ProStream 9000™
Stream Processing Platform
RELEASE 10.5.3

Installation Guide
June 2015
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**CAUTION:** The Caution symbol calls your attention to information that, if ignored, can adversely affect the performance of your Harmonic product, or that can make a procedure needlessly difficult.

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**NOTE:** The Note symbol calls your attention to additional information that you will benefit from heeding. It may be used to call attention to an especially important piece of information you need, or it may provide additional information that applies in only some carefully delineated circumstances.

**IMPORTANT:** The Important symbol calls your attention to information that should stand out when you are reading product details and procedural information.

**TIP:** The Tip symbol calls your attention to parenthetical information that is not necessary for performing a given procedure, but which, if followed, might make the procedure or its subsequent steps easier, smoother, or more efficient.

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

<table>
<thead>
<tr>
<th>Convention</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typed Command</td>
<td>Indicates the text that you type in at the keyboard prompt.</td>
</tr>
<tr>
<td>(&lt;\text{Ctrl}), (&lt;\text{Ctrl}&gt;+,(&lt;\text{Shift})&gt;</td>
<td>A key or key sequence to press.</td>
</tr>
<tr>
<td>Links</td>
<td>The <em>italics in blue</em> text to indicate Cross-references, and hyperlinked cross-references in online documents.</td>
</tr>
<tr>
<td>Bold</td>
<td>Indicates a button to click, or a menu item to select.</td>
</tr>
<tr>
<td>ScreenOutput</td>
<td>The text that is displayed on a computer screen.</td>
</tr>
<tr>
<td>Emphasis</td>
<td>The <em>italics</em> text used for emphasis and document references.</td>
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Contacting the Technical Assistance Center

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Sicherheit Symbole und übersetzt Sicherheit, Achtung & Vorsicht Anleitung (Deutsch)

Site Preparation Instructions

Product End-of-Life Disassembly Instructions

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<td>Compliance with additional country specific environmental, safety and EMC standards</td>
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Chapter 1
Introduction

This manual describes the Harmonic ProStream™ 9000 Stream Processing platform. It describes the ProStream features, the various optional components that can be integrated into the platform, and provides instructions for basic installation and setup.

The ProStream 9000 platform is normally delivered with all cards, components, software, and licenses pre-installed according to customer specifications. The purpose of this manual is to guide you through the installation of the device, from mounting it in the rack to making it operational.

NOTE: While information about various cards and modules may include installation instructions, Harmonic strongly recommends that only trained service representatives perform installation of internal cards and components.

Manual Organization

This manual is organized to walk you through the basic steps of the stream processor configuration: unpacking and mounting the device, cabling and power-up. It includes instructions specific to each optional component, as well as component replacement, troubleshooting and maintenance information. Also included are comprehensive specifications for the physical characteristics of the device, as well as for the features supported by the device.

This manual contains the following parts:

- **Chapter 2 ProStream 9000 Overview**, introduces the stream processor and describes its features.
- **Chapter 3 Installing the Processor**, provides instructions for rack-mounting the device, cabling for the basic configuration, and power-up/boot sequence instructions.
- **Chapter 4 Operating the Stream Processor**, describes how to begin configuring the processor using NMX or Standalone GUI (SAG).
- **Chapter 5 Maintenance**, describes maintenance of the unit, how to replace field-replaceable components, and what to do in the event of problems.
Chapter 2
ProStream 9000 Overview

This chapter describes the ProStream 9000 platform, and gives a high-level overview of the ProStream 9000 features. It includes the following sections:

- **Platform Description**
- **ProStream 9000 Device Features**
- **ProStream 9000 Physical and Power Specifications**
- **Control Modes**
- **Front Panel**
- **Back Panel**

**Platform Description**

Harmonic ProStream 9000 is a highly integrated MPEG/DVB multiplexer, scrambler descrambler and transcoder for multimedia services carried over digital broadcast networks. This guide describes the configuration and monitoring instructions for ProStream 9000, a high density stream processing platform.

ProStream 9000 is a digital video multiplexer, scrambler, descrambler and transcoder that suits the dynamic requirements of various market segments such as Telco, Cable, DBS and Broadcasters.

ProStream 9000 receives MPEG streams over Gigabit Ethernet (GbE), DVB-ASI, 8VSB inputs. It multiplexes, scrambles, transcodes and outputs the content over GbE and/or DVB-ASI ports. It features a modular, high-density chassis that is furnished with up to 5 IOMs (Input/Output Module) and up to 4 IPCs (Internal Processing Card) in a single one-rack-unit (1-RU) chassis. The number of input and output ports changes according to device configuration to fully meet customer’s needs.

The modularity of the platform allows easy field replacement of cards, as well as field upgrades of SW and HW features. The new design of ProStream 9000 improves device serviceability:

- Dual power supply units
- Swappable modules:
  - ACE modules
  - IOM modules
  - Power supply units
  - Fan tray
- Fan control for noise reduction
- Improved air flow for cooling

**ProStream 9000 Device Features**

The main features and capabilities of the device are as follows:
- Modular platform - provides a density of up to 5 IOM (Input Output Module) cards in a single one-rack-unit (1-RU) chassis. The modular design allows a flexible and easy field replacement of cards as well as field upgrades of SW and HW features.

- IP IOM card - when mounted in the device, ProStream 9000 receives and transmits data via a GbE port. The GbE card occupies two IOM slots and should be mounted in slots 1&3. Each device supports a single IP IOM card. Each IP IOM card has four active GbE ports.

- DVB-ASI IOM card - when mounted in the device, ProStream 9000 receives and transmits data via four DVB-ASI ports. Each port may be configured as an input or output port. The following two types of DVB-ASI cards are available:
  - ASI-SCR – in addition to the ASI-RMX capabilities, this card type also supports DVB-CSA (Common Scrambling Algorithm). The ASI-SCR card supports maximum bit rate of 140 Mbps.

  **NOTE:** For further details, see *DVB-ASI IOM Card* on page 17.

- 8VSB Input card - when mounted in the device, ProStream 9000 receives ATSC terrestrial TV. It receives four independent ATSC 8VSB signals on the inputs and outputs MPEG-2 Transport Streams over GbE or ASI output ports.

- Input Extraction capability - the device extracts incoming feeds and displays their structure and elements on the control interface in a user friendly view.

- Full multiplexing capability — content may be routed from any input port to any output port.

- Advanced scrambling - ProStream 9000 scrambles the input content in compliance with the DVB-CSA standard. This feature is available for both GbE and DVB-ASI output ports, in NMX and standalone control modes.

- Transcoding - ProStream 9000 transcodes any to any codecs, video and audio streams for Broadcast and OTT Mobile/Web video and audio streams.

### ProStream 9000 Physical and Power Specifications

#### Physical Dimensions

**Table 2-1: Physical Dimensions**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Inches</th>
<th>Centimeters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>1.75</td>
<td>4.45</td>
</tr>
<tr>
<td>Width</td>
<td>19</td>
<td>48.36</td>
</tr>
<tr>
<td>Total Length (front to back)</td>
<td>27</td>
<td>68.69</td>
</tr>
<tr>
<td>Depth (From rack mount fixture to back of device)</td>
<td>25.20</td>
<td>64</td>
</tr>
</tbody>
</table>

#### Power Supply Specifications

ProStream 9000 is furnished with two field replaceable redundant AC/DC power supply units. Each power supply unit easily accommodates the power consumption of a fully populated device. When both power supply units are plugged in and connected to the mains, the power supply units operate in current sharing mode.
Harmonic sells power supply units that have been thoroughly qualified to operate with the ProStream 9000 device. Table 2–2 lists power specifications of a fully populated unit together with the Harmonic part numbers for the qualified power supply modules. Use these part numbers for ordering your power supply modules.

Table 2–2: Power Supply Units Specifications

<table>
<thead>
<tr>
<th>Harmonic Part Number</th>
<th>PS Type</th>
<th>Input Voltage Range</th>
<th>Input Line Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRM-9K-AC-PS-DUAL</td>
<td>AC</td>
<td>100 to 240 VAC</td>
<td>47 to 63 Hz</td>
<td>Input voltage range is auto ranging</td>
</tr>
<tr>
<td>PRM-9K-DC-PS-DUAL</td>
<td>DC</td>
<td>40 to 60 VDC</td>
<td>N/A</td>
<td>Nominal input is -48VDC</td>
</tr>
</tbody>
</table>

For installation details, see Overcurrent Protection on page 34.
For cabling details, see Connecting the Power on page 32.

Environmental Specifications

The following table lists the environmental specifications for ProStream 9000:

Table 2–3: Environmental Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>Operating 0 to 50 °C (32 to 122 °F)</td>
</tr>
<tr>
<td></td>
<td>Storage –20 to 80 °C (–4 to 176 °F)</td>
</tr>
<tr>
<td>Humidity Humidity</td>
<td>Operation &lt;95% non-condensing</td>
</tr>
<tr>
<td></td>
<td>Storage &lt;95% non-condensing</td>
</tr>
<tr>
<td>Ventilation</td>
<td>Ventilation When fans operate at full speed, air flow through the device is at least 2.098m³/min (74.1 CFM) per ProStream 9000 unit</td>
</tr>
<tr>
<td>Altitude</td>
<td>Operation &lt;15,000 feet (4,572 meters)</td>
</tr>
<tr>
<td></td>
<td>Storage &lt;40,000 feet (12,192 meters)</td>
</tr>
<tr>
<td>Shock and Vibration</td>
<td>Packaged Passes the impact, compression, and vibration requirements of ASTM D4169-94, Distribution Cycle 13, Assurance Level 1</td>
</tr>
<tr>
<td></td>
<td>Operating Passes NEBS Office Vibration Test while operating (0.1G sine sweep, 5 to 100 Hz, 3 axis)</td>
</tr>
<tr>
<td>RoHs Compliance</td>
<td>ProStream 9000 is compliant with RoHS Directive 2002/95/EC</td>
</tr>
</tbody>
</table>

Control Modes

ProStream 9000 supports the following control mode options:
- NMX - Harmonic’s NMX Digital Service Manager offers comprehensive management of networks including automatic device redundancy, source switching and automation. ProStream 9000 is managed as an integral part of a broadcasting system.

- Standalone - the device is managed as a standalone device independent of the broadcasting system. It is controlled by a Web client which is an onboard interface accessible through Microsoft Internet Explorer with comprehensive management capabilities.

**System Requirements of Managing PC**

System requirements of the managing computer vary according to the control mode as the following table lists:

<table>
<thead>
<tr>
<th>Control Mode</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMX</td>
<td>NMX runs on an NMX computer which is a Harmonic approved Dell™ Computer</td>
</tr>
<tr>
<td>Standalone</td>
<td>Pentium 3.x or higher</td>
</tr>
<tr>
<td></td>
<td>Windows XP, Windows 7</td>
</tr>
<tr>
<td></td>
<td>Internet Explorer 7.0, 8.0 and 9.0</td>
</tr>
</tbody>
</table>

**Front Panel**

The front panel of ProStream 9000 contains the following:

- Front bezel
- Control Panel
- LEDs
- Front Panel Latch
- Ethernet service port for debugging purposes only
- Cooling fans - mounted on the back side of the front panel

The following illustrations show the front and back panels of the device without any optional modules.
Figure 2–1: Front Panel

Table 2–5: Front Control Panel and Bezel

<table>
<thead>
<tr>
<th>Item</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ethernet service port</td>
<td>Ethernet service connection</td>
</tr>
<tr>
<td>2</td>
<td>LED—Power</td>
<td>Power indicator</td>
</tr>
<tr>
<td>3</td>
<td>LED—Fault</td>
<td>Fault indicator</td>
</tr>
<tr>
<td>4</td>
<td>LED—Focal</td>
<td>Local Control indicator</td>
</tr>
<tr>
<td>5</td>
<td>LED—TX</td>
<td>Transmitting Indicator</td>
</tr>
<tr>
<td>6</td>
<td>LCD panel</td>
<td>Status indicator</td>
</tr>
<tr>
<td>7</td>
<td>Latch</td>
<td>Front panel latch</td>
</tr>
<tr>
<td>8</td>
<td>Right key</td>
<td>Menu right</td>
</tr>
<tr>
<td>9</td>
<td>ESC key</td>
<td>Menu escape</td>
</tr>
<tr>
<td>10</td>
<td>ENTER key</td>
<td>Menu Select</td>
</tr>
<tr>
<td>11</td>
<td>Down key</td>
<td>Menu down</td>
</tr>
<tr>
<td>12</td>
<td>Left key</td>
<td>Menu left</td>
</tr>
<tr>
<td>13</td>
<td>Up key</td>
<td>Menu up</td>
</tr>
</tbody>
</table>
Front Panel Bezel

ProStream 9000 has a detachable front bezel that snaps on top of the control panel. The air inlets located on the sides of the bezel provide access to the reusable air filters. To remove bezel, see Removing and Replacing the Bezel on page 43.

Control Panel

The control panel consists of an LCD display and a keypad. The control panel enables preliminary configuration and basic monitoring of ProStream 9000. It is usually used for standalone devices. For further information, see Front Panel on page 12.

Front Panel LEDs

The four LEDs on the front panel indicate the operational status. The LEDs function the same whether ProStream 9000 is operating in standalone or NMX control mode. See Figure 2–1 on page 13.

Air Inlets

The air inlets are designed to provide maximum air flow. The air flow is critical for maintaining the proper temperature range. Fans in the front unit draw air in through the front inlets. To clean and replace air filters, Air Filter on page 44.

CAUTION: Do not obstruct the airflow when mounting the device on the rack. Severe equipment damage can result when the device cannot properly exhaust the airflow.

Cooling Fans

The ProStream 9000 platform uses fan tray unit that contains 8-12V fans which control the temperature during operation. The fans located in the front of the device, use air from the front and exhaust it to the rear of the device. Each fan has a speed control mechanism and the CPC manages their speed. Fan Control mechanism triggers fans to speed up according to real environmental measurements to increase Mean time Between Failures and to lower the noise level when working in typical environmental conditions.

All fans are mounted on the back side of the front panel to allow a quick and easy field replacement in case of a fan failure. See Fan Tray on page 46.

Back Panel

The following figure illustrates the back panel of the ProStream 9000 device with an optional configuration of the IOM cards. The number and type of mounted IOM cards may vary according to the needs of the user:
Central Processing Card (CPC)

The Central Processing Card (CPC) is the main card of the ProStream 9000 platform. It includes the communication interfaces of the device and additional components all of which are described henceforth:

- **2 x Ethernet ports** - the Ethernet ports allow connection to separate networks. The Ethernet ports are labeled ETH1-2. ETH1 port is used to connect the device to the management network and ETH1 port for CAS network when required.

  ETH1-2 are 10/100/1000 Base-T ports. For cabling instructions, see *Connecting the Ethernet Cables* on page 30.

- **EIA-RS-232 Serial Communication Port** - the EIA-RS-232 serial port is used for technical support only.

- **Fault Relay Port** - currently not in use.
CPC LEDs - the following table lists the CPC LEDs from top to bottom and explains their functionality. The LEDs function similar whether ProStream 9000 operates in standalone or NMX control mode. (See also Figure 2–2 on page 15):

**Table 2–7: CPC LEDs**

<table>
<thead>
<tr>
<th>LED</th>
<th>Color</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault</td>
<td>Red</td>
<td>Same as front panel. An alarm has been issued. For further details, refer to Troubleshooting on page 30</td>
</tr>
<tr>
<td>Locater</td>
<td>Blue</td>
<td>Identify unit, indicates the device when it needs service</td>
</tr>
</tbody>
</table>

**Power Supply**

The ProStream 9000 device is furnished with two field replaceable redundant AC or DC power supply units. Each power supply unit easily accommodates the power consumption of a fully populated device. When both power supply units are plugged in and connected to the mains, the power supply units operate in current sharing mode. For power consumption specifications, see Power Supply Specifications on page 10.

The physical dimensions of the AC/DC power supply unit: 40mmH x 90mmW x 440mmD.

Each power supply unit features two LEDs. The following table describes the LEDs:

**Table 2–8: Power Supply LEDs**

<table>
<thead>
<tr>
<th>LED</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Ok</td>
<td>Green</td>
<td>Illuminates when mains input voltage is present</td>
</tr>
<tr>
<td>Out Ok</td>
<td>Green</td>
<td>Illuminates when output voltage is greater than 80% of the nominal output rate</td>
</tr>
</tbody>
</table>

For instructions to connect the AC power supply, see Connecting the Power on page 32.

The -48 VDC power supply unit is supplied with the required 3-pin male connector. See Connecting the DC Power Supply on page 33 for instructions to connect the power supply.

**NOTE:** Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

**IOM Slots and Cards**

The ProStream 9000 device back panel has five Input Output Module (IOM) slots labeled one to five. Each one of the slots accommodates a single IOM card. The following figure illustrates the arrangement of the slots at the back panel:
ProStream 9000 supports the following IOM cards:
- DVB-ASI SCR-IOM card - PRM-9K-ASI-SCR-0001
- GbE 4G IOM card - PRM-9K-IOM-GBE-4G
- 8VSB Modulation card - PRM-9K-IOM-8VSB

**DVB-ASI IOM Card**

**NOTE:** The following information applies to both types of the DVB-ASI card.

Each DVB-ASI IOM card has four independent ports labeled ASI 1-4. Each port may be configured as an input or output port. The following table lists the ASI card specifications:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Ports</td>
<td>4 x ASI ports. Each port may be configured as an input or output port. In DVB-ASI-SCR card, port two may be configured to receive the GPS frequency</td>
</tr>
<tr>
<td>Connector</td>
<td>Female BNC connector</td>
</tr>
<tr>
<td>Max. input bit rate</td>
<td>Up to 156 Mbps per port</td>
</tr>
<tr>
<td>Input extraction</td>
<td>Extraction of incoming streams is displayed on the management interface</td>
</tr>
<tr>
<td>Max. output bit rate</td>
<td>Up to 140 Mbps per port</td>
</tr>
<tr>
<td>Multicast content</td>
<td>Content elements may be simultaneously routed to multiple output ports</td>
</tr>
</tbody>
</table>
ASI Port LEDs

Each ASI port features two LEDs: Tx and Rx. The following table describes the available status of each LED:

**Table 2–10: Status of ASI Port LEDs**

<table>
<thead>
<tr>
<th>LED</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rx</td>
<td>Off</td>
<td>Port is disabled</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>Port is enabled and there is no ASI input flow</td>
</tr>
<tr>
<td></td>
<td>Amber</td>
<td>Port is enabled and invalid MPEG data is detected</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>Port is enabled and nulls only are detected in the flow</td>
</tr>
<tr>
<td></td>
<td>Blinking green</td>
<td>Port is enabled and traffic is flowing</td>
</tr>
<tr>
<td>Tx</td>
<td>Off</td>
<td>Port is disabled</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>Port is enabled and overflow is detected in output port</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>Port is enabled and nulls only are detected in the flow</td>
</tr>
<tr>
<td></td>
<td>Blinking green</td>
<td>Port is enabled and traffic is flowing</td>
</tr>
</tbody>
</table>

GbE 4G IOM Card

The GbE 4G IOM card has 6 independent ports. The ports are organized as follows:
- GbE 1–4, maximum bitrate is 1Gbps. The ports are labeled GbE1-4. These ports support fiber or copper cables and use SFP transceivers.
- 10GbE1-2, maximum bitrate is 10Gbps. The ports are labeled 10GbE1-2. These ports support fiber cables only and use SFP+ transceivers.
Each port is bi-directional and may receive and transmit streams simultaneously. The following table lists the GbE card specifications:

Table 2–11: GbE Card Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Ports</td>
<td>• 4xGbE 1Gbps&lt;br&gt;  • 2xGbE 1Gbps with SFP transceiver for fiber&lt;br&gt;  • 2xGbE 1Gbps with SFP transceiver for copper cables&lt;br&gt;  • 2xGbE 10Gbps</td>
</tr>
<tr>
<td>Number of Active ports</td>
<td>Up to four ports may be active simultaneously:&lt;br&gt;  • 4xGbE 1Gbps&lt;br&gt;  or&lt;br&gt;  • 2xGbE 10Gbps and 2xGbE 1Gbps with copper cables</td>
</tr>
<tr>
<td>Connector</td>
<td>• SFP+ transceiver for fiber cable only&lt;br&gt;  • SFP transceiver for either fiber or copper cables</td>
</tr>
<tr>
<td>Max. input bit rate</td>
<td>• SFP&lt;br&gt;  • Line rate up to 1000 Mbps&lt;br&gt;  • Processing up to 960Mbps&lt;br&gt;  • SFP+&lt;br&gt;  • Line rate up to 10,000Mbps&lt;br&gt;  • Processing up to 9600Mbps&lt;br&gt;  Total of 4Gbps processing per card</td>
</tr>
<tr>
<td>Number of input sockets</td>
<td>Up to 250 sockets SPTS or MPTS</td>
</tr>
<tr>
<td>Input extraction</td>
<td>Extraction of incoming streams is displayed on the management interface.</td>
</tr>
<tr>
<td>Max. output bit rate</td>
<td>Up to 1Gbps</td>
</tr>
<tr>
<td>Number of output sockets</td>
<td>Up to 250 sockets SPTS or MPTS</td>
</tr>
<tr>
<td>Input De-Jittering capability</td>
<td>Up to 50msc point-to-point</td>
</tr>
<tr>
<td>Multicast content</td>
<td>Content elements may be simultaneously routed to multiple output ports.</td>
</tr>
<tr>
<td>Null Packet Insertion</td>
<td>Constant Bit rate output stream with null packet insertion and PCR correction.</td>
</tr>
<tr>
<td>IP UDP modes</td>
<td>The following IP UDP modes are supported in both input and output streams:&lt;br&gt;  • IP UDP unicast&lt;br&gt;  • IP UDP multicast (IGMP Ver. 2)</td>
</tr>
</tbody>
</table>
Table 2–11: GbE Card Specifications continued

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. number of input services</td>
<td>250 per device</td>
</tr>
<tr>
<td>Max. number of output services</td>
<td>250 per device</td>
</tr>
</tbody>
</table>

GbE Port LEDs

Each GbE port features two LEDs: Tx and Rx. The following table describes the available status of each LED:

Table 2–12: Status of GbE Port LEDs

<table>
<thead>
<tr>
<th>LED Status</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
</table>
| Activity   | Green | On - A live fiber is connected to the port and a network link is detected  
|            |       | Blinking - A real traffic flows through the link                  |
| Alarm      | Red   | On - Indicates an error in the GbE port                          |

SFP Module

The SFP (Small Form Factor Pluggable) module converts optical data into electrical data and vice versa. The SFP modules allow to receive input signals over a variety of physical interfaces:

- **SFP**
  - Single-mode optical interface (1000 Base-LX)
  - Multi-mode optical interface (1000 Base-SX)
  - Copper interface (1000 Base-T)
- **SFP +**
  - Multi-mode optical interface (1000 Base-SX 1G Ethernet, 10GBase-SR/SW 10G Ethernet)

The following figure illustrates an SFP module:
Warning: Class I laser product. (IEC/EN 60825-1; 21CFR SubChapter J (1040.10 and 1040.11)

You can use either of the following types of SFP depending on the cable/fiber type you are using.

Harmonic sells SFP modules that have been thoroughly qualified to operate with the ProStream 9000 device. These SFPs are made by Finisar, and may be purchased either directly from Harmonic, or from other sources.

Table 2–13 lists the Harmonic part numbers for the qualified SFP modules, as well as the matching Finisar part numbers for the same modules. Use these part numbers for ordering your SFP modules.

NOTE: To be eligible for support by Harmonic, use qualified SFPs only.

Table 2–13: 1Giga SFP Modules

<table>
<thead>
<tr>
<th>Harmonic Part Num.</th>
<th>Fiber/Cable Type</th>
<th>Connector Type</th>
<th>Wave Length</th>
<th>Max. Cable/Fiber Length</th>
<th>Qualified Finisar SFP Model Part Num.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSF9311-02</td>
<td>Multimode fiber</td>
<td>2 x LC</td>
<td>850 nm</td>
<td>550m</td>
<td>FTLF8519P2BNL</td>
</tr>
<tr>
<td>GSF9322-02</td>
<td>Singlemode fiber</td>
<td>2 x LC</td>
<td>1310 nm</td>
<td>10 km</td>
<td>FTLF1319P1BTL</td>
</tr>
<tr>
<td>GSF9132-02</td>
<td>Singlemode fiber</td>
<td>2 x LC</td>
<td>1550 nm</td>
<td>70 km</td>
<td>FTLF1621P1BCL</td>
</tr>
<tr>
<td>GSF9100-02</td>
<td>Shielded and grounded CAT-6 or CAT-7</td>
<td>1 x RJ-45</td>
<td>N/A</td>
<td>100m</td>
<td>FCLF-8521-3</td>
</tr>
</tbody>
</table>

Table 2–14: 10Giga SFP+ Modules

<table>
<thead>
<tr>
<th>Harmonic Part Num.</th>
<th>Fiber/Cable Type</th>
<th>Connector Type</th>
<th>Wave Length</th>
<th>Max. Cable/Fiber Length</th>
<th>Qualified Finisar SFP Model Part Num.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSF9400-02</td>
<td>Multimode fiber</td>
<td>2 x LC</td>
<td>850nm</td>
<td>300m</td>
<td>FTLX8571D3BCV</td>
</tr>
</tbody>
</table>

An optical SFP has two LC sockets, Receive(Rx) and Transmit(Tx). Use Multimode or Singlemode fiber optics to connect your Gigabit Ethernet switch to the Rx socket. If bi-directional topology is used, connect the Tx socket back to the switch.

8VSB Modulation Card

The 8VSB modulation card is an RF input module that enables the reception of ATSC terrestrial TV. It receives four independent ATSC 8VSB signals on the inputs and outputs four MPEG-2 Transport Streams.

NOTE: The four inputs are enabled by optional firmware licenses.
8VSB Modulation Card Specifications

*Table 2–15* provides the specifications for the RF module.

**Table 2–15: RF Module Specifications**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectors</td>
<td>4x Type F, 75 Ω per IEC 60169-24</td>
</tr>
<tr>
<td>Modulation</td>
<td>8–VSB (ATSC compliant)</td>
</tr>
<tr>
<td>Tuning Range</td>
<td>VHF/LHF (Channels 2–59)</td>
</tr>
<tr>
<td></td>
<td>Note: The tuning range is limited to Channels 2 to 59 by software (and SCTE 02-2006), per the FCC/Industry Canada decisions to release channels 60 to 69 for public safety use</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>–83dBm/6 MHz</td>
</tr>
<tr>
<td>Dynamic Range</td>
<td>&gt; 80dB</td>
</tr>
<tr>
<td>MPEG Format</td>
<td>188 Bytes per TS packet</td>
</tr>
<tr>
<td>MPEG-2 TS</td>
<td>MPTS and SPTS</td>
</tr>
</tbody>
</table>

Environmental and Physical

Compliant with ROHS Directive 2002/95/EC. See *Environmental and Physical* on page 22. *Figure 2–5* displays the module (rear panel).

*Figure 2–5: RF Input Module*

**RF Module LED Lights**

The LED lights show status, as shown in *Table 2–16*.

**Table 2–16: LED Status Lights**

<table>
<thead>
<tr>
<th>Display</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Port disabled</td>
</tr>
<tr>
<td>Blinking Yellow</td>
<td>Loss of sync</td>
</tr>
<tr>
<td>Red</td>
<td>Packet error rate (PER) threshold exceeded</td>
</tr>
</tbody>
</table>
Table 2–16: LED Status Lights

<table>
<thead>
<tr>
<th>Display</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steady yellow</td>
<td>SNR below threshold</td>
</tr>
<tr>
<td>Green</td>
<td>Port Enabled, no alarms</td>
</tr>
</tbody>
</table>
Chapter 3
Installing the Processor

This chapter provides detailed instructions for installing the ProStream 9000 unit in a standard 19-inch rack, connecting the cables, and powering up the device.

Following is the installation checklist, with links to instruction for each task. Perform these tasks in the order presented:

- Preparation
- Unpacking
- Installing the Device on a Rack
- Inserting the IOM Cards and RF Input Card
- Cabling ProStream 9000
- Front Panel LEDs
- Back Panel LEDs
- Main Board LEDs

Preparation

For installation and cabling, you need the following

- Phillips screwdriver - to mount the ProStream 9000 device in a standard 19-inch rack.
- Rack-mount screws - Harmonic ships the necessary rack-mount screws and rack rails with the optional rack-mounting kit. Harmonic ships rack-mounting kits in a separate shipping container.

Unpacking

The ProStream 9000 device comes in a specially designed shipping container that ensures the integrity of the unit. To avoid damage to the component, follow the unpacking instructions that come with the device.

When you unpack the ProStream 9000 device, you should find the following items:

- Device
- Standard IEC power cord.
- Spare air filters
- Installation manual

NOTE: The AC power input cable shall comply with national electrical code and 18 AWG minimum.
Installing the Device on a Rack

This section describes how to mount the device in a standard 19-inch rack, using the two side-mount rails included in the optional rack-mounting kit. A 30 inch deep rack with a spacer or chimney between racks with multiple devices is the recommended rack setup.

When you view the rack from the rear, the power rail should be installed on the left side.

Rack Guidelines

When operating the device in the rack, ensure that:

- 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 overcurrent protection.
- The equipment is properly grounded.
- No objects are placed on top of the unit.

Chassis Warnings for Rack Mounting and Servicing

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 assure your safety:

- 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 a 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.

CAUTION: Rack mount the platform using the screws that came with your Harmonic rail kit. If you did not purchase a Harmonic rail kit, use a rack-mount screw with a head no larger than 0.4 inches in diameter and 0.14 inches in height to avoid damaging the front panel of the platform. (Some platforms may come with a peel-away sticker which advises on the correct screw size.) Using only the bottom two screw holes will be sufficient.

Airflow

The airflow through the device is critical for maintaining the proper temperature range. Fans in the chassis draw air in through the front bezel and through the device. The airflow ventilates out the right side (front view).
CAUTION: Do not obstruct the airflow of the device. Severe equipment damage can result when the device cannot properly exhaust the airflow.

Attaching the Rack Rails

Attach the side-mount rack rails to the rack to hold the device in place. Figure 3–1 illustrates the parts of the rack rails.

![Figure 3–1: Rack Rails](image)

To attach the rack rails to the rack

1. If needed, place a Tinnerman™ speed nut with the nut on the outside of the rack over the holes to which you would like to mount the rails.

   NOTE: Each of the four rack posts requires two speed nuts.

2. Position the rack rails so the shelves are toward the inside of the rack.

3. Using the #10 screws provided with the device, screw the mounts into the speed nuts from the inside of the rack using the rack-mount holes that line up with the holes on the rack posts. Figure 3–2 on page 27 illustrates attaching the rails.
CAUTION: Make sure to install the rack rails with the shelf at the top of the rail. If you install the rail upside down, the rail blocks the device air vents, which can result in overheating the device.

Mounting the Device

See Chassis Warnings for Rack Mounting and Servicing on page 25.

To Mount the Device on a Rack

1. Detach the bezel as explained in Removing and Replacing the Bezel and expose the mount holes. See Figure 3–3.
2. Gently slide the device to rest on the rack rails.
3. Push the device back until the rack-mount holes in the front of the device line up with the rack posts.
4. Insert four screws through the mount holes in the front of the device to the corresponding holes on the rack posts.
5. Tighten the screws with a screwdriver.
6. Carefully replace the front bezel of the device.

Figure 3–3: Mounting the device

Inserting the IOM Cards and RF Input Card

Usually, ProStream 9000 devices are shipped with the IOM cards installed according to the hardware configuration required by the customer.

ESD Guidelines

In case you need to install or replace an IOM card, handle it according to the following instructions to avoid any damage.

**CAUTION:** Electrostatic Discharge (ESD) may damage the device components. Take precautions to eliminate ESD from your body and clothes before handling the device or card by using a wrist band and a rubber mat and read the following section.

To prevent damage caused by ESD, it is recommended to follow these instructions:

- When unpacking an IOM card, keep the card in the anti-static wrapping until you are ready to install it in the device. Unwrap the card only at an ESD workstation or when grounded.
- If for any reason you cannot insert the card, lay it in an anti-static container or packaging.
- Handle the card only at ESD workstation and use anti-static rubber mat and wrist bands.
- Handle the IOM card with care. Do not touch components and contacts on the board and hold board by its edges.

**To insert an IOM/RF card**

To insert an IOM card, you need the following:

- Phillips screwdriver to remove the fillers and to fasten the card to its place.
- ESD-preventing wrist band and a rubber mat
- Powered off device.

1. Verify that the device is powered off.
2. Mount the device into the rack (optional)
3. Remove the filler panel that covers the required IOM slot.
4. While following the ESD guidelines mentioned above, unpack the IOM card.

5. While holding the card by its edges, insert it into the slot. Make sure that the sides of the card slide into the guides of the IOM slot.

6. Push the card until its edge-connector mates securely with the connector in the slot.

7. Fasten the screws of the card to secure the IOM card to the chassis.

8. If you did not mount the device into the rack, mount it into the rack.

9. Start cabling the device as instructed in the following section.

**Device Dimensions**

Dimensions are provided in Inches and millimeters as follows:

<table>
<thead>
<tr>
<th>Inch</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>651.0</td>
<td>25.6</td>
</tr>
<tr>
<td>690.7</td>
<td>27.2</td>
</tr>
<tr>
<td>482.6</td>
<td>19.0</td>
</tr>
<tr>
<td>43.1</td>
<td>1.7</td>
</tr>
</tbody>
</table>

*Figure 3–4: Device Dimensions*
Cabling ProStream 9000

**CAUTION:** Do not make any cable connections when the power cord is connected. You must unplug the power cable to turn off the device.

Cabling the ProStream 9000 device is very straightforward. All input and output ports as well as Ethernet ports are clearly marked. For further information, refer to *Back Panel* on page 14.

The following table lists the ports, cables/fibers and the required connectors:

**Table 3–1: Cabling ProStream 9000**

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASI/RF</td>
<td>75 Ohm coax cables</td>
<td>Standard BNC</td>
</tr>
<tr>
<td>GbE</td>
<td>Multimode or singlemode optic fiber</td>
<td>LC</td>
</tr>
<tr>
<td></td>
<td>Shielded and grounded CAT-6 or CAT-7</td>
<td>RJ45</td>
</tr>
<tr>
<td>Ethernet</td>
<td>Shielded and grounded CAT-5E</td>
<td>RJ45</td>
</tr>
</tbody>
</table>

**Connecting the Ethernet Cables**

The Ethernet ports, labeled ETH1 and ETH2 provide access to two independent networks. All ProStream 9000 devices use the ETH1 port to connect to a management network. The ETH2 port is used to connect the ProStream 9000 to a CAS (Conditional Access) network.

**To connect the Ethernet ports**

- Connect a shielded and grounded CAT-5E cable from the ETH1/ETH2 port on the ProStream 9000 device to your network hub or switch.

**NOTE:** The 10/100 test port on the front panel is for testing use only and should not be used as a management port.

**Connecting the ASI Input/Output Ports**

The ASI ports require a 75 Ohm cable with standard BNC connector.

**To connect the ASI Ports**

1. Connect the BNC male connector to the BNC female connector of the required ASI port located on the ProStream 9000 back panel.
2. Connect the connector on the other side of the cable to your ASI source/destination.

**Connecting the GbE Input/Output Ports**

The GbE connection requires SFP modules and either of the following:

- Optic fiber with standard LC connectors
- Shielded and grounded CAT-6 or CAT-7 cable (copper cable) with RJ-45 connector
The SFP modules should be purchased separately. For further information about SFP modules see *SFP Module* on page 20.

**to connect the optic fiber/copper cables to the ProStream 9000**

1. Insert the SFP module into the SFP receptacle of the required GbE port at the back of the ProStream 9000.

2. Do either of the following:
   - Fiber cable — insert the LC connector into the Rx port of the SFP.
   - Shielded and grounded CAT 6 or 7 copper cable — Insert the RJ-45 connector into the matching port.

3. Connect the connector on the other side of the fiber to your GbE source/destination (typically a GbE switch).

4. Fiber cable only — If using bi-directional network configuration, use another fiber to connect the Tx port of the SFP to the Rx port of the switch.

**Connecting the Input 8VSB Modulation Card**

The RF ports require a 75 Ohm cable with standard BNC connector.

**To connect the 8VSB ports (RF ports)**

1. Connect the BNC male connector to the BNC female connector of the required RF port located on the ProStream 9000 back panel.

2. Connect the connector on the other side of the cable to your ATSC 8VSB source.

**Grounding Mounted Devices**

ProStream 9000 is manufactured with zinc plating on all chassis surfaces. The unit is installed with metal to metal contact between the rack rails, front ears and the rack frames. You must ensure rack is properly grounded.

ProStream 9000 must be connected to the main Earth line of the rack, using the dedicated ground terminal on the back of the chassis. See *Figure 2–3* on page 17.

**To ground each mounted device:**

1. Connect one end of the grounding wire to the rack grounding terminal.
2. Connect the other end of the grounding wire to the grounding terminal at the back panel of the device by fastening it with two lock nuts.

![Grounding wire fastened to the back panel](image1)

![Grounding terminal tightened by two lock nuts](image2)

Figure 3–5: Grounding Mounted Device

Connecting the Power

The device is customized with either an AC or DC power supply. Instructions for both are included in this section:

- Connecting the AC Power Supply
- Connecting the DC Power Supply

The chassis does not have a power switch. The unit powers on automatically when you plug it in.

Before you power-up the device, make sure that you have performed all of the cabling required for each of the optional modules that are installed.

To power-up the device:

1. Connect the power cord to the power plug on the device back panel and connect the power cord to the power outlet.

2. The boot sequence begins, as described in Local Control Panel Display Messages during Bootup on page 37

Connecting the AC Power Supply

The device AC power supply uses autosensing to adjust to different incoming voltages. The AC power plug accommodates standard IEC 120 VAC and 250 VAC power cords.

**CAUTION:** This product relies on the building’s electrical installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 20 A U.S. (240 VAC, 20 A international) is used on the phase conductors (all current-carrying conductors).
ATTENTION: 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., 20 A U.S. maximum (240 V alt., 20 A international) est utilisé sur les conducteurs de phase (conducteurs de charge).


Power Supply Cord Notice

CAUTION: This unit has more than one power supply connection; all connections must be removed to remove all power from this unit.

ATTENTION: Cette unité est équipée de plusieurs raccordements d'alimentation. Pour supprimer tout courant électrique de l'unité, tous les cordons d'alimentation doivent être débranchés.

WARNUNG: Diese Einheit verfügt über mehr als einen Stromanschluß; um Strom gänzlich von der Einheit fernzuhalten, müssen alle Stromzufuhren abgetrennt sein.

CAUTION: The power supply cord is used as the main disconnect device. Ensure that the socket/outlet is located/installed near the equipment and is easily accessible.

ATTENTION: Le cordon d’alimentation est utilisé comme interrupteur général. La prise de courant doit être située ou installée à proximité du matériel et être facile d'accès.

WARNUNG: Das Netzkabel dient als Netzschalter. Stellen sie sicher, das die Steckdose einfach zugänglich ist.

Connecting the DC Power Supply

If your device has the optional –40 VDC power supply, follow these steps to wire the power supply. Figure 3–6 shows the DC power supply, which is located on the back panel.

Figure 3–6: DC Power Supply
Getting Started

Before you begin wiring the –40 VDC power supply, make sure you provide the necessary overcurrent protection, wires, and power connector.

Power Source Specifications

The DC power source feeding the device must meet the following requirements:

- Electrically isolated from any AC power source.
- Positive ground. The Positive bus of the DC power source must be reliably connected to the Ground bus.

Each feed-pair must provide a continuous supply of power that meets the specifications shown in Table 3–2.

Table 3–2: DC Power Source Requirements

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>40 to 60 VDC</td>
</tr>
<tr>
<td>Max operating current</td>
<td>15 amps</td>
</tr>
<tr>
<td>Max input surge current</td>
<td>20 amps</td>
</tr>
</tbody>
</table>

Overcurrent Protection

To provide overcurrent protection:

- Provide overcurrent protection devices as part of each rack housing the stream processors.
- Locate a readily accessible disconnect device between the DC power source and the stream processor.
- Use a 20-amp double-pole fast trip, DC-rated disconnect device for each DC power connector.

NOTE: Overcurrent protection devices must meet applicable national and local electrical safety codes and be approved for the intended application.

Wiring Requirements

The device is connected to the DC power source using three wires:

- –Vin
- GND
- +Vin

Although Harmonic provides the power input connector with the device, you must supply the wires.
The wires must comply with the specifications shown in Table 3–3.

Table 3–3: DC Power Wire Requirements

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitable conductor material</td>
<td>Copper only</td>
</tr>
<tr>
<td>−Vin and +Vin wires</td>
<td>16 AWG rating</td>
</tr>
<tr>
<td>Ground cable</td>
<td>16 AWG rating</td>
</tr>
<tr>
<td>Cable insulation rating</td>
<td>Minimum 80 C, low smoke fume (LSF), flame retardant</td>
</tr>
<tr>
<td>Cable type</td>
<td>Must comply with at least one of the following standards:</td>
</tr>
<tr>
<td></td>
<td>• UL 1581 (VW-1) - UL style 1028 or equivalent</td>
</tr>
<tr>
<td></td>
<td>• EEE 383</td>
</tr>
<tr>
<td></td>
<td>• EEE 1202-1991</td>
</tr>
<tr>
<td>Branch circuit cable insulation color</td>
<td>Per applicable national electrical codes</td>
</tr>
<tr>
<td>Grounding cable color</td>
<td>Green-yellow</td>
</tr>
</tbody>
</table>

Power Connector

The device is supplied with a special DC power connector plug that matches the DC power socket on the back of the device.

This connector is made by WAGO, model number 231-103/037-000.

Use only the original connector for connecting the device to the DC power source. Contact Harmonic Technical Support if you want to use any other type of connector.

Figure 3–7 shows the connector and its strain relief housing.

Figure 3–7: DC power connector

Assembling the DC Input Power Cable

To assemble the DC input power cable:

1. Prepare the power wires as specified in Wiring Requirements on page 34.
2. Use the disconnect device to make sure that the power supply from the DC power source to the cables is switched off.
CAUTION: Turn off the power before proceeding with these instructions.

3. Unplug the WAGO power connector from the power socket on the back panel of the device.
4. Identify the three wires coming from the DC power source that are used in the connection to the expansion unit:
   - Vin
   - +Vin
   - GND
5. Strip up to 0.3 inches (8 mm) of insulation from each of the wires coming from the DC power source.
   Do not strip more than this length from each wire. Stripping more leaves uninsulated wire exposed outside the DC connector after the assembly is complete.
6. Insert a small screwdriver into the rectangular hole directly above the hole in the DC connector where you want to insert the first cable and press down on the screwdriver. This opens the cage clamp for this section of the DC plug connector.

   NOTE: WAGO also sells tools specifically designed to open cage clamps easily. For more information, either visit the WAGO web site at www.wago.com, or call WAGO at 1-800-346-7245 and request information about items 210-250 or 231-131.

7. Feed the exposed section of the wire into the matching hole in the DC plug connector, as shown in Figure 3–8

   Figure 3–8: DC Power Connector Detail

8. Repeat 5 through 7 for the other two wires to complete the assembly of the DC input cable.

   NOTE: If you need to remove a wire from the DC plug connector, insert a small screwdriver into the slot directly above the wire and press down on the screwdriver to free the wire from the cage clamp.

The Boot Sequence

The boot sequence begins as soon as you plug in your device. This section describes the boot sequence, including the messages that appear on the local control panel display.
Local Control Panel Display Messages during Bootup

Messages on the local control panel indicate progress during boot-up. During a successful boot, many events occur so quickly you cannot see the messages. The following sections describe the messages that you can see during boot attempts.

**NOTE:** During the boot sequence, do not press any key on the keypad.

The following sequence describes the display on the vacuum fluorescent display (VFD) during a successful startup:

- **Power on**
  - VFD line 1 = Harmonic Logo

- **Begin loading**
  - VFD line 1 = Initializing

- **Configuring**
  - VFD line 1 = MAC Address xx:xx:xx:xx:xx

- **Booting**
  - VFD line 1 = BootP 1–4 (screen updates 1,2,3,4)
  - VFD line 2 = Boot From Hard Drive

- **Finished**
  - VFD line 1 = ProStream 9000
  - VFD line 2 = WWW.HARMONICINC.COM

The local control panel displays messages for other types of restarts, including a system reset and loading new software.

**Messages WhenResetting the Device**

When you reset the device from NMX, a message on the VFD shows that the device has been reset. The device uses the boot file on the hard drive when you reset it.

- **Reset from NMX**
  - VFD line 1 = Bye bye...
  - VFD line 2 =

- **After power cycle**
  - VFD line 1 = Harmonic Inc
  - VFD line 2 = System Loading

- **Begin loading**
  - VFD line 1 = ProStream 9000
  - VFD line 2 = System Loading

- **Booting**
  - VFD line 1 = ProStream 9000
  - VFD line 2 = Loading xxxxxxxx.elf
Front Panel LEDs

The four LEDs on the front panel indicate the operational state of the device. Table 3–4 describes the front panel LEDs.

**NOTE:** When the device is first powered up, the power light is green and the local light is yellow. If the device is not configured, the Fault and Activity lights do not indicate anything.

Table 3–4: Front Panel LEDs

<table>
<thead>
<tr>
<th>LED</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Yellow</td>
<td>The Power LED is yellow while the device initializes after startup.</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>The Power LED turns green when the device initialization is complete and the management interface is enabled and ready.</td>
</tr>
<tr>
<td>Fault</td>
<td>Red</td>
<td>The Fault LED lights when the application software detects an alarm.</td>
</tr>
<tr>
<td>Local</td>
<td>Yellow</td>
<td>The Local LED lights when the device is operating in local mode.</td>
</tr>
<tr>
<td>Tx</td>
<td>Yellow</td>
<td>The Tx LED lights when the device generates an MPEG-2 transport stream. It blinks slowly when MPEG packets are being transmitted steadily. It blinks fast or intermittently when the transmission rate is slow or intermittent.</td>
</tr>
</tbody>
</table>

Back Panel LEDs

The following sections describe the back panel LEDs and their functions.

Main Board LEDs

The back panel contains two LEDs on the main board. Table 3–5 describes the LEDs located on the main board.

Table 3–5: Rear Panel Main Board LEDs

<table>
<thead>
<tr>
<th>LED</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locator</td>
<td>Blue</td>
<td>The Locator LED lights when this device is enabled through NMX or SAG. Use the Locator LED to help you identify a specific chassis in a rack.</td>
</tr>
<tr>
<td>Fault</td>
<td>Red</td>
<td>The Fault LED lights when the application software detects an alarm. The front panel and back panel Fault LEDs light at the same time.</td>
</tr>
</tbody>
</table>
Chapter 4
Operating the Stream Processor

After installing the Stream Processor, you configure the Stream Processor platform and services. The configuration and management application you use depends on whether the Stream Processor is part of a network, or is operating as a standalone device.

This chapter describes how to access Stream Processor management for both options, and includes the following sections:

- Operating with NMX Digital Service Manager
- Operating in Standalone Mode
- Licensing Information

Operating with NMX Digital Service Manager

When you use NMX Digital Service Manager to manage the Stream Processors in your network, you perform all the configuration, including IP address assignment, in NMX. You do not need to do any configuration from the device front panel.

See the NMX online help for instructions on adding a Stream Processor to an NMX network group. You will need to know the MAC address of the device when you add the device to a network group. See Front Panel Display on page 40 for instructions on viewing the MAC address in the front panel display.

While you can perform all platform and configuration tasks from NMX, you will use SAG to manage any feature license additions/deletions. For information about feature licensing on the ProStream 9000, see Licensing Information on page 41.

Operating in Standalone Mode

When the ProStream 9000 operates in standalone mode, you must perform some initial network configuration from the device front panel before using the standalone GUI (SAG) to configure the platform and its services.

The sections below describe how to use the front panel to set the IP address, default gateway, and subnet mask for the device. After supplying these values, use SAG to fully configure the device.

Using the Front Panel

You can perform some initial network configuration from the device front panel. From the front panel, you can set the IP address of the device, default gateway, and subnet mask, and you can view the device’s MAC address and serial number.

Front Panel Keypad

The keypad on the local control panel is used to set the IP address.
Chapter 4 Operating the Stream Processor

Using the Front Panel

Figure 4–1: Front Panel Keypad

<table>
<thead>
<tr>
<th>Item</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LED—Power</td>
<td>Power indicator</td>
</tr>
<tr>
<td>2</td>
<td>LED—Fault</td>
<td>Fault indicator</td>
</tr>
<tr>
<td>3</td>
<td>LED—Focal</td>
<td>Local Control indicator</td>
</tr>
<tr>
<td>4</td>
<td>LED—TX</td>
<td>Transmitting indicator</td>
</tr>
<tr>
<td>5</td>
<td>Left key</td>
<td>Menu left</td>
</tr>
<tr>
<td>6</td>
<td>Up key</td>
<td>Menu up</td>
</tr>
<tr>
<td>7</td>
<td>Right key</td>
<td>Menu right</td>
</tr>
<tr>
<td>8</td>
<td>ESC key</td>
<td>Menu escape</td>
</tr>
<tr>
<td>9</td>
<td>Down key</td>
<td>Menu down</td>
</tr>
<tr>
<td>10</td>
<td>ENTER key</td>
<td>Menu select</td>
</tr>
</tbody>
</table>

Table 4–1: Front Panel Keypad

Front Panel Display

The four-line, 28-character Vacuum Fluorescent Display (VFD) shows the ProStream 9000 menus, parameters, and options. As illustrated in Figure 4–2, line 1 of the local control panel display shows the menu path for the currently selected option. To represent a path, the VFD displays each submenu as two or more letters and a colon.

Line 2 of the display shows the second line of a help message or a parameter value. To change this value, you must enter the new value using the keypad.

A blinking cursor shows the current value. A steady cursor shows the value being edited.

Figure 4–2: Setting a Value in the Front Panel Display

A blinking cursor shows the current value. A steady cursor shows the value being edited.
Setting Network Properties of the Device

Before you can begin using SAG to configure the device, you must set the following parameters of the device from the front panel:

- IP address
- subnet mask
- default gateway

The stream processor ships with a default IP address based on the stream processor serial number. The default subnet mask is 255.0.0.0, and the default gateway address is 10.0.0.1.

This section is only applicable to setup for stream processor management using SAG.

To set the stream processor management port IP address

1. Press the Right arrow key.
   
   The VFD display shows NTWK: Configuration.

2. Press the Down arrow key to navigate to NTWK: Control IP.

3. Press Enter.

4. Enter the IP address using the arrow keys.

5. When you finish, press Enter.

   Do not exit the Network menu because you can set the other properties from here.

Licensing Information

Licensing is required for some features, and you cannot enable those features without the appropriate licensing. You can add licenses to your system using the Harmonic NodeLock License Manager. Most licenses are permanent—once enabled the feature will continue to function without raising license-related alarms. A small set of licenses are time-limited and have different behavior, as follows:

- Streams that include features under license will raise alarms when their licensing expires.
- When licenses expire, streams will continue to flow as configured, but cannot be modified or re-enabled if disabled for any reason.
- If any changes are made after a license expires, service may be affected, and other operations, such as redundancy, may not function properly.
- If a license is not installed for a feature that is enabled, a grace period will allow that function to operate fully for 45 days. Alarms will issue each day to advise you that licensing is required for a given feature.
- If the 45-day grace period has been used temporarily, the 45-day period will incrementally renew as long as there are no unlicensed features enabled.

In NodeLock License Manager, you can:

- Add licenses to your Harmonic device.
- Remove licenses from your Harmonic device.

To add licenses to your device in NodeLock License Manager:
1. Connect your device to the network with other Harmonic devices to allow License Manager to discover your device.

2. Under Devices List > Device IP, click the check box to allow License Manager to discover licenses available for your device.

3. Save the License Manager Database file for later retrieval from a local area network (optional).

4. Using your Harmonic Web Portal credentials, log in to NodeLock License Manager.

5. Click Get Entitlements to view and select available entitlements.

   The amount of available licenses for an entitlement can be viewed under Entitlements > Available Licenses.

6. Under Device Licenses > Revised Quantity, enter the amount of licenses you want to add to the selected entitlement, and then click Activate.

   Under Device Licenses > Pending Actions, the status will read, Pending Apply.

7. Click Apply Certificate to add the license to the device.

To remove licenses from your device in NodeLock License Manager:

1. Under Device Licenses > Revised Quantity, enter the new (reduced) amount of licenses you want to have on the device.

2. Click Activate.

   Under Device Licenses > Pending Actions, the status will read, Pending Apply.

3. Click Apply Certificate.

   Under Device Licenses > Pending Actions, the status will read, Pending Acknowledge.

4. Click Acknowledge Receipt to remove the license from the device.

For a complete overview and instructions on how to use NodeLock License Manager, refer to the NodeLock License Manager 4.0 online help, which is packaged with your Harmonic device.

For a list of licensing options available for the ProStream 9000, refer to the latest NMX Release Notes.
Removing and Replacing the Bezel

The bezel, made of a lightweight, flexible plastic material, is field replaceable.

**WARNING:** The front panel display on the device is susceptible to electrostatic discharge (ESD) when the bezel is removed. Wear the appropriate ESD protection when the bezel is removed. See *ESD Guidelines* on page 28.

**To Remove the Bezel**

You do not need to turn off the device when removing and replacing the bezel.

1. Locate the lever on the front of the bezel and push to the right to disengage the right side of the bezel as shown in *Figure 5–1*.
2. Pull the right side of the bezel towards you.
3. Ease the bezel away from the fan tray. The bezel is secured to the fan tray by a clip.
4. Ease the left side of the bezel away from the unit.

*Figure 5–1: Steps for removing the Bezel*
To replace the bezel:

1. Replace the bezel by inserting the plastic catch at the back of the left side of the bezel into the slot in the metal frame, as shown in Figure 5–2.

![Figure 5–2: Steps for replacing the Bezel](image)

2. Ease the right side of the bezel onto the unit, as shown in step 2, Figure 5–2.

3. Push the front of the bezel flush with the fan tray to secure the clip that holds the bezel to the fan tray, as shown in step 3, Figure 5–2.

4. Locate the lever on the front of the bezel and push to the right to snap the bezel into place, as shown in step 4, Figure 5–2.

**Air Filter**

The device uses an air filter to minimize dust and dirt in the circuitry and components in the chassis. The filter is made of flexible, open cell polyurethane foam, which is specially coated to provide flame and fungus resistance. It is enclosed in a sheet metal frame that slides from the top of the unit and is located directly in front of the air vents in the fan cage at the front of the device. The filter is fire retardant and conforms to UL 900 Class 2 and UL 94 HF-1 specifications.

**Maintaining the Air Filter**

The operating environment of the device plays a large factor in determining the life of the air filter. Devices that operate in dusty and dirty surroundings require more frequent inspections and filter cleaning than those operating in cleaner environments.

Inspect and clean the filter with a frequency that is appropriate to the environment in which the device operates. Harmonic recommends inspecting and cleaning the filter every six weeks to ensure proper airflow through the chassis.
To clean dust and dirt from the filters, you can use a vacuum cleaner to remove the dirt, or you can rinse the filter in water. You can also use soaps or mild detergents on the filter. If you rinse the filter in water, make sure that you squeeze the excess water from it before reinstalling it in the device.

Removing and Replacing the Air Filter

You do not need to turn off the device when removing and replacing the air filter.

NOTE: You may need to slide the chassis forward to enable this procedure.

To remove the air filter:

1. Using your fingers, push up on the air filter unit from the bottom of the chassis until the filter is displaced, as shown in Figure 5–3.

![Figure 5–3: Removing the Air Filter](image)

2. Remove the filter from the chassis.
3. Inspect the air filter for dirt, and clean it if necessary.

NOTE: When the filter is new, its color is medium charcoal. As dust and dirt collect in the porous filter material, the filter’s color gradually changes to brown, then to an ash color.
To replace the filter:

1. With your fingers on the corners of the filter (indicated in red), push down on the filter until it is secure in the chassis, as shown in Figure 5–4. The corners of the filter should press against the chassis when it is fully inserted.

![Figure 5–4: Replacing the Air Filter](image)

**Fan Tray**

The fan tray unit contains 8-12V fans which pull air from the front of the unit through a series of air vents. A curved frame, housing the front panel display unit, attaches to the front of the fan tray unit and should be considered an integral part of the fan tray unit. This curved frame should not be removed at any time.

**NOTE:** If the fan tray unit is removed for more than two minutes, the device may shut down.

Removing and Replacing the Fan Tray

To remove the fan tray:

1. Remove the bezel from the unit, as described in *Removing and Replacing the Bezel* on page 43
2. With a Phillips-head screwdriver, remove the two screws that attach the fan tray assembly to the chassis, as shown in step 2 in Figure 5–5.
3. Grasp the front of the fan tray assembly, and pull the tray firmly but smoothly towards you to disengage it from the PC connector inside the unit
4. Slide the fan tray assembly away from the chassis.

**To replace the fan tray assembly:**

1. Replace the fan tray assembly by sliding the tray into the chassis, engaging the PC connector, identified by the red arrow in Figure 5–6.
Figure 5–6: Replacing the Fan Tray

2. Using a Phillips-head screwdriver, secure the fan tray assembly to the chassis, as shown in step 2 in Figure 5–6.

3. Install the bezel as described in Removing and Replacing the Bezel on page 43.

Power Supply

Dual power supply units power ProStream 9000. You can easily replace the power supply as outlined in Removing and Replacing the Power Supply on page 48.

Removing and Replacing the Power Supply

To remove the power supply

1. Turn off the device.

2. Remove the bezel from the chassis as described in Removing and Replacing the Bezel on page 43

3. Remove the fan tray unit from the chassis as described in Removing and Replacing the Fan Tray on page 46

4. Applies only in case you need to replace the power supply unit on the right side.
   With a Phillips-head screwdriver, remove the L-shaped bracket attached to the inside of the chassis on the right side, as shown in step 1, Figure 5–7
5. Grasp the metal handle on the front of the power supply unit and pull firmly to disengage the power supply from the connector, as shown in step 2, Figure 5–7.

6. Slide the power supply away from the unit.

**To replace the power supply**

1. With the bezel and fan tray assembly removed, insert the power supply into the chassis until it engages with the connector, as shown in step 1, Figure 5–8.
Chapter 5 Maintenance

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**Input/Output Modules**

To extend the capability of the ProStream 9000, there are 5 slots for optional input/output modules in the rear of the chassis. See  *IOM Slots and Cards* on page 16.

**CAUTION:** Wear an ESD wrist strap when unpacking a module from its antistatic protective packing material. Unpack and handle the module away from electric motors, transformers, and other similar machinery.

**Removing and Replacing an Input/Output(I/O) Module**

**NOTE:** The device needs to be turned off when removing and replacing an I/O module.

**To replace an I/O module**

1. With a Phillips-head screwdriver, remove the two screws attaching the module to the back of the chassis, as shown in step 1, *Figure 5–9.*

---

Figure 5–8: Replacing a Power Supply

2. Applies only in case you need to replace the power supply unit on the right side. With a Phillips-head screwdriver, attach the L-shaped bracket to the right inside of the chassis, as shown in step 2, *Figure 5–8.*

3. Reinstall the fan tray assembly, as described in *Removing and Replacing the Fan Tray* on page 46.

4. Reinstall the bezel, as described in *Removing and Replacing the Bezel* on page 43.
Figure 5–9: Removing an I/O module

**NOTE:** The cover should never be removed and the graphics show no cover for ease of explanation.

2. Pull firmly on the module to remove it from the chassis, as shown in step 2, *Figure 5–9.*

**To replace an I/O module**

1. Insert the module into an empty slot on the back of the chassis, as shown in step 1, *Figure 5–10.*
Inserting/Replacing IPC Cards

Usually, ProStream 9000 with ACE™ (Agile Compression Engine) devices are shipped with Transcoding modules installed according to the hardware configuration required by the customer. Transcoding specifications per ProStream 9000 with ACE are as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transcoding module</td>
<td>Up to four</td>
</tr>
<tr>
<td>Transcoding chips</td>
<td>Five per Transcoding module</td>
</tr>
<tr>
<td>Services (channels)</td>
<td>5 HD services per card</td>
</tr>
<tr>
<td></td>
<td>Up to 20 services per box</td>
</tr>
</tbody>
</table>

In case you need to install or replace a Transcoding module, or other IPC, handle it according to the following instructions to avoid any damage.
CAUTION: Wear an ESD wrist strap when unpacking a module from its antistatic protective packing material. Unpack and handle the module away from electric motors, transformers, and other similar machinery.

To remove an IPC Card

1. Turn off the device.

2. Remove the bezel from the chassis as described in see Removing and Replacing the Bezel on page 43.

   It is not necessary to remove the cover from the Stream Processor to remove an IPC. If you want to remove the cover, use a Phillips-head screwdriver to remove the screws from the top of the chassis.

3. Remove the fan tray assembly from the chassis as described in see Removing and Replacing the Fan Tray on page 46.

4. With a Phillips-head screwdriver, remove the screw attaching the card retaining device to the chassis, as shown in Figure 5–11.

   ![Figure 5–11: Removing the Card Retaining Device](image)

5. Grab the card handle to slide the card out of the chassis, as shown in Figure 5–12.
To replace an IPC Card

1. From the front of the unit, insert the IPC module into the chassis until the module engages with the chassis connector, as shown in Figure 5–13.
2. Reattach the card retainer.
3. Reinsert the fan tray as described in *Removing and Replacing the Fan Tray* on page 46
4. Reinstall the bezel as described in *Removing and Replacing the Bezel* on page 43
Appendix A

Contacting the Technical Assistance Center

Harmonic Global Service and Support has many Technical Assistance Centers (TAC) located globally, but virtually co-located where our customers can obtain technical assistance or request on-site visits from the Regional Field Service Management team. The TAC operates a Follow-The-Sun support model to provide Global Technical Support anytime, anywhere, through a single case management and virtual telephone system. Depending on time of day, anywhere in the world, we will receive and address your calls or emails in one of our global support centers. The Follow-the-Sun model greatly benefits our customers by providing continuous problem resolution and escalation of issues around the clock.

Report an issue online at:

http://harmonicinc.com/webform/report-issue-online

Table A–1: Technical Support Phone Numbers and Email Addresses

<table>
<thead>
<tr>
<th>Region</th>
<th>Telephone Technical Support</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Americas</td>
<td>888.673.4896 (888.MPEG.TWO) or +1.408.490.6477</td>
<td><a href="mailto:support@harmonicinc.com">support@harmonicinc.com</a></td>
</tr>
<tr>
<td>Europe, Middle East, and Africa (EMEA)</td>
<td>+44.1252.555.450</td>
<td><a href="mailto:emeasupport@harmonicinc.com">emeasupport@harmonicinc.com</a></td>
</tr>
<tr>
<td>India</td>
<td>+91.120.498.3199</td>
<td><a href="mailto:apacsupport@harmonicinc.com">apacsupport@harmonicinc.com</a></td>
</tr>
<tr>
<td>Russia</td>
<td>+7.495.926.4608</td>
<td><a href="mailto:rusupport@harmonicinc.com">rusupport@harmonicinc.com</a></td>
</tr>
<tr>
<td>Mainland China</td>
<td>+86.10.6569.5580</td>
<td><a href="mailto:chinasupport@harmonicinc.com">chinasupport@harmonicinc.com</a></td>
</tr>
<tr>
<td>Japan</td>
<td>+81.3.5565.6737</td>
<td><a href="mailto:japansupport@harmonicinc.com">japansupport@harmonicinc.com</a></td>
</tr>
<tr>
<td>Asia Pacific – Other Territories</td>
<td>+852.3184.0045 or 65.6542.0050</td>
<td><a href="mailto:apacsupport@harmonicinc.com">apacsupport@harmonicinc.com</a></td>
</tr>
</tbody>
</table>

The Harmonic Inc. support website is:

http://www.harmonicinc.com/content/technical-support

The Harmonic Inc. software downloads sites are:

<table>
<thead>
<tr>
<th>Distribution and Delivery Software</th>
<th>ftp://ftp.harmonicinc.com</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software for Select Electra Encoders</td>
<td><a href="https://harmonic.force.com/SWAccess/SWDownloadLogin">https://harmonic.force.com/SWAccess/SWDownloadLogin</a></td>
</tr>
</tbody>
</table>
The Harmonic Inc. corporate address is:
Harmonic Inc.
4300 North First St.
San Jose, CA 95134, U.S.A.
Attn: Customer Support

The corporate telephone numbers for Harmonic Inc. are:
Tel. 1.800.788.1330 (inside the U.S.)
Tel. +1.408.542.2500 (outside the U.S.)
Fax.+1.408.542.2511
Appendix B
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

This section provides 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 & Translated Safety, Warning & Caution Instructions (English)

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.
### Safety Symbols & Translated Safety, Warning & Caution Instructions (English)

#### Mark

<table>
<thead>
<tr>
<th>Mark</th>
<th>Notes</th>
</tr>
</thead>
</table>
| ![Warning Symbol] | **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 Symbol] | **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. |
| ![Warning Symbol] | **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. |
<table>
<thead>
<tr>
<th>Mark</th>
<th>Electric Shock Warning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="electric_shock_icon.png" alt="electric_shock_icon" /></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Before working on a chassis or working near power supplies, unplug the power cord on AC units.</td>
</tr>
<tr>
<td></td>
<td>Do not work on the system or connect or disconnect cables during periods of lightning activity.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Never install an AC power module and a DC power module in the same chassis.</td>
</tr>
<tr>
<td></td>
<td>Do not wear hand jewelry or watch when troubleshooting high current circuits, such as the power supplies.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>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).</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>Mark</td>
<td>Electrostatic Discharge (ESD) Caution</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td><img src="esd_icon.png" alt="esd_icon" /></td>
<td>Follow static precaution at all times when handling this unit.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Handle cards by the faceplates and edges only; avoid touching the printed circuit board and connector pins.</td>
</tr>
<tr>
<td></td>
<td>Place any removed component on an antistatic surface or in a static shielding bag.</td>
</tr>
<tr>
<td></td>
<td>Avoid contact between the cards and clothing.</td>
</tr>
<tr>
<td></td>
<td>Periodically check the resistance value of the antistatic strap. Recommended value is between 1 and 10 mega-ohms (Mohms).</td>
</tr>
</tbody>
</table>
## Appendix B Safety and Regulatory Compliance Information

### Symboles de sécurité et traduits de sécurité, d'avertissement et Attention Instructions (français)

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.

<table>
<thead>
<tr>
<th>Mark</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Laser Radiation Warning" /></td>
<td><strong>Laser Radiation Warning</strong>&lt;br&gt;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.</td>
</tr>
<tr>
<td><img src="image" alt="Lithium Battery Handling Safety Instructions" /></td>
<td><strong>Lithium Battery Handling Safety Instructions</strong>&lt;br&gt;- CALIFORNIA PERCHLORATE ADVISORY: Some lithium batteries may contain perchlorate material. The following advisory is provided: &quot;Perchlorate Material - special handling may apply, see: <a href="http://www.dtsc.ca.gov/hazardous_waste/perchlorate/">www.dtsc.ca.gov/hazardous_waste/perchlorate/</a> for information&quot;.</td>
</tr>
<tr>
<td><img src="image" alt="Risk of explosion if battery is replaced incorrectly or with an incorrect type" /></td>
<td>- Risk of explosion if battery is replaced incorrectly or with an incorrect type&lt;br&gt;- Dispose of used batteries according to the manufacturer’s instructions&lt;br&gt;- There are no user-serviceable batteries inside Harmonic products. Refer to Harmonic qualified personnel only to service the replaceable batteries</td>
</tr>
</tbody>
</table>
## 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.

## 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.

## 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.
<table>
<thead>
<tr>
<th>Mark</th>
<th>Choc électrique Avertissement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher le cordon d'alimentation des unités en courant alternatif.</td>
</tr>
<tr>
<td></td>
<td>Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage.</td>
</tr>
<tr>
<td></td>
<td>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 câblée avant de raccorder les entrées ou sorties du unité.</td>
</tr>
<tr>
<td></td>
<td>Installer les cordons d'alimentation et autres câbles de sorte qu'ils ne risquent pas d'être endommagés. Couper l'alimentation avant nettoyage. Ne pas utiliser de nettoyant liquide ou en aérosol; utiliser seulement un linge humide.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>N'installez jamais un module d'alimentation AC et un module d'alimentation DC dans le même châssis.</td>
</tr>
<tr>
<td></td>
<td>Ne pas porter de bijoux aux mains ni de montre durant le dépannage des circuits à haute tension, comme les transformateurs.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>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 À U.S. maximum (240 V alt., 10 À international) est utilisé sur les conducteurs de phase (conducteurs de charge).</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>
### Les décharges électrostatiques (ESD) Attention
- Respectez systématiquement les précautions 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 mégao-ohms (Mohms).

### Rayonnement laser Avertissement
- 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.

### Batterie au lithium Manipulation instructions de sécurité
- Perchlorate pour la Californie Avertissement: 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: www.dtsc.ca.gov/hazardous waste/perchlorate/ for information".

### 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 usagées conformément 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.
### Installation oder den Austausch des Produkts Einheit Warnung

- Das Installieren, Ersetzen oder Bedienen dieser Ausrüstung sollte nur geschultem, qualifiziertem Personal gestattet werden (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.
- Verwenden Sie nur die angegebenen Ersatzteile

### Rack-Montage-Warnung

Zur Vermeidung von Körpervorüchtigung 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.

### 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 an 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.
### Sicherheitsanweisungen

<table>
<thead>
<tr>
<th>Mark</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Elektroschock-Warnung</strong></td>
</tr>
<tr>
<td></td>
<td>- Diese Einheit hat möglicherweise mehr als ein Netzkabel. Zur Verringerung der Stromschlaggefahr trennen Sie beide Netzgerätekabel ab, bevor Sie die Einheit warten.</td>
</tr>
<tr>
<td></td>
<td>- Vor der Arbeit an einem Chassis für Arbeiten in der Nähe Stromversorgung, ziehen Sie das Netzkabel mit Netzeinheiten.</td>
</tr>
<tr>
<td></td>
<td>- Arbeiten Sie nicht am System und schließen Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert.</td>
</tr>
<tr>
<td></td>
<td>- 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.</td>
</tr>
<tr>
<td></td>
<td>- 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.</td>
</tr>
<tr>
<td></td>
<td>- Ein Wechselstromsmodul und ein Gleichstrommodul dürfen niemals in demselben Chassis installiert werden.</td>
</tr>
<tr>
<td></td>
<td>- Tragen Sie keine Hand Schmuck oder schauen Sie bei der Fehlersuche hohen Stromkreise, wie beispielsweise die Stromversorgung.</td>
</tr>
<tr>
<td></td>
<td>- 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.</td>
</tr>
<tr>
<td></td>
<td>- 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.</td>
</tr>
</tbody>
</table>
## Site Preparation Instructions

**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.

### Mark | Notes
--- | ---
Vorsich | **Elektrostatische Entladung (ESD) Vorsicht**
- Folgen Sie statische vorsorglich zu jeder Zeit beim Umgang mit diesem Gerät.
- 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 (MΩ).

Warnung | **Laserstrahlungen Warnung.**

Warnung | **Lithium-Batterie Handhabung Sicherheitshinweise**

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
Appendix B Safety and Regulatory Compliance
Information

Site Preparation Instructions

- Choose a site with a dry, clean, well-ventilated and air-conditioned area.
- Choose a site that maintains an ambient temperature of 32 to 104°F (0 to 40°C)

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
   a. AC Power
      - Adding to the system a UPS (Uninterrupted Power Supply) and an AVR (Automated Voltage Regulator) is highly recommended.
      - Installing the main power supply by a qualified electrician, according to power authority regulations. Make sure all powering are wired with an earth leakage, according to local regulations.
      - It is recommended to install the encoder within 1.5m (approximately 5 feet) from an easily accessible grounded AC outlet.
      - When the encoder is rack-mounted, ensure that the rack is correctly grounded.
   b. DC Power
      - Ensure a suitable overcurrent 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

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 Contacting the Technical Assistance Center.

Product Disassembly Process

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)

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 (French)

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**

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](http://www.harmonicinc.com) or contact Harmonic Compliance Team at regulatory.compliance@harmonicinc.com

**Electromagnetic Compatibility Notices – Class A**

a. **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.

b. **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.

c. **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.
Appendix B Safety and Regulatory Compliance Information

Electromagnetic Compatibility Notices – Class A

d. VCCI Class A Warning (Japan)

この装置は、情報処理装置等電波障害自主規制協議会（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.

e. 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.

f. Class A Warning (Korea)

주의

A급 기기 이 기기는 업무용으로 전자파 적합 등록을 한 기기이오니 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.

g. 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.

h. Class A Warning – CISPR 22 (AS/NZS)
   
   Warning (English)
   
   This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

   Attention (French)
   
   Il s’agit d’un produit de classe A. Dans un environnement local, ce produit peut entraîner des perturbations radioélectriques, auquel cas l’utilisateur devra éventuellement prendre des mesures adéquates.

**Product Regulatory Compliance**

Harmonic products are typically tested to the latest safety and electromagnetic compatibility (EMC) specifications and test methods, and are marked with one or more of the following regulatory/certification markings. Some of the certification markings will vary depending on what certifier was used to obtain a certification.

Please visit Harmonic *Product Regulatory Compliance* page to view information on applied safety & EMC standards and regulatory marks on Harmonic products. You can also email us at regulatory.compliance@harmonicinc.com for assistance on regulatory compliance for Harmonic products.

**Product Regulatory Compliance Markings**

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Testing Standard/Specification</th>
<th>Certification Type</th>
<th>Regulatory Mark Name</th>
<th>Product Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA/Canada</td>
<td>FCC CFR 47 Part 15, Class A ICES-003: Issue 5, 2012; Class A</td>
<td>EMC</td>
<td>FCC Class A Statement</td>
<td><img src="https://www.harmonicinc.com/files/images/fcc-class-a.png" alt="FCC Class A" /></td>
</tr>
</tbody>
</table>

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.
# Table B–1: Regulatory Compliance Markings

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Testing Standard/Specification</th>
<th>Certification Type</th>
<th>Regulatory Mark Name</th>
<th>Product Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>EN 60950-1; EN60825-1 (for laser)</td>
<td>Safety</td>
<td>GS</td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>NOM-019-SCFI-1998</td>
<td>Safety</td>
<td>NOM</td>
<td></td>
</tr>
<tr>
<td>Taiwan</td>
<td>CNS 14336-1:2010 CNS 13438:2006; Class A</td>
<td>Safety and EMC</td>
<td>BSMI Certification (RPC) Number &amp; Class A Warning</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>VCCI V-3/2013.04; CISPR 22:2008, Class A</td>
<td>EMC</td>
<td>VCCI</td>
<td></td>
</tr>
<tr>
<td>Australia and New Zealand</td>
<td>AS/NZS CISPR22:2009+A1:2010; Class A</td>
<td>Safety</td>
<td>C-Tick</td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td>KN22 Class A and KN 24</td>
<td>EMC</td>
<td>KC</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B Safety and Regulatory Compliance Information

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

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.


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–2:Restricted Substances

<table>
<thead>
<tr>
<th>Restricted Substance</th>
<th>Permitted Limit*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadmium (Cd)</td>
<td>(\leq 0.01%)</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>(\leq 0.1%)</td>
</tr>
<tr>
<td>Chromium (VI) (Cr (VI))</td>
<td>(\leq 0.1%)</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>(\leq 0.1%)</td>
</tr>
</tbody>
</table>
Appendix B Safety and Regulatory Compliance

Information

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EU REACH

REACH (Registration, Evaluation, Authorization and restriction of Chemicals) (EC 1907/2006) is a European Union’s 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

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/

Table B-2: Restricted Substances

<table>
<thead>
<tr>
<th>Restricted Substance</th>
<th>Permitted Limit*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polybrominated biphenyls (PBBs)</td>
<td>≤ 0.1%</td>
</tr>
<tr>
<td>Polybrominated diphenyl ether (PBDE)</td>
<td>≤ 0.1%</td>
</tr>
</tbody>
</table>

*Homogeneous material definition as per the EU Directive.
China RoHS Disclosure Report

Below table shows the presence of hazardous substances, or elements in Harmonic products, if the part is present.

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 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.

<table>
<thead>
<tr>
<th>部件名称 (Part name)</th>
<th>有毒有害物质或元素 (Hazardous Substance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>铅 (Pb)</td>
<td>汞 (Hg)</td>
</tr>
<tr>
<td>印刷线路板 (Printed Circuit Assemblies)</td>
<td>X</td>
</tr>
<tr>
<td>机械组件 (Mechanical Subassemblies)</td>
<td>X</td>
</tr>
<tr>
<td>光学组件 (Optical Subassemblies)</td>
<td>X</td>
</tr>
<tr>
<td>电源 (Power Supplies)</td>
<td>X</td>
</tr>
<tr>
<td>缆线 / 线束 (Cables, harnesses)</td>
<td>X</td>
</tr>
<tr>
<td>屏幕 / 显示器 (Screens, Monitors)</td>
<td>X</td>
</tr>
<tr>
<td>金属零件 (Metal Parts)</td>
<td>X</td>
</tr>
<tr>
<td>塑料 / 发泡材料 (Plastics, foams)</td>
<td>O</td>
</tr>
<tr>
<td>电池 (Batteries)</td>
<td>O</td>
</tr>
</tbody>
</table>

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/T 11363 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过 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/T 11363 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)

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.


Battery Directive

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’s Environmental Compliance Statement at the following location:


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 additional 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.