

ACX7000 FAMILY OF CLOUD METRO ROUTERS DATASHEET

Product Overview

Juniper Cloud Metro is Juniper's vision for next-generation metro networks. It leverages cloud principles to facilitate operations where edge hosting, connectivity, and service experiences converge. The ACX7000 Family portfolio, designed for the IP service fabric underlay of a Juniper Cloud Metro and managed by Junos OS Evolved and Paragon Automation, is embedded with active service assurance and zero trust security. It has been optimized to deliver high-scale, differentiated services anywhere and offers fixed, modular, and industrial-rated options that deliver highly flexible and scalable build-as-you-grow native port speeds from 1GbE to 400GbE.

Product Description

Network operators are discovering incredible opportunities associated with the 5G, Internet of Things (IoT), and cloud evolution. These come along with daunting challenges to support new and increasingly complex services and applications—all while striving to deliver experience-first networking. Juniper® Cloud Metro is Juniper's vision for next-generation multiservice metro networks, leveraging cloud principles to architect, deploy, and operate networks optimized for distributed edge cloud service delivery. Juniper Cloud Metro unlocks a new generation of highly scalable architectures, automated operations, and differentiated subscriber services.

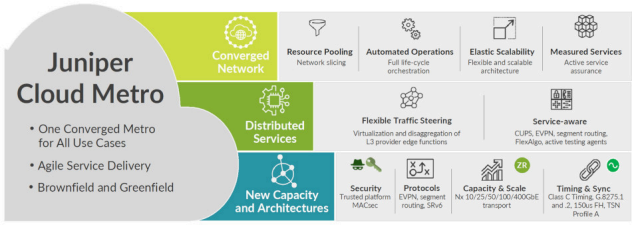


Figure 1. Juniper Cloud Metro - built for experience-first networking

ACX7000 Family Portfolio Highlights

The Juniper Networks® ACX7000 Family, managed by Junos® OS Evolved and Juniper Paragon™ Automation, is purposely built for the IP service fabric underlay of a Juniper Cloud Metro. Leveraging the industry's fastest chipsets, the portfolio presents a unique and innovative balance of leading-edge platform design, technologies, and capabilities to deliver the industry's most sustainable and high-performance metro portfolio. The ACX7000 Family delivers a broad range of fixed and modular multiservice routers (including environmentally industrial-rated options) providing highly flexible and scalable build-as-you-grow native port speeds from 1GbE to 400GbE, high-power ZR/ZR+ support, breakout cable options for more granular port speed deployments, and high-capacity fully modular platforms pre-engineered for 800GbE and beyond. Every ACX7000 platform includes active service assurance and zero trust security embedded, enabling operators to deliver highly reliable and differentiated customer experiences.

Individually, ACX7000 platforms bring leading-edge performance, scale, and capability to any deployment. When building a comprehensive Juniper Cloud Metro architecture consisting of multiple ACX7000 platforms, new dimensions of end-to-end operational capability, performance, and simplicity are realized. These cloud metro routers excel in three key areas: exceptional TCO, investment protection, and cloud metro-ready to deliver experience-first networking for residential, enterprise, wholesale, and 4G/5G mobile services.

- **Complete Portfolio**: The ACX7000 Family covers all metro use case and deployment scenarios, from fixed compact and industrial-rated (i-temp) 1 U platforms, to fully modular systems capable of highly scalable throughput and capacity. All platforms are equipped with a full suite of Layer 2/Layer 3 and MPLS routing features and protocols, while supporting scale-up, scale-out, and hybrid architectures for both greenfield and brownfield deployments.
- **Sustainable High-Performance Platforms**: The ACX7000 Family sets new metro benchmarks for energy efficiency, space efficiency, fabric capacity, port density, and flexibility of both port speed and optics options. Juniper's use of multi-rate ports simplifies today's most common 1GbE to 10GbE and 100GbE to 400GbE service migrations, including cloud-inspired 25GbE and 50GbE options, on a port-by-port basis without a forklift. Cooling and power innovations enable these platforms to support unrestricted use of today's and tomorrow's high-power transceivers on all supporting ports.
- **Timing and Synchronization**: The ACX7000 Family delivers precision timing and advanced timing capabilities, for ultra-reliable low-latency communications to leverage the full potential of 5G and to confidently offer and deliver differentiated service-level agreements (SLAs).
- **Cloud-Delivered Automation-as-a-Service**: Drive down Day-2 operations (root cause analysis, predictive maintenance) through AI-driven operations (AIOps) with conversational assist. An ACX7000 enabled cloud metro network, leveraging Juniper Paragon Automation as a cloud-hosted service, can observe, predict, and remediate device failures and service degradations, often before impacting users. Teams can instantly simplify and accelerate their most important workflows with automation as a service solution, immediately reducing time-to-service from months to minutes.
- **Network as the Experience Sensor**: Juniper embeds Juniper Paragon Active Assurance test agents directly into Junos OS Evolved operating system in every ACX7000 platform, turning an entire Cloud Metro network into an "Experience Sensor" that proactively assures user experience without requiring advanced expertise or tedious manual effort.
- **Zero Trust Security**: ACX7000 Family platforms feature a unique, cryptographically bound device identity that cannot be spoofed by hackers. The moment a Juniper Cloud Metro platform boots, it automatically verifies device authenticity and integrity, attesting that neither hardware nor software has been tampered with and activating RFC-compliant secure zero-touch provisioning (sZTP).

Use Cases and Applications

Juniper Networks ACX Series portfolio offers a variety of multiservice platforms. The ACX7000 Family overlaps and extends the breadth of Juniper's multiservice routing portfolio, and when deployed as the primary product family within a Juniper Cloud Metro architecture, bolstered by Junos OS Evolved and Paragon Automation, operators unlock an added layer of performance, capability, and operational simplicity that facilitates new pathways to, and benchmarks for, highly differentiated user experiences. Use case support includes:

- **Universal Metro Routing**: ACX7000 Family support a full suite of routing features, allowing operators to customize deployment models to achieve their business objectives. Create a converged multiservice architecture that best supports your business, residential, and wholesale connectivity service needs. The ACX7000 Family can be deployed as highly versatile multiservice routers enabling Ethernet VPN (EVPN), virtual private LAN service (VPLS), MPLS label-switching router (LSR), SR-MPLS, SRv6, and as Layer 2 Ethernet or Layer 3 IP services. Select platforms incorporate packet optical convergence capabilities enabling dense wavelength-division multiplexing (DWDM) wavelengths to extend reach over dark fiber, to efficiently interconnect IP/packet and DWDM networks and support passive optical network (PON) deployments leveraging Juniper Unified PON technology. See, **Leveraging Packet Optical Convergence** section.
- **Data Center and Edge Compute**: The ACX7000 Family is ideal for service provider and data center/cloud applications, with support for multiple overlay encapsulation methods. Select platforms also support data plane security with inline Media Access Control Security (MACsec) on all ports.
- **Enterprise WAN**: Enterprises and government agencies worldwide use ACX Series platforms to build their own L2, L3, and MPLS networks. The common and synchronized feature set provided across all ACX7000 Family platforms makes it an ideal selection to ensure that operators of enterprise WAN networks can easily, confidently, and securely interconnect with public service provider networks.
- **Mobile Backhaul**: ACX7000 Family platforms support highly scalable and reliable hardware-based timing that meets the strictest 4G/5G requirements. These include advanced timing, Synchronous Ethernet for frequency, and Precision Time Protocol (PTP) for frequency and phase synchronization, enabling deployment in next-generation mobile networks such as 4G/5G.



Figure 2. Juniper ACX7000 Family—engineered for the IP service fabric of a Juniper Cloud Metro

Table 1. ACX7000 Family of Cloud Metro Routers

ACX7000 Family	Key Feature/Benefit (For details, please reference respective product page)
ACX7024 Industrial-rated, compact, 1 U fixed, 1GbE-100GbE cloud metro router Product page	The ACX7024, part of the ACX7000 line, provides industry-leading access performance in a Industrial-rated (i-temp), dense, and compact 1 U footprint. Ideal for service providers, enterprises, and wholesale services, it helps operators deliver differentiated customer experiences. • 1 U, Industrial-rated platform with 9.44 in (24 cm) depth • 320 Gbps throughput • 24 1GbE/10GbE/25GbE, 4 100GbE ports
ACX7100-32C High-capacity, secure, 1 U fixed, 100GbE-400GbE, high fan-out density cloud metro router Product page	The ACX7100-32C, part of the ACX7100 line, is a high-capacity, high-density router that provides up to 4.8 Tbps of throughput and 100GbE to 400GbE services in a 1 U footprint. Ideal for service providers, wholesale, data centers, and enterprises. • 1 U, with 23.42 in (59.49 cm) depth • 4.8 Tbps throughput • 32 40GbE/100GbE, 4 400GbE
ACX7100-48L High-capacity, high-density, 1 U fixed, 10GbE-400GbE cloud metro router Product page	The ACX7100-48L, part of the ACX7100 line, is a high-capacity, high-density router that provides up to 4.8 Tbps of throughput and 10GbE to 400GbE services in a 1 U footprint. Ideal for service providers, wholesale, data centers, and enterprises. • 1 U, with 23.42 in (59.49 cm) depth • 4.8 Tbps throughput • 48 10GbE/25GbE/50GbE, 6 400GbE ports
ACX7348 Industrial-rated, compact, fixed + I/O bay design, 1GbE-400GbE cloud metro router Product page	The ACX7348, part of the ACX7300 line, offers modularity for scale with three pluggable modules in a Industrial-rated (i-temp), dense, compact, redundant, and fixed footprint. Ideal for service providers and large enterprises. • Industrial-rated platform • Massive throughput • 1GbE to 400GbE ports including optional pluggable modules
ACX7509 Compact, 5 U, modular, 1GbE-400GbE, high-density low-speed fan-out cloud metro router Product page	The ACX7509, part of the ACX7500 line, is a high availability (HA), power-efficient, and modular 5 U platform. Ideal for service providers, data centers, and large enterprises, it helps network operators deliver differentiated customer experiences. • 5 U, with 23.62 in (60 cm) depth • 4.8 Tbps throughput, 9-slots (supporting 8-slots in initial release) • Module options include: - 20-port: 1GbE/10GbE/25GbE/50GbE - 4-port: 200GbE/400GbE, - 16-port: 40GbE/100GbE ports

Leveraging Packet Optical Convergence: When the application calls for increased transport capacity, reach, resiliency, or interconnecting an IP/packet network to an optical transport network, deploying a platform that offers integrated DWDM interfaces is convenient and cost effective. Referred to as packet optical convergence platforms, they can convert Ethernet circuits into a DWDM signal, which can be multiplexed with other DWDM channels onto a single fiber, enabling efficient transport over an optical layer to eliminate additional, costly, standalone DWDM transponders.

The advent of small form-factor technologies like QSFP56-DD pluggable optics and 400ZR/ZR+ pluggable transceivers, enables selection on a port-by-port basis between grey client interfaces (400G LR4) for shorter distances or coherent DWDM interfaces (400ZR/ZR+) for longer distances, as well as transport overactive optical line systems—all without sacrificing platform density. Juniper integrates QSFP-DD interfaces in its solutions, including the ACX7000 Family, enabling considerable capital savings and substantial sustainability benefits for operators compared to the traditional use of external DWDM transponders.

Architecture and Key Components

Powered by Junos OS Evolved, the ACX7000 Family adds a new dimension of capability to the Juniper routing portfolio for service provider, large enterprise, and data center operations. Designed to address the rapid growth of mobile, video, and edge compute services, the ACX7000 Family builds upon Juniper's proven IP/MPLS leadership that spans from access and aggregation to edge and core. As services change, so must service architectures.

The emergence of 5G, IoT, and cloud is forcing an evolution in how services are delivered. What's needed are purpose-built platforms that create an agile IP service fabric capable of intelligently steering traffic between user and network resource—whether the service is hosted in a physical network device or it's a virtual and dynamic instantiation hosted across a distributed cloud. Operators capable of strategically positioning service instantiations to maximize performance and minimize latency over a single, converged architecture will optimize capital investments, reduce operational expenses, and enable highly differentiated and compelling user experiences.

- **Juniper Cloud Metro**: Juniper Cloud Metro (Figure 1) is a converged multiservice networking solution that takes the most powerful cloud principles used in massive hyperscale data centers and adapts them to metro networking. It optimizes the experiences of both network operators and the customers they serve, and it redefines outcomes from being purely connectivity-driven, to being completely experience-driven. A Juniper Cloud Metro, deployable in both brownfield and greenfield environments, intelligently and cost efficiently steers traffic to the best physical and virtual resource to minimize latency and optimize user experiences. It also leverages automation to accelerate and simplify network operations and showcase service delivery sophistication and quality that only network operators, and their Juniper Cloud Metro networks can achieve:
  - One converged Juniper Cloud Metro for all use cases
  - Agile service delivery with advanced network slicing and embedded active assurance
  - Advanced protocols, timing, scale, and automation
- **Flexible capacity**: A wide variety of ACX7000 platform and pluggable optics options gives operators the flexibility to position the right device at every edge location. Choose interface options from 1GbE to 400GbE with ZR/ZR+ support. All Juniper Cloud Metro systems use the same consistent Junos OS Evolved operating system providing consistent and extensible performance across an entire ACX7000 deployment. Pay for only the bandwidth, optics and features needed, when they are needed, with a Juniper Cloud Metro that evolves with your business without chassis forklifts.
- **Converged traffic-handling**: A Juniper Cloud Metro is built for network slicing, enabling any-to-any intelligent traffic steering across the distributed network to meet SLAs. Every Juniper Cloud Metro platform supports EVPN overlays, IPv6 Segment Routing (SRv6), and Layer 2/Layer 3 VPN. Operators can converge all metro use cases—residential, business, mobile xHaul transport—onto a single converged architecture, with a single operational model. They can also grow revenues by supporting diverse new services, each with its own quality requirements and SLAs, over the same converged infrastructure.
- **Build-as-you-grow scalability**: Juniper Cloud Metro offers a more sustainable approach to ongoing network expansion. As demand grows, operators can continue using traditional scale-up approaches in existing ring architectures. But alongside them, all Juniper Cloud Metro systems support the same scale-out models—and spine-leaf architectures—that public cloud providers use in hyperscale data centers. By building a next-generation edge with smaller distributed platforms, each serving fewer subscribers, network resources are aligned more closely with demand while reducing the "blast radius" if any node goes down.
- **Embedded Paragon Active Assurance**: Traditional networks require complex standalone solutions to validate network devices and services. Juniper embeds Paragon Active Assurance test agents directly into the Junos OS Evolved operating system in every ACX7000 Family platform, turning your entire Juniper Cloud Metro into an "Experience Sensor" that continually detects and fixes problems—without advanced expertise or tedious manual effort. Operators can proactively assure end-to-end 5G services, verifying that, for example, new cell sites are ready to serve customers or that edge clouds will meet SLA requirements for a new network slice, before the service is delivered. Incident resolution times are cut in half as most problems are identified and fixed before they affect customers—translating to happier, more loyal subscribers.
- **Embedded Zero Trust security**: With a Juniper Cloud Metro architecture, zero trust security is engineered into the IP services fabric. Each ACX7000 platform features a unique, cryptographically bound device identity that can't be spoofed by hackers. The moment a Juniper Cloud Metro platform boots, it automatically verifies device authenticity and integrity, attesting that neither hardware nor software has been tampered with and activating RFC-compliant secure zero-touch provisioning (sZTP). This enhanced Juniper Cloud Metro security fabric also features native disk and file encryption to protect data at rest and offers MACsec to safeguard data in motion. Using the security built into your Juniper Cloud Metro

architecture, risk is reduced to better protect users and the network. This enables operators to explore a wider range of new edge experiences that can be delivered to customers with confidence.

Together, these capabilities create a more scalable, assured, and secure IP service fabric underlay for your Juniper Cloud Metro that's optimized for the explosion of new devices and applications at the edge. They provide a powerful foundation to deliver next-generation edge services and network slices to achieve and drive sustainable business outcomes.

Sustainable Business Growth

Juniper Cloud Metro solutions are optimized to enable sustainable business growth with a focus on addressing profits, people, and the planet holistically, while delivering exceptional service experiences. Through innovative design, leading-edge technology, and groundbreaking orchestration, Juniper provides operators with an "easy button" to create a cloud metro of their own to deliver highly compelling experiences to their customers.

The metro is evolving to become the new "edge," with massive growth potential. It is where 5G, edge cloud hosting, connectivity, and service experience converge. Traditional "retro metro" architectures were not designed to sustain business growth in this quickly evolving environment.

According to ACG Research, metro traffic bandwidth is projected to grow more than 500% from 2021 to 2027, making the current cost per bit economics unsustainable. User expectations continue to increase, and security threats persistently expand. From an operational perspective, 86% of telecom executives named skilled staff shortage as the primary industry challenge, and from an environmental sustainability perspective, new ITU standards require operators to reduce greenhouse emissions by 45% from 2020 to 2030. A new approach is needed to effectively tackle these challenges and enable sustainable business growth—Juniper Cloud Metro is designed with these challenges and opportunities in mind.

Juniper Cloud Metro is about applying cloud principles to architecting, building, and operating metro networks and represents a new solution category because the attributes for its operations, systems, and architecture are fundamentally different from traditional retro metros (Figure 3). Consider a car analogy, electric vehicles and gasoline vehicles are both "vehicles" but can clearly be placed in different categories due to their unique characteristics and attributes.

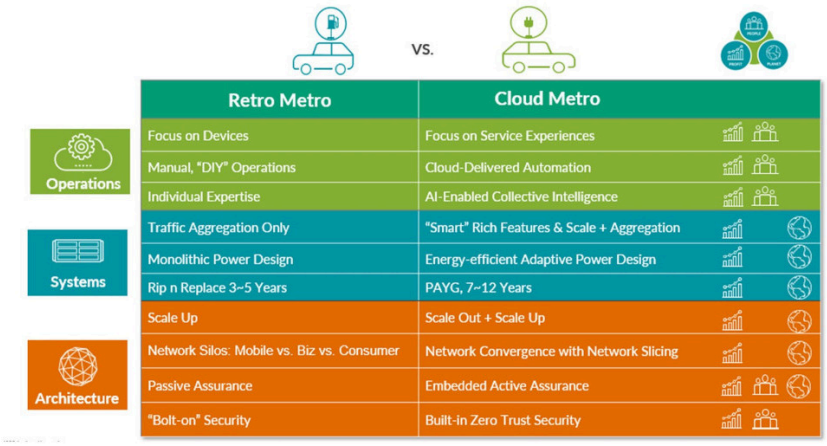


Figure 3. Juniper Cloud Metro: A New Category of Metro Solution

The Juniper Cloud Metro solution combines an IP service fabric underlay of ACX7000 Family routers, Junos OS Evolved, and Paragon Automation to achieve a singular and converged purpose —enabling sustainable business growth:

- **Sustainable Operations** with Paragon Automation as a service
- **Sustainable Systems** that deliver the industry's highest 400GbE port density, density and capacity, while reducing carbon footprint and e-waste
- **Sustainable Architecture** with a scalable IP service fabric that features embedded active service assurance and zero trust security

Optics and Transceiver Support

ACX7000 platforms support a wide variety of port speeds and transceiver options, including coherent optics (ZR/ZR+), direct attach copper (DAC), active optical cable (AOC), and breakout (BO)

cable. Detailed information on supported optics can be found at https://apps.juniper.net/home/.

Juniper Service 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 https://www.juniper.net/us/en/products.html.

Ordering Information

Please contact your Juniper sales representative for information on ordering platforms in the ACX7000 Family or visit https://www.juniper.net/us/en/how-to-buy/form.html.

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.

Statement of Product Direction

The information on this page may contain Juniper's development and plans for future products, features, or enhancements ("SOPD Information"). SOPD Information is subject to change at any time, without notice. Juniper provides no assurances, and assumes no responsibility, that future products, features, or enhancements will be introduced. In no event should any purchase decision be based upon reliance of timeframes or specifics outlined as part of SOPD Information, because Juniper may delay or never introduce the future products, features, or enhancements.

Any SOPD Information within, or referenced or obtained from, this website by any person does not give rise to any reliance claim, or any estoppel, against Juniper in connection with, or arising out of, any representations set forth in the SOPD Information. Juniper is not liable for any loss or damage (howsoever incurred) by any person in connection with, or arising out of, any representations set forth in the SOPD Information.

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
www.juniper.net

APAC and EMEA Headquarters
Juniper Networks International B.V.
Boeing Avenue 240 1119 PZ Schiphol-Rijk
Amsterdam, The Netherlands
Phone: +31.207.125.700

Juniper Networks | Driven by Experience™

Copyright 2023 Juniper Networks, Inc. All rights reserved. Juniper Networks, the Juniper Networks logo, Juniper, and Junos 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.