connector attached to the Spectrum X, connect AES audio using the AES/LTC connector on the breakout cable to your Master Control Switcher or Routing Switcher.

3. For the Preview Spectrum X, make the following connections to preview audio and video in an off air environment as required.

    a. Connect the first SDI OUT connector to an SDI monitor.
    b. Using the DSUB connector attached to the Spectrum X, connect AES audio using the AES/LTC connector on the breakout cable to your Routing Switcher.
    c. Connect the second SDI OUT connector to your Routing Switcher.

4. For each Spectrum X, if LTC is available, connect as follows.

    a. Connect the LTC **IN(s)** to the LTC output of a source device or the LTC output of a timecode generator.
    b. Connect the LTC **OUT**(s) to the LTC input of a destination device.

Additional information

Spectrum X rear panel *on page 115*

Connecting audio and video I/O to a MediaPort or ChannelPort

Connect the SDI I/O connectors on the rear panel of the ChannelPort or MediaPort as needed.

📝 **NOTE:** Spectrum supports embedded audio. Separate connections to AES audio as described below are optional.

1. For the Record MediaPort with MediaPort modules, make the following connections to record audio and video on the MediaStore and monitor the recording process.

    a. Connect video from a VTR or Routing Switcher to the SDI IN connector.
    b. Connect one of the two SDI OUT connectors to an SDI monitor.
    c. Connect AES audio from a VTR or Routing Switcher to the AES IN connectors.
    d. Connect AES audio from the AES OUT connectors to AES audio monitors.

2. For the Play MediaPort with MediaPort or ChannelPort modules, make the following connections to play audio and video and monitor the playback process.

    a. Connect the first SDI OUT connector to an SDI monitor.
    b. Connect the second SDI OUT connector to your Master Control Switcher or Routing Switcher.
    c. (MediaPort modules only) Connect AES audio from the AES OUT connectors to your Master Control Switcher or Routing Switcher.

3. For the Preview MediaPort with MediaPort or ChannelPort modules, make the following connections to preview audio and video from the MediaStore in an off air environment as required.

    a. Connect the first SDI OUT connector to an SDI monitor.
    b. (MediaPort modules only) Connect AES audio from the AES OUT connectors to your Routing Switcher.
    c. Connect the second SDI OUT connector to your Routing Switcher.

4. For each MediaPort or ChannelPort, if available, connect LTC as follows.

    a. Connect the LTC **IN(s)** to the LTC output of a source device or the LTC output of a timecode generator.
    b. Connect the LTC **OUT**(s) to the LTC input of a destination device.

5. Connect the Reference Loop to the house-timed black signal. If you are not making a loop connection, terminate the unused connector with a 75 ohm terminator.

Additional information

ChannelPort module rear panel *on page 213*

Connecting an LTC generator to a MediaDirector 2252B/2251B or MediaCenter 2200B (optional)

The diagram in this section shows the optional connection between a timecode generator and the MediaDirector 2252B/2251B. You can make a similar connection with the MediaCenter 2200B.

LTC Unbalanced
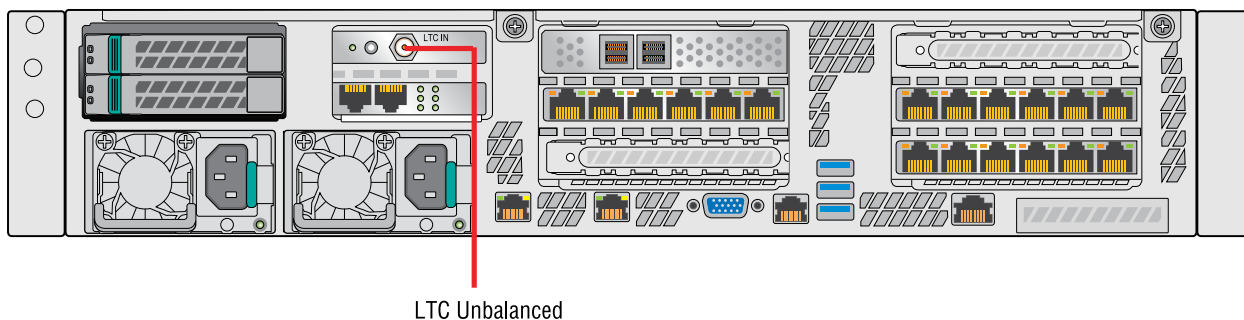
Figure 2-41: Connecting a LTC generator

Connecting an LTC generator to a MediaDirector 2252/2251 (optional)

The diagram in this section shows the optional connection between a timecode generator and the MediaDirector 2252/2251.

LTC Unbalanced
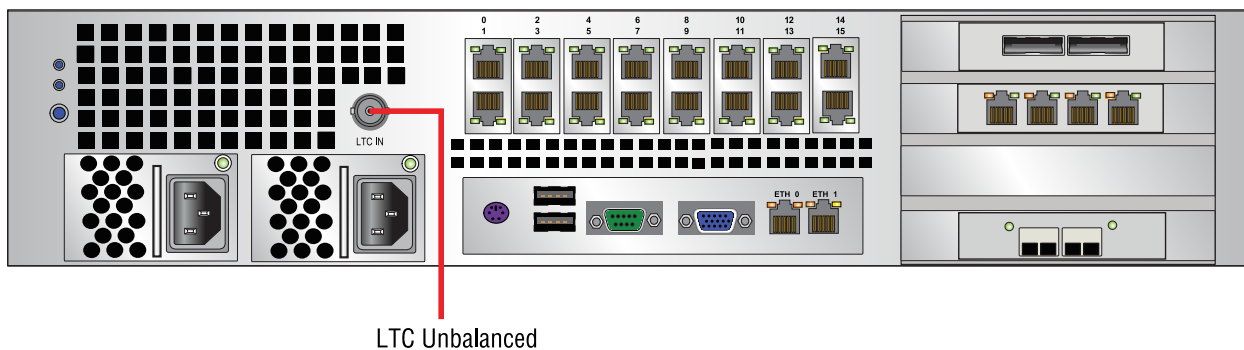
Figure 2-42: Connecting a LTC generator

Connecting an LTC generator to a MediaCenter 2200 or 2200A (optional)

The diagram in this section shows the optional connection between a timecode generator and the MediaCenter 2200 or 2200A.
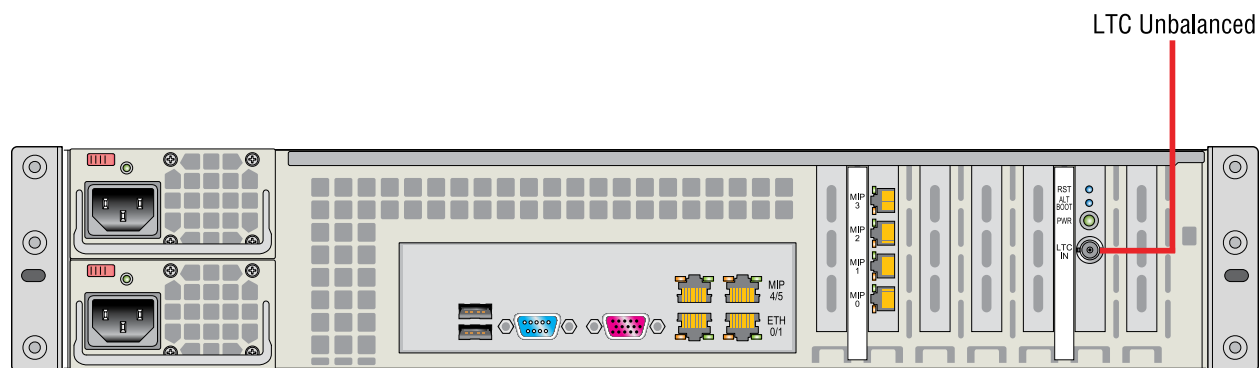
Figure 2-43: Connecting a LTC generator

Connecting to an Emergency Alert System (EAS)

You can use the ChannelPort or Spectrum X to provide support for an Emergency Alert System (EAS). The ChannelPort or Spectrum X provide the graphics and audio functions required by an EAS.

The Spectrum X and ChannelPort currently support the TFT* EAS 911T, the Sage* Digital ENDEC, and the Monroe DASDEC.

To connect an EAS encoder/decoder to the ChannelPort, first connect the GPIO/RS-422 and EAS connectors on the ChannelPort module as shown in the following sections. For the Spectrum X, use the breakout cable to connect the GPIO and RS-422 pins to the EAS. Once the Spectrum X or ChannelPort is connected, use SystemManager to assign GPIO/RS-422 pins and configure event management. Refer to "Configuring GPIO Triggers" in the *Harmonic SystemManager User Guide* for more information.

Connecting to the Sage Digital ENDEC

Use the diagrams of a sample EAS installation in this section to connect the ChannelPort or Spectrum X to the Sage Digital ENDEC.

1. Connect to the Sage EAS as shown in the following example.
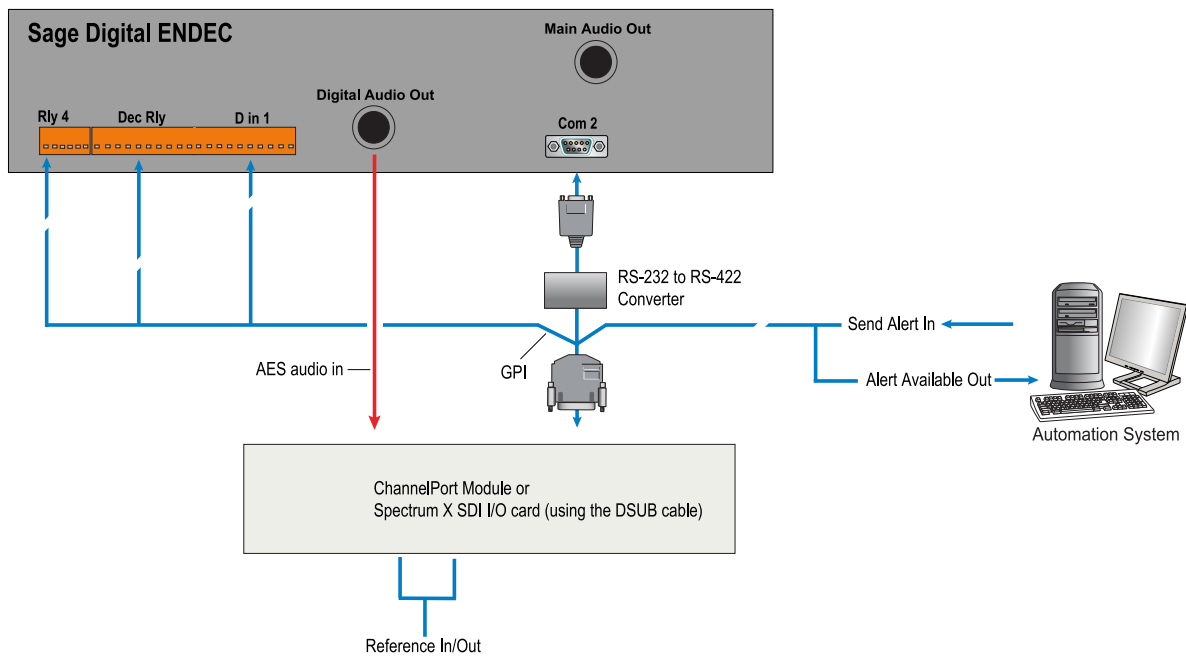
Figure 2-44: Overview of sample EAS installation with Sage Digital ENDEC
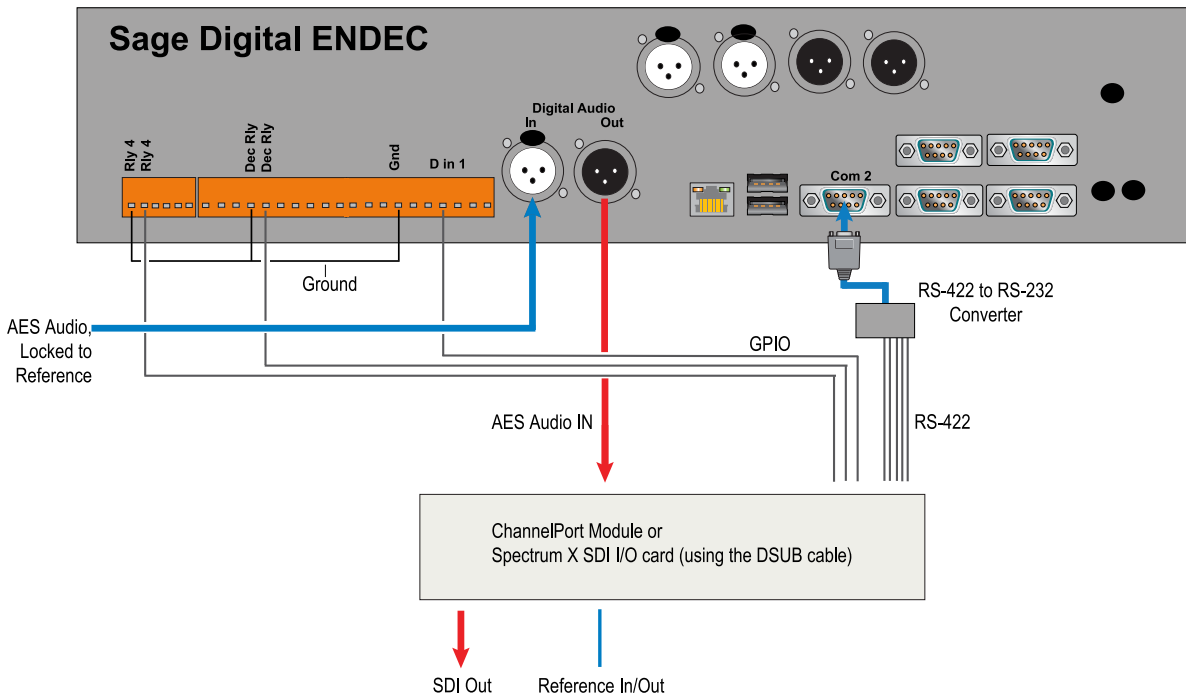
Figure 2-45: Detailed view of sample EAS installation with Sage Digital ENDEC

2. The following table explains the pin signals and assignments used in the detailed view of the Sage Digital ENDEC installation. Use the following table for reference when connecting to the EAS.

84

Table 2-1: GPIO/RS-422 Pin Signals and Assignments

Spectrum X pin	ChannelPort pin	Signal	Assignment
RS-422 #1: shell	1	Ground	Ground on Com 2 connector
RS-422 #1: pin 8	2	RS422_RX0_N	Receive/Transmit on Com 2 connector
RS-422 #1: pin 3	3	RS422_RX0_P	
RS-422 #1: pin 7	11	RS422_TX0_P	
RS-422 #1: pin 2	10	RS422_TX0_N	
GPIO: pin 4	22	GPI 3	D in 1
GPIO: pin 5	23	GPI 4	Decoder Relay
GPIO: pin 6	24	GPI 5	Relay 4

When connecting RS-422 pins from the GPIO/RS-422 connector(s), make sure the polarity matches. For example, always connect the Rx+ signal to Tx+ and, likewise, connect the Rx- signal to Tx-.

Additional information

Breakout cable *on page 125*

GPIO/RS-422 connector signal assignments *on page 221*

Configuring the Sage Digital ENDEC

Use the front panel of the Sage Digital ENDEC to configure the necessary settings.

> **NOTE:** In a typical configuration for a Sage ENDEC, an amplifier may be required to boost the audio output from the PC.

Using the Sage Digital ENDEC front panel, configure the following settings.

Relay Configuration	◦ Relay 4: Delay Post CGEN, 0, End ◦ Decoder Relay: Ready
Main Configuration	Override Input (D In Use): Active Closed, Hold
Incoming Filter	In order to hold off alerts they should be associated with "Timed Relay." This gives the operator a period of time to cancel relaying the alert before it is sent. In this mode, the forwarding of an alert is gated by the override input (D In 1) which allows automation to control when an alert is inserted into program material. The Hold Time can be set to 0 to make it immediately relay the alert (subject to the hold-off input). "Timed Ignore" provides the operator opportunity to manually relay the alert or else it will be ignored. Relaying the alert is subject to the hold-off input. ◦ Timed Relay, Hold 0: Send immediately, hold-off enabled ◦ Timed Relay, Hold n: Send after n minutes, hold-off enabled ◦ Timed Ignore, Hold n: Ignore after n minutes, hold-off enabled

    ◦   Automatic Relay: Send immediately, ignore hold-off

    ◦   Log Only: Ignore alert

Device   Com 2: Generic CGEN, 9600 baud

Digital Audio   External Clock: The AES input to the I/O module must be synchronized to reference.

For more information on configuring the Sage Digital ENDEC, refer to the documentation that came with your Sage device.

Connecting to a TFT EAS 911T Encoder/Decoder

Use the diagrams of a sample EAS installation in this section to connect the ChannelPort or Spectrum X to the TFT EAS 911T Encoder/Decoder.

1.   Connect to the TFT EAS as shown in the following example.
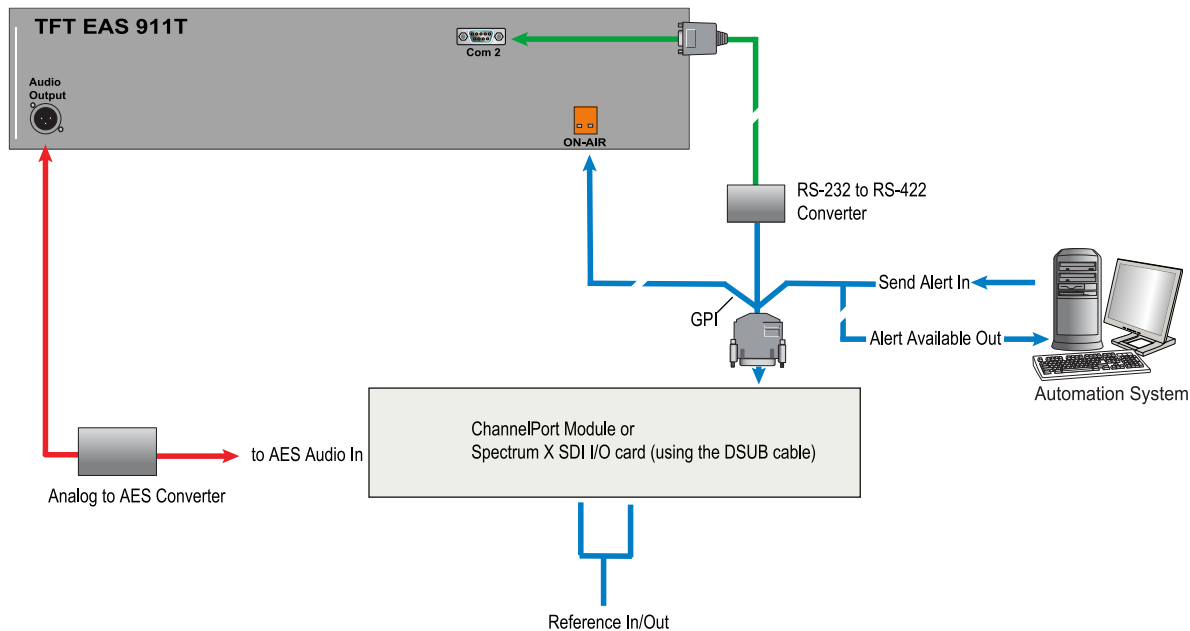
Figure 2-46: Overview of sample EAS installation with TFT EAS 911T
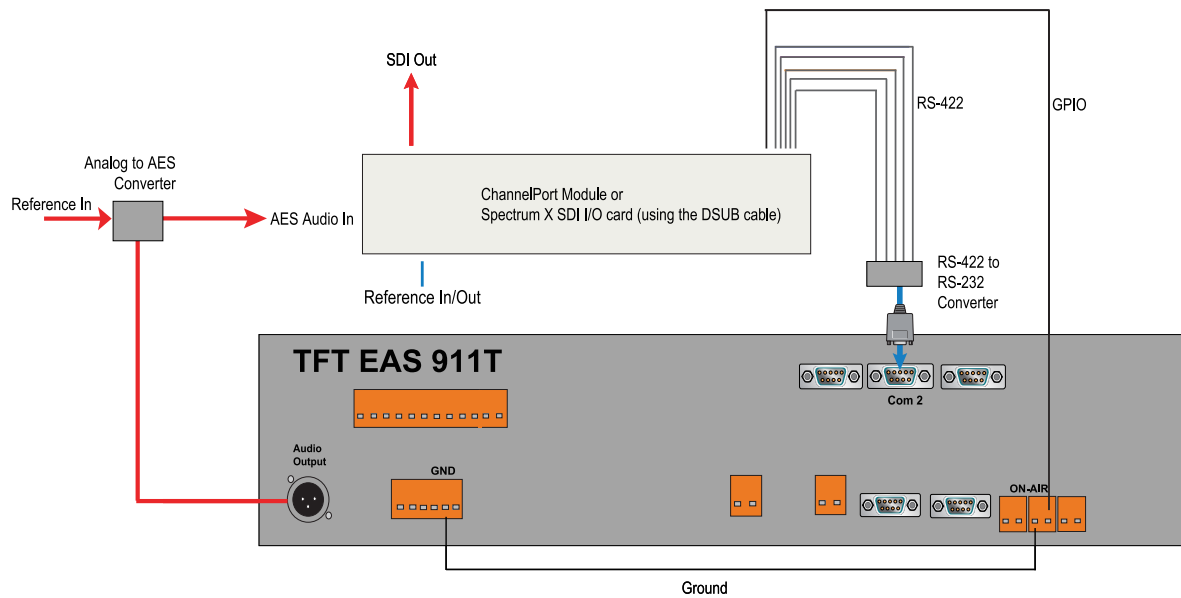
Figure 2-47: Detailed view of sample installation with TFT EAS 911T

2. The following table explains the pin signals and assignments used in the detailed view of the TFT EAS 911T installation. Use the following table for reference when connecting to the EAS.

Table 2-2: GPIO/RS-422 Pin Signals and Assignments

Spectrum X pin	ChannelPort pin	Signal	Assignment
RS-422 #1: shell	1	Ground	Ground on Com 2 connector
RS-422 #1: pin 8	2	RS422_RX0_N	Receive/Transmit on Com 2 connector
RS-422 #1: pin 3	3	RS422_RX0_P	
RS-422 #1: pin 7	11	RS422_TX0_P	
RS-422 #1: pin 2	10	RS422_TX0_N	
GPIO: pin 4	22	GPI 3	On-Air

When connecting RS-422 pins from the GPIO/RS-422 connector(s), make sure the polarity matches. For example, always connect the Rx+ signal to Tx+ and, likewise, connect the Rx- signal to Tx-.

Additional information

Breakout cable *on page 125*
GPIO/RS-422 connector signal assignments *on page 221*

Configuring the TFT EAS 911T

Use the front panel of the TFT EAS 911T to configure the necessary settings.

For a typical configuration, set the following:

- **Enable Char Gen Interface**: Set to STD.

For more information on configuring the TFT EAS 911T, refer to the documentation that came with your TFT device.

Connecting to a Monroe DASDEC Encoder/Decoder

The Monroe DASDEC can be set to emulate a Sage Digital ENDEC or a TFT EAS 911T Encoder/Decoder. The diagrams in this section show a sample installation of a Monroe DASDEC set to emulate a Sage Digital ENDEC.

1. Connect to the Monroe EAS as shown in the following example.

    NOTE: When the Monroe DASDEC is set to emulate a TFT EAS 911T Encoder/Decoder, only the "Alert Active" GPI is needed, not the "Alert Pending" GPI.

Monroe DASDEC
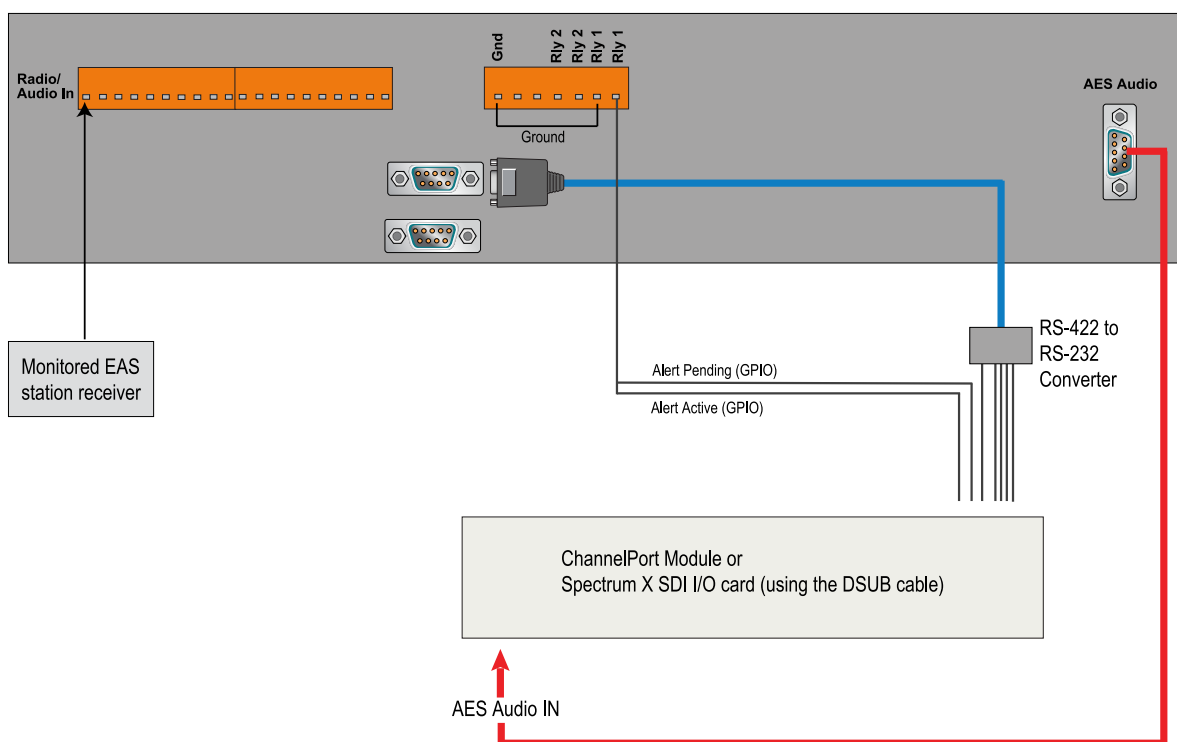
Figure 2-48: Detailed view of sample installation with Monroe DASDEC

2. The following table explains the pin signals and assignments used in the detailed view of the Monroe DASDEC installation. Use the following table for reference when connecting to the EAS.

Table 2-3: GPIO/RS-422 Pin Signals and Assignments

Spectrum X pin	ChannelPort pin	Signal	Assignment
RS-422 #1: shell	1	Ground	Ground on Com 2 connector

Spectrum X pin	ChannelPort pin	Signal	Assignment
RS-422 #1: pin 8	2	RS422_RX0_N	Receive/Transmit on Com 2 connector
RS-422 #1: pin 3	3	RS422_RX0_P	
RS-422 #1: pin 7	11	RS422_TX0_P	
RS-422 #1: pin 2	10	RS422_TX0_N	
GPIO: pin 1	19	GPI 0	Alert Pending
GPIO: pin 2	20	GPI 1	Alert Active

When connecting RS-422 pins from the GPIO/RS-422 connector(s), make sure the polarity matches. For example, always connect the Rx+ signal to Tx+ and, likewise, connect the Rx- signal to Tx-.

Additional information

Configuring the Monroe DASDEC

Configure the necessary settings for the Monroe DASDEC.

1. Follow the instructions provided by the Monroe DASDEC documentation to set the DASDEC to "Sage Generic CG" mode.

2. Set the baud rate to 9600, no handshake.

3. To emulate the Sage you must connect two GPIs to the same relay connection on the DASDEC. The GPI assigned to Alert Pending must be a lower signal number than the one used for Alert Active. In the detailed view of the sample installation, GPI 0 and GPI 1 are used. Note that it does not matter which GPIO is used nor its name.

4. Configure the GPI triggers in SystemManager or Spectrum Management, as described in "Configuring GPIO Triggers" in the *Harmonic SystemManager User Guide* or the Spectrum Management help system.

   Note that the GPIO name field in SystemManager or Spectrum Management serves as a "friendly name" by which the GPIO signals are referenced.

   ⚠ **IMPORTANT:** GPIO trigger names are global across a Spectrum video server. Therefore, you must use unique names for all triggers on all ChannelPorts, MediaPorts, or Spectrum X units in your system.

   The following is an example.

5. Configure the EAS settings for the ChannelPort or Spectrum X. For details, refer to "EAS Configuration" in the *Harmonic SystemManager User Guide* or the Spectrum Management help system. Note the following:

   • The Decoder model should be set to **SageDigitalENDEC**
   • Alert Hold-Off is not possible in this mode, so "Send Alert" should be set to **None**.

   The following is an example.

Connecting multiple Spectrum X or ChannelPort channels to the same EAS

You can connect multiple Spectrum X or ChannelPort channels to the same EAS with one channel configured as master and the others slaves. A slave may be channel B of the same Spectrum X SDI I/O card or ChannelPort module, or a channel on a separate Spectrum X/ChannelPort connected to the same Spectrum video server.

NOTE: All Spectrum Xs (in shared storage mode) or ChannelPorts connected to one EAS must be connected to the same Spectrum video server.

1. Follow the instructions in the previous section to connect the master Spectrum X/ChannelPort to the EAS, leaving the Digital Audio Out unconnected.

2. Depending your EAS model, do one of the following:

   For the Sage Digital ENDEC and Monroe DASDEC:

   1. From the Digital Audio Out connector on the EAS, connect to a Digital Distribution Amplifier.
   2. From the Digital Distribution Amplifier, make separate connections to the master Spectrum X/ChannelPort and to the additional slave Spectrum Xs/ChannelPorts, as shown in the following figure.
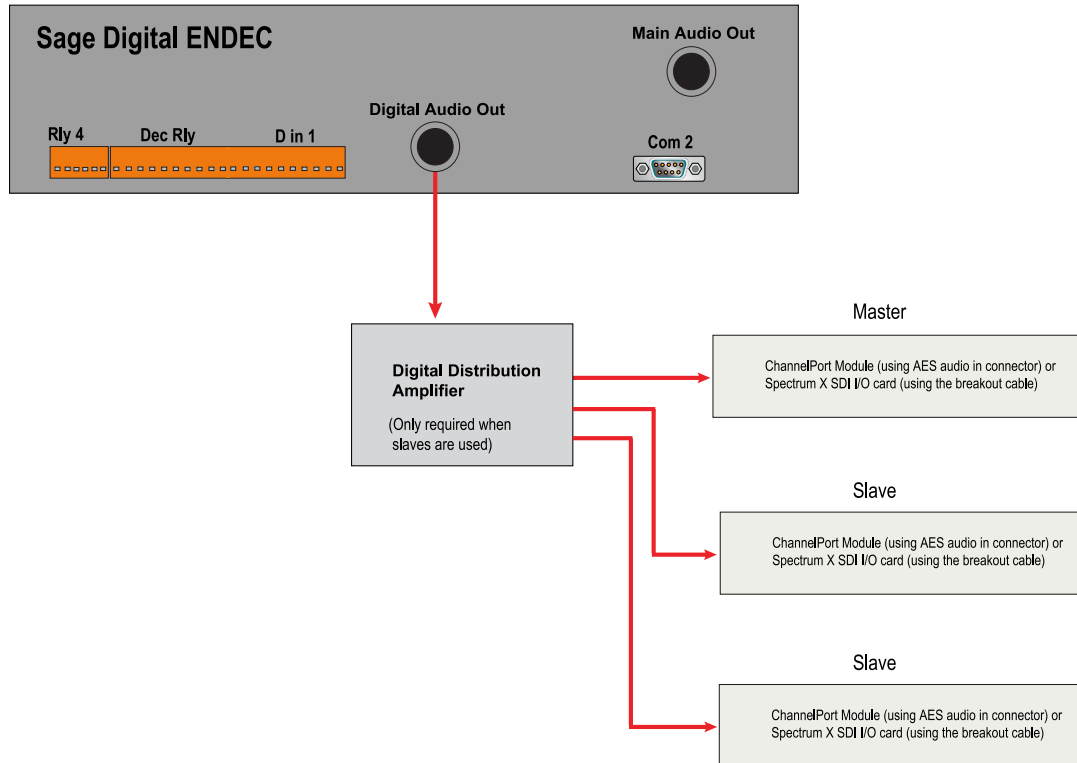
Figure 2-49: Connecting the Sage Digital ENDEC to Master and Slave Spectrum X/ChannelPorts

> **NOTE:** When using Channel B as a slave, make sure to connect the Digital Distribution Amplifier to the AES Audio In connector for Channel B.

   For the TFT EAS 911T:

   1. From the Digital Audio Out connector on the EAS, connect to an Analog/AES Converter, and then to a Digital Distribution Amplifier.
   2. From the Digital Distribution Amplifier, make separate connections to the master Spectrum X/ChannelPort and to the additional slave Spectrum Xs/ChannelPorts, as shown in the following figure.
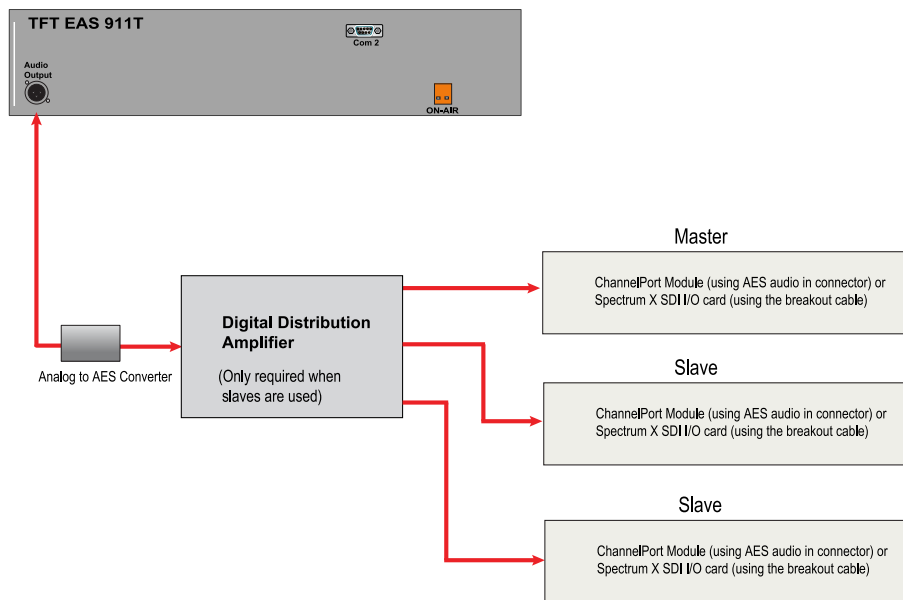
Figure 2-50: Connecting the TFT EAS 911T to Master and Slave Spectrum X/ChannelPorts

> 📝 **NOTE:** When using Channel B as a slave, make sure to connect the Digital Distribution Amplifier to the AES Audio In connector for Channel B.

3. Configure the master and slave Spectrum Xs/ChannelPorts according to the "EAS Configuration" section of the *Harmonic SystemManager User Guide*.

Connecting AC power

Once all audio, video, and communication connections are completed, connect AC power cords to your system. Do *not* plug the AC cords into an AC power source yet.

1. For the MediaDirector 2252B/2251B and 2252/2251 systems only: connect power to the MediaStores first.

   a. The MediaStore 5000 series has two power switches—ensure that they are off. To take full advantage of the dual redundant power supplies on the MediaStore, connect AC from separate, isolated power sources to each AC connector on the MediaStore.

   b. Attach the female ends of the power cords to the Power Supply Modules, and secure them with the retainers, if supplied.

   c. Attach the male ends of the power cords to your facility's AC power source.

   > ⚠ **IMPORTANT:** Ensure that both MediaStore power supplies are connected. This guarantees full power redundancy, and provides a much faster drive spin-up time — once power is applied. If only one of the power supplies is used and another one is present but not powered, the system will beep.

   > ⚠ **DANGER:** When connecting a MediaStore 5000 series, use only the power cords supplied, or cords that match the specification in MediaStore 5000 series Specifications.

2. For MediaCenter 2200B systems with the MediaStore 7200, connect power cables to the MediaStore 7200. Do not plug the cords into power sources yet.
The MediaStore 7200 has two power buttons on the front panel. To take advantage of the redundant power supplies, ensure that separate, isolated power sources are available for each PSU.

3. Connect AC power cords to the two AC connectors on the MediaDirector 2252B/2251B, MediaCenter 2200B, MediaDeck 7000 or Spectrum X. To take full advantage of the dual redundant power supplies, ensure that separate, isolated power sources are available.

   • If so desired, Spectrum video servers with dual redundant power can operate with only one power supply connected; either one can be used.

4. If using an automation system, connect AC to the automation system's AC connector. Ensure that the automation system's power switch is off.

5. MediaPorts do not have power switches. Connect an AC power cord to each AC connector on the MediaPort. Do not plug the AC cords into an AC power source yet. To take full advantage of the dual redundant power supplies available onMediaPorts, Harmonic recommends that you use separate, isolated power sources for each AC input.

   • Since MediaPorts do not have power switches, Harmonic recommends you use breakers or switched power strips instead.
   • If so desired, MediaPorts with dual redundant power supplies can operate with only one power supply connected; either one can be used.

6. Ensure that the SystemManager Platform or customer-supplied PC's power switch is off, and that the SystemManager Keyboard/Monitor Tray's power switch is off. Connect AC to the SystemManager's AC connector and plug in the SystemManager Keyboard/Monitor Tray's universal power supply.

Installing the power cord retention strap

Harmonic recommends that you install the supplied power cord retention straps to help keep the power cords connected to your Spectrum device.

1. Locate the Harmonic-supplied power cord retention strap. This may be labeled "PSU Power Cable Clamp Kit."

2. Insert the locking tab end of the retention strap into either the air vent or receiver hole depending on your Spectrum device:

   • For the MediaDirector2252B/2251B, MediaCenter 2200B, or Spectrum X, use the retention strap receiver hole located beneath the power cord receptacle on the back end of the power supply module, as shown below.

Retention strap
receiver hole
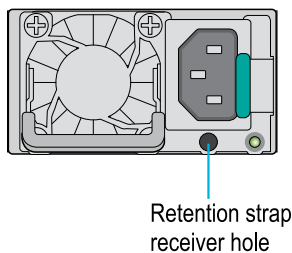
- • For the MediaDirector 2252/2251, insert the retainer tie into the air vent hole in the power supply unit as shown in the following figure.

3. While pushing up the locking tab on the bottom of the slider, adjust the slider to the desired position.

4. Install the power cord into the power cord receptacle.

5. Pull the slider strap over the power cord and lock it securely into place. Tighten the retainer loop around the power cord by grasping the two plastic tabs and depressing Tab A so that the retainer clicks into place. The loop should be tightened around the power cord as firmly as possible.

To remove the power cord from the retention strap: push down on the slider tab to release the slider strap, pull the slider strap back over the power cord, and then remove the power cord.

Powering up

Power up your Spectrum system devices in the order provided in this section.

📝 **NOTE:** The network on which the Spectrum system is installed should have a DHCP server enabled to assign IP addresses. If you do not have a DHCP server on your network, contact Harmonic Technical Support for assistance.

1. For the MediaDirector 2252B/2251B and 2252/2251 only: apply power to the MediaStore as follows.

a. Ensure that all MediaStore modules are firmly seated in their correct bays.

b. Apply power to each MediaStore.

c. Turn each PCM switch to **ON**.
On the Operators Panel, the Alarm beeps once, all LEDs flash for seven seconds, then the Alarm double beeps. After the double beep, during normal operation, the System Power LED on the Operators Panel should be lit solid green and the disk drive motors should start.

Before continuing, on the MediaStores, ensure that all drive Activity LEDs have stopped blinking. This indicates that the MediaStore drives have properly spun up and have reached speed.

> **NOTE:** The entire system should have power applied within 10 seconds. If this cannot be done, power up MediaStores first followed as quickly as possible by MediaDirectors.

> **IMPORTANT:** Both power supplies should be used for optimum performance. When the MediaStore is powered up with only a single power supply, drive spin-up can take up to two minutes. When both power supplies are used, spin-up takes approximately 30 seconds.

> **IMPORTANT:** There are rare instances when a MediaStore is unresponsive after power up. If this happens, note the status of the LEDs on the MediaStore. After several minutes, the LEDs should come to a stable and non-blinking state, provided the system is quiescent and the drives or RAID sets contained therein have not been put into a Wink state by the SystemManager application. If the drives are blinking, the MediaStore should be powered off (both power supplies turned off) and then powered on again.

2. For MediaCenter 2200B systems with the MediaStore 7200: Connect the power cords to power sources on the MediaStore 7200. Press the power button on the front panel.

3. Apply power to your Ethernet hub or switch.

4. Apply power to the SystemManager platform and the Keyboard/Monitor Tray, or client PC.

5. Log on to SystemManager.

a. When the Welcome to Windows dialog appears on the SystemManager display, press **CTRL** + **ALT** + **DEL**.

b. When the **Log on to Windows** dialog appears, type **Administrator** as the user, type **omneon** as the password and press Enter. Both entries are case sensitive. The SystemManager will now start up all network services and attempt to assign IP addresses.

c. If an error message appears indicating that a network connection is missing, acknowledge the message by clicking **OK**, and continue with the power-up sequence.

6. Apply power to each MediaDirector, MediaCenter, MediaDeck 7000 or Spectrum X in your system by connecting the AC cords to separate, isolated power sources.

7. Check the status indicators for your Spectrum server as follows:

   ◦ For the MediaDirectors, MediaCenters, or Spectrum X, verify that the status LEDs on the front panel are functioning and do not indicate an error condition.

   ◦ For the MediaDeck 7000, check the port status display on the front panel and verify there are no problems.

8. For the MediaDirector 2252B/2251B and 2252/2251 only: check the MediaStore disk drive status LEDs to ensure that there are no problems. Each drive has two LEDs.

9. Apply power to the MediaPorts. If a breaker or power strip is used, turn on power to the unit and verify that the front panel power indicator light is on. Verify that air is flowing through the unit.

10. Verify the condition of all appropriate status LEDs on the front panel of your MediaPorts.

11. Apply power to the (optional) automation system.

Additional information

About MediaStore 5000 series drive startup

Unless otherwise selected during installation, all drives in the MediaStore will automatically start their motors upon power-up. If this has not occurred, there may be a power problem (an alarm and power fault indication would normally be active).

Note that if there is only one Power Cooling Module present, the drive motors will spin up in a delayed sequence.

Each drive carrier incorporates a green LED () and an amber LED (). In normal operation, the green LED will be ON and will flicker as the drive operates.

Using the color bar generator to verify connectivity on a MediaPort 7000 or MediaDeck 7000

After you have completed the Spectrum system installation, the front panel LCD display on the MediaPort 7000 chassis or MediaDeck 7000 can be used to configure a static SMPTE RP219 color bar pattern on any of the SDI output connectors to verify connectivity.

The color bars can be displayed in any of the formats supported by the MediaPort or ChannelPort module.

1. Ensure the LCD panel is on the default status screen, and then press the panel until it turns red. The Navigation panel will display, as shown in the following figure.
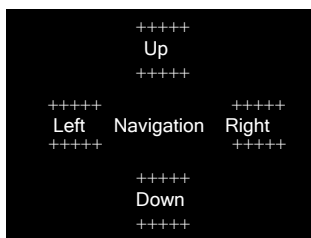
2. Press the panel again to display the Color Bar Output panel, as shown in the following figure.

```
          Color Bar Output
> Slot 1 -
    Channel: ChB ChA
    PriMode: 625i25
    SecMode: 621i25
    Activate
    Exit

  Status:  OK
```
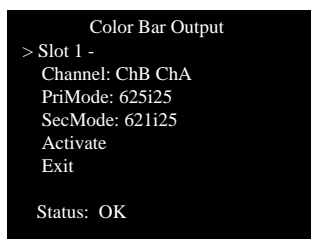
To navigate within the Color Bar Output panel, press the left, right, top, or bottom sections of the display. A carat symbol (>) at the beginning of a setting indicates that setting is selected for configuration. If you do not touch the Color Bar Output panel for thirty seconds, the LCD panel will return to the default status screen.

3. Configure the following settings as necessary:

   - **Slot**: Press the left or right areas of the display to choose a module in one or both slots of the chassis. Only slots with modules installed can be selected. Note that when facing the rear panel of the MediaDeck 7000, slot 0 is on the left and slot 1 is on the right.
   - **Channel**: Press the left or right areas of the display to choose Channel A, Channel B, or both Channel A and Channel B.
   - **PriMode**: Press the left or right areas of the display to choose the primary output format for the module you have selected in the Slot option.
   - **SecMode**: Press the left or right areas of the display to choose the secondary output format for the module you have selected in the Slot option.
   - **Activate**: Press the left or right areas of the display to activate changes made to the Color Bar Output settings.
   - **Exit**: Press the right area of the display to exit the Color Bar Output panel. Any changes you made to the settings will be saved and will remain in effect until you restart the MediaDeck or MediaPort or start a player on the video server.
   - **Status**: Indicates the status of the most recent changes you made to the Color Bar Output settings. The status will read "Setting," "OK," or "Failed."

   📝 **NOTE:** Please note the following about the output format options:

   - ◦ When using a MediaPort 7000 module, there are no restrictions on the combinations you can choose for the output formats on the primary and secondary modes.
   - ◦ When using a ChannelPort module, you must configure both the primary and secondary modes for the same format, or you must configure the primary mode for an HD format, and the secondary mode for an SD format.

Powering down

If you need to power down your system, do so in the order shown in this section.

📝 **NOTE:** In certain circumstances, powering down one MediaDirector in an EFS configuration may cause video disruption to channels on other MediaDirectors. In addition, removal/insertion of a Fibre Channel cable or removal/ insertion of a disk drive may cause brief instances of video disruption. When removing a disk drive, clicking the **Bypass Drive** button found in the SystemManager Drive Properties page prior to removing the Disk Drive reduces the probability of video disruption.

1. Power down your Spectrum video server(s). From the Properties page in SystemManager, click the **Shutdown** button for your Spectrum video server.

   > 📝 **NOTE:** In the event that you cannot use SystemManager to power down a MediaDirector 2252B/2251Bor MediaCenter 2200B, you can gracefully power down the unit using the power button on the right-hand rack ear behind the bezel The physical buttons are only accessible with the use of a small tipped tool.
   >
   > This does a software shutdown of the system and stops the file system. The shutdown typically takes 15-20 seconds to complete, but it could take up to a minute.

2. Exit the SystemManager application, and then Exit Internet Explorer by clicking **File** > **Close**.

3. Shut down the SystemManager Platform or customer-supplied PC by clicking **Start** > **Shutdown** > **OK**, and then turning off its main power switch.

4. Turn off the SystemManager Keyboard/Monitor Tray by turning off its power switch.

5. Power down MediaStores as follows:

   ◦ For the MediaStore 5000, switch off the power buttons on the PCMs, or remove the AC power at the power source.
   ◦ For the MediaStore 7200, 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 unit.

6. Remove power from each MediaPort, ChannelPort, or Spectrum X by disconnecting the AC cord from the power source.

Additional information

Managing and configuring your Spectrum system

For all MediaDirectors and MediaCenters, you may manage and configure your system using SystemManager. For Spectrum X and MediaDeck 7000, you can use either SystemManager or Spectrum Management.

Using SystemManager

The SystemManager application comes pre-installed on the SystemManager Platform.

However, if you need to re-install the SystemManager software or update the system with a new version of software, refer to the *Harmonic SystemManager User Guide* for detailed instructions. For instructions on logging in and configuring SystemManager, refer to the *Harmonic SystemManager User Guide*.

• To verify the proper connection of individual components, view the **System Diagram** page. To view the properties of a single device, from the **System Diagram** page click the icon for the device you wish to view.

• For help with creating a file system and RAID set for a MediaCenter, Spectrum X, or MediaDeck 7000, follow the instructions in "Using One-Click Functions" in the *Harmonic SystemManager User Guide*. For the MediaDirector, refer to "Spectrum Video Server File System Configuration" in the same guide.

• For instructions on creating a player and attaching the player to a device, refer to "Creating a Player" in the *Harmonic SystemManager User Guide*.

- To configure network settings, refer to "Configuring Network Settings" in the *Harmonic SystemManager User Guide*.

Using Spectrum Management

Spectrum Management allows you to configure, operate, and monitor the Spectrum X or MediaDeck 7000 on which it's running. Currently, this application does not allow you to manage any additional Spectrum devices in your network.

Spectrum Management can be accessed from a Windows, Linux, or Macintosh client system. Refer to the Spectrum release notes for details on the latest browser support.

Access Spectrum Management as follows:

1. Make sure you have connected a client computer to your Ethernet network.
2. Identify the IP address of your Spectrum video server. See the Spectrum release notes for details.
3. Open a web browser on your client computer, and then type the Spectrum video server IP address in the address bar to open the Spectrum Management interface.
4. Log in using one of the following accounts:

   ◦ User Account: The "user" account allows you to only view configurations for your device, wink devices, and create schedules using Polaris Play: Scheduler.

      ◦ User name: user
      ◦ Password: user

   ◦ Admin Account: The "admin" account allows you to perform all supported Spectrum video server configuration.

      ◦ User name: admin
      ◦ Password: omneon

5. You may change your password by clicking the profile icon in the upper right-hand corner of the Spectrum Management window and selecting **Change Password**.

For help with using Spectrum Management, click the Help icon to open the online help system.

Spectrum X and ChannelPort system configuration overview

If you are using the branding and graphics features of the Spectrum X or ChannelPort, configure your system in the order described in this section.

1. **System**: If you wish to enable Enhanced Channel mode on your Spectrum X or ChannelPort, do so before configuring your channels. Otherwise, it will operate in Standard Channel mode. See "Enabling Enhanced Channel Mode" in the *Harmonic SystemManager User Guide*.

2. **Channel**: Configure the basic parameters for your Spectrum X or ChannelPort channel, including master control switcher settings, audio profiles, independent branding, or serial port settings required for automation. See "Configuring a Spectrum X or ChannelPort Channel" and "Configuring an Audio Profile" in the *Harmonic SystemManager User Guide* for more information.

3. **Player**: See "Player Configuration" in the *Harmonic SystemManager User Guide* for help with configuring a player. Note that if you wish to use Playlist Control for player control, configure your player to use "Harmonic Playout" for control.

4. **Graphics**: Make sure your graphic templates follow Harmonic guidelines so they can be played on the Spectrum X or ChannelPort. Configure FXTool if you plan to use it. See the *Spectrum X and ChannelPort Template Authoring Guide*.

5. **Playlist Control**: Configure any Polaris Play: Playlist Control features and tools that you wish to use. For help with configuring the Playout Channel, Traffic and Billing, or Polaris Play: Media Fetch, see "Video Server Services Configuration" in the *Harmonic SystemManager User Guide*. For information on creating and monitoring playlists with Polaris Play: Scheduler and Polaris Play: Playlist Control, see the *Polaris Play: Playlist User Guide*. For information on configuring PreviewTool, refer to the *Spectrum X and ChannelPort Tools User Guide*.

6. **GPIO**: If using GPIO, configure the Spectrum X or ChannelPort GPIO triggers and then map them to channel events or Playout Channel events. See the "Configuring GPIO Triggers" section for the Spectrum X or ChannelPort in the *Harmonic SystemManager User Guide*.

7. **EAS**: If using an EAS, make sure the Spectrum X or ChannelPort is connected to the EAS as described in the installation instructions, and then configure the EAS settings. See "Configuring a Spectrum X or ChannelPort Channel" in the *Harmonic SystemManager User Guide*.

Determining the Spectrum X and ChannelPort port number

If you are using a Spectrum X or ChannelPort to preview graphics with FXTool or using it with an automation system, you will need to identify the port number for theSpectrum X or ChannelPort channel you wish to use.

Note that FXTool and most automation systems use different protocols—FXTool uses "Network Automation" and most automation systems use "Serial Automation." However, automation that uses Oxtel over Ethernet is considered "Network Automation."

When a ChannelPort module is installed in a MediaDeck 7000, the module on the left (when facing the rear panel) is com0, and the module on the right is com1. In a Spectrum X, the left-hand SDI I/O card is com0 and right-hand SDI I/O card is com1. If only one SDI I/O card is installed, that card is always com 0.

For a Spectrum X in shared storage mode, navigate to the Properties page for your video server in SystemManager, and then scroll down to the Private Ethernet Interfaces section to view the "com" label for the associated Ethernet port.

Each Spectrum X SDI I/O card and each ChannelPort module supports two channels (A and B). Once you know the module or SDI I/O card and channel you will be using for FXTool or automation, you may use the following table to identify the correct port number to use.

Table 2-4: Port numbers

Spectrum X or ChannelPort Module IP	Spectrum X or ChannelPort channel	Port number for network automation (FXTool)	Port number for serial automation
com 0	A	9100	9000
com 0	B	9101	9001
com 1	A	9102	9002
com 1	B	9103	9003
com 2	A	9104	9104

Spectrum X or ChannelPort Module IP	Spectrum X or ChannelPort channel	Port number for network automation (FXTool)	Port number for serial automation
com 2	B	9105	9105
com 3	A	9106	9106
com 3	B	9107	9107
com 4	A	9108	9108
com 4	B	9109	9109
com 5	A	9110	9110
com 5	B	9111	9111
com 6	A	9112	9112
com 6	B	9113	9113
com 7	A	9114	9114
com 7	B	9115	9115
com 8	A	9116	9116
com 8	B	9117	9117
com 9	A	9118	9118
com 9	B	9119	9119
com 10	A	9120	9120
com 10	B	9121	9121
com 11	A	9122	9122
com 11	B	9123	9123
com 12	A	9124	9124
com 12	B	9125	9125
com 13	A	9126	9126
com 13	B	9127	9127
com 14	A	9128	9128
com 14	B	9129	9129
com 15	A	9130	9130
com 15	B	9131	9131

Spectrum firmware upgrades

Spectrum devices typically ship with the latest firmware factory-installed. At some point after initial system installation, or upon the recommendation of Harmonic Support, you may need to upgrade to a later version of Spectrum firmware.

- *Spectrum firmware upgrades: overview*
- *Verifying software release versions*
- *Upgrading Spectrum video server firmware*
- *Upgrading I/O module firmware*
- *Restarting an I/O module*
- *Restarting a Spectrum video server*
- *Verifying disk drive firmware*
- *Upgrading disk drive firmware*
- *Handling device upgrade failures*
- *Replacing PCapps files*
- *Upgrading MediaPort and ChannelPort licenses*

Spectrum firmware upgrades: overview

It is important that you upgrade the Spectrum video server firmware and I/O module firmware in the following order:

⚠️ **CAUTION:** If you upgrade the Spectrum video server and *restart* before upgrading your I/O module, you may not be able to perform the I/O module upgrade.

1. Follow the instructions for *Upgrading Spectrum video server firmware on page 103*. Do not restart the video server at this time.
2. Follow the instructions for *Upgrading I/O module firmware on page 105*.
3. Follow the instructions for *Restarting an I/O module on page 106*.
4. Follow the instructions for *Restarting a Spectrum video server on page 107*.

Verifying software release versions

After installation is complete and prior to commencing system operation, verify the software and firmware release versions in SystemManager match those described in the release notes.

1. Under the **Help** tab, verify that the SystemManager version matches the version that is shown in the Compatibility section of the Release Notes.

2. Under the **Home** tab, verify that the **Firmware Selection** matches the Firmware Build shown on the title page of the Release Notes (ignore any digits after the build date).

3. Under the **Home** tab, click the Upgrade Firmware page and verify that the current firmware for all MediaDirectors and MediaPort has the same build date as the Firmware Build shown on the title page of the Release Notes (ignore any digits after the build date).

Upgrading Spectrum video server firmware

You may upgrade the Spectrum video server firmware from the **Properties** page or from the **Upgrade Firmware** page in SystemManager.

Before you begin

Before upgrading to the latest version of firmware, check with your automation, archival, and third party software vendors for compatibility information.

⚠️ **CAUTION:** You cannot have MediaDirectors with different versions on the same file system; to ensure file system integrity, upgrade all MediaDirectors at the same time.

Upgrading the Spectrum video server firmware from the Properties page

The **Properties** page allows you to upgrade the selected Spectrum video server only.

1. Ensure that no recording or playback is taking place. Ensure that all Players are stopped. Ensure that no file copies or transfers are in progress, internally or on any Ethernet port.

2. Ensure that the most recent release of SystemManager application software has been installed. Refer to "Verifying software release versions" for instructions.

3. With the SystemManager software properly installed, log on to the SystemManager application.

4. Click the **Home** tab, and in the left hand column, click the **Firmware Selection** icon to display the **Firmware Selection** page, as shown in the following figure.

5. Click the radio button for the desired version of firmware. When the **Confirm** dialog appears, click **OK**.

   📝 **NOTE:** This selection chooses the *directory* from which firmware upgrade files will be selected. The selection does not perform the upgrade.

6. Click the **Configuration** tab.

7. From the **System Diagram** page, click the icon for the unit you want to upgrade.

   The Spectrum video server **Physical Configuration** page appears.

8. Click the large video server icon to display the **Properties** page for the Spectrum video server, and then scroll to the bottom of the **General Properties** section, and click **Upgrade Firmware**.

    The **Upgrade Firmware** page is displayed.

9. Click **Upgrade Device** to upgrade the selected unit, or click **Cancel** to exit the procedure.

    When you click **Upgrade Device**, the message "Upgrade in Progress" appears.

What to do next

When the upgrade process is complete, proceed with upgrading the I/O module firmware. Do *not* restart the video server at this time.

Additional information

Upgrading Spectrum video server firmware from the Upgrade Firmware page

The Upgrade Firmware page displays the current firmware version running on all of your Spectrum devices and allows you to upgrade more than one device at a time.

1. Ensure that no recording or playback is taking place. Ensure that all Players are stopped. Ensure that no file copies or transfers are in progress, internally or on any Ethernet port.

2. Ensure that the most recent release of SystemManager software has been installed.

3. With the SystemManager software properly installed, log on to the SystemManager application.

4. Click the **Home** tab.

5. In the left hand column, click the **Firmware Selection** icon to display the Firmware Selection page.

6. Click the button for the desired version of firmware. When the Confirm dialog appears, click **OK**.

    📋 **NOTE:** This selection chooses the *directory* from which firmware upgrade files will be selected. The selection does not perform the upgrade.

7. Click the **Configuration** tab.

8. In the left hand column, click the **Upgrade Firmware** icon to display the Upgrade Firmware page.

9. In the **Spectrum Servers** section, click the **check boxes** for the unit whose firmware you want to upgrade, or (recommended), click Select all.

10. Click the **Upgrade** button.

    The Upgrade Now dialog is displayed with a list of the selected units.

11. Click **OK** to upgrade the selected unit, or click **Cancel** to exit the procedure safely without upgrading.

What to do next

When the upgrade process is complete, proceed with upgrading the MediaPort/ChannelPort/ Spectrum X firmware. Do not restart the video server at this time.

Additional information

Upgrading I/O module firmware

You may upgrade the Spectrum I/O module firmware from the **Properties** page or from the **Upgrade Firmware** page. The **Properties** page allows you to upgrade the selected module or SDI I/O card only, while the **Upgrade Firmware** page allows you to upgrade multiple modules/SDI I/O cards at once.

Before you begin

Before upgrading to the latest version of firmware, check with your automation, archival, and third party software vendors for compatibility information.

📝 **NOTE:** When upgrading video servers and I/O modules ensure that no recording or playback is taking place. Make sure all players are stopped. Also ensure that no file copies or transfers are in progress internally or on the Ethernet port. Upgrade all video servers at the same time. Before commencing any player or file activity, verify that all Spectrum devices are running the same version of firmware as shown on the SystemManager's Upgrade Firmware page under the Home tab.

Upgrading the I/O module firmware from the Properties page

If you have received a new SystemManager CD-ROM that includes a specific module upgrade, the Software Installation instructions must be followed completely. This ensures that new software is placed properly in the D:\Upgrades directory.

1. Ensure that no recording or playback is taking place. Ensure that all Players are stopped. Ensure that no file copies or transfers are in progress, internally or on any Ethernet port.

2. Ensure that the most recent release of SystemManager software has been installed.

3. With the SystemManager software properly installed, log on to the SystemManager application.

4. Click the **Home** tab, and in the left-hand column, click the small **Firmware Selection** icon to display the **Firmware Selection** page. A check box will appear next to the currently installed firmware version.

5. Click the radio button for the desired version of firmware. When the Confirm dialog appears, click **OK**.

   📝 **NOTE:** This selection chooses the directory from which firmware upgrade files will be selected. The selection does not perform the upgrade.

6. Click the **Configuration** tab.

7. Click the icon for the I/O module or SDI I/O card that you want to upgrade.

   The **Properties** page appears.

8. Scroll to the bottom of the page and click **Upgrade Firmware**.

   The **Upgrade Firmware** page appears.

9. Click **Upgrade Device** to begin upgrading.

What to do next

When the upgrade process is complete, restart the upgraded I/O module.

Additional information

Upgrading I/O module firmware from the Upgrade Firmware page

If you have received a new SystemManager CD-ROM that includes a specific module upgrade, the Software Installation instructions must be followed completely. This ensures that new software is placed properly in the D:\Upgrades directory.

1. Ensure that no recording or playback is taking place. Ensure that all Players are stopped. Ensure that no file copies or transfers are in progress internally or on any Ethernet port.

2. Ensure that the most recent release of SystemManager software has been installed.

3. With the SystemManager software properly installed, log on to the SystemManager application.

4. Click the **Home** tab, and in the left-hand column, click the small **Firmware Selection** icon to display the Firmware Selection page.

5. Click the radio button for the desired version of firmware. When the Confirm dialog appears, click **OK**.

   📝 **NOTE:** This selection chooses the directory from which firmware upgrade files will be selected. The selection does not perform the upgrade.

6. Click the **Home** tab, and in the left-hand column, click the **Upgrade Firmware** icon to display the **Upgrade Firmware** page.

7. Scroll to the **I/O Modules** section of the page.

8. Click the check boxes for the modules that you want to upgrade, or click **Select all** (recommended).

   📝 **NOTE:** You cannot have different module revisions on the same system.

9. Click the **Upgrade** button.

   A confirmation dialog appears with a list of the selected modules.

10. Click **OK** to upgrade the selected modules, or click **Cancel** to exit the procedure safely.

What to do next

When the upgrade process is complete, restart the upgraded I/O module.

Additional information

Restarting an I/O module

Restart an upgraded I/O module using SystemManager.

1. On the SystemManager **Upgrade Firmware** page, scroll to the I/O Modules section.

2. Select the I/O module(s) that you recently upgraded and then click the **Reboot** button. The **Reboot I/O Modules Now** page appears.

3. Click **OK** to restart the selected I/O module(s), or click **Cancel** to exit the procedure safely

What to do next

📝   **NOTE:** You can begin restarting your Spectrum video server while the I/O module(s) are still restarting.

Restarting a Spectrum video server

Restart an upgraded Spectrum video server using SystemManager.

1. On the SystemManager **Upgrade Firmware** page, scroll to the Spectrum servers section.

2. Select the Spectrum video servers that you recently upgraded and then click the **Reboot** button. The **Reboot Spectrum Servers Now** page appears.

3. Click **OK** to restart the selected Spectrum video servers, or click **Cancel** to exit the procedure safely

Verifying disk drive firmware

You may verify disk drive firmware from the **Disk Utilities** page in SystemManager.

1. Go to the **Disk Utilities** page for any connected Spectrum video server.

2. Click the **Upgrade Disk Firmware** button.

3. Compare the **Firmware Rev. Level** and **New Firmware Available** columns for each drive.

Upgrading disk drive firmware

In some cases, you may need to upgrade disk drive firmware. Note that all disk drives in a RAID set must be running the same firmware version.

Before starting to upgrade disk drive firmware, ensure the following:

*   Verify that start up is complete
*   Ensure that the most recent release of SystemManager has been installed.
*   Ensure that no recording or playback is taking place on the entire system.
*   Ensure that no file copies or transfers are in progress.
*   Stop the file system on every Spectrum video server in your system.

Upgrade all Spectrum servers at the same time. Before commencing any player or file activity, verify that all Spectrum servers and I/O modules are running the same version of firmware as shown on the SystemManager's Upgrade Firmware page under the Home tab.

1. With the SystemManager software properly installed, log on to the application.

2. On all Spectrum server to which the disk drives are attached, stop all playback and recording activities, and stop all file systems.

3. Click the **Home** tab.

4. Click the **Firmware Selection** icon to display the Firmware Selection page.

5. Click the radio button for the desired version of firmware. When the Confirm dialog appears, click **OK**.

6. Click the **Configuration** tab.

7. Click the **Disk Utilities** icon to display the Disk Utilities page for all Spectrum servers.

8. Click the Spectrum server whose disk drive(s) you want to upgrade. The Disk Utilities page for the selected unit appears.

9. At the bottom of the page, click **Upgrade Disk Firmware**. The Upgrade Drive Firmware page for the selected unit appears.

10. Click the check boxes for the drives whose firmware you want to upgrade, or (recommended) click Select all Disks.

> 📝 **NOTE:** You cannot have disks with different revisions within a RAID set.

11. Click the **Start Upgrade Firmware** button to display the Upgrade Disk Drives Now dialog.

12. Click **OK** to upgrade the selected disk drives, or click **Cancel** to exit the procedure safely without upgrading.

Additional information

Verifying software release versions *on page 103*

Handling device upgrade failures

If a failure occurs when upgrading a device, the SystemManager will generate an Upgrade Failed alarm. When this occurs, the SystemManager will not let you perform another upgrade until the alarm is cleared.

Follow these instructions to clear the alarm:

1. Click on the **Diagnostic** tab on the SystemManager's menu bar.

2. Click on the **View Alarms** icon in the left hand column to display the View Alarms page.

3. Click the **Clear Alarms** button to clear all the listed alarms.

4. Start another upgrade.

Replacing PCapps files

PCapps may be used by Service for system troubleshooting.

1. Download the latest PCapps files from the Harmonic FTP site at *ftp://ftp.omneon.com/Updates/Omneon/Current/*

    The files unzip automatically to: D:\Upgrades\[release name]\[timestamp]\pcapp

2. Open this "pcapp" directory and drag all files to the "D:\Omneon\bin" directory.

3. Start the SystemManager application.

4. Select the new firmware version via the SystemManager application.

5. Upgrade the MediaPorts. When you have completed the entire procedure, continue to the next step.

6. Upgrade the MediaDirector.

Additional information

PCapps file descriptions

PCapps files are stored in the D:\Omneon\bin directory,.

File	Description
monitor.exe	This application provides a window that monitors system messages, logs and processes that occur between the Spectrum server and other Spectrum devices.
cliptool.exe	ClipTool application
omnicueservice.exe	Software application that OmniBus uses for system control.
fsmain.exe	A command line program used to issue file system and disk drive commands to Spectrum servers.
flashprog.exe	A command line program to upgrade firmware in Spectrum servers.
playerlib.dll	The library containing code to control Players on Spectrum servers.
oncrpc.dll	The library containing code which provides basic communication with all Spectrum products.
mfc42.dll	The Microsoft library providing basic program functions.

Upgrading MediaPort and ChannelPort licenses

Every MediaPort and ChannelPort includes a license file. Upgrading the license file also changes the model number and enables functionality. For example, CPT-8100-DMH may be upgraded to CPT-8100-DMHVC3P.

Before you begin

If you have purchased a new license file from Harmonic, you may upgrade your MediaPort or ChannelPort license using *Harmonic SystemManager User Guide*. Refer to the *Harmonic SystemManager User Guide* for instructions on how to perform the upgrade.

Spectrum X hardware reference

Spectrum X combines file, baseband and transport stream ingest with comprehensive integrated channel playout (ICP) capabilities, including graphics, branding, and DVE.

- *About the Spectrum X*
- *Spectrum X bezel*
- *Spectrum X front panel*
- *Spectrum X rear panel*
- *About Spectrum X storage*
- *Breakout cable*
- *About software licensing for Spectrum X, MediaDirector 2252B/2251B, and MediaCenter 2200B*
- *Spectrum X specifications*

About the Spectrum X

The Spectrum X can operate in either *internal storage* mode or *shared storage* mode.

In internal storage mode, the Spectrum X provides four hot-swappable drives and up to 12 TB of usable storage. In shared storage mode, the Spectrum X can be connected to a MediaDirector 2252B/2251B or MediaCenter 2200B.

Some features include:

- Codec support includes HD/SD MPEG-2, SD DV (DV 25, DVCPRO 25, and DVCPRO 50), DVCPRO HD, XDCAM HD, AVC I-Frame, AVC-Ultra, and XAVC Long GOP.
- Support for ingest and playout of 3G HD: 1080p @ 50 and 60 Hz (50, 59.94)
- Integrated branding and graphics control for four to eight layers of graphics is supported by the Oxtel control protocol.
- Up to four video inputs and outputs.
- Automation support includes all Polaris systems. Supports all Oxtel protocol automation systems, with clip playback control via Spectrum API or VDCP/BVW (RS-422).
- Master Control Switching supports switching between live inputs and prerecorded clips.
- Support for Emergency Alert System (EAS) is available as a license option for use only in the United States. EAS data and audio is provided by customer's EAS equipment.
- Support for audio profiles containing down-mix and voice-over parameters, which can be mapped to Spectrum X channel sources.
- Support for UHD playout, which includes the following:
  - Support for AVC-Intra Class 300 with the MXF OP1a wrapper.

- ◦ Agile timeline file playback: Spectrum supports a mixed timeline, which can include UHD, HD, and 3G HD video formats.
- ◦ Simulcast out: UHD down-convert with Independent Branding, Clean, or Mirrored for secondary output.
- ◦ Dual live inputs with auto up-convert: Unlike the standard or enhanced channel modes, with UHD channel, you can have two Spectrum X inputs with different video formats, and Spectrum will automatically up-convert to play out UHD.
- ◦ Support for branding with multiple layers, animation, DVE, and dynamic data.
- ◦ Support for Polaris Play: Playlist Control automation.

NOTE: There are no user-serviceable parts in a Spectrum X.

Additional information

Spectrum X specifications *on page 131*

Spectrum X bezel

The Spectrum X bezel provides power and status indicators to quickly assess the status of the device.
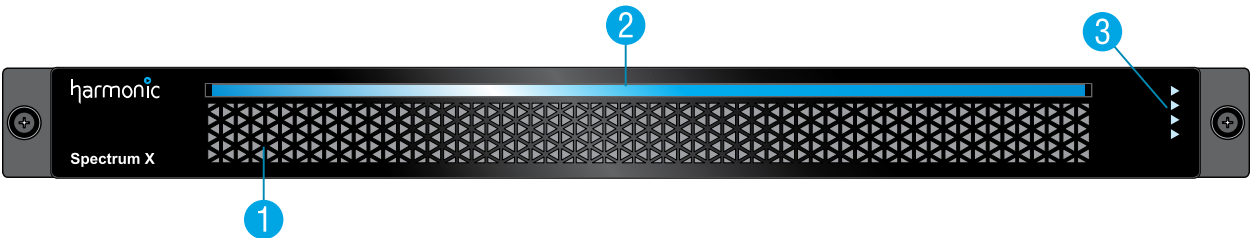
Figure 4-1: Spectrum X bezel

Key	Component	Detail
1	Air vents	Air vents provide optimum air flow from the internal fans. Do not obstruct the Spectrum X air vents.
2	Power indicator	This indicator lights when the system is powered on, and also provides a "wink" function that identifies a selected Spectrum X
3	Status LEDs	The status LEDs indicate status for reference, the Ethernet network connection, and the SDI I/O cards.

Spectrum X status LEDs

The Spectrum X status LEDs indicate the status for reference, the Ethernet network connection, and the SDI I/O cards.
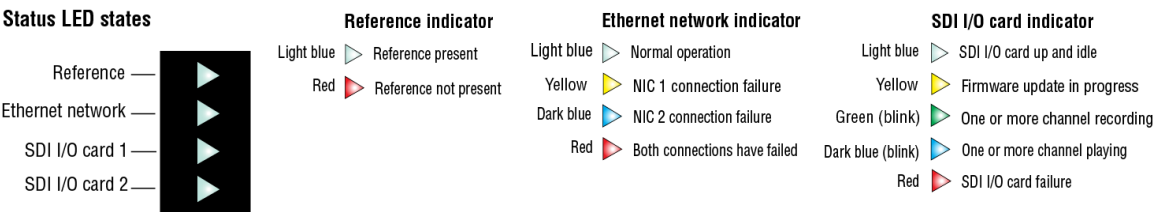
Figure 4-2: Spectrum X status LED states

Spectrum X front panel

The Spectrum X front panel provides access to drives and other components.
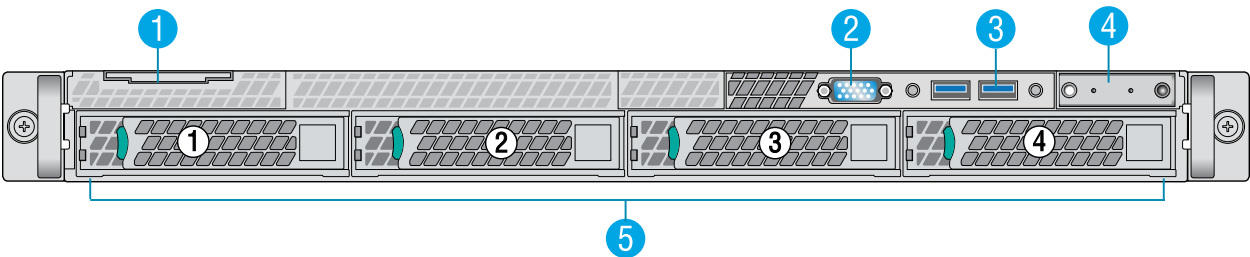
Figure 4-3: Spectrum X front panel

Key	Component	Detail
1	System label pull-out tab	Use to apply a product number and/or serial number label.
2	VGA port	(For Service only)
3	USB ports	Use to connect the front bezel.
4	Control panel	Provides basic system status.
5	Hard drives	(For internal storage configuration only). The drives are numbered 1 to 4 from left to right.

Spectrum X control panel

The Spectrum X control panel provides basic system status.
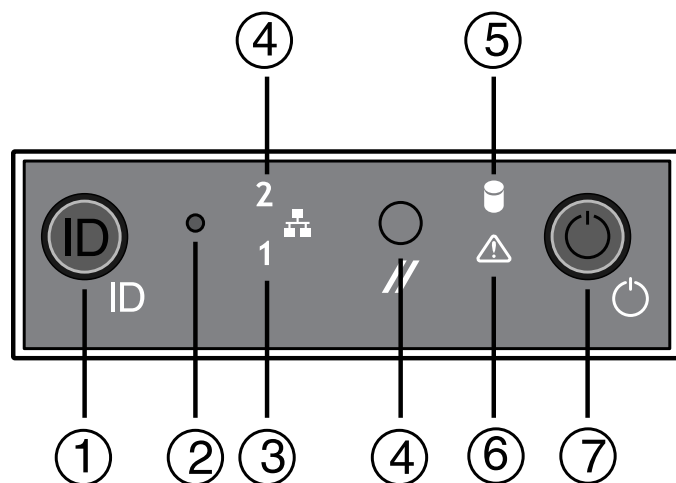
Figure 4-4: Spectrum X control panel

Key	Button/Indicator	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.

Key	Button/Indicator	Description
6	System status LED	• **Off**: the system is off. • **Green, solid on**: the system is on and status is healthy. • **Green, blink**: 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**: 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. • **Amber, solid on**: the system has failed or shut down.
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.

Spectrum X rear panel

The Spectrum X rear panel provides network connectivity, serial connections, and audio and video I/O connections.
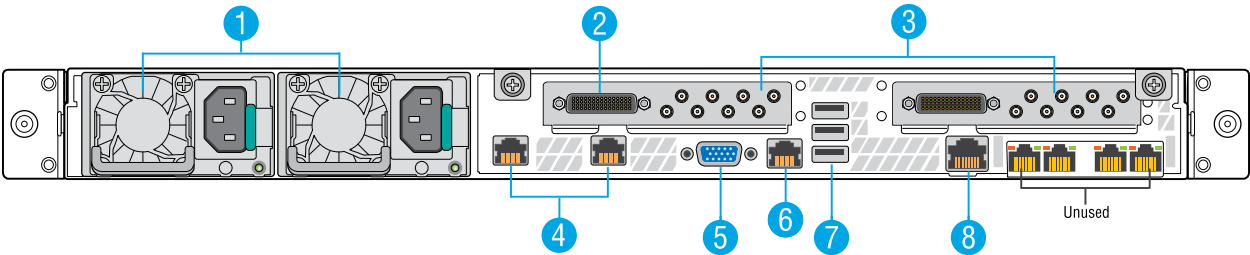
Figure 4-5: Spectrum X rear panel

Key	Component	Description
1	Power supplies (0, 1 from left to right)	Two redundant, hot-swappable power supplies are provided, each with an independent AC In connector. If one supply fails, the load is transferred to the remaining supply without interruption to service. To take full advantage of the redundant supplies, Harmonic recommends that you use separate, isolated power sources for each AC input.

Key	Component	Description
2	DSUB 60 connector	The DSUB 60 connector on each SDI I/O card provides connections for RS-422, GPIO, reference video, and multi-function I/O.
3	SDI I/O card (1, 2 from left to right. If only one card is installed, that card is always 1 regardless of slot)	The SDI I/O card provides eight DIN connectors for audio and video I/O and a DSUB 60 connector.
4	1 Gb Ethernet ports (1, 2 from left to right; eth0 and eth1 in software)	In internal storage configuration: use for system management and file transfers. In shared storage configuration: use for connection to Spectrum video server. For models with one SDI I/O card, use port 0. ⚠ **IMPORTANT:** Use only a CAT 6 Ethernet cable or better for these network interfaces. For lengths between 37m and 100m, or greater, use CAT 6a.
5	VGA port	Use only if instructed by Harmonic Technical Support to do so.
6	RS-232 serial	For Service only
7	USB ports	Use only if instructed by Harmonic Technical Support to do so.
8	BMC	For Service only

About Enhanced Channel mode

Enhanced Channel is a licensed option that combines resources from both channels into a single channel with additional capabilities.

Enhanced Channel features include:

- External key/fill support (available when inputs are not in use for blending live video). The SDI input format must match the video format of the primary output and must be referenced aligned.
- Two live inputs (available when inputs are not being used for external key/fill). Each live SDI input must match the video format of the Primary SDI output and must be reference-aligned.
- Two DVE engines on a single channel.
- Two clip players for a single channel.
- Four or eight graphics layers, as licensed.
- Optional Independent Branding mode (see "Enabling and configuring independent branding" in the *Harmonic SystemManager User Guide*).

These additional features allow you to:

- Brand the Secondary output with graphics different than those used for the Primary output.
- Mix video from any combination of two clip players or two live input sources.

- Use two DVE engines on a single channel, allowing squeeze-backs between player/ input combinations.
- Use an external device to generate key/fill graphics, and overlay that onto the Spectrum X or ChannelPort output video, along with graphics generated by the Spectrum X or ChannelPort.

Note that when the Spectrum X or ChannelPort module is in Enhanced Channel mode, the functionality of some I/O connectors will change based on your I/O Configuration selection inSystemManager or Spectrum Management. For instructions on enabling Enhanced Channel and changing connector configurations, see "Enabling Enhanced Channel mode" and "Master control switcher configuration" in the *Harmonic SystemManager User Guide* or the Spectrum Management Help system.

About UHD mode

With Spectrum 8.2 and later, Spectrum X supports UHD playout.

Note that *both* SDI cards on the Spectrum X are used to play *one* channel of UHD.

In order to configure a UHD player, in SystemManager, the **Channel Configuration** setting on the I/O Module Properties page for your Spectrum X must be set to **Ultra**.

> 📝 **NOTE:** Changing the Spectrum X channel configuration requires a restart. Due to the system changes, the restart may take up to 15 minutes.

Support for UHD playout includes the following:

- Support for AVC-Intra Class 300 with the MXF OP1a wrapper.
- Agile timeline file playback: Spectrum supports a mixed timeline, which can include UHD, HD, and 3G HD video formats.
- Simulcast out: UHD down-convert with Independent Branding, Clean, or Mirrored for secondary output.
- Dual live inputs with auto up-convert: Unlike the standard or enhanced channel modes, with UHD channel, you can have two Spectrum X inputs with different video formats, and Spectrum will automatically up-convert to play out UHD.
- Support for branding with multiple layers, animation, DVE, and dynamic data.
- Support for Polaris Play: Playlist Control automation.

For instructions on creating a UHD player, see "Creating an AVC-Intra UHD player" in the *Harmonic SystemManager User Guide*.

Spectrum X channel mode configurations

The Spectrum X offers eight DIN 1.0/2.3 connectors for video input and output. The connector configurations vary according to Standard Channel mode and Enhanced Channel mode.

> 📝 **NOTE:** In the following tables, "Clean Primary/Secondary" refers to video output with no graphics or overlays.

Table 4-1: Standard Channel configuration 1 (SC1)

Connector	Description	Connector	Description
I/O 1	Ext In 1 (Channel A)	I/O 5	Ext In 1 (Channel B)
I/O 2	Out, Primary (Channel A)	I/O 6	Out, Primary (Channel B)
I/O 3	Out, Secondary (Channel A)	I/O 7	Out, Secondary (Channel B)

Connector	Description	Connector	Description
I/O 4	Out, Primary (Channel A)	I/O 8	Out, Primary (Channel B)

Table 4-2: Standard Channel configuration 2 (SC2)

Connector	Description	Connector	Channel B
I/O 1	Ext In 1 (Channel A)	I/O 5	Ext In 1 (Channel B)
I/O 2	Ext In 2 (Channel A)	I/O 6	Ext In 2 (Channel B)
I/O 3	Out, Secondary (Channel A)	I/O 7	Out, Secondary (Channel B)
I/O 4	Out, Primary (Channel A)	I/O 8	Out, Primary (Channel B)

Table 4-3: Enhanced Channel configuration 1 (EC1)

Connector	Description	Connector	Description
I/O 1	Ext In 1/Key 1	I/O 5	Ext In 4/Key 2
I/O 2	Ext In 2/Fill 1	I/O 6	Ext In 5/Fill 2
I/O 3	Out, Secondary	I/O 7	Ext In 6
I/O 4	Out, Primary	I/O 8	Out, Clean Primary

Table 4-4: Enhanced Channel configuration 2 (EC2)

Connector	Description	Connector	Description
I/O 1	Ext In 1/Key 1	I/O 5	Ext In 4/Key 2
I/O 2	Ext In 2/Fill 1	I/O 6	Ext In 5/Fill 2
I/O 3	Out, Secondary	I/O 7	Out, Clean Secondary
I/O 4	Out, Primary	I/O 8	Out, Clean Primary

Table 4-5: Enhanced Channel configuration 3 (EC3)

Connector	Description	Connector	Description
I/O 1	Ext In 1/Key 1	I/O 5	Ext In 4/Key 2
I/O 2	Ext In 2/Fill 1	I/O 6	Ext In 5/Fill 2
I/O 3	Ext In 3	I/O 7	Ext In 6
I/O 4	Out, Primary	I/O 8	Out, Secondary

UHD configuration

📝 **NOTE:** In UHD mode, both SDI cards on the Spectrum X are used for one channel of UHD. SDI card 1 refers to the card on the left-hand side when facing the rear panel. SDI card 2 refers to the card on the right-hand side when facing the rear panel.

Table 4-6: UHD configuration (UC1)

Connector, SDI card 1	Description	Connector, SDI card 2	Description
I/O 1	External input 1	I/O 1	External input 2
I/O 2	External input 1	I/O 2	External input 2
I/O 3	Out, Primary	I/O 3	Out, Secondary
I/O 4	Out, Primary	I/O 4	Out, Secondary
I/O 5	External input 1	I/O 5	External input 2
I/O 6	External input 1	I/O 6	External input 2
I/O 7	Out, Primary	I/O 7	Out, Secondary
I/O 8	Out, Primary	I/O 8	Out, Secondary

Spectrum X SDI I/O connectors: standard channel mode

Find the functionality of the Spectrum X SDI I/O connectors for standard channel mode.

The SDI I/O connections on the Spectrum X use DIN 1.0/2.3 connectors.
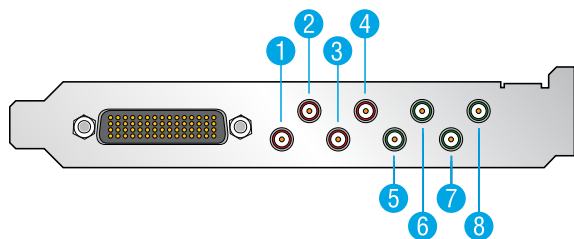
Figure 4-6: Spectrum X SDI I/O connectors: standard channel

Key	Component	Description
1	External Input 1 Channel A	Use for video input on Channel A.
2	External Input 2/ Clean Primary Video Output Channel A	Use for video input or for clean primary video output on Channel A. Note that if used for clean video output, "clean" output refers to video output with no graphics or overlays.
3	Video Output (Secondary) Channel A	Use for secondary video output or for HD/SD-branded output on Channel A when in Independent Branding mode. Refer to "Configuring a ChannelPort channel" in the *Harmonic SystemManager User Guide* for instructions on configuring Independent Branding mode.

Key	Component	Description
4	Video Output (Primary) Channel A	Use for primary video output or for HD/SD-branded output on Channel A when in Independent Branding mode.
5	External Input 1 Channel B	Use for video input on Channel B.
6	External Input 2/ Clean Primary Video Output Channel B	Use for video input or for clean primary video output on Channel B. Note that if used for clean primary video output, "clean" refers to video output with no graphics or overlays.
7	Video Output (Secondary) Channel B	Use for secondary video output or for HD/SD-branded output on Channel B when in Independent Branding mode.
8	Video Output (Primary) Channel B	Use for primary video output or for HD/SD-branded output on Channel B when in Independent Branding mode.

Spectrum X SDI I/O connectors: enhanced channel mode

Find the functionality of the Spectrum X SDI I/O connectors for enhanced channel mode.

The SDI I/O connections on the Spectrum X use DIN 1.0/2.3 connectors.
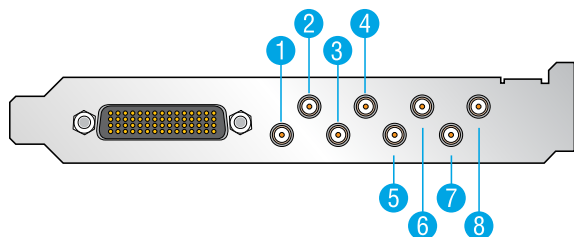
Figure 4-7: Spectrum X SDI I/O connectors: enhanced channel

Key	Component	Description
1	External Input 1/ External Key Input 1	Use for video input or External Key input 1. Refer to "Enabling Enhanced Channel mode" in the *Harmonic SystemManager User Guide* for instructions on configuring Enhanced Channel mode to enable Key/Fill. Refer to the *Spectrum X and ChannelPort Template Authoring Guide* for information on External Key/Fill.
2	External Input 2/ External Fill Input 1	Use for video input or External Fill input 1.

Key	Component	Description
3	External Input 3/Video Output (Secondary)	Use for video input, secondary video output, or for HD/SD-branded output when in Independent Branding mode. Refer to "Configuring a ChannelPort channel" in the *Harmonic SystemManager User Guide* for instructions on configuring Independent Branding mode.
4	Video Output (Primary)	Use for primary video output or for HD/SD-branded output on Channel A when in Independent Branding mode.
5	External Input 4/ External Key Input 2	Use for video input or External Key input 2.
6	External Input 5/ External Fill Input 2	Use for video input or External Fill input 2.
7	External Input 6	Use for video input.
8	Video Output	Use for clean primary video output, secondary video output, or for HD/SD-branded output when in Independent Branding mode. Note that if used for clean primary video output, "clean" refers to video output with no graphics or overlays.

NOTE: "HD/SD-branded" refers to Independent Branding mode. "Clean Primary/Secondary" refers to video output with no graphics or overlays.

Spectrum X SDI I/O connectors: UHD mode

Find the functionality of the Spectrum X SDI I/O connectors for UHD channel mode.

The SDI I/O connections on the Spectrum X use DIN 1.0/2.3 connectors.
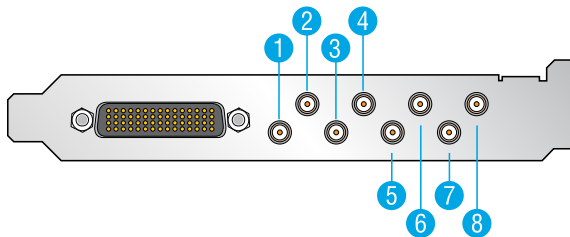
Figure 4-8: Spectrum X SDI I/O connectors: UHD channel

Table 4-7: SDI card 1 (left-hand side when facing rear panel)

Key	Component	UHD link
1	External Input 1	Input: C
2	External Input 1	Input: A
3	Output, Primary	Output: C
4	Output, Primary	Output: A

Key	Component	UHD link
5	External Input 1	Input: D
6	External Input 1	Input: B
7	Output, Primary	Output: D
8	Output, Primary	Output: B

Table 4-8: SDI card 2 (right-hand side when facing rear panel)

Key	Component	UHD link
1	External Input 2	Input: C
2	External Input 2	Input: A
3	Output, Secondary or HD/SD branded	Output: C
4	Output, Secondary or HD/SD branded	Output: A
5	External Input 2	Input: D
6	External Input 2	Input: B
7	Output, Secondary or HD/SD branded	Output: D
8	Output, Secondary or HD/SD branded	Output: B

📝 **NOTE:** "HD/SD-branded" refers to Independent Branding mode.

📝 **NOTE:** For input of non-UHD content, use I/O 2.

High Density DSUB 60 connector pinout

The DSUB 60 connector provides connections for RS-422, GPIO, reference video, and multi-function I/O.
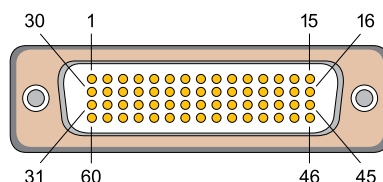
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RS422_RX0+	RS422_RX0-	GND 3	RS422_TX0+	RS422_TX0-	GND 6	RS422_RX4+	RS422_RX4-	GND 9	GPIO0	GPIO1	GPIO2	GPIO3	GND 14	MFIO1
30	**29**	**28**	**27**	**26**	**25**	**24**	**23**	**22**	**21**	**20**	**19**	**18**	**17**	**16**
RS422_RX1+	RS422_RX1-	GND 28	RS422_TX1+	RS422_TX1-	GND 25	RS422_TX4+	RS422_TX4-	I2C_SDA	GPIO4	GPIO5	GPIO6	GPIO7	GND 17	MFIO2
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
RS422_RX2+	RS422_RX2-	GND 33	RS422_TX2+	RS422_TX2-	GND 36	RS422_RX5+	RS422_RX5-	I2C_SCK	GND 40	GND 41	GND 42	GND 43	GND 44	MFIO3
60	**59**	**58**	**57**	**56**	**55**	**54**	**53**	**52**	**51**	**50**	**49**	**48**	**47**	**46**
RS422_RX3+	RS422_RX3-	GND 58	RS422_TX3+	RS422_TX3-	GND 55	RS422_TX5+	RS422_TX5-	GND 52	GND 51-DCT	GND 50	Timing REF	GND 48	GND 47	MFIO4

Figure 4-9: DSUB 60 connector pinout

1 Gigabit Ethernet port LED states

The 1 Gigabit Ethernet ports can be used for system management or file transfers. The LEDs provide link, activity, and link speed status.
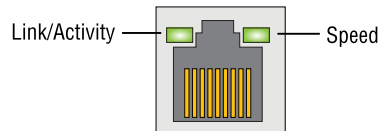
Figure 4-10: 1 Gigabit Ethernet port LED

LED/State	Condition
Link/Activity: green (blink)	Network activity
Link/Activity: green (solid)	Network link established
Link/Activity: off	No link
Speed: green	Network traffic at 1 Gbps
Speed: yellow	Network traffic at 100 Mbps
Speed: off	No link

⚠ **CAUTION:** If two power supplies are used, they must be of the same type and have the same maximum output power.

Power supply LED states

Each power supply includes an LED to indicate the status of AC power to the system.
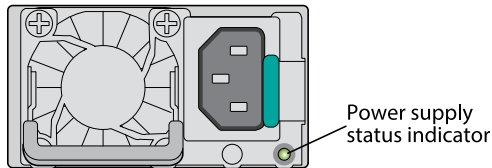
Figure 4-11: Power supply LED

LED state	Condition
Off	AC power is not connected.
Green, solid	A valid AC source is connected to the power supply, and the power supply is operational.
Green (1 Hz blink)	AC is present, but the power switch on the front panel is off or in a cold redundant state due to low system power load.
Green (2 Hz blink)	Power supply firmware updating.
Amber, blink	Power supply is operational, but experiencing a warning event.
Amber, solid	AC power is lost or a power supply is shut down.

⚠️ **CAUTION:** If two power supplies are used, they must be of the same type and have the same maximum output power.

About Spectrum X storage

The Spectrum X in internal storage configuration provides four hot-swappable disk drives in a 3+1 RAID set.

Refer to the following table for supported RAID configurations.

Table 4-9: Spectrum X RAID configurations

Drives	RAID set	Capacity per drive	Storage capacity
4 SAS	3+1	6 TB	18 TB
4 SAS	3+1	4 TB	12 TB
4 SAS	3+1	2 TB	6 TB

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

If managing your system with SystemManager, use the "One-Click" functions to create the file system and RAID set, and initialize the file system. Follow the instructions in "Using One-Click Functions" in the *Harmonic SystemManager User Guide*.

Note that drives are numbered 1 to 4, from left to right, when facing the front panel.

Spectrum X drive LEDs

Each drive includes an LED for drive activity.
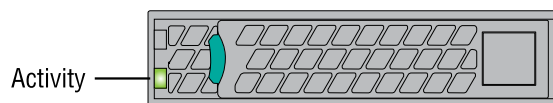
Activity

Figure 4-12: Drive LED

Table 4-10: Activity LED (green)

State	Description
Solid	Power on, no drive activity
Blink off when processing command	Power on with drive activity
Off	Power on and drive spun down
Blink	Power on and drive spinning up

Additional information

Breakout cable

Harmonic provides a breakout cable for use with the DSUB 60 connector, which provides six RS-422 connectors, one GPIO connector, a Reference In connector, and four multi-function I/O (MFIO) connectors.
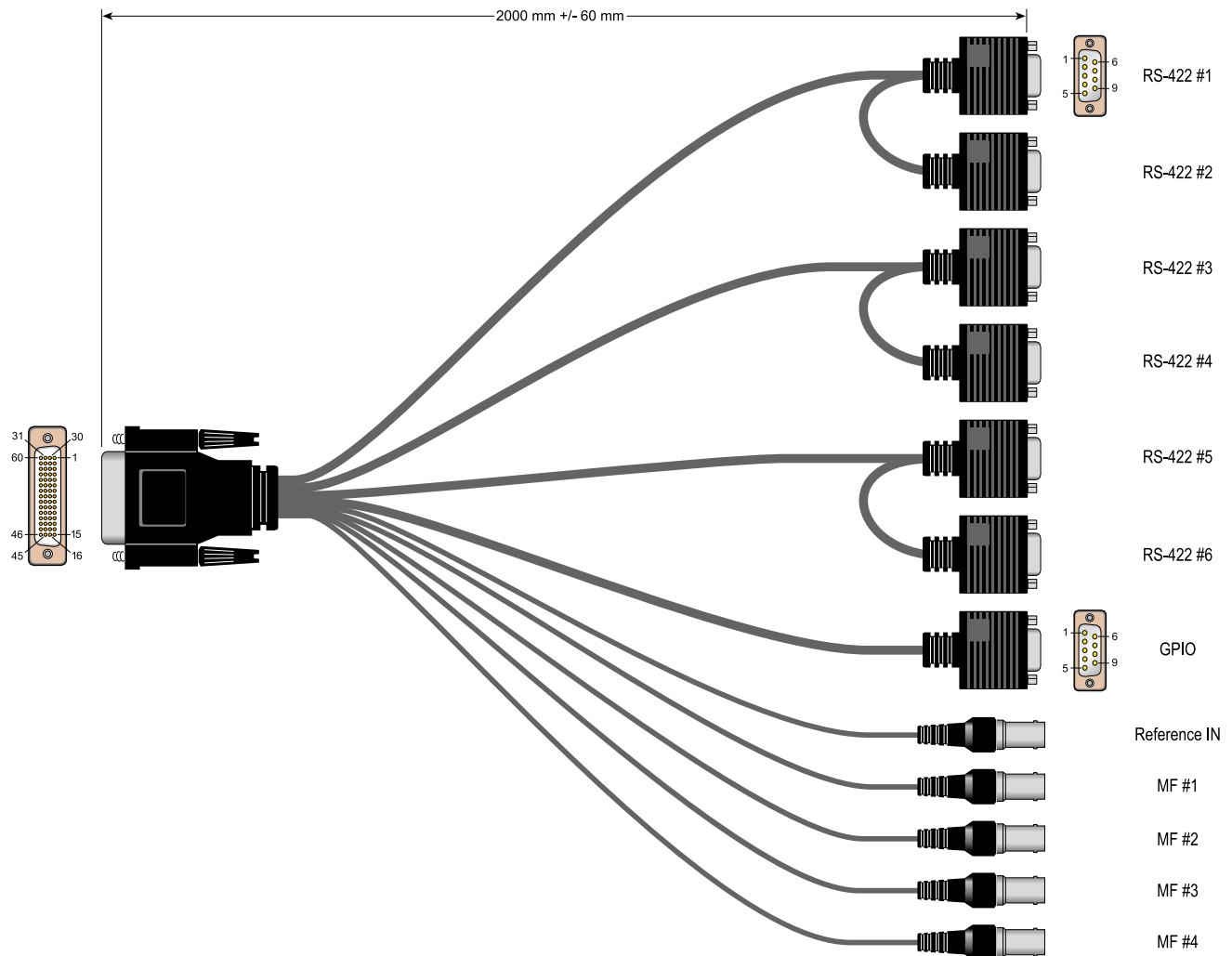
Figure 4-13: Breakout cable overview

Table 4-11: Breakout cable connector use

Connector	Description
RS-422 #1	Use for channel A player control with VDCP
RS-422 #2	Use for channel B player control with VDCP
RS-422 #3	Use for Oxtel and EAS. Shown as **Serial 0** in SystemManager or Spectrum Management

Connector	Description
RS-422 #4	Use for Oxtel and EAS. Shown as **Serial 1** in SystemManager or Spectrum Management
RS-422 #5	Use for Oxtel and EAS. Shown as **Serial 2** in SystemManager or Spectrum Management
RS-422 #6	Use for Oxtel and EAS. Shown as **Serial 3** in SystemManager or Spectrum Management
GPIO	Use for graphics control or EAS
Reference In	Use for Reference video

For instructions on configuring a serial connection to control graphics, see "Configuring a Spectrum X and ChannelPort Channel" in the *Harmonic SystemManager User Guide*.

For instructions on configuring GPIO, see "Configuring Spectrum X GPIO Triggers" in the *Harmonic SystemManager User Guide*.

Table 4-12: MFIO connector use

MFIO connector	Function in Standard Channel mode	Function in Enhanced Channel mode
MF# 1	Channel A AES In / Channel A LTC In	AES In / LTC In
MF #2	Channel A LTC Out	LTC Out
MF #3	Channel B AES In / Channel B LTC In	Unused
MF #4	Channel B LTC Out	Unused

Use the Attach Devices page in SystemManager to configure LTC or AES audio for a connector. For instructions, see "Attaching Devices and Setting Conversion Options"in the *Harmonic SystemManager User Guide*.

Partial breakout cable

Harmonic provides a partial breakout cable for use with the DSUB 60 connector, which includes one RS-422 connector, one GPIO connector, a Reference In connector, and four multi-function I/O (MFIO) connectors.
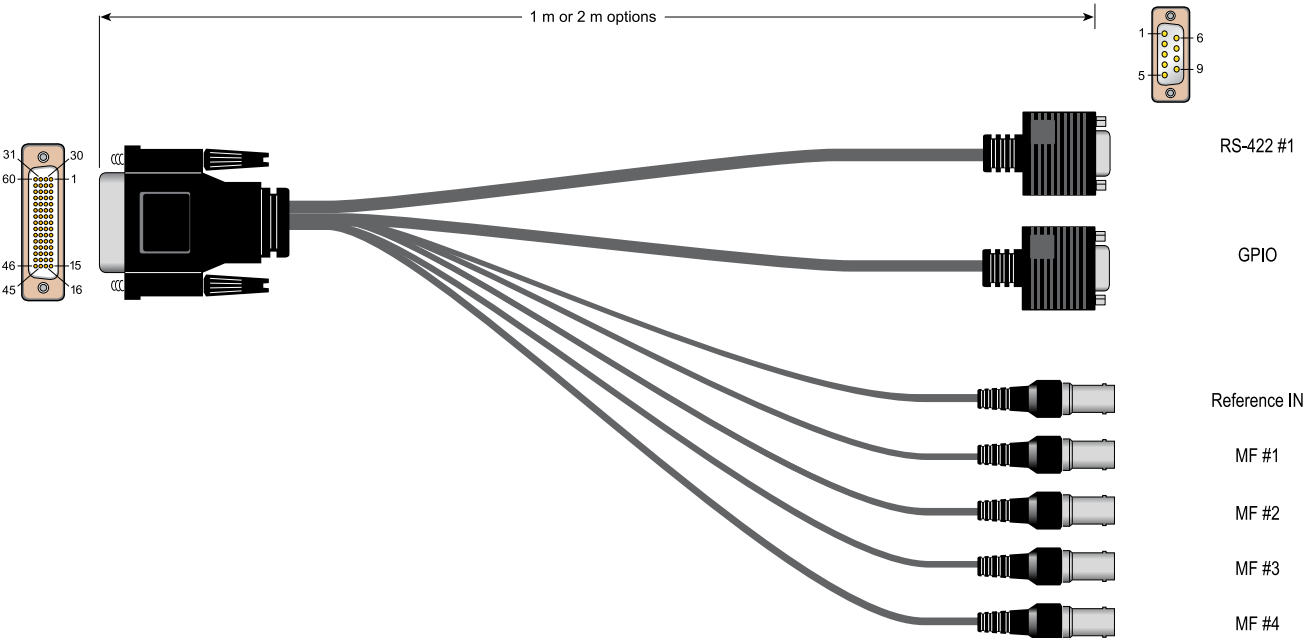
Figure 4-14: Partial breakout cable overview

Table 4-13: Breakout cable connector use

Connector	Description
RS-422 #1	Use for channel A player control with VDCP
GPIO	Use for graphics control or EAS
Reference In	Use for Reference video

For instructions on configuring a serial connection to control graphics, see "Configuring a Spectrum X and ChannelPort Channel" in the *Harmonic SystemManager User Guide*.

For instructions on configuring GPIO, see "Configuring Spectrum X GPIO Triggers" in the *Harmonic SystemManager User Guide*.

Table 4-14: MFIO connector use

MFIO connector	Function in Standard Channel mode	Function in Enhanced Channel mode
MF# 1	Channel A AES In / Channel A LTC In	AES In / LTC In
MF #2	Channel A LTC Out	LTC Out
MF #3	Channel B AES In / Channel B LTC In	Unused

MFIO connector	Function in Standard Channel mode	Function in Enhanced Channel mode
MF #4	Channel B LTC Out	Unused

Use the Attach Devices page in SystemManager to configure LTC or AES audio for a connector. For instructions, see "Attaching Devices and Setting Conversion Options"in the *Harmonic SystemManager User Guide*.

Reference breakout cable

Harmonic provides a partial breakout cable for use with the DSUB 60 connector, which includes a Reference In connector and four multi-function I/O (MFIO) connectors.
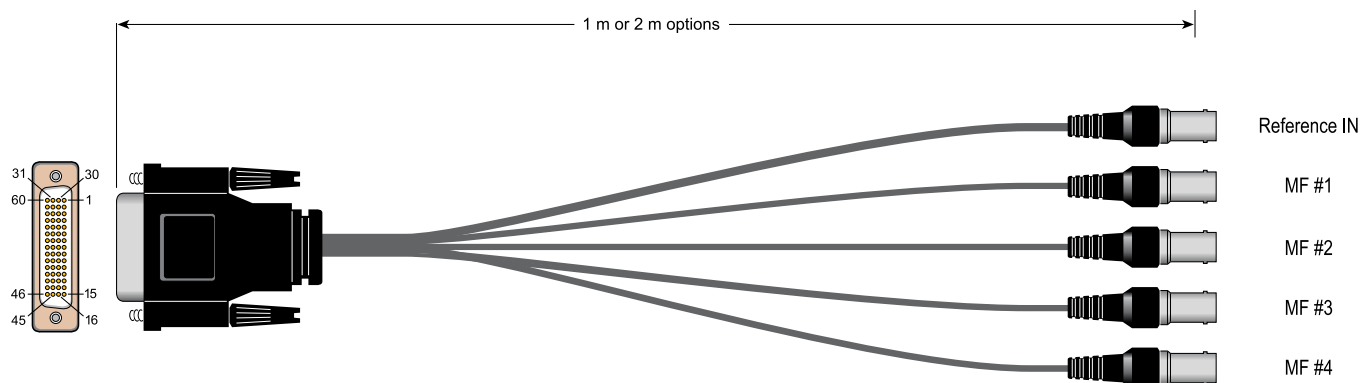
Figure 4-15: Reference breakout cable overview

Table 4-15: Breakout cable connector use

Connector	Description
Reference In	Use for Reference video

For instructions on configuring a serial connection to control graphics, see "Configuring a Spectrum X and ChannelPort Channel" in the *Harmonic SystemManager User Guide*.

For instructions on configuring GPIO, see "Configuring Spectrum X GPIO Triggers" in the *Harmonic SystemManager User Guide*.

Table 4-16: MFIO connector use

MFIO connector	Function in Standard Channel mode	Function in Enhanced Channel mode
MF# 1	Channel A AES In / Channel A LTC In	AES In / LTC In
MF #2	Channel A LTC Out	LTC Out
MF #3	Channel B AES In / Channel B LTC In	Unused
MF #4	Channel B LTC Out	Unused

Use the Attach Devices page in SystemManager to configure LTC or AES audio for a connector. For instructions, see "Attaching Devices and Setting Conversion Options" in the *Harmonic SystemManager User Guide*.

Breakout cable: RS-422 connector pinout

The breakout cable includes six RS-422 connectors, which can be used for control or EAS connections.
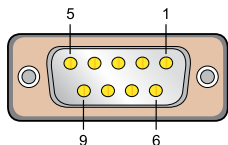
Figure 4-16: RS-422 connector pinout

Table 4-17: RS-422 connector #1

Pin	Signal
8	RS422_RS0-
3	RS422_RS0+
shell	GND 3
2	RS422_TS0-
7	RS422_TS0+

Table 4-18: RS-422 connector #2

Pin	Signal
8	RS422_RS1-
3	RS422_RS1+
shell	GND 28
2	RS422_TS1-
7	RS422_TS1+

Table 4-19: RS-422 connector #3

Pin	Signal
8	RS422_RS2-
3	RS422_RS2+
shell	GND 33
2	RS422_TS2-
7	RS422_TS2+

Table 4-20: RS-422 connector #4

Pin	Signal
8	RS422_RS3-
3	RS422_RS3+
shell	GND 58
2	RS422_TS3-
7	RS422_TS3+

Table 4-21: RS-422 connector #5

Pin	Signal
8	RS422_RS4-
3	RS422_RS4+
shell	GND 6
2	RS422_TS4-
7	RS422_TS4+

Table 4-22: RS-422 connector #6

Pin	Signal
8	RS422_RS5-
3	RS422_RS5+
shell	GND 36
2	RS422_TS5-
7	RS422_TS5+

Breakout cable: GPIO connector pinout

The breakout cable includes one GPIO connector, which can be used for graphics control or EAS connections.
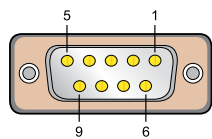
Figure 4-17: GPIO connector pinout

Table 4-23: Signal assignments

Pin	Signal
1	GPIO 0

Pin	Signal
2	GPIO 1
3	GPIO 2
4	GPIO 3
5	GPIO 4
6	GPIO 5
7	GPIO 6
8	GPIO 7
9	GND 40

About RS-422 grounding

Note the following regarding RS-422 grounding:

- RS-422 uses differential signaling, much like balanced audio. As long as the chassis grounds of the controller and the Spectrum device share a common ground through the AC power connections, no ground connection is needed on the RS-422 cable.
- In some cases, grounding the RS-422 at one end and running a shield around the balanced pairs can reduce noise pickup.

About software licensing for Spectrum X, MediaDirector 2252B/2251B, and MediaCenter 2200B

In Spectrum 8.0 and later, software licenses are installed only on the Spectrum video servers.

With Spectrum 8.2 and later, licensed features for Spectrum systems with Spectrum X are installed on the Spectrum video server regardless of whether the Spectrum X is in internal storage mode or shared storage mode. To view all installed licenses, open the Licensed Features page for your Spectrum video server in SystemManager. For details, see "Viewing licensed features for a Spectrum video server" in the *Harmonic SystemManager User Guide*.

If your system includes MediaPorts or ChannelPorts, licenses will continue to be installed directly on those devices.

Refer to the "Specifications" section for details on Spectrum X features.

Spectrum X specifications

Find specifications for the Spectrum X here.

The Spectrum X series can include one or two SDI I/O modules.

📝 **NOTE:** For video codec and audio format support, see *Spectrum Media and Wrapper Formats*.

Table 4-24: Video I/O connectors and channels

Specification	Detail
SD: SMPTE 259M HD: SMPTE 292M, 424M UHD: SMPTE ST425-5	8 DIN 1.0/2.3 connectors per SDI I/O card Note: The SMPTE specifications refer to BNC connectors only. However, the DIN connectors on the Spectrum X are electrically equivalent to the specifications.
Standard Channel (depends on configuration)	• 1 - 2 video inputs per channel • 2 - 3 video outputs per channel with independently configurable up/down/cross-conversion
Enhanced Channel (depends on configuration)	• 4 - 6 inputs per channel • 2 - 4 video outputs per channel with independently configurable up/down/cross-conversion
UHD channel (depends on configuration)	Both SDI cards on the Spectrum X are required to play one channel of UHD • 8 inputs per channel • 8 video outputs per channel with independently configurable up/down/cross-conversion
Input	Four SD/HD DIN 1.0 connectors, SMPTE 259M, 292M, 424M One video input per channel.
Output	Four SD/HD DIN 1.0 connectors, SMPTE 259M, 292M, 424M. Independently configurable up/down/cross conversion
Simulcast	Four SD/HD DIN 1.0 connectors, SMPTE 259M, 292M, 424M

Table 4-25: Video I/O: raster

Specification	Details
SD	• 525i @ 29.97 fps • 625i @ 25 fps
HD	• 1080i @ 25, 29.97 fps • 720p @ 50, 59.94 fps
HD 3G	1080p @ 50, 59.94 fps
Ultra HD (UHD)	• 2160p @ 50, 59.94 fps, Interleaved, Square Division • Synchronized 4x 3G playback

Table 4-26: Conversion options

Specification	Detail
Up conversion	Configurable pillarbox, crop, anamorphic, non-linear. EIA-608 captions translated to EIA-708. Line 21 OP-42 subtitles translated to OP-47
Down conversion	Configurable letterbox, crop, anamorphic EIA-608 compatibility bytes extracted from EIA-708 data to create EIA-608 captions. OP-47 subtitles translated to line 21 OP-42

Table 4-27: Standard and Enhanced channel conversion

Clip being played can be any one of:	Format of External SDI input:	Primary Output format can be:	Secondary Output format can then be:
1080p, 1080i, 720p, or SD	SD	SD	SD
	720p	720p	720p or SD
	1080i	1080i	1080i or SD
	1080p	1080p	1080p, 1080i, 720p, or SD

⚠ **IMPORTANT:** For standard or enhanced channel, the format of the External SDI input must match the video format of the Primary Output and must be referenced aligned.

Table 4-28: UHD channel conversion

Clip being played can be any one of:	Format of External SDI input:	Primary Output format can be:	Secondary Output format can then be:
UHD-1,1080p, 1080i, or 720p	UHD-1 (square division or interleaved),1080p, 1080i, or 720p	UHD-1 (square division or interleaved)	UHD-1 (square division or interleaved), 1080p, 1080i, or 720p

⚠ **IMPORTANT:** For UHD channel, the External SDI input must be referenced aligned.

Table 4-29: SD-SD Aspect Ratio Converter (ARC)

Specification	Detail
RP-186 AFD SMPTE-2016, ATSC A/53	• 16:9 SD to 4:3 Letterbox (Vertical Decimation) • 16:9 SD to Full Screen (Horizontal Interpolation) • 16:9 SD to Crop 14:9 (Vertical Decimation, Horizontal Interpolation)

Table 4-30: Audio processing

Specification	Detail
Channels	SMPTE 299M/272M, up to 16 embedded per video channel

Specification	Detail
Features	Audio down-mix.
	Audio track swapping; track tagging, language rules
	Audio mix effects; VO insertion

Table 4-31: Connectivity

Specification	Detail
Connectors	RS-422 per video channel (multi-pin connector; available adapter cable) Ethernet from client to Spectrum video server.
Server Interface	Private, point-to-point, non-switchable gigabit Ethernet to Spectrum video server.
GPIO	Eight GPIO lines, configurable

Table 4-32: Control

Specification	Detail
VDCP and Limited BVW	Via RS-422 per video channel (RJ-45 connector; DB-9 adapter supplied)
Spectrum API	Via Ethernet from client to Spectrum video server.

Table 4-33: Timecode

Specification	Detail
LTC	Dedicated LTC I/O per channel (using DSUB 60 connector)
VITC	Extracted from or inserted into SDI

Table 4-34: Data

Specification	Detail
Closed Caption	
EIA-608	Analog caption data recovered from VBI and stored as digital data; inserted into VBI on playout.
EIA-708	Digital caption data preserved on record and inserted on playout.
Onboard Closed Caption Insertion	Onboard Closed Caption Insertion available as licensed feature; Cheetah, NCI, and SCC are supported file types.
Onboard subtitle Insertion	
OP47a SMPTE-2031	Onboard Subtitle Insertion available as licensed feature; STL, PAC, and 890 are supported file types
Ancillary Data	

Specification	Detail
VBI	Up to 6 lines (configurable) preserved. Line 21 caption data saved automatically
VANC	Up to 6000 bytes (configurable) preserved per frame
Reference	
	Analog black with color burst

Table 4-35: Safety

Specification	Detail
UL 60950-1 2nd Edition	Information Technology Equipment - Safety - Part 1: General Requirements
CSA C22.2	

Table 4-36: Dimensions

Model	Weight (including rack rails)	L x H x W (bezel attached, rack mountable per EIA-310 specification)
Spectrum X with two SDI I/O cards, four drives	37.5 lbs	30.25" x 1.7" x 17.25"
Spectrum X with one SDI I/O card, four drives	36.6 lbs	30.25" x 1.7" x 17.25"
Spectrum X with two SDI I/O cards, no drives	32.2 lbs	30.25" x 1.7" x 17.25"
Spectrum X with one SDI I/O card, no drives	31.3 lbs	30.25" x 1.7" x 17.25"

Table 4-37: Spectrum X power

Specification	Detail
Voltage	90 to 132V and 180 to 264V
Frequency	47-63Hz
Power with two SDI I/O cards, four drives installed	504 W
Power with one SDI I/O card, four drives installed	440 W
Power with two SDI I/O cards, no drives installed	464 W
Power with one SDI I/O card, no drives	464 W

Table 4-38: Environmental

Altitude	Maximum temp for Spectrum X in internal storage mode (four drives installed)	Maximum temp for Spectrum X in shared storage mode (no drives)
3000m (10K')	30° C	33° C
1500m (5K')	35° C	38° C
900m (3K')	37° C	40° C
Sea level	40° C	40° C

NOTE: The environmental specifications in this table assume a maximum CPU temperature of approximately 90° C. Operating at temperatures close to those specified may result in temperature alarms.

MediaDirector 2252B/2251B hardware reference

The MediaDirector is the central server component of a Spectrum system. The MediaDirector 2252B/2251B integrates file system, system management, communication, and all connectivity including Serial-attached SCSI (SAS) connections and Gigabit Ethernet.

- *About the MediaDirector 2252B/2251B and 2252B-DS*
- *MediaDirector 2252B/2251B bezel*
- *MediaDirector 2252B/2251B status LEDs*
- *MediaDirector 2251B rear panel*
- *MediaDirector 2252B and 2252B-DS rear panel*
- *MediaDirector 2252B/2251B specifications*

About the MediaDirector 2252B/2251B and 2252B-DS

The MediaDirector is the core of the Spectrum system, actively managing the flow of data to and from other Spectrum components, including the MediaStore 5000 series storage arrays and real-time I/O modules such as the MediaPort 7000, ChannelPort, andSpectrum X.

The MediaDirector 2252B-DS includes 18 connections for I/O modules, as well as 10 Gb Ethernet ports for file transfers, four SAS connections for storage, and support a four-MediaDirector EFS configuration.

The MediaDirector 2252B includes 12 connections for I/O modules, as well as 10 Gb Ethernet ports for file transfers, SAS connections for storage, and EFS connections.

The MediaDirector 2251B includes 6 connections for I/0 modules.

The Gigabit Ethernet connectivity is a standard implementation of high speed Ethernet for non-real time asynchronous file transfer and support of FTP, Samba, and AFP (Apple® Filing Protocol) protocols.

⚠ **CAUTION:** MediaDirectors run on a non-standard Linux operating system. Do not edit files manually, or run Linux-type commands via the shell unless instructed to do so by Technical Support, or the product documentation. Be aware that If you manually edit files, any changes made may be overwritten when daemons restart, the system reboots, or during system upgrades. Modifying files by hand and/or running Linux-type commands may seriously impact MediaDirector functionality and performance.

📝 **NOTE:** There are no user-serviceable parts in a MediaDirector 2252B/2251B or 2252B-DS.

Additional information

MediaDirector 2252B/2251B bezel

The bezel provides power and status indicators to quickly assess the status of the device.
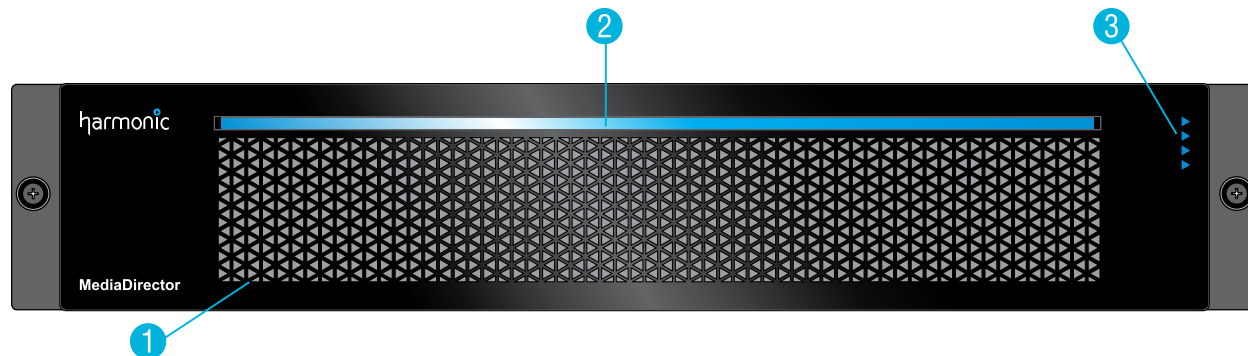
Figure 5-1: MediaDirector bezel

Key	Component	Detail
1	Air vents	Air vents provide optimum air flow from the internal fans. Do not obstruct the air vents.
2	Power indicator	This indicator lights when the system is powered on, and also provides a "wink" function that identifies a selected MediaDirector
3	Status LEDs	The status LEDs indicate status for the file system, RAID set,and Ethernet network connection.

MediaDirector 2252B/2251B and MediaCenter 2200B front panel buttons

Power and reset buttons are provided on the right-hand rack ear behind the bezel. To access them, remove the bezel by loosening the captive thumb screws and pulling the bezel straight back.

NOTE: The physical buttons are only accessible with the use of a small tipped tool.

Figure 5-2: Front panel buttons

Key	Component	Description
1	Power button	Turns the unit On/Off. For use only if you are unable to use SystemManager to power down the system.
2	Reset button	Operates as a momentary switch to complete a "soft" reset of the MediaDirector or MediaCenter. Once pressed, all boards reset and code is re-loaded. The function is similar to clicking the **Reboot** button on the **Properties** page for your Spectrum video server in SystemManager. For use only if you are unable to use SystemManager to restart the system.

MediaDirector 2252B/2251B status LEDs

The MediaDirector 2252B/2251B status LEDs indicate basic system status.

File system indicator

Off	No file system
Green	File system coming up
Dark blue	(Solid) File system started, read-only (Blink) File system present, halted
Light blue	(Solid) File system started, read-write (Blink) File system present, unable to start

1 Gb Ethernet (system management)

Off	No ports connected
Dark blue	(Solid) At least one connected port not assigned an IP address (Blink) Hardware or software fault
Light blue	(Solid) At least one port linked at 1 Gb or more (Blink) At least one port linked at less than 1 Gb

Raid set indicator

Off	No RAID sets, or file system unavailable
Yellow	(Solid) Rebuild(s) in proces (Blink) One or more RAID sets unprotected
Dark blue	(Blink) RAID sets present, no file system
Light blue	(Solid) All RAID sets protected (non-compromised) (Blink) File system not viable to start

10 Gb Ethernet (file transfers)

Off	No ports connected
Dark blue	(Solid) At least one connected port not assigned an IP address (Blink) Hardware or software fault
Light blue	(Solid) At least one Ethernet port linked and all ports at maximum speed (10 Gb) (Blink) At least one port linked at less than 10 Gb

File system — RAID — 1 Gb Ethernet — 10 Gb Ethernet

Figure 5-3: MediaDirector 2252B/2251B status LEDs

MediaDirector 2251B rear panel

The MediaDirector 2251B rear panel includes 6 connections for I/O modules, as well as 10 Gb Ethernet ports for file transfers, SAS connections for storage, and EFS connections.
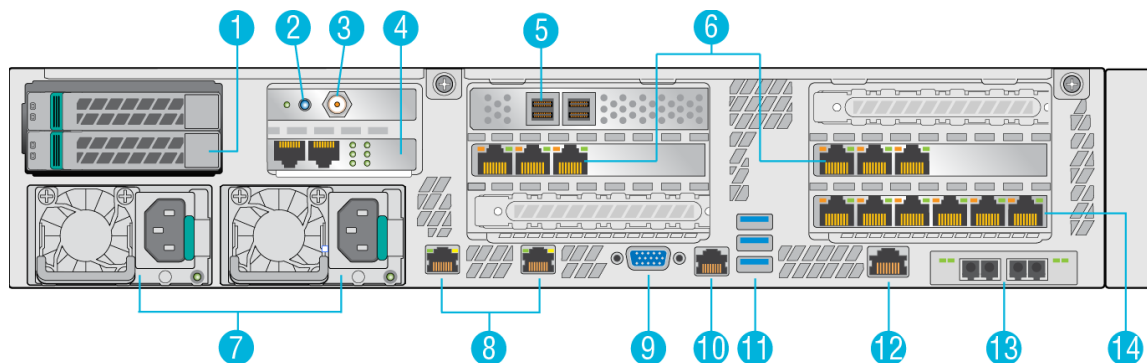
Figure 5-4: MediaDirector 2251B rear panel

Key	Component	Description
1	Boot drive	Top bay only
2	Power button/LED	This button/LED turns the unit On/Off. If a power cord is attached to the unit and the button is pressed, the LED flashes blue to indicate the unit is transitioning. Once the unit has fully powered up, the LED changes to solid light blue.

Key	Component	Description
3	LTC connector	Use to connect a LTC timecode source to the MediaDirector. Note that the MediaDirector LTC timecode will override the reference VITC obtained from the MediaPort.
4	1 Gb Ethernet connector and LEDs	Use for system management. Note that the Ethernet card and LED type may vary from the one show here. Refer to "1 Gb Ethernet port status LEDs (for system management)" for a description of the possible Ethernet cards and possible LEDs
5	Serial attached SCSI (SAS) connectors	Use for MediaStore 5000 series connections
6	MediaPort Ethernet array	Use these ports only to connect to MediaPorts, ChannelPorts, and Spectrum X devices. DO NOT use these ports for any other purpose, including plugging directly into a network.
7	Power supplies (0, 1 from left to right)	Two power supplies, each including an independent AC connector, are located on the left-hand side of the rear panel. If one supply fails, the load is transferred to the remaining supply without interruption to service. To take full advantage of the redundant supplies, use separate, isolated power sources for each AC input.
8	10 Gb Ethernet ports (1, 2 from left to right)	Use for file transfers or communication with a public network. ⚠ **IMPORTANT:** Use only a CAT 6 Ethernet cable or better for these network interfaces. For lengths between 37m and 100m, or greater, use CAT 6a.
9	VGA port	For Service only
10	RS-232 serial port	For Service only
11	USB ports	For Service only
12	BMC port	For Service only
13	10 Gb optical SFP (optional)	If installed, use these port for file transfers or communication with a public network. ⚠ **IMPORTANT:** If 10 Gb optical ports are installed, the onboard 10 Gb Ethernet ports (see 8) are disabled.

Key	Component	Description
14	1 Gb Ethernet for Extended file system (EFS) connections	Use these ports in two or three MediaDirector EFS configurations. DO NOT use these ports for any other purpose. License required.

MediaDirector 2252B and 2252B-DS rear panel

The MediaDirector 2252B and 2252B-DS rear panel includes connections for I/O modules, as well as 10 Gb Ethernet ports for file transfers, SAS connections for storage, and EFS connections.
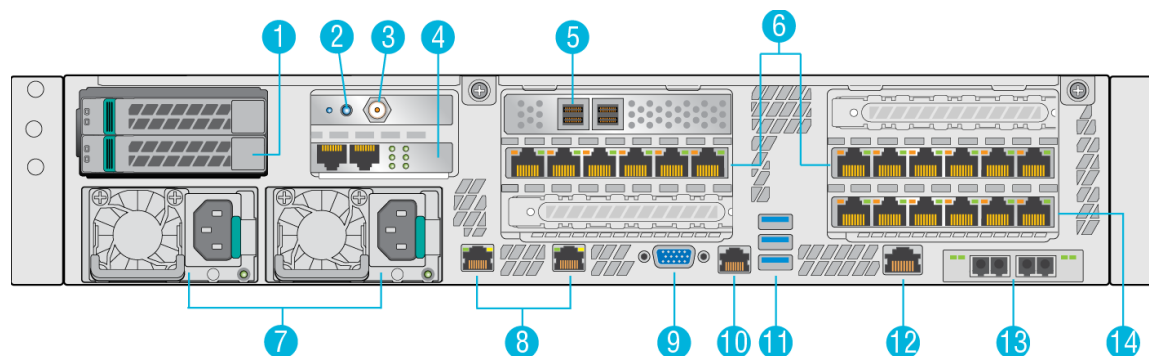
Figure 5-5: MediaDirector 2252B rear panel

Figure 5-6: MediaDirector 2252B-DS rear panel

Key	Component	Description
1	Boot drive	Top bay only
2	Power button/LED	This button/LED turns the unit On/Off. If a power cord is attached to the unit and the button is pressed, the LED flashes blue to indicate the unit is transitioning. Once the unit has fully powered up, the LED changes to solid light blue.

Key	Component	Description
3	LTC connector	Use to connect a LTC timecode source to the MediaDirector. Note that the MediaDirector LTC timecode will override the reference VITC obtained from the MediaPort.
4	1 Gb Ethernet connector and LEDs	Use for system management. Note that the Ethernet card and LED type may vary from the one show here. Refer to "1 Gb Ethernet port status LEDs (for system management)" for a description of the possible Ethernet cards and possible LEDs
5	Serial attached SCSI (SAS) connectors	Use for MediaStore 5000 series connections
6	MediaPort Ethernet array	Use these ports only to connect to MediaPorts, ChannelPorts, and Spectrum X devices. DO NOT use these ports for any other purpose, including plugging directly into a network.
7	Power supplies (0, 1 from left to right)	Two power supplies, each including an independent AC connector, are located on the left-hand side of the rear panel. If one supply fails, the load is transferred to the remaining supply without interruption to service. To take full advantage of the redundant supplies, use separate, isolated power sources for each AC input.
8	10 Gb Ethernet ports (1, 2 from left to right)	Use for file transfers or communication with a public network. ⚠ **IMPORTANT:** Use only a CAT 6 Ethernet cable or better for these network interfaces. For lengths between 37m and 100m, or greater, use CAT 6a.
9	VGA port	For Service only
10	RS-232 serial port	For Service only
11	USB ports	For Service only
12	BMC port	For Service only
13	10 Gb optical SFP (optional)	If installed, use these port for file transfers or communication with a public network. ⚠ **IMPORTANT:** If 10 Gb optical ports are installed, the onboard 10 Gb Ethernet ports (see 8) are disabled.

Key	Component	Description
14	1 Gb Ethernet for Extended file system (EFS) connections	Use these ports in two or three MediaDirector EFS configurations. DO NOT use these ports for any other purpose. License required.

1 Gb Ethernet port status LEDs (for system management)

The MediaDirector and MediaCenter may include one of the two Ethernet cards described in this section.
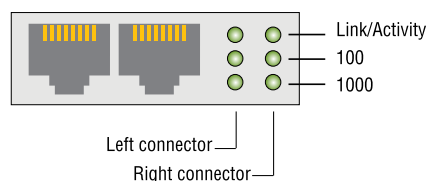
Figure 5-7: 1 Gb Ethernet port LEDs (green)

LED	State
Link/Activity	On with any link, blinks on activity
100	On with 100 Mbps link
1000	On with 1 Gbps link
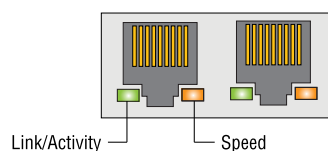
Figure 5-8: 1 Gb Ethernet port LEDs (green, amber, yellow)

LED/State	Condition
Link/Activity: green	1 Gbps
Link/Activity: off	No link
Speed: amber	1 Gbps
Speed: green	100 Mbps
Speed: off	Inactive or 10 Mbps

1 Gb Ethernet LED states (for EFS connections)

Six 1 Gb Ethernet ports are provided for connecting up to three additional MediaDirectors in an Extended File System (EFS) configuration.
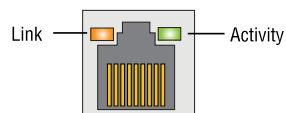
Figure 5-9: 1 Gb Ethernet LED states (for EFS connections)

LED/state	Condition
Link: green	100 Mbps
Link: amber	1 Gbps
Activity: green, blink	Normal

MediaPort Ethernet array LED states

The MediaPort Ethernet array ports provide access to MediaPort, ChannelPorts, and Spectrum X.

Do not use these ports for any purpose other than I/O module connection.

Figure 5-10: MediaPort Ethernet array LED states

LED/state	Condition
Link: amber	100 Mbps
Link: green	1 Gbps
Link: off	Inactive or 10 Mbps
Activity: green, blink	Normal

10 Gb Ethernet port LED states

The 10 Gb Ethernet ports can be used for file transfers. The LEDs provide link, activity, and link speed status.
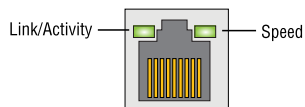
Figure 5-11: 10 Gigabit Ethernet port LED states

LED/State	Condition
Link/Activity: green (blink)	Network activity
Link/Activity: green (solid)	Network link established
Link/Activity: off	No link
Speed: green	Network traffic at 10 Gbps
Speed: amber	Network traffic at 1 Gbs
Speed: off	Network traffic at 100 Mbps or no activity

10 Gb fiber optic port LED states

The optional 10 Gb fiber optic ports can be used for file transfers. The LEDs provide link, activity, and link speed status.

LED/State	Condition
Link/Activity: green (blink)	Network activity
Link/Activity: green (solid)	Network link established
Link/Activity: off	No link
Speed: green	Network traffic at 10 Gbps
Speed: amber	Network traffic at 1 Gbs
Speed: off	Network traffic at 100 Mbps or no activity

Power supply LED states

Each power supply includes an LED to indicate the status of AC power to the system.
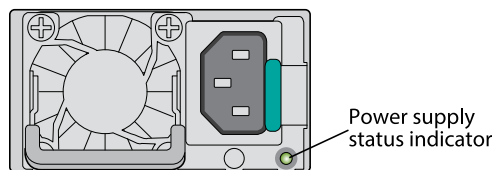
Figure 5-12: Power supply LED

LED state	Condition
Off	AC power is not connected.
Green, solid	A valid AC source is connected to the power supply, and the power supply is operational.
Green (1 Hz blink)	AC is present, but the power switch on the front panel is off or in a cold redundant state due to low system power load.
Green (2 Hz blink)	Power supply firmware updating.
Amber, blink	Power supply is operational, but experiencing a warning event.
Amber, solid	AC power is lost or a power supply is shut down.

⚠️ **CAUTION:** If two power supplies are used, they must be of the same type and have the same maximum output power.

MediaDirector 2252B/2251B specifications

Find MediaDirector 2252B/2251B specifications here.

Table 5-1: SAS connection to storage

Specification	Details
SAS HBA Control	MCP-2252B: 2 x SFF8644 Mini SAS HD connectors supporting 12 Gbps connections
	MCP-2252B-DS: 4 x SFF8644 Mini SAS HD connectors supporting 12 Gbps connections

Table 5-2: Public Ethernet ports

Specification	Details
Base: 2 × 10 Gb Ethernet	Spectrum API, Windows File System Interface (Samba), FTP, Apple Filing Protocol
Optional: 2 × 10 Gb Ethernet Optical SR	📝 **NOTE:** If 10 Gb optical ports are installed, the onboard 10 Gb Ethernet ports are disabled.

Table 5-3: MediaPort Ethernet array

Specification	Details
Private 1 Gb Ethernet	MCP-2252B: 12 ports, each for I/O module connectivity.
	MCP-2251B: 6 ports, each for I/O module connectivity.

Table 5-4: Ethernet for EFS

Specification	Details
1 Gb Ethernet	6 ports for EFS connections only

Table 5-5: Reference

Per MediaPort/ ChannelPort/ Spectrum X/	The MediaDirector can support multiple timing standards on a single system. Reference is handled by MediaPorts independently.

Table 5-6: Dimensions

Weight (including rack rails)	L x H x W (bezel attached, rack mountable per EIA-310 specification)
43.3 lbs	30.75" x 3.5" x 17.25"

Table 5-7: MediaDirector 2252B/2251B power

Specification	Detail
Power (max)	231 W
Voltage	90 to 132V and 180 to 264V
Frequency	47-63Hz

MediaDirector 2252/2251 hardware reference

The MediaDirector is the central server component of a Spectrum system. The MediaDirector 2252/2251 integrates file system, system management, communication, and all connectivity including Serial-attached SCSI (SAS) connections and Gigabit Ethernet.

About the MediaDirector 2252/2251

The MediaDirector is the core of the Spectrum system, actively managing the flow of data to and from other Spectrum components, including the MediaStore 5000 series arrays and real-time I/O modules such as the MediaPort 7000, ChannelPort, andSpectrum X.

The MediaDirector 2252 includes 12 connections for MediaPorts, ChannelPorts, and Spectrum X units, as well as 10 Gb Ethernet ports for file transfers, SAS connections for storage, and EFS connections. The MediaDirector 2251 includes 6 connections for I/O modules.

The Gigabit Ethernet connectivity is a standard implementation of high speed Ethernet for non-real time asynchronous file transfer and support of FTP, Samba, and AFP (Apple® Filing Protocol) protocols.

⚠️ **CAUTION:** MediaDirectors run on a non-standard Linux operating system. Do not edit files manually, or run Linux-type commands via the shell unless instructed to do so by Technical Support, or the product documentation. Be aware that If you manually edit files, any changes made may be overwritten when daemons restart, the system reboots, or during system upgrades. Modifying files by hand and/or running Linux-type commands may seriously impact MediaDirector functionality and performance.

📝 **NOTE:** There are no user-serviceable parts in a MediaDirector 2252/2251.

Additional information

MediaDirector 2252/2251 status LEDs

The MediaDirector 2252/2251 status LEDs indicate basic system status.

Figure 6-1: MediaDirector 2252/2251 status LEDs

1. File System

Black	⬤	File system installation not complete
Green	🟢	File system in process of coming up
Blue	🔵	(Solid) File system started, read only (Blink) File system present, halted
White	⚪	(Solid) File system started, read-write (Blink) File system present, unable to start

2. RAID

Black	⬤	RAID system initialization not complete
Green	🟢	(Solid) Rebuild(s) in process (Blink) One or more RAID sets unprotected
Blue	🔵	(Blink) RAID sets present, no file system running
White	⚪	(Solid) All RAID sets protected (Blink) File system not viable to start

3. Built-in Ethernet

Black	⬤	No ports connected
Blue	🔵	Hardware or software fault
White	⚪	(Solid) At least one port linked at 1 Gb (Blink) At least one port linked at less than 1 Gb

4. Expansion Ethernet

Black	⬤	No ports connected
Blue	🔵	Hardware or software fault
White	⚪	(Solid) No expansion card present, or at least one Ethernet port linked and all ports at maximum speed (10 Gb or 1 Gb) (Blink) At least one port linked at less than maximum speed (<10 Gb or <1 Gb)

Figure 6-2: MediaDirector 2252/2251 status LEDs

MediaDirector 2252/2251 bezel

The bezel provides power and status indicators to quickly assess the status of the device.
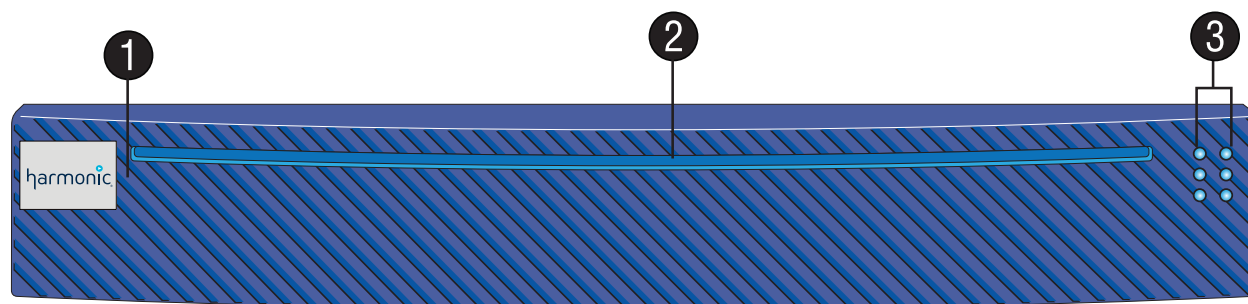
Figure 6-3: MediaDirector bezel

Key	Component	Detail
1	Air vents	Air vents provide optimum air flow from the internal fans. Do not obstruct the air vents.

Key	Component	Detail
2	Power indicator	This indicator lights when the system is powered on, and also provides a "wink" function that identifies a selected MediaDirector
3	Status LEDs	The status LEDs indicate status for the file system, RAID set,and Ethernet network connection.

MediaDirector 2252 rear panel

The MediaDirector 2252 rear panel includes 12 connections for MediaPorts, ChannelPorts, and Spectrum X units, as well as 10 Gb Ethernet ports for file transfers, SAS connections for storage, and EFS connections.
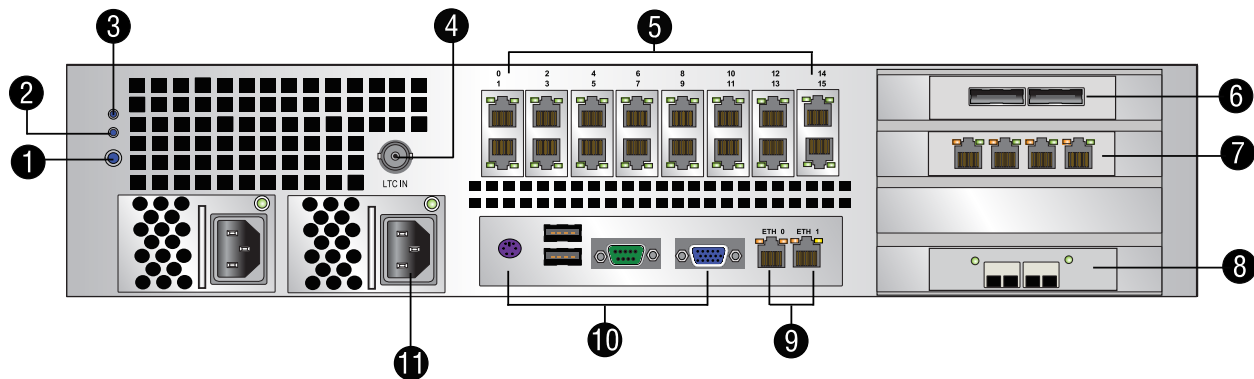
Figure 6-4: MediaDirector 2252 rear panel

Key	Component	Description
1	Power button/ LED	This button/LED turns the unit On/Off. If a power cord is attached to the unit and the button is pressed, the LED flashes blue. Once the unit has fully powered up, the LED changes to solid light blue.
2	Alt/boot	Do not use this button unless instructed to do so by Harmonic support personnel.
3	Reset button	This button operates as a momentary switch to complete a "soft" reset of the MediaDirector. Once pressed, all boards reset and code is re-loaded. The function is similar to clicking the **Reboot** button on the **Properties** page in SystemManager.
4	LTC In	Use this connector to connect a LTC timecode source to the MediaDirector. The MediaDirector LTC timecode will override the reference VITC obtained from the MediaPort.

Key	Component	Description
5	MediaPort Ethernet array	Use these ports only to connect to I/O modules (for example, MediaPort, ChannelPort, and Spectrum X). DO NOT use these ports for any other purpose. For the MediaDirector 2251, some ports are unused; do not remove the cover from those ports.
6	Serial-attached SCSI (SAS) connectors	Use these connectors to communicate between the MediaDirector and the MediaStore 5000 series.
7	1 Gb Quad Port Ethernet Card	Use these ports in two or three MediaDirector EFS configurations.
8	Network Card Slot	Depending on the model of your MediaDirector, this slot can be filled be filled with a 1 Gb Quad Port Ethernet card or a 10 Gb Dual Port Ethernet card for communication with a public network.
9	Ethernet Ports: Eth0, Eth1	Use either port to connect a SystemManager Platform or client PC to the MediaDirector. Alternatively, you can use eth0 or eth1 to a switched network
9	VGA port	For Service only
10	Connectors/ Ports	For Harmonic Service use only.
11	Redundant power supplies	Two power supplies, each including an independent AC connector, are located on the left-hand side of the rear panel. If one supply fails, the load is transferred to the remaining supply without interruption to service. To take full advantage of the redundant supplies, use separate, isolated power sources for each AC input.

MediaDirector 2251 rear panel

The MediaDirector 2251 rear panel includes 6 connections for MediaPorts, ChannelPorts, and Spectrum X units, as well as 10 Gb Ethernet ports for file transfers, SAS connections for storage, and EFS connections.
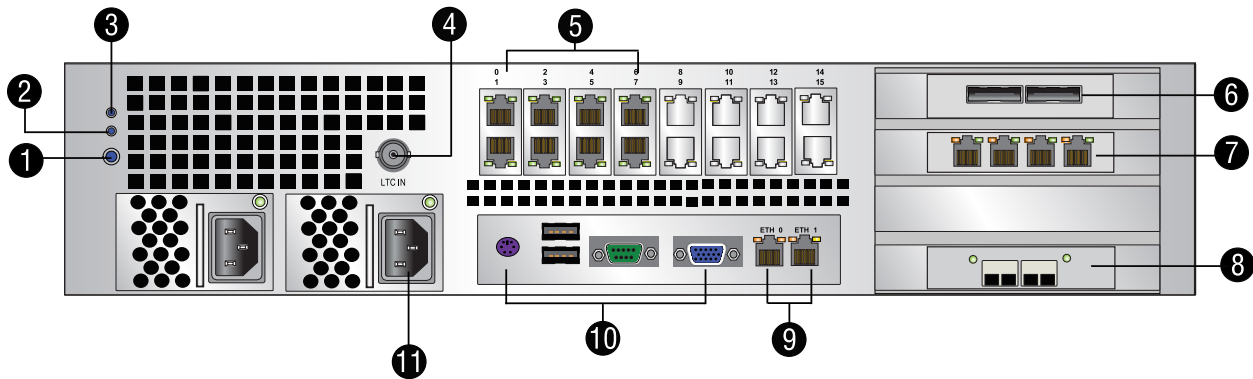
Figure 6-5: MediaDirector 2251 rear panel
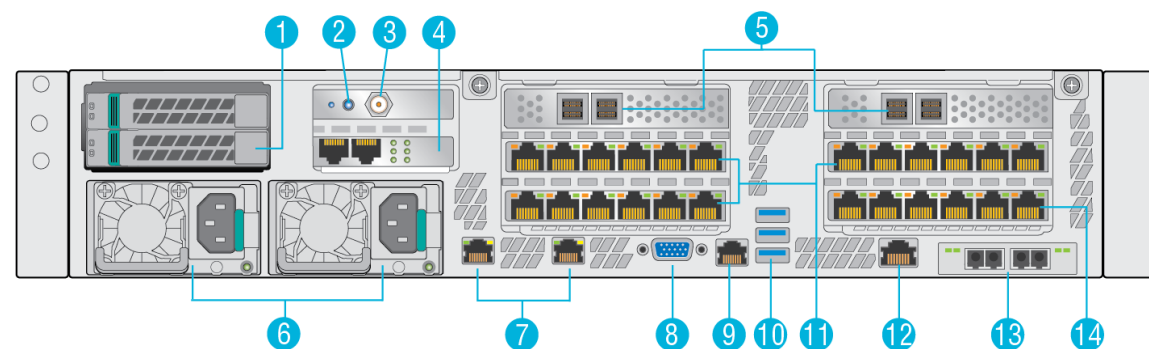
Key	Component	Description
1	Power button/ LED	This button/LED turns the unit On/Off. If a power cord is attached to the unit and the button is pressed, the LED flashes blue. Once the unit has fully powered up, the LED changes to solid light blue.
2	Alt/boot	Do not use this button unless instructed to do so by Harmonic support personnel.
3	Reset button	This button operates as a momentary switch to complete a "soft" reset of the MediaDirector. Once pressed, all boards reset and code is re-loaded. The function is similar to clicking the **Reboot** button on the **Properties** page in SystemManager.
4	LTC In	Use this connector to connect a LTC timecode source to the MediaDirector. The MediaDirector LTC timecode will override the reference VITC obtained from the MediaPort.
5	MediaPort Ethernet array	Use these ports only to connect to I/O modules (for example, MediaPort, ChannelPort, and Spectrum X). DO NOT use these ports for any other purpose. For the MediaDirector 2251, some ports are unused; do not remove the cover from those ports.
6	Serial-attached SCSI (SAS) connectors	Use these connectors to communicate between the MediaDirector and the MediaStore 5000 series.
7	1 Gb Quad Port Ethernet Card	Use these ports in two or three MediaDirector EFS configurations.

Key	Component	Description
8	Network Card Slot	Depending on the model of your MediaDirector, this slot can be filled be filled with a 1 Gb Quad Port Ethernet card or a 10 Gb Dual Port Ethernet card for communication with a public network.
9	Ethernet Ports: Eth0, Eth1	Use either port to connect a SystemManager Platform or client PC to the MediaDirector. Alternatively, you can use eth0 or eth1 to a switched network
9	VGA port	For Service only
10	Connectors/ Ports	For Harmonic Service use only.
11	Redundant power supplies	Two power supplies, each including an independent AC connector, are located on the left-hand side of the rear panel. If one supply fails, the load is transferred to the remaining supply without interruption to service. To take full advantage of the redundant supplies, use separate, isolated power sources for each AC input.

1 Gb Ethernet port LED states

Use either of the Ethernet ports labeled Eth 0 and Eth 1 on the rear panel of the MediaDirector 2252/2251to connect a SystemManager Platform or client PC to the MediaDirector.

Alternatively, you can use Eth 0 or Eth 1 to connect to a switched network.
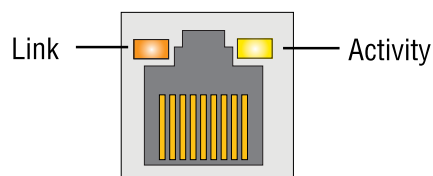
Figure 6-6: 1 Gb Ethernet port LEDs

LED/state	Condition
Link: amber	1 Gbps
Link: green	100 Mbps
Link: off	Inactive, or 10 Mbps
Activity: yellow, blink	Normal

MediaPort Ethernet array LED states

The MediaPort Ethernet array ports provide access to MediaPort, ChannelPorts, and Spectrum X.

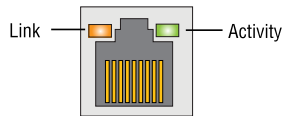Do not use these ports for any purpose other than I/O module connection.

Figure 6-7: MediaPort Ethernet array LED states

LED/state	Condition
Link: amber	100 Mbps
Link: green	1 Gbps
Link: off	Inactive or 10 Mbps
Activity: green, blink	Normal

1 Gb quad port Ethernet card LED states

Use these ports in two or three MediaDirector extended file system (EFS) configurations.
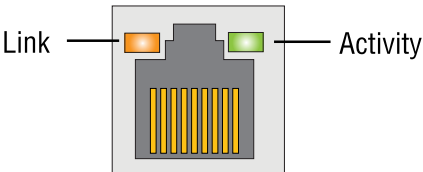
Figure 6-8: 1 Gb Quad port Ethernet card LEDs

LED/state	Condition
Link: amber	100 Mbps
Link: green	1 Gbps
Link: off	Inactive or 10 Mbps
Activity: green, blink	Normal

10 Gb dual port Ethernet card LED states

The location off the LED on the 10 Gb dual port Ethernet card may vary according to model.

The following shows one example of a 10 Gb dual port Ethernet card.

Figure 6-9: 10Gb dual port Ethernet card LEDs

LED/state	Condition
Off	No link

LED/state	Condition
Green, blink	Link established and network activity

Power supply LED states

Each power supply includes an LED to indicate the status of AC power to the system.

Power supply status indicator

Figure 6-10: Power supply LED

LED state	Condition
Off	Power off
Green, solid	Power on
Green, blink	Power attached, unit on standby
Red, solid	Power supply failure

MediaDirector 2252/2251 specifications

Find MediaDirector 2252/2251 specifications here.

Table 6-1: SAS connection to storage

Specification	Details
SAS HBA Control	2 x SFF-8088 Mini SAS HD connectors supporting 6 Gbps connections

Table 6-2: Public Ethernet ports

Specification	Details
Base: 2 × 1 Gb Ethernet Models: • MCP-2251-41C: 4 × 1 Gb Ethernet • MCP-2251-2XO: 2 × 10 Gb Ethernet Optical SR • MCP-2252-41C: 4 × I Gb Ethernet • MCP-2252-2XO: 2 × 10 Gb Ethernet Optical SR	Spectrum API, Windows File System Interface (Samba), FTP, Apple Filing Protocol

Table 6-3: MediaPort Ethernet array

Specification	Details
Private 1 Gb Ethernet	MCP-2252: 16 ports, each for I/O module connectivity.
	MCP-2251: 8 ports, each for I/O module connectivity.

Table 6-4: Ethernet for EFS

Specification	Details
1 Gb Ethernet	4 ports for EFS connections only

Table 6-5: Reference

Per I/O module	The MediaDirector can support multiple timing standards on a single system. Reference is handled by the I/O module (for example, MediaPort) independently.

Table 6-6: Dimensions and power

Specification	Detail
Height	8.9 cm (3.5") 2RU
Width	44.5 cm (17.15") Chassis only, IEC rack compliant
Depth	64.7 cm (25.5 in.)

Specification	Detail
Weight	MCP-2252: 12 kg (26.f lbs)
	MCP-2251: 11.6 kg (25.5 lbs)

Table 6-7: MediaDirector 2252/2251 power

Specification	Detail
Power (max)	Max 350 W (dual redundant power supplies)
Voltage	100-240 VAC rated
Frequency	50-60 Hz

Table 6-8: Environmental

Specification	Detail
Temperature range	+5° to +40° C (41° to 104° F)
Humidity	10% to 80%

MediaCenter 2200B hardware reference

The Spectrum MediaCenter is a media server and media store combined in a compact 2-RU chassis.

It provides file system and communication management for video and audio ingest and playout activities. MediaCenter coordinates connectivity between external Spectrum MediaPorts, ChannelPorts, or Spectrum X and the integrated storage subsystem.

- *About the MediaCenter 2200B*
- *MediaCenter 2200B bezel*
- *MediaCenter 2200B status LEDs*
- *MediaCenter 2200B rear panel*
- *About MediaCenter 2200B storage*
- *MediaCenter 2200B specifications*

About the MediaCenter 2200B

The MediaCenter 2200B provides a compact media server solution for up to 24 channels, and up to 32-TB of usable storage.

Up to 10 Spectrum MediaPorts, ChannelPorts, or Spectrum X devices can be connected to the MediaCenter for real-time ingest and playout of video and audio content.

Internal storage, via SAS disk drives, uses secure RAID-6 topology with dual-parity protection.

The Gigabit Ethernet connectivity is a standard implementation of high speed Ethernet for non-real time asynchronous file transfer and support of FTP, Samba, and AFP (Apple® Filing Protocol) protocols.

⚠️ **CAUTION:** MediaCenter run on a non-standard Linux operating system. Do not edit files manually, or run Linux-type commands via the shell unless instructed to do so by Technical Support, or the product documentation. Be aware that If you manually edit files, any changes made may be overwritten when daemons restart, the system reboots, or during system upgrades. Modifying files by hand and/or running Linux-type commands may seriously impact functionality and performance.

📝 **NOTE:** There are no user-serviceable parts in a MediaCenter 2200B.

Additional information

MediaCenter 2200B bezel

The bezel provides power and status indicators to quickly assess the status of the device.
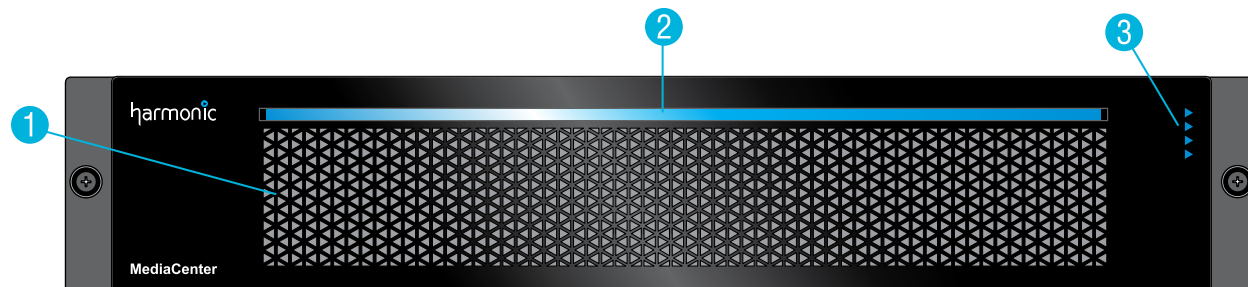
Figure 7-1: MediaCenter 2200B bezel

Key	Component	Detail
1	Air vents	Air vents provide optimum air flow from the internal fans. Do not obstruct the air vents.
2	Power indicator	This indicator lights when the system is powered on, and also provides a "wink" function that identifies a selected MediaCenter.
3	Status LEDs	The status LEDs indicate status for the file system, RAID set,and Ethernet network connection.

MediaDirector 2252B/2251B and MediaCenter 2200B front panel buttons

Power and reset buttons are provided on the right-hand rack ear behind the bezel. To access them, remove the bezel by loosening the captive thumb screws and pulling the bezel straight back.

📝 **NOTE:** The physical buttons are only accessible with the use of a small tipped tool.

Figure 7-2: Front panel buttons

Key	Component	Description
1	Power button	Turns the unit On/Off. For use only if you are unable to use SystemManager to power down the system.
2	Reset button	Operates as a momentary switch to complete a "soft" reset of the MediaDirector or MediaCenter. Once pressed, all boards reset and code is re-loaded. The function is similar to clicking the **Reboot** button on the **Properties** page for your Spectrum video server in SystemManager. For use only if you are unable to use SystemManager to restart the system.

MediaCenter 2200B status LEDs

The MediaCenter 2200B status LEDs indicate basic system status.

File system indicator

Off	No file system
Green	File system coming up
Dark blue	(Solid) File system started, read-only (Blink) File system present, halted
Light blue	(Solid) File system started, read-write (Blink) File system present, unable to start

1 Gb Ethernet (system management)

Off	No ports connected
Dark blue	(Solid) At least one connected port not assigned an IP address (Blink) Hardware or software fault
Light blue	(Solid) At least one port linked at 1 Gb or more (Blink) At least one port linked at less than 1 Gb

Raid set indicator

Off	No RAID sets, or file system unavailable
Yellow	(Solid) Rebuild(s) in proces (Blink) One or more RAID sets unprotected
Dark blue	(Blink) RAID sets present, no file system
Light blue	(Solid) All RAID sets protected (non-compromised) (Blink) File system not viable to start

10 Gb Ethernet (file transfers)

Off	No ports connected
Dark blue	(Solid) At least one connected port not assigned an IP address (Blink) Hardware or software fault
Light blue	(Solid) At least one Ethernet port linked and all ports at maximum speed (10 Gb) (Blink) At least one port linked at less than 10 Gb

Figure 7-3: MediaCenter 2200B status LEDs

MediaCenter 2200B rear panel

The MediaCenter 2200B rear panel includes connections for MediaPorts, ChannelPorts, and Spectrum X units, and 10 Gb Ethernet ports for file transfers.
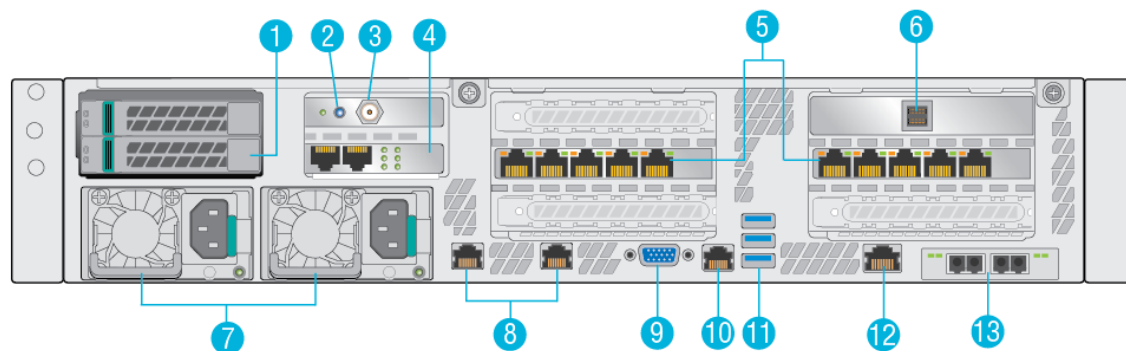
Figure 7-4: MediaCenter 2200B rear panel

Key	Component	Description
1	Boot drive	Top bay only
2	Power button/LED	This button/LED turns the unit On/Off. If a power cord is attached to the unit and the button is pressed, the LED flashes blue to indicate the unit is transitioning. Once the unit has fully powered up, the LED changes to solid light blue.

Key	Component	Description
3	LTC connector	Use to connect a LTC timecode source to the MediaCenter. Note that the MediaCenter LTC timecode will override the reference VITC obtained from the MediaPort.
4	1 Gb Ethernet connector and LEDs	Use for system management. Note that the Ethernet card and LED type may vary from the one show here. Refer to "1 Gb Ethernet port status LEDs (for system management)" for a description of the possible Ethernet cards and possible LEDs
5	MediaPort Ethernet array	Use these ports only to connect to MediaPorts, ChannelPorts, and Spectrum X devices. DO NOT use these ports for any other purpose, including plugging directly into a network.
6	Serial-attached SCSI (SAS) connector	Use to connect to a MediaStore 7200.
7	Power supplies (0, 1 from left to right)	Two power supplies, each including an independent AC connector, are located on the left-hand side of the rear panel. If one supply fails, the load is transferred to the remaining supply without interruption to service. To take full advantage of the redundant supplies, use separate, isolated power sources for each AC input.
8	10 Gb Ethernet ports (1, 2 from left to right)	Use for file transfers or communication with a public network.
9	VGA port	For Service only
10	RS-232 serial port	For Service only
11	USB ports	For Service only
12	BMC port	For Service only
13	10 Gb optical SFP (optional)	If installed, use these port for file transfers or communication with a public network. ⚠ **IMPORTANT:** If 10 Gb optical ports are installed, the onboard 10 Gb Ethernet ports (see 8) are disabled.

1 Gb Ethernet port status LEDs (for system management)

The MediaDirector and MediaCenter may include one of the two Ethernet cards described in this section.
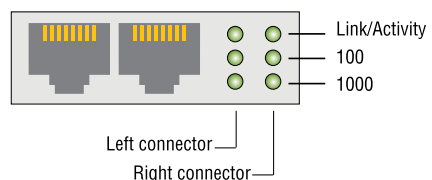
Figure 7-5: 1 Gb Ethernet port LEDs (green)

LED	State
Link/Activity	On with any link, blinks on activity
100	On with 100 Mbps link
1000	On with 1 Gbps link
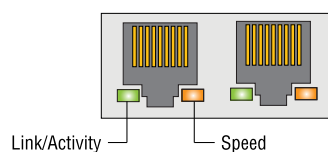
Figure 7-6: 1 Gb Ethernet port LEDs (green, amber, yellow)

LED/State	Condition
Link/Activity: green	1 Gbps
Link/Activity: off	No link
Speed: amber	1 Gbps
Speed: green	100 Mbps
Speed: off	Inactive or 10 Mbps

10 Gb Ethernet port LED states

The 10 Gb Ethernet ports can be used for file transfers. The LEDs provide link, activity, and link speed status.
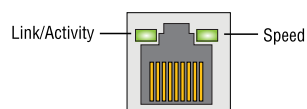
Figure 7-7: 10 Gigabit Ethernet port LED states

LED/State	Condition
Link/Activity: green (blink)	Network activity
Link/Activity: green (solid)	Network link established
Link/Activity: off	No link

LED/State	Condition
Speed: green	Network traffic at 10 Gbps
Speed: amber	Network traffic at 1 Gbs
Speed: off	Network traffic at 100 Mbps or no activity

10 Gb fiber optic port LED states

The optional 10 Gb fiber optic ports can be used for file transfers. The LEDs provide link, activity, and link speed status.

Link/Activity   Speed

LED/State	Condition
Link/Activity: green (blink)	Network activity
Link/Activity: green (solid)	Network link established
Link/Activity: off	No link
Speed: green	Network traffic at 10 Gbps
Speed: amber	Network traffic at 1 Gbs
Speed: off	Network traffic at 100 Mbps or no activity

MediaPort Ethernet array LED states

The MediaPort Ethernet array ports provide access to MediaPort, ChannelPorts, and Spectrum X.

Do not use these ports for any purpose other than I/O module connection.
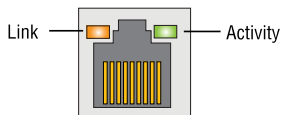
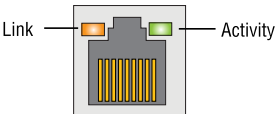Link   Activity

Figure 7-8: MediaPort Ethernet array LED states

LED/state	Condition
Link: amber	100 Mbps
Link: green	1 Gbps
Link: off	Inactive or 10 Mbps
Activity: green, blink	Normal

Power supply LED states

Each power supply includes an LED to indicate the status of AC power to the system.
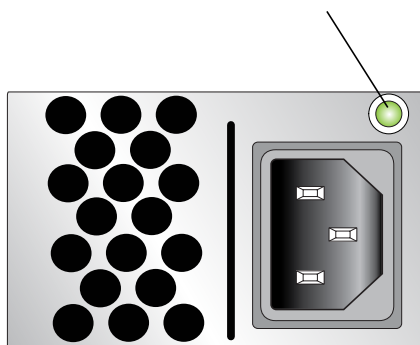

Power supply
status indicator
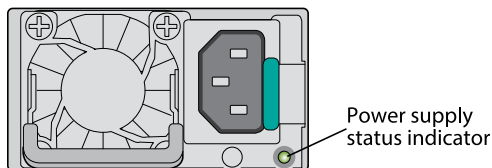
Figure 7-9: Power supply LED

LED state	Condition
Off	AC power is not connected.
Green, solid	A valid AC source is connected to the power supply, and the power supply is operational.
Green (1 Hz blink)	AC is present, but the power switch on the front panel is off or in a cold redundant state due to low system power load.
Green (2 Hz blink)	Power supply firmware updating.
Amber, blink	Power supply is operational, but experiencing a warning event.
Amber, solid	AC power is lost or a power supply is shut down.

⚠ **CAUTION:** If two power supplies are used, they must be of the same type and have the same maximum output power.

About MediaCenter 2200B storage

The MediaCenter 2200B provides 12 hot-swappable disk drives in a 2 x (4 +2) RAID set, and up to 48 TB of usable storage.

Refer to the following table for supported RAID configurations.

Table 7-1: MediaCenter 2200B RAID configurations

Drives	RAID set	Capacity per drive	Storage capacity
12 SAS	2 x (4+2)	6 TB	48 TB
12 SAS	2 x (4+2)	4 TB	32 TB
12 SAS	2 x (4+2)	2 TB	16 TB

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

In SystemManager, use the "One-Click" function to create the file system and RAID set, and initialize the file system. Follow the instructions in "Using One-Click Functions" in the *Harmonic SystemManager User Guide*.

Refer to the following image to identify the numbering of drives.
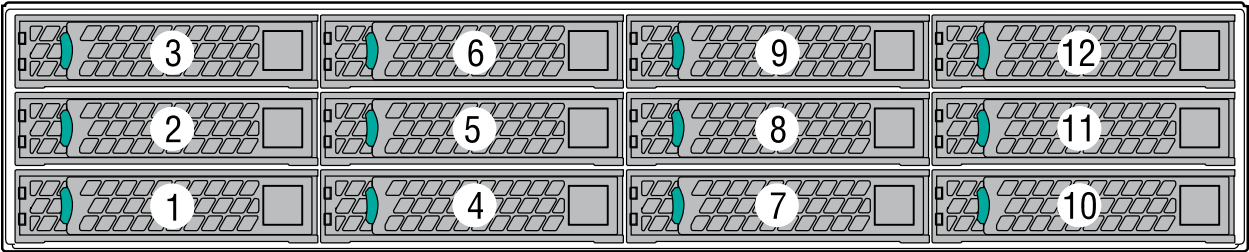
Figure 7-10: MediaCenter 2200B drive numbering

MediaCenter 2200B drive LEDs

Each drive includes a status and activity LED, which provide information on the RAID set state, drive usage or faults, and a wink capability.
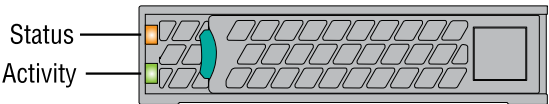
Figure 7-11: Drive LEDs

Table 7-2: Status LED (amber)

State	Description
Solid	Hard drive fault
Blink, 1 Hz	RAID rebuild in progress
Blink, 2 Hz	Drive being winked
Off	No access and no fault

Table 7-3: Activity LED (green)

State	Description
Solid	Power on, no drive activity
Blink off when processing command	Power on with drive activity
Off	Power on and drive spun down
Blink	Power on and drive spinning up

Additional information

Gathering drive failure information *on page 266*

MediaCenter 2200B specifications

Find MediaCenter 2200B specifications here.

Table 7-4: Public Ethernet ports

Specification	Details
2 × 10 Gb Ethernet Optional: 2 × 10 Gb Ethernet Optical SR	Spectrum API, Windows File System Interface (Samba), FTP, Apple Filing Protocol 📝 **NOTE:** If 10 Gb optical ports are installed, the onboard 10 Gb Ethernet ports are disabled.

Table 7-5: MediaPort Ethernet array

Specification	Details
Private 1 Gb Ethernet	10 ports available for MediaPort/ChannelPort/Spectrum X connectivity.

Table 7-6: Reference

Per MediaPort/ ChannelPort/ Spectrum X/	The MediaCenter can support multiple timing standards on a single system. Reference is handled by MediaPorts independently.

Table 7-7: Dimensions

Weight (including rack rails)	L x H x W (bezel attached, rack mountable per EIA-310 specification)
64.5 lbs	30.75" x 3.5" x 17.25"

Table 7-8: MediaCenter 2200B power

Specification	Detail
Power (max)	440 W
Voltage	90 to 132V and 180 to 264V
Frequency	47-63Hz

MediaCenter 2200A and 2200 hardware reference

The Spectrum MediaCenter is a media server and media store combined in a compact 2-RU chassis. It provides file system and communication management for video and audio ingest and playout activities.

- *About the MediaCenter 2200A and 2200*
- *MediaCenter 2200A and 2200 bezel*
- *MediaCenter 2200A and 2200 status LEDs*
- *About MediaCenter 2200A and 2200 storage*
- *MediaCenter 2200A rear panel*
- *MediaCenter 2200 rear panel*
- *MediaCenter 2200A and 2200 specifications*

About the MediaCenter 2200A and 2200

The Spectrum MediaCenter is a media server and media store combined in a compact 2-RU chassis. It

The MediaCenter coordinates connectivity between external Spectrum I/O modules (for example, MediaPorts) and the integrated storage subsystem. Connection to I/O modules and public IP is via Gigabit Ethernet. Internal storage, via SATA disk drives or solid-state drives (SSD), uses secure RAID-6 topology with dual-parity protection.

Up to 10 I/O modules can be connected to the MediaCenter for real-time ingest and playout of video and audio content. I/O modules supporting different media formats can be connected to the same MediaCenter to share its common file system.

⚠ **CAUTION:** MediaCenters run on a non-standard Linux operating system. Do not edit files manually, or run Linux-type commands via the shell unless instructed to do so by Technical Support, or the product documentation. Be aware that If you manually edit files, any changes made may be overwritten when daemons restart, the system reboots, or during system upgrades. Modifying files by hand and/or running Linux-type commands may seriously impact functionality and performance.

📄 **NOTE:** There are no user-serviceable parts in a MediaCenter.

MediaCenter 2200A and 2200 bezel

The bezel provides power and status indicators to quickly assess the status of the device.
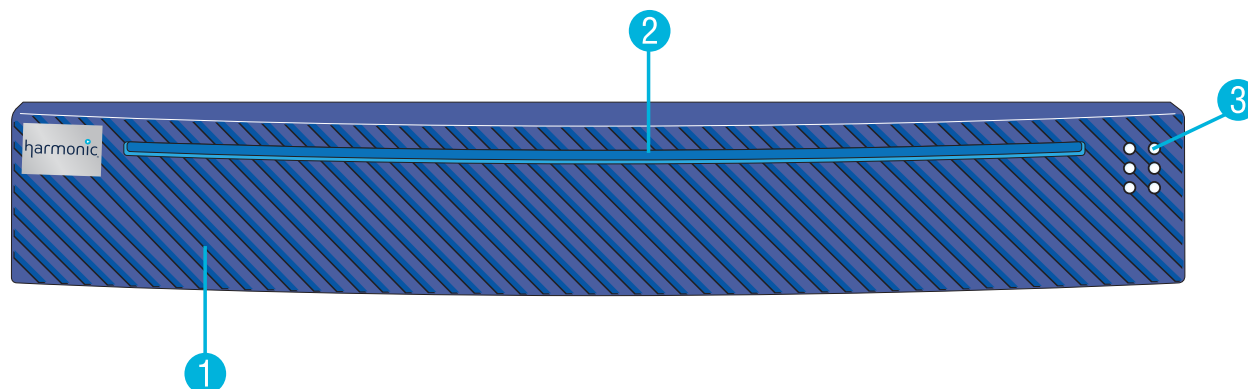
Figure 8-1: MediaCenter bezel

Key	Component	Detail
1	Air vents	Air vents provide optimum air flow from the internal fans. Do not obstruct the air vents.
2	Power indicator	This indicator lights when the system is powered on, and also provides a "wink" function that identifies a selected MediaCenter.
3	Status LEDs	The status LEDs indicate status for the file system, RAID set,and Ethernet network connection.

MediaCenter 2200A and 2200 status LEDs

The status LEDs provide basic system status.
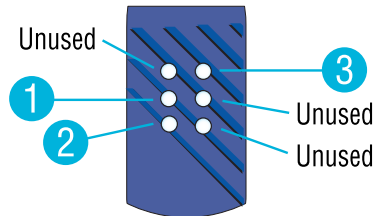
1. File System

Black	●	No file system
Green	○	(Solid) File system in process of coming up
Blue	○	(Solid) File system started, read only
		(Blink) File system present, halted
White	○	(Solid) File system started, read-write
		(Blink) File system present, unable to start

2. RAID

Black	●	No RAID sets or file system unavailable
Green	○	(Solid) Rebuild(s) in proces
		(Blink) One or more RAID sets unprotected
Blue	○	(Blink) RAID sets present, no file system
White	○	(Solid) All RAID sets protected (non-compromised)
		(Blink) File system not viable to start

3. Built-in Ethernet

Black	●	No ports connected
Blue	○	(Solid) At least one connected port not assigned an IP address
		(Blink) Hardware or software fault
White	○	(Solid) At least one port linked at 1 Gb
		(Blink) At least one port linked at less than 1 Gb

Figure 8-2: MediaCenter 2200A and 2200 status LEDs

About MediaCenter 2200A and 2200 storage

The MediaCenter provides 12 hot-swappable disk drives in a 2 x (4 +2) RAID set, and up to 32 TB of usable storage.

The MediaCenter features either SATA disk drives or SSDs in various RAID 6 topologies capable of 32 TB of usable storage. Drives are hot swappable from the front of the chassis by first removing the bezel. Refer to MediaCenter Component Replacement for detailed instructions.

Refer to the following table for supported RAID configurations.

Table 8-1: MediaCenter RAID configurations

Drives	RAID set	Capacity per drive	Storage capacity
12 SAS	2 x (4+2)	4 TB	32 TB
12 SATA	2 x (4+2)	2 TB	16 TB
12 SATA	2 x (4+2)	1 TB	8 TB
12 SSD	2 x (5+1)	480 GB	4.8 TB
6 SSD	1 x (5+1)	480 GB	2.4

The figure below shows the order of disks in the disk drive array and the states for the drive LEDs.
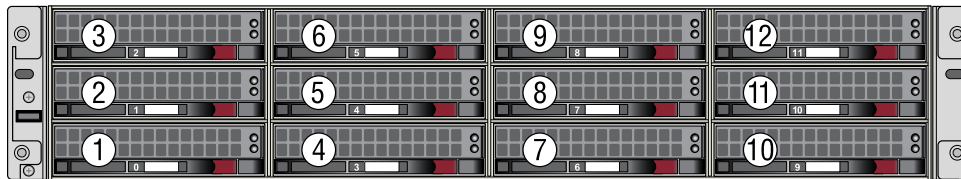
Figure 8-3: MediaCenter 2200A drive numbering

MediaCenter 2200A and 2200 drive LEDs

Each drive includes a status and activity LED, which provide information on the RAID set state, drive usage or faults, and a wink capability.
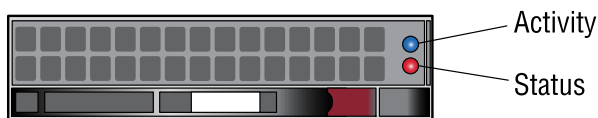
Figure 8-4: MediaCenter 2200A and 2200 drive LEDs

Table 8-2: Activity LED (blue)

State	Description
Solid	Drive is powered on
Off	No power is provided to the drive
Blink	Drive activity

Table 8-3: Status LED (red)

State	Description
Solid	Drive is not being used by the unit
Blink	Drive failure or drive is being winked
Two rapid blinks then pause	Drive is being rebuilt
Off	Drive state is normal

Additional information

Gathering drive failure information *on page 266*

MediaCenter 2200A rear panel

The MediaCenter 2200A rear panel includes connections for MediaPorts, ChannelPorts, and Spectrum X units, and 10 Gb Ethernet ports for file transfers.
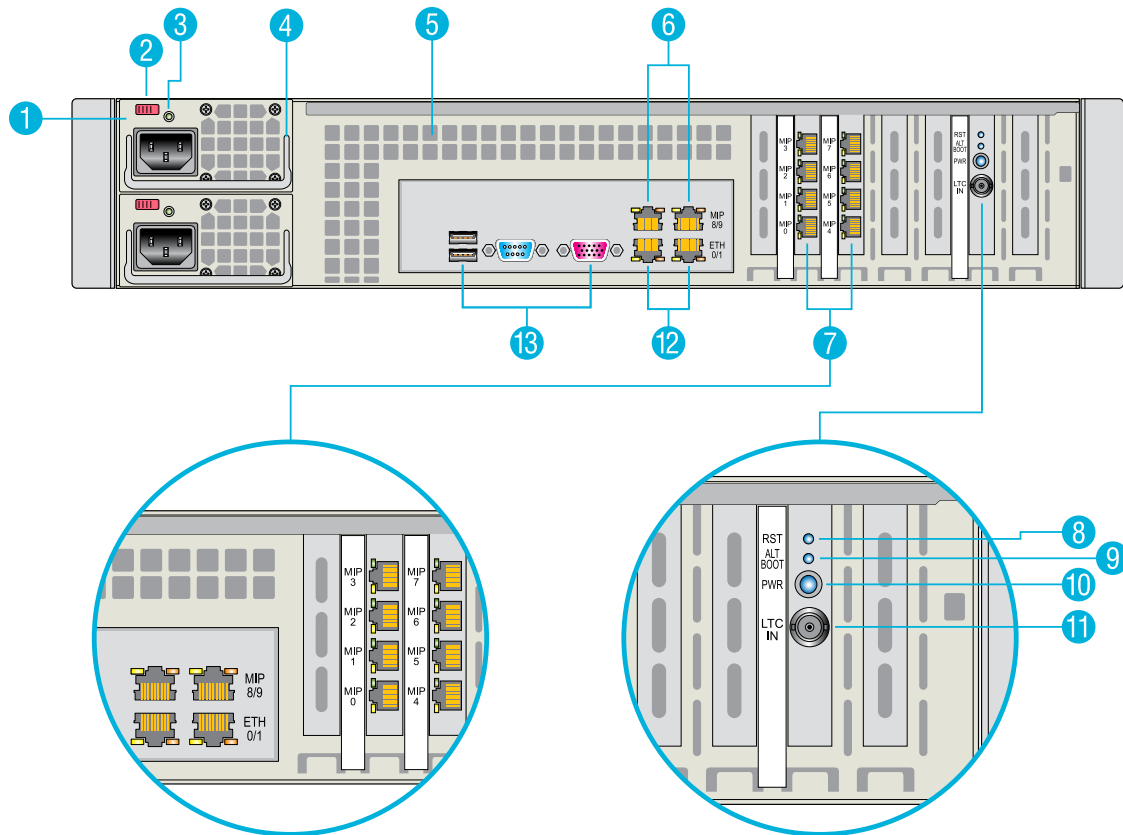
Figure 8-5: MediaCenter 2200A rear panel

Key	Component	Description
1	Redundant Power Supply	Two Redundant Power Supplies are provided, each with an independent AC In connector. If one supply fails, the load is transferred to the remaining supply without interruption to service. To take full advantage of the redundant supplies, Harmonic recommends that you use separate, isolated power sources for each AC input.
2	Power Supply Release	Use to release the power supply unit from the chassis before removing the unit from the chassis.
3	Power Supply LED	This LED indicates the state of the power supply
4	Power Supply Unit Handle	Use this handle to pull the power supply unit away from the chassis.

Key	Component	Description
5	Air Vents	An array of air vents provide airflow from the internal fans. For optimum results, do not obstruct the air vents.
6	For I/O module connection or file transfers depending on configuration	Use these Ethernet interfaces for connection to I/O modules or, depending on the configuration in SystemManager, for files transfers using FTP, Samba, and AFP protocols. For configration details, see "Configuring Ethernet Interfaces" in the *SystemManagerSystemManager User Guide*.
7	MediaPort Ethernet Array and LEDs	Use these connectors for additional communication between the MediaCenter and I/O modules. DO NOT use these ports for any other purpose, including plugging directly into a network.
8	Reset Button	This button operates as a momentary switch to complete a "soft" reset of the MediaCenter. Once pressed, all boards reset and code is re-loaded. The function is similar to clicking the **Reboot** button on the **Properties** page in SystemManager.
9	Alt/Boot Button	The Alt/Boot button allows Harmonic Service to boot the MediaCenter from an alternate USB boot device on the network.
10	Power Button/ LED	This button/LED turns the unit On/Off. If a power cord is attached to the unit and the button is pressed, the LED flashes blue. The unit is transitioning. Once the unit has fully powered up, the LED changes to solid light blue.
11	LTC in	Use to connect a LTC timecode source to the MediaCenter for automation purposes. Note that the MediaCenter LTC timecode will override the reference VITC obtained from the I/O module
12	Ethernet Ports and LEDs (ETH0: left, ETH1: right)	Use ETH0 to connect a SystemManager Platform or client PC to the MediaCenter. Eth0 can also be used for BMC control. Use either ETH0 or ETH1 for general networking purposes such as file transfer, for failover, or to connect to Final Cut Pro. Refer to "Configuring the Ethernet Interfaces on a MediaCenter" in the *SystemManager User Guide* for more information.
13	For Service only	Use only if instructed by Harmonic Service.

MediaCenter 2200 rear panel

The MediaCenter 2200 rear panel includes connections for MediaPort, ChannelPorts, and Spectrum X units, and 10 Gb Ethernet ports for file transfers.
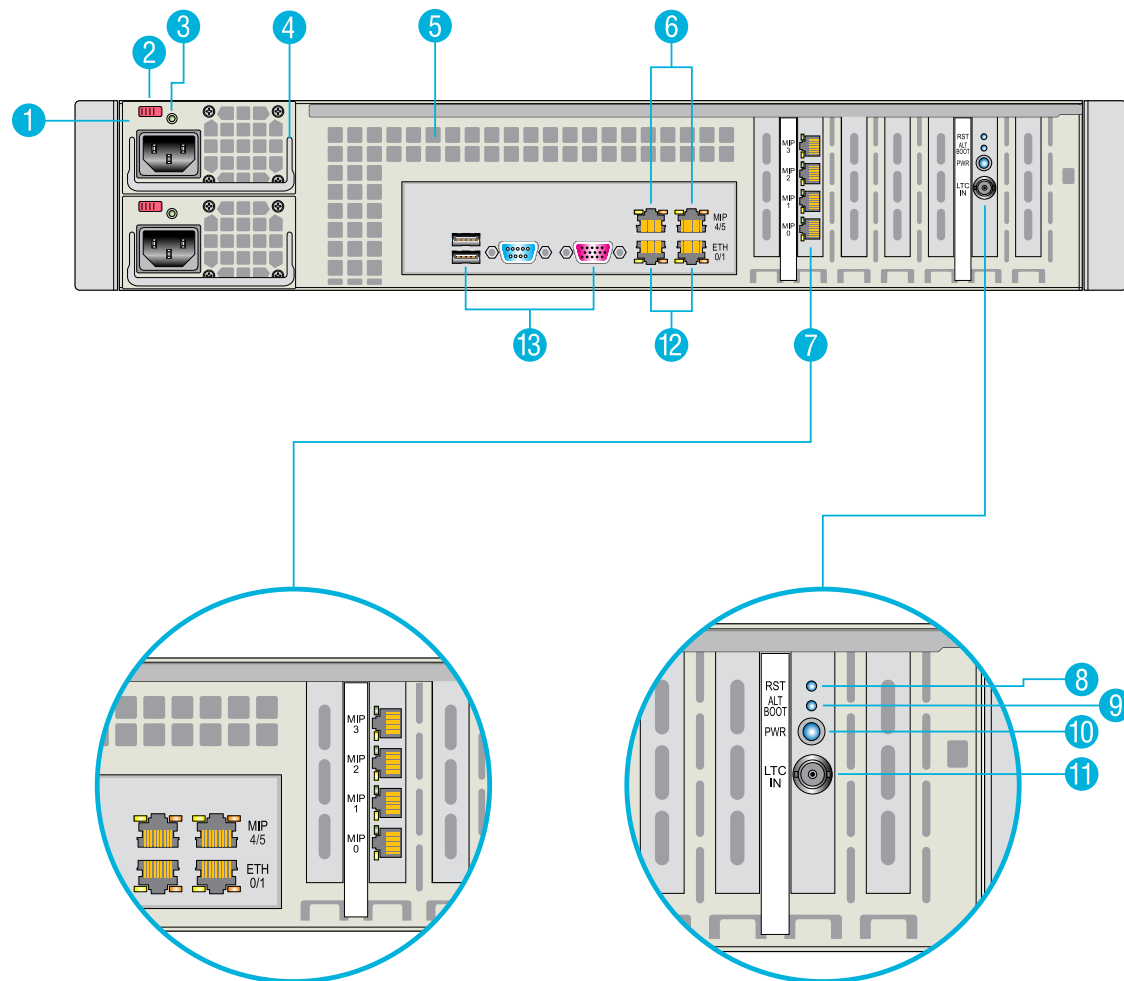
Figure 8-6: MediaCenter 2200 rear panel

Key	Component	Description
1	Redundant Power Supply	Two Redundant Power Supplies are provided, each with an independent AC In connector. If one supply fails, the load is transferred to the remaining supply without interruption to service. To take full advantage of the redundant supplies, Harmonic recommends that you use separate, isolated power sources for each AC input.
2	Power Supply Release	Use to release the power supply unit from the chassis before removing the unit from the chassis.
3	Power Supply LED	This LED indicates the state of the power supply

Key	Component	Description
4	Power Supply Unit Handle	Use this handle to pull the power supply unit away from the chassis.
5	Air Vents	An array of air vents provide airflow from the internal fans. For optimum results, do not obstruct the air vents.
6	For I/O module connection or file transfers depending on configuration	Use these Ethernet interfaces for connection to I/O modules or, depending on the configration in SystemManager, for files transfers using FTP, Samba, and AFP protocols. For configration details, see "Configuring Ethernet Interfaces" in the *SystemManagerSystemManager User Guide*.
7	MediaPort Ethernet Array and LEDs	Use these connectors for additional communication between the MediaCenter and I/O modules. DO NOT use these ports for any other purpose, including plugging directly into a network.
8	Reset Button	This button operates as a momentary switch to complete a "soft" reset of the MediaCenter. Once pressed, all boards reset and code is re-loaded. The function is similar to clicking the **Reboot** button on the **Properties** page in SystemManager.
9	Alt/Boot Button	The Alt/Boot button allows Harmonic Service to boot the MediaCenter from an alternate USB boot device on the network.
10	Power Button/ LED	This button/LED turns the unit On/Off. If a power cord is attached to the unit and the button is pressed, the LED flashes blue. The unit is transitioning. Once the unit has fully powered up, the LED changes to solid light blue.
11	LTC in	Use to connect a LTC timecode source to the MediaCenter for automation purposes. Note that the MediaCenter LTC timecode will override the reference VITC obtained from the I/O module
12	Ethernet Ports and LEDs (ETH0: left, ETH1: right)	Use ETH0 to connect a SystemManager Platform or client PC to the MediaCenter. Eth0 can also be used for BMC control. Use either ETH0 or ETH1 for general networking purposes such as file transfer, for failover, or to connect to Final Cut Pro. Refer to "Configuring the Ethernet Interfaces on a MediaCenter" in the *SystemManager User Guide* for more information.
13	For Service only	Use only if instructed by Harmonic Service.

MediaPort Ethernet array LED states

The MediaPort Ethernet array ports provide access to MediaPorts, ChannelPorts, and Spectrum X

The MediaPort Ethernet array interfaces are oriented sideways on the rear panel so that one LED is aligned over the other.

Activity/Link
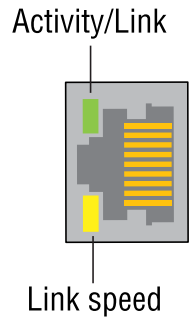
Link speed

Figure 8-7: MediaPort Ethernet array LED states

Activity/Link (top)	Link speed (bottom)	Status
Green, blink	Yellow, solid	1000 Mbps
Green, blink	Green, solid	100 Mbps
Green, blink	Off	10 Mbps
Green, solid	Off	Inactive

1 Gb Ethernet port LED states

The four 1-Gigabit Ethernet ports on the MediaCenter rear panel labeled MIP 8/9 and ETH 0/1 can be used for different purposes depending on how they are configured in SystemManager. The LEDs on the connectors provide link, activity, and link speed status.
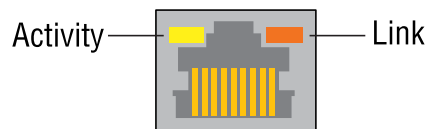
Activity — Link

Figure 8-8: Gigabit Ethernet port LED states

Activity	Link	Status
Yellow, blink	Amber, solid	1 Gbps link
Yellow, blink	Green, solid	100 Mbps link
Off	Off	Inactive

Power supply LED states

Each power supply includes an LED to indicate the status of AC power to the system.

Power supply indicator
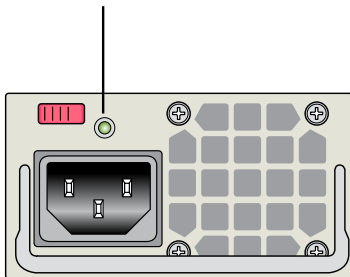
Figure 8-9: Power supply indicator LED states

Table 8-4: Gigabit Ethernet port LED states

LED state	Condition
Green, solid	Normal, power on state
Green, blinking	Abnormal state
Amber, solid	Normal, power off state (standby power only)
Amber, blink	Abnormal state
Off	Power supply module not powered or faulty

MediaCenter 2200A and 2200 specifications

Find specifications here.

Table 8-5: Public Ethernet ports

Specification	Details
Two to four 1 Gb Ethernet ports	Two dedicated network ports; two additional ports configurable for network or MediaPort operation Support for Spectrum API, Windows File System Interface (Samba), FTP, and Apple Filing Protocol

Table 8-6: MediaPort Ethernet array for MediaCenter 2200A

Specification	Details
Private 1 Gb Ethernet	MCP-2200A: maximum 10 ports available for I/O module (for example, MediaPort) connectivity. MCP-2200: maximum 6 ports available for I/O module connectivity.

Table 8-7: Reference

Specification	Details
Per I/O module	The MediaCenter can support multiple timing standards on a single system. Reference is handled by MediaPorts independently.

Table 8-8: Dimensions

Specification	Detail
Height	8.8 cm (3.5") 2RU
Width	44.4 cm (17.15") Chassis only, IEC rack compliant
Depth	68.6 cm (27 in.)
Weight	26.3 kg (58.0 lbs) Chassis with 12 disk drives

Table 8-9: MediaCenter 2200A and 2200 power

Specification	Detail
Power consumption (max)	360 W (dual redundant power supplies)
Voltage	100 – 240 VAC rated
Frequency	50 – 60 Hz

Table 8-10: Environmental

Specification	Detail
Temperature Range	+5° to +40° C (41° to 104° F)
Humidity	10% to 85%

MediaDeck 7000 hardware reference

The MediaDeck 7000 provides four video channels, Gigabit Ethernet connectivity, and 3+1 RAID storage in a one rack unit (1-RU) chassis.

- *About the MediaDeck 7000*
- *MediaDeck 7000 bezel*
- *MediaDeck 7000 rear panel*
- *About MediaDeck 7000 storage*
- *MediaDeck 7000 chassis specifications*

About the MediaDeck 7000

The MediaDeck 7000 provides four video channels, Gigabit Ethernet connectivity, and 3+1 RAID storage in a one rack unit (1-RU) chassis.

One Spectrum MediaDeck 7000 supports up to two MediaPort or ChannelPort modules, which can be installed in either slot. For MediaPorts, the supported Audio/Video formats will vary depend on the model. The MediaDeck includes four hot-swappable disk drives for content storage. You can choose between enterprise-class SATA disk drives or solid-state disk drives. The use of 3+1 RAID ensures that the system continues to operate even in the event of a disk drive failure. The MediaDeck 7000 provides Gigabit Ethernet connectivity for asynchronous file transfer and support of FTP, SMB, and the Apple® Filing Protocol. The file system can be "shared" by network computers.

Additional information

MediaDeck 7000 chassis specifications *on page 188*

MediaDeck 7000 bezel

The bezel provides a power indicator and port status display to quickly assess the status of the device.
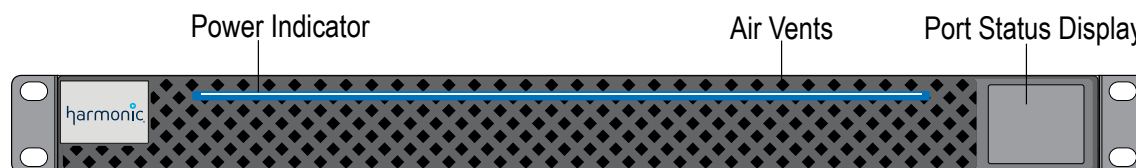
Figure 9-1: Bezel components

Component	Description
Power indicator	A bright blue light across the upper part of the front panel indicates the power is on. This indicator also provides a "wink" function that identifies the device when wink mode is enabled in SystemManager or Spectrum Management.
Air vents	An array of vent openings across the front panel provide air flow. For optimum airflow, do not obstruct the front panel air vents or block the rear panel vents.
Port status display	A back lit LCD panel displays the basic system status and hardware health of the unit. The back light darkens automatically after a brief period of illumination. Increase the illumination of the display by touching the panel.

About the port status display

The port status display on the bezel provides basic system status and hardware health details of the unit.

Port Status Display	
Status of Module A	Health Summary Reference Input
	Channel 0: Player name, Player state, and timecode
	Channel 1: Player name, Player state, and timecode
	Environmental alarms, if any
Status of Module B	Health Summary Reference Input
	Channel 0: Player name, Player state, and timecode
	Channel 1: Player name, Player state, and timecode
	Environmental alarms, if any

Note the following:

- The Player name is truncated to the first 8 characters.
- The Player state can be: "IDLE," "PLAY," "CUED," "RECD" (record), "PAUS" (paused), "SHTL" (forward shuttling), and "REV" (any reverse playback)
- Playback timecode of the current clip is given, if the Player is not idle. If the current clip contains an embedded timecode, then the front panel reports this timecode. If the current clip does not contain any timecode, then the front panel reports timecode starting from 00:00:00:00. This behavior follows the conventions used by other Harmonic tools, such as ClipTool.
- Environmental alerts or health alarms are given when an event arises. The text displayed is color-coded to indicate the severity of the event. Red text indicates an error event; yellow text indicates a warning event.
- The front panel flashes when there is a fault condition or warning. This is intended as a visual indicator to the user that the system needs attention.
  - The background color on the screen will alternate between blank and orange, at approximately one-second intervals.
  - When the display is touched to bring it to the "awake" state, it stops flashing for the duration of the "awake" state.
- The current reference input is given, if available.

- The screen is always enabled and active, as long as at least one module is installed and powered on. Removing or rebooting a module may cause a brief interruption or glitch in the panel output.
- The status of Module A is always displayed on the top portion of the screen, Module B is displayed on the bottom portion. When viewed from the back of the chassis, Module A is the module on the left.

Additional information

MediaDeck 7000 rear panel

The rear panel includes redundant power supplies and two slots for I/O module connection.

Figure 9-2: Rear panel

Component	Description
Redundant Power Supplies	Two redundant power supplies are provided, each with an independent AC In connector. If one supply fails, the load is transferred to the remaining supply without interruption of service. To take full advantage of the redundant supplies, Harmonic recommends that you use separate, isolated power sources for each AC input.
Filler Panels	Filler panels may cover the slots for I/O modules when the chassis ships from the factory.

Power supply LED states

The power supply LED can help you determine the state of the power supply.

Figure 9-3: Power Supply LED States

LED state	Condition
Off	No power
Green, solid	On
Green, blink	Power attached, unit on standby
Red, solid	Power supply failure

LED state	Condition
Red, blink (1 second on/ 1 second off)	No AC power to this power supply

📝 **NOTE:** When a power supply fails, an audible alarm sounds.

About MediaDeck 7000 storage

The MediaDeck7000 provides four hot-swappable disk drives or SSDs in a 3+1 RAID set.

Refer to the following table for supported RAID configurations.

Table 9-1: MediaDeck7000 RAID configurations

Drives	RAID set	Capacity per drive	Storage capacity
4 SATA	3+1	4 TB	12 TB
4 SATA	3+1	2 TB	6 TB
4 SSD	3+1	480 GB	1.406 TB (1440 GB)

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

If managing your system with SystemManager, use the "One-Click" functions to create the file system and RAID set, and initialize the file system. Follow the instructions in "Using One-Click Functions" in the *Harmonic SystemManager User Guide*.

Note that drives are numbered 0 to 3, from left to right, when facing the front panel.

Drive 0	Drive 1	Drive 2	Drive 3

MediaDeck 7000 drive LEDs

Each drive includes a status and activity LED.
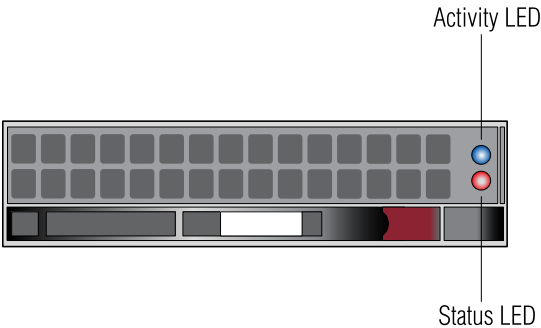
Figure 9-4: Drive LEDs

Table 9-2: Activity LED (blue)

State	Description
Off	The drive has failed or the drive is unplugged.
On	The drive is powered on.
Blink	The drive is active.

Table 9-3: Status LED (red)

State	Description
Solid	The drive is not being used by the unit.
Rapid blink (4 per second)	The drive has failed.
Slow blink (1per second)	The drive is being winked.
Two rapid blinks then pause	The drive is being rebuilt.
Off	The drive state is normal.

MediaDeck 7000 drive troubleshooting

Spectrum provides diagnostics and alarms to help troubleshoot drive issues.

Data security guidelines

Review the guidelines in this topic to ensure data security when operating the MediaDeck.

Note the following important points:

- Disk units are fragile. Handle them with care, observe static electricity precautions, and keep them away from strong magnetic fields.
- If you remove a drive module, replace it immediately. If it is faulty, replace it with a drive module of the same type and capacity.
- Ensure that all disk drives are removed from the enclosure before attempting to manhandle or move the rack installation.

Additional information
Gathering drive failure information *on page 266*

About the automatic diagnostic for new drives

When a new disk drive (one never previously used by an Harmonic system) is installed in a MediaDeck, Spectrum performs an automatic diagnostic to ensure the performance of the disk drive

This diagnostic takes approximately five minutes. When installing multiple disk drives, the diagnostic is performed in parallel on all new disk drives.

If a new disk drive passes the diagnostic, the drive is made available to the file system and no action is required.

If a new disk drive is found to be usable but has performance issues, an alarm will appear in SystemManager indicating that the drive has marginal performance. For information on viewing alarms,

refer to "Viewing and/or Clearing Alarms" in the *Harmonic SystemManager User Guide*. For assistance, contact Technical Support.

If a new disk drive is found to be unusable, an alarm will appear in SystemManager indicating the cause. Follow the instructions in "Replacing a Disk Drive" in the *MediaDeck 7000 Component Replacement Guide* to replace the disk drive. For assistance, contact Technical Support.

Overview of proactive drive alarming and removal

The proactive drive alarming and removal feature enhances the ability of Spectrum to detect and recover from various drive error conditions, while minimizing disruption to the system.

There are several drive error conditions that will cause the system to attempt to mark a drive as bad and remove it from the associated RAID Set. Since failing an active drive in a RAID Set can cause the RAID Set to become compromised, several checks are done prior to failing the drive. A drive is removed from the RAID Set when the following conditions are true:

- The File system has been started.
- All drives in the RAID Set are on-line and ready.
- No other drives in the RAID Set have bad blocks.
- A hot spare is available to start a rebuild on the RAID Set.
- The target drive is a hot spare or belongs to a RAID Set that is not compromised, rebuilding, or is the rebuild target.

Additional drive conditions that prevent a drive from being auto-failed include:

- The drive is in the process of a bad block repair.
- The drive is in the process of a drive firmware upgrade.
- The drive is being formatted.

> 📝 **NOTE:** For **Persistent Login Failures** and **Insubordinate Disks,** the conditions mentioned above do not apply. Drive are auto-failed regardless of the state of the file system or other drives in the drive's RAID set.

Disk read/write errors can be either persistent or intermittent:

- **Persistent Errors**: An error at the same disk drive address that recurs at least 5 times on writes or 10 times on reads. This error is sometimes referred to as a "**Hard** Error".
- **Intermittent Errors**: An error that the same disk drive address that recurs less than 5 times on writes and less than 10 times on reads. This error is sometimes referred to as a "**Soft** Error".

The SystemManager application reports on the following drive error conditions:

- SMART Warnings: Critical alarms (red) are generated for any drive that issues a SMART warning. Drives that exhibit SMART warnings will attempt to be auto-failed by the Spectrum server and should be replaced as soon as possible.
- Hardware Errors: Critical alarms (red) are generated for any drive that issues a Hardware error. Drives that exhibit hardware errors will attempt to be auto-failed by the Spectrum server and should be replaced as soon as possible.
- Persistent Login Failures: A warning alarm (yellow) is generated for any drive that experiences persistent Login failures. If a Spectrum server cannot log in to a disk for more than five seconds, that drive will be temporarily removed from the RAID set (subject to the conditions mentioned above), but no Spectrum server in the RAID set will attempt to start a rebuild on the drive's RAID set, even if a hot spare is available. If the login failure persists for a period of two minutes, or if any write operation to the disk in question is postponed for at least 30 seconds, then the disk will be failed, regardless of any of the requisite conditions mentioned above. Note that in extreme circumstances, this may cause the

Spectrum server to shut down its file system, stopping all playback and recording on that Spectrum server. If the drive successfully logs in before these limits are reached, an automatic "surgical" rebuild will be immediately started. Otherwise, one of the Spectrum servers in the system will automatically start a rebuild (provided a hot spare is available.)

- Write Errors: Warning alarms (yellow) are generated for any drive that reports write errors. Write errors are errors that can occur occasionally on any system and do not, by themselves, imply catastrophic drive failures. Drives exhibiting 32 read/write errors (both hard and soft errors) will attempt to be auto-failed by the Spectrum server provided the RAID Set criteria mentioned above is met. Refer to "About bad-block auto-repair" for more information.

- Read Errors: Warning alarms (yellow) are generated for any drive that reports read errors. Read errors are errors that can occur occasionally on any system and do not, by themselves, imply catastrophic drive failures. Drives that exhibit any combination of read/write errors at different disk drive addresses will attempt to be auto-failed by the Spectrum servers provided the RAID Set criteria mentioned above is met. Refer to "About bad-block auto-repair" for more information.

- Auto-Fail Starting: Failure alarms (orange) are generated for any drive that exhibits a problem requiring it to be removed from the RAID Set. This alarm will report that the Auto-fail process is queued and provide the reason for the attempted auto-failure.

- Auto-Fail Succeeded: Warning alarms (yellow) are generated for any drive that is successfully removed from the RAID Set following the auto-fail starting alarm. If this alarm is generated, the drive will already have been failed. A rebuild should be started on the RAID Set, and this drive should be removed from the MediaStore and replaced with a good drive.

- Auto-Fail Not Successful: Critical alarms (red) are generated in the for any drive that is not successfully removed from the RAID Set following the auto-fail starting alarm. If this alarm is generated, a reason is given and user intervention is needed to correct the situation. Drive auto-fail attempts are retried in five-minute intervals until the drive is successfully failed or the error condition has been resolved. Reason codes and suggested user actions are as follows:

- RAID Set Compromised: A hot spare needs to be added to the RAID Set to allow a rebuild of the RAID Set. Once the rebuild has completed, an additional hot spare should be added to the RAID Set to allow for the failure of the bad drive.

- RAID Set Rebuilding: A hot spare should be added to the RAID Set to allow the bad drive to be auto-failed once the rebuild has completed.

- Bad Blocks in RAID Set: Bad blocks on other drives in the RAID set can cause the rebuild to stall, which could result in data loss. As a result, a drive cannot be auto-failed if there are other drives in the RAID set with bad blocks. Once the bad blocks are auto-repaired, the drive should be auto-failed by the Spectrum server. Refer to "About bad-block auto-repair" for more information.

- Disk Readiness Test Failure: A warning alarm (yellow) is generated for any drive that fails a Disk Readiness Test. Every four hours approximately, each disk in the system is tested for readiness. This test is transparent for disks that are currently in use, but allows any disk that is otherwise idle to indicate whether it believes itself ready for use. A drive may respond to this by generating a SMART warning or Hardware error, which are discussed above, but it may also fail to respond at all. In this case, the Spectrum servers will report a Disk Readiness Test Failure.

- Insubordinate Disk: A warning alarm (yellow) is generated for any drive that becomes insubordinate. In this rare case, a disk refuses to accept commands from any Spectrum server until it is power-cycled. When this condition is detected, the disk will be failed, regardless of any of the requisite conditions mentioned previously. In extreme circumstances, this may cause the MediaDirector to shut down its file system, stopping all playback and recording on that Spectrum server (but not affecting other Spectrum servers in an EFS system.) The drive will be automatically bypassed, and an alarm message will be generated instructing the operator to remove and reinsert the drive. If this is done within five minutes of the failure, an automatic "surgical" rebuild will be immediately started. Otherwise,

one of the Spectrum servers in the system will automatically start a rebuild (provided a hot spare is available).

About bad-block auto-repair

When an unreadable or unwritable ("Read Error" or "Write Error") block occurs, the block is internally marked as bad. Bad block errors can occur occasionally on any system and do not, by themselves, imply catastrophic drive failures. After a short period to allow collection of clusters of bad-blocks, and if it safe to do so, a bad-block auto-repair will be performed as follows:

- Any drive with any unrepaired bad blocks ("Read/Write" and hard/soft errors) will be temporarily auto-failed from the RAID set.
- The failed blocks will be recovered or reallocated on the disk.
- Blocks that could not be recovered will be marked for later rebuild.
- The drive will be added back into the RAID set.
- A surgical rebuild will be performed. A surgical rebuild uses RAID functionality to regenerate the missing blocks that could not be recovered or were written to the RAID set while the drive was removed.

In order for BBAR to be performed on a drive, its containing RAID set must be on-line with redundancy, and the RAID set's containing file-system must be on-line and writable.

If the BBAR is unable to fix the block, the drive will be failed and will need to be replaced.

If an auto-fail is unsuccessful, be cautious when manually failing or removing any drives in the RAID Set. Failing another drive on a rebuilding RAID Set or a compromised RAID Set could cause all Spectrum servers to stop the file system. Contact Technical Support if you are unsure of what action to take.

Notes about proactive drive alarming and removal

Spectrum provides proactive drive alarming and removal for drives in the system.

Alarms are generated for Warning level situations in addition to alarms for Critical and Failure level situations. You can also choose to alarm on Informational level situations. Informational alarms represent messages that usually do not require user action but do provide context for the overall operation of the system.

Refer to "Filtering alarms" in the *Harmonic SystemManager User Guide* for instructions on how to select alarming levels.

⚠️ **IMPORTANT:** Use caution if setting the alarming level to include informational alarms when using the email notification feature to send alarms to a pager or phone. In some cases, SystemManager application alarms can be sent frequently.

Disk polling and scrubbing capabilities identify silent disk drive failures, provoke alarms through the SystemManager application, and ensure the availability of all disks in a RAID Set. The purpose of these features is to proactively identify disk issues before they impact the normal functioning of a system. Note however, that they may result in a slight elevation of the frequency in which errors are reported.

For additional information on disk drive alarming and removal, refer to "Viewing drive properties" and "Viewing and clearing alarms" in the *Harmonic SystemManager User Guide*.

Checking solid-state drive (SSD) life expectancy

SystemManager and Spectrum Management display the SSD life expectancy for any SSD installed in a Spectrum server as a percentage. Replace the SSD by the time the life expectancy reaches 1%.

1. In SystemManager, from the **Configuration** tab, click **Disk Utilities**.

2. Click the icon for your Spectrum.

3. Click the icon for the drive you want to check.
   The **Drive Properties** page appears.

4. In the **Disk Statistics** section, find the **SSD life expectancy** field.

Disk Statistics:	
Disk Size	480 GB
Block Size	4,096
Blocks	117,211,844
SMART Threshold Errors	1
Hardware Errors	0
Login Failures	0
Bad Blocks	0
Read Errors	0
Write Errors	0
Read Timeouts	0
Write Timeouts	13
Blocks Repaired	0
Aggregate Errors	0
SSD life expectancy	100%

In Spectrum Management, to view drive properties, click **Configure** > **Storage** > **Drives**.

MediaDeck 7000 chassis specifications

Find MediaDeck7000 specifications here.

Table 9-4: MediaDeck 7000Dimensions

Specification	Detail
Height	4.4 cm (1.75 in.), 1 RU
Width (chassis only, inside rack)	44.4 cm (17.50 in.)
Depth	Bezel front to chassis rear: 76.84 cm (30.25 in.) Bezel front to rear of BNC connectors: 79.38 cm (31.25 in.)
Weight with SATA drives	Chassis + single module: 16.6 kg (36.5 lbs) Chassis + double modules: 18.4 kg (40.5 lbs)

Specification	Detail
Weight with SSDs	Chassis + single module: 14.5 kg (32 lbs) Chassis + double modules: 16.6 kg (36.5 lbs)

Table 9-5: MediaDeck 7000 power consumption

Specification	Detail
Power	100-240V~, 50/60Hz, 3.9-1.7A Dual redundant universal power supplies.
Power consumption with SATA drives and one module installed	MediaPort 7000: • Typical: 181 W/1.57 A • Maximum: 248 W/2.16 A ChannelPort: • Typical: 202W/1.76 A • Maximum: 273 W/2.37 A
Power consumption with SATA drives and two modules installed	MediaPort 7000: • Typical: 266 W/2.31 A • Maximum: 325 W/2.83 A ChannelPort: • Typical: 305W/2.65 A • Maximum: 363 W/3.16 A
Power consumption with SSDs and one module installed	MediaPort 7000: • Typical: 152 W/1.32 A • Maximum: 220 W/1.91 A ChannelPort: • Typical: 174 W/1.51 A • Maximum: 273 W/2.12 A
Power Consumption with SSDs and two modules installed	MediaPort 7000: • Typical: 237 W/2.06 A • Maximum: 297 W/2.58 A ChannelPort: • Typical: 276 W/2.40 A • Maximum: 335 W/2.91 A

Table 9-6: MediaDeck 7000 power details

Specification	Detail
Power (max)	360 W (dual redundant power supplies)

Specification	Detail
Voltage	100 – 240 VAC rated
Frequency	50 – 60 Hz

MediaPort 7000 series hardware reference

The MediaPort 7000 series include hot-swappable modules, which provide SDI and GPIO connections as well as Gigabit Ethernet connectivity. Modules can be licensed to record and play a variety of codecs, perform up, down, and cross conversion, record proxies, as well as support Playlist Control, onboard MediaFetch, onboard subtitle insertion, and onboard closed caption insertion.

About the MediaPort 7000 series

The MediaPort 7000 series can include HD and SD play and record modules with options to support various video formats, proxy record, and a variety of add-on functionality. Each MediaPort 7000 module includes SDI connections, a Gigabit Ethernet port for connecting to Spectrum video servers, and RS-422 ports for connecting to automation systems and other control devices. ChannelPort modules can also be installed in a MediaPort 7000 series chassis.

MediaPort 7000 series modules provide the following features:

- I/O modules are hot-swappable and can be installed or replaced without disrupting on-air operation.
- License options for Playlist Control, onboard MediaFetch, onboard subtitle insertion, and onboard closed caption insertion.
- Codec support includes play and record options for HD/SD MPEG-2, SD DV (DV 25, DVCPRO 25, and DVCPRO 50), DVCPRO HD, XDCAM HD,VC-3, AVC-Intra (Class 50 and Class 100), and ProRes (play only).
- Up, down, and cross-conversion are standard with every HD-capable module. There are no channel-count or performance penalties. Cross-conversion allows playout of 720p material on a 1080i channel, and vice-versa.

- Simulcast is available on every channel, where SD-only channels include 2 identical outputs, and HD-capable channels include 2 independently-configurable outputs. An HD video channel can be presented in both 720p and 1080i.
- A proxy option enables simultaneous generation of both low- and high-resolution clips during recording.
- Chroma sampling options are 4:2:2, 4:2:0, or 4:2:1, as appropriate for the operating point.
- Each video channel includes 16 channels of embedded audio for up to two pairs (four channels).

Additional information

The bezel provides a power indicator and port status display to quickly assess the status of the device.
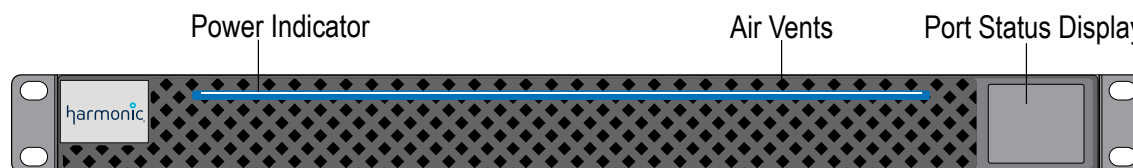
Figure 10-1: Bezel components

Component	Description
Power indicator	A bright blue light across the upper part of the front panel indicates the power is on. This indicator also provides a "wink" function that identifies the device when wink mode is enabled in SystemManager or Spectrum Management.
Air vents	An array of vent openings across the front panel provide air flow. For optimum airflow, do not obstruct the front panel air vents or block the rear panel vents.
Port status display	A back lit LCD panel displays the basic system status and hardware health of the unit. The back light darkens automatically after a brief period of illumination. Increase the illumination of the display by touching the panel.

About the port status display

The port status display on the bezel provides basic system status and hardware health details of the unit.

Port Status Display		
Status of Module A	Health Summary	Reference Input
	Channel 0: Player name, Player state, and timecode	
	Channel 1: Player name, Player state, and timecode	
	Environmental alarms, if any	
Status of Module B	Health Summary	Reference Input
	Channel 0: Player name, Player state, and timecode	
	Channel 1: Player name, Player state, and timecode	
	Environmental alarms, if any	

Note the following:

- The Player name is truncated to the first 8 characters.
- The Player state can be: "IDLE," "PLAY," "CUED," "RECD" (record), "PAUS" (paused), "SHTL" (forward shuttling), and "REV" (any reverse playback)
- Playback timecode of the current clip is given, if the Player is not idle. If the current clip contains an embedded timecode, then the front panel reports this timecode. If the current clip does not contain any timecode, then the front panel reports timecode starting from 00:00:00:00. This behavior follows the conventions used by other Harmonic tools, such as ClipTool.
- Environmental alerts or health alarms are given when an event arises. The text displayed is color-coded to indicate the severity of the event. Red text indicates an error event; yellow text indicates a warning event.
- The front panel flashes when there is a fault condition or warning. This is intended as a visual indicator to the user that the system needs attention.
    - The background color on the screen will alternate between blank and orange, at approximately one-second intervals.
    - When the display is touched to bring it to the "awake" state, it stops flashing for the duration of the "awake" state.
- The current reference input is given, if available.
- The screen is always enabled and active, as long as at least one module is installed and powered on. Removing or rebooting a module may cause a brief interruption or glitch in the panel output.
- The status of Module A is always displayed on the top portion of the screen, Module B is displayed on the bottom portion. When viewed from the back of the chassis, Module A is the module on the left.

Additional information

MediaPort 7000 rear panel

The rear panel includes redundant power supplies and two slots for I/O module connection.
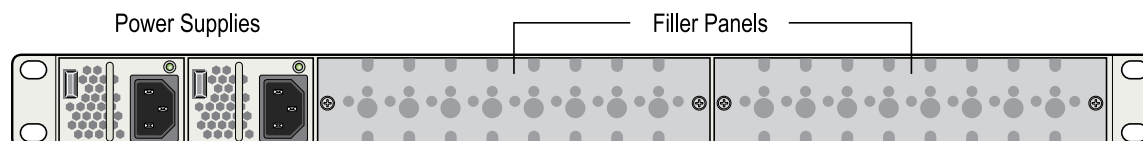
Figure 10-2: Rear panel

Component	Description
Redundant Power Supplies	Two redundant power supplies are provided, each with an independent AC In connector. If one supply fails, the load is transferred to the remaining supply without interruption of service. To take full advantage of the redundant supplies, Harmonic recommends that you use separate, isolated power sources for each AC input.
Filler Panels	Filler panels may cover the slots for I/O modules when the chassis ships from the factory.

Power supply LED states

The power supply LED can help you determine the state of the power supply.

Figure 10-3: Power Supply LED States

LED state	Condition
Off	No power
Green, solid	On
Green, blink	Power attached, unit on standby
Red, solid	Power supply failure
Red, blink (1 second on/ 1 second off)	No AC power to this power supply

NOTE: When a power supply fails, an audible alarm sounds.

MediaPort 7000 Series module rear panel

The MediaPort 7000 series modules share a common rear panel view.
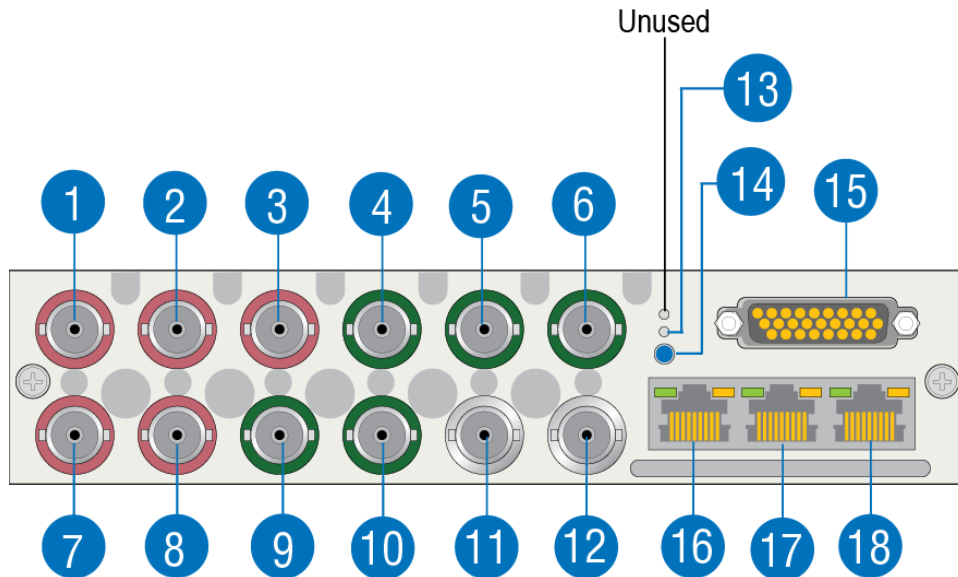
Figure 10-4: MediaPort 7000 series module rear panel

Key	Component	Description
1	HD/SD SDI IN Channel A	Use for SDI video input on Channel A.
2	HD/SD SDI OUT Channel A (Primary)	Use for SDI video output on Channel A.
3	HD/SD SDI OUT Channel A (Secondary)	Use for SDI video output on Channel A. By default, output from this port is the same as that of the Primary port. Note that the port can be configured for simulcast from the SystemManager application. Refer to "Attaching Devices" in the *SystemManager User Guide* for instructions.
4	HD/SD SDI IN Channel B	Use for SDI video input on Channel B.
5	HD/SD SDI OUT Channel B (Primary)	Use for SDI video output on Channel B.
6	HD/SD SDI OUT Channel B (Secondary)	Use for SDI video output on Channel B. By default, output from this port is the same as that of the Primary port. Note that the port can be configured for simulcast from the SystemManager application. Refer to "Attaching Devices" in the *SystemManager User Guide*e for instructions.

Key	Component	Description
7	LTC IN Channel A	Use these connectors for an analog LTC (longitudinal timecode) signal: two input (IN) and two output (OUT). When LTC is present at the IN port and a Player has been configured to record LTC, LTC timecode will be embedded in the DV stream. On playback, timecode can be routed from the OUT port to an external device such as a timecode reader/character generator for inserting code in frame.

Note that some devices (such as Sony* Betacam* decks) will not display LTC timecode unless the source timecode is changing. For example, if the clip is in "cue play" or "play zero-speed" mode, the timecode shown on the Sony deck may be incorrect. |
8	LTC OUT Channel B	
9	LTC IN Channel B	
10	LTC OUT Channel B	
11, 12	Reference Loop	Use these connectors to connect reference black video to the MediaPort. Reference black video should be looped through these connectors and then eventually terminated.
13	Soft Power	The Soft Power button is a momentary switch that is used to perform a "soft" reset of the MediaPort. Once pressed, all boards reset and code is re-loaded. The function is similar to clicking the **Reboot** button on the MediaPort Properties page in SystemManager.
14	Status/Wink LED	The Status/Wink LEDdisplays blue to indicate power is ON. The LED will blink (wink) when its wink mode is activated.
15	GPIO Connector	The GPIO connector can be used for player and Playout Control.
16	RS-422 Port	Use this connector (RJ-45) for RS-422 serial control. The LEDs represent connection status.
17	Ethernet Port	Used only when installed in MediaDeck 7000.
18	Ethernet Port	Use this Ethernet port to connect to the Spectrum video server. Note that the Activity LED on the left side of the port blinks when data is being sent or received.

Additional information
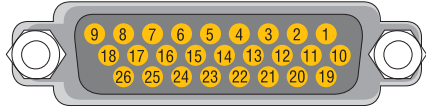
MediaPort 7000 GPIO signal assignments

The GPIO connector on a MediaPort 7000 module can be connected to an external device and used to control players.

GPIO Signals	
Function	**Pin**
Ground	18
GPIO 0	19
GPIO 1	20
GPIO 2	21
GPIO 3	22
GPIO 4	23
GPIO 5	24
GPIO 6	25
GPIO 7	26

Figure 10-5: GPIO Signal Assignments

NOTE: The GPIO connector on the MediaPort 7000 series module is a "female" connector.

For information on configuring GPIO on a MediaPort using SystemManager, refer to "MediaPort Configuration" in the *Harmonic SystemManager User Guide*.

About MediaPort 7000 and ChannelPort timing

Timing works the same way on both MediaPort 7000 and ChannelPort modules.

If reference VITC is present on the timing input of a MediaPort or ChannelPort, it will provide the timecode information to any Players associated with that MediaPort or ChannelPort, unless it is overridden by a LTC connection on the Spectrum video server.

If a LTC timecode source is connected to the Spectrum video server, the Spectrum video server automatically uses that as the timecode source for any attached Player. This setting overrides the reference VITC from the MediaPort or ChannelPort for purposes of automation. However, if the attached Player is configured with a different frame rate than that of the LTC input, then its reference will not be overridden. For example, a LTC input with a frame rate of 25 Hz would not override the reference for a player configured with a frame rate of 29.97 Hz.

Serial control connections for MediaPort 7000 and ChannelPort

The MediaPort 7000 and ChannelPort modules include an RJ-45 port for RS-422 serial control connections with an automation system.

NOTE: Because manufacturer specifications for cables, connectors and adapters can change, always consult with your control system vendor first for the most current information on interface equipment and peripherals.

NOTE: Depending on the MediaPort, there can be between one and six serial control ports, each of which controls an independent DVB/ASI output. You are not required to use all available ports.

On both the MediaPort 7000 and the ChannelPort, the left-most RJ-45 connector is wired for two channels (Ch 0 and Ch 1). Harmonic supplies an RJ-45/ DB-9 splitter cable, which provides the Channel 0 on one DB-9 and the Channel 1 signals on the other.

Pinout assignment for the RS-422 port on the MediaPort 7000/ChannelPort is shown in the following diagram. The connector type is RJ-45 (female)

Figure 10-6: MediaPort 7000/ChannelPort RS-422 Port Pinout

Pin	Signal
1	RX+ (Ch 0)
2	RX- (Ch 0)
3	TX+ (Ch 0)
4	RX+ (Ch 1)
5	RX- (Ch 1)
6	TX- (Ch 0)
7	TX+ (Ch 1)
8	RX- (Ch 1)

RJ-45/DB-9 splitter cable pinout

The MediaPort 7000 series and the ChannelPort ship with one integrated RJ-45 to DB-9 (Female) splitter cable. RS-422 connections for both channels A and B on the MediaPort 7000 series are on one RJ-45 port. This cable splits the two sets of signals out to two DB-9 connectors.

Use the Harmonic RJ45/DB-9 splitter cable to interface with controllers (or cables) using standard SMPTE/EBU ES bus wiring connections. This adapter converts the RJ45 connections on the back of the MediaPorts to standard SMPTE/EBU ES Bus.

Connector B
DB-9, Female

Pin	Signal
8	TX1-
3	TX1+
7	RX1+
2	RX1-

RJ45, Male

1 2 3 4 5 6 7 8

Pin	Signal
1	RX0+
2	RX0-
3	TX0+
4	RX1+
5	RX1-
6	TX0-
7	TX1+
8	TX1-

Connector A
DB-9, Female

Pin	Signal
8	TX0-
3	TX0+
7	RX0+
2	RX0-

Figure 10-7: RJ-45/DB-9 Splitter Cable

📝 **NOTE:** The RJ-45 to DB-9 (Female) splitter cable can be used in a single (Channel 0) port.

To obtain the necessary interconnection between the MediaPort or ChannelPort Module and the controller, the following methods can be used:

• Harmonic RJ45/DB-9 Splitter Cable to Standard RS-422 extension cable
• Harmonic RJ45/DB-9 Splitter Cable to Automation System adapter cable

📝 **NOTE:** Harmonic does not provide RS-422 extension cables or RJ45 (Ethernet) extension cables.

About RS-422 grounding

Make sure to follow grounding guidelines for RS-422.

RS-422 uses differential signaling, much like balanced audio. As long as the chassis grounds of the controller and the MediaPort share a common ground through the AC power connections, no ground connection is needed on the RS-422 cable.

In some cases, grounding the RS-422 at one end and running a shield around the balanced pairs can reduce noise pickup.

About MediaPort 7000 support for AC-3 and Dolby E

The MediaPort 7000 provides pre-compressed audio support, with the ability to record and playout AC-3 and Dolby E audio pairs. As part of the Player configuration process within the SystemManager, audio resampling can be disabled on a per "audio pair" basis.

Note the following:

- AC-3 pairs are handled automatically and dynamically by the MediaPort 7000; the user does not have to explicitly turn off re-sampling on the selected pair. AC-3 audio can co-exist with other audio types (e.g. AES/EBU) in an arbitrary mix of up to 8 pairs (4 channels).
- For proper operation with Dolby E, audio re-sampling must be explicitly turned off for the selected channel pair, when material is recorded on the MediaStore. Dolby E can co-exist with other audio types (e.g. AES/EBU) in an arbitrary mix of up to 4 audio pairs. Players can be enabled for Dolby E support on a per audio pair basis (0 to four channel pairs).
- The MediaPort 7000 does not encode or decode AC-3 or Dolby E. Encoding must occur prior to recording, and decoding after playing from the MediaPort.
- Improper configuration of a Player is not detected or reported by the SystemManager application.
- If you record Dolby E through a Player that is not properly configured for Dolby E, on playback an external Dolby E decoder will not detect a valid bit stream and the result will be audio silence.
- AC-3 and Dolby E implementation assumes that audio/video alignment in the incoming (recorded) media streams is satisfactory for subsequent playout. The audio samples will be "passed through" as received with no attempt at realignment.

For instructions on adding audio tracks to players, refer to "Adding Audio Tracks" in the *Harmonic SystemManager User Guide*.

MediaPort 7000 series module and license options

The following tables show the various MediaPort 7000 modules and license options

📝 **NOTE:** In Spectrum 8.0 and later, software licenses are installed only on the Spectrum video servers.

Table 10-1: MediaPort 7000 series module options

Model	H.264 proxy	MPEG-2 rec/play	DV/ DVCPRO rec/play	AVC-Intra rec	AVC-Intra play	VC-3 rec/ play	ProRes play
MIP-7100		X	X		X	X	X
MIP-7101	X	X	X		X	X	X
MIP-7300		X	X		X	X	X
MIP-7301	X	X	X		X	X	X
MIP-7600		X	X	X	X	X	X

Model	H.264 proxy	MPEG-2 rec/play	DV/ DVCPRO rec/play	AVC-Intra rec	AVC-Intra play	VC-3 rec/ play	ProRes play
MIP-7601	X	X	X	X	X	X	X

Table 10-2: MediaPort 7000 series license options

Product ID	SD	HD	Up, Down, Cross Convert, HD/SD Simulcast	MPEG-2	DV, DVCPRO rec/play	AVC-Intra	VC-3
APR	X	X	X	X (play)	X	X (rec/ play)	
DMH	X	X	X	X (play)	X		
DMS	X		X	X (play)	X		
DVH	X	X			X		
DVS	X				X		
M2H	X	X	X	X (play)	X		
M2S	X			X (play)			
M2R	X			X (rec)			
MAH	X	X	X	X (rec)		X	
UVP	X	X	X	X (play)	X	X	
VC3*	X	X	X				X (rec/ play)
VC3P*	X	X	X				X
VC3R*	X	X	X				

Table 10-3: Additional MediaPort 7000 licensed features

Product ID	Description
MPU-7000-M2D	License upgrade to add DV REC/PLAY to a MIP-7X0X with MPEG-2

Product ID	Description
MPU-7000-M2R	License upgrade to add MPEG-2 RECORD to any MIP-760X MediaPort
MPU-7000-S2H	License upgrade to add HD SUPPORT to any SD MIP-7X0X
MPU-7000-VC3P	License upgrade to add VC-3 PLAY to any MIP-7X0X or ChannelPort
MPU-7000-VC3R	License upgrade to add VC-3 REC to any HD MIP-7X0X
MPU-7100-D2M	License upgrade to add MPEG-2 PLAY to any MIP-710X MediaPort
MPU-7600-U2A	License upgrade to add AVC-I REC to a MIP-760X-APR
SPL-OCC	Onboard closed caption insertion license for 1 ch of ChannelPort OR MediaPort 7000
SPL-PRORES-PLAY	ProRes playout upgrade license for one module (2 channels) of ChannelPort or MediaPort 7000
SPL-STL	Onboard subtitle insertion license for one Spectrum MediaPort channel or ChannelPort channel

Table 10-4: Additional Spectrum server licensed features

Product ID	Description
POL-PLAY-CH	License for one channel ChannelPort or MediaPort Polaris Play: Playlist Control package. Package provides control of a single channel and includes the embedded controller software running on a Spectrum server. Includes control of one scheduled play to air channel and one playlist application with timeline view. Maximum channel count is limited by the Spectrum video server channel count.
POL-PLAY-SCHED	License for Polaris Play: Scheduler for a Spectrum server. One license per Spectrum server. This optional embedded service allows for manual creation of schedules for primary (clips) and secondary (graphic/branding) assets via a web browser. Multiple clients may attach to the service at one time. The maximum recommended simultaneous web browsers accessing this service is 4.
POL-PLAY-BXF	License for BXF file import for Polaris Play: Playlist Control for a Spectrum server. One license per Spectrum server. Works for all licensed Polaris Play channels. Playlist Control licenses are sold separately. Verify the traffic system BXF compatibility before ordering.
POL-PLAY-OMF	License for Polaris Play: Media Fetch for one Spectrum server. One license per Spectrum server. This feature imports assets from 1 to 4 FTP storage locations and purges them when no longer needed. It works with Polaris Play: Playlist Control for all active playlists.
SDL-SCTE104	SCTE 104 license for one channel of Spectrum ChannelPort or MediaPort 7000. Supports SCTE 104 protocol to insert SCTE packets in the ANC payload. License is set on the MediaDirector or MediaCenter.
SPL-AVCI-PLAY	AVC-Intra playout upgrade license for one ChannelPort or MediaPort 7000 module (two channels).

Product ID	Description
AUTO-EXPORT	Auto-export to Harmonic MediaGrid license for all channels of the MediaCenter and MediaDirector respectively.

MediaPort 7000 module specifications

The MediaPort 7000 series chassis can accommodate two modules.

📝 **NOTE:** For video codec and audio format support, see *Spectrum Media and Wrapper Formats.*

Table 10-5: Video channels

Specification	Detail
	Each module provides two bi-directional channels

Table 10-6: Video I/O

Specification	Detail
SD: SMPTE 259M	75 ohm BNC female connector
HD: SMPTE 292M	Single video input per channel. Dual video outputs per channel with independently configurable up/down/cross-conversion.

Table 10-7: Up Conversion

Specification	Detail
	Configurable pillarbox, crop, anamorphic. EIA-608 captions translated to EIA-708. Line 21 OP-42 subtitles translated to OP-47

Table 10-8: Down conversion

Specification	Detail
	Configurable letterbox, crop, anamorphic EIA-608 compatibility bytes extracted from EIA-708 data to create EIA-608 captions. OP-47 subtitles translated to line 21 OP-42

Table 10-9: SD-SD Aspect Ratio Converter (ARC)

Specification	Detail
RP-186 AFD SMPTE-2016, ATSC A/53	• 16:9 SD to 4:3 Letterbox (Vertical Decimation) • 16:9 SD to Full Screen (Horizontal Interpolation) • 16:9 SD to Crop 14:9 (Vertical Decimation, Horizontal Interpolation)

Table 10-10: Cross conversion

Specification	Detail
	720p to 1080i
	1080i to 720p

Table 10-11: Video raster

Specification	Detail
SD	720x486i (29.97fps)
HD	• 720x576i (25 fps) • 1280x720 (50 and 59.94 fps) • 1920x1080i (25 and 29.97 fps) • 1920 x 1080p @ 25 and 29.97 fps (carried as PsF in HD-SDI; limited to AVC-I)

Table 10-12: Audio channels

Specification	Detail
SMPTE 272M	Up to 16 embedded per video channel

Table 10-13: Control

Specification	Detail
VDCP and Limited BVW	Via RS-422 per video channel (RJ-45 connector; DB-9 adapter supplied)
Spectrum API	Via Ethernet from client to Spectrum video server.

Table 10-14: Server interface

Specification	Detail
	Private, point-to-point, non-switchable Gigabit Ethernet to Spectrum video server

Table 10-15: Timecode

Specification	Detail
LTC	Dedicated LTC I/O per channel (BNC)
VITC	Extracted from or inserted into SDI

Table 10-16: Closed caption

Specification	Detail
EIA-608	Analog caption data recovered from VBI and stored as digital data; inserted into VBI on playout.

Specification	Detail
EIA-708	Digital caption data preserved on record and inserted on playout.
Onboard Closed Caption Insertion	Onboard Closed Caption Insertion available as licensed feature; Cheetah, NCI, and SCC are supported file types.

Table 10-17: Onboard subtitle Insertion

Specification	Detail
OP47a SMPTE-2031	Onboard Subtitle Insertion available as licensed feature; STL, PAC, and 890 are supported file types

Table 10-18: Ancillary Data

Specification	Detail
VBI	Up to 6 lines (configurable) preserved. Line 21 caption data saved automatically
VANC	Up to 6000 bytes (configurable) preserved per frame

Table 10-19: Reference

Specification	Detail
Analog burst with color burst	Optional for playout; unused for recording. Loop-through connector

Table 10-20: Safety

Specification	Detail
UL 60950-1 2nd Edition	Information Technology Equipment - Safety - Part 1: General Requirements
CSA C22.2	

Table 10-21: CE

Specification	Detail
Low Voltage Directive (73/23/ EEC) including amendments	EN60950: 1992, A1+A2+A3+A4 Safety of Information Technology Equipment

Table 10-22: EMC

Specification	Detail
FCC Part 15 Class A	USA
VCCI Class A	Japan

Specification	Detail
CISPR 22 Class A	Australia, New Zealand, EU
CNS 13438 Class A	Taiwan
ICES-003 Class A	Canada
En 55022 Class A	EU
KN22 Class A	Korea

Table 10-23: Dimension

Specification	Detail
Height	4.4 cm (1.75") 1RU
Width	44.4 cm (17.15") Chassis only, IEC rack compliant
Depth	67.3 cm (26.5 in.)
Weight	0.7 kg (23.6 lbs) Chassis + one module
	12.2 kg (26.9 lbs) Chassis + two modules

Table 10-24: MediaPort 7000 power

Specification	Detail
One module installed	112 W
Two modules installed	175 W
Voltage	90 – 260 VAC rated
Frequency	45 – 63 Hz
1 MediaPort Module installed	At 40°C, 115 VAC, 60 Hz, .6 A
1 ChannelPort Module installed	At 40°C, 115 VAC, 60 Hz, .79 A

MediaPort 7000 H.264 proxy options

The MediaPort 7000 series can record H.264 proxy files with a number of configurable options.

Table 10-25: Video encoding

Specification	Detail
H.264 (MPEG-4 Part 10/15)	Baseline profile @ Level 3.1. Variable-length IP GOP (maximum length 16)

Table 10-26: Video bit rate

Specification	Detail
600 Kbps – 3.0 Mbps	User configurable

Table 10-27: Chroma sampling

Specification	Detail
4:2:0	

Table 10-28: Audio encoding

Specification	Detail
AAC-LC	0-8 two-channel pairs (up to 16 channels)

Table 10-29: Audio bit rate

Specification	Detail
64, 96, or 128 Kbps	Per pair

Table 10-30: HD encoded frame size

Specification	Detail
640x360 or 432x240	User configurable

Table 10-31: SD encoded frame size

Specification	Detail
25 fps: 352x288, 320x240 29.97 fps: 352x240, 320x240	User configurable

Table 10-32: Wrapper

Specification	Detail
MXF Op1a low-latency, QuickTime self-contained	

Table 10-33: Ancillary data

Specification	Detail
AFD, timecode, closed captions	Stored as unregistered SEI

Table 10-34: Timecode burn-in

Specification	Detail
Within frame or below it	Position selectable by user

Table 10-35: Logo/watermark

Specification	Detail
User-supplied PNG with alpha	Position selectable by user

Table 10-36: Link to hi-res

Specification	Detail
SMPTE 330M	Via parent UMID

ChannelPort module hardware reference

The ChannelPort 8100/8200 modules support clip playout, channel branding, key/fill input, emergency alert systems, and cuts-only switching between live inputs and prerecorded clips. Each ChannelPort module provides a "channel" or "channels" capable of playing and processing control commands.

- *About the ChannelPort*
- *About Enhanced Channel mode*
- *ChannelPort 8100 channel mode configurations*
- *ChannelPort 8200 channel mode configurations*
- *About ChannelPort modules*
- *ChannelPort module rear panel*
- *About MediaPort 7000 and ChannelPort timing*
- *GPIO/RS-422 connector signal assignments*
- *Serial control connections for MediaPort 7000 and ChannelPort*
- *License options*
- *ChannelPort specifications*

About the ChannelPort

The ChannelPort modules support clip playout, channel branding, key/fill input, emergency alert systems, and cuts-only switching between live inputs and prerecorded clips.

Each ChannelPort module provides a "channel" or "channels" capable of playing and processing control commands. The ChannelPort module includes external video input connections, RS-422 ports, a GPIO/RS-422 port for connecting to automation systems and other control devices, and a Gigabit Ethernet port.

⚠ **IMPORTANT:** Connections 1 - 8 on ChannelPort 8200 modules use DIN 1.0/2.3 connectors.

The ChannelPort provides the following features:

- Options for Playlist Control, onboard MediaFetch, onboard subtitle insertion, onboard closed or open caption insertion, single and Dual DVE functionality, and key/fill input support.
- Codec support includes HD/SD MPEG-2, SD DV (DV 25, DVCPRO 25, and DVCPRO 50), DVCPRO HD, XDCAM HD, VC-3, ProRes, and AVC/H.264.
- Up, down, cross conversion of 720p to 1080i and 1080i to 720p is standard.
- Integrated branding and graphics control for four to eight layers of graphics is supported by the Oxtel control protocol.
- Graphic formats supported include the following:

- ◦ .swf (Adobe Flash format)
  - ◦ .flv (Flash Video)
  - ◦ .mp4 (MPEG-4)
  - ◦ .png (Portable Network Graphic)
  - ◦ .jpg (Joint Photographic Experts Group)
  - ◦ .tga (Targa Graphic)
  - ◦ .gif (Graphical Interchange Format)
  - ◦ .bmp (Bitmap Image)
  - ◦ .tif (Tagged Image File)
- Automation support includes all Oxtel protocol automation systems, with clip playback control via Spectrum API or VDCP/BVW (RS-422).
- Master Control Switching supports switching between live inputs and prerecorded clips.
- Support for Emergency Alert System (EAS) is available as a license option for use only in the United States. EAS data and audio is provided by customer's EAS equipment.
- Support for audio profiles containing down-mix and voice-over parameters, which can be mapped to ChannelPort channel sources.

About Enhanced Channel mode

Enhanced Channel is a licensed option that combines resources from both channels into a single channel with additional capabilities.

Enhanced Channel features include:

- External key/fill support (available when inputs are not in use for blending live video). The SDI input format must match the video format of the primary output and must be referenced aligned.
- Two live inputs (available when inputs are not being used for external key/fill). Each live SDI input must match the video format of the Primary SDI output and must be reference-aligned.
- Two DVE engines on a single channel.
- Two clip players for a single channel.
- Four or eight graphics layers, as licensed.
- Optional Independent Branding mode (see "Enabling and configuring independent branding" in the *Harmonic SystemManager User Guide*).

These additional features allow you to:

- Brand the Secondary output with graphics different than those used for the Primary output.
- Mix video from any combination of two clip players or two live input sources.
- Use two DVE engines on a single channel, allowing squeeze-backs between player/ input combinations.
- Use an external device to generate key/fill graphics, and overlay that onto the Spectrum X or ChannelPort output video, along with graphics generated by the Spectrum X or ChannelPort.

Note that when the Spectrum X or ChannelPort module is in Enhanced Channel mode, the functionality of some I/O connectors will change based on your I/O Configuration selection inSystemManager or Spectrum Management. For instructions on enabling Enhanced Channel and changing connector configurations, see "Enabling Enhanced Channel mode" and "Master control switcher configuration" in the *Harmonic SystemManager User Guide* or the Spectrum Management Help system.

ChannelPort 8100 channel mode configurations

The ChannelPort 8100 includes six BNC connectors for SDI video input and output: two for input and four for output. The BNC connector configurations vary according to Standard Channel mode and Enhanced Channel mode.

Table 11-1: ChannelPort 8100 Standard Channel configuration (SC1)

Connector	Description	Connector	Description
I/O 1	External In 1 (Channel A)	I/O 4	External In 1 (Channel B)
I/O 2	Out Primary (Channel A)	I/O 5	Out Primary (Channel B)
I/O 3	Out Secondary (Channel A)	I/O 6	Out Secondary (Channel B)

Table 11-2: ChannelPort 8100 Enhanced Channel configuration (EC1)

Connector	Description	Connector	Description
I/O 1	External In 1/Key	I/O 4	External In 2/Fill
I/O 2	Out Primary	I/O 5	Out (Clean Primary*)
I/O 3	Out Secondary	I/O 6	Out (Clean Secondary*)

*Clean Primary/Secondary refers to video output with no graphics or overlays.

ChannelPort 8200 channel mode configurations

The ChannelPort 8200 offers eight DIN 1.0/2.3 connectors for video input and output. The connector configurations vary according to Standard Channel mode and Enhanced Channel mode.

📝 **NOTE:** In the following tables, "Clean Primary/Secondary" refers to video output with no graphics or overlays.

Table 11-3: Standard Channel configuration 1 (SC1)

Connector	Description	Connector	Description
I/O 1	Ext In 1 (Channel A)	I/O 5	Ext In 1 (Channel B)
I/O 2	Out, Primary (Channel A)	I/O 6	Out, Primary (Channel B)
I/O 3	Out, Secondary (Channel A)	I/O 7	Out, Secondary (Channel B)
I/O 4	Out, Primary (Channel A)	I/O 8	Out, Primary (Channel B)

Table 11-4: Standard Channel configuration 2 (SC2)

Connector	Description	Connector	Channel B
I/O 1	Ext In 1 (Channel A)	I/O 5	Ext In 1 (Channel B)
I/O 2	Ext In 2 (Channel A)	I/O 6	Ext In 2 (Channel B)
I/O 3	Out, Secondary (Channel A)	I/O 7	Out, Secondary (Channel B)

Connector	Description	Connector	Channel B
I/O 4	Out, Primary (Channel A)	I/O 8	Out, Primary (Channel B)

Table 11-5: Enhanced Channel configuration 1 (EC1)

Connector	Description	Connector	Description
I/O 1	Ext In 1/Key 1	I/O 5	Ext In 4/Key 2
I/O 2	Ext In 2/Fill 1	I/O 6	Ext In 5/Fill 2
I/O 3	Out, Secondary	I/O 7	Ext In 6
I/O 4	Out, Primary	I/O 8	Out, Clean Primary

Table 11-6: Enhanced Channel configuration 2 (EC2)

Connector	Description	Connector	Description
I/O 1	Ext In 1/Key 1	I/O 5	Ext In 4/Key 2
I/O 2	Ext In 2/Fill 1	I/O 6	Ext In 5/Fill 2
I/O 3	Out, Secondary	I/O 7	Out, Clean Secondary
I/O 4	Out, Primary	I/O 8	Out, Clean Primary

Table 11-7: Enhanced Channel configuration 3 (EC3)

Connector	Description	Connector	Description
I/O 1	Ext In 1/Key 1	I/O 5	Ext In 4/Key 2
I/O 2	Ext In 2/Fill 1	I/O 6	Ext In 5/Fill 2
I/O 3	Ext In 3	I/O 7	Ext In 6
I/O 4	Out, Primary	I/O 8	Out, Secondary

About ChannelPort modules

Harmonic offers two ChannelPort modules with options to support various video formats and a variety of add-on functionality.

Each module can be installed in the MediaPort 7000 or MediaDeck 7000 chassis. Additional licensed, add-on functionality for each module is available as described in "ChannelPort module license options".

In most instances, the MediaPort 7000 chassis ships from the factory with the MediaPort modules already installed in the chassis and any add-on functionality already enabled. If you receive a chassis with filler panels covering the module slots, follow the steps in "Installing MediaPort 7000 or ChannelPort modules in the MediaPort chassis" to remove the filler panel(s) and install a module.

ChannelPort modules can be used in Standard Channel mode or Enhanced Channel mode. Depending on the mode you are using, the rear module components will have different functionalities.

📝 **NOTE:** There are no user-serviceable parts in a ChannelPort module.

Additional information

ChannelPort module rear panel

The ChannelPort rear panel component functionality will vary based on the channel mode.

ChannelPort 8100 rear panel: Enhanced Channel mode

The ChannelPort rear panel component functionality will vary based on the channel mode.

Figure 11-1: ChannelPort 8100 rear panel (Enhanced Channel mode))

Key	Component	Description
1	External Input 1/External Key Input	Use for video input or External Key input. Refer to "Enabling Enhanced Channel mode" in the *Harmonic SystemManager User Guide* for instructions on configuring Enhanced Channel mode to enable Key/Fill. Refer to the *Spectrum X and ChannelPort Template Authoring Guide* for information on External Key/Fill.
2	Video Output (Primary)	Use for primary video output or for HD-branded output when in Independent Branding mode. Refer to "Configuring a ChannelPort channel" in the *Harmonic SystemManager User Guide* for instructions on configuring Independent Branding mode.
3	Video Output (Secondary)	Use for secondary video output or for SD-branded output when in Independent Branding mode.
4	External Input 2/External Fill Input	Use for video input or External Fill input when port 1 is used for Key input.

Key	Component	Description
5	Video Output (Clean Secondary)	Use for clean secondary video output."Clean"output refers to video output with no graphics or overlays.
6	Video Output (Clean Primary)	Use for secondary video output or for SD-branded output when in Independent Branding mode on Channel B.
7	AES Audio IN	Use for AES input.
8	LTC OUT	Use for LTC output.
9, 10	Reference In and Reference Loop	Use these connectors to connect reference black video to the ChannelPort. Reference black video should be looped through these connectors and then eventually terminated. Refer to "About MediaPort module timing" for additional information.
11	Soft Power button	The **Soft Power** button, in the middle, is a momentary switch that is used to perform a "soft" reset of the ChannelPort. Once pressed, all boards reset and code is re-loaded. The function is similar to clicking the **Reboot** button on the SystemManager ChannelPort Properties page. The Status/Wink LED, on the bottom, is blue to indicate power is ON. The LED will blink (wink) when its wink mode is activated.
12	Status/Wink LED	The Status/Wink LED, on the bottom, is blue to indicate power is ON. This LED can show the following states: • Blue, solid: Indicates the unit is powered on. • Off: Indicates the unit is powered off. • Blue, blinking: Indicates wink state is on. For information on changing the wink state, refer to "Changing the ChannelPort wink state" in the *Harmonic SystemManager User Guide*.
13	GPIO Connector	This connector can be used for player or graphics control, or for EAS connection. See "GPIO connector signal assignments" for signal assignments.
14	RS-422 Port and LEDs	Use this connector (RJ-45) for RS-422 serial control. The LED at the top left of the port indicates channel activity.
15	Gigabit Ethernet Port	Used only in MediaDeck 7000.
16	Gigabit Ethernet Port	Used only in MediaPort 7000.

Additional information

ChannelPort 8100 rear panel: Standard Channel mode

The ChannelPort rear panel component functionality will vary based on the channel mode.

Figure 11-2: ChannelPort 8100 rear panel (Standard Channel mode)

Key	Component	Description
1	External Input 1 Channel A	Use for video input on Channel A.
2	Video Output Channel A (Primary)	Use for primary video output or for HD-branded output when in Independent Branding mode on Channel A. Refer to "Configuring a ChannelPort channel" in the *Harmonic SystemManager User Guide* for instructions on configuring Independent Branding mode.
3	Video Output Channel A (Secondary)	Use for secondary video output or for SD-branded output when in Independent Branding mode on Channel A.
4	External Input 1 Channel B	Use for video input on Channel B.
5	Video Output Channel B (Primary)	Use for primary video output or for HD-branded output when in Independent Branding mode on Channel B.
6	Video Output Channel B (Secondary)	Use for secondary video output or for SD-branded output when in Independent Branding mode on Channel B.
7, 9	AES Audio IN Channel A AES Audio IN Channel B	Use for AES input.
8, 10	LTC OUT Channel A LTC OUT Channel B	Use for LTC output.

Spectrum System 8.2 Installation Guide

Key	Component	Description
11, 12	Reference In and Reference Loop	Use these connectors to connect reference black video to the ChannelPort. Reference black video should be looped through these connectors and then eventually terminated. Refer to "About MediaPort module timing" for additional information.
13	Soft Power button	The **Soft Power** button, in the middle, is a momentary switch that is used to perform a "soft" reset of the ChannelPort. Once pressed, all boards reset and code is re-loaded. The function is similar to clicking the **Reboot** button on the SystemManager ChannelPort Properties page. The Status/Wink LED, on the bottom, is blue to indicate power is ON. The LED will blink (wink) when its wink mode is activated.
14	Status/Wink LED	The Status/Wink LED, on the bottom, is blue to indicate power is ON. This LED can show the following states: • Blue, solid: Indicates the unit is powered on. • Off: Indicates the unit is powered off. • Blue, blinking: Indicates wink state is on. For information on changing the wink state, refer to "Changing the ChannelPort wink state" in the *Harmonic SystemManager User Guide*.
15	GPIO Connector	This connector can be used for player or graphics control, or for EAS connection. See "GPIO connector signal assignments" for signal assignments.
16	RS-422 Port and LEDs	Use this connector (RJ-45) for RS-422 serial control. The LED at the top left of the port indicates channel activity.
17	Gigabit Ethernet Port	Used only in MediaDeck 7000.
18	Gigabit Ethernet Port	Used only in MediaPort 7000.

Additional information

About MediaPort 7000 and ChannelPort timing *on page 197*
GPIO/RS-422 connector signal assignments *on page 221*

ChannelPort 8200 rear panel: Standard Channel mode

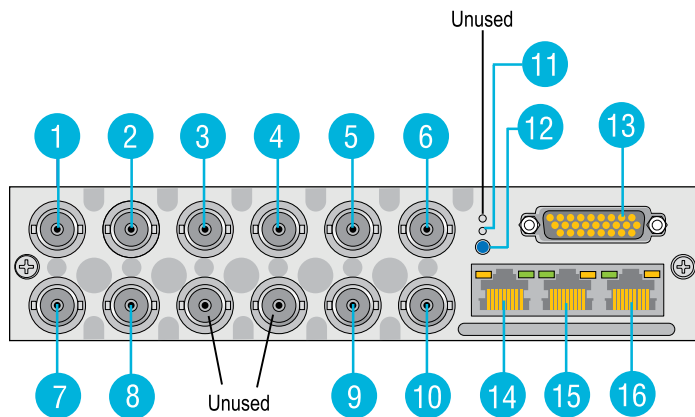The ChannelPort rear panel component functionality will vary based on the channel mode.

📝 **NOTE:** Connections 1 - 8 on ChannelPort 8200 modules use DIN 1.0/2.3 connectors.
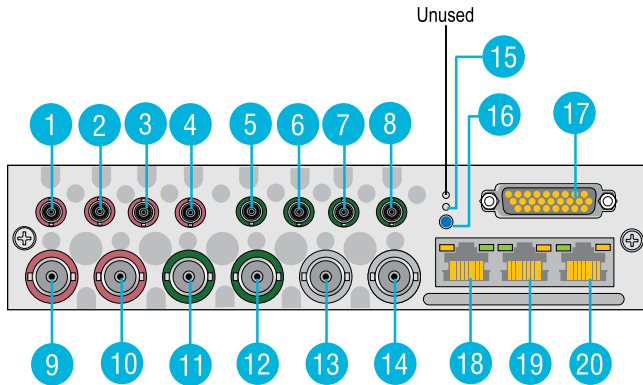
Figure 11-3: ChannelPort 8200 rear panel (Standard Channel mode)

Key	Component	Description
1	External Input 1 Channel A	Use for video input on Channel A.
2	External Input 2/Clean Primary Video Output Channel A	Use for video input or for clean primary video output on Channel A. Note that if used for clean video output, "clean" output refers to video output with no graphics or overlays.
3	Video Output (Secondary) Channel A	Use for secondary video output or for SD-branded output on Channel A when in Independent Branding mode. Refer to "Configuring a ChannelPort channel" in the *Harmonic SystemManager User Guide* for instructions on configuring Independent Branding mode.
4	Video Output (Primary) Channel A	Use for primary video output or for HD-branded output on Channel A when in Independent Branding mode.
5	External Input 1 Channel B	Use for video input on Channel B.
6	External Input 2/Clean Primary Video Output Channel B	Use for video input or for clean primary video output on Channel B. Note that if used for clean primary video output, "clean" refers to video output with no graphics or overlays.
7	Video Output (Secondary) Channel B	Use for secondary video output or for SD-branded output on Channel B when in Independent Branding mode.

Key	Component	Description
8	Video Output (Primary) Channel B	Use for primary video output or for HD-branded output on Channel B when in Independent Branding mode.
9	AES Audio IN	Use for AES input.
10	LTC OUT	Use for LTC output.
11, 12	Unused	
13, 14	Reference In and Reference Loop	Use these connectors to connect reference black video to the ChannelPort. Reference black video should be looped through these connectors and then eventually terminated. Refer to "About MediaPort module timing" for additional information.
15	Soft Power button	The **Soft Power** button, in the middle, is a momentary switch that is used to perform a "soft" reset of the ChannelPort. Once pressed, all boards reset and code is re-loaded. The function is similar to clicking the **Reboot** button on the SystemManager ChannelPort Properties page. The Status/Wink LED, on the bottom, is blue to indicate power is ON. The LED will blink (wink) when its wink mode is activated.
16	Status/Wink LED	The Status/Wink LED, on the bottom, is blue to indicate power is ON. This LED can show the following states: • Blue, solid: Indicates the unit is powered on. • Off: Indicates the unit is powered off. • Blue, blinking: Indicates wink state is on. For information on changing the wink state, refer to "Changing the ChannelPort wink state" in the *Harmonic SystemManager User Guide*.
17	GPIO Connector	This connector can be used for player or graphics control, or for EAS connection. See "GPIO connector signal assignments" for signal assignments.
18	RS-422 Port and LEDs	Use this connector (RJ-45) for RS-422 serial control. The LED at the top left of the port indicates channel activity.
19	Gigabit Ethernet Port	Used only in MediaDeck 7000.
20	Gigabit Ethernet Port	Used only in MediaPort 7000.

📝 **NOTE:** "HD/SD-branded" refers to Independent Branding mode.

Additional information

ChannelPort 8200 rear panel: Enhanced Channel mode

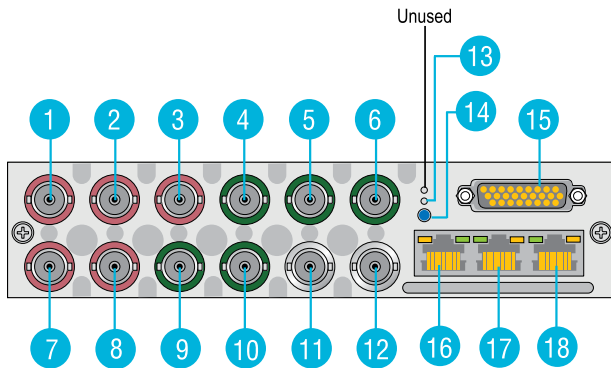The ChannelPort rear panel component functionality will vary based on the channel mode.

📝 **NOTE:** Connections 1 - 8 on ChannelPort 8200 modules use DIN 1.0/2.3 connectors.

Figure 11-4: ChannelPort 8200 rear panel (Enhanced Channel mode)

Key	Component	Description
1	External Input 1/External Key Input 1	Use for video input or External Key input 1. Refer to "Enabling Enhanced Channel mode" in the *Harmonic SystemManager User Guide* for instructions on configuring Enhanced Channel mode to enable Key/Fill. Refer to the *Spectrum X and ChannelPort Template Authoring Guide* for information on External Key/Fill.
2	External Input 2/External Fill Input 1	Use for video input or External Fill input 1.
3	External Input 3/Video Output (Secondary)	Use for video input, secondary video output, or for SD-branded output when in Independent Branding mode. Refer to "Configuring a ChannelPort channel" in the *Harmonic SystemManager User Guide* for instructions on configuring Independent Branding mode.
4	Video Output (Primary)	Use for primary video output or for HD-branded output on Channel A when in Independent Branding mode.

Key	Component	Description
5	External Input 4/External Key Input 2	Use for video input or External Key input 2.
6	External Input 5/External Fill Input 2	Use for video input or External Fill input 2.
7	External Input 6	Use for video input.
8	Video Output	Use for clean primary video output, secondary video output, or for SD-branded output when in Independent Branding mode. Note that if used for clean primary video output, "clean" refers to video output with no graphics or overlays.
9	AES Audio IN	Use for AES input.
10	LTC OUT	Use for LTC output.
11, 12	Reference In and Reference Loop	Use these connectors to connect reference black video to the ChannelPort. Reference black video should be looped through these connectors and then eventually terminated. Refer to "About MediaPort module timing" for additional information.
13	Soft Power button	The **Soft Power** button, in the middle, is a momentary switch that is used to perform a "soft" reset of the ChannelPort. Once pressed, all boards reset and code is re-loaded. The function is similar to clicking the **Reboot** button on the SystemManager ChannelPort Properties page. The Status/Wink LED, on the bottom, is blue to indicate power is ON. The LED will blink (wink) when its wink mode is activated.
14	Status/Wink LED	The Status/Wink LED, on the bottom, is blue to indicate power is ON. This LED can show the following states: • Blue, solid: Indicates the unit is powered on. • Off: Indicates the unit is powered off. • Blue, blinking: Indicates wink state is on. For information on changing the wink state, refer to "Changing the ChannelPort wink state" in the *Harmonic SystemManager User Guide*.
15	GPIO Connector	This connector can be used for player or graphics control, or for EAS connection. See "GPIO connector signal assignments" for signal assignments.

Key	Component	Description
16	RS-422 Port and LEDs	Use this connector (RJ-45) for RS-422 serial control. The LED at the top left of the port indicates channel activity.
17	Gigabit Ethernet Port	Used only in MediaDeck 7000.
18	Gigabit Ethernet Port	Used only in MediaPort 7000.

Additional information

About MediaPort 7000 and ChannelPort timing

Timing works the same way on both MediaPort 7000 and ChannelPort modules.

If reference VITC is present on the timing input of a MediaPort or ChannelPort, it will provide the timecode information to any Players associated with that MediaPort or ChannelPort, unless it is overridden by a LTC connection on the Spectrum video server.

If a LTC timecode source is connected to the Spectrum video server, the Spectrum video server automatically uses that as the timecode source for any attached Player. This setting overrides the reference VITC from the MediaPort or ChannelPort for purposes of automation. However, if the attached Player is configured with a different frame rate than that of the LTC input, then its reference will not be overridden. For example, a LTC input with a frame rate of 25 Hz would not override the reference for a player configured with a frame rate of 29.97 Hz.

GPIO/RS-422 connector signal assignments

The GPIO/RS-422 connector on a ChannelPort module can be connected to an external device and used to control players, connect to an Emergency Alert System (EAS), and control graphics in a number of ways.

ChannelPort GPIO triggers can be used to:

- Add a Fade Layer for a graphic
- Toggle graphics on or off
- Toggle all graphics on or off except an Auto Load graphic
- Mute audio and load a specified "trouble slate" graphic
- Perform mixer transitions
- Perform mixer ARC control
- Perform Playlist operations

The following figure describes the connector pins. Note that this is a female connector.
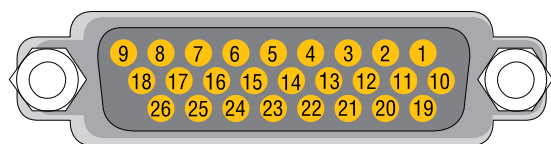
GPIO/RS-422 Signals				
Function	RX (-/+)	TX (-/+)	Function	Pin
Serial 0	2-3	10-11	Ground	18
			GPIO 0	19
Serial 1	6-7	14-15	GPIO 1	20
			GPIO 2	21
Serial 2	4-5	12-13	GPIO 3	22
			GPIO 4	23
Serial 3	8-9	16-17	GPIO 5	24
Ground		1	GPIO 6	25
			GPIO 7	26

Figure 11-5: GPIO/RS-422 signal assignments

For information on configuring GPIO triggers using SystemManager, refer to "Configuring ChannelPort GPIO triggers" in the *Harmonic SystemManager User Guide*.

For information on configuring the serial connections for use with automation or an EAS, see "Configuring a Spectrum X or ChannelPort Channel" in the *Harmonic SystemManager User Guide*.

Serial control connections for MediaPort 7000 and ChannelPort

The MediaPort 7000 and ChannelPort modules include an RJ-45 port for RS-422 serial control connections with an automation system.

📝 **NOTE:** Because manufacturer specifications for cables, connectors and adapters can change, always consult with your control system vendor first for the most current information on interface equipment and peripherals.

📝 **NOTE:** Depending on the MediaPort, there can be between one and six serial control ports, each of which controls an independent DVB/ASI output. You are not required to use all available ports.

On both the MediaPort 7000 and the ChannelPort, the left-most RJ-45 connector is wired for two channels (Ch 0 and Ch 1). Harmonic supplies an RJ-45/ DB-9 splitter cable, which provides the Channel 0 on one DB-9 and the Channel 1 signals on the other.

Pinout assignment for the RS-422 port on the MediaPort 7000/ChannelPort is shown in the following diagram. The connector type is RJ-45 (female)

Figure 11-6: MediaPort 7000/ChannelPort RS-422 Port Pinout

Pin	Signal
1	RX+ (Ch 0)

Pin	Signal
2	RX- (Ch 0)
3	TX+ (Ch 0)
4	RX+ (Ch 1)
5	RX- (Ch 1)
6	TX- (Ch 0)
7	TX+ (Ch 1)
8	RX- (Ch 1)

RJ-45/DB-9 splitter cable pinout

The MediaPort 7000 series and the ChannelPort ship with one integrated RJ-45 to DB-9 (Female) splitter cable. RS-422 connections for both channels A and B on the MediaPort 7000 series are on one RJ-45 port. This cable splits the two sets of signals out to two DB-9 connectors.

Use the Harmonic RJ45/DB-9 splitter cable to interface with controllers (or cables) using standard SMPTE/EBU ES bus wiring connections. This adapter converts the RJ45 connections on the back of the MediaPorts to standard SMPTE/EBU ES Bus.

Connector B
DB-9, Female

Pin	Signal
8	TX1-
3	TX1+
7	RX1+
2	RX1-

RJ45, Male

1 2 3 4 5 6 7 8

Pin	Signal
1	RX0+
2	RX0-
3	TX0+
4	RX1+
5	RX1-
6	TX0-
7	TX1+
8	TX1-

Connector A
DB-9, Female

Pin	Signal
8	TX0-
3	TX0+
7	RX0+
2	RX0-

Figure 11-7: RJ-45/DB-9 Splitter Cable

📝 **NOTE:** The RJ-45 to DB-9 (Female) splitter cable can be used in a single (Channel 0) port.

To obtain the necessary interconnection between the MediaPort or ChannelPort Module and the controller, the following methods can be used:

• Harmonic RJ45/DB-9 Splitter Cable to Standard RS-422 extension cable
• Harmonic RJ45/DB-9 Splitter Cable to Automation System adapter cable

📝 **NOTE:** Harmonic does not provide RS-422 extension cables or RJ45 (Ethernet) extension cables.

About RS-422 grounding

Make sure to follow grounding guidelines for RS-422.

RS-422 uses differential signaling, much like balanced audio. As long as the chassis grounds of the controller and the MediaPort share a common ground through the AC power connections, no ground connection is needed on the RS-422 cable.

In some cases, grounding the RS-422 at one end and running a shield around the balanced pairs can reduce noise pickup.

License options

Harmonic provides a variety of license options for the ChannelPort.

📄 **NOTE:** In Spectrum 8.0 and later, software licenses are installed only on the Spectrum video servers.

Note that for ChannelPorts with 4 graphics layers enabled (4GL), U/D/X conversion is not included with the DMH, DVH, and M2H licenses unless explicitly upgraded for that capability. For ChannelPorts with 8 graphics layers enabled (8GL), U/D/X conversion is included with the DMH, DVH, and M2H licenses unless you are upgrading from a 4GL version.

📄 **NOTE:** Due to changes in the license structure, ChannelPort licenses issued for releases 7.0 and 7.1 will not have full graphics capabilities when used with release 7.2 or later. To correct this problem, contact Harmonic Technical Support to request a new ChannelPort license key.

Table 11-8: ChannelPort 8000 series module options

Model Number	MPEG-2	DV/ DVCPRO	AVC-Intra	VC-3	ProRes
	Play	Play	Play	Play	Play
CPT-8100	X	X	X	X	X
CPT-8200	X	X	X	X	X

Table 11-9: ChannelPort licensed features

Product ID	SD	HD	Up, Down, Cross Convert, HD/SD Simulcast	MPEG-2 play	DV, DVCPRO play	AVC-Intra play	VC-3 play	ProRes play
DMH	X	X		X	X			
DMS	X			X	X			
M2H	X	X	X	X				
VC3P[1]	X	X					X	
AVCI						X		
SPL-PRORES								X

....
[1] *Upgrading to this license requires that an HD license be present on the ChannelPort module.*

Table 11-10: Additional ChannelPort module licensed features

Product ID	Description
CPL-8000-EAS	Onboard emergency alert system support for ChannelPort, per channel
CPL-COMBINED-CHANNEL	License upgrade to enable ChannelPort combined channel mode. License is for one module (2 channels)
CPL-DUAL-DVE	License upgrade for ChannelPort combined channel mode w/ dual DVE. License is for one module (2 ch).
CPL-DVE	DVE license upgrade for one ChannelPort module (2 ch)
CPL-H264-PLAY	License upgrade for PitchBlue TS demux and H.264 decode for PitchBlue operating points only.
CPL-HD	HD license upgrade (no U/D/X conversion) for one ChannelPort module (2 ch)
CPL-INDEP-BRANDING	License upgrade to enable ChannelPort independent SD/HD branding. license is for 1 module (2 channels)
CPL-MAX-GRAPHIC-LAYERS	License upgrade to enable maximum number of graphics layers on ChannelPort module (2 channels)
CPL-MCS	Master control (live input) license upgrade for one ChannelPort module (2 ch)
CPL-OPEN-CAPTIONS	Onboard open caption insertion license for one channel of a ChannelPort module. The first license for the module goes to Channel A.
CPL-UDX	U/D/X converter license upgrade (HD option is also required) for one ChannelPort module (2 ch)
CPL-DOLBY-DECODE	Onboard Dolby$^®$ E decode license for Live and Player inputs for 2 channels of a ChannelPort module.
MPU-7000-VC3P	License upgrade to add VC-3 Play to any MIP-7x0x or ChannelPort.
SPL-OCC	Onboard closed caption insertion license for 1 ch of ChannelPort OR MediaPort 7000
SPL-PRORES-PLAY	ProRes playout upgrade license for one module (2 channels) of Spectrum ChannelPort OR MediaPort 7000
SPL-STL	Onboard subtitle insertion license for one Spectrum MediaPort channel or ChannelPort channel

Table 11-11: Additional Spectrum server licensed features

Product ID	Description
POL-PLAY-CH	License for one channel ChannelPort or MediaPort Polaris Play: Playlist Control package. Package provides control of a single channel and includes the embedded controller software running on a Spectrum server. Includes control of one scheduled play to air channel and one playlist application with timeline view. Maximum channel count is limited by the Spectrum video server channel count.

Product ID	Description
POL-PLAY-SCHED	License for Polaris Play: Scheduler for a Spectrum server. One license per Spectrum server. This optional embedded service allows for manual creation of schedules for primary (clips) and secondary (graphic/branding) assets via a web browser. Multiple clients may attach to the service at one time. The maximum recommended simultaneous web browsers accessing this service is 4.
POL-PLAY-BXF	License for BXF file import for Polaris Play: Playlist Control for a Spectrum server. One license per Spectrum server. Works for all licensed Polaris Play channels. Playlist Control licenses are sold separately. Verify the traffic system BXF compatibility before ordering.
POL-PLAY-OMF	License for Polaris Play: Media Fetch for one Spectrum server. One license per Spectrum server. This feature imports assets from 1 to 4 FTP storage locations and purges them when no longer needed. It works with Polaris Play: Playlist Control for all active playlists.
SDL-SCTE104	SCTE 104 license for one channel of Spectrum ChannelPort or MediaPort 7000. Supports SCTE 104 protocol to insert SCTE packets in the ANC payload. License is set on the MediaDirector or MediaCenter.
SPL-AVCI-PLAY	AVC-Intra playout upgrade license for one ChannelPort or MediaPort 7000 module (two channels).
AUTO-EXPORT	Auto-export to Harmonic MediaGrid license for all channels of the MediaCenter and MediaDirector respectively.

ChannelPort specifications

Find ChannelPort specifications here.

Each MediaPort 7000 series chassis can accommodate two ChannelPort modules with up to two independent playout channels per module. Each module has a private, point-to-point, non-switchable Gigabit Ethernet connection to the Spectrum video server.

📝 **NOTE:** For video codec and audio format support, see *Spectrum Media and Wrapper Formats*.

Table 11-12: Video I/O

Specification	Details
SD: SMPTE 259M	8100 modules: 6 75 ohm BNC female connectors
HD: SMPTE 292M	8200 modules: 8 DIN 1.0/2.3 connectors
	Note: The SMPTE specifications refer to BNC connectors only. However, the DIN connectors on the 8200 module are electrically equivalent to the specifications.
8100 module Standard Channel	• Single video input per channel • Dual video outputs per channel with independently configurable up/down/cross-conversion

Specification	Details
8100 module Enhanced Channel	• Dual video inputs per channel • Dual video outputs per channel with independently configurable up/down/cross-conversion
8200 module Standard Channel (depends on configuration)	• 1 - 2 video inputs per channel • 2 - 3 video outputs per channel with independently configurable up/down/cross-conversion
8200 module Enhanced Channel (depends on configuration)	• 4 - 6 inputs per channel • 2 - 4 video outputs per channel with independently configurable up/down/cross-conversion

Table 11-13: Conversion

Specification	Detail
Up Conversion	• Configurable pillarbox, crop, anamorphic. • EIA-608 captions translated to EIA-708. • Line 21 OP-42 subtitles translated to OP-47
Down Conversion	• Configurable letterbox, crop, anamorphic • EIA-608 compatibility bytes extracted from EIA-708 data to create EIA-608 captions. • OP-47 subtitles translated to line 21 OP-42
Up/Down/Cross	720p to 1080i 10801 to 720p

Table 11-14: SD-SD Aspect Ratio Converter (ARC)

Specification	Details
RP-186 AFD SMPTE-2016, ATSC A/53	• 16:9 SD to 4:3 Letterbox (Vertical Decimation) • 16:9 SD to Full Screen (Horizontal Interpolation) • 16:9 SD to Crop 14:9 (Vertical Decimation, Horizontal Interpolation)

Table 11-15: Video raster

Specification	Details
SD	720x486i (29.97fps)
	720x576i (25 fps)
HD	1280x720p (50 and 59.94 fps)
	1920x1080i (25 and 29.97 fps)
	1920x1080p (25 and 29.97 fps carried as psf in HD-SDI*)

Table 11-16: Audio channels

Specification	Details
SMPTE 272M	Up to 16 embedded per video channel

Table 11-17: Control

Specification	Details
VDCP and Limited BVW	Via RS-422 per video channel (RJ-45 connector; DB-9 adapter supplied)
Spectrum API	Via Ethernet from client to MediaDeck.

Table 11-18: Timecode

Specification	Details
LTC	Dedicated LTC I/O per channel (BNC)
VITC	Extracted from or inserted into SDI

Table 11-19: Caption

Specification	Details
EIA-608	Analog caption data recovered from VBI and stored as digital data; inserted into VBI on playout. Onboard Closed Caption insertion available as licensed feature; Cheetah, NCI, and SCC are supported file types.
EIA-708	Digital caption data preserved on record and inserted on playout.
Onboard Closed Caption Insertion	Onboard Closed Caption Insertion available as licensed feature; Cheetah, NCI, and SCC are supported file types.
Onboard Open Caption Insertion,	Onboard Closed Caption Insertion available as licensed feature; STL and 890 are supported file types.

Table 11-20: Onboard subtitle insertion

Specification	Details
OP47a SMPTE-2031	Onboard Subtitle Insertion available as licensed feature; STL, PAC, and 890 are supported file types.

Table 11-21: Ancillary data

Specification	Details
VBI	Up to 6 lines (configurable) preserved. Line 21 caption data saved automatically
VANC	Up to 6000 bytes (configurable) preserved per frame

Table 11-22: Reference

Specification	Details
Analog burst with color burst	Optional for playout; unused for recording. Loop-through connector
Input-to-Reference	+/- 1 native video line for the live input to be passed through

Table 11-23: Environmental

Specification	Details
Operating Temperature	+5°C to +40°C
Humidity	10% to 85% non-condensing

Table 11-24: Safety

Specification	Details
UL 60950-1 2nd Edition	Information Technology Equipment - Safety - Part 1: General
CSA C22.2	CSA C22.2 Requirements

Table 11-25: CE

Specification	Details
Low Voltage Directive (73/23/EEC) including amendments	EN60950: 1992, A1+A2+A3+A4 Safety of Information Technology Equipment

Table 11-26: EMC

Specification	Details
FCC Part 15 Class A	USA
VCCI Class A	Japan
CISPR 22 Class A	Australia, New Zealand, EU
CNS 13438 Class A	Taiwan
ICES-003 Class A	Canada
En 55022 Class A	EU
KN22 Class A	Korea

MediaStore 5000 series hardware reference

The MediaStore 5000 series is a network storage device that employs Serial-attached SCSI (SAS) host bus adapters (HBA) to connect to a MediaDirector. The MediaStore 5000 series is based on a storage subsystem together with a set of plug-in modules.

- *About the MediaStore 5000 series*
- *MediaStore 5000 series front panel*
- *MediaStore 5000 series disk carrier module*
- *MediaStore 5000 series drive carrier components*
- *MediaStore 5000 series operator panel components*
- *MediaStore 5000 series rear panel*
- *MediaStore 5000 series power cooling modules (PCMs)*
- *MediaStore 5000 series I/O module components*
- *About MediaStore 5000 series drive start up*
- *MediaStore 5000 series RAID configurations*
- *MediaStore 5000 series troubleshooting and maintenance*
- *MediaStore 5000 series specifications*

About the MediaStore 5000 series

Using SAS connections and the MediaDirector 2252B/2251B, up to four MediaStores can be connected together. A second MediaDirector 2252B/2251B can be added for Extended File Sharing (

The MediaStores include the following features:

- 16 or 24 disk drive capacity, all contained in a 2 RU chassis. The chassis can house two (for 16 drive capacities) or three (for 24 drive capacities) 6+2 RAID sets. All drives install from the front of the chassis. All power supplies and I/O modules install from the rear.
- Chassis with front panel Operators Panel, including clear status indicators and audible failure alarms.
- Two hot swappable AC Power Cooling Modules (PCMs) with integral cooling fans.
- Hard Disk Drive Carrier Modules and associated dummy carrier modules for blank drive slots.
- Hot-swappable high-performance 300, 600, or 900 GB SAS hard disk drives.
- Serial-attached SCSI (SAS) connections.

📝 **NOTE:** There are no user-serviceable parts on the MediaStore.

Additional information

MediaStore 5000 series front panel

The MediaStore 5000 series chassis consists of a sheet metal enclosure assembly containing a midplane printed circuit board (PCB) and module runner system. The chassis installs in a standard 19-inch rack and uses two EIA units of rack space (2 RU). The chassis assembly also includes an integral Operator Panel, mounted on the front.

The chassis assembly contains 24 drive bays at the front, each of which accommodates a plug-in drive carrier module. A bay is defined as the space required to house a single 5/8 inch high 2.5-inch disk drive in its carrier module.

Operator Panel

Disk Drives (1-24, from left to right)
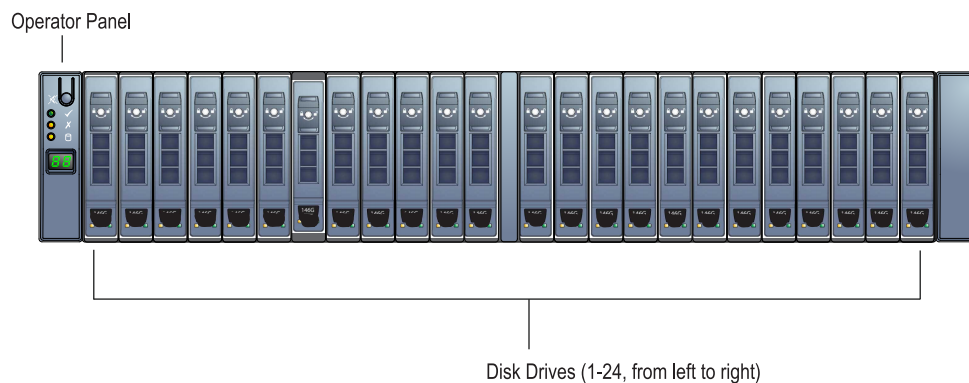
Figure 12-1: MediaStore 5000 series front panel view

MediaStore 5000 series disk carrier module

A drive carrier module houses a single 5/8-inch high, 2.5-inch disk drive. Each drive carrier provides excellent thermal conduction, radio frequency and electro-magnetic induction protection and affords maximum protection for the drive.
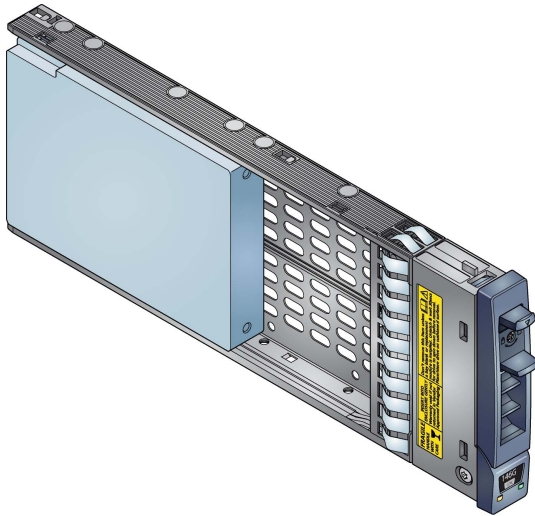
Figure 12-2: Disk carrier module

The front cap also supports an ergonomic handle that provides the following functions:

- Camming of carrier into and out of drive bays.
- Positive "spring loading" of the drive/midplane connector.
- An anti-tamper lock operated by a "toRX" socket security key.

For MediaStore 5000 Series that use only 16 drives, blank drive carrier modules are installed in slots 17-24. They are designed as integral modules with handles, and must be installed in all unused drive bays in order to maintain a balanced airflow.

MediaStore 5000 series drive carrier components

The front of a drive carrier module consists of an anti-tamper lock, a drive latch, a Drive Status LED and Drive Activity LED.
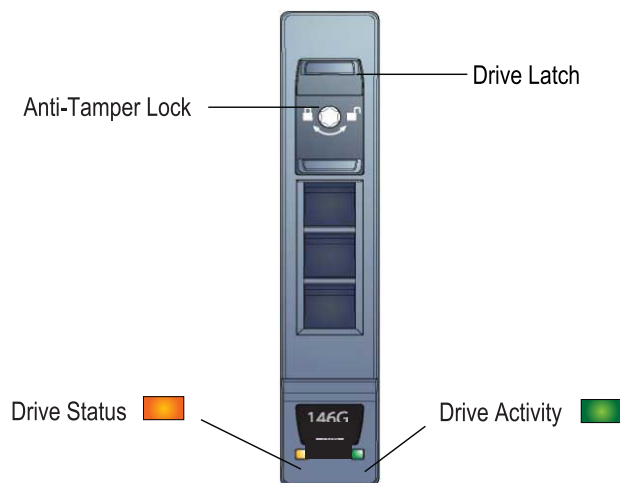
Figure 12-3: Front of drive carrier module

Table 12-1: Drive carrier components

Component	Description
Drive Latch	The Drive Latch releases the carrier handle, allowing you to remove and install the Drive Carrier Module. When the Anti-Tamper Lock is off, pinch the latch to release.
Anti-Tamper Lock	Each Drive Carrier has an integral Anti-Tamper Lock that is accessed through the small cutout in the handle. Use a "toRX" socket security key to lock and unlock the handle. One security key is included with your MediaStore.
Drive Activity LED	In normal operation, the Drive Carrier Module Drive Activity LED (Green) will blink as it operates. Please note that the Drive Activity LED also works in association with the Drive Status LED, as well as the LEDs on the Operator Panel.
Drive Status LED	In normal operation, the Drive Carrier Module Drive Status LED (Amber) has three states: • Off: no drive is present, or drive is present and operating. • On: drive fault.

Table 12-2: Drive carrier LED states

Drive activity LED (green)	Drive status LED (amber)	Associated operator panel LED	Status
Off	Off	None	No drive installed
Blink	Off	None	Drive installed and operational
Solid	Blink (1 sec on/1 sec off)	None	SAS identity set
Solid	Solid	Logical fault (amber)	SAS device fault bit set
Off	Solid	Module fault (amber)	Power control circuit failure
Solid	Blink (3 sec on/1 sec off)	Logical fault (amber)	Failed disk array

MediaStore 5000 series: drive carrier LED states

The drive carrier LEDs work in association with the Operator Panel LEDs.

Drive Activity LED (Green)	Drive Status LED (Amber)	Associated Operator Panel LED	Status
Off	Off	None	No drive installed
Blink	Off	None	Drive installed and operational
Solid	Blink (1 sec on/1 sec off)	None	SAS identity set
Solid	Solid	**Logical Fault** (Amber)	SAS device fault bit set
Off	Solid	**Module Fault** (Amber)	Power control circuit failure
Solid	Blink (3 sec on/1 sec off)	**Logical Fault** (Amber)	Failed disk array

MediaStore 5000 series operator panel components

The operator panel provides a number of LEDs to help with troubleshooting.
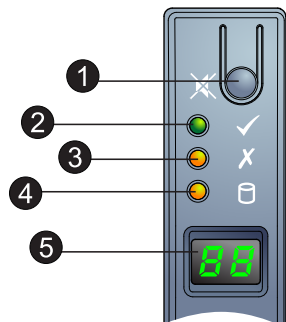
Figure 12-4: MediaStore 5000 series operator panel

Key	Component	Descriptions
1	Alarm Silence Button	The Operators Panel incorporates an Audible Alarm that indicates when a fault state is present. Push the **Alarm Silence Button** to mute the audible alarm. Refer to "MediaStore 5000 series audible alarms" for additional details. The **Alarm Silence Button** is also used to set the Unit ID number. Refer to "Setting the unit ID number" for instructions.
2	System Power LED	The **System Power LED** indicates the status of the system's power. Refer to "Powering up a MediaStore" for details.
4	Module Fault LED	The **Module Fault LED** indicates a system hardware fault. Refer to "Powering up a MediaStore" for details.
5	Logical Fault LED	The **System Fault LED** indicates a variety of system states and faults. Refer to "Powering up a MediaStore" for details.
6	Unit ID Display	The primary function of the **Unit ID Display** is to display a MediaStore unit identification number to assist users in setting up and maintaining multiple MediaStores. For instructions on setting the Unit ID number, refer to "Setting the unit ID number"..
7	Audible Alarm (behind panel)	The **Audible Alarm** can be activated for a variety of reasons. Refer to "MediaStore 5000 series audible alarms" for additional details.

236

Key	Component	Descriptions
8	Thermal Sensor (behind panel)	The Operator Panel **Thermal Sensor** is on the outside the MediaStore and connects to another thermal sensor on the midplane of the MediaStore. This external **Thermal Sensor** sends input to the MediaStore about its external operating ambient temperature. Its other function is to cause a warning signal to be generated by the SAS when there is a break in this sensor's connection to the MediaStore midplane. Refer to "MediaStore 5000 series audible alarms" for details.

The operator panel LEDs work in association with other LEDs and alarms on the MediaStore.

Table 12-3: MediaStore 5000 series operator panel LEDs and alarms

System Power, (green or amber)	Module Fault (amber)	Logical Fault (amber)	LED Display	Associated LEDs/ Alarms	Status
Solid	Solid	On	On		Operator panel power on, test state
Solid	Off	Off			5V standby power present, overall power failed or switched off
Solid	Off	Off			Power on, all functions good
Solid	Solid			PCM fault LEDs, fan fault LEDs	Any PCM fault, fan fault, over or under temperature
Solid	Solid			I/O module LEDs	Any Storage Bridge Bay (SBB) module fault
Solid	Solid			No module LEDs	MediaStore logical fault
Solid	Blink			Module status LED on I/O module	Invalid or mixed SBB module type installed, I^2C bus failure, EBOD VPD configuration error.
Solid	Blink			PCM fault LEDs, fan fault LEDs	Invalid or mixed PCM type installed or I^2C bus failure (PCM comms)

System Power, (green or amber)	Module Fault (amber)	Logical Fault (amber)	LED Display	Associated LEDs/ Alarms	Status
Solid		Solid		Array in failed or degraded state	Drive failure has caused loss of availability or redundancy
Solid		Blink		Array in impacted state	Arrays operating background function
Solid	Blink			SES state S1	MediaStore ID setting different from "start of day" setting
			Blink		MediaStore ID or invalid ID selected

Additional information

Setting the unit ID number

You may create a Unit ID Number, displayed on the Unit ID Display of the MediaStore, in order to track and maintain multiple MediaStores.

Please note the following when setting the Unit ID Number:

- Software within the I/O module controls the use of the Unit ID Number within the system.
- By default, and when there are no I/O modules installed, the display will show "00."
- The Unit ID Number is not set until the system is powered on. Once the Unit ID Number is set, it is stored in the I/O module and will appear in the Unit ID Display when the MediaStore is next powered on.
- Harmonic recommends that you set the Unit ID of the first MediaStore in your Spectrum system to "01" and to increase Unit ID by one for each additional MediaStore.

    To set the Unit ID Number:

1. On the **Operator Panel**, press the **Alarm Silence Button** for five seconds.

2. When the left-hand digit begins to flash, press the **Alarm Silence Button** to change the number.

    Each time you press the **Alarm Silence Button**, the number will increase by one.

3. When the required number is reached, press the **Alarm Silence Button** for five seconds to set the number.

4. When the right-hand digit begins to flash, press the **Alarm Silence Button** to change the number, or press the button for five seconds to select "00."

MediaStore 5000 series rear panel

The MediaStore rear panel includes replaceable power cooling modules and I/O modules.
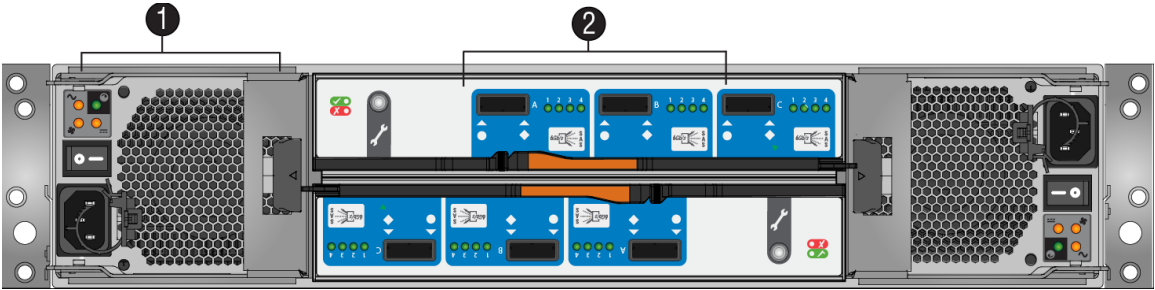
Figure 12-5: MediaStore 5000 series rear panel

Key	Component	Description
1	Hot-swappable Power Cooling Modules (PCM)	The MediaStore contains dual independent hot-swappable PCMs. • **PCM 1** installs on the left side of the MediaStore (as you face the rear) • **PCM 2** installs *upside-down* on the right. Each PCM includes integral fans, a power switch, and status LEDs. Refer to "MediaStore 5000 series power cooling modules" for complete information on the power supply and status LEDs. ⚠ **IMPORTANT:** The MediaStore must always be operated with two PCMs installed.
2	I/O Modules	The MediaStore contains two **I/O Modules** for interfacing to additional MediaStores via SAS connection. Both modules are the same (mechanically and electronically). Each module includes three SAS ports and Status LEDs. • The **Primary I/O Module** is installed in the top bay (facing the rear). • The **Secondary I/O Module** is installed *upside-down* in the bottom bay. Refer to "MediaStore 5000 series I/O modules" for complete information on the modules and its indicators.

MediaStore 5000 series power cooling modules (PCMs)

Two hot-swappable power cooling modules (PCM) with integral cooling fans are mounted in the rear of the MediaStore. The position of the components may vary slightly according to installation, as the PCM on the right-hand side when facing the rear of the MediaStore is installed *upside-down*.

Note the following important points regarding the power supplies:

- The MediaStore 5000 series must always be operated with two Power Supply modules installed. The two modules operate together so that if one fails, the other maintains the power supply and cooling while you replace the faulty unit.

  NOTE: With both Power Supplies installed and turned on, disk spin-up time is significantly faster.

- When replacing a faulty PCM, do not leave the PCM slot empty for more than ten minutes. Doing so will cause the MediaStore to overheat, which will result in component failure.

  Refer to "Power cooling module replacement" in the *Spectrum MediaStore 5000 Component Replacement Guide* for instructions.

PCM voltage operating ranges are nominally 115V or 230V AC, selected automatically.

MediaStore 5000 series: power cooling module components

PCMs include power supply status LEDs, power button, AC In connector, power supply retainer, as well as a latch and handle.
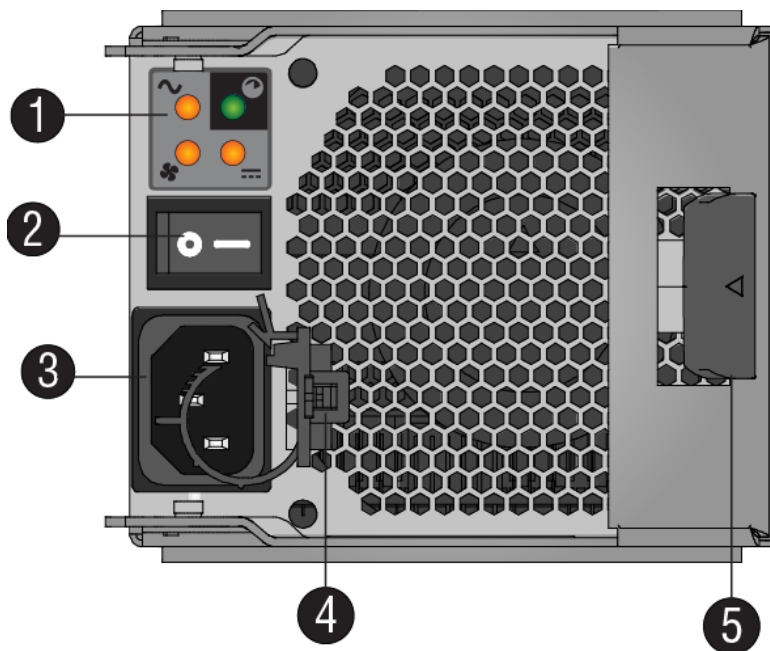
Figure 12-6: Power cooling module

Key	Component	Description
1	Power Supply Status LEDs	Each power supply includes four Status LEDs and their associated labels.

Key	Component	Description
2	Power Button	Each power supply includes a Power Button that turns the supply on and off. Each switch is labeled with an "**I**" for ON and an "**O**" for OFF.
3	AC IN Connector	Connect a stable AC source to each PCM AC IN connector.
4	Power Supply Retainer	Holds the AC source in place.
5	Latch and Handle	Each PCM includes a Latch and Handle that is used for removing and inserting the module.
		Refer to the *Spectrum Component Replacement Guide* for operating instructions when replacing a PCM.

MediaStore 5000 series: power cooling module status LEDs

Under normal conditions, the **Power status LED** is illuminated green and all other LEDs are off. If a problem occurs, the relevant LED lights amber.
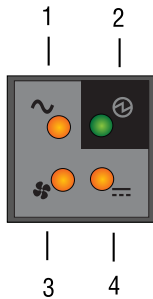
Figure 12-7: PCM status LEDs

Table 12-4: PCM symbols and definitions

Symbol	Definition	LED On (green or amber)
1	AC Input Status	Amber
2	Power Status	Green
3	Fan Status	Amber
4	DC Output Power	Amber

Table 12-5: PCM LED states

PCM OK (green)	Fan Fail (amber)	AC Fail (amber)	DC Fail (amber)	Status
Off	Off	Off	Off	No AC on any PCM
Off	Off	**On**	**On**	No AC on this PCM only

PCM OK (green)	Fan Fail (amber)	AC Fail (amber)	DC Fail (amber)	Status
On	Off	Off	Off	AC present; PCM working correctly
On	Off	Off	**On**	PCM fan is outside acceptable limits
Off	**On**	Off	Off	Fan failure
Off	**On**	**On**	**On**	PCM fault (over temperature, voltage, or current)
Off	**Blink**	**Blink**	**Blink**	PCM firmware download in progress

MediaStore 5000 series I/O module components

Two Input/Output (I/O) Modules are mounted in the rear of the MediaStore. Both modules are the same — mechanically and electronically. The **Primary I/O** module is the module installed in the *top* slot. The **Secondary I/O** module is the module installed in the *bottom* slot.
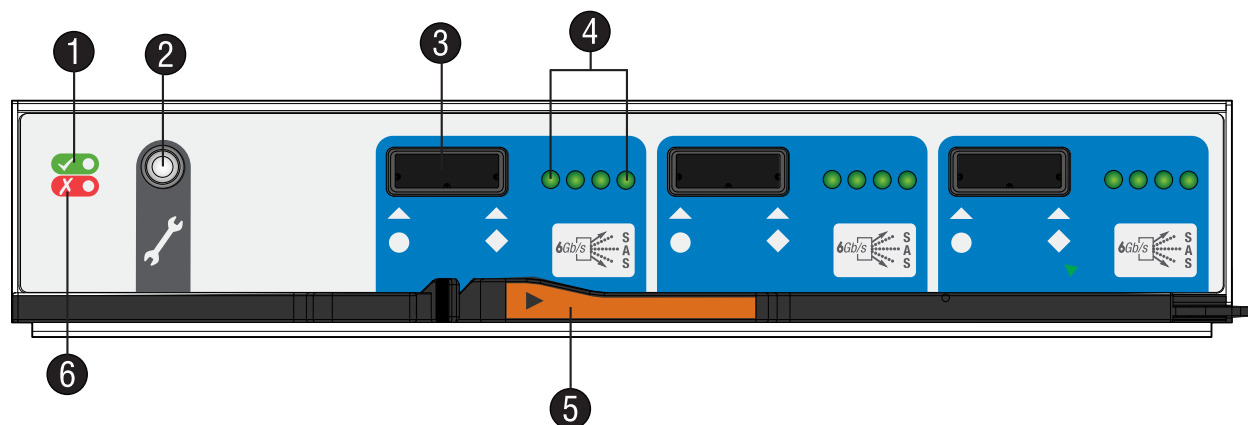
Figure 12-8: MediaStore 5000 series I/O module

Key	Component	Description
1	I/O Module Power LED	The I/O Module Power LED has three states described in "MediaStore 5000 series: I/O module status LEDS".
2	Service Use Only	For Service Use only
3	SAS connectors	Each I/O module has three SAS connectors, with 4 links per port.
4	SAS Link Activity LEDs	The SAS Connector Activity LEDs are described in "MediaStore 5000 series: SAS link activity LEDs".

Key	Component	Description
5	Handle	Each I/O module includes a Handle that is used for removing and inserting the module. Refer to the *Spectrum MediaStore 5000 Component Replacement Guide* for operating instructions when replacing an I/O Module.
6	I/O Module Fault LED	The I/O Module Fault LED has two states described in "MediaStore 5000 series module status LEDs."

📝 **NOTE:** The MediaDirector 2252B/2251B requires a different SAS cable than previous MediaDirector models. To make sure you have the correct SAS cable, contact your Harmonic sales representative.

MediaStore 5000 series: I/O module status LEDs

The I/O modules include status LEDs for help with troubleshooting.

I/O Module Power LED

I/O Module Fault LED

Figure 12-9: I/O module status LEDs

Component	Status (green, amber, or clear)	Definition
I/O Module Power	Green (Solid)	On
	Green (Blink)	Configuration error
	Clear	Off
I/O Module Fault	Amber	Fault Condition
	Clear	Normal

MediaStore 5000 series: SAS link activity LEDs

During normal operations, the three SAS connections on an I/O module are measured for Link Activity.

Figure 12-10: MediaStore 5000 series SAS link activity LEDs

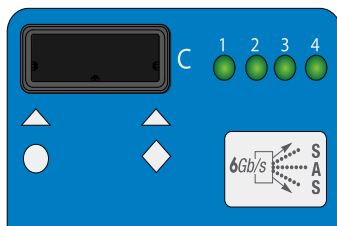| Indicator	Status
Green, solid	Ready, no traffic
Green, blink	Active, I/O traffic
Green, blink, all module indicators	Fault Condition, or rebooting

About MediaStore 5000 series drive start up

Unless otherwise selected during installation, all drives in the MediaStore will automatically start their motors upon power-up. If this has *not* occurred, there may be a power problem (an alarm and power fault indication would normally be active). Note that if there is only one Power Cooling Module present, the drive motors will spin up in a delayed sequence.

Each drive carrier incorporates a green LED and an amber LED. In normal operation, the green LED will be ON and will flicker as the drive operates.

MediaStore 5000 series RAID configurations

The MediaStore 5000 series is available in either 16 or 24 drive configurations, with drive size ranging from 300 GB to 1.2 TB.

Drive Size	# of Drives	RAID Set	Usable Storage
300 GB	16	2 (6+2)	3.49 TB
	24	3 (6+2)	5.23 TB
600 GB	16	2 (6+2)	6.98 TB
	24	3 (6+2)	10.46 TB
900 GB	16	2 (6+2)	10.47 TB
	24	3 (6+2)	15.71 TB
1.2 TB	16	2 (6+2)	13.97 TB
	24	3 (6+2)	20.95 TB

MediaStore 5000 series troubleshooting and maintenance

The MediaStore includes a processor and associated monitoring and control logic to enable it to diagnose problems within the subsystems of the MediaStore. The independent sensors for power and cooling conditions are housed within the midplane and PCMs.

NOTE: If a fault is indicated on the **Operators Panel**, refer to the table in "MediaStore 5000 Series: Operator Panel components," and then to the appropriate troubleshooting section for additional information.

Additional information

About data security

In order to prevent loss of data, Harmonic recommends that you follow some data security guidelines when handling a disk drive.

- Each MediaStore 5000 series contains up to 24 removable disk drives. Disk units are fragile. Handle them with care, observe static electricity precautions, and keep them away from strong magnetic fields.
- *All* the supplied plug-in modules and blanking plates must be in place for the air to flow correctly around the MediaStore and also to complete the internal circuitry.
- If you remove any disk drive, you may lose data.
- If you remove a disk drive, replace it immediately. If it is faulty, replace it with a disk drive of the same type and capacity. For instructions on replacing disk drives, refer to the *Spectrum MediaStore 5000 Component Replacement Guide*.
- Ensure that all disk drives are removed from the MediaStore before attempting to handle or move the rack installation.

Additional information

Checking for faulty cords

Verify that the cords for your MediaStore are working properly.

1. Check that you have wired up the MediaStore correctly.

2. Check for the following:

    ◦ missing or damaged cords
    ◦ incorrect plugs
    ◦ cords are too short

3. If you verify that any of the above cords or components are faulty, contact your supplier for a replacement.

Dealing with hardware faults

Be sure to take certain precautions when dealing with hardware faults.

Before you begin

⚠ **DANGER:** If a MediaStore 5000 series is powered up and you remove any module, replace it immediately. If the MediaStore is used with modules or module blanks missing for more than a few minutes, the MediaStore can overheat, causing power failure and data loss. Such use will invalidate the warranty.

- Ensure that you have obtained a replacement module of the same type before removing any faulty module. For more information on replacing modules, refer to the *Spectrum Component Replacement Guide*.

- Replace a faulty drive with a drive of the same type and capacity. For more information on replacing drives, refer to the*Spectrum Component Replacement Guide*.
- All drive bays must be fitted with a Drive Carrier module or a dummy carrier module in order to maintain a balanced airflow.
- All the supplied plug-in power supply units, electronics modules and blank modules must be in place for the air to flow correctly around the cabinet.

Continuous operation during replacement

Depending on how the MediaStore is set up, if a disk unit fails, it can normally be replaced without interrupting the use of the system.

In addition, each MediaStore contains two Power Cooling Modules (PCMs), either of which can maintain power and cooling to the MediaStore while the other is replaced.

MediaStore auto start failure

Unless otherwise selected at installation time, all drives in the MediaStore should automatically start their motors after power is applied. If this does not occur, there is a power problem. An alarm and power fault indication will normally be active.

📝 **NOTE:** The **System Fault LED** on the Operators Panel will blink Green /Amber.

Audible alarm states

The MediaStore 5000 series includes an **Audible Alarm** on the **Operator Panel** that indicates when a fault state is present.

The following conditions will activate the alarm:

- PCM Faults
- Fan Fault
- Temperature Alerts
- System faults

When the Audible Alarm sounds, pressing the **Alarm Silence Button** may mute it. If the Alarm Silence Button is not manually operated, the alarm will automatically mute after two minutes. When the alarm is muted, it continues to sound with short intermittent bleeps to indicate that a problem still exists. It will be silenced when all problems are cleared.

The **Alarm Silence Button** can be used to test the LEDs on the Operators Panel. When the Alarm Silence Button is pressed and held, all LEDs will be illuminated if there are no faults present.

Table 12-6: Audible alarm states

Alarm state	Action	Action with Alarm Silence button pressed
S0	Normal mode: silent	Beep twice
S1	Fault mode: 1 sec on/1 sec off	Transition to S2
S2	Remind mode: intermittent beep	None
S3	Muted mode: silent	None

Alarm state	Action	Action with Alarm Silence button pressed
S4	Critical fault mode: continuous alarm	None: mute not active

Note the following about Audible Alarm States:

- When an alarm is in state S1, and you do not mute the alarm within two minutes, the alarm will automatically transition to state S2.
- Alarm states S1 to S4 return to state S0 when you clear the fault.
- Alarm state S4 can be entered from any other alarm state

MediaStore 5000 series: audible alarm conditions

Certain MediaStore alerts result in an audible alarm.

Status	Severity	Alarm
PCM alert—loss of DC power from a single PCM	Fault—no loss of redundancy	S1
PCM alert—loss of DC power from a single PCM	Fault—loss of redundancy	S1
PCM fan fail	Fault—loss of redundancy	S1
SBB module detected PCM fault	Fault	S1
MediaStore configuration error	Fault—critical	S1
Low temperature alert	Warning	S1
High temperature alert	Warning	S1
Over temperature alarm	Fault—critical	S4
I^2C bus failure	Fault—loss of redundancy	S1
Ops panel communication error (I^2C)	Fault—critical	S1
RAID error	Fault—critical	S1
SBB interface module fault	Fault—critical	S1
Drive power control fault	Warning—no loss of drive power	S1
Drive power control fault	Fault—critical—loss of drive power	S1

Troubleshooting subsystem recognition problems

Follow this procedure when the MediaDirector does not recognize the MediaStore subsystem.

1. Check that the **SAS** interface cables from the MediaStore 5000 series to the MediaDirector 2252B/2251B are fitted correctly.

2. Check that the LEDs on all installed Drive Carrier Modules are illuminated green. Note that the LEDs on the Drive Carrier Module will not be lit during spin-up.

3. Check that all Drive Carrier Modules have been correctly installed.

4. Check the I/O module setup as follows:

    a. Check that the I/O module has been correctly installed and all external links and cables are securely fitted.
    b. Check that all SAS Connector Activity LEDs on the I/O module are functioning properly.
    c. Check the maximum cable length has not been exceeded.

Troubleshooting system faults

An audible alarm will sound when an internal fault is detected, such as failure of an internal communications path.

1. Check for other amber LED indications on the PCMs.

    If there is a PCM error present, there may be a communications problem with that PCM.

2. Remove and then re-install the PCM.

3. If the problem persists, replace the PCM.

    Refer to the *Spectrum Component Replacement Guide* for instructions on removing and re-installing the PCM.

Power cooling module faults

The MediaStore provides different ways to indicate if there is a PCM issue.

Symptom	Cause	Action
Operator Panel Module Fault LED amber	Any power fault	Check that the AC main connection to PCM is live.
Audible alarm	Thermal condition that could cause PCM overheating	Disconnect the PCM from the main power. Remove and then re-install the PCM. If the problem persists, replace the PCM. Refer to the *Spectrum Component Replacement Guide* for instructions on removing and re-installing the PCM.
Fan Fail LED illuminated on PCM	Fan failure	Replace the PCM.

Troubleshooting thermal monitoring and control faults

The MediaStore 5000 series uses extensive thermal monitoring, and takes a number of actions to ensure that component temperatures are kept low and acoustic noise is minimized. Air flows from the front to the rear of the MediaStore. In some cases, you may need to take steps to ensure proper thermal control.

Symptom: If the ambient air temperature is below 25°C, and the fans have increased in speed, then some airflow restriction may be causing an increase in the internal temperature.

📝 **NOTE:** This is not a fault condition.

Cause: 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.

Action:
- Check the installation for any airflow restrictions at either the front or rear of the MediaStore. A minimum gap of 25 mm at the front and 50 mm at the rear is recommended.
- Check for restrictions due to dust build-up. Clean as appropriate.
- Check for excessive re-circulation of heated air from the rear to the front. Use of the MediaStore in a fully enclosed rack is not recommended.
- Check that all blank modules are in place.
- Reduce the ambient temperature.

Troubleshooting thermal alarm faults

In the case of thermal alarm faults, you may need to take steps to maintain a proper thermal state.

Symptom: A thermal alarm will sound. The Operator Panel Module Fault displays amber and/or the Fan Fail LED is lit on one or more PCMs.

Cause: The internal temperature exceeds a pre-set threshold.

Action:
- Check that the local ambient environment temperature is below the given specifications.
- Check the installation for any airflow restrictions at either the front or rear of the MediaStore. A minimum gap of 25 mm at the front and 50 mm at the rear is recommended.
- Check for restrictions due to dust build-up. Clean as appropriate.
- Check for excessive re-circulation of heated air from the rear to the front. Use of the MediaStore in a fully enclosed rack is not recommended.
- If possible, shutdown the MediaStore and investigate the problem before continuing.

Additional information

Overview of proactive drive alarming and removal

The proactive drive alarming and removal feature enhances the ability of Spectrum to detect and recover from various drive error conditions, while minimizing disruption to the system.

There are several drive error conditions that will cause the system to attempt to mark a drive as bad and remove it from the associated RAID Set. Since failing an active drive in a RAID Set can cause the RAID Set to become compromised, several checks are done prior to failing the drive. A drive is removed from the RAID Set when the following conditions are true:

- The File system has been started.
- All drives in the RAID Set are on-line and ready.

- No other drives in the RAID Set have bad blocks.
- A hot spare is available to start a rebuild on the RAID Set.
- The target drive is a hot spare or belongs to a RAID Set that is not compromised, rebuilding, or is the rebuild target.

Additional drive conditions that prevent a drive from being auto-failed include:

- The drive is in the process of a bad block repair.
- The drive is in the process of a drive firmware upgrade.
- The drive is being formatted.

> **NOTE:** For **Persistent Login Failures** and **Insubordinate Disks,** the conditions mentioned above do not apply. Drive are auto-failed regardless of the state of the file system or other drives in the drive's RAID set.

Disk read/write errors can be either persistent or intermittent:

- **Persistent Errors**: An error at the same disk drive address that recurs at least 5 times on writes or 10 times on reads. This error is sometimes referred to as a "**Hard** Error".
- **Intermittent Errors**: An error that the same disk drive address that recurs less than 5 times on writes and less than 10 times on reads. This error is sometimes referred to as a "**Soft** Error".

The SystemManager application reports on the following drive error conditions:

- SMART Warnings: Critical alarms (red) are generated for any drive that issues a SMART warning. Drives that exhibit SMART warnings will attempt to be auto-failed by the Spectrum server and should be replaced as soon as possible.
- Hardware Errors: Critical alarms (red) are generated for any drive that issues a Hardware error. Drives that exhibit hardware errors will attempt to be auto-failed by the Spectrum server and should be replaced as soon as possible.
- Persistent Login Failures: A warning alarm (yellow) is generated for any drive that experiences persistent Login failures. If a Spectrum server cannot log in to a disk for more than five seconds, that drive will be temporarily removed from the RAID set (subject to the conditions mentioned above), but no Spectrum server in the RAID set will attempt to start a rebuild on the drive's RAID set, even if a hot spare is available. If the login failure persists for a period of two minutes, or if any write operation to the disk in question is postponed for at least 30 seconds, then the disk will be failed, regardless of any of the requisite conditions mentioned above. Note that in extreme circumstances, this may cause the Spectrum server to shut down its file system, stopping all playback and recording on that Spectrum server. If the drive successfully logs in before these limits are reached, an automatic "surgical" rebuild will be immediately started. Otherwise, one of the Spectrum servers in the system will automatically start a rebuild (provided a hot spare is available.)
- Write Errors: Warning alarms (yellow) are generated for any drive that reports write errors. Write errors are errors that can occur occasionally on any system and do not, by themselves, imply catastrophic drive failures. Drives exhibiting 32 read/write errors (both hard and soft errors) will attempt to be auto-failed by the Spectrum server provided the RAID Set criteria mentioned above is met. Refer to "About bad-block auto-repair" for more information.
- Read Errors: Warning alarms (yellow) are generated for any drive that reports read errors. Read errors are errors that can occur occasionally on any system and do not, by themselves, imply catastrophic drive failures. Drives that exhibit any combination of read/write errors at different disk drive addresses will attempt to be auto-failed by the Spectrum servers provided the RAID Set criteria mentioned above is met. Refer to "About bad-block auto-repair" for more information.
- Auto-Fail Starting: Failure alarms (orange) are generated for any drive that exhibits a problem requiring it to be removed from the RAID Set. This alarm will report that the Auto-fail process is queued and provide the reason for the attempted auto-failure.

- Auto-Fail Succeeded: Warning alarms (yellow) are generated for any drive that is successfully removed from the RAID Set following the auto-fail starting alarm. If this alarm is generated, the drive will already have been failed. A rebuild should be started on the RAID Set, and this drive should be removed from the MediaStore and replaced with a good drive.
- Auto-Fail Not Successful: Critical alarms (red) are generated in the for any drive that is not successfully removed from the RAID Set following the auto-fail starting alarm. If this alarm is generated, a reason is given and user intervention is needed to correct the situation. Drive auto-fail attempts are retried in five-minute intervals until the drive is successfully failed or the error condition has been resolved. Reason codes and suggested user actions are as follows:
- RAID Set Compromised: A hot spare needs to be added to the RAID Set to allow a rebuild of the RAID Set. Once the rebuild has completed, an additional hot spare should be added to the RAID Set to allow for the failure of the bad drive.
- RAID Set Rebuilding: A hot spare should be added to the RAID Set to allow the bad drive to be auto-failed once the rebuild has completed.
- Bad Blocks in RAID Set: Bad blocks on other drives in the RAID set can cause the rebuild to stall, which could result in data loss. As a result, a drive cannot be auto-failed if there are other drives in the RAID set with bad blocks. Once the bad blocks are auto-repaired, the drive should be auto-failed by the Spectrum server. Refer to "About bad-block auto-repair" for more information.
- Disk Readiness Test Failure: A warning alarm (yellow) is generated for any drive that fails a Disk Readiness Test. Every four hours approximately, each disk in the system is tested for readiness. This test is transparent for disks that are currently in use, but allows any disk that is otherwise idle to indicate whether it believes itself ready for use. A drive may respond to this by generating a SMART warning or Hardware error, which are discussed above, but it may also fail to respond at all. In this case, the Spectrum servers will report a Disk Readiness Test Failure.
- Insubordinate Disk: A warning alarm (yellow) is generated for any drive that becomes insubordinate. In this rare case, a disk refuses to accept commands from any Spectrum server until it is power-cycled. When this condition is detected, the disk will be failed, regardless of any of the requisite conditions mentioned previously. In extreme circumstances, this may cause the MediaDirector to shut down its file system, stopping all playback and recording on that Spectrum server (but not affecting other Spectrum servers in an EFS system.) The drive will be automatically bypassed, and an alarm message will be generated instructing the operator to remove and reinsert the drive. If this is done within five minutes of the failure, an automatic "surgical" rebuild will be immediately started. Otherwise, one of the Spectrum servers in the system will automatically start a rebuild (provided a hot spare is available).

About bad-block auto-repair

When an unreadable or unwritable ("Read Error" or "Write Error") block occurs, the block is internally marked as bad. Bad block errors can occur occasionally on any system and do not, by themselves, imply catastrophic drive failures. After a short period to allow collection of clusters of bad-blocks, and if it safe to do so, a bad-block auto-repair will be performed as follows:

- Any drive with any unrepaired bad blocks ("Read/Write" and hard/soft errors) will be temporarily auto-failed from the RAID set.
- The failed blocks will be recovered or reallocated on the disk.
- Blocks that could not be recovered will be marked for later rebuild.
- The drive will be added back into the RAID set.
- A surgical rebuild will be performed. A surgical rebuild uses RAID functionality to regenerate the missing blocks that could not be recovered or were written to the RAID set while the drive was removed.

In order for BBAR to be performed on a drive, its containing RAID set must be on-line with redundancy, and the RAID set's containing file-system must be on-line and writable.

If the BBAR is unable to fix the block, the drive will be failed and will need to be replaced.

If an auto-fail is unsuccessful, be cautious when manually failing or removing any drives in the RAID Set. Failing another drive on a rebuilding RAID Set or a compromised RAID Set could cause all Spectrum servers to stop the file system. Contact Technical Support if you are unsure of what action to take.

Bad-block auto-repair in SystemManager

Warning alarms (yellow) are generated in SystemManager for any drive that reports a bad block.

In some cases, the bad-block auto-repair process may generate a red "CRIT" (critical) alarm in SystemManager when the drive is temporarily auto-failed. This alarm is normal and can be ignored provided the sequence of alarms confirms the "RAID Set rebuild completed." The following is an example of the SystemManager alarm sequence:

1. Disk diagnostics detect Bad Blocks (after a "Read Error" or "Write Error" on that block.)

| WARN | Sun Feb 5 12:52:25 | MediaStore8615:MediaStore8615:3 | Warning level drive error counters increased. | Drive 20000024-b6e3cd7b on 1Main_Omneon: Changed values: rdErrs: 10 to 11 blocksRepaired: 10 to 11. | [Cleared] | Delete |

2. Disk diagnostics deactivate the drive to recover bad blocks. During this time, RAID set protection is momentarily lost while bad blocks are recovered or reallocated and bad-block tables are updated.

| CRIT | Sun Feb 5 12:52:25 | RaidSet8478 | RAID Set lost protection status. | RAID Set: 50a90815-0f7e0007 on 1Main_Omneon | [Cleared] | Delete |

3. The drive is added back to the RAID set and, if needed, a rebuild is scheduled. At this point, the drive is active, and RAID set protection is restored. After the rebuild is complete, disk diagnostics will confirm and report zero bad blocks.

| INFO | Sun Feb 5 12:52:53 | RaidSet8478 | RAID Set rebuild completed. | RAID Set: 50a90815-0f7e0007 on 1Main_Omneon | [Cleared] | Delete |
| INFO | Sun Feb 5 12:52:53 | MediaStore8615:MediaStore8615:3 | Disk drive unfailed. | Drive: 20000024-b6e3cd7b on 1Main_Omneon | [Cleared] | Delete |

Notes about proactive drive alarming and removal

Spectrum provides proactive drive alarming and removal for drives in the system.

Alarms are generated for Warning level situations in addition to alarms for Critical and Failure level situations. You can also choose to alarm on Informational level situations. Informational alarms represent messages that usually do not require user action but do provide context for the overall operation of the system.

Refer to "Filtering alarms" in the *Harmonic SystemManager User Guide* for instructions on how to select alarming levels.

⚠ **IMPORTANT:** Use caution if setting the alarming level to include informational alarms when using the email notification feature to send alarms to a pager or phone. In some cases, SystemManager application alarms can be sent frequently.

Disk polling and scrubbing capabilities identify silent disk drive failures, provoke alarms through the SystemManager application, and ensure the availability of all disks in a RAID Set. The purpose of these features is to proactively identify disk issues before they impact the normal functioning of a system. Note however, that they may result in a slight elevation of the frequency in which errors are reported.

For additional information on disk drive alarming and removal, refer to "Viewing drive properties" and "Viewing and clearing alarms" in the *Harmonic SystemManager User Guide*.

Performing grounding checks

Perform these checks to ensure that a safe grounding system is provided for your MediaStore.

If a rack distribution system is being used:

- Ensure power is removed from the rack.
- Connect the power cord to the rack distribution and the MediaStore.
- If a direct connection is made with the power cord, ensure that it is connected to the MediaStore.

    ⚠ **DANGER:** Some electrical circuits could be damaged if external signal cables or power control cables are present during the grounding checks.

- Check for continuity between the earth pin of the IEC 320 connector on one of the Power Supply modules and any exposed metal surface of the MediaStore 5000 series.

MediaStore 5000 series specifications

Find MediaStore 5000 series specifications here.

Table 12-7: General Information

Specification	Detail
External Interface	6 Gbps SAS ports (3 per I/O Module; 4 External links per port)
Supported Hosts	Single/dual active/dual independent bridge
Total Capacity	16 – 24 drives

Table 12-8: System availability

Specification	Detail
Hot Swappable Components	Power Cooling Modules, disk drives, I/O modules

Table 12-9: Dimension

Specification	Detail
Height	87.9 mm (3.46") 2RU
Width	483 mm (19.01") IEC rack compliant
Depth	576.8 mm (22.71") from front mounting flange to extremity of enclosure
	629.6 mm (24.79") from Operator Panel to furthest extremity of enclosure
	602.9 mm (23.74") from front mounting flange to furthest extremity of enclosure
Weight	25 kg (55 lbs) fully populated, maximum weight

Table 12-10: Environmental

Specification	Detail
Temperature Range	+5° to +40° C (41° to 104° F)
Humidity	20% to 80%

Table 12-11: MediaStore 5000 power

Specification	Detail
Dual redundant power supplies	Max 580 W (dual redundant power supplies)
Power consumption: 16 drive model	326 W at 240 VAC 333 W at 110 VAC
Power consumption: 24 drive model	388 W at 240 VAC 396 W at 110 VAC
Voltage	100 – 240 VAC rated
Frequency	50 – 60 Hz

Table 12-12: Safety

Specification	Detail
UL 60950-1 2nd Edition	Information Technology Equipment – Safety – Part 1: General Requirements
CSA C22.2	

Table 12-13: CES

Specification	Detail
Low Voltage Directive (73/23/EEC) including amendments	EN60950:1992, A1+A2+A3+A4 Safety of Information Technology Equipment

Table 12-14: EMC

Specification	Detail
FCC Part 15 Class A	USA
VCCI Class A	Japan
CISPR 22 Class A	Australia, New Zealand, EU
CNS 13438 Class A	Taiwan
ICES-003 Class A	Canada

Specification	Detail
EN55022/EN55024 Class A	EU
KN22/KN24 Class A	Korea

MediaStore 7200 series hardware reference

The MediaStore 7200 series is a 4-rack unit network storage device that employs Serial-attached SCSI (SAS) host bus adapters (HBA) to connect to the MediaCenter 2200B via SAS cables.

About the MediaStore 7200 series

You can connect one MediaStore 7200 series to the MediaCenter 2200B via SAS to provide additional storage.

The MediaStore 7200 series includes the following features:

- 12 or 24 disk drive capacity, all contained in a 4 RU chassis. All drives install from the front of the chassis. All power supplies and I/O modules install from the rear.
- Chassis with front panel Operators Panel, including clear status indicators and audible failure alarms.
- Two hot swappable AC Power Cooling Modules (PCMs) with integral cooling fans.
- Hard Disk Drive Carrier Modules and associated dummy carrier modules for blank drive slots.
- Hot-swappable high-performance 2, 4, or 6 TB SAS hard disk drives.
- Serial-attached SCSI (SAS) connections.

📝 **NOTE:** There are no user-serviceable parts on the MediaStore7200 series.

Harmonic provides either 1 meter or 3 meter SAS cables to connect the MediaStore 7200 to the MediaCenter.

About the file system configuration for MediaCenter 2200B with the MediaStore 7200

Find available file system configurations for the MediaCenter 2200B with a MediaStore 7200

Table 13-1: MediaCenter 2200B (12 drives) with the MediaStore 7224 (24 drives)

# Drives	RAID Set	Capacity per Drive	Raw Storage Capacity
36	6 x (4+2)	6 TB	144 TB
36	6 x (4+2)	4 TB	96 TB
36	6 x (4+2)	2 TB	48 TB

Table 13-2: MediaCenter 2200B (12 drives) with the MediaStore 7212 (12 drives)

# Drives	RAID Set	Capacity per Drive	Raw Storage Capacity
24	4 x (4+2)	6 TB	96 TB
24	4 x (4+2)	4 TB	64 TB
24	4 x (4+2)	2 TB	24 TB

Front panel components

The front panel contains 12 or 24 hot-swappable disk drives, a bezel connector, and a control panel with power button and system status LEDs.

Figure 13-1: MediaStore 7200 front panel

Key	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.

Key	Component	Description
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.

Drive numbering

Drives are numbered from 1-24, starting with the top left drive.

Figure 13-2: Drive slot numbers

Control panel indicators

The control panel provides LED indicators for power, system status, temperature, and fans.
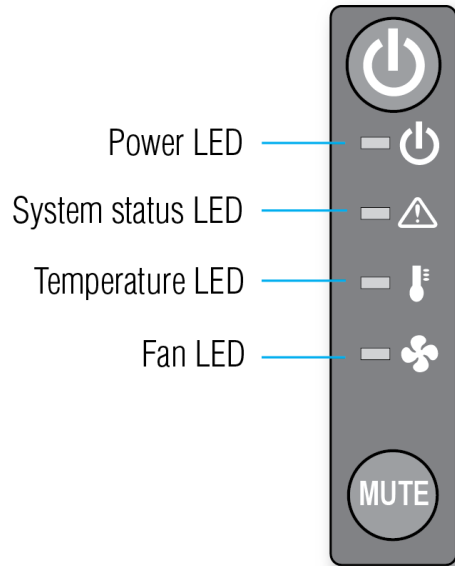

Figure 13-3: control panel

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

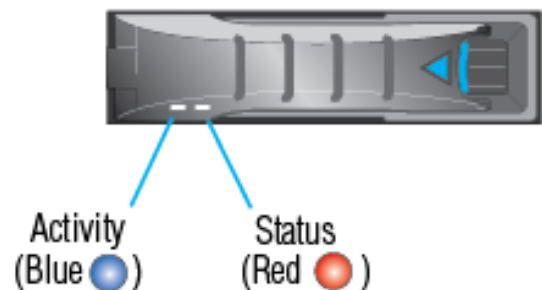Each disk drive has an Activity LED and a Status LED.

Figure 13-4: MediaStore 7200 disk drive LED indicators

Table 13-3: MediaStore 7200 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 includes dual redundant power supplies and SAS expander modules.
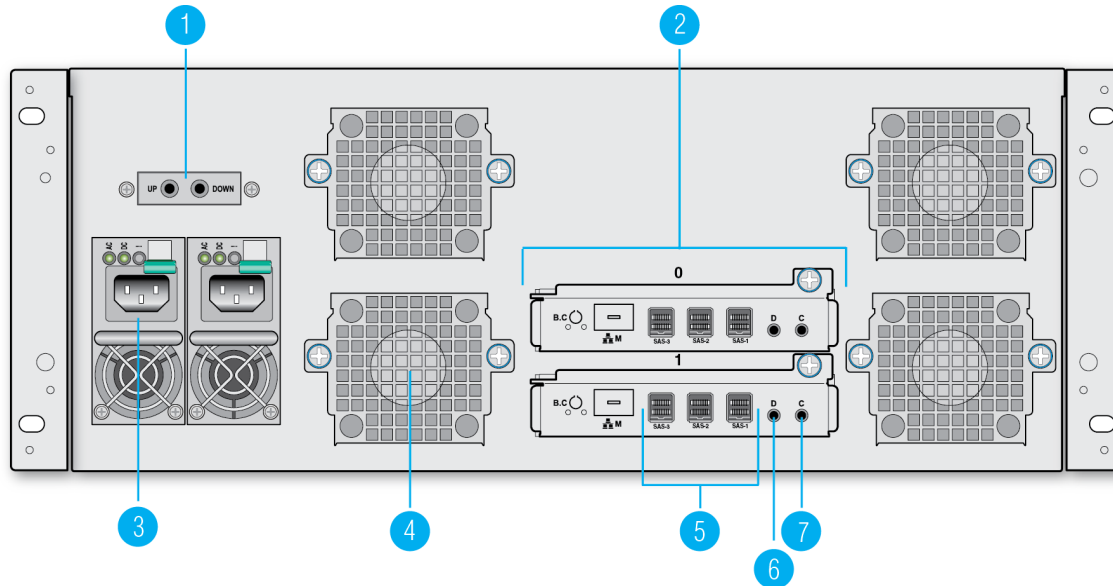

Figure 13-5: MediaStore 7200 rear panel

Key	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 MediaStore to the MediaCenter.
6	Debug port	Unused.
7	Console port	Unused.

Power supply unit LED indicators

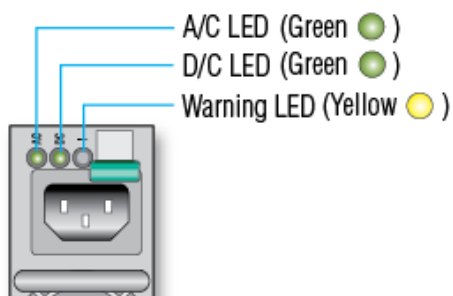Each power supply module has an AC, DC, and Warning LED indicator.

Figure 13-6: MediaStore 7200 power supply unit LED 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

MediaStore 7200 series specifications

Find MediaStore7200 specifications here.

Table 13-4: General information

Specification	Detail
External interface	6 Mini SAS HD ports (SFF-8644)
Total capacity	12 or 24 drives

Table 13-5: System availability

Specification	Detail
Hot-swappable components	Fans, disk drives, power supplies

Table 13-6: Dimension

Specification	Detail
Width	483 mm (3.46")

Specification	Detail
Depth	534.2 mm (19.01")
Height	173.8 mm (6.8") , 4 RU
Weight (with power supplies; without rails or disks)	26 kg (57.3 lbs)

Table 13-7: Environmental

Specification	Detail
Operating environment	Temperature range: 0° to 35° C
	Humidity: 20% to 80%

Table 13-8: Power

Specification	Detail
Power supply	549 W, 1+1 hot-swap redundant, 80+ platinum
Universal AC input	100-240V AC full range

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: 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	+81.3.5565.6737	japansupport@harmonicinc.com
Asia Pacific (APAC) – Other Territories	+852.3184.0045 +65.6542.0050	apacsupport@harmonicinc.com

Report an issue online

http://www.harmonicinc.com/webform/report-issue-online

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*
- *Useful information for Technical Support*

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

Useful information for 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 Technical Support.

Information about your Spectrum system

In the event of a component or device failure, please gather the following information about your Spectrum system before contacting Technical Support.

Technical Support may request the following information:

- **What is the model and serial number of the hardware involved?**

  For Spectrum devices: from the **Home** tab in SystemManager, click the **Upgrade Firmware** icon in the left-hand column to display the **Upgrade Firmware** page. All Spectrum video servers in your system are listed in the **Spectrum Servers** section. Find the model numbers and serial numbers listed in their respective columns.

  Scroll down to the **I/O modules** section to view the model numbers and serial numbers for I/O modules.

- **What is the name of the Player that is being used?**

  From the **Configuration** tab in SystemManager, click the **Player Configuration** link in the left-hand column, and then click the name of the Spectrum video server. The **Player List** page for that device appears. The names and status of all players are listed.

- **What file format and bit rate is the Player configured for? (for example, MPEG, DV, or IMX?)**

  From the **Configuration** tab in SystemManager, click the **Player Configuration** link in the left-hand column, and then click the name of the Spectrum video server. The **Player List** page for that device appears. From the player list, click the **Properties** link to view all the details for a player.

- **If the problem is related to Ingest or Playout of a clip, what is the Clip ID involved?**

  The clip name or clip ID should be indicated by whatever software application you are using to play or record video. For ClipTool, clip names are displayed in the clip management area of the ClipTool main window.

- **What brand of Automation, if any, is being used for control?**

- **Is the Automation using VDCP or API for communication control?**

Information about the SystemManager client PC

Please gather information about the SystemManager client PC as well as the SystemManager database file before contacting Technical Support.

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.

Gathering drive failure information

In the event of a drive failure, before contacting Technical Support, please gather the requested information to assist in drive problem diagnosis and remediation.

1. Provide the following general details about the drive failure:

   - Site Location
   - Server Name
   - Date of Failure
   - Time of Failure
   - Description of Failure

2. Collect the following information from the **Spectrum Server Properties** page in SystemManager:

   > **TIP:** To view the **Spectrum Server Properties** page in SystemManager, from the **System Diagram** page of the **Configuration** tab, click the icon for your Spectrum video server. Then, from the **Physical Configuration** tab, click the icon for your Spectrum.

   - Firmware Version
   - Host Name
   - Serial Number

3. Collect the following information from the **Drive Properties** page:

   > **TIP:** To view **Drive Properties**, from the **Configuration** tab, click **Disk Utilities**, then click the icon for your Spectrum server. From the second **Disk Utilities** page, click the icon for the drive that has failed.

   - Disk GUID
   - Disk Serial Number
   - Disk Size (GB)

4. From your SystemManager platform or client PC, use Windows Explorer to navigate to the following directory:

   `\\IPADDR\FSNAME\om(serial_number_of_director)\logs`

   - IPADDR = IP address or host name if using DNS
   - FSNAME = file system name

5. Locate `Badblockhistory.txt` and the log file that coincides with the date/time of the failure.

   `Badblockhistory.txt`

   Note the naming of the log files: `syslog_(server_name)_NNNN_YYYY_MM_DD_hh_mm_ss.log`, where

   - NNNN = serial number of unit
   - YYYY = year of log start
   - MM = month of log start
   - DD = day of log start
   - hh = hour of log start
   - mm = minute of log start
   - ss = second of log start

What to do next

Once you obtain a Return Authorization Number (RA) from Harmonic Technical Support, email a copy of the requested file(s) to Technical Support and quote the RA number in the email.

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*
- *Site preparation instructions*
- *Product end-of-life disassembly instructions*
- *Safety rules (English)*
- *Règles de sécurité*
- *EU manufacturer's Declaration of Conformity*
- *Electromagnetic compatibility notices – Class A*
- *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 Wechelstromsmodul 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

Site preparation instructions

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.

Option	Description
	◦ 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.
	◦ 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.

Product end-of-life disassembly instructions

Review guidance on responsible product disposal and recycling of a products.

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 (2014/30/EU) and EMC Directive (2014/35/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.
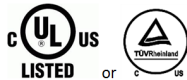
8. Class A warning – CISPR 22 (AS/NZS)

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 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; 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 5, 2012; 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.
European Union	RoHS: EN 50581:2012; EN55022:2010/ CISPR 22:2008; EN55024:2010/ CISPR 24:2010; EN61000-3-2: 2006 +A1:2009 +A2:2009; EN61000-3-3: 2008; Class A	Safety and EMC	CE / Low Voltage Directive	CE
Germany	EN 60950-1; EN60825-1 (for laser)	Safety	GS	

Country/region	Testing standard/specification	Certification type	Regulatory mark name	Product marks
Mexico	NOM-019-SCFI-1998	Safety	NOM	NOM
Taiwan	CNS 14336-1:2010 CNS 13438:2006; Class A	Safety and EMC	BSMI Certification (RPC) Number & Class A Warning	R3A001 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。
Japan	VCCI V-3/2013.04; CISPR 22:2008, Class A	EMC	VCCI	VCI
Australia and New Zealand	AS/NZS CISPR22:2009 +A1:2010; Class A	Safety	C-Tick	NXXXXX
Korea	KN22 Class A and KN 24	EMC	KC	KC
China	GB4943.1-2011 GB9254-2008 GB17625.1-2012	Safety and EMC	CCC	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 B-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%

....
[2] *Homogeneous material definition as per the EU Directive.*

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.

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.

部件名称 (Part name)	有毒有害物质或元素 (Hazardous substance)					
	铅 (PB)	汞 (Hg)	镉 (Cd)	六价铬 (CrVI)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷线路板 (Printed circuit assemblies)	X	O	O	O	O	O
机械组件 (Mechanical subassemblies)	X	O	O	O	O	O
光学组件 (Optical subassemblies)	X	O	O	O	O	O
电源 (Power supplies)	X	O	O	O	O	O
缆线 / 线束 (Cables, harnesses)	X	O	O	O	O	O
屏幕 / 显示器 (Screens, monitors)	X	O	O	O	O	O
金属零件 (Metal parts)	X	O	O	O	O	O
塑料/ 发泡材料 (Plastics, foams)	O	O	O	O	O	O
电池 (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.

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.
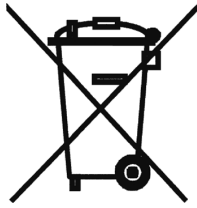
Harmonic will pay for the cost of shipping and will provide a Certificate of Recycling or a Certificate of Destruction upon request. For more information on collection, reuse and recycling or to initiate the WEEE take-back process, please complete the form at *http://www.harmonicinc.com/webform/weee-takeback-request* 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.