

Juniper PTX Metro Aggregation Use Case Brief

Discover the Juniper PTX advantage

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Future-proof your network with a new generation of routing platforms

Juniper PTX Series Routers

Prepare to scale to 400G, 800G, and beyond

Today's mobile, residential, and business Ethernet customers are pushing the limits of service and cloud provider networks. This increased pressure comes from multiple sources: massive growth in cloud and IP video traffic, more people working from home, and emerging edge and AI applications that demand ever-higher throughput. And it's all coming to a head in metro networks.

In response, operators are scrambling to add capacity, starting at the last mile. They're moving from 1G to 10G links to the home for residential broadband, upgrading mobile backhaul networks, and deploying 10G and even 100G circuits for business Ethernet customers. Rather than laying new fiber, however, most find it simpler and less expensive to upgrade equipment in existing metro networks.

Unfortunately, while existing metro architectures can be updated to meet these changing needs, with legacy metro routing platforms, it's not so simple. Current metro aggregation networks fall short in:

- **Port density:** As service providers evolve residential wired broadband, port density requirements are growing. The same is true for business Ethernet. In the short term, operators can meet these needs with larger legacy platforms, but most max out at 4.8 Tbps—offering no upgrade path for the future.
- **5G backhaul:** Mobile operators designed their metro aggregation architectures for 3G/4G backhaul. But 5G radio access networks (RAN) demand far more capacity—often requiring forklift upgrades to RAN equipment and interconnects—stressing uplink bandwidth and aggregation networks.
- **Modern networking technologies:** Current metro platforms were designed primarily for traditional Metro Ethernet Forum (MEF) services. However, legacy platforms may not support advanced feature sets such as modern VPN technologies (i.e. EVPN-VXLANs). And it may be physically impossible for them to support SRv6 due to legacy ASIC limitations.

Yesterday's technologies will not meet the demands of the rapidly-evolving metro landscape. As operators invest in metro upgrades, they're looking to a new generation of 800G-capable routing platforms to future-proof their networks.

Yesterday's technologies are **unable to meet the demands of the rapidly-evolving** metro landscape. It's time to upgrade.

The capabilities you need

A robust and versatile routing solution for metro aggregation

[Juniper PTX Series Routers](#) have long provided high-performance core, peering, and aggregation functions for the world’s largest and most demanding WAN and data center architectures. Now, a growing number of service and cloud providers are discovering that PTX Series Routers deliver a robust solution for metro aggregation.

Leading with Express 5 in the Metro

Transport	Services	Scale	Performance
RSVP-TE SR-TE SRv6	L2: PW, VPLS, EVPN; E-LINE, E-TREE and E-LAN services, Classical and EVPN L3 VPN Multicast: NGMVPN, BIER	10M IPv4 FIB 8M counters Label stack depth: 16 uSIDs: 48 Carrier segments: 8	288 x 100 / 72 x 400 / 36 x 800 per PTX 10002 or per LC1301 All ports MACSEC capable from 10G to 800G MACSEC VLAN in the clear for multi-hop e2e encryption

FIGURE 1
Next-generation Express 5 silicon for next-generation metro networks

Next-generation Express 5 silicon

Drawing on Juniper’s groundbreaking Express 5 silicon, new 800G-capable PTX routers deliver industry-leading port density, flexibility, and features. This enables you to easily meet demanding metro aggregation requirements (Figure 1).

Future-proof design

Service and cloud providers can seamlessly scale up and out as needed, using the overlay technologies, such as EVPN, traffic engineering protocols, and coherent or non-coherent optics, they prefer. And they can continually, cost-effectively address changing metro bandwidth and interconnect requirements as their network evolves.

Sustainable, versatile, high-performance at scale

New Express 5-based Juniper PTX routers are available in two form factors:

- PTX10002-36QDD fixed platforms with 36 ports of 800G
- PTX10000 modular chassis with slots for 4-, 8-, and 16-line cards

Together, they provide a flexible, highly scalable solution for the full range of metro aggregation applications. That includes backhauling residential broadband, cable, and “any-G” mobile traffic; new and traditional business services, including EVPN-VXLAN overlays; and distributed telco applications like disaggregated virtual RAN (vRAN) workloads and edge AI.

Comprehensive support for metro aggregation

PTX provides the flexibility to continually, cost-effectively meet changing requirements as metro networks evolve. Operators can mix and match coherent and non-coherent optics as needed in the same platform, delivering up to 800G of throughput across all ports simultaneously.

Whether deploying a PTX10002 fixed platform at a smaller site (supporting 36x800G, 72x400G, and 288x100G) or using a modular PTX10000 platform with 4, 8, and 16 slot capacity for larger aggregation nodes, operators are ready for the future. Whenever they want to move up to an 800G interface, upstream or downstream, they can.

PTX Adoption and Use-cases in Aggregation

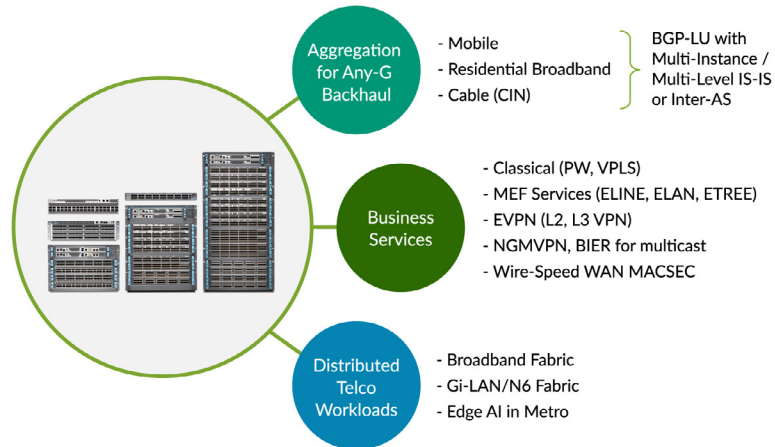


FIGURE 2
Comprehensive support for metro aggregation

The answer: **Juniper PTX Series Routers**

Juniper PTX for Metro Aggregation

Operators can use Juniper PTX to aggregate traffic from multiple broadband network gateway (BNG) and business Ethernet platforms (upper left). All residential and business traffic gets stitched to the fabric over EVPN-VXLAN. This allows the operator to readily scale out BNGs as business and residential subscriber scales grow.

PTX in Broadband and Gi-LAN Fabric

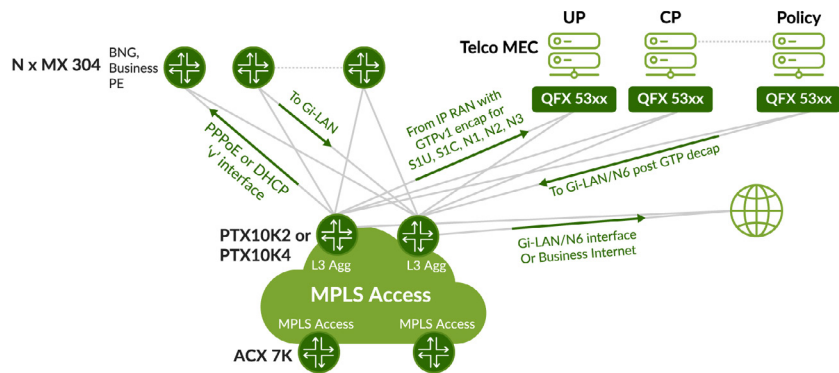


FIGURE 3
Using Juniper PTX in a Broadband and Gi-LAN Fabric

The same architecture also supports disaggregated 5G vRAN workloads (upper right). Here, edge platforms handle user plane, control plane and policy functions for traffic coming from mobile towers—whether those functions are deployed in the same central office (CO) or distributed across multiple sites.

Meanwhile, to improve performance for business and residential cloud services, this architecture incorporates localized handoffs to cloud and content provider peering points within the metro footprint. Operators can pass subscriber traffic over the GiLAN/N6 interface—or even support business internet for large customers who want full routing capability.

Multiple service providers are already using previous-generation (Express 4-based) PTX platforms in aggregation roles. Now, leading operators are deploying new PTX routers with Express 5 silicon to support these next-generation aggregation fabrics in metro networks.

How it works

Reimagine metro networks with Juniper PTX

Bandwidth requirements for both consumers and businesses will explode in the coming years, and metro networks are positioned to feel the pressure first. Leading service and cloud providers know they can't afford to wait. With our new PTX platforms and Express 5 silicon, Juniper is ready to help build a more scalable, flexible, future-proof metro network.

Real-world SRv6

While other vendors talk about SRv6 in future terms, Juniper supports it today. Our Express 5 silicon delivers 33% better performance for SRv6 Layer-2/Layer-3 customer routing than any other solution on the market.

Automation

When operators use Juniper PTX in multiple roles—metro aggregation, core and peering, data center interconnect—they can apply the same consistent automation across all of them. They can use Paragon Automation, homegrown tools or open management protocols and APIs, using standards-based data models to automate operations from Day 0 planning through Day 2 operations and beyond.

Packet-optical convergence

Juniper PTX enables transformative IPoDWDM architectures, opening new possibilities for more efficient network designs. PTX routers support a wide range of coherent and non-coherent optical transceivers from Juniper and others. Operators can continually connect new locations over longer distances without the need for external transponders, enabling up to 54% power savings and 55% lower carbon emissions.

Core capabilities

“Moving from 100G to 400G routing with Juniper results in **saving over 80%** in network costs.”

Steven Schecter
Senior Director of Network Architecture, Akamai

Industry-leading port density and scale New PTX routers with Express 5 silicon unleash 800GE (or double density 400GE) scalability. With up to 28.8 Terabits of throughput per line card or fixed chassis, they provide industry-leading radix and density with deep packet buffers and very low latency.

Future-proof flexibility and agility With Express 5 silicon, PTX routers support diverse network technologies, including EVPN and SRv6. Operators gain far more flexibility to aggregate metro mobile, residential, and business traffic over converged transport using the overlays, underlays, and protocols they choose.

Carrier-grade reliability PTX routers use features like redundant power supplies, hot-swappable components, and graceful restart to ensure that the network stays operational, even in the event of component failures.

Expanded visibility PTX routers come equipped with advanced features like Hierarchical QoS (HQoS), traffic engineering, and streaming telemetry that provide valuable insights to optimize network performance.

Leading sustainability With their innovative system design, advanced power management features, and Express 5 silicon, PTX routers set the standard for environmentally-conscious networking. The PTX10002-36QDD, for example, delivers double the capacity of previous-generation routers in the same footprint, with a 75% improvement in Watts/Gbps.

How we deliver



Akamai connects its massively distributed cloud with Juniper 400G



Swiss Networking Solutions scales global connectivity for mobile operators and enterprises

Our advantage

Choose the right solution

The table below details capabilities of Juniper PTX and ACX routing platforms that can be deployed in metro networks. Choosing the best solution depends on the specific design and requirements of your architecture. For example, PTX modular platforms are well-suited for aggregation applications that require control plane and data plane redundancy. Alternately, PTX fixed platforms can provide a scalable, cost-effective solution for adding throughput and density in locations that don't require that redundancy.

Platform Selection Pointers

Platform	Form-factor	BW	Ports and Density	Data-plane Redundancy	Control-plane Redundancy
PTX10002-36QDD	Fixed 2U	7.2, 14.4, 28.8T	800/400/100 native, 10G using QSA, 10/25G using breakouts	No	No
PTX10K4/8 chassis	Modular 7/13U	4.8T, 14.4T, 28.8T	800/400/100 native, 10G using QSA, 10/25G using breakouts	Yes	Yes
ACX7509	Modular 5U	4.8T	400/100/25/10G/1G	Yes	Yes
ACX 7348/7332	Fixed + Modular 3U	3.6T	400/100/25/10G/1G	No	Yes

Why Juniper

About Juniper Networks

At Juniper Networks, we are dedicated to dramatically simplifying network operations and driving superior experiences for end users. Our solutions deliver industry-leading insight, automation, security, and AI to drive real business results. We believe that powering connections will bring us closer together while empowering us all to solve the world's greatest challenges of well-being, sustainability, and equality.

More information

Explore the capabilities of Juniper routing platforms

To learn more, please visit our [PTX Series Routers product page](#)

For technical data sheets, guides and documentation, visit <https://www.juniper.net/us/en/products/routers.html>

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