

# PL-4000T 1.6T Muxponder / Transponder

## Transport of 4 x 200G/300G/400G wavelengths, for high capacity metro and long haul applications

### Features Overview

- Pay-as-you-grow architecture based on standard pluggable coherent optical modules
- Up to 4 slices of 200G/300G/400G
- Supported services: 100GbE, 400GbE, OTU4
- Supported line FEC:
  - C-FEC (OIF-ZR)
  - oFEC (Open ROADM and Open ZR+)
- Range of modulation modes: 16QAM, 8QAM, QPSK
- Client options per slice:
  - 400GbE QSFPDD
  - 4 x 100GbE QSFP28
  - 4 x OTU4 QSFP28
- Supported 400G QSFPDD client optics: LR8/SR8/FR4/DR4/DR+/LR4
- Uplink options per slice:
  - 400G CFP2-DCO
  - 400G QSFPDD-DCO
- Layer-1 GCM-AES-256 encryption
- Elliptic Curve Diffie-Hellman key exchange
- Comprehensive line and service performance monitoring
- Integrated EDFA, mux/demux and up to 4 optical switches (optional)
- Facility protection using integrated optical switches (optional)
- Remote management with in-band GCC, or out-of-band OSC
- Easy maintenance with field-replacable and hot-swappable parts:
  - Dual hot pluggable power supply units (AC/DC)
  - Fan unit

### 400G Muxponder/Transponder

The PL-4000T is a modular and cost-effective high capacity solution for rolling out 400GbE and 100GbE services, or increasing existing network capacity. The device has four 400G pluggable uplink optical modules, delivering up to 1.6T in a 1U chassis. The PL-4000T integrates mux/demux, EDFA and OSW and delivers the entire optical layer. This flexible solution enables pay-as-you-grow architecture.

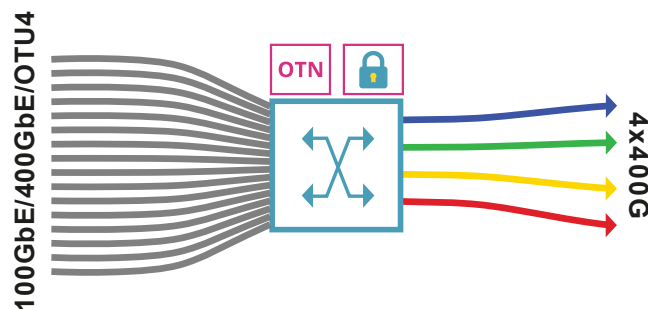


### Main Benefits

- **Cost-effective high capacity transport of 200G/300G/400G over single wavelength**
- **Up to 4x400G transponders/muxponders in a 1U chassis**
- **Embedded Layer-1 GCM-AES-256 encryption**
- **Integrated EDFA, mux/demux and optical switch in 1U**
- **Modular and cost-effective for future growth and maintenance**

### Flexible Pay-as-you-grow Architecture, with Redundancy

The solution provides full demarcation point between the service and the DWDM network, and is interoperable with any third party switch or router. This provides full visibility and performance monitoring of both the optical transport layer (OTN) and 100GbE/400GbE/OTU4 service interfaces.



PL-4000T Transponder/Muxponder Diagram

### Recommended applications:

- Metro and long haul network applications
- High capacity DCI for enterprise, campus and cloud computing networks
- 400G wavelengths to bolster existing OTN/DWDM infrastructure
- Last mile access/aggregation CPE for 100/400GbE managed services
- Secured and encrypted communication for 100/400GbE services



Layer-1 encryption



1U rack mount



Cost-effective solution

## Technical Specifications

### Product Configurations

**Muxponder:** 4x100G clients per 200G/300G/400G slice

**Transponder:** 1x400G per 400G

**Optical Amplifiers:** Up to two EDFA modules (optional)

**Mux/Demux:** 4ch mux/demux module (optional)

#### Optical Switch:

- 1+1 optical switch
- 4 x 1+1 optical switches

### Uplink Characteristics

#### Bit Rate:

- 200G/300G/400G OpenROADM
- 200G/300G/400G OpenZR+

**Optical Interface:** CFP2-DCO or QSFPDD-DCO 400G uplink

#### Tunability range:

- DWDM ITU-T G.694.1 Grid
- C-band, with flex-grid support

#### FEC Support:

- oFEC
- C-FEC

#### CFP2-DCO:

- Tx power 400G: -8dBm to +3dBm
- Rx power 400G: -23dBm
- Rx power 300G: -23dBm
- Rx power 200G: -30dBm
- 400G 16QAM OSNR Tolerance at -12dBm Rx Power: typical 21.8dB, min. 22.8dB
- 300G 8QAM OSNR Tolerance at -16dBm Rx Power: typical 18.9dB, min. 19.4dB
- 200G QPSK OSNR Tolerance at -17dBm Rx Power: typical 13.9dB, min. 14.9dB
- Rx Sensitivity at High OSNR: 400G 16QAM -22.5dBm, 300 8QAM -23dBm 200G QPSK -30dBm

#### Chromatic Dispersion Tolerance:

- 400G: 26,000ps/nm
- 300G: 26,000ps/nm
- 200G: 40,000ps/nm

#### QSFPDD-DCO:

- Tx power 400G: -6 to -10dBm
- 400G 16QAM C-FEC OSNR Tolerance at -12dBm Rx power: typical 24dB, min. 26dB
- Rx sensitivity at high OSNR: 400G 16QAM/ C-FEC -20dBm

#### Chromatic Dispersion Tolerance:

- 400G: 2,400ps/nm

### Client Characteristics

#### Service Types:

- 100Gb Ethernet
- 400Gb Ethernet
- OTU4

#### Optical Interface:

- 100GbE QSFP28 LR4/ER4/SR4/ZR/CWDM4/FR1/DR1
- 400GbE QSFPDD LR8/SR8/FR4/DR4/DR+/LR4

#### FEC Support:

- 100GbE: RS-FEC or no-FEC
- 400GbE: KP4-FEC
- OTU4: ITU-T G.709 G-FEC

### Amplifier

**Applications:** Booster, pre-amp

#### Output Power:

- Booster: up to 20dBm
- Pre-amp: up to 5dBm

#### Input Power:

- Booster: -24dB to +10dBm
- Pre-amp: -36dB to -10dBm

#### Gain:

- Booster: 5dB to 22dB
- Pre-amp: 13dB to 22dB

#### Operating Modes:

- Automatic gain control (AGC)
- Automatic power control (APC)

### Network Management

#### Management Ports:

- 2xRJ-45 LAN port 100/1000MBase-T
- 2xSFP MNG ports 100/1000MBase-X
- RJ-45 serial port
- RJ-45 external alarm port
- OTN in-band GCC channel

#### Management Protocols:

- HTTP/HTTPS, CLI over RS-232 or CLI over Telnet/SSH, SNMPv2/3, Syslog, RADIUS, TACACS+, Sntp, TFTP & SFTP, REST, NETCONF

#### NMS:

- PacketLight LightWatch™ NMS, or third party NMS over SNMP

#### OAM:

- Facility loopback (client and line interfaces), terminal loopback, PRBS, event log, alarms

#### Performance Monitoring:

- Layer-1/2 PM for 100/400GbE services
- FlexO PM
- OTN PM for uplink and OTU4 services
- Optical PM for optical ports

**Visual Indicators:** Status indicators for client and line ports, Management and LAN ports, amplifier/s, system Critical/Major/Minor and Power Supply

#### Software Upgrade:

Hitless traffic – dual image

### Power Supply

**AC/DC:** 100 to 240 VAC, 50/60 Hz, -44 to -60 VDC, 300W max

**PSU Redundancy:** Single/dual feeding, hot swappable

**Cooling Unit:** Hot swappable fan unit

### Environmental

**Operating Temperature:** -5°C to 45°C (+23°F to +113°F) operational

**Humidity:** 5% to 85% RH

**Storage:** 85°C

### Physical Dimensions

#### 1U:

- 1.77" (H) x 17.32" (W) x 15.75" (D)
- 45mm (H) x 440mm (W) x 400mm (D)

**Weight:** 8.4kg / 18.5lb (max)

**Mounting:** 19", ETSI, 21", 23"

### Encryption

**Functionality:** Full speed transparent Layer-1 encryption for selected 100GbE/400GbE/OTU4 services / 400G uplinks

#### Compliance:

- FIPS 140-3 Level 2

#### Algorithms:

- Encryption/decryption: GCM-AES-256
- Key exchange: ECC CDH, Curve P-384
- Message digest: SHA-384

**Authentication:** Role-based user/password authentication

**Note:** For specific countries, models that include Layer-1 GCM-AES-256 based encryption will be marked with the suffix C.

### Approvals & Standards

- CE, FCC, RoHS, REACH
- NEBS ready

For more information please contact us at [www.packetlight.com](http://www.packetlight.com)

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