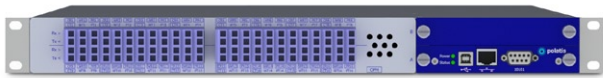# SERIES 6000*n-PSS*
Protection Services Switch

COMPACT AUTOMATED PROTECTION SWITCHING SOLUTION FOR UP TO 16 RX/TX LINE PAIRS

The Polatis Series 6000n Protection Services Switch (PSS) is a versatile solution for a wide range of protection switching applications. The PSS can protect up to 16 transmission RX/TX line pairs in a compact 1RU space and uses less than 25 Watts. It can operate as a standalone protection switch or it can be controlled and monitored by a higher level network management system to expand its capabilities. The PSS combines Polatis' patented DirectLight™ optical switch module with integrated power monitors and optical splitters to provide fast, efficient and cost-effective protection switching. A protection switch is triggered on loss of service, defined by user-settable optical power alarms. The Polatis 6000n-PSS can be configured to automatically switch individual traffic lines, or entire traffic groups all in less than 30ms. With support for SDN-OpenFlow, NETCONF, TL1, SNMP and integrated user-friendly Web GUI control interfaces, it can be easily integrated into existing network control platforms. The Polatis DirectLight™ optical switching technology used in the Series 6000n-PSS has been proven in the most challenging data center, telecom, and defense applications.

KEY FEATURES

- **Protects up to 16 bi-directional line services in a compact 1RU package**
- **Supports manual or fully automated protection switching and reversion**
- **Can be used standalone or integrate with existing network management systems**
- **Easy provisioning, management and integration**
- **Configurable to protect individual or groups of traffic lines**
- **Integrated switching, optical power monitors and signal splitters in a single package**
- **User configurable major and minor optical power alarm thresholds**
- **Carrier-class interfaces with SDN-OpenFlow, NETCONF, SNMP, and TL1 control languages**
- **Built-in secure, user-friendly web GUI**
- **High reliability with dual redundant power supplies**
- **Protocol and bit-rate agnostic up to 40Gbs, 100Gbs and beyond**
- **Eco-friendly with low 25W power consumption**
- **1:1 and N:1 optical layer APS configurations available**

AUTOMATIC PROTECTION SWITCHING

The Polatis Series 6000n-PSS provides protection switching against fiber faults or any other conditions that cause loss or degradation of the optical signal power. The Polatis Series 6000n-PSS supports both manual and fully automated protection switching operation. The manual mode allows remote users or network controllers to switch between working and protection lines. In the automated mode, protection switching is triggered when the optical signal goes outside of user settable high or low threshold alarm levels. After the fault is repaired, automatic reversion back to the working line is done after a stable signal power is detected on the working line.

Figure 1 shows the internal block diagram for a four-line protection service in the PSS. The line protection is implemented by splitting the optical signals over two diverse paths, one working and the other protection. The TX Section uses a splitter to duplicate the signals from common input connected to the client transmitter. The splitter broadcasts the client signal on both the working and protection lines. The RX-Section uses an optical switch to connect to either the working or the protection line to the client receiver.

There are 4 optical power monitors (PD-1 to PD-4) in each protection line service group. In the TX-Section, PD-1 is used to monitor the input transmitted signal power level. In the RX-Section, PD-3 monitors the power level on the working line and PD-4 monitors the power on the protection line. PD-2 is used to monitor the signal power out of the optical switch.

All of the power monitors have user settable major and minor alarms that can be used to individually customize the protection switching threshold of each line service. The Series 6000n-PSS can be programmed to send minor alarms if the power on any service drops below a programmable minor alarm level and perform a protection switch on a major alarm.

There are a variety of options for triggering a protection switch using the four power detectors. This flexibility allows the PSS operation to be tailored to meet a wide range of customer requirements but in most cases protection switching is simply triggered by a loss, or reduction, in the optical power on the working path using PD-3. The PSS can also be programmed to switch individual or multiple lines when a protection switch is triggered and can detect a fault and switch in less than 30ms.

BENEFITS OF POLATIS SOLUTION

- Simple drop-in, stand-alone, protection switching solution
- Cost effective all-optical protection switching solution
- Low optical loss minimizes impact on system power budget
- Superior optical specifications enable format-independent operation at line rates to 100Gbs and beyond
- Fast 30ms detection plus switching time insures fast recovery
- Supports both single or multiple line protection switching
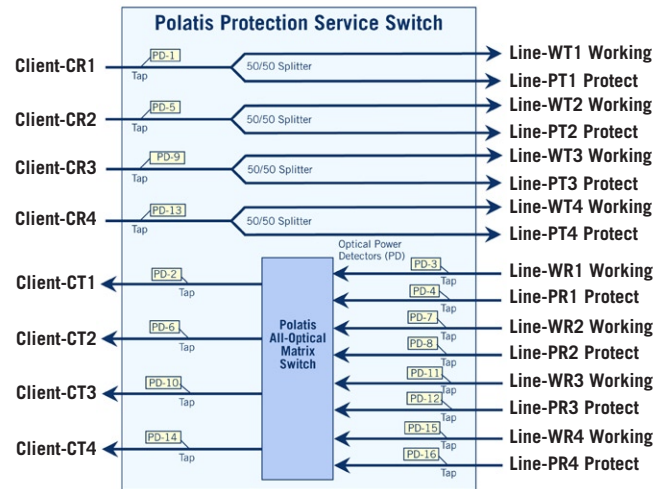- Available in 4, 8 or 16 Rx/Tx line pair configurations

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6000n-PSS part codes:

4 Protection Services
N-VST-8x4-HU1-MMHNP-800

8 Protection Services
N-VST-16x8-HU1-MMHNP-800

16 Protection Services
N-VST-32x16-HU1-MMHNP-800

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Figure 1: Block diagram of a four-line service on the Polatis Protection Service Switch (PSS)

CARRIER CLASS MANAGEMENT INTERFACES

Polatis offers an OpenFlow client on the Polatis Series 6000n so it can be deployed in a Software-Defined Network under an OpenFlow-enabled control plane. SDN-OpenFlow, NETCONF, SNMP, TL1 and SCPI command languages allow for seamless integration with higher-level network management systems or test equipment controllers. Each switch also has a user-friendly HTML web browser GUI interface that can be used to provision, monitor and control the switch. In addition, the switch software can be easily upgraded in the field without affecting in-service switch operations.

CARRIER CLASS DIRECTLIGHT™ BEAM-STEERING

The Series 6000n-PSS leverages Polatis' patented, highly reliable piezoelectric DirectLight™ beam-steering technology that sets the industry standard for the lowest optical loss and the highest optical performance. It has carrier-class reliability that includes dual hotswap power supplies.

Performance Parameters	Polatis 6000n-PSS Specifications
Number of Protection Services	16 RX/TX Line Pairs
Insertion Loss[1] (Client-CR to Line-WT/PT)	4.0dB
Insertion Loss[1] (Line-WR/PR to Client-CT)	2.8dB
Connection Stability (Line-WR/PR to Client-CT)	+/-0.1dB
Dark Fiber Switching	Yes
Max Protection Switching Time	30ms
Polarization Dependent Loss (PDL)	<0.5dB (C+L Band)
Crosstalk	<-50dB
Operating Wavelength Range	1270-1330nm & 1510-1620nm
Return Loss	>45dB
Optical Power Monitoring (OPM)	Wavelength range 1270-1330nm & 1510-1620nm
	Dynamic range -25dBm to +20dBm
	Accuracy +/-1.0dBm
Maximum Optical Input Power	+20dBm
Switch Lifetime	>10^8 Cycles
Operating Temperature	+10ºC to +40ºC <85% RH non-condensing
Storage Temperature	-40ºC to +70ºC <40% RH non-condensing

Electrical and Mechanical	Polatis 6000n-PSS Specifications
Fiber Type	Single Mode
Single Fiber Connectors	LC Connectors (high density)
Control Protocols	OpenFlow, NETCONF, TL1, SNMP & HTML
User Interfaces	RJ45 Multi-Session Ethernet 10/100 Base T and USB
Craft Interface	RS232 Serial
Power options	Hot Swappable Dual Redundant 100-240 VAC 50/60 Hz
	Hot Swappable Dual Redundant -48 VDC"
Power Consumption	25W

Fiber Connector	Polatis 6000n-PSS Size (HxWxD)
LC-HD	1RU x 19" x 22"

All parameters are measured excluding connectors at 1550nm and 20ºC with an unpolarized source after thermal equalization unless otherwise noted.
1. Measured using the 3 patch-cord method as defined in ANSI/TIA/EIA-526-7-1998