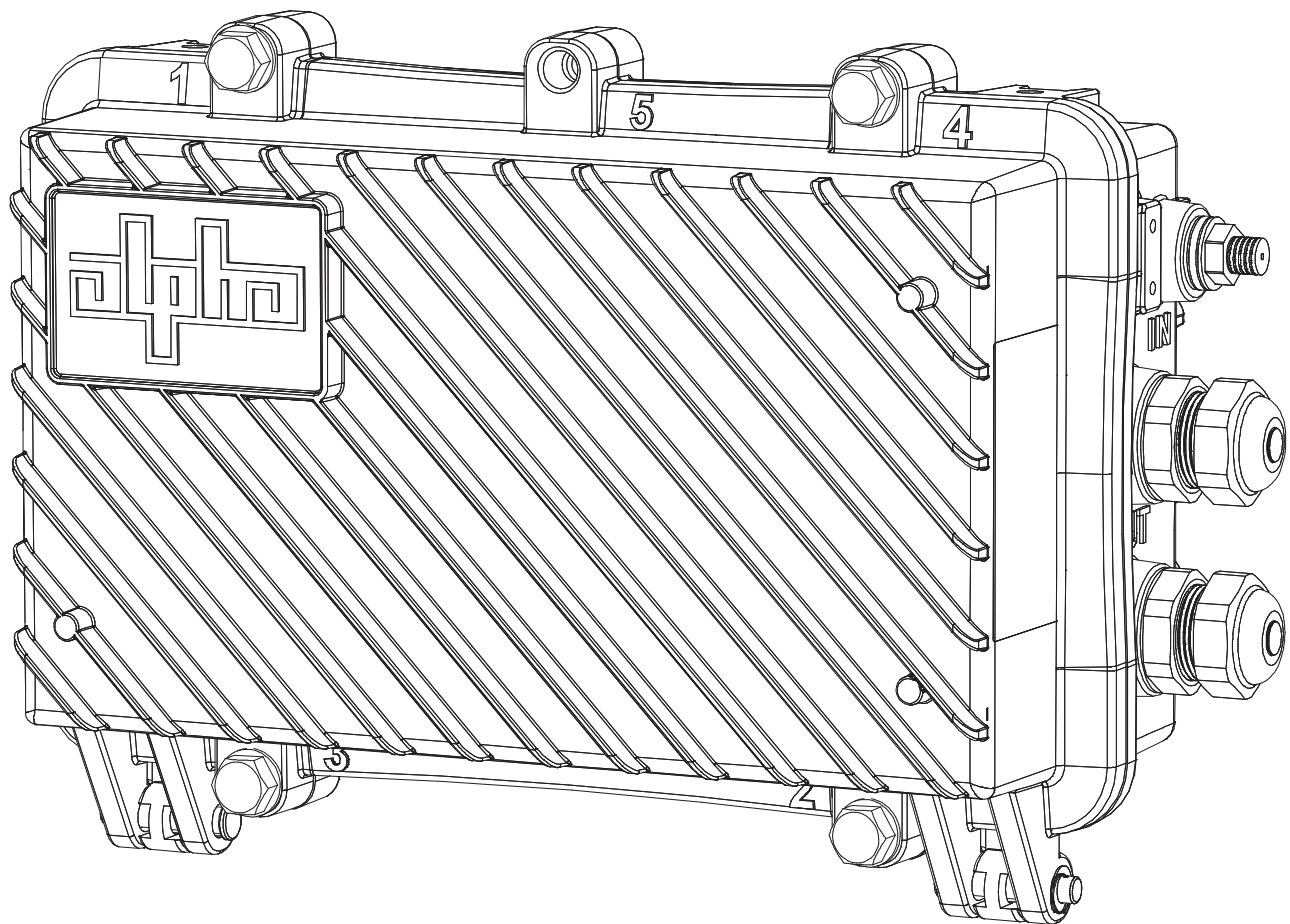alpha®

AlphaGateway SMG-01PE
Technical Manual
Effective: January 2017

Safety Notes

Alpha considers customer safety and satisfaction its most important priority. To reduce the risk of injury or death and to ensure continual safe operation of this product, certain information is presented differently in this manual. Alpha tries to adhere to ANSI Z535 and encourages special attention and care to information presented in the following manner:

⚠️ **WARNING! GENERAL HAZARD**

GENERAL HAZARD WARNING provides safety information to PREVENT INJURY OR DEATH to the technician or user.

⚡ **WARNING! ELECTRICAL HAZARD**

ELECTRICAL HAZARD WARNING provides electrical safety information to PREVENT INJURY OR DEATH to the technician or user.

☠️ **WARNING! FUMES HAZARD**

FUMES HAZARD WARNING provides fumes safety information to PREVENT INJURY OR DEATH to the technician or user.

🔥 **WARNING! FIRE HAZARD**

FIRE HAZARD WARNING provides flammability safety information to PREVENT INJURY OR DEATH to the technician or user.

There may be multiple warnings associated with the call out. Example:

⚡🔥 **WARNING! ELECTRICAL & FIRE HAZARD**

This WARNING provides safety information for both Electrical AND Fire Hazards

⚠️ CAUTION!

CAUTION provides safety information intended to PREVENT DAMAGE to material or equipment.

✓ *NOTICE*:

NOTICE provides additional information to help complete a specific task or procedure.

ATTENTION:

ATTENTION provides specific regulatory/code requirements that may affect the placement of equipment and /or installation procedures.

The following sections contain important safety information that must be followed during the installation and maintenance of the equipment and batteries. Read all of the instructions before installing or operating the equipment, and save this manual for future reference.

AlphaGateway SMG-01PE
Technical Manual
018-344-B0-001, Rev. A

Effective Date: January 2017

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Disclaimer

Images contained in this manual are for illustrative purposes only. These images may not match your installation.

Operator is cautioned to review the drawings and illustrations contained in this manual before proceeding. If there are questions regarding the safe operation of this powering system, please contact Alpha Technologies or your nearest Alpha representative.

Alpha shall not be held liable for any damage or injury involving its enclosures, power supplies, generators, batteries or other hardware if used or operated in any manner or subject to any condition not consistent with its intended purpose or is installed or operated in an unapproved manner or improperly maintained.

Contact Information

Sales information and customer service in USA
(7AM to 5PM, Pacific Time):   1 800 322 5742

Complete technical support in USA
(7AM to 5PM, Pacific Time or 24/7 emergency support):   1 800 863 3364

Sales information and technical support in Canada: 1 888 462 7487

Website: www.alpha.com

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Figures

Tables

AlphaGateway SMG-01PE Safety Notes

Safety Precautions

⚠ CAUTION!

- Only qualified personnel should service the Power Supply.
- Verify the voltage requirements of the equipment to be protected (load), the AC input voltage to the Power Supply (line) and the output voltage of the system prior to installation.
- When connecting the load, DO NOT exceed the output rating of the Power Supply.

⚡ **WARNING! ELECTRICAL HAZARD**

- The Power Supply contains hazardous voltage. Only qualified personnel should service the Power Supply.

⚡ 🔥 **WARNING! ELECTRICAL & FIRE HAZARD**

- CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE AND RATING OF FUSE:
    - F2 2AG, Slo-Blo® Fuse Littlefuse 229/230 Series Type 0229 007. Rated 125V, 7A or equivalent.

⚠ **WARNING! GENERAL HAZARD**

Observe the safety information contained in the technical manuals for the various system components (Power Supply, Batteries, Network Interface Devices) as well as local codes for servicing electrical systems and working at height.

ATTENTION:

This product has been inspected by regulatory for use as described in the manual. If your intended use is different, it is your responsibility to ensure your combination conforms to your local regulatory requirements and the Power Supply remains within its environmental specifications (See below for this missing section). This product is approved for installation under AC voltage supply lines (line cross) up to 277Vac phase to earth ground.

Grounding and Earth Connection Notes

In order to provide a ready, reliable source of power, it is necessary to connect the Gateway to an effective grounding and earthing system. This not only provides for the safety of the service personnel responsible for its operation and maintenance, but also facilitates the proper operation and protection of the equipment within the network. Such a grounding system provides protection with respect to operator safety, system communication and equipment protection.

Lightning strikes, grid switching or other aberrations on the power line and/or communications cable have the potential to cause high-energy transients that can damage the powering or communications systems. The most viable method available to protect the system from damage is to divert these unwanted high-energy transients along a low-impedance path to earth. A low-impedance path to earth prevents these currents from reaching high voltage levels and posing a threat to equipment.

1.0 Introduction

Utilizing a Hybrid Fiber-Coaxial (HFC) Network connection, the AlphaGateway SMG provides power and backhaul to street-level network devices by converting the HFC plant voltage (42VAC - 90VAC) and DOCSIS backhaul into a standard Power over Ethernet (PoE) interface. The AlphaGateway SMG allows for the deployment of carrier-class Wi-Fi networks, or other connected devices, such as cameras or traffic monitoring devices, in a single weather-proof modem by backhauling collected data via the HFC connection.
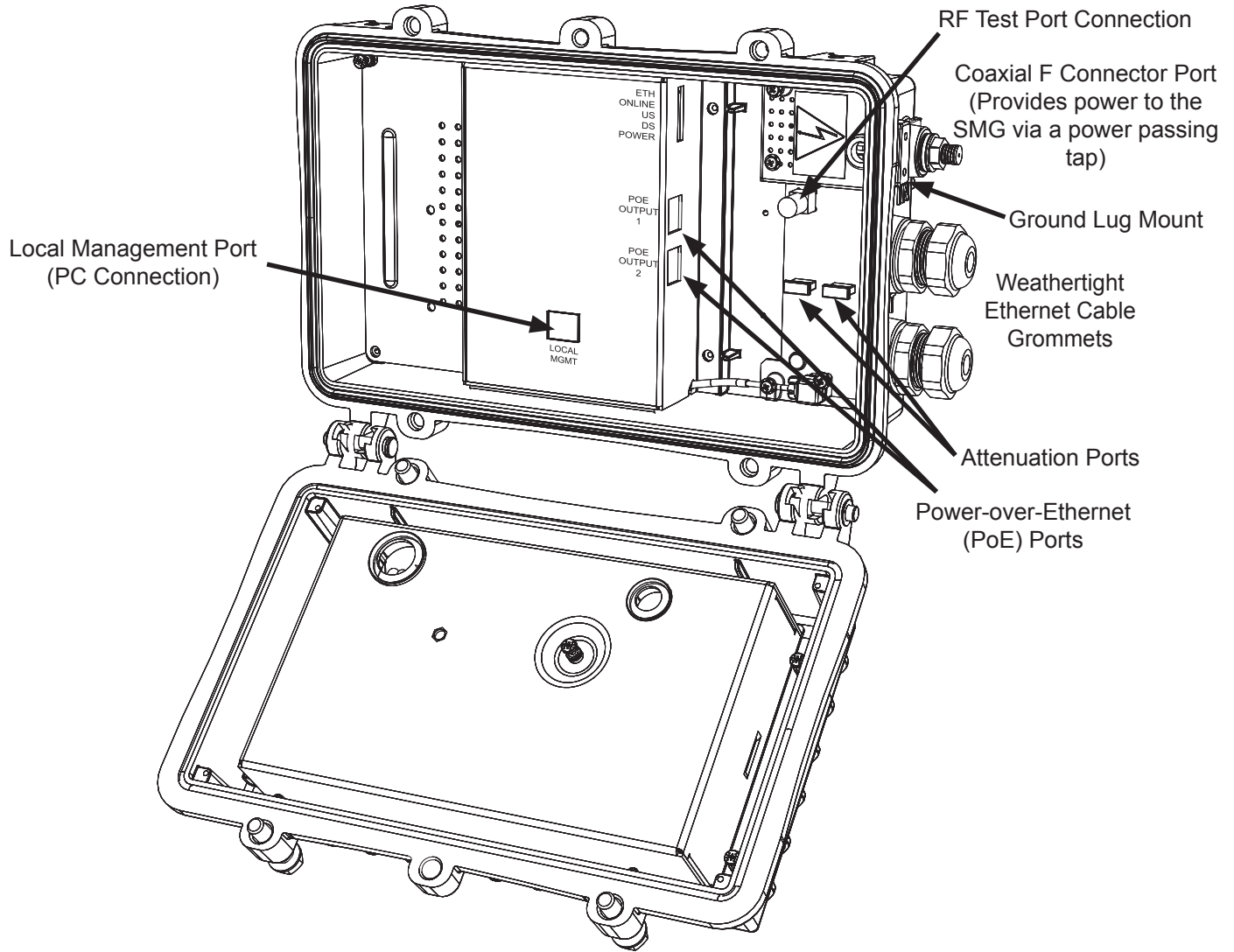
1.1 AlphaGateway SMG Connections

Fig. 1-1, AlphaGateway SMG Connections and Ports

2.0 Installation

The AlphaGateway SMG has four different installation methods:

- Strand Mount
- Wall Mount
- Pole Mount
- Vault Mount

Prior to Installation:

- Provision the SMG's DOCSIS Modem and RF MAC Address. This can include, but is not limited to:
    - Assign a cable modem configuration file with the EMS as a trap destination, CPE enabled, and the bandwidth set properly.
    - Set up a billing account (if applicable)
- Provision each connected device (e.g. camera, Wi-Fi radio) using the device's MAC address.
- Install a power-passing tap on the hard coax. The SMG can also be connected to the hard coax through a directional coupler.

NOTICE:

Each device will register as a distinct CPE device; these may need fixed IP addresses depending upon the usage model.

Required Tools and Materials (User-Supplied):

- Torque Wrench
    - 7/16" (11mm) Socket
    - 1/2" (13mm) Socket
- Drill (Wall Mount Installation)
- Signal Level Meter

2.1 Strand Mount Installation Procedure

1. Take the two strand mount brackets from the strand bracket installation kit (*Alpha p/n 746-627-20*) and remove the two plugs from the top of the enclosure, securing the mounting brackets to the SMG in their place. Position the strand mounting brackets around the strand and verify the proper orientation as shown in the image. Use the hex head bolts, lock washers, and flat washers to secure the strand brackets to the SMG, torquing to 44.3 – 53.1 in-lbs (5 – 6 N-m).
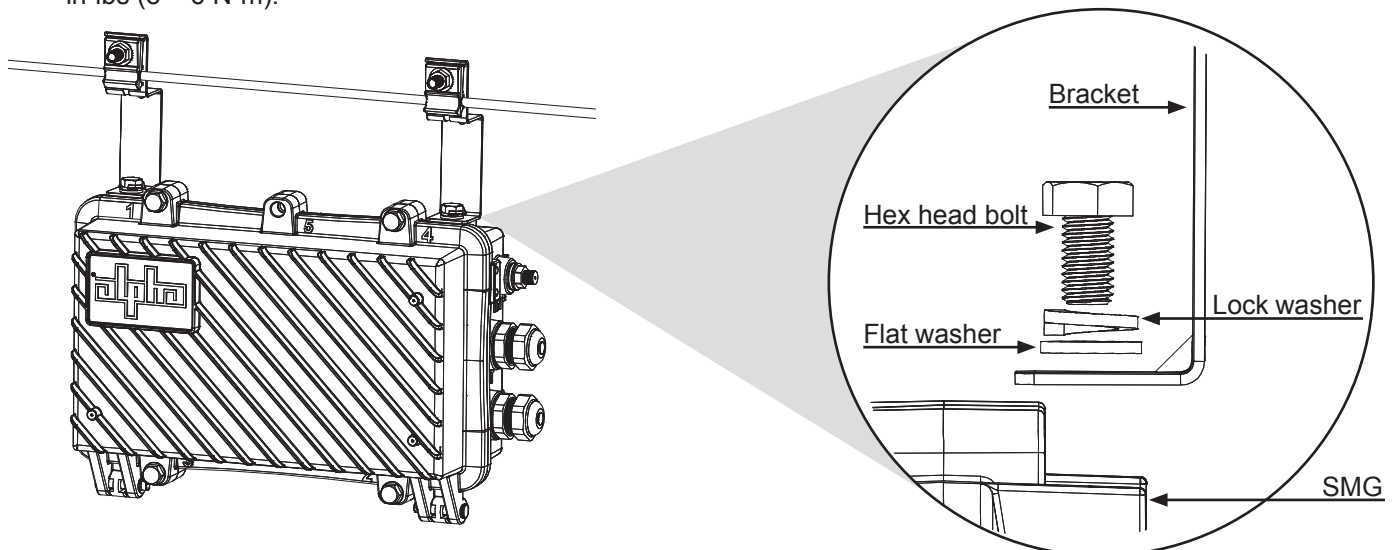

Fig. 2-1, Strand Mount Bracket Installation

2.0 Installation, Continued

✓ **NOTICE**:

The SMG must hang from the strand with the hinges facing down.

2. Hang both brackets on the strand through the clamps on the bracket as shown. For thicker 3/8" strands, reverse the orientation of the clamp so that the larger concave side faces the strand. Insert the carriage bolt through the back of the bracket and tighten the hex head nut, lock washer, and flat washer against the clamp on the front of the bracket, torquing to 79.7 – 88.5 in-lbs (9 – 10 N-m). Repeat for the second bracket.

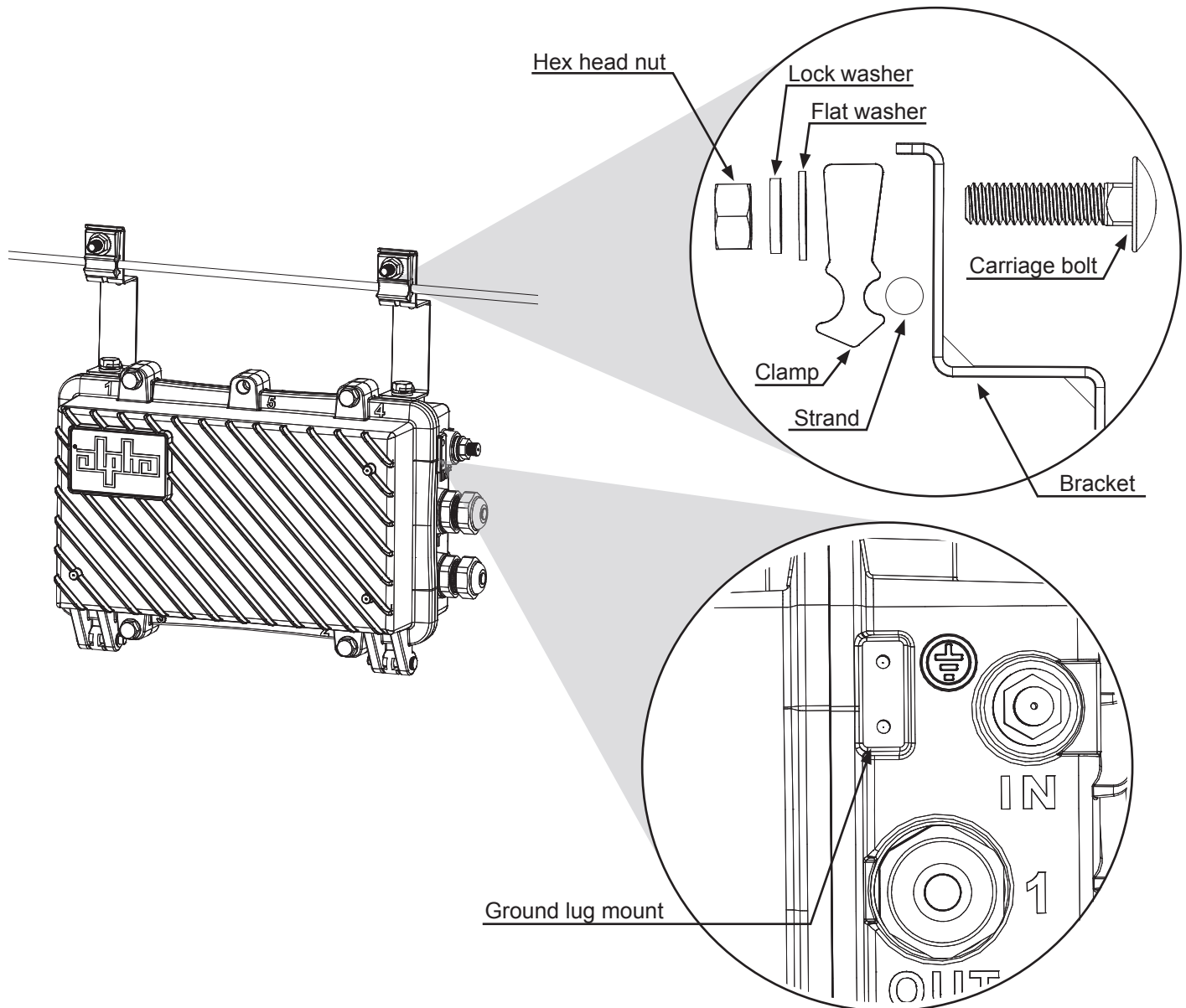**Fig. 2-2, Strand Mount Clamp Installation and Ground Lug Mount Location**

3. Properly ground the SMG by connecting a #6 AWG wire from the grounding lug on the outside of the enclosure to either a driven ground rod or the strand ground on the pole to which the unit is mounted. Apply anti-oxidant compound (e.g. Noalox® or equivalent) to the ground connection.

4. Proceed to the "Start-Up and Verification" section.

2.2 Wall Mount Installation

9.69"
(246.2mm)

1/4-20x1/2"
Bolt

1/4-20x1/2"
Bolt

10.64"
(270.2mm)

Drill Here
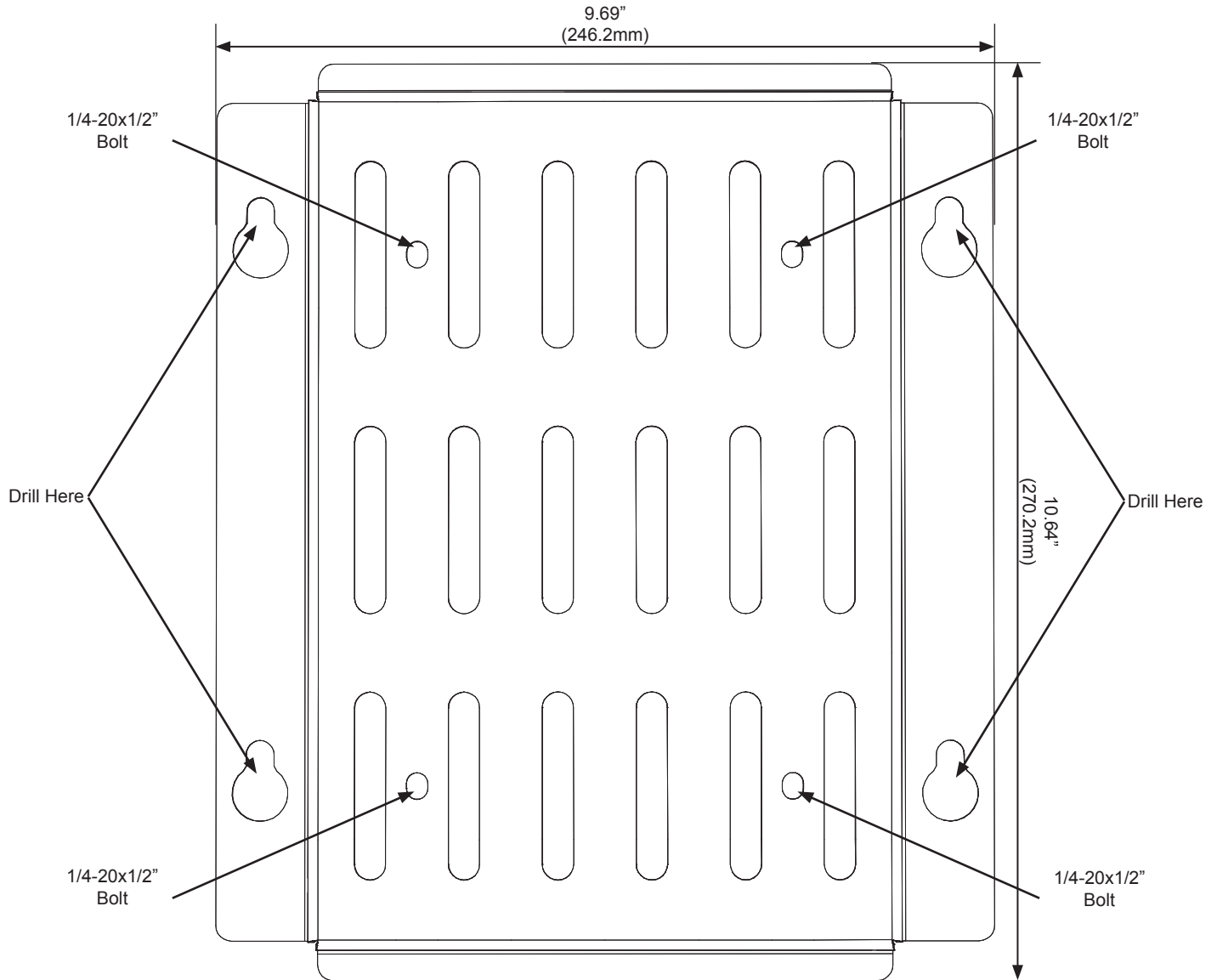
Drill Here

1/4-20x1/2"
Bolt

1/4-20x1/2"
Bolt

Fig. 2-3, Wall Mount Installation

1. Align the bracket (*Alpha p/n* 746-645-20) into the desired installation position on the wall. Mark the four holes where the 5/16" (M8) hex head screws will be drilled into the wall.

2. Drill four pilot holes into the wall using the wall mount bracket as a template. If mounting to drywall, a stud should be located and used to secure any two of the hex head screws.

3. Using the four 1/4-20x1/2" bolts and flat washers, mount the SMG to the wall mount bracket with the 7/16" (11mm) socket, torquing to 44.3 – 53.1 in-lbs (5 – 6 N-m). The F connector must be facing down with the hinges on the enclosure facing left.

4. Mount the SMG and wall mount bracket on the wall by partially screwing in the top two 5/16" lag bolts without washers and hang the unit by the bracket with the key-holes. Install the other two lag bolts with washers and tighten all four.

5. Properly ground the SMG by connecting a #6 AWG wire from the ground lug mount on the outside of the enclosure to either a driven ground rod or the strand ground on the pole to which the unit is mounted. Apply anti-oxidant compound (e.g. Noalox® or equivalent) to the ground connection.

6. Proceed to the "Start-Up and Verification" section.

2.3 Round Pole Mount Installation

1. Align the I-bracket (*Alpha p/n* 607-210-B1-001) on the back of the SMG, with the F connector on the SMG facing down.

✓ **NOTICE**:

Note the orientation of the bracket. The SMG must be installed with the bracket in the position below (the F connector facing down and the hinges facing left).

2. Using the four 1/4"-20 bolts, split washers, and flat washers, mount the I-bracket to the SMG with the 7/16" (11mm) socket, torquing to 44.3 – 53.1 in-lbs (5 – 6 N-m).

3. Secure the round pole mount bracket (*Alpha p/n* 607-212-N2-001) to the pole using the metal straps.
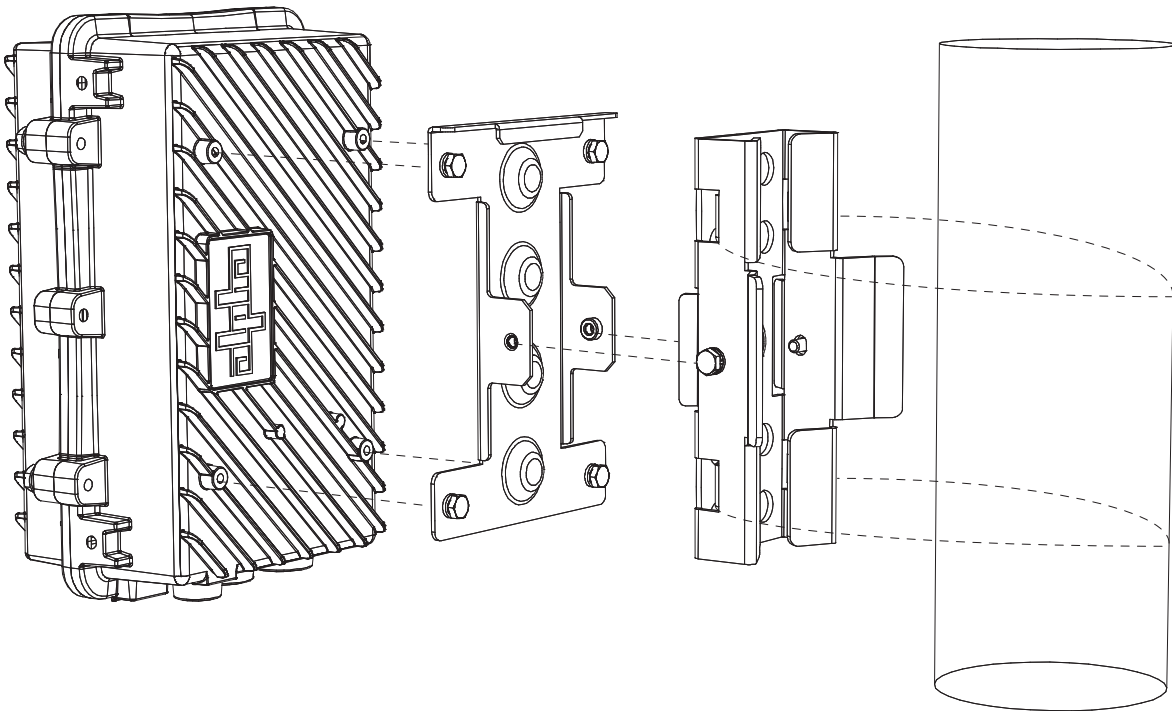
Fig. 2-4, Round Pole Mount Installation

4. Using the two 1/4"-20 bolts, lock washers, and flat washers, mount the SMG and I-bracket to the round pole mount bracket with the 7/16" (11mm) socket, torquing to 44.3 – 53.1 in-lbs (5 – 6 N-m). The F connector must be facing down with the hinges on the enclosure facing left.

5. Properly ground the SMG by connecting a #6 AWG wire from the ground lug mount on the outside of the enclosure to either a driven ground rod or the strand ground on the pole to which the unit is mounted. Apply anti-oxidant compound (e.g. Noalox® or equivalent) to the ground connection.

6. Proceed to the "Start-Up and Verification" section.

2.4 Square Pole Mount Installation

1. Align the I-bracket on the back of the SMG, with the F connector on the SMG facing down.

![check mark icon] **NOTICE**:

Note the orientation of the bracket. The SMG must be installed with the bracket in the position below (the F connector facing down and the hinges facing left).

2. Using the four 1/4"-20 bolts, split washers, and flat washers, mount the I-bracket to the SMG with the 7/16" (11mm) socket, torquing to 44.3 – 53.1 in-lbs (5 – 6 N-m).

3. Secure the square pole mount bracket (*Alpha p/n* 607-211-N2-001) to the pole using the metal straps.
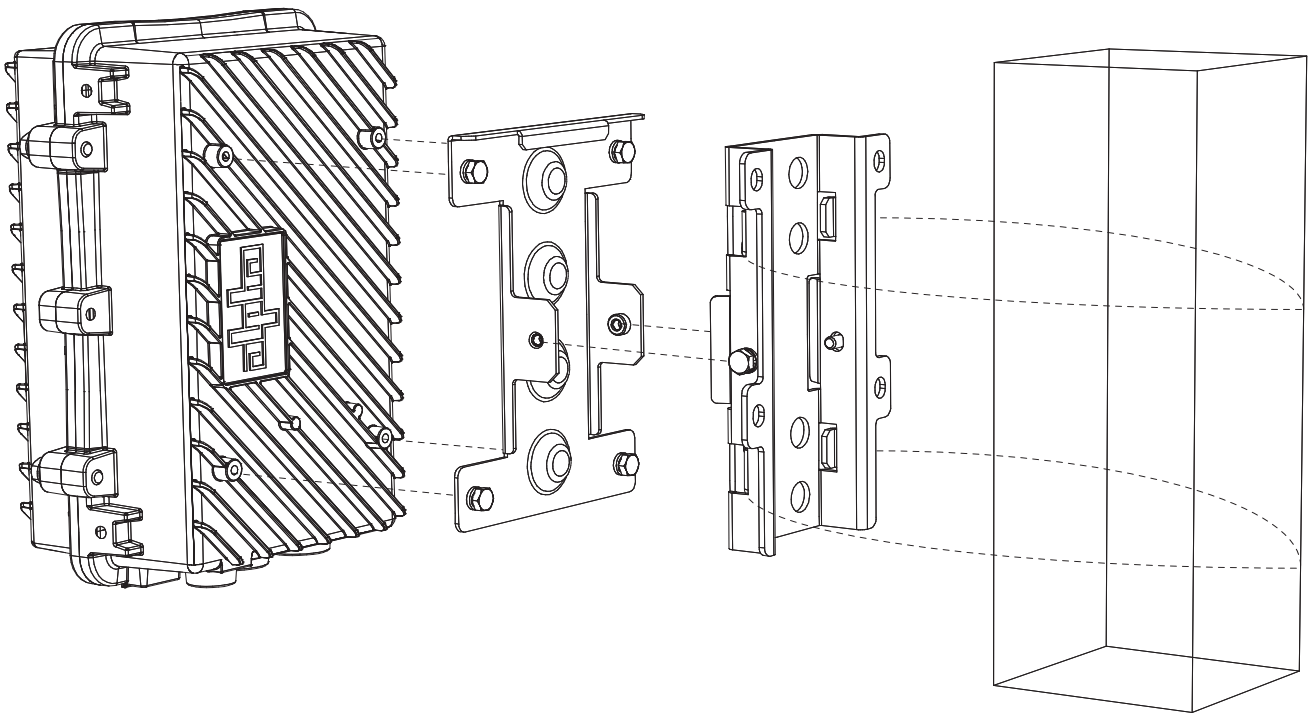
Fig. 2-5, Square Pole Mount Installation

4. Using the two 1/4"-20 bolts, split washers, and flat washers, mount the SMG and I-bracket to the square pole mount bracket with the 7/16" (11mm) socket, torquing to 44.3 – 53.1 in-lbs (5 – 6 N-m). The F connector must be facing down with the hinges on the enclosure facing left.

5. Properly ground the SMG by connecting a #6 AWG wire from the grounding lug on the outside of the enclosure to either a driven ground rod or the strand ground on the pole to which the unit is mounted. Apply anti-oxidant compound (e.g. Noalox® or equivalent) to the ground connection.

6. Proceed to the "Start-Up and Verification" section.

2.5 Vault Mount Installation

For the vault mount installation, follow the same procedure used in the strand mount installation.

2.6 Start-Up and Verification

1. Connect the powered-coax from the coaxial F connector port to the power-passing tap or directional coupler. When installing the coax to the F Connector, torque to 35 in-lbs (4.0 N-m).

2. Using the 1/2" (13mm) socket, loosen the four M8 enclosure bolts and open the SMG.

✓ ***NOTICE****:*

If replacing the Pin to F Connector, first remove the coax from the F Connector, then loosen the Pin Seizure screw and remove the connector. Apply silicone-based o-ring grease (Dow Corning® 55 O-Ring, or equivalent) to the 5/8-24 threads of the new connector. Install the new connector by hand (to avoid cross-threading) and tighten it to the enclosure with a torque of 44 in-lbs (5.0 N-m). Torque the Pin Seizure screw to 12 in-lbs (1.3 N-m).

3. Verify that the unit powers up by looking at the DOCSIS Modem "POWER" LED.

4. Measure the downstream power level of the RF connector Test Port with the signal level meter. The RF connector Test Port is located above the upstream and downstream attenuators.

✓ ***NOTICE****:*

The reading obtained from the RF connector Test Port will be 20dB less than the actual power level of the cable plant.

5. Ensure that the downstream recieve signal level does not exceed +15dBmV. Attenuation can be adjusted through the replaceable JXP-style attenuators.

✓ ***NOTICE****:*

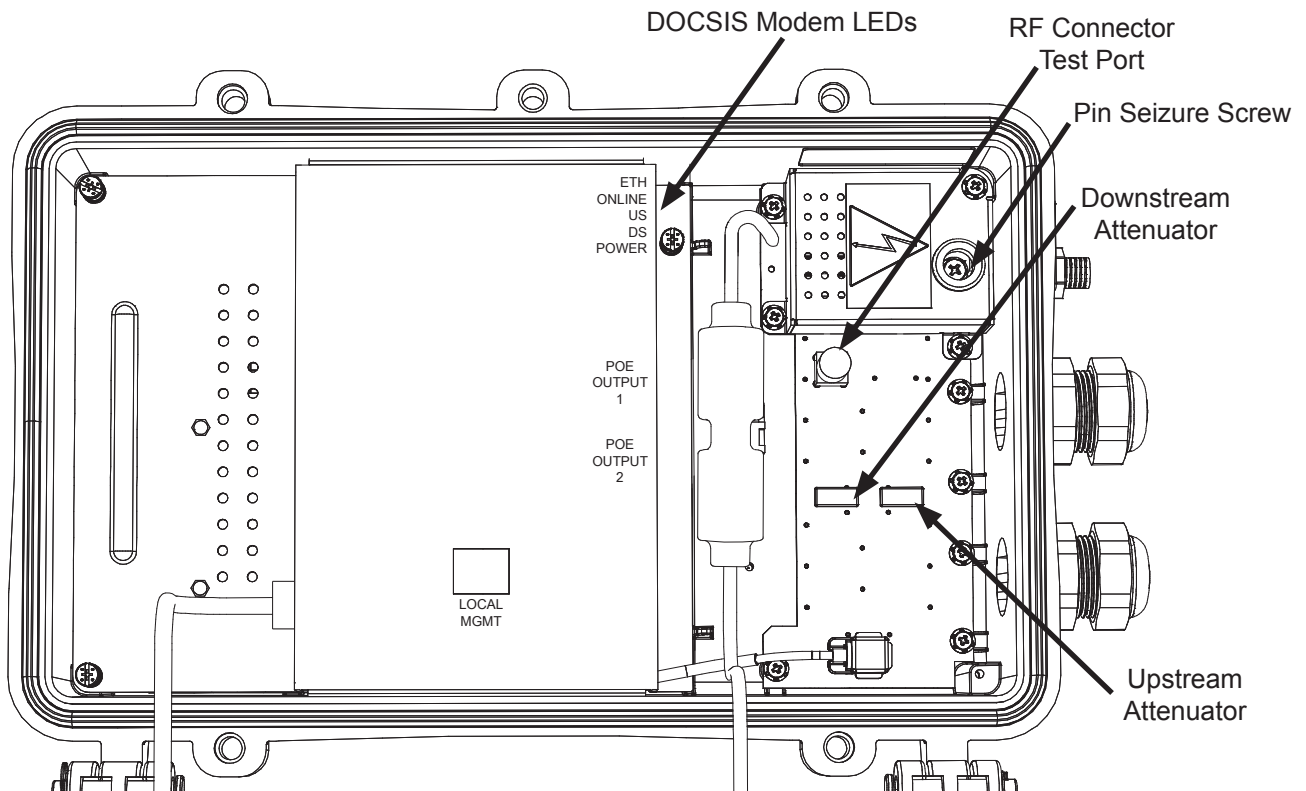DOCSIS Specifications limit downstream power levels to be within +15dBmV to -15dBmV.

Fig. 2-6, Adjusting the Attenuator

2.0 Installation, Continued

6. Once the first four LEDs on the DOCSIS modem are solid green (POWER, DS, US, and ONLINE) remove one (or both) of the grommet plugs below the F connector port to access the PoE ports from outside the enclosure.

NOTICE:

The fifth LED (ETH) will continually flash green as an indication that the SMG ports have established communications link necessary for PoE port MAC and IP connected device data reporting. The local port will be ready for connectivity approximately twenty seconds after this LED begins to continually flash.

DOCSIS Modem LEDs and Indications			
LED or Connector	Status	Behavior	Indication
ETH: Link	GREEN	OFF	Powering Up / No Link
		ON	Link
ONLINE: (Online status)	GREEN	OFF	No Communications Activity
		OFF / ON	Flashes while performing early authentication, IP connectivity, BPI intialization.
		ON	Online and Operational
US: Upstream ranging and registration lock	GREEN	OFF	No power, upstream frequency undetermined
		OFF / ON	Power on, downstream locked, upstream frequency ranging, DHCP request in progress
		ON	CMTS registration completed
DS: Downstream RF Carrier detection and lock	GREEN	OFF	No Power / Downstream Carrier
		OFF / ON	Power on, downstream carrier frequency searching
		ON	Downstream carrier lock
POWER	GREEN	OFF	No power
		OFF / ON	Startup. DM3 status has not yet been recieved
		ON	Normal Operation
PoE Ports	GREEN	OFF	No link
		ON	Link / Activity
	AMBER	OFF	No PoE
		ON	PoE

Table 2-1, DOCSIS Modem LEDs and Indications

2.0 Installation, Continued

⚠ CAUTION!

Failure to properly install the sealing insert and nut could result in water intrusion into the enclosure.

7. Feed the minimum 26 AWG Ethernet cable (4 – 6.6mm diameter) through the grommet hole. Plug the cable into the PoE port and torque the sealing nut to 12 in-lbs (1.5 N-m, hand tight), then connect the Ethernet cable to the desired device. Each PoE port has two LEDs to indicate PoE and communication status.

✓ *NOTICE:*

Normally, the Body of the grommet connected to the enclosure stays installed. However, if it gets removed, apply silicone-based o-ring grease (Dow Corning® 55 O-Ring, or equivalent) to the gasket surface that faces the enclosure, and reinstall, torquing to 30 in-lbs (3.5 N-m).

8. Proceed to the "Managing the SMG" section for SMG device management before returning to complete steps 9 and 10.

9. Close the lid on the AlphaGateway SMG and hand tighten the four M8 enclosure bolts. With the bolts firmly in place, use the 1/2" (13mm) socket to torque each to 44.3 – 48.7 in-lbs (5 – 5.5 N-m) following the order of the numbers on the enclosure.

10. Ensure that the grommet for any unused PoE port remains plugged to ensure a weathertight enclosure.

✓ *NOTICE:*

A fifth bolt is available as an optional Alpha security screw (*Alpha p/n* 647-189-13). Torque to 26.5 in-lbs (3 N-m).
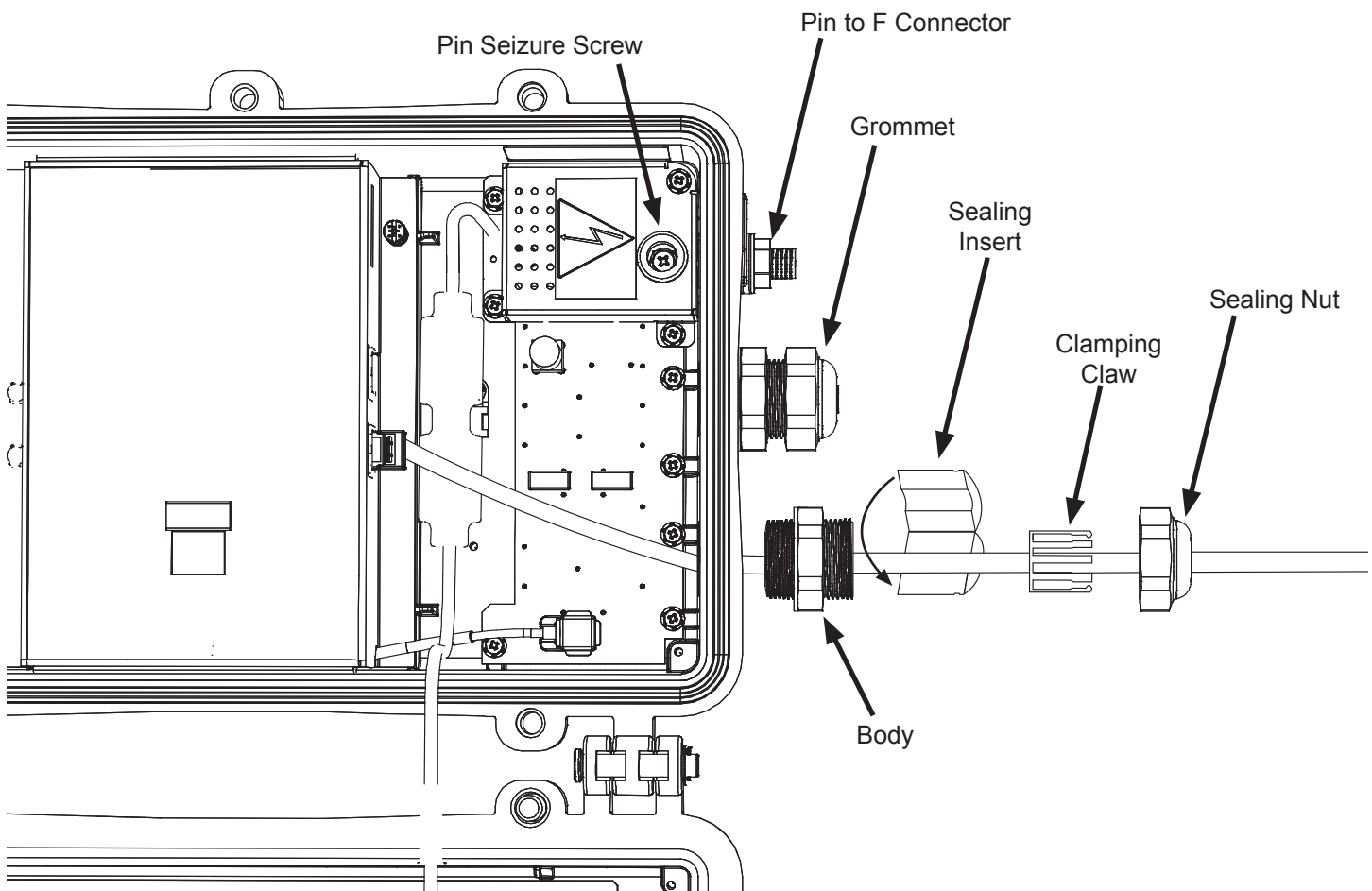

Fig. 2-7, Connecting the PoE Device

3.0 Managing the SMG

3.1 Local Access - Web Interface

The AlphaGateway SMG provides embedded Ethernet communications, allowing the user to view and configure settings via a Web interface. The local management port (seen in the figure below) is used as a connection point between the SMG and a PC's Ethernet port. The Ethernet port on the SMG is a fully functional standard Ethernet port, capable of providing all the functionality of any standard Ethernet connection.
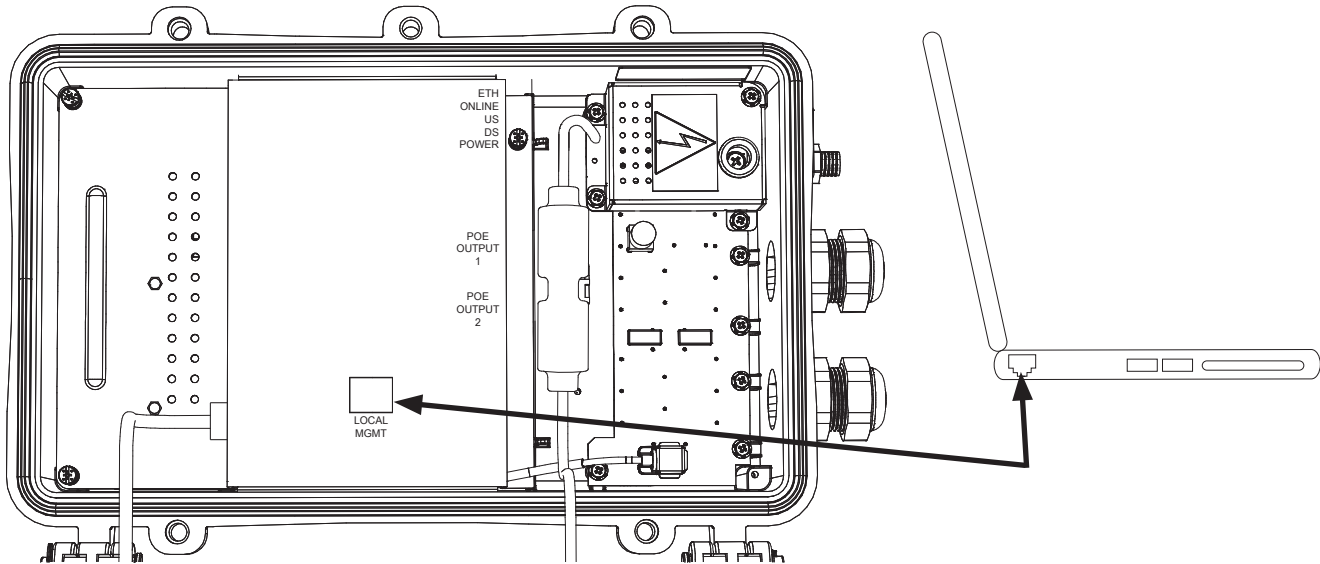

Fig. 3-1, SMG Local Connection Port

To access the SMG's Web interface locally via a Web browser, use the following procedure:

1. Connect a standard Ethernet cable (CAT5 or better) between the SMG's local management port and a laptop or computer's network interface port.

2. Launch a Web browser.

3. Enter the default IP address (192.168.100.1) of the SMG into the Web browser's address field.

4. The SMG's Web interface will load. If the page does not load, see the section titled "Configuring a Static IP Address."

5. Navigate the site to record diagnostic information and verify operational status of the SMG. Navigate to the DOCSIS page located under the "System" menu selection for signal level readings. Install the appropriate amount of attenuation using the JXP-style attenuators to adjust the upstream and downstream signals to the desired level.
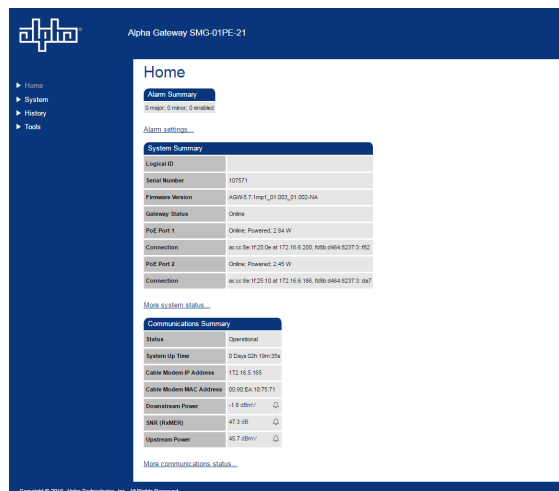

Fig. 3-2, SMG Web Interface

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3.0 Managing the SMG, Continued

Configuring a Static IP Address

Use the following procedure to configure a static IP address on a laptop or computer with the Windows 7® operating system:

1. Click **Start** (lower left button on most Windows 7® computers).
2. Click **Control Panel**.
3. Depending on the Control Panel view:
   - Click **Network and Internet**, then click **Network and Sharing Center**.
   - Click **Network and Sharing Center**.
4. Click **Local Area Connection**.
5. Click **Properties**.
6. In the dialog box (Fig. 3-3), select **Internet Protocol Version 4 (TCP/IPv4)** and then click **Properties**.
7. In the Internet Protocol Version 4 (TCP/IPv4) Properties window, record the existing IP address and Subnet mask in order to revert the computer back to its original settings when finished.
8. Select **Use the following IP address** (See Fig. 3-4). Enter the values as shown (i.e. IP address 192.168.100.10 and Subnet mask 255.255.255.0).
9. Click **OK** and attempt to connect to the SMG Web interface using the IP address in the Web browser.
10. To restore network settings, repeat Steps 1 through 6, then click **Obtain an IP address automatically** or **Use the following IP address** (based on the original settings recorded in Step 7).
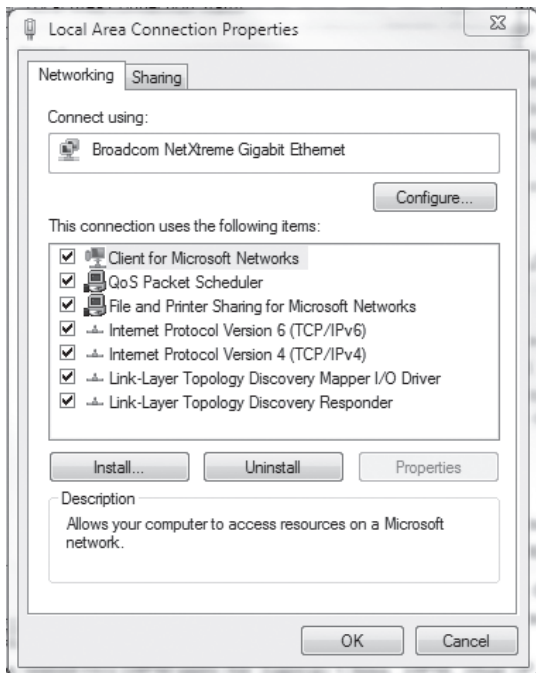11. Click **Close**.

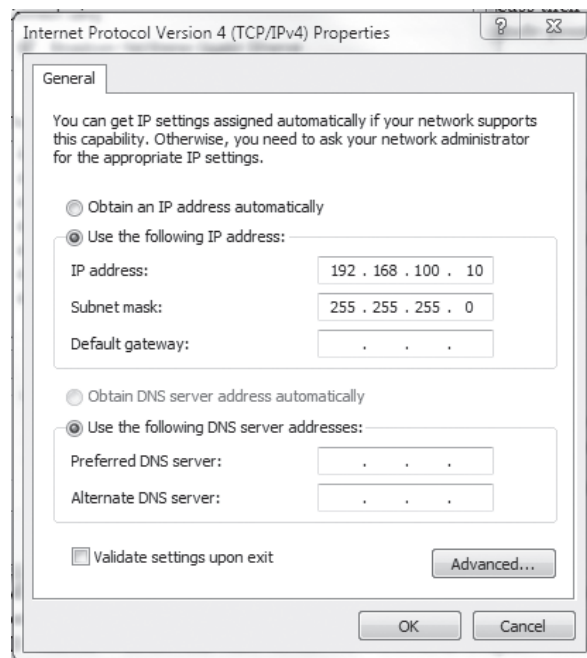Fig. 3-3, Windows 7® Local Area Connection

Fig. 3-4, Windows 7® Internet Protocol Version 4 (TCP/IPv4) Properties

3.0 Managing the SMG, Continued

Use the following procedure to configure a static IP address on a laptop or computer with the Windows 8® or Windows 10® operating system:

1. Right-click the **Windows® Logo** (lower left button on most Windows 8® computers).
2. Scroll through the list that appears and click **Network Connections**.
3. Right-click on **Ethernet** and select **Properties**.
4. In the dialog box (Fig. 3-5), select **Internet Protocol Version4 (TCP/IPv4)** and then click the **Properties** button.
5. In the Internet Protocol Version 4 (TCP/IPv4) Properties dialog box, record the existing IP address and Subnet mask in order to later return the computer to its original state.
6. Select **Use the following IP address** (See Fig. 3-6). Enter the values as shown (i.e. IP address 192.168.100.10 and Subnet mask 255.255.255.0).
7. Click **OK** and attempt to connect to the SMG's local Web interface using the default IP address in the Web browser.
8. To restore network settings, repeat steps 1 through 5, then click **Obtain an IP address automatically** or **Use the Following IP address** based on the original settings recorded in step 5, then click **Close**.
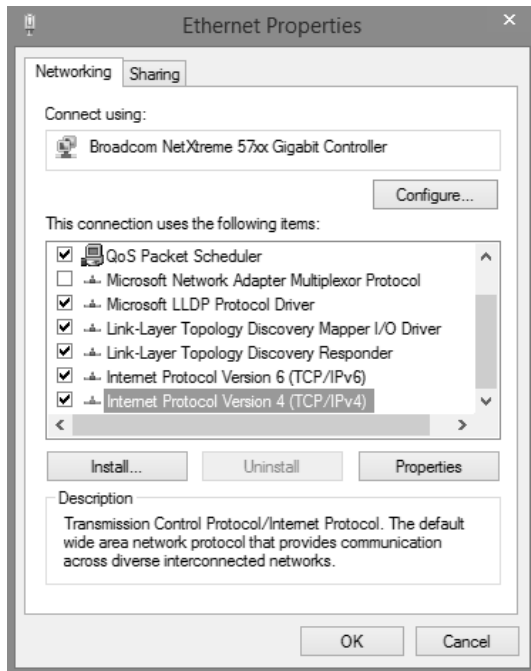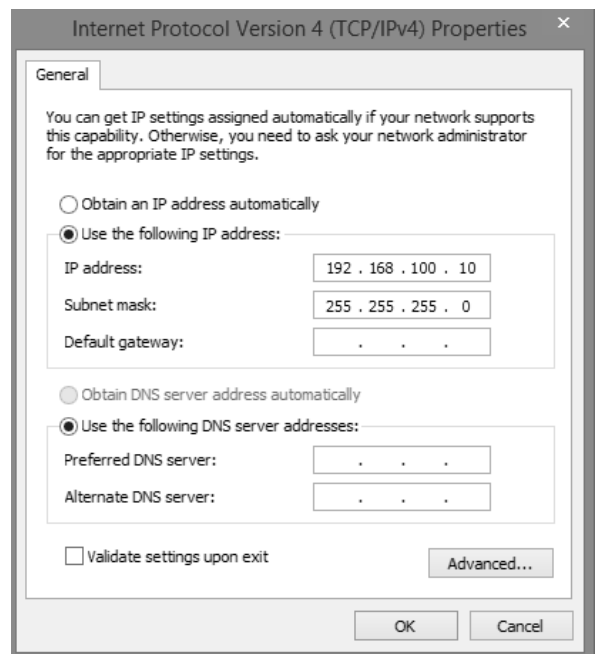

**Fig. 3-5, Windows 8® Ethernet
Properties Screen**

**Fig. 3-6, Windows 8® Internet Protocol
Version 4 (TCP/IPv4) Properties**
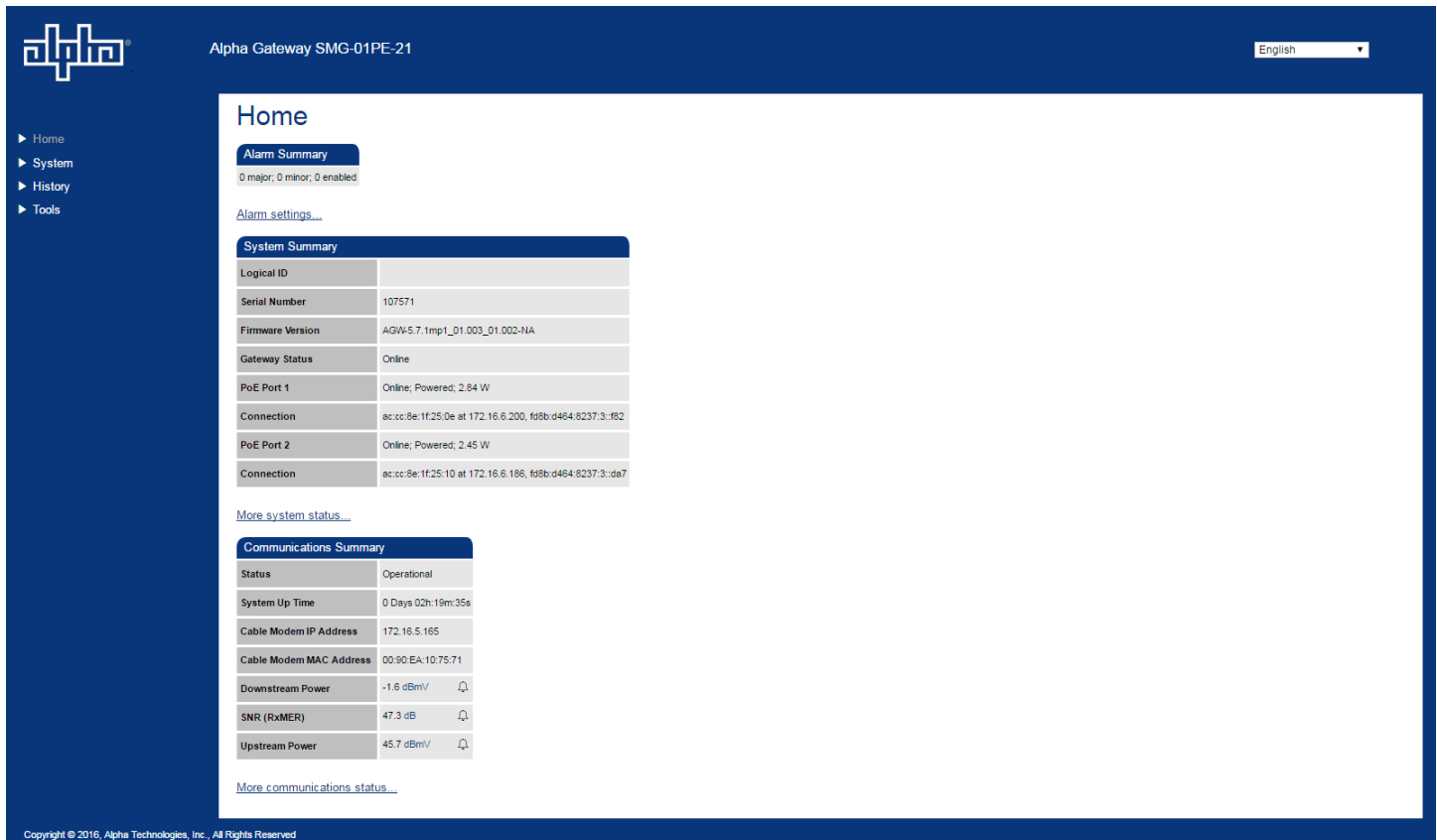
3.2 Remote Access - Web Interface

NOTICE:
- For Web server (HTTP) access, port 80 must not be blocked and the computer must have access to the private cable modem network.
- The SMG supports SNMPv1, v2C and v3. Contact Alpha Tech Support to obtain the supported MIBs.

To access the SMG's Web interface remotely via Web browser, use the following procedure:

1. Connect the laptop or computer's network interface port to the company's Ethernet network.
2. Open a Web browser.
3. Enter the SMG's DHCP designated IP address into the Web browser's address field (Use square brackets when entering IPv6 addresses: [FC00:168:40::124]).
4. The SMG's Web page will load.

3.3 Navigating the SMG Web Page

The home page offers a brief summary of the primary elements of the SMG. Detailed system information, history logs, and analytical tools can be accessed via the navigation pane in the left column.

Fig. 3-7, SMG Home Page

3.0 Managing the SMG, Continued

Select a link in the navigation pane and the page specific to the topic will open, enabling real-time data and parameters to be observed and configured.
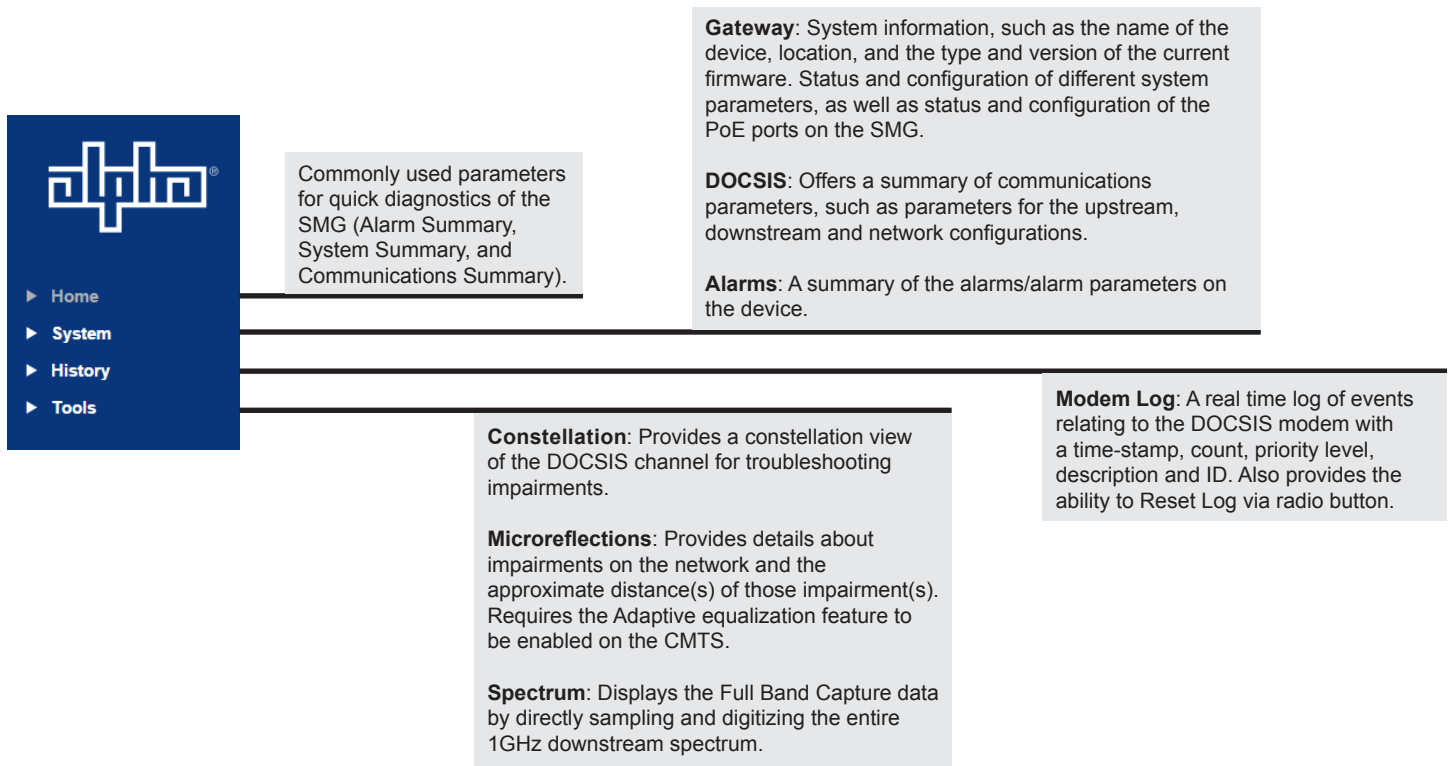
Commonly used parameters for quick diagnostics of the SMG (Alarm Summary, System Summary, and Communications Summary).

Gateway: System information, such as the name of the device, location, and the type and version of the current firmware. Status and configuration of different system parameters, as well as status and configuration of the PoE ports on the SMG.

DOCSIS: Offers a summary of communications parameters, such as parameters for the upstream, downstream and network configurations.

Alarms: A summary of the alarms/alarm parameters on the device.

- ▶ Home
- ▶ System
- ▶ History
- ▶ Tools

Modem Log: A real time log of events relating to the DOCSIS modem with a time-stamp, count, priority level, description and ID. Also provides the ability to Reset Log via radio button.

Constellation: Provides a constellation view of the DOCSIS channel for troubleshooting impairments.

Microreflections: Provides details about impairments on the network and the approximate distance(s) of those impairment(s). Requires the Adaptive equalization feature to be enabled on the CMTS.

Spectrum: Displays the Full Band Capture data by directly sampling and digitizing the entire 1GHz downstream spectrum.

Fig. 3-8, Navigation Pane Links

System Pages

Selecting the **System** link in the navigation pane enables the user to access three areas:

- **Gateway Page** - View system information, as well as status and configuration of PoE ports.
- **DOCSIS Page** - View details about the cable modem communications link.
- **Alarms Page** - View the current alarms, and view alarm settings.
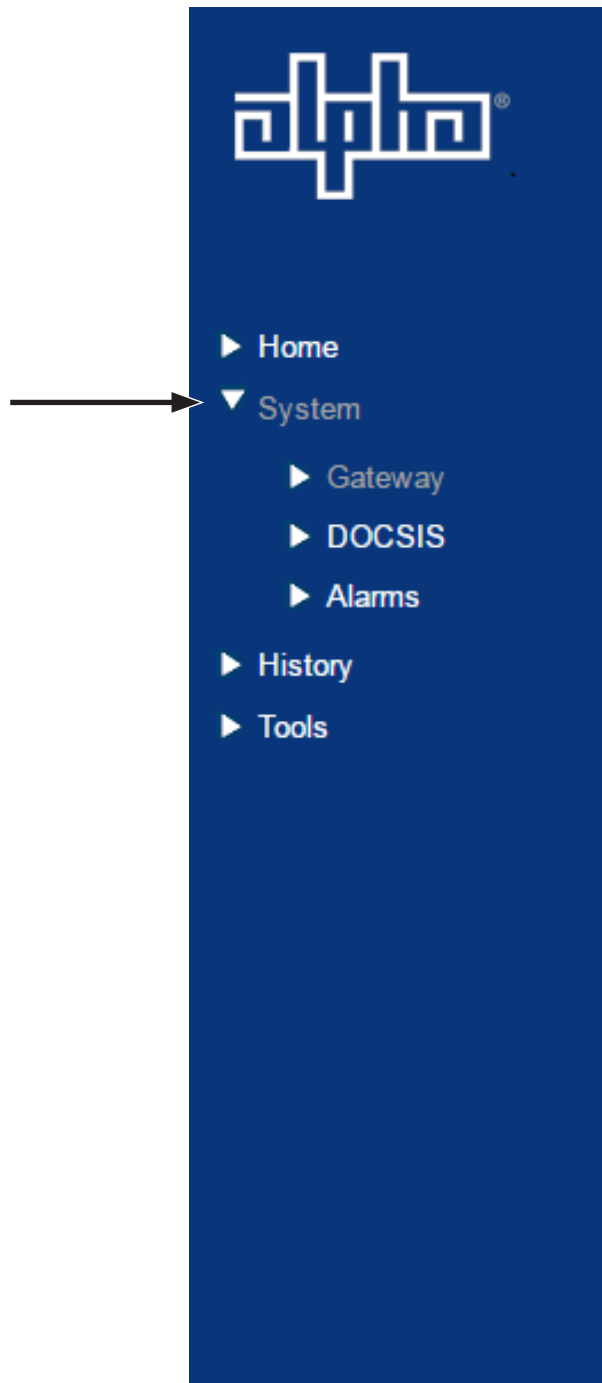

Fig. 3-9, System Link, Navigation Pane

3.0 Managing the SMG, Continued

Gateway Page

Open the Gateway page by selecting **System** -> **Gateway** on the main menu.

Fig. 3-10, Gateway Data

For the Gateway page port control function, security authorization is needed before carrying out selectable function. Use Alpha default username "Alpha" and password "AlphaSet" to control Gateway page editable functions like port control and clear DOCSIS log.

DOCSIS Page

Open the DOCSIS page by selecting **System** -> **DOCSIS** on the main menu. The DOCSIS page displays detailed information about the DOCSIS modem including a quick communications summary, downstream and upstream data, and network communications data.

Fig. 3-11, DOCSIS Data

Three data points on this page can also be enabled with alarm settings. These data points are Downstream Power and SNR (RxMER) in the Downstream section and Upstream Power in the Upstream section.

Alarms Page

Open the Alarms page by selecting **System** -> **Alarms** on the main menu.

The Alarms page consists of three main sections:

- Alarms - Any items currently in alarm, first listed as a summary and then by category.
- Limit Properties - Configuration of alarms generated by exceeding numeric limits.
- Discrete Properties - Configuration of alarms generated by entering a specific discrete status.

Alpha Gateway SMG-01PE-21

Alarms

Alarm Summary
0 major; 0 minor; 0 enabled

Limit Properties

Gateway 1

Item	State	Major High	Minor High	Minor Low	Major Low	Dead Band	Current Value
Input AC Voltage	Nominal	0.00	0.00	0.00	0.00	0.00	61.58 VAC
Input Current	Nominal	0.00	0.00	0.00	0.00	0.00	0.48 A
Input Apparent Power	Nominal	0.00	0.00	0.00	0.00	0.00	29.74 VA
Port 1 Output DC Voltage	Nominal	0.00	0.00	0.00	0.00	0.00	54.55 VDC
Port 2 Output DC Voltage	Nominal	0.00	0.00	0.00	0.00	0.00	54.50 VDC
Port 1 Output Power	Nominal	0.00	0.00	0.00	0.00	0.00	2.29 W
Port 2 Output Power	Nominal	0.00	0.00	0.00	0.00	0.00	2.56 W
Port 1 Received Data Rate	Nominal	0	0	0	0	0	0 Kbps
Port 2 Received Data Rate	Nominal	0	0	0	0	0	0 Kbps
Port 1 Sent Data Rate	Nominal	0	0	0	0	0	0 Kbps
Port 2 Sent Data Rate	Nominal	0	0	0	0	0	0 Kbps

System Alarms

Item	State	Major High	Minor High	Minor Low	Major Low	Dead Band	Current Value
Internal Temperature	Nominal	0	0	0	0	0	56 ℃
Downstream Power	Nominal	15.00	10.00	-10.00	-15.00	1.50	-1.90 dBmv
SNR (RxMER)	Nominal	0.00	0.00	0.00	0.00	0.00	48.60 dB
Upstream Power	Nominal	55.00	50.00	0.00	0.00	1.50	45.50 dBmv

Discrete Properties

Gateway 1

Item	Setting	State	Enable	Current Value
Control Status	Online	Nominal	No Alarm	
	Local Override	Nominal	No Alarm	Online
	Not Communicating	Nominal	No Alarm	
Port 1 Link Status	Online	Nominal	No Alarm	
	Limited	Nominal	No Alarm	
	Offline	Nominal	No Alarm	Online
	Disabled	Nominal	No Alarm	

Home
System
  Gateway
  DOCSIS
  Alarms
History
Tools

Fig. 3-12, Alarms Page

The Alarms section presents a quick list of every current alarm, not just the first few shown on the Home page. The alarm details, including the current value, are then listed by category.

The Limit Properties section shows all the SNMP objects in this gateway that can generate an alarm based on numeric limits.

History Pages

Selecting the **History** link in the navigation pane enables the user to access one area:

- **Modem Log Page** - A real time log of events relating to the DOCSIS modem.
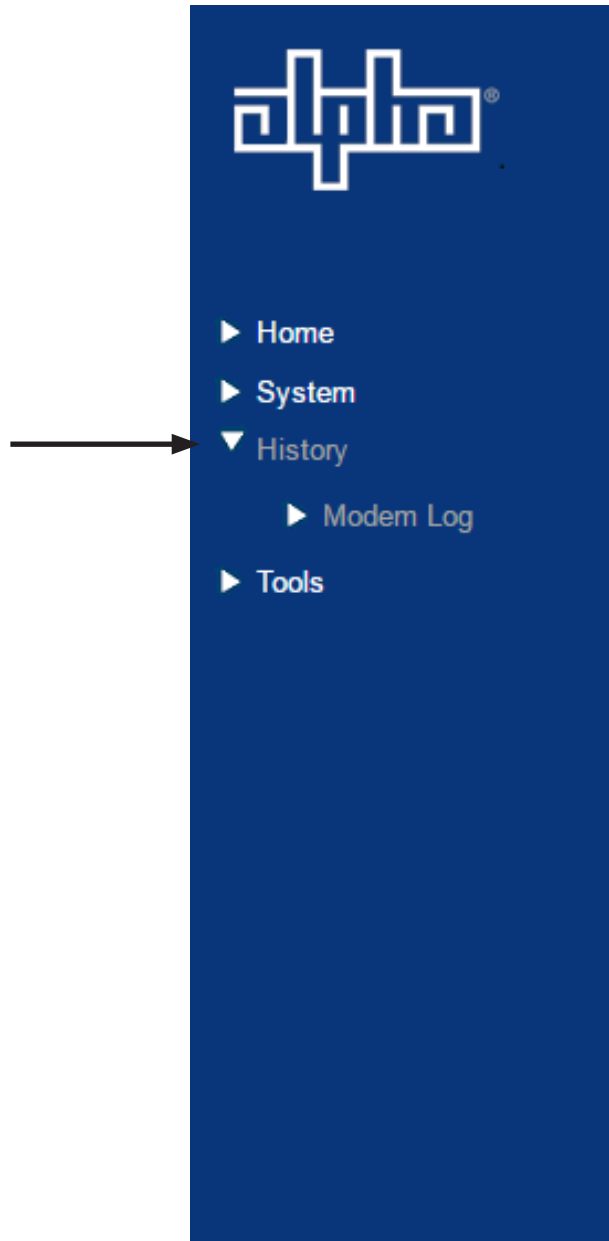

Fig. 3-13, History Pages

Modem Log Page

Open the Modem Log page by selecting **History** -> **Modem Log** on the main menu. The Modem Log page records the system events including the time, alarm count, priority, event description, and the ID of the alarm.

Time	Count	Priority	Event Description	ID
Fri,Aug 05,2016 15:40:37 Fri,Aug 05,2016 15:40:37	1	Critical(3)	Telnet user logged in from IP address 172.16.6.199.	913D0020
Fri,Aug 05,2016 15:40:37 Fri,Aug 05,2016 15:40:37	1	Critical(3)	SSH user logged out.	913D0024
Fri,Aug 05,2016 15:40:05 Fri,Aug 05,2016 15:40:05	1	Critical(3)	SSH login failed from 172.16.6.199.	913D0025
+00h:00m:32s +00h:00m:32s	1	Warning(5)	DHCP WARNING - Non-critical field invalid in response ;CM-MAC=00:90:ea:10:75:71;CMTS-MAC=00:17:10:02:e6:47;CM-QOS=1.0;CM-VER=3.0;	40D9A2C
+00h:00m:30s +00h:00m:30s	1	Notice(6)	Honoring MDD; IP provisioning mode = IPv4	913D0032
Fri,Aug 05,2016 15:25:26 Fri,Aug 05,2016 15:25:26	1	Critical(3)	SSH user logged in from IP address 172.16.6.199.	913D0023
Fri,Aug 05,2016 15:24:58 Fri,Aug 05,2016 15:24:58	1	Critical(3)	Telnet user logged out.	913D0021
Fri,Aug 05,2016 15:24:11 Fri,Aug 05,2016 15:24:11	1	Critical(3)	Telnet user logged in from IP address 172.16.6.199.	913D0020
Fri,Aug 05,2016 15:24:11 Fri,Aug 05,2016 15:24:11	1	Critical(3)	SSH user logged out.	913D0024
Fri,Aug 05,2016 15:11:08 Fri,Aug 05,2016 15:11:16	8	Critical(3)	No Ranging Response received - T3 time-out;CM-MAC=00:90:ea:10:75:71;CMTS-MAC=00:17:10:02:e6:47;CM-QOS=1.1;CM-VER=3.0;	4E33948
+00h:00m:32s +00h:00m:32s	1	Warning(5)	DHCP WARNING - Non-critical field invalid in response ;CM-MAC=00:90:ea:10:75:71;CMTS-MAC=00:17:10:02:e6:47;CM-QOS=1.0;CM-VER=3.0;	40D9A2C
+00h:00m:30s +00h:00m:30s	1	Notice(6)	Honoring MDD; IP provisioning mode = IPv4	913D0032
Fri,Aug 05,2016 15:10:19 Fri,Aug 05,2016 15:10:20	8	Warning(5)	MDD message timeout;CM-MAC=00:90:ea:10:75:71;CMTS-MAC=00:17:10:02:e6:47;CM-QOS=1.1;CM-VER=3.0;	5020C4C
Fri,Aug 05,2016 14:28:39 Fri,Aug 05,2016 14:28:50	8	Critical(3)	No Ranging Response received - T3 time-out;CM-MAC=00:90:ea:10:75:71;CMTS-MAC=00:17:10:02:e6:47;CM-QOS=1.1;CM-VER=3.0;	4E33948
+00h:00m:31s +00h:00m:31s	1	Warning(5)	DHCP WARNING - Non-critical field invalid in response ;CM-MAC=00:90:ea:10:75:71;CMTS-MAC=00:17:10:02:e6:47;CM-QOS=1.0;CM-VER=3.0;	40D9A2C
+00h:00m:29s +00h:00m:29s	1	Notice(6)	Honoring MDD; IP provisioning mode = IPv4	913D0032
Fri,Aug 05,2016 11:23:17 Fri,Aug 05,2016 11:23:24	7	Critical(3)	No Ranging Response received - T3 time-out;CM-MAC=00:90:ea:10:75:71;CMTS-MAC=00:17:10:02:e6:47;CM-QOS=1.1;CM-VER=3.0;	4E33948
+00h:00m:32s +00h:00m:32s	1	Warning(5)	DHCP WARNING - Non-critical field invalid in response ;CM-MAC=00:90:ea:10:75:71;CMTS-MAC=00:17:10:02:e6:47;CM-QOS=1.0;CM-VER=3.0;	40D9A2C
+00h:00m:30s +00h:00m:30s	1	Notice(6)	Honoring MDD; IP provisioning mode = IPv4	913D0032
Fri,Aug 05,2016 11:21:43 Fri,Aug 05,2016 11:21:43	1	Notice(6)	SW download Successful - Via NMS	41D069C
Fri,Aug 05,2016 11:21:06 Fri,Aug 05,2016 11:21:06	1	Notice(6)	SW Download INIT - Via NMS	41D02B4
+00h:00m:31s +00h:00m:31s	1	Warning(5)	DHCP WARNING - Non-critical field invalid in response ;CM-MAC=00:90:ea:10:75:71;CMTS-MAC=00:17:10:02:e6:47;CM-QOS=1.0;CM-VER=3.0;	40D9A2C
+00h:00m:29s +00h:00m:29s	1	Notice(6)	Honoring MDD; IP provisioning mode = IPv4	913D0032

Fig. 3-14, Modem Log Page

Security authorization is needed before carrying out selectable functions. Use Alpha default username "Alpha" and password "AlphaSet" to control editable parameters.

Tools Pages

Selecting the **Tools** link in the navigation pane enables the user to access three areas:

- **Constellation Page** - Provides a constellation view of the DOCSIS channel for troubleshooting impairments.
- **Microreflections Page** - Provides details about impairments on the network.
- **Spectrum Page** - Displays the Full Band Capture data by directly sampling and digitizing the entire 1GHz downstream spectrum.
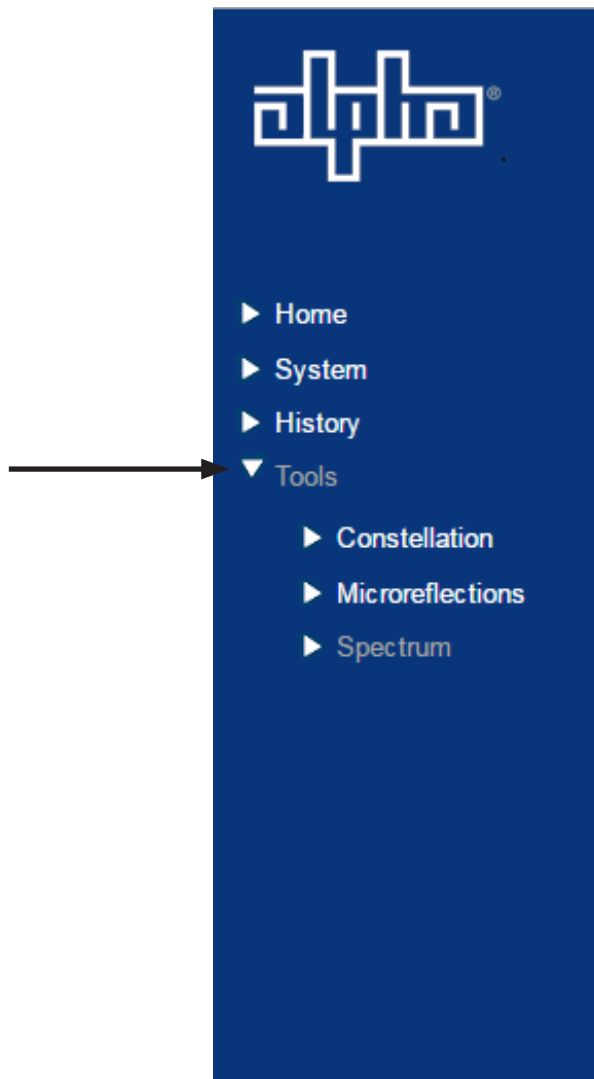

Fig. 3-15, Tools Pages

Constellation Page

The Constellation page provides a constellation view of the DOCSIS channel that may assist in identifying and troubleshooting common network impairments.

The page will automatically refresh until the samples remaining counter reaches 0. Clicking the Restart button refreshes the constellation tool, and clicking the Stop button halts the analysis.

The number of samples can be changed from 100 (default) on the sampling control to either 150 or 50 for more or less sample rates.
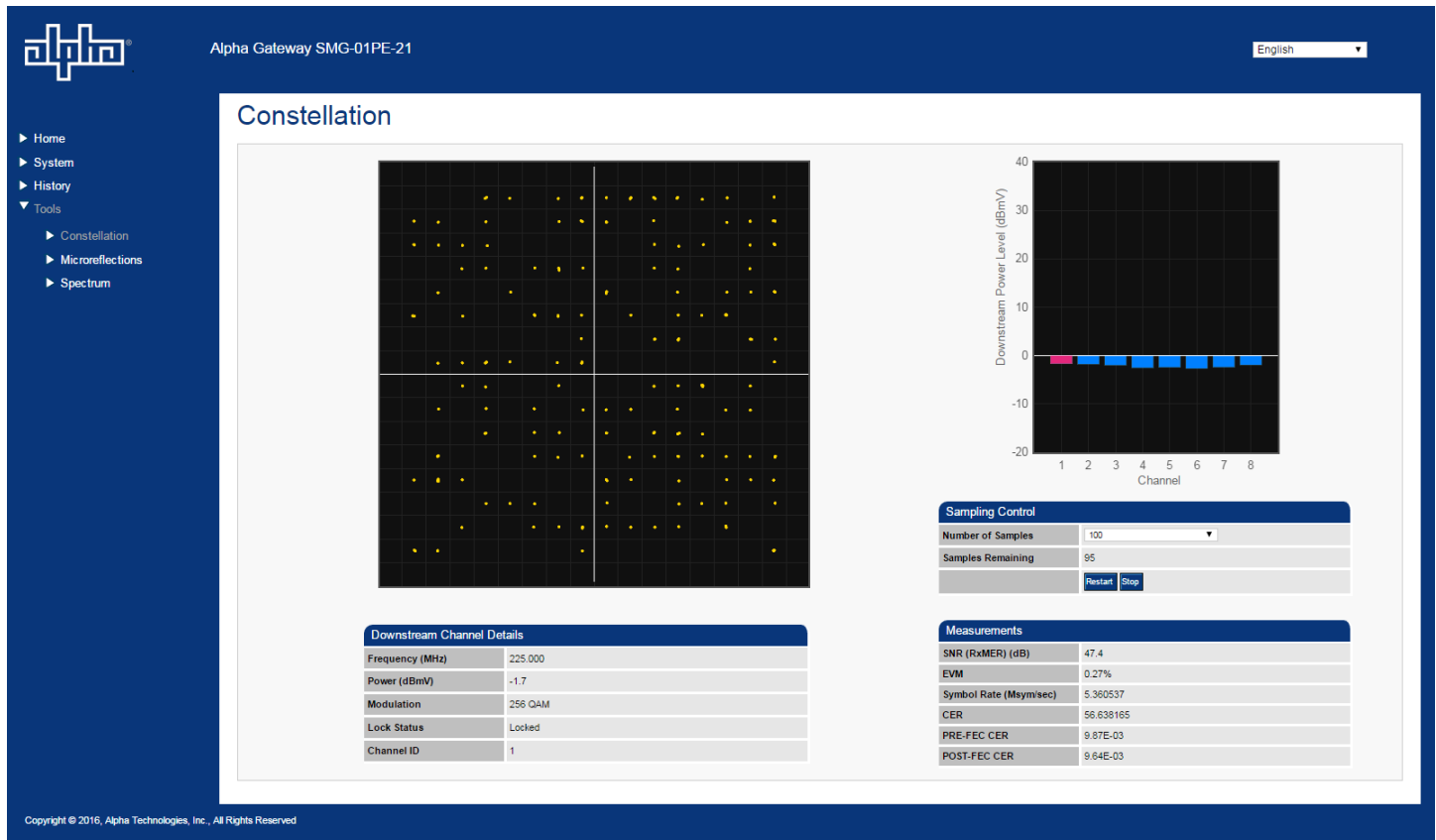
Fig. 3-16 QAM Constellation Tool

The tables on the right hand side of the screen provide a summary of common parameters associated with QAM Constellation analysis. Here's a breakdown of the parameters listed:

- Frequency - The tuned downstream frequency given in MHz.
- Power – Downstream power given in dBmV.
- SNR / (RxMER) – Downstream signal quality. Modulation Error Ratio (SNR)
- EVM – Error Vector Magnitude (from hardware MER (Modulation Error Ratio) / software MER).
- CER Interval – Codeword Error Rate (CER) refresh rate.
- Pre FEC CER – Codeword Error rate (CER) BEFORE forward error correction is applied.
- Post FEC CER – Codeword Error rate (CER) AFTER forward error correction is applied.

QAM Constellation Common Impairments

Several common impairments tend to reveal themselves on the constellation display which can help determine the cause of the reduced MER levels. Below are examples of several of these common impairments and their footprints.

Individual Cells and Entire QAM Constellation
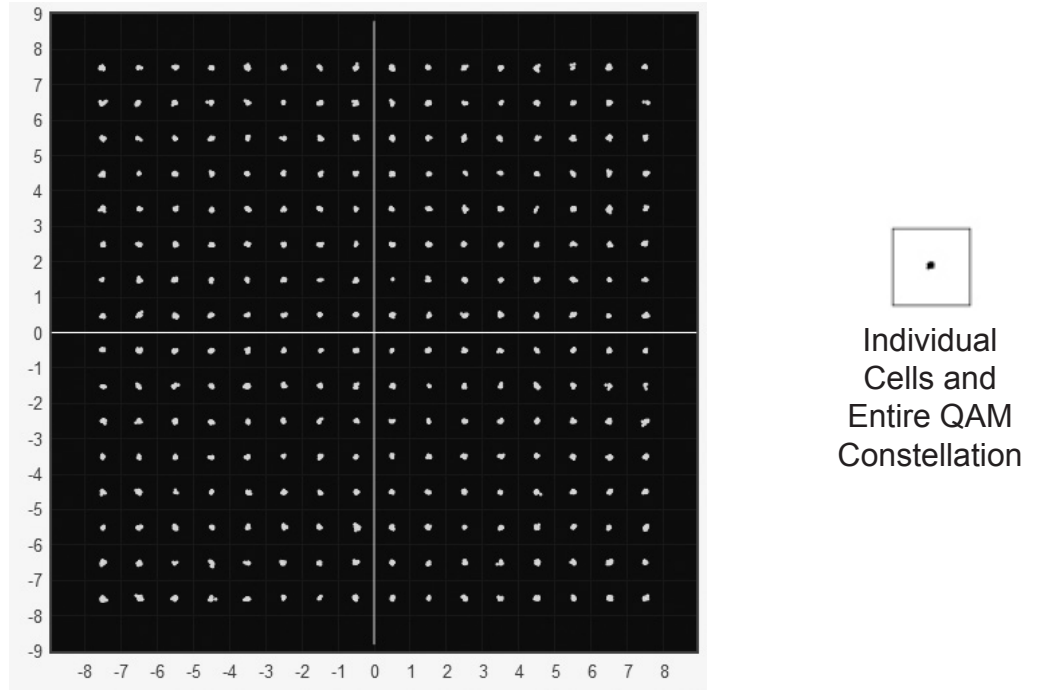
Fig. 3-17, Normal (Good Quality) and Individual Cell Characteristics

Individual Cells and Entire QAM Constellation
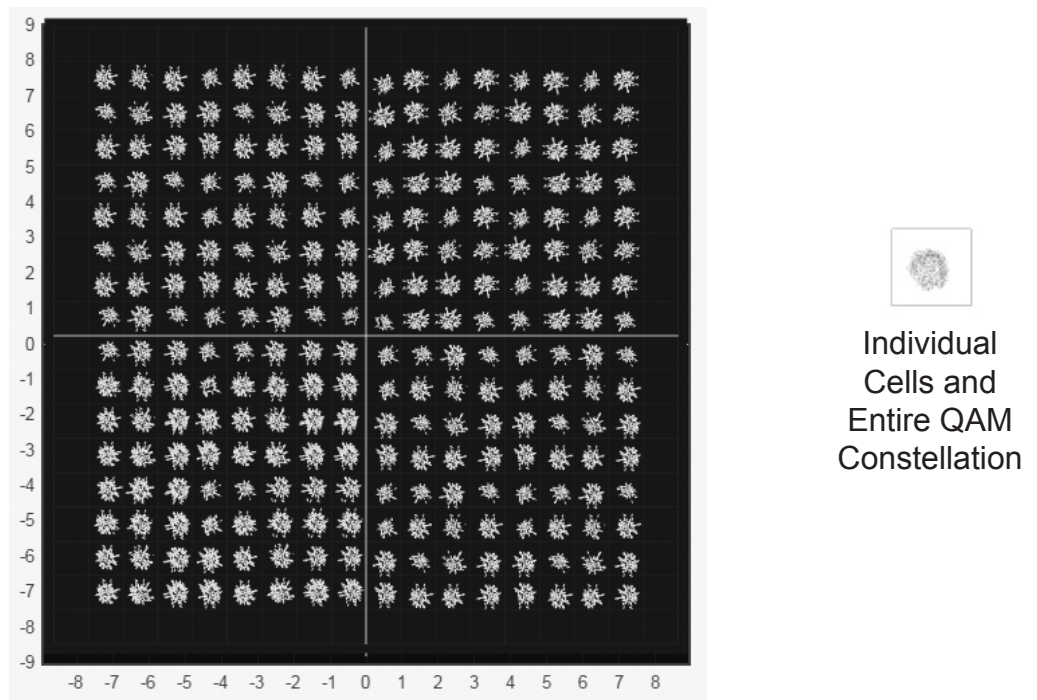
Fig. 3-18, Fuzzy (Low CNR and/or Low MER) and Individual Cell Characteristics

3.0 Managing the SMG, Continued

Individual
Cells and
Entire QAM
Constellation
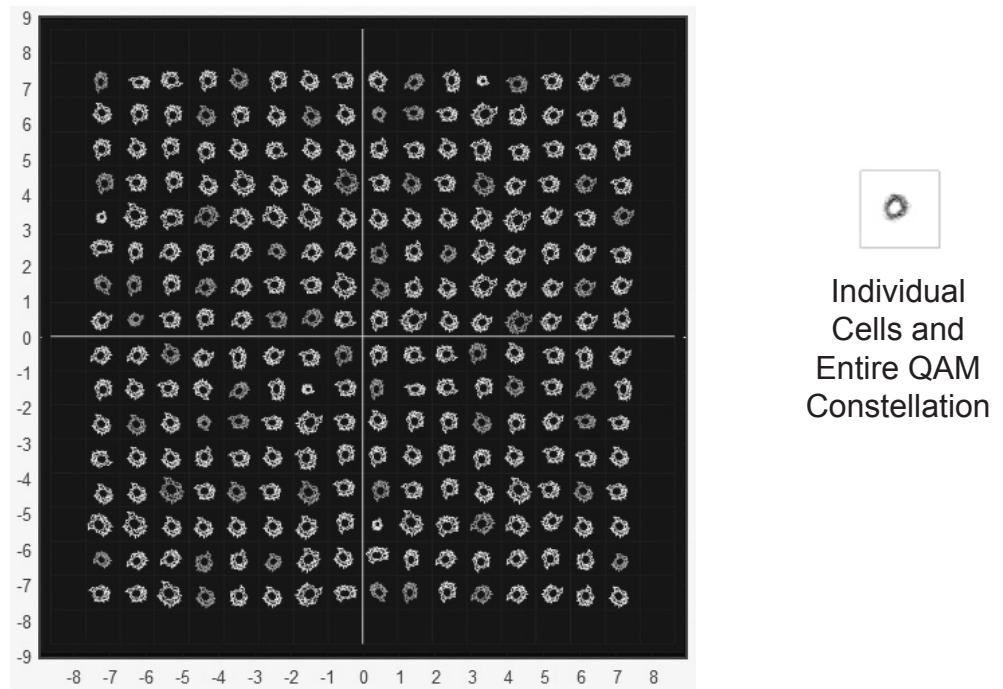
Fig. 3-19, Doughnuts (Coherent Interference) and Individual Cell Characteristics

Individual
Cells and
Entire QAM
Constellation
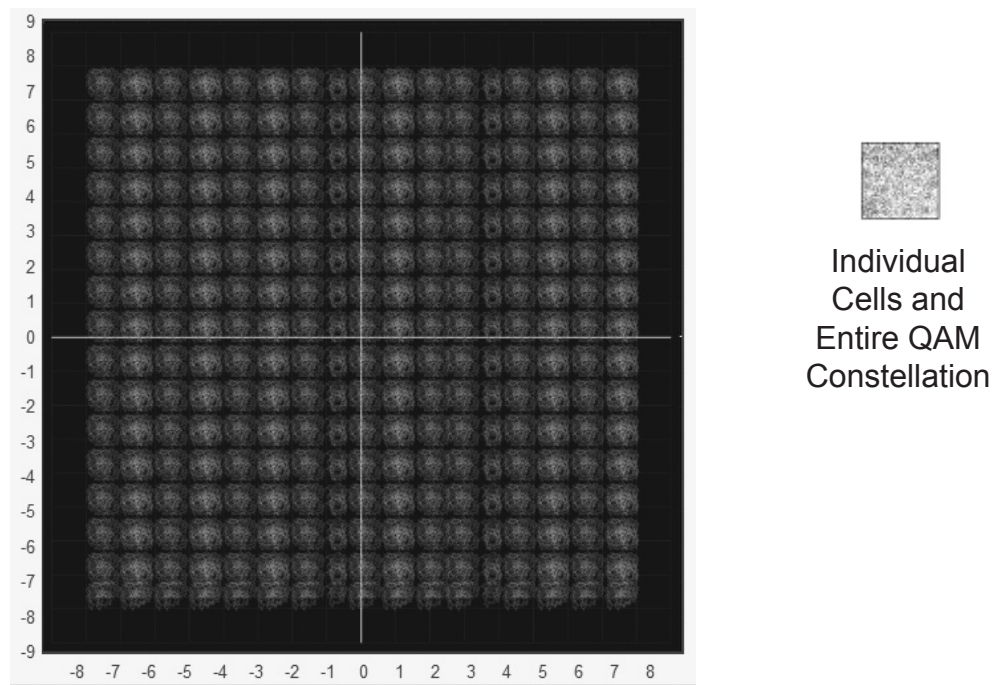
Fig. 3-20, Gaussian Noise and Individual Cell Characteristics

3.0 Managing the SMG, Continued

Entire QAM
Constellation
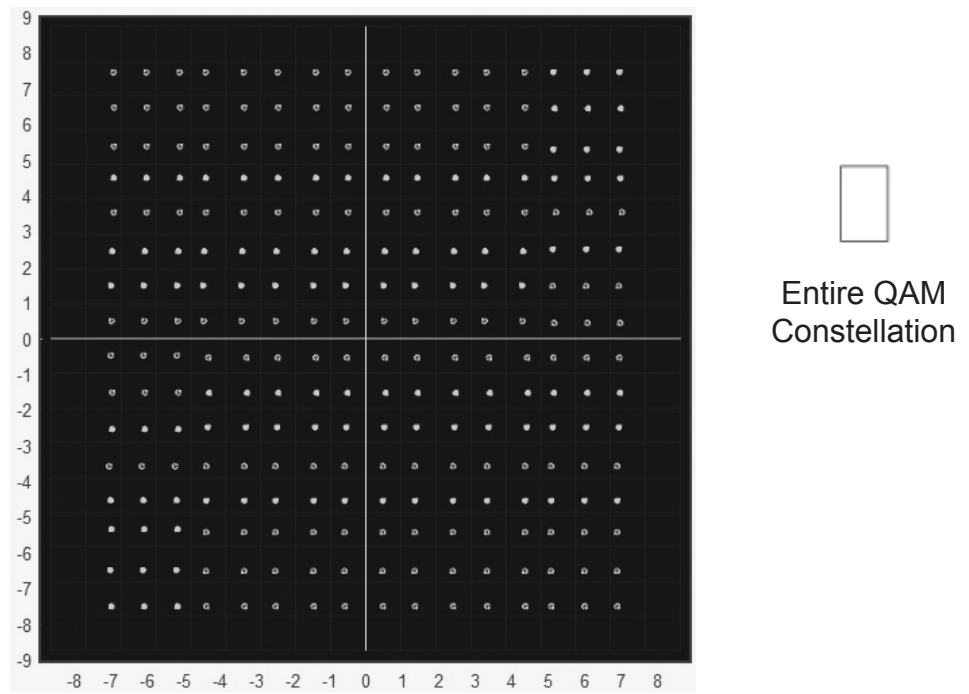
Fig. 3-21, Regular vs. Square (I-Q Imbalance) and Entire Constellation Shape

Entire QAM
Constellation
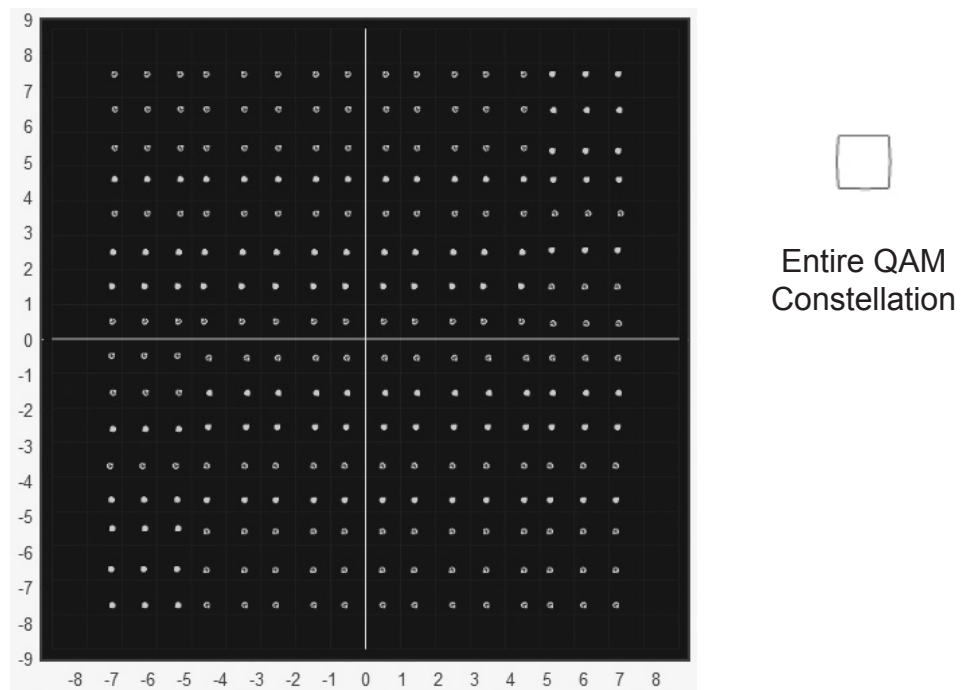
Fig. 3-22, Corners Squeezed to Center (Gain Compression) and Entire Constellation Shape

3.0 Managing the SMG, Continued

Entire QAM Constellation
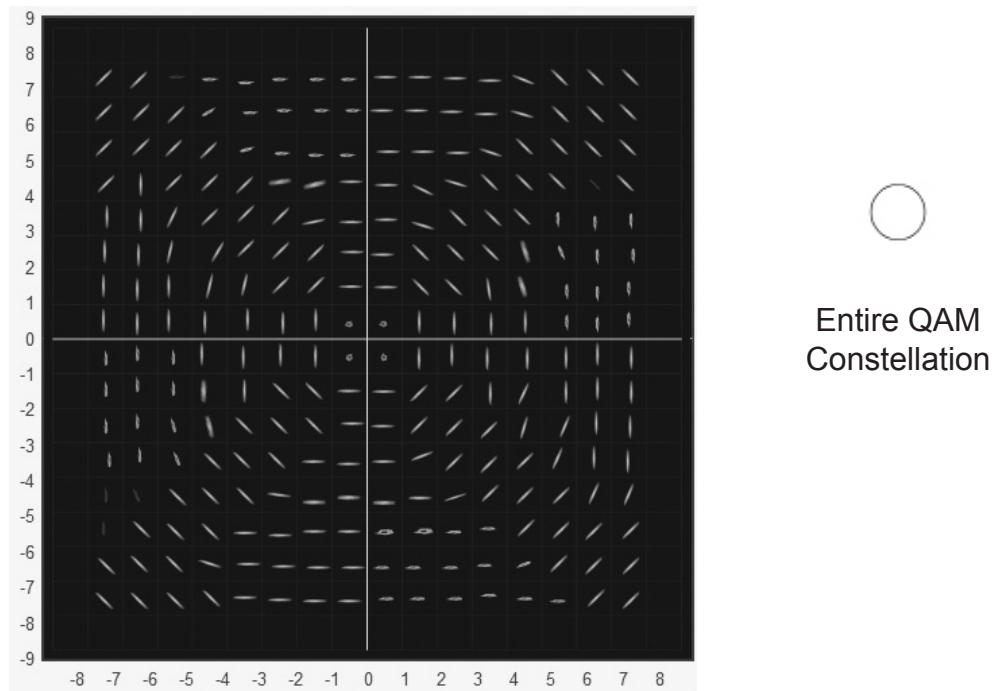
Fig. 3-23, Circular Smear (Phase Noise) and Entire Constellation Shape

Entire QAM Constellation
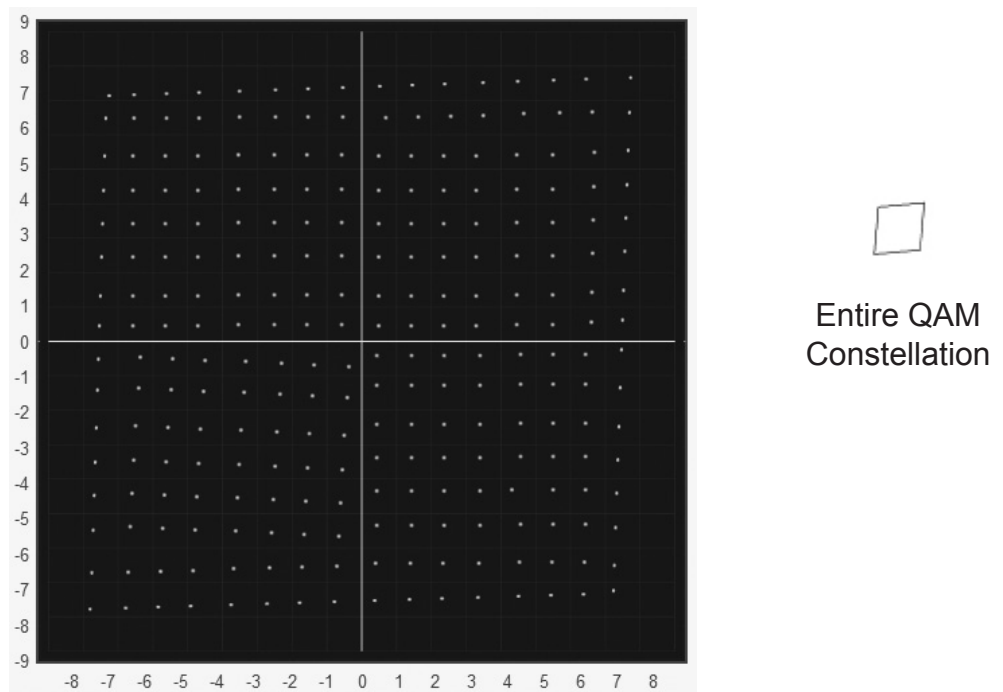
Fig. 3-24, Twisted or Skewed (Quadrature Distortion) and Entire Constellation Shape

Microreflections Tool

The Microreflections page provides details about impairments on the DOCSIS network and the approximate distance(s) of the impairment(s). In order to provide the analysis and a display of possible impairments, this tool requires the Adaptive Equalization function to be enabled on the CMTS.
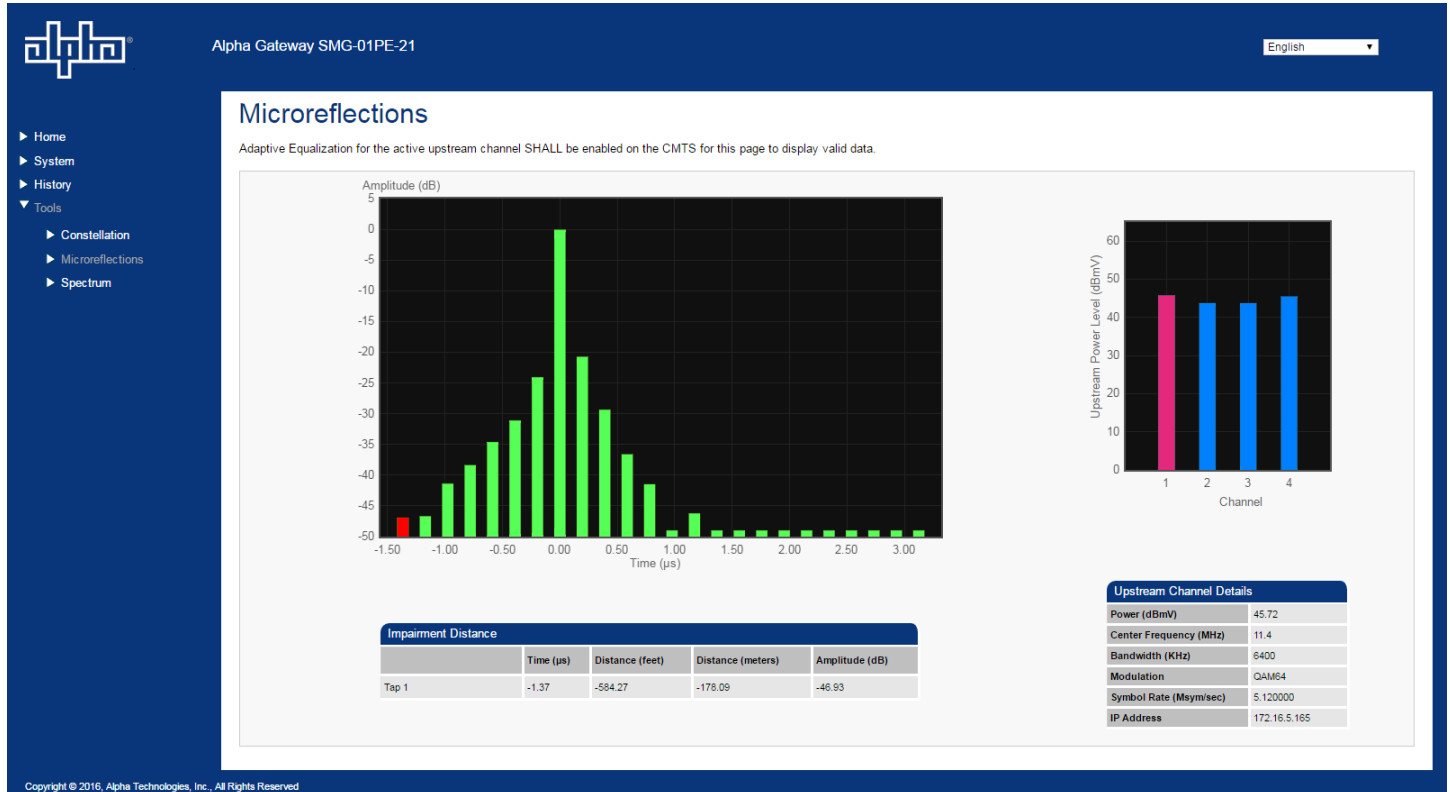
Fig. 3-25, Microreflections Tool

3.0 Managing the SMG, Continued

Click on a particular bar in the graph to display the details of the impairment such as time, distance (feet & meters) and amplitude (See Fig. 3-19). The selected bar will turn a slightly different shade of color compared to other bars in the graph.
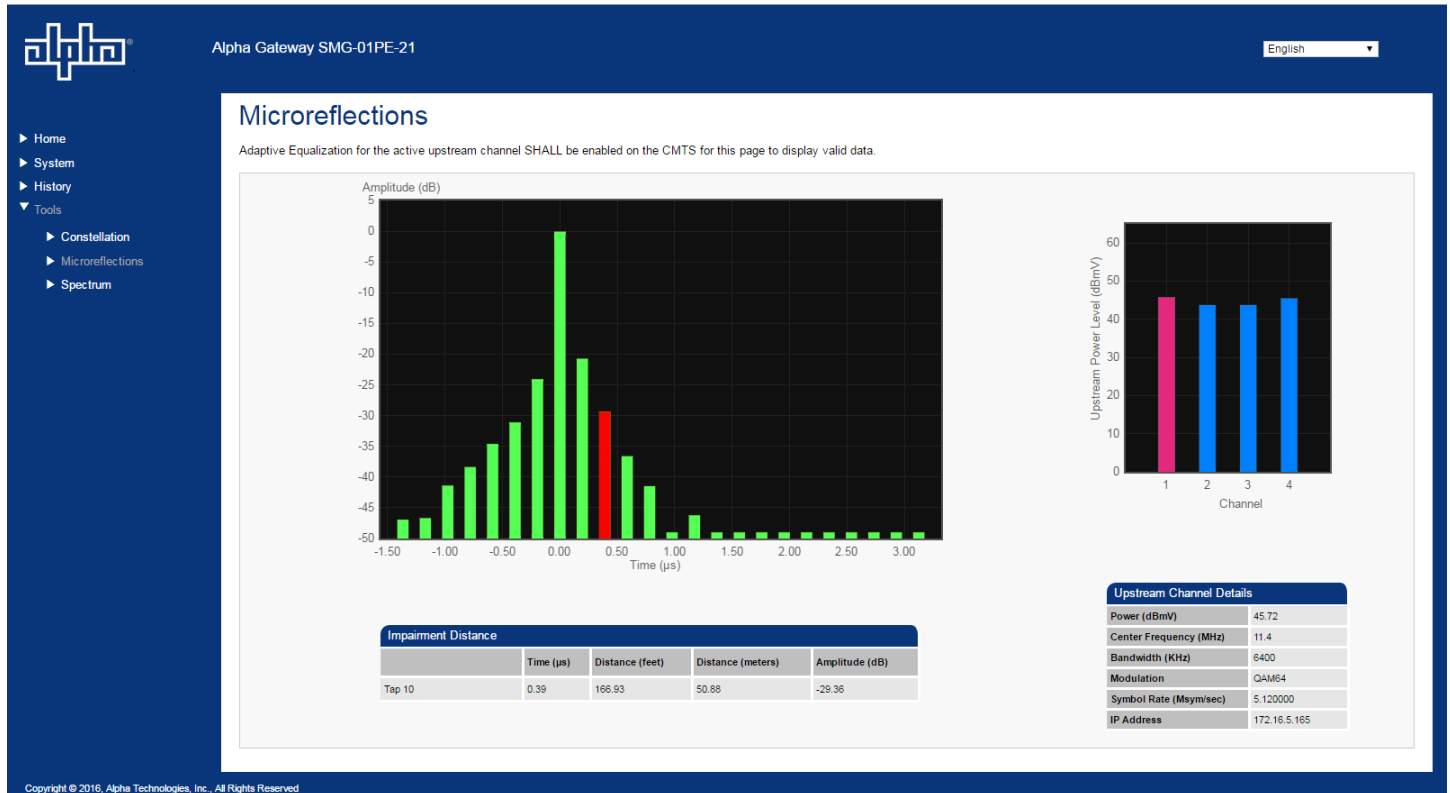
Fig. 3-26, Microreflections Tool (Bar Selected)

Spectrum Tool

A full-range display spanning 0 - 1005MHz, the Spectrum page provides a detailed, full-band capture analysis of DOCSIS Channels. This tool assists in identifying and troubleshooting common impairments throughout the range of DOCSIS Channels.

Fig. 3-27, Spectrum Tool

Spectrum Tool Buttons	
Feature	**Function**
Range	This drop down menu allows the user to select the window's span of measurement - Full, 3 Channel, or 1 Channel.
Channel	The channel number in the center of the display.
Frequency	The frequency (in MHz) in the center of the display.
Restart	Restarts the spectrum display.
Stop	Stops the spectrum display from refreshing.
Max Hold	Marks the highest power seen. (Only applies to the "Live" view.)
Save 1	Saves the current trace (1) and display.
Save 2	Saves the current trace (2) and display.
Clear	This clears the Max Hold, Save 1 and Save 2 traces.

Table 3-1, Spectrum Tool Buttons

3.0 Managing the SMG, Continued

The tables on the right of the Spectrum page detail the X-Axis (Frequency), the Y-Axis (Amplitude) and the settings for the Spectrum display.

Frequency	
Center Frequency	502.5 MHz
Span	1005 MHz
Start Frequency	0 MHz
Stop Frequency	1005 MHz
Resolution Bandwidth	1 MHz

Amplitude	
Maximum	30 dBmV
Minimum	-80 dBmV
Attenuation	0.0 dB

Measurements	
Peak	-5.27 dBmV
Peak Position	265.78 MHz
Marker 1	MHz
Power	
Marker 2	MHz
Power	
Δ Frequency	
Δ Power	

Fig. 3-28, Spectrum Tables

Spectrum Tool Features	
Feature	Function
Frequency (X-Axis)	
Center Frequency (MHz)	The frequency in the center of the display.
Span (MHz)	The range of frequencies in the display.
Start Frequency (MHz)	The frequency at the left end of the display.
Stop Frequency (MHz)	The frequency at the right end of the display.
Resolution Bandwidth (MHz)	The frequency range represented by each point on the spectral display.
Amplitude (Y-Axis)	
Maximum (dBmV)	Enter a maximum power level in dBmV to control the scale of the Y-axis on the display.
Minimum (dBmV)	Enter a minimum power level in dBmV to control the scale of the Y-axis on the display.
Measurements	
Peak (dBmV)	The highest power level shown on the display. The reported value is dependant upon the Resolution Bandwidth.
Peak Position (MHz)	The approximate frequency with the highest power level on the display.
Marker 1 (MHz)	Enter a frequency in MHz to see it's respective power level.
Power (dBmV)	The power level for the previously entered frequency.
Marker 2 (MHz)	Enter a frequency in Mhz to see it's respective power level.
Power (dBmV)	The power level for the previously entered frequency.
▲Frequency (MHz)	The difference in frequency between the two markers.
▲Power (dBmV)	The difference in power between the two markers.

Table 3-2, Spectrum Table Details

4.0 Technical Specifications

Technical Specifications		
	SMG-01PE-21	**SMG-01PE-24**
Cable Modem		
Compliance:	DOCSIS 3.0	EuroDOCSIS 3.0
Transmit Frequency Range:	5 to 42MHz	5 to 65MHz
Receive Frequency Range:	88 to 1002MHz	108 ~ 1002MHz
Channel Bandwidth:	6MHz	8MHz
Downstream Data Rate:	Up to 300Mbps (8 Bonded Channels)	Up to 400Mbps (8 Bonded Channels)
Maximum Operating Level (3 or 4 Channels)**:**	**TDMA** QPSK, QAM(8, 16, 32, 64) **S-CDMA** QPSK, QAM(8, 16, 32, 64, 128)	**TDMA** QPSK, QAM(8, 16, 32, 64) **S-CDMA** QPSK, QAM(8, 16, 32, 64, 128)
Upstream Data Rate:	Up to 100Mbps (4 Bonded Channels)	Up to 100Mbps (4 Bonded Channels)
Outdoor Hardened:	Yes	
Network Management Protocols:	SNMPv1, V2C, V3, TFTP	
Input Connector:	RF F-type female	
Input Impedance:	75 Ohm	
Privacy:	BPI+	
Downstream Modulation:	64 or 256 QAM	
Ethernet		
Number of Powered Ethernet Ports:	2	
Connection:	10/100/1000 BASE-T auto sensing/auto-MDIX (8P8C modular jack)	
Distance:	100M	
Bulkhead Interface for Ethernet:	Secure grommet (0.17 to 0.25in outer diameter cabling)	
Power Over Ethernet:	**Compliance:** IEEE 802.3at PoE **Max Power Out:** 34.2W per port **Max Power at PD (Powered Device):** 25W per port **Voltage Range Out of Base Unit:** 50-57V **Voltage Range at PD:** 42.5-57V **Max Current:** 600mA per port	
Remote PoE Port Power Control:	On, off, reset (per port)	
Remote PoE Status:	Link up/down, link speed, power up/down, PoE device class, PoE power consumption	
Remote PoE Device Status:	MAC address, IPv4/IPv6 address	
Environment		
Input Voltage:	42 to 90VAC, 50/60Hz (HFC plant powered)	
Power Consumption:	15W + PoE Loading	
Operating Temperature:	-40 to 60°C (-40 to 140°F)	
Storage Temperature:	-40 to 70°C (-40 to 158°F)	
Humitidy:	5 to 95%, non-condensing	
Regulatory Compliance:	**Environmental:** UL50E / NEMA 6; IEC 60529: IP67 **Safety:** UL/IEC/EN 60950-1: ED2 **Surge:** SCTE 81 **EMC:** FCC Class B (FCC CFR 47 Part 15 Class B), ICCES-003 **RoHS:** Directive 2011/65/EU	
Physical		
Mounting Options:	Strand, pole, wall, vault	
Dimensions H x W x D (in/mm)**:**	13.3 x 8.8 x 5.4 / 338 x 223 x 137	
Weight (lbs/kg)**:**	11.2 / 5.1	

Table 4-1, Technical Specifications

4.0 Technical Specifications, Continued

Torque Specifications		
Hardware	**Location**	**Torque**
M8 (2 bolts)	Strand bracket to top of enclosure	44.3 – 53.1 in-lbs (5 – 6 N-m)
M8 (4 bolts)	Enclosure lid	44.3 – 48.7 in-lbs (5 –5.5 N-m)
1/4-20x1/2" (4 bolts)	Wall mount bracket to back of enclosure	44.3 – 53.1 in-lbs (5 – 6 N-m)
Carriage Bolt (2 bolts)	Strand mount bracket clamp	79.7 – 88.5 in-lbs (9 – 10 N-m)
Security screw (*Alpha p/n* 647-189-13)	Enclosure lid	26.5 in-lbs (3 N-m)
Pin to F Connector	F Connector	44 in-lbs (5.0 N-m)
Pin Seizure Screw	Inside enclosure	12 in-lbs (1.3 N-m)
Coax to F Connector	F Connector	35 in-lbs (4.0 N-m)
Grommet Body to Enclosure	Weathertight Ethernet cable grommet	30 in-lbs (3.5 N-m)
Sealing Nut (2)	Weathertight Ethernet cable grommet	12 in-lbs (1.5 N-m)
Ground Connection Hardware	Ground lug mount	44.3 in-lbs (5 N-m)

Table 4-2, Torque Specifications