



Smartzone[™] *Connectivity*

PViQ[™] Connectivity System User Manual

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Important Information

General Safety Notices

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

Only qualified personnel should perform service procedures.

Injury Precautions

- **Use Proper Power Cord with Panduit Adapter.** To avoid fire hazard, use only the power cord specified for this product.
- **Avoid Electric Overload.** To avoid injury or fire hazard, do not apply potential to any input, including the common inputs that vary from ground by more than the maximum rating for that input.
- **Do Not Operate Without Covers.** To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.
- **Do Not Operate in Wet/Damp Conditions.** To avoid electric shock, do not operate this product in wet or damp conditions.
- **Do Not Operate in an Explosive Atmosphere.** To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

Product Damage Precautions

- **Use Proper Power Source.** Do not operate this product from a power source that applies more than the voltage specified.
- **Do Not Operate with Suspected Failures.** If you suspect there is damage to this product, have it inspected by qualified service personnel.

Section 1 – PViQ™ Connectivity System Overview

PViQ™ Connectivity Hardware

The Panduit PViQ™ Connectivity Hardware System consists of a patch field and intelligent modules. The patch panels/trays have 24 data ports and occupy 1 Rack Unit (RU) space in a standard rack or cabinet. The intelligent modules are removeable modules that plug into the back of the patch field panels/trays, eliminating the need for additional RU space for the intelligent connectivity system.

Patch Field Hardware

There are two types of patch field hardware. The PViQ™ Connectivity Patch Panel and the PViQ™ Connectivity Fiber Tray. There are several variants to each of these two types of patch fields.

PViQ™ Connectivity Patch Panel

The Patch Panel may be ordered as a copper panel or a fiber panel. Copper or fiber is programmed at the factory and may not be changed. A copper panel is available as either flat or angled. A copper flat panel may be ordered as shielded or unshielded. The copper angled panel may be ordered as shielded or unshielded. The fiber panel is available as a flat panel only. However, the Fiber Panel is available in single mode or multimode with LC type data connections or with MPO type data connections.



Figure 1: Flat PViQ™ Connectivity Patch Panel (without data connectors)



Figure 2: Angled PViQ™ Connectivity Patch Panel (without data connectors)

PViQ™ Connectivity Fiber Tray

On the Fiber Tray, intelligent modules are accessed from the back of the unit. The Fiber Tray is available as pre-terminated or field terminated. The tray is available in single mode or multimode with LC type data connections or MPO type data connections.



Figure 3: Standard PViQ™ Connectivity Fiber Tray (with LC data connectors)

Intelligent Modules

There are two types of intelligent modules. The Panel Manager (PM) and an Expansion Module (EM).

Panel Manager

The PM provides the system patch field management interface to the network and the power source to the system. A PM will support 0 to 4 EMs for power and management communications. The PM is supplied with a mounting bracket, Ethernet cable and a PM user Interface Unit (IU).



Figure 4: PViQ™ Connectivity Panel Manager (with mounting bracket, patch cord and interface unit)

The PM is a removable module that provides scanning and management capabilities for patch panels or fiber trays. The PM includes LAN connectors for daisy chaining multiple PMs. A total of 30 PMs may be daisy chained to access the network via a single LAN port. An expansion port extends management capabilities and power from the PM to 1, 2, 3, or 4 EMs.

The back of PM has a label showing the MAC Address of the Module. Make a note of the MAC Address or Bar Code Scanner – it is needed for a later step to log into this module via the Web UI.

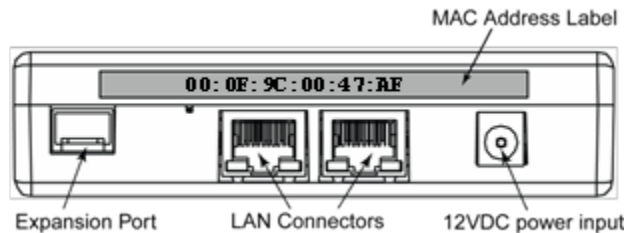


Figure 5: PViQ™ Connectivity Panel Manager Connections and MAC Address

Expansion Module

The EM provides the panel/tray patch field management interface to the PM and the power source to the next EM. The EM is supplied with a mounting bracket, Expansion Port Cable (EPC) and an EM user Interface Unit (IU).



Figure 6: PViQ™ Connectivity Expansion Module (with mounting bracket, expansion port cable, and IU)

NOTE: When installing the EPC make sure the cable coming from the PM (or previous EM) connects into the “Expansion In” port on this EM and the cable going to the next EM in the chain connects to the “Expansion Out” port on this EM.

Interface Units

The PViQ™ Connectivity IU attaches to the front of the patch panel or fiber tray. This unit provides access to various operational modes directly from the front of the panel. There are two types of IU that may be attached to the patch panel. The figures below show the IU for the Panel Manager and the IU for the Expansion Module.



Figure 7: PViQ™ Connectivity Interface Units (PM Interface Unit and EM Interface Unit)

When upgrading a PViQ™ Connectivity panel/tray from non-intelligent to intelligent, remove the blanking center unit and replace it with the appropriate IU before inserting the associated PM or EM into the rear of the panel/tray.

Each IU has four visual indicators, plus two navigation keys. In addition, the PM IU includes a Provisioning Port that supports copper Basic and Enhanced Interconnect Cords. The PM IU and the EM IU are identical except for the provisioning port located

on the PM IU.

The three indicators on the top (MAC, MODE, TRC) indicate the mode that the panel/tray is in.

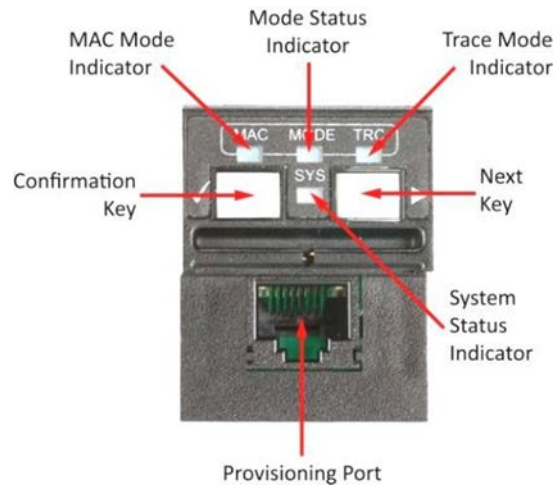


Figure 8: PViQ™ Connectivity PM Interface Unit

Mounting Bracket

Panel Managers and Expansion Modules are connected to the patch panel/tray using the PViQ™ Connectivity Mounting Brackets. Both the PM and EM use the same mounting bracket. Mounting brackets, including a built-in securing screw, are included with each PM and EM.



Figure 9: PViQ™ Connectivity Mounting Bracket (to be used with both PMs and EMs)

NOTE: The Standard PViQ™ Connectivity Fiber Tray does not require a mounting bracket. The mounting bracket is built into the Standard PViQ™ Connectivity Fiber Tray.

Patch Cords and Cables

Enabling the full potential of the PViQ™ Connectivity System requires specific patch cords and cables.

Standard Shielded Patch Cord

A standard shielded patch cord connects one PM to another PM. Thirty PMs may be connected together and connected back to one Ethernet LAN port. A 0.5M patch cord is provided with every PM. Any standard-length patch cord could be used to connect one PM to another, however, it is recommended to not connect more than 30 PMs to one LAN port.

Expansion Port Cable (EPC)

The EPC is used to connect the PM to the EM and each successive EM. When connecting the EPC make sure to connect the “Data Out” on the PM to the “Data In” on the EM. Then connect the “Data Out” on the EM to the “Data In” on the next EM and so on. The EPC is available in multiple lengths between 0.18M and 1.1M. A 0.18M EPC is provided with every EM.



Figure 10: PViQ™ Connectivity EPC

Cross-Connect Patch Cords

The copper cross-connect patch cord connects two PViQ™ Connectivity copper panels. This cross-connect patch cord is available as shielded or unshielded. These cords consist of a standard PViQ™ 9-wire patch cord plug on both ends. These cords are available in various lengths and colors.



Figure 11: Copper Cross-connect Patch Cord

The fiber cross-connect cord is used to connect between two PViQ™ Connectivity fiber panels/trays. These cords consist of a standard PViQ™ fiber patch cord plug on both ends. The Fiber LC cross-connect cords are also available with single-mode or multimode fiber.



Figure 12: Fiber Cross-connect Patch Cord

Interconnect Patch Cords

The PViQ™ Connectivity System utilizes the following styles of Interconnect Patch Cords to support connectivity between non- PViQ™ Connectivity enabled ports (switches with shielded jacks, servers with shielded jacks, etc.) and PViQ™ Connectivity Panels:

1. PViQ™ Connectivity Interconnect Patch Cords (I-Cord)
2. PViQ™ Connectivity Enhanced Interconnect Patch Cords (Enhanced I-Cord)
3. PViQ™ Connectivity Fiber Interconnect Patch Cords (Fiber I-Cord)

NOTE: Advanced provisioning features of the Copper PViQ Connectivity Interconnect Patch Cords (I-Cords) and Enhanced PViQ Patch Cords (Enhanced I-Cords) **are only available with compatible CDP and LLDP enabled switches when using the SmartZone Assent and Connectivity Software Modules.** SmartZone Assent and Connectivity Software Modules are compatible with most current major network equipment manufacturer's switch and router products. For questions about the compatibility of your specific hardware, please contact Panduit Technical Support.

- 1-866-721-5302 (toll-free)
Monday-Friday, 7:30 am – 5:00 pm CST
- systemsupport@panduit.com

Copper Interconnect cords are RJ45 cords available in enhanced shielded and

unshielded and basic unshielded. Each interconnect copper cord type is available in various lengths and colors.

The PViQ™ Connectivity Basic Interconnect Patch Cord (see figure below), also called the “I-Cord,” consists of a standard PViQ™ 9-wire patch cord plug on one side, and a special shielded housing on the far end to allow the system to sense double ended connections and provide visual verification in the PViQ™ Connectivity System.

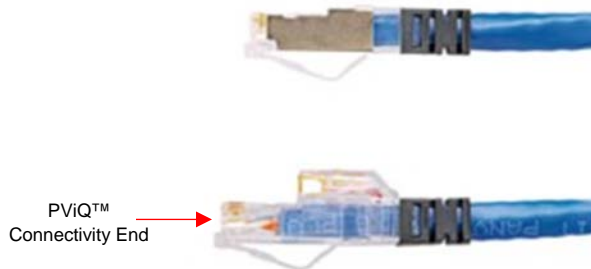


Figure 13: Basic Interconnect Patch Cord (Copper)

The PViQ™ Connectivity Enhanced Interconnect Patch Cord (see figure below), also called the “Enhanced I-Cord”, builds on the functionality of the Basic I-Cord by integrating LEDs directly into the patch cord plug, providing visual verification of accurate patching and tracing activities. It is available in shielded and unshielded.

The integrated LEDs also make it easy to identify the far end of I-Cords that have been bunched together and groomed in advance by the installer. The Enhanced I-Cord has a 10-wire plug with separate contacts on each side of an insulation layer.

The Enhanced I-Cord indicates and verifies insertion at the switch port, ensuring that the correct networking capabilities are provided for this connection. It also guides removal of interconnect patch cords from both the switch and corresponding PViQ Connectivity Patch Panel.

The Enhanced I-Cord has a standard PViQ™ 10-wire patch cord plug on one side and a standard RJ45 plug with a plunger on the far end to allow the system to sense double ended connections and provide visual verification in the PViQ™ Connectivity System. The plunger side of the cord also has a green/red visual indicator to enable port tracing between PViQ™ Connectivity System and network switches via local access or remote management. This capability allows for direct mapping and verification of end-to-end patch field connection points.

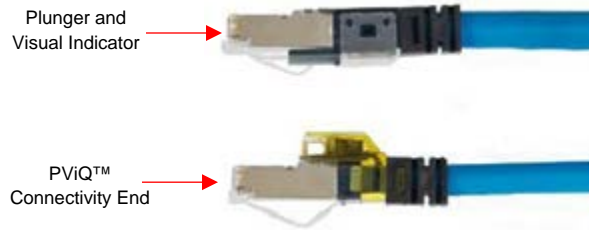


Figure 14: Copper Enhanced Interconnect Patch Cord (Shielded)

The PViQ™ Connectivity Fiber Interconnect Patch Cord consists of a standard PViQ™ fiber patch cord fiber connector on one side, and a standard fiber connector on the far end to allow the system to sense PViQ™ Connectivity System connections and provide visual verification in the PViQ™ Connectivity System. The Fiber Interconnect Patch Cord is available with LC or MPO fiber connectors and with single mode or multimode fiber. Each Fiber Interconnect Patch Cord type is available in various lengths and are color coded to the fiber type.



Figure 15: Fiber LC Interconnect Patch Cord (Multimode)

Power Supply

The PViQ™ Connectivity System (one PM and four EMs) uses one 12-volt power supply. The power supply is connected to the PM in the system.



Figure 16: PViQ™ Connectivity System Power Supply

Before applying power to the unit, ensure that you have an appropriate power supply for your region. Use the following recommended Panduit power supply for your region listed in Appendix A or a recommended end use LPS power supply where applicable.

Table 1: Power Supply Part Numbers

Region	Part Number
North America	PVQ-PS12VDC-S
Europe	PVQ-PS12VDC-E
United Kingdom	PVQ-PS12VDC-U
Japan	PVQ-PS12VDC-J
China	PVQ-PS12VDC-C
Universal	PVQ-PS12VDC-UNI

Installing/ Connecting PViQ™ Connectivity System to the Management Network

Refer to Appendix A: PViQ™ Connectivity Hardware Installation for installing and connecting the PViQ™ Connectivity System into the network.

Initial Power Up of PViQ™ Connectivity System

When power is first applied to a new PViQ™ Connectivity System, a series of diagnostics and firmware updates take place. These updates are automatic and occur without intervention from the user.

From the user point of view, you will see port LEDs lighting and extinguishing in a series as the PM synchronizes the firmware revisions of each piece of hardware. When all of the port LEDs are extinguished, and the System Status (SYS) LED on each Interface Unit (IU) is solid green (will flash amber every 10 seconds indicating the processors in the intelligent modules are running), the panel is in “Secure” mode and ready for operation.

NOTE: *If any cables are connected to a port, a RED LED may be lit above that port. See Secure Violations for more information.*

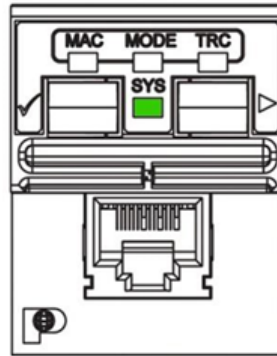


Figure 17: Secure Mode Status

NOTE: The entire initialization process may take up to 45 minutes to complete for a complete system (one PM and four EMs). Please be patient during this time and do not take any further action until Secure Mode status is reached.

Interacting with the PViQ™ Connectivity System

There are several ways to interact with the PViQ™ Connectivity System:

- Through the PViQ™ Connectivity Web UI
- Through the PM or EM IU
- Through the SmartZone Asset and Connectivity Software Modules
- Through the Pan Shell Command Line Interface (CLI) initiated using Telnet

For details on using the PViQ™ Connectivity Web UI, refer to Section 2 – PViQ™ Connectivity Web User Interface, in this document.

For details on using the IUs, refer to Appendix G: Interacting with the PViQ™ Connectivity System Interface Units in this document.

For details on using the SmartZone Asset and Connectivity Software Modules, refer to SmartZone Software User Manual, which is included as part of the documentation set of the SmartZone Software Platform. The SmartZone Asset and Connectivity Software Modules are part of a Windows based Graphical User Interface (GUI) Software Platform that may be purchased separately from Panduit.

For details on using the CLI, refer to Section 4 - Accessing the PViQ™ Connectivity System Through the Command Line Interface (CLI).

PViQ™ Connectivity System Interface Unit (IU)

The PViQ™ Connectivity System has several standard operating modes. These various modes may be accessed through unique combinations of key presses using the Function Keys (the Confirmation Key and Next Key), through the PViQ™ Connectivity Web UI or through the SmartZone Software.

Interface Unit (IU) Function Keys

Once the PViQ™ Connectivity System components have been installed and powered up and the system is in the Secure Mode state, one way to interact with the panel itself is through the Interface Unit (IU) Function Keys, located on the front of each PViQ™ Connectivity Panel.

Appendix G: Interacting with the PViQ™ Connectivity System Interface Units, describes how the function keys work, and some of the general tasks that can be accomplished with these keys.

Identifying the Function Keys

The IU has two Function Keys, located on the front of each Interface Unit.

- The Left Function Key is called the “Confirmation” Key. It is identified by the small checkmark to the left of the key.
- The Right Function Key is called the “Next” Key. It is identified by the arrow to the right of the key.



Figure 18: IU Function Keys

Pressing the Function Keys in predefined sequences enables users to initiate different operating modes.

Operating Modes

The functionality of the PViQ™ Connectivity System is determined by its mode of operation. There are six basic modes of operations that the panel may operate in and

two modes that the panel may be transitioning through. Each of these modes has its own use and functionality.

It is important to be able to visually determine the current state of the hardware, and to manipulate the hardware into the desired mode, to accomplish various tasks.

The following PViQ™ Connectivity System Modes include:

- Secure Mode
- Trace Mode
- MAC Mode (Move, Add, Change)
- Learn Mode
- Maintenance Mode
- Location Mode
- Detached Mode
- Factory Mode

These modes are defined in the following table. Detailed information can be found later in this section.

Table 2: Mode Definitions

Mode	Meaning
Secure Mode	Secure Mode is the normal operating state. This mode provides alerts when any unauthorized changes are made. The panels/trays will automatically enter Secure Mode, unless specifically placed into other modes.
Trace Mode	Trace Mode visually identifies or verifies near-end and far-end connectivity in the patch panel or fiber tray. This mode may be entered through the PViQ™ Connectivity Web UI or the PViQ™ Connectivity Panel IU.

Mode	Meaning
MAC Mode	Move, Add, and Change (MAC) Mode notifies users when pending change orders have been sent to the PViQ™ Connectivity System. The mode may be entered through the SmartZone Asset and Connectivity Software Modules only. The PViQ™ Connectivity Web UI triggers MAC Mode when using “Clear Security Policy”, to guide the removal of the patch cord.
Learn Mode	Learn Mode is a process where panel and port information for existing patch connections is detected and learned. Learn Mode may be entered through the PViQ™ Connectivity Web UI, the SmartZone Asset and Connectivity Software Modules or the Command Line interface on a per panel bases. For security reasons, the panels cannot be placed into Learn Mode through the PViQ™ Connectivity Panel IU.
Maintenance Mode	Maintenance Mode is used for resets, restorations and firmware updates. Maintenance Mode may be entered through the PViQ™ Connectivity Web UI, the PViQ™ Connectivity Panel IU or the SmartZone Connectivity Software Module.
Location Mode	Location Mode is used to identify where a specific panel resides within a facility. When invoked, all of the port LEDs for the requested panel light green, and the panel beeps until the Confirmation Key on the Interface Unit is pressed. The mode may be entered through the PViQ™ Connectivity Command Line Interface only. Location Mode is a future feature that is currently not available through the PViQ™ Connectivity Web UI or the SmartZone Connectivity Software Module.
Detached Mode	Detached Mode is a transitional mode where the PM/EM is not connected into a panel. This is not a typical mode. To get back into an operational mode, remove the power from the PM, insert the PM/EM into the appropriate panel and reapply power to the PM.
Factory Mode	Factory Mode is a transitional mode where the panel is powered up for the first time. The PM will automatically initiate a firmware update to the panel and transition it to Secure Mode. Please refer to the NOTE in the First Time Power Up section of this document.

Secure Mode

Secure Mode is the normal operating mode. Each panel/tray will be in Secure Mode under normal operating conditions.

Once the panel/tray is in Secure Mode, any unauthorized changes that occur in the patch field will result in a “Secure Violation,” and a red LED will light above the port identifying the violation. The LED will remain red until the violation has been cleared (see Secure Violations, later in this section).

Identifying Secure Mode

In Secure Mode, the System Status Indicator LED (SYS) remains solid green. All other indicator LEDs are off. The figure below shows the IU in Secure Mode.

NOTE: The SYS LED for the PM will briefly flash amber every 10 seconds.

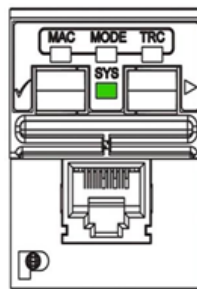


Figure 19: Secure Mode

Entering Secure Mode

Secure Mode is the default mode after initial power up. It is also the mode to which the system typically returns after resets or following the completion of activities initiated by other modes.

Secure Mode can be accessed through:

- PViq™ Connectivity Web UI
- PViq™ Connectivity Interface Unit (IU) Function Keys
- PViq™ Connectivity Command Line Interface (CLI)
- SmartZone Connectivity Software Module

Secure Violations

All changes made to the patch field should be initiated through the PViq™ Connectivity

Web UI or the SmartZone Connectivity Software Module. If a change is made without a request through the Web UI or SmartZone Connectivity Module (manually connecting or disconnecting patch cords at either end of the cord), a Secure violation occurs.

NOTE: When the PViQ™ Connectivity System first powers up, existing patch cord connections will all appear as Secure violations until these connections are discovered and verified. This is normal.

Inserting a patch cord, or removing a patch cord, causes the LED above the port associated with the violation to light solid red.



Figure 20: Secure Violation (unauthorized patch cord inserted into a port)

Removing one end of a patch cord will also cause the far-end port LED to light solid red, indicating that it is also affected by the action. Restoring the connections to their original state extinguishes the LEDs. If the cords are installed in the wrong positions, the ports will remain in Secure Violation.

Trace Mode

Trace Mode is used for the direct mapping and verification of end-to-end patch field connection points.

Identifying Trace Mode

In Trace Mode, the System Status Indicator LED (SYS) and Trace Indicator LED (TRC) light solid green. All other indicator LEDs are off. The below figure shows the IU in Trace Mode.

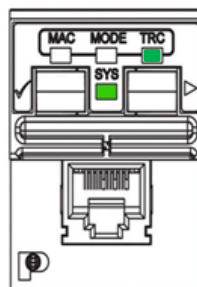


Figure 21: Trace Mode

Entering and Exiting Trace Mode

The PViQ™ Connectivity System may be put into Trace Mode through the PViQ™ Connectivity Web UI or through the PViQ™ Connectivity Panel IU. Refer to Section 2 – PViQ™ Connectivity System Web User Interface (Web UI) for entering and exiting Trace Mode through the Web UI. Refer to Appendix G: Interacting with the PViQ™ Connectivity System Interface Units for entering and exiting Trace Mode through the PViQ™ Connectivity Panel IU.

MAC Mode

Work orders for Move, Add, or Change (MAC) activities initiated through the SmartZone Asset and Connectivity Software Modules place the PViQ™ Connectivity Panels/Trays into MAC Mode. This provides a visual reference on the panel and notifies the user that a change order is pending.

When the Web UI is used to perform a “Clear Security Policy” on a connected port, the panel will go into MAC Mode to guide the user through the removal operation.

Identifying MAC Mode

In MAC Mode, the System Status Indicator LED (SYS) is solid green and MAC Indicator LED (MAC) is solid green. All other indicator LEDs are off. The following figure shows the IU in MAC Mode.

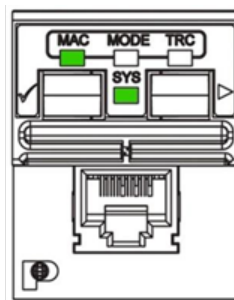


Figure 22: MAC Mode

Entering MAC Mode

The PViQ Connectivity Patch Panels can only be put into MAC Mode through the SmartZone Asset and Connectivity Software Modules (available separately). The PViQ™ Connectivity Web UI uses MAC Mode to guide the removal of a security policy on a port.

Exiting MAC Mode

Upon completion of the MAC activity, the PViQ Connectivity Patch Panel will automatically return to Secure Mode.

Learn Mode

Learn Mode is used to commit the current patch field configuration to the database. Changes to the patch field (for example, moving patch cables from one port to another) are “learned” by the PM and saved to the database. Learn Mode can be particularly valuable during first time setup, or when a large number of approved patch field modifications need to be completed.

Identifying Learn Mode

In Learn Mode, the System Status Indicator LED (SYS) is lit solid green. The Mode Indicator LED (MODE) is amber. The below figure shows the IU in Learn Mode.

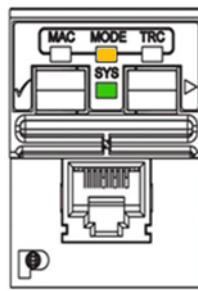


Figure 23: Learn Mode

Entering and Exiting Learn Mode

PViQ™ Connectivity System may be put in Learn Mode through three ways:

- Using the PViQ™ Connectivity Web UI
- Using the PViQ™ Connectivity Command Line Interface (CLI)
- Using the SmartZone Assent and Connectivity Software Modules

For security reasons, Learn Mode cannot be initiated through the Interface Unit (IU) Function Keys. Refer to Section 2 – PViQ™ Connectivity System Web User Interface (Web UI) to learn how to enter and exit Learn Mode on the PViQ™ Connectivity Panel.

To enter Learn Mode using the CLI set mode command, enter the command as shown below:

```
set mode <x> learn
```

Where <x> is the offset number of the panel.

To exit Learn Mode, and return to Secure Mode, using the CLI set mode command, enter the command as shown below:

```
set mode <x> secure
```

Where <x> is the offset number of the panel.

Refer to the SmartZone Software User Manual to learn how to enter and exit Learn Mode on the PViQ™ Connectivity Panel.

Maintenance Mode

Maintenance Mode is used for initializing and resetting the PViQ™ Connectivity System. This Mode provides the capabilities to perform panel/tray reconfigurations, firmware updates, system level technical functions, and troubleshooting procedures.

CAUTION: This section describes actions that can cause the PViQ™ Connectivity System database to be cleared, losing all current configurations, provisioning and patch field connectivity data. Use caution before attempting Maintenance Mode Resets described here.

Identifying Maintenance Mode

In Maintenance Mode, the System Status Indicator LED (SYS), Trace Indicator LED (TRC) and MAC Indicator LED (MAC) will all light solid green. The Mode Indicator LED is off. The below figure shows the IU in Maintenance Mode.

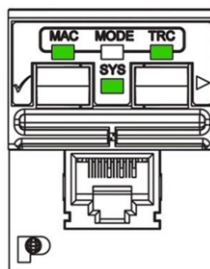


Figure 24: Maintenance Mode

In addition, all port LEDs will light solid red and an audible beep will continue to sound every 15 seconds.

Entering and Exiting Maintenance Mode

Maintenance Mode may be entered by the PViQ™ Connectivity PM IU (refer to

Appendix G: Interacting with the PViQ™ Connectivity System Interface Units), by the Command Line Interface (refer to Appendix C: PViQ™ Connectivity CLI Commands) or by the SmartZone Asset and Connectivity Software Modules (refer to the SmartZone Software User Manual). Maintenance Mode is implicitly entered through the Web UI during firmware update.

Location Mode

Location Mode is used to provide visual and audio identification cues to locate specific PViQ™ Connectivity Panel.

Identifying Location Mode

In Location Mode, the System Status Indicator LED (SYS), will light solid green. The MAC, Mode, and TRC Indicator LEDs are off. The following figure shows the PM in Location Mode.

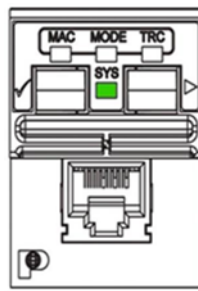


Figure 25: PM in Location Mode

In addition, all port LEDs will light solid green, and an audible beep will continue to sound.



Figure 26: Panel in Location Mode

To silence the audible beep, press the LEFT Function Key once. The port LEDs will remain lit until the panel is taken out of Location Mode.

Entering Location Mode

The PViQ Connectivity Patch Panels can only be put into Location Mode using the CLI set mode command, as shown below:

set mode <x> location

Where <x> is the offset number of the panel.

This is a future feature in the PVIQ™ Connectivity Web UI that has not been implemented yet.

Exiting Location Mode

To exit Location Mode, and return to Secure Mode, use the CLI set mode command, as shown below:

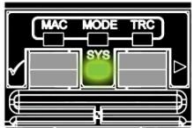
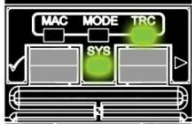
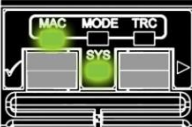
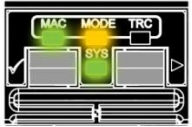
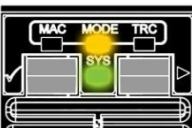
set mode <x> secure

Where <x> is the offset number of the panel.

Mode Identification Summary

The table below provides a quick reference for identifying the modes of the IU.

Table 3: Interface Unit Mode Summary

Interface Unit Modes	
	Secure Mode or Location Mode <i>(In Location Mode, all port LEDs will also be Green)</i>
	Trace Mode
	MAC Mode
	MAC Mode – single ended connection
	Learn Mode








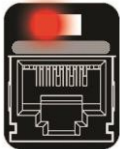


Port LED Indicators

Each panel/tray in the PViQ™ Connectivity System has individual LEDs located above each port. The table below describes the basic states for the ports and defines the LED colors associated with these states.

NOTE: When the PViQ™ Connectivity System is in the normal operating state (Secure Mode), with no Secure Violations, the Port LED indicators are “off” – that is, the LEDs are not illuminated, regardless of the presence of a patch cord.

Table 4: Port Indicator Meaning

Port	LED Status	Meaning
	“off”	Normal Operating State
	Solid Green	Connection successfully “learned” (must be in Learn Mode).
	Flashing Green and Red	Trace is active on this port. If a patch cord is connected, the far-end port will also flash.
	Solid Amber	Panel is in Learn Mode, with a single ended connection on this port

	<p>Flashing Green</p>	<p>Move, Add, or Change (MAC) is pending on this port. Waiting for insert.</p>
	<p>Flashing Red</p>	<p>Move, Add, or Change (MAC) is pending on this port. Waiting for remove.</p>
	<p>Solid Red ALL ports</p>	<p>Panel is in Maintenance Mode</p>
	<p>Solid Red ONE port</p>	<p>Secure Violation</p>

Section 2 – PViQ™ Connectivity System Web User Interface (Web UI)

Internet Protocol (IP) Address

The PViQ™ Connectivity System, by default, is configured to obtain an IP address from a Dynamic Host Configuration Protocol (DHCP) server when connected to a network. To obtain the IP address, run the `pviqutil.exe` tool (refer to Appendix B: Finding the PViQ™ Connectivity System IP Address, for downloading and using this tool). After obtaining the IP address, login to the Web UI to configure the PViQ™ Connectivity System and assign a static IP address (if desired). If there is no DHCP server, download and use an open source DHCP server on your PC (refer to Appendix H: Changing Your PC to Be a Standalone DHCP Server).

Web Configuration

Supported Web Browsers

The supported Web browsers are: Mozilla Firefox, Microsoft Edge, Google Chrome, and Apple Safari for desktops; Google Chrome and Apple Safari for mobile devices.

Logging in to the Web Interface

Open a supported web browser and enter the IP address of the PViQ™ Connectivity System. If the default username and password were NOT changed in a prior login to the PViQ™ Connectivity System, use the default username: **admin** and password: **panduit**. For security purposes, change the password upon login.

PViQ™ Connectivity Web UI Pages

There is a total of eight different pages in the PViQ™ Connectivity Web UI.

1. **Login** – is the login page to the PViQ™ Connectivity Web UI.
2. **Dashboard** – provides real time monitoring of every port in the PViQ™ Connectivity System.
3. **Patching** – allows you to configure every port in the PViQ™ Connectivity System.
4. **Alarms** – lists alarms by panels and ports in the PViQ™ Connectivity System.
5. **Logs** – provides a log of all alarms that are sent by the PViQ™ Connectivity System.

6. **Network** – allows you to change system attributes and network configuration of the PViQ™ Connectivity System.
7. **Email** – allows you to activate email alerts from the PViQ™ Connectivity System.
8. **Users** – allows you to add user and permissions into the PViQ™ Connectivity System.

Only the Dashboard, Patching, and Alarms Pages refresh automatically. The Network Page will automatically refresh during firmware updates only.

Login Page

The Login Page appears after typing in the IP address in the web browser URL and hitting enter.



Figure 27: Login Page

Dashboard Page

The dashboard page appears after logging into the PViQ™ Connectivity System. The Dashboard page will default to showing the first panel (the PM panel) in the PViQ™ Connectivity System.

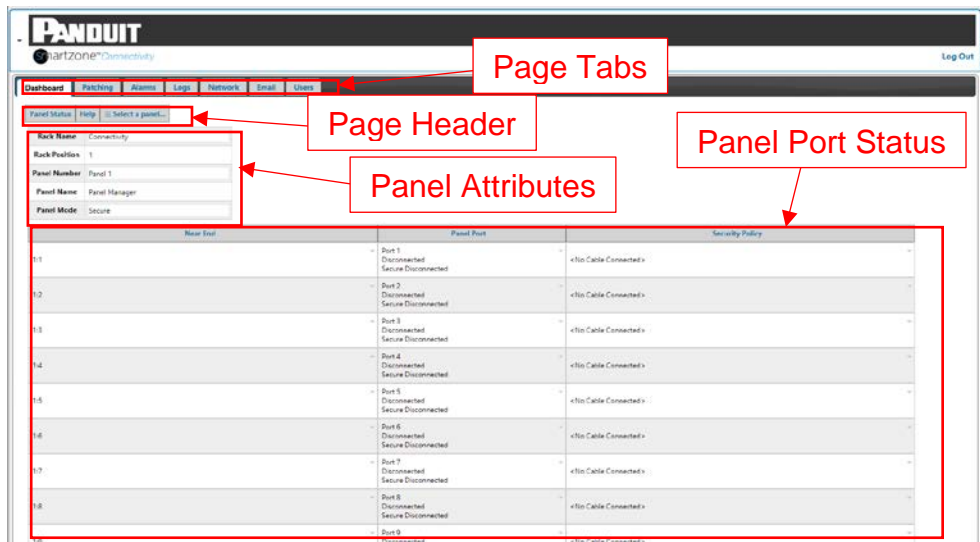


Figure 28: Default Dashboard Page

The dashboard page is a monitor only page. In the ribbon at the upper left side of the page are seven tabs that you can use to navigate between pages in the PViQ™ Connectivity Web UI.

Page Header

Below the ribbon is the Panel Status heading. Hover over the “Help” to open a tool tip describing the page. Click the “Select a panel” button to open a drop-down menu where you can select the viewing of the other panels (EM panels) in the PViQ™ Connectivity System.

Panel Attributes

Under the page header is a table of attributes for the PViQ™ Connectivity Panel and the rack/cabinet where it is located. The default values are shown in the figure above. You can change these attributes (on the Network page). Hover over each panel attribute to view a description of that attribute.

Panel Port Status

Under the panel attributes table is the main table on the page. This table provides the real time status of the individual ports on the panel. There are three fields across the top of the table. Each field is explained in the following sections.

Near End

The “Near End” column is defaulted to the **panel number:port number**. The first row indicates panel 1: port 1, the second row is panel 1: port 2, etc., as shown in the

“Default Dashboard Page” figure above. This field may be changed by the user. The intent of this field is to enter a name that identifies what is connected to the back side of the patch panel on this port.

All PViQ™ Connectivity Panels have 24 ports. Use the scroll bar on the right side of the page to see the rest of the ports on the panel.

Panel Port

The column “Panel Port” provides the **port number**, the **patch cord type**, and the **alarm status. port status**. There is a section for each one of these attributes under the Patching Page section later in this document.

Security Policy

This column provides the security policy that has been set on each port in the panel.

The column “Security Policy” provides the **far end port or device port number**, the **far end panel or device name**, and the **far end horizontal name**, if a cross-connect cable is expected to be plugged into this port. If the expectations are to have no cable, a Basic I-Cord/Fiber I-Cord, or an Enhanced I-Cord plugged in, the “Security Policy” will provide the following - “<No Cable Connected>”, “<Basic I-Cord Detection Mode>” or “<Enhanced I-Cord Detection Mode>”, respectively.

Patching Page

Click the Patching tab in the page ribbon at the upper left side of the page to get to the Patching Page. The ribbon of tabs is the same at the top of all pages in the PViQ™ Connectivity Web UI.

The patching page allows provisioning of the panel ports. This page is used to customize the port attributes. You can configure each port to what the port should expect (setting/clearing the security policy for the port).

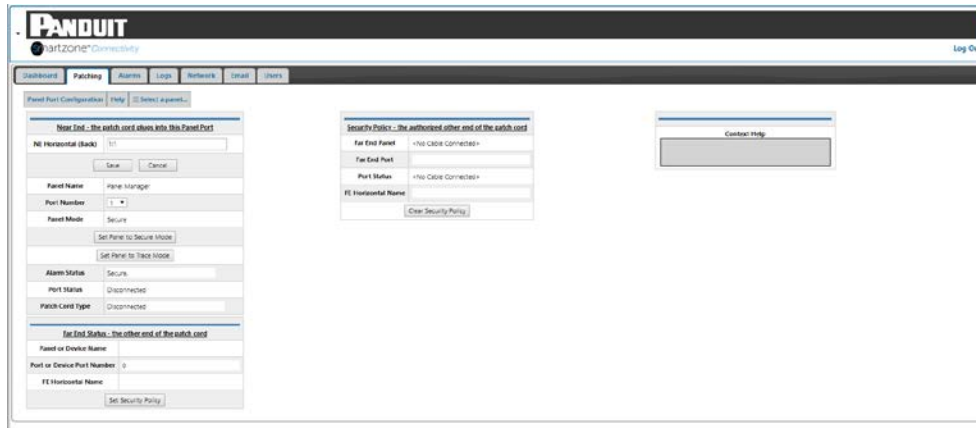


Figure 29: Patching Page

NOTE: If any text in a field does not fit in the field box, float over the text line and a pop up will provide the full text content.

Page Header

Below the ribbon is the “Panel Port Configuration” page header. Hover over “Help” to see a description of the page, this description also appears in the “Context Help” box. Click the “Select a panel” button to open a drop-down menu that allows you to view any panel in the PViQ™ Connectivity System. There may be 1 to 5 panels in a system. Each system configuration must contain a PM panel. All subsequent panels are EM panels.

Near End Attributes Section

In the Near End Attributes section, you can change the port attributes associated with the near end of a patch cable. This section contains the attributes of the port being viewed on the Patching Page. All references on this page are with respect to this port. Some fields are monitor only and others may be customized.

NE Horizontal (Back)

You may customize this field. This field name should identify what is connected to the back side (permanent link) on this port. After changing this field, click **Save**. The **Cancel** button reverts changes to this field.

Panel Name (actual)

You can customize this field, which identifies the panel name of the port being worked on.

Port Number (actual)

This field allows you to select the port in the panel being worked on. Click the field to open a drop-down menu where you can select any of the 24 ports on the selected panel. (All PViQ™ Connectivity Panels/Trays have 24 ports.)

Panel Mode (actual)

This read-only field shows the current mode of the panel. The panel can be in one of 8 different modes:

- Secure
- Learn
- Detached
- Trace
- MAC
- Location
- Maintenance
- Factory

There are only five modes that the panel may enter from the PViQ™ Connectivity Web UI:

- Secure
- Learn
- Trace
- MAC
- Maintenance

Refer to Operating Modes for a list of modes and how to enter them.

Set Panel to Secure Mode Button

Click this button to place the current panel selected on the Patching Page in the Secure

Mode. This means any patching changes to the ports on this panel will create a Security Violation alert.

Set Panel to Trace Mode Button

Click this button to place the current panel selected on the Patching Page in the Trace Mode. The port LED on the port selected and panel selected on this page will flash green-red. If there is a cross-connect patch cord plugged into the port, the other panel will automatically enter Trace Mode and the port on that panel will start flashing green-red. To move tracing to a new port on the same panel or a different panel, click **Set Panel to Secure Mode** first to clear the last trace. Then select the panel and port that the trace should be performed on and click **Set Panel to Trace Mode**.

NOTE: *The panel is placed into Trace Mode, but only one port on that panel is being traced (indicated by the port LED flashing green-red).*

NOTE: *Panduit recommends running only one trace at a time to avoid confusion.*

Alarm Status (actual)

This read-only field provides the status of the alarm on this port. The alarm status will be one of the following:

- “Secure.” = the port is in secure mode and there are no security violations.
- “Security Policy Violation!” = the port is in secure mode with a security violation.
- “Maintenance Mode.” = the port (the whole system) is in Maintenance Mode. The system will transition to Maintenance Mode to perform a Firmware update.

Port Status (actual)

This read-only field provides the connectivity status of the port. The port status will be one of the following:

- Disconnected = no patch cord is plugged into this port.
- Connected – Both Ends = a patch cord is plugged into this port and the far end of the patch cord is plugged into a port (the far end port is defined by the Type of Patch Cord – PVIQ™ Panel or non- PVIQ™ Panel).
- Connected – Near End = a patch cord is plugged into this port.

Patch Cord Type (actual)

This read-only field identifies the type of patch cord that is plugged into the port. The patch cord type will be one of the following:

- Disconnected = no cord plugged into the port
- Connected = this is either a Fiber I-Cord or a single-ended connection of any of the other cords in this group.
- Cross-Connect = both ends of a copper or fiber cross-connect cord are connected (both ends are connected to PViQ™ Connectivity Panels).
- Basic I-Cord = both ends of this copper I-Cord are connected (one end to the PViQ™ Connectivity Panel and the other to IT equipment with a grounded shielded RJ45 jack).
- Enhanced I-Cord = both ends of this copper I-Cord are connected (one end to the PViQ™ Connectivity Panel and the other to any equipment with an RJ45 jack).

Far End Status Section

This section provides the status of the far end of the connection. These fields are populated automatically when the other end of the patch cable gets plugged in or removed.

Far End Panel or Device Name (actual)

This read-only field provides name of the far-end panel for a device. Only far-end PViQ™ Connectivity Panels may be customized by the user at this time. To edit this field, login to the Network Page of the far-end panel. (If the far end panel is on another PViQ™ Connectivity System, you will need to login to that system. If the far end is on another panel in this PViQ™ Connectivity System, select the other panel from the Network Page.) Then enter the desired name into the **Panel Name** field and click **Save**.

The far-end panel or device name will be one of the following:

- **Panel Name** MAC: **MAC Address**, Panel: **Panel Number** = a cross-connect cable is plugged into both ends where the far end is plugged into the panel identified with the **Panel Name** where the panels PViQ™ PM MAC address is **MAC Address** and that panel number is **Panel Number**.
- **Blank** = because an I-Cord is plugged in to this port and the far end device is unknown.

Far End Port or Device Port Number (actual)

The **far-end port number** will be one of the following:

- **Port #** = a cross-connect cable is plugged into both ends where the far end is plugged into the port number identified with the **#**.

- **Blank** = the line is blank because there is no cable connected or there is an I-Cord connected and the far-end port is unknown.

Far End Horizontal Name (actual)

This read-only field provides name of the device that is connected to the back side of the far-end Panel/Port. Only far end PViQ™ Connectivity Panels may be customized by the user at this time. To edit this field, login to the Patching Page (if the far-end panel is on another PViQ™ Connectivity System you will need to login to that system or if the far end is on another panel in this PViQ™ Connectivity System then select the other panel from this Patching Page) of the far-end panel. Then enter the desired name into the “NE Horizontal (Back):” field and press the “Save” button.

The default value for this field is **far end panel number:far end port number**. These are two numbers separated by a “:”. The first number is the far-end panel number and the second number is the port number on that far-end panel. Example: If the far end of the cable is connected to port 8 on panel 3, then this value would be 3:8.

Set Security Policy Button

Setting a security policy is typically used when a new patch cord has been added. This button will also need to be clicked if either end of an I-Cord has been disconnected and reconnected.

When a new patch cord is added to the PViQ™ Connectivity Patch Field, a Security Violation Alert will be created (plugging a cord into a port that is not expected to have a cord plugged in) for each end that gets plugged in. Once both ends are plugged in and it has been verified that both ends are connected in correct locations, click on the “Set Security Policy” button. This will create a new security policy (set the panel’s port expectations) for the port(s). Going forward, any changes to either end of the cord will cause a Security Violation Alert, leading to the following events:

- The port LEDs will light red
- A security violation alarm will get set on the Alarm Page
- The event will get entered in the Logs Page
- An email alert (if email alerts are setup by the customer) will get sent to the provisioned email address(es).

In the case of a cross-connect patch cord, if the removed end is reconnected to the correct port:

- The port LEDs will turn off
- The alarm will clear from the Alarm Page
- The event will get entered into the Logs Page
- An email alert will be sent to the provisioned email address(es).

In the case of an I-Cord patch cord, if the removed end is reconnected to the correct port:

- The port LEDs will remain red
- The alarm will remain in the Alarm Page
- The event will get entered into the Logs Page
- An email alert will be sent to the provisioned email address(es).

In this case the security violation is still active, because the system does not know if the correct connect was reestablished. Make a physical confirmation to determine that the correct connections were made. Then click **Set Security Policy** on the Patching Page to clear this alarm and get the ports back into a secure state.

Security Policy Section

This last section on the Patching Page provides the information about the current Security Policy set on this port and provides an option to clear this security policy.

Far End Panel (expected)

This is the expected name of the panel that is at the far end of the patch cord plugged into the port that is being viewed on the Patching Page. This field, in conjunction with the “Far End Port”, should match the information in the “Panel or Device Name” and “Port or Device Port Number” fields under the “Far End Status” section if there is no Security Violation. If no cable is expected in this port this field will be “<No Cable Connected>”. If an I-Cord is expected this field will be “<Basic I-Cord Detection Mode>” or “<Enhanced I-Cord Detection Mode>”.

Far End Port (expected)

This is the expected port number that is at the far end of the patch cord plugged into the port that is being viewed on the Patching Page. This field, in conjunction with the “Far End Panel”, should match the information in the “Panel or Device Name” and “Port or Device Port Number” fields under the “Far End Status” section if there is no Security Violation. If no cable or an I-Cord is expected in this port, this field will be **blank**.

Port Status (expected)

This is the expected port status. If a cross-connect of interconnect cable is expected this field will be “Both Connected”. If no cable is connected this field will be “<No Cable Connected>”.

FE Horizontal Name (expected)

This field is the name of the device that is connected to the back side of the far-end Panel/Port. Only far-end PViQ™ Connectivity Panels connected to the same Panel Manager may be displayed to the user at this time. To edit this field, go to the **Patching Page** of the far-end panel. Then enter the desired name into the **NE Horizontal (Back):** field and click **Save**. The entered name is used in the Security Policy rules and will appear in this field.

The default value for this field is **far end panel number:far end port number**. These are two numbers separated by a “.”. The first number is the far-end panel number and the second number is the port number on that far-end panel. For example, if the far end of the cable is connected to port 8 on panel 3, then this value would be 3:8.

Clear Security Policy Button

Click the **Clear Security Policy** button when an expected connection is to be removed from the patch field. Login to the appropriate PViQ™ Connectivity System and select the appropriate panel and port that the connection is to be removed from. In the case of a cross-connect connection, the port LEDs on both ends of the patch cord will start blinking red until the cord is removed from the port. In the case of an I-Cord, the port on the PViQ™ Connectivity Panel will start blinking red until the cord is removed from the port. It is assumed that the far end of the I-Cord will also be removed.

Alarms Page

From any page, click the **Alarms** tab in the page ribbon at the upper left side of the page to get to the **Alarms Page**. The ribbon of tabs is the same at the top of all pages in the PViQ™ Connectivity Web UI. This page provides a list of the active alarms in the PViQ™ Connectivity System.

The table on this page may have placeholders for up to 5 panels (depending on how many panels were connected to the PViQ™ Connectivity PM in the past). If only one panel is currently in the PViQ™ Connectivity System, then the table will indicate that the other panels are not active.

The following figure shows the alarm page with alarms on panels 1, 3 and 4. This provides examples of multiple alarms on a panel, no alarms on a panel and one alarm

on a panel. Note that the summary lines provide a summation of all the current alarms on a panel. When no alarms are on a panel, the summary line does not appear.

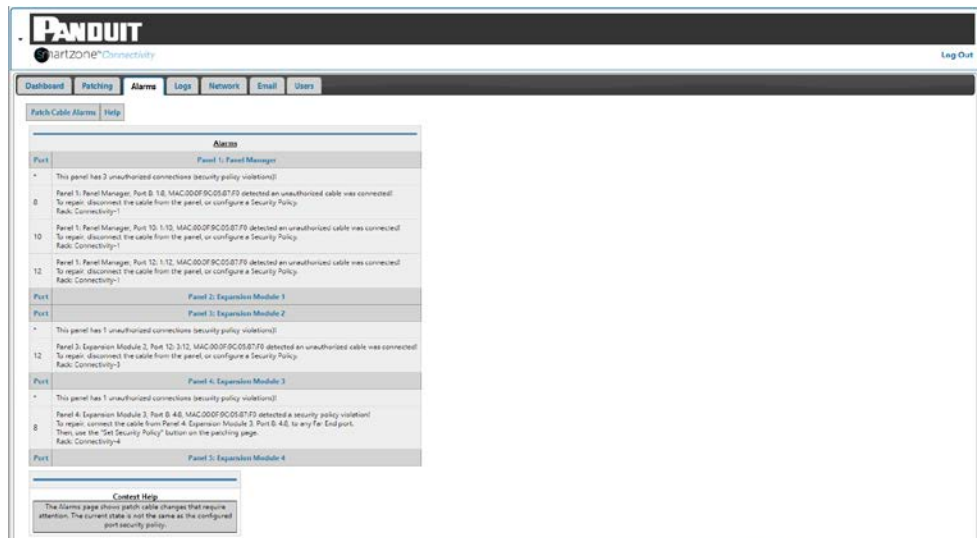


Figure 30: Alarms Page (with five active alarms on the system)

Page Header

Below the ribbon is the page heading “Patch Cable Alarms”. Hover over the **Help** button to see a description of the page. This description also appears in the “Context Help” box.

Alarm Table

Below the page header is the alarm table. This table provides a per-panel summary line, designated by a “*” in the port field, with the total number of Security Policy Violations currently active in each panel. If there are none on a given panel then there will be no summary line under that panel. Following the summary line under each panel is a list of the current security violations, in port sequential order. Each security violation entry provides the Panel **number**: **panel name**, Port #: **horizontal name**, MAC: **MAC address of the panel PM** detected and a **description of the violation!** on the first line. The second line in the entry provides the steps to take to repair the security violation.

Logs Page

From any page, click the **Logs** tab in the page ribbon at the upper left side of the page to get to the Logs Page. The ribbon of tabs is the same at the top of all pages in the PVIQ™ Connectivity Web UI. This page provides a log of all alarms that have happened in the PVIQ™ Connectivity System. This is a first-in/first-out log that holds the last 128

- 40, I-cord has been connected to the wrong switch port.
- 45, I-cord provisioning cord has failed to detect CDP.
- 50, I-cord has been disconnected from a switch.
- 60, I-cord has been disconnected from the wrong switch port.
- 70, Report the switch info for the I-cord that has been connected to a switch port.
- 80, Single-Ended patch cord, connect.
- 90, Single-Ended patch cord, disconnect.
- 100, Unauthorized patch cord, connect.
- 110, Unauthorized patch cord, disconnect.
- 140, Double-Ended patch cord connect.
- 145, Unauthorized Double-Ended patch cord connect.
- 290, A PM or EM has been reconnected to the wing boards.
- 295, A PM or EM has been disconnected from the wing boards.
- 999, Unknown trap type.

Network Page

From any page, click the **Network** tab in the page ribbon at the upper left side of the page to get to the Network Page. The ribbon of tabs is the same at the top of all pages in the PVIQ™ Connectivity Web UI. This page provides the system attributes for the selected panel. Most attributes on this page may be changed by the user.

NOTE: The **Save** button will save what is currently shown on the page. If you make changes to a panel and then switch panels before clicking the **Save** button, you will lose the changes on the previous panel. You must click the **Save** button before you select a different panel on the Network Page.

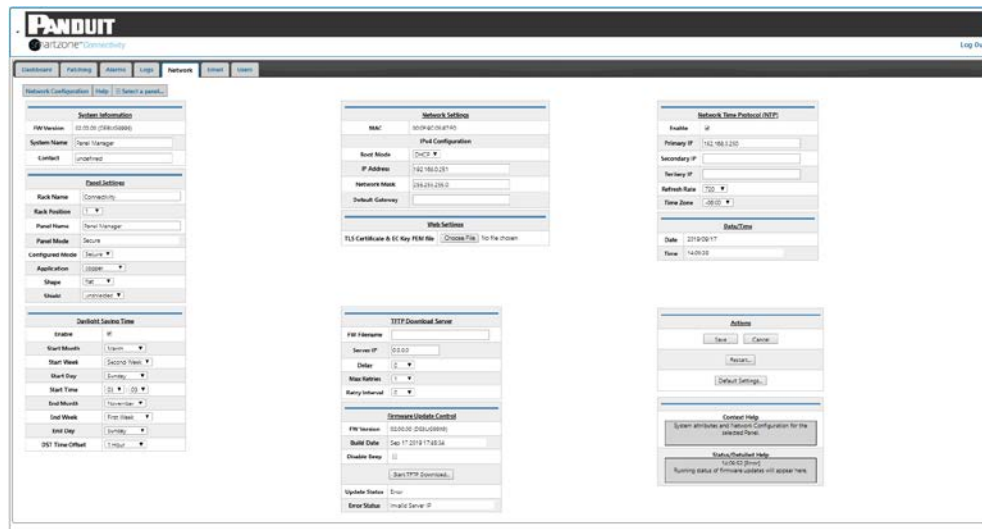


Figure 32: Network Page (default settings)

Page Header

Below the ribbon is the page heading “System Attributes and Network Configuration”. Hover over the **Help** button to see a description of the page. This description also appears in the “Context Help” box.

System Information

This section contains the attributes about the PViQ™ Connectivity System.

FW Version

This read-only field automatically updates when a new version of firmware is installed on the PViQ™ Connectivity System. The PViQ™ Connectivity Web UI is available in firmware version 02.00.00 or later.

System Name

This user-changeable field allows you to identify this PViQ™ Connectivity System with a unique name. The default name in this field is “Panel Manager”.

NOTE: Changing the System Name will also change the Panel Name of the first panel in the system and vice versa.

Contact

This user-changeable field allows you to identify the person that should be contacted when there are system issues. This is an informational field only.

NOTE: This field does not create an automatic contact, this field is for informational purposes only. To notify a contact automatically of system changes, enter the appropriate information in the Email Page.

Panel Settings

This section contains the attributes about the selected panel in the PViQ™ Connectivity System.

Rack Name

This user-changeable field allows you to name the rack in which the selected panel is located.

Rack Position

This user-selectable pulldown number allows you to select the RU location in the rack where the selected panel is located.

Panel Name

This user-changeable field allows you to identify the selected panel with a unique name. The default name in this field is “Panel Manager”, or “Expansion Module” [1-4], depending on the panel selected.

NOTE: Changing the Panel Name on Panel 1 will also change the System Name of the and vice versa.

Panel Mode

This read-only field automatically updates when the panel changes modes. The panel could be in anyone of the 8 different modes (Secure, Learn, Detached, Trace, MAC, Location, Maintenance, and Factory).

There are only five modes that the panel may enter from the PViQ™ Connectivity Web UI (Secure, Learn, Trace, MAC, Maintenance). Trace Mode is entered via the **Set Panel to Trace Mode** button on the Patching Page. Secure Mode is entered via the **Set Panel to Secure Mode** button on the Patching Page and Secure Mode or Learn Mode is entered via the **Configured Mode** field on the Network Page. MAC Mode may be entered when clearing a Security Policy. Maintenance Mode is entered during firmware update. Refer to Operating Modes for a list of modes and how to enter them.

Configured Mode Select

Click **Configure Mode** to open a pulldown menu to select a mode to place the panel into. This pulldown has two options, **Secure** or **Learn**. Secure is the default mode of all panels in the PViQ™ Connectivity System. Learn is an optional mode that allows patch

cords to be removed, added, or changed without causing an alarm. However, these actions will still be recorded in the log file. The panel is typically put into Learn Mode during the initial install of the patch field.

Application Select

Click **Application Select** to open a pulldown menu that allows you to select the application (copper, singlemode, multimode, OM4, fieldterm) the panel/tray is being used in. Choose the default to go back to the factory programmed Application setting of the panel. This field is for informational purposes only. Changing this field will not change the panel/tray type.

Shape Select

Click **Shape** to open a pulldown menu that allows you to select the panel shape (flat or angled). Choose the default to go back to the factory-programmed Shape type of the panel. This field is for informational purposes only. Changing this field will not change the panel type.

Shield Select

Click **Shield** to open a pulldown menu that allows you to select the type of shielding (shielded or unshielded) the panel has. Choose the default to go back to the factory-programmed Shield type of the panel. This field is for informational purposes only. Changing this field will not change the panel type.

Daylight Savings Time

This section contains the attributes about daylight savings time for the PViQ™ Connectivity System. These fields allow the precise date and time when daylight savings time will start and stop.

Enable

This is a check box to enable daylight savings time change. To disable daylight saving time, uncheck the enable box.

Start Month

This is a user-selectable pulldown menu that allows the customer to select the month in which daylight savings time will start.

Start Week

This is a user-selectable pulldown menu that allows the customer to select the week in the month in which daylight savings time will start.

Start Day

This is a user-selectable pulldown menu that allows the customer to select the day in the week in which daylight savings time will start.

Start Time

This is a user-selectable pulldown menu that allows the customer to select the time of day in which daylight savings time will start. There is a pulldown menu for hours and a pulldown menu for minutes.

End Month

This is a user-selectable pulldown menu that allows the customer to select the month in which daylight savings time will end.

End Week

This is a user-selectable pulldown menu that allows the customer to select the week in the month in which daylight savings time will end.

End Day

This is a user-selectable pulldown menu that allows the customer to select the day in the week in which daylight savings time will end.

DST Time Offset

This is a user-selectable pulldown menu that allows the customer to select the offset in time (“1 Hour” or “30 Minutes”) that will happen when day light saving time starts and ends.

Network Settings

This section contains the attributes about the network interface on the PViQ™ Connectivity System.

MAC

This is a read-only field that automatically updates with the Media Access Control (MAC) address of the PViQ™ Connectivity Panel Module (PM). Each PViQ™ Connectivity PM will have a unique MAC address. This is the means of identifying each PViQ™ Connectivity System.

Boot Mode Select

The **Boot Mode** select pulldown menu allows the user to enable the system to boot up in Dynamic Host Configuration Protocol (DHCP) mode or in Static Mode. The PViQ™ Connectivity PM is shipped with this defaulted to DHCP. To make it easier to manage TCP/IP settings, use DHCP. In DHCP mode, the PM will automatically acquire an IP

address from a DHCP server. In Static Mode the user must assign an IP Address, Network Mask, and the Default Gateway Address.

IP Address

This field will autofill if DHCP is selected for the Boot Mode. If the user prefers to assign an IP address to the PViQ™ Connectivity System, then the Boot Mode must be set to “Static” and the user assigned IP address must be entered into this field.

Network Mask

This field will autofill if DHCP is selected for the Boot Mode. If the user prefers to change the Boot Mode to “Static”, then the user must assign the Network Mask.

Default Gateway

This field will autofill if DHCP is selected for the Boot Mode. If the user prefers to change the Boot Mode to “Static”, then the user must assign the Default Gateway address.

TLS Certificate & EC Key PEM file

A default certificate and key are provided with the system. All systems have the same default certificate and key. It is recommended to change this key to maintain data security on the system.

The PViQ™ Connectivity System ships with a default certificate and encryption key. All systems have the same default encryption key. It is recommended that the customer create a custom certificate/key pair for each PViQ™ Connectivity System. Use the ECC curve SECP256R1 digital signature algorithm to create a custom certificate/key. The PViQ™ Connectivity System also supports RSA2048 encryption keys. The certificate/key must be Privacy Enhanced Mail (PEM) formatted with the certificate immediately following the key in a single file.

TFTP Download Server

Firmware updates on the PViQ™ Connectivity System are performed through Trivial File Transfer Protocol (TFTP). To perform a firmware update on the system, the customer must deploy a TFTP server and place the downloaded PViQ™ Connectivity System firmware file on that server. The attributes in this section are used to set up the system for performing firmware updates on the PViQ™ Connectivity System.

FW Filename

This is a user-changeable field that allows the customer to enter the filename of the

updated firmware load that is located on their TFTP server.

Server IP

This is a user-changeable field that allows the customer to enter the IP address of the TFTP server that contains the firmware update file to be loaded on the PViQ™ Connectivity System.

Delay

This is a user-selectable pulldown number that allows the customer to select the delay in minutes before starting the firmware update to the PViQ™ Connectivity System.

Max Retries

This is a user-selectable pulldown number that allows the customer to select the number of retries that will be allowed before the firmware update to the PViQ™ Connectivity System gives up. There may be multiple reasons why a firmware update may not happen on the first few tries (including integrity of the network, congestion on the network, etc.), so the option to perform retries may be necessary to increase the chances of firmware update success.

Retry Intervals

This is a user-selectable pulldown number that allows the customer to select the delay in minutes between retries. As explained in the “Max Retry” section above there are many reasons why a firmware update may not be successful on the first few tries. Placing a delay between the retries may help improve the chances of success.

Update Control

This section provides the current PViQ™ Connectivity System firmware version, a vehicle for performing firmware updates on the system and fields for monitoring the progress of the firmware update to the system.

FW Version

This is a read-only field that is automatically populated with the current version of firmware that is installed on the PViQ™ Connectivity System.

Build Date

This is a read-only field that is automatically populated with the build date of the current version of firmware that is installed on the PViQ™ Connectivity System.

Disable Beep

This is a feature that can be enabled or disabled during Firmware update of the PViQ™ Connectivity System. When a firmware update is performed, the PViQ™ Connectivity

System will automatically go into Maintenance Mode and stay in this mode until the firmware update is complete. When the system goes into Maintenance Mode, the system will have an audio beep every 15 seconds. Refer to Identifying Maintenance Mode for characteristics of the system during Maintenance Mode. This check box will allow the customer to prevent the system from sounding the audio beep every 15 seconds during firmware update.

Start TFTP Download... Button

Clicking on this button will cause the PViQ™ Connectivity System to transition into Maintenance Mode and start the firmware update on the system. A valid TFTP server address must be in the Server Address field and a valid firmware update filename must be in the **FW Filename** fields in the TFTP Download Server section on this page to allow the firmware update to be successful.

Update Status

This is a read-only field that is automatically updated as the status changes during a firmware update to the PViQ™ Connectivity System.

Error Status

This is a read-only field that is automatically updated if any errors occur during a firmware update to the PViQ™ Connectivity System.

Network Time Protocol (NTP)

This section provides the controls for connecting and setting up a Network Time Protocol (NTP) server on the PViQ™ Connectivity System. This system does not have a battery to maintain real time. Connecting the system to an NTP server will guarantee that that the PViQ™ Connectivity System will be on local real time and provide meaningful timestamps on the alarm logs in the Logs Page.

Enable

Checking this box will enable the system to be connected to an NTP server. This is required for meaningful timestamps on the log and email alerts.

Primary IP

This is a user-changeable field that allows the customer to enter the IP address of the Primary NTP server that that they want the PViQ™ Connectivity System to get the time from. If connection to this server fails, the system will attempt to get the time from the Secondary (back up) NTP server.

Secondary IP

This is a user-changeable field that allows the customer to enter the IP address of the Secondary (back up) NTP server that they want the PViQ™ Connectivity System to get the time from. If connection to this server fails, the system will attempt to get the time from the Tertiary (next back up) NTP server.

Tertiary IP

This is a user-changeable field that allows the customer to enter the IP address of the Tertiary (next back up) NTP server that they want the PViQ™ Connectivity System to get the time from. If connection to this server fails, the system will attempt to get the time from the Primary NTP server again.

NOTE: *The PViQ™ Connectivity System will always attempt to get the time from the Primary NTP server first (every time the system resynchronizes) and fails over to Secondary NTP server, then fails over to the Tertiary NTP server.*

Refresh Rate

This is a user-selectable pulldown menu that allows the customer to select the refresh rate in minutes. The refresh rate is defaulted to 720 minutes (12 hours). The refresh rate is the rate at which the system will synchronize its time to the NTP server. This refresh rate may be set from 360 minutes (6 hours) to 7200 minutes (120 hours). Selecting a higher number will allow the system time to drift more between NTP server synchronization. Selecting 360 will minimize the drift in time on the PViQ™ Connectivity System between NTP synchronizations.

Time Zone

This is a user-selectable pulldown menu that allows the customer to select the time zone their PViQ™ Connectivity System is in. The time zone is defaulted to -6:00 hours (Central Standard Time). NTP servers all set to UTC (Coordinated Universal Time). The numbers in this selectable pulldown menu allow the user to set the local real time with respect to the UTC time.

Date/Time

This section provides the date and local time of the PViQ™ Connectivity System.

Date

This is a read-only field that is automatically updated with the date that the PViQ™ Connectivity System is set to. The format of this field is year/month/day.

Time

This is a read-only field that is automatically updated with the time that the PViQ™ Connectivity System is set to. This field is formatted to 24 hour mode (hours:minutes:seconds) and cannot be changed.

Actions

This section provides the buttons that are used to act on the PViQ™ Connectivity System.

Save Button

If there are any changes made on this page, these changes will not be saved to the system until the **Save** button is clicked. If another page is selected before the **Save** button is clicked, all changes made on this page will be lost.

NOTE: The **Save** button will save what is currently shown on the page. If you make changes to a panel and then switch panels before clicking the **Save** button, you will lose the changes on the previous panel. You must click the **Save** button before you select a different panel on the Network Page.

Cancel Button

The **Cancel** button may be selected if it was decided that the changes made on this page are not to be saved. The **Cancel** button may also be selected to refresh the page (**NOTE:** any changes made on this page after the last save will be lost).

Restart Button

The **Restart** button will reboot the PViQ™ Connectivity System. When this button is clicked, a popup window will appear to confirm that a restart is what was intended.

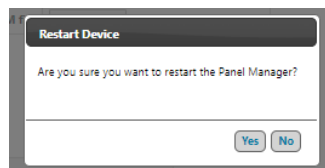


Figure 33: Restart Confirmation Popup Window

Default Settings Button

The **Default Setting** button will cause all attributes to be reset to factory default and restart the PViQ™ Connectivity System, all of your customized data will be lost. When this button is clicked, a popup window will appear to confirm that a reset to defaults is what was intended.

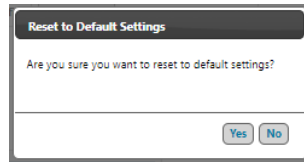


Figure 34: Reset to Default Settings Confirmation Popup Window

IMPORTANT NOTE: This action will cause the system to lose all of your customized data and configurations saved to the PViQ™ Connectivity System. Make sure you know this is what you want to do before clicking on the **Yes** button.

Email Page

From any page, click the **Email** tab in the page ribbon at the upper left side of the page to get to the Email Page. The ribbon of tabs is the same at the top of all pages in the PViQ™ Connectivity Web UI. This page allows the entry of all the email attributes into the system so email alerts can be sent to individual emails.

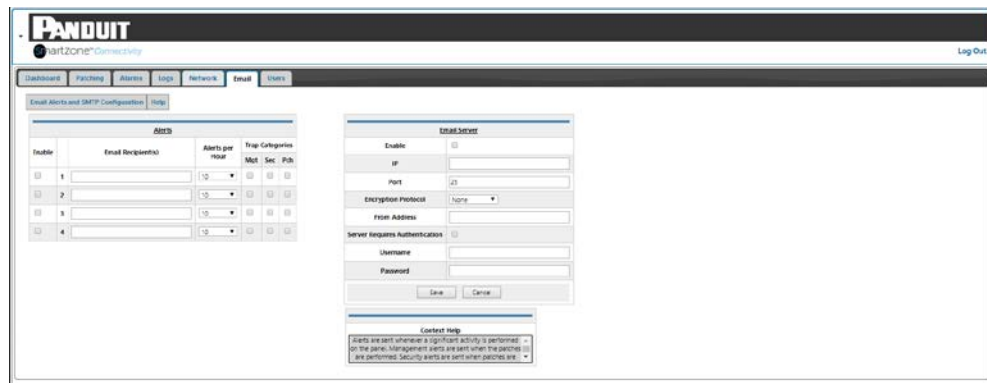


Figure 35: Email Page

Page Header

Below the ribbon is the page heading "Email Alerts and SMTP Configuration". Hover over **Help** to see a description of the page. This description also appears in the "Context Help" box.

Alerts

This section allows the user to enable and configure alerts to be sent to the specified email addresses. Whenever a significant activity is performed on the PViQ™ Connectivity System, an alert will be emailed to the email addresses specified.

NOTE: Only one to four email recipients may be setup to receive these email alerts.

NOTE: Any changes made to this section requires a click on the **Save** button or the changes will be lost.

Enable

This is a check box to enable or disable the recipient from receiving email alerts. If recipient is not to receive email alerts, uncheck the enable box.

Email Recipient(s)

This field is customizable by the user. This field should contain the email address of the recipient that should receive the alerts from this PViQ™ Connectivity System.

Alerts per Hour

This is a user-selectable pulldown number (1 – 10) that allows the customer to select the number of alerts per hour that the recipient will receive. For some recipients (for example, managers), you may choose to send fewer emails. However, the technician responsible for maintaining the patch field may want to receive the maximum alerts.

NOTE: Even though the email alerts are limited to 10 per hour, all alerts are still captured and maintained in the alarm log.

Trap Categories

These are check boxes to enable or disable the type of alerts that will be sent to the recipient. All alerts fall into one of these three categories. If no category is selected for a recipient, then no email alerts will be sent to that recipient.

There are 18 different type of alerts supported in the PViQ™ Connectivity Web UI as listed in the Logs Page section above. There are two Management Alerts (1, 999), eight Security Alerts (10, 40, 60, 100, 110, 145, 290, 295) and eight Patching Alerts (20, 30, 45, 50, 70, 80, 90, 140) supported in the PViQ™ Connectivity Web UI.

Management alerts are sent when non-patch field changes are made to the system (Firmware updates, etc.).

Security alerts are sent when the patch field is changed without authorization (for example, an unauthorized connect or disconnect of a patch cord).

Patching alerts are sent when authorized patches are being performed (for example, a new security policy was entered for a connect, a security policy was cleared for a patch cord remove, etc.).

Email Server

This section allows the user to configure the attributes of the email server.

Enable

This is a check box to enable or disable the PViQ™ Connectivity System from sending email alerts to the Email Server. If you do not want the system to send email alerts, uncheck the box.

IP

This is a user-changeable field that allows you to enter the IP address of the email server that you want the PViQ™ Connectivity System to send email alerts through. Talk to your Email Server Administrator to determine the IP address that needs to be entered in this field.

Port

This is a user-changeable field that allows you to enter the email server port number that you want the PViQ™ Connectivity System to send email alerts through. The port number is typically 25 for SMTP (this is the default number entered into this field). The port number is typically 465 for SMTPS. The port number is typically 587 for STARTTLS. Talk to your Email Server Administrator to determine the port number to enter in this field.

Encryption Protocol Select

The **Encryption Protocol** select button is a pulldown menu to select the encryption type used on the email server. This pulldown has three options: **None**, **SMTPS** or **STARTTLS**. **None** is the default mode. Talk to your Email Server Administrator to determine the encryption protocol used by the email server selected.

From Address

This is a user-changeable field that allows the user to enter the address that the email is coming from. Depending on the authentication required by the email server selected, this field may have certain restrictions. Talk to your Email Server Administrator to determine the options available for this field.

Server Requires Authentication

This is a check box to enable or disable email server authentication. Email server authentication is dependent on your company's policies and the Email Server selected. Talk to your Email Server Administrator to determine if Email Server Authentication should be enabled or not.

Username

This is a user-changeable field that allows the user to enter the authentication username for the email server. If email server authentication is required, this field must

be filled in with an authentic username. Talk to your Email Server Administrator to determine what should be entered into this field. If email server authentication is not required, this field may be left blank.

Password

This is a user-changeable field that allows the user to enter the authentic username's password for the email server. If email server authentication is required, this field must be filled in with an authentic username's password. Talk to your Email Server Administrator to determine what should be entered into this field. If email server authentication is not required, this field may be left blank.

Save Button

If there are any changes made on this page, these changes will not be saved until the **Save** button is clicked. If another page is selected before the **Save** button is clicked, all changes made on this page will be lost.

Cancel Button

The **Cancel** button in this section may be selected if it was decided that the changes made on this page are not to be saved. The **Cancel** button may also be selected to refresh the page (**NOTE: any changes made on this page after the last save will be lost**).

Users Page

From any page click on the **Users** tab in the page ribbon at the upper left side of the page to get to the Users Page. The ribbon of tabs is the same at the top of all pages in the PViQ™ Connectivity Web UI. This page allows the configuration of all the users' (users that are allowed to log into this PViQ™ Connectivity System's Web UI) attributes. There is one default user (admin) that will appear on this page when the system is shipped. This default admin user is allowed access to the system through the Web UI and Telnet (it is set to **Both**).

IMPORTANT NOTE: *There must always be at least one user that is enabled and has the HTTP protocol allowed to prevent the customer from being locked out of the PViQ™ Connectivity Web UI. If the customer accidentally locks themselves out of the Web UI, then they may enable HTTP through CLI (refer to Section 4) or they will have to perform a level 7 reset from the PViQ™ Connectivity System Interface Unit on the front of the PM panel. Caution: A level 7 reset will cause all customized configurations and data to be lost.*

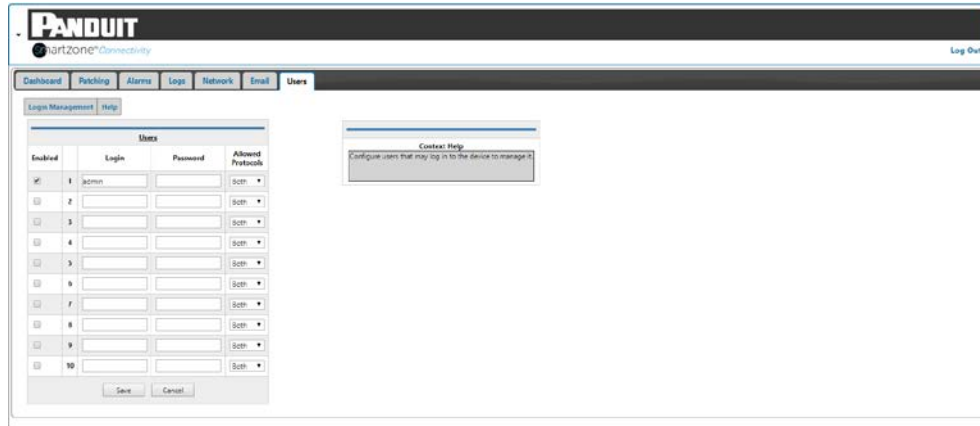


Figure 36: Users Page

A total of 10 users may be enabled to log into the PViQ™ Connectivity System.

Page Header

Below the ribbon is the page heading “Login Management”. Hover over **Help** to see a description of the page. This description also appears in the “Context Help” box.

Users

This section allows the user to enable and configure the users that may log into this PViQ™ Connectivity System.

Enable

This is a check box to enable or disable the user from being able to log into this PViQ™ Connectivity System. If a user is not approved to log into the system (user is setup to be able to log into the system but is not authorized yet, a user’s password has been compromised and that user needs to be prevented from logging into the system until the password is changed, etc.), uncheck the enable box.

Login

This field is customizable by the user. This field should contain the login name of the user that will be allowed to log into this PViQ™ Connectivity System.

Password

This field is customizable by the user. This field should contain the password of the associated login name of the user that will be allowed to log into this PViQ™ Connectivity System.

Allowed Protocols

The **Allowed Protocol** select button is a pulldown menu to select the allowable login protocols that this user may use to log into the PViQ™ Connectivity System. This pulldown has three options:

- **Both:** Means the user may log into this system via Web UI or Telnet.
- **Telnet:** Means that this user may log into this system via a Telnet session using CLI commands only.
- **HTTP:** HTTP means the user may log into this system via the Web UI only.

NOTE: To use the system with the SmartZone Software, the user must have “Telnet” protocol enabled to run the CLI automated scripts to configure the system for SmartZone Software.

Save Button

If there are any changes made on this page, these changes will not be saved until the **Save** button is clicked. If another page is selected before the **Save** button is clicked, all changes made on this page will be lost.

Cancel Button

The **Cancel** button in this section may be selected if it was decided that the changes made on this page are not to be saved. The **Cancel** button may also be selected to refresh the page (**NOTE:** any changes made on this page after the last save will be lost).

Section 3 – Simple Network Management Protocol (SNMP)

SNMP Management Configuration

For details on SNMP, refer to the SmartZone Software User Manual.

Section 4 - Accessing the PViQ™ Connectivity System Through the CLI

Introduction

The Command Line Interface (CLI) is an alternate method used to manage and control the PViQ™ Connectivity System status and parameters, as well as basic admin functions.

NOTE: *The preferred method of managing and controlling the PViQ™ Connectivity System is through the PViQ™ Connectivity Web UI or through the SmartZone Asset and Connectivity Software Modules.*

The PViQ™ CLI provides access to a PViQ™ Connectivity System via a Telnet session. Through this procedure, users can access a specific Panel Manager (PM) and up to four associated Expansion Modules (EMs) through a single Telnet session. This provides control of up to 120 ports on five panels during any given session.

This section provides the following:

- The basic procedure for initiating a CLI session
- The default login and password for the CLI

Using the CLI

Commands entered using the CLI communicate with the PViQ™ Patch Panels through a Telnet connection to the PM. To establish a Telnet connection, the IP address of the PM must be known.

If the IP address of the PM is not already known, use the process in Appendix B: Finding the PViQ™ Connectivity System IP Address to find the IP address.

Telnet into the Panel Manager

By default, no users may access the PViQ™ Connectivity System through Telnet. Each user needing Telnet access to the PViQ Connectivity System must be granted that access through the PViQ™ Connectivity Web UI. Refer to Users Page for how to grant a user Telnet access to the PViQ™ Connectivity System.

Connecting to PViQ™ CLI requires a terminal emulation program such as HyperTerminal or PuTTY.

Logging in with Telnet via PuTTY

1. Open the PuTTY terminal emulation program.

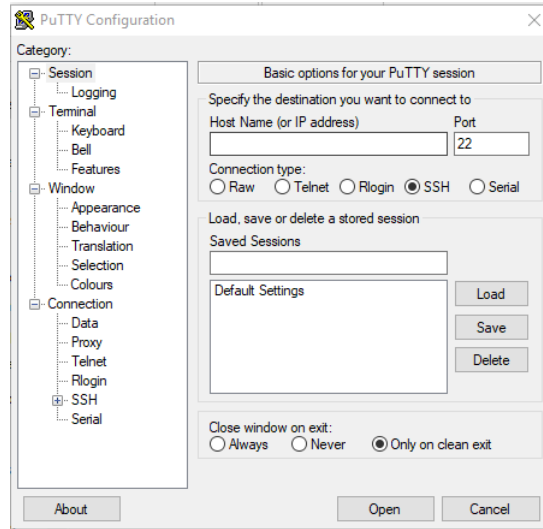


Figure 37: PuTTY Configuration Window

2. Select the Telnet radio button in the PuTTY Configuration window.
3. Type in the PViQ™ Connectivity PM IP address acquired from Appendix B process and leave all other settings as default.
4. Select **Open**.

A terminal window will open, wait for the PViQ™ Panel to prompt for a “Username:”

Default Username is: ***admin***

Default Password is: ***panduit***

5. Enter the Username. Press **Enter**.
6. Enter the password. Press **Enter**.

A screen similar to the below figure will appear.


```
Welcome to Panduit Shell ...
This system is to be used by authorized personnel only.

Username:admin
Password:*****

You are using PAN SHELL command line interface, Version 1.0.0
Last logon: Unavailable

PSH >
```

Figure 38: Pan Shell CLI Ready Window

7. You are now logged into the PViQ™ Panel. Refer to the CLI Commands list in Appendix C: PViQ™ Connectivity CLI Commands for available commands.

NOTE: For security purposes, it is recommended to change the default password as soon as possible. Use the `config password` command (described in Appendix C) to change the password.

Section 5 – Accessing the PViQ™ Connectivity System Through the Web UI

Logging in to the Web Interface for the First Time

For security reasons it is recommended to change the password upon login.

1. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity System.
2. The Login Page will appear. Enter the default UserName: **admin** and Password: **panduit**.



Figure 39: Login Page (username and password)

3. The Dashboard Page will appear. Select the **Users** tab.

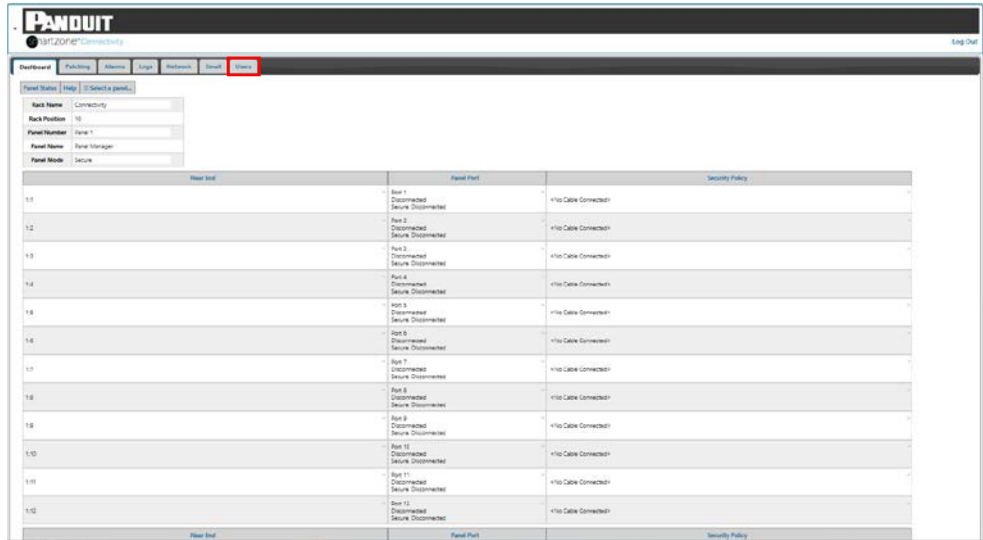


Figure 40: Dashboard Page (Users tab)

4. The Users page will appear. Enter a new password for the **admin** username.

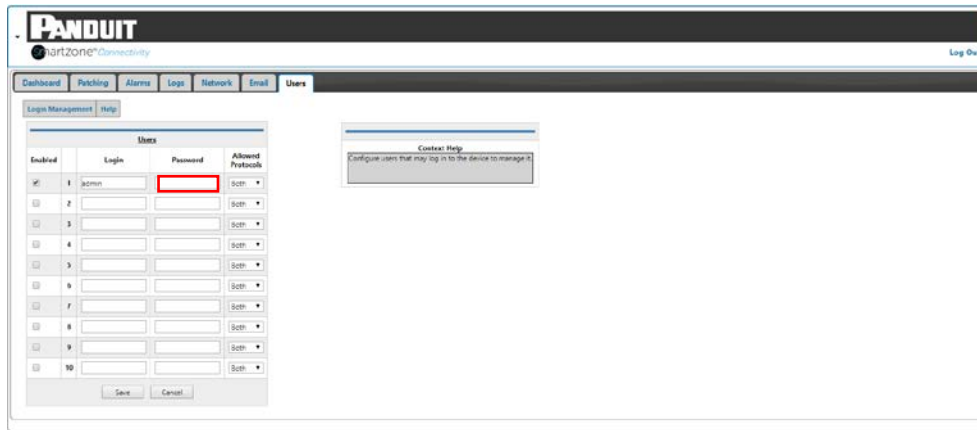


Figure 41: Users Page (password)

5. Click **Save**.

The default password for the **admin** username has been changed to the new password. If the admin username password needs to change again, perform these steps again, logging in with the new password.

Logging Out

Users should logout after each session to prevent unauthorized changes to the system.

1. Click **Log Out** in the top right corner (above the tab ribbon) of any page.

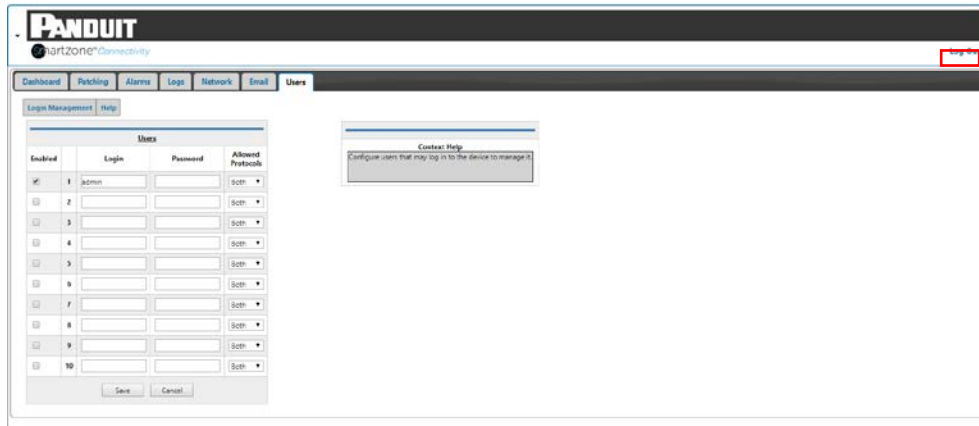


Figure 42: Users Page (Log Out)

2. The Login Page will appear.

Access Types

There are three levels of access privileges:

- Administrator Privileges with Web UI and Telnet Access
- Administrator Privileges with Web UI only
- Administrator Privileges with Telnet Access only

The PViQ™ Connectivity System comes with a standard **Administrator Privileges with Web UI Access only** profile. Any one of these access privileges may be changed from either the Web UI or Telnet through CLI commands.

User Accounts

Add a user with the following steps:

1. Go to the **Users Page**.
2. Type in a new username in the **Login** field on a new line. The username may be 1 to 255 characters with no restrictions. The username is case sensitive.
3. Type in the new user's password in the **Password** field on that new line. Password may be 1 to 255 characters with no restrictions. The password is case sensitive.
4. Select the **Allowed Protocols** for that new user on that new line.

5. Click on the **Enable** box (to create a check mark in the box) for that new user on the new line.
6. Click on the **Save** button.

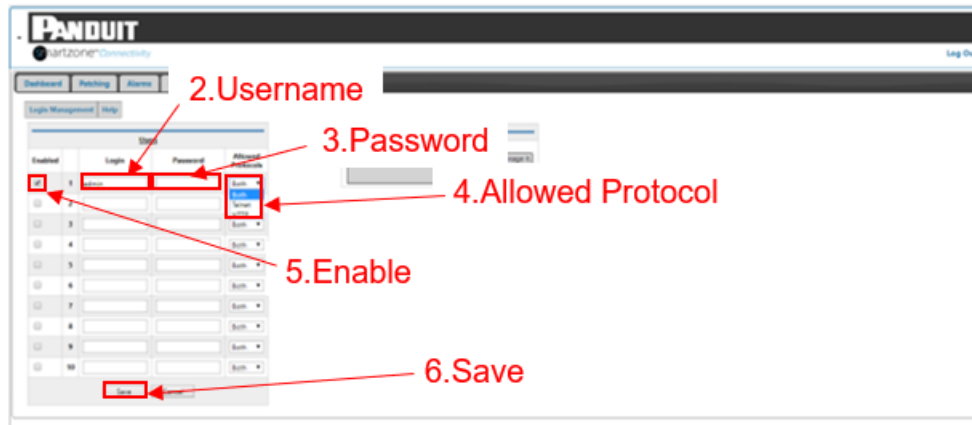


Figure 43: Users Page (adding a user)

Modify user access privileges:

1. Go to the **Users Page**.
2. Select **Both**, **HTTP** or **Telnet** from the pulldown menu under Allowed Protocols on the specific user's line to change the access privileges for that user.
3. Click on the **Save** button.

Delete user profile with the following steps:

1. Go to the **Users Page**.
2. Delete the *username* from the **Login** field on the appropriate line.
3. Click on the **Enable** box (to delete the check mark in the box) for that user on the that line.
4. Click on the **Save** button.

Section 6 – Configuring the PViQ™ Connectivity System Through the Web UI

Introduction

This section provides the steps to configure the PViQ™ Connectivity System for normal use through the PViQ™ Connectivity Web UI. This section provides the steps to:

- Configure the PViQ™ Connectivity Panels with:
 - The Name of the Rack where each PViQ™ Connectivity Panel is located
 - The Rack Unit location in the rack where each PViQ™ Connectivity Panel is located
 - The name of each PViQ™ Connectivity Panel
 - The mode of each PViQ™ Connectivity Panel
 - The application use of each PViQ™ Connectivity Panel
 - The mechanical shape of each PViQ™ Connectivity Panel
 - The shielding of each PViQ™ Connectivity Panel
- Configure the PViQ™ Connectivity System for automatic change time for:
 - Daylight Saving Time
- Configure the PViQ™ Connectivity System's Network Settings for:
 - Boot Mode
 - Security
- Configure the PViQ™ Connectivity System's Network Time Protocol

Entering Panel Configuration Attributes

Identifying panels and locations with common terms helps the customer identify the services that might be compromised and locate the alerting panels to reduce recovery time.

Racks in the data center or enterprise closet are typically identified with a nomenclature that make sense to the organization that is maintaining the systems. The PViQ™ Connectivity Web UI allows to user to use these organizational nomenclatures to

identify each PViQ™ Connectivity panel down to the RU location.

NOTE: The PViQ™ Connectivity Web UI will automatically log you out after 5 minutes of inactivity with the PViQ™ Connectivity System. Changing fields is not considered activity with the PViQ™ Connectivity System until you click the **Save** button. It is recommended to click the **Save** button frequently during the procedures below.

The following steps are used to enter the panel configuration attributes on each panel in a PViQ™ Connectivity System.

1. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity System that is being configured.
2. The Login Page will appear. Enter the appropriate username and password.
3. The Dashboard Page will appear. Select the **Network** tab.

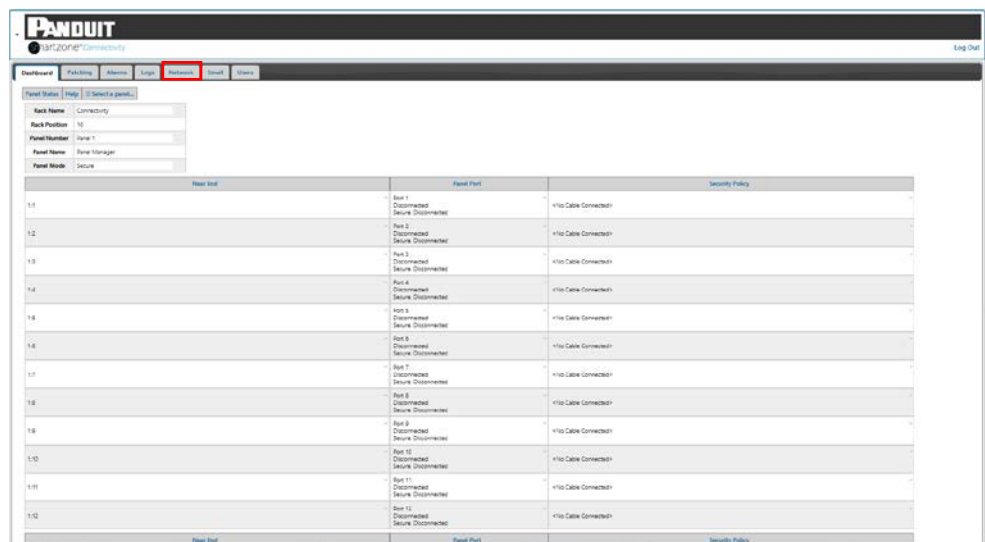


Figure 44: Dashboard Page (Network tab)

4. The Network page will appear.
5. Select the Panel in the PViQ™ Connectivity System that you will be configuring, from the **Select a panel...** pulldown menu.
6. Enter your organization's nomenclatures for the rack that this panel is located in, in the **Rack Name** field.
 - a. Default in this field is **Connectivity**.
 - b. Ex: **5F3C2R3C_Server**
 - i. This nomenclature may stand for - **Fifth Floor, third closet,**

second row, third cabinet and it is a server cabinet

7. Select the RU location in the Rack where this panel is mounted, from the **Rack Position** pulldown menu.
 - a. Default in this field is **1** for **Panel 1**, **2** for **Panel 2**, **3** for **Panel 3**, **4** for **Panel 4** and **5** for **Panel 5**.
 - b. Ex: **10**
 - i. This panel is physically located at RU location **10**
 8. Enter your organizations nomenclatures for the panel, in the **Panel Name** field.
 - a. Default in this field is **Panel Manager** for **Panel 1**, **Expansion Module 1** for **Panel 2**, **Expansion Module 2** for **Panel 3**, **Expansion Module 3** for **Panel 4** and **Expansion Module 4** for **Panel 5**.
 - b. Ex: **Servers 7-13**
 - i. This nomenclature may stand for – this panel provides the connections for servers 7 through 13.
- NOTE:** The **Panel Name** of the first panel in each PVIQ™ Connectivity System is the same as the **System Name**. If either one of these fields are changed, the other field will change also (for the first panel in the system only).
9. Select the security mode of this panel from the **Configured Mode** pulldown menu.
 - a. There are two modes to select from. The default mode is **Secure**.
 - b. The recommended mode is **Secure**.
 - i. **Secure** mode – any unauthorized changes in the patching field will cause a security alert.
 - ii. **Learn** mode – there is not a concept of authorized and unauthorized, so patching field changes will not send out alerts. However, they still will be captured in the log file.
 10. Select the media type of this panel from the **Application** pulldown menu. This is for informational purposes only (it will not change the media type of this panel). This field may help identify the panel by site.
 - a. There are six media type values to choose from (the **default** selection, one copper and four fiber).
 - b. The **default** selection will cause the field to populate with copper or one of the fibers depending how the panel was programmed at manufacturing time.
 - c. The user may want to change this if the customer decides to populate the panel with different media type minicom modules.
 11. Select the shape of this panel, from the **Shape** pulldown menu. Panduit offers flat or angled panels. This is for informational purposes only. This field may help identify the panel by site.

- a. There are two shapes to choose from (flat or angled).
 - b. The **default** selection will cause the field to populate with how the panel was programmed at manufacturing time.
 - c. There should be no need to change this field. It may be a read-only field in future Web UI releases.
12. Select the shielding of this panel from the **Shield** pulldown menu. Panduit offers shielded or angled copper panels. This is for informational purposes only. This field may help identify the panel by site.
- a. There are two shapes to choose from (shielded or unshielded).
 - b. The **default** selection will cause the field to populate with how the panel was programmed at manufacturing time.
 - c. The user may want to change this if the customer has a shielded panel and decides to populate it with unshielded minicom modules.
13. Click on the **Save** button in the **Actions** section to save your changes.

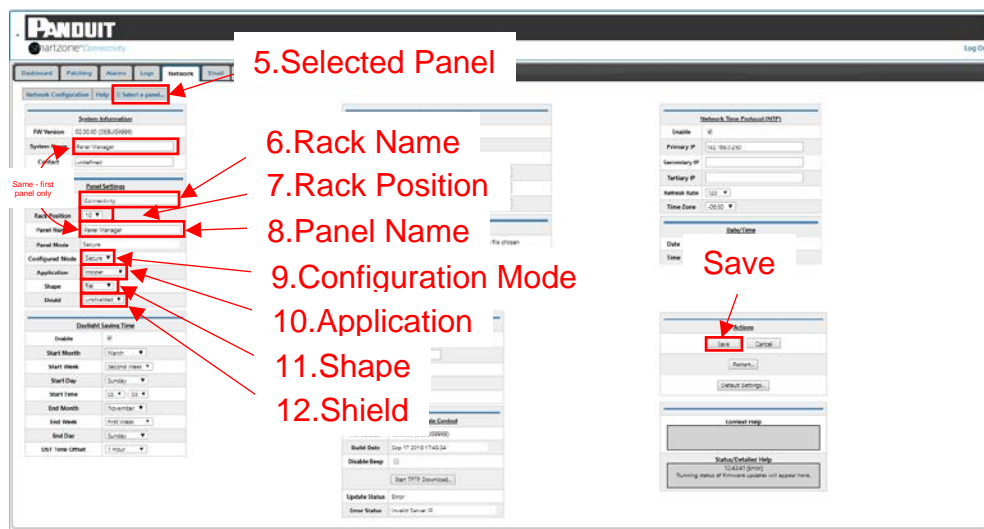


Figure 45: Network Page (panel settings)

Configuring the System for Daylight Saving Time

To maintain accurate time in the PViQ™ Connectivity System which enables accurate time stamps on alerts and logs in regions that following daylight savings time, the daylight saving time must be configured and enabled on the system via the PViQ™ Connectivity Web UI.

NOTE: The PViQ™ Connectivity Web UI will automatically log you out after 5 minutes of inactivity with the PViQ™ Connectivity System. Changing fields is not consider activity with the PViQ™ Connectivity System until you click the **Save** button. It is recommended

to click the **Save** button frequently during the procedure below.

The following steps are used to configure and enable daylight savings time on the PViQ™ Connectivity System.

1. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity System that is being configured.
2. The Login Page will appear. Enter the appropriate username and password.
3. The Dashboard Page will appear. Select the **Network** tab.
4. The Network page will appear.
5. Click on the check box to enable daylight savings time change.
6. Select the start month from the **Start Month** pulldown menu.
7. Select the start week from the **Start Week** pulldown menu.
8. Select the start day from the **Start Day** pulldown menu.
9. Select the start time from the **Start Time** pulldown menu.
10. Select the end month from the **End Month** pulldown menu.
11. Select the end week from the **End Week** pulldown menu.
12. Select the end day from the **End Day** pulldown menu.
 - a. It is assumed that the end of daylight saving time will occur at the same time during the day that is started.
13. Select the offset in time that daylight savings time will add to standard time, from the **DST Time Offset** pulldown menu. There is a choice of **1 Hour** or **30 Minutes**.
14. Click on the **Save** button in the **Actions** section to save your changes.

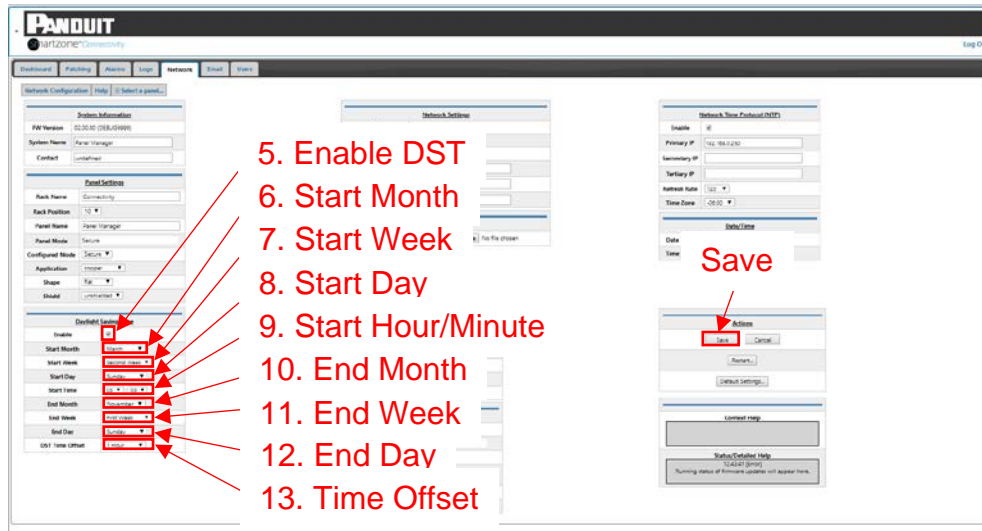


Figure 46: Network Page (daylight savings settings)

Configuring the System's Network Settings

The PViQ™ Connectivity System may be configured to automatically obtain an IP address (**DHCP**) or configured to have the IP address assigned (**Static**). The system is shipped in DHCP mode. Typically, devices on the IT network get an IP assigned from a DHCP server. This is the most foolproof way of adding the system to your network. Assigning an IP address will cause network problems if that address is already assigned to another network device.

NOTE: The PViQ™ Connectivity Web UI will automatically log you out after 5 minutes of inactivity with the PViQ™ Connectivity System. Changing fields is not consider activity with the PViQ™ Connectivity System until you click the **Save** button. It is recommended to click the **Save** button frequently during the below steps.

The following steps are used to configure the Internet Protocol (IP) Address Mode for the PViQ™ Connectivity System.

1. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity System that is being configured.
2. The Login Page will appear. Enter the appropriate username and password.
3. The Dashboard Page will appear. Select the Network tab.
4. The Network page will appear.

5. Select the Internet Protocol Mode that you want the PViQ™ Connectivity System configured to, from the **Boot Mode** pulldown menu.
 - a. There are two IP Address Configurations that the system can be configured for (**DHCP** or **Static**).
 - b. The system ships configured as **DHCP**.
 - c. If you change the system to DHCP mode, no other fields in the Network Settings section will need to be set. Click on the **Save** button in the **Actions** section to save any changes. This system is now active with the proper network connection.
 - d. If the system is deployed into a network that does not have a DHCP Server or if the customer wants to assign a specific IP address to the system, then the user would select **Static**.
6. If Static IP address mode is selected, consult with your IT administrator to obtain the proper static **IP Address** to assign to this PViQ™ Connectivity System, to obtain the Network Mask and to obtain the **Default Gateway** IP address.
 - a. Type in the designated addresses and mask in the appropriate fields in this section.
 - b. Click on the **Save** button in the **Actions** section to save any changes. This system is now active with a Static IP address.
7. Click on the **Save** button in the **Actions** section to save your changes.

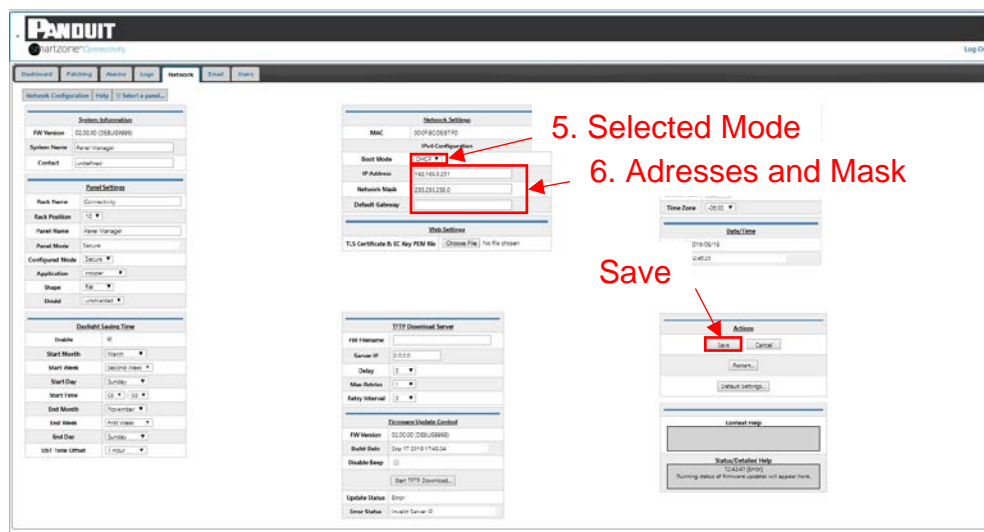


Figure 47: Network Page (network settings)

Configuring the PViQ™ Connectivity System Time

To maintain accurate time in the PViQ™ Connectivity System which enables accurate time stamps on alerts and logs, it is necessary to connect the system to a Network Time Protocol (NTP) server. The PViQ™ Connectivity System does not have a battery to

maintain real time. Connecting the system to an NTP server will guarantee that that PViQ™ Connectivity System will maintain local real time and provide meaningful timestamps on the alarm logs in the Logs Page.

NOTE: *The PViQ™ Connectivity Web UI will automatically log you out after 5 minutes of inactivity with the PViQ™ Connectivity System. Changing fields is not consider activity with the PViQ™ Connectivity System until you click the **Save** button. It is recommended to click the **Save** button frequently during the below steps.*

The following steps are used to configure PViQ™ Connectivity System to utilize and NTP server to maintain real time.

1. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity System that is being configured.
2. The Login Page will appear. Enter the appropriate username and password.
3. The Dashboard Page will appear. Select the **Network** tab.
4. The Network page will appear.
5. Click on the check box to enable connections to NTP servers.
6. Consult with your IT administrator to obtain the IP Address of the Primary, Secondary, and Tertiary NTP servers that the PViQ™ Connectivity System may connect to.
 - a. Type in the designated addresses in the appropriate fields in this section.
 - b. The primary NTP server is the server that the PViQ™ Connectivity System will attempt to synchronize with first. If the connection to this server fails, then the system will select the secondary NTP server. If the connection to the secondary server fails, then the system will select the tertiary NTP server.

NOTE: *The PViQ™ Connectivity System will always attempt to get the time from the Primary NTP server first (every time the system resynchronizes) and fails over to Secondary NTP server then fails over to the Tertiary NTP server.*

7. Select the frequency that you want the PViQ™ Connectivity System to go to the NTP server to synchronize its time, from the **Refresh Rate** pulldown menu. The NTP server is intended to synchronize all participating devices on the network to within a few milliseconds of the Coordinated Universal Time (UTC).
 - a. The default is set to 720 minutes (12 hours).
 - b. If you want to increase or decrease the rate, select a different number from the **Refresh Rate** pulldown menu.
8. Select the time zone that the PViQ™ Connectivity System is in, from the **Time**

Zone pulldown menu.

- a. The NTP server provides the UTC and the system must be set to an offset from the UTC to provide the local time.
 - b. Example: US Central Standard Time (CST) is -6.00.
9. Click on the **Save** button in the **Actions** section to save your changes.

The screenshot displays the Smartzone Network Configuration interface for a PANDUIT device. The page is organized into several sections:

- System Information:** Includes fields for FW Version (02.00.00.000.0000), System Name (Panic Manager), and Contact (undefined).
- Panel Settings:** Includes fields for Rack Name (Connectivity), Rack Position (10), Rack Name (Server Storage), Panel Mode (Secure), Configured Mode (Secure), Application (cmpp), Shape (Flat), and Shutil (unconnected).
- Daylight Saving Time:** Includes fields for Enable (off), Start Month (March), Start Week (Second week), Start Day (Sunday), Start Time (01:00), End Month (November), End Week (Last week), End Day (Sunday), and DST Time Offset (1 hour).
- Network Settings:** Includes fields for MAC (00:0A:00:00:00:00), IPv6 Configuration (disabled), Bond Mode (LACP), IP Address (192.168.0.201), Network Mask (255.255.255.0), and Default Gateway.
- Static Settings:** Includes a field for T.S. Certificate & IC Key PEM file (Choose File).
- Network Time Protocol (NTP):** Includes fields for Enable (off), Primary IP (192.168.0.200), Secondary IP, Tertiary IP, Network Mode (off), and Time Zone (CST-06:00).
- Actions:** Includes buttons for Save, Cancel, Refresh, and Default Settings.
- Contract Info:** Includes a field for Contract ID.
- Status/Refresh Page:** Includes a button for Refresh and a message: "Running status of firmware updates will appear here."

Figure 48: Network Page (time protocol)

Section 7 – PViQ™ Connectivity System Installation Configurations

Introduction

The PViQ™ Connectivity System can be configured into a network in two ways:

1. Cross-Connect
2. Interconnect

Either configuration or a combination of both may be used to connect network elements within data centers, telecommunication room, and edge computing space. Factors such as density of IT assets within racks and cabinets as well as the frequency of asset reconfigurations will determine which method will be most effective.

Cross-Connect

In cross-connect configurations, the more permanent and highest density network element (such as the high-speed switch) is permanently cabled to the back of the PViQ™ Connectivity System with modular jacks. PViQ™ Connectivity Patch Cords are then connected between the representative switch-port panel and the PViQ™ Connectivity System via horizontal runs to remote cabinets. These cabinets typically contain other network elements (such as servers) or endpoint equipment (such as computers, IP phones, security equipment, etc.).

Cross-Connect Data Center or Edge Solution

Cross-connect is warranted at sites where server commissioning/decommissioning and equipment cut-overs necessitate configuration flexibility and cable routing for application re-configurations (as shown in the figure below).

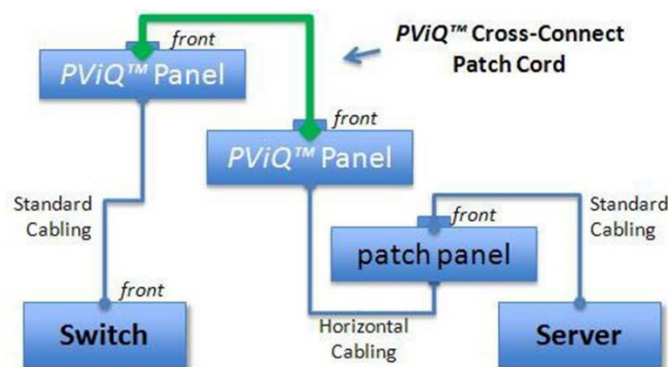


Figure 49: Cross-Connect Data Center or Edge Solution

Cross-Connect Enterprise or Edge Solution

The Cross-Connect configuration may also be used in intermediate distribution areas or data communications closets to reduce the facility reconfiguration costs and cabling time (as shown in the figure below).

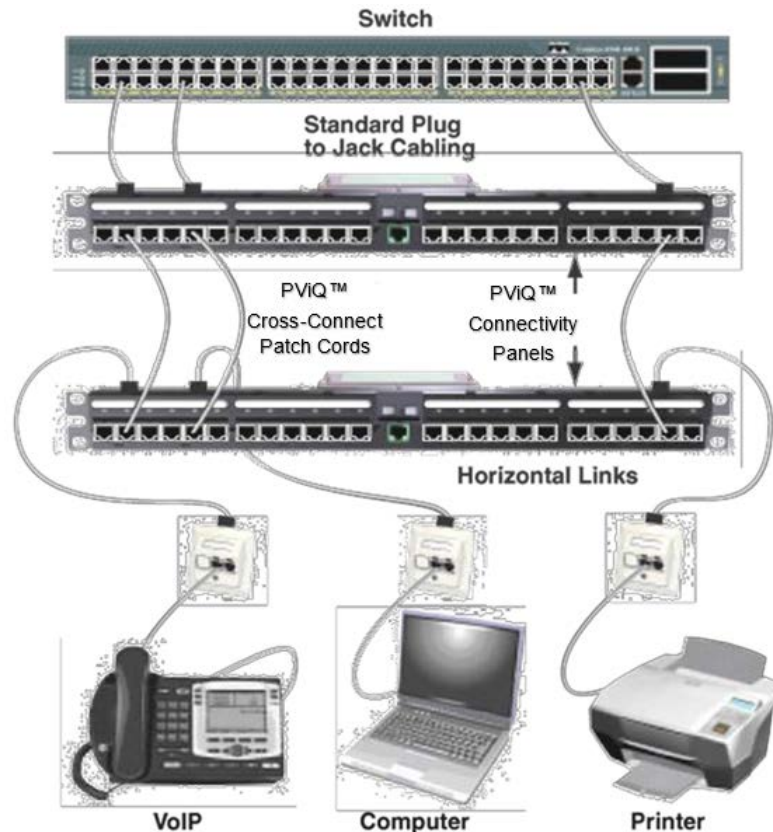


Figure 50: Cross-Connect Enterprise or Edge Solution

Interconnect

Interconnect configurations utilize PVIQ™ Connectivity Interconnect Patch Cords to provide connectivity between non- PVIQ™ Connectivity enabled ports and PVIQ™ Connectivity Panels.

The basic I-Cord may only be used to connect to network elements with shielded jacks. The Enhanced I-Cord may be used to connect to any network element.

Interconnect Data Center or Edge Solution

The interconnect configuration is ideal for configurations with space limited areas that have lower reconfiguration requirements and utilize higher density connections than other computing areas (as shown in the figure below).

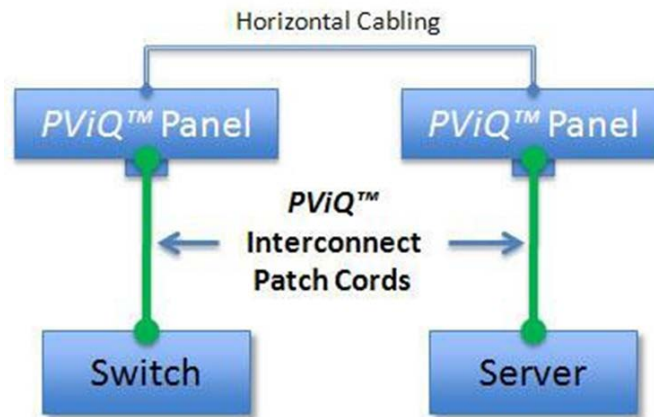


Figure 51: Interconnect Data Center or Edge Solution

Interconnect Enterprise or Edge Solution

The interconnect configuration may also be used in intermediate distribution areas or data communications closets where space is at a premium, and limited moves, adds, and changes are expected. (as shown in the figure below).

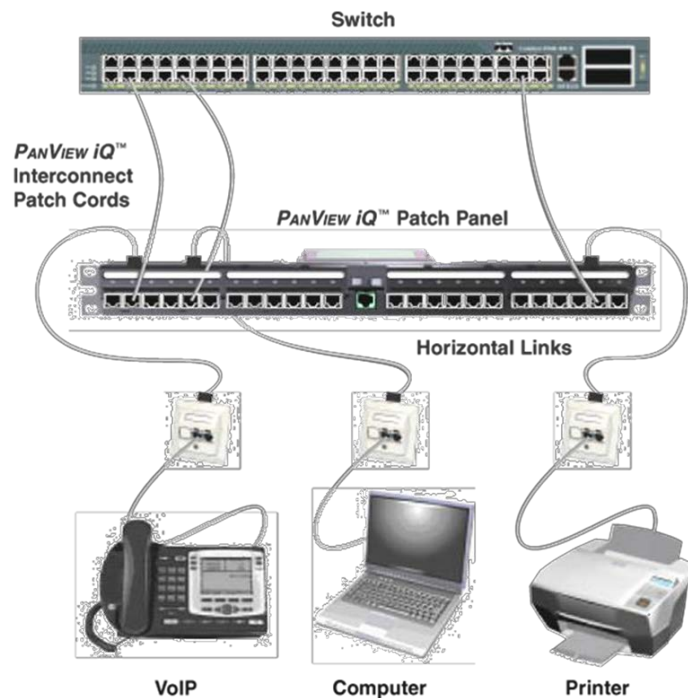


Figure 52: Interconnect Enterprise or Edge Solution

The Provisioning Port on the PM and Interconnect Patch Cords guides installers to the correct switch and panel ports for moves, adds, and changes. The PViQ™ Connectivity System detects connections and disconnections made between the switch and PViQ™ Connectivity Panel and visually identifies these ports through colored LEDs on the panels, as well as LEDs built into Enhanced Interconnect Patch Cords.

Section 8 – Adding/Removing Connections Using PViQ™ Connectivity Web UI

Introduction

This section will provide the step-by-step procedures for updating the patch field and getting it back into a secure state. In the secure state, the PViQ™ Connectivity System will set an alarm, record the alarm in the alarm log, and send an alert via email (if enabled) when there is a change to the patch filed.

Adding a Cross-Connect Connection to the Patch Field

A cross-connect patch cord is a cable that connects two PViQ™ Connectivity System ports. There are two methods to add cross-connect cables to the patch field. The first method is through individual port security policy setting and the second method is through panel Learn mode. The following sections provide the steps to implement either method.

NOTE: *Ports that have Security Policies that were automatically created during Learn Mode act differently than ports that were explicitly provisioned in Secure Mode using “Set Security Policy”. When in Secure Mode, Learn Mode provisioned ports will automatically go back to Secure mode when the learned Security Policy is restored; Secure Mode provisioned ports will remain in Secure Violation mode until they are re-provisioned.*

Individual Port Security Policy Method

This method may be used at initial patch field setup or when adding to a patch field that is already setup. This method is typically used when adding connections to a patch field that is already setup.

The following steps are used to add cross-connections to a PViQ™ Connectivity System patch field or between two PViQ™ Connectivity System patch fields.

1. Connect the cross-connect patch cord between the two ports in the patch field.
 - a. A security alarm will alert from both panels that the patch cord is plugged into.
 - b. The port LED above the ports that the patch could is plugged into will light red, indicating a security policy violation.
2. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity

System that the added connection is being added to.

NOTE: *If connecting a cross-connect between two PViQ™ Connectivity Systems, you only need to log into one of the systems with an end point on that connection. The security policy will automatically be setup on the other system when the following steps are completed.*

3. The Login Page will appear. Enter the appropriate username and password. The Dashboard page will appear.
4. Select the **Patching** tab. The **Patching** page will appear.
5. Select the panel from the **Select a Panel** pulldown menu.
6. Select the port on the panel, from the **Port Number** pulldown menu that you made your connection to in step 1.
 - a. The **Alarm Status** field is populated with **Security Policy Violation!** and there is a red dot in the field.
 - b. The **Port Status** field is populated with **Connected – Both Ends**.
 - c. The **Patch Cord Type** field is populated with **Cross-Connect**.
 - d. The **Panel or Device Name** field is populated with *the name assigned to the panel* at the other end (far end) of the newly added patch cord.
 - e. The **Port or Device Port Number** field is populated with the port number of the panel on the far end of the newly added patch cord.
 - f. The **FE Horizontal Name** field is populated with the name assign to the backside of the port on the far-end panel of the newly added patch cord.
7. Click on the **Set Security Policy** button.
 - a. The LEDs above the ports that the patch cord is plugged into will extinguish.
 - b. The **Panel Mode** will go into **MAC** mode for a short while.
 - c. Then **Panel Mode** will transition back to **Secure** mode and the **Alarm Status** will change to **Secure**. and the red dot will disappear.
8. The new connection has been added to the system (or both systems), the security policy violation alarm for this connection will disappear and all systems involved will be left in secure mode.

Panel Learn Mode Method

This method may be used at initial patch field setup or when adding to a patch field that is already setup. This method is typically used for initial patch field setup.

The following steps are used to add cross-connections to a PViQ™ Connectivity System patch field or between two PViQ™ Connectivity System patch fields.

1. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity System that the connection is being added to.

NOTE: *If you are connecting a cross-connect between two PViQ™ Connectivity Systems, you will need to log into both systems that have an end point on that connection to place both the end point panels into Learn mode. Follow steps 1 through 7 for each system.*

2. The Login Page will appear. Enter the appropriate username and password. The Dashboard page will appear.
3. Select the **Network** tab. The **Network** page will appear.
4. Select the panel from the **Select a Panel** pulldown menu.
5. Select **Learn** in the **Configuration Mode** field from the pulldown menu.
6. Click on the **Save** button to change the panel into Learn mode.
 - a. The Mode LED on the panel with light amber.
7. Select the other panel from the **Select a Panel** pulldown menu.
8. Select **Learn** in the **Configuration Mode** field from the pulldown menu.
9. Click on the **Save** button to change the panel to Learn mode.
 - a. The Mode LED on the panel will light amber.

NOTE: *You must place both end point panels into Learn mode before completing the next step (connecting the cross-connect patch cord). Learning only one end of the connection will make that connection secure on that side and a security policy violation on the other side.*

10. Connect the cross-connect patch cord between the two ports in the patch field.
 - a. When you make the first connection, the LED above the port will light amber and the system will provide a single audio beep.
 - b. When you make the second connection, the LED above the port will light amber and the system will provide a single audio beep, followed quickly by

turning both port LEDs green and two audio beeps (indicating both ends are connected).

NOTE: *If the panels at both ends of the connection were not placed into Learn mode before the connections are made, you can recover by placing the second panel into Learn mode after the connection was made.*

NOTE: *You may place all your panels into Learn mode before populating your cross-connect patch field and the system will learn the connections as they are made. However, any connection that was in place and was a security policy violation will now be accepted as the security policy.*

11. You may continue making additional patch connections between panels that are in Learn mode.
 - a. When you make the first connection the LED above the port will light amber and the system will provide a single audio beep.
 - b. When you make the second connection the LED above the port will light amber and the system will provide a single audio beep, followed quickly by turning both port LEDs green and two audio beeps (indicating both ends are connected).
12. Change all panels in Learn mode back to secure mode. For each panel in Learn mode, select **Secure** in the **Configuration Mode** field from the pulldown menu.

NOTE: *You may have to log back into each system to change the panels back to Secure Mode, because the web UI will automatically log you out after five minutes of inactivity.*
13. Click on the **Save** button to change the panel into Secure mode.
 - a. The Mode LED on the panel will extinguish.
14. Repeat steps 12 and 13 for each panel in Learn mode.
15. The new connection has been added to the system(s), and the panels are in secure mode.

Removing a Cross-Connect Connection from the Patch Field

There are two methods to remove cross-connect cables from the patch field. The first method is through individual port security policy clearing and the second method is through panel Learn mode. The following sections provide the steps to implement either method.

Individual Port Security Policy Method

This method may be used for patch field teardown or when removing individual patch cords from a patch field. This method is typically used when removing one or more individual connections in the patch field.

Perform the following steps to remove cross-connections to a PViQ™ Connectivity System patch field or between two PViQ™ Connectivity System patch fields.

1. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity System that the patch cord connection is being removed from.

NOTE: *If you are connecting a cross-connect between two PViQ™ Connectivity Systems, you only need to log into one of the systems with an end point on that connection. The security policy will automatically span across the two systems when the following steps are completed.*

2. The Login Page will appear. Enter the appropriate username and password. The **Dashboard** page will appear.
3. Select the **Patching** tab. The **Patching** page will appear.
4. Select the panel from the **Select a Panel** pulldown menu.
5. Select the port on the panel that you want to disconnect from the **Port Number** pulldown menu.
6. Click on the **Clear Security Policy** button.
 - a. The LEDs above the ports that the patch cord is plugged into (on both ends of the patch cord) will start flashing red.
 - b. The **Panel Mode** will change to **MAC** mode.
 - c. The panel(s) MAC LED will light green.
7. Disconnect the cross-connect patch cord at both ends in the patch field.
 - a. The port LED will extinguish once the cord is removed from the port.
 - b. The MAC LED will automatically turn off when both ends of the cord have been removed.
 - c. The **Panel Mode** will change back to **Secure** mode.
 - d. All **Far End Status** will get cleared out.
8. The connection has been removed from the system(s) and all systems involved with be left in secure mode.

Panel Learn Mode Method

This method may be used for patch field teardown or when removing individual patch cords from a patch field. This method is typically used for patch field teardown.

Perform the following steps to remove cross-connections from a PViQ™ Connectivity System patch field or between two PViQ™ Connectivity System patch fields.

1. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity System that the connection is being added to.

NOTE: *If connecting a cross-connect between two PViQ™ Connectivity Systems, you will need to log into both systems that have an end point on the connection to be removed to place both the end point panels into Learn mode. Follow steps 1 through 6 for each system.*

2. The Login Page will appear. Enter the appropriate username and password.
3. The Dashboard page will appear. Select the **Network** tab. The **Network** page will appear.
4. Select the panel from the **Select a Panel** pulldown menu.
5. Select **Learn** in the **Configuration Mode** field from the pulldown menu.
6. Click **Save** to change the panel to Learn mode.
 - a. The Mode LED on the panel will light amber.
 - b. All port LEDs with cross-connect cables will light green.
 - c. All ports LEDs with a copper interconnect will extinguish.
 - d. All ports LEDs with a fiber interconnect will light amber.
7. Select the other panel from the **Select a Panel** pulldown menu.
8. Select **Learn** in the **Configuration Mode** field from the pulldown menu.
9. Click on the **Save** button to change the panel into Learn mode.
 - a. The Mode LED on the panel will light amber.

NOTE: *You must place both end point panels into Learn mode before completing the next step (removing the cross-connect patch cord). Learning only one end of the connection will make that connection secure on that side and a security policy violation on the other side.*

10. Remove the cross-connect patch cord between the two port in the patch field.

- a. When you remove the first connection, the LED above the port will extinguish and the far end connected port will change to amber and the system will provide a single audio beep.
- b. When you remove the second connection, the LED above the port will extinguish.

NOTE: *If the panels at both ends of the connection were not placed into Learn mode before the connections are made, you can recover by placing the second panel into Learn mode after the connections were removed.*

NOTE: *You may place all your panels into Learn mode before removing all of your cross-connect patch cords and the system will learn the connections as they are removed.*

11. You may continue remove additional patch connections between panels that are in Learn mode.
12. Upon completion of all your removals, change all panels in Learn mode back to Secure mode. For each panel in Learn mode, select **Secure** in the **Configuration Mode** field from the pulldown menu.

NOTE: *You may have to log back into each system to change the panels back to Secure Mode, because the web UI will automatically log you out after five minutes of inactivity.*

13. Click on the **Save** button to change the panel to Secure mode.
 - a. The Mode LED on the panel will extinguish.
14. Repeat steps 12 and 13 for each panel in Learn mode.
15. The connection(s) have been removed from the system(s), and the panels are in secure mode.

Adding a Copper Interconnect to the Patch Field

An interconnect patch cord is a cable that connects between PViQ™ Connectivity System ports and network devices (i.e. Ethernet Switch, Server, etc.). There is only one method for adding copper interconnect cables to the patch field. This method is through individual port security policy setting. The following sections will provide the steps to implement this method.

NOTE: *Learn Mode cannot be used to add copper interconnect patch cords to the patch field.*

Individual Port Security Policy Method

The following steps are used to add copper interconnect patch cords to a PViQ™ Connectivity System patch field.

1. Connect the interconnect patch cord between the PViQ™ Connectivity System port and the network device in the patch field.
 - a. A security alarm will alert from the PViQ™ Connectivity System panel that the patch cord is plugged into.
 - b. The port LED above the ports that the patch cord is plugged into will light red, indicating a security policy violation.
 - c. If you are using an Enhanced I-Cord, the LED in the cord will light red when it is plugged into the network device.
2. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity System that the added connection is being added to.
3. The Login Page will appear. Enter the appropriate username and password.
4. The **Dashboard** page will appear. Select the **Patching** tab.
5. The **Patching** page will appear.
6. Select the panel from the **Select a Panel** pulldown menu.
7. Select the port on the panel, from the **Port Number** pulldown menu, that you made your connection to in step 1.
 - a. The **Alarm Status** field is populated with **Security Policy Violation!** and there is a red dot in the field.
 - b. The **Port Status** field is populated with **Connected – Both**.
 - c. The **Patch Cord Type** field is populated with **Enhanced I-Cord** or **Basic I-Cord**, depending on the type of copper I-Cord that was connected.
 - d. The **Far End Status** fields will all be blank.
8. Click on the **Set Security Policy** button.
 - a. The LEDs above the ports that the patch cord is plugged into will extinguish.
 - b. If you are using an Enhanced I-Cord, the LED in the cord will extinguish.
 - c. The **Panel Mode** will go into **MAC** mode for a short while.

- d. Then **Panel Mode** will transition back to **Secure** mode, the **Alarm Status** will change to **Secure**, and the red dot will disappear.
9. The new connection has been added to the system, the security policy violation alarm for this connection will disappear, and the system involved will be left in Secure mode.

Removing an Interconnect from the Path Field

There are two methods for removing copper or fiber interconnect cables from the patch field. The first method is through individual port security policy clearing and the second method is through panel Learn mode. The following sections provide the steps to implement either method.

Individual Port Security Policy Method

This method may be used for patch field teardown or when removing individual patch cords from a patch field. This method is typically used when removing one or more individual connections in patch field.

The following steps are used to remove interconnect connections from a PViQ™ Connectivity System patch field.

1. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity System that the patch cord connection is being removed from.
2. The Login Page will appear. Enter the appropriate username and password. The **Dashboard** page will appear.
3. Select the **Patching** tab. The **Patching** page will appear.
4. Select the panel from the **Select a Panel** pulldown menu.
5. Select the port on the panel, from the **Port Number** pulldown menu, that you want to disconnect.
6. Click on the **Clear Security Policy** button.
 - a. The LEDs above the port that the patch cord is plugged into will start flashing red.
 - b. If using an Enhanced I-Cord the LED in the cord will start blinking red.
 - c. The **Panel Mode** will change to **MAC** mode.
 - d. The panel(s) MAC LED will light green.
7. Disconnect the interconnect patch cord at both ends.

- a. The port LED and MAC LED will extinguish once the cord is removed from the port.
 - b. The **Panel Mode** will change back to **Secure** mode.
 - c. The **Port Status** and **Patch Cord Type** will change to **Disconnected**.
8. The connection has been removed from the system and the system will be left in secure mode.

Panel Learn Mode Method

This method may be used for patch field teardown or when removing individual patch cords from a patch field. This method is typically used for patch field teardown.

Perform the following steps to remove Interconnect connections from a PViQ™ Connectivity System patch field.

1. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity System that the connection is being removed from.
2. The Login Page will appear. Enter the appropriate username and password. The **Dashboard** page will appear.
3. Select the **Network** tab. The **Network** page will appear.
4. Select the panel from the **Select a Panel** pulldown menu.
5. Select **Learn** in the **Configuration Mode** field from the pulldown menu.
6. Click on the **Save** button to change the panel to Learn mode.
 - a. The Mode LED on the panel will light amber.
 - b. All port LEDs with cross-connect cables will light green.
 - c. All ports LEDs with a copper interconnect will extinguish.
 - d. All ports LEDs with a fiber interconnect will light amber.
7. Remove the interconnect patch cord from the patch field.
 - a. When you remove the fiber interconnect cord from the PViQ™ Connectivity System, the LED above the port will extinguish.

NOTE: You may place all your panels into Learn mode before removing all of your interconnect patch cords and the system will learn the connections as they are removed.

8. You may continue remove additional interconnect patch cords from the panel that are in Learn mode.
9. Upon completion of all your removals, change all panels in Learn mode back to secure mode. For each panel in Learn mode, select **Secure** in the **Configuration Mode** field from the pulldown menu.

NOTE: You may have to log back into each system to change the panels back to Secure Mode, because the web UI will automatically log you out after five minutes of inactivity.

10. Click on the **Save** button to change the panel into Secure mode.
 - a. The Mode LED on the panel will extinguish.
11. Repeat steps 9 and 10 for each panel in Learn mode.
12. The removed connection(s) have been removed from the system(s), the panels are in secure mode.

Adding a Fiber Interconnect to the Patch Field

An interconnect fiber patch cord is a fiber cable that connects PViQ™ Connectivity System ports to network devices (i.e. Ethernet Switch, Server, etc.). There are two methods to add fiber interconnect cables to the patch field. The first method is through individual port security policy setting, and the second method is through panel Learn mode. The following sections provide the steps to implement either method.

Individual Port Security Policy Method

This method may be used at initial patch field setup or when adding to a patch field that is already set up. This method is typically used when adding connections to a patch field that is already set up.

Perform the following steps to add fiber interconnect cables to a PViQ™ Connectivity System patch field.

1. Connect the interconnect patch cord between the PViQ™ Connectivity System port and the network device in the patch field.
 - a. A security alarm will alert from the PViQ™ Connectivity System panel that the patch cord is plugged into.
 - b. The port LED above the ports that the patch cord is plugged into will light red, indicating a security policy violation.
2. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity

System that the added connection is being added to.

3. The Login Page will appear. Enter the appropriate username and password. The **Dashboard** page will appear.
4. Select the **Patching** tab. The **Patching** page will appear.
5. Select the panel from the **Select a Panel** pulldown menu.
6. Select the port on the panel, from the **Port Number** pulldown menu, that you made your connection to in step 1.
 - a. The **Alarm Status** field is populated with **Security Policy Violation!** and there is a red dot in the field.
 - b. The **Port Status** field is populated with **Connected – Near End**.
 - c. The **Patch Cord Type** field is populated with **Connected**.
 - d. The **Far End Status** fields will all be blank.
7. Click on the **Set Security Policy** button.
 - a. The LEDs above the ports that the patch cord is plugged into will extinguish.
 - b. The **Panel Mode** will go into **MAC** mode for a short while.
 - c. Then **Panel Mode** will transition back to **Secure** mode, the **Alarm Status** will change to **Secure**, and the red dot will disappear.
 - d. The **Port Status** will change to **Connected – Both**.
 - e. The **Patch Cord Type** will change to **Basic I-Cord**.
8. The new connection has been added to the system, the security policy violation alarm for this connection will disappear, and the system involved will be left in secure mode.

Panel Learn Mode Method

This method may be used at initial patch field setup or when adding to a patch field that is already setup. This method is typically used for initial patch field setup.

NOTE: *The Learn mode method cannot be used for copper interconnect cords.*

Perform the following steps to add fiber interconnect cables to a PVIQ™ Connectivity System patch field.

1. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity System that the added connection is being added to.
2. The Login Page will appear. Enter the appropriate username and password. The **Dashboard** page will appear.
3. Select the **Network** tab. The **Network** page will appear.
4. Select the panel from the **Select a Panel** pulldown menu.
5. Select **Learn** in the **Configuration Mode** field from the pulldown menu.
6. Click on the **Save** button to change the panel into Learn mode.
 - a. The Mode LED on the panel with light amber.
7. Connect the interconnect patch cord between the PViQ™ Connectivity System port and the network device.
 - a. When you make the connection the LED above the port will light amber and the system will provide a single audio beep.

NOTE: You may place all your panels into Learn mode before populating your fiber interconnect cables in the patch field, and the system will learn the connections as they are made. However, any connection that was in place and was a security policy violation will now be accepted as the security policy.

8. You may continue making additional patch connections between panels that are in Learn mode.
 - a. When you make the connection the LED above the port will light amber and the system will provide a single audio beep.
9. Change all panels in Learn mode back to Secure mode. For each panel in Learn mode, select **Secure** in the **Configuration Mode** field from the pulldown menu.

NOTE: You may have to log back into each system to change the panels back to Secure Mode, because the web UI will automatically log you out after five minutes of inactivity.

10. Click on the **Save** button to change the panel to Secure mode.
 - a. The Mode LED on the panel will extinguish.
 - b. All port LEDs will extinguish.
11. Repeat steps 9 and 10 for each panel in Learn mode.
12. The new connection(s) have been added to the system(s), the panels are in

secure mode.

Clearing a Cross-Connect Security Violation

A cross-connect patch cord is a cable that connects between two PViQ™ Connectivity System ports. When the Security Violation is on a port with a cross-connect cable, you will receive two violations, one from each panel at the end point of the cross-connect cable.

There are two reasons why you may receive a Security Violation from the PViQ™ Connectivity System because of a port associated with a cross-connect patch cord.

1. An unauthorized remove of one or both ends of the provisioned cross-connect patch cord. (The Security Policy states that these two ports should be connected together.)
2. An unauthorized add of one or both ends of a cross-connect patch cord. (The Security Policy states that this port(s) should not have a connection.)

Clearing a Security Violation for an Unauthorized Remove

Perform the following step should be performed to clear a Security Violation that resulted from a cross-connect patch cord being removed without authorization.

1. If one or both ends of a cross-connect patch cord were removed without authorization (security policy states that these two ports should be connected), reconnect that patch cord between the same ports. Both ports will have the port LED light red.
 - a. The Security Violation will automatically be cleared.
 - b. The port LEDs will be extinguished.

Clearing a Security Violation for an Unauthorized Add

A Security Violation from the system when adding a cross-connect cables is a normal step when adding a cross-connect cable to the patch field. Either remove the cable (because it was unintended) or follow the steps outlined in Adding a Cross-Connect Connection to the Patch Field.

Clearing a Copper Interconnect Security Violation

A copper interconnect patch cord is a cable that connects a PViQ™ Connectivity System port to a network device (Ethernet Switch, Server, etc.). When the Security Violation is on a port with an interconnect cable, you will receive one violation from the

PViQ™ Connectivity System panel where the I-Cord is connected.

There are two reasons why you may receive a Security Violation from the PViQ™ Connectivity System because of a port associated with a copper interconnect patch cord.

1. An unauthorized remove of one or both ends of the provisioned interconnect patch cord. (The Security Policy states that this port should be connected to a far-end port that was not disconnect.)
2. An unauthorized add of one or both ends of a copper interconnect patch cord. (The Security Policy states that this port should not have a connection.)

Clearing a Security Violation for an Unauthorized Remove

Perform the following steps to clear a Security Violation that resulted from a copper interconnect patch cord being removed without authorization.

1. If either end or both ends of a copper interconnect patch cord were removed without authorization (security policy states that this port should be connected to a network device that was never disconnected), reconnect that patch cord to the same port on the PViQ™ Connectivity System and to the same port on the network device. The PViQ™ Connectivity System port will have the port LED light red.
2. Then follow the steps outlined in Adding a Copper Interconnect to the Patch Field.

NOTE: After remaking the connections you must go through the process of adding a new copper interconnect patch cord to authorize that this is the correct connection at both ends.

Clearing a Security Violation for an Unauthorized Add

A Security Violation from the system when adding a copper interconnect cable is a normal step when adding a cross-connect cable to the patch field. Either remove the cable (because it was unintended) or follow the steps outlined in Adding a Copper Interconnect to the Patch Field .

Clearing a Fiber Interconnect Security Violation

A fiber interconnect patch cord is a cable that connects a PViQ™ Connectivity System port to a fiber port on a network device (Ethernet Switch, Server, etc.). When the Security Violation is on a port with an interconnect cable, you will receive one violation from the PViQ™ Connectivity System panel where the I-Cord is connected.

There are two reasons why you may receive a Security Violation from the PViQ™

Connectivity System because of a port associated with a fiber interconnect patch cord.

1. An unauthorized remove of the PViQ™ Connectivity System side of the provisioned fiber interconnect patch cord. (The Security Policy states that this port should be connected.)
2. An unauthorized add to the PViQ™ Connectivity System side of the fiber interconnect patch cord. (The Security Policy states that this port should not have a connection.)

Clearing a Security Violation for an Unauthorized Remove

Perform the following steps to clear a Security Violation that resulted from a fiber interconnect patch cord being removed without authorization.

1. If the PViQ™ Connectivity System end of a fiber interconnect patch cord was removed without authorization (security policy states that this port should be connected), reconnect that patch cord to the same port on the PViQ™ Connectivity System. The PViQ™ Connectivity System port will have the port LED light red.
2. Then follow the steps outlined in the Adding a Fiber Interconnect to the Patch Field.

NOTE: After remaking the connection, you must go through the process of adding a new fiber interconnect patch cord to authorize that this is the correct connection at both ends.

NOTE: The PViQ™ Connectivity System cannot detect the state of the far end of a fiber interconnect cord, so it is assumed that the customer knows that the far end is connected to the correct location before authorizing that this is the correct connection at both ends.

Clearing a Security Violation for an Unauthorized Add

A Security Violation from the system when adding a fiber interconnect cable is a normal step when adding a cross-connect cable to the patch field. Either remove the cable (because it was unintended) or follow the steps outlined in the Adding a Fiber Interconnect to the Patch Field .

Section 9 – Adding/Removing Connections Using MAC Mode and PViQ™ I-Cords

Introduction

This section will provide step-by-step scenarios for utilizing the I-Cord and Enhanced I-Cord.

NOTE: MAC orders can only be issued through the SmartZone Asset and Connectivity Software Modules. The SmartZone Connectivity Software Module is the minimum SmartZone software required to operate with the PViQ™ Connectivity System. SmartZone Asset Software Module may be included to gain the full experience when connecting I-cords into the system.

For details on creating a change order using SmartZone Asset and Connectivity Software Modules, refer to the SmartZone Software User Manual.

Basic I-Cord Connection

Use the following procedure to make connections using the PViQ™ Basic I-Cord.

1. After a Move, Add, or Change (MAC) order has been issued, the PM Interface Unit MAC LED lights solid green, and the MODE LED flashes green.

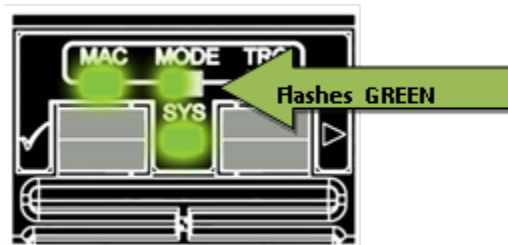


Figure 53: PM IU in MAC Mode

2. Connect the 9-wire side of the I-Cord to the Provisioning Port of the PM. The MODE LED becomes a solid green. The target port LED also lights solid green.

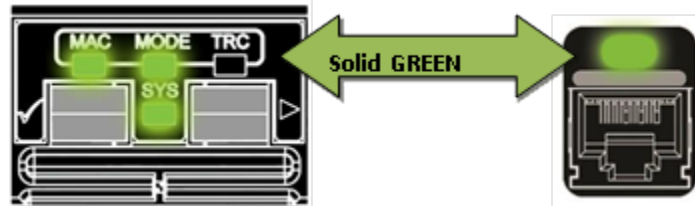


Figure 54: PM IU and Port during a Guided Add (provisioning connect)

3. Connect the shielded plug end of the I-Cord to the proper jack on the switch. The Mode LED will change to a flashing amber, indicating a single-ended connection.

NOTE: This may take 3-8 seconds depending on the switch.

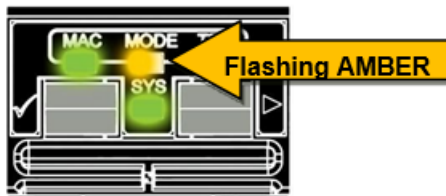


Figure 55: PM IU and Port during a Guided Add (far end connect)

On the PViQ™ Patch Panel, the Port LED to which the cable should be connected begins flashing green.

4. Remove the I-Cord from the PM Provisioning Port. The MODE LED turns off.

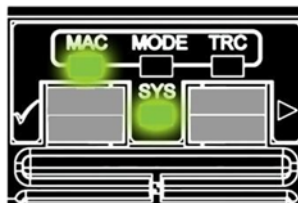


Figure 56: PM IU during a Guided Add (moving from provisioning port to target port)

5. Connect the I-Cord to the designated port on the PViQ™ Patch Panel.

The MAC LED turns off, the MODE LED changes to green briefly, and then the panel returns to Secure Mode if the MAC is complete on this panel. The Port LED turns off.



Figure 57: PMIU and Port when MAC is Complete

IMPORTANT NOTE: If the user removes one end of the I-Cord from the patch panel without issuing a work order, a Secure Violation occurs. Simply inserting the I-Cord back into the port will NOT remove the violation in the SmartZone Software. The user MUST perform the provisioning process again.

Basic I-Cord Connection – Incorrect Switch Port

The previous scenario demonstrates the steps of connecting an I-Cord as they would occur if perfectly executed. The procedure in this section demonstrates what would occur in a common failure scenario – in this case, a technician plugs the far end of the I-Cord into an incorrect switch port.

1. After a Move, Add, or Change (MAC) order has been issued, the PM Interface Unit MAC LED lights solid green, and the MODE LED flashes green.

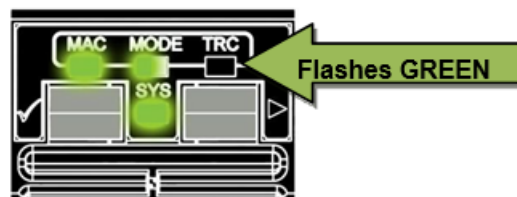


Figure 58: PM IU in MAC Mode

2. Connect the 9-wire side of the I-Cord to the Provisioning Port of the PM. The MODE LED becomes a solid green. The target port LED also lights solid green.

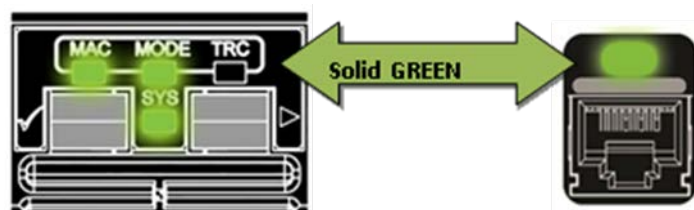


Figure 59: PM IU and Port during a Guided Add (provisioning connect)

NOTE: If the target panel is an EM, the PM MAC will extinguish when the I-Cord is removed from the Provisioning Port and the EM MAC LED will stay on until the panel port connection is made.

3. Connect the shielded plug end of the I-Cord to an incorrect port on the switch. After a few seconds, the system recognizes the incorrect port. The Mode LED will then change to a flashing RED, indicating an incorrect connection.

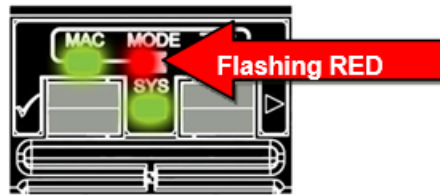


Figure 60: PM IU and Port during a Guided Add (far end incorrect connect)

4. Disconnect the far end of the I-Cord from the incorrect port. The MODE LED becomes solid green.

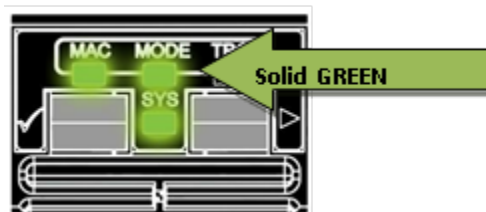


Figure 61: PM IU and Port during a Guided Add (far end incorrect connect removed)

5. Connect the far end of the I-Cord to the proper port on the switch. The Mode LED will change to a flashing amber, indicating a single-ended connection.

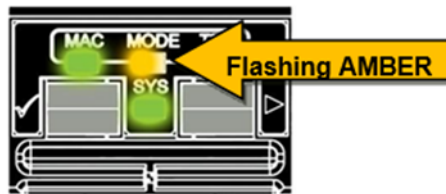


Figure 62: PM IU and Port during a Guided Add (far end connect)

On the PViQ™ Patch Panel, the Port LED to which the cable should be connected begins flashing green.

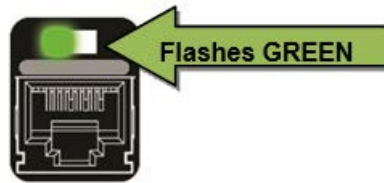


Figure 63: Target Port during a Guided Add

6. Remove the I-Cord from the PM Provisioning Port. The MODE LED turns off.

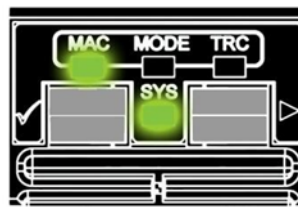


Figure 64: PM IU during a Guided Add (moving from provisioning port to target port)

7. Connect the I-Cord to the designated port on the PViQ™ Patch Panel.

The MAC LED turns off, the MODE LED changes to green briefly, then the panel returns to Secure Mode if the MAC is complete on this panel. The Port LED turns off.



Figure 65: PM IU and Port when MAC is Complete

Enhanced I-Cord Connection

Perform the following procedure to make connections using the Enhanced PViQ™ I-Cord.

1. After a Move, Add, or Change (MAC) order has been issued, the PM Interface Unit MAC LED lights solid green, and the MODE LED flashes green.

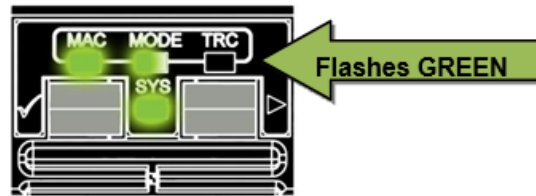


Figure 66: PM IU in MAC Mode

2. Connect the 10-wire side of the I-Cord to the Provisioning Port of the PM. The MODE LED becomes a solid green. The target port LED also lights solid green.

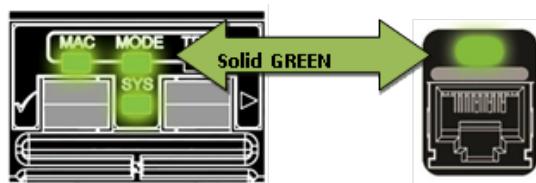


Figure 67: PM IU and Port during a Guided Add (provisioning connect)

Also, the LED of the Enhanced I-Cord flashes green.



Figure 68: PVIQ™ Enhanced I-Cord during a Guided Add

NOTE: If the target panel is an EM, the PM MAC will extinguish when the I-Cord is removed from the Provisioning Port and the EM MAC LED will stay on until the panel port connection is made.

3. Connect the far end of the Enhanced I-Cord to the proper jack on the switch. The Mode LED will change to a flashing amber, indicating a single-ended connection.

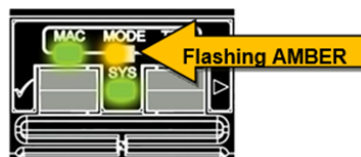


Figure 69: PM IU during a Guided Add (far-end connect)

The Enhanced I-Cord LED turns off.



Figure 70: PViQ™ Enhanced I-Cord during a Guided Add (switch end correct connect)

On the PViQ™ Patch Panel, the Port LED to which the cable should be connected begins flashing green.

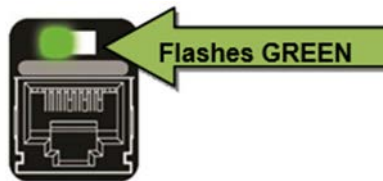


Figure 71: Target Port during a Guided Add

4. Remove the Enhanced I-Cord from the PM Provisioning Port and connect it to the target port on the PViQ™ Patch Panel. The MAC and MODE LEDs turn off.

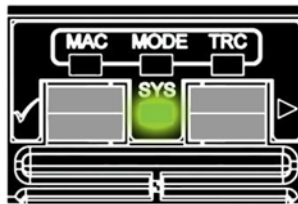


Figure 72: PM IU when MAC is Complete

The MODE LED changes to green briefly, then the panel returns to Secure Mode if the MAC is complete for this panel. The Target Port LED turns off.

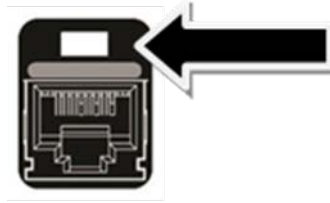


Figure 73: Target Port when MAC is Complete

IMPORTANT NOTE: If the user removes one end of the I-Cord from the patch panel without issuing a work order, a Secure Violation occurs. Simply inserting the I-Cord back into the port will NOT remove the violation in the SmartZone Software. The user MUST perform the provisioning process again.

Enhanced I-Cord Connection – Incorrect Switch Port

The previous scenario demonstrates the steps of connecting an Enhanced I-Cord as they would occur if perfectly executed. The procedure in this section demonstrates what would occur in a common failure scenario – in this case, a technician plugs the LED end of the Enhanced I-Cord into an incorrect switch port.

1. After a Move, Add, or Change (MAC) order has been issued, the PM Interface Unit MAC LED lights solid green, and the MODE LED flashes green.

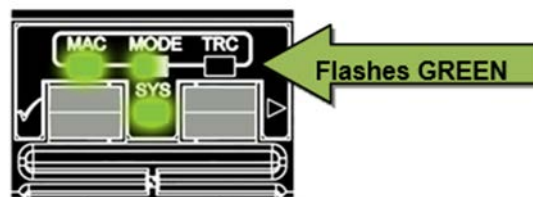


Figure 74: PM IU in MAC Mode

2. Connect the 10-wire side of the I-Cord to the Provisioning Port of the PM. The MODE LED becomes a solid green. The target port LED also lights solid green, identifying the correct port for the connection.

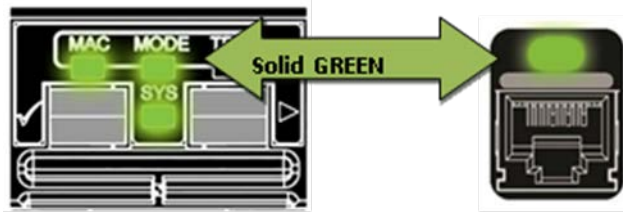


Figure 75: PM IU and Port during a Guided Add (provisioning connect)

Also, the LED of the Enhanced I-Cord flashes green.



Figure 76: PVIQ™ Enhanced I-Cord during a Guided Add

3. Connect the far end of the Enhanced I-Cord to an incorrect port on the switch. The green LED of the Enhanced I-Cord will turn off.

After a few seconds, the system recognizes the incorrect port. The Mode LED will then change to a flashing RED, indicating an incorrect connection.

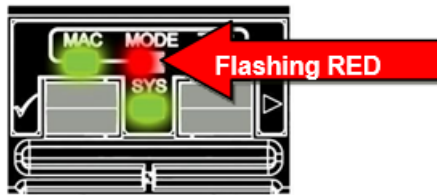


Figure 77: PM IU and Port during a Guided Add (far-end incorrect connect)

Also, the Enhanced I-Cord LED flashed RED.



Figure 78: PViQ™ Enhanced I-Cord during a Guided Add (incorrect switch port connection)

4. Disconnect the far end of the Enhanced I-Cord from the incorrect port. The MODE LED becomes solid green.

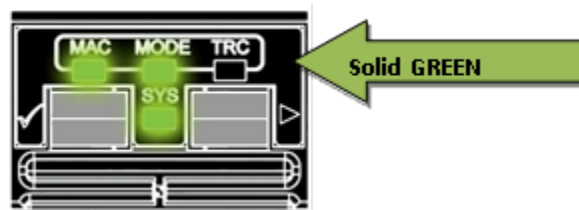


Figure 79: PM IU and Port during a Guided Add (far-end incorrect connect removed)

The LED of the Enhanced I-Cord flashes green.



Figure 80: PViQ™ Enhanced I-Cord during a Guided Add (incorrect connection at the switch port has been removed)

5. Connect the far end of the Enhanced I-Cord to the proper port on the switch. The Mode LED will change to a flashing amber, indicating a single-ended connection.

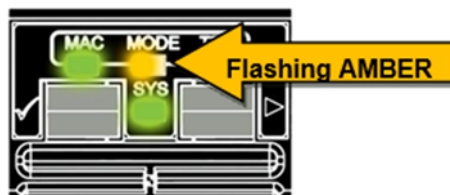


Figure 81: PM IU during a Guided Add (far-end connect)

The Enhanced I-Cord LED turns off.



Figure 82: PViQ™ Enhanced I-Cord during a Guided Add (switch end correct connect)

On the PViQ™ Patch Panel, the Port LED to which the cable should be connected begins flashing green.

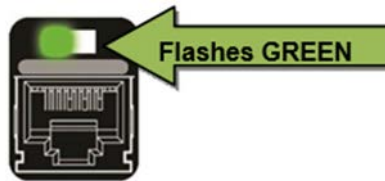


Figure 83: Target Port during a Guided Add

6. Remove the Enhanced I-Cord from the PM Provisioning Port. The MODE LED turns off.

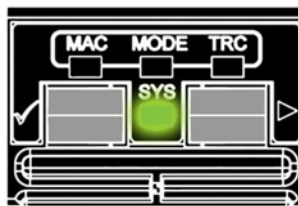


Figure 84: PM IU when MAC is Complete

7. Connect the I-Cord to the designated port on the PViQ™ Patch Panel.

The MAC LED turns off, the MODE LED changes to green briefly, then the panel returns to Secure Mode if the MAC is complete for this panel. The Port LED turns off.

Fiber I-Cord Connection

Adding a connection via a guided MAC is not currently supported. The following procedure provides instructions to make connections using the SmartZone Asset and Connectivity Software Modules Teach option. Additional information on the SmartZone Teach option can be found in the SmartZone Software User Manual.

1. Connect one end of a PViQ™ Fiber I-Cord to the desired switch port, and the opposite end to the PViQ™ Fiber Patch Panel. Either end may be connected first. The Port LED on the PViQ™ Fiber Patch Panel turns on solid red, denoting a secure violation. On the SmartZone Asset and Connectivity Software Modules connectivity screen, the patch port shows a single-ended connection with a secure violation.

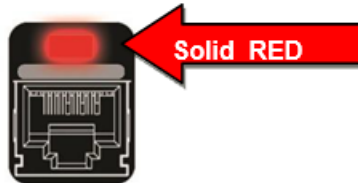


Figure 85: Target Port on First Connect of Fiber I-cord to the PViQ™ Panel during and Add

2. Drag the desired fiber switch port to the cell opposite the PViQ™ Fiber Port in the SmartZone Asset and Connectivity Software Module connectivity window.
3. Right-click the connection cell and select PViQ™ I-Cord from the drop-down list. Click **Save** to implement the change.
4. The SmartZone Asset and Connectivity Software Modules sends an accept command to the PViQ™ Fiber Patch Panel, designating a PViQ™ I-Cord, and including the appropriate far-end information. The PViQ™ panel saves the connection information and the patch port LED turns off.

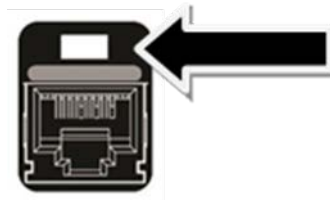


Figure 86: Target Port when Save is Complete

The SmartZone Asset and Connectivity Software Modules replace the single-ended connection icon with a PViQ™ I- Cord (connected) icon.

Fiber I-Cord Disconnection

The following procedure provides instructions to disconnect a Fiber I-Cord connection using a guided Move, Add or Change (MAC) order from the SmartZone Asset and Connectivity Software Modules. Additional information on the SmartZone Asset and Connectivity Software Modules can be found in the SmartZone Software User Manual.

1. Right-click the PViQ™ I-Cord connection icon of the desired switch port and select **Disconnect**. Click **Save**. The SmartZone Asset and Connectivity Software Modules send a MAC-delete-interconnect command to the patch panel. The panel prompts by flashing the designated port LED red and displaying MAC mode on front panel to the desired switch port.



Figure 87: Designated Port and PViQ™ Panel IU during a Fiber I-Cord Authorized Remove

2. Unplug the Fiber I-Cord from the PViQ™ Fiber Patch Panel. The Port LED turns off.

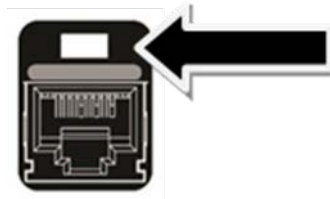


Figure 88: Designated Port after Remove is Complete

3. Right-click the connection cell and select PViQ™ I-Cord from the drop-down list. Click **Save** to implement the change.
4. The panel signals end of MAC by returning to Secure mode. The SmartZone Asset and Connectivity Software Modules trust that the far end has been disconnected and replaces the PViQ™ I-Cord (connected) icon between the two ports with a no connection icon.

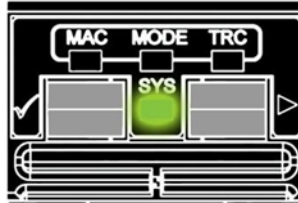


Figure 89: PM IU when MAC Remove is Complete

Fiber I-Cord Guided Patching

This section describes the process for adding a connection via a guided MAC.

1. From the SmartZone Asset and Connectivity Software Modules Connectivity window, drag (or cut and paste) a fiber switch port to a location opposite the desired connection patch port.
2. Select the connection cell, located between the two fiber switch port cells. Right-click the connection cell and select PViQ™ I-Cord from the drop-down list. Click **Save** to implement the change.

The SmartZone Asset and Connectivity Software Modules send a MAC add interconnect command to the PViQ™ Fiber Patch Panel, designating a PViQ™ I-Cord, and including the appropriate far-end information. The designated port LED flashes green.

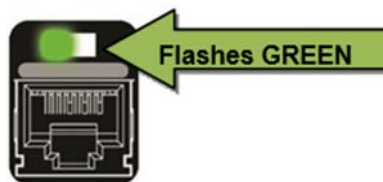


Figure 90: Target Port during a Guided Add

3. Plug in the near-end of the I-Cord to the designated port. The LED turns off.

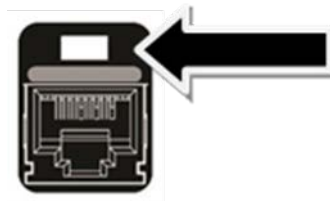


Figure 91: Designated Port after Add is Complete

4. The panel signals the end of the MAC by returning to **Secure Mode**. The SmartZone Asset and Connectivity Software Modules trust that the far end of the I-Cord is connected to the appropriate switch port and displays the **Connected** icon in the connection cell.

Section 10 - Safety, Warranty, Maintenance and Regulatory Information

Safety Warning

Always observe standard safety precautions during installation, operation, and maintenance of this product. Read the installation instructions before connecting the unit to its power source. There are no user-serviceable parts inside the unit. To avoid the possibility of electric shock, the user should not perform any adjustment, maintenance, or repairs, or open the unit. Do not work on the product or connect or disconnect cables during periods of lightning activity. Ultimate disposal of this product should be handled according to all national laws and regulations.

Warranty Information

(<http://www.Panduit.com>)

Maintenance Agreement

Panduit also offers a separate Maintenance Agreement, which includes additional benefits and features. Contact your Panduit sales representative for details.

Regulatory Information

Safety and regulatory compliance

For important safety, environmental, and regulatory information, see *Safety and Compliance Information* on the Panduit website (<http://www.Panduit.com>)

Section 11 - Support and Other Resources

Accessing Panduit Support

- For live assistance, go to the Panduit.com website.
- To access documentation and support services, go to the Panduit.com website.

Section 12 - Acronyms and Abbreviations

This section contains a list and meaning of the acronyms and abbreviations used in this document.

Acronym	Meaning
CLI	Command Line Interface
DCIM	Data Center Infrastructure Management
DHCP	Dynamic Host Configuration Protocol
EM	Expansion Module
EPC	Expansion Port Cable
GUI	Graphical User Interface
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secured
I-Cord	PViQ™ Interconnect Patch Cord
IM	Intelligent Module
IU	Interface Unit
LAN	Local Area Network
MAC	Moves, Adds, and Changes
MAC Address	Media Access Control Address
MTP	Media Termination Point
PD	Powered Device
PM	Panel Manager
PViQ™	PanView iQ
RU	Rack Unit
SNMP	Simple Network Management Protocol
STP	Shielded Twisted Pair
Web UI	PViQ™ Connectivity Web User Interface
UTP	Unshielded Twisted Pair

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Appendix A: PViQ™ Connectivity Hardware Installation

Hardware Installation Overview

This appendix describes the steps and procedures for installing the PViQ™ Connectivity Hardware. Also refer to the installation instructions that are included in the hardware packaging.

This list below represents the components that make up a maximized PViQ™ Connectivity System:

- Five Patch Panels (shielded or unshielded, flat or angled) or Fiber Trays
- 120 Terminated Jack Modules (24 per panel, five panels) if applicable (sold separately)
- Interface Units
 - One Panel Manager Interface Unit
 - Four Expansion Module Interface Units
- Five Mounting Brackets (not required for standard fiber trays)
- Intelligent Modules
 - One Panel Manager
 - Four Expansion Modules
- Connections
 - One shielded RJ45 LAN cord
 - Four Expansion Port Cables
- Ultimate ID Labels (sold separately) and Ultimate ID Label Covers
- One LPS Power Supply (sold separately)

NOTE: The following sections in this appendix show the installation of a copper four-panel PViQ™ Connectivity System (not the five-panel maximized system). Just add the fifth panel to the end of the system through the EPC and an EM.

Panel/Tray Mounting and Grounding

The first step in the PViQ™ Connectivity System Hardware installation procedure is to connect the patch panels or fiber trays to the rack. This installation includes four 24-port panels – one for the Panel Manager (PM) and three for the Expansion Modules (EMs).

PViQ™ Connectivity System Panels and Trays work interchangeably with either the PM or the EM. It is recommended that they be placed in a manner that will efficiently accommodate one PM for every four EMs, with appropriate cable management installed for proper cable routing. The PM can be placed at either the top or bottom of the system, depending on need or preference.

NOTE: The Expansion Modules (EMs) are connected using an Expansion Port Cable (EPC). The EPC should be carefully installed so that the connectors on both ends are not bent or stretched in a manner to stress the connection points.

The following figure shows one suggested panel layout of a 4-panel system with the PM taking the top position of the system. Other layouts are also possible.

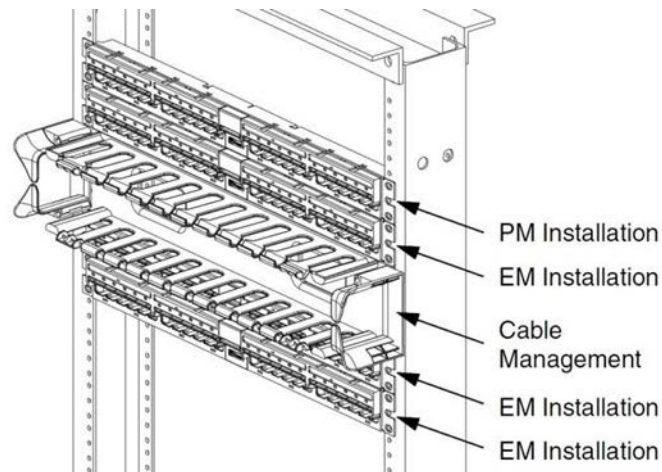


Figure 92: Suggested 4-Panel Layout with a 2RU Cable Management Unit

Mount the PViQ™ Connectivity Panel onto the face of the rack or rack cabinet using the supplied grounding screws (as shown below).

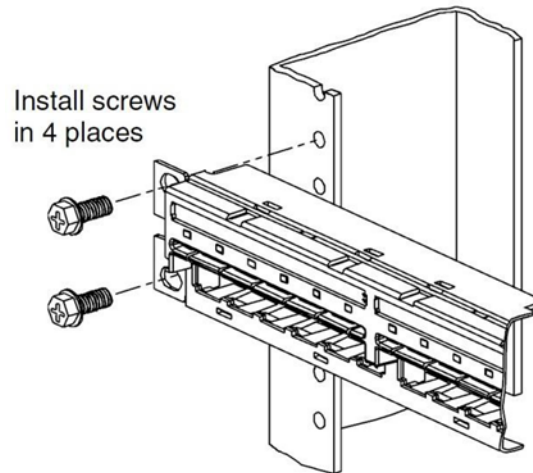


Figure 93: PViQ™ Connectivity Panel Installation

NOTE: The provided screws must be used to guarantee a good ground connection between panels/trays for proper operation of the PViQ™ Connectivity System.



Figure 94: Alternate Acceptable Mounting Screws

Jack Module Installation

After the PViQ™ Connectivity Panel is secured to the rack or cabinet, the next step is to install terminated jack modules into the patch panel. In this PViQ™ Connectivity System configuration (one PM connected to three EMs), 96 jacks are needed, although the PViQ™ Connectivity System does not require a jack in every port.

If sufficient slack cable is available, the terminated Mini-Com Jack Modules can be installed into the PViQ™ Connectivity Panel prior to permanently mounting into the rack. This will allow for flexibility and provide easier access to the panels.

NOTE: The PViQ™ Connectivity Panel accepts all Mini-Com Copper Modules.

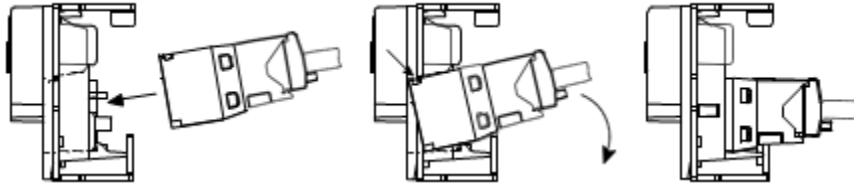


Figure 95: Side View of Jack Installation

Installing the Interface Units

The next step is to install the Interface Units (IUs) on the individual panels. The IUs attach to the front of the flat or angled patch panels and provide access to various operational modes.

The PViQ™ Connectivity Panels are shipped from the factory with a blank Interface Unit which must be removed prior to installing the PM or EM IU.

To remove the blank plastic interface unit, depress the locking tabs from the rear of the panel (upper right and lower left) and gently push the unit forward (see below).

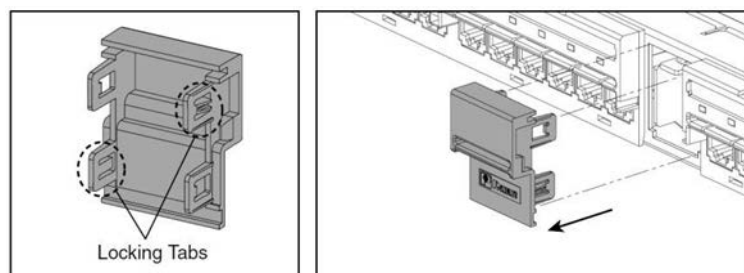


Figure 96: Removing the Blank IU

The new PM or EM Interface Unit can now be installed by gently pushing it into the open slot until it snaps into place (see below). Ensure that the Interface Unit is mounted with the LED indicators on the top.

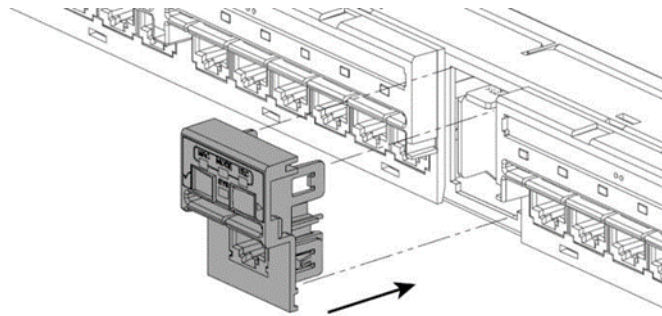


Figure 97: Installing the PM/EM UI

It is important to install the correct Interface Unit on the correct patch panel. The Patch Panel that houses the Panel Manager requires an IU with an RJ45 interface jack (provisioning port) located on it. The panels for the Expansion Modules will receive IUs that *do not* have this Provisioning Port. Refer to the following figures to see the differences.



Figure 98: Panel Manager Interface Unit (with RJ45 Provisioning Port)



Figure 99: Expansion Module Interface Unit

Installing the Mounting Bracket

The Panel Manager and Expansion Module(s) attach to the back of the Patch Panels using a Mounting Bracket. Both the PM and EM use the same Mounting Bracket.

NOTE: Standard Fiber Trays do not require Mounting Brackets.

1. Locate the mounting bracket on the center of the PViQ™ Connectivity Panel.

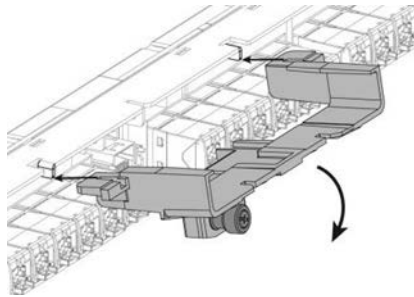


Figure 100: Mounting Bracket, step 1

2. Pivot the bracket until the tabs on the patch panel rest inside the slots of the mounting bracket.

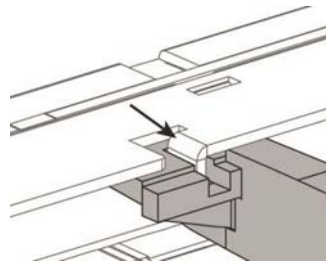


Figure 101: Mounting Bracket, step 2

3. Apply forward and upward pressure until the bracket slides into the catch on the patch panel.

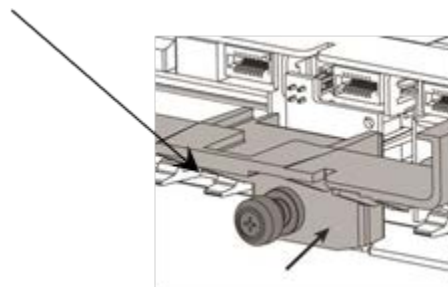


Figure 102: Mounting Bracket, step 3

4. Secure the bracket to the patch panel using a Phillips-head screwdriver to push in and turn the securing screw.

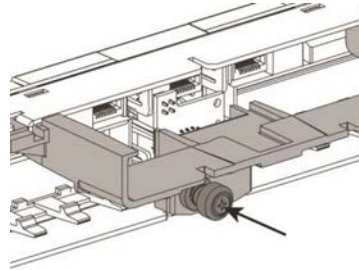


Figure 103: Mounting Bracket, step 4

Installing the Intelligent Modules

With the mounting brackets securely in place, the next step is to install the Intelligent Modules:

- Panel Manager (PM)
- Expansion Module(s) (EMs)

The installation procedure is the same for both the PM and the EM. However, the PM must be installed in the patch panel or fiber tray containing the Panel Manager Interface Unit. The PM Interface Unit can be identified by the Provisioning Port – the RJ45 jack on the front of the unit.

NOTE: *PViQ™ Connectivity panels must be shipped with the PM, EM, or Fiber Trays uninstalled to prevent permanent damage.*

Slide the PM or EM into the mounting bracket as shown below.

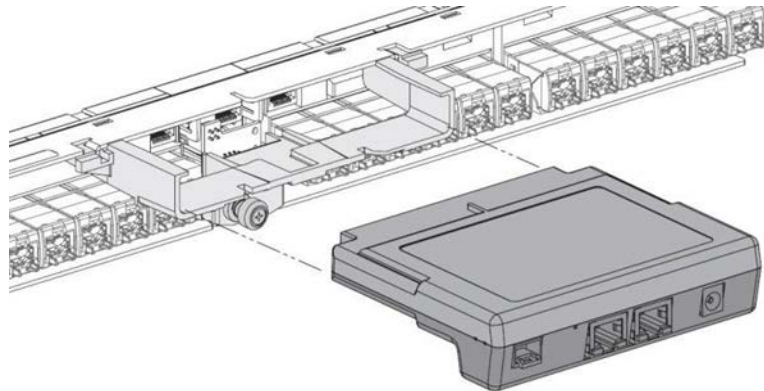


Figure 104: Inserting Module into Mounting Bracket

The latch on the bottom of the PM or EM will snap into the slot on the bracket, and an audible “click” should be heard.

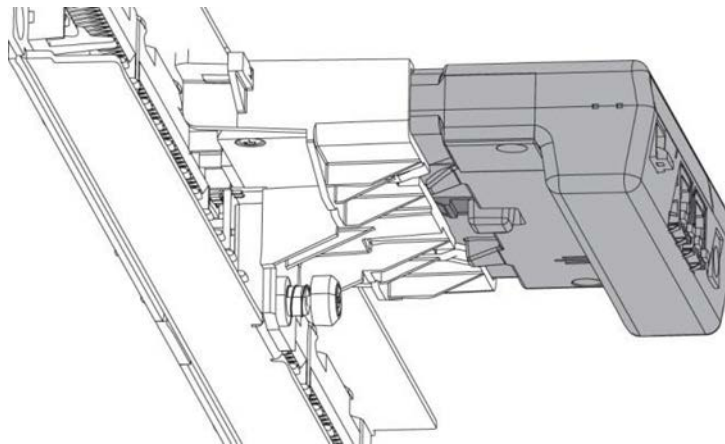


Figure 105: Bottom Latch Engagement

Repeat the process for each of the modules, ensuring that each is firmly locked into place before proceeding.

PM and EM Connections

This section describes the process for making the following connections:

- Connect the PM to the network
- Connect the PM with an EM

- Daisy chain multiple EMs
- Connect multiple PMs together

Connection Points

Panel Manager connections are made from the back of the unit. The figure below shows the connection points.

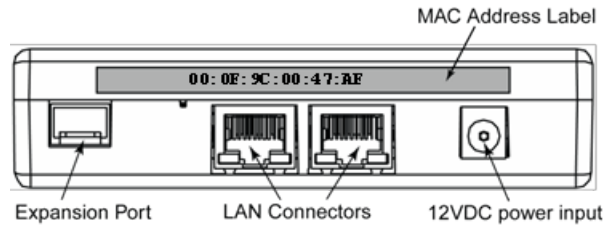


Figure 106: PM Connections

The Expansion Port is used to connect the PM to an EM through the supplied Expansion Port Cable (EPC).

The LAN connectors are used to connect the PM to the network, or daisy chain multiple PMs. The LAN ports are interchangeable; either port may be used for the network or the daisy chain. Up to 30 PMs may be daisy chained together.

The PViQ™ Connectivity System 12VDC power supply (sold separately) must be connected to the 12VDC power input on the back of each PM. Power from the PM is then distributed to the EMs via the EPC.

The Media Access Control (MAC) address label is a printed sticker found on the back of the PM. This MAC Address uniquely identifies the PM to your network. Make note of this MAC Address and refer to it when provisioning the rack location into the PM.

The connection points for the EM are shown below.

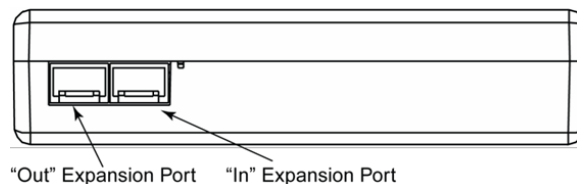


Figure 107: EM Connections

The "Out" Expansion Port connects the EM to the next EM in the chain. Up to four EMs may be daisy chained to a single PM.

The “In” Expansion Port receives an EPC from either the PM or another EM.

Connecting the PM to the EM

Connect the PM to the first EM in the chain by attaching one end of the supplied Expansion Port Cable (EPC) to the “Out” Expansion Port on the PM. Then attach the far end of the EPC to the “In” Expansion Port of the first EM in the chain. The EPC will have a positive latch when inserting into the Expansion Ports. To remove the EPC, depress the locking tab on the EPC before removing it from the Expansion Port.

NOTE: *Ensure that the EPC is not bent or stretched to the point of stress.*

Daisy Chaining EMs

To connect one EM to the next EM in the chain, attach one end of the supplied EPC to the “Out” Expansion Port on the EM. Then attach the far end of the EPC to the “In” Expansion Port of the next EM in the chain (see below). Up to 4 EMs may be daisy chained to a single PM.

NOTE: *Ensure that the EPC is not stretched or stressed in any way, especially when using cable managers.*

Connecting Multiple PMs

Multiple PMs may be daisy chained together, providing management access of additional panels through a single LAN connection. Using this method, up to 30 PMs can be controlled by a single LAN port.

Begin by attaching the shielded RJ45 cable (supplied) to either of the LAN connectors on the back of the PM. Then, attach the far end of the cable to either of the LAN connectors on the next PM in the chain.

Repeat this procedure for as many PMs as required (up to 30).

NOTE: *Either LAN connector functions as either an “In” or an “Out” connection. Panduit recommends establishing a standard convention for easier traceability. For example, use the right connector as the “In” (closest to the network connection) connection and the left connector as the “Out” connection.*

NOTE: *In order to avoid a “looping” error condition, ensure that the last PM in the chain has one Ethernet port unconnected.*

Connection Diagram

The figure below shows all of the connections described in this section. The table below defines each of the connections.

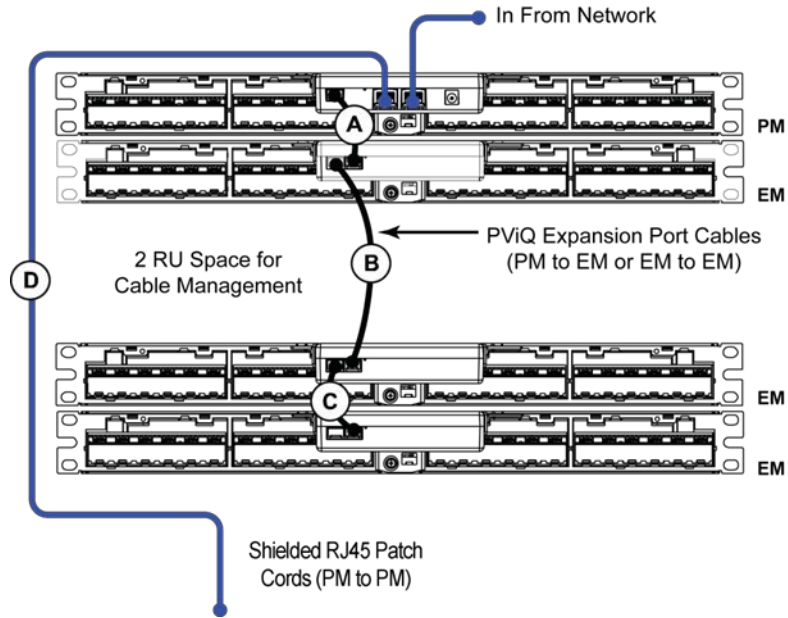


Figure 108: Connection Diagram of a 4 Panel System

Table 5: Connection Types

Label	Connection
A	PM Expansion Port out to EM Expansion Port in
B	EM Expansion Port out to EM Expansion Port in
C	Connection B repeated for an additional EM
D	PM LAN out to PM LAN in

Attaching the Power Supply

The PVIQ™ Connectivity System Power Supply provides power to an entire PVIQ™ Connectivity System (one PM module and up to four EM modules) through the PM module.

Attach the appropriate end of the AC cord to the Power Supply. Insert the Power Supply's angled plug into the PM as shown below.

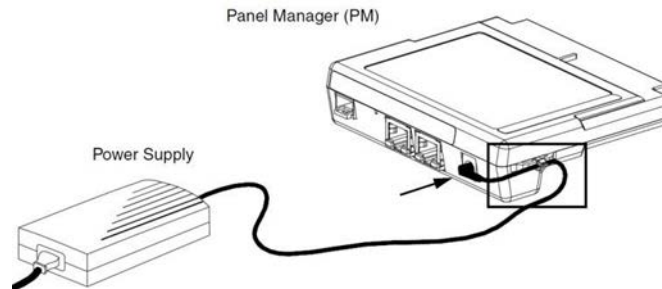


Figure 109: Power Supply Connection

Secure the power cable to the PM strain relief with a Pan-Ty cable tie (available separately), as shown below.

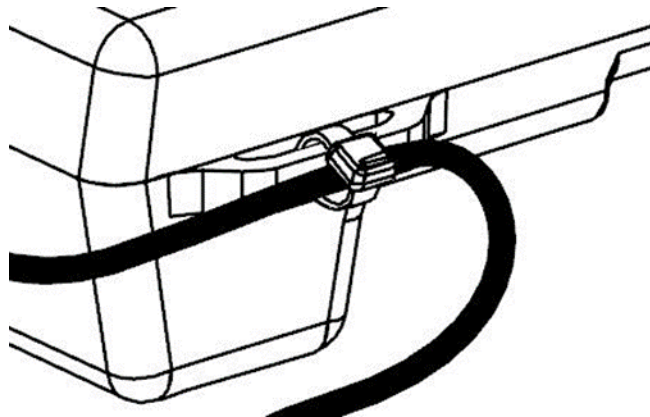


Figure 110: Power Supply Cord Strain Relief, Expanded View

NOTE: For standard Fiber Trays, the strain relief is integrated directly into the tray itself. If you are using Fiber Trays, you will not use the strain relief on the PM.

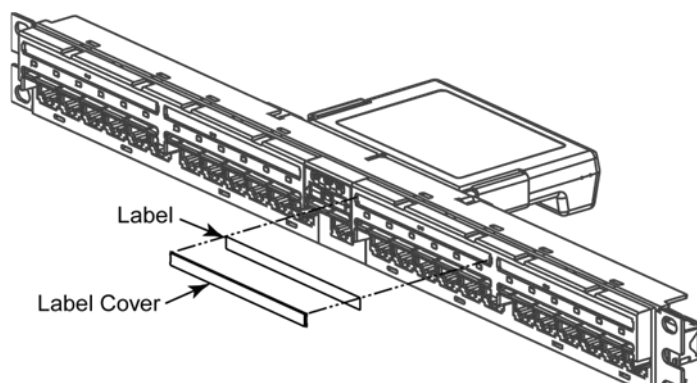
Before applying power to the unit, ensure that you have the correct power supply for your region as shown in the table below.

Table 6: Power Supply Part Number by Region

Region	Part Number
North America	PVQ-PS12VDC-S
Europe	PVQ-PS12VDC-E
United Kingdom	PVQ-PS12VDC-U
Japan	PVQ-PS12VDC-J
China	PVQ-PS12VDC-C
Universal	PVQ-PS12VDC-UNI

Label and Label Cover Installation

PViQ™ Connectivity Panels should be labeled according to TIA/EIA-606-A standards. To meet this requirement, the Ultimate ID™ Network Labeling System (not included) can be used to create labels.

**Figure 111: Installing Ultimate ID Labels and Ultimate ID Label Cover**

Ultimate ID Labels are sized to cover 6 ports, four per panel. Ultimate ID Label covers

should be installed to protect the label. Four label covers are included with each PViQ™ Connectivity Panel.

NOTE: *Write-on labels are not included with this patch panel per TIA-EIA-606-A standard which states: “To maximize legibility, all labels shall be printed or generated by a mechanical device and shall not be written by hand.”*

Appendix B: Finding the PViQ™ Connectivity System IP Address

Finding the IP Address of the Panel Manager

A Panduit PViQ™ Connectivity System Utility called `pviqutil.exe` can be used to find the IP address of all the PMs on a given VLAN. This utility may be downloaded directly from the Panduit.com website.

Perform the following steps to locate the IP address of a PViQ™ Connectivity Panel Manager.

1. Find and make a note of the Media Access Control (MAC) Address of the PM. The MAC is located on MAC Address Label, above the LAN Connectors on the back of the PM.

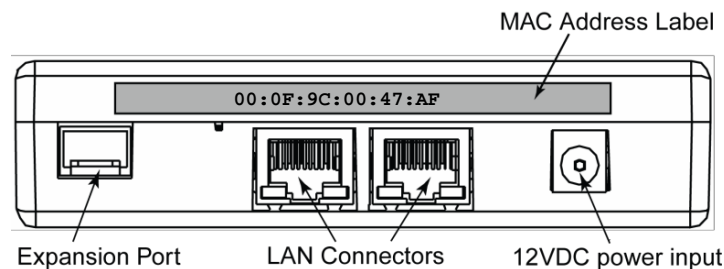


Figure 112: MAC Address on the PM

2. Download the `pviqutil.exe` utility from the Panduit web site:
<http://www.panduit.com>
3. Copy `pviqutil.exe` to your client machine, placing it in an easily accessible location, such as your Downloads folder.
4. Make sure your client machine is on the same VLAN as the PM you are looking for. One way to guarantee this is to plug your client machine into the other Ethernet port on the PM or into the last open Ethernet port on the chain of PMs.
5. Execute the `pviqutil.exe` utility by double clicking the `pviqutil.exe` file.

The output of the executed command produces a list similar to the following figure.

```
There is 1 interface
 1: network address 172.21.50.0

Search Network 172.21.50.0
It takes 10 to 30 seconds, please wait ...
172.21.51.190 00:0F:9C:00:3E:29 Apr 9 2009 11:17:08 U=00.00.00 <01Jan2008>
172.21.51.192 00:0F:9C:00:3C:BD Apr 14 2009 13:59:32 U=00.00.00 <01Jan2008>
172.21.51.203 00:0F:9C:00:47:AF Nov 3 2008 10:00:11 U=01.16.03 <03Nov2008>
172.21.51.205 00:0F:9C:00:3F:07 Mar 20 2009 17:44:13 U=01.10.04 <20Mar2009>

Done!! Press the Enter key to exit ...
```

Figure 113: pviqutil Output Example

The first column of the output lists all of the IP addresses on this particular VLAN. The second column is a list of the corresponding Media Access Control (MAC) addresses.

6. Find the MAC address of the PM (which you found in Step 1) in this list and note the associated IP address. For example, if the MAC address of the PM was:

00:0F:9C:00:47:AF

Then the IP address for the PM is:

172.21.51.203

This is the IP address used to log into the PM via the Web UI.

Appendix C: PViQ™ Connectivity CLI Commands

The following lists the available CLI commands and provides definitions and other information for their use.

NOTE: From within the CLI, type “?” to receive a listing of all possible commands. Narrow your search by entering a basic command (such as config or show) followed by the “?” For example:

```
PSH > show ?
```

config

The config command allows configuration of various components and variables, as shown below:

config contactname <name>

Configures the contact name for this PViQ™ cluster. The variable <name> is a 256 byte free format string.

config devicename <name>

Configures the device name for this PViQ™ cluster. The variable <name> is a 256 byte free format string.

config offsetname <1-5> <name>

Configures the name for this PViQ™ Patch Panel. The variable <name> is a 256 byte free format string.

config ip

Displays the current IP configuration.

config ip commit | config | [-type] [-address] [-mask] [-gateway]

Sets or changes the current IP configurations using the entered parameters.

config ntp

Displays the Network Time Server configuration.

config ntp { <1,2,3> <NTP-server-ipv4-address (0.0.0.0=undefine)> } | {enable|disable} | {query in-minutes}

These three forms configure the Network Time Server IP address, enable or disable NTP, and set the query interval.

config password <password>

Sets the password for the logged in CLI user to the entered string.

config physloc <location>

Sets the physical location variable to the entered location. The variable <location> is a 256 byte free format string.

config rackname <1-5> <name>

Sets the Rack Name variable for a given panel (1-5) to the entered name. The variable <name> is a 256 byte free format string.

config rackposition <1-5> <position>

Sets the Rack Position variable for a given panel (1-5) to the entered numeric position. The variable <position> is a numeric value, typically between 1 and 99.

config snmp <disable | enable> <all | provision | rear> <v1v2c | v3>

Enables or disables SNMP on an Ethernet port.

NOTE: Only the first username (default: admin) can execute this command.

config snmp –read <name>

Sets the SNMP v1/v2c read community string.

NOTE: Only the first username (default: admin) can execute this command.

config snmp –trapcom <1-5> <name>

Sets the SNMP v1/v2c trap community string.

config snmp –trapip <1-5> <IP address>

Sets the SNMP v1/v2c trap receiver IP address. Up to 5 separate receivers are allowed.

config snmp –trapon <1-5> <all | none | [crit] [maj] [min] [adv]

Enables/disables/filters SNMP v1/v2c traps for the specific receiver.

config snmp –write <name>

Sets the SNMP v1/v2c write community string.

NOTE: Only the first username (default: admin) can execute this command.

config timeout <minutes>

Sets the command idle timeout time in minutes. By default the telnet session will timeout after 10 minutes of inactivity. The timeout time is specified in minutes. Maximum value is 30000 minutes (approximately 20 days).

config trapver <1-5> <v1 | v2 | v3 >

Sets the Trap Version for traps sent to v1/v2c/v3 trap receiver.

config username add <name> <password>

Adds a User Name and Password to the database.

NOTE: Only the first username (default: admin) can execute this command.

config username delete <name>

Deletes a User Name from the database.

NOTE: The “admin” username cannot be deleted from the telnet CLI.

NOTE: Only the first username (default: admin) can execute this command.

exit

Ends the telnet session.

ping

Pings the requested IP address.

ping <Dotted IP Address>

Example: ping 192.0.2.203

quit

Ends the telnet session.

reset

Performs a Reset of the system. There are eight levels of reset available, as described below:

reset system <1-8>

- 1 = reset the PM
- 2 = reset all the EMs
- 3 = reset the PM and all EMs
- 4 = obtain a new IP address from the DHCP Server
- 5 = clear the SNMP community string
- 6 = clear the database
- 7 = clear the file system. This is the same as the web UI “Default Settings...” button.
- 8 = revert firmware to the version that the unit was shipped with and perform a “reset system 7”.

CAUTION: Only qualified technicians should perform these resets. Level 6, 7 and 8 resets will cause the PViQ™ database to be cleared, losing all current configuration, provisioning and patch field connectivity data.

set

Sets various parameters within the system, as shown below:

set email alert <email address> [always | daily | weekday | Saturday | Sunday]

Establishes rules for receiving email alerts.

NOTE: The web UI does not manage this setting. It defaults to “always” and can only be adjusted from the CLI.

set email rate <email address> <emails-per-hour-per- event>

Sets the allowable number of emails per hour, per event for a given email address.

set email trap [add | delete] <trap number>

Adds an email trap number (or set of trap numbers) to the database or deletes an

email trap number (or set of trap numbers) from the database. Note: the web UI manages traps by Categories which are groups of trap numbers.

set email user [add | delete] <email address>

Adds an email user (or set of users) to the database, or deletes an email user (or set of users) from the database.

set http <on | off>

Turns http and https on or off.

set mode <1-5> <learn | location | secure>

Sets the mode of a given panel (1,2,3,4 or 5). For example, to set panel 1 to the secure mode, enter: set mode 1 secure.

set paneltype application [offset | offset.port] [copper | multimode | singlemode | fieldterm | default]

Overrides the current application for an individual panel or reset the default value.

set paneltype shape [offset] [angled | flat | default]

Overrides the current shape for an individual panel or reset the default value.

set paneltype shielding [offset] [shielded | unshielded | default]

Overrides the current shielding type for an individual panel or reset the default value.

**set pmail account <IP address>[:<SMTP Server Port>] <email address>
<password> ["Mail Name <From@Address>"]**

Sets the Panel Manager email account. The SMTP Server Port and Mail From address are optional.

set smtp <on|off>

Turns SMTP on or off.

set time mm/dd/yyyy hh:mm:ss

Sets the time for the PM. Hours are input in 00-23 format.

set timeout <minutes>

By default, the telnet session will timeout after 10 minutes of inactivity. The timeout time is specified in minutes. Maximum value is 30000 minutes (approximately 20 days).

set timezone behind:ahead utc number-of-minutes

Sets the parameters for system timezone.

show

Displays the current setting for various parameters within the system.

show config

Displays all of the configuration parameters of the system.

show contactname

Displays the designated Contact Name for the system.

show devicename

Displays the current setting for the Device Name.

show email alert

Displays the current setting for the email alerts.

show email user

Displays the current setting for email user.

show fw

Displays the current firmware revision of the PM.

show hw

Displays the current hardware serial numbers and model types.

show ip

Displays the current IP address of the PM.

show mac

Displays the current MAC address of the PM.

show mode

Displays the current mode of each panel.

show ntpconfig

Displays the current NTP settings.

show offsetname

Displays the current name of each panel.

show paneltype

Displays a chart of the current Shape, Shielding type and Application for PViQ™ panels. Also displays whether or not the panel settings have been modified from the default settings.

show physloc

Displays the current setting for the Physical Location.

show pmemail account

Displays the current setting for the PM email account.

show port <1-5>

Displays the patch field status for all the ports in a specified offset

show rackname

Displays the current setting for the Rack Name.

show rackposition

Displays the current setting for the Rack Position.

show snmp

Displays the current settings for SNMP v1/v2c/v3.

show time

Displays the current setting for time and date.

show timeout

Displays the current command idle timeout in minutes.

show traplog <count>

Displays the most recent traps received by the traplog. The number of traps displayed is equal to the <count> parameter. Entering the command without parameters with show all 128 traplog entries. The web UI provides the traplog as the “Alarm Log”.

show username

Displays the current parameter settings for the default User Name.

show topology

Displays the current topology for the system.

start

Starts the various updates and processes as shown below:

start email alert <email-address>

Initiates the sending of email alerts to the email- address specified.

start fwupdate <Server-IP> <filename>

Initiates a firmware update, accessing the update file (filename) from the server IP address (Server- IP)

NOTE: *Because some operating systems may convert uppercase letters to lowercase, ensure that <filename> contains only lowercase letters.*

start fwupdatepic

Initiates a PIC update.

stop

Stop a process or procedure, as shown below.

stop email alert <email-address>

Stops email alerts initiated with the start command.

help

List available parameters for a given command or lists all available commands.

For example:

config help

Appendix D: Output Examples of Common CLI Commands

This appendix contains examples of the output for several common CLI commands and gives information on the use.

To display the current configuration parameters:

PSH > config ip

```
PSH > config ip
IP Type ..... : Current      Committed   Pending
IP Address ..... : dynamic    dynamic     dynamic
Subnet Mask ..... : 172.21.50.42
Gateway ..... : 255.255.254.0
DNS Server ..... : 172.21.50.1
Physical Address ... : 172.16.36.19
Physical Address ... : 00:0f:9c:00:47:af
```

Example 1: config ip

To display and change the current modes of the panels:

PSH > show mode

```
PSH > show mode
Offset current      previous
1 Secure           Learn
2 Secure           Learn
3 Secure           Learn
4 Secure           Learn
```

Example 2: show mode

In Example 2 all of the PViQ™ Patch Panels are in SECURE mode. You could change the third panel(offset 3) to Learn Mode by entering:

PSH > set mode 3 learn

The output of the “show mode” command would then change as shown below:

```

PSH > set mode 3 learn
PSH > show mode
Offset current          previous
  1 Secure              Learn
  2 Secure              Learn
  3 Learn               Secure
  4 Secure              Learn

```

Example 3: show mode

To display the current Firmware Revision:

PSH > show fw

```

PSH > show fw
Firmware Updates: Total:0001 Last: IP-172.21.51.157, File-pviq_fw_01.22_04
-----
FLASH Images
-----
PMM (bootloader):
  MBL v0.4 (07Oct2007)
PMM (application):
  Jun  4 2009 14:42:15 #PVIQ:FW Version 01.22.04 (04Jun2009) Serpentine #IFAC
-01.14.04]
PEPIC:
  May 11 2009 14:45:50!0x400f0000!001.004!
  May 11 2009 14:45:50!0x400f0000!001.004!
WBPIC:
  May 22 2009 15:02:33!0x40110100!000.075!099099
PPPIC:
  May 22 2009 15:03:08!0x40140280!000.011!
-----
Running Images
-----
PP:
<01: > HW:90 BL:000.002 AP:000.011
PE:
<01:..> HW:00 BL:000.007 AP:001.004
<02:..> HW:02 BL:000.007 AP:001.004
<03:..> HW:02 BL:000.007 AP:001.004
<04:..> HW:02 BL:000.007 AP:001.004

```

Example 4 – show fw

NOTE: The screen capture in Example 4 shows the hardware data for the PM (labeled as “PE: 1” or Panel Element 1). The remaining elements are not shown.

To display Port information for a given panel:

PSH > show port 3


```
PSH > show port 3
NEOffset NEPort MM State FEMAC FEOffset FEPort
3 01 DISC
3 02 DISC
3 03 DISC
3 04 DISC
3 05 DISC
3 06 DISC
3 07 9WD 00:0F:9C:00:47:AF 1 19
3 08 DISC
3 09 DISC
3 10 DISC
3 11 DISC
3 12 DISC
3 13 9WD 00:0F:9C:00:47:AF 1 7
3 14 DISC
3 15 DISC
3 16 DISC
3 17 DISC
3 18 DISC
3 19 DISC
3 20 DISC
3 21 DISC
3 22 DISC
3 23 DISC
3 24 9WD 00:0F:9C:00:47:AF 4 1
```

Example 5: show port

Appendix E: Firmware Update Procedure

A firmware update may be initiated by the PViQ™ Connectivity Web UI, by the Command Line Interface, or by the SmartZone Connectivity Software Module.

General Firmware Update Steps

There are common steps that must be executed for performing a firmware update by the Web UI and CLI. Refer to the SmartZone Software User Manual for performing Firmware update by the SmartZone Connectivity Software Module.

A firmware update by the Web UI and CLI is performed through Trivial File Transfer Protocol (TFTP). In order to perform a firmware update on the system, the customer must have access to a TFTP server and place the downloaded PViQ™ Connectivity System firmware file on that server. The steps in this section are to create a standalone TFTP server, download the proper PViQ™ Connectivity System Firmware files on that server and execute the standalone TFTP server. If your network already has a TFTP server that could be used to perform a firmware update on the PViQ™ Connectivity System, then only perform the steps under the “Downloading the Firmware File to the TFTP Server” subsection and move on to the Web UI Method or CLI Method.

Creating a Standalone TFTP Server

A standalone TFTP server can be created on a PC that is located on the same network that the PViQ™ Connectivity System is located on. Use the following steps to download and execute an open source standalone TFTP server on your PC.

1. Open a web browser and go to the SourceForge website to download the Open TFTP Server at the following link.
 - a. <https://sourceforge.net/projects/tftp-server/>
2. Install the open source TFTP Server.
3. Select all the default setting when asked.
4. On your PC, change to the “OpenTFTPServer” directory.
5. Edit the OpenTFTPServerMT.ini file
 - a. Scroll down to the line – **'c:\users\me\firmware**
 - b. Under this line add the following:
 - i. **c:\tftp-root**

- c. Save and close the file.
6. On your PC, change to the root directory “c:”
7. Create a directory called:
 - a. tftp-root

Downloading the Firmware File to the TFTP Server

This section provides the steps to acquire the correct files and download them to your TFTP server. If your network already has a TFTP server, contact your network administrator to perform the following steps and provide you with the file names downloaded and the IP address of the TFTP server (this information will be needed in future steps).

1. Open a web browser and connect to the Panduit Web site at:
 - a. <https://www.panduit.com/>
2. Download the file(s) and place on your TFTP server.
 - a. Example for standalone TFTP server, place the files in:
 - i. c:\tftp-root
3. Make note of the file names that have been placed on the TFTP server.
 - a. Example of firmware file names will be:
 - i. pviq_fw_02_00_01.bin
 - ii. pviq_fw_02_00_01.s19

NOTE: Because some operating systems may convert uppercase letters to lowercase, ensure that <filename> contains only lowercase letters.

NOTE: The .bin file will be used when upgrading the PViQ™ Connectivity System from firmware version 02.00.00 or later. The .s19 file is used when upgrading the PViQ™ Connectivity System from a firmware version earlier than version 02.00.00.

Executing the Standalone TFTP Server

If you are using the standalone TFTP server down loaded above, follow these steps to start the TFTP server.

1. Go to the location where the standalone TFTP server is located on your PC.

2. Execute the **RunStandAloneMT.bat** file.
3. Make note of the IP address that is listed on the line that states:
 - a. Listening On: xxx.xxx.xxx.xxx
 - b. Example: Listening On: 192.168.0.250
 - c. You will need to enter this IP address when performing the PViQ™ Connectivity System Firmware Update.

Web UI Method

Updating PViQ™ Connectivity System Firmware for the first time will require some setup steps to point to the TFTP server. After this is setup it will only take a few clicks to update the firmware the next time.

NOTE: *The PViQ™ Connectivity Web UI will automatically log you out after 5 minutes of inactivity with the PViQ™ Connectivity System. Changing fields is not consider activity on the PViQ™ Connectivity System until you click the **Save** button. It is recommended to click the **Save** button frequently during the below steps.*

The following steps are used to configure the TFTP server and update the firmware on the PViQ™ Connectivity System.

1. Open a supported web browser. Enter the IP address of the PViQ™ Connectivity System that is being updated. The Login Page will appear.
2. Enter the appropriate username and password. The Dashboard Page will appear.
3. Select the **Network** tab. The Network page will appear.
4. Enter the file name of the firmware update file on your TFTP server that you want to load onto this PViQ™ Connectivity System in the **FW Filename** field in the **TFTP Download Server** section.
 - a. File name example: pviq_fw_02_00_01.bin

NOTE: *The Web UI was first available on PViQ™ Connectivity System firmware version 02.00.00. So, if you are doing firmware update through the Web UI you will be using the .bin file.*

5. Enter the TFTP Server IP address in the IP Address field in the TFTP Download Server section.
 - a. If you are using the standalone TFTP server us the IP address obtained in

the step 3 of the **Executing the Standalone TFTP Server** section above.

- i. Example of the above standalone TFTP server: 192.168.0.250
 - b. If you are using a TFTP server on your network use the IP address that your network administrator provided for the network TFTP server.
6. If you want to delay the start time of the Firmware Update, select the number of minutes to delay before Firmware update starts in the **Delay** pulldown field.
 7. There may be multiple reasons why firmware update may not happen on the first few tries (i.e. integrity of the network, congestion on the network, etc.), so the option to perform retries is necessary to increase the chances of firmware update success. If you want the system to retry firmware update, select the number of retries in the **Max Retries** pulldown field.

Placing a delay between the retries may help improve the chances of success. If you want the system to delay between retrying firmware update, select the number of minutes to delay between firmware update retries in the **Retry Interval** pulldown field.

8. The PViQ™ Connectivity System goes into Maintenance mode when firmware update is initiated. When the System is in Maintenance Mode it will beep an audio alert every 15 seconds. If you want to disable the audio alert during firmware update, click on the check box to cause a check mark in the **Disable Beep** field.
9. Start the PViQ™ Connectivity System firmware update process by clicking on the **Start TFTP Download** button.
 - a. **Update Status** and **Error Status** will provide status of the firmware update while it progresses.
 - b. The firmware upgrade procedure verifies the image by validating the signature of the images. If the signature does not match, the firmware upgrade procedure will ignore the image and remain on the current version.
10. When the firmware update is finished, the system will reboot automatically.

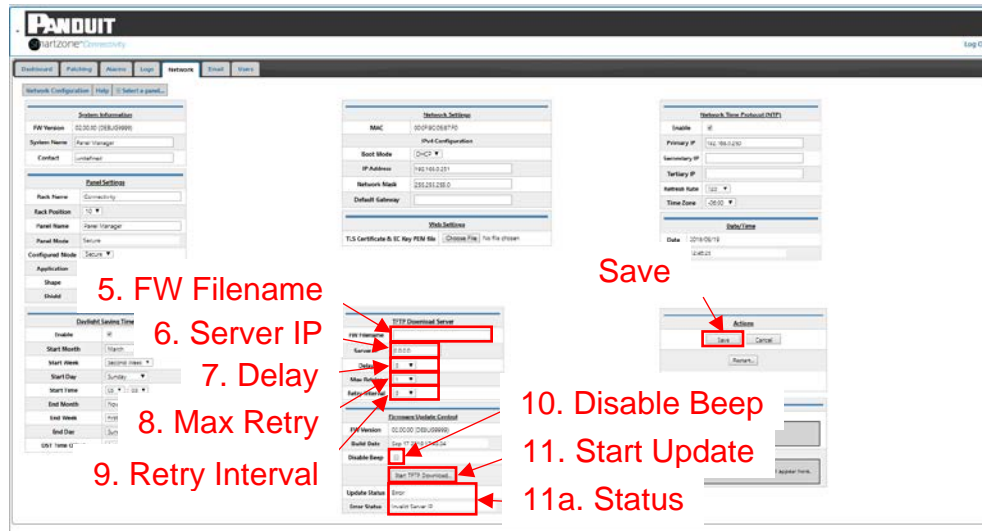


Figure 114: Network Page (FW Update)

CLI Method

By default, no users may access the PViQ™ Connectivity System through Telnet. Each user needing Telnet access to the PViQ™ Connectivity System must be granted that access through the PViQ™ Connectivity Web UI. Refer to Section 2 - PViQ™ Connectivity Web User Interface (Web UI), on how to grant a user Telnet access to the PViQ™ Connectivity System.

Connecting to the PViQ™ Connectivity System via CLI requires a terminal emulation program such as HyperTerminal or PuTTY. Refer to Logging in with Telnet via PuTTY to log into the system using a Telnet terminal emulation program.

The following steps are used to perform a firmware update on the PViQ™ Connectivity System via the Command Line Interface.

1. At the PSH> prompt in the terminal window type the following command:
 - a. **start fwupdate** <Server-IP> <filename>
 - iii. Example: start fwupdate 192.168.0.250 pviq_fw_02_00_01.bin
 - i. Where the <Server-IP> is the IP address of your TFTP server.
 - ii. Where <filename> is the name of the file on the TFTP server that you will be loading on the PViQ™ Connectivity System.

NOTE: The .bin file will be used when upgrading the PViQ™ Connectivity

System from firmware version 02.00.00 or later. The .s19 file is used when upgrading the PViQ™ Connectivity System from a firmware version earlier than version 02.00.00.

NOTE: Because some operating systems may convert uppercase letters to lowercase, ensure that <filename> contains only lowercase letters.

2. When the firmware update is finished, the system will reboot automatically.

SmartZone Connectivity Software Module Method

To perform a firmware update through the SmartZone Connectivity Software Module, refer to the SmartZone Software User Manual.

Appendix F: PViQ™ Connectivity System Alarm Categories and Codes

There are 18 different alerts supported in the PViQ™ Connectivity System as listed in the Logs Page section above. There are two Management Alerts (1, 999), eight Security Alerts (10, 40, 60, 100, 110, 145, 290, 295) and eight Patching Alerts (20, 30, 45, 50, 70, 80, 90, 140) supported in the PViQ™ Connectivity System.

Alarm codes assigned for Management alarms:

Category	Code	Trap Description
Management	1	Firmware Update status has changed
	999	Unknown trap type.

Alarm codes assigned for Security alarms:

Category	Code	Trap Description
Security	10	Bad Command - invalid operation requested or malformed request.
	40	I-cord has been connected to the wrong switch port.
	60	I-cord has been disconnected from the wrong switch port.
	100	Unauthorized patch cord, connect.
	110	Unauthorized patch cord, disconnect.
	145	Unauthorized Double-Ended patch cord connect.
	290	A PM or EM has been reconnected to the wing boards.
	295	A PM or EM has been disconnected from the wing boards.

Alarm codes assigned for Patching alarms:

Category	Code	Trap Description
Patching	20	PViQ mode has changed.
	30	I-cord has been connected to a switch.
	45	I-cord provisioning cord has failed to detect CDP.
	50	I-cord has been disconnected from a switch.
	70	Report the switch info for the I-cord that has been connected to a switch port.
	80	Single-Ended patch cord, connect.
	90	Single-Ended patch cord, disconnect.
	140	Double-Ended patch cord connect.

NOTE: *SNMP and SNMP traps are currently not support in the PViQ™ Connectivity Web UI.*

Appendix G: Interacting with the PViQ™ Connectivity System Interface Units

PViQ™ Connectivity System Interface Unit (IU) Overview

The PViQ™ Connectivity System has several standard operating modes. These various modes may be accessed through unique combinations of key presses using the Function Keys (the Confirmation Key and Next Key), or through the Web UI.

This Appendix will describe how to interface with the Interface Unit (IU).

Interface Unit (IU) Function Keys

Once the PViQ™ Connectivity System components have been installed and powered up and the system is in the Secure Mode state, one way to interact with the panel itself is through the Interface Unit (IU) Function Keys, located on the front of the IU.

The following sections describe how the function keys work and some of the general tasks that can be accomplished with these keys.

Identifying the Function Keys

The IU has two Function Keys, located on the front of each Interface Unit.

- The Left Function Key is called the “Confirmation” Key. It is identified by the small checkmark to the left of the key.
- The Right Function Key is called the “Next” Key. It is identified by the arrow to the right of the key.



Figure 115: IU Function Keys

Pressing the Function Keys in predefined sequences enables users to initiate different operating modes.

Entering Secure Mode

Secure Mode is the default mode after initial power up. It is also the mode to which the system typically returns after resets or following the completion of activities initiated by other modes.

Entering Trace Mode

To enter Trace Mode:

1. Press and hold the left Function Key of the IU for approximately 2 seconds. When the TRC indicator flashes green and an audible tone is heard, release the key.
2. Confirm trace mode by pressing and releasing the left Function Key a second time. TRC indicator will change to solid green and an audible acknowledgement beep will sound.
3. If the port being traced was connected to another panel, the far-end patch panel will automatically transition into Trace Mode also.

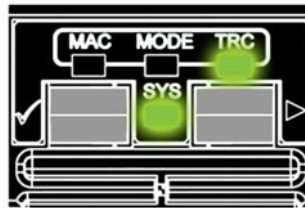


Figure 116: IU Trace Mode

Exiting Trace Mode

To exit Trace Mode:

1. Press and hold the left Function Key of user interface for 2 seconds. The patch panel will return to Secure Mode (or, Learn Mode if the panel was in Learn Mode before the Trace).
2. If the port being traced was connected to another panel, the far-end patch panel will exit Trace Mode automatically when the Trace ends.

Trace Mode is used for the direct mapping and verification of end-to-end patch field connection points.

Entering Maintenance Mode

To Initialize Ports on the PViQ™ Connectivity System in Maintenance Mode:

1. Press and hold both Function Keys on the PM Interface Unit for about 5 seconds.

NOTE: Only the PM panel/tray can initiate Maintenance Mode for the PViQ™ Connectivity System. The EM panels/trays cannot enter Maintenance Mode without the PM.

Result: The panel will beep once when the keys are initially pushed and again after 2 seconds. After 5 seconds, the Mode LED will blink green, indicating that the panel has recognized the request to enter Maintenance Mode.

If the “Mode” LED does not blink green after five seconds, check the following:

- Ensure the Interface Unit is for a PM and not an EM
- Ensure the unit is getting power
- Ensure the PM module is fully inserted into the PViQ™ Connectivity Panel/Tray

2. Release both Function Keys simultaneously.

Result: The Mode LED will continue to flash for another 5 seconds, during which time the user can confirm or cancel the Maintenance Mode.

3. To **confirm**: press and release the left Function Key. The confirmation is acknowledged with a beep.

To **cancel**: press and release the right Function Key or let the panel simply time out after 5 seconds. The time out will be acknowledged by three short beeps.

After confirmation of Maintenance Mode, the PM and all connected EM Interface Unit Mode LEDs will turn off and the MAC and TRC (Trace) LEDs will turn on. Additionally, all port LEDs will turn red.

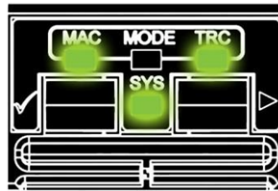


Figure 117: IU Maintenance Mode

The Maintenance Mode has a default 30-minute time limit before it will exit. Five minutes before this time limit is reached, the panel will begin producing 2 short beeps every 5 seconds, serving as a pre-timeout warning.

At any point after these warnings begin, the Maintenance Mode time can be extended for an additional 30 minutes by pressing and releasing the left Function Key, acknowledged by a beep to confirm the request.

NOTE: *While in Maintenance Mode, the panel will produce a short beep every 15 seconds. By default, the PM and all connected EM Interface Unit MAC, Trace, and Sys LEDs will be green, and all port LEDs will be red.*

Maintenance Mode Resets

There are eight levels of initialization and resets that can be performed when the PM is in Maintenance Mode:

- Level 1 – Reset the PViQ™ Connectivity System host processor (or exit maintenance mode)
- Level 2 – Reset all non-host processors
- Level 3 – Performs Level 1 and Level 2 resets together
- Level 4 – Set IP configuration to DHCP (factory default)
- Level 5 – Clear SNMP community string, SNMP credentials and login credentials to the factory default
- Level 6* – Clear the internal PViQ™ Connectivity System database to the factory default, followed by a Level 3 reset
- Level 7* – Reformat the entire file system, including clearing the database, followed by a Level 3 reset
- Level 8* – Reset firmware image to factory default, followed by a Level 7 reset. All firmware upgrades performed since installation will be lost.

***WARNING:** Only qualified technicians should perform these resets. Level 6, 7 and 8 resets will cause the PViQ™ Connectivity System database to be cleared, losing all current configurations, provisioning and patch field connectivity data. A Level 8 reset will clear all data and reset the PViQ™ Connectivity System components to the factory image and default database settings. A full firmware update is required after a Level 8 reset.

Performing a Maintenance Mode Reset

With the panel in Maintenance Mode

1. Press and hold both Function Keys on the PM Interface Unit.

Result: The panel will move through each level of the resets at approximately 5 second intervals. At the end of the initial 5 seconds, the panel will produce a Level 1 reset indication. The unit will beep once a second, and the outer most port LED will change from Red to Green.

If you continue to hold the Function Keys down for another 5 seconds, a Level 2 reset will be indicated. The unit will beep two times per second, and the two outermost port LEDs will change from Red to Green (see figure below).

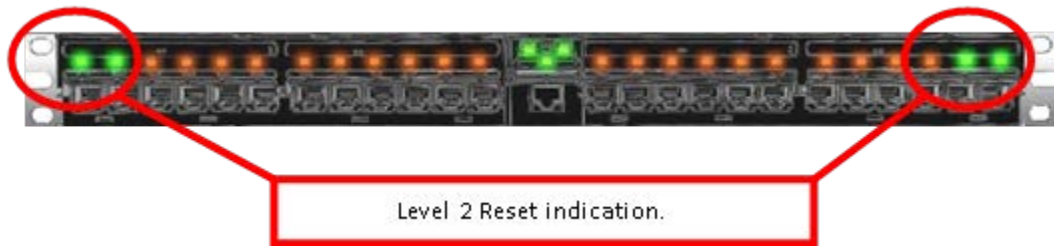


Figure 118: Level 2 Reset Indication

2. When the desired reset level is reached, release both Function Keys simultaneously.

Result: The elected reset level indications will continue for approximately 5 additional seconds, during which the user can confirm or cancel the selected reset.

To **confirm**: press and release the left Confirm Function Key and a beep will follow. After the confirmation, reset level indications will turn off and the system will perform the requested reset.

To **cancel**: press and release the right Cancel Function Key or let the panel simply time out after 5 seconds (the time out will be acknowledged by three short beeps).

Exiting Maintenance Mode

When the requested reset is complete, the panel will automatically exit the Maintenance Mode, and will return to the state it was in before the Maintenance Mode was initiated (Exception: If the panel was in Trace Mode, it returns to Secure Mode after a reset).

The panel will also exit Maintenance Mode after a 30-minute period of inactivity.

Appendix H: Changing Your PC to Be a Standalone DHCP Server

The PViQ™ Connectivity System is shipped in Dynamic Host Configuration Protocol (DHCP) mode. The only way to initially access the system is to connect it into a network with a DHCP server. If your network does not have a DHCP server, then you will need to create a standalone DHCP server.

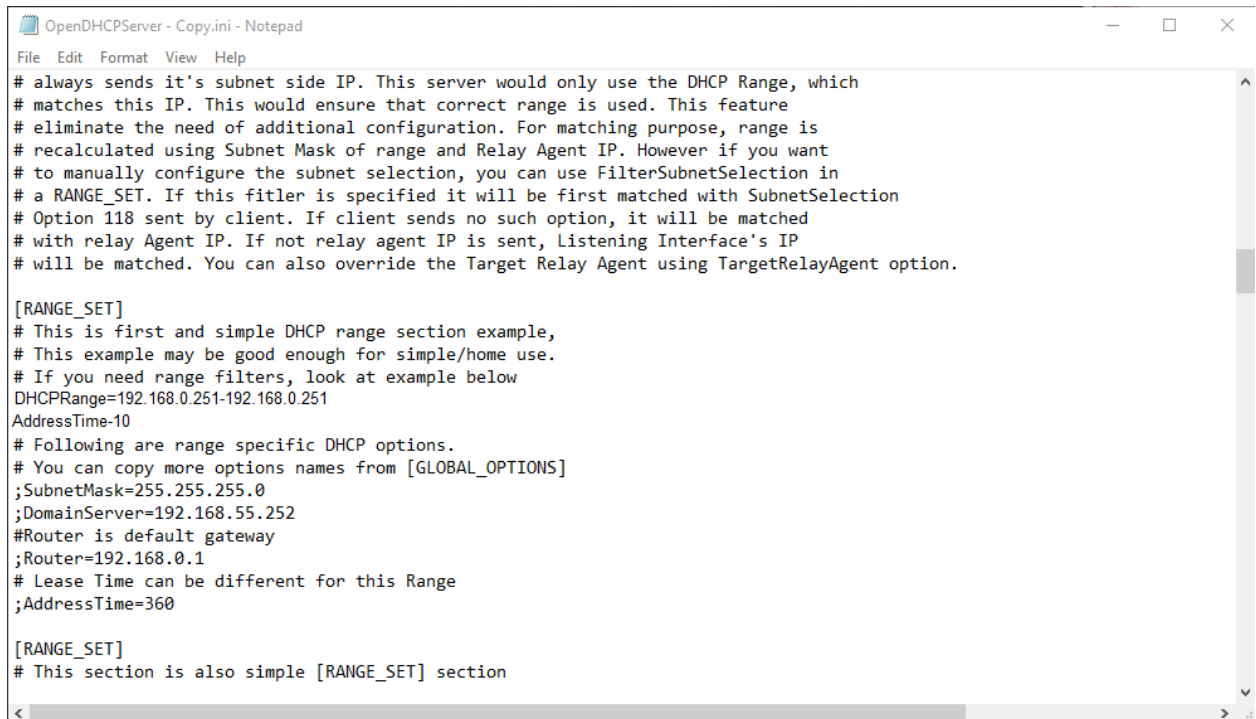
Creating a Standalone DHCP Server

A standalone DHCP server can be created on a PC and then directly connect between the network ports on the PC and the PViQ™ Connectivity System. Use the following steps to download an open source standalone DHCP server to your PC.

1. Open a web browser to go to the SourceForge website to download the Open DHCP Server at the following link.
 - a. <https://sourceforge.net/projects/dhcpserver/>
2. Install the open source DHCP Server
3. Select all the default setting when asked.
4. On your PC, change to the “C:\Install\DHCP Server IPV4” directory.
5. Edit the “OpenDHCPServer.ini file”
 - a. Scroll down to the line – **DHCPRange=192.168.0.1-192.168.0.254**
 - b. Replace this line with - **DHCPRange=192.168.0.251-192.168.0.251**
 - i. This will allow the DHCP server to only serve up one IP address (192.168.0.251)
 - ii. Now you know the IP address of the PViQ™ Connectivity System that is connected to the PC through this DHCP server.
 - c. Below the above edited line add the line – **AddressTime=10**
 - i. This will allow the DHCP server to offer up the IP Address every 10 seconds. This will allow you to switch between PViQ™ Connectivity Systems within delay (10 seconds is about the time it will take you to remove the patch cord from on system’s Ethernet port and plug into another system’s Ethernet port).
 - ii. Connection to the same system will not be affected by the 10

second lease time of the IP address.

d. Save and close the file



```
OpenDHCPServer - Copy.ini - Notepad
File Edit Format View Help
# always sends it's subnet side IP. This server would only use the DHCP Range, which
# matches this IP. This would ensure that correct range is used. This feature
# eliminate the need of additional configuration. For matching purpose, range is
# recalculated using Subnet Mask of range and Relay Agent IP. However if you want
# to manually configure the subnet selection, you can use FilterSubnetSelection in
# a RANGE_SET. If this filter is specified it will be first matched with SubnetSelection
# Option 118 sent by client. If client sends no such option, it will be matched
# with relay Agent IP. If not relay agent IP is sent, Listening Interface's IP
# will be matched. You can also override the Target Relay Agent using TargetRelayAgent option.

[RANGE_SET]
# This is first and simple DHCP range section example,
# This example may be good enough for simple/home use.
# If you need range filters, look at example below
DHCPRange=192.168.0.251-192.168.0.251
AddressTime=10
# Following are range specific DHCP options.
# You can copy more options names from [GLOBAL_OPTIONS]
;SubnetMask=255.255.255.0
;DomainServer=192.168.55.252
#Router is default gateway
;Router=192.168.0.1
# Lease Time can be different for this Range
;AddressTime=360

[RANGE_SET]
# This section is also simple [RANGE_SET] section
```

Figure 119: OpenDHCPServer.ini File Edits

6. You may want to execute the DHCP server from a convenient place. Copy the executable to your desktop on your PC.
 - a. Right click on the **RunStandAlone.bat** file and select **Create Shortcut**.
 - b. Move that shortcut to the PC Desktop by drag and drop.
7. You now have a Standalone DHCP Server on your PC, but you cannot use it until you reconfigure your Ethernet port on your PC.

Reconfiguring the Ethernet Port on your PC

NOTE: Instructions refer specifically to Windows 10. Please refer to your operating system documentation if you are not using Windows 10.

1. Click in the search box next to the Window Icon, type in **Control Panel**, and click on the app.

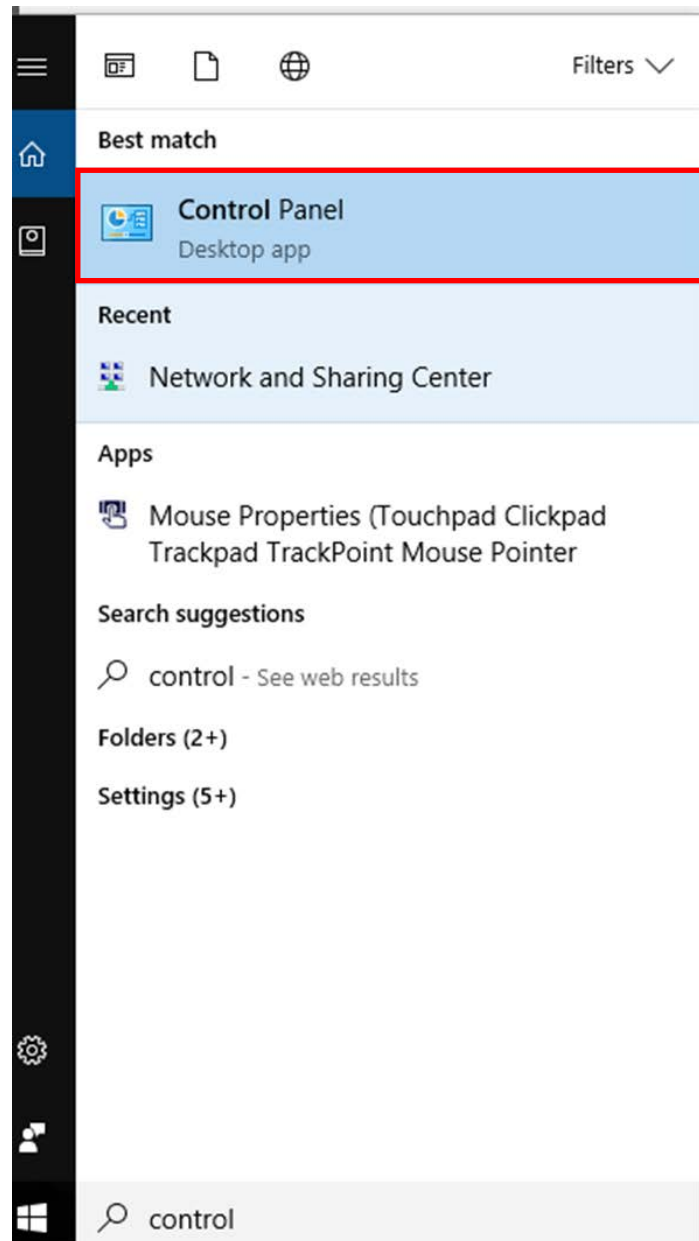


Figure 120: Control Panel

2. In the Control Panel window, select **Network and Sharing Center**.

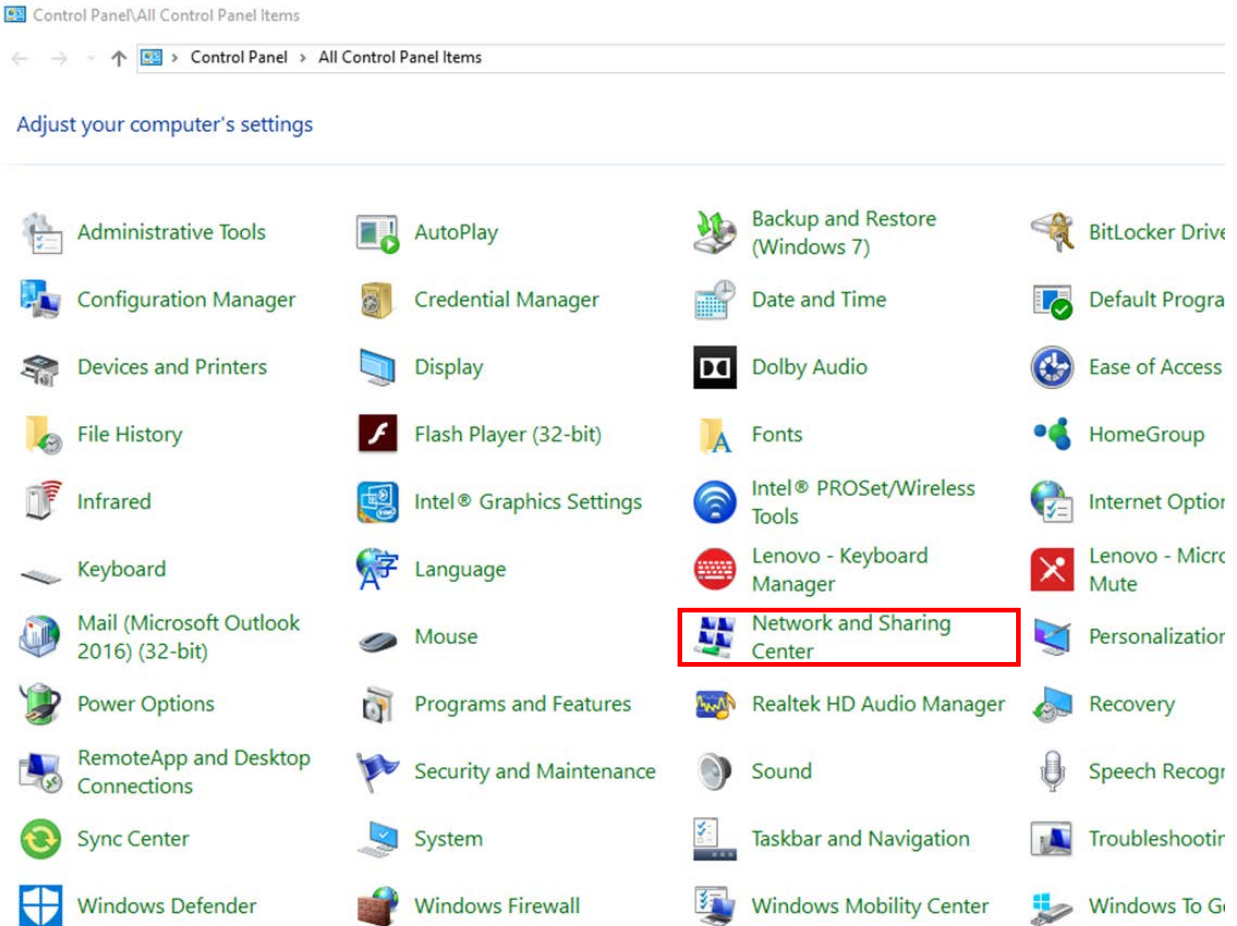


Figure 121: Network and Sharing Center

3. Select **Change adapter settings** from the menu on the left.

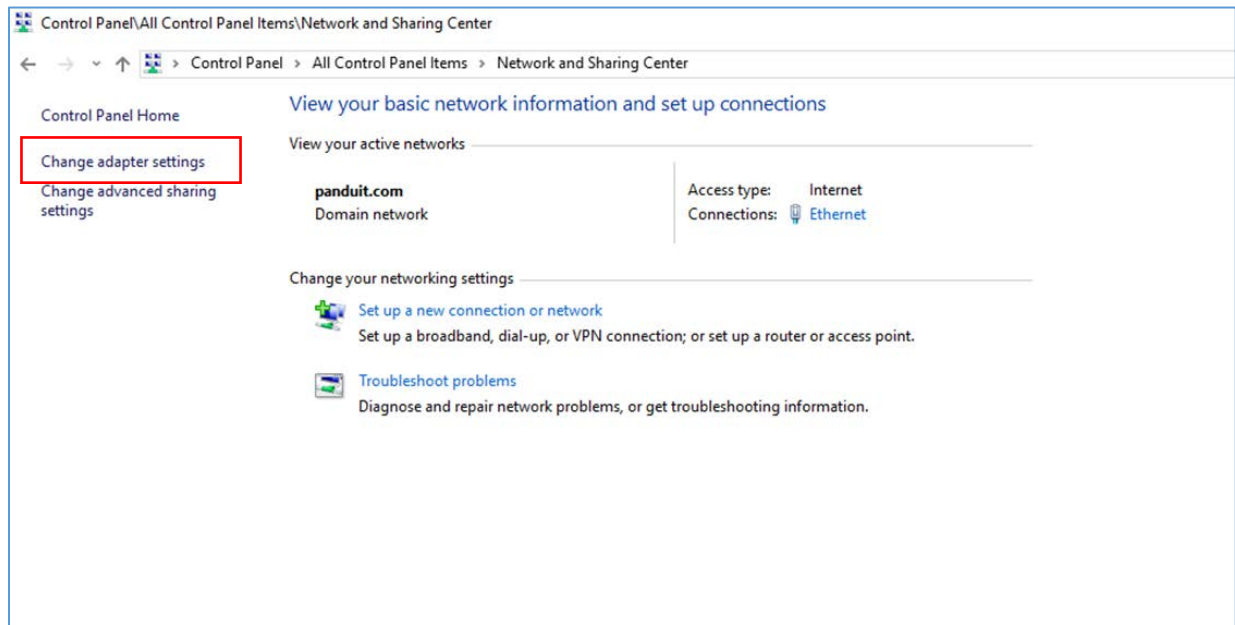


Figure 122: Change Adapter Settings

4. Right-click **Ethernet** and select **Properties**.

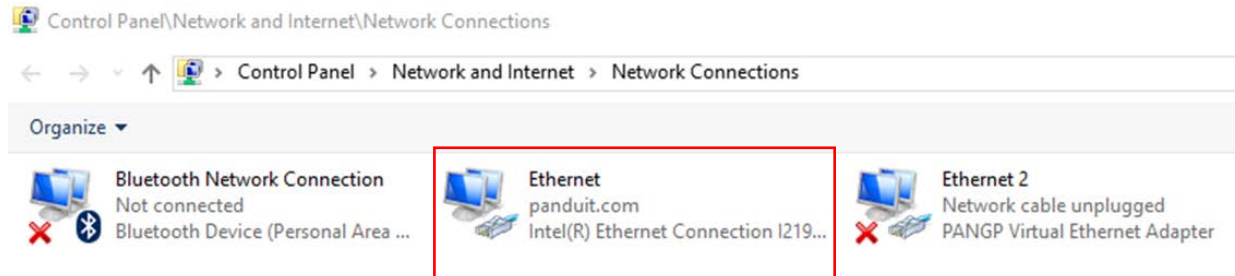


Figure 123: Properties

5. Select **Internet Protocol Version 4 (TCP/IPv4)** (you may need to scroll down). Then click the **Properties** button.

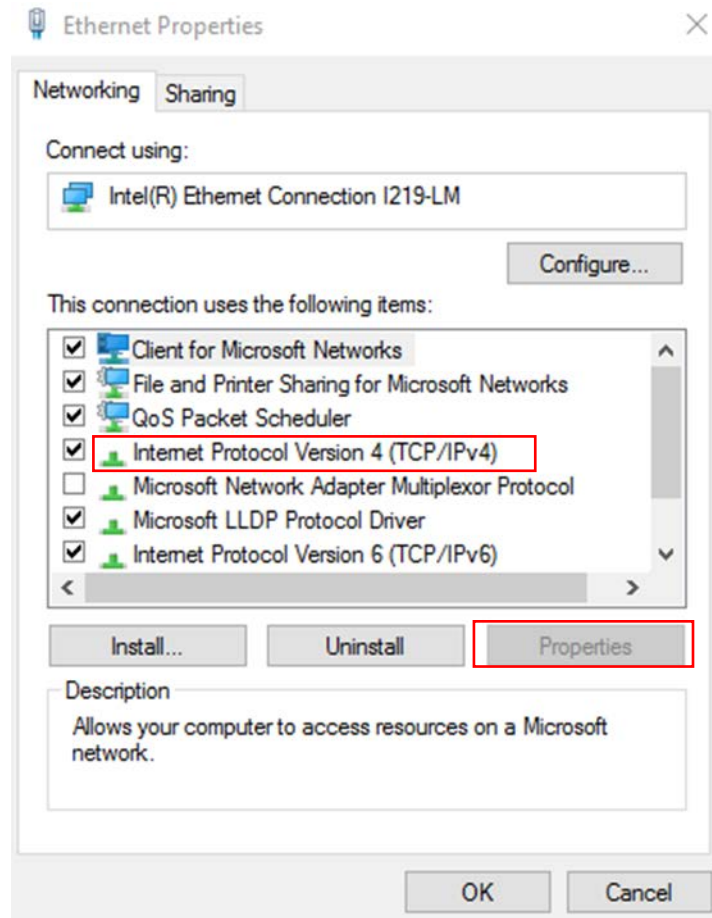


Figure 124: Internet Protocol Version 4 (TCP/IPv4) - Properties

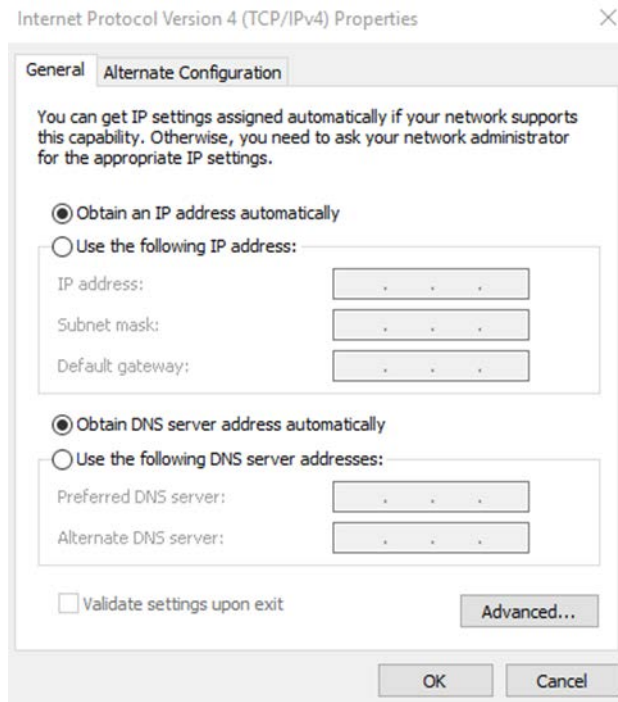


Figure 125: Internet Protocol Version 4

6. Select the **Use the following IP address** radio button. The **Use the following DNS server addresses** radio button then selects automatically.
7. Enter the following details into the appropriate boxes:
 - a. **IP address:** 192.168.0.250
 - b. **Subnet mask:** 255.255.255.0
8. Leave the **Default gateway**, **Preferred DNS server**, and **Alternate DNS server** blank (because this setup will be point to point between your PC and a PVIQ™ Connectivity System).
9. Click **OK** to accept the entries.

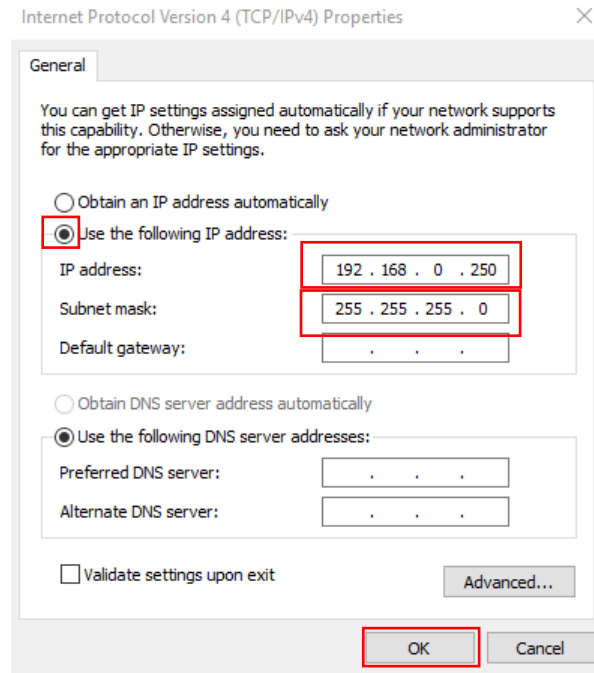


Figure 126: Port Configurations

WARNING: Do not connect this configured port on this PC to a DHCP network after these changes have been made. If you must connect this wired port to a DHCP network, then you must go back into these settings and change the properties back to “Obtain an IP address automatically”. If you back the change back to “Obtain an IP address automatically” on this wired port on the PC, then you must rerun each of the above steps in this subsection before using this PC to connect to another PViQ™ Connectivity System in DHCP mode.

Connecting the Standalone DHCP Server to the PViQ™ Connectivity System

If you are using the standalone DHCP server downloaded above, follow these steps to start the DHCP server.

1. Double click on the **RunStandAlone.bat** icon on your desktop that was created in the “Creating a Standalone DHCP Server” subsection above.
 - a. An Open DHCP Server popup window will appear.
 - b. Leave this window running in the background

Appendix I: Configuring the PViQ™ Panel Manager for Deployment with SmartZone Software

The PViQ™ Connectivity System Firmware Web UI version configuration is identical to the pre-Web UI version, except HTTP is enabled. If you are using SmartZone Software but want HTTP disabled, consult this appendix for the steps necessary to disable HTTP.

Some customers may not want the web interface. The HTTP Web Server may be disabled to configure the Panel Manager to be in the same factory default mode as those shipped with firmware version 1.xx.xx, to meet the customer's security requirements.

Disabling HTTP through CLI

The recommend way to disable HTTP is through CLI commands over telnet.

Connecting to PViQ™ CLI requires a terminal emulation program such as HyperTerminal or PuTTY.

Logging in with Telnet via PuTTY

1. Open the PuTTY terminal emulation program.

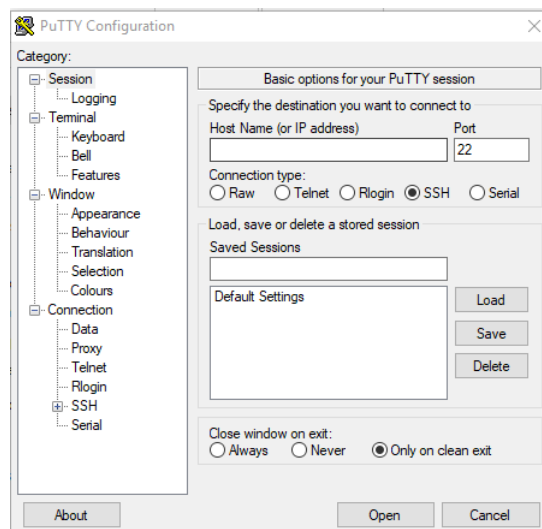


Figure 128: PuTTY Configuration Window

2. Select the Telnet radio button in the PuTTY Configuration window.
3. Type in the PViQ™ Connectivity PM IP address obtained earlier and leave all other settings as default.
4. Select **Open**.

A terminal window will open, wait for the PViQ™ Panel to prompt for a “Username:”

Default Username is: **admin**

Default Password is: **panduit** (or the new password, changed in the earlier steps)

5. Enter the Username. Press **Enter**.
6. Enter the password. Press **Enter**.

A screen similar to the example below displays.

```
Welcome to Panduit Shell ...
This system is to be used by authorized personnel only.

Username:admin
Password:*****

You are using PAN SHELL command line interface, Version 1.0.0
Last logon: Unavailable

PSH >
```

Figure 130: Pan Shell CLI Ready Window

7. You are now logged into the PViQ™ Panel Manager. Refer to the CLI Commands list in Appendix C: PViQ™ Connectivity CLI Commands for available commands.

NOTE: For security purposes, Panduit recommends that you change the default password as soon as possible. Use the *config password* command (described in Appendix C) to change the password.

8. At the command prompt in the Pan Shell CLI Window, type in the following to turn off the embedded HTTP Web Server on the PViQ™ Panel Manager module.

```
set http off
```

9. HTTP and HTTPS are now disabled on this PViQ™ Panel Manager.

Appendix J: Secure Deployment

This secure deployment Appendix may be used to train end users and system integrators on the management interfaces of the product that must be secured.

To make first time deployment of the product more convenient, Panduit configures all management interfaces with default credentials. These interfaces must be configured appropriately to avoid unexpected access to the product.

The PViQ™ Connectivity System provides several interfaces to configure and manage the device over an IPv4 network.

TCP and UDP Ports used by the PViQ™ Connectivity System

This guide lists all ports that may be used by the product based upon user configured settings.

Port	TCP or UDP	Service or Protocol Name	RFC	Service name	Used by
7	UDP	Echo Protocol	792	echo	Echo server
9	UDP	Discard Protocol	863	discard	Discard server
23	TCP	Telnet Protocol	854	telnet	Telnet CLI server
25	TCP	Simple Mail Transfer Protocol (SMTP)	5321	smtp	Email Notification client
67	UDP	Bootstrap Protocol Server (bootp, bootps)	951	bootp, bootps	DHCP client
68	UDP	Bootstrap Protocol Client (bootc)	951	bootpc	DHCP client
69	UDP	Trivial File Transfer Protocol (TFTP)	1350	tftp	Firmware Update client
80	TCP	Hypertext Transfer Protocol (HTTP)	2616	http	HTTP server
123	UDP	Network Time Protocol	1305	ntp	NTP client

		(NTP)			
161	UDP	Simple Network Management Protocol (SNMP)	1157	snmp	SNMP Agent, server
162	UDP	Simple Network Management Protocol (SNMP)	1157	snmptrap	SNMP Trap client
443	TCP	Secure Sockets Layer (SSL or HTTPS)	2818	https	Secure HTTP server
465	TCP	Message Submission for Mail (Authenticated SMTP)		smtp (legacy)	Email Notification client
587	UDP	Message Submission for Mail (Authenticated SMTP)	4409	submission	Email Notification client
6387	UDP	Panduit PVIQ RPC Protocol			Device discovery server

Best Practices for Secure Configuration of PVIQ

To minimize the threat surface of a deployed product, it may be configured to only expose interfaces that are essential to the secure operation of the device.

This section describes the features of the product that are used by the secure deployment practices.

SNMP Agent (SNMP MIB API access)

- Enable only SNMPv3. Disable SNMPv1 and SNMP v2c.
 - Through Telnet in the CLI type: **config snmp disable v1v2c**
- There are 6 default SNMPv3 users.

SNMPv3 Username	Authentication Protocol	Privacy Protocol

v3Md5User	MD5	None
v3Md5DesUser	MD5	DES
v3Md5AesUser	MD5	AES-128
v3ShaUser	SHA-1	None
v3ShaDesUser	SHA-1	DES
v3ShaAesUser	SHA-1	AES-128

- Modern SNMP Network Management Station (NMS) or DCIM software provide SHA-1 authentication and AES-128 encryption.
 - Use the v3ShaAesUser SHA-1, AES-128.
 - Delete all other users.
- The default SNMPv3 password is “setup_passphrase”.
- Always change the password: use the default password for initial bulk configuration and change the password before deploying for production.
- SNMPv3 users may be cloned, deleted or renamed according to the customer’s requirements.
- Up to 10 SNMPv3 users may be configured.
- SNMPv3 users may be managed using net-snmp’s snmpusm command, or any available SNMPv3 software that is capable of managing SNMPv3 USM users.
- SNMPv3 passwords are encoded using a hash type using the configured Authentical Protocol that is salted using the SNMPv3 Agent’s Engine ID, and then stored in non-volatile memory.

HTTP (Web GUI) Server

- Use https:// to manage the product using encryption to gain confidentiality.
- The unencrypted http:// server cannot be disabled without also disabling https://.
- The default HTTPS X.509 Certificate and Key are the same for all PVIQ Panel Managers. Use the Network page’s Web Settings to upload a customized Certificate and Key.

Telnet CLI Server

- The Telnet server may be disabled by setting the integer “2” in the SNMP

panduitProtocolSupportTelnetEnable OID (.1.3.6.1.4.1.19536.7.9.3.1.0).

User Management

- The default user is “admin” and password is “panduit”. Change the password of the admin user on your first login.
- Users of the HTTP Web UI and Telnet CLI share a common authentication database.
- Users may be configured to only be allowed access to Telnet, HTTP or both Telnet and HTTP protocols.
- Up to 10 system users are configurable.
- Passwords are encoded using two CRC32 algorithms and stored in non-volatile memory.
- The first user (the default “admin” user) is allowed access to a few more commands than other users.
- The first user (the default “admin” user) cannot be deleted via the Telnet CLI.

SNMP Trap Notifications

- Use SNMPv3 trap receivers with authPriv users. Note that SNMPv3 Trap Receivers are also provided SNMPv3 Agent access.

Email Alarm Notifications

- Use Authenticated and Encrypted Email Notifications.
- Because the SMTP Protocol has multiple methods for communicating a password, the SMTP password is stored unencrypted.

Protocol Access Configuration

- All management protocols are accessible on the rear Ethernet ports of the product by default.
- The provisioning port on the front of the panel only parses LLDP and CDP.
- Unless needed, do not enable “config snmp enable provision” or “config snmp enable all”. These commands enable the provisioning port to provide SNMP Agent access.

Secure Deployment, General Guidelines

- Disable interfaces that won't be used.
 - HTTP may be disabled from the Telnet CLI.

- **set http off**
 - SNMP may be disabled from the Telnet CLI.
- **config snmp disable rear**
 - Telnet and SNMP may be disabled from the SNMP MIB.
- Do not disable all management interfaces. Only disable the ones that won't be used.
- Configure system users to only have access to secure protocols.
- Configure firewall and/or Intrusion Detection/Prevention Systems to allow TCP/UDP access to only expected protocols on to the PViQ Panel Manager.

Secure Deployment for SNMPv3 Access Only

This section is intended to help SmartZone DCIM Integrators and Customers configure the product in a secure manner. It assumes the integrator will use Telnet for bulk configuration and troubleshooting and SNMPv3 with a single SHA-1/AES-128 user for all other operations. SNMPv3 Traps are also used.

- Use Telnet to access the PViQ Panel Manager CLI, disable HTTP and set up a trap receiver.
 - **set http off**
 - **config snmp disable v1v2c**
 - **config snmp -trapip 1 IPv4.Address.of.NMS**
 - **config snmp -traver 1 v3**
 - **config snmp -traon 1 all**
- Configure additional SNMP Trap Receivers as required.
- Use Telnet to change the admin user's password.
 - **config password NEWADMINPASSWORD**
- Use a SNMPv3 USM management tool to configure a SNMPv3 user that has authPriv access.
 - The "v3bulkupdate.bat" script demonstrates how to use net-snmp's snmpusm command to manage the users on the PViQ Panel Manager.
 - Delete all of the users except for *v3ShaAesUser*.

- Change the passwords for the *v3ShaAesUser*.
- Optionally, you may rename the *v3ShaAesUser* to a new name and use it in future commands.
- Use the SNMPv3 Network Management Station or `snmpset` tool to set the SNMPv3 trap username in the `panduitNetSNMPTrapRecvUser` OID (.1.3.6.1.4.1.19536.2.2.2.3.2.1.7.1) using the new authentication and encryption passwords:
 - `snmpset -v3 -l authPriv -u v3ShaAesUser -a SHA -A NEWAUTHENTICATIONPASSWORD -x AES -X NEWENCRYPTIONPASSWORD IPv4.ADDRESS.OF.TRAPRECEIVER .1.3.6.1.4.1.19536.2.2.2.3.2.1.7.1 s v3ShaAesUser`

To manage the device, always use the SNMPv3 user with `authPriv`.

SNMPv3 Traps are authenticated and encrypted.

Because Telnet does not provide confidentiality, it is recommended that Telnet access only be used in exceptional situations, such as bulk re-configuration or troubleshooting.

Secure Deployment for HTTPS Access Only

This section is intended to help customers configure the product in a secure manner for HTTPS Access Only. Secure Email Notifications are also configured.

- Use Telnet to access the PViQ Panel Manager CLI.
 - **config snmp disable all**
- Use a web browser to log in via `https://` to the PViQ Panel Manager.
- Navigate to the Users tab.
- Change the admin user's Protocol Access to "HTTP" to remove Telnet access.
- Change the admin user's password to a password that meets the customer's password policy.
- Save.
- Navigate to the Network tab.
- Change the Web Setting's TLS Certificate and EC Key PEM file.
- Generate a proper TLS Certificate and Private Key for a HTTPS server. The help

text for the field shows:

- Select a file that contains both a TLS Certificate and Private Key. The SmartZone Connectivity panel manager ships with a default certificate. It is recommended that the device administrator create a custom key/certificate pair for each panel manager using the ECC curve SECP256R1. The PM also supports RSA2048 keys. The key/certificate must be PEM formatted with the certificate immediately following the key in a single file. e.g. `openssl ecparam -name SECP256R1 -genkey -param_enc explicit -out ServerKey.pem`. e.g. `openssl genrsa -out ServerKey.pem 2048`.
- Note that some operating systems, such as iOS 13 and macOS Catalina (10.15), may have additional certificate validation requirements.
- Click “Choose File” and select the Certificate + Key file.
- Click Save to upload the certificate.
- Reboot the PViQ Panel Manager to verify the new certificate is in use.
- Log in via `https://` to the PViQ Panel Manager.
- Navigate to the Email tab.
- Configure Alarm Notifications to be sent using a SMTP server that provides authentication and encryption.
 - For this example, consider a fictitious Gmail user:
 - Enable: Checked.
 - IP: 172.253.112.109
 - Note: the IP address of `smtp.gmail.com` may change over time or by geographic region. You may find the IPv4 address of the email server by using the `nslookup` command. E.g. `“nslookup smtp.gmail.com”`.
 - Port: 587
 - Encryption Protocol: STARTTLS.
 - From Address: My PViQ Panel Name
<firstname.lastname@gmail.com>
 - Server Requires Authentication: Checked.
 - Username: `firstname.lastname@gmail.com`
 - Password: The password for the user. If two-factor authentication is

enabled, an App Password may be used.

Always use a web browser with https:// to manage the device.

Best Practice for Password Complexity/Strength

A best practice is to use a non-trivial password. For example, a reasonable password security policy may say: passwords must be 8-32 characters in length, and to have at least one numeric character, and at least one special character.

Do not continue to use default passwords.

Best Practice for Secure Physical Deployment

Rear Management Ports

The unused Ethernet port on the rear of the panel may be secured.

- Use a RJ45 lock out device to block the unused rear port.
- Use a PVIQ I-Cord from the front of the panel to the unused port and ensure the horizontal connection (the back of the panel connection for that port) does not inadvertently result in a Layer 2 switching loop.

Unused Panel Ports

The patch field (front of the panel) is intended to provide security alerts for the patch cable connections.

Care should be taken for unused panel ports.

- Use a RJ45 lock out device to block the panel ports.
- Provision a PVIQ I-Cord that has far end detection between two unused ports.
- Insert a PVIQ I-Cord in the unused port and place the unused far end in a secure part of the cabinet so the loose end can neither be used nor retrieved.

User Interface Buttons

The Panel Manager provides User Interface buttons on the face of the panel. These buttons can be used to trigger Maintenance Mode reset levels 4 through 8, which perform varying levels of reconfiguration of product that may be unexpected or undesirable. Every 5 seconds the Reset Level advances when triggered, with two audible beeps every 5 seconds and the port LEDs will turn green from the outside in. Example: a Level 4 reset will show ports 1-4 and ports 24-21 as green and when it transitions into Level 5 reset, ports 1-5 and ports 24-20 will be light a green and the Level 5 reset would take 25 seconds to reach and confirm.

- Level 4 – Set IP configuration to DHCP (factory default)
- Level 5 – Clear SNMP community string, SNMP credentials and login credentials to the factory default
- Level 6 – Clear the internal PViQ™ Connectivity System database to the factory default, followed by a Level 3 reset
- Level 7 – Reformat the entire file system, including clearing the database, followed by a Level 3 reset
- Level 8 – Reset firmware image to factory default, followed by a Level 7 reset. All firmware upgrades performed since installation will be lost.

Best Practice for Secure Decommissioning

Perform a “reset level 7” from Maintenance mode or by clicking the “Default Settings” button on the Network page in the Web UI. This performs an erase of the entire non-volatile configuration setting area.