

# 10G-40G QSFP Second-Generation PTX Series PICs



## Product Overview

Juniper Networks 10G-40G quad small form-factor pluggable optical transceiver (QSFP) second-generation PTX Series PICs enable service providers to deploy high-density 10GbE/40GbE interfaces in a wide variety of service provider, data center interconnect, Internet eXchange, and public sector applications. Using configurable LAN and WAN PHY personality for 10GbE applications with optical channel transport unit (OTU2) framing via breakout cables, the 10G-40G PICs can also deliver 40GbE functionality with OTU3 wrapper. This unprecedented flexibility allows for mix-and-match of 10GbE and 40GbE applications on a single card.

## Product Description

Juniper Networks® PTX Series Packet Transport Routers are architected for industry-leading system density in a transport focused design that delivers the ability to scale, rapidly qualify and deploy, and reliably support the core—at almost half the power of other core routers. The second generation of PTX Series hardware uses an optimized packaging of the Junos® Express chip for robust, line-rate, and low latency packet performance at up to 960 Gbps per slot. The 10G-40G second-generation PTX Series PICs extend the existing PIC portfolio by offering cost optimized flexibility of dense 10GbE/40GbE solutions to the service provider. The mix and match of 10GbE and 40GbE interfaces is configurable per Packet Forwarding Engine (PFE), which allows for each of eight Express chips to independently operate three 40GbE or twelve 10GbE ports. A PTX Series router fully equipped with second-generation linecards can demonstrate efficiency as high as 1.2 W/Gbps.

## Architecture and Key Components

The 10G-40G QSFP PICs for second-generation PTX Series linecards leverage the proven Junos Express technology in octal-PFE configuration of FPC2. This approach combines proven and qualified hardware with advanced packaging and the latest modular optical technology. The 10G-40G QSFP second-generation PTX Series PIC supports Ethernet over short reach (SR), long reach (LR), and extended reach (ER) applications; it has been designed for the highest flexibility in local, long-haul, and dense wavelength-division multiplexing (DWDM) applications with Ethernet and optical transport network (OTN) framing.

## Features and Benefits

### 40GbE Configuration

Each of eight PFEs on PTX Series FPC2 can be configured to support three 40GbE interfaces in LAN or OTN (OTU3) flavors. The quad small form-factor pluggable plus transceiver (QSFP+) supporting 40Gb rates incorporate duplex LC connectors.

### 10GbE configuration

Each of eight PFEs on PTX Series FPC2 can be configured to support twelve 10GbE interfaces in LAN or OTN (OTU2) configurations. The QSFP+ supporting 10GbE rates incorporate 12-pin MPO connectors. For high-density 10GbE applications, 12-pin MTP to 4 duplex LC breakout cables need to be used along with the QSFP+ modules for connecting to individual remote side 10GbE ports (as shown in Figure 1).

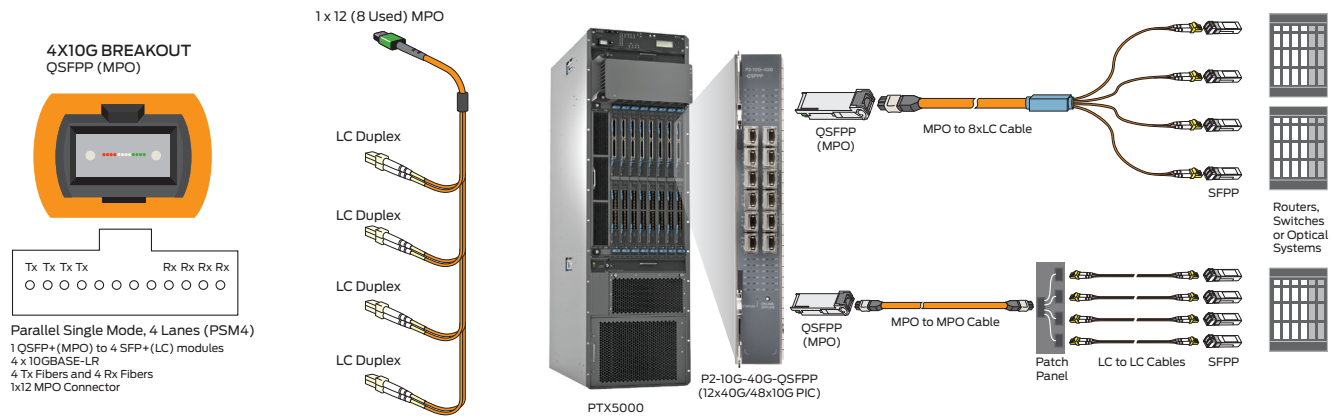


Figure 1: 10GbE configuration

Table 1: Pluggable Optical Modules Supported

Optics	Framing	Compatibility
4x10GBASE-SR/SW	Ethernet	X
4x10GBASE-LR/LW	Ethernet	X
40GBASE-SR4	Ethernet	X
40GBASE-LR4	Ethernet	X
4x10GBASE-LR/LW/OTU2/OTU2e/OTU1e	Ethernet and OTN	X
4x10GBASE-ER/EW/OTU2/OTU2e/OTU1e	Ethernet and OTN	X
4x10GBASE-ZR/ZW/OTU2/OTU2e/OTU1e	Ethernet and OTN	X
40GBASE-LR4/OTU3	Ethernet and OTN	X
40GBASE-ER4/OTU3	Ethernet and OTN	X

Table 2: Modes of Operation Supported

Mode	Client Rate (Gbps)	Line Rate (Gbps)	Fast Ethernet Channel (FEC)	Frequency Accuracy
10GbE LAN to LAN	10.3125	10.3125	-	± 100
10GbE LAN to WAN	10.3125	9.95328	-	± 20
10GbE LAN over WAN over OTN (OTU2)	10.3125	10.709	GFEC/1.4/1.7	± 20
10GbE LAN over OTN (OTU2e)	10.3125	11.095	GFEC/1.4/1.7	± 100
10GbE LAN over OTN (OTU1e)	10.325	11.049	GFEC/1.4/1.7	± 100
40GbE LAN to LAN	10.3125/ Lane	10.3125/ Lane	-	± 100
40GbE LAN over OTN (OTU3)	10.3125/ Lane	10.755/ Lane	GFEC	± 20

## Specifications

### LEDs

Overlay Label	Color	Meaning
Status (Tri-Color LED)	OFF	PIC powered down and offline.
	AMBER	PIC is getting initialized by software.
	GREEN	PIC is online with all voltages in range.
	RED	PIC is in fail state.
Link/Activity/Alarm 0:0,0:1,0:2,0:3;1:0...11:3 (10GbE ports) 0:0, 1:0, 2:0...11:0 (40GbE ports) (Dual-color LED)	OFF	Port is off.
	GREEN	Port is powered on and link is up. (This light only has meaning if the PIC status LED is lit and is green.)
	Flashing	Indicates link activity for that particular port sending/receiving packets.
	RED	Port has fault/alarm.

### Physical Dimensions

- 7.75 x 11 in (196.8 x 279.4 mm)

### Weight

- Not to exceed 20 lbs (9.07 kg)

### Power

- 200 watts (maximum)

### Network Management

- Simple Network Management Protocol (SNMP)
- Juniper Networks Junos Space CLI

## Standards Compliance and Interoperability

### Optical Standards

- Telcordia GR-63 Issue 4: 2012
- EN 60825-1 (2007) Safety of Laser Products—Part 1: Equipment classification and requirements
- FDA CDRH21 CFR-1040 Environment
- Operating Temperature: 32° to 104° F, 0° to 40° C
- Storage Temperature: -40° to 158° F, -40° to 70° C
- Relative Humidity: (Operating) 5 to 90% noncondensing
- CAN/CSA-C22.2 No. 60950-1 (2007) Information Technology Equipment—Safety
- UL 60950-1 (2nd Ed.) Information Technology Equipment—Safety
- EN 60950-1 (2005) Information Technology Equipment—Safety
- IEC 60950-1 (2005) Information Technology Equipment—Safety (All country deviations)
- EN 60825-1 +A1+A2 (1994) Safety of Laser Products—Part 1: Equipment Classification

### Electromagnetic Compatibility

- EN 300 386 V1.4.1 (2008) Telecom Network Equipment—EMC requirements
- EN 55024 +A1+A2 (1998) Information Technology Equipment Immunity Characteristics

### EMI

- FCC CFR 45, Part 15 Class A (2009) USA Radiated Emissions
- EN 55022 Class A (2006)+ A1 2007 European Radiated Emissions
- VCCI Class A (2007) Japanese Radiated Emissions
- BSMI CNS 13438 and NCC C6357 Taiwan Radiated Emissions
- AS/NZS CISPR22:2009

### Customer-Specific Requirements

- GR-63-Core (2006) Network Equipment, Building Systems (NEBS) Physical Protection
- GR-1089-Core Issue 5 (2009) EMC and Electrical Safety for Network Telecommunications Equipment
- SR-3580 (2007) NEBS Criteria Levels (Level 3)
- ETSI EN 300 019: Environmental Conditions & Environmental Tests for Telecommunications Equipment
- ETSI EN 300 019-2-1 (2000)—Storage
- ETSI EN 300 019-2-2 (1999)—Transportation
- ETSI EN 300 019-2-3 (2003)—Stationary Use at Weather-protected Locations
- ETSI EN 300 019-2-4 (2003)—Stationary Use at Non-Weather-protected Locations

- ETS 300753 (1997)—Acoustic noise emitted by telecommunications equipment
- 1 TR 9 (2005) Deutsche Telekom EMC Specification
- British Telecom EMC Immunity Requirements (2004)
- ITU-T K.21 (2003) Resistibility of telecommunication equipment installed in customer premises to over voltages and over currents

### Mandatory Power Supply Markings

- Power Supply integrated in system (with metal enclosure or open frame)
  - UL, CSA: UL/CSA 60950-1 (2007)
  - TUV: EN 60950-1 2nd Edition (2005)
  - CE: EN55022 Class B (2006), EN55024 + A1 + A2 (1998), EN60950-1 2nd Edition (2005)
  - China CCC
  - Argentina IRAM/S-mark

## Juniper Networks Services and Support

Juniper Networks is the leader in performance-enabling services that are designed to accelerate, extend, and optimize your high-performance network. Our services allow you to maximize operational efficiency while reducing costs and minimizing risk, achieving a faster time to value for your network. Juniper Networks ensures operational excellence by optimizing the network to maintain required levels of performance, reliability, and availability. For more details, please visit [www.juniper.net/us/en/products-services](http://www.juniper.net/us/en/products-services).

## Ordering Information

Model Number	Description	Platform
P2-10G-40G-QSFPP	PTX Series 48x10GbE and 12x40GbE QSFP+ second-generation PIC	PTX5000
QSFP-40GD-LR4	QSFP+ 40GbE LR4 OTN and Ethernet dual rate module	P2-10G-40G-QSFPP
QSFP-4X10GE-LR	QSFP+ 4x10GbE BASE LR module	P2-10G-40G-QSFPP
QSFP-4X10GE-SR	QSFP+ 4x10GbE BASE SR module	P2-10G-40G-QSFPP
QSFP-4X10GD-LR	QSFP+ 4x10GbE BASE LR OTN and Ethernet dual rate module	P2-10G-40G-QSFPP

## About Juniper Networks

Juniper Networks is in the business of network innovation. From devices to data centers, from consumers to cloud providers, Juniper Networks delivers the software, silicon and systems that transform the experience and economics of networking. The company serves customers and partners worldwide. Additional information can be found at [www.juniper.net](http://www.juniper.net).

### Corporate and Sales Headquarters

Juniper Networks, Inc.  
1133 Innovation Way  
Sunnyvale, CA 94089 USA  
Phone: 888.JUNIPER (888.586.4737)  
or +1.408.745.2000  
Fax: +1.408.745.2100  
[www.juniper.net](http://www.juniper.net)

### APAC and EMEA Headquarters

Juniper Networks International B.V.  
Boeing Avenue 240  
1119 PZ Schiphol-Rijk  
Amsterdam, The Netherlands  
Phone: +31.0.207.125.700  
Fax: +31.0.207.125.701

Copyright 2014 Juniper Networks, Inc. All rights reserved. Juniper Networks, the Juniper Networks logo, Junos and QFabric are registered trademarks of Juniper Networks, Inc. in the United States and other countries. All other trademarks, service marks, registered marks, or registered service marks are the property of their respective owners. Juniper Networks assumes no responsibility for any inaccuracies in this document. Juniper Networks reserves the right to change, modify, transfer, or otherwise revise this publication without notice.