# NSG™ Exo™
## Indoor Distributed CCAP System

## HW and Installation Guide
## Rev B

Manual Part No. MAN-XXX0000-0.0

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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:

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

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# Table of Contents

# Chapter 1
# Main Features and Specifications

## Introduction

Harmonic's NSG™ Exo distributed CCAP system is a high-performance cable edge device for the delivery of video, data and voice services over coax. Compact and cost-effective, NSG Exo moves a service provider's RF requirements out of the headend or hub and places them deep in the fiber network, simplifying headend design and operation to resolve space and power constraints, lower capital and operational expenses, and provide service flexibility.

The following illustration shows the location of the NSG Exo in the fiber network:

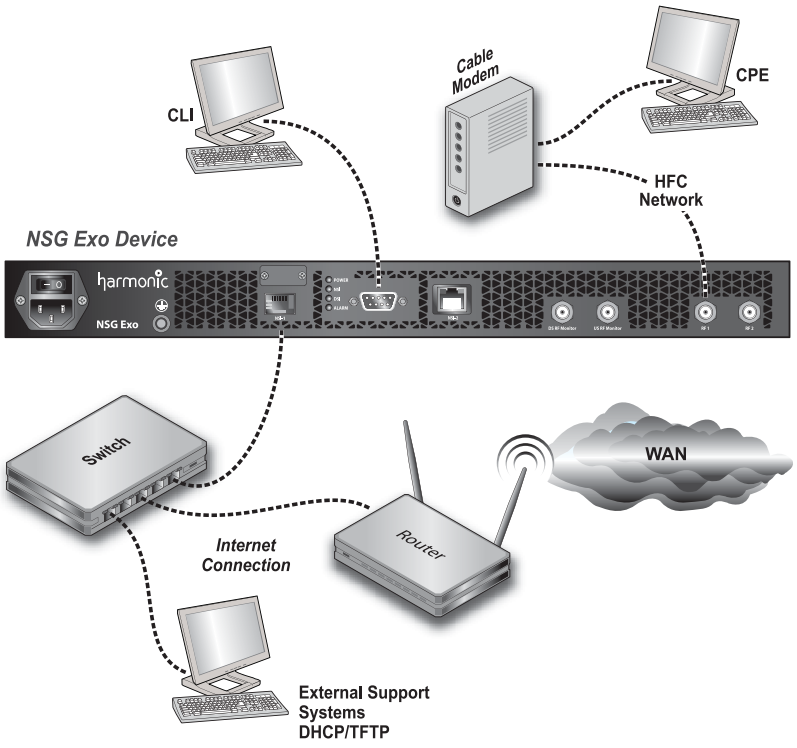



**Figure 1–1: NSG Exo System**

The main capabilities of the NSG Exo include:

- Generate new revenue streams from the delivery of video, voice and data from a single deep-fiber device
- CCAP-ready: DOCSIS/EuroDOCSIS/J-DOCSIS CMTS and universal edgeQAM (future) capabilities
- Gbps throughput via GigE, GPON or EPON network interface
- CMTS and edgeQAM CCAP functionality
- 960 Mbps downstream/160 Mbps upstream
- 16 Annex-A or Annex-B downstream channels/4 upstream channels

- Downstream and upstream channel bonding with partial service support
- Supports up to 500 subscribers per device
- NSG Exo offers two enclosure options:
  - Indoor
  - Outdoor

## Main Features

The following table describes the main features of the NSG Exo platform:

**Table 1–1: NSG Exo Main Features**

| Component | Feature | Description |
|---|---|---|
| Chassis | Form factor | ■ 1 RU form factor<br>■ Front-side<br>❑ 1 x PSU compartments<br>❑ 2 x NSI ports<br>❑ 1 x Console port<br>❑ 2 x RF ports in the following configuration per chassis:<br>Two independent RF ports, one DS, one US<br>Combined DS/US channels<br>❑ 2 x RF monitoring ports, one DS, one US |
| | Flexible Edge Architecture | A simplified and unified access network allows operators to deliver differentiated residential, commercial and wireless services across any access medium. |
| | Distributed Access Architecture (DAA) | ■ Delivers voice, video, data services to MDU locations with coax<br>■ Supports mix of FTTx & HFC customers<br>■ Fits into small, remote, power-constrained locations<br>■ Reduce OPEX, by removing RF from hub<br>■ Reduce CAPEX, by removing analog transport |
| Network Side Interface (NSI) | 3 x NSI Ports | ■ NSI ports serve for management and content traffic<br>■ Input rate - 1 Gbps - up to 1000 Mbps per port, full duplex<br>■ Only one port is active per chassis<br>■ NSI ports assignment:<br>❑ 1 x NSI port, capable of hosting fiber/copper SFP<br>❑ 1 x NSI port with RJ-45 connector, copper SFP<br>❑ Korean Version:1 x NSI port, capable of hosting an LC/SC connector |

**Table 1–1: NSG Exo Main Features**

| Component | Feature | Description |
|---|---|---|
| RF Ports | Assignment | ■ 2 x RF ports assigned as follows:<br>1 x RF port is downstream, 1 x RF port upstream<br>2 x RF ports, both DS and US<br>Note: RF ports are configured per chassis prior to shipping according to customer's order. |
| DS RF Ports | Frequency | ■ RF frequency range: 54-1006 MHz |
| | QAM Modulation Modes | ■ ITU-T J.83 Annex-A (DVB-C, 8 MHz channel bandwidth)<br>■ ITU-T J.83 Annex-B (North America cable, 6 MHz channel bandwidth)<br>■ ITU-T J.83 Annex-C: (Japan cable, 6 MHz channel bandwidth) |
| | Number of QAMs per RF Port | ■ Annex-A: up to 16 QAMs/Port (Throughput - max. 960 Mbps<br>■ Annex-B and C: up to 16 QAMs/Port (Throughput - max. 960 Mbps) |
| | QAM Channels Allocation | ■ Flexible allocation of Narrowcast QAMs to any type of Narrowcast service (M-CMTS/VOD/SDV)<br>■ Flexible allocation of Narrowcast/Broadcast QAMs:<br>■ Flexible QAM channels allocation inside window range of 192 Mhz |
| Upstream RF ports | Upstream Frequency | ■ RF frequency range: 5-65 MHz |
| | Upstream QAM Channels | ■ Up to 4 channels |
| | Modulation Mode | ■ QPSK, 16-QAM, 32-QAM, 64-QAM, 128-QAM, 256-QAM |
| | Modulation method | A-TDMA |
| | Monitoring | MER, Ber, CNR |
| RF Monitoring Ports | DS Mirroring | ■ 1 x RF port for DS mirroring<br>■ Power level of -20 dB from main RF port |
| | US Mirroring | |
| Power Supply | Power Supply Options | AC (85 - 264 VAC) |
| Management | Management options | ■ CLI - Fully-featured Command-line interface, for configuring and monitoring an individual device<br>■ SNMP-based alarms and monitoring<br>■ Syslog |

# NSG Exo Physical and Power Specifications

## Physical Dimensions

**Table 1–2: Physical Dimensions**

| Dimension | Inches | cm |
|---|---|---|
| Width | 17.1 | 43.4 |
| Height | 1.7 | 4.3 |
| Total Length (front to back)<br>See *Device Dimensions* | 11.98 | 30. 4 |
| Depth (From RF Type connector to back of device) | 12.54 | 31.8 |

## NSG Exo Weight

The weight of the device is: 5.0 lbs/2.3 Kg.

## Power Supply Specifications

*Table 1–3* lists power specifications for the qualified power supply module.

**Table 1–3: Power Supply Units Specifications**

| PS Type | Input Voltage Range | Input Line Frequency |
|---|---|---|
| AC | 85 to 264 VAC | 47 to 63 Hz |

## Power Consumption from Grid

The following table lists the power consumption from grid in a typical ambient temperature of 25°C:

**Table 1–4: Power Consumption from Grid**

| Chassis | AC Power Consumption from Grid (Watts) |
|---|---|
| NSG Exo | < 52 |

For installation details, see *Overcurrent protection*.

For cabling details, see *Connecting Power*.

## Environmental Specifications

The following table lists the environmental specifications for the NSG Exo:

**Table 1–5: Environmental Specifications**

| Parameter | Description |
|---|---|
| Operating temperature | 0º to +50 °C (+32º to +122 °F) |
| Storage temperature | -40º to 75º C (-40º to 176 °F) |
| Relative humidity | Maximum 95% non-condensing |
| Operating Altitude | ≤ 15,000 feet (4,572 meters) |

# NSG Exo Front Side

The front side of the NSG Exo contains the following:

- Power supply:
  - 1 x power inlet
  - 1 x power switch
- 2 x NSI ports
  - NSI-RJ-45 port
  - NSI SFP

    NSI SC/LC port (Korean version)
- 4 x LEDs
- 1 x RS-232 connector
- 4 x RF ports:
  - 1 x DS RF monitoring
  - 1 x US monitoring
  - 2 x DS/US RF output
- Air inlets

The following figure illustrates the front panel of the NSG Exo platform:

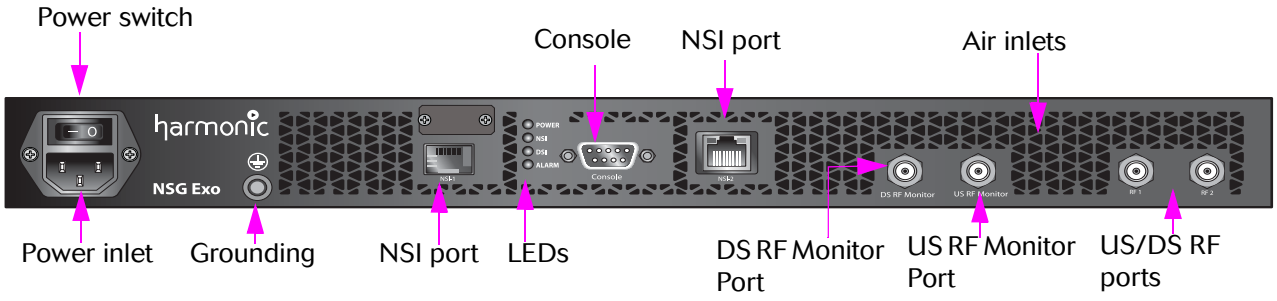



**Figure 1–2: NSG Exo Front panel**

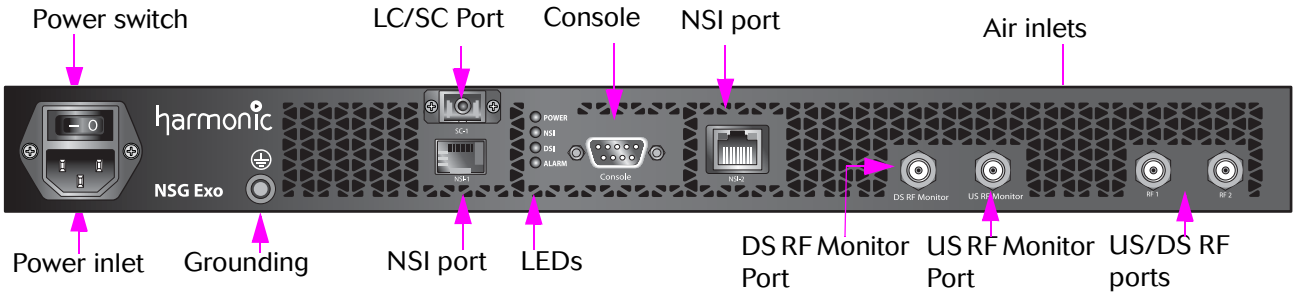



**Figure 1–3: NSG Exo Front panel Korean Version**

## Power Supply Switch

NSG Exo is furnished with a switch to easily turn the device on and off.

## Power Supply Unit

NSG Exo is furnished with a single AC power supply unit.

The power supply cabling is performed on the front side of the device. See *page 25*.

For power consumption specifications, see *Power Supply Specifications*.

## NSI Ports

NSG Exo is furnished with two NSI ports and only one NSI port is active per chassis. The NSI ports are labeled as follows:

NSI-1: SFP port. This port accommodates 1GbE SFP with optical interface

NSI-2: SFP port. This port accommodates 1GbE SFP with copper interface

SC-1: SC port. This port is available in Korean version only. This port has an SC connector.

The total throughput is 1 Gbps full duplex.

## SFP Module

The SFP (Small Form Factor Pluggable) module converts optical signals into electrical signals and vice versa. The SFP modules allow the NSG 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)

The following figure illustrates an SFP module:

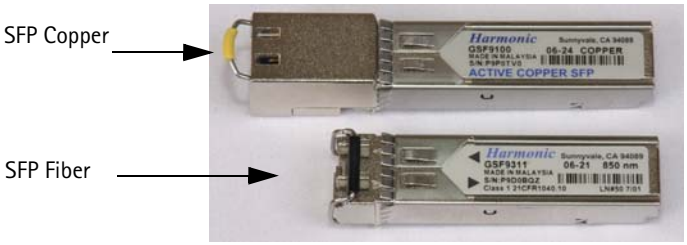



**Figure 1–4: SFP**

**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 NSG Exo device. These SFPs are made by Finisar, and may be purchased either directly from Harmonic, or from other sources.

*Table 1–6* 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 1–6: 1GbE SFP Modules**

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

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 NSG Exo.

### LEDs

The front panel of NSG Exo includes the following LEDs:

**Table 1–7: NSG Exo LEDs**

| LED | Color | Description |
|---|---|---|
| Power | Green | Indicates whether the device is on |
| NSI | Green | Illuminates when a network link is detected. |
| DSI | Green | Illuminates when a DOCSIS link is detected. |
| Warning/ Alarm | Yellow | Indicates that an alarm is up. |

### EIA-232 Serial Port

The EIA-232 serial port may be used to configure the Ethernet port IP addresses. You can also use the serial port for monitoring and manual maintenance operations. The EIA-232 serial port has a female DB-9 D-type connector.

## RF Ports

NSG Exo is furnished with four RF ports labeled as follows (see *Figure 1–2*):

- DS RF Monitor - monitors downstream channels
- US RF Monitor - monitors upstream channels
- RF 1 - a Separate US RF port (SRF), or a Combined DS and US RF port (CRF)
- RF 2 - a Separate DS RF port (SRF), or a Combined DS and US RF port (CRF)

The assignment of RF ports labeled RF 1 and RF 2 is defined prior to shipping according to the customer's order. See *NSG Exo Ordering Guide*.

### Air Inlets

Air inlets are located along the front bezel. The air inlets are designed to provide maximum air flow. The air flow is critical for maintaining the proper temperature range.

**CAUTION:** Do not obstruct the airflow when installing the device. Severe equipment damage can result when the device cannot properly exhaust the airflow.

## Cooling Fans

The NSG Exo platform uses three fans to control the temperature during operation. The fans located in the back of the device, use air from the front and exhaust it to the rear of the device.

At up to 30°C ambient temperature, the NSG Exo can operate indefinitely with a single failed fan. Nevertheless, to reduce wear and minimize the possibility of a system shutdown due to a secondary failure, heed the failure of the single fan.

# Chapter 2
# Installation

This chapter instructs you on how to install the NSG Exo platform. For best results, perform the required actions according to following the order:

- Unpack the NSG Exo platform
- Read the installation guidelines
- Install the NSG Exo at the required location
- Connect cables

## Unpacking the NSG Exo Platform

The NSG Exo platform comes in a specially designed shipping container that ensures its safety during shipping and handling. To avoid damaging the NSG Exo platform, unpack it carefully. The container includes the following:

- Chassis with brackets.
- Accessories - include an AC power cord. The AC power cord is for use in North America as listed below:

**Table 2–1: AC Power Supply Types**

| Harmonic Part Number | Region | Specifications |
|---|---|---|
| 091-0035-001F | North America | IEC-60320-C13, cable side that connects to the NSG Exo and NEMA 5-15P plug on grid side |

## Installation Guidelines

**CAUTION:** The NSG Exo platforms are used in areas that comply with the environmental specifications indicated in *Environmental Specifications*.

**NOTE:** To prevent body injury when mounting or servicing this platform, you must take special precautions to ensure that the system remains stable. Read the following guidelines to assure your safety.

### Rack Specifications

Install the 1-RU chassis in the following rack:

- A standard EIA 19-inch computer rack with at least 12"(30.5 cm) deep and 1RU high.
- To allow free air flow, the rack must be completely open at its front side. See Table 1: Guidelines and Specifications for Mounting a Device on page 23.
- The rack should be mounted with side walls and a back door.
- If rack has a back door, the back door should have ventilation slots either at its bottom part only or throughout the height of the door.

## Rack Ventilation

A typical rack, a rack with an open front and top and with ventilation slots at the back, should enable free flow of hot air into the air conditioning system intake. The rack should meet the following:

Typical NSG air flow is front to back.

NSG air flow as indicated in *Environmental Specifications* on page 11.

## Rack Positioning and Device Mounting

### Rack Positioning

- From front - leave clearance of at least 25" (63cm0 from the front to any neighboring cabinet/ wall.
- From back - leave clearance of at least 20" (51cm) from the back to any neighboring cabinet/ wall.
- Ensure that the front of the rack is not directly exposed to the air-outlet side of any other racks.

### Device Mounting

The following table lists the guidelines and specifications for mounting the NSG Exo devices on a rack:

**NOTE:** Do not obstruct the airflow of the platform. Severe equipment damage can result when the device cannot properly intake or exhaust the airflow

**Table 2–2: Guidelines and Specifications for Mounting a Device**

| Parameters | Description |
|---|---|
| Occupied Space | 1 rack unit |
| Mounting Order | Partially filled rack - load rack from the bottom to the top with the heaviest component at the bottom of the rack. |
| Max Number | According to allowed floor load. See, *Rack Weight* on page 17.<br>Spacing between units (1RU or more) is recommended for ease of cabling. Block the spaces between units as explained in this table in Open space. |
| Open Space | To prevent hot air circulation, all open spaces below and above the devices should be closed with a blank panel. |
| Cabling | Route all cables at the front panel along the sides of the rack. |

### Rack Weight

1. Check the allowed floor load of the facility.

2. Calculate the total weight and load according to the following parameters:

**Table 2–3: Total Load and Weight**

| Item | Value (US) | Value (metric) |
|---|---|---|
| Single unit | 5.0 lbs | 2.3 Kg |
| Footprint of typical rack 19″ x 36″ rack | 100 lbs | 45 Kg |
| Footprint of a typical 19″ x 40″ rack | 110 lbs | 50 Kg |

**CAUTION:** Ambient temperature for a continuously operating device should be 25°c. NSG Exo can continuously operate in ambient temperature of up to 50°c. However, continuous operation in a high ambient temperature shortens the device lifetime.

## Power Source and Wiring Specifications

When installing NSG Exo platforms, the device should be fed by appropriate AC power source

### Overcurrent protection

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

Power feed to the NSG Exo should meet the following requirement:

- Input voltage - 100 - 240 VAC
- Typical Steady State Current - 0.5 Amp

Provide overcurrent protection devices as part of each rack housing NSG Exo devices.

To protect the power source, the power supply is furnished with an internal fuse of 250V 3.15A.

### Grounding

- Every rack must be properly earthed, connected to the ground bus of the plant.
- Each NSG Exo platform in the rack must also be connected to the main Earth line of the rack, using a 8 AWG copper wire. See *Grounding the Mounted Platform* on page 26.

# Installing NSG Exo Platform

You can install the NSG Exo platform as follows:

- Installing NSG Exo platform on a rack. See *Installing NSG Exo on a Rack* on page 19.
- Installing NSG Exo platform on a wall. See *Installing NSG Exo on a Wall* on page 20.
- Installing NSG Exo on a shelf. See *Installing NSG Exo on a Shelf* on page 19.

## Installing NSG Exo on a Rack

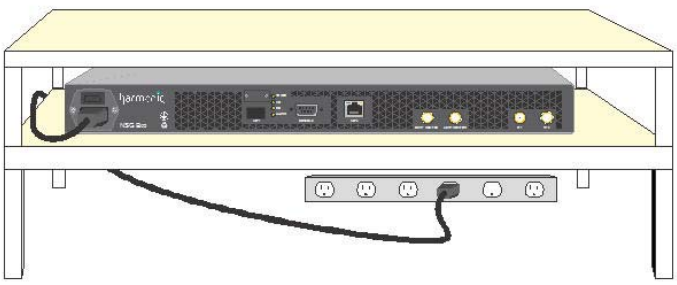
- Screws to secure the unit to its required location
- A screwdriver for fastening the screws

1. Install the rack-mounting rails before mounting the device on the rack.
2. Place the 1-RU chassis on the rack.
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 go through the corresponding holes on the rack posts.
5. Tighten the screws with a screwdriver.


## Installing NSG Exo on a Shelf

- Rubber-adhesive pads
- A screwdriver for removing the ears

1. Remove both left and right front ears. Unscrew the screws that attach both left and right front ears.
2. Flip the chassis so the bottom of the chassis is face-up.
3. Install rubber-adhesive pads to each bottom corner of the NSG Exo.
4. Flip the chassis and place in on the shelf or any flat surface.
5. Provide adequate clearance as explained in *Rack Positioning and Device Mounting* on page 17.

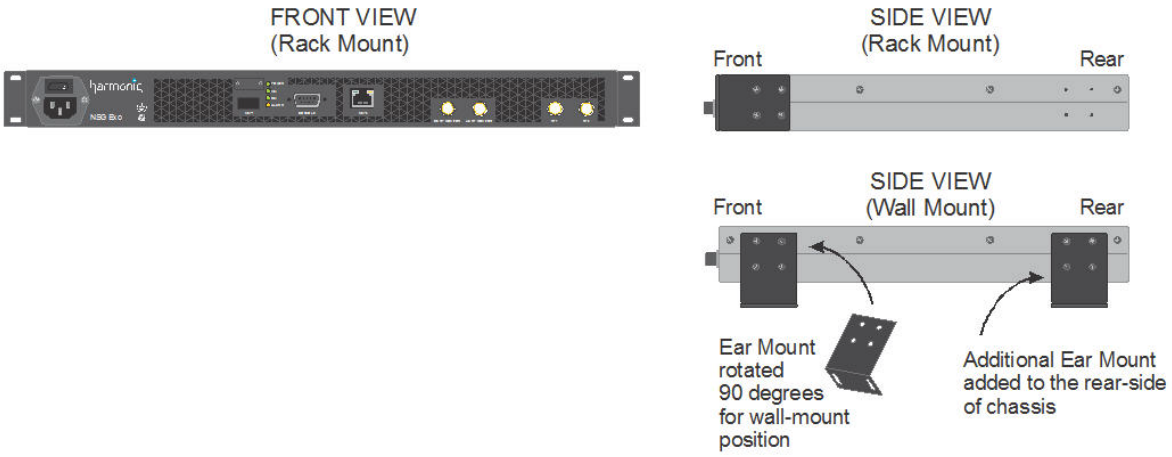


# Installing NSG Exo on a Wall

To install the NSG Exo on a wall, you need the following:

- A screwdriver for removing/installing the ears
- Additional pair of ears for the rear left and right side of the chassis

1. Remove both left and right front ears. Unscrew the screws that attach both left and right front ears.
2. Attach ears to rear left and right sides of the chassis for the wall mount position.
3. Mount the NSG Exo to the wall. Screw in both ear mounts to a solid wall frame.



# Chapter 3
# Cabling

The Cabling chapter guides you on how to connect the console, NSI and QAM-RF ports. Connecting cables to the NSG Exo platform is straightforward. The NSG Exo ports are clearly marked on the NSG Exo front panel. See *NSG Exo Front Side* for placement.

The Cabling chapter also includes device dimensions to allow better planning of the rack cabling scheme:



**CAUTION:** Before cabling read all safety precautions. See specific instructions and *Safety Precautions* on page 47.

## Device Dimensions

Dimensions are provided in millimeters.

*Figure 3–1* shows the measurements of the NSG Exo platform from the front F-Type connectors to the rear side of the unit.

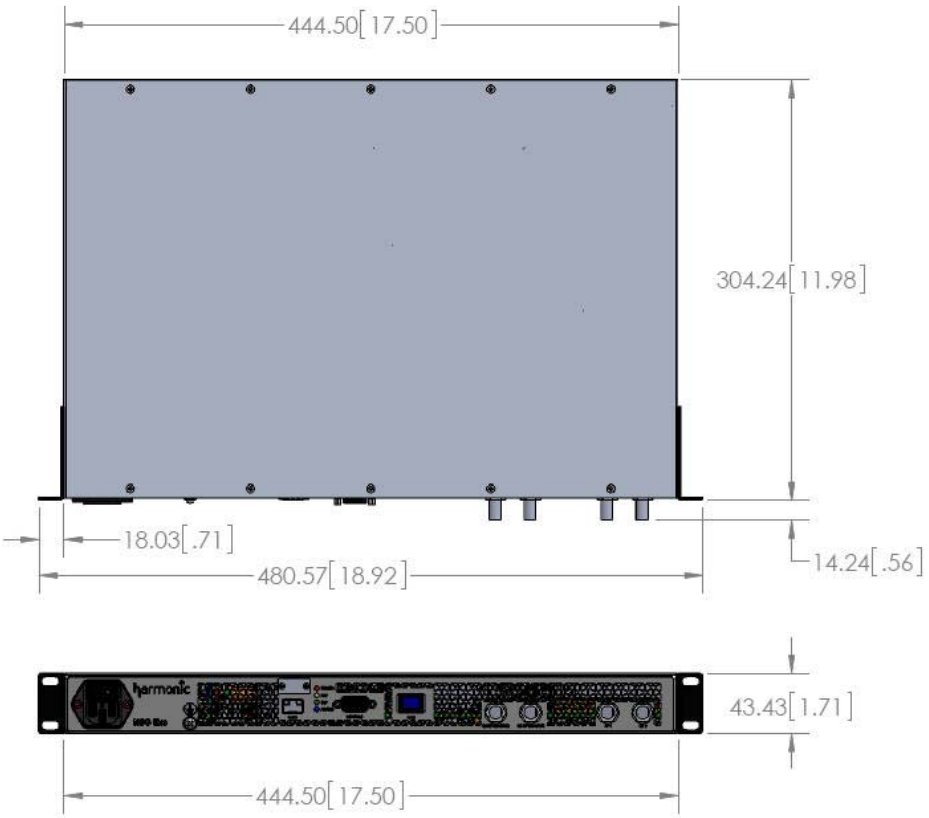



**Figure 3–1: NSG Exo Dimensions**

## Cabling the NSG Exo

The following illustrations show you the ports and the required cables. It is following by step-by-step instructions.

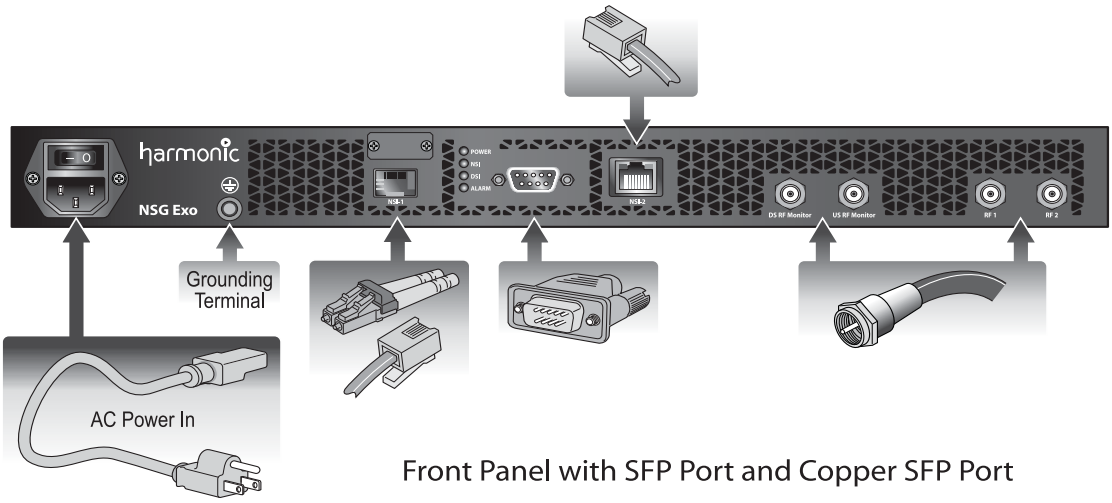



**Figure 3–2: Cabling the NSG Exo**

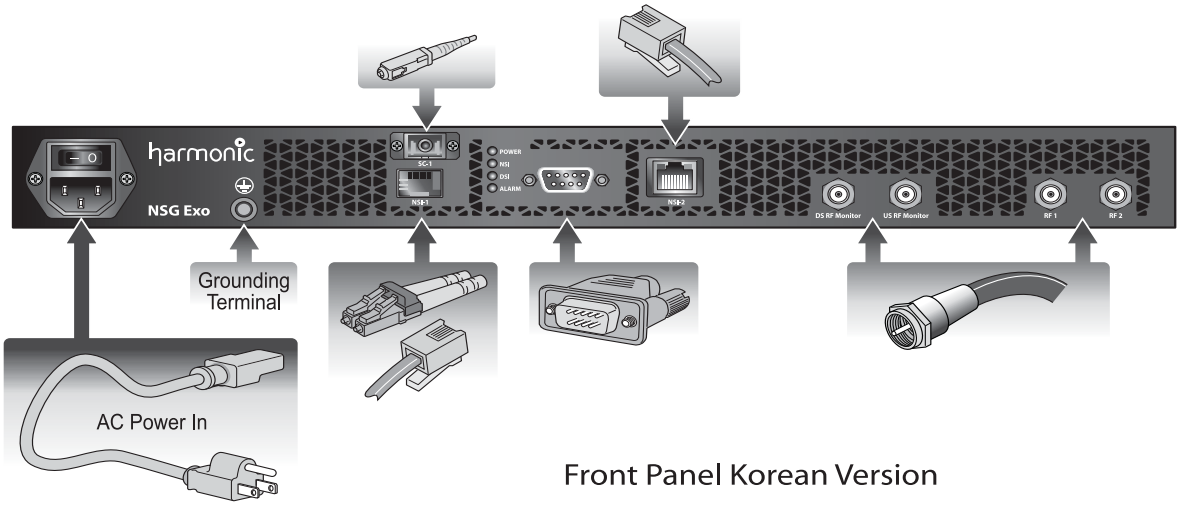



**Figure 3–3: Cabling the NSG Exo, Korean Version**

# Cabling the NSI Port

NSG Exo is furnished with two NSI ports. Only one NSI port is active. The NSI ports handle management and content data. The following table lists the NSI port labeling, functionality and the required cables:

**Table 3–1: NSI Ports**

| Labeling | Functionality | Cables |
|---|---|---|
| NSI-1 | SFP port | ■ Fiber SFP<br>Multimode or single-mode optic fibers with LC connectors. The LC connectors plug into an SFP receptacle, which accommodates two fibers, one for transmission and the other for reception.<br>■ Copper SFP<br>Shielded and grounded CAT-6 or CAT-7 cable with an RJ-45 connector. The RJ-45 connector plugs into a copper SFP receptacle. |
| NSI-2 | SFP copper port | Shielded and grounded CAT-6 or CAT-7 cable with an RJ-45 connector. The RJ-45 connector plugs into a copper SFP receptacle. |
| SC-1 Korean version | SC port | Multimode or single-mode optic fibers with LC connectors. The LC connectors plug into an SFP receptacle, which accommodates two fibers, one for transmission and the other for reception. |

**IMPORTANT:** It is recommended to use the NSI SFP port, labeled NSI-1.

## To Connect the NSI Port with SFP

1. Insert the SFP modules into the required NSI port at the front of the NSG Exo.
2. Insert the LC/RJ-45 plugs into the fiber or copper SFP module, respectively.
3. Connect the NSG Exo to a switch/router.

## To Connect the SC Port (Korean Version)

1. Insert the SC plug into the SC connector.
2. Connect the NSG Exo to a switch/router.

# Connecting the RF Output/Monitoring Cables

The NSG Exo device accommodates up to four RF output ports. RF ports are assigned as follows:

- RF Output Ports:
  - RF 1 - a Separate US RF port (SRF), or a Combined DS and US RF port (CRF)
  - RF 2 - a Separate DS RF port (SRF), or a Combined DS and US RF port (CRF)

**NOTE:** RF ports assignment is arranged prior to shipping according to customer's order. See *NSG Exo Ordering Guide* on page 34.

- RF Output Monitoring Ports:
  - 1 x DS RF monitor
  - 1 x US RF monitor

To connect the RF ports, use either of the following cables:

- RG-6 (75 Ohm, 0-3 GHz) coaxial cable equipped with male F-type connectors only
- RG-59 (75 Ohm, 0-3 GHz) coaxial cable equipped with male F-type connectors only

**NOTE:** The female F-type connectors are designed to accept cables with center pin diameter of 0.68-1.73 mm (0.026"- 0.068"). Cables that do not meet this requirement must be mounted with crimp-on connector of the required dimensions.

**CAUTION:** Using cables other than the cables indicated above may adversely affect the QAM-RF performance.

### To connect RF Output Ports

1. Remove the terminator that cover the port you wish to work with. It is labeled RF1or RF2.
2. Connect the cable to the RF port.
3. Connect the other side of the cable to your output equipment according to your network schema.

**CAUTION:** Failing to connect to an output equipment and having a loose edge of the RF cable, exposes the unit to ESD and may severely damage the unit.

### To connect RF Monitoring Ports

1. Do the following according to the configuration of the chassis:
   - Downstream only - To monitor the DS output, connect the cable to the DS RF Monitor port.
   - Two-way chassis configuration - To monitor the US output, connect the cable to the US RF Monitor port.
2. Connect the other side of the cable to any network analyzer device.

**CAUTION:** Failing to connect to an output equipment and having a loose edge of the RF cable, exposes the unit to ESD and may severely damage the unit.

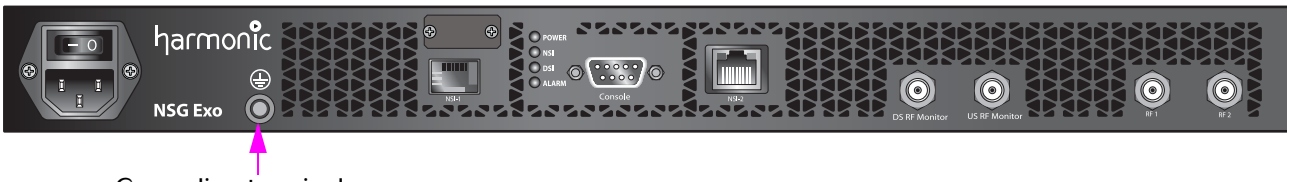
## Connecting Power

Follow the instructions appropriate to your power supply.

**CAUTION:** 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.

## Grounding the Mounted Platform

For grounding the NSG Exo use:.




- NSG Exo Grounding terminal
- A lug terminated 8 AWG rating green-yellow grounding cable

To ground each mounted platform, do the following:

1. Connect one edge of the grounding wire to the Rack grounding terminal.
2. Connect the other edge of the grounding wire to the platform grounding terminal by fastening the nut.


## Connecting to the Power Outlet

### Power cord rating

Harmonic ships the NSG Exo with a power cord for North America. When using an AC power feed, be sure to use the appropriate AC power cords that Harmonic provides for the NSG Exo.

**Table 3–2: AC Power Cords**

| Cord Part Number | Plug Type at Grid Side | Region |
|---|---|---|
| TBD | NEMA L6-20P | North America |

Harmonic strongly recommends to use only the Harmonic-provided AC power cords. Users who still choose to obtain cords from a source other than Harmonic should use an AC cord that meets the following specifications:

Current rating - 10 Amp or higher

Wire gauge - 18 AWG or thicker

Connector at device side - IEC-13

### Connecting the NSG Exo to the Power Source

- Connect the NSG to the AC power source - After verifying that a proper AC power cord is being used, connect the power cord to the power connector on the NSG Exo front side, and to the power outlet of the location of the unit.

  Make sure that the power source is protected with an appropriate circuit breaker.

**CAUTION:** Use the recommended 16A/18 AWG cord to ensure your own personal safety and to help protect the device and working environment from potential damage.

The power supply automatically senses the input voltage for either 120/240 Volt.

## Booting UP the Device

When you connect the NSG Exo to the power source, the boot up procedure starts. Once boot up is complete the power LED shines in steady green.

## Networks Configuring

Because the NSG Exo is configured and controlled by a remote management system, and due to the network architecture of the NSG Exo, you must set the following via the serial port:

- Management network - Setting the management interface
- DHCP - Configuring operation support system.
- Cable Modem (CM) network - Configuring the RF parameters.
- CPE network

### Configuring the Network

For this procedure, you need the following:

- Any serial application (Putty or Minicom on LINUX) that is installed on your computer
- A cable with a DB-9 female connector on one side, and a DB-9 male/USB connector on the other side.

1. Power-up the NSG Exo, and wait until it completes the boot process.
2. Connect the serial port - connect the side with the DB-9 female connector to the port on the front of the NSG Exo and the side with the DB-9 male connector to the serial port on your computer. In case, your computer does not have a serial port, use a USB to serial cable.
3. Using the serial communication utility of your choice, configure the following parameters for the serial connection:
   - **Port Speed** - enter 115,200 bps
   - **Data bits** - enter 8 bits
   - **Stop Bits** - enter 1
   - **Party** - select None
   - **Flow Control** - select None
4. In the console type the following to access the CLI of the NSG Exo:
   - Username: `admin`

- Password: `nsgadmin`

5. Configure the physical layer of the management port. See *Configuring Physical Interface Type* on page 28.
6. Configure the management interface and sub-interface, see *Configuring Management Interface* on page 28.
7. Configure the default gateway. See *Configuring Default Gateway* on page 30.
8. Configure network services. See NSG Exo Software Guide, Configuring Network Services.
9. Configuring the DHCP relay mode. See *Configuring Network DHCP Relay* on page 30.
10. Commit the changes to allow the NSG Exo to run with the new IP address.
11. Exit *configure* mode by typing `exit`.
12. At the prompt type `copy running-config startup-config`

## Configuring Physical Interface Type

NSG Exo is furnished with two physical NSI ports:

- SFP - Fiber/copper Gigabit interface
- RJ-45 - Copper Gigabit interface

**NOTE:** Korean version only. NSI port with LC/SC interface - supports the GPON protocol

Currently only one port is active and it is port 0. You must select the required interface:

```
interface gigabit phy-type {sfp |fiber | rj45}
```

**Table 3–3: Configuring Interface**

| Attribute/Value | Explanation |
|---|---|
| phy-type | Select one of the following ports: It is recommended to work with either the SFP port<br>sfp - fiber/copper interface<br>rj45 - copper interface.<br>fiber - LC/SC interface (Korean version only. |

## Configuring Management Interface

Currently only one port is active and it is port 0. You must select the required interface. Once you set admin-state to up of one of the ports, the other ports are automatically set to down. Since the port is also a management port, you can never select down.

```
interface gigabit port
admin-state {up| down}
sub-interface {mng | cm | cpe |emta}
```

**Table 3–4: Configuring Interface**

| Attribute/Value | Explanation |
|---|---|
| *port* | Integer<br>Currently only 0 |
| admin-state | Port is always up and cannot be down.<br>up \| down |
| sub-interface | Allows to configure VLAN interfaces. |
| *sub-interface* | Select one of the following:<br>mng \| cm \| cpe\| emta |
| ip-address/netmaks | IP address and subnet of the sub-interface. |
| *ip-address/subnet* | String in the following format:<br>xxx.xxx.xxx.xxx/xx |
| encapsulation | Select the VLAN encapsulation. |
| *encapsulation-dot1q* | Integer between 1 to 4095 |

**Example**

```
(config) # interface gigabit 0
(if-gigabit 0) # admin-state up
(if-gigabit 0) # sub-interface 0.mng
(sub-interface 0.msg) # ip-address 40.41.42.2/24
(sub-interface 0.msg) # encapsulation-dot1q 555
(if-gigabit 0) # sub-interface 0.cm
(sub-interface 0.msg) # ip-address 30.31.32.2/24
(sub-interface 0.msg) # encapsulation-dot1q 333
(if-gigabit 0) # sub-interface 0.cpe
(sub-interface 0.msg) # ip-address 40.41.42.2/24
(sub-interface 0.msg) # encapsulation-dot1q 444
(if-gigabit 0) # sub-interface 0.emta
(sub-interface 0.msg) # ip-address 50.51.52.2/24
(sub-interface 0.msg) # encapsulation-dot1q 555
(sub-interface 0.msg) # commit
```

## Initial Configuration of Management Port

To configure the management port IP, while in configuration mode, type the following command:

`(config)# ip-address` *`ip-address`*

**Table 3–5: Configuring Management Port Parameters**

| Attribute/Value | Explanation |
|---|---|
| *ip-address/netmaks* | String in the following format: A.B.C.D/mask |

### Configuring Default Gateway

To configure the default gateway, type:

```
# default-gateway ip-address
```

**Table 3–6: Configuring Gateway Parameters**

| Attribute/Value | Explanation |
|---|---|
| default-gateway | Configure the IP the default gateway for management interface |
| *ip-address* | String in the following format: A.B.C.D |

Example

```
# default-gateway 172.17.1.100
```

## Configuring Network DHCP Relay

You can configure the NSG Exo DHCP Relay to work as l2 or l3. For layer-3, NSG Exo adds DHCP relay-agent option 82.1 *remote id* to upstream DHCPv4-DISCOVER and DHCPv4-REQUEST messages that contain the 6-byte MAC address of the host-type.

To configure, type the following command:

```
# network dhcp-relay
(dhcp-relay) # mode mode
(dhcp-relay) # option82 circuit-id circuit-id
(dhcp-relay) # host-type host-type [{cm|cpe|emta}
(dhcp-relay) # dhcp-server ip-address
```

**Table 3–7: Configuring DHCP Relay**

| Attribute/Value | Explanation |
|---|---|
| **network dhcp-relay** | Enter this command |
| **mode** | DHCP relay mode of work. Set active or passive DHCP relay behavior. |
| *mode* | l2 (layer 2) \| l3 (layer 3)<br>Default: l3 |
| **option82 circuit-id** | Set the name of option82 circuit-id |
| *option82 circuit-id* | String: user definable, no spaces or special characters are allowed.<br>Default: circuit-id |
| **host-type** | Sets the type of the host |
| *host-type* | {cm\|cpe\|emta} |
| **dhcp-server** | Parameter of host-type.<br>The IP address of the server for sending unicast packets. |

**Table 3–7: Configuring DHCP Relay**

| Attribute/Value | Explanation |
|---|---|
| *ip-address* | String in the format of IPv4 IP address: A.B.C.D |
| **next-hop** | IP address of the next hop |
| *next-hop* | String in the format of IPv4 IP address: A.B.C.D |

**Example**

```
(config) # network dhcp-relay
(dhcp-relay) # mode l3
(dhcp-relay) # option82 circuit-id test
(dhcp-relay) # host-type cpe
(dhcp-relay host-type cpe) dhcp-server 24.24.24.24
(dhcp-relay host-type cpe) next-hop 30.31.32.2
(dhcp-relay host-type cpe) commit
```

For further instructions, see *NSG Exo SW Guide*.

# 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.

**Table A–1: For Distribution and Delivery (D&D, Legacy Harmonic) Products**

| Region | Telephone Technical Support | E-mail |
|---|---|---|
| Americas | 888.673.4896 (888.MPEG.TWO) or 408.490.6477 | *support@harmonicinc.com* |
| EME | +44.1252.555.450 | *support.emea@harmonicinc.com* |
| India | +44.1252.555.450 | *support.emea@harmonicinc.com* |
| Russia | +7.495.926.4608 | *support.sm@harmonicinc.com* |
| Africa | +44.1252.555.450 | *support.emea@harmonicinc.com* |
| Mainland China | +86.10.6569.5580 | *chinasupport@harmonicinc.com* |
| Japan | +81.3.5565.6737 | *japansupport@harmonicinc.com* |
| Asia Pacific – Other Territories | +65.6542.0050 | *apacsupport@harmonicinc.com* |

**Table A–2: For Production and Playout (P&P, Legacy Omneon and Rhozet) Products**

| Region | Telephone Technical Support | E-mail |
|---|---|---|
| Americas | 888.673.4896 (888.MPEG.TWO) or 408.490.6477 | *omneon.support@harmonicinc.com* |
| EMEA | +44.1252.555.450 | *omneonemeasupport@harmonicinc.com* |
| Mainland China | +86.10.6569.5580 | *chinasupport@harmonicinc.com* |
| Japan | +81.3.5565.6737 | *japansupport@harmonicinc.com* |
| Asia Pacific – Other Territories | +65.6542.0050 | *apacsupport@harmonicinc.com* |

**The Harmonic Inc. support website is:**

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

**The Harmonic Inc. Distribution and Delivery product software downloads site is:**

*ftp://ftp.harmonicinc.com*

**The Harmonic Inc. Playout and Production software downloads site is:**

*ftp://ftp.Omneon.com//Updates/Omneon/Current/*

**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 (from the U.S. and Canada)
Tel. +1.408.542.2500 (outside the U.S. and Canada)
Fax.+1.408.542.2511

# Appendix B
# NSG Exo Ordering Guide

**Table 3–8: NSG Exo Ordering Guide**

| Category | Part Number | Description |
|---|---|---|
| NSGEXO-CH-CRF | NSG Exo Chassis, Combined DS/US RF | NSG Exo Indoor Chassis, 1U, AC, Combined US/DS on single RF port, 16 DS/ 4 US, D3.0 CMTS & EQAM |
| NSGEXO-CH-SRF | NSG Exo Chassis, Separate DS/US RF | NSG Exo Indoor Chassis, 1U, AC, Separate US/DS RF ports, 16 DS/ 4 US, D3.0 CMTS & EQAM |

# Appendix C
# 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.

| Mark | Notes |
|---|---|
|  Warning | **Installing or Replacing the Product Unit Warning**<br>■ 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).<br>■ Read the installation instructions before connecting the system to the power source.<br>■ When installing or replacing the unit, always make the ground connection first and disconnect it last.<br>■ Installation of the unit must comply with local and national electrical codes.<br>■ 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.<br>■ Use only specified replacement parts.<br>■ Do not use this unit in or near water. Disconnect all AC power before installing any options or servicing the unit unless instructed to do so by this manual. |
|  Warning | **Rack Mount Warning**<br>■ 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:<br>■ Conform to local occupational health and safety requirements when moving and lifting the equipment.<br>■ Ensure that mounting of the unit by mechanical loading tools should not induce hazardous conditions.<br>■ 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 | **Chassis Warning**<br>■ Before connecting or disconnecting ground or power wires to the chassis, ensure that power is removed from the DC circuit.<br>■ 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.<br>■ Any instructions in this guide that require opening the chassis or removing a board should be performed by qualified service personnel only.<br>■ 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. |

| Mark | Notes |
|---|---|
|  <br>Warning | **Electric Shock Warning**<br>■ 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.<br>■ Before working on a chassis or working near power supplies, unplug the power cord on AC units.<br>■ Do not work on the system or connect or disconnect cables during periods of lightning activity.<br>■ 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.<br>■ 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.<br>■ 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<br>■ Never install an AC power module and a DC power module in the same chassis.<br>■ Do not wear hand jewelry or watch when troubleshooting high current circuits, such as the power supplies.<br>■ 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.<br>■ 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).<br>■ 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. |
|  <br>Caution | **Electrostatic Discharge (ESD) Caution**<br>■ Follow static precaution at all times when handling this unit.<br>■ 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<br>■ Handle cards by the faceplates and edges only; avoid touching the printed circuit board and connector pins.<br>■ Place any removed component on an antistatic surface or in a static shielding bag.<br>■ Avoid contact between the cards and clothing.<br>■ Periodically check the resistance value of the antistatic strap. Recommended value is between 1 and 10 mega-ohms (Mohms). |

| Mark | Notes |
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|  Warning | **Laser Radiation Warning**<br>Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Never operate a unit with a broken fibre or with a separated fiber connector. |
|  Warning | Lithium Battery Handling Safety Instructions<br>■ CALIFORNIA PERCHLORATE ADVISORY: Some lithium batteries may contain perchlorate material. The following advisory is provided: "Perchlorate Material - special handling may apply, see: *www.dtsc.ca.gov/hazardous waste/perchlorate/ for information*". |
|  Caution | ■ Risk of explosion if battery is replaced incorrectly or with an incorrect type<br>■ Dispose of used batteries according to the manufacturer's instructions<br>■ There are no user-serviceable batteries inside Harmonic products. Refer to Harmonic qualified personnel only to service the replaceable batteries |

# 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.

| Mark | Notes |
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|  <br>Avertissement | **Installation ou remplacement de l'unité de produit Avertissement**<br>■ 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).<br>■ Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.<br>■ 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.<br>■ L'équipement doit être installé conformément aux normes électriques nationales et locales.<br>■ 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.<br>■ Utilisez uniquement des pièces de rechange spécifiées.<br>■ 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. |
|  <br>Avertissement | **Rack Monture Avertissement**<br>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:<br>■ Conformez-vous aux exigences de médecine du travail et de sécurité lorsque vous déplacez et soulevez le matériel.<br>■ Assurez-vous que le montage de l'appareil par des outils de chargement mécaniques ne doit pas induire des conditions dangereuses.<br>■ 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. |
|  <br>Avertissement | **Châssis Avertissement**<br>■ 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.<br>■ 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.<br>■ 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.<br>■ Le châssis est muni de fentes et d'ouvertures d'aération. Ne pas les bloquer. Dégager l'arrière du cadre pour permettre le refroidissement de l'évacuation d'air et laisser de la place au câblage; un dégagement d'au moins 15.24 cm (6 po) est recommandé. |

| Mark | Notes |
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|  <br>Avertissement | **Choc électrique Avertissement**<br>■ 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.<br>■ Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher le cordon d'alimentation des unités en courant alternatif.<br>■ Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage.<br>■ Ce unité est mis à la terre par le conducteur de protection intégré au cordon d'alimentation. Pour éviter les chocs électriques, brancher le cordon d'alimentation dans une prise correctement cable avant de raccorder les entrées ou sorties du unité.<br>■ Installer les cordons d'alimentation et autres cables de sorte qu'ils ne risquent pas d'être endommagés. Couper l'alimentation avant nettoyage. Ne pas utilizer de nettoyant liquide ou en aérosol; utiliser seulement un linge humide.<br>■ 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.<br>■ N'installez jamais un module d'alimentation AC et un module d'alimentation DC dans le même châssis.<br>■ Ne pas porter de bijoux aux mains ni de montre durant le dépannage des circuits à haute tension, comme les transformateurs.<br>■ 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.<br>■ Pour ce qui est de la protection contre les courts-circuits (surtension), ce produit dépend de l'installation électrique du local. Vérifier qu'un fusible ou qu'un disjoncteur de 120 V alt., 15 A U.S. maximum (240 V alt., 10 A international) est utilisé sur les conducteurs de phase (conducteurs de charge).<br>■ Pour éviter l'électrocution, assurez-vous que le rack a bien été mis à la terre avant de mettre l'unité en marche. Lors du retrait de l'unité, retirer le raccordement de terre seulement après avoir mis l'unité à l'arrêt et l'avoir débranchée. |

| Mark | Notes |
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|  Attention | **Les décharges électrostatiques (ESD) Attention**<br>■ Respecter systématiquement les precautions relatives aux charges électrostatiques durant la manipulation de cet unité.<br>■ 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.<br>■ Manipulez les cartes en les faces avant et les bords seulement; éviter de toucher la carte de circuit imprimé et les broches du connecteur.<br>■ Placer un composant retiré sur une surface antistatique ou dans un sac de protection statique.<br>■ Éviter tout contact entre les cartes et les vêtements.<br>■ Vérifier périodiquement la valeur de résistance de la sangle antistatique. Valeur recommandée est comprise entre 1 et 10 méga-ohms (Mohms). |
|  Avertissement | **Rayonnement laser Attention**<br>■ Rayonnement laser invisible peut être émis à partir de fibres ou les connecteurs débranchés. Ne pas regarder en faisceaux ou regarder directement avec des instruments optiques. Ne jamais faire fonctionner une unité en cas de bris d'une fibre ou de séparation d'un connecteur de fibre. |
|  Avertissement | **Batterie au lithium Manipulation instructions de sécurité**<br>■ Perchlorate pour la Californie Consultatif: Certaines batteries au lithium, peuvent contenir du perchlorate. le texte qui suit consultatif est prévu: "Présence de perchlorate - une manipulation spéciale peut s'appliquer, voir: *www.dtsc.ca.gov/hazardous waste/perchlorate/ for information*". |
|  Attention | ■ Il y a danger d'explosion si la batterie est remplacée de manière incorrecte ou par une batterie de type incorrect.<br>■ Mettre au rebut les batteries usagees conformement aux instructions du fabricant.<br>■ Les batteries des produits Harmonic ne peuvent pas être réparées ni entretenues par l'utilisateur. Ne confier l'entretien des batteries remplaçables qu'à du personnel compétent de Harmonic. |

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

Um Verletzungen oder Sachschäden zu vermeiden, bevor Sie mit der Installation oder Austausch des Produkts zu beginnen, zu lesen, zu beobachten, und sich an all den folgenden Sicherheitshinweise und Informationen. Harmonic Produkte und / oder Produktverpackungen können mit den Sicherheitssymbole in diesem Dokument verwendet werden, markiert, wenn es notwendig ist für die Betreiber, Anwender und Dienstleister, um relevante Sicherheitsanweisungen in den Handbüchern zu alarmieren.

| Mark | Notes |
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|  <br>Warnung | **Installation oder den Austausch des Produkts Einheit Warnung**<br>■ Das Installieren, Ersetzen oder Bedienen dieser Ausrüstung sollte nur geschultem, qualifiziertem Personal gestattet warden (siehe AS / NZS 3260 Clause 1.2.14.3 Servicepersonal)<br>■ Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen.<br>■ Der Erdanschluß muß bei der Installation der Einheit immer zuerst hergestellt und zuletzt abgetrennt werden.<br>■ Die Installation der Geräte muss den Sicherheitsstandards entsprechen.<br>■ Diese Einheit ist zur Installation in Bereichen mit beschränktem Zutritt vorgesehen. Ein Bereich mit beschränktem Zutritt ist ein Bereich, zu dem nur Wartungspersonal mit einem Spezialwerkzeugs, Schloß und Schlüssel oder anderer Sicherheitsvorkehrungen Zugang.<br>■ Verwenden Sie nur die angegebenen Ersatzteile<br>■ Das Gerät in oder in der Nähe von Wasser verwenden. Trennen Sie vor der Installation von Optionen oder Wartung des Gerätes, es sei denn, dies wurde von diesem Handbuch alle Netz. |
|  <br>Warnung | **Rack-Montage-Warnung**<br>Zur Vermeidung von Körperverletzung beim Anbringen oder Warten dieser Einheit in einem Gestell müssen Sie besondere Vorkehrungen treffen, um sicherzustellen, daß das System stabil bleibt:<br>■ Entsprechen den lokalen Arbeitsschutzanforderungen beim Bewegen und Heben der Ausrüstung.<br>■ Stellen Sie sicher, dass die Montage des Gerätes durch mechanische Belastung Werkzeuge sollten nicht gefährlichen Bedingungen zu induzieren.<br>■ Um das Risiko von möglichen elektrischen Schlag zu vermeiden, muss mit einer angemessenen Erdung für Rack und jedes Gerät installiert ist implementiert werden. |
|  <br>Warnung | **Chassis Warnung**<br>■ Gleichstrom-Unterbrechung Bevor Sie Erdungs- oder Stromkabel an das Chassis anschließen oder von ihm abtrennen, ist sicherzustellen, daß der Gleichstrom-Stromkreis unterbrochen ist.<br>■ Um Verletzungen und Beschädigung des Chassis zu vermeiden, sollten Sie das Chassis nicht an den Henkeln auf den Elementen (wie z.B. Stromanschlüsse, Kühlungen oder Karten) heben oder kippen; oder indem Sie es unterhalb der Unterkante packen.<br>■ Alle Hinweise in diesem Handbuch, die das Öffnen benötigen Sie das Gehäuse oder das Entfernen eines Board sollte nur von qualifiziertem Fachpersonal durchgeführt werden.<br>■ Für Schlitze und Öffnungen im Chassis vorgesehen. Blockieren Sie sie nicht. Lassen Sie die Rückseite des Rahmens frei für Abluftkühlung und um Platz für die Verkabelung ermöglichen - ein Minimum von 6 Zoll (15,24 cm) Abstand wird empfohlen |

| Mark | Notes |
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|  <br>Warnung | **Elektroschock-Warnung**<br>■ Diese Einheit hat möglicherweise mehr als ein Netzkabel. Zur Verringerung der Stromschlaggefahr trennen Sie beide Netzgerätekabel ab, bevor Sie die Einheit warten.<br>■ Vor der Arbeit an einem Chassis für Arbeiten in der Nähe Stromversorgung, ziehen Sie das Netzkabel mit Netzeinheiten.<br>■ Arbeiten Sie nicht am System und schließen Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert.<br>■ 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.<br>■ 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.<br>■ Gefährliche Spannungen vorhanden sind an mehreren Stellen in diesem Produkt. Um Verletzungen zu vermeiden, berühren Sie nicht freiliegenden Anschlüsse und Komponenten während schaltet ist. Sie keine Gegenstände in einem der beiden Stromversorgungs Hohlräume des Systems mit Strom verbunden einführen.<br>■ Ein Wechelstromsmodul und ein Gleichstrommodul dürfen niemals in demselben Chassis installiert werden.<br>■ Tragen Sie keine Hand Schmuck oder schauen Sie bei der Fehlersuche hohen Stromkreise, wie beispielsweise die Stromversorgung.<br>■ 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.<br>■ Dieses Produkt ist darauf angewiesen, daß im Gebäude ein Kurzschluß- bzw. Überstromschutz installiert ist. Stellen Sie sicher, daß eine Sicherung oder ein Unterbrecher von nicht mehr als 240 V Wechselstrom, 10 A (bzw. in den USA 120 V Wechselstrom, 15 A) an den Phasenleitern (allen stromführenden Leitern) verwendet wird.<br>■ Um einen Stromschlag zu vermeiden, sicherzustellen, dass die Zahnstange wurde korrekt vor dem Einschalten des Gerätes geerdet. Beim Entfernen der Einheit entfernen Sie die Masseverbindung nur, nachdem das Gerät ausgeschaltet und der Netzstecker gezogen. |

| Mark | Notes |
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|  Vorsich | **Elektrostatische Entladung (ESD) Vorsicht**<br>■ Folgen Sie statische vorsorglich zu jeder Zeit beim Umgang mit diesem Gerät.<br>■ Tragen Sie immer einen ESD-präventive Handgelenk oder Knöchel-Riemen beim Umgang mit elektronischen Komponenten. Schließen Sie ein Ende des Bandes an einem ESD-Buchse oder ein unlackiertes Metallteil auf dem System.<br>■ Hand Karten nur durch die Faceplates und Kanten; Berühren Sie die bedruckte Leiterplatte und Steckerstifte.<br>■ Legen Sie alle entfernten Komponenten auf eine antistatische Oberfläche oder in einem Statik-Beutel.<br>■ Kontakt zwischen den Karten und Kleidung vermeiden.<br>■ Den Widerstandswert der gegen statische Gurt in regelmäßigen Abständen überprüfen. Empfohlener Wert ist zwischen 1 und 10 Mega-Ohm (MOhm). |
|  Warnung | **Laserstrahlungen Warnung.**<br>Unsichtbare Laserstrahlung kann von getrennten Fasern oder Stecker emittiert werden. Nicht in die Strahlen blicken oder direkt mit optischen Instrumenten. Niemals ein Gerät mit einem gebrochenen Faser oder mit einem Glasfaseranschluss getrennt. |
|  Warnung | **Lithium-Batterie Handhabung Sicherheitshinweise**<br>CALIFORNIA PERCHLORATE ADVISORY: Einige Lithium-Batterien kann Perchlorat enthalten. Die folgende Beratungs gesetzt: "Perchlorat - Sonderbehandlung kann erforderlich sein, finden Sie unter: *www.dtsc.ca.gov/ hazardous waste/perchlorate/ for information*". |
|  Vorsich | ■ Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr<br>■ Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers.<br>■ Es gibt keine zu wartenden Akkus im Harmonic Produkte. Siehe Harmonic qualifiziertes Personal, um die austauschbare Batterien Service |

# 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.

- 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 accoring to the rack maufacturer'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* 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.

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，可能需要用户对其干扰采取切实可行的措施。

English translation of the notice above:

When labeled with the CCC marking, the product meets the applicable safety and EMC requirements for China. This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

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 3–9: Regulatory Compliance Markings**

| Country/ Region | Testing Standard/ Specification | Certification Type | Regulatory Mark Name | Product Marketing |
|---|---|---|---|---|
| USA/ Canada | EN 60950-1:2006+A11:2009+A1:2010+A12:2011; CAN/CSA C22.2 No. 60950-1-07+A1:2011/UL 60950-1:2011 | Safety | NRTL (National Recognized Test Laboratory) | c UL us LISTED or TÜVRheinland c us |
| USA/ Canada | FCC CFR 47 Part 15, Class A<br>ICES-003: Issue 5, 2012; Class A | EMC | FCC Class A Statement | This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. |

**Table 3–9: Regulatory Compliance Markings**

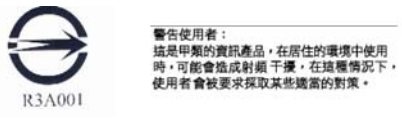
| Country/ Region | Testing Standard/ Specification | Certification Type | Regulatory Mark Name | Product Marketing |
|---|---|---|---|---|
| European Union | RoHS: EN 50581:2012; EN55022:2010/ CISPR 22:2008; EN55024:2010/ CISPR 24:2010; EN61000-3-2:2006+A1:2009+A2:2009; EN61000-3-3:2008; Class A | Safety and EMC | CE / Low Voltage Directive |  |
| Germany | EN 60950-1; EN60825-1 (for laser) | Safety | GS |  |
| Mexico | NOM-019-SCFI-1998 | Safety | NOM |  |
| Taiwan | CNS 14336-1:2010 CNS 13438:2006; Class A | Safety and EMC | BSMI Certification (RPC) Number & Class A Warning |  |
| Japan | VCCI V-3/2013.04; CISPR 22:2008, Class A | EMC | VCCI |  |
| Australia and New Zealand | AS/NZS CISPR22:2009+A1:2010; Class A | Safety | C-Tick |  |
| Korea | KN22 Class A and KN 24 | EMC | KC |  |

**Table 3–9: Regulatory Compliance Markings**

| Country/ Region | Testing Standard/ Specification | Certification Type | Regulatory Mark Name | Product Marketing |
|---|---|---|---|---|
| China | GB4943.1-2011<br>GB9254-2008<br>GB17625.1-2012 | Safety and EMC | CCC |  |
| India | IS 13252 (Part 1): 2010 | Safety | BIS Compulsory Registration | "Self Declaration - Conforming to IS 13252 (Part 1):2010, R-XXXXXXXX" |

# Product Environmental Compliance

Harmonic manufactures high quality and innovative IT and telecommunications equipment, video delivery infrastructure solutions and services for its customers worldwide. Harmonic is committed to providing our customers with safe and environmentally friendly products that are compliant with all relevant regulations, customer specifications, and environmental legislation, including the directives described below.

## EU RoHS

In July 2006, the European Union's (EU) Directive (2002/95/EC) on the Restriction of the use of certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment (EEE) went into effect, and in July, 2011, the European Union's RoHS Recast Directive (2011/65/EU) also known as RoHS II entered into force.

Harmonic understands the environmental risks associated with the substances covered by the RoHS Directive and has committed to eliminating or reducing the use of these, as well as other environmentally sensitive substances in our products. Harmonic also continues to comply with the requirements under RoHS II.

For more information, please visit EU RoHS directive page at official EU website.

*http://ec.europa.eu/environment/waste/rohs_eee/legis_en.htm*

### Restricted Substance Statement

Harmonic products contain less than the permitted limits for the six restricted substances except where exemptions published in the RoHS2 Directive are applicable. This statement is based on vendor-supplied analysis or material certifications, and/or lab test results of the component raw materials used in the manufacture of Harmonic products.

**Table 3–10: Restricted Substances**

| Restricted Substance | Permitted Limit* |
|---|---|
| Cadmium (Cd) | ≤0.01% |
| Lead (Pb) | ≤0.1% |
| Chromium (VI) (Cr (VI)) | ≤0.1% |
| Mercury (Hg) | ≤0.1% |

**Table 3–10: Restricted Substances**

| Restricted Substance | Permitted Limit* |
|---|---|
| Polybrominated biphenyls (PBBs) | ≤0.1% |
| Polybrominated diphenyl ether (PBDE) | ≤0.1% |
| *Homogeneous material definition as per the EU Directive. | |

## EU REACH

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

## China RoHS Disclosure Report

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

该表显示哈雷公司产品中可能含有的有毒有害物质元配件的信息，除了来源于元配件供应商的物料成分资料， 亦来自其它相关的机构与资料。哈雷产品不一定使用这些元配件。

This table shows those components where hazardous substances may be found in Harmonic products based on, among other things, material content information provided by third party suppliers. These components may or may not be part of the product.

除非特殊注明，哈雷公司产品的环保使用期限 均为 20 年。该环保使用期限的有效条件为：必须遵循该产品使用手 册的规定，对该产品进行使用或存储。

The Environmental Protective Use Period for Harmonic products is 20 years unless displayed otherwise on the product. The EPUP period is valid only when the products are operated or stored as per the conditions specified in the product manual.

| 部件名称 (Part name) | 有毒有害物质或元素 (Hazardous Substance) | | | | | |
|---|---|---|---|---|---|---|
| | 铅 (PB) | 汞 (Hg) | 镉 (Cd) | 六价铬 (CrVI) | 多溴联苯 (PBB) | 多溴二苯醚 (PBDE) |
| 印刷线路板 (Printed Circuit Assemblies) | X | O | O | O | O | O |
| 机械组件 (Mechanical Subassemblies) | X | O | O | O | O | O |
| 光学组件 (Optical Subassemblies) | X | O | O | O | O | O |
| 电源 (Power Supplies) | X | O | O | O | O | O |
| 缆线 / 线束 (Cables, harnesses) | X | O | O | O | O | O |
| 屏幕 / 显示器 (Screens, Monitors) | X | O | O | O | O | O |
| 金属零件 (Metal Parts) | X | O | O | O | O | O |
| 塑料 / 发泡材料 (Plastics, foams) | O | O | O | O | O | O |
| 电池 (Batteries) | O | O | O | O | O | O |

O: 表示在该部件的所有均质材料中，此类有毒有害物质的含量均小于 SJ/T11363-2006 标准所规定的限量。

O: Indicates the content of the toxic and hazardous substances at the homogeneous material level of the parts is below the limit defined in SJ/T11363 2006 standard.

X: 表示至少在该部件的某一均质材料中，此类有毒有害物质的含量超出 SJ/T11363-2006 标准规定的限量。

X: Indicates that the content of the toxic and hazardous substances in at least one of the homogeneous materials of the parts is above the limit defined in SJ/T11363 2006 standard.

## Other RoHS and REACH type Regulations

Harmonic will comply with RoHS and REACH type regulations evolving in other countries, if they become relevant to our products or in markets where we sell our products.

## Waste Electrical and Electronic Equipment (WEEE)

European Parliament and the Council of the European Union's WEEE Directive (2002/96/EC) came into force on August, 2005 and, were more recently amended in July, 2012. This directive encourages the reuse, recycling, and recovery of WEEE and to improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment, especially those dealing with WEEE. Harmonic ensures that all requirements for registration, reporting, design and data tracking are complied with to meet the objectives of the WEEE directive.

For more information, please visit WEEE directive page at official EU website.

*http://ec.europa.eu/environment/waste/weee/legis_en.htm*

## Battery Directive

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:

*http://www.harmonicinc.com/sites/default/filesEnvironmental%20Compliance%20Statement.pdf*

## 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.

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