PTX1000 Packet Transport Router

Product Overview

Increased interactions between people and machines are creating a deluge of traffic, with increasingly unpredictable patterns. These dynamics have intensified the challenge to accommodate growth with traditional network products and architectures. However, a new approach, based on both physical and virtual innovations, is required to help service providers stay ahead of growing traffic demands while remaining profitable. PTX Series Packet Transport Routers with custom ExpressPlus silicon, built from the ground up with SDN in mind, provide operators with an architecture that reduces TCO with highly flexible, high-performance innovations for easy deployment.

Product Description

The Juniper Networks PTX1000 Packet Transport Router transforms the core network with physical and virtual innovations that deliver unprecedented scale at a low cost. With the PTX1000, service providers now have the freedom to create new virtualized services anywhere in the network and elastically create an architecture with precise traffic control without compromising the service experience.

The Evolving Landscape

New traffic dynamics like mobility, video, and cloud-based services are transforming traditional network patterns and topologies. Stratified, statically designed and manually operated networks must evolve to meet constantly growing volumes of traffic quickly and economically. Many operators have seen profitability stagnate and TCO grow under the burden that growing traffic volumes are imposing. Service providers need to become more agile in order to optimize their existing network resources, shorten planning cycles, and remove rigid network layers.

- **Static scale:** The service provider backbone handles the entire weight of the network's traffic. Therefore, it is paramount that the core network can grow organically, along with the traffic, to meet escalating demands. Silicon, system, and SDN innovations for the core empower service providers to scale faster than the traffic demands in an elegant, elastic, redundant package—without requiring forklift upgrades.

- **Static architecture:** Virtualized services and the explosion of cloud-based applications are creating increasingly unpredictable traffic patterns. To handle this unpredictability, service providers need a flexible and dynamic architecture across all layers. Rigid architectures hinder rather than enable programmable, predictable, and traffic-optimized networks supporting any service, anywhere.

- **Power challenges:** For service providers, the operational cost to transmit a packet through the core is far exceeded by the power requirements to move that packet. Service providers have determined that the total power draw over a few years exceeds the total cost of deploying the network infrastructure. Efficient core router power utilization requires a holistic ground-up engineering approach.

- **Facility challenges:** Service providers cannot continue growing their facilities exponentially. They need innovations that provide a low-touch deployment model optimized around space availability, facility power requirements, and floor weight thresholds. Transport-oriented central office locations have the added requirement of European Telecommunications Standardization Institute (ETSI) standard depth, and any transit router innovation must be able to operate within these constraints.

In order to address these challenges, service providers need an innovative core router that delivers three defining principles: performance, deployability, and SDN programmability. With Juniper Networks® PTX1000 Packet Transport Router, Juniper introduces the industry's only fixed core router that exceeds these requirements and easily fits into the service provider network, expanding the Juniper Networks architecture beyond lean label-switching router (LSR) deployments.

PTX Series

The Juniper Networks PTX Series Packet Transport Routers bring physical and virtual innovations to the service provider core network. These directly address concerns about operational expenditures while scaling organically to keep pace with growing traffic demands. In order for PTX Series routers to lower operational expenses, physical innovations at the core silicon are needed. PTX Series routers are powered by Juniper Networks ExpressPlus™ silicon, building upon the Juniper Networks Junos® Express silicon concepts of low consistent latency and wire-rate packet performance for both IP traffic and MPLS transport without sacrificing the optimized system power profile. All of these concepts are incorporated into the design along with full IP functionality, preserving the spirit of the original Junos Express chipset. The ExpressPlus silicon is the first purpose-built telecommunication silicon to engineer a 3D memory architecture into the base design for more than 1.6 billion filter operations per second, dynamic table memory allocation for mammoth IP routing scale, and enormous power efficiency gains.

The ability to address service provider core networking requirements of performance, deployability, and SDN control begins with the silicon. The integration of optical transport with 100GbE coherent technology further improves the economics of the core network. With PTX Series routers powered by the ExpressPlus silicon, service providers can now deploy an architecture with the efficiency of a lean core deployment featuring Juniper Networks NorthStar Controller, a robust, full-featured Internet backbone router, and a converged regional IP/MPLS core router with integrated 100GbE coherent transport for superior performance, elegant deployment, and SDN programmability.

PTX1000

For the first time, the PTX1000 lets service providers organically distribute peering points throughout the network with a rich IP/MPLS feature set without sacrificing performance and deployability—the main contributors to eroding TCO for service providers when peering. The PTX1000 expands the applications scope that the PTX Series architecture addresses, enabling

service providers to implement a distributed core architecture for interconnecting growing cloud services. Service providers can distribute peering points to match traffic demand with an optimized core router without sacrificing performance or deployability. The PTX1000 is the industry's only fix configuration core router in a compact, 2 U form factor, making it easily deployable in space-constrained Internet exchange locations, remote central offices, and embedded peering points anywhere in the network, including cloud-hosted services.

The PTX1000 operates at 2.88 Tbps in a fixed core router configuration and supports flexible interface configuration options, including 288 x 10GbE ports via a quad small form-factor pluggable plus transceiver (QSFP+) breakout, 72 x 40GbE ports via QSFP+, and 24 x 100GbE ports via QSFP28. Like the rest of the PTX Series, the PTX1000 is powered by ExpressPlus silicon, offering predictable IP/MPLS packet performance and functionality. ExpressPlus silicon also eliminates the complex sawtooth packet profile found in elaborate over-engineered network processing units (NPUs) deployed in other core routers. This delivers the distributed peering scale (2 million plus forwarding information base [FIB] and 5 million routing information base [RIB], also known as forwarding and routing tables, respectively), required to match expanding traffic demands.

Features and Benefits

Performance is one of the guiding design principles for the PTX Series routers. This focus empowers service providers with superior scale to match increased traffic demands and network engineering challenges with predictable system latency to improve the overall service experience, deliver best-in-class resiliency, and ensure that service providers meet strict customer service-level agreements (SLAs).

Deployability is the other guiding design principle for the PTX Series routers, focusing on power, space, and weight—fundamental concerns that impact service providers' operational budget with respect to growing traffic demands.

SDN programmability brings virtual innovations to the service provider core, while the NorthStar Controller is an open, standards-based solution that optimizes both the IP layer and the transport layer with precise SDN control, allowing service providers to automate and scale operations.

Table 1 summarizes the features available on the PTX1000 router.

Table 1: PTX1000 Features and Benefits

Feature	Feature Description	Benefit
System capacity	The PTX1000 scales to 2.88 Tbps in a single chassis, breaking out into 288 10GbE, 72 40GbE, and 24 100GbE interfaces.	PTX1000 routers give service providers the performance and scalability needed to outpace increased traffic demands.
High availability hardware	The PTX1000 is engineered with hardware redundancy for cooling, power supply, and forwarding.	High availability (HA) is a critical requirement for service providers to maintain an always on infrastructure base for meeting stringent SLAs across the core.
Packet performance	Groundbreaking ExpressPlus silicon empowers the PTX1000 with unparalleled packet processing for both full IP functionality and MPLS transport, thereby leveraging revolutionary 3D memory architecture.	Exceptional packet processing capabilities help alleviate the challenge of scaling the network as traffic levels increase while optimizing IP/MPLS transit functionality around superior performance and elegant deployability.
Ultra-compact 2 U form factor	With cutting-edge innovation in power and cooling technology, the PTX1000 is the only fixed-configuration core router that provides 2.88 Tbps of capacity at a 2 U form factor.	Space efficiency is a critical requirement for peering Internet Exchange points, peering colocations, central offices, and regional networks, especially in emerging markets.

PTX1000 Packet Transport Router

PTX1000 Specifications

Hardware

System throughput
- Up to 2.88 Tbps

Forwarding capacity
- Up to 2 Bpps

Maximum 10GbE port density
- 288

Maximum 40GbE port density
- 72

Maximum 100GbE port density
- 24

Dimensions (W x H x D):
- 17.4 x 3.46 x 31 in
- (44.2 x 8.8 x 78.7 cm)

Rack units (U)
- 2

Weight
- 68.6 lb (31 kg)

Operating system
- Junos OS

CPU
- Intel Quad Core Ivy Bridge 2.5 GHz CPU, 16 GB SDRAM

Management and Precision Time Protocol (PTP) interfaces
- 1 small form-factor pluggable transceiver (SFP/SFP +) port or PTP Grandmaster
- Fiber (SFP) or 10/100/1000BASE-T (RJ-45) Ethernet management port
- SMB in, SMB out, 10 MHz in, 10 MHz out
- One console port
- USB 2.0 storage interface

Power
- 4x 1,600 Watt AC/DC power supply

Cooling
- Front-to-back airflow
- Three hot-swappable fan modules with redundant fans

Total packet buffer
- 24 GB

Latency
- As low as 2.5 microseconds within a Packet Forwarding Engine (PFE)
- As low as 5.5 microseconds across PFEs

Environmental Ranges

- Operating temperature: 32º to 104º F (0º to 40º C)
- Storage temperature: -40º to 158º F (-40º to 70º C)
- Operating altitude: Up to 10,000 ft. (3,048 m)
- Relative humidity operating: 5 to 90% (noncondensing)
- Relative humidity nonoperating: 5 to 95% (noncondensing)
- Seismic: Designed to meet GR-63, Zone 4 earthquake requirements

Maximum Thermal Output*

- Maximum power draw: 1,425 W (AC, DC), 4,862 BTU/hr
- Typical power draw: 1,050 W (AC, DC), 3,583 BTU/hr

Safety and Compliance

Safety

- CAN/CSA-C22.2 No. 60950-1 Information Technology Equipment—Safety
- UL 60950-1 Information Technology Equipment—Safety
- EN 60950-1 Information Technology Equipment—Safety
- IEC 60950-1 Information Technology Equipment—Safety (All country deviations)
- EN 60825-1 Safety of Laser Products—Part 1: Equipment Classification

Electromagnetic Compatibility

- 47CFR Part 15, (FCC) Class A
- ICES-003 Class A
- EN 55022 Class A
- CISPR 22 Class A
- EN 55024
- CISPR 24
- EN 300 386
- VCCI Class A
- AS/NZA CISPR22 Class A
- KN22 Class A
- CNS 13438 Class A
- EN 61000-3-2
- EN 61000-3-3
- ETSI
- 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

*Estimated; subject to change

Environmental Compliance

- Restriction of Hazardous Substances (ROHS) 6/6
- Silver PSU Efficiency
- Recycled material
- Waste Electronics and Electrical Equipment (WEEE)
- Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
- China Restriction of Hazardous Substances (ROHS)

Telco

- Common Language Equipment Identifier (CLEI) code

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.

Automated Support and Prevention

Juniper's Automated Support and Prevention consists of an ecosystem of tools, applications, and systems targeted towards simplifying and streamlining operations, delivering operational efficiency, reducing downtime, and increasing your network's ROI running Juniper Networks Junos operating system. Automated Support and Prevention brings operational efficiency by automating several time-consuming tasks such as incident management, inventory management, proactive bug notification and on-demand EOL/EOS/EOE reports. The Junos Space Service Now and Service Insight service automation tools are standard entitlements of all Juniper Care contracts.

Warranty

For warranty information, please visit www.juniper.net/support/warranty/.

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.

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