PL-400
Installation and Configuration Manual

PL-400 Installation and Configuration Manual

Contents

Chapter 1

Introduction

1.1 Overview

The PL-400 is designed primarily as an access/transport device. It is typically deployed as a CLE (Customer Located Equipment) in enterprise campus environments and in central offices.

The PL-400 supports up to 8 high-speed services (100Mbps to 4.25Gbps). Each service is configured independently, using PacketLight's user-friendly Web-based management tool.

The PL-400 is designed to support point-to-point, chain and ring topologies with multiple protection schemes.

The PL-400 is a highly integrated device, incorporating MUX/DEMUX and EDFA for both transponder and regenerator modes.

All optical transceivers, both on the service side and on the WDM-uplink side, are pluggable and fully replaceable, allowing pay-as-you-grow budget planning and simplified maintenance.

Configurations

The PL-400 is a 19-inch/1U box with dual field replaceable AC or DC power supplies. The PL-400 is designed in a modular way thereby enabling a variety of configurations and applications. It is available in the following configurations:

1. PL-400 T: Transponder configuration
   - For non-APS configuration - two MUX with four wavelengths
   - For APS configuration - eight wavelengths passive optical MUX and DEMUX
   - Eight 1310/850 nm to 15xy nm transponders with 3R capabilities

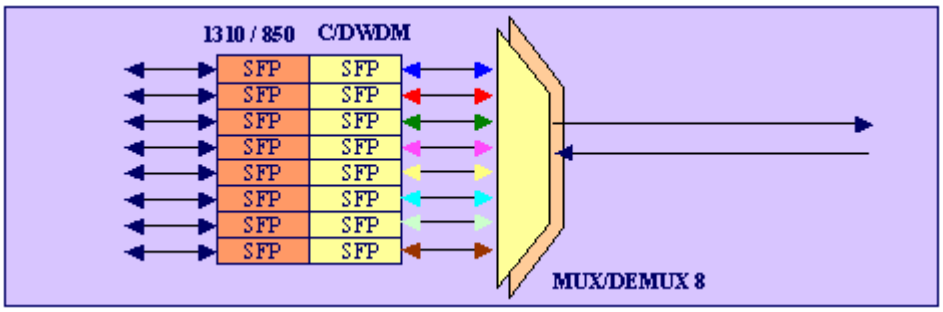


Figure 1-1. PL-400 T without APS

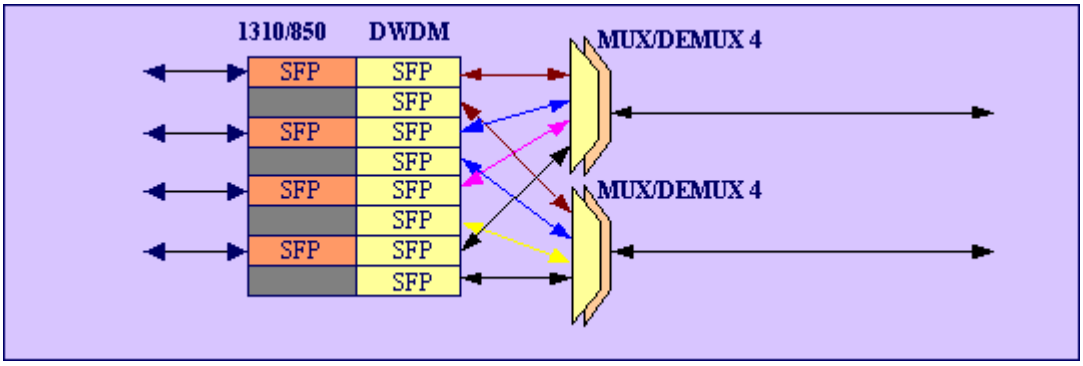


Figure 1-2. PL-400 T with APS

2. PL-400 TB: Transponder with added booster amplifier
   - Transponder and passive optical capabilities as described above
   - For non-APS configuration – a single integrated EDFA booster amplifier
   - For APS configuration – two integrated EDFA booster amplifiers

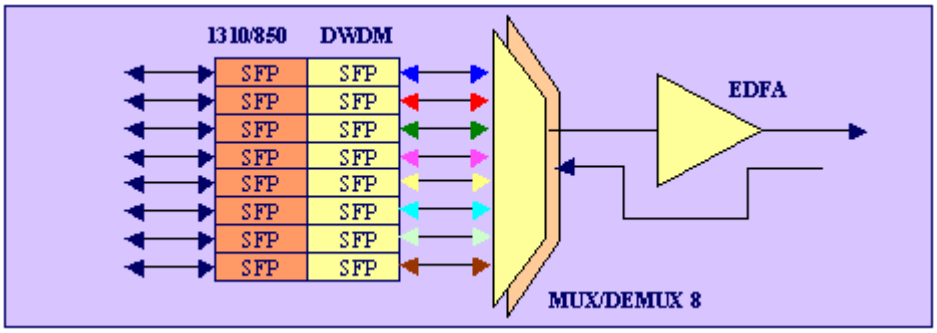


Figure 1-3. PL-400 TB without APS

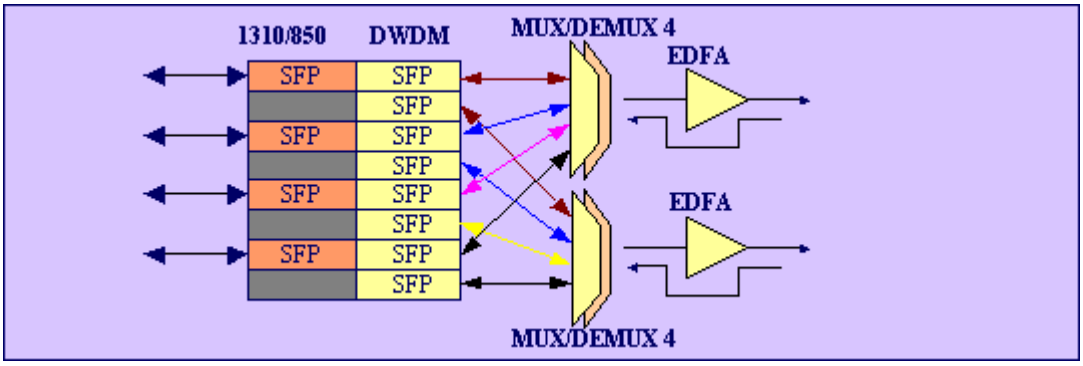


Figure 1-4. PL-400 TB with APS

3. PL-400 TX: Expandable Transponder
   - Eight 1310/850 nm to 15xy nm transponders with 3R capabilities

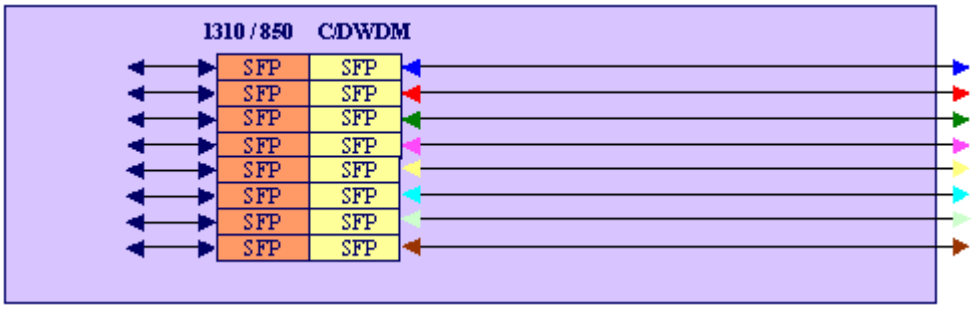


Figure 1-5. PL-400TX

4. PL-400 Reg: Regeneration
   - In this configuration, the PL-400 performs regeneration for all eight channels. This configuration is applicable when distances between sites demand regeneration of the optical signal in order to reach the end point.

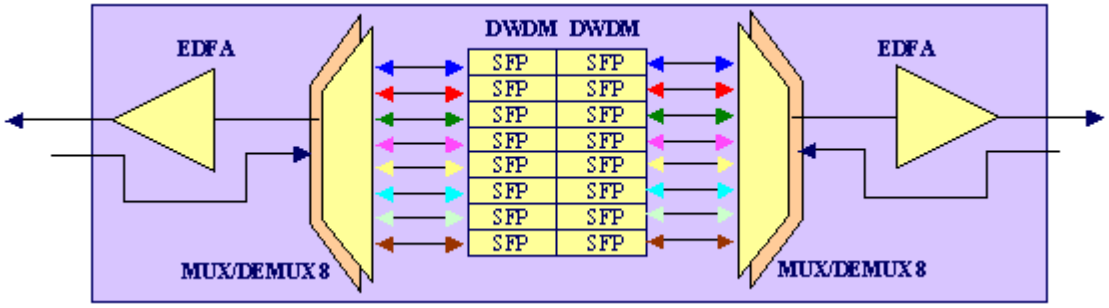


Figure 1-6. PL-400 Reg

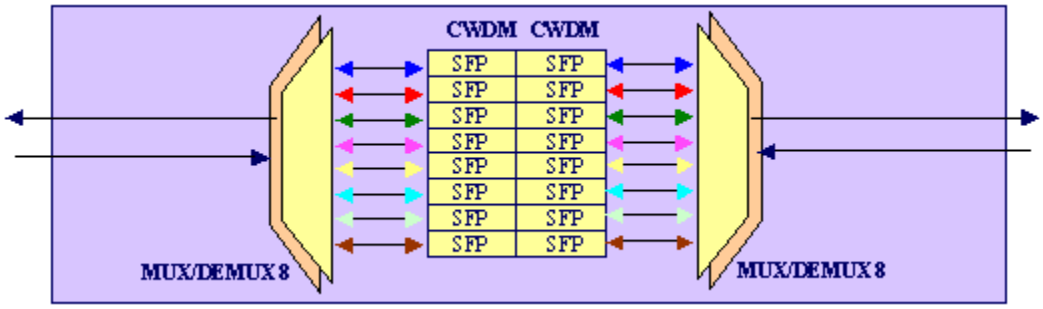


Figure 1-7. PL-400 Reg

5. PL-400 ADM: Add Drop Multiplexer
   - This configuration enables adding and dropping services in a ring or a daisy chain topology. Regeneration of other services is also supported. This configuration is supported both for CWDM and DWDM (with/without EDFA).

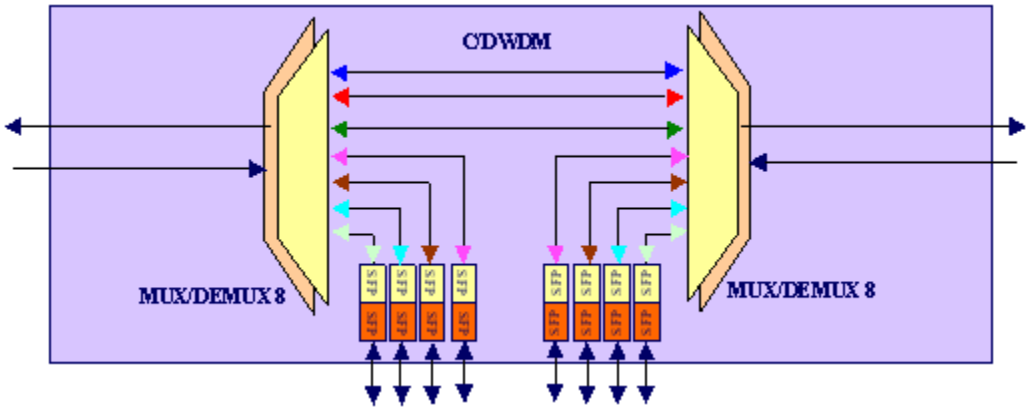


Figure 1-8. PL-400 ADM

6. PL-400 MF: Mono Fiber (Single Fiber is used for Tx and Rx)
   - The Mono Fiber configuration enables you to transfer four services over a single fiber. Different wavelengths are used for reception (Rx) and for transition (Tx).

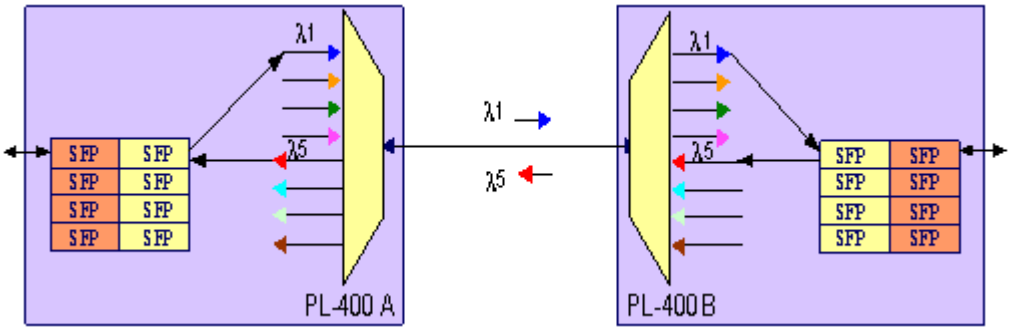


Figure 1-9. PL-400 MF

7. PL-400 M: 4/8/16 optical MUX
   - This configuration is a passive box (no power supplies are needed), with muxes 4, 8 or 16 C/DWDM wavelengths on one fiber.

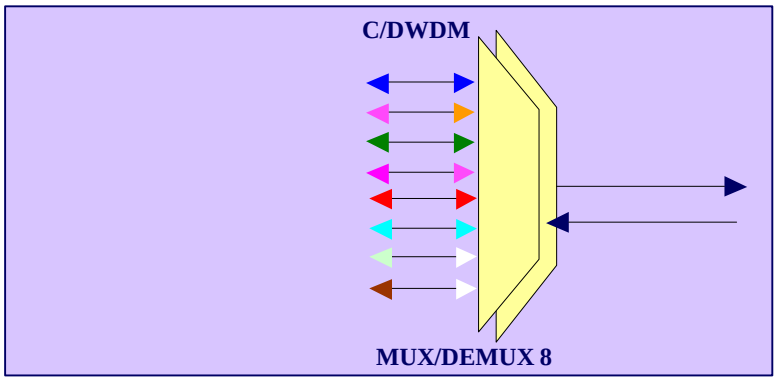


Figure 1-10. PL-400 M

8. PL-400 InL: In-Line
   - In this configuration, the PL-400 serves as an amplifier in the middle of a point-to-point, ring or daisy chain topology.

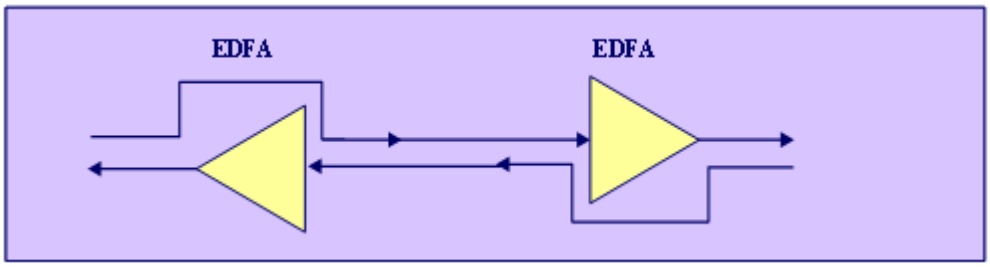


Figure 1-11. PL-400 InL

Main Features

The PL-400 effectively combines the following key functionalities:

- Transparent multiplexing and transponding of variable high-speed services (100 Mbps to 4.25 Gbps)
- Small Form Pluggable (SFP) optics for both WDM side and service side, which enables any combination of SM, MM, CWDM and DWDM support, as well as easy maintenance and pay-as-you-grow architecture
- Optical power amplification (PL-400 with booster)
- Support facility protection schemes
- Two Management channels

- Support for performance monitoring and loopback capabilities for diagnostics and statistics
- FAN speed control HW with support for lower noise, improved MTBF and power save
- AC or DC, single or Dual pluggable Power supply

Transponder Interfaces

The PL-400 transponder ports are used to transparently convert between the service interface and the C/DWDM uplink interface. The transponder ports (service side) may be any combination of the following:

- FC 1G, 2G or 4G
- FICON 1G, 2G or 4G
- ESCON
- InfiniBand 2.5G
- Gigabit Ethernet – Optical or Copper
- Fast Ethernet – Optical or Copper
- STM-1/OC-3, STM-4/OC-12, STM-16/OC-48
- 2.66G OTN
- DVB-ASI 270M
- SMPTE-SDI 540M
- 1.24G, 2.4G GPON

All transponder ports are equipped with the appropriate SFP optics.

Other rates up to 4.25Gbps may be supported as well. For information, please consult with PacketLight.

Passive MUX/DEMUX Interfaces

The PL-400 supports up to two MUXs. In its basic configuration, the PL-400 contains 8 channels MUX/DEMUX. The PL-400 4 channels version is available as well.

The PL-400 passive MUX/DEMUX ports are typically connected to the WDM optics of the PL-400. They may be connected to other devices with WDM uplinks as well, such as the PL-100. Several PL-400 devices can be connected in a modular fashion, thus providing expanded capabilities to aggregate 16 or 32 wavelengths.

EDFA Support

The PL-400 supports up to 2 EDFAs. The PL-400 with EDFA is used to boost the power of DWDM optical signal. The EDFA is connected internally to the output fiber of the passive MUX.

Management Support

Setup, control and monitoring of status and diagnostics information can be performed via one of the following methods:

- ASCII terminal connected to the RS-232 control port (required for initial configuration).
- Web browser (SurfLight) and SNMP-based network management stations supporting access via the Management 10/100BaseT port. OSC between the local PL-400 and the remote PL-400 units.
- Remote management provided by the OSC management channels that connect between the local PL-400 and the remote PL-400 units.

Typical Application

Designed primarily as an access/transport node, the PL-400 is typically deployed as a CPE in enterprise campus environments. It offers optical functionality of multiplexing (CWDM and DWDM), transponding, and amplifying.

The PL-400 is highly suitable for applications such as:

- Interconnection of SAN and LAN islands over remote metro sites
- Aggregation of DSLAM and Ethernet switch traffic on a single fiber from access to core
- WDM GPON extension between the central office and the local exchange for network simplification and cost reduction
- SONET/SDH transport
- Fiber relief for high-capacity multitenant buildings and campuses

The PL-400 can be used in conjunction with the PL-100 Multiplexer to provide a modular, flexible and scalable data and storage transport solution which saves wavelength resources and enables long distance high performance storage connectivity.

The PL-400 can also be installed as an adjunct to MSPPs, Metro DWDM and Metro Ethernet in the Central Offices of the carriers, storage service providers and MSOs.

Figure 1-12 illustrates a typical application for standalone PL-400 units. They are deployed as CPE in enterprise campus environments, and connect the local SANs in the two campuses across a fiber connection or via CWDM/DWDM public network.

The application can provide the following services:

- **Disaster recovery**: Locating backup storage at a remote site offers disaster-proof data protection.
- **Shared information**: The network enables sharing of information between different sites; for example, print processing centers, which are often located miles away from their processor host.
- **Data Storage Facilities**: This type of solution offers scalability, centralization and high availability.

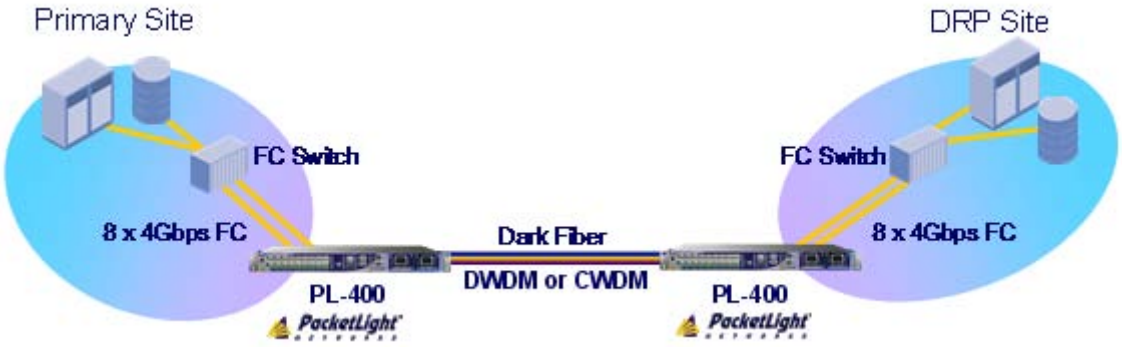


Figure 1-12. Typical Storage Application for PL-400 Devices

The next figure illustrates an application of GbE IP DSLAMs in a ring topology. Here the ADM capabilities of the PL-400 are in use.

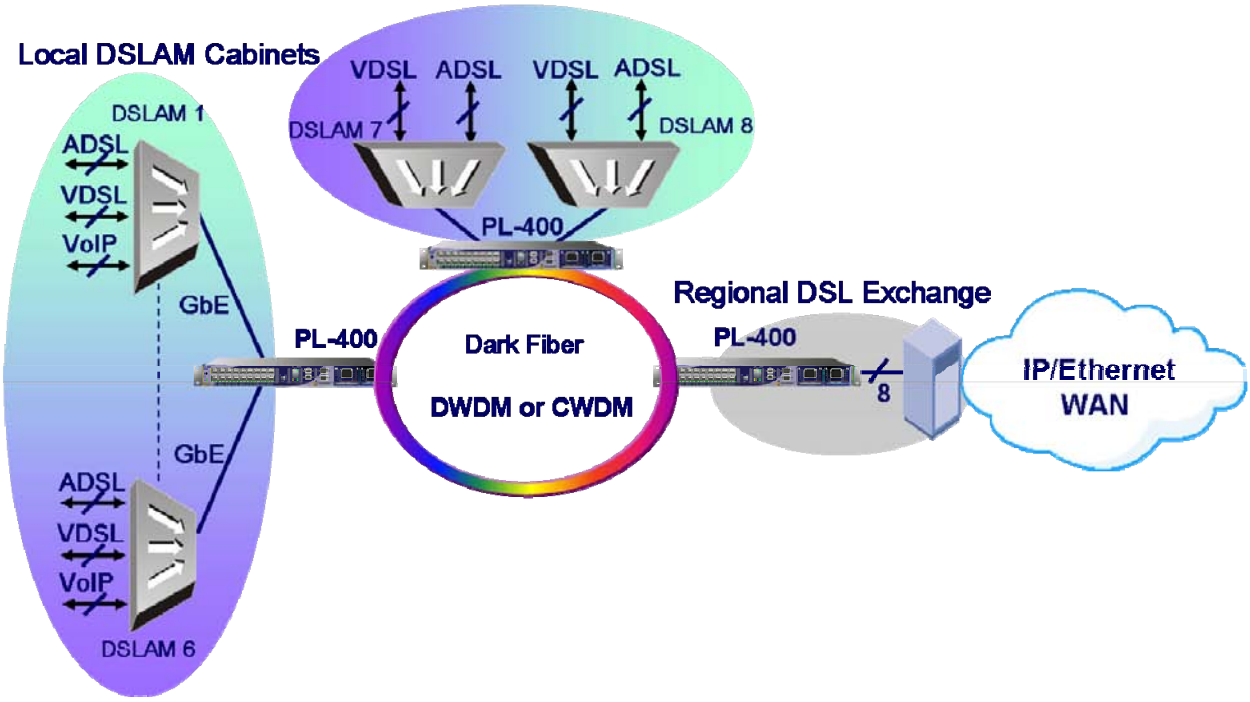


Figure 1-13. DSLAM Ring Application for PL-400 Devices

1.2 Physical Description

PL-400 is a compact unit, intended for installation in 19" racks, on desktops or on shelves. The unit height is 1U (1.77 in).

All connections are made to the front panel. The PL-400 front panel also includes indicator LEDs that indicate its operating status.

Cooling is by free air convection and an internal cooling fan. The air intake vents are located on the rear side. The PL-400 supports a fan speed control mechanism to reduce noise.

The following figure shows a general view of the PL-400.

Figure 1-14. PL-400 T Unit, General View

1.3 Functional Description

It is important to clarify the relationship between the transponder (Uplink and Service) subsystems and the various types of physical ports designated on the front panel.

In a non-protected modem, the sixteen LINK ports are divided into groups of two. Each group is one transponder entity thus composing a total of eight independent transponder interfaces with each pair of ports (LINK1/LINK2, LINK3/LINK4 and so on) functioning as one transponder entity. The odd-numbered ports are the uplink interfaces, while the even-numbered ports are the service interfaces.

In protected mode, the ports are divided into groups of four as described below. In each group there is one service port and two uplink interfaces.

Each group of four ports may be configured as two non-protected transponders or a single protected transponder.

Notice that for regenerator mode, both LINK optics are either CWDM or DWDM.

The service interfaces are typically connected to local equipment directly. However, there are several options for the uplink WDM ports according to the PL-400 configuration and application:

- Using PL-400 MUX/DEMUX - Connect the uplink C/DWDM SFP to the passive MUX and DEMUX ports; 'COM' port is connected to the dark fiber between the remote sites: In this scenario, the Com in is used for the Rx fiber and the Com out is used for the Tx fiber. Wavelengths from the appropriate WDM SFP are connected to the corresponding wavelength in the MUX/DEMUX. The eight transmit (Tx) outputs of the WDM SFPs should be connected to the MUX inputs. The eight receive (Rx) inputs of the WDM should be connected to the DEMUX outputs.
- Using PL-400 MUX/DEMUX and EDFA: In this scenario the EDFA is connected internally to the MUX and the optical signal on the Tx path is amplified for all channels.
- The connections between the MUX/DEMUX and the WDM SFPs are the same as above.
- Connect to 3rd party C/DWDM passive MUX/DEMUX equipment: In this scenario, the CDWM/DWDM Uplink SFPs ports are connected

directly to 3rd party MUX/DEMUX. The MUX/DEMUX functionality is not provided by PacketLight.

Table 1-1. Subsystem and Interface Relationships

Subsystem	Interface Type	Front Panel Designation
Uplink	Optical CWDM/DWDM uplink	Odd-numbered LINK ports (LINK1, LINK3,…LINK15)
	Passive CWDM/DWDM MUX/DEMUX	MUX port, DEMUX port, and COM port
	Optical Amplifier	EDFA port
Service	1G/2G/4G FC and FICON, ESCON, 2.5G InfiniBand, Optical Fast Ethernet, Copper Fast Ethernet, Optical GbE, Copper GbE, STM-1/OC-3, STM-4/OC-12, STM-16/OC-48, 2.66G OTN, DVB-ASI 270M, SMPTE-SDI 540M, 2.488G /1.244G GPON.	Even-numbered LINK ports (LINK2, LINK4…LINK16)

PL-400 includes the following main subsystems:

- Transponder interface subsystem:

  Each of the transponders includes a service interface and one or two uplink interfaces, depending on the protection configuration
- Passive MUX/DEMUX interfaces subsystem
- Optical Amplifier interfaces subsystem
- Management and Control subsystem
- Performance Monitoring subsystem

Transponder Interface Subsystem

Service Interfaces

The service ports accept SFP transceivers.

- Interface rates: 100 Mbps to 4.25 Gbps
- Optical interface: 850nm Multi Mode or 1310 nm Single Mode
- Transparent services:
  - FC 1G, 2G or 4G
  - FICON 1G, 2G or 4G
  - ESCON
  - InfiniBand 2.5G
  - Fast Ethernet – Optical or Copper
  - Gigabit Ethernet – Optical or Copper
  - STM-1/OC-3, STM-4/OC-12, STM-16/OC-48
  - 2.48Gbps GPON
  - 2.66G OTN
  - Video (DVB-ASI) 270Mbps
  - Video (SMPTE-SDI) 540Mbps
  - 1.24Gbps GPON

CWDM/DWDM Uplink Interfaces Subsystem

WDM systems are bit-rate flexible and format independent and can accept any combination of interface rates (e.g., synchronous, asynchronous, OC-3, -12, -48, or FC, ESCON, FICON, GbE) on the same fiber at the same time.

The uplink ports accept SFP transceivers.

- CWDM:
  - Wavelengths: 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 nm
  - Optical reach: Up to 80 Km
  - Optical power output: 0 to 5 dBm
  - Sensitivity: -28 dBm APD
- DWDM:
  - Wavelengths: 1549.32, 1550.12, 1550.92, 1551.72, 1552.52, 1553.33, 1554.13, 1554.94 nm 100 GHz spacing

- Optical reach: Up to 180 Km (2.66Gbps) or up to 80 Km (4Gbps)
- Optical power output: 0 to 4 dBm
- Sensitivity: -28 dBm APD

CWDM/DWDM MUX/DEMUX Interfaces Subsystem

The MUX and DEMUX ports are connected to the uplink ports and to the WDM network/fiber (or to an internal Optical Amplifier Input, if it exists).

A ribbon cable is used for connecting the MUX and DEMUX ports to the uplink ports. This connection is done externally.

Optical Amplifier Interfaces Subsystem

Optical Amplifier can be used with DWDM interfaces only. It can be configured as a Booster amplifier or as an In-Line amplifier.

- Output power: 17 dBm
- Optical gain: 10 to 20 dB
- Configurable AGC or APC operational modes
- Eye safety

Management Subsystem

PL-400 management subsystem provides configuration, control and monitoring of PL-400. The management activities include:

- Configuring PL-400
- Monitoring PL-400 status and reading its performance monitoring statistics
- User management
- Performing PL-400 diagnostics
- Displaying alarms and events detected during PL-400 operation
- Displaying PL-400 network topology

PL-400 supervision and configuration activities can be performed via a standard Web browser. PL-400 units can also be managed by an SNMP-based client server Element Management System.

Supervision, Diagnostics and Performance Monitoring

PL-400 supports comprehensive diagnostics, supervision and maintenance capabilities for easy maintenance and rapid fault detection and location. The PL-400 supply Layer-1 performance monitoring is for the services 1/2/4 FC and GbE. Additionally, a dedicated add-on daughter board provides protocol level Layer-2 performance monitoring for each of the 1/2/4G FC and GbE services.

Alarm Reporting

PL-400 generates time stamped alarm messages for all system events. The time stamp is provided by an internal real time clock. Up to 512 of the most recent events can be stored in an internal buffer. They can be retrieved as long as the PL-400 has not suffered a loss of power.

The event messages stored in the buffer can be read on line via the SurfLight application. The display of event messages may be filtered by type (either alarms only or all existing events) and by interface.

Supervisory Port Capabilities

Initial configuration of PL-400 is performed using any ASCII terminal (or a PC running a terminal emulation program) directly connected to PL-400 serial Control connector.

The RS-232 asynchronous supervisory port is located on its front panel. No software needs to be installed on the terminal, which is used simply as an interface to the program on the PL-400.

After the initial configuration, PL-400 is managed, supervised and configured by either a Web browser or an SNMP network management station.

The supervisory port has a DCE interface that supports a data rate of 9600 bps.

Management through 10/100BaseT Management Port

PL-400 can be accessed through the 10/100BaseT Management port, using SNMP or HTML (for Web browsers).

Remote Management Using Optical Supervisory Channels

The PL-400 is equipped with two Optical Supervisory Channels.

An Optical Supervisory Channel enables you to manage a remote PL-400 box. This management channel is multiplexed as a ninth wavelength inside the optical MUX-8 or as the fifth wavelength inside the optical MUX-4.

The PL-400 supports two Optical Supervisory channels for remote management of different topologies such as ring or daisy chain, facility protection schemes and multi-chassis application. In case only one OSC is needed, either Optical Supervisory Channel can be used.

Power Supply Subsystem

PL-400 is available with either AC or DC power supplies:

- AC: 100 to 240 VAC, 50/60 Hz
- DC: -48 VDC

The maximum power consumption of the PL-400 is 68W.

PL-400 may be ordered with either one or two power supply units.

The unit does not have a power ON/OFF switch, and therefore starts operating as soon as the power is connected.

The power supplies are redundant and replaceable without causing traffic interference.

1.4 Technical Specifications

Service Interfaces	*Number of Ports*	Eight ports
	Interface Type Options	• FC 1G, 2G or 4G • FICON 1G, 2G or 4G • ESCON 200M • InfiniBand 2.5G • Fast Ethernet 100M – Optical or Copper • Gigabit Ethernet 1.25G – Optical or Copper • STM-1/OC-3, STM-4/OC-12, STM-16/OC-48 • OTN 2.66G • Video DVB-ASI 270M and SMPTE-SDI 540M • GPON 2.488G/1.244G
	Data Rate	100 Mbps to 4.25 G
	Connectors	SFP transceiver
Optical Uplink Interface	*Number of Ports*	Eight ports
	8 Wavelength	• CWDM: 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 nm • DWDM ITU Channels 28-35: 1549.32, 1550.12, 1550.92, 1551.72, 1552.52, 1553.33, 1554.13, 1554.94 nm 100 GHz spacing
	Optical Reach	• CWDM: up to 80 Km • DWDM: up to 180 Km (2.66Gbps) or up to 80 Km (4.25Gbps)
	Optical Power Output	• CWDM: 0 to 5 dBm • DWDM: 0 to 4 dBm
	Sensitivity	-28 dBm APD
	Link Connectors	SFP transceiver
Optical Amplifier	*Output Power*	17 dBm
	Optical Gain	10 to 20 dB

	Automatic Gain Control	Keeping the amplifier gain fixed, without dependency in adding or removing services
	Automatic Power Control	Keeping the amplifier output power fixed, without dependency in adding or removing services
	Eye Safety	Automatic laser power reduction upon fiber cut or disconnection
Supervisory and Management Ports	*RS-232 CONTROL Port*	Interface: RS-232 Connector: 9-pin D-type, female Format: asynchronous Baud rate: 9600 bps Word format: 8 bits, no parity, 1 stop bit, and 1 start bit
	Out of Band Access	10/100BaseT Management port
	In-Band Remote Management	Two Optical Supervisory Channels • CWDM: 1310 nm • DWDM: 1510 nm
	Management IP Address Assignment	Manual configuration
Indicators	*RDY*	Green steady: Normal operation Red: Failure Blinking: Booting up
	LNK	Green: No failure detected Red: Major or minor alarm detected
	MNG	Green: No failure detected Red: Major or minor alarm detected
	EDFA	Green: The Amplifier is operational (DWDM applications only)
	PROT: OPR	Used for equipment protection. Not implemented in this version.

	PROT: MASTER	Used for equipment protection. Not implemented in this version.
	ETH: LINK	Green: Link integrity signal is detected by the corresponding LAN port (normal operating condition)
	ETH: ACT	Yellow blinking: Transmit and/or receive activity detected on port.
Alarm Collection and Monitoring	*Alarms*	Last 255 events are available. Each alarm is time stamped.
Power	*Supply Voltage*	
	AC Source	100 to 240 VAC, 50/60 Hz, 0.7A maximum
	DC Source	-48V DC, 1.2A maximum
	Power Consumption	68W maximum
Physical	*Height*	4.5 cm / 1.77 in
	Width	44.0 cm / 17.32 in
	Depth	31.3 cm / 12.32 in
	Weight	2.4 kg / 5.3 lb
Environment	*Operating Temperature*	0°C to 50°C / 32°F to 122°F
	Relative Humidity	Up to 90%, non-condensing
	Safety	CE Class B, TUV, FCC

Chapter 2

Installation

2.1 Introduction

Scope

This chapter provides installation instructions for the PL-400, including:

- Safety precautions for installation personnel and users
- Site requirements
- General description of equipment enclosures and their panels
- Mechanical and electrical installation instructions.

After installing the system, it is necessary to configure it in accordance with the specific user's requirements. The preliminary system configuration is performed through a supervision terminal directly connected to the PL-400 (procedures for using the terminal are given in *Chapter 3*). The software necessary for using the terminal is stored in the PL-400.

2.2 Safety Precautions

General Safety Precautions

Warning

The equipment should be used in a restricted access location only.

Warning

No internal settings, adjustment, maintenance and repairs may be performed by either the operator or the user; such activities may be performed only by skilled service personnel who are aware of the hazards involved.
Always observe standard safety precautions during installation, operation and maintenance of this product.

Grounding

For your protection and to prevent possible damage to equipment when a fault condition, e.g., a lightning stroke or contact with high voltage power lines, occurs on the cables connected to the equipment, the case of the PL-400 unit must be properly grounded at all times. Any interruption of the protective (grounding) connection inside or outside the equipment, or the disconnection of the protective ground terminal can make this equipment dangerous. Intentional interruption is prohibited.

Warning

Dangerous voltages may be present on the cables connected to the PL-400.

- **Never connect cables to a PL-400 unit if it is not properly installed and grounded.**
- **Disconnect all the cables connected to the electrical connectors of the PL-400 before disconnecting the power cable.**
- **Disconnect the power cable before removing a pluggable power supply unit.**

Before connecting any cables, the protective ground terminal of the PL-400 must be connected to a protective ground. For details, please refer to *Appendix A*.

The grounding connection is also made through the power cable, which must be inserted in a power socket (outlet) with protective ground contact. Therefore, the power cable plug must always be inserted in a socket outlet provided with a protective ground contact, and the protective action must not be negated by use of an extension cord (power cable) without a protective conductor (grounding).

Whenever PL-400 units are installed in a rack, make sure that the rack is properly grounded and connected to a reliable, low resistance grounding system.

Laser Safety Classification

PL-400 units equipped with laser devices comply with laser product performance standards set by government agencies for Class 1 laser products. The modules do not emit hazardous light, and the beam is off during all operating modes of customer operation and maintenance, until the operator changes the status of each laser to **Admin Up**.

PL-400 units are shipped with protective covers installed on all the optical connectors. Do not remove these covers until you are ready to connect optical cables to the connectors. Keep the covers for reuse, to reinstall the cover over the optical connector as soon as the optical cable is disconnected.

Laser Safety Statutory Warning and Operating Precautions

All the personnel involved in equipment installation, operation, and maintenance must be aware that the laser radiation is invisible. Therefore, the personnel must strictly observe the applicable safety precautions and in particular must avoid looking straight into optical connectors, either directly or using optical instruments.

In addition to the general precautions described in this section, be sure to observe the following warnings when operating a product equipped with a laser device. Failure to observe these warnings could result in fire, bodily injury and damage to the equipment.

Warning

To reduce the risk of exposure to hazardous radiation:

- **Do not try to open the enclosure. There are no user serviceable components inside.**
- **Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.**
- **Allow only authorized service technicians to repair the unit.**

Protection against Electrostatic Discharge (ESD)

An electrostatic discharge occurs between two objects when an object carrying static electrical charges touches, or is brought near, the other object. Static electrical charges appear as a result of friction between surfaces of insulating materials or separation of two such surfaces. They may also be induced by electrical fields.

Routine activities such as walking across an insulating floor, friction between garment parts, friction between objects, etc. can easily build charges up to levels that may cause damage, especially when humidity is low.

Caution

PL-400 internal boards contain components sensitive to ESD. To prevent ESD damage, do not touch internal components or connectors. If you are not using a wrist strap, before touching a PL-400 unit or performing any internal settings on the PL-400, it is recommended to discharge the electrostatic charge of your body by touching the frame of a grounded equipment unit.

Whenever feasible during installation, use standard ESD protection wrist straps to discharge electrostatic charges. It is also recommended to use either garments and packaging made of antistatic materials, or materials that have high resistance, yet are not insulators.

2.3 Site Requirements

Physical Requirements

The PL-400 can be installed in racks, on desktops and on shelves. All the connections are made to the front panel.

Power Requirements

AC-powered PL-400 units should be installed within 1.5m (5 feet) of an easily accessible, grounded AC outlet capable of furnishing the required AC supply voltage, of 100 to 240 VAC, 60/50 Hz and 0.7 A maximum.

DC-powered PL-400 units require a -48V DC, 1.2 A maximum DC power source with positive terminal grounded. In addition, the DC power connector contains the chassis (frame) ground terminal. For details, refer to *Appendix A*.

Optical Ports

This section presents general requirements regarding the connections to the various PL-400 interfaces. For specific information regarding the PL-400 connectors, refer to *Appendix A*.

The PL-400 unit has the following types of optical ports:

- Service/Uplink ports: Accept SFP transceivers
- COM/Amplifier ports: Fixed ports installed with covers and a special marking
- Passive MUX/DEMUX ports: Fixed ports with special connector for ribbon cable
- Optical Supervisory Channels ports: Accept SFP transceivers.
  - CWDM configuration: 1310 nm single mode SFP
  - DWDM configuration: 1510 nm single mode SFP

Transponder (Uplink/Service) Connections

The PL-400 contains sixteen transponder (Uplink/Service) ports. The following table provides information regarding the fiber and connector specifications for the transponder interfaces.

Table 2-1. Transponder/Service Interface Specifications

Specification	Requirement
Fiber type	Either single mode or multi-mode
Fiber size	2 mm optical fiber
Connector type	LC
Port Type	Any type of optical port with speeds between 100Mb/s and 4.25Gb/s (such as Ethernet, GbE, ESCON, FICON, FC-1G, FC-2G, FC-4G, STM-1, STM-4, STM-16).

In addition, the PL-400 supports Copper SFPs for 100/1000Base-T Ethernet services. In this case the connector type is RJ-45.

Table 2-2. Transponder Uplink Interface Specifications

Specification	Requirement
Fiber type	Single mode
Fiber size	2 mm optical fiber
Connector type	LC
Port type	CWDM/DWDM uplink

Each port has two optical connectors, one for the receive input and the other for the transmit output.

COM/Amplifier Connection

The COM port is connected internally to the MUX and DEMUX.

When the PL-400 contains EDFA, the EDFA output is connected internally to the COM port (TX path).

The following table provides information regarding the fiber and connector specifications for the COM/Amplifier interfaces.

Table 2-3. Amplifier Interface Specifications

Specification	Requirement
Fiber type	Single mode
Fiber size	2 mm optical
Connector type	LC with protective shutters or SC
Port type	Optical COM/Amplifier port

Passive MUX/DEMUX Connections

The passive MUX/DEMUX has two channel ports (marked MUX and DEMUX) and one common port (marked COM).

The MUX and DEMUX ports are connected to the external ribbon cable.

The following table provides information regarding the fiber and connector specifications for the passive MUX/DEMUX channel interfaces.

Table 2-4. Passive Interface Specifications

Specification	Requirement
Fiber type	Single mode
Fiber size	2 mm optical fiber
Connector type	MUX/DEMUX: MTP/APC Male
Port type	MUX/DEMUX connections

Optical Supervisory Channel Ports

There are two optical supervisory channel ports. These ports are used for in-band management. The ports are connected via the ribbon cable to the MUX/DEMUX.

Table 2-5. Passive Interface Specifications

Specification	Requirement
Fiber type	Single mode • 1310 nm CWDM configuration • 1510 nm DWDM configuration
Fiber size	2 mm optical fiber
Connector type	LC
Port type	Optical Supervisory channel

Supervisory Terminal Port Connections

The PL-400 contains two supervisory terminal interfaces:

- CONTROL port: This port can be directly connected to terminals using a cable wired point-to-point (see *Appendix A*).
- ETH: This port allows out-of-band access to a remote supervisory terminal.

The following tables provide information regarding the specifications for the supervisory port interfaces.

Table 2-6. CONTROL Interface Specifications

Specification	Requirement
Interface type	Serial RS-232 asynchronous DCE
Connector type	9-pin D-type female

Table 2-7. ETH Interface Specifications

Specification	Requirement
Interface type	10/100 Base T
Connector type	RJ-45 Category 5

Front and Rear Panel Clearance

Allow at least 90 cm (36 inches) of frontal clearance for operator access and at least 15 cm (5.9 inches) of rear clearance for proper fans ventilation.

Ambient Requirements

The ambient operating temperature of the PL-400 is 0°C to 50°C (32°F to 122°F), at a relative humidity of up to 90%, non-condensing.

The PL-400 is cooled by free air convection, and in addition, has internal cooling fans. The air intake vents are located on the rear side. Do not obstruct these vents.

The PL-400 contains FAN speed control for lower noise, improved MTBF and power save.

Electromagnetic Compatibility Considerations

The PL-400 is designed to comply with the electromagnetic compatibility (EMC) requirements of Sub Part J of FCC Rules, Part 15, for Class B electronic equipment and additional applicable standards. To meet these standards, the following conditions are necessary:

- The PL-400 must be connected to a low resistance grounding system.
- Whenever feasible, shielded cables must be used.

2.4 Package Contents

The PL-400 package includes the following items:

- PL-400 unit
- Ribbon cable (in case the PL-400 contains a MUX/DEMUX)
- 3m RS-232 terminal cable
- Power cord
  - AC power – 3m power cord equipped with the appropriate plug, depending on customer location.
  - DC power – The DC power cord is included.
- Kit for rack installation (if ordered) – 600mm ETSI, 23" or 19"
- DESI PAK and humidity indicator
- Technical Documentation CD

2.5 Equipment Needed

The cables you need to connect to the PL-400 depend on the PL-400 application. You can use standard cables or prepare the appropriate cables yourself in accordance with the information given in *Appendix A*.

2.6 PL-400 Front Panels

The following figures illustrate PL-400 front panels.

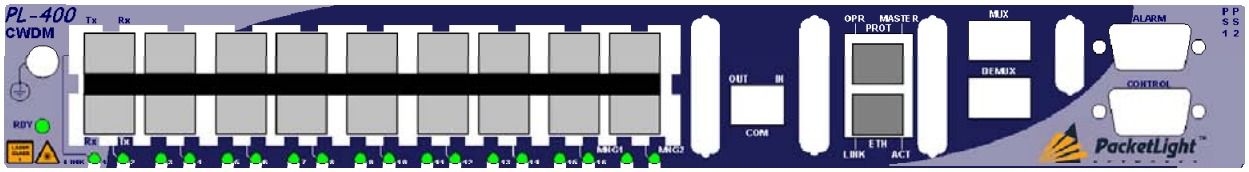


Figure 2-1. PL-400 T Front Panel

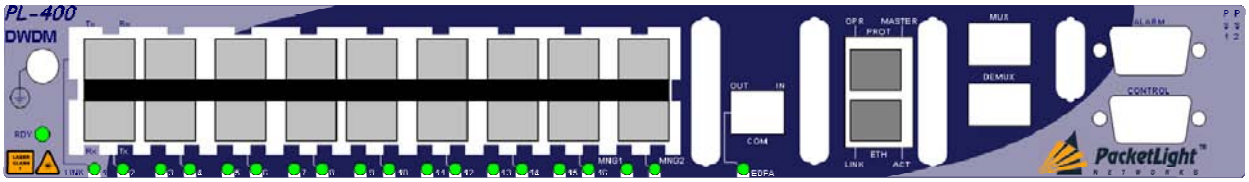


Figure 2-2. PL-400 TB Front Panel

The front panel contains the following connectors:

- Sixteen Transponder (Service/Uplink) interfaces labeled “LINK”.

  Each pair of ports (LNK1/LNK2, LNK3/LNK4, and so on) serves as a single transponder: the even ports are the service interfaces (such as FC, Gbe, ESCON), while the odd ports are the uplink interfaces.

- Two passive MUX/DEMUX interfaces labeled “MUX” and “DEMUX”.

  A ribbon cable is connected to the “MUX” and “DEMUX” interfaces.

  The ribbon is composed of three parts:

  1. One MTP/APC female connector, which is marked “MUX” and is connected to the “MUX” interface.
  2. One MTP/APC female connector, which is marked “DEMUX” and is connected to the “DEMUX” interface.
  3. Nine pairs (TX & RX) of LC connectors, which are marked λ1 – λ8 and MNG. These LC connectors are connected to the WDM uplink ports and to an OSC port.

- One passive MUX common interface labeled “COM”,

  The common interface connects the multiplexed output to the line.

  When the PL-400 contains EDFA amplifier (PL-400 TB), the “COM” interface is connected to the output of the EDFA internally.

  The connections between the optical interfaces are illustrated in the following figure:

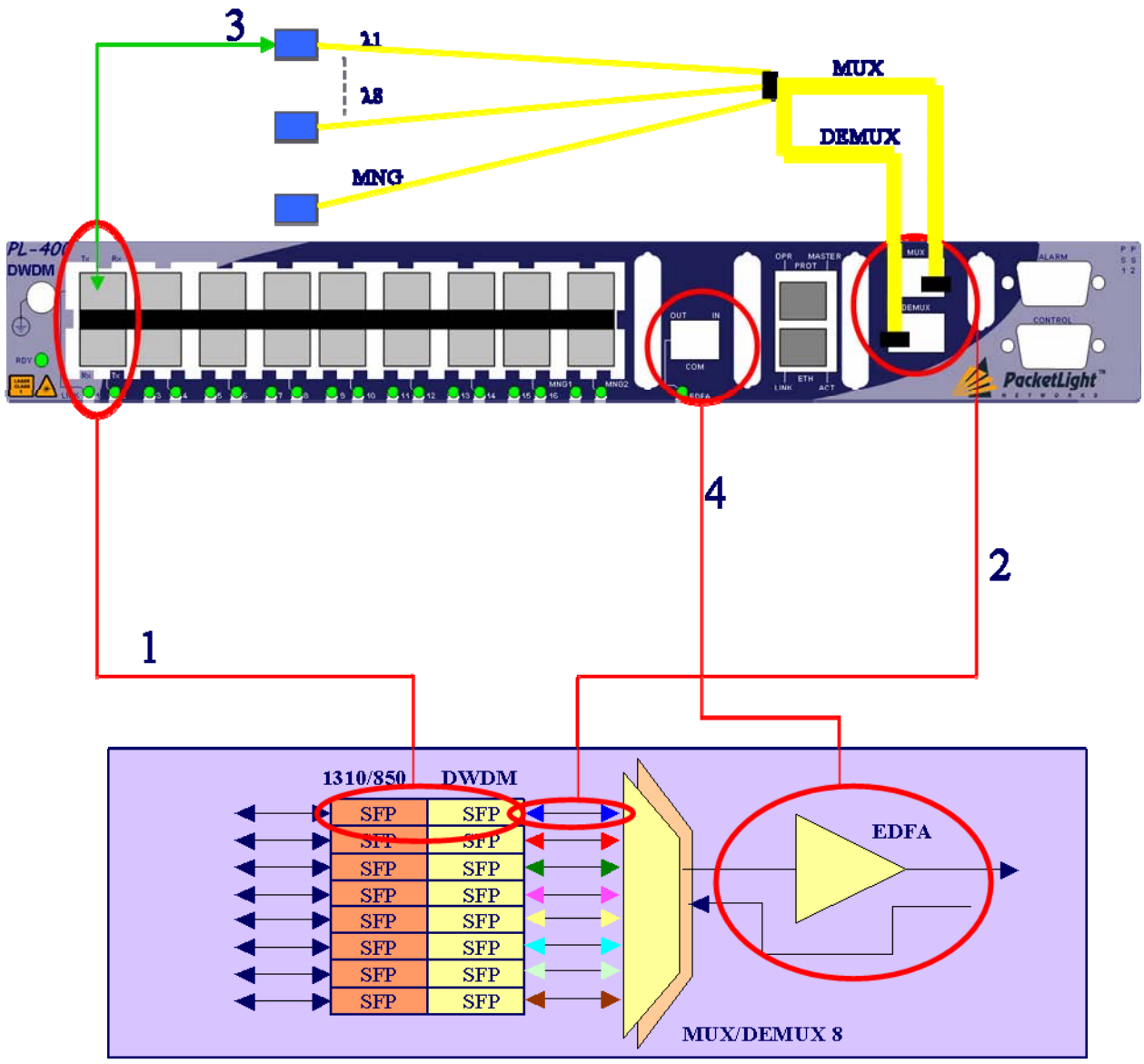


Figure 2-3. Connections between Optical Interfaces

- #1: Pairs of LINK ports
- #2: MUX and DEMUX ports
- #3: Connecting the relevant LC connector of the DEMUX ribbon cable to the Uplink port
- #4: COM/EDFA port

- Two Optical Supervisory Channels labeled “MNG1” and “MNG2”
- 10/100 BaseT LAN connector labeled “ETH”
- Equipment Protection connector labeled “PROT”
- CONTROL connector: RS-232 interface
- External alarms connector labeled “ALARMS”

- Power connections

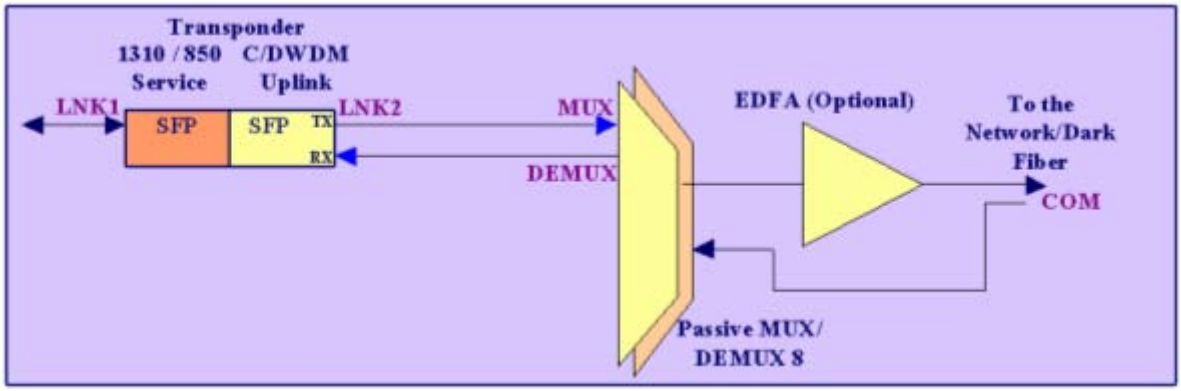


Figure 2-4. Connections and Naming of Optical Interfaces

Table 2-8 explains the functions of all the indicators located on the PL-400 front panel.

Table 2-8. PL-400 Front Panel Indicators

Group	Item	Function
System Indicators	**RDY** Indicator (Green/Red)	• Green: No failure detected • Green blinking: Powerup stage • Red: Major or minor alarm detected
LINK Port Indicators	**LNK** Indicator (Green/Red)	• Green: No failure detected • Red: Major or minor alarm detected
OSC Port Indicators	**MNG** Indicator (Green/Red)	• Green: No failure detected • Red: Major or minor alarm detected
ETH Port Indicators	**LINK** Indicator (Green)	Lights when the link integrity signal is detected by the corresponding LAN port (normal operating condition)
	ACT Indicator (Yellow)	Blinks in accordance with the transmit and/or receive activity on the port.

Group	Item	Function
PROT Port Indicators	**OPR** Indicator (Green)	Not implemented in this version
	MASTER Indicator (Yellow)	Not implemented in this vesion
Amplifier	**EDFA**	• Green: Normal operation • Red: EDFA failure
PSU Indicators	**PWR** Indicators (Green/Red)	• Green: Normal operation • Red: PSU failure

2.7 Installing the PL-400 Unit

Caution Before installing a PL-400 unit, review the safety precautions in *Section 2.2*.

PL-400 units are intended for installation on desktops, shelves or in 19" racks.

Do not connect the power before the unit is in the designated position.

Cable Connections, General

Before starting, refer to the site installation plan and identify the cables intended for connection to this PL-400 unit. Refer to *Appendix A* for connector pinouts.

For general information regarding the required connections, refer to *Section 2.3*.

General Optical Cable Handling Instructions

When connecting optical cables, make sure to prevent cable twisting and avoid sharp bends. Unless otherwise specified by the optical cable manufacturer, the minimum fiber bending radius is 35 mm. Always leave some slack, as to prevent stress.

It is recommended that you install plastic supports on each cable connector. These supports determine the fiber bending radius at the connector entry point and also prevent stress at this point.

Caution

Make sure all the optical connectors are closed at all times, either by the appropriate protective caps, or by the mating cable connector.
Do not remove the protective cap until an optical fiber is connected to the corresponding connector, and immediately install a protective cap after a cable is disconnected.

Before installing optical cables, it is recommended to thoroughly clean their connectors using an approved cleaning kit.

Connecting PL-400 to Ground and Power

Any interruption of the protective (grounding) conductor (inside or outside the device) or disconnecting the protective earth terminal can make the device dangerous. Intentional interruption is prohibited.

Grounding

Before switching this PL-400 unit on and connecting any other cable, the PL-400 protective ground terminals must be connected to protective ground. This connection is made through the AC or DC power cable.
The power cord plug should only be inserted in an outlet provided with a protective ground (earth) contact. The protective action must not be negated by using an extension cord (power cable) without a protective conductor (grounding).

Warning

Dangerous voltages may be present on the cables connected to the PL-400:

- **Never connect cables to a PL-400 unit if it is not properly installed and grounded. This means that its power cable must be inserted in an outlet provided with a protective ground (earth) contact before connecting any user or network (network) cable to the PL-400.**
- **Disconnect all the cables connected to the connectors of the PL-400 before disconnecting the PL-400 power cable.**

Caution

PL-400 does not have a power on/off switch, and therefore it will start operating as soon as power is applied. It is recommended to use an external power on/off switch, which disconnects all poles simultaneously, to control the connection of power to the PL-400.
For example, the circuit breaker used to protect the supply line to the PL-400 may also serve as the on/off switch. This type of circuit breaker should be rated 1.2A.

Power should be supplied to the PL-400 through a power cable terminated in an appropriate plug, in accordance with the required power source.

➔ **To connect PL-400 power and ground:**

1. Connect one end of the power cable to each PL-400 power connector.
2. When ready to apply power, insert the plug at other end of the power cable into a socket (outlet) with a protective ground contact.

   The PWR indicator of the PL-400 illuminates.

Cabling the Passive MUX/DEMUX Ports

➔ **To connect cables to the PL-400 passive MUX/DEMUX ports:**

1. Remove the protective plug from the desired passive MUX port (MUX or DEMUX).
2. Connect the ribbon cables (which are supplied separately) to the MUX and DEMUX ports.

Cabling the Transponder (Link) Ports

Remember that the LINK ports are configured in pairs, with each pair of ports acting as a single transponder, as follows:

- Uplink interfaces: Odd ports (LNK1, LNK3, LNK5, LNK7, LNK9, LNK11, LNK13, LNK15)
- Service interfaces: Even ports (LNK2, LNK4, LNK6, LNK8, LNK10, LNK12, LNK14, LNK16)

Each LINK interface has two connectors, marked Tx and Rx.

➔ **To connect optical cables to the PL-400 uplink port:**

1. Remove the protective plug from the desired odd-numbered LINK port and insert an SFP transceiver. You can place the uplink SFP transceiver in any even-numbered port.
2. Connect the port to either the appropriate remote equipment or the passive MUX interface as follows:
   - Tx connector (transmit fiber) to receive input of the remote equipment, and Rx connector (receive fiber) to transmit output of the remote equipment.

     OR

- Plug the suitable LC connector from the ribbon cable, which is attached to the MUX and DEMUX ports, into the uplink port. Use the management GUI to determine which LC connector to use. The management GUI maps the LC connectors of the ribbon cable to the uplink SFP, according to the SFP unique wavelength and the name tags on the LC connectors.

  Always leave enough slack to prevent strain.

➔ **To connect cables to a PL-400 service port:**

1. Remove the protective plug from the desired service even-numbered LINK port and insert an SFP transceiver.
2. Connect the port to the appropriate remote equipment as follows:
   - Tx connector (transmit fiber) to receive input of the remote equipment
   - Rx connector (receive fiber) to transmit output of the remote equipment

     Always leave enough slack to prevent strain.

Management Connections

➔ **To cable the PL-400 Optical Supervisory Channel port:**

1. Remove the protective plug from the selected Optical Supervisory Channel port (MNG1 or MNG2) and insert an SFP transceiver.
2. Connect the port to the passive MUX interface, using the LC connector which is marked “MNG” over the ribbon cable.

➔ **To cable the PL-400 supervisory port:**

- Connect the local console to the 9-pin CONTROL port using a straight cable (a cable wired point to point).

  For specific information regarding pin allocations in the PL-400 connectors, refer to *Appendix A*.

➔ **To cable the PL-400 management port:**

- Connect the 10/100BaseT ETH port to the local LAN using a cable with an RJ-45 connector.

  For specific information regarding pin allocations in the PL-400 connectors, refer to *Appendix A*.

Chapter 3

Operation and Preliminary Configuration

3.1 Scope

This chapter provides general operating instructions and preliminary configuration instructions for PL-400 units. It also explains how to log in to the SurfLight management application.

3.2 Operating Instructions

Configuring the Terminal

➔ **To prepare the PL-400 for first-time turn-on:**

1. To enable monitoring the PL-400 during configuration, connect a terminal to the CONTROL connector of the PL-400, using a straight (point-to-point) cable.

   Any standard ASCII terminal (dumb terminal or personal computer emulating an ASCII terminal) equipped with an RS-232 communication interface can be used for PL-400 preliminary configuration. Make sure to use VT-100 terminal emulation.

2. Check that the installation and the required cable connections have been correctly performed in accordance with *Chapter 2*.

3. To monitor the PL-400, configure the terminal as follows:
   - 9600 kbps
   - One start bit
   - Eight data bits
   - No parity
   - One stop bit

- Full-duplex
- Echo off
- Disable any type of flow control

Turning on the PL-400

➔ **To turn on the PL-400:**

Caution PL-400 does not have a power on/off switch, and therefore it will start operating as soon as power is connected.

1. Connect the PL-400 to the power source (see detailed instructions in *Chapter 2*).

   The Power LED illuminates. The RDY indicator flashes during boot. The other indicators (except ETH and PWR) remain off while RDY flashes.

2. Wait for the completion of the power-up initialization and LED testing. This takes about one minute.

   Following power-up initialization and LED testing, the RDY indicator lights steadily, and the other indicators display the PL-400 status.

Preliminary Configuration

The Ethernet port IP address must be configured via the terminal in order to support the Web-based application:

Refer to *Table 3-1* for an explanation of the command attributes.

Note *As an alternative to using a local terminal, the first time preliminary configuration can also be performed via Telnet, using the default IP address* ***192.192.192.1*** *and Subnet mask* ***255.255.255.0****.*

➔ **To configure the IP addresses for Web access:**

- At the prompt, type the following CLI command:
  `configure interface ethernet ip <addr> [-n <netmask>] [-g <gateway>]`

  Example: To configure the IP address to **`192.168.0.100`** with mask **`255.255.255.0`**, use the command:
  `configure interface Ethernet ip 192.168.0.100 -n 255.255.255.0`

Table 3-1. Configure Interface Command Options

Attribute Name	Description	Legal Values
<addr>	IP address	Dot notation (192.168.0.1)
<netmask>	Subnet mask	Either of the following formats: • Dot notation (255.255.0.0) • Hexadecimal notation (ffff0000) • Default = subnet mask of the IP class corresponding to the specified address
<gateway>	Gateway IP address	Dot notation (192.168.0.1)

Accessing SurfLight

Web Browser Requirements

The following are the Web browser requirements:

- Internet Explorer version 6 or above, running on Windows™ 2000 or Windows™ XP
- Mozilla FireFox version 1.5 or above, running on Windows™ 2000 or Windows™ XP

The Web user interface enables user configuration via HTTP client (using default IP address **192.192.192.1** and Subnet mask **255.255.255.0**).

The default address can be changed by the user.

If a different IP address is desired, it is necessary to configure the Ethernet port interface IP address of the PL-400 before accessing the Web (see *Preliminary Configuration* page *3-2*).

Logging in to SurfLight

Before starting, make sure you know the IP address of the PL-400.

➔ **To log in to SurfLight:**

1. Open the Web browser.
2. Disable any pop-up blocking software, such as Google Popup Blocker.
3. Enter the IP address of the PL-400 in the address field of the browser in the following format:

   http://IP_address (**'IP_address'** stands for the actual PL-400 IP address)**.**
4. After entering the address, press <**Enter**> to command the browser to connect.

   The Login window appears.

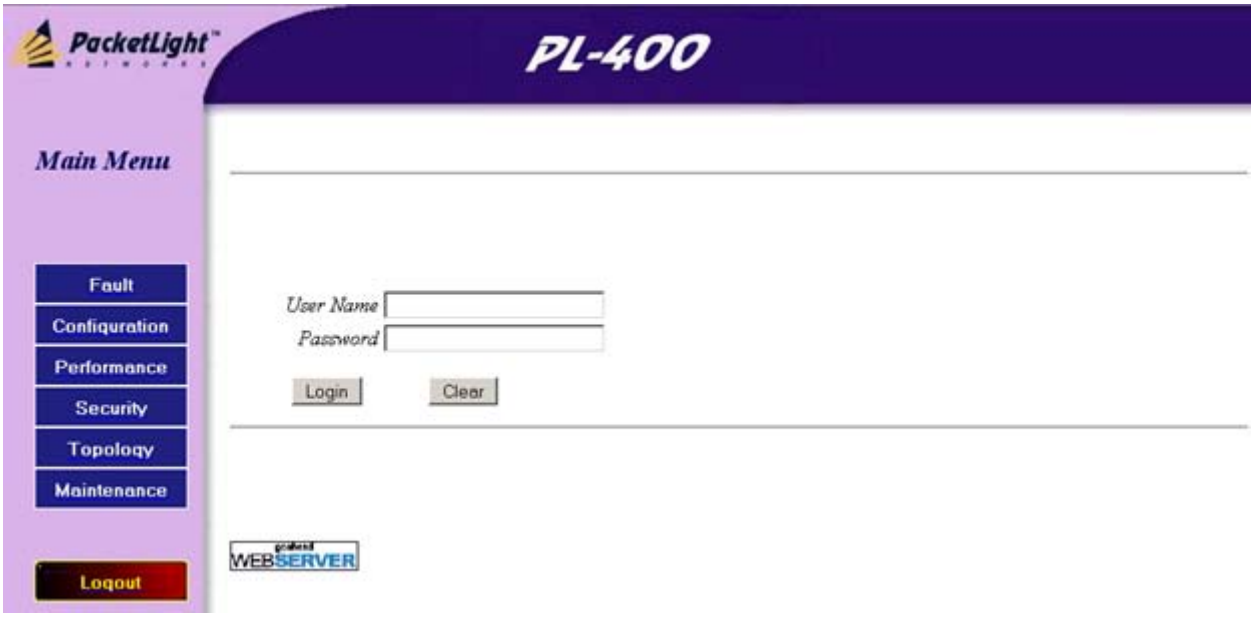


Figure 3-1. Web Browser Access, Typical Login Window

5. Enter your username and password in the appropriate boxes and click **Login**.
6. Use standard browser operating procedures to perform the desired activities.

SurfLight Access Levels

PL-400 supports the following access levels for specific users:

- Administrator: Access and editing rights for all functions.
  - Default administrator username: admin
  - Default administrator password: admin

    For security reasons, it is recommended to change the **admin** password.
- Read-only: View menus only, no editing
- Read/Write: View menus and manage PL-400. Cannot manage users.

The administrator can add and remove users, as well as change passwords and assign access level. The administrator cannot remove the **admin** user.

Each user can change their password (see *Chapter 4* for detailed instructions).

Note

- *The user name as well as the password are case sensitive.*
- *If the administrator password has been changed and is not known, contact Technical Support for help.*

Chapter 4

Managing the PL-400 Using SurfLight

The configuration and management of PL-400 is performed via SurfLight, the WEB-based management application. *Chapter 3* explains the initial configuration of the PL-400 via a local terminal and the procedure for logging in to SurfLight.

4.1 Scope

This chapter describes how to manage the PL-400 using SurfLight. SurfLight allows you to perform the following:

- Configuration
  - Configure the PL-400 system
  - Configure a selected interface
  - Enable/disable a selected port
- Performance Monitoring
  - View the performance counters of a selected service port
- Security
  - Manage users and passwords
- Topology
  - View the topology of PL-400 nodes
- Maintenance
  - Perform maintenance tasks such as system restart
  - Perform software download

For information regarding fault management, performance monitoring and diagnostics, refer to *Chapter 6*.

4.2 Configuration

Use the SurfLight **Configuration** options to configure the PL-400 ports, provide identifying information for the PL-400 unit and view current configuration of the individual ports and the system.

You can configure/view configuration for the following entities using SurfLight:

- **System**
  - View system information, such as version and IP addresses
  - Configure identifying information for the PL-400 unit
  - Configure SNMP entities
- **Service (Transponder) Port**
  - View port status
  - Configure the service type
  - View SFP information
  - Enable/disable port
- **EDFA Port**
  - View port status
  - Configure the port mode and related properties
  - Enable/disable port
- **MUX Port**
  - View channel wavelength configuration
- **Optical Supervisory Channel (OSC) Port**
  - View port status
  - View SFP information
  - Enable/disable port
- **Ethernet Port**
  - View port properties

General System Configuration

Following is the general procedure for configuring the components of the PL-400, or for viewing the current configuration. The specific procedure for configuring the optical ports (uplink and service) is described after the general procedure.

™ **To configure/view configuration for the PL-400:**

1. From the buttons on the left-hand side of the SurfLight window, click **Configuration**.

   The Configuration window is displayed.

2. Click the desired button in the upper portion of the window to select the entity to configure/view configuration:
   - System (See *Figure 4-1*. Fields available for editing are explained in *Table 4-1*.)
   - Port 1 – Port 16 (Service/Uplink Ports) (See *Figure 4-3*. Fields available for editing are explained in *Table 4-3*.)
   - EDFA Port (See *Figure 4-7*. Fields available for editing are explained in *Table 4-5*.)
   - MUX Port (See *Figure 4-8*. All fields are read only.)
   - MNG Port (See *Figure 4-3*. Fields available for editing are explained in *Table 4-3*.)
   - Ethernet Port (See *Figure 4-10*. All fields are read only.)
3. Fill in the fields in the window as explained in the appropriate table. Note that some fields are read only.
4. When all information is provided, click **Apply**.

   The selected configuration parameters are applied.

System Configuration Window

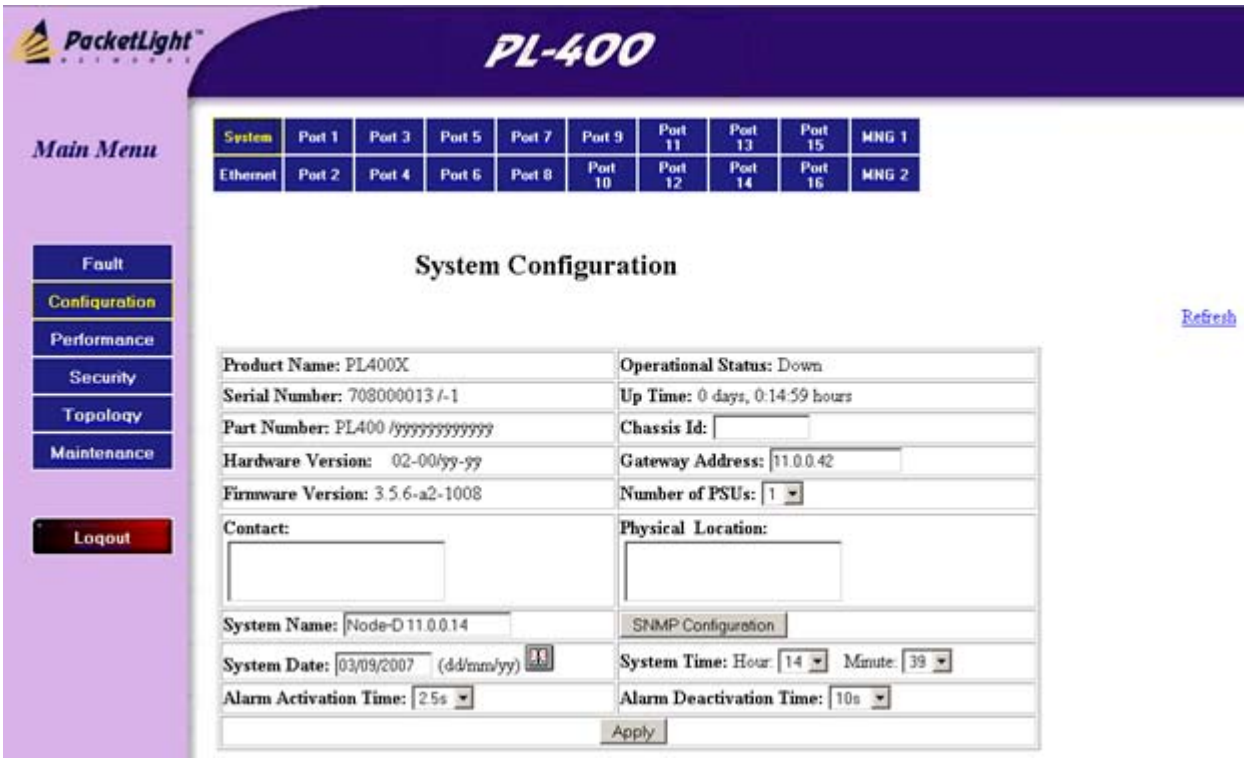


Figure 4-1. Configuration: System Window

Table 4-1. Configuration: System Parameters

Parameter	Description	Format/Values
Number of PSUs	The number of power supply units in the PL-400.	1 or 2
System Name	Logical name given to the PL-400.	Free Text
Contact	Contact information for reaching technical support.	Free Text
Physical Location	Address of the site.	Free Text
Gateway Address	The IP address of the default gateway	Dot notation (10.0.0.1)
Chassis ID	Optimization the topology display	1,2…

Parameter	Description	Format/Values
System Date	Sets the current system date.	DD-Month-YYYY *or* select a date from the calendar
System Time	Sets the current system time of day.	Select Hour/Minutes from the drop-down lists
Alarm Activation Time	Time from defect detection till report, if defect is still constantly detected. **Note**: Recommended not to change.	1-10 seconds Default: 2.5 seconds
Alarm Deactivation Time	Time from no defect detection till report, if defect is still constantly not detected. **Note**:Recommended not to change.	1-20 seconds Default: 10 seconds

™ **To configure an SNMP entity:**

1. From the System Configuration window, click **SNMP Configuration**. The SNMP Configuration window is displayed.
2. Fill in the fields in the window as explained in *Table 4-2*.
3. To add a configuration, click **Add**.
4. To delete a configuration, click **Delete**.

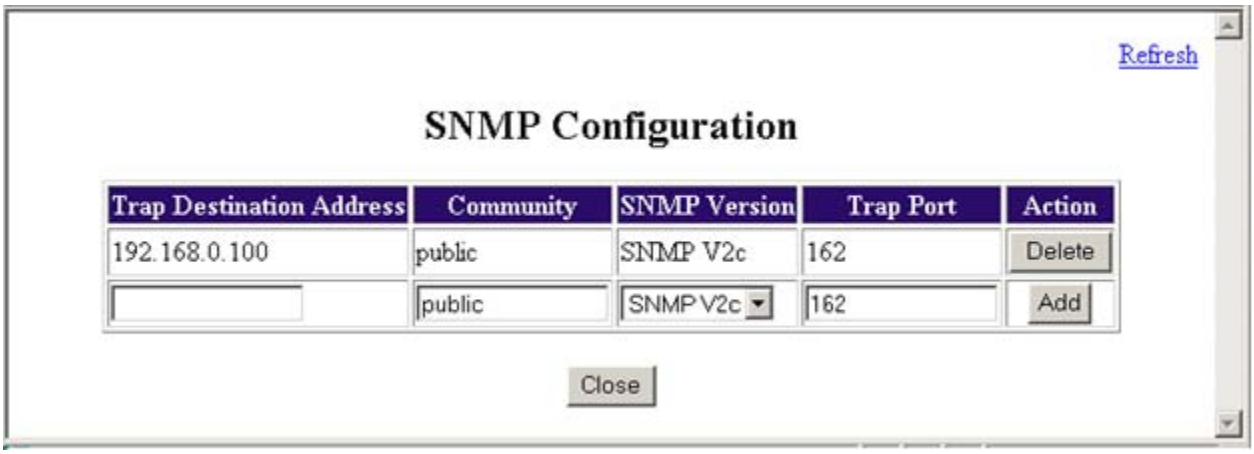


Figure 4-2. Configuration: SNMP Configuration Window

Table 4-2. Configuration: SNMP Configuration Parameters

Parameter	Description	Format/Values
Trap Destination Address	The IP destination address for the SNMP traps.	IP address format For example: `192.168.0.100`
Community	Community string.	Free text
SNMP Version	SNMP trap format.	• SNMPV2c (default) • SNMPV1
Trap Port	UDP port number.	162 (default)

Transponder Port Configuration Window

Click any of the **Port** buttons to configure the selected LINK port.

In Transponder configuration, the ports are organized in pairs, with each pair functioning as one transponder. The even-numbered ports are the service ports, and the odd-numbered ports are the WDM uplink ports. In this way, ports 1 and 2 create one transponder pair; ports 3 and 4 create another transponder pair, and so on.

When the **Service Type** is configured for the first port in a pair, the system automatically assigns the same Service Type to the second port in the pair. The second port in the pair is displayed in the **Port Mate** field.

You can display information about the type and status of the SFP transceiver inserted in the selected port by clicking **SPF Information**.

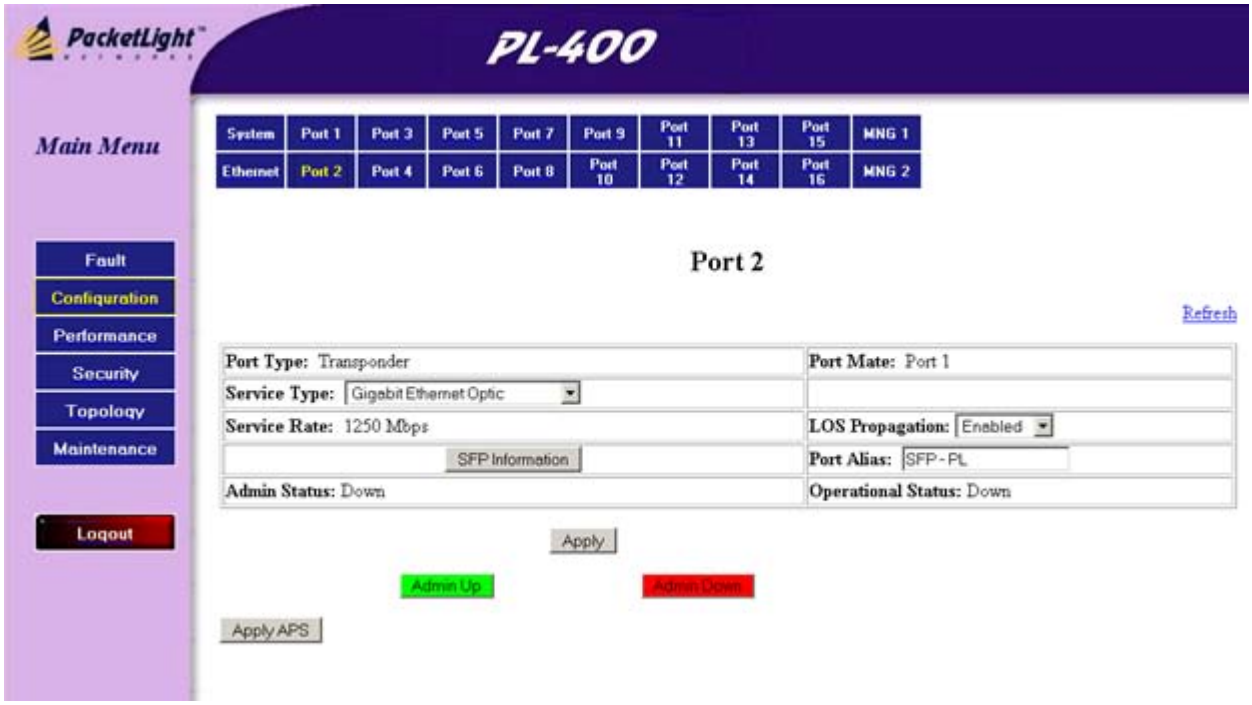


Figure 4-3. Configuration: Service Port Window

Table 4-3. Configuration: Service Port Parameters

Parameter	Description	Format/Values
Service Type	Interface type/speed.	• 1G FC/FICON • 2G FC/FICON • 4G FC/FICON • ESCON • 2.5G InfiniBand • Fast Ethernet Optic • Fast Ethernet Copper • Gigabit Ethernet • OC-3/STM-1 • OC-12/STM-4 • OC-48/STM-16 & 2.4G GPON • 2.66G OTN (OTU1) • DVB-ASI 270M • SMPTE-SDI 540M • 1.244G GPON • Other (Bypass)
LOS	Enable or Disable LOS	Enable,Disable

Parameter	Description	Format/Values
Propogation	Propogation	
Port Alias	Logical name given to the port for identification purposes.	Free Text

™ **To display information about the SFP transceiver installed in a selected port:**

1. From the buttons on the left-hand side of the SurfLight window, click **Configuration**.

   The Configuration window is displayed.

2. Click the appropriate **Port** button in the upper portion of the window to select the desired LINK port.

3. Click **SPF Information**.

   The Sfp Information window is displayed.

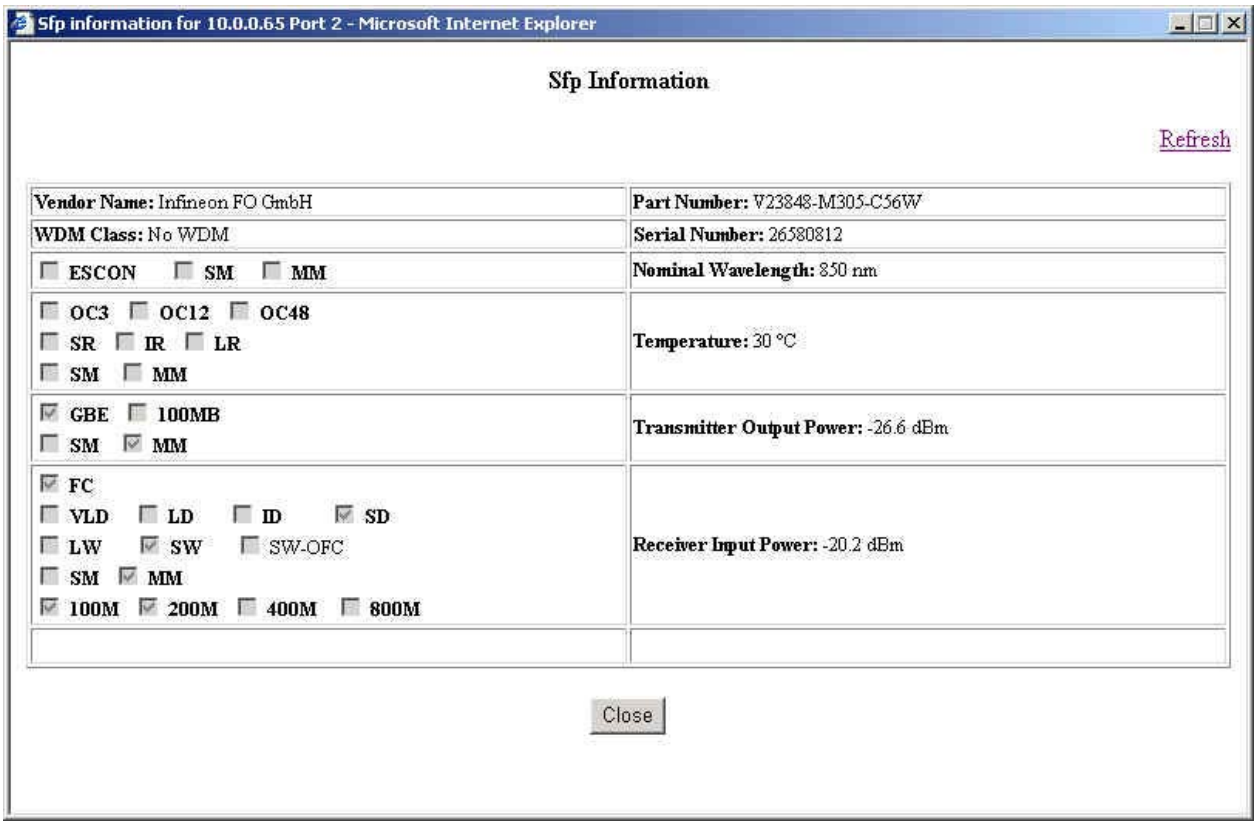


Figure 4-4. Configuration: Sfp Information Window

APS Configuration

The PL-400 supports Uni-directional, Non-revertible, 1+1 channel, Automatic Protection Switching (APS). This protection scheme is called Facility Protection because it ensures service continuity in case of fiber break or failure of an Uplink SFP.

An APS with a group of three ports consists of one Service port and two Uplink ports. The Service ports that can be included in an APS are 2, 6, 10 and 14. For each protected Service port there are two pre-assigned protecting Uplink ports:

1) **Working port** - The port above the Service port

2) **Protection port** - The port to the right of the Working port

When an APS is defined, the port to the right of the Service is disabled.

It is impossible to change port parameters while they are participating in an APS group. In order to make changes, you need to first remove the APS, then perform the desired changes and then re-apply the APS.

Up to 4 protected services are supported. The following figure shows the potential APS groups.

Figure 4-5. Potential APS Groups

The APS is supported for both Point-to-Point (PTP) and Ring topologies. The protected topologies are based on 2 x MUX-4 (+1 for the OSC).

The following APS configurations are supported:

- 1 Protected Service + 6 x Unprotected Services
- 2 Protected Services + 4 x Unprotected Services
- 3 Protected Services + 2 x Unprotected Services

™ **To define a protected service channel:**

1. Select a link port.
2. Press **Apply APS**.

   The new APS Configuration table is displayed (see *Figure 4-6*).
3. Fill in the fields in the window as explained in *Table 4-4*.

4. When all the information is provided, click **Apply**.
   The selected configuration parameters are applied.

™ **To delete an APS:**

1. Select one of the ports that participate in the APS group.
2. Press **Stop APS**.

After defining an APS, the new APS Configuration table is displayed.

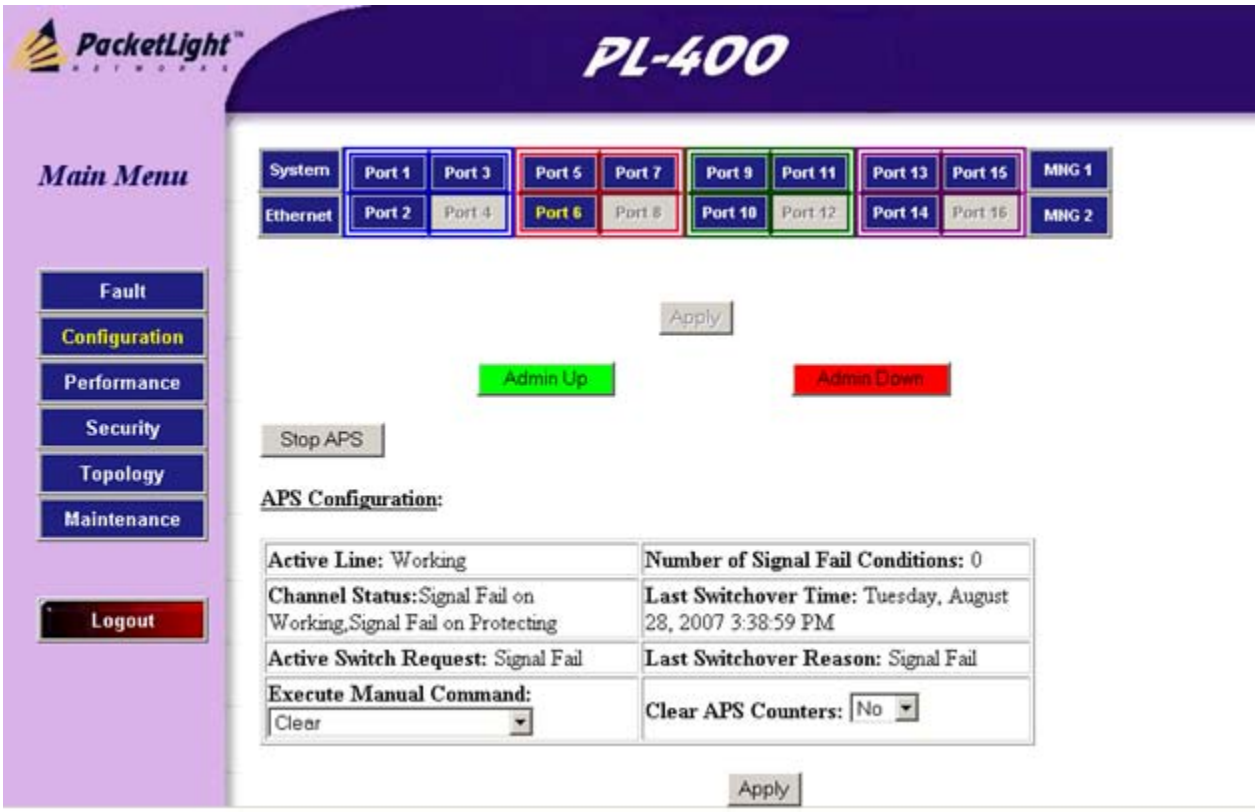


Figure 4-6. Configuration: APS Configuration Window

Table 4-4. Configuration: APS Configuration Parameters

Parameter	Description	Format/Values
Active Line	The current active uplink	Working, Protection
Channel Status	The current APS channel status	Any combination of the following values: • Locked Out (avoiding Protection) • Failure on Working • Failure on Protection • Switched (to Protection)
Active Switch Request	The currenly affective switch request	• Manual Switch • Signal Failure

Parameter	Description	Format/Values
		• Force Switch • Lock Out
Number of Signal Fail Conditions	The number of times the Signal Fail condition occured	A numerical digit
Last Switchover Time	The time of the last switch over event	Dater and time
Last Switchover Reason	The reason for the last switchover	• Manual Switch • Signal Failure • Force Switch • Lock Out
Execute Manual Command	Manual APS commands	• Clear (default) Clears the last APS switch command. • Lockout of Protection Blocks any switch from protection. • Force Switch to Protecting Forces switch to protecting in any condition. • Force Switch to Working Forces switch to working in any condition. • Manual Switch to Protecting Switches to protecting only if the protecting uplink is OK. • Manual Switch to Working Switches to working only if the working uplink is OK.
Clear APS Counters	Clears the APS counters	• No: (default) Do not clear APS counters. • Yes Clear the APS counters.

EDFA Port Configuration Window

Up to two EDFA unit may be assembled in a PL-400 system.

The following figure shows a system with a single EDFA.

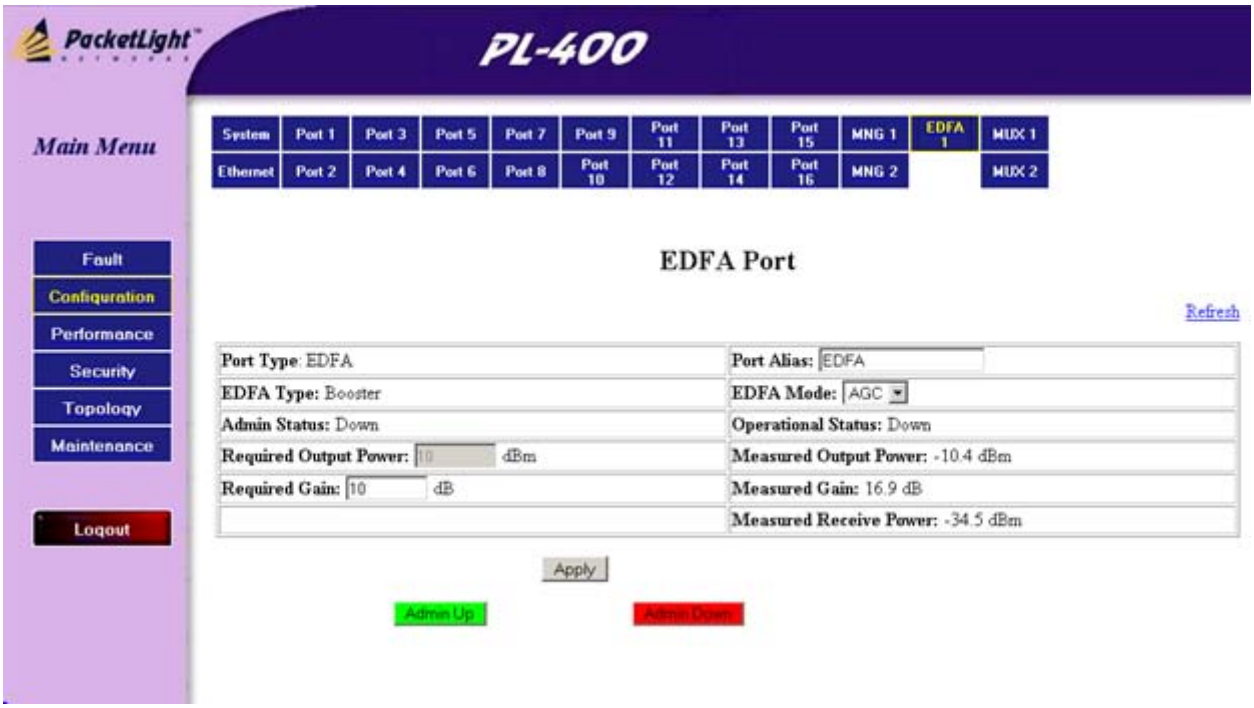


Figure 4-7. Configuration: EDFA Port Window

Table 4-5. Configuration: EDFA Port Parameters

Parameter	Description	Format/Values
EDFA Mode	Selected amplification mode. The other available fields vary depending on which EDFA mode is selected.	• AGC (recommended): Automatic Gain Control, gain remains contstant. • APC: Automatic Power Control, output power remains constant.
Required Output Power *Only if EDFA mode = APC*	Specifies the required constant power.	3.0-17.0dBm
Required Gain *Only if EDFA mode = AGC*	Specifies the required constant gain.	10.0-20.0 dB

MUX Configuration Window

Up to two MUX components may be assembled in a PL-400 system. The MUX configuration displays the wavelengths of the WDM uplink channels; there are no configurable parameters.

The LC connectors of the ribbon cable are marked λ1 to λ8, and MNG. The MUX Configuration window shows which λ belongs to which channel/wavelength within the MUX, so you can connect the right ribbon cable LC connector to the right WDM SFP.

The wavelengths of the SFPs are provided in the **SPF Information** window.

The following figure shows a system with two MUX components.

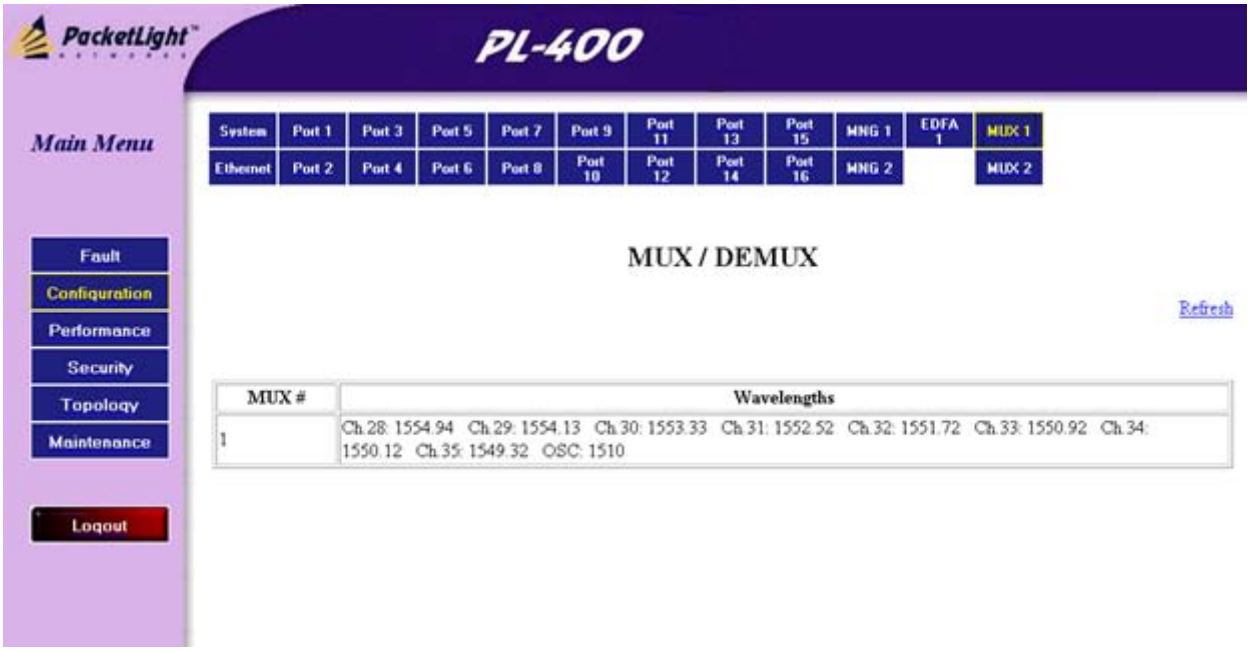


Figure 4-8. Configuration: MUX Port Window

OSC Port Configuration Window

The PL-400 has two OSC ports (MNG1 and MNG2). These ports enable remote management by extra dedicated wavelength, which is connected to the Mux/Demux. In point-to-point topology without protection, only one OSC port is needed on each side (it can be either of the two). For a protected point-to-point both OSC ports should be used.

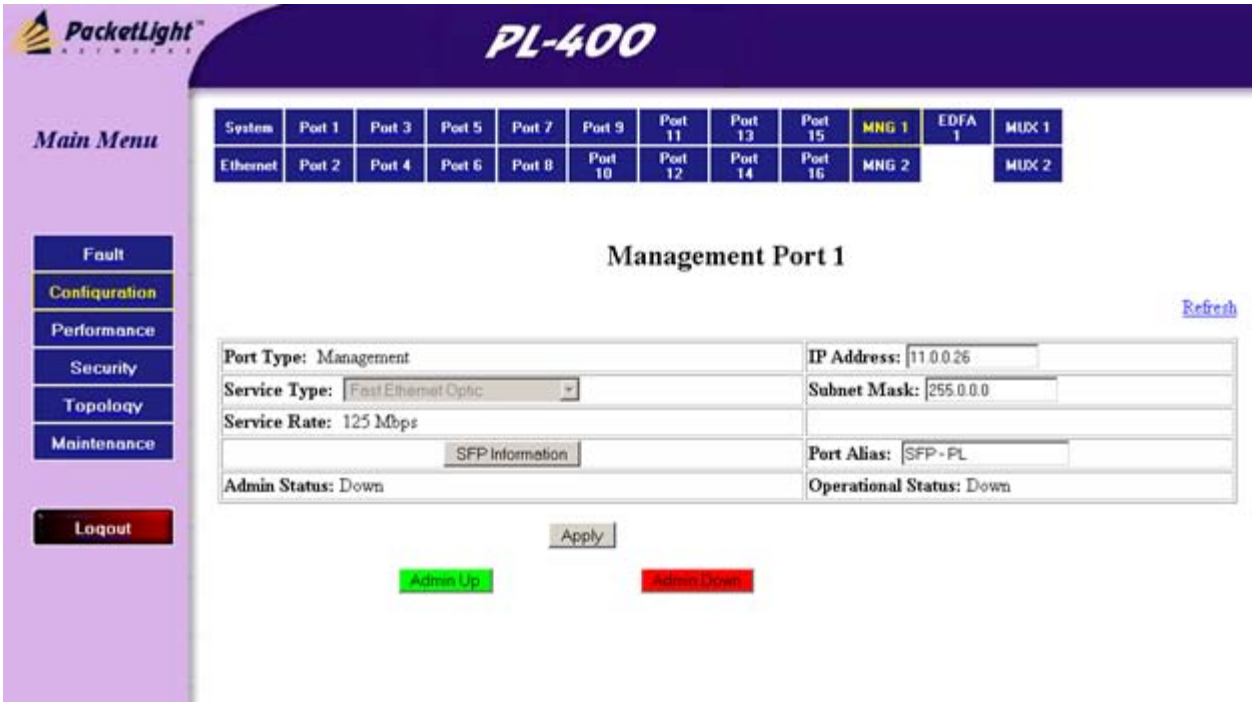


Figure 4-9. Configuration: OSC Port Window

™ **To configure an MNG port:**

1. From the System Configuration window, click on the relevant MNG port.

   The MNG Configuration window is displayed, see *Figure 4-9*.

2. Fill in the fields in the window as explained in *Table 4-6*.

Table 4-6. Configuration: MNG Configuration Parameters

Parameter	Description	Format/Values
IP Address	The IP address of the OSC management port	Dot notation (10.0.0.1) The address is the same for both MNG ports
Subnet Mask	The subnet mask of the OSC management port	Dot notation (255.255.0.0)
Port Alies	Port name	Free text

Management Network Protection

PL-400 supports facility protection for the management network, when the two OSC ports are active and there is more than one management route between the nodes.

The PL-400 uses the standard Rapid Spanning Tree Protocol (RSTP) protocol to uniquely determine the route for the management traffic between the nodes, and to dynamically change the management route should a facility failure occur.

™ **To display information about the SFP transceiver installed in a selected MNG port:**

- From the PSC Port Window (see *Figure 4-9*), click <**SFP Information**>.

Ethernet Port Configuration Window

The Ethernet port configuration is read only; there are no configurable parameters.

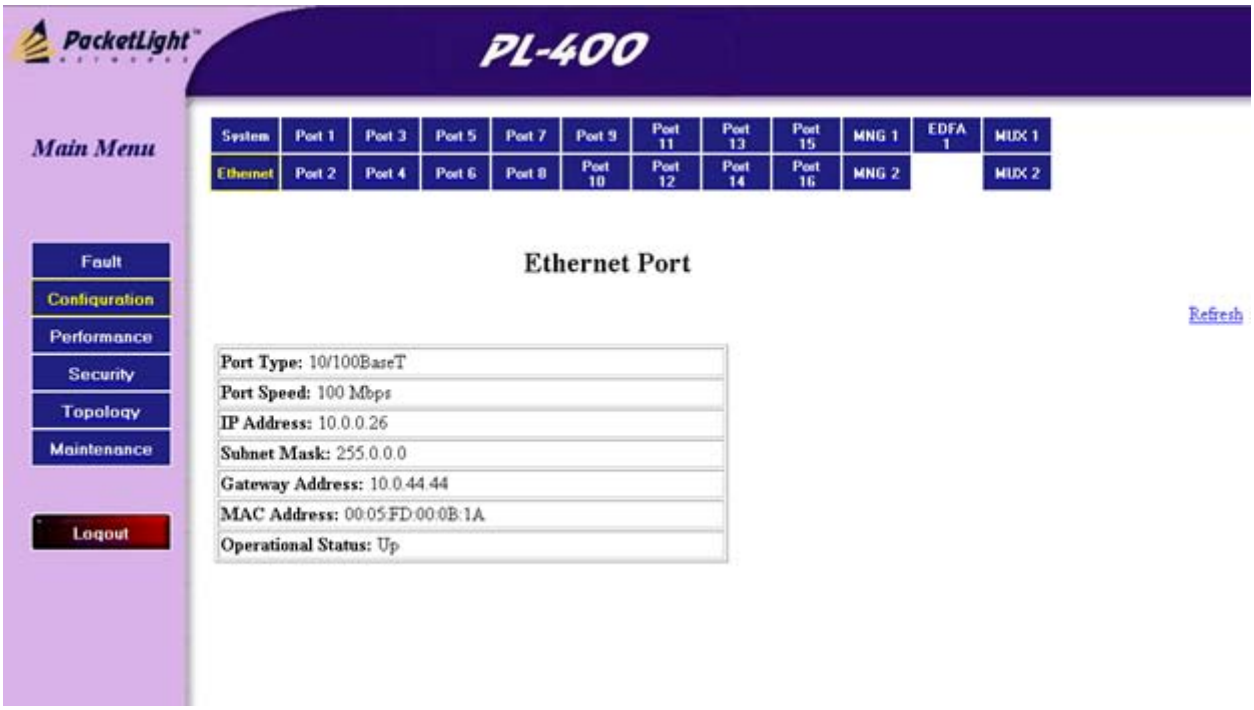


Figure 4-10. Configuration: Ethernet Port Window

Enabling/Disabling a Selected Port

You can set a LINK, MNG or EDFA port in or out of service (enable/disable) from the Configuration window by clicking **Admin Up** and **Admin Down**. This allows the operator to disable a selected port in order to perform maintenance tasks when necessary. The port should be enabled when maintenance is complete.

™ **To enable a port:**

1. From the **Configuration** window, in the upper portion of the window, click the desired LINK, MNG or EDFA port.
2. Click **Admin Up**.

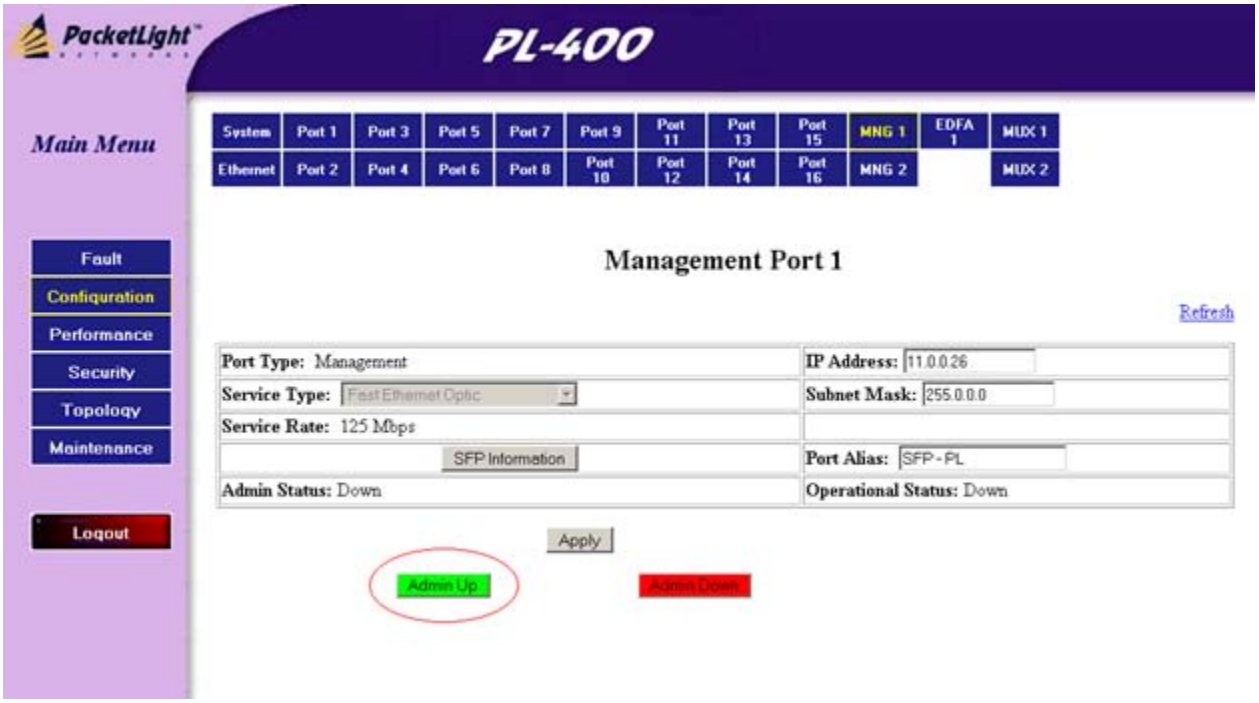


Figure 4-11. Configuration: Enable a Selected Port

A confirmation message appears.

Figure 4-12. Configuration: Confirm Enabled Port

3. Click **OK**.

   The selected port is enabled.

™ **To disable a port:**

1. From the **Configuration** window, in the upper portion of the window, click the desired LINK, MNG or EDFA port.
2. Click **Admin Down**.

   A confirmation message appears.
3. Click **OK**.

   The selected port is disabled.

4.3 Setting Security

Use the **User Management** window to manage users and passwords.

- Administrator (user = admin)

  An administrator can add, modify and delete users, including changing the user password.

  A list of all existing users and their permission level is displayed.
- Users (user = user)

  A user can only change his own password.

Security (Administrator)

™ **To create a new user:**

1. Login to SurfLight as **admin**.
2. From the buttons on the left-hand side of the window, click **Security**.

   The Administrator User Management window is displayed.
3. In the fields provided type in the **User name** and **password**.

   The password is hidden for security reasons.
4. Type the password again in the **Verify Password** field to be certain that it was typed correctly.
5. From the drop-down list, select the permission level for this user:
   - Read Only User
   - Read/Write User
   - Administrator
6. Click **Apply**.

A new user is created with the specified user name and password.

™ **To change a user password:**

1. Login to SurfLight as **admin**.
2. From the buttons on the left-hand side of the window, click **Security**.

   The User Management window is displayed.
3. Type in the **User name** of the user whose password is to be changed.
4. Type the new **password** in the password field.

   The password is hidden for security reasons.
5. Type the new **password** again in the **Verify Password** field to be certain that it was typed correctly.
6. Click **Apply**.

   A new password is assigned to the specified user.

™ **To change a user permission level:**

1. Login to SurfLight as **admin**.
2. From the buttons on the left-hand side of the window, click **Security**.

   The User Management window is displayed.
3. Type in the **User name** of the user whose permission level is to be changed.
4. From the drop-down list, select the permission:
   - Read Only User
   - Read/Write User
   - Administrator
5. Click **Apply**.

   A new permission level is assigned to the specified user.

™ **To delete a user:**

1. Login to SurfLight as **admin**.
2. From the buttons on the left-hand side of the window, click **Security**.

   The User Management window is displayed.
3. Type in the **User name** of the user that is to be deleted.
4. Select the **Delete User** checkbox.
5. Click **Apply**.

   The specified user is deleted.

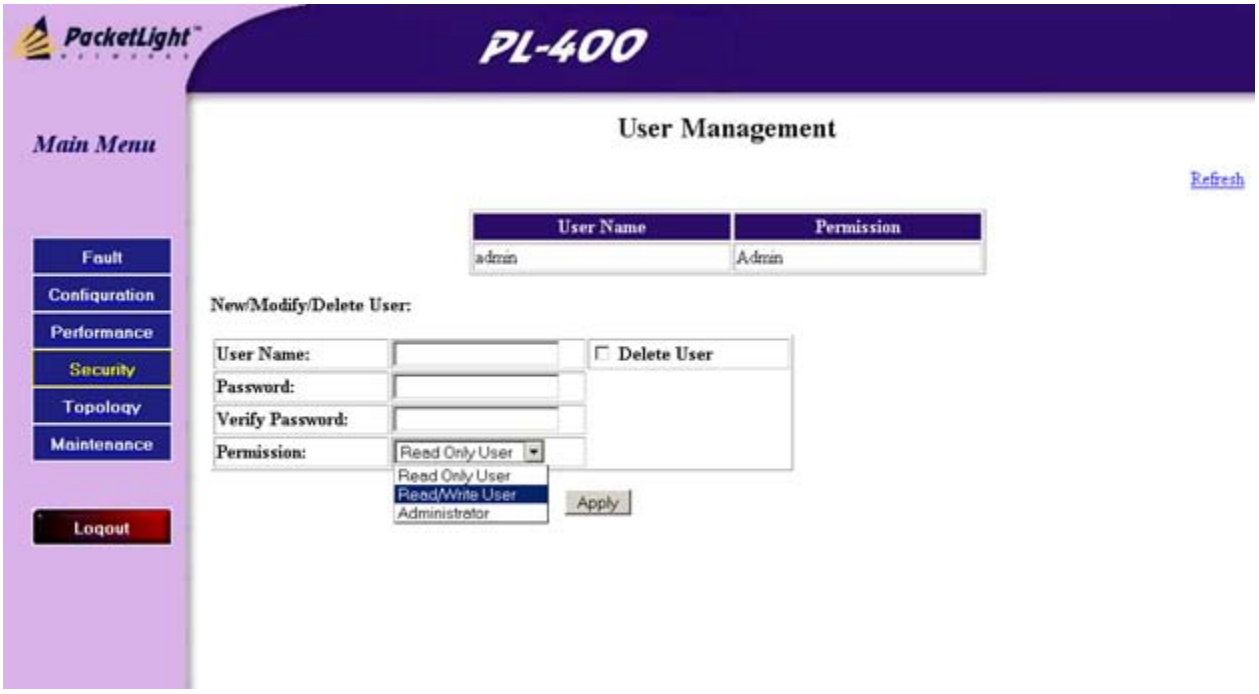


Figure 4-13. Security (Administrator): User Management Window

Security (User)

™ **To change your password:**

1. Login to SurfLight as **user**.
2. From the buttons on the left-hand side of the window, click **Security**.

   The User Management window is displayed.
3. Type in your **User name**.
4. Type the new **password** in the password field.

   The password is hidden for security reasons.

5. Type the new **password** again in the **Verify Password** field to be certain that it was typed correctly.
6. Click **Apply**.

   Your password is changed.

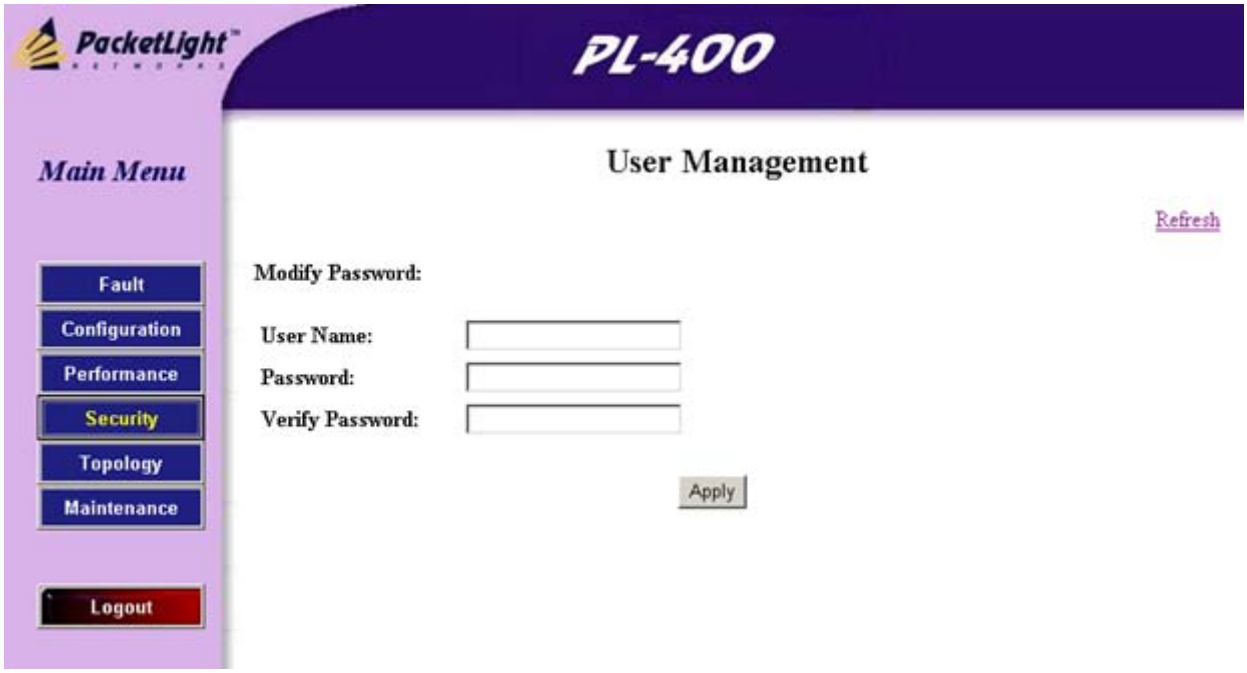


Figure 4-14. Security (User): User Management Window

4.4 Topology

To discover the PL-400 network topology, PL-400 uses a proprietary protocol between the nodes over the OSC channel.

The topology view displays the PL-400 nodes connected, together with the OSC channel.

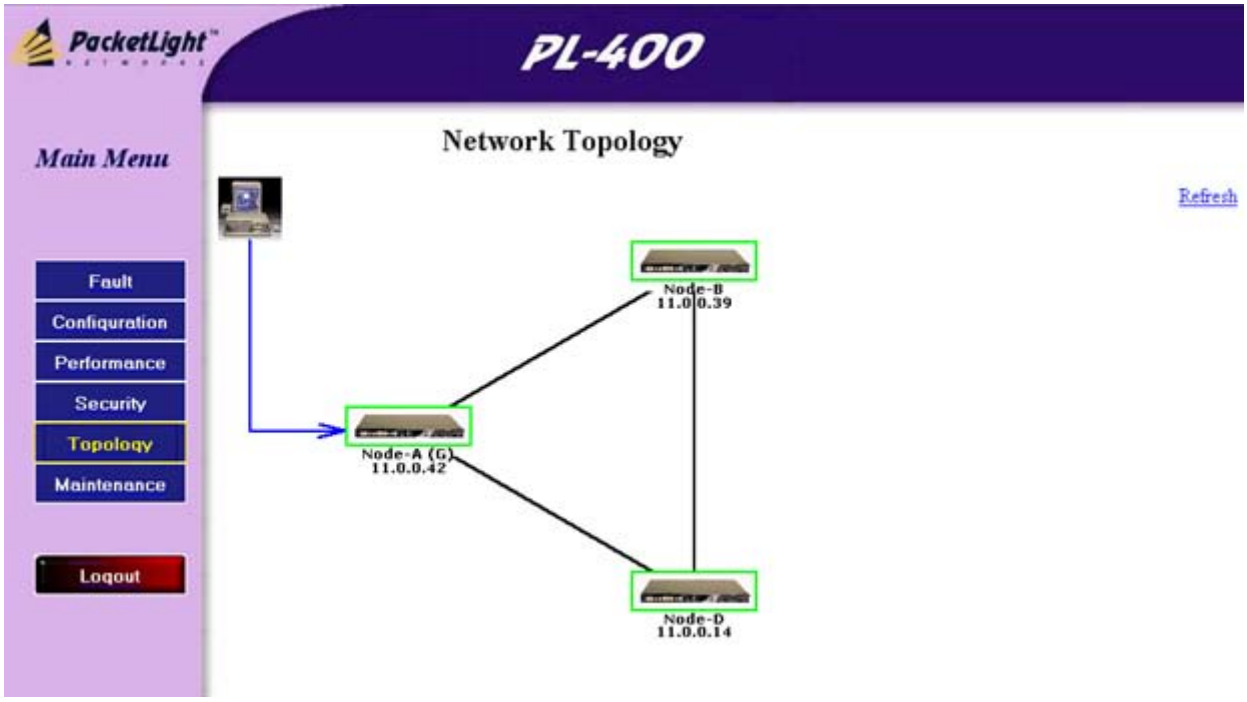


Figure 4-15. Topology: Network Topology

Alarm Status of the Node

The alarm status of each node is marked by the color of the box around the node:

- Green – no major alarms on the node
- Red – major alarms on the node

Node Title

The name of the node is listed below the node. If there is no configured name, the IP address of the node is displayed.

Management Link

The arrow from the management system points to the PL-400 node that the management system is currently browsing.

Pressing one of the nodes in the Topology View opens a new web browser to view the selected node.

Multichassis

When multiple PL-400 nodes are located at the same site, it is possible to define them as Multichassis. This is done by setting the same Chassis Id to both nodes in the System Configuration window (see *Figure 4-16* and *Figure 4-17*).

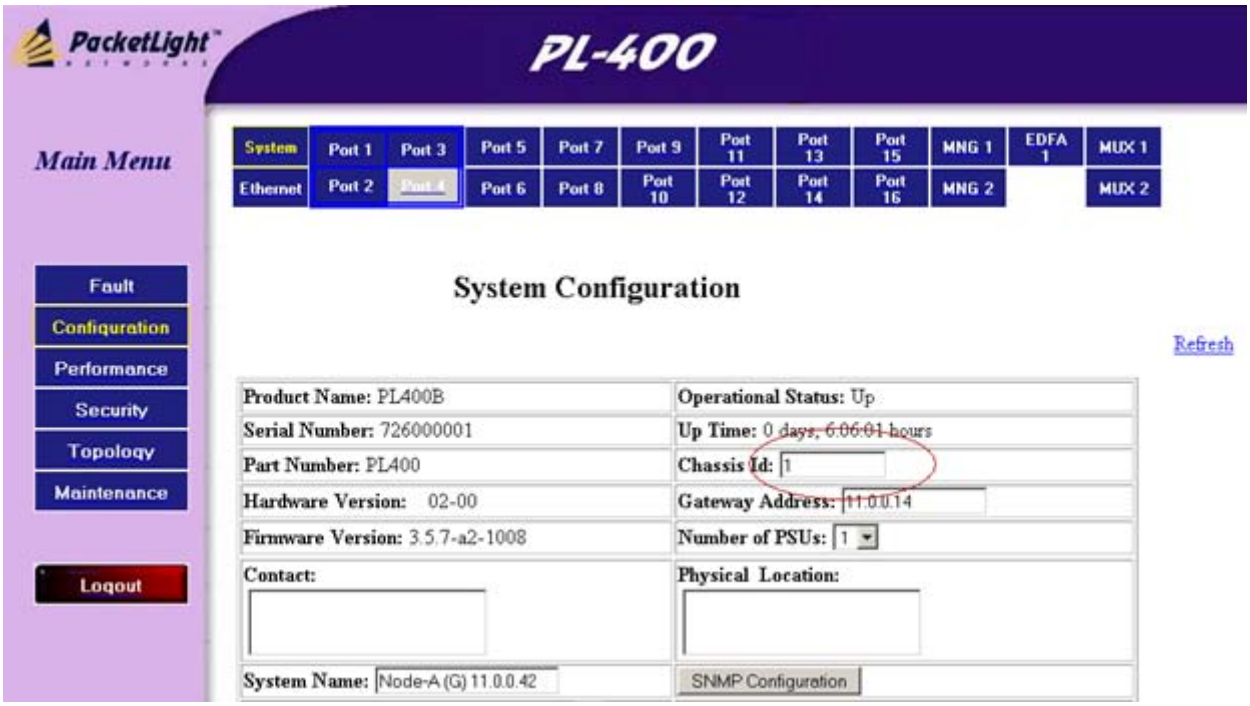


Figure 4-16. Topology: Defining Nodes as Multichassis

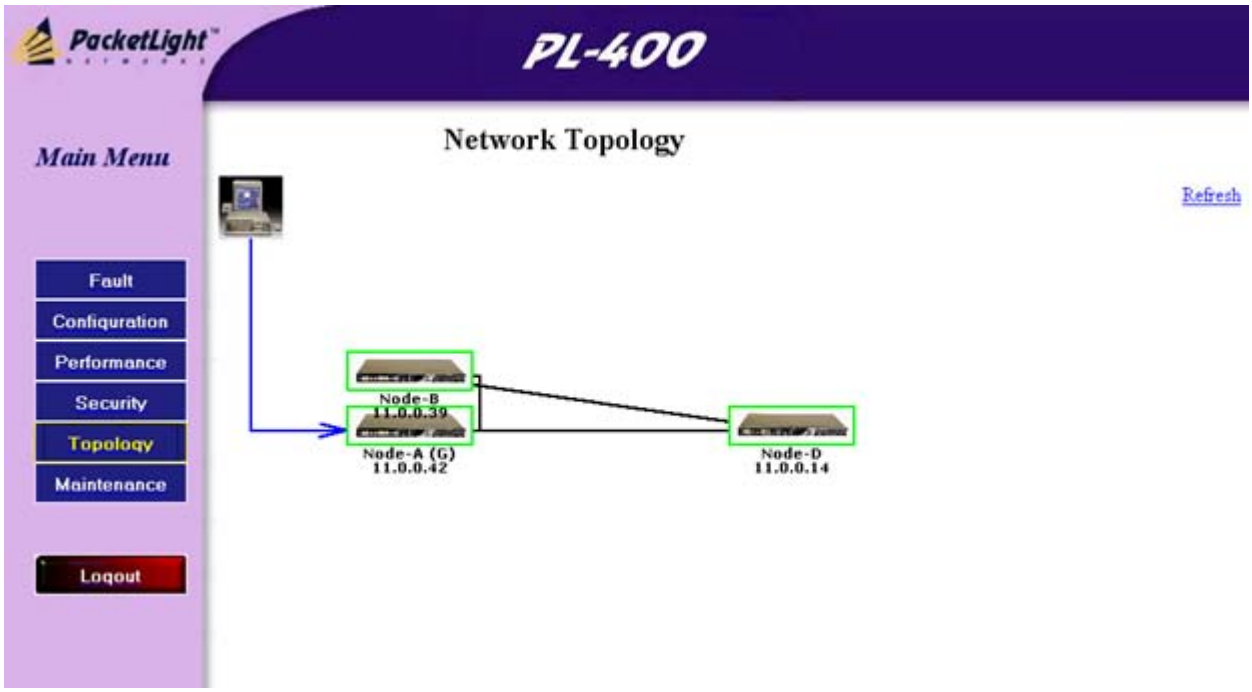


Figure 4-17. Topology: Multichassis Nodes

4.5 Maintenance

Use the **Maintenance** options to perform the following:

- System maintenance
  - Cold restart
  - Hot restart
  - Restore factory defaults
  - Get system log files
  - Get system configuration
  - Update system configuration
- External Alarms
  - Configure the behavior of the Input External Alarm
- LINK Port maintenance
  - Reset port PM (see *Chapter 6*)
  - Facility Loopback (see *Chapter 6*)
- Software maintenance
  - Download updated application software

System Maintenance

™ **To restart the PL-400 unit:**

1. From the buttons on the left-hand side of the SurfLight window, click **Maintenance**.

   The Maintenance window is displayed.

2. In the upper portion of the window, click **System**.
3. Click either **Cold Restart** or **Hot Restart**.
   - **Cold Restart**: Software and hardware are reloaded. The traffic may undergo a short down time.
   - **Hot Restart**: The software is reloaded and restarted. There is no effect on hardware or on current traffic.

   The system performs the selected system restart.

™ **To restore all system default configuration parameter values:**

1. From the buttons on the left-hand side of the SurfLight window, click **Maintenance**.

   The Maintenance window is displayed.

2. In the upper portion of the window, click **System**.

3. Click **Restore to Factory Defaults**.

   All factory default configuration values are restored.

   - All ports are set to OC-48, Admin Down
   - EDFA is set to AGC, 10 dB gain, Admin Down

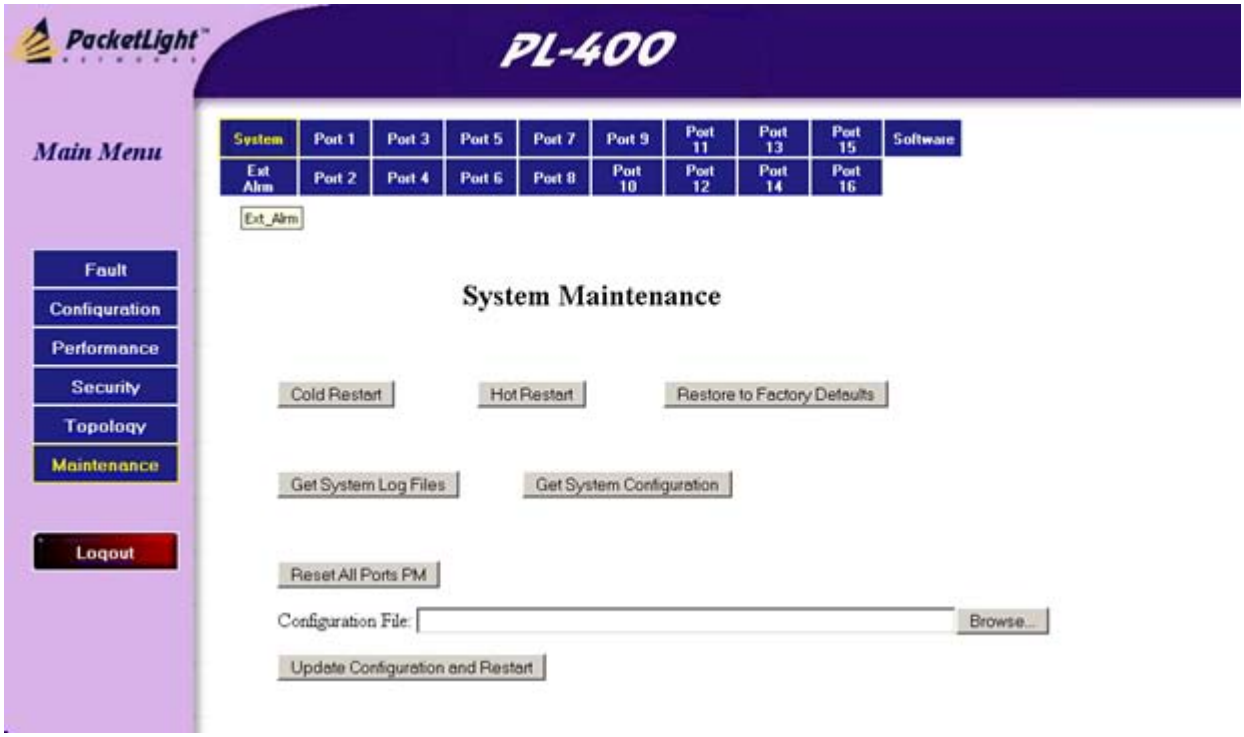


Figure 4-18. Maintenance: System Window

™ **To get the system log files:**

1. From the buttons on the left-hand side of the SurfLight window, click **Maintenance**.

   The Maintenance window is displayed.

2. In the upper portion of the window, click **System**.

3. Click **Get System Log Files**.

   The system log files are downloaded to the local computer.

4. Copy and paste the log files into a text file on the computer.

™ **To get the system configuration:**

1. From the buttons on the left-hand side of the SurfLight window, click **Maintenance**.

   The Maintenance window is displayed.

2. In the upper portion of the window, click **System**.

3. Click **Get System Configuration**.

   The system configuration is downloaded to the local computer.

4. Copy and paste the system configuration into a text file on the computer.

™ **To upload a system configuration and restart the system:**

1. From the buttons on the left-hand side of the SurfLight window, click **Maintenance**.

   The Maintenance window is displayed.

2. In the upper portion of the window, click **System**.

3. Enter the path to the configuration file in the space provided.

4. Click **Update Configuration and Restart**.

   A confirmation message appears.

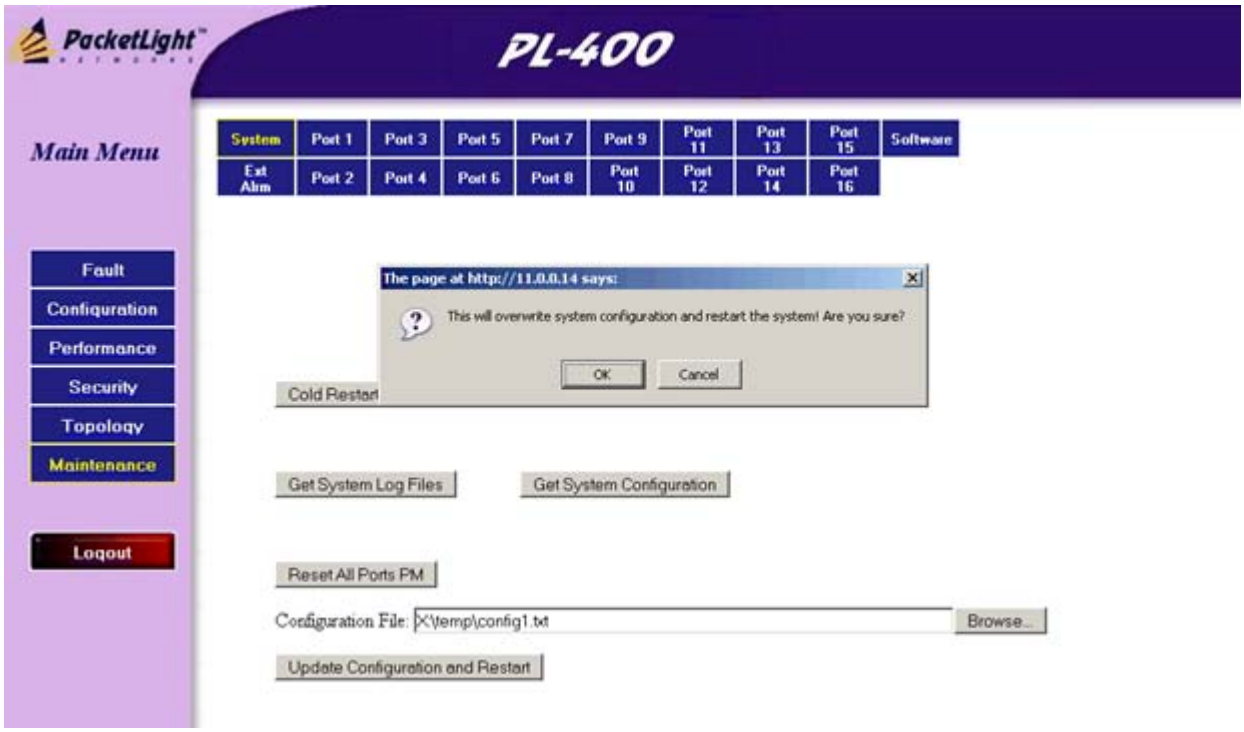


Figure 4-19. Maintenance: Confirm System Overwrite

An update message appears.

Warning

When uploading a system configuration file which was retrieved from another PL-400, make sure to change the IP addresses to the correct values per box. DCCIP stands for the OSC MNG port IP in the configuration file.

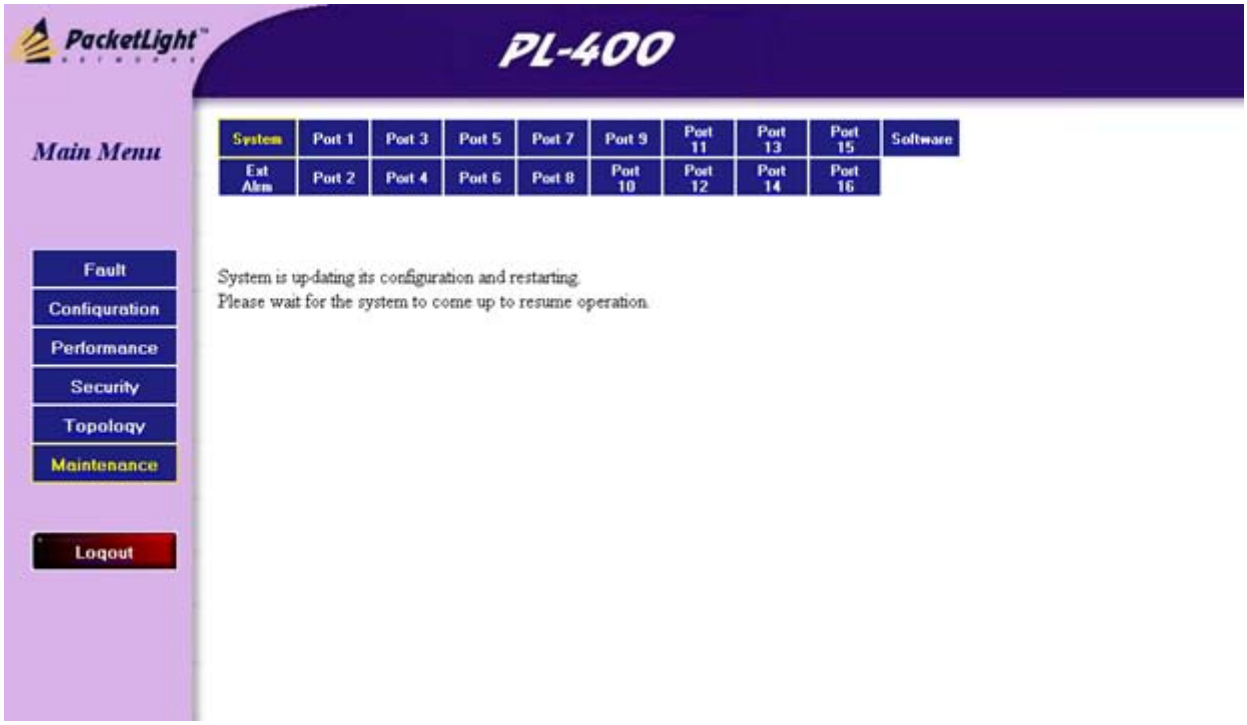


Figure 4-20. Maintenance: System Updating and Restarting Message

The system configuration is updated and the system is restarted.

4.6 Maintenance of the Input External Alarm

™ **To configure the Input External Alarm**

1. Click the Maintenance menu.
2. Select **Ext Alarm**.
   The Input External Alarm window appears (see *Figure 4-21*).
3. Configure the parameters as explained in *Table 4-7*.
4. When all the information is provided, click **Apply**.
   The selected configuration parameters are applied.

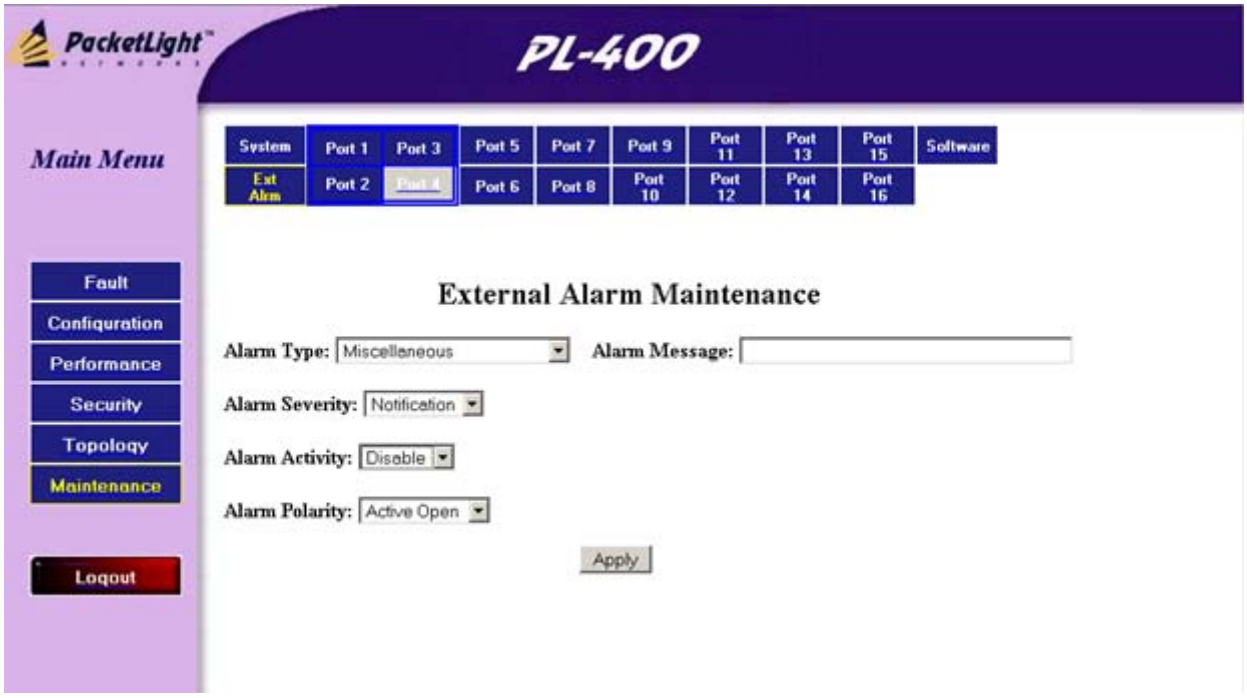


Figure 4-21. Maintenance: Input External Alarm

Table 4-7. Maintenance: Input External Alarm Parameters

Parameter	Description	Format/Values
Alarm Type	A predefined list of standard alam types	The type of configuration determines the values.
Alarm Severity	The severity of the External Input Alarm	Critical, Major, Minor, Notification
Alarm Activity	Used to disable the Input External Alarm	Disable, Enable
Alarm Polarity	Determines the polarity of the Input Dry Contact	Normally Close, Normally Open
Alarm Message	The alarm text that is used when Miscellenuous is configured as the Alarm Type	Free text

4.7 Software Download

Updated application software for the PL-400 is downloaded from the **Maintenance** menu.

The Software Download window also displays a listing of all stored software versions, and indicates which version is currently active.

™ **To download software:**

1. From the buttons on the left-hand side of the SurfLight window, click **Maintenance**.

   The Maintenance window is displayed.

2. In the upper portion of the window, click **Software**.

   The Software Version Maintenance window is displayed.

   Check the listing to see which versions are stored and which one is active.

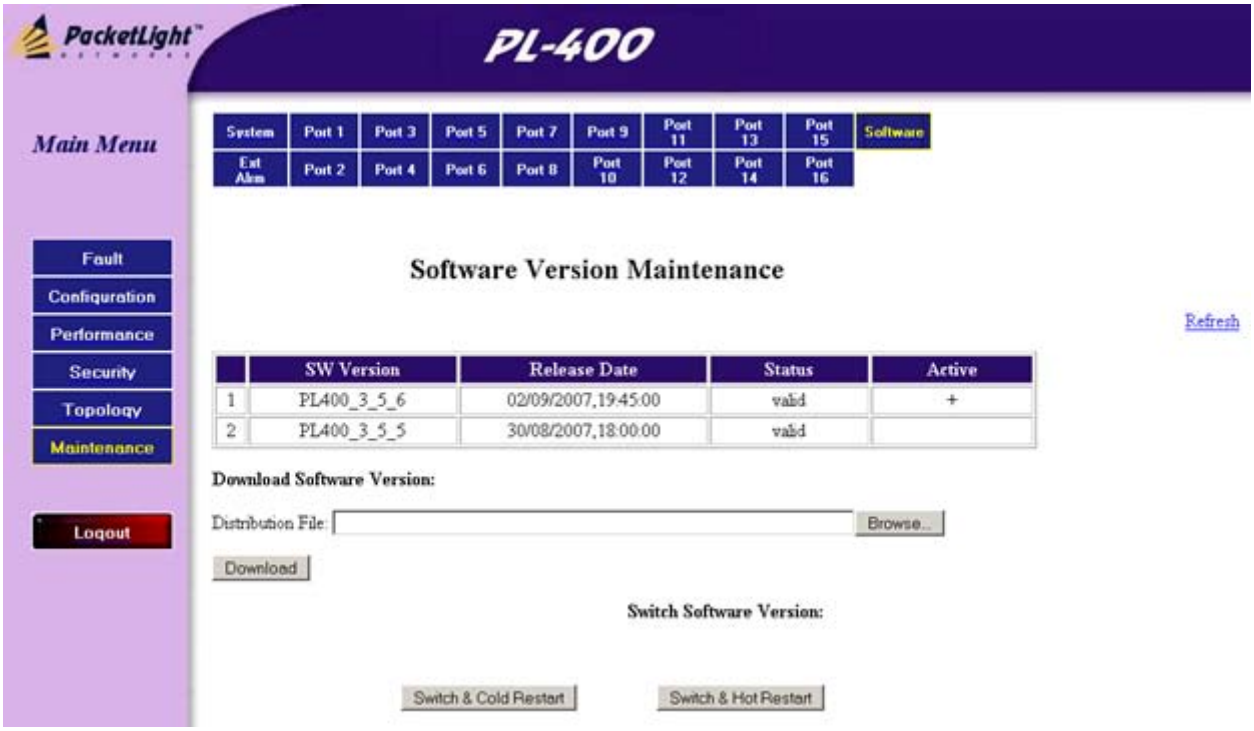


Figure 4-22. Maintenance: Software Download Window

3. In the **Distribution Directory** field, type in the location of the files, or click **Browse** to browse to the file location.

4. Click **Download**.

   A message appears.

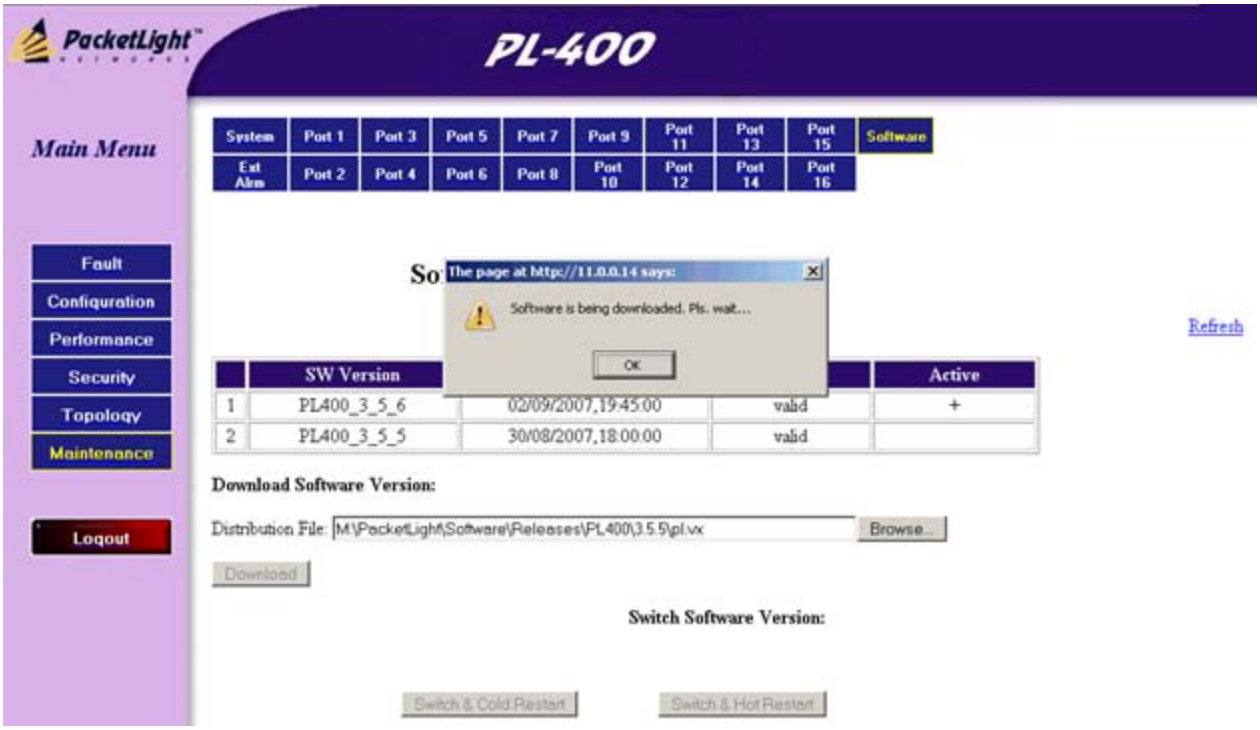


Figure 4-23. Maintenance: Software Download Message

5. Click **OK**.

   The Software Download Status window is displayed.

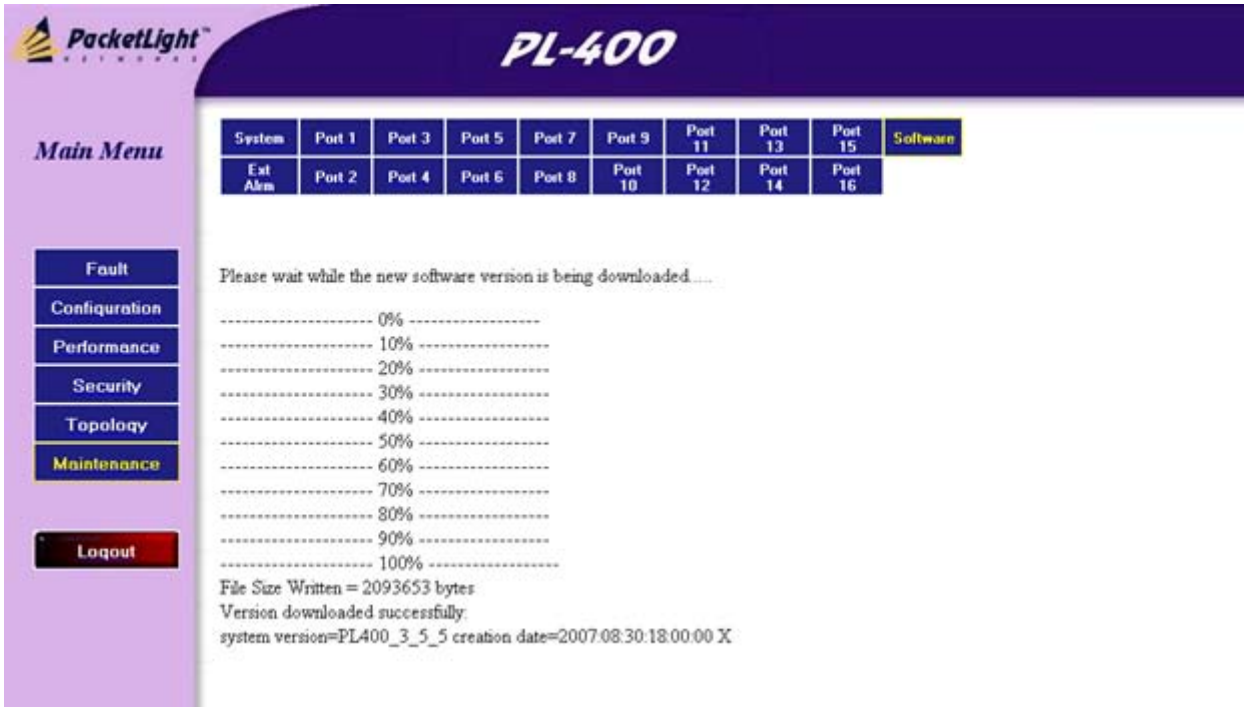


Figure 4-24. Maintenance: Software Download Status Window

The files are downloaded and the version now appears in the SW Version listing. The new version is always idle (not active).

Warning

Do not attempt to do any operations from another open browser during download.

The system may display the following security warning while downloading and installing files:

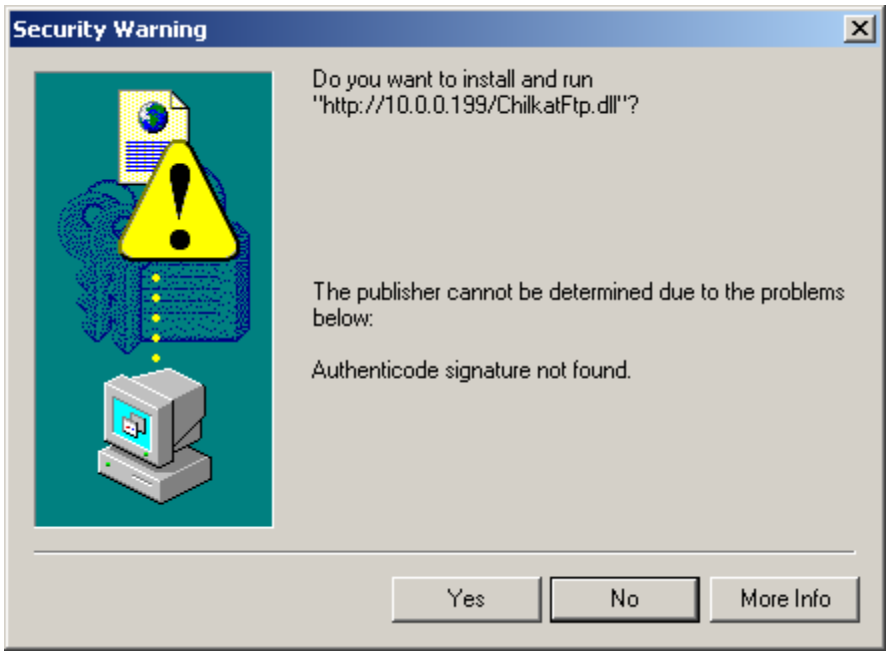


Figure 4-25. Security Warning

™ **To switch software versions:**

1. From the buttons on the left-hand side of the SurfLight window, click **Maintenance**.

   The Maintenance window is displayed.

2. In the upper portion of the window, click **Software**.

   The Software Version Maintenance window is displayed. If a new version has been uploaded, two versions will appear in the listing.

   Check the listing to see which version is active (indicated by a '+').

3. To activate the alternate software version, click the appropriate restart button, depending on whether you want to perform a cold or a hot restart after updating the software version:
   - **Switch & Cold Restart**
   - **Switch & Hot Restart**

Note *After switching to another software version, delete all files in the temporary Internet files, using the* ***Internet Options*** *menu of the WEB browser.*

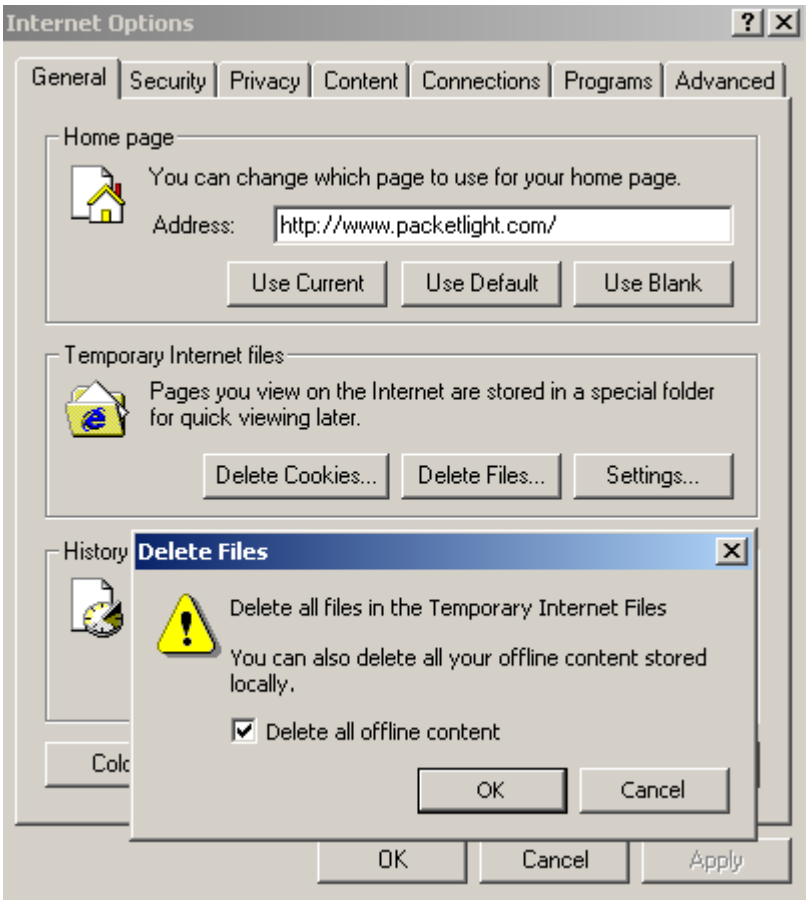


Figure 4-26. Delete Temporary Internet Files

4.8 Logging Out of SurfLight

™ **To logout from SurfLight:**

- From the buttons on the left-hand side of the window, click **Logout**. You are logged out of SurfLight.

Chapter 5

Configuring a Typical Application

This chapter gives detailed instructions for configuring PL-400 for a typical application.

5.1 Application Requirements

Figure 5-1 illustrates a typical application that shows two PL-400 units deployed as CPEs in enterprise campus environments. The two units connect the local SAN and LAN in the two campuses across a dark fiber.

Figure 5-1. Typical PL-400 Application

The following requirements exist for each PL-400 unit:

- Service (4G Fibre Channel and GbE) connections to the local SAN and LAN.
- Internal connections between the transponder and the passive MUX/DEMUX through the ribbon cable.
- Link to the dark fiber.
- Terminal for management via the Web.

The PL-400 unit is configured via a Web browser. The configuration procedure is divided into two main stages:

  - Configure the overall PL-400 system
  - Configure the interfaces.

5.2 Accessing SurfLight

Make sure that the PL-400 is properly installed and connected to a Web browser, and that any pop-up blocking software is disabled.

➔ **To access SurfLight:**

1. Enter the IP address of the PL-400 in the address field of the browser in the following format and then press :<**Enter**>

   http://IP_address (**'IP_address'** stands for the IP address of the LAN port of the PL-400)**.**

2. Enter your username and password in the appropriate boxes and click **Login**.

5.3 Configuring the System Parameters

This step may not be necessary, as most parameters have suitable defaults.

Configurable system parameters include:

- Identifying information
- System time
- Alarm activation time settings

➔ **To configure the system parameters:**

1. From the buttons on the left-hand side of the SurfLight window, click **Configuration**.

   The Configuration window is displayed.

2. Click **System**.

   The System Configuration window is displayed. Some of the fields are read only.

3. Configure the following System parameters, as needed:
   - Identifying Information: System Name, Contact, Physical Location
   - System Date and Time: System Date, System Time
   - Alarm Configuration: Alarm Activation Time, Alarm Deactivation Time
   - Other System Information:
     - Number of PSUs.

5.4 Configuring the Physical Ports

Configure the following physical ports:

- Service ports
- MNG port(s)
- EDFA port(s), if exists

Note *The Mux port and Ethernet port have no configurable parameters; all of the fields in these Configuration windows are read only.*

Configuring and Enabling a Transponder Interface Pair

➔ **To configure Service Port parameters:**

1. In the Configuration window, click the port number of the desired **Port** (Ports 1to 16).

   The Service Port Configuration window is displayed.

2. Configure the following **Service Port** parameters:
   - Service Type
   - Port Alias

3. When all of the information is provided, click **Apply**.

The selected configuration parameters are applied both to the selected port and to the other port of the transponder interface pair (indicated in the **Port Mate** field).

4. To display the SFP information for the selected port, click **SFP Information.**
5. Click **Admin Up**.

   The port is enabled.
6. Repeat these steps for the remaining Service Ports.

Configuring and Enabling the EDFA Port

➔ **To configure EDFA port parameters:**

1. In the Configuration window, click **EDFA1** or **EDFA2**.

   The EDFA Port Configuration window is displayed.
2. Configure the following EDFA Port parameters:
   - EDFA mode
   - Required Gain (if EDFA mode is AGC)
   - Required Output Power (if EDFA mode is APC)
3. When all of the information is provided, click **Apply.**

   The selected configuration parameters are applied.
4. Click **Admin Up.**

   The EDFA port is enabled.

5.5 Remote Management

A remote PL-400 is managed through the Optical Supervisory Channel. This management channel is multiplexed as a ninth wavelength inside the optical MUX.

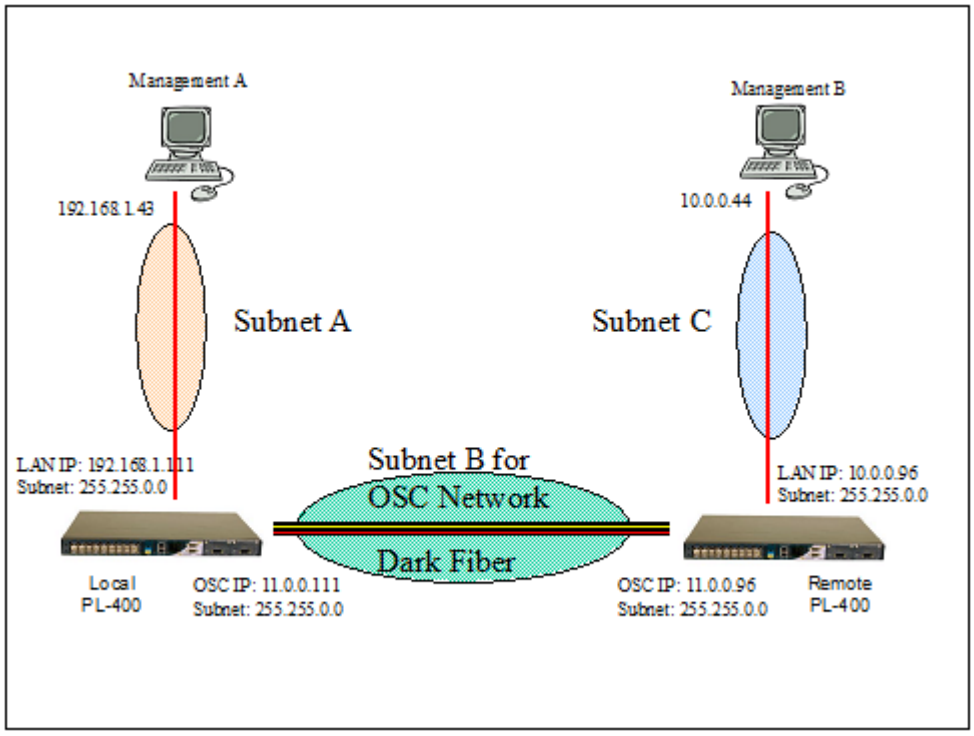


Figure 5-2. Remote Management Set-up

Remote Management Setup

➔ **To configure MNG port parameters:**

1. In the Configuration window, click **MNG1** or **MNG2**.
   The **MNG** Port Configuration window is displayed.
2. Configure the following MNG Port parameters:
   - IP Address
   - Subnet Mask
3. When all of the information is provided, click **Apply**.
   The selected configuration parameters are applied.
4. Click **Admin Up**.
   The **MNG** port is enabled.

➔ **To configure the PL-400 gateway address:**

1. In the Configuration window, click **SYSTEM**.

   The SYSTEM Port Configuration window is displayed.

2. Configure the following parameter:
   - Gateway address.
     - The gateway address, which is configured in the local PL-400, is the IP address of the router connected to the PL-400 Ethernet management port. If there is no such router, the gateway address is not relevant.
     - The gateway address, which is configured in the remote PL-400, is the OSC **MNG** port IP address of the local PL-400 (11.0.0.111).

Important Notes:

- Configure the relevant OSC **MNG** port both in the remote PL-400 and the local PL-400.
- Different IP addresses should be assigned to each OSC **MNG** port in both the remote and local boxes. Note that both of these IP addresses belong to the same subnet (subnet B in *Figure 5-2*).
- There are 3 different subnets included in the configuration:
  - Subnet A – should be configured for the Eth management port of the local PL-400 and the management station.
  - Subnet B – should be configured for the Eth management port of the remote PL-400 and a remote management station. This Subnet is only necessary when there is a need to manage the remote PL-400 locally from the remote site as well.
  - Subnet C – should be configured for the OSC **MNG** ports of both the local PL-400 and the remote PL-400.
- The IP address of the Eth management port of the remote PL-400 should not be in the same subnet as the Eth management port of the local PL-400.

➔ **To access SurfLight on the remote PL-400:**

1. Add a new route in the local management station PC.

   For example: ROUTE ADD 11.0.0.0 MASK 255.0.0.0 192.168.1.111

2. If there is a router between the management station and the PL-400 local box, the router should be configured in the following way: the IP address of the local PL-400 Eth port (192.168.1.111 in the figure) is the gateway for subnet 11.0.0.0.

3. Enter the IP address of the OSC **MNG** port of the remote PL-400 in the address field of the browser, and then press :<**Enter**>

   http://IP_address (11.0.0.96 according to the example illustrated in *Figure 5-2*).

4. Enter your username and password in the appropriate boxes and click **Login**.

Chapter 6

Diagnostics

6.1 Scope

This chapter describes the PL-400 diagnostic functions. The alarm and event collection functions available via SurfLight, can be used to identify problems in the network incorporating PL-400 units.

6.2 Alarm and Events Collection and Reporting

Alarm/Events Buffer

The PL-400 continuously monitors critical signals and signal processing functions. In case a problem is detected, the PL-400 generates time-stamped alarm messages that cover all of the events. The time stamp is provided by an internal real-time clock.

Internally, the PL-400 stores alarms and events in an alarm buffer. This alarm buffer can store up to 512 alarm or event messages, together with their time stamps. The alarm history buffer is organized as a FIFO queue; therefore after 512 alarms are written into the buffer, new alarms overwrite the oldest alarms.

The alarms/events can be read by the network administrator using SurfLight. The user can specify how often the alarms display should be refreshed to display updated alarms.

Viewing Alarms via SurfLight

Logon to SurfLight to monitor the alarms. You can view all current alarms, or only the alarms for a selected interface.

You can also define the refresh rate, which specifies how often the SurfLight alarm listing will refresh to display new alarms.

In addition to the alarms/events listing, the window displays the current state of the indicator LEDs on the front panel of the unit.

➔ **To view alarms or events:**

1. Login to SurfLight as explained in *Chapter 3*.
2. From the buttons on the left-hand side of the window, click **Fault**.

   The Current Alarms window is displayed.
3. Click **Alarms** to see only actual alarms or **Events** to see all events.
4. In the upper portion of the window, click the desired button to select the alarms to be displayed:
   - System
   - Port (LINK port)
   - EDFA (if exists)
   - Optical Supervisory Channel Port (MNG port)
   - All

➔ **To automatically refresh the alarm/event display:**

1. At the bottom of the window, fill in the **Refresh every** field to define how often the window will refresh.
2. Click **Start Refresh**.

   The Current Alarms window will constantly update after the specified number of seconds.
3. If you do not want the display to automatically refresh, click **Stop Refresh**.

➔ **To manually refresh the alarm/event display:**

- Click **Refresh Once**.

  The alarm/event display updates.

➔ **To turn off the external Alarm**

- Click **Ext Alarm Cut-Off**.

  The external alarm caused by the current faults turns off. New faults will activate the external alarm again.

  This action does not clear any alarms.

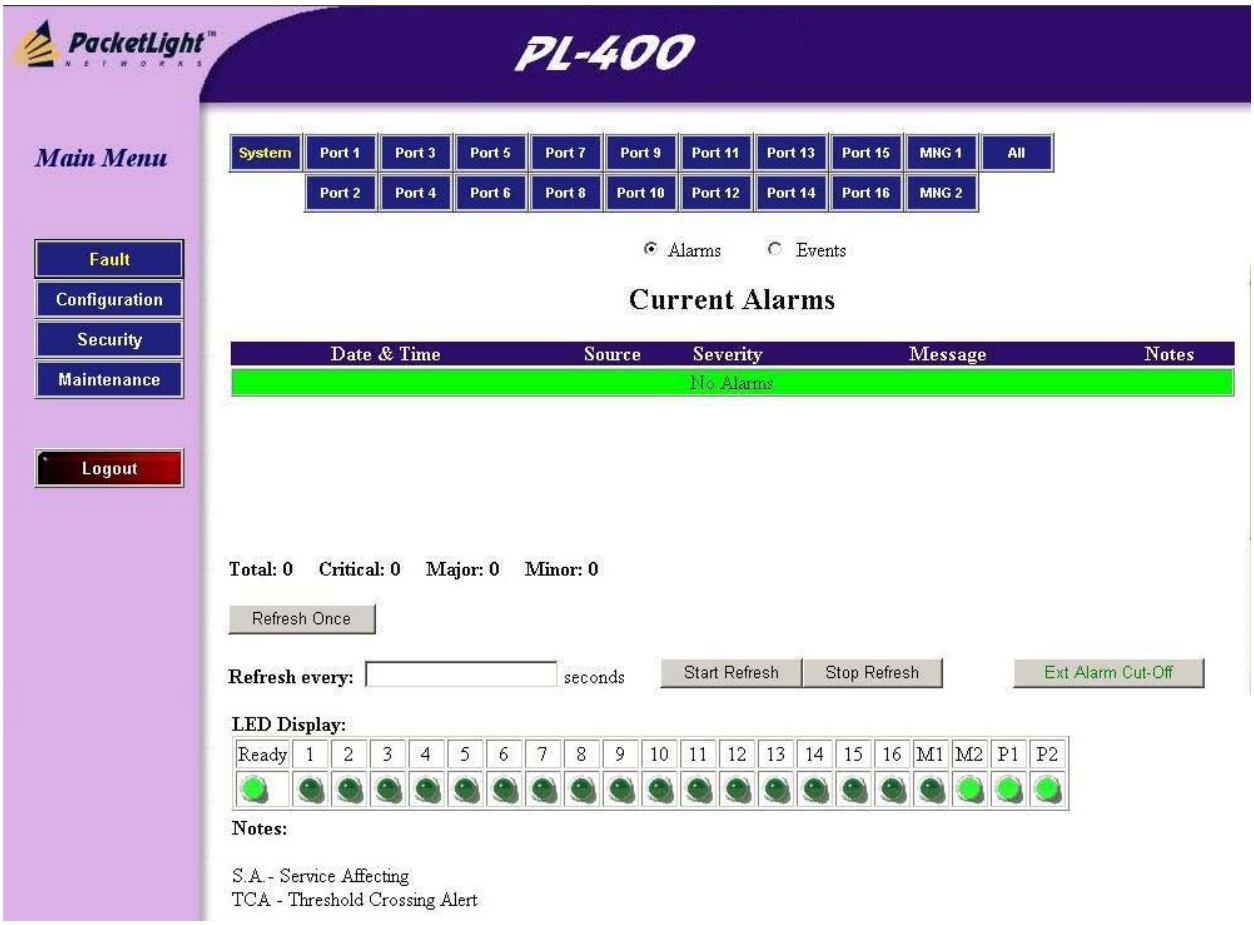


Figure 6-1. Fault: Current Alarms Listing

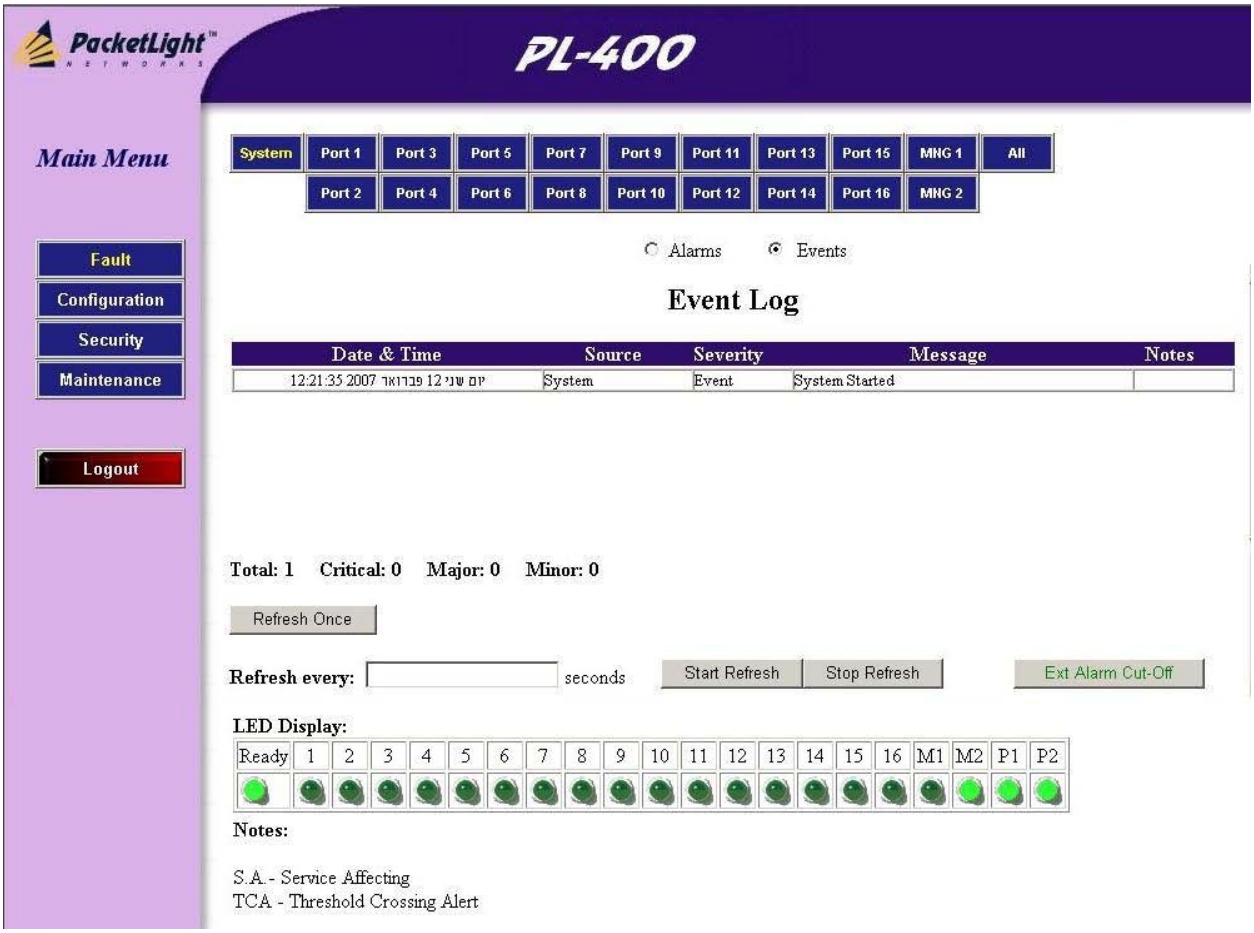


Figure 6-2. Fault: Events Log

Note *The LED Display reflects the actual LED indications on the unit. For details on the possible indications, please refer to the* PL-400 Front Panel Indicators table *in* Chapter 2*.*

6.3 Performance Monitoring

The PL-400 provides performance monitoring for the Link ports of the following service types:

- GbE
- 1G/2G/4G FC

There are two types of performance monitoring that are supported:

- Layer 1 PM: Errors detected by the 8b/10b encoding of the traffic.
- Layer 2 PM: Errors detected by the GbE Mac or the FC Mac. This type of PM is supported only if the daughter card is present.

Layer 1 PM

➔ **To view the Layer 1 PM:**

1. Click the **Performance** menu.
2. Select the Link port.

   The Performance Monitoring window is displayed (see *Figure 6-3*).
3. In the **Type** field, select **Layer 1**.
4. Press <**Get PM**>.

   The Layer 1 errors are displayed (see *Figure 6-4*).

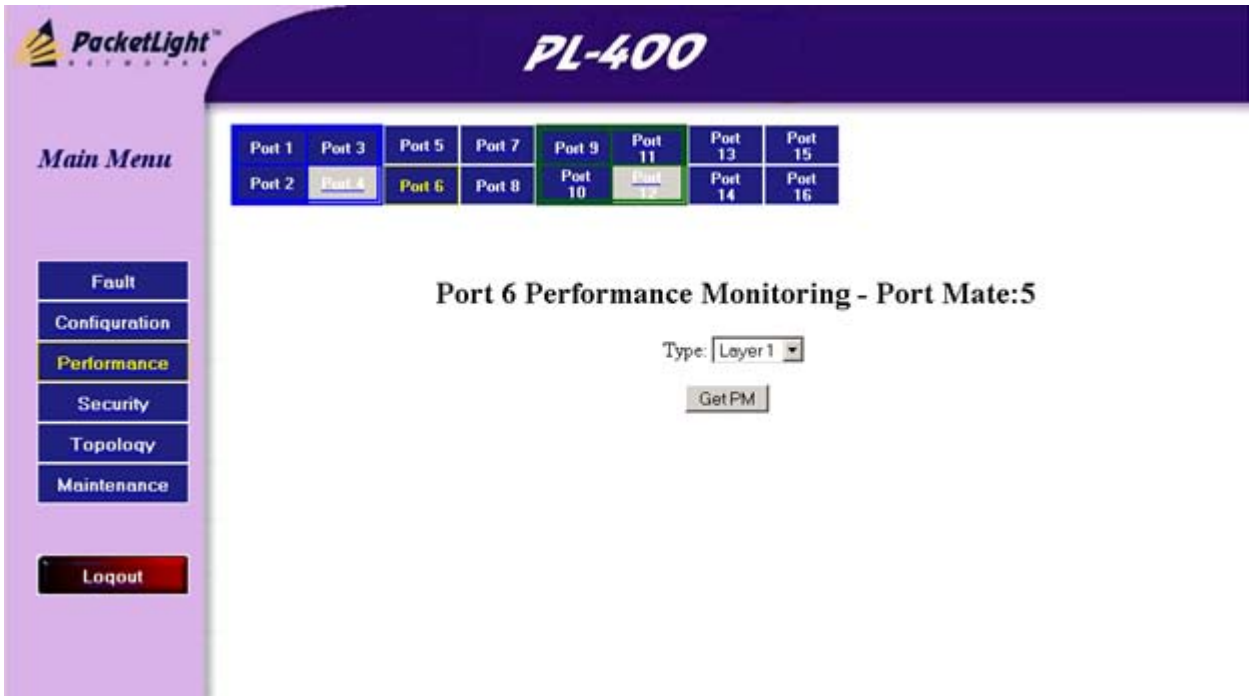


Figure 6-3. Performance Monitoring: Layer 1 PM

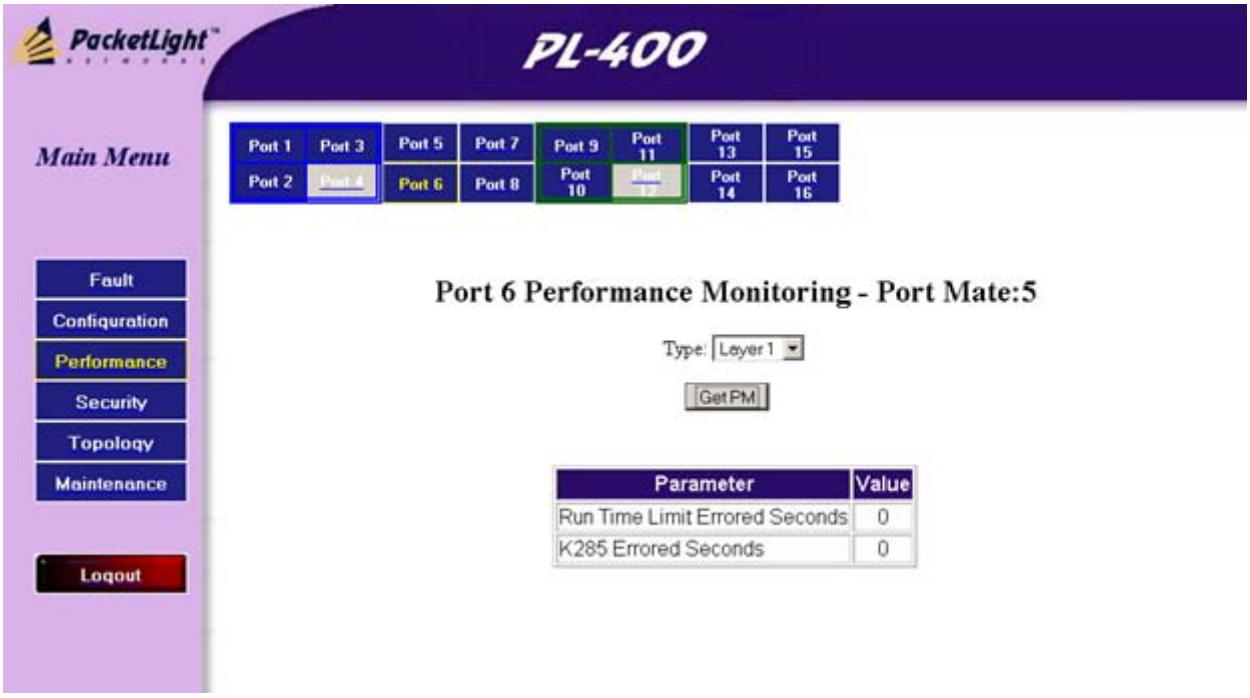


Figure 6-4. Performance Monitoring: Layer 1 Errors

Table 6-1. FC and GbE Layer-1 Performance Monitoring Parameters

Parameter	Description
Run Time Error Seconds	The number of seconds in which at least one Run Length Limit (RLL) error was detected (more than 6 consecutive bits, 1b or 0b).
K28.5 Error Seconds	The number of seconds in which at least one K28.5 error was detected (the K28.5 symbol was not detected for too long).

Layer 2 PM

➔ **To display the Layer 2 PM:**

1. Click the **Performance** menu.
2. Select the Link port.

   The Performance Monitoring window is displayed (see *Figure 6-3*).
3. In the **Type** field, select **Layer 2**.
4. Press <**Get PM**>.

   The Layer 2 errors are displayed (see *Figure 6-5*).

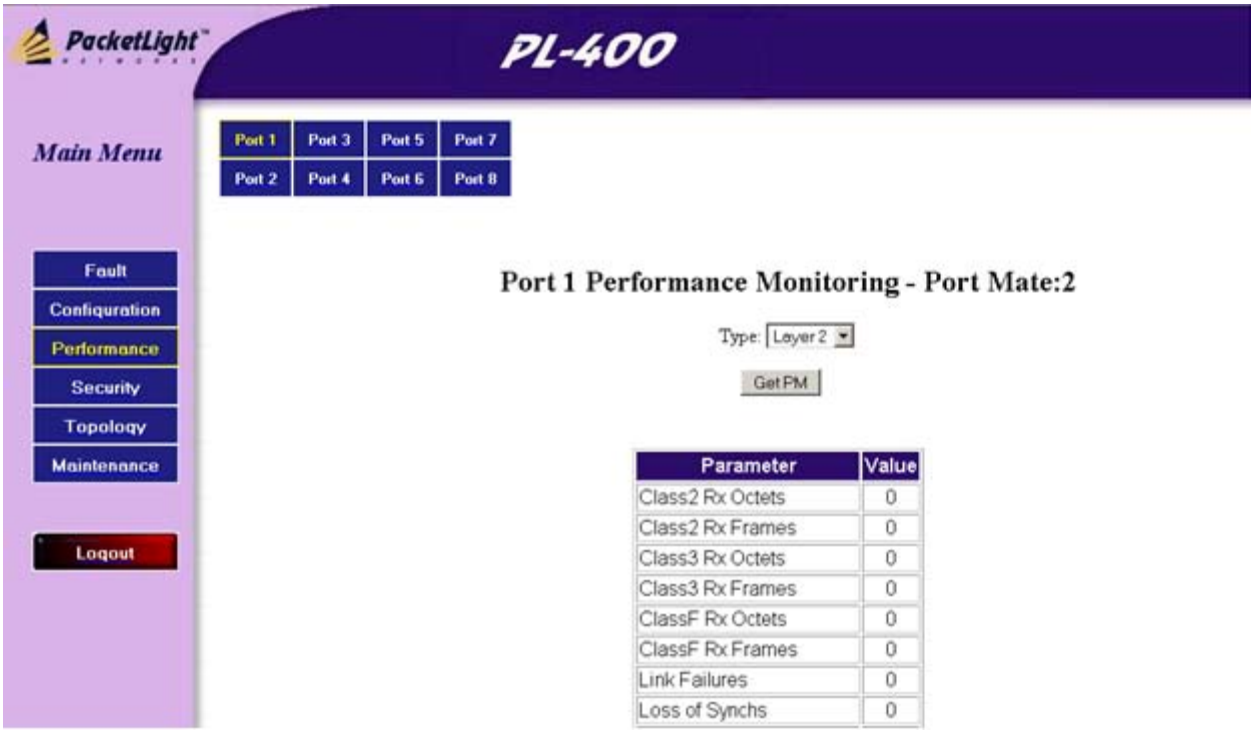


Figure 6-5. Performance Monitoring: Layer 2 Errors

The Layer 2 counters are displayed according to the following standards:

- For the FC port, the counters are displayed according to RFC-4044 the FC-MGMT-MIB.

Table 6-2. FC Layer-2 Performance Monitoring Parameters

Parameter	Description
Class2 Rx Octets	The number of Class 2 frames received at this port.
Class2 Rx Frames	The number of octets contained in Class 2 frames received at this port.
Class3 Rx Octets	The number of Class 3 frames received at this port.
Class3 Rx Frames	The number of octets contained in Class 3 frames received at this port.
ClassF Rx Octets	The number of Class F frames received at this port.
ClassF Rx Frames	The number of octets contained in Class F frames received at this port.

Parameter	Description
Rx Link Resets	The number of Link Reset (LR) Primitive Sequences received.
Rx Offline Sequences	The number of Offline (OLS) Primitive Sequences received at this port.
Link Failures	The number of link failures.
Loss of Synchs	The number of instances of synchronization loss detected at this port.
Loss of Signals	The number of instances of signal loss detected at this port.
Invalid Tx Words	The number of invalid transmission words received at this port.
Invalid CRCs	The number of frames received at this port with an invalid CRC.
Invalid Ordered Sets	The number of invalid ordered sets received at this port.
Frame Too Longs	The number of frames received at this port with the frame length greater than what was agreed on in FLOGI/PLOGI.
Truncated Frames	The number of frames received at this port with the frame length less than the minimum indicated by the frame header.
Delimiter Errors	The number of Link Reset (LR) Primitive Sequences received.
Encoding Disparity Errors	The number of encoding disparity errors received at this port.

- For the GbE port, the counters are displayed according to RFC-2819 the RMON-MIB.

Table 6-3. GbE Layer-2 Performance Parameters

Parameters	Description
Current Octets	The number of packets (including bad packets) received during this sampling interval.
Current Pkts	The total number of octets of data (including those in bad packets) received on the network(excluding framing bits but including FCS Octets).
Current Broadcast Pkts	The number of good packets received during this sampling interval that were directed to the broadcast address.
Current Multicast Pkts	The number of good packets received during this sampling interval that were directed to a multicast address. Note that this number does not include packets addressed to the broadcast address.
Current CRC Align Errors	The number of packets received during this sampling interval that had a length (excluding framing bits, including FCS octets) between 64 and 1518 octets inclusive, but had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
Current Undersize Pkts	The number of packets received during this sampling interval that were less than 64 octets long (excluding framing bits, including FCS octets) and were otherwise well formed.
Current Oversize Pkts	The number of packets received during this sampling interval that were longer than 1518 octets (excluding framing bits, including FCS octets) but were otherwise well formed.

Parameters	Description
Current Fragments	The number of packets received during this sampling interval that were less than 64 octets in length (excluding framing bits, including FCS octets) had either a Bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
Current Jabbers	The number of packets received that were longer that 1518 octets (excluding framing bits, including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
Current Rx Pause	The number of Pause frames received during the current interval.
Current Rx Pkts 64 Octets	The total number or packets (including bad packets) received that were 64 octets in length (excluding framing bits, including FCS octets).
Current Rx Pkts 65 to 127 Octets	The total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits, including FCS octets).
Current Rx Pkts 128 to 255 Octets	The total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits, including FCS octets).
Current Rx Pkts 256 to 511 Octets	The total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits, including FCS octets).
Current Rx Packets 512 to 1023 Octets	The total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits, including FCS octets).

Parameters	Description
Current Rx Pkts 1024 to 1518 Octets	The total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits, including FCS octets).
Current Rx Pkts 1519 to 1522 Octets	The total number of packets (including bad packets) received that were between 1519 and 1522 octets in length inclusive (excluding framing bits, including FCS octets).
Current Rx Vlan Pkts	The total number of VLAN packets received (with 802.1Q Tag).
Current Rx Jumbo Pkts	The total number of Jumbo packets received with: 9000 ≥ data-length > 1500.

➔ **To clear the PM counters of the Link port:**

1. Click the **Maintenance** menu.
2. Select the Link port.

   The Port Maintenance window is displayed (see *Figure 6-6*).

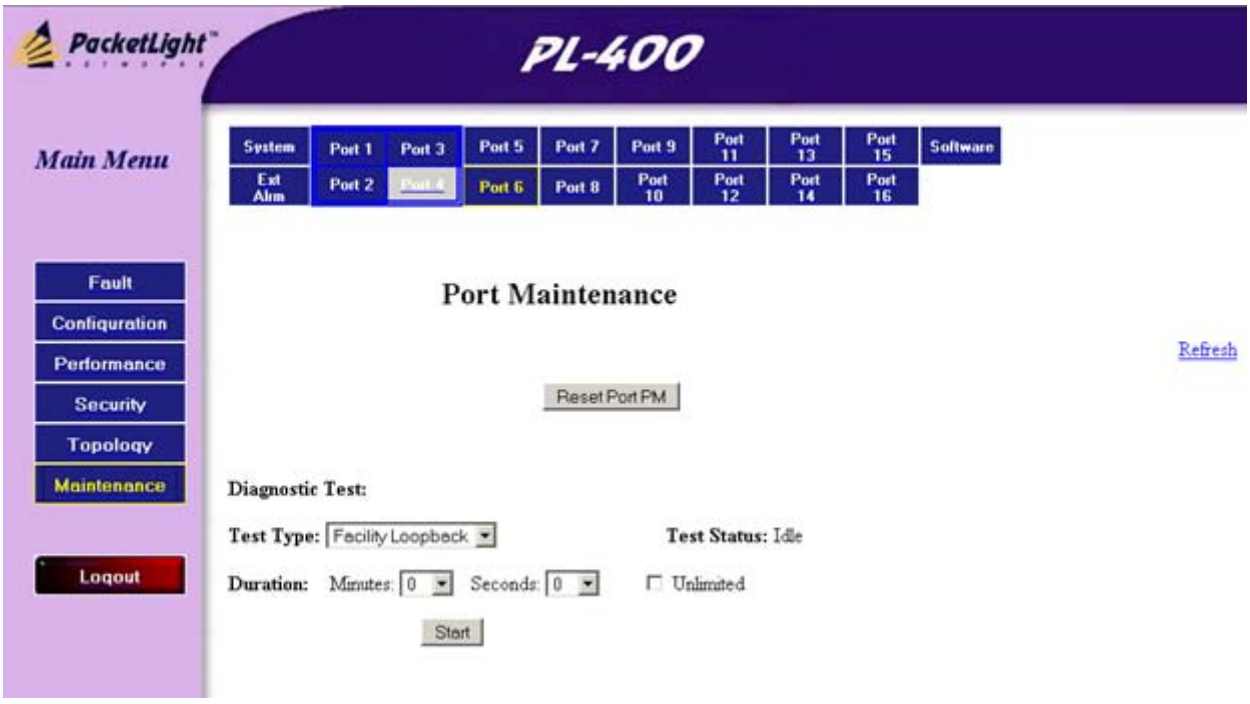
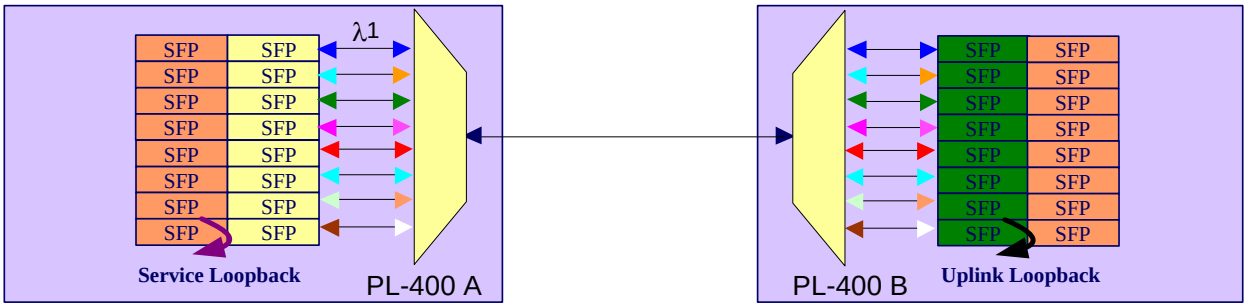


Figure 6-6. Performance Monitoring: Port Maintenance

6.4 Diagnostic Testing

The PL-400 supports the following diagnostic tests on its ports:

- Uplink loopback: This remote test allows the operator to verify that the entire link is operational. This loopback should be performed on the uplink port of the remote PL-400.
- Service loopback: This local loopback test verifies that the local unit connections are functioning properly. This loopback is performed on the service port.



➔ **To perform a selected loopback test:**

1. Login to SurfLight as explained in *Chapter 3*.
2. From the buttons on the left-hand side of the SurfLight window, click **Maintenance**.

   The Maintenance window is displayed (see *Figure 6-6*).
3. Select the desired port.
4. From the **Test Type** drop-down list, select the **Facility Loopback** test.
5. In the **Minutes** and **Seconds** drop-down lists, specify the duration of the test (or select the **Unlimited** checkbox if the test is to continue until manually stopped.
6. Click **Start**.

   The loopback test is performed. Note that the **Start** button toggles to **Stop** for the duration of the test.

➔ **To stop a loopback test:**

- Click **Stop**.

  The loopback test stops and the button toggles to **Start**.

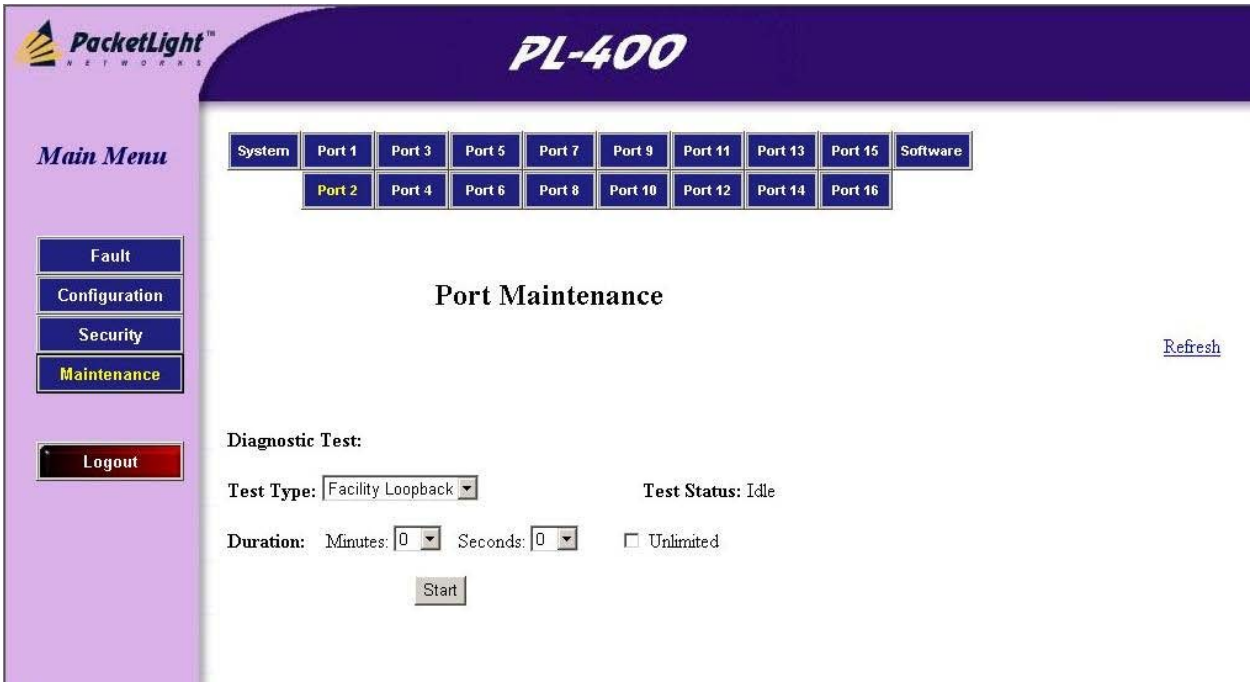


Figure 6-6. Maintenance: LINK Port Window

6.5 Troubleshooting

Identify the trouble symptoms in the following table and perform the actions listed under “Corrective Measures” in the order given, until the problem is corrected.

Table 6-4. Troubleshooting Chart

No.	Trouble Symptoms	Probable Cause	Corrective Measures
1	PL-400 does not turn on	1. No power	1. Check that the power cable is properly connected to the PL-400 POWER connector. 2. Check that both ends of the power cable are properly connected. 3. Check that power is available at the power outlet serving the PL-400.
		2. Defective power supply	Replace the power supply unit.
		3. Defective PL-400	Replace the PL-400.
2	The SIG LOS indicator of a device connected to PL-400 is lit	1. Cable connection problems	1. Check all cables at the PL-400 LINK TX and RX connectors. 2. Repeat check at the remote equipment. 3. Make sure that the SFP used matches the fiber type (SM/MM).
		2. Fiber problem	1. Use a short fiber to connect the Remote equipment RX connector to its TX. 2. If the problem is solved, connect the RX connector of the fiber to the TX connector at the PL-400 location. 3. If the problem persists, replace the fiber.
		3. Defective remote equipment	Use a short fiber to connect the Remote equipment RX connector to its TX. If the SIG LOS LED is still lit, the remote equipment is defective.

No.	Trouble Symptoms	Probable Cause	Corrective Measures
		4. A problem with the PL-400 Port State	Set the Admin State of the PL-400 Upink port to UP.
		5. Loss Propagation	1. Disable Loss Propagation for this port. 2. If the problem is solved the reason for the SIG LOS is a loss on the mate PL-400 port.
		6. Defective SFP	1. Check for SFP alarms 2. Replace the SFP
		7. Defective PL-400	1. Use a short fiber to connect the PL-400 Rx connector to its TX. (A signal generator may be required as the PL-400 does not generates signals by itself*.) 2. If the SIG LOS LED is still lit, replace the PL-400.□
		5. A problem with the PL-400 Port State	Set the Admin State of the PL-400 Upink port to UP.

No.	Trouble Symptoms	Probable Cause	Corrective Measures
3	The LINK indicator of the local PL-400 port is red	1. Cable connection problems	1. Check for proper connections of the cables to the PL-400 LINK TX and RX connector. 2. Repeat check at the remote equipment.
		2. Loss Propagation	1. Disable Loss Propagation for this port. 2. If the problem is solved the reason for the SIG LOS is a loss on the mate PL-400 port.
		3. High Signal Level	1. Read the Receiver Input Power in the SFP Information Window. 2. If the power is too high, add attenuator.
		4. Defective SFP	1. Check for SFP alarms. 2. Replace the SFP.
		5. Fiber problem	1. Read the Receiver Input Power in the SFP Information Window. 2. If the power is too low replace the fiber.
		3. Defective PL-400	1. Check the PL-400 alarms. 2. If there are equipment alarms, replace the PL-400.
		4. Defective remote equipment	1. Use a different remote unit. 2. If the problem is solved, replace the remote unit.
4	The equipment attached to the LAN port of the local PL-400 cannot communicate with remote PL-400 over the WAN	1. Problem in connection to LAN	1. Check that the LINK indicator of the corresponding LAN port lights. If not, check for proper connection of the cable to the LAN port. 2. Check that the the Admin state of the MNG Port is UP, and that its status is OK. 3. Check that the IP information of the remote PL-400 is configured correctly (for example the default gatway).

No.	Trouble Symptoms	Probable Cause	Corrective Measures
		2. External problem	Check the IP configuration of the external equipment (for example the gateway address) that is connected to the local PL-400 LAN port.
		3. Defective PL-400	Replace the PL-400.

Appendix A

Connection Data

A.1 CONTROL Connector

The CONTROL connector is a 9 pin D-type female connector with RS-232 asynchronous DCE interface, intended for direct connection to a supervision terminal. The connection to the supervision terminal is by means of a straight cable (a cable wired point-to-point). The connector is wired in accordance with *Table A-1*.

Table A-1. CONTROL Connector Wiring

Pin	Function	Direction
2	Transmit Data (Tx)	From PL-400
3	Receive Data (Rx)	To PL-400
5	Signal Ground (SIG)	Common reference

A.2 ALARMS Connector

The ALARMS connector of the PL-400 is a 9-pin D-type female connector that is used to connect to the external alarm system (for example, a buzzer) of the customer.

The ALARMS connector provides two connectivity methods: Normally Open and Normally Closed. The connector is wired in accordance with *Table A-2*.

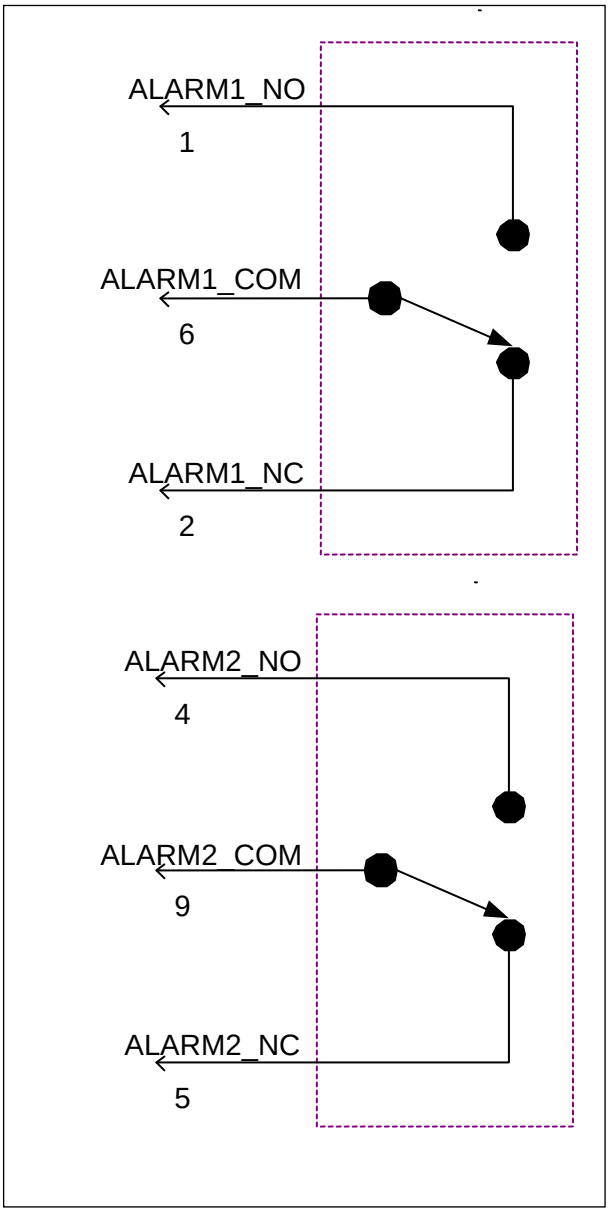


Figure A-1. External ALARMS Diagram

Table A-2. ALARMS Interface, Pin Function

Pin	Designation	Function
1	ALARM Normally Open (ALARM1_NO)	In normal operation, pin number 6 (ALARM Common) is internally connected to pin number 2. Upon major alarm, the internal connection of the ALARM Common pin is switched to this pin.
2	ALARM Normally Closed (ALARM1_NC)	In normal operation, pin number 6 (ALARM Common) is internally connected to this pin. Upon major alarm, the internal connection of the ALARM Common pin is switched to pin number 1.
6	ALARM Common (ALARM1_COM)	Common signal
3		Internally connected to GND
7	ALARM IN 1	The Input External Alarm
8	ALARM IN 2	Not connected
4*	ALARM Normally Open (ALARM2_NO)	In normal operation, pin number 9 (ALARM Common) is internally connected to pin number 5. Upon major alarm, the internal connection of the ALARM Common pin is switched to this pin.
5*	ALARM Normally Closed (ALARM2_NC)	In normal operation, pin number 9 (ALARM Common) is internally connected to this pin. Upon major alarm, the internal connection of the ALARM Common pin is switched to pin number 4.
9*	ALARM Common (ALARM2_COM)	Common signal

* The pin will be implemented in a future software release.

A.3 ETH Connector

Each PL-400 ETH port has a 10/100BaseT Ethernet hub interface terminated in an RJ-45 connector. The port can be connected by a standard station cable to any type of 10/100BaseT Ethernet port.

Connector pin functions are listed in *Table A-3*.

Table A-3. ETH Interface Connector, Pin Functions

Pin	Designation	Function
1	RxD+	Receive Data output, + wire
2	RxD-	Receive Data output, - wire
3	TxD+	Transmit Data input, + wire
4, 5	-	Not connected
6	TxD-	Transmit Data input, - wire
7, 8	-	Not connected

A.4 Optical PL-400 Interface Connectors

All uplink and service (LINK) ports are optical ports requiring appropriate SFP transceivers.

MUX/DEMUX and COM ports are fixed optical connectors.

The **MUX** and **DEMUX** ports are suitable only for a dedicated ribbon cable (supplied by PacketLight Networks).

- **Uplink Ports**: The PL-400 can be ordered with either CWDM or DWDM uplink SFPs
- **Service Ports**: Two options are available:
  - Multi-mode 850 nm
  - Single mode 1310 nm
- **Optical Supervisory Channel Ports**: Two options are available:
  - CWDM PL-400: Single mode 1310 nm
  - DWDM PL-400: Single mode 1510 nm

A.5 Power Connectors

AC-powered PL-400 units have two standard IEC three pin sockets, with integral fuse, for connection to AC power.

The AC power cord should conform to the following specifications:

- Internationally harmonized (<HAR> mark)
- 3 x conductor, 0.75 mm² minimum wire cross sectional area
- Rated 300 V
- PVC insulated jacket
- Molded on plug cap rated 250 V, 10 A

DC-powered PL-400 units have one three-pin (5.08mm pitch) socket for connection to -48V DC power source.

The DC power is supplied with a dedicated connector for wiring.

The following figure describes how to wire the DC connector (DC power supply only).

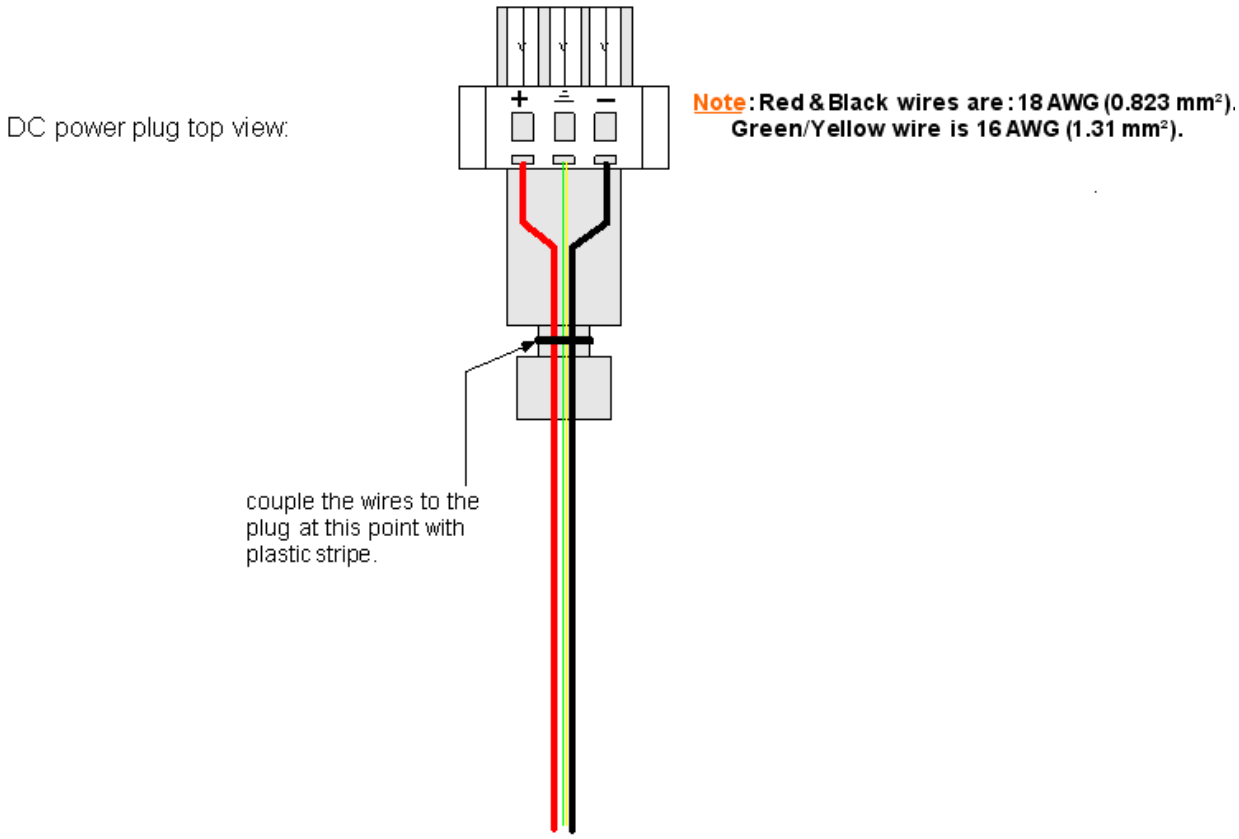


Figure A-2. DC Connector Wiring Diagram

A.6 DC and AC Power Supply Combinations

The following power supply combinations are feasible in the PL-400:

- One AC power supply and one DC power supply
- Two AC power supplies
- Two DC power supplies
- One AC power supply
- One DC power supply

Installing one DC power supply and one AC power supply in the same unit is allowed. This type of configuration provides redundancy between the power sources themselves.

Please refer to *Chapter 2* for the power supply requirements.

A.7 Protective Ground Terminal

The protective ground terminal of the PL-400 front panel must be connected to a protective ground.

The following figure describes how to wire the ground terminal.

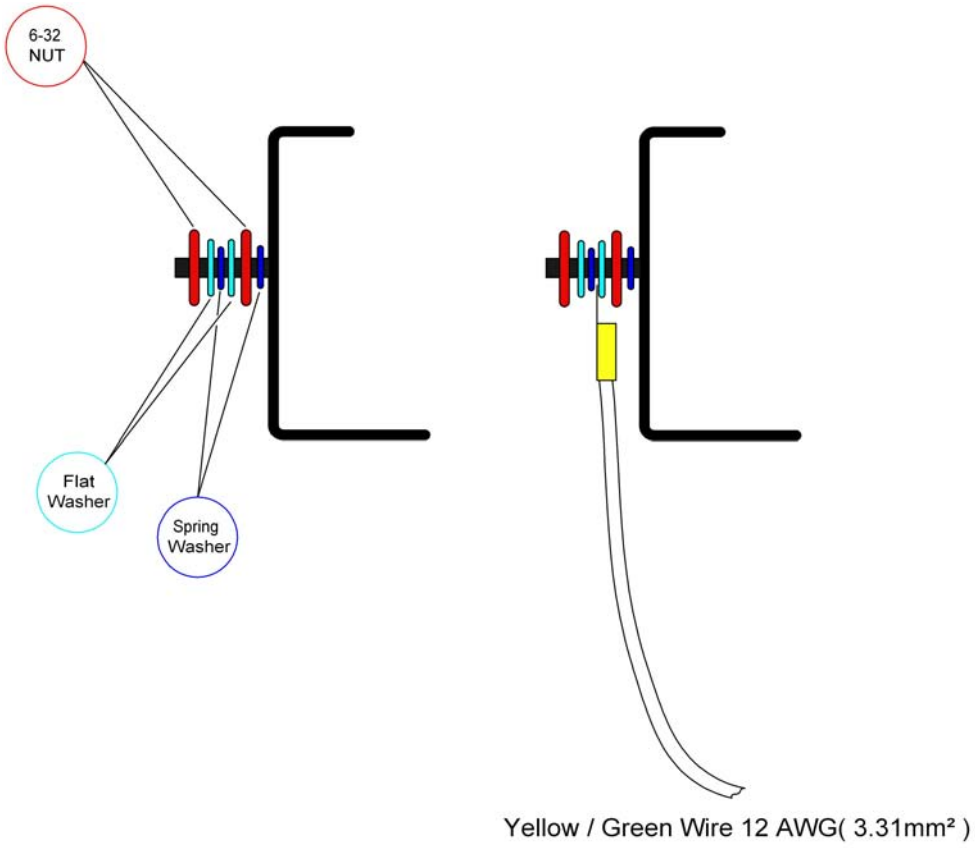


Figure A-3. Protective Ground Terminal Wiring Diagram

Appendix B

Alarm Messages

B.1 Alarm Messages

Table B-1 lists the alarm messages generated by the PL-400, specifies their type (event or state), and explains their interpretation. The alarm messages are grouped according to the source of the alarm.

Table B-1. Alarm Messages

Source	Message	Default Severity	Interpretation
PSU1 / PSU2	POWER SUPPLY FAILURE	Major	Replace the faulty power supply.
FAN1 to FAN6	FAN FAILURE	Major	The internal cooling fan of the PL-400 does not operate. Replace the unit as soon as possible.
System	HARDWARE FAILURE	Critical	A technical failure has been detected. Replace the PL-400.
System	CLOCK FAILURE	Major	The system clock (Real-Time Clock) has failed.
SFP	SFP Loss of Light	Critical	A Loss of Light indication has been received in regards to the specific SFP. The optical power of the received signal is below the minimum.
SFP	SFP transmitter fault	Critical	Transceiver not transmitting.
SFP	SFP HW fault	Major	A hardware fault was detected in the SFP.
SFP	SFP low TX power	Major	The transmission power of the SFP is below its specification.
SFP	SFP high TX power	Major	The transmission power of the SFP is above its specification.
SFP	SFP high temp	Major	The temperature inside the SFP is above its specification.

Source	Message	Default Severity	Interpretation
SFP	SFP low temp	Major	The temperature inside the SFP is below its specification.
SFP	SFP high RX power	Major	The incoming signal into the SFP is too high.
SFP	SFP low RX power	Major	The incoming signal into the SFP is too low.
SFP	SFP low WL	Major	DWDM wavelength below acceptable range.
SFP	SFP high WL	Major	DWDM wavelength exceeds acceptable range.
SFP	SFP Loss of Propagation	Minor	Laser was shut down due to a problem on the port's mate interface.
SFP	SFP mismatch	Major	The inserted SFP has a mismatch problem due to the wrong rate or type.
SFP	SFP Blocking	Major	The inserted SFP is unauthorized for use.
SFP	SFP Loss of Sync	Major	The interface is not synchronized.
EDFA	EDFA Gain Out-of-Bound	Major	EDFA gain is out-of-range-bounds.
EDFA	EDFA HW failure	Critical	EDFA hardware failure. The interface is not responding.
EDFA	EDFA temperature OOB	Critical	EDFA temperature out of acceptable range.
EDFA	EDFA LOS	Critical	No signal detected.
EDFA	EDFA Rx power OOB	Minor	Receive signal is out of acceptable range.
EDFA	EDFA Tx power OOB	Critical	Transmit signal is out of acceptable range
EDFA	EDFA Eye safety alarm	Major	Hazard. No fiber is connected to the port.
Link Port	GbE Loss of Sync	Major	Incorrect signal rate. Supported only when the daughter card is present.
Link Port	FC Loss of Sync	Major	Incorrect signal rate. Supported only when the daughter card is present.

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