INTRODUCTION

Harmonic video servers, shared storage and automation solutions provide professional media organizations with open platforms optimized for the production, transformation and distribution of digital media. The Spectrum X product family offers a variety of media server systems to satisfy the many different needs of broadcasters, service providers and content providers. All Spectrum servers provide the utmost in reliability and flexibility.

Spectrum X server systems come in several different sizes to accommodate small to large channel counts, as well as differing storage capacity needs. Servers vary in size from the compact Channel-in-a-Box Spectrum X to the large, scalable MediaDirector/MediaStore server systems. MediaCenter is in the middle with integrated storage and an optional external storage chassis.

Integrated Channel Playout functionality is present in all Spectrum X products. Signal chains that used to require multiple pieces of equipment can be collapsed into a single Spectrum X server. Examples of integrated functions are onboard graphics, master control switching, playout automation, subtitle insertion, audio mixing, delay service, audio watermarking and much, much more. Additionally, Spectrum X media servers support both baseband and IP I/O formats.

TABLE OF CONTENTS

Spectrum X ................................................................. 3
MediaCenter 2200B .................................................... 7
MediaStore 7200 ............................................................ 10
MediaDirector 2252B .................................................. 12
MediaDirector 2251B .................................................. 14
MediaStore 5100 .......................................................... 16
SystemManager ......................................................... 18
The Harmonic virtualized Spectrum™ X advanced media server system brings new levels of efficiency, simplicity and reliability to broadcast ingest, production and playout workflows. Available as an appliance or software-only solution to run on customer-provided hardware. Leveraging the power of commercial off-the-shelf (COTS) computing, the virtualized solution offers new deployment options and advanced features.

Designed for mission-critical production and playout applications, Spectrum X combines file, baseband and transport stream ingest with comprehensive integrated channel playout (ICP) capabilities, including HTML5 graphics, branding, DVE, and live switching of baseband and compressed IP sources. By reducing the number of discrete devices required to produce and distribute branded programming, Spectrum X lowers capital expenditures, simplifies workflows and reduces operational costs. The system’s high density, low power consumption and rock-solid reliability further reduce operating expenses while providing high availability.

The software-based Spectrum X supports a broad range of SD and HD formats up to 1080p (3G). Ultra HD support includes SDR/HDR conversion including tone mapping and tone expansion. It can operate as a true channel-in-a-box (CiaB) or as part of a Spectrum shared storage infrastructure that includes everything from simple ingest and playout to feature-rich ICP capabilities. All functionality is available via software license keying, resulting in a highly flexible system that allows the easy addition of new codecs, CiaB functionality, IP I/O and other advanced features to baseband I/O when needed.

Open APIs for the conventional Spectrum appliances and the new virtualized Spectrum X enable control of media workflows under a single user interface to suit exact workflow requirements, making it easier to deliver content on any platform to any end user.

Fully compatible with Spectrum MediaDirector and MediaCenter servers, and Harmonic Polaris™ playout management systems, Spectrum X fits seamlessly into existing broadcast infrastructures. In combination with the Harmonic MediaGrid, users have greater expansion possibilities for all workflows from Ingest to MCR playout, utilizing the same high availability shared storage and intelligent media management. By integrating SDI and IP I/O on the same chassis, Spectrum X also eases the migration to IP playout workflows, allowing broadcasters to transition away from baseband at their own pace.

The highly scalable Spectrum X system is ideal for a wide range of applications, including:

- CiaB and ICP workflows
- Studio production
- Hybrid baseband and IP playout environments
- Integrated master control room (iMCR) workflows
- News production
- Disaster recovery

As a next-generation media server system, Spectrum X offers a new approach to production and channel playout. With its function integration, workflow flexibility and cost-efficiency, this next-generation server powers new revenue-generating services while delivering low total cost of ownership. The virtualized Spectrum X solution allows users to utilize their IT budgets to get the Harmonic-compatible hardware they need while still getting the benefits of the industry-leading Spectrum X platform.

**HIGHLIGHTS**

- Easy-to-deploy ingest and playout system for baseband and IP workflows
- Supports a broad range of SD, HD and Ultra HD formats with SDR/HDR tone mapping and tone expansion
- Integrates SDI and IP I/O on the same chassis to ease migration to IP workflows
- Adaptable to all production and playout applications, including integrated channel playout, channel-in-a-box and integrated master control
- Integrated video graphics and branding, using industry-standard authoring tools
- Single and dual integrated DVEs for sophisticated content presentation
- Plug and play compatibility with Harmonic Spectrum media servers and Harmonic MediaGrid shared storage
- Open control architecture makes CIAB/ICP available to Harmonic Polaris and third-party automation systems
- COTS HP 2-RU chassis or compact 1-RU server. Specification varies for each option.
Virtualized Spectrum X  ADVANCED MEDIA SERVER SYSTEM

SPECIFICATIONS

FEATURE SUMMARY

- **Branding & Graphics**
  - Adobe® Creative Cloud compatibility
  - Integrated DVE; single and dual 2D DVE mode
  - Independent branding for each primary and simulcast channel
  - Up to eight layers of graphics per channel
  - Static and animated graphics, logo, full-screen slate, rolls, crawls, voice-over

- **Graphics Formats**
  - PNG, JPG, TIFF, GIF, FLV, Targa, WEBM, MP4, with HTML5 or SWF

- **Master Control Switching (MCS)**
  - 1-6 live inputs (configurable)
  - Switch between live and recorded clips
  - Key + fill support

- **Typefaces**
  - All standard font formats are supported

- **Automation Support**
  - Polaris Play, Polaris Live
  - All Oxtel protocol automation systems (Ethernet or RS-422)
  - Clip playback control via Spectrum API or VDCP (RS-422)

- **Audio Watermarking**
  - Kantar® Media Watermarking

- **Delay Service**
  - Realtime program delay capability

- **Captions & Subtitles**
  - Localized and customized open captions
  - Live & file-based open- and closed-caption insertion

- **EAS Support (U.S. only)**
  - Text and audio sourced from customer’s EAS equipment.

- **Loop Record Service**
  - Continuously records short clip segments from an incoming video feed

- **Codec Options**

<table>
<thead>
<tr>
<th>CODES</th>
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</thead>
<tbody>
<tr>
<td>SD</td>
<td>MPEG-2</td>
<td>DV</td>
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<td>3-24.9 Mbps LGOP; 25-50 Mbps I-frame</td>
<td>DV 25, DVCPR025, DVCPR050</td>
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<td>HD 15 G (1080i/50, 720p/50/60)</td>
<td>MPEG-2</td>
<td>DV</td>
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<td>18-85 Mbps LGOP; 50-100 Mbps I-frame</td>
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<td>XDCAM HD</td>
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<td>RP 2027 Class 50/100 (Generic)</td>
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<td>AVC-Ultra (Panasonic)</td>
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<td>VC-3 (SMPTE 2019-1)</td>
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<td>XAVC-I Frame</td>
<td>XAVC-Intra, XAVC-1 RP 2027 Class 100 (generic)</td>
<td>XAVC, High 422, Level 4.2, up to 50 Mbps</td>
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<td>XAVC-LongG</td>
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<td>XAVC</td>
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<td>I-Frame, Class 300, 422, 10-bit, 50p/60p</td>
<td>L-Gop 10bit 4.2.2 200mbs 50p/60p</td>
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**Check Availability**

- **Raster**

  |          | 525i @ 29.97 fps | 625i @ 25 fps |
  |          |          |          |
  | HD 15 G | 1080i @ 25, 29.97 fps | 720p @ 50, 59.94 fps |
  |          |          |          |
  | HD 3G   | 1080p @ 50, 59.94 fps |          |
  |          |          |          |
  | UHD 4 x 3G | 2160p @ 50, 59.94 fps |          |

- **Data Storage Options**

  - Choice of four internal 3.5" 2-, 4-, or 6-TB HDDs or 19-TB SSDs
  - 3+1 modified RAID 4 (single parity)
  - Connect to Spectrum MediaCenter (MCP-2200 series) via GbE
  - Connect to Spectrum SAN (MediaDirector, MCP-2250 series) via GbE
  - Ingest to Harmonic MediaGrid as MXF OPla wrapped media
  - Preview/Playout from Harmonic MediaGrid via 1GbE or 10GbE

- **Audio Processing**

  - Channels SMPTE 299M/272M, up to 16 embedded per video channel
  - Formats Uncompressed: 16, 24, PCM @ 48 kHz
  - Compressed: Dolby® encode and decode
  - Features Audio down-mix, Audio track swapping, track tagging, language rules
  - Audio mix effects, VO insertion

- **Data**

  - Closed, Open, Live Captions
  - Data EIA-608, EIA-708
  - Ancillary Data VBI, VANC
  - Reference Analog black with color burst, PTP for IP I/O

- **Connectivity**

  - SDI Input Up to four SD/HD channels, one UHD channel
  - Up to two Live inputs in standard channel mode
  - Up to six Live inputs in combined channel mode
  - SDI Output Up to four SD/HD channels, one UHD channel
  - Up to two simulcast outputs per channel
  - Independently configurable up/down/crossconversion

  - IP I/O
  - Quad 1GE ports for TS ingest
  - Optional dual 10GE ports for Ingest/Play from MediaGrid
  - Two 1GE ports for connection to the Server, SystemManager, file transfer or API control

  - Connectors
  - RS-422, AES, LTC and GPIO (multi-pin connector; available adapter cable)
  - Two 1GE ports for connection to the Server, SystemManager, file transfer or API control

  - Server Interface Private, point-to-point, non-switchable gigabit Ethernet to MediaDirector or MediaCenter Server

- **Power**

  - Power Supplies Dual, hot-swappable Platinum efficiency
  - Power Consumption 800 W (max)

- **Physical**

  - Dimensions 17.53 in x 3.44 in x 28.75 in in 2RU
  - 44.55 cm x 8.74 cm x 73.03 cm
  - Weight 46 lbs/20.8 kg (with HDDs)
  - 38.5 lbs/17.5 kg (without HDDs)
SPECIFICATIONS

FEATURE SUMMARY

Branding & Graphics
- Adobe® Creative Cloud compatibility
- Integrated DVE; single and dual 2D DVE mode
- Independent branding for each primary and simulcast channel
- Up to eight layers of graphics per channel
- Static and animated graphics, logo, full-screen slate, rolls, crawls, voice-over

Graphics Formats
- PNG, JPG, TIFF, GIF, FLV, Targa, WEBM, MP4, with HTML5 or SWF

Master Control Switching (MCS)
- 1-6 live inputs (configurable)
- Switch between live and recorded clips
- Key + fill support

Typefaces
- All standard font formats are supported

Automation Support
- Polaris Play, Polaris Live
- All Oxtel protocol automation systems (Ethernet or RS-422)
- Clip playback control via Spectrum API or VDCP (RS-422)

Audio Watermarking
- Kantar® Media Watermarking

Delay Service
- Realtime program delay capability

Captions & Subtitles
- Localized and customized open captions
- Live & file-based open- and closed-caption insertion

EAS Support (U.S. only)
- Text and audio sourced from customer's EAS equipment.

Loop Record Service
- Continuously records short clip segments from an incoming video feed

CODECS

SD
- MPEG-2
- DV 3-24.9 Mbps LGOP, 25-50 Mbps I-frame
- DVC PRO HD

HD 1.5 G (1080i 50/60, 720p 50/60)
- MPEG-2
- DV 18-85 Mbps LGOP, 50-100 Mbps I-frame
- DVC PRO HD
- XDCAM HD 18, 25, 35, 50 Mbps
- RP 2027 Class 50/100 (Generic) Class 50 and Class 100, 1920x1080 (25/29.97 Hz); 1280x720 (50/59.94 Hz)
- AVC Ultra (Panasonic) Class 100, 1920x1080 (25/29.97 Hz); 1280x720 (50/59.94 Hz)
- XAVC-I Class 100 (Sony) Class 100, 1920x1080 (25/29.97 Hz); 1280x720 (50/59.94 Hz)
- XAVC-L High 422, Level 4, 2, 25, 50 Mbps
- AVC-LongG Record: 25, 50 Mbps, Playback: 12, 25, 50 Mbps
- VC-3 (SMPT 2019-1) 120, 145, 220 Mbps
- ProRes 122, 147, 220 Mbps, SQ and HQ modes

HD 3G (1080p 50/60)
- XAVC-I Frame XAVC-I, AVC-Intra, AVC-I RP 2027 Class 100 [generic]
- XAVC High 422, Level 4.2, up to 50 Mbps
- XAVC LongG 35, 40, 45, 50 Mbps
- AVCU LongG 12, 25, 50 Mbps
- VC-3 (SMPT 2019-1) 190, 220, 367, 440 Mbps, HQX mode
- ProRes 144 Mbps, LT mode

UHD
- XAVC I-Frame, Class 300, 422, 10-bit, 50p/60p
- L-Gop 10bit 4:2:2 200Mbps 50p/60p – play only
- AVCU I-Frame, Level 5.2, 422, 10-bit, 50p/60p
- VC-3 (SMPT 2019-1) 145-180 Mbps, LB mode
- ProRes 821 Mbps LT mode

MEDIA STORAGE OPTIONS

Choice of four internal 3.5” 2-, 4-, or 6-TB HDDs or 1.9-TB SSDs
- 3+1 modified RAID 4 (single parity)
- Connect to Spectrum MediaCenter (MCP-2200 series) via GbE
- Connect to Spectrum SAN (MediaDirector, MCP-2250 series) via GbE
- Ingest to Harmonic MediaGrid as MXF OP1a wrapped media
- Preview/Playout from Harmonic MediaGrid via tGbE or 10GbE

AUDIO PROCESSING

Channels
- SMPTE 299M/272M, up to 16 embedded per video channel

Formats
- Uncompressed: 16, 24, PCM @ 48 kHz
- Compressed: audio pass-through, Dolby® encode and decode

Features
- Audio down-mix
- Audio track swapping; track tagging, language rules
- Audio mix effects; VO insertion

DATA

Captions
- Closed, Open, Live
- EIA-608, EIA-708

Ancillary Data
- VBI, VANC

Reference
- Analog black with color burst, PTP for IP I/O

CONNECTIVITY

SDI Input
- Up to four SD/HD channels, one UHD channel
- Up to two Live inputs in standard channel mode
- Up to six Live inputs in combined channel mode

SDI Output
- Up to four SD/HD channels, one UHD channel
- Up to two simulcast outputs per channel
- Independently configurable up/down/crossconversion

IP I/O
- Quad IGe ports for TS ingest
- Optional dual IGe ports for HD 2022-6 / 2110 IP I/O

Connectors
- RS-422, AES, LTC and GPIO (multi-pin connector; available adapter cable)
- Two IGE ports for connection to the Server, SystemManager, file transfer or API control

Server Interface
- Private, point-to-point, non-switchable gigabit Ethernet to MediaDirector or MediaCenter Server

POWER

Power Supplies
- Dual, hot-swappable Platinum efficiency

Power Consumption
- 505 W (max)

PHYSICAL

Dimensions
- W x H x D 17.67 in x 1.7 in x 27.75 in (1 RU)
- 449 cm x 4.32 cm x 70.5 cm

Weight
- 37.5 lbs/17.0 kg (with HDDs)
- 29.5 lbs/13.4 kg (without HDDs)
Spectrum X/MIP-9121 ADVANCED MEDIA SERVER SYSTEM

FEATURE SUMMARY

Branding & Graphics
Adobe Creative Suite compatibility
Integrated DVE: single and dual 2D DVE mode
Independent branding for each primary and simulcast channel
Up to eight layers of graphics per channel
Static and animated graphics, logo, full-screen slate, rolls, crawls, voice-over

Graphics Formats
PNG, JPG, TIFF, GIF, Targa, FLV, WebM and HTML5* files

Master Control Switching (MCS)
1-6 live inputs (configurable)
Switch between live and recorded clips
Key + fill support

Typefaces
All standard font formats are supported

Automation Support
Polaris Advance, Polaris Elite, Polaris Play, Polaris Live
All Oxtel protocol automation systems (Ethernet or RS-422)
Clip playback control via Spectrum API or VDCP (RS-422)

Audio Watermarking
Kantar Media Watermarking

Delay Service
Realtime program delay capability

Captions & Subtitles
Localized and customized open captions
File-based open- and closed-caption insertion

EAS Support (U.S. only)
GPI triggers EAS mode
Selects predefined EAS template Data and audio sourced from customer’s EAS equipment

RASTER

SD
525i @ 29.97 fps
625i @ 25 fps

HD 1.5 G
1080i @ 25, 29.97 fps
720p @ 50, 59.94 fps

HD 3G
1080p @ 50, 59.94 fps

CODECS

SD
MPEG-2
DV
3-24.9 Mbps LGOP, 25-50 Mbps I-frame
DV 25, DVCPro25, DVCPro50

HD 1.5 G (1080p 50/60, 720p 50/60)
MPEG-2
DV
XDCAM HD
RTP 2027 Class 50/100
AVC-Ultra (Panasonic)

AVC-I Class 100 (Sony)
XAVC-I Class 100 (generic)

XAVC-L
AVC-LongG
VC-3 (SMPTE 2019-1)
ProRes

HD 3G (1080p 50/60)
AVC-I-Frame
XAVC-L
AVC-LongG
AVCU-LongG

VC-3 (SMPTE 2019-1)
ProRes

MEDIA STORAGE OPTIONS

Choice of four internal 3.5" 2-, 4- or 6-TB, 7,200-RPM SAS drives
3+1 modified RAID 4 (single parity)

Connect to Spectrum MediaCenter (MCP-2200 series) via GbE
Connect to Spectrum SAN (MediaDirector, MCP-2250 series) via GbE

Ingest to MediaGrid as MXF OPLA wrapped media
Preview from MediaGrid via GbE

GRAPHICS PROCESSING

Device Type
Graphics Card - Low Profile
Bus Type
PCI Express 3.0 x16

Graphics Engine
NVIDIA Quadro

AUDIO PROCESSING

Channels
SMPT 299M/272M, up to 16 embedded per video channel

Formats
Uncompressed: 16, 24, PCM @ 48 kHz
Compressed: audio pass-through, Dolby encode and decode

Features
Audio down-mix
Audio track swapping; track tagging, language rules
Audio mix effects; VO insertion

DATA

Closed and Open Captions
EIA-608, EIA-708

Ancillary Data
VBI, VANC

Reference
Analog black with color burst

CONNECTIVITY

SDI Input
Up to two SD/HD channels
Up to six Live inputs in combined channel mode

SDI Output
Up to two SD/HD channels
Up to two simulcast outputs per channel
Independently configurable up/down/cross conversion

IP I/O
Quad IGE ports for TS ingest
Optional dual IGGE ports for 2022-6 I/O

Connectors
RS-422, AES, LTC and GPIO (multi-pin connector; available adapter cable)
Two IGE ports for connection to the Server, SystemManager, file transfer or API control

Server Interface
Private, point-to-point, non-switchable gigabit Ethernet to MediaDirector or MediaCenter Server

POWER

Power Supplies
Dual, hot-swappable Platinum efficiency

Power, with four HDDs
Typical (20°C) @ 100% CPU: 500 W
Maximum (40°C) @ 100% CPU: 540 W

Power, no HDDs
Typical (20°C) @ 100% CPU: 460 W
Maximum (40°C) @ 100% CPU: 500 W

PHYSICAL

Dimensions (W x H x D)
17.67 x 1.7 x 27.75 in (1 RU)
44.9 cm x 4.32 cm x 70.5 cm

Weight
37.5 lbs/17.0 kg (with HDDs)
29.5 lbs/13.4 kg (without HDDs)

* Check Availability
Ideal for moderate (up to 20) channel-count applications, the Spectrum™ MediaCenter 2200B media server from Harmonic provides file system and communication management and storage for video and audio ingest and playout at a compelling price point.

I/O on the 2-RU MediaCenter 2200B is provided by up to 10 Spectrum™ X advanced media servers or Spectrum™ MediaPort 7000-series I/O modules, which provide video/audio interfaces as well as encode and decode for record and playback. Clients have access to FTP, CIFS and AFP file transfer via dual 10-GbE connections. Combined, these capabilities provide network throughput of up to 225 MBps (depending on real-time play/record activity).

For integrated channel playout applications, MediaCenter 2200B supports the Spectrum™ X and Spectrum™ ChannelPort systems. These next-generation solutions include comprehensive, integrated graphics, branding, DVE and live switching to accelerate the cost-effective deployment of new SD and HD television channels. Spectrum X also features SDI and IP I/O on the same chassis to ease the migration to IP workflows, and is software-upgradeable to Ultra HD. Whether configured with MediaPort, Spectrum X or ChannelPort, the MediaCenter 2200B helps you to meet your master control requirements today while allowing for future expansion.

**Rock-Solid Reliability**
All Spectrum media server systems are designed specifically to isolate potential problems so that a failure of one component does not disrupt operations across the rest of the system. Redundancy features include:

- Disconnection of a media I/O module causes only that unit to stop operating until replaced or reconnected, while no other component in the system is affected.
- Failure of a power supply does not disrupt system operation. A replacement power supply can be hot-swapped while the system is running.
- Failure of a disk drive does not result in loss of content or even a dropped frame.

The isolation of component failures to minimize overall system impact is a key architectural advantage of the MediaCenter 2200B server. It lowers the risk of a catastrophic failure, since the impact of any one component is limited to only a portion of the system, and failed components can be quickly replaced while the system remains operational.

**HIGHLIGHTS**
- Compact media server solution for up to 20 channels
- Choice of storage: 16-, 32- or 48-TB usable HDD
- Easily add features to support new services, ensuring complete investment protection
- Implement best-of-breed solutions for transmission, studio production, news and sports highlights, and distributed broadcast workflows
- Choose from hundreds of applications, enabled by broad support built around open standards and APIs
Spectrum™ MediaCenter 2200B
MEDIA SERVER WITH INTEGRATED STORAGE

Mediacenter Features

Spectrum Modular Architecture
The Spectrum media server system is built on a modular architecture that allows for maximum configuration flexibility and adaptability to future needs. Every system can be precisely tailored to each customer's unique requirements, and new channels can be added at any time. Software license upgrades are available to increase channel capabilities without requiring new hardware. These upgrades and additions can be performed on the system without taking it off the air.

Flexibility to Fit Any Workflow
The flexible MediaCenter 2200B server supports up to 20 channels at 50 Mbps or 10 channels at 100 Mbps. It is ideal for a variety of advanced file-based workflows, including ingest, transmission, live studio production and news production, as well as for facilities requiring simultaneous support for multiple applications.

Utilizing MediaPort, ChannelPort or Spectrum X for I/O, the MediaCenter 2200B server provides broad support for a wide range of production and playout formats — including AVC-Intra, ProRes and PitchBlue® — and file wrappers, including QuickTime and MXF. Playout channels can perform up-, down- and cross-conversion without channel-count or performance penalties, and play back any mix of SD and HD content on a single timeline. SD/HD simulcast is also available on every channel.

Media Processing Performance
MediaCenter 2200B provides a wide range of powerful media processing functions, including:
- Back-to-back playback of clips of different formats
- Simultaneous proxy creation during recording
- Support for up to 16 channels of embedded audio per video clip
- API-based audio track manipulation for multi-language applications
- Edit-in-place for multiple Apple® Final Cut Pro® or Adobe® Premiere® Pro seats
- Aspect ratio signaling to downstream equipment
- Optional closed-caption and SCTE-104 file insertion
- Full VBI and VANC support

Storage Options
MediaCenter 2200B is available with a choice of SAS storage configurations: 16 TB (approximately 600 hours at 50 Mbps) using 2-TB drives, 32 TB (approximately 1,200 hours at 50 Mbps) using 4-TB drives, or 48 TB (approximately 1,800 hours at 50 Mbps) using 6-TB drives. All HDD storage is protected with Spectrum’s robust RAID 6 (dual parity) technology.
Spectrum™ MediaCenter 2200B
MEDIA SERVER WITH INTEGRATED STORAGE

SPECIFICATIONS

VIDEO

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video Channels</td>
<td>20 @ 50 Mbps</td>
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<td>10 @ 100 Mbps</td>
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<tr>
<td>Video I/O Modules</td>
<td>Up to 10 dual-channel Spectrum X, ChannelPort or MediaPort 7000-series modules per MediaCenter chassis</td>
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<tr>
<td>HDD Storage</td>
<td>12 2-TB SAS drives (standard), 16 TB usable in two 4+2 RAID sets (600 hours at 50 Mbps)</td>
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<td>12 4-TB SAS drives (optional), 32 TB usable in two 4+2 RAID sets (1,200 hours at 50 Mbps)</td>
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<td></td>
<td>12 6-TB SAS drives (optional), 48 TB usable in two 4+2 RAID sets (1,800 hours at 50 Mbps)</td>
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<tr>
<td>Network</td>
<td>Two 1-GbE ports for system management</td>
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<td>Two 10-GbE ports for file transfer</td>
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<td>Access to FTP, CIFS and AFP services</td>
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<tr>
<td>Reference</td>
<td>Per MediaPort or ChannelPort module or Spectrum X SDI I/O card</td>
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<tr>
<td></td>
<td>Support for multiple timing standards</td>
</tr>
</tbody>
</table>

POWER

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>Dual redundant, hot-swappable</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>100-240 VAC</td>
</tr>
<tr>
<td>Line Frequency</td>
<td>50-60 Hz</td>
</tr>
<tr>
<td>Consumption</td>
<td>350 W maximum</td>
</tr>
</tbody>
</table>

PHYSICAL

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W x H x D)</td>
<td>17.5 in x 3.5 in x 30.75 in (2 RU)/44.3 cm x 8.9 cm x 78.1 cm</td>
</tr>
<tr>
<td>Weight</td>
<td>43.3 lbs/19.6 kg (12 disk drives)</td>
</tr>
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</table>

ENVIRONMENTAL

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Temperature Range</td>
<td>40°F F to 104°F F/+5°C to 40°C C</td>
</tr>
<tr>
<td>Operational Relative Humidity</td>
<td>10-80% non-condensing</td>
</tr>
</tbody>
</table>

STANDARDS & REGULATIONS

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>UL 60950-1 2nd Edition</td>
</tr>
<tr>
<td></td>
<td>CSA C22.2</td>
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<td></td>
<td>Information Technology Equipment - Safety - part 1: General Requirements</td>
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<tr>
<td>CE</td>
<td>Low Voltage Directive (73/23/EEC)</td>
</tr>
<tr>
<td></td>
<td>EN60950 1992, A1+2+A3+A4</td>
</tr>
<tr>
<td>Electromagnetic Compliance</td>
<td>Safety of Information Technology Equipment</td>
</tr>
<tr>
<td></td>
<td>USA: FCC Part 15 Class A</td>
</tr>
<tr>
<td></td>
<td>Japan: VCCI Class A</td>
</tr>
<tr>
<td></td>
<td>Australia, New Zealand, EU: CISPR 22 Class A</td>
</tr>
<tr>
<td></td>
<td>Taiwan: CNS 13438 Class A</td>
</tr>
<tr>
<td></td>
<td>Canada ICES-003 Class A</td>
</tr>
<tr>
<td></td>
<td>EU: EN55022/EN55024 Class A</td>
</tr>
<tr>
<td></td>
<td>Korea: KN22/KN24 Class A</td>
</tr>
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</table>

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCP-2200B-C2H</td>
<td>MediaCenter 2200B with 12x 2-TB HDDs, supports 20 50-Mbps channels, rack rails included</td>
</tr>
<tr>
<td>MCP-2200B-C4H</td>
<td>MediaCenter 2200B with 12x 4-TB HDDs, supports 20 50-Mbps channels, rack rails included</td>
</tr>
<tr>
<td>MCP-2200B-C6H</td>
<td>MediaCenter 2200B with 12x 6-TB HDDs, supports 20 50-Mbps channels, rack rails included</td>
</tr>
</tbody>
</table>

SPARES KITS

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPR-PSU-1100-INTEL-001</td>
<td>Power supply, 2 RU</td>
</tr>
<tr>
<td>SPR-FAN-2U-INTEL-001</td>
<td>Fan, 2 RU</td>
</tr>
<tr>
<td>SPR-SPECT-HDD-2TB-SAS-001</td>
<td>Spare 2-TB SAS HDD</td>
</tr>
<tr>
<td>SPR-SPECT-HDD-4TB-SAS-001</td>
<td>Spare 4-TB SAS HDD</td>
</tr>
<tr>
<td>SPR-SPECT-HDD-6TB-SAS-001</td>
<td>Spare 6-TB SAS HDD</td>
</tr>
</tbody>
</table>
The Spectrum™ MediaStore 7200 provides high-performance external storage for the Spectrum MediaCenter 2200B media server from Harmonic.

The MediaCenter 2200B server includes up to 48 TB of integrated SAS storage; MediaStore 7200 provides optional expansion storage to increase its capacity and performance. Featuring cost-effective, Ethernet-based storage drives and superior, consistent performance for media workflows, MediaStore 7200 is ideal for customers utilizing high bitrate codecs and 3G or UHD rasters — the result of the system’s ability to support high storage bandwidth and large media files.

Multiple MediaStore 7200 chassis configurations are available to meet the needs of specific workflows. Customers can choose from either 12 or 24 drives (two or four RAID sets), and 2-, 4- or 6-TB hot-swappable enterprise drives.

- 12 drives provide usable storage capacity of 16, 32 or 48 TB.
- 24 drives provide usable storage capacity of 32, 64 or 96 TB.

HIGHLIGHTS
- Optional high-performance external expansion storage for the Spectrum MediaCenter 2200B media server
- Choice of 12 or 24 drives, and 16-96 TB of usable storage capacity
- Ideal for workflows featuring high-bitrate codecs and 3G or UHD rasters
**Spectrum™ MediaStore 7200**

**EXPANSION STORAGE FOR MEDIACENTER 2200B**

**SPECIFICATIONS**

**DRIVES**
- **Configuration Options**
  - 12 or 24 hot-swap 3.5" SAS drives
  - 2 TB, 4 TB or 6 TB enterprise
- **Raw Capacity**
  - 12 drives: 24 TB, 48 TB or 72 TB
  - 24 drives: 48 TB, 96 TB or 144 TB
- **Usable Capacity**
  - 12 drives: 16 TB, 32 TB or 48 TB
  - 24 drives: 21 TB, 64 TB or 96 TB
- **Controller Configuration**
  - Two 12-Gb SAS expanders per unit, active-active
- **Connectivity**
  - Dual redundant 12-Gb SAS fabric

**POWER**
- **Input Voltage**
  - 100-127/200-240 VAC
- **Line Frequency**
  - 50/60 Hz
- **Max Input Current**
  - 6.5/3.3 A
- **Cooling**
  - 1436 BTU/hr @ 421 W

**PHYSICAL**
- **Dimensions (W x H x D)**
  - 19 in x 6.9 in x 21 in (4 RU)
  - 48.3 cm x 6.9 cm x 53.4 cm
- **Weight**
  - 63.9 lbs/29 kg

**STANDARDS & REGULATIONS**
- **Safety**
  - CB certification to IEC 60950
  - USA: UL
  - EU: DoC
  - Taiwan: BSMI
  - Russia: EAC
  - India: BIS
  - Mexico: NOM
  - China: CCC

- **Electromagnetic Compliance**
  - USA: FCC Part 15 Class A
  - EU: EN55022/EN55024 Class A
  - Canada: ICES-003 Class A
  - Korea: KN22/KN24 Class A
  - Taiwan: CNS 13438 Class A
  - Japan: VCCI Class A
  - China: CCC

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSS-7200-CHASSIS</td>
<td>MediaStore 7200 chassis with 12x or 24x 2-TB, 4-TB or 6-TB SAS HDDs, for use with MediaCenter 2200B</td>
</tr>
<tr>
<td>SAS-JBOD-C0H</td>
<td>12x blank drive carriers for MSS-7200 configurations with 12x SAS HDDs</td>
</tr>
<tr>
<td>SAS-JBOD-C2H</td>
<td>12x 2-TB SAS HDDs for MSS-7200</td>
</tr>
<tr>
<td>SAS-JBOD-C4H</td>
<td>12x 4-TB SAS HDDs for MSS-7200</td>
</tr>
<tr>
<td>SAS-JBOD-C6H</td>
<td>12x 6-TB SAS HDDs for MSS-7200</td>
</tr>
</tbody>
</table>

**SPARES KITS**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPR-SPECT-MSS-7200-CABLE-1M</td>
<td>1m cable, SFF-8644 mini-SAS HD to SFF-8644 mini-SAS HD, for MCP-2200B connection to MSS-7200</td>
</tr>
<tr>
<td>SPR-SPECT-MSS-7200-CABLE-3M</td>
<td>3m cable, SFF-8644 mini-SAS HD to SFF-8644 mini-SAS HD, for MCP-2200B connection to MSS-7200</td>
</tr>
<tr>
<td>SPR-SPWR-CSJ4</td>
<td>Spare single power supply for MSS-7200</td>
</tr>
<tr>
<td>SPR-4240-CON</td>
<td>Spare controller for MSS-7200</td>
</tr>
<tr>
<td>SPR-4240-CHASSIS</td>
<td>Spare chassis for MSS-7200</td>
</tr>
</tbody>
</table>
Spectrum™ MediaDirector 2252B-DS system controllers are the core of the Spectrum media server system, actively managing the flow of data to and from Spectrum media I/O modules and MediaStore 5000 storage arrays.

MediaDirector 2252B-DS provides 18 high-speed media I/O ports and the processing power to support a wide range of configurations and workflows. Its SAS interface provides redundant data paths between the MediaDirector and MediaStores.

MediaDirector can be dedicated to both real-time and IP packet processing. Four MediaDirectors can be linked together for scaling of channels or IP bandwidth — or both. MediaDirectors, individually or grouped, strictly manage overall system bandwidth to ensure uninterrupted real-time operations, even under heavy IP file-transfer loads.

MediaDirector 2252B-DS systems are designed with a real-time Linux OS for fast startup and secure, reliable operation. In the unlikely event of a drive failure in a connected MediaStore storage array, software RAID file system management enables efficient recovery of data.

### Additional Features and Functions

**System Expansion** — A Spectrum system based on the MediaDirector 2252B-DS can be expanded to a maximum of six MediaStore 5000 storage arrays, each containing up to 24 disk drives. Four MediaDirector 2252B-DS units can be connected to the same file system via an Extended File Sharing (EFS) license.

**External Clock Synchronization** — An LTC input on MediaDirector supports a TOD clock.

**Resiliency** — The MediaDirector 2252B-DS supports multiple diagnostic, monitoring and notification features for system resiliency and maximum up time, and may be configured to automatically rebuild protected MediaStore 5000 RAID sets in hot spare configurations.

### HIGHLIGHTS

- Integrates file system, management, communication and all connectivity for Spectrum media server
- 12-Gbps SAS interfaces provide multiple data paths to system storage
- 18 high-speed media I/O ports
- Enables maximum scalability of Spectrum channels and IP bandwidth
- Supports multiple diagnostic, monitoring and notification features for Spectrum system resiliency and availability
**Spectrum™ MediaDirector 2252B-DS**

**SYSTEM CONTROLLER**

| 1. Boot drive |
| 2. Power button/LED |
| 3. LTC In connector |
| 4. 1 Gb Ethernet card (for system management) |
| 5. Serial-attached SCSI (SAS) connectors (right-hand SAS card with DS model only) |

| 6. Redundant, hot-swappable power supplies (0.1 from left to right) |
| 7. 10 Gb Ethernet ports (for file transfers) |
| 8. VGA port (for Service only) |
| 9. RS-232 serial (for Service only) |
| 10. USB ports (for Service only) |

| 11. MediaPort Ethernet array* |
| 12. BMC (for Service only) |
| 13. 10 Gb optical SFP (optional, for file transfers)** |

*Use these ports to connect to Spectrum I/O (for example, MediaPorts) only. DO NOT use these ports for any other purpose.
** If 10 Gb optical ports are installed, the onboard copper 10 Gb Ethernet ports (see 7.) are disabled.
*** Use these ports in multiple-MediaDirector EFS configurations. DO NOT use these ports for any other purpose.

**CONNECTIVITY**

| SAS | Dual redundant SAS 3.0 connectivity to MediaStore 5000 storage arrays via miniSAS-to-miniSAS cables. |
| Ethernet | NIC Options: Two 10-Gb Ethernet optical SR or copper with RJ45 connectors Base: Two 1-Gb Ethernet ports |
| EFS I/O | Six 1-Gb Ethernet ports for EFS private network connectivity |
| High-Speed Media I/O | 18 1-Gb Ethernet ports |
| Reference | Per Spectrum media I/O module Support for multiple timing standards on a single system Reference handled by Spectrum media I/O module independently |

**PHYSICAL**

| Dimensions (W x H x D) | 17.5 in x 3.5 in x 30.75 in (2 RU) |
| Weight | 43.3 lbs/19.6 kg |

**ENVIRONMENTAL**

| Operating Temperature Range | +41º to 104º F/+5º to 40º C |
| Operational Relative Humidity | 10-80% non-condensing |

**STANDARDS & REGULATIONS**

| Safety | UL 60950-1 2nd Edition CSA C22.2 Information Technology Equipment - Safety - part 1: General Requirements |

**Electromagnetic Compliance**

| USA: FCC Part 15 Class A Japan: VCCI Class A Australia, New Zealand, EU: CISPR 22 Class A Taiwan: CNS 13438 Class A Canada: ICES-003 Class A EU: EN55022/EN55024 Class A |

**INCLUDED ACCESSORIES**

| Power Cords | Two: 6 ft/1.83 m each |
| Rack-Mount Hardware Kit | 19 in (standard) |

**SPARES KITS**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPR-SPECT-SAS-CABLE-1M-001</td>
<td>1 m SFF-8644 to SFF-8088 SAS cable for MediaDirector 225x8 connection to MediaStore 5000</td>
</tr>
<tr>
<td>SPR-SPECT-SAS-CABLE-2M-001</td>
<td>2 m SFF-8644 to SFF-8088 SAS cable for MediaDirector 225x8 connection to MediaStore 5000</td>
</tr>
<tr>
<td>SPR-SPECT-SAS-CABLE-5M-001</td>
<td>5 m SFF-8644 to SFF-8088 SAS cable for MediaDirector 225x8 connection to MediaStore 5000</td>
</tr>
<tr>
<td>SPR-PSU-1100-INTER-001</td>
<td>Power supply, 2 RU</td>
</tr>
<tr>
<td>SPR-FAN-2U-INTEL-001</td>
<td>Fan, 2 RU</td>
</tr>
</tbody>
</table>
Spectrum™ MediaDirector 2251B system controllers are the core of the Spectrum media server system, actively managing the flow of data to and from Spectrum media I/O modules and MediaStore 5000 storage arrays.

MediaDirector 2251B provides six high-speed media I/O ports and the processing power to support a wide range of configurations and workflows. Its SAS interface provides redundant data paths between the MediaDirector and MediaStores.

MediaDirector can be dedicated to both real-time and IP packet processing. Three MediaDirectors can be linked together for scaling of channels or IP bandwidth — or both. MediaDirectors, individually or grouped, strictly manage overall system bandwidth to ensure uninterrupted real-time operations, even under heavy IP file-transfer loads.

MediaDirector 2251B systems are designed with a real-time Linux OS for fast startup and secure, reliable operation. In the unlikely event of a drive failure in a connected array, software RAID file system management enables efficient recovery of data.

**Additional Features and Functions**

**System Expansion** — A Spectrum system based on the MediaDirector 2251B can be expanded to a maximum of four MediaStore 5000 arrays, each containing up to 24 disk drives. Three MediaDirector 2251B units can be connected to the same file system via an Extended File Sharing (EFS) license.

**External Clock Synchronization** — An LTC input on MediaDirector supports a TOD clock.

**Resiliency** — The MediaDirector 2251B supports multiple diagnostic, monitoring and notification features for system resiliency and maximum up time, and may be configured to automatically rebuild protected RAID sets in hot spare configurations.

**HIGHLIGHTS**

- Integrates file system, management, communication and all connectivity for Spectrum media servers
- 12-Gbps SAS interfaces provide multiple data paths to system storage
- Six high-speed media I/O ports
- Enables scalability of channels and IP bandwidth
- Supports multiple diagnostic, monitoring and notification features for Spectrum system resiliency and availability
**Connectivity**

- **SAS**: Two SAS 3.0 domains connect to arrays via miniSAS-to-miniSAS cables
- **Ethernet**: NIC: Two 10-Gb Ethernet ports, copper with RJ45 connectors; Base: Two 1-Gb Ethernet ports
- **EFS I/O**: Six 1-Gb Ethernet ports for EFS private network connectivity
- **High-Speed Media I/O Reference**: Per Spectrum media I/O module; Support for multiple timing standards on a single system; Reference handled by Spectrum media I/O module independently

**Physical**

- **Dimensions (W x H x D)**: 17.5 in x 3.5 in x 30.75 in (2 RU)/44.3 cm x 8.9 cm x 78.1 cm
- **Weight**: 43.3 lbs/19.6 kg

**Environmental**

- **Operating Temperature Range**: +41º to 104º F/+5º to 40º C
- **Operational Relative Humidity**: 10-80% non-condensing

**Standards & Regulations**

- **Safety**: UL 60950-1 2nd Edition, CSA C22.2 Information Technology Equipment - Safety - part 1: General Requirements
- **CE**: Low Voltage Directive (73/23/EEC) including amendments
- **Electromagnetic Compliance**: USA: FCC Part 15 Class A; Japan: VCCI Class A; Australia, New Zealand, EU: CISPR 22 Class A; Taiwan: CNS 13438 Class A; Canada: ICES-003 Class A; EU: EN55022/EN55024 Class A

**Included Accessories**

- **Power Cords**: Two: 6 ft/1.83 m each
- **Rack-Mount Hardware Kit**: 19 in (standard)

**Spares Kits**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPR-SPECT-SAS-CABLE-1M-001</td>
<td>1 m SFF-8644 to SFF-8088 SAS cable for MediaDirector 225xB connection to MediaStore 5000</td>
</tr>
<tr>
<td>SPR-SPECT-SAS-CABLE-2M-001</td>
<td>2 m SFF-8644 to SFF-8088 SAS cable for MediaDirector 225xB connection to MediaStore 5000</td>
</tr>
<tr>
<td>SPR-SPECT-SAS-CABLE-5M-001</td>
<td>5 m SFF-8644 to SFF-8088 SAS cable for MediaDirector 225xB connection to MediaStore 5000</td>
</tr>
<tr>
<td>SPR-PSU-1100-INTEL-001</td>
<td>Power supply, 2 RU</td>
</tr>
<tr>
<td>SPR-FAN-2U-INTEL-001</td>
<td>Fan, 2 RU</td>
</tr>
</tbody>
</table>
MediaStore 5100 storage arrays provide scalable and reliable high-performance, disk-based shared storage for Spectrum™ media server systems. Twenty-four serial-attached SCSI (SAS) disk drives are integrated into each compact, 2-RU MediaStore 5100 chassis, and up to four MediaStore chassis can be linked in a single Spectrum system. With disk capacity options of 300 GB, 600 GB or 1.2 TB, broadcasters can access up to 303.4 TB of usable online storage, making it easy to tailor a Spectrum system to their exact needs.

Each hot-swappable drive in a MediaStore 5100 enclosure is connected via two integral SAS expanders. Storage capacity can be added at any time without disrupting on-air operations, while SAS connectivity between MediaStores and the rest of the system guarantees the bandwidth required for real-time media operations. Up to four MediaStores can be daisy-chained in a single Spectrum system to create a complete server solution with unmatched bandwidth and storage capacity.

The MediaStore 5100 chassis connects to Spectrum MediaDirector 2251, 2252, 2251B or 2252B system controllers using two 12-Gbps SAS interfaces, providing the advantages of high throughput and complete path redundancy. Every MediaStore 5100 also includes dual redundant power supplies with automatic failover, integrated fans and separate power cables. Since all disk subsystem management is provided in software by MediaDirector — including all file system and RAID information — no hardware controller is required.

In addition to SCSI enclosure service (SES) support, Spectrum provides advanced drive diagnostics and error-correction capabilities. Configurable alerts and notifications enable users to easily maintain and manage their MediaStore 5100 system, resulting in the industry’s highest level of storage resiliency.

**HIGHLIGHTS**

- 24 high-performance, hot-swappable SAS drives per chassis
- Three drive sizes available: 300 and 600 GB, and 1.2 TB
- 12-Gbps SAS interfaces
- Redundant hot-swappable power supplies with redundant fans and separate power cables
- SCSI enclosure service (SES) support
**SPECIFICATIONS**

**DRIVES**
- Drives Supported: 24 SAS disk drives
- Host Interface: 12 Gbps SAS
- Drive Interface: 12 Gbps SAS
- Shock: 5 g 10 ms ½ sine (vertical axis)
- Vibration:
  - Operational: 0.21 g RMS 5-500 Hz random
  - Non-Operating: 1.04 g RMS 2-200 Hz random
- Power Supply: Redundant, hot-swappable
  - Input Voltage Range: Auto ranging, 90 to 264 VAC
  - Line Frequency: 47/63 Hz
  - Power Cord: Two, 120V

**PHYSICAL**
- Dimensions (W x H x D): 17.5 in x 3.46 in x 22.71 in (2 RU)/44.3 cm x 8.79 cm x 57.68 cm
- Weight: 55 lbs/25 kg maximum total weight, enclosure fully populated

**ENVIRONMENTAL**
- Operating Temperature Range: +41º to 104º F/+5º to 40º C
- Operational Relative Humidity: 20%-80% non-condensing

**CONFIGURATIONS**

<table>
<thead>
<tr>
<th>Drive Size</th>
<th>Part Number</th>
<th>Number of Drives</th>
<th>RAID Set</th>
<th>Usable Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 GB</td>
<td>MSS-5124-03H</td>
<td>24</td>
<td>3 (6 + 2)</td>
<td>5.23 TB</td>
</tr>
<tr>
<td>600 GB</td>
<td>MSS-5124-06H</td>
<td>24</td>
<td>3 (6 + 2)</td>
<td>10.46 TB</td>
</tr>
<tr>
<td>1.2 TB</td>
<td>MSS-5124-12H</td>
<td>24</td>
<td>3 (6 + 2)</td>
<td>20.95 TB</td>
</tr>
</tbody>
</table>

**OPTIONAL ACCESSORIES AND SPARE PARTS**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPR-MSS-5124-03HDD</td>
<td>300 GB SAS HDD drive for MediaStore 5100</td>
</tr>
<tr>
<td>SPR-MSS-5124-06HDD</td>
<td>600 GB SAS HDD drive for MediaStore 5100</td>
</tr>
<tr>
<td>SPR-MSS-5124-12HDD</td>
<td>1.2 TB SAS HDD drive for MediaStore 5100</td>
</tr>
<tr>
<td>SPR-SPECT-12G-SAS-CABLE-1M</td>
<td>1m cable, SFF-8644 mini-SAS HD to SFF-8644 mini-SAS HD. For MSS-7200 and MSS-5124.</td>
</tr>
<tr>
<td>SPR-SPECT-12G-SAS-CABLE-3M</td>
<td>3m cable, SFF-8644 mini-SAS HD to SFF-8644 mini-SAS HD. For MSS-7200 and MSS-5124.</td>
</tr>
<tr>
<td>SP-0113-001</td>
<td>Spare power supply module</td>
</tr>
</tbody>
</table>
SystemManager acts as the administrative hub of Harmonic ingest, storage and playout systems, including Spectrum™ media servers, Harmonic MediaGrid shared storage and the Media Application Server (MAS) asset management platform. The controller’s streamlined and intuitive browser-based user interface allows quick configuration of new systems, rapid adjustment of existing configurations, and simplified integration of new components. Real-time fault reporting and alerting capabilities allow users to head off issues before they become critical.

**Workflow Control**
SystemManager integrates with the user’s existing data network to allow administrators and technicians to monitor and manage Spectrum X, MediaDirector, MediaCenter and MediaDeck servers, MediaGrid storage systems and MAS workflow applications from any web-enabled computer in real time.

**Active Monitoring**
SystemManager constantly monitors dozens of characteristics of every component in the system, alerting administrators to abnormal conditions such as temperature, power, data connectivity, etc. If a fault is discovered, SystemManager automatically sends an email or page to the system administrator.

**Configurations**
SystemManager is available in three variants:

- **NSM-2017** is a hardware and software solution for managing any combination of Spectrum, MediaGrid and MAS systems.
- **NSM-2017K** utilizes the same hardware and software as NSM-2017, with the addition of a rack-mountable keyboard, monitor and trackpad module (KMM).
- **NSM-2017SW** is a software-only version which can be installed and configured on customer-supplied hardware.

**HIGHLIGHTS**
- Facility-wide control of Harmonic Spectrum and MediaGrid systems
- Active monitoring and alerting
- Intuitive web-based GUI
- Integrates with existing data networks
## NSM-2017 SERVER SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Intel® Xeon® E3-1220 v5 processor</td>
</tr>
<tr>
<td>Memory</td>
<td>4GB UDIMM, 3 GHz</td>
</tr>
<tr>
<td>Storage</td>
<td>2 x 500GB 7.2k RPM SATA 3Gbps, 3.5 in</td>
</tr>
<tr>
<td>Ethernet</td>
<td>On-board dual Gigabit network adapter</td>
</tr>
</tbody>
</table>

## POWER

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>Single</td>
</tr>
<tr>
<td>Voltage</td>
<td>100-240 V</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>250 W</td>
</tr>
</tbody>
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## PHYSICAL

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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<tbody>
<tr>
<td>Dimensions (WxHxD)</td>
<td>17.60 x 1.68 x 21.50 in (1 RU)</td>
</tr>
<tr>
<td></td>
<td>44.70 x 4.27 x 54.6 cm</td>
</tr>
<tr>
<td>Weight</td>
<td>26.0 lbs/11.8 kg</td>
</tr>
</tbody>
</table>

## ENVIRONMENTAL

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>+50° F to 95° F</td>
</tr>
<tr>
<td></td>
<td>+10° C to 35° C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40° to 149°F</td>
</tr>
<tr>
<td></td>
<td>-40° to 65°C</td>
</tr>
<tr>
<td>Operating Relative Humidity</td>
<td>20-80% (non-condensing) with a maximum humidity gradient of 10% / hr</td>
</tr>
<tr>
<td>Storage Relative Humidity</td>
<td>5% to 95% (non-condensing)</td>
</tr>
<tr>
<td>Operating Maximum Vibration</td>
<td>0.26 Grms @ 5 Hz to 350 Hz</td>
</tr>
<tr>
<td>Operating Maximum Shock</td>
<td>31 G, 2.6 ms, 20 in/sec, bottom side</td>
</tr>
<tr>
<td>Operating Altitude</td>
<td>10,000 ft maximum</td>
</tr>
<tr>
<td></td>
<td>3,048 m maximum</td>
</tr>
<tr>
<td>Safety</td>
<td>FCC Part 15 Class A</td>
</tr>
<tr>
<td></td>
<td>EN60000-3-2: A1, A2: Current Harmonics</td>
</tr>
<tr>
<td></td>
<td>EN60000-3-3: Voltage Flicker</td>
</tr>
<tr>
<td></td>
<td>EN55022: 1998 and CISPR 22: 1997 Class A</td>
</tr>
<tr>
<td></td>
<td>VCCI Class I</td>
</tr>
<tr>
<td></td>
<td>MIC Class A</td>
</tr>
<tr>
<td></td>
<td>BSMI</td>
</tr>
<tr>
<td></td>
<td>IEC 61000-4-2: Electrostatic Discharge Specification</td>
</tr>
<tr>
<td></td>
<td>EC 61000-4-3: Radiated Immunity</td>
</tr>
<tr>
<td></td>
<td>IEC 61000-4-4: EFT/Bursts Immunity</td>
</tr>
<tr>
<td></td>
<td>IEC 61000-4-5: Surge Immunity</td>
</tr>
<tr>
<td></td>
<td>IEC 61000-4-6: Conducted Immunity 0.15-80MHz</td>
</tr>
<tr>
<td></td>
<td>IEC 61000-4-8: Power Frequency H-Field</td>
</tr>
<tr>
<td></td>
<td>IEC 61000-4-11: Voltage Dips/Interrupts/Variation</td>
</tr>
</tbody>
</table>

## INCLUDED ACCESSORIES

<table>
<thead>
<tr>
<th>Qty</th>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power Cord</td>
<td>NSM-2017</td>
</tr>
<tr>
<td>2</td>
<td>Power Cords</td>
<td>NSM-2017K</td>
</tr>
<tr>
<td>1</td>
<td>Rack-Mount Hardware Kit</td>
<td>1RU/2 RU Static Rails for 2-Post and 4-Post Racks</td>
</tr>
</tbody>
</table>

## NSM-2017K KMM MODULE SPECIFICATIONS (INCLUDED WITH NSM-2017K)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectors</td>
<td>Integrated USB KVM, HD15 VGA, USB Type A for KB/MS</td>
</tr>
<tr>
<td>Video</td>
<td>Samsung grade A industrial TFT LCD Panel</td>
</tr>
<tr>
<td>Resolution</td>
<td>1,280 x 1,024 with 60/70/75 Hz</td>
</tr>
</tbody>
</table>

## POWER

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>AC adapter (12 V, 5 A)</td>
</tr>
<tr>
<td>Voltage</td>
<td>110/220 V</td>
</tr>
<tr>
<td>Line Frequency</td>
<td>50/60 Hz</td>
</tr>
</tbody>
</table>

## PHYSICAL

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (WxHxD)</td>
<td>17.4 x 1.75 x 23.6 in</td>
</tr>
<tr>
<td></td>
<td>44.2 x 4.45 x 60 cm</td>
</tr>
<tr>
<td>Weight</td>
<td>35.27 lbs/16 kg</td>
</tr>
</tbody>
</table>

## ENVIRONMENTAL

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>+32° F to 122° F</td>
</tr>
<tr>
<td></td>
<td>0° C to 50° C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>23° to 149°F</td>
</tr>
<tr>
<td></td>
<td>-5° to 65°C</td>
</tr>
<tr>
<td>Operating Relative Humidity</td>
<td>5-90% (non-condensing)</td>
</tr>
<tr>
<td>Operating Maximum Shock</td>
<td>10 G acceleration, 11 ms duration</td>
</tr>
<tr>
<td>Maximum Vibration</td>
<td>5-500 Hz, 1G RMS random vibration</td>
</tr>
<tr>
<td>Safety</td>
<td>FCC</td>
</tr>
<tr>
<td></td>
<td>CE</td>
</tr>
<tr>
<td></td>
<td>VCCI</td>
</tr>
<tr>
<td></td>
<td>3C</td>
</tr>
</tbody>
</table>

## NSM-2017SW MINIMUM HARDWARE REQUIREMENTS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Intel® Celeron® Processor 336 at 2.8GHz/256K Cache, 533MHz FSB</td>
</tr>
<tr>
<td>Memory</td>
<td>1-GB RAM</td>
</tr>
<tr>
<td>Storage</td>
<td>80-GB, SATA II, 3.5-in, 7.2K rpm HDD and DVD-ROM</td>
</tr>
<tr>
<td>Ethernet</td>
<td>Dual Gigabit Network Adapter</td>
</tr>
<tr>
<td>Operating System</td>
<td>Windows Server 2012 R2, Windows Server 2008 R2 Service Pack 1, Windows 7 Pro 64-bit</td>
</tr>
</tbody>
</table>