

# PL-4000T

## 1.6T Integrated Transponder/Muxponder



**4 x 400G wavelengths for high capacity metro and long haul applications**

### Features Overview

- Pay-as-you-grow architecture based on standard pluggable coherent optical modules
- Operation modes per slice:
  - 4 x 100G muxponder
  - 1 x 400G transponder
- Supported services: 100GbE, 400GbE, OTU4
- Supported FEC modes on the line side:
  - C-FEC (for ZR standard)
  - O-FEC (for Open ROADM standard)
- Standard MSA pluggable modules:
  - 16 x 100GbE QSFP28 clients
  - 4 x 400GbE QSFPDD-DCO clients
  - 4 x 400G CPF2-DCO DWDM uplinks
  - 4 x 400G QSFPDD-DCO DWDM uplinks
- Layer-1 GCM-AES-256 encryption
- Elliptic Curve Diffie-Hellman key exchange
- Comprehensive line and service performance monitoring
- Integrated EDFA, mux/demux and optical switch (optional)
- Facility protection using an integrated optical switch (optional)
- Remote management with in-band GCC, or out-of-band OSC
- Easy maintenance with field-replaceable parts:
  - Dual hot pluggable power supply units (AC/DC)
  - Fan unit

### 400G Muxponder/Transponder

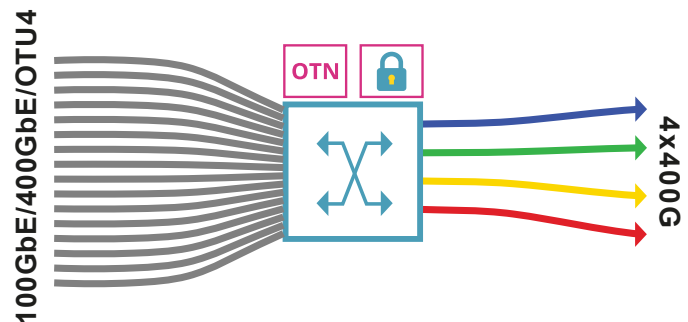
The PL-4000T is a modular and cost-effective high capacity solution for rolling out 400GbE and 100GbE services, or increasing existing network capacity. The device has four 400G pluggable uplink optical modules, delivering up to 1.6T in a 1U chassis. The PL-4000T integrates mux/demux, EDFA and OSW and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

### Main Benefits

- **Cost-effective high capacity transport of 400G over single wavelength**
- **Up to 4 x 400G transponders/muxponders in a 1U chassis**
- **Embedded Layer-1 GCM-AES-256 optical 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 uplink, 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 for the following applications:

- Metro and long haul network applications ranging up to 1,000km
- High capacity DCI for enterprise, campus and cloud computing networks
- 400G links 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 per 400G

**Transponder:** 1x400G per 400G

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

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

**Optical Switch:** 1+1 facility protection (optional)

### Uplink Characteristics

#### Bit Rate:

- 400G FlexO
- 200G FlexO

**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:

- C-FEC
- O-FEC

#### CFP2-DCO:

- Tx power 400G: -10dBm to 0dBm
- Rx power 400G: -23dBm
- 400G 16QAM OSNR Tolerance at -12dBm Rx Power: typical 21.8dB, worst case 22.8dB
- 200G QPSK OSNR Tolerance at -17dBm Rx Power: typical 13.9dB, worst case 14.9dB
- Rx Sensitivity at High OSNR: 400G 16QAM -22.5dBm, 200G QPSK -30dBm

#### QSFPDD-DCO:

- Tx power 400G: -10dBm
- Rx power 400G: -20dBm
- 400G 16QAM O-FEC OSNR Tolerance at -12dBm Rx power: typical 21.3dB, worst case 22.3dB
- 400G 16QAM C-FEC OSNR Tolerance at -12dBm Rx power: typical 24dB, worst case 26dB
- 200G QPSK OSNR Tolerance at -17dBm Rx Power: typical -13.7dBm, worst case -14.7dBm
- Rx sensitivity at high OSNR: 400G 16QAM/O-FEC -23dBm, 400G 16QAM/C-FEC -20dBm, 200G QPSK -30dBm

#### Chromatic Dispersion Tolerance:

- 400G: 26,000ps/nm
- 200G: 50,000ps/nm

### Client Characteristics

#### Service Types:

- 100Gb Ethernet
- 400Gb Ethernet
- OTU4

#### Optical Interface:

- 100GbE QSFP28 LR4/ER4/SR4
- 400GbE QSFPDD-DCO LR8/FR8

#### FEC Support:

- 100GbE: RS-FEC or no-FEC
- 400GbE: KP4-FEC
- OTU4: Standard 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

**Protocols:** SNMP v1/v2/v3, HTTP/HTTPS, Telnet/SSH, Syslog, RADIUS, SNMP, TFTP & SFTP

#### Management:

- Web browser over HTTP/HTTPS,
- PacketLight LightWatch™ NMS/EMS, or third party NMS over SNMP
- CLI over RS-232 or CLI over Telnet/SSH

#### 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, -36 to -60 VDC, 300W max

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

**Cooling Unit:** Hot swappable fan unit

### Environmental

**Operating Temperature:** -5°C to 50°C (+23°F to +122°F) operational

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

### Physical Dimensions

#### 1U:

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

**Weight:** 13kg / 28.66lb (max)

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

### Encryption

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

#### Compliance:

- FIPS 140-2 Level 2
- CNSA Top Secret Suite B 2015

#### 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