Imagine COMMUNICATIONS™

## Hardware Setup Guide

# Selenio™ VMG-14+

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**Revision A**

*Selenio™ VMG-14+ Hardware Setup Guide*
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# Publication Information



# Notice

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U.S. Patents: 6,996,129; 7,046,677; 7,818,355; 8,180,920. Other US and foreign patents pending.

# Contact Information

Imagine Communications has office locations around the world. For domestic and international location and contact information see: http://www.imaginecommunications.com/contact-us/

# Support Contact Information

For domestic and international support of Selenio VMG, Selenio BNP, Selenio SEP, Selenio MMC, Selenio TAT, Telurio Packager, Telurio Recording Manager, and Telurio AIM products, contact:

| | |
|---|---|
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# Document Change History

Selenio™ VMG-14+ Hardware Setup Guide Document History

| Part Number | Software Version | Release Date | Changes |
|---|---|---|---|
| 250-0350-01 Rev A | N/A | 06/01/2015 | • Updated graphics and verbiage to Imagine Communications branding |
| 250-0248-01 Rev A | N/A | 12/19/13 | • Recommended Ethernet cable routing information, and doc maintenance.<br>• Updates to Initialization chapter, to incorporate current Element Manager screens. |
| 250-0211-01 Rev A | N/A | 6/15/13 | • Add NPM2, TCM2, TCM2+<br>• Add new DC PEM Terminal Block Cover. |
| 250-0177-01 Rev A | Release 3.1.3 | 11/15/12 | • Updated hardware: two fan trays.<br>• Correct numbering for SCMs and AC PSUs. |
| 250-0137-01 Rev A | Release 3.1 | 11/30/11 | New Product |

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CHAPTER 1

# Introduction

All Selenio™ Video Multiprocessing Gateway (VMG) systems from Imagine Communications deliver the industry's highest density digital video solution—per Rack Unit (RU)—for grooming, statistical multiplexing, transrating, digital program insertion (DPI), and MPEG-2 / H.264 transcoding. Based on a flexible, scalable and modular platform, VMG systems expedite deployments of advanced video services and simplify operation and management, while reducing operational and capital costs.

The Selenio™ VMG-14+ is available as a DC-powered (13 RU) or an AC-powered (14 RU) system, and both are front-loading systems for use in standard Telco racks.

This *Selenio™ VMG-14+ Hardware Setup Guide* describes the Selenio VMG system hardware and provides guidelines for physical installation, initial configuration, and basic troubleshooting.

## Document Organization

This guide is organized as follows:

- Chapter 1, *Introduction* – (this chapter) describes the contents and conventions used in the Selenio™ VMG-14+ Hardware Setup Guide.
- Chapter 2, *Overview* – provides a detailed description of the VMG-14+ features and components.
- Chapter 3, *Physical Installation* – describes the initial steps and requirements for installing the VMG-14+.
- Chapter 4, *Initial Configuration* – describes how to prepare a GEN1 system (VMG-14+ populated with one or more NPM cards) for management by the VMG *Element Manager*.
- Chapter 5, *Troubleshooting and Maintenance* – provides information about LED indicators and component replacement.
- Chapter 6, *System Specifications* – includes information about regulatory, environmental, electrical, and mechanical compliances.
- Appendix A, *Localized Cautions and Warnings* – lists all of this guide's *Caution* and *Warning* statements in French and German.
- Appendix A, *Conformity and Safety Information* – provides regulatory compliance information for the Selenio VMG.
- The glossary and index can be used to quickly reference information.

## Document Audience

This guide is intended for system administrators who are responsible for installation and maintenance of the Selenio VMG at Telco and Cable Headends. Users of this guide should be familiar with general video and networking terminology and should be accustomed to basic network hardware installation.

Most importantly, the user must be familiar with the basics and principles of broadcast network processing.

# Related Documentation

- *Video Multiprocessing Gateway, Element Manager User Guide.*
- *Video Multiprocessing Gateway, Software Upgrade Guide.*
- *Video Multiprocessing Gateway Software Release Notes.*
- *Application Media Processor (AMP) Install Guide for GEN1 VMG Systems.*

# Document Conventions

Table 1 provides an easy way to recognize information of particular importance in this manual

Table 1. Document Conventions

| When you see: | It means: |
|---|---|
|  | **Notes** point out information that may not be part of the text but provide tips and other helpful advice. |
|  | **Cautions** let you know that an action may have undesirable consequences if the instructions are not followed correctly. Cautions also indicate that failure to follow guidelines could cause damage to equipment or loss of data. |
| | Les symboles "**ATTENTION**", représentés par l'icône de gauche, indiquent qu'une action peut avoir des conséquences indésirables si les instructions ne sont pas suivies correctement.<br>Les symboles " ATTENTION " indiquent également que le fait de ne pas suivre les instructions peut causer des dommages à l'équipement ou résulter en une perte de données. |
| | Das links abgebildete Symbol **Vorsicht** weist darauf hin, dass ein Vorgang unerwünschte Konsequenzen haben kann, falls die Anweisungen nicht korrekt befolgt werden.<br>Das Symbol Vorsicht weist außerdem darauf hin, dass Geräte beschädigt oder Daten verloren gehen können, wenn die Anweisungen nicht befolgt werden. |
|  | **Warnings** indicate that failure to take the necessary precautions or to follow guidelines could cause harm to equipment and personnel. |
| | Les symboles " **AVERTISSEMENT** ", représentés par l'icône de gauche, indiquent que le fait de ne pas prendre les précautions nécessaires ou de ne pas suivre les instructions peut endommager l'équipement ou provoquer des blessures. |
| | Das links abgebildete Symbol **Warnung** weist darauf hin, dass Geräte beschädigt oder Personen verletzt werden können, wenn die notwendigen Vorsichtsmaßnahmen nicht eingehalten oder die Anweisungen nicht befolgt werden. |
| **Hyperlinks**: Clicking any blue link takes you to the item to which the link refers.<br>**Localization**: See Appendix , "Localized Cautions and Warnings" for the French and German versions of the caution and warning statements in this manual. | |

# Graphics

In some cases the line art and screen-shots shown in this manual may differ slightly from what appears on the actual product.

All efforts have been made to ensure that the latest images are used. In all cases, the functionality described is current at the time of writing.

# Technical Assistance

Use the contact information provided in this section if you need to phone or write to Imagine Communications Customer Support for assistance with VMG installation, initial configuration, or other VMG product issues.

Table 2. Contact Information for Product Returns

| To Do This... | Use this contact information | |
|---|---|---|
| Return product. | **Customer Portal**: | http://support.rgbnetworks.com |
| Request authorization from Imagine Communications to return materials | **Phone**<br>From inside USA:<br>From outside USA: | <br>1.877.RGB.NETW<br>(977.742.6389)+1.408.701.2800 |
| | Email | support@rgbnetworks.com |
| Affix proper address on the return shipment | Company Address<br>RMA Number | Use address and RMA number, as advised by your Imagine Communications Customer Support contact. |

See also the RBG Networks web site at http://www.rgbnetworks.com/support for more details.

CHAPTER 2

# Overview

The Imagine Communications Video Multiprocessing Gateway (VMG) products provide stream routing, switching and video processing for deployment of digital simulcast, digital broadcast and IPTV streaming in advanced digital cable TV and Telco IPTV networks.

The 14-slot (300-watt) Video Multiprocessing Gateway "Plus" system (VMG-14+) from Imagine Communications is provides high-level carrier-class service availability through the chassis, service-level, and module-level redundancy and is engineered for future-proof operations. It is ideally suited for operations at lower density video headends and hub sizes, to deliver the industry's highest density digital video solution per-rack-unit for grooming, statistical multiplexing, and digital program insertion (DPI), and transcoding.

The VMG-14+ is fully MPEG-2 and H.264 compliant and interoperable with leading video industry equipment; it shares the same software functionality and application modules (NPMs, AMPs, TCMs, and VPMs) as all other VMG systems. This chassis is available either as an AC or DC system (Figure 1) and all system modules and shelf management modules are conveniently loaded at the front of the chassis cage.VMG-14+ chassis slots support up to 300 watts each, to enable seamless migration to future high capacity modules. The VMG-14+ provides advanced standard definition (SD) and high definition (HD) MPEG-2 and MPEG-4/H.264 video processing, which enables telecommunications deployment of next-generation cable and IPTV services.

Figure 1. VMG-14+ Chassis


VMG-14+ AC System


VMG-14+ DC System

# In This Chapter:



# Product Features

In addition to being software-upgradeable, scalable and reliable, the VMG-14+ platform has the following features:

- Up to 300 watts per slot.
- Web-based embedded management.
- Front-loading, hot-swappable Video Processor Modules (VPMs), Transcoding Modules (TCM, TCM2, TCM2+), Network Processor Modules (NPM or NPM2), Application Media Processors (AMPs), and (two) fan trays.
- Redundancy:
  - Intelligent Platform Management Bus (IPMB) interfaces in a radial configuration.
  - 1:1 Shelf Control Manager (SCM), 1:1 NPM or NPM2 (and AMP) redundancy, N+M VPM and TCM redundancy, and service-level redundancy.
  - Redundant Power Entry Modules (PEMs).
- Mounting flanges for 19" cabinets.
- Chassis size:
  - AC system = 14 RU
  - DC system = 13 RU
- 14 front-loading slots: Two dedicated for NPM or NPM2 insertions.

# VMG-14+ Chassis and Components

The VMG-14+ utilizes a chassis platform fitted either for 13 RU (DC system) or 14 RU (AC system). The front of the VMG-14+ chassis cage accommodates all system and application modules. For AC systems (Figure 3), the front also includes the AC PSUs located in the power bay at the base of the system.

Figure 2. VMG-14+ DC System

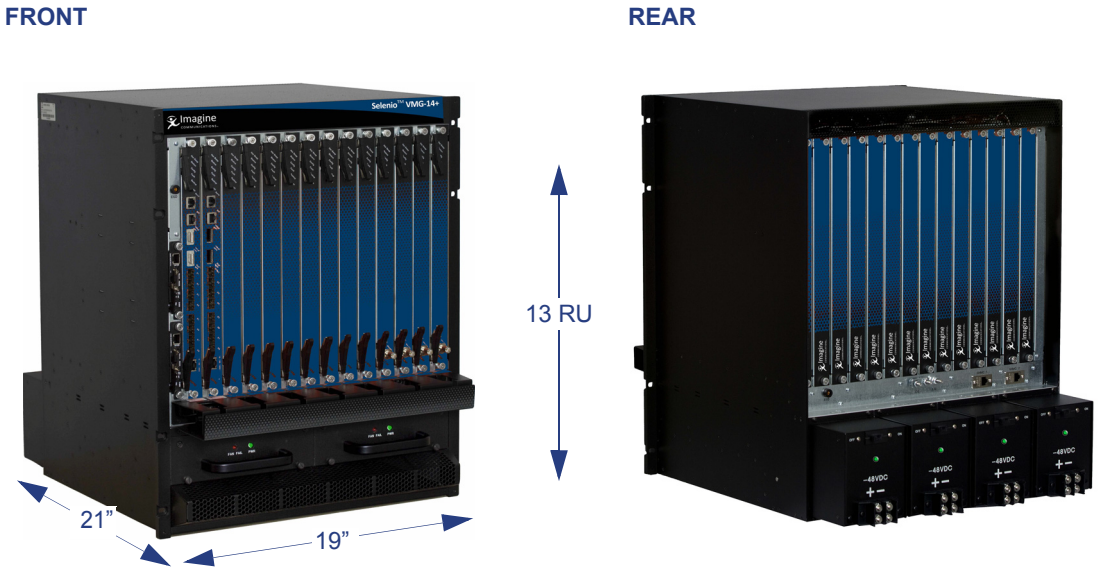



Figure 3. VMG-14+ AC System

# Chassis Front

The VMG-14+ chassis cage front provides 14 vertical slots for loading of the application modules. Two of these slots are dedicated for use by Network Processor Modules (NPM or NPM2) for 1:1 redundancy configuration.

- If the VMG-14+ is using GEN2 NPM2 cards, the remaining 12 slots can be used for Transcoding Modules (TCM2, or TCM2+).
- If the VMG-14+ is using GEN1 NPM cards, the remaining 12 slots can be used for Video Processor Modules (VPM), Transcoding Modules (TCM), and up to two Application Media Processors (AMPs).

**Note:** *Rules for loading the various modules are applicable. See "Basic Chassis Populations" on page 18 for more information.*

System modules fit into numbered slots, from left (1) to right (14). Up to two Shelf Manager modules fit into the two vertical slots at the left edge of the chassis, alongside slot 1. The AC (Figure 4) and DC (Figure 5) VMG chassis are identical except for the inclusion of AC PSUs at the base of the AC chassis.

For slot assignments, see Table 3.

Rack-mounting flanges are incorporated into the chassis at the left and right front edges, to enable front-mount at the rack. During installation, you will prepare the rack by attaching a chassis shelf to it, which will support the rear of the rack-mounted chassis.

Figure 4. VMG-14+ Front—AC System

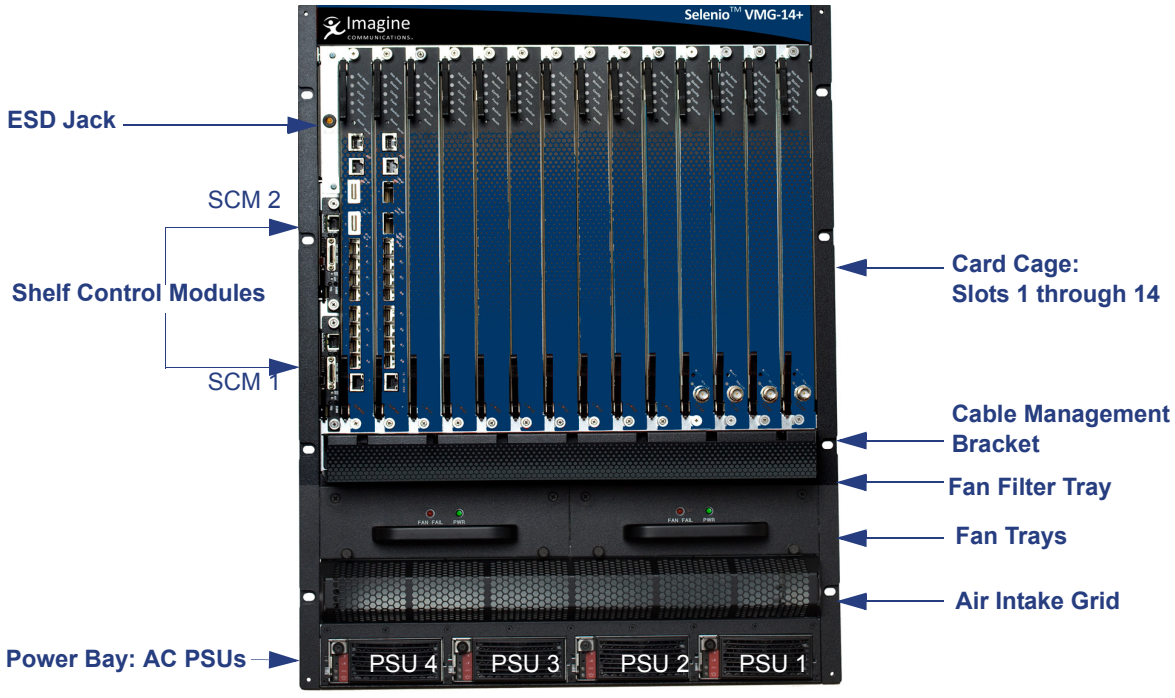
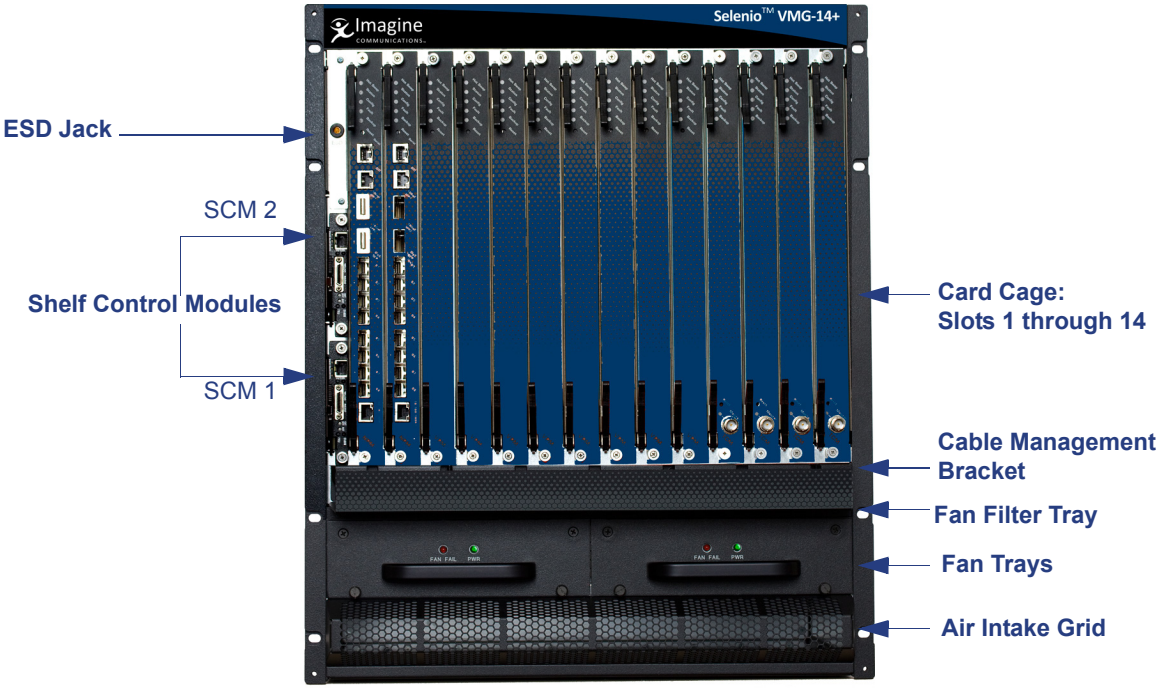


Figure 5. VMG-14+ Front—DC System



## Chassis Rear

The rear chassis cage contains the power entry modules at the base of the system. All slots at the rear card cage are covered with RTMs. These must not be removed.

Figure 6. VMG-14+ Rear —AC System

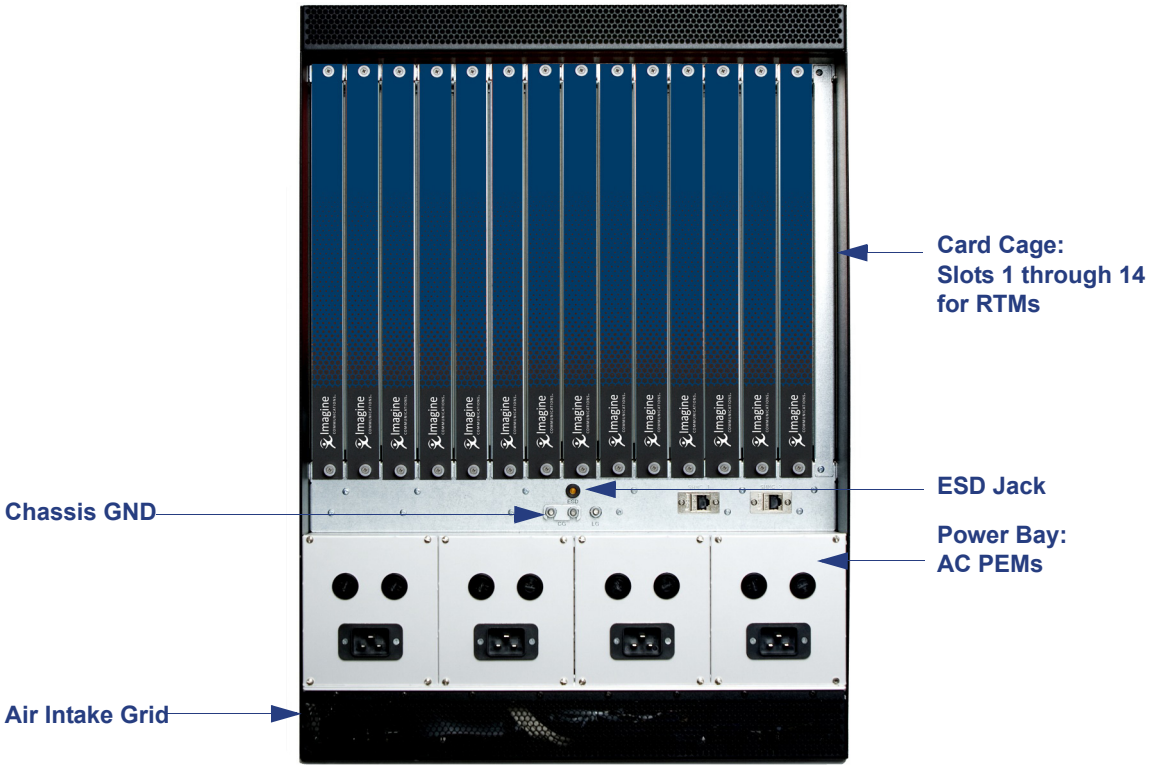
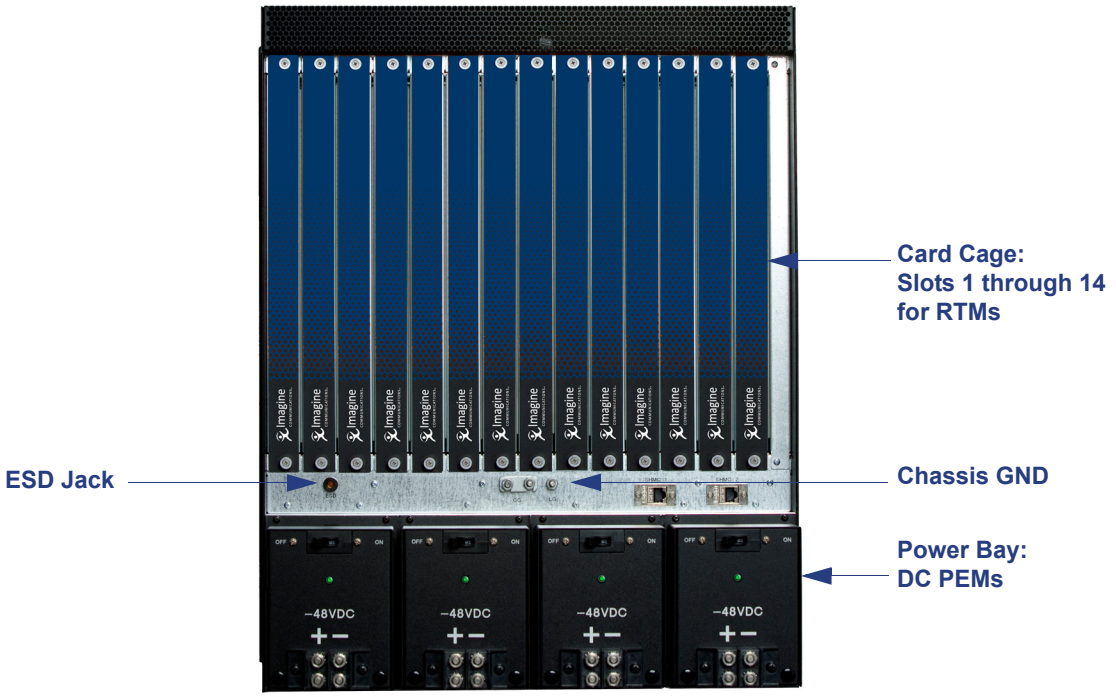



Figure 7. VMG-14+ Rear —DC System



## Basic Chassis Populations

Slot assignments determine where to load the system modules, SCMs, fan trays, air filter, and (for AC) power supply units. The VMG-14+ supports the components and modules listed in Table 3.

Table 3. VMG-14+ Chassis Modules and Components

| Name | Description | System Capacity | Slot Assignments |
|---|---|---|---|
| Network Control Processor (NPM and NPM2) | Either NPM type provides management functions and ingress/egress for transport streams.<br>The NPM2 also provides packet inspection.<br>**Compatibility Notes:**<br>• The NPM is compatible with the TCM card.<br>• The NPM2 is compatible with TCM2 or TCM2+ cards.<br>• Various models of NPM cards cannot be mixed. Use only NPM or only NPM2 cards in your VMG-14+.<br>See also "Network Processor Modules" on page 23. | • NPM: 2 or<br>• NPM2: 2 | Front, slots 1 and 2. |
| System modules | Family of modules that includes AMP, TCM, TCM2, TCM2+, and VPM.<br>**Compatibility Notes:**<br>• The TCM, AMP, and VPM is compatible with NPM.<br>• The TCM2 or TCM2+ is compatible with NPM2 only.<br>• Various models of TCM cards cannot be mixed.Use only TCM, TCM2, or TCM2+ in your VMG-14+.<br>See also "VMG-14+ System Modules" on page 26. | • AMP: **2**<br>• Others: up to **12** | Front, slots 3 through 14. |
| Shelf Control Manager (SCM) | Manage power and cooling, and system inter-connectivity via interaction between the SCM and Intelligent Management Controllers (IPMC) over IPMB-0.<br>Enable system management through Ethernet.<br>See also "Shelf Control Managers" on page 19. | **2** | Front, vertically stacked slots at left of Slot 1.<br>SCM2 (top)<br>SCM1 (bottom) |
| DC Power Entry Modules (PEMs) | See also "DC System Power" on page 32. | **4** | Rear: in power bay of DC systems. |
| DC PEM Terminal Block Cover(s) | | **4** | For attachment to DC PEM(s) |
| AC Power Entry Modules | See also "AC System Power" on page 30. | **4** | Rear: in power bay of AC systems. |
| AC Power Supplies | | **4** | Front:, in power bay of AC systems. |

Table 3. VMG-14+ Chassis Modules and Components (Continued)

| Name | Description | System Capacity | Slot Assignments |
|---|---|---|---|
| Filler Panels<br>• Front Filler<br>• RTM Filler Panels | See also "Filler Panels" on page 34. | all empty slots | |
| Fan Tray | See also "Fan Trays" on page 21. | 2 | Fan Tray slot, below cable management tray. |
| Fan Filter Tray | See also "Fan Filter Tray" on page 22. | 1 | Front of chassis, above fan trays, and below cable management tray. |

## Shelf Control Managers

The VMG-14+ SCMs fit into the dedicated SCM slots located at the left-front-edge of the chassis. Two SCMs are required for redundancy, and an SCM in either slot can serve as the primary. When the active is removed, the remaining SCM changes state—from standby to active.

**Note:** *Although each Shelf Manager module contains a mini DB25 Telco Alarm interface at the RS-232 port, telco alarm LEds, and Telco alarm cutoff push button, the current release does not support Telco alarm functionality.*

The SCM faceplate provides the LEDs and components illustrated in Figure 8, and described in Table 4.

Figure 8. Shelf Control Manager Front Panel

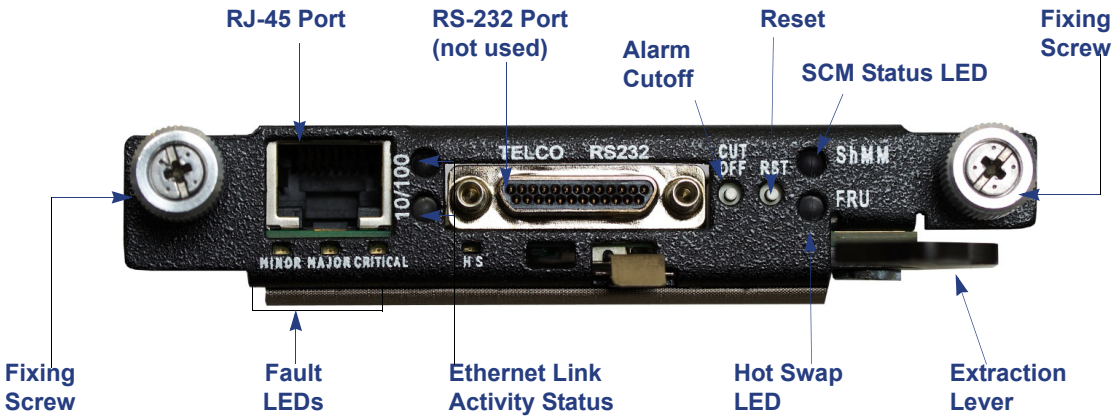



Table 4. Shelf Control Manager—Front Panel

| LED Name | Color/Condition | Description |
|---|---|---|
| Cutoff Button | n/a | Not supported for the current release. |
| Reset Button (RST) | n/a | Reset (power cycle) the SCM. Use a small pointed object to access and depress this button. |
| Fault LEDs | Green | Temperature normal: not exceeding thresholds. This LED illuminates upon system power-up. |
| | Red | Temperature exceeds thresholds. |

Table 4. Shelf Control Manager—Front Panel (Continued)

| LED Name | Color/Condition | Description |
|---|---|---|
| SCM Status (ShMM) | Solid Green | Active. This LED illuminates upon system powerup. |
| | Blinking Green | Standby. |
| | Red | Failure. |
| Hot Swap (FRU) | Off | SCM is not ready to be removed or disconnected from the chassis. |
| | Blue | SCM is ready to be removed or disconnected from the chassis. |
| RJ-45 port | Solid/blinking green<br><br>Note that the RJ45 LEDs illuminate even if the cable is not inserted, to report status of Ethernet link activity over the VMG-14+ backplane. | 10/100 link status and activity.<br>10: The RJ-45 port is operating in 10 Mbps mode (data is being received or transmitted at 10 Mbps).<br>100: The RJ-45 port is operating in 100 Mbps mode (data is being received or transmitted at 100 Mbps).<br>Pinouts for this port are provided in "10/100 Ethernet Connector," on this page. |
| RS-232 port | n/a | Not supported in the current release for Telco alarm functions. However, you can directly connect to it for troubleshooting purposes. See also "Serial Console Configuration—SCM" on page 20, and "10/100 Ethernet Connector" on page 21. |

Steps for servicing of the Shelf Control Managerare provided in Chapter 5, *Shelf Control Manager Servicing* on Page 64.

## Serial Console Configuration—SCM

- 115200 baud
- No parity
- 8 data bits
- 1 stop bit
- no flow control

### 10/100 Ethernet Connector

Pinouts for the SCM RJ-45 port are provided in Table 5.

Table 5. RJ-45 Port Pinouts—VMG-14+ SCM

| Pin | Description |
|---|---|
| 1 | TX+ |
| 2 | TX- |
| 3 | RX+ |
| 4, 5 | Unused pair |
| 6 | RX- |
| 7, 8 | Unused pair |

## Fan Trays

The fan trays operate continuously to provide cooling to the system and are monitored by the SCM. In the event of a failure—such as a fan problem or removal of both SCMs—the remaining fans continue to run at full speed. The fan trays are hot swappable field-replaceable units. The VMG-14+ chassis contains two fan trays, which fit into the base of the chassis at the front. Each fan tray contains six fans (Figure 9).

Figure 9. Fan Trays and Fans


### Fan Tray LEDs

Fan Tray LEDs are located on the Fan Tray front panel (Figure 10) and are described in Table 6.

Figure 10. Fan Tray LEDs

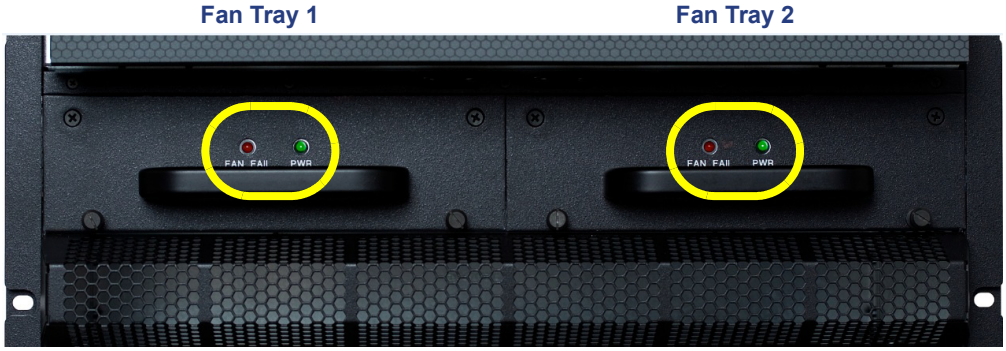


Table 6. Fan Tray LEDs

| Color | Description | Status | Condition |
|---|---|---|---|
| Red | Alarm LED | Solid Red | Indicates a failure condition. Also, this LED is lit upon system power-up. Thereafter the LED is either OFF or ON.<br>• OFF<br>Fan speed is normal and does not exceed normal threshold.<br>• ON<br>Fan speed is exceeding the normal speed, due to critical alarm. |
| Green | Normal operation | Solid green | • Following system initialization: indicates success.<br>• During operations: indicates that no problems are detected with the fans, fan tray, or system temperature. |

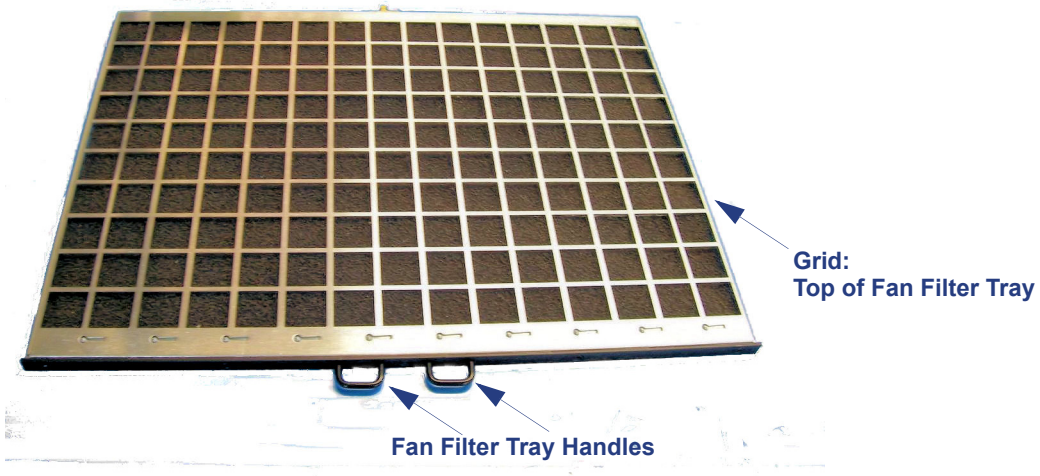
The fan tray replacement procedure is provided in Chapter 5, *Fan Tray Removal* on Page 64.

## Fan Filter Tray

The VMG-14+ chassis uses a front replaceable Fan Filter Tray (Figure 11). During operations, the system detects the presence of the fan filter, and the fan filter must be in place at all times. The tray inserts horizontally into the chassis front, at the fan filter slot directly above the Fan Trays.

This unit has a grid surface on one side, and a foam liner on the opposite side. The grid (shown below) must be uppermost when installing the Fan Tray Filter at the VMG-14+.

Figure 11. VMG-14+ Fan Filter




Fan filter maintenance and replacement information is provided in "Fan Tray Servicing" on page 64.

# Network Processor Modules

The Network Processor Modules are the NPM and NPM2 cards. These modules share common physical characteristics (Figure 12 and Table 7) which provide the interfaces, indicators and functions described in the following sections:

- "NPM and NPM2 Interfaces" on page 24.
- "NPM and NPM2 LEDs" on page 24.
- "NPM and NPM2 Management and Serial Ports" on page 25.

Figure 12. NPM Front Panel

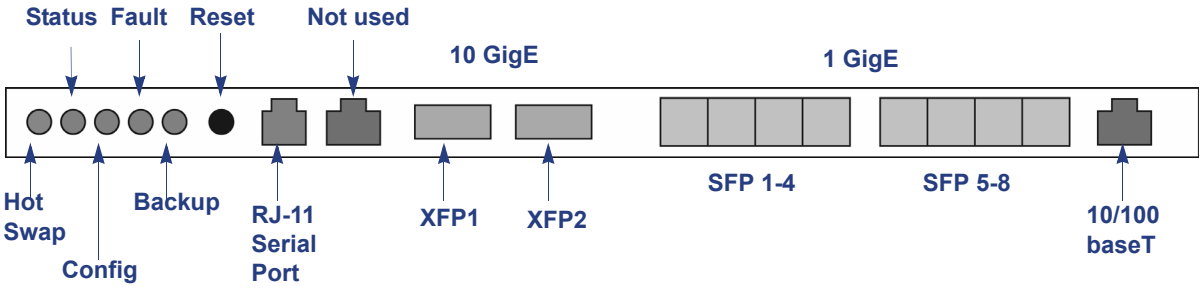



Figure 13. NPM2 Front Panel

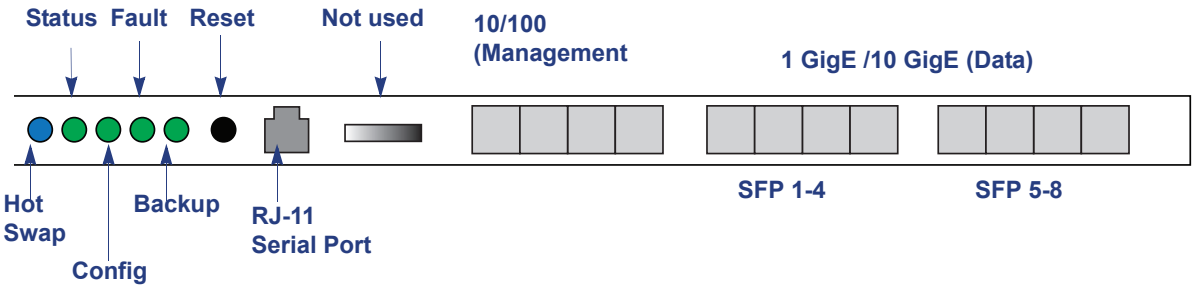



Table 7. NPM Models

| Name | Front Panel Label | Description | System Capacity | Slot Assignments |
|---|---|---|---|---|
| Network Processor Module | NPM | Purpose: receive and transmit MPEG-2 and H.264 transport streams carried in an SPTS and/or MPTS, encapsulated with UDP / IP or RTP / UDP / IP over GigE or 10GigE in GEN1 VMG:<br>• System management functions.<br>• Supports 1:1 module redundancy. | • Up to two.<br>• At least one is required. | 1, 2 |
| Network Processor Module2 | NPM2 | Identical to the NPM, plus packet inspection for GEN2 VMG. | | |

# NPM and NPM2 Interfaces

## Management Interfaces

- Eight bi-directional GigE ports:
  - Each GigE port supports small form factor pluggable (SFP) (16mm H x 42mm D) optical modules with a data rate of 1.0625Gbps according to IEEE-802.3z.
  - Each GigE port supports either single mode or multimode SFP optical modules (the NPM supports both types simultaneously), and operates on frequencies compliant with the optical channel plan defined in ITU G.692, 100 GHz channel plan appendix IV.
  - The NPM supports SFP modules with wavelengths of SX 850nm for short distances up to 65 meters, LX 1310nm for medium distances up to 10 kilometers, or LX 1550nm for long distances up to 70 kilometers.
  - The GigE port also supports SFP copper modules of full duplex 1000BaseT Ethernet with copper interfaces that are compliant with IEEE-802.3ab. The copper SFP module supports distances up to 100 meters.

## Data Interfaces

- NPM: Two 10GigE ports
  NPM2: Four 10GigE ports
  - Each 10GigE port supports pluggable 10 Gigabit small form factor pluggable (XFP) (23.5mm H x 67mm D) optical modules that are IEEE-802.3ae compliant with data rates of 10.3125Gbps. The NPM supports XFP modules with wavelengths of 850nm for distances from 26 meters to 300 meters, depending on the grade of fiber, and 1310nm for distances up to 10 kilometers.
  - Each 10GigE port receives input as MPEG-2 SPTS and MPTS with unicast or multicast, de-jitters up to 100ms of network jittering and routes the video or data streams to the appropriate application module (VPM, TCM, AMP).
  - The 10GigE ports can handle either constant bit rate (CBR) or variable bit rate (VBR) MPEG-2 as well as H.264 digital video streams in both SD and HD format, then deliver the processed video content over MPEG-2TS / UDP / IP / GigE or MPEG-2TS / RTP / UDP / IP / GigE unicast or multicast IP transport.
- NPM only: One Fast Ethernet (10/100BaseT) Management port for management and control, including SCTE 30 messages.
- One RJ-11 serial console interface for management access and event logging.
- Reset button.

# NPM and NPM2 LEDs

The NPM and NPM2 faceplate provides the LEDs listed in Table 8.

Table 8. NPM Front Panel LED Description

| LED Name | Color/Condition | Description |
|---|---|---|
| Hot Swap | Blue | NPM is ready for hot-swap. |
| | Flashing Blue | Transition between the hot-swap *not-ready* state to *ready* state, or from *ready* state to hot-swap *not-ready* state. |
| | Off | NPM is not ready for hot-swap. |

Table 8. NPM Front Panel LED Description (Continued)

| LED Name | Color/Condition | Description |
|---|---|---|
| Status | Red | Chassis interface is in fault state. |
| | Green | NPM payload powered and out of reset. |
| Config | Red | FPGA configuration in progress. |
| | Green | FPGA configuration is done. |
| Fault | Red | Fault. |
| | Green | In normal operation. |
| Backup | Red | Standby. |
| | Green | In operation. |

**Note:** *For a list of SFP and XFP modules approved for use with the NPM or NPM2, please refer to the VMG release notes and/or Imagine Communications Customer Portal.*

## NPM and NPM2 Management and Serial Ports

The NPM and NPM2 provides one 10/100BaseT Ethernet interface with an RJ-45 connector, compliant with IEEE-802.3ab. A serial console port with an RJ-11 connector is also provided.

### Serial Console Configuration—NPM and NPM2

- 19200 baud
- No parity
- 8 data bits
- 1 stop bit
- no flow control

### Serial Port Pinouts—NPM and NPM2

Table 9. NPM Serial Reference

| Pin Number | Name |
|---|---|
| 1 | No Connect |
| 2 | TXD |
| 3 | RXD |
| 4 | No Connect |
| 5 | GND |
| 6 | No Connect |

# VMG-14+ System Modules

The VMG-14+ platform supports the service module suite listed in Table 10. These modules are inserted into the front of the chassis cage for connection to the chassis backplane. During operations, the installed modules provide high speed routing and inter-module communication paths.

**Note:** *All VMG-14+ modules are hot swappable.System indicators are provided to ensure safe card swaps (see also "Hot Swap Indicators" on page 60).*

Table 10. VMG-14+ System Modules

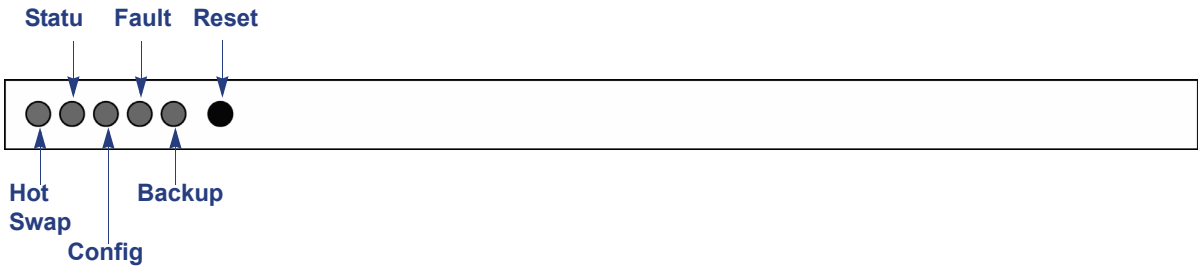
| Name | Front Panel Label | Description | System Capacity | Slot Assignments |
|---|---|---|---|---|
| Application Media Processor | AMP | Purpose: Audio transcoding for GEN1 VMG.<br>• Pairs with an NPM by connecting its Ethernet ports to ports 7 and 8 on the NPM.<br>• See also "Application Media Processor" on page 29. | Up to two | 3 (to pair with NPM slot 1)<br>4 (to pair with NPM in slot 2) |
| Video Processor Module | VPM | Purpose: Video and data traffic, and control messages for GEN1 VMG:<br>• Statistical multiplexing for SD programs and HD programs, and concurrent transrating.<br>• Digital ad insertion for CBR or VBR H.264 video and MPEG-2 video program streams.<br>• See also "Video Processor Module" on page 27. | Up to 12 | Slots 3 to 14 |
| Transcoding Module | TCM, TCM2, TCM2+ | Purpose: Video transcoding.<br>• NPM or NPM2 interfacing through the Selenio VMG chassis backplane, via the high speed bus fabric for the video and data traffic, and control messages.<br>• Transcoding functions: MPEG-2 to H.264 SPTS, H.264 to MPEG-2 SPTS, or MPEG-2 to MPEG-2 SPTS.<br>• Video resolution handling, up to HD resolutions.<br>• High capacity support for multiple HD streams through single device:<br>  • TCM and TCM2: up to 12 HD streams.<br>  • TCM2+: up to 24 HD streams.<br>• See also "Transcoding Modules" on page 28. | Up to 12 | Slots 3 to 14 |

# Video Processor Module

The VPM (Figure 14) provides the indicators described in the following section:

- "VPM LEDs" on page 27.

Figure 14. VPM Front Panel




## VPM LEDs

The VMP faceplate provides the LEDs list in Table 11.

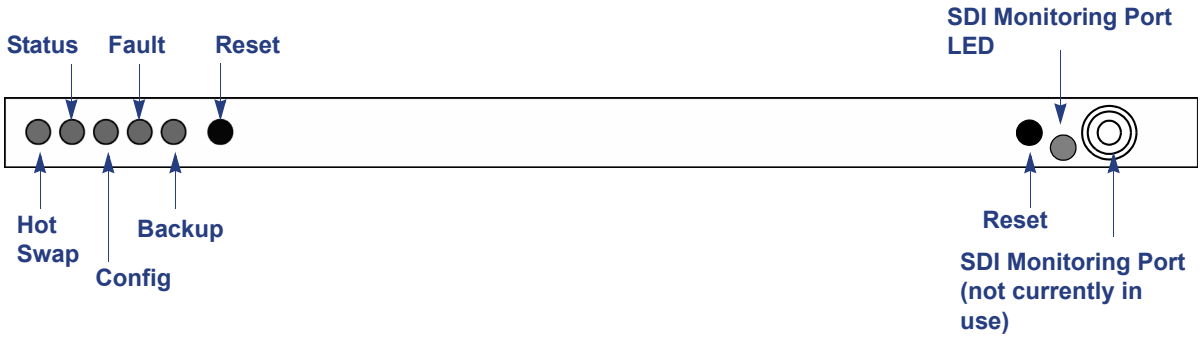
Table 11. VPM Front Panel LEDs

| LED Name | Color/Condition | Description |
|---|---|---|
| Hot Swap | Blue | VPM is ready for hot-swap. |
| | Flashing Blue | VPM is making transition from hot-swap *not ready* to *ready* state, or from *ready* state to hot-swap *not-ready* state. |
| | Off | VPM is not ready for hot-swap. |
| Status | Red | Chassis interface fault. |
| | Green | Payload up. |
| Config | Red | FPGA configuration in progress. |
| | Green | FPGA configuration completed. |
| | Orange | FPGA failure: reverting to factory defaults. |
| Fault | Red | Fault. |
| | Green | Normal operation. |
| Backup | Red | Standby. |
| | Green | In operation. |

# Transcoding Modules

The family of transcoding modules includes the TCM, TCM2, and TCM2+, which share common characteristics at their faceplates (Figure 15) and provides the indicators and functions described in "TCM, TCM2, TCM2+ LEDs," on this page.

Figure 15. TCM, TCM2, TCM2+ Front Panel




For TCM usage in the VMG-14+, the TCM must be compatible with the installed NPM or NPM2:

- Use TCM only with NPM (GEN1 VMG).
- Use TCM2 or TCM2+ only with NPM2 (GEN2 VMG).

## TCM, TCM2, TCM2+ LEDs

The TCM, TCM2, TCM2+ faceplate provides the LEDs listed in Table 12.

Table 12. TCM, TCM2, TCM2+ Front Panel LEDs

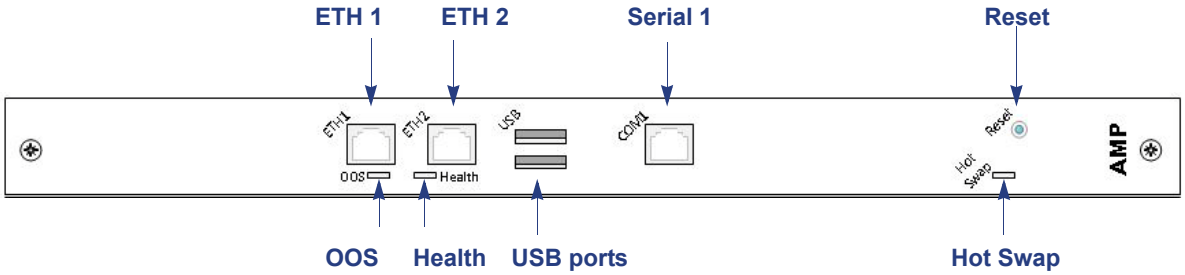
| LED Name | Color/Condition | Description |
|---|---|---|
| Hot Swap | Blue | TCM is ready for hot-swap. |
| | Flashing Blue | TCM is making transition from hot-swap *not-ready* to *ready* state, or from *ready* state to hot-swap *not-ready* state. |
| | Off | TCM is not ready for hot-swap. |
| Status | Red | Chassis interface fault. |
| | Green | Payload up. |
| Config | Red | FPGA configuration in progress. |
| | Green | FPGA configuration completed. |
| Fault | Red | Fault. |
| | Green | Normal operation. |
| Backup | Red | Standby. |
| | Green | In operation. |
| SDI Monitoring Port LED | n/a | This LED is currently not used. |

# Application Media Processor

The AMP (Figure 16) provides the interface, indicators and functions described in the following sections:

- "AMP Interfaces" on page 29.
- "AMP LEDs" on page 29.

Figure 16. AMP Module Front Panel.




For AMP usage in the VMG-14+, one AMP module is always paired with an NPM, using the following rules:

- The AMP in slot 3 must be paired with the NPM in slot 1.
- The AMP in slot 4 must be paired with the NPM in slot 2.

**Note:** *If you are using AMP Cards, you must install the same number of AMP cards as NPM cards. A configuration such as two NPMs and one AMP, or one NPM and two AMPs is not supported.*

**Note:** *If you are not using AMP Cards, you do not need AMP modules and can install TCM and VPM modules in slots 3 and 4 instead. If you previously used AMP modules and are now using TCM and/or VPM modules in those slots instead, you must power cycle the VMG in order for those modules to come up.*

## AMP Interfaces

The AMP module interfaces with an NPM via direct connectivity between the ETH ports of the AMP to the SFP GigE ports on the NPM. Each AMP must be paired to an NPM, using guidelines provided in "AMP-to-NPM Cabling" on page 49.

## AMP LEDs

Table 13 describes the AMP front panel LEDs.

Table 13. AMP Front Panel LEDs

| LED Name | Color/Condition | Description |
|---|---|---|
| OOS (Out of Service) | Red | System out of service. |
| | Off | System normal. |
| Health | Solid green | AMP firmware is active, payload enabled. |
| | Flashing green | AMP firmware is active, payload disabled. |
| | Off | AMP firmware is inactive. |

Table 13. AMP Front Panel LEDs (Continued)

| LED Name | Color/Condition | Description |
|---|---|---|
| Hot Swap | Solid blue | AMP board is inactive and ready to be swapped. |
| | Flashing blue | AMP board is activating/deactivating and unsafe to swap. |
| | Off | AMP board is active and unsafe to swap. |

# System Power

The VMG-14+ is available either as a DC system or an AC system. The components that provide the system power are described in the following topics:

- "AC System Power" on page 30.
- "DC System Power" on page 32.

**Note:** *There are no ON/OFF circuit breakers/switches on the VMG-14+ AC system. Once the system is cabled and connected to the site power source, the system powers up as associated with power-up of the source.*
*Circuit breakers will be provided on the DC PEMs for the VMG-14+ DC system.*

## AC System Power

An AC power system consists of four AC PEMs and four AC power supplies. Each PEM provides AC power for the individual AC power supply units (PSUs) directly in line at the rear connection. For normal operations, all PSUs should be present. An alarm is generated and reported at the *VMG Element Manager* if any are removed.

The AC PEM does not contain status indicators or control features, and does not communicate with the SCM. However, all communications with the AC power system occur between the AC PSUs the SCM. The SCM monitors each power supply for presence and operational status. Status indicators are provided on the AC PSU (Table 14).

The VMG-14+ AC system uses Imagine Communications-supplied power cords. Ordering information is provided in the "FRU Reference" on page 66.

Overall input specifications per AC PSU are 209-240V, 14-10A, 12-7A, 47-63Hz.

### AC Power Components

AC power components fit into the front and rear power bays of the VMG-14+ chassis:

- The front power bay contains up to four AC PSUs (Figure 17).
- The rear power bay contains up to four AC PEMs (Figure 19).

Figure 17. AC PSUs

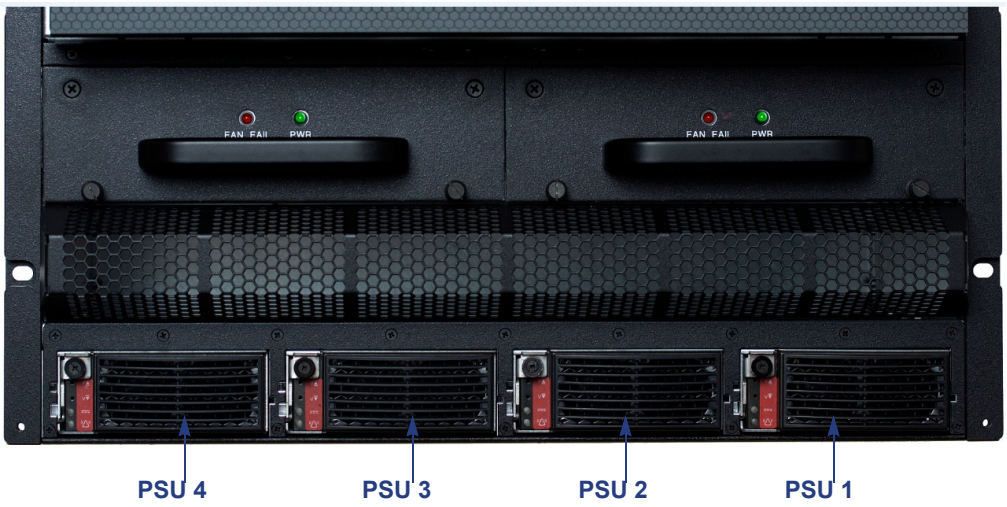



Figure 18. AC PSU Faceplate


## AC PSU LEDs

The front panel of the AC power supply unit provides the LEDs listed in Table 14.

Table 14. AC Power Supply LEDs

| LED Color | Condition | Description |
|---|---|---|
| Green | OK | AC output ON: AC power is present. |
| Red | Fault | ON: fault condition. AC output is OFF.<br>Flashing: warning condition. Can be triggered by events such as fans are running below speed, temperature exceeding high or low threshold, output current nearing maximum, or AC input outside range.<br>OFF: AC output ON |

Figure 19. AC PEMs


## DC System Power

The VMG-14+ can be powered using a regular telecommunications power supply of -48 nominal VDC with a VDC return. The specified voltage range is from -41 VDC to -60 VDC. The VMG-14+ supports redundant power supplies; each power supply should be independently powered by a dedicated source.

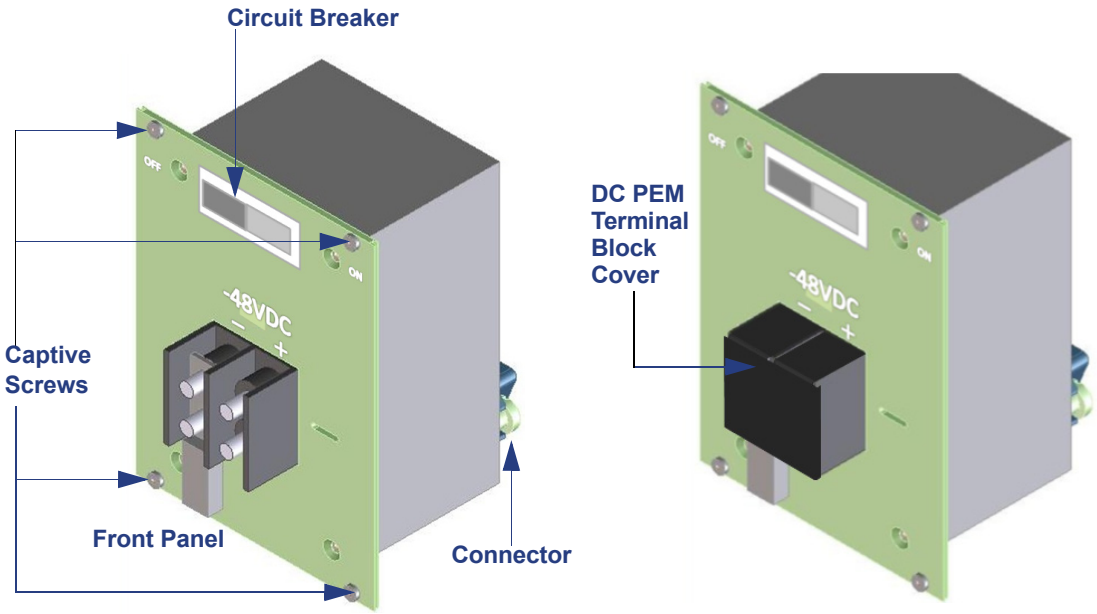
**Note:** *The DC PEMs are hot swappable FRUs. During servicing, however, remove only one PEM at a time to ensure that the system does not lose power.*

For maximum fault tolerance, the PEMs should be independently powered by separate feeds.

Up to four pluggable DC PEMs can be installed into the rear power bay of the VMG-14+ chassis.

- Each PEM provides power terminals for one 70A power feed.
- Each power feed consists of a -48V DC cable and its corresponding return cable.
- When cabled, the DC connectors should be shielded by the snap-on DC PEM terminal block cover (Figure 20). See also "DC PEM Terminal Block Cover" on page 33.

Figure 20. DC PEM



See also "Connecting DC Cables" on page 43 for DC cabling procedures. Troubleshooting information is provided in Chapter 5, "DC Power Servicing."

### DC PEM LEDs

The front panel of the DC PEM provides the LEDs listed in Table 15.

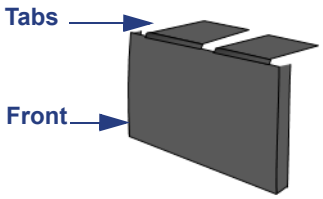
Table 15. DC PEM LEDs

| LED Color | Condition | Description |
|---|---|---|
| Green | Service state | Off - No power to the PEM. |
| | | Solid - Normal operation: DC power is good. |
| Red | Alarm state | Solid red = Error condition. |
| | | Solid Amber = -48 VDC supply voltage not connected to PEM, or fan failure on PEM. |

### DC PEM Terminal Block Cover

Use the snap-on DC terminal block cover (Figure 21) to protect the cabled connectors on the DC PEM. The unit can be positioned at the terminal block with tabs either at the upper edge, or at the lower edge.

Figure 21. DC PEM Terminal Block Cover



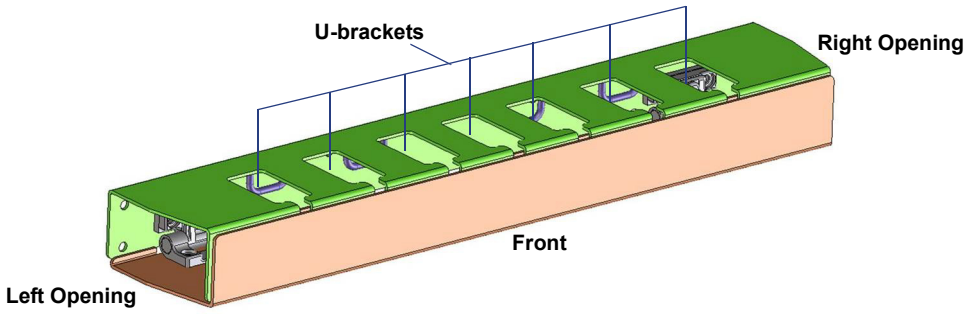

When placed in this position at the terminal block, the connected cables are guided out of the bottom edge.

To guide cables out of the top edge, position the tabs at the lower edge when snapping the unit into the PEM.

# Cable Management

The cable manage tray (Figure 22 and Figure 23) provides a means to organize the input and output cables that connect to various installed modules, without impeding the insertion or removal of modules in adjacent slots.

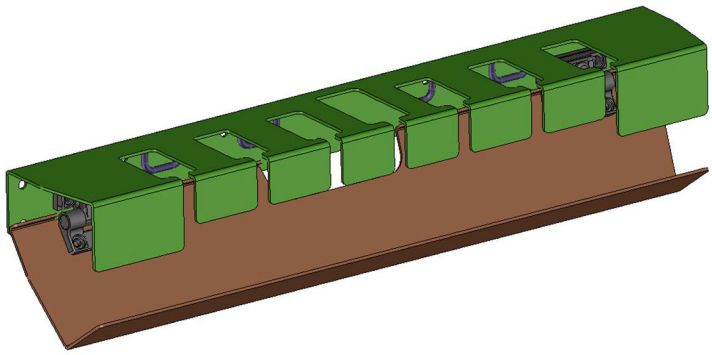
Figure 22. Cable Management Bracket (closed)




Imagine Communications recommends the following usage with the VMG-14+ Cable Tray

1. Connect a cable to an installed module.
2. Open the cable management bracket (Figure 23) and drop the cable down vertically—from the card—toward the tray.

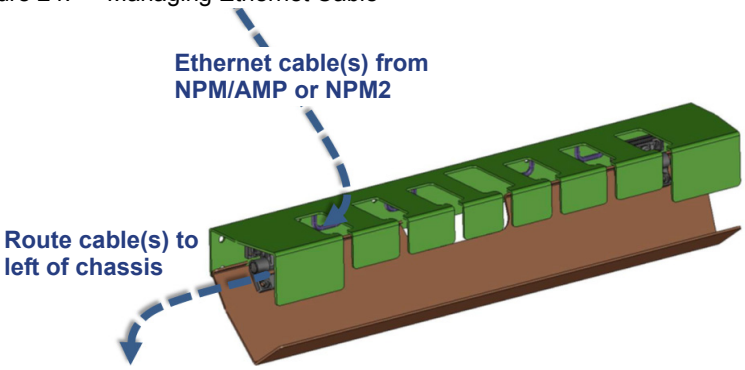
Figure 23. Cable Management Bracket (open)



3. Slide the cable into a U-bracket at the upper lip of the tray, and guide it out through the side of the tray.

   For Ethernet cable(s) from the NPM/AMP or NPM2 card(s), guide the cable(s) through the left-most U-bracket(s) and out through the left opening of the tray.

Figure 24. Managing Ethernet Cable




4. Close the cable management bracket.

# Filler Panels

To maintain proper airflow through the chassis, all empty slots must be shielded by a filler panel. Specific panels are designed for use with front and rear of the VMG-14+, as described in this section.

Imagine Communications provides filler panels for use at the front and rear cage slots of the VMG systems.

**Caution:** *All filler panels must be installed to maintain proper airflow and prevent air from escaping out of the front of an open slot. Filler panels should include an airflow baffle that extends to the backplane.*

## Front Filler Panel

The front filler panel for the VMG-14+ is a FRU intended for use on any empty slot at the front of the chassis. The system ships with front filler panels as appropriate for your order. See also "FRU Reference for VMG-14+" on page 66 for ordering information.

## Rear Transition Module (RTM)

RTMs are filler panels that cover each of the numbered slots at the rear of the chassis. Each is a blank cover that is one slot wide with screws at the left and right. The system ships with these installed and Imagine Communications recommends that these always remain in place to ensure proper airflow throughout the VMG-14+ system.

CHAPTER 3

# Physical Installation

This chapter provides the necessary information for installing the Selenio VMG into a rack and applying power. Please read this entire chapter before beginning the installation procedure.

Successful completion of this installation readies the system for the initial configuration.

## In This Chapter:



## Site Preparation

Imagine Communications recommends that the VMG operations site be prepared as described in the following topics:



### Tools and Equipment

The installation guidelines in this manual use the following tools, which you should provide at your installation site.

- 3/8" box wrench, socket wrench, or nut driver to attach cables to the DC PEM.
- 5/16" screwdriver and suitable screws to rack mount the chassis.
- Cable ties and cable clamps to secure power cords and signal cables.
- An anti-static pad or treatment if installing on vinyl composite tile, linoleum, or carpet.

### Site Equipment

The installation guidelines in this manual require the following equipment at the operations site:

- An equipment rack: EIA compliant 19":
  - The rack must be accessible from the front and rear for installation.
  - Ensure that any stabilizers that came with the equipment rack have been installed before mounting the chassis in the rack.
  - See also "Rack Requirements" on page 37.
- For DC power:

  - Dedicated primary branch circuit protection for each line feed supplied to the chassis.
  - It is recommended to use appropriately-sized circuit breakers that conform to local codes.
  - See also "Power Connectivity" on page 38.
- For AC power:
  - Dedicated outlet at wall in close proximity to the installation rack.
  - See also "AC System Power" on page 30.
- An ESD protection strap for use when installing or removing modules.
- A PC or workstation running terminal emulation software (such as Microsoft HyperTerminal). This will be used to communicate with the NPM management port during initial configuration.
- Slotted screwdriver.
- An Ethernet cable long enough to connect to the management workstation.

## Personnel

Minimally, two people are required for lifting the chassis, and for positioning and securing the chassis to the operations rack.

## Site Space Requirements

This equipment is intended for use only in a Restricted Access Location. The Selenio VMG relies on the building installation's safety measures for protection against short-circuit, over-current, and earth (grounding) fault. Precaution must be taken to ensure these protective devices are in place prior to installation, and that they are properly rated to protect the system.

- Keep tools and chassis components off the floor and away from foot traffic.
- Clear the area of possible hazards, such as wet floors, ungrounded power cables, and missing safety grounds.
- Keep the area around the chassis free from dust and foreign conductive material.

**Note:** *For complete environmental requirements, see "Environmental Specifications" on page 73.*

## Rack Requirements

The operations rack for the VMG-14+ must comply with the requirements listed in this section.

- **Elevated Operating Ambient**

  If installed in a closed or multi-rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
- **Reduced Air Flow**

  Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised. Air flow on the Selenio VMG is from right (ingress from the air filter) to left (from the front of the chassis).
- **Mechanical Loading**

  Mounting of the equipment in the rack should be in such a way as to ensure an even mechanical load in the equipment rack.
- **Circuit Overloading**

Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. When connecting equipment to a supply circuit, proper consideration should be taken to avoid overloading the supply circuits.

- **Reliable Earthing**

  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).

## Rack Allocation

- Allow 14 RUs for the Selenio VMG AC system.
- Allow 13 RUs for the Selenio VMG DC system.

## Power Connectivity

Power cables and cord for use with your Selenio VMG are described in the following sections:

- "DC-Power Cables," next.
- "AC-Power Cord" on page 39.

### DC-Power Cables

To ensure the safe and continued operation of the system, use specifications for chassis ground cabling (Table 16) and power cabling (Table 17). At each installed PEM, be sure to protect cabled DC connectors with the snap-on DC terminal block cover.

Table 16. DC Ground Connection Specifications

| Parameter | Specification |
|---|---|
| Wire size | 8 AWG. |
| Terminal | Use the cable shelf ground terminal provided on the rear of the chassis (Figure 27). |

**Note:** *Use only a UL listed crimp connector.*

Table 17. DC Power Connection Specifications

| Parameter | Specification |
|---|---|
| Wire size | 4 AWG, maximum length 3.0 m.<br>Terminal connections must use only UL listed ring terminals, such as the Panduit PM6-6R-L ring terminal. |

### AC-Power Cord

International AC power cords will be supplied (or recommended), as needed, to ensure that AC power connectivity is compliant with power requirements for your operations site.

**Note:** *The VMG-14+ requires AC input 240 VAC.*

# Electrostatic Discharge (ESD) Prevention

To prevent ESD damage during installation or removal of Selenio VMG modules, wear an ESD ground strap, and connect it to the ESD terminal at either the front or the rear of the chassis (Figure 25).

Figure 25. Location of ESD Jack


# Unpacking and Inspection

Begin inspection as soon as your Selenio VMG shipment arrives. If you see damage (such as punctures, damp spots, or crushed corners) anywhere on the shipping carton, do not proceed with the unpacking instruction in this chapter. Immediately notify the transfer company about the damage, and record the damage on the bill of lading.

Store the Selenio VMG in its original packaging until it is needed for installation.

Once you begin to unpack, do not discard any of the packing materials until you have completed the unpacking procedures and verified the integrity of your Selenio VMG shipment. You may need to reuse the materials if returning the product to Imagine Communications.

**Caution:** *When opening the shipping carton, use caution to avoid damaging the Selenio VMG.*

**Caution:** *Do NOT use module handles to lift the VMG system. The handles provided on the fan trays, PEMs, or cable trays cannot support the weight of the chassis.*

## Inspect Contents

The Selenio VMG chassis ships with blank cards loaded in the rear slots. The power modules, fan trays, and shelf control module cards are pre-loaded. All network and application modules are separately packed. Check to ensure that your shipping carton contains the following components, as compliant with your order:

- System modules, as ordered, and front filler cards (as appropriate).
  Each module is packed separately in your Selenio VMG shipping carton. Do not insert the network or application modules until the chassis is rack mounted.
- Power Supply Modules (PEMs): either AC or DC:
  - For DC: Up to four Power Entry Modules (PEMs), and a DC terminal block cover for each.
  - For AC: Up to four power supply units and up to four AC PEMs.

  PEMs are typically pre-loaded in the chassis and should not be removed except for servicing.
- Two front fan trays (each containing six fans).
  The fan trays are typically pre-loaded in the chassis and should not be removed except for servicing.
- Up to two Shelf Control Managers (SCMs).
  The SCMs are typically pre-loaded in the chassis and should not be removed except for servicing.
- 14 Rear Transition Module (RTM) Filler Panels.
  The RTMs are always pre-loaded in the chassis and should never be removed.
- One serial cable with serial connector.
- One chassis support shelf.
- Packaging.

## Verify Receipt

After removing the shipping contents from the carton, compare the contents of the shipping container against the packaging list to ensure you have received all components required for your installation of the Selenio VMG.

- If any components are missing, contact your Imagine Communications representative.
- If you need assistance, use the contact information provided in "Technical Assistance" on page 11.

# Installation Instructions

Installation of a new VMG system typically encompasses the tasks described in the following topics:

## Use ESD Protection

Ground yourself by attaching the plug from the ESD wrist strap to one of the ESD jacks on the chassis (Figure 25).

**Warning!** *Danger of electrostatic discharge. Static electricity can harm delicate components inside the Selenio VMG. An ESD wrist strap must be worn before unpacking or exchanging any part or electric component.*

## Installing the Chassis at the Operations Rack

**Note:** *To keep the chassis weight down, do not load the modules until the chassis is secured at the rack. Do, not, however, remove the power modules, SCMs, or fan trays.*

**Caution:** *Do NOT use module handles to lift the VMG system. The handles provided on the fan trays, PEMs, or cable trays cannot support the weight of the chassis.*

1. From the front of the rack, guide the chassis into the rack space until the chassis flanges are flush against the rack, and the mounting holes are aligned.
   - One person should hold the chassis from the front.
   - The other person should work from the chassis rear to guide the chassis onto to the chassis shelf.
2. Using eight (8) chassis rack mount screws, secure the chassis into the rack, tightening each screw incrementally until all four are evenly snug-tight.

## Inserting VMG Modules—New System

This section provides basic guidelines for inserting modules for a new system. Steps in this section should be used after each module has been removed from its shipping carton and inspected.

**Note:** *For instructions about how to handle module with a live system, see "Hot Swap Indicators" on page 60 and "Handling Application Modules-Live System" on page 61.*

1. At the card, extend the ejector levers fully by releasing the thumbscrew.
2. Hold both ejector handles and carefully align the module to the slot as you guide it toward the backplane:
   - Align the edge of the module with the slot track in the chassis.
   - Ensure that the alignment pins on the card are aligned with the corresponding holes on the chassis before pushing the card into the backplane connector (Figure 26).

**Note:** *It is not advisable to apply pressure directly to the faceplate when inserting the card into the slot. Always use the ejector handles.*

Figure 26. Card insertion—alignment


3. After pressing the card into the backplane, press the ejector handles down to the faceplate, to set each in closed position.
4. Tighten the thumb screws at both ends of the module faceplate.

## Preparing the Power Supply (For DC)

Use information in the following sections to set up the DC power supply for the Selenio VMG.

- "Electrical Warnings," next.
- "Grounding the Chassis" on page 43.
- "Connecting DC Cables" on page 43.

### Electrical Warnings

**Warning!** *High leakage current. Earth connection is essential before connecting supply.*

**Warning!** *Before working, ensure that the power is removed from the power connection cables. When the system is powered on, do **NOT** touch the power terminals.*

**Warning!** *Hazardous voltage! Before working, ensure that the power connection cables are disconnected from power. When the system is powered on, do **NOT** touch the power terminals.*

**Warning!** *The Selenio VMG is intended to be grounded. Ensure that the ground terminals are connected to the Protective Earth (PE) of the building.*

**Warning!** *Avoid electric overload. To avoid electrical hazard, do not make connections to terminals outside the specified voltage range for the Selenio VMG.*

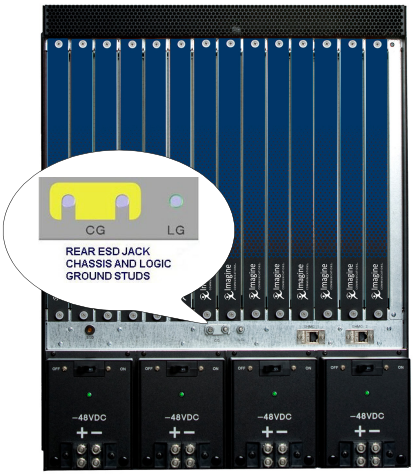
**Warning!** *Remove jewelry (rings, watches, etc.) before working on equipment that is connected to power lines.*

See "Localized Cautions and Warnings" on page 74 to read translations for all Warnings applied in this manual.

## Grounding the Chassis

The Selenio VMG provides a chassis and logic ground terminals—labelled **CG and LG (**Figure 27)—at the rear of the chassis. The CG terminal provides two threaded screws (10-32 UNF) with a 15.88 mm (.625 in.) spacing between thread centers to connect a double lug Shelf ground terminal cable.

Figure 27. Chassis (rear) Ground and Logic Ground—DC System

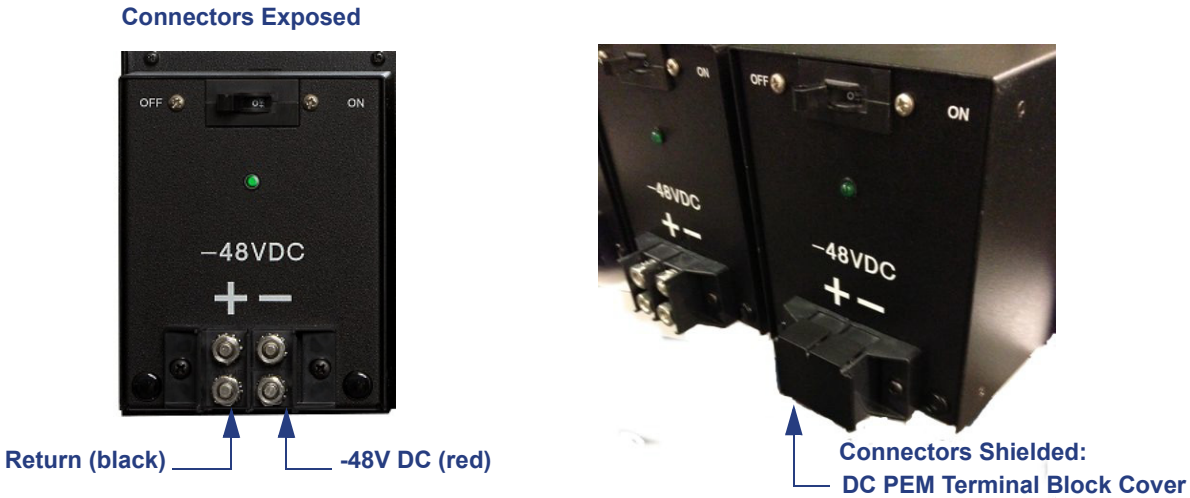



Use your site guidelines to determine the site grounding point for the chassis.

## Connecting DC Cables

Each DC PEM provides two pairs of 1/4" studs (1/4 - 20 UNC) for **Return** and for **48V DC (**Figure 28). See "DC-Power Cables" on page 38 for cable specifications appropriate for use with these studs. Use the snap-on DC PEM terminal block cover provided by Imagine Communications to protect cabled DC connectors.

Figure 28. DC PEM Cable Connectors



To connect DC cables to the Selenio VMG DC PEM:

1. Ensure that the power supply is turned off.
2. Connect the power cables to the power terminal. You can opt to position both cables either upwards or downwards of the connector. Torque the bolts to 6.8N-m (5 foot pounds).
3. Snap on the DC connector cover.

**Caution:** *Verify the correct polarity of the -48V DC and the RTN cables.*

4. Affix the cables with cable ties.

## Preparing the Power Supply (for AC)

The AC PEMs are four separate panels, which provide four sockets for AC plug-in. AC power supply units cannot function without the AC PEMs and AC Power supplies cannot use the DC PEM.

### Electrical Warnings

**Warning!** *High leakage current. Earth connection is essential before connecting supply.*

**Warning!** *Before working, ensure that the power is removed from the power connection cables. When the system is powered on, do **NOT** touch the power terminals.*

**Warning!** *Hazardous voltage! Before working, ensure that the power connection cables are disconnected from power. When the system is powered on, do **NOT** touch the power terminals.*

**Warning!** *The Selenio VMG is intended to be grounded. Ensure that the ground terminals are connected to the Protective Earth (PE) of the building.*

**Warning!** *Avoid electric overload. To avoid electrical hazard, do not make connections to terminals outside the specified voltage range for the Selenio VMG.*

**Warning!** *Remove jewelry (rings, watches, etc.) before working on equipment that is connected to power lines.*

See "Localized Cautions and Warnings" on page 74 to read translations for all Warnings applied in this manual.

## Grounding the Chassis

The Selenio VMG provides a chassis and logic ground terminals—labelled **CG and LG (**Figure 27)—at the rear of the chassis. The CG terminal provides two threaded screws (10-32 UNF) with a 15.88 mm (.625 in.) spacing between thread centers to connect a double lug Shelf ground terminal cable.

Figure 29. Chassis Ground and Logic Ground—AC Systems

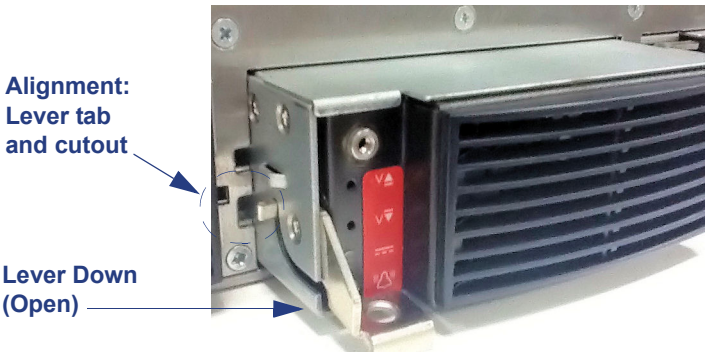

**Use your site guidelines to determine the site grounding point for the chassis.**

## AC Power Supply Units (PSUs)

Each AC power supply unit must be firmly seated at the chassis-front AC power bay. If you are installing the AC power supply unit for your system, use the following steps to ensure that each is properly inserted:

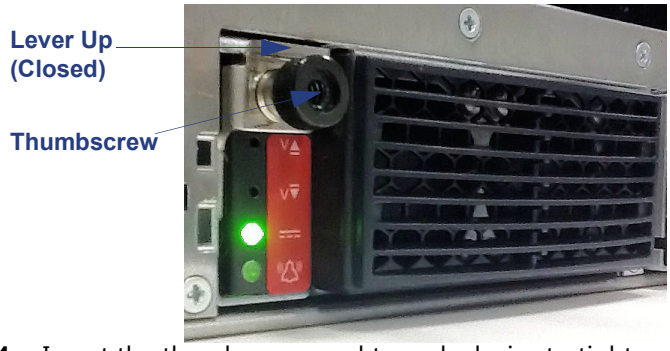
1. To insert an AC PSU, make sure the lever is in open position, and ensure that the lever tab can clear the entry cutout of the AC PSU slot (Figure 30).

Figure 30. AC Power Supply Unit: Ejector/Insertion Lever (Open)




2. Guide the power supply unit into a slot, at the chassis front power bay, until it stops.
3. Push the lever into the up position until it is completely closed (Figure 31). This will lock the PSU into the slot.

Figure 31. AC Power Supply Unit: Ejector/Insertion Lever (Close)

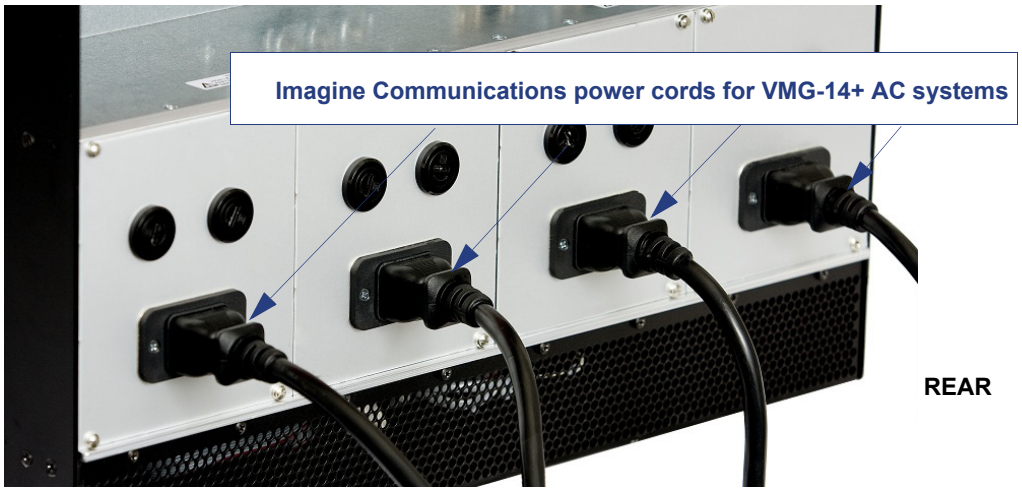



**4.** Insert the thumb screw and turn clockwise to tighten it.

## AC Power Entry Modules (PEMs)

Four AC PEMs are installed at the chassis rear, which contains sockets for up to four Imagine Communications power cords.(Figure 32).

Figure 32. AC Power Entry Modules with Imagine Communications-Supplied Cords




## AC Power Cord

Use only the AC power cords provided by Imagine Communications. Insert one into each applicable AC PEM socket and plug it into the dedicated wall outlet near the installation rack. There are no circuit breakers or ON/OFF switches. AC power is applied to the system directly from the site source.

# Loading the Application Modules

Use the guidelines from "Inserting VMG Modules—New System" on page 41, to re-insert the modules into the chassis.

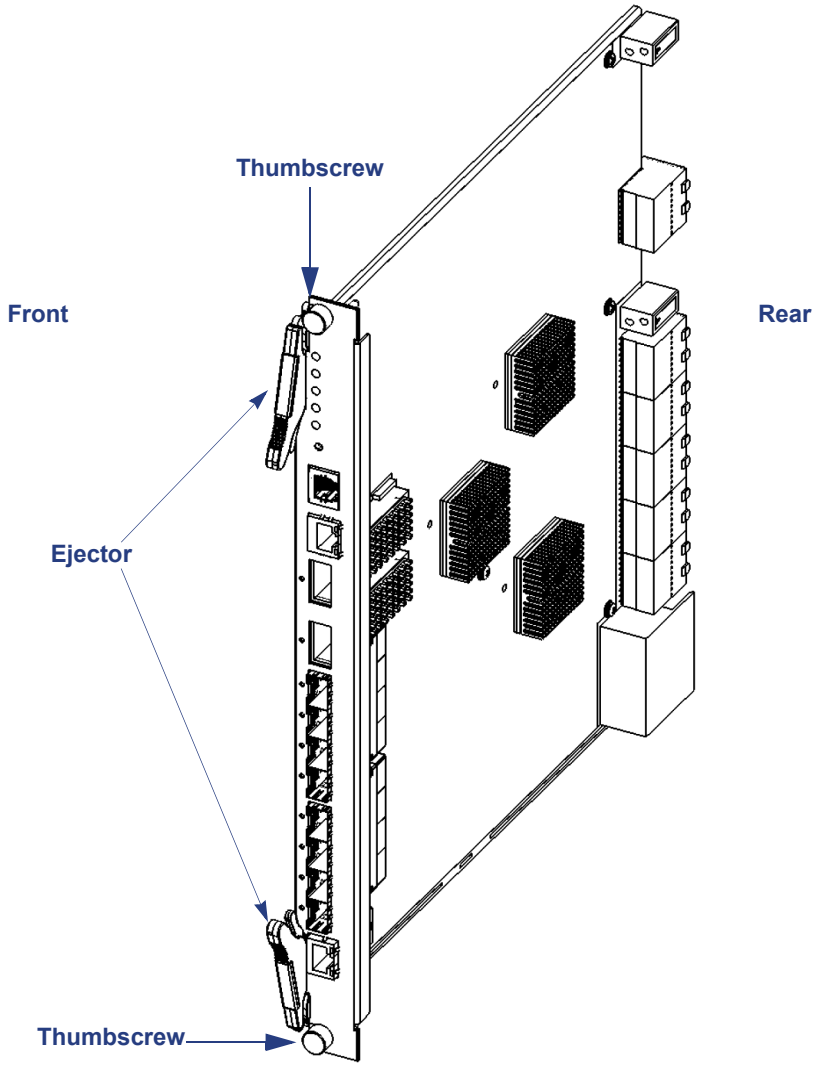
**Warning!** *At the front of the chassis, any empty card slot must be fitted with a filler panel to maintain proper air flow.*
*The system ships with rear slots 1 - 14 covered by RTMs. Do not remove these.*

## Network Processor Modules

**Slot Assignment**: Selenio VMG chassis-front, slot 1 and/or 2

Use the guidelines in "Inserting VMG Modules—New System" on page 41 to place and secure the NPM and NPM2 cards (Figure 33).

Figure 33. NPM or NPM2 Card



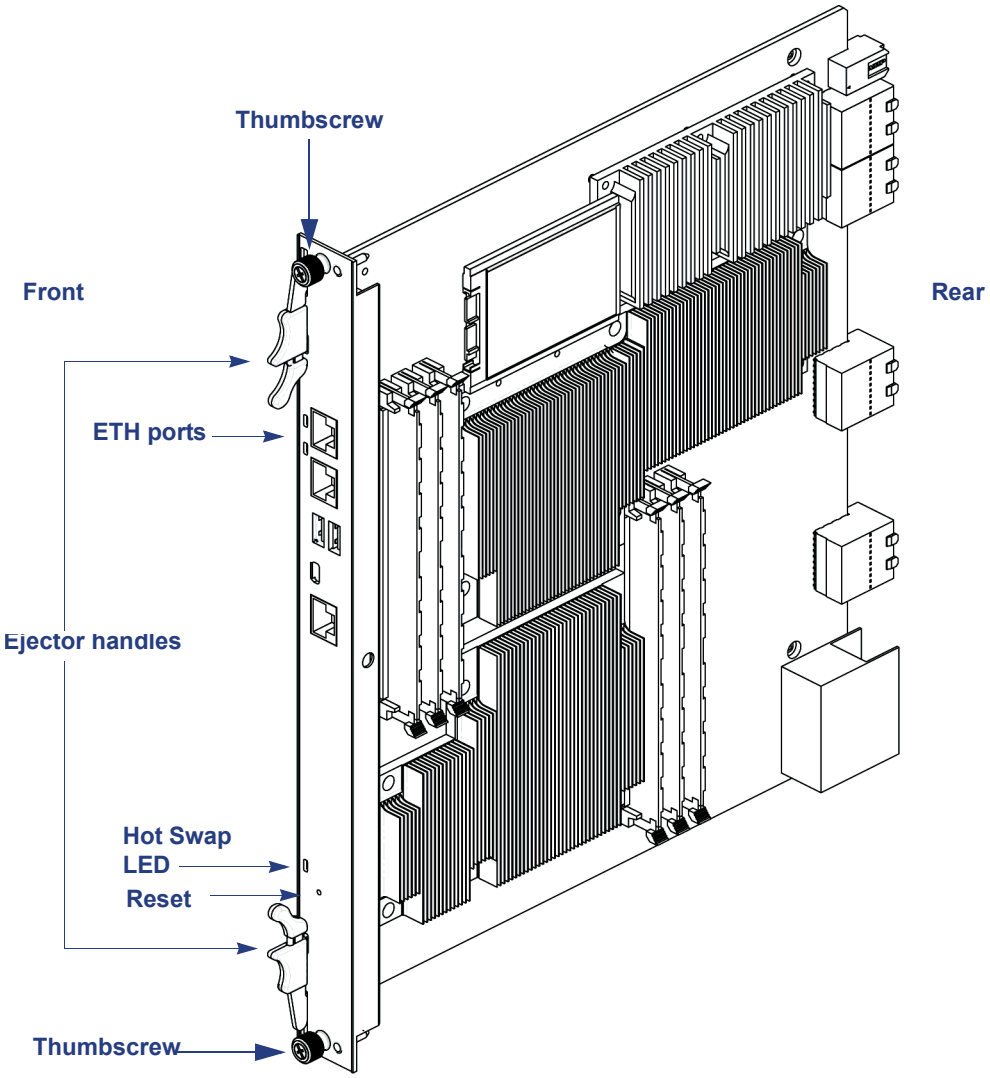
## Application Media Processor

**Slot Assignment**: VMG chassis-front, slot 3 and/or 4

**Note:** *The quantity of AMPs installed must equal the quantity of NPMs installed.*

Use the guidelines in "Inserting VMG Modules—New System" on page 41 to place and secure the AMP(s) (Figure 34).

Figure 34. AMP Card



# AMP-to-NPM Cabling

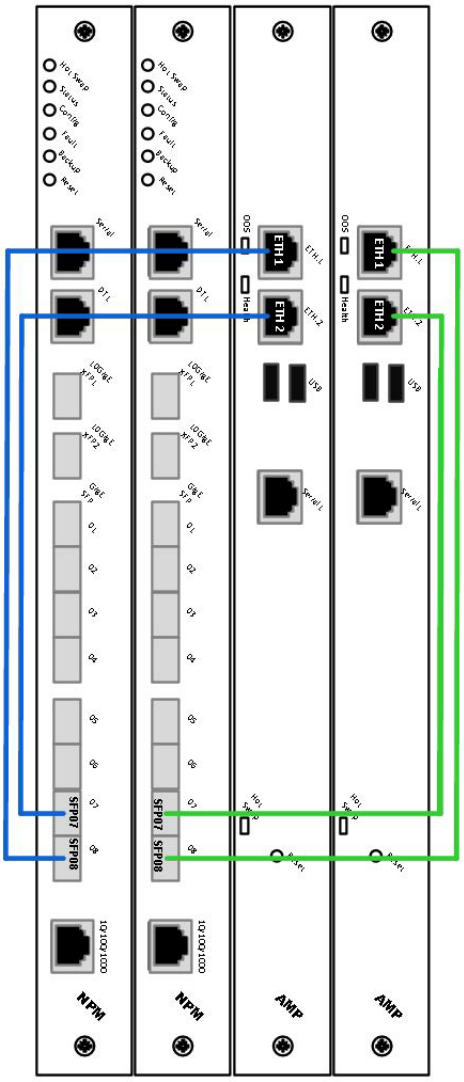
**Note:** *The AMP-to-NPM cabling described in this section applies only to VMG-14+ system loaded with a pair of VMG GEN 1 NPM cards.*

Once the AMP card is installed, use the cable Ethernet cable provided by Imagine Communications to connect the AMP card to its corresponding NPM card:

- Connect the AMP card in slot 3 to the NPM in slot 1.
- Connect the AMP card in slot 4 to the NPM in slot 2.
- Connect the Ethernet cable to ETH 1 on the AMP and GigE port 8 on the NPM.
- Connect the Ethernet cable to ETH 2 on the AMP and GigE port 7 on the NPM.

Figure 35 shows the front panel connections for a 2-NPM or NPM2 /2-AMP configuration at the Selenio VMG.

Figure 35. AMP Connections to an NPM or NPM2 Pair in the VMG-14+



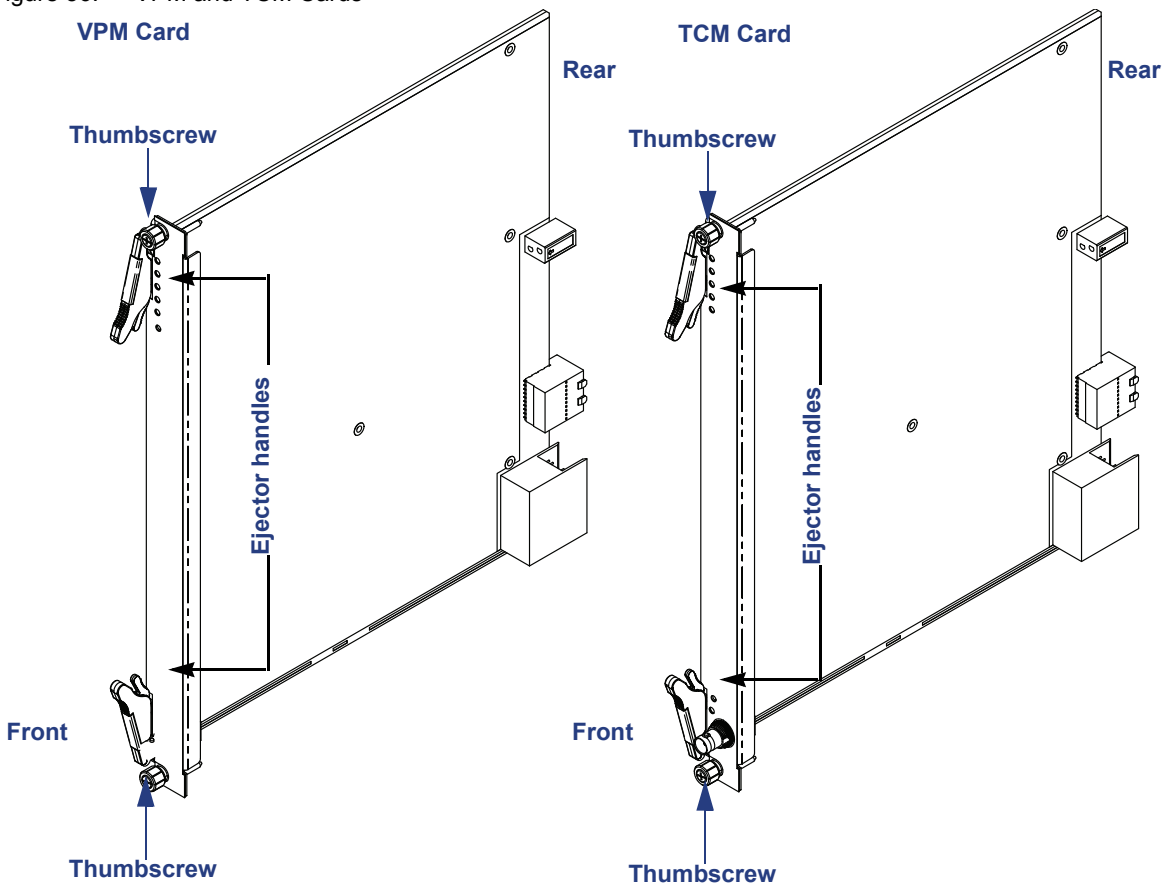

Additional information about AMP setup is available in the *Application Media Processor (AMP Installation Guide for VMG Systems* (part number 250-0104-01).

### Video Processing Module, and Transcoding Modules

**Slot Assignment**: VMG chassis-front, any slot in the range 3 to 14

Use guidelines in "Inserting VMG Modules—New System" on page 41 to place and secure the VPM card(s) or TCM or TCM2 or TCM2+ cards (Figure 36).

Figure 36. VPM and TCM Cards




## Double-Checking the Physical Installation

- Ensure that all modules are firmly seated.
- Ensure that the thumb screws for all modules are tightly secured.

**Caution:** *Ensure that Imagine Communications-supplied filler panels are installed in empty slots. This is necessary to maintain proper airflow and prevent air from escaping out of the front of an open slot.*

## Power Up and Verify

1. On a DC System, connect power to the PEMs.
   On an AC System, set the circuit breaker of each AC PEM to be used to the ON position.
2. Monitor the boot-up process, which proceeds as follows:
   - All of the LEDs on the SCM, the Fan Trays, the PEMs, the VPMs, the TCMs, and the NPMs illuminate.

- The fans spin up to full speed.
- The fans reduce speed to 25%, normal operational speed.
- The red LEDs on the PEMs and fan trays turn off.
- All blue Hot-Swap LEDs blink.
- All blue Hot-Swap LEDs turn off.
- All Status-OK LEDs should be green.

**Note:** *The status LED of the active SCM should be solid green.*

# System Initialization Preparation

Use guidelines in the section to prepare the system for the TCON method of initialization (which is described in Chapter 4, *Initial Configuration on page 52*).

## Required equipment

- Workstation with terminal emulation program (such as Microsoft Hyperterminal).
- Imagine Communications-specific serial cable (included in accessory package).

## Steps

1. Connect the serial cable from your workstation directly to the serial port of the NPM or the NPM2 in slot 1 of the VMG.
2. At the console, open a terminal emulation program with the following parameters:

```
19,200 bits per second
data bits=8
parity=0
stop bits=1
flow control=NONE
```

3. Tap the <ENTER> key several times to receive a prompt.

**Note:** *If the Selenio VMG has just been powered on (or the NPM has been inserted in the chassis), boot messages will be displayed. There are three sets of messages:*
*- The first set comes from startup of the OS kernel and the device drivers.*
*- The second set consists of internal communications.*
*- The third set comes from the startup up of video applications.*

4. If or when the boot messages have finished scrolling, the console program will be displayed. Tapping <ENTER> should re-display the TCON console program menu.
5. Set the IP configuration for the VMG-14+:refer to "Using TCON (Temporary Console) to Set Initial Configuration" on page 53.

CHAPTER 4

# Initial Configuration

Completion of the initial configuration enables management of the VMG by the management platform—Element Manager—which is built into the NPM or NPM2. The NPM system management system is the VMG *Element Manager*, which is a a Web-based GUI for configuration, monitoring and management of the chassis, NPMs, AMPs, TCMs, and VPMs. All configuration, monitoring and management control are XML-RPC based.

## In This Chapter:



## Selenio VMG Physical and Virtual IP Addresses

To provide NPM redundancy, there are two types of IP addresses employed by the Selenio VMG: physical and virtual. Each NPM installed in the Selenio VMG must have a physical address assigned to it during the initial system configuration. See "Using TCON (Temporary Console) to Set Initial Configuration" on page 53.

The Selenio VMG Element Manager uses 10.1.1.1 / 255.255.255.0 as the default IP address and subnet mask.

Configuring a virtual IP address for the Selenio VMG system means that IP connectivity to the Selenio VMG remains unchanged regardless of which NPM is active. Once the virtual IP address is configured on the Selenio VMG, this address will be used for subsequent access to the active NPM (the management interface) of the Selenio VMG.

# Prerequisites

Before beginning, be sure the console is connected to an NPM or NPM2, as described in Chapter 3, "System Initialization Preparation."

In a Selenio VMG system containing two NPMs, the configuration requires the following network addresses:

- Three IPv4 addresses (all in the same IP subnet).
- The subnet mask (netmask).
- The default router (gateway) address.
- The address of a DNS server (if one is not available, the address `0.0.0.0` may be used).

Initial configuration consists of connecting through the serial port and setting the *physical* IPv4 address, net mask, default router (gateway) address, and DNS server address for each NPM in the Selenio VMG. After the IP configuration has been set for the NPMs, a Web browser is used to complete the initial configuration. The browser is used to configure the following:

- The Virtual IP address that the VMG-14+ will use for GUI management access.
  Note that 10.0.1x and 10.0.2x subnets are reserved for VMG internal use only and cannot be used for the management interface.
- The address of one or more NTP servers.
- The time zone.
- The address of the syslog server (optional).

**Note:** *Although the syslog server is optional, it is highly recommended!*

**Note:** *The DNS, NTP and syslog servers are not required to be on the same IP subnet as the Selenio VMG. However, it is strongly recommended that the same NTP server be used for the Selenio VMG and all of its DPI (Ad) servers.*

# Using TCON (Temporary Console) to Set Initial Configuration

The temporary console (TCON) program displays a menu of actions, then prompts for the number identifying the action. Actions that require further input will issue a prompt for the needed values. If the **Enter** key is pressed when prompted for action, the menu will be re-displayed.

**Note:** *Customer use of TCON and the command line interface (CLI) is supported for initial configuration only as described in this section and "Using TCON (Temporary Console) to Set Initial Configuration" on page 53.*

## The TCON Main Menu

The TCON welcome screen is the TCON main menu, which contains five options.

```
Welcome to the Selenio VMG

Choose action:

          1)Display Mgmt IF configuration
          2)Configure Mgmt IF IP address, netmask, and gateway
          3)Check connectivity from Mgmt IF to gateway
          4)Reboot NPM
          5)Display build info

   Enter number of your choice:
```

For initial configuration, use options 1, 2, 3, and 5, as demonstrated in the following sections:

- "Viewing Current Configuration," in the next section.
- "Setting Network Addresses for the NPM" on page 55.
- "Verifying Gateway Connectivity" on page 55.
- "Viewing VMG Build Information" on page 56.

Once the management interface is configured for each NPM, the NPMs can be rebooted (using option 4 of the TCON main menu). You can then use a Web browser to access the *Element Manager* and finish the initial configuration (as described in "Using Element Manager to Finalize Initial Configuration" on page 56.

## Viewing Current Configuration

To view the configuration currently saved to the NPM, select **1** from the TCON main menu. Output similar to the following example will be displayed.

```
Enter number of your choice: 1

Configuration of Mgmt interface
-------------------------------------------------------------------

Configuration Saved in EEPROM

      MACblock=00:11:07:03:ED:E0 (used for all interfaces)
      MAC=00:11:07:03:ED:EA
      IP=10.32.144.240
      Mask=255.255.255.0
      GW=10.32.144.1
      DNS=10.32.11.11
Configuration presently on system

      MAC=00:11:07:03:ED:EA
      IP=10.32.144.240
      Mask=255.255.255.0
      GW=10.32.144.1
      DNS=10.32.11.11
-------------------------------------------------------------------
```

**Note:** *A management interface must be configured for each installed NPM at the VMG-14+ system.*

## Setting Network Addresses for the NPM

To set the network addresses for the NPM, select **2** from the TCON main menu. Output similar to the following example will be displayed.

```
Enter number of your choice: 2

Enter the mgmt interface IP address, netmask, gateway address, and DNS

address

Format is a single line of 4 dotted quads, for example:

      10.0.0.34     255.255.255.0     10.0.0.1    0.0.0.0
Hint: use 0.0.0.0 for DNS when none is available

values:
```

(At the values: line, enter the single line of four dotted quads for your configuration. Using values from the example Configuration of Mgmt Interface, this entry would look like the following):

```
  10.32.144.240     255.255.255.0    10.32.144.1    10.32.11.11
```

Enter values for each installed NPM in the VMG-14+ system.

## Verifying Gateway Connectivity

To verify connectivity with the default router (gateway), select **3** from the TCON main menu. Output similar to the following example will be displayed, where connectivity is enabled.

```
Enter number of your choice: 3

Pinging 10.32.144.1

------------------------------------------------------------------------

PING 10.32.144.1 (10.32.144.1): 56 data bytes

64 bytes from 10.32.144.1: seq=0 ttl=255 time=2.6 ms

--- 10.32.144.1 ping statistics ---

1 packets transmitted, 1 packets received, 0% packet los

round-trip min/avg/max = 2.6/2.6/2.6 ms
------------------------------------------------------------------------

** Connectivity OK
```

If connectivity is not enabled, a screen similar to the following example will be displayed.

```
Enter number of your choice: 3


Pinging 10.32.144.1

------------------------------------------------------------------------

PING 10.32.144.1 (10.32.144.1): 56 data bytes

--- 10.32.144.1 ping statistics ---

1 packets transmitted, 0 packets received, 100% packet loss
------------------------------------------------------------------------

** Have a connectivity problem
```

## Viewing VMG Build Information

To examine current system build information, select **5** from the TCON main menu. Output similar to the following example will be displayed.

```
Enter number of your choice: 5


Build info

-----------------------------------------------------------------

Software Version: 1.1.1 Build# 65583
Imagine Communications Date: 2013-09-11 01:43:45 VMG-TCM
-----------------------------------------------------------------
```

# Using Element Manager to Finalize Initial Configuration

Using a web browser, type the physical IP address of the active NPM's management interface.

**Note:** *If two NPMs are installed, the active NPM will be the module in Slot 1.*

The URL will be the IP address preceded by 'http://' (e.g., if the IP address is `10.32.97.181` the URL is `http://10.32.97.181`). Successful web connection with the VMG results in display of the Video Multiprocessing Gateway Home page (Figure 37),

Figure 37. Selenio VMG Home Page


**Note:** *The VMG Element Manager requires that the PC on which it is running have Java™ Runtime Environment (JRE) v1.6 Update 39 or higher, or version 1.7 Update 12 or higher. If your PC does not have the correct JRE installed, it is available free-of-charge from the following sources:*
*- Imagine Communications Customer Portal.*
*- Oracle® website—at the Java Technologies pages.*
*You can access the Oracle website from the Download Java link of the VMG Home page.*

To obtain installation instructions and the latest version of JRE that is compatible with the *VMG Element Manager,* log in to Imagine Communications' Customer Portal and search for *Download Java Runtime Environment*.

1. Click the **Launch** Selenio VMG **Element Manager** link.

   After clicking through the various Java applet options and accepting the EULA, the *VMG Element Manager* login screen is displayed (Figure 38).

   Figure 38. *VMG Element Manager* Login


2. At the *Log in* screen, make sure the **User** field is set to ***Administrator,*** then enter ***Admin*** in the **Password** field.

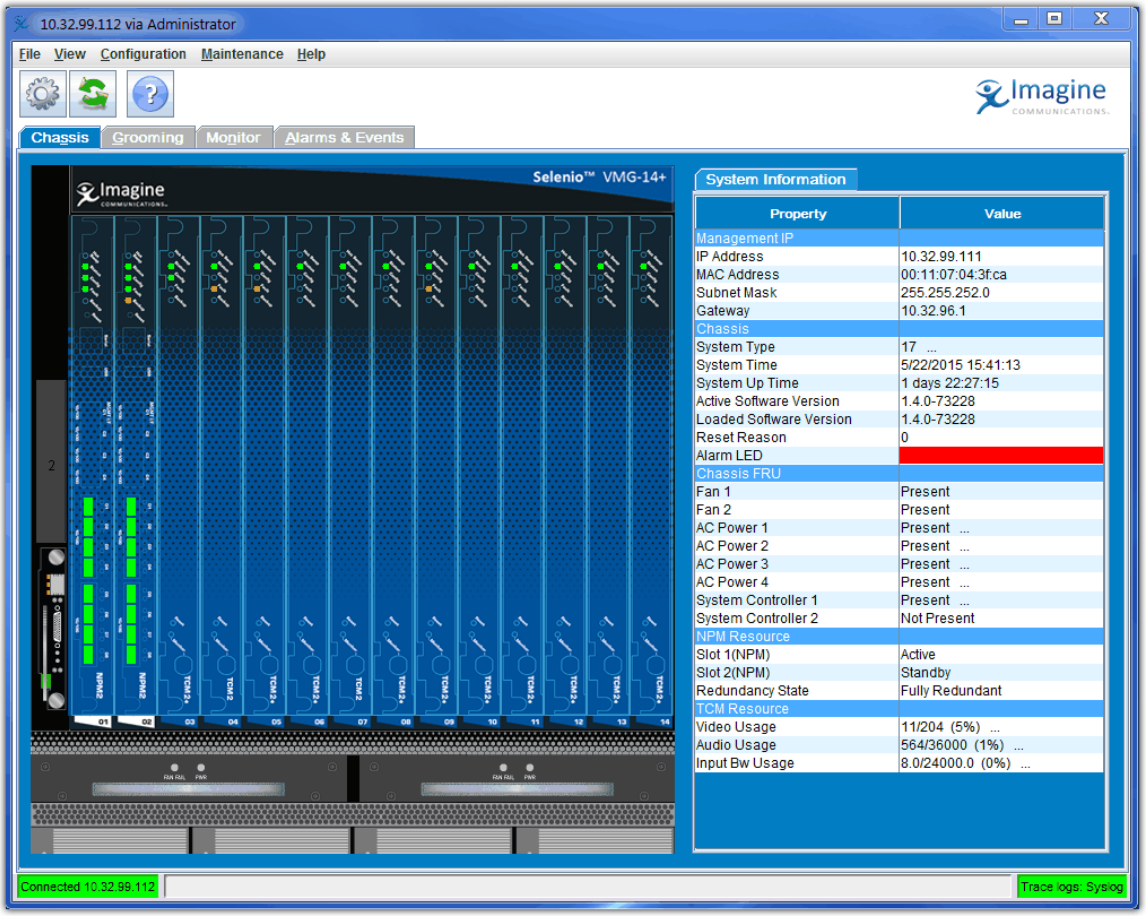
   If using an AAA server account, *type* the AAA login name in the **User** field and the AAA password in the **Password** field).

3. Click **Log in** (or use **Alt l**) to continue with the login.

   Upon logging in, the initial view defaults to the **Chassis** tab as seen in Figure 39, which displays a representation of the physical VMG-14+ and its populated slots.

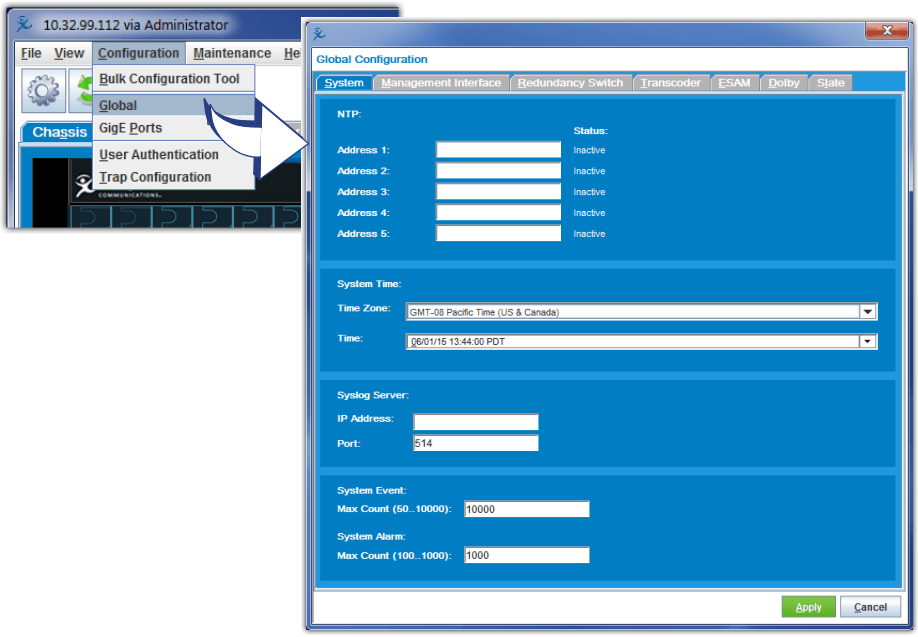
   - The **System Information** window on the right side of the screen provides details of the system in general.
   - Right-clicking on a particular card in the chassis opens a pop-up window for viewing additional information or configuration parameters for the card or system.
   - You can also use drop-down functions available from the Menu Bar located at the upper edge of the Element Manager window.
   - Use the scroll bar, at the right edge of the screen, to view the lower portion of the AC or the DC chassis.

Figure 39. *Element Manager* - Chassis View



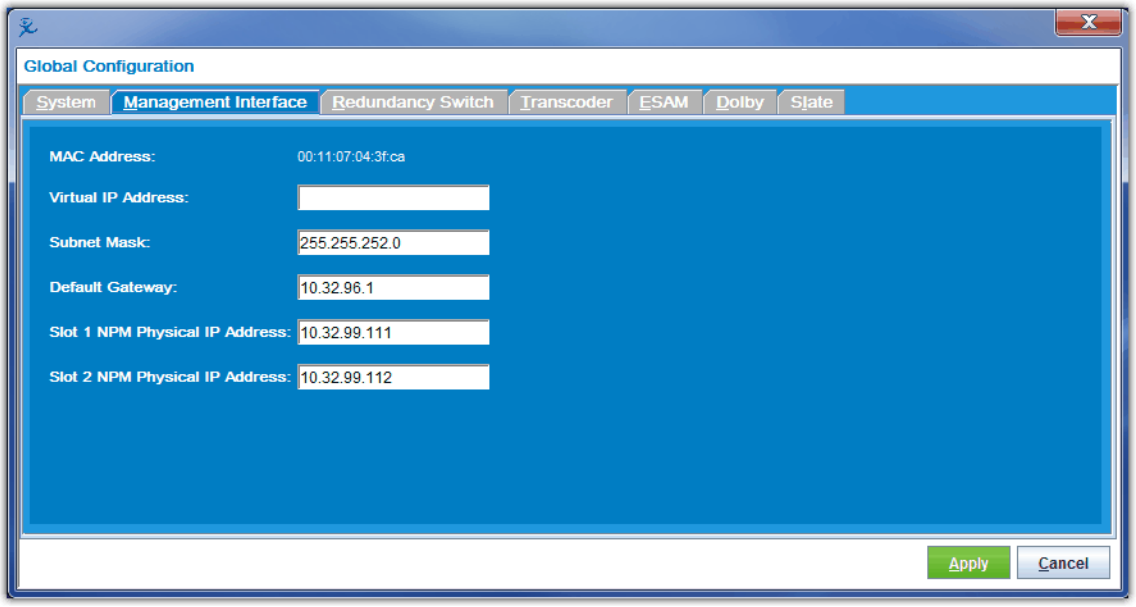

4. From the main menu bar, select ***Configuration*** -> ***Global*** from the drop down menu to present the **Global Configuration** window, which defaults to display of the **System** tab (Figure 40).

Figure 40. Accessing System Parameters



5. In the **System** tab, enter the value for (minimally) one NTP server address and the **Time Zone**.
6. Optionally, enter the **Syslog Server IP Address** and **Port** number (the typically UDP port for syslog is 514).
7. Click on the **Management Interface** tab (Figure 41) to access configuration fields for the virtual (management) IP address of the system. The IP address configured here will be used to access the VMG-14+.

Figure 41. Global Configuration - Management Interface Tab




8. In the **Virtual IP Address** section, enter the **IP Address**, **Subnet Mask** (netmask), and **Gateway** (default router) address (if used).
9. Click **Apply** (or use **Alt a**) button to commit the values and complete initial configuration.

**Note:** *For instructions on configuring the VMG-14+ with the Element Manager, refer to the Selenio™ VMG-14+ Element Manager User Guide.*

CHAPTER 5

# Troubleshooting and Maintenance

This chapter provides recommended procedures for maintenance of VMG-14+ system components. Troubleshooting advice and Imagine Communications Customer Support information is also included in this chapter.

## In This Chapter:



**Warning!** *Static electricity can harm delicate components inside the chassis. You must wear an ESD wrist strap exchanging any part or electrical component. Connect your ESD strap to the ESD jack at the rear of the VMG-14+ chassis.*

## Hot Swap Indicators

Before removing or servicing modules on a live system, it is important to notice current swap-readiness of the module, as indicated by the **Hot Swap** LED at the front panel of the module. During operations, the **Hot Swap** LED remains Off until the ejector levers are opened. After opening the levers, you should wait until the **Hot Swap** LED becomes solid blue before extracting the module from the system. Table 18 lists the LED information important for hot swaps of the VMG modules.

Table 18. **Hot Swap** LED

| State | Description |
|---|---|
| Off | The shelf manager is not ready to be removed/disconnected from the chassis. |
| Solid Blue | The shelf manager is ready to be removed/disconnected from the chassis. |
| Long-blink | The shelf manager is activating. |
| Short-blink | Deactivation in progress. |

# Handling Application Modules-Live System

This section describes how to handle the NPM and application modules in a VMG system that is up and running, in the following topics:

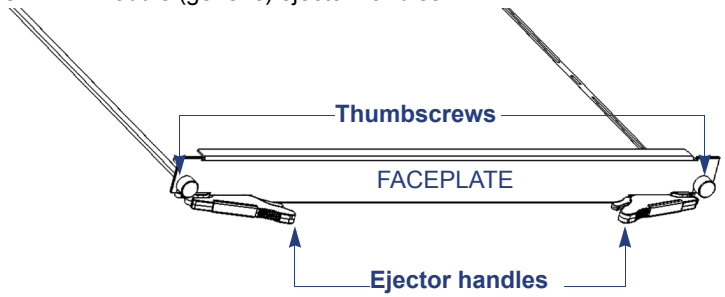
- "Removing VMG Modules from a Live System" on page 61.
- "Replacing VMG Modules at a Live System" on page 62.

To see instructions for a new (unpopulated and not initialized) system, refer to "Inserting VMG Modules—New System" on page 41.

All VMG modules use ejector handles, which are located at opposite ends of the faceplates (Figure 42). Handling the ejector handles on a live system results in the following behaviors:

- Activity at the Hot Swap LED, which lets you know when it's safe to remove the card, when opening the ejector handles.
- LED indications on the card faceplate when replacing the card, which informs if the card is operating properly.

Figure 42. Module (generic) ejector handles




## Removing VMG Modules from a Live System

Be sure to have the replacement card or the filler card available whenever removing a card from a live system. You should re-populate the slot as soon as possible after removing a card from it.

1. Unscrew the two thumb screws at both sides of the module faceplate.
2. While holding both ejector handles, slowly and simultaneously unlatch them until the **Hot Swap** (blue) LED begins blinking.
3. Wait until the **Hot Swap** LED stops blinking and becomes solid blue. It is now safe to remove the card.
4. With both ejector handles fully extended, hold onto each and pull to guide the module out and away from the chassis.

**Note:** *It is not advisable to grasp the faceplate when pulling the card from the slot. Always use the ejector handles.*

## Replacing VMG Modules at a Live System

1. Use steps provided in "Inserting VMG Modules—New System" on page 41.
2. After securing the module in the slot, check the LEDs on the faceplate to ensure that the module is functioning as expected (Table 19).

Table 19. Hot Swap LED Reference

| Indication | Recommended Action |
|---|---|
| Blue hot-swap LED is unlit | Ensure the card is fully seated and the ejector handles are completely locked. |
| | Verify power is getting to the chassis. |
| Blue hot-swap LED is on solid | Ensure the ejector handles are completely seated and locked. |
| | Verify the Shelf Manager is properly installed. |

# DC Power Servicing

Each DC PEM is a fully serviceable FRU. When servicing DC power, and to avoid losing power to the chassis, make sure that you do not remove more than one PEM at a time.

1. Determine which of the DC PEMs is not operating. A non-functional PEM has a non-illuminated LED.
2. Remove the DC PEM terminal block cover, and set it aside.

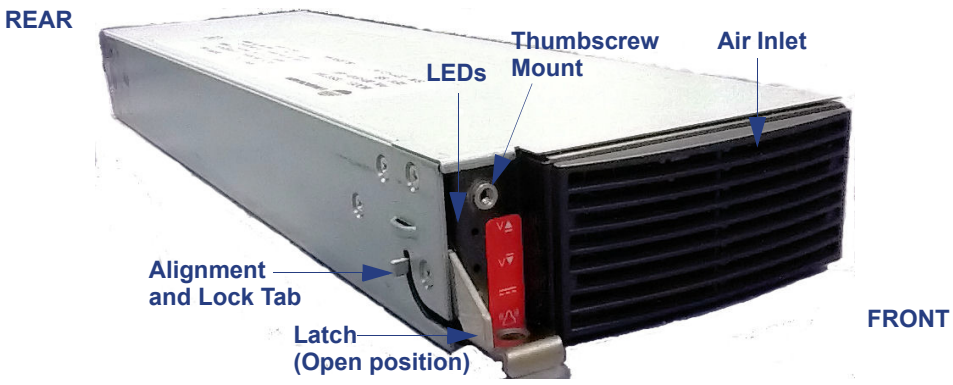
**Note:** *You should check to ensure that the power feed to the non-functional DC PEM is de-energized.*

3. Using a 7/16" nut driver, disconnect the input wires from the terminal block bolts.
4. Using a Phillips screwdriver (size PH1), loosen the four captive screws around the DC PEM faceplate.
5. Pull the DC PEM out and away from the DC power bay. When the PEM is completely extracted, you will see the DC PEM connector at the chassis.
6. Guide the new PEM into the empty PEM slot, making sure to fully seat the PEM into the connector.
7. Using a Phillips screwdriver (size PH1), tighten the four captive screws around the DC PEM faceplate.
8. Reconnect the input wires at the terminal block bolts, positioning the cables either upwards, or downwards, and torque the bolts to 6.8N-m (5 foot pounds).
9. Snap the DC PEM terminal block cover onto the PEM connector block, positioning the tabs opposite to the cables.
10. Ensure that the DC PEM LED is illuminated green.

# AC PSU Servicing

Each AC PSU is a fully serviceable FRU (Figure 43) fits into a slot in the front power bay of a VMG-14+ AC system; the system accommodates up to four AC PSUs.

Figure 43. AC PSU for VMG-14+ AC System

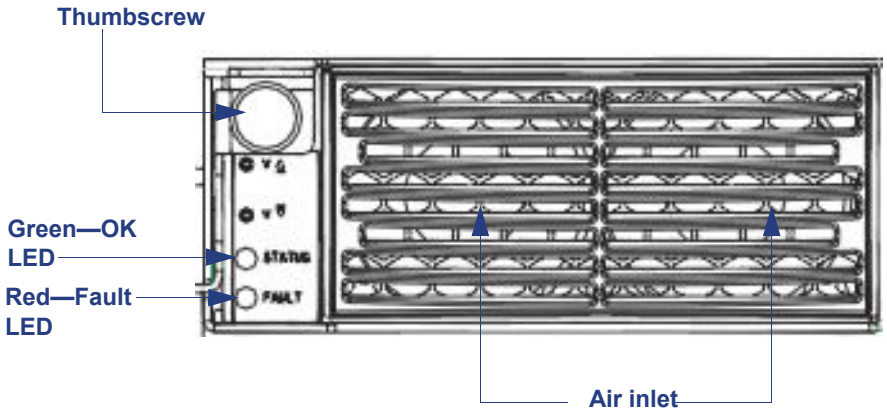



## Replacing an AC PSU

The procedure for hot-swapping an AC PSU, in this section, is applicable for a system that is currently running.

1. Remove the faulty PSU.
   - Unscrew the thumbscrew and set it aside.
   - Set the latch into open position, and gently guide the AC PSU out and away from the slot.
2. Insert the replacement PSU.
   - Guide the AC PSU into the empty slot, and adjust the latch so that the latch tab can clear the slot cutout, then push the AC PSU in until it stops.
   - Guide the latch into upright position. It should be completely flush with the surface of the front panel when fully closed.
3. Insert the thumbscrew and twist to finger-tight.
4. Check the LEDs at the front panel of the AC PSUs (Figure 44). The Green LED should now be illuminated.

Figure 44. AC Power Entry Module



# Shelf Control Manager Servicing

For a front panel view of the SCM, see Figure 8 on page 19.

## SCM Removal

1. Unscrew the thumb screws at the opposite ends of the SCM.
2. Open the extraction levers slowly and simultaneously until the **Hot Swap** (blue) LED begins blinking.
3. Wait until the **Hot Swap** LED stops blinking, and becomes solid blue.
4. Extend the levers completely, continue holding them, and pull the SCM out of the slot.

## SCM Replacement

1. Extend the ejector levers fully by releasing the thumbscrew.
2. Carefully align the edge of the SCM with the slot in the chassis and gently slide it in.
3. Press the module into the backplane and lock the ejector levers in place, making sure that the retaining hooks are properly engaged.
4. Tighten the thumb screws at both ends of the module faceplate.
5. Check the LEDs to ensure that the module is functioning as expected.

**Warning!** *Some shelf managers can contain a lithium battery. There is a risk of explosion if the battery is replaced with an incorrect type. Dispose of used batteries according to the instructions.*

# Fan Tray Servicing

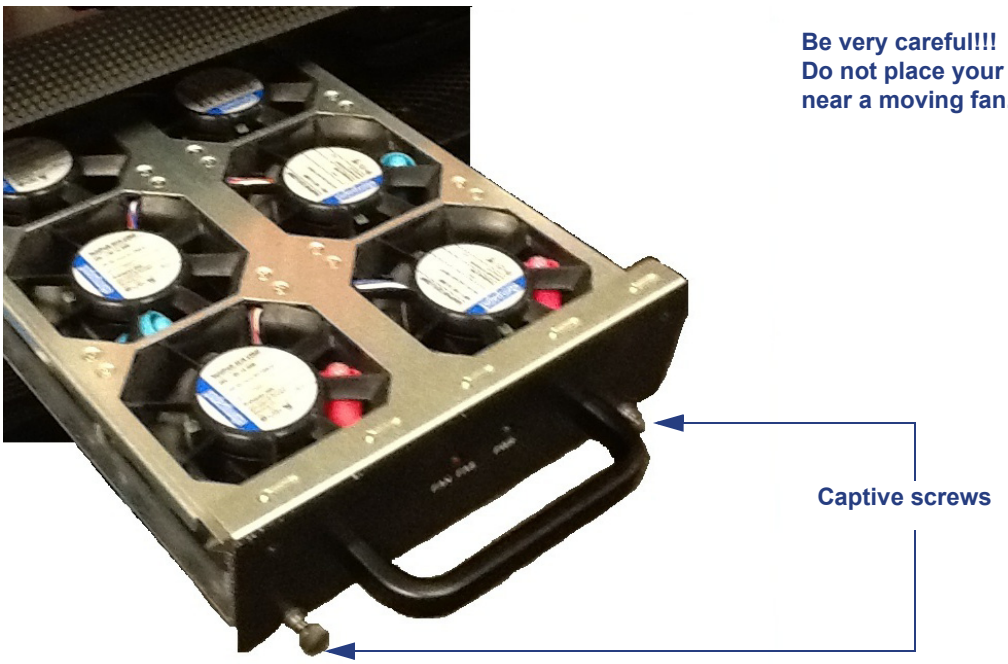
You can remove either of the two fan trays without disruption to service or degradation to system cooling. It is not advisable to remove more than one from the system at any time.

VMG chassis fans within the chassis fan trays are not individually serviceable: do not attempt to remove or service a fan within the fan tray. Refer to Figure 9 on page 21 for Fan Tray component information.

## Fan Tray Removal

1. Determine which of the Fan Trays has failed by looking at the LED on the Fan Tray faceplate. If the LED is red, the Fan Tray is not operating properly.
2. Using a 0.250-in slotted screw driver, loosen the lower captive screws on the Fan Tray faceplate.
3. Grasp the Fan Tray handle and slowly guide the fan tray out and away from the chassis.

Figure 45. Fan Tray Removal




### Fan Tray Replacement

1. Guide the fan tray into a fan tray slot at the VMG-14+ chassis until it is firmly seated.
2. Using a 0.250-in slotted screw driver, tighten the lower captive screws on the Fan Tray faceplate.
3. At the Fan Tray LED, check to ensure that the OK LED is illuminated.

## Fan Filter Tray Servicing

The Fan Filter tray should be checked periodically to rule out excess dust collection. A dirty air filter can cause overheating of the system. Imagine Communications recommends that air filters be replaced every three to six months, or more often (as dependent on conditions in the operations site).

To view the location of the Fan Filter Tray, see "Fan Filter Tray" on page 22.

### Fan Filter Removal

Remove the air filter by grasping both handles on the air filter tray, and sliding it out and away from the air filter slot.

### Fan Filter Replacement

Grasping the handles of the Fan Filter Tray, carefully align and insert the new Fan Filter into its slot at the front of the VMG-14+ chassis.

# FRU Reference

Field replacement units for the VMG-14+ can be ordered, using the component identifiers listed in Table 20.

Table 20. FRU Reference for VMG-14+

| Components / Spares | Part |
|---|---|
| VMG-14+-CHASSIS-AC | VMG-14+ AC Chassis. |
| VMG-14+-CHASSIS-DC | VMG-14+ DC Chassis. |
| VMG-NPM | Network Processing Module. |
| VMG-NPM2 | Network Processing Module, 2nd Generation |
| VMG-VPM | Video Processing Module. |
| VMG-TCM | Transcoding Module. |
| VMG-TCM2 | Transcoding Module, 2nd Generation |
| VMG-TCM2+ | Transcoding Module, 2nd Generation Plus |
| VMG-AMP | Application Media Processor. |
| VMG-14+-SCM | VMG-14+ Shelf Control Manager. |
| VMG-14+-FAN-TRAY | VMG-14+ fan tray. |
| VMG-14+-AIR-FILTER | VMG-14+ Replacement air filter. |
| VMG-14-MODULE-FILLER-PANEL | VMG-14+ filler panel for front slots. |
| VMG-14+-DC-PEM | DC power entry module for use with VMG-14+. |
| VMG-14+-AC-PEM | AC power entry module for use with VMG 14+, |
| VMG-14+-AC-PSU | AC power supply unit for use with VMG-14+. |
| VMG-14+-DC-CABLE | DC cable for use with VMG-14+ DC system. |
| VMG-14+AC-CORD-NAM-240V | AC power cord for use with VMG-14+ AC system. |

# If You Need Assistance

Additional guidelines that may be helpful during your VMG-14+ installation are provided in the following topics:

- "Imagine Communications Technical Response Center," next.
- "Imagine Communications Customer Portal" on page 67.
- "Event Log Analysis" on page 67.

## Imagine Communications Technical Response Center

For issues beyond the scope of this manual, contact the Imagine Communications Technical Response Center (TRC). Imagine Communications' TRC provides 24x7 access to professional services, via phone, email, and web (see also "Technical Assistance" on page 11).

Before contacting Imagine Communications Customer Support, gather the following information:

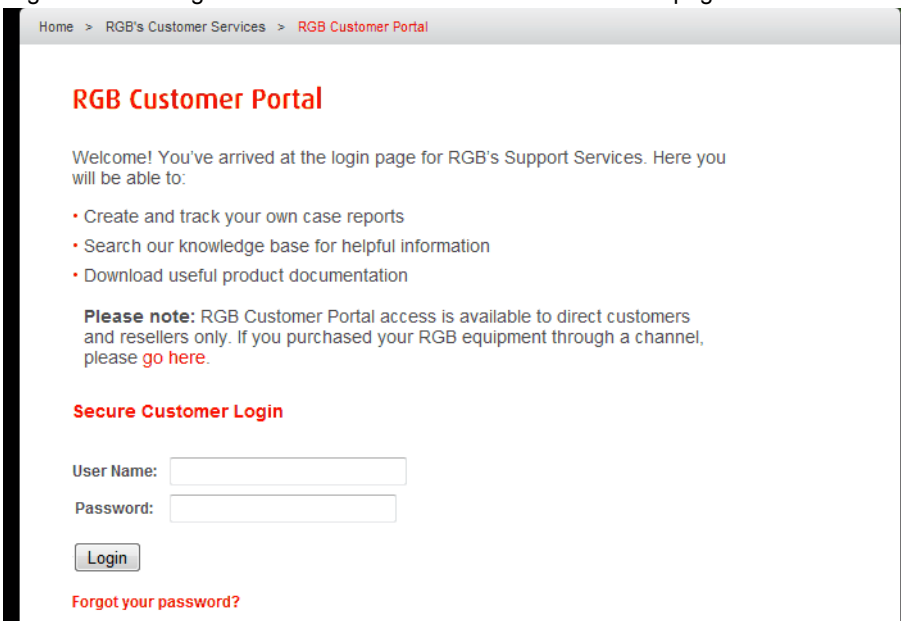
- Chassis model and serial number.
- A clear description of the problem.
- Steps to reproduce the problem, if applicable.

## Imagine Communications Customer Portal

To search the Imagine Communications Customer Portal for a specific document or solution, proceed as follows:

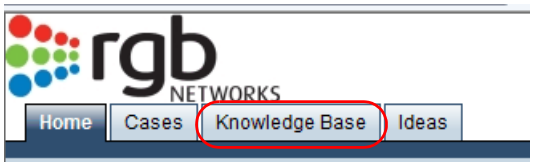
1. Log in to the Imagine Communications Customer Portal site (http://support.rgbnetworks.com).

Figure 46. Imagine Communications Customer Portal home page

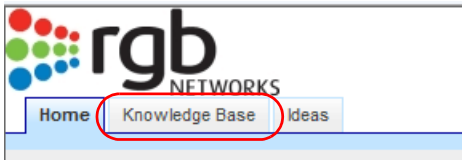



2. From the Customer Portal home page, click on the **Knowledge Base** tab:

Figure 47. Customer Portal home page - Direct and Reseller




Direct Customers - RGB Customer Portal home

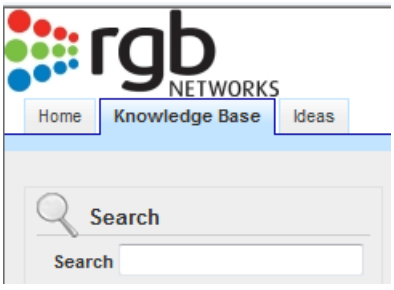



Resellers - RGB Customer Portal home

3. From the **Knowledge Base** home page, enter the desired search term in the **Search** box and tap the `[Enter]` key:

Figure 48. Knowledge Base search - Direct and Reseller


Direct Customers - Knowledge Base search




Resellers - Knowledge Base search

## Event Log Analysis

If asked to do so by customer support, access the system event log. You will be instructed on this procedure by the customer support engineer.

CHAPTER 6

# System Specifications

This chapter provides system specifications for the VMG-14+.

## In This Chapter:



## Application Modules

Table 21. Application Modules

| Module name | Function |
|---|---|
| Network Processing Module (NPM, NPM2) | Runs host software and includes GigE input/output interfaces. |
| Transcoding Module (TCM, TCM2, TCM2+) | Provides H.264 / MPEG-2 transcoding of streams. |
| Video Processing Modules (VPM) | Performs grooming, stat-muxing, DPI, program substitution, and video processing functions. |
| Application Media Processor (AMP) | Pairs with an NPM to provide audio transcoding. |

# Input / Output Interfaces

The VMG-14+ chassis contains no interface ports. Input/output interfaces described in this section are associated with various modules, as listed in Table 22.

Table 22. Input/Output interfaces

| Interface | Type | Applicable Modules |
|---|---|---|
| Ethernet | 2 x 10GigE, 8 x GigE interfaces - copper or optical | NPM, AMP |
| | 4 x 10GigE, 8x GigE interfaces - copper or optical | NPM2 |
| Fast Ethernet | 1 x 10/100Base-T control and management interface | NPM |
| | 4x10/100Base-T control and management interface. | NPM2 |
| Serial | 1 x RJ-45 serial port | NPM, NPM2, SCM, AMP |
| | 1x RJ-11 serial port | NPM |
| SDI | SDI out for testing | TCM, TCM2, TCM2+ |

# Redundancy

Table 23. System and Component-Level Redundancy

| Redundancy | Module |
|---|---|
| Redundancy | • All modules are hot-swappable.<br>• 1:1 NPM, NPM2<br>• 1:1 AMP<br>• N+M VPM<br>• N+M TCM, TCM2, TCM2+<br>• N:1 AC Power<br>• N:1 DC Power<br>• Service level on one or all output programs.<br>• Power supplies and fans. |

# Compliance

Table 24. Regulatory Standards Compliance

| Category | Standard |
|---|---|
| Safety | cTUVus 60950-1:2005 2nd Edition CB Certificate |
| EMC | FCC - Title 47 CFR Part 15, Subpart B<br>Canada - ICES-003, Issue 2, April 1995<br>CE Mark - EN55022 2006 and EN55024:1998 + A1:2001 + A2:2003 |
| EMI | FCC part 15 Class A<br>Conducted Emissions EN 55022 Class A<br>Radiated Emissions EN 55022 Class A<br>Electromagnetic Compatibility EN50082-1:1992-1997 - Generic Immunity Standard, Part 1: Residential, commercial and light industry.<br>ESD Immunity EN61000-4-2<br>Level 3, air at 8 kV, contact at 4 kV, Criteria A<br>Radiated RF Field Immunity EN6100-4-3<br>80-1000 MHz, 3 V/m, Criteria A, Modulation: 1 kHz, 80% AM, 1% step size.<br>Immunity to Electrical Fast Transients EN61000-4-4<br>Signal Ports: Level 2, 0.5 kV, Criteria A<br>Power Line: Level 2, 1 kV, Criteria A<br>Surge Immunity EN61000-4-5<br>1.0 kV, 1.2/50-8/20uS, Criteria B, Un-balanced Indoor Cables and shielded cables, Common Mode.<br>Not applicable to Intra-system cables.<br>Not applicable to Un-shielded cables that will not operate through CDN.<br>RF Conducted Immunity EN61000-4-6<br>Power Lines, level 3,.15 MHz-80 MHz, 3 V emf, Criteria A, Modulation 1 kHz, 80% AM, 1% Step size.<br>Signal lines, level 3, 150 kHz-80 MHz, 3 V emf, Criteria A, Modulation: 1 kHz, 80% AM, 1% Step size.<br>Compliant |
| RoHS | Compliant |

# Safety

Table 25. Safety Specifications

| Parameter | Value |
|---|---|
| Protected earth test | EN 60950, test current 25 A, resistance <100mOhm |

# Physical Dimensions

Table 26. Physical Dimensions

| Parameter | Value |
|---|---|
| Height | DC System: 578 mm (22.75”) 13 RU<br>AC System: 622 mm (24.5”) 14 RU |
| Width (with flanges) | 448.2 mm (19”) |
| Depth (with PEM covers & handles)[a] | DC system: 533.4 mm (21”)<br>AC system: 508 mm (20”) |

a. Not including cable management tray.

# Weight Specifications

Table 27. Weight Specifications

| Parameter | Value |
|---|---|
| AC chassis cage weight, empty | 37.9 Kg (83.6 lbs) |
| DC chassis cage weight, empty | 36.0 Kg (79.3 lbs) |
| SCM Board weight | 0.3 Kg (0.5 lbs) |
| DC PEM weight | 1.8 Kg (4.0 lbs) |
| AC power supply unit weight | 2.2 Kg (4.9 lbs) |
| Fan tray weight | 1.6 Kg (3.5 lbs) |
| NPM Board weight | 1.5 Kg (3.4 lbs) |
| NPM2 Board weight | 2.11 Kg (4.65 lbs) |
| VPM Board weight | 1.3 Kg (3.0 lbs) |
| TCM Board weight | 1.1 Kg (2.4 lbs) |
| TCM2 Board weight | 2.47 Kg (5.45 lbs) |
| TCM2+ Board weight | 2.88 Kg (6.35 lbs) |
| AMP Board weight | 2.5 Kg (5.6 lbs) |

# Power Specifications

## DC Power

Table 28. DC Power Specifications

| Parameter | Value |
|---|---|
| Input Voltage | Four DC inputs each rated: -41 VDC to -60 VDC, 70A |
| Input Power | • DC 60A per power feed.<br>• 3+1 power feeds. |
| Power Consumption | 5400W maximum - fully loaded. |
| Overcurrent Protection | 70A automatic circuit breaker on DC PEM |

## AC Power

Table 29. AC Power Input Specifications

| Parameter | Value |
|---|---|
| Input Voltage Range | 85 to 264 VAC (180 - 264 V for full 300-watt slot) |
| Input Current Max per AC Feed | 10A @ 240 VAC |
| Inrush Current per AC Feed | 50A peak |
| AC Power Consumption at Low Line | |
| AC Power Consumption at High Line | 5400W maximum - fully loaded |

Table 30. AC Power Supply Module Specifications

| Parameter | Value |
|---|---|
| Input Voltage Range | 85 - 264 VAC~ 47 - 63Hz |
| Input Current Maximum | 10A@ 240 VAC |
| Inrush Current | 50A peak |
| Power Factor | >0.98 |
| Output Power | 1500W@ 85 - 132 VAC, 2000W@ 180 - 264 VAC |
| Output Voltage Range | Adjustable over 30 - 60V<br>Default: 48.0V |
| Output Current | 31.0A@ 85 - 132 VAC, 42.0A@ 180 - 264 VAC |

# Environmental Specifications

Table 31. Environmental Specifications

| Parameter | Value |
|---|---|
| Storage temperature | -40º to 70º C (-40º to 158º F) |
| Operating temperature | 0º to 45º C (32º to 113º F) |
| Ambient temperature (transient operation) | +5 º to +55 ºC (41º to 131ºF) |
| Humidity | +5% to +90%, non-condensing |
| Humidity (transient operation) | +5% to +95%, non-condensing |
| Altitude | -71 to 3028 m (-200 to 14,000 ft) |
| Operational shock | 15 g @ 8 ms |
| Non-operational shock | 40 g @ 11 ms |

APPENDIX A

# Localized Cautions and Warnings

This appendix provides French and German translations for the Caution and Warning statements in this manual.

## In This Appendix

## Earth Connectivity Advisory

| Page number and subject | Statement type | Statement |
|---|---|---|
| Page 42 | Warning | High leakage current. Earth connection is essential before connecting supply. |
| | Avertissement | Courant de fuite important. Il est primordial d'opérer une connexion à la terre avant de connecter le matériel. |
| | Warnung | Hoher Fehlerstrom. Vor dem Anlegen der Stromversorgung unbedingt auf korrekte Erdung achten. |

## Power Source Safety -- Connection Cables and Terminals Advisory

| Page number and subject | Statement type | Statement |
|---|---|---|
| Page 42, DC Power | Warning | Before working, ensure that the power is removed from the power connection cables. When the system is powered on, do ***NOT*** touch the power terminals. |
| | Avertissement | Avant de travailler, assurez-vous que les câbles d'alimentation sont hors tension. Lorsque le système est allumé, ne touchez PAS les bornes électriques. |
| | Warnung | Stellen Sie vor Beginn der Arbeiten sicher, dass die Netzkabel stromlos sind. Wenn das System eingeschaltet ist, dürfen die Stromanschlüsse NICHT berührt werden. |

## Filler Panels

| Page number and subject | Statement type | Statement |
|---|---|---|
| Page 50, Rack Requirements, Filler Panels | Caution | Ensure that Imagine Communications-supplied filler panels are installed in empty slots. This is necessary to maintain proper airflow and prevent air from escaping out of the front of an open slot. |
| | Attention | Tous les panneaux d'obturation doivent être en place pour maintenir un débit d'air approprié et empêcher l'air de s'échapper par l'avant d'un logement ouvert. Ces panneaux doivent comporter un déflecteur qui s'étend jusqu'au fond de panier. |
| | Vorsicht | Alle Blindblenden müssen eingebaut werden, um einen ordnungsgemäßen Luftstrom sicherzustellen und zu verhindern, dass Luft durch einen offenen Steckplatz an der Vorderseite entweicht.<br>Die Blindblenden müssen mit einem Luftleitblech bis hin zur Rückwand ausgestattet sein. |

## Power Safety -- Hazardous Voltage Advisory

| Page number and subject | Statement type | Statement |
|---|---|---|
| Page 42, DC Power Supply, Electrical Warnings | Warning | Hazardous voltage! Before working, ensure that the power connection cables are disconnected from power. When the system is powered on, do ***NOT*** touch the power terminals. |
| | Avertissement | Tension dangereuse ! Avant de travailler, assurez-vous que les câbles d'alimentation sont débranchés. Lorsque le système est allumé, ne touchez PAS les bornes électriques. |
| | Warnung | Gefährliche Spannung! Vergewissern Sie sich vor Beginn der Arbeiten, dass die Netzkabel von der Stromversorgung getrennt sind. Wenn das System eingeschaltet ist, dürfen die Stromanschlüsse NICHT berührt werden. |

## Grounding Equipment, Protective Earth

| Page number and subject | Statement type | Statement |
|---|---|---|
| Page 42, DC Power Supply, Electrical Warnings | Warning | The Selenio VMG is intended to be grounded. Ensure that the ground terminals are connected to the Protective Earth (PE) of the building. |
| | Avertissement | Le VMG doit être mis à la terre. Assurez-vous que les bornes de terre sont connectées à la terre du bâtiment. |
| | Warnung | Das VMG muss geerdet werden. Vergewissern Sie sich, dass die Erdungsanschlüsse mit dem Schutzleiter des Gebäudes verbunden sind. |

## Handling Computer Equipment - Static Electricity (2)

| Page number and subject | Statement type | Statement |
|---|---|---|
| Page 41, DC Power Supply, Electrical Warnings | Warning | Danger of electrostatic discharge. Static electricity can harm delicate components inside the Selenio VMG. An ESD wrist strap must be worn before unpacking or exchanging any part or electric component. |
| | Avertissement | Risque de décharge électrostatique. L'électricité statique peut endommager les composants sensibles du VMG. Portez un bracelet antistatique pour déballer ou remplacer toute pièce ou tout composant électrique. |
| | Warnung | Gefahr der elektrostatischen Entladung. Empfindliche Komponenten innerhalb des VMG können durch statische Elektrizität beschädigt werden. Beim Auspacken und Austauschen von Teilen oder elektrischen Komponenten muss stets ein Erdungsarmband getragen werden. |

## Electric Overload Advisory

| Page number and subject | Statement type | Statement |
|---|---|---|
| Page 42, DC Power Supply, Electrical Warnings | Warning | Avoid electric overload. To avoid electrical hazard, do not make connections to terminals outside the specified voltage range for the Selenio VMG. |
| | Avertissement | Évitez une surcharge électrique. Pour éviter les risques liés à l'électricité, n'effectuez aucune connexion à des bornes dont la tension est en dehors de la plage spécifiée pour le VMG. |
| | Warnung | Vermeiden Sie Überspannungen. Um Gefahren durch Strom auszuschließen, darf keine Spannung außerhalb des für das VMG zulässigen Bereichs an die Anschlüsse angelegt werden. |

## Remove Jewelry

| Page number and subject | Statement type | Statement |
|---|---|---|
| Page 42, DC Power Supply, Electrical Warnings | Warning | Remove jewelry (rings, watches, etc.) before working on equipment that is connected to power lines. |
| | Avertissement | Retirez vos bijoux (bagues, montres, etc.) avant de travailler sur un équipement branché sur l'électricité. |
| | Warnung | Legen Sie vor Beginn von Arbeiten an Geräten, die an die Stromversorgung angeschlossen sind, jeglichen Schmuck (Ringe, Uhren usw.) ab. |

## Unpacking

| Page number and subject | Statement type | Statement |
|---|---|---|
| Page 39, Unpacking and Inspection | Caution | When opening the shipping carton, use caution to avoid damaging the Selenio VMG. |
| | Attention | Lors de l'ouverture du carton d'expédition, faites attention à ne pas endommager le VMG. |
| | Vorsicht | Gehen Sie beim Öffnen des Versandkartons vorsichtig vor, damit das VMG nicht beschädigt wird. |

## Lifting

| Page number and subject | Statement type | Statement |
|---|---|---|
| Page 40, Page 41 Lifting of chassis | Caution | Do NOT use module handles to lift the VMG system. The handles provided on the fan trays, PEMs, or cable trays cannot support the weight of the chassis. |
| | Attention | N'utilisez PAS les poignées du plateau de ventilation ou du PEM ni les chemins de câbles comme points de levage. |
| | Vorsicht | Der Lüftereinschub und die PEM-Griffe bzw. die Kabelrinnen dürfen NICHT als Hebepunkte genutzt werden. |

## Polarities

| Page number and subject | Statement type | Statement |
|---|---|---|
| Page 44, DC Cables, Polarity | Caution | Verify the correct polarity of the -48V DC and the RTN cables. |
| | Attention | Vérifiez la polarité du circuit -48 Vcc et des câbles RTN. |
| | Vorsicht | Vergewissern Sie sich, dass das -48-V-Gleichstromkabel und das RTN-Kabel richtig gepolt sind. |

## Filler Panel Advisory

| Page number and subject | Statement type | Statement |
|---|---|---|
| Page 47, Filler panel requirements | Warning | At the front of the chassis, any empty card slot must be fitted with a filler panel to maintain proper air flow. The system ships with rear slots 1 - 14 covered by RTMs. Do not remove these. |
| | Avertissement | Un logement de carte vide doit être couvert avec un panneau d'obturation pour maintenir un débit d'air approprié. |
| | Warnung | Jeder leere Kartensteckplatz muss mit einer Blindblende versehen werden, um einen ordnungsgemäßen Luftstrom sicherzustellen. |

## Handling Computer Equipment - Static Electricity (3)

| Page number and subject | Statement type | Statement |
|---|---|---|
| Page 60<br>ESD advisory | Warning | Static electricity can harm delicate components inside the chassis. You must wear an ESD wrist strap exchanging any part or electrical component. Connect your ESD strap to the ESD jack at the rear of the VMG-14+ chassis. |
| | Avertissement | L'électricité statique peut endommager les composants sensibles à l'intérieur du châssis. Vous devez porter un bracelet antistatique avant de remplacer toute pièce ou tout composant électrique. |
| | Warnung | Empfindliche Komponenten innerhalb des Gehäuses können durch statische Elektrizität beschädigt werden. Beim Austauschen von Teilen oder elektrischen Komponenten muss stets ein Erdungsarmband getragen werden. |

## Lithium Battery Advisory

| Page number and subject | Statement type | Statement |
|---|---|---|
| Page 64,<br>Lithium Battery | Warning | Some shelf managers can contain a lithium battery. There is a risk of explosion if the battery is replaced with an incorrect type. Dispose of used batteries according to the instructions. |
| | Avertissement | Certains shelf managers peuvent contenir une batterie au lithium.<br>Il y a un risque d'explosion si la batterie est remplacée par une autre de type incorrect. Éliminez les batteries usagées conformément aux instructions. |
| | Warnung | Einige Shelf-Manager können eine Lithiumbatterie enthalten.<br>Wenn diese durch eine Batterie eines unzulässigen Typs ersetzt wird, besteht Explosionsgefahr. Entsorgen Sie Altbatterien entsprechend den geltenden Vorschriften. |

APPENDIX A

# Conformity and Safety Information

This appendix contains compliance and regulatory information pertinent to the VMG 14+, in the following topics:



The VMG-14+ has been certified and is in compliance to the requirements below:

- Subpart B of Part 15 of FCC Rules for Class A digital devices
- Industry Canada Interference Causing Equipment Standard ICES-003, "Information Technology Equipment (ITE) – Limits and methods of measurement", Issue 5, dated August 2012 (Class A)
- VCCI Regulations For Voluntary Control Measures of radio interference generated by Information Technology Equipment, dated April 2013 (Class A)
- EN 55022:2010, "Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement" (Class A)
- CISPR 22:2008 "Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement" (Class A)
- AS/NZS CISPR 22:2009: "Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement" (Class A)
- EN 55024:2010 "Information technology equipment – Immunity characteristics, Limits and method of measurement."
- CISPR 24:2010 "Information technology equipment – Immunity characteristics, Limits and method of measurement."
- EN 61000-3-2:2006 +A1:2009 +A2:2009 – AC Current Harmonics
- EN 61000-3-3:2008 – AC Voltage Fluctuations

This product follows the provisions of the EMC Directive 2004 / 108 / EC and carries the CE marking accordingly.

Imagine Communications Customer Support:

- Tel: 877-RGB-NETW
- FAX: (408) 701-2710

# Declarations of Conformity

Declarations of conformity pertinent to the VMG-14+ are provided in the following sections:



## United States

### Declaration of Conformity

| | |
|---|---|
| Responsible Party Name: | Imagine Communications Corp. |
| Address: | 390 West Java Drive<br>Sunnyvale, CA 94089, U.S.A. |
| Telephone: | (877) 742-6389 |
| Declares that product: | Video Multiprocessing Gateway—VMG-14+<br>Complies with Part 15 of the FCC Rules. |

This device complies with Subpart B of Part 15 of FCC Rules for Class A digital devices. Operations are subject to the following two conditions: (1) This device must not be allowed to cause harmful interference; (2) This device must accept any interference received, including interference that may cause undesired operation.

Modifying the equipment without Imagine Communications' authorization may result in the equipment no longer complying with FCC requirements for Subpart B of Part 15 of FCC Rules for Class A or Class B digital devices. In that event, your right to use the equipment may be limited by FCC regulations, and you may be required to correct any interference to radio or television communications at your own expense.

### For Class A Equipment

**Note:** *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 the user will be required to correct the interference at his own expense.*

## Canada

This Class A digital apparatus complies with Industry Canada Interference Causing Equipment Standard ICES-003, "Information Technology Equipment (ITE)—Limits and methods of measurement", Issue 5, dated August 2012 (Class A).

Avis de conformité à la réglementation d'Industrie Canada.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

## Europe

**Warning!** *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.*

### EN 55024

Imagine Communications Corp., declares that the VMG-14+ complies with EN 55024:2010 "Information Technology Equipment—Immunity Characteristics, Limits and method of measurements. EN 55024 references various international and European standards and for clarity, the standards utilized are provided in Table 32.

Table 32. EN55024 Referenced Standards

| Referenced Standard | Description | Standard Used |
|---|---|---|
| IEC 60050-161:1990 | International Electrotechnical Vocabulary (IEV)—Chapter 161: Electromagnetic compatibility. | IEC 60050-161:1990 |
| IEC 6100-4-2:2008<br>EN 61000-4-2:2009 | Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques—"Section 2: Electrostatic discharge immunity test". | IEC 6100-4-2:2008<br>EN 6100-4-2:2009 |
| IEC 6100-4-3:2006<br>+A1:2007<br>+A2:2010<br>EN 61000-4-3:2006<br>+A1:2008<br>+A2:2010 | Section 3: Radiated radio-frequency electromagnetic field immunity test. | IEC 61000-4-2:2006<br>+A1:2007<br>+A2:2010<br>EN 61000-4-3:2006<br>+A1:2008<br>+A2:2010 |
| IEC 6100-4-4:2004<br>EN 61000-4-4:2004 | Section 4: Electrical fast transient/burst immunity test | IEC 61000-4-4:2012<br>EN 61000-4-4:2012 |
| IEC 61000-4-5:2005<br>EN 61000-4-5:2006 | Section 5: Surge immunity test | IEC 61000-4-5:2005<br>EN 61000-4-5:2006 |
| IEC 61000-4-6: 2008<br>EN 61000-4-6:2009 | Section 6: Immunity to conducted disturbances, induced by radio-frequency fields. | IEC 61000-4-6:2008<br>EN 61000-4-6:2009 |
| IEC 61000-4-8:2009<br>EN 61000-4-8:2010 | Section 8: Power frequency magnetic field immunity text | IEC 61000-4-8:2009<br>EN 61000-4-8:2010 |
| IEC 61000-4-11:2004<br>EN 61000-4-11:2004 | Section 11: Voltage dips, short interruptions and voltage variations immunity tests. | IEC 61000-4-11:2004<br>EN 61000-4011:2004 |
| CISPR 16-1-2:2003<br>+A1:2004<br>+A2:2006<br>EN 55016-1-2:2004<br>+A1:2005<br>+A2:2006 | Specification for radio disturbance and immunity measuring apparatus and methods—Part 1-2 Radio disturbance and immunity measuring apparatus—ancillary equipment - Conducted disturbances. | CISPR 16-1-2:2003<br>+A1:2004<br>+A2:2006<br>EN55016-1-2:2004<br>+A1:2005<br>+A2:2006 |

Table 32. EN55024 Referenced Standards

| Referenced Standard | Description | Standard Used |
|---|---|---|
| CISPR 20:2006<br>EN 55020-2007 | Sound and television broadcast receivers and associated equipment—Immunity characteristics—Limits and methods of measurement | CISPR 20-2006<br>EN 55020:2007 |
| CISPR 22:2008 (mod)<br>EN 55022-2010 | Information technology equipment—Radio disturbance characteristics—Limits and methods of measurement. | CISPR 22-2008 (mod)<br>EN 55022:2010 |

### EN 55022

EN 55022:2010 references various internal and European standards and for clarity, the standards utilized are provided in Table 33.

Table 33. EN550-22 Referenced Standards

| Referenced Standard | Description | Standard Used |
|---|---|---|
| CISPR 16-1-1:2006<br>+A1:2006<br>EN 55016-1-1:2007<br>+A1:2007 | Specification for radio disturbance and immunity measuring apparatus and methods—Part 1-1:Radio disturbance and immunity measuring apparatus-Measuring apparatus | CISPR 16-1 2006<br>+A1:2006<br>+A2:2007 |
| CISPR 16-1-2:2003<br>+A1:2004<br>+A2:2006 | Specification for radio disturbance and immunity measuring apparatus and methods—Part 1-2: Radio disturbance and immunity measuring apparatus-Ancillary equipment - Conducted disturbance | CISPR 16-1:2003<br>+A1:2004<br>+A2:2006 |
| CISPR 16-1-4:2007<br>EN 55016-1-4: 2007 | Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Radiated disturbances | CISPR 16-1-4:2007 |
| CISPR 16-2-3:2003<br>+A1:2005?<br>EN 55016-2-3:2004<br>+A1:2005 | Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements | CISPR-2-3:2006 |
| CISPR 16-4-2:2003<br>EN 55016-4-2 2004 | Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling - Uncertainty in EMC measurements | CISPR 16-4-2:2003 |

## Japan

この装置は、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。

VCCI-A

**Warning!** *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 adquate measures.*

VCCI Regulations for Voluntary Control Measures of radio interference generated by Information Technology Equipment, dated April 2013 (Class A).

VCCI regulations reference various national and internal standards and for clarity, the standards utilizaed are provided in Table 34.

Table 34. VCCI Referenced Standards

| Referenced Standard | Description |
|---|---|
| CISPR 22: Ed 6:2008 | Information Technology Equipment – Radio disturbance characteristics - Limits and methods of measurement |
| CISPR 16-1-1 Ed2.1:2006 | Specification for radio disturbance and immunity measuring apparatus and method – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus. |
| CISPR 16-1-2 Ed1.2:2006 | Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Measuring apparatus – Ancillary equipment – Conducted disturbances |
| CISPR 16-1-4 Ed2.0:2007 | Specification for radio disturbance and immunity measuring apparatus and methods –Part 1-4: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Radio disturbances |
| CISPR 16-2-3 Ed2.0:2006 | Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: Methods of measurement of disturbance and immunity – Radiated disturbance measurements |
| CISPR 16-4-2 Ed1.0:2003 | Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modeling – Uncertainty in EMC measurements |
| ANSI C63.4-2003 and ANSI C63-2009 | American National Standard for Method of Measurement of Radio Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range 9kHz to 40 GHz. |

## Australia/New Zealand

**Warning!** *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 adquate measures.*

AS/NZS CISPR 22:2009: "Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement" (Class A)

# Safety

The VMG-14+ has been certified and is in compliance to the following requirements:

- IEC 60950-1:2005 (2nd Edition); Am 1:2009
- EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011

# Glossary

This glossary describes some of the terminology used in this document.

## A

### AMP—Application Media Processor
The VMG module that performs audio transcoding.

### ANSI—American National Standards Institute

### ATSC—Advanced Television Systems Committee
ATSC is working to coordinate television standards among different communications media. ATSC is also developing digital television implementation strategies.

## B

### Bandwidth
The maximum amount of data that a transmission device is capable of carrying.

## C

### CBR—Constant Bit Rate
Constant bit rate encoding ensures that the rate at which a codec's output is consumed is constant. Because it is the maximum bitrate that matters, CBR is useful for streaming multimedia content on limited capacity channels. See also VBR.

### Codec
A program or device used for compressing/decompressing or encoding/decoding data and signals.

### CPU—Central Processing Unit

### CVCT—Cable Virtual Channel Table

## E

### Ethernet
A frame based local area network technology. Specified in the IEEE 802.3 family of standards.

# F

### FCC—Federal Communications Commission
The agency that regulates communications services, including cable television, that originate in the United States.

### FPGA—Field Programmable Gate Array
An array of logic gates that can be hardware-programmed to fulfill user-specified tasks.

### FTP—File Transfer Protocol
A network protocol used to transfer data from one computer to another through a network.

# G

### GigE—Gigabit Ethernet
Technology for transmitting Ethernet frames at data transfer rates of 1 Gigabit (1,000 megabits) per second.

### GUI—Graphical User Interface
A type of user interface that allows people to interact with electronic devices.

# H

### H.264
A block oriented motion-compensation based codec. It is equivalent to the MPEG-4 Part 10 standard.

### HD—High Definition
High-resolution digital television combined with Dolby Digital surround sound (AC-3).

### Headend
A regional distribution point in a television system.

# I

### IEEE—Institute of Electrical and Electronics Engineers
An international non-profit professional organization that develops a wide array of standards related to electricity.

### IP—Internet Protocol
The network layer for the TCP/IP (Internet Protocol) Suite. It is a connectionless, best-effort packet switching protocol.

### IP Address
A numerical identifier used by computers and devices on an IP network.

### IPTV—Internet Protocol Television

A system where digital television is delivered to a network infrastructure using Internet Protocol through a broadband connection. Often, IPTV is delivered in conjunction with Video on Demand and other Internet services, such as web access and Voice over IP.

### ITU—International Telecommunication Union

An international organization through which governments and the private sector coordinate global telecommunications networks and devices.

## J

### JRE—Java Runtime Environment

JRE is made up of the Java virtual machine, the Java platform core classes, and supporting files.

## L

### LED—Light Emitting Diode

A semiconductor diode that emits light when current passes through it. LEDs are used as indicators.

## M

### MPEG—Moving Pictures Experts Group

A joint standards working group of ISO/IEC that develops video and audio encoding standards.

### MPEG-2

A transport, audio, and video standard for compression and storage of broadcast quality television.

### MPEG-4

A graphics and video compression algorithm standard based on MPEG-1, MPEG-2, and other related technologies.

### MPTS—Multi-Program Transport Stream

A transport stream that contains multiple programs.

## N

### NPM—Network Processor Module

The Selenio VMG module that performs network related processing.

### NTP—Network Time Protocol

A TCP protocol that ensures accurate local time-keeping with reference to radio and atomic clocks, and can synchronize distributed clocks within milliseconds.

## P

### PEM—Power Entry Module

### PSU—Power Supply Unit

## R

### RADIUS—Remote Authentication Dial In User Service
A networking protocol that provides centralized AAA services.

### Redundancy
A method of providing a backup for critical system components to ensure uninterruptible service in the event of a failure. High availability and reliability.

### RF—Radio Frequency
Television signals are modulated onto RF signals and are then demodulated by the television tuner.

### RTP—Real Time Protocol
RTP provides services such as payload type identification, sequence numbering, time-stamping, and delivery monitoring to real-time applications.

### RTM—Rear Transition Module

### RU—Rack Unit
A common increment of equipment space height. The height of 1 RU is 1.75 inches.

## S

### SCTE—Society of Cable Telecommunications Engineers
An organization that develops training for cable television installers and engineers and standards for the cable industry.

### SD—Standard Definition
Television systems that have a resolution that meets standards but not considered either enhanced definition or high definition.

### SFP—Small Form Factor Pluggable
An optical interface that is used in network switches for Fibre Channel, Gigabit Ethernet and InfiniBand.

### SCM—Shelf Control Manager
Manager of the chassis population and infrastructure.

### SPTS—Single Program Transport Stream.
A transport stream that contains only one program.

### Status Bar
Strip located at the bottom of an application window, which displays system status information.

# T

### TCM—Transcoding Module
The VMG module that performs transcoding.

### TCP—Transmission Control Protocol
A connection oriented transport protocol in the Internet (TCP/IP) protocol suite.

### Transcoding
The process of converting one digitally encoded format to another, such as MPEG-2 to H.264 or vice versa.

### Transrating
Transrating, or rate shaping, is the process of changing the bitrate of a video stream for the purposes of improving bandwidth and system efficiency.

# U

### UDP—User Datagram Protocol
A connectionless transport protocol in the TCP/IP (Internet) protocol suite that runs over the IP network protocol. UDP provides a direct way to send information over an IP network. It is used primarily for broadcasting messages over a network.

# V

### VBR—Variable Bit Rate
VBR streams vary in bandwidth over time.

### VIA—Video Intelligence Architecture
An FPGA based modular architecture developed by Imagine Communications.

### VMG-6—Video Multiprocessing Gateway, 6-slot chassis

### VMG-8—Video Multiprocessing Gateway, 8-slot chassis

### VMG-14—Video Multiprocessing Gateway, 14-slot chassis

### VMG-14+—Video Multiprocessing Gateway, 14-slot chassis (300 watts)

### VPM—Video Processor Module
The VMG card that performs video related processing.

# X

### XFI

Serial GbE optical interface

### XFP—10 Gigabit Small Form Factor Pluggable

10 Gigabit Small Form Factor Pluggable (SFP). The XFP is a pluggable, hot-swappable optical interface for 10 Gigabit SONET/SDH, Fibre Channel, Gigabit Ethernet, and other applications. XFP modules are optical transceivers, typically 1310nm or 1550nm. Optical XFPs include digital diagnostics.

# Index

## R



## S



## T



## U



## V