



# 4-PORT 10 GE PIC FOR T SERIES CORE ROUTERS

## Product Overview

Ethernet has long been the preferred interconnection technology for large data centers and POPs (point of presence), and is increasingly the technology of choice for core and inter-site uplinks. The 4-port 10 GE Type 4 PIC is the answer for these service providers and data center operators who must cost-effectively deploy large numbers of high bandwidth Ethernet ports.

The performance, versatility, and scalability of the 4-port 10 GE PIC (Physical Interface Card) for T Series platforms makes this PIC ideal for a wide range of high-performance network connectivity options.

## Product Description

The 4-port 10 GE PIC provides 10 GE line rate performance across all ports, down to 64 byte packets, and is supported on the Juniper Networks® T Series Core Routers. Per-port configuration options include LAN-PHY or WAN-PHY, and transmission distance based on multi-rate XFP pluggable optics. These optics provide a rich set of software-configurable options enabling a variable set of range and feature configurations among the four ports.

A single T640 can support up to (8) 4-port 10 GE PICs using the T640-FPC4-ES, for a total of (32) 10 GE ports per chassis; a Juniper Networks T1600 or T4000 Core Router can support up to (16) 4-port 10 GE PICs using the T1600-FPC4-ES.

Alternatively, Type 4 FPCs (Flexible PIC Concentrators) can be mixed with other FPC types creating a wide range of flexible interface options to match your high capacity, high performance platform needs.

The combination of exceptional interface density, performance, and versatility ensures not only that you get the most out of your current T Series investment, but that your investment continues to be protected as your data center or POP grows.

## Architecture and Key Components

The 4-port 10 GE PIC has a double-wide physical form factor. A single PIC can be supported in a T640-FPC4-ES (40 Gbps total throughput), or two PICs can be supported in a T1600-FPC4-ES (100 Gbps total throughput). The power and cooling budget of the 4-port 10 GE PIC permits up to 8 PICs in a T640 router, or any combination of 4-port 10 GE PICs and other T Series supported PICs.

## Features and Benefits

The 4-port 10 GE PIC offers several unique features and benefits for both large-scale data centers and POPs. The massive 10 Gbps port density makes this PIC a cost-effective solution for device and network consolidation, intra- and inter-site connectivity, and core uplinks.

## Investment Protection

The modular architecture of the 4-port 10 GE Type 4 PIC provides significant investment protection for T Series routers and Flexible PIC Concentrators. FPCs purchased for the T640 (T640-FPC4-ES) and the T1600 (T1600-FPC4-ES) can be re-tasked over time with new Type 4 interfaces for new applications, based on the FPC-PIC concept, without forklift upgrades to the platform.

The use of pluggable XFP optics also ensure investment protection; as new modules are developed to provide additional connectivity options or enhanced cabling distances, service providers and data center operators can simply insert the new optical module into the PIC without replacing the entire unit.

## Management

The 4-port 10 GE PIC includes Ethernet-based OAM, and provides support for per INF-8077i optical diagnostics and monitoring through the use of XFP pluggable optics.

## Product Overview

Feature	Description
Ports	Four line-rate 10 GE ports
Framing	Ethernet CCC, Ethernet TCC, Ethernet VPLS, VLAN CCC, Extended VLAN TCCC, VLAN VPLS through command line interface (CLI)
Data rate	10 Gbps, full line rate down to minimum 64 bytes with no reordering of packets in the same flow
Optics	XFP, with LC optical connectors
Transmission distance	Flexible XFP-based connectivity: SR1, LR1, ER2, ZR2
Diagnostic optical monitoring (INF 8077i)	Module temperature; TX Bias Current; TX output power; RX input power
Alarm support (INF 8077i)	Laser Bias Current, Laser Output Power, Module Temperature, Laser Rx Power, Module Not Ready, Module Power Down, Tx, Data Not Ready, Tx Not Ready, Tx Laser Fault, Tx Cdr Loss of Lock, Rx Not Ready, Rx Loss of Signal
Tri-color LED per port	<ul style="list-style-type: none"><li>• Off: Not enabled</li><li>• Green: Online with no alarms or failures</li><li>• Amber: Online with alarms for remote failures</li><li>• Red: Active with a local alarm; router has detected a failure</li></ul>
Supported platforms	T640, T1600, T4000

## Software Features

Ingress frames can be filtered according to VLA, Source Address, and VLAN Destination Address. Ingress frames can also be classified according to VLAN, Stacked VLAN, Source Address, VLAN Source Address, and Stacked VLAN Source Address.

The following software features are supported with Junos® operating system 9.0 and above:

- Protocol Support:
  - L2 Protocols:
    - › Ethernet CCC, Ethernet TCC, Ethernet VPLS
    - › VLAN CCC
    - › Extended VLAN TCCC
    - › VLAN VPLS
    - › Flexible-Ethernet-Service
  - L3 Protocols:
    - › IPv4
    - › IPv6
    - › MPLS
- 802.3ad Link Aggregation
  - Aggregated Ethernet, LACP
  - 16 groups with 1 links per group (8 links per group for TX)
  - Multiple VPN types (Flexible-Ethernet-Service) over Aggregated Ethernet
- MAC Learning, Accounting and Filtering
  - Up to 1023 source MAC addresses per port
  - VLAN Pass counters
  - VLAN Drop counters
  - VLAN, SA counters
- 1024 VLANs (or stacked VLANs) per port
- Flex-VLAN tagging support
- Interrupt driven link down detection
- Ethernet OAM 802.3ah
- Ethernet OAM 802.1ag
- Ethernet WAN Interface Sublayer (WIS) SNMP Object
- Graceful Routing Engine Restart (GRES) fully operable in all PIC/ chassis configurations
- Configurable WAN-PHY mode options include:
  - Loopback
  - MPLS
  - Path-Trace
  - Trigger

## Agency Approvals

### Safety

- CAN/CSA-C22.2 No. 60950-00/UL 60950 – Third Edition, Safety of Information Technology Equipment
- EN 60825-1 Safety of Laser Products – Part 1: Equipment Classification, Requirements and User's Guide
- EN 60825-2 Safety of Laser Products – Part 2: Safety of Optical Fibre Communications Systems
- EN 60950-1 Safety of Information Technology Equipment

### EMI

- AS/NZS 3548 Class A (Australia and New Zealand)
- BSMI Class A (Taiwan)
- EN 55022 Class A (Europe)
- FCC Part 15 Class A (USA)
- VCCI Class A (Japan)
- Immunity
- EN 61000-3-2 Power Line Harmonics
- EN 61000-3-3 Voltage Fluctuations and Flicker
- EN 61000-4-2 ESD
- EN 61000-4-3 Radiated Immunity
- EN 61000-4-4 EFT
- EN 61000-4-5 Surge
- EN 61000-4-6 Low Frequency Common Immunity
- EN 61000-4-11 Voltage Dips and Sags

### NEBS

- GR-63-CORE: NEBS, Physical Protection
- GR-1089-CORE: EMC and Electrical Safety for Network Telecommunications Equipment
- SR-3580 NEBS Criteria Levels (Level 3 Compliance)

### ETSI

- ETSI EN-300386-2 Telecommunication Network Equipment, Electromagnetic Capability Requirements

## 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
PD-4XGE-XFP	Type 4 Physical Interface Card (PIC) providing 10 GE LAN/WAY, selectable on a per-port basis

### XFP Optical Transceivers

XFP-10G-S	10 GE pluggable transceiver, 850 nm for 300 m transmission
XFP-10G-L-OC192-SR1	Dual Rate 10 G pluggable transceiver for 10 GE and OC192, transmitting at 1310 nm for 10 KM transmission
XFP-10G-E-OC192-IR2	Dual Rate 10 G pluggable transceiver for 10 GE and OC192, transmitting at 1550 nm for 40 KM transmission
XFP-10G-Z-OC192-LR2	Dual Rate 10 G pluggable transceiver for 10 GE and OC192, transmitting at 1550 nm for 80 KM transmission

## 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.  
1194 North Mathilda Avenue  
Sunnyvale, CA 94089 USA  
Phone: 888.JUNIPER (888.586.4737)  
or 408.745.2000  
Fax: 408.745.2100  
[www.juniper.net](http://www.juniper.net)

#### APAC Headquarters

Juniper Networks (Hong Kong)  
26/F, Cityplaza One  
1111 King's Road  
Taikoo Shing, Hong Kong  
Phone: 852.2332.3636  
Fax: 852.2574.7803

#### EMEA Headquarters

Juniper Networks Ireland  
Airside Business Park  
Swords, County Dublin, Ireland  
Phone: 35.31.8903.600  
EMEA Sales: 00800.4586.4737  
Fax: 35.31.8903.601

To purchase Juniper Networks solutions, please contact your Juniper Networks representative at 1-866-298-6428 or authorized reseller.

Copyright 2011 Juniper Networks, Inc. All rights reserved. Juniper Networks, the Juniper Networks logo, Junos, NetScreen, and ScreenOS 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.