

ACX5000 LINE OF UNIVERSAL METRO ROUTERS

Product Overview

The ACX5000 line of Universal Metro Routers adds operational intelligence to metro environments, giving you the option to deploy packet optical, Metro Ethernet, and IP/MPLS infrastructure. The ACX5000 platforms address multiple service provider use cases, including cable distributed access architectures, residential fiber, and mobile backhaul, as well as enterprise applications for utilities, oil and gas, mining, transportation, defense, and public safety industries.

Product Description

Juniper Networks® ACX5000 line of Universal Metro Routers is a response to a shift in metro network architectures where the access and aggregation layers are extending operational intelligence from the service provider edge to the access network. The ACX5000 line simplifies access and aggregation architectures by eliminating unnecessary layers and network overlays, dramatically reducing CapEx and OpEx. Based on architectural simplification and cost reduction, the ACX5000 line gives service providers and enterprises the ability to adopt a true universal metro paradigm. The ACX5000 line also provides high capacity, scalability, and a packet optical transport layer, while delivering industry-leading performance with a wide range of port densities and interface types. Table 1 provides an overview of the interfaces supported on each ACX5000 model.

ACX5000 Line Product Family

Juniper Networks ACX Series Universal Metro Routers offer a wide range of metro solutions, including the ACX500, ACX1000, ACX2000, ACX4000, ACX5000, and ACX6000 lines. The ACX5000 line includes five models.

- **ACX5048:** The ACX5048 provides full duplex throughput of 1.44 Tbps in a 1 U platform. Built to handle 1GbE/10GbE capacity and density, it supports 48 1GbE/10GbE and six 40GbE interfaces, making it ideal for Metro Ethernet access and aggregation deployments with full support of E-Line, E-LAN, E-Tree, and E-Access, as well as IP/IP VPN services.
- **ACX5096:** The ACX5096 provides full duplex throughput of 2.56 Tbps in a 2 U platform. It supports 48 x 1GbE, 96 x 10GbE, and 8 x 40GbE interfaces, making it ideal for metro aggregation deployments with full support of E-Line, E-LAN, E-Tree, and E-Access, as well as IP/IP VPN services.
- **ACX5448:** The ACX5448 offers 48 1GbE/10GbE aggregation ports, four high-capacity 40GbE/100GbE uplink ports, and full Metro Ethernet and IP/MPLS VPN services in a space- and cost-optimized platform, smoothing the transition from 10GbE to 100GbE for service providers preparing for the emerging 5G rollout.
- **ACX5448-D:** The ACX5448-D supports 36 1GbE/10GbE, two 100GbE, and two 100G/200G dense wavelength-division multiplexing (DWDM) ports using CFP2-DCO. It is designed for packet-optical convergence to reduce TCO and to help service providers prepare for the emerging 5G rollout.
- **ACX5448-M:** The ACX5448-M supports 44 1GbE/10GbE and six 100GbE ports, as well as advanced security capabilities such as Media Access Control Security (MACsec) on all 1GbE/10GbE ports.

Table 1: Built-In Interface Options for Various ACX Series Models

| Model | GbE (copper) | GbE (SFP) | 10GbE (SFP+) | 40GbE (QSFP) | 100GbE (QSFP28) | 100/200 Gbps (CFP2-DCO) |
|-----------|--------------|-----------|--------------|--------------|-----------------|-------------------------|
| ACX5048 | 24 (SFP) | 48 | 48* | 6 | - | - |
| ACX5096 | 48 (SFP) | 96 | 96* | 8 | - | - |
| ACX5448 | 48 (SFP) | 48 | 48 | - | 4 | - |
| ACX5448-D | 36 (SFP) | 36 | 36 | - | 2 | 2 |
| ACX5448-M | 44 (SFP) | 44 | 44 | - | 6 | - |

* Small form-factor pluggable plus transceiver (SFP+ transceiver) ports can be configured to be 1GbE ports and accept 1GbE SFP.

Architecture and Key Components

Powered by Juniper Networks Junos® operating system, the ACX5000 line complements Juniper Networks MX Series 5G Universal Routing Platforms through a flexible and scalable service provider and enterprise branch routing portfolio optimized to support rapidly growing mobile, video, and cloud computing applications. The ACX Series introduces Juniper's proven IP/MPLS leadership from core and edge into the access layers of the network. Maintaining relative simplicity in the access network, the ACX Series supports a rich suite of L2, L3, and IP/MPLS functionality to allow large-scale seamless MPLS networks with simplified service provisioning and operations.

- **Seamless MPLS:** The ACX5000 line of routers supports both Ethernet bridging and MPLS. Growing demands for bandwidth are accompanied by network growth in terms of number of nodes. In some cases, users demand to scale their networks up to tens of thousands of nodes. Seamless MPLS architecture enables scale and service flexibility by decoupling physical topology from transport and service layers. With a seamless MPLS architecture, service providers can leverage their existing investment in MPLS in the core and edge and extend the operational benefit into the access layer. This enables greater network service flexibility and higher scaling parameters of the metro area network (MAN), where Metro Ethernet services can span multiple network segments and be seamlessly terminated at any point of the network or cloud.
- **Junos OS:** A reliable, high-performance, modular network operating system, Junos OS is supported across all of Juniper's physical and virtual routing, switching, and security platforms. Junos OS improves network operations and increases service availability, performance, and security

with features like low-latency multicast, comprehensive quality of service (QoS), unified in-service software upgrade (unified ISSU), and Junos Continuity, which eliminates the risk and complexity of OS upgrades. Junos OS comes with embedded scripting tools and APIs, which enable automation of many routine tasks and practical integration with any operator's back-end management tools. With secure programming interfaces, the Juniper Extension Toolkit (JET), versatile scripting support, and integration with popular orchestration frameworks, Junos OS offers flexible options for DevOps-style management that can unlock more value from the network.

- **Management:** Juniper Networks Junos Space® Network Management Platform provides comprehensive management with broad fault, configuration, accounting, performance, and security management (FCAPS) capabilities for both device and service-level management. For device management, Junos Space supports Network Configuration Protocol (NETCONF), CLI, and SNMP v1/v2/v3, while its northbound APIs support easy integration with existing network management systems (NMS) and operations/business support systems (OSS/BSS).

Running on the Junos Space platform, Junos Space Connectivity Services Director ensures effortless end-to-end service provisioning of Metro Ethernet (E-Line, E-LAN, E-Tree, E-Access), VPLS, L3VPN, Ethernet VPN (EVPN), and MPLS, using a simple interface to design, validate, and manage these services. Another application of Junos Space, Cross Provisioning Platform helps service providers provision E-Line, L2/L3 VPN services, and virtual private LAN service (VPLS) between Juniper devices and those from third-party vendors.

Features and Benefits

The ACX Series delivers new levels of programmability, reliability, and scalability to service provider and enterprise networks. The ACX Series portfolio improves customer satisfaction while lowering the total cost of operating, maintaining, and updating the network infrastructure.

Zero Touch Deployment

Based on Junos OS automation capabilities, ACX Series routers support a zero touch deployment (ZTD) feature that significantly reduces the time required to install and provision new equipment, resulting in lower OpEx, lower TCO, and greater operational efficiency. ZTD also reduces the complexity of deploying MPLS in the access layer.

Advanced Security Services

The ACX5000 line of routers enables advanced security services such as MACsec to protect against potential vulnerabilities in the network as well as subscriber traffic.

High Availability and Reliability

Junos Continuity and unified ISSU features eliminate the downtime risks associated with implementing new hardware or upgrading operating systems. Junos Continuity eliminates OS upgrades and system reboots when adding new hardware to ACX Series routers—a plug-in package provides the drivers and support files needed to bring the hardware online. Unified ISSU reduces the risks associated with OS upgrades by enabling upgrades between two different Junos OS releases (major or minor) with no control plane disruption and minimal traffic disruption on the forwarding plane.

MEF CE 2.0 Compliant

The ACX5000 line of routers are all Metro Ethernet Forum (MEF) CE 2.0-compliant and are able to support all carrier Ethernet services, including E-Line, E-LAN, E-Tree, and E-Access.

Full Feature Set of L2, L3, IP/MPLS

ACX Series routers support a full feature set of L2, L3, and IP/MPLS, enabling service providers to not only monetize Layer 2 Ethernet services, but also Layer 3, IP/IP-VPN, and other services.

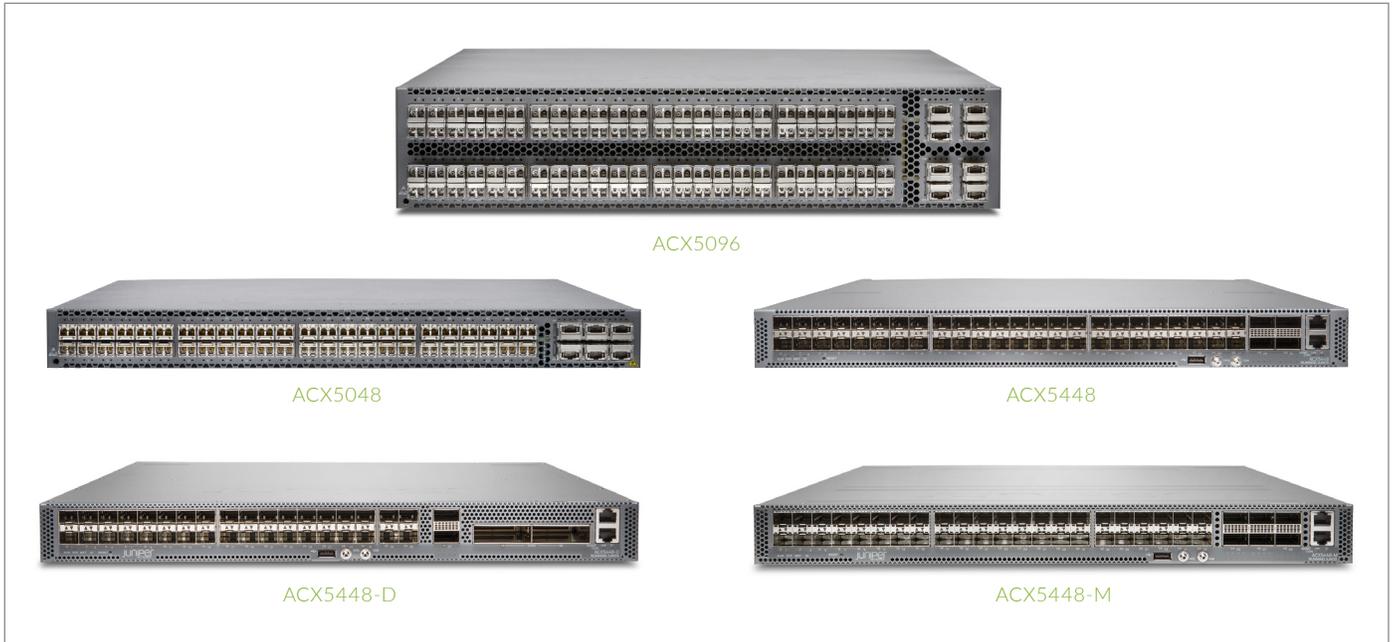
Table 2: ACX Series Platform Feature Matrix

| Features | ACX5048 | ACX5096 | ACX5448 | ACX5448-D | ACX5448-M |
|---|-----------|-----------|----------|-----------|-----------|
| Throughput | 1.44 Tbps | 1.44 Tbps | 800 Gbps | 800 Gbps | 800 Gbps |
| IEEE 802.3 bridging | ✓ | ✓ | ✓ | ✓ | ✓ |
| IEEE 802.1q | ✓ | ✓ | ✓ | ✓ | ✓ |
| IEEE 802.1ad (Q-in-Q) | ✓ | ✓ | ✓ | ✓ | ✓ |
| VLAN id manipulation for outer/inner: swap/pop/push | ✓ | ✓ | ✓ | ✓ | ✓ |
| Rapid Spanning Tree Protocol (RSTP)/VLAN Spanning Tree Protocol (VSTP)/Multiple Spanning Tree Protocol (MSTP) | ✓ | ✓ | ✓ | ✓ | ✓ |
| ERPS G.8032v1 | ✓ | ✓ | - | - | - |
| ERPS G8032v2 | ✓ | ✓ | - | - | - |
| Link Aggregation Control Protocol (LACP) | ✓ | ✓ | ✓ | ✓ | ✓ |
| Enhanced load balancing based on L2-L4 header info | ✓ | ✓ | ✓ | ✓ | ✓ |
| Link Layer Discovery Protocol (LLDP) | ✓ | ✓ | ✓ | ✓ | ✓ |
| Layer 2 bridge protocol data unit (BPDU) tunneling/MAC rewrite | ✓ | ✓ | ✓ | ✓ | ✓ |
| IPv4 | ✓ | ✓ | ✓ | ✓ | ✓ |
| IPv6 | ✓ | ✓ | ✓ | ✓ | ✓ |
| RPF | ✓ | ✓ | ✓ | ✓ | ✓ |
| Equal-cost multipath (ECMP) | ✓ | ✓ | ✓ | ✓ | ✓ |
| Enhanced load balancing based on L2-L4 header info | ✓ | ✓ | ✓ | ✓ | ✓ |
| OSPF | ✓ | ✓ | ✓ | ✓ | ✓ |
| IS-IS | ✓ | ✓ | ✓ | ✓ | ✓ |
| BGP | ✓ | ✓ | ✓ | ✓ | ✓ |
| Indirect/composite next hop | ✓ | ✓ | ✓ | ✓ | ✓ |
| RSVP | ✓ | ✓ | ✓ | ✓ | ✓ |
| LDP | ✓ | ✓ | ✓ | ✓ | ✓ |
| RSVP-TE | ✓ | ✓ | ✓ | ✓ | ✓ |

| Features | ACX5048 | ACX5096 | ACX5448 | ACX5448-D | ACX5448-M |
|--|---------|---------|----------------------------------|----------------------------------|----------------------------------|
| BGP-LU | √ | √ | √ | √ | √ |
| RSVP fast reroute (FRR) | √ | √ | √ | √ | √ |
| Segment routing | - | - | √ | √ | √ |
| IEEE 802.3 bridge domain | √ | √ | √ | √ | √ |
| PWE (T-LDP) | √ | √ | √ | √ | √ |
| L2VPN (BGP) | √ | √ | √ | √ | √ |
| VPLS (T-LDP/BGP/LDP autodiscovery) | √ | √ | √ | √ | √ |
| EVPN E-Line (PWE) | - | - | √ | √ | √ |
| EVPN E-Line (FXC) | - | - | √ | √ | √ |
| EVPN over MPLS | - | - | √ | √ | √ |
| Layer 3 VPN | √ | √ | √ | √ | √ |
| Integrated routing and bridging (IRB) | √ | √ | √ | √ | √ |
| Stateless filters L2-L4 | √ | √ | √ | √ | √ |
| 8 queues per port with schedulers and shaping | √ | √ | √ | √ | √ |
| Classification based on 802.1p, DiffServ code point (DSCP), IP-precedence, EXP bit | √ | √ | √ | √ | √ |
| Single-rate policer ingress/egress | √ | √ | √ | √ | √ |
| Two-rate three-color policer ingress/egress | √ | √ | √ | √ | √ |
| Per-port egress shaping | √ | √ | √ | √ | √ |
| H-QoS | √ | √ | √ ¹ | √ ¹ | √ ¹ |
| Bidirectional Forwarding Detection (BFD) | √ | √ | √ | √ | √ |
| Connectivity fault management (CFM) | √ | √ | √ | √ | √ |
| Y.1731 | √ | √ | √ | √ | √ |
| RFC2544 | √ | √ | √ ² | √ ^{1,2} | √ ^{1,2} |
| TWAMP | - | - | √ | √ | √ |
| Protocol Independent Multicast (PIM) | √ | √ | √ | √ | √ |
| Internet Group Management Protocol (IGMP) | √ | √ | √ | √ | √ |
| IGMP snooping | √ | √ | √ | √ | √ |
| BITS/1pps/10 MHz | - | - | √ (1 PPS and 10 MHz-out only) | √ (1 PPS and 10 MHz-out only) | √ (1 PPS and 10 Mhz-out only) |
| 1588v2 BC | - | - | √ | √ | √ |
| 1588v2 Transparent | √ | √ | √ | √ | √ |
| 1588v2 over IP | √ | √ | √ | √ | √ |
| 1588v2 over Ethernet | √ | √ | √ ¹ | √ ¹ | √ ¹ |
| Synchronous Ethernet | - | - | √ | √ | √ |
| L2 storm control | √ | √ | √ | √ | √ |
| IEEE 802.1AE/802.1X industry-compliant 256AES MACsec | - | - | - | - | √ |
| CLI | √ | √ | √ | √ | √ |
| NETCONF | √ | √ | √ | √ | √ |
| SNMP v2/v3 | √ | √ | √ | √ | √ |
| SLAX/Python on-box scripting tools | √ | √ | √ | √ | √ |
| ZTD | √ | √ | √ | √ | √ |
| YANG | √ | √ | √ | √ | √ |

¹ Planned for future release.

² Supports RFC2544 reflector mode only generator in future release..



Specifications

This section lists basic specifications for the ACX5000 line of routers. For further details, please refer to the hardware installation manuals at www.juniper.net/techpubs.

| Specifications | ACX5048 | ACX5096 | ACX5448 | ACX5448-D | ACX5448-M |
|---------------------------------|--|--|--|--|--|
| Dimensions (W x H x D) | 17.36 x 1.72 x 20.48 in (44.09 x 4.37 x 52.02 cm) | 17.36 x 3.46 x 22.44 in (44.09 x 8.8 x 57 cm) | 17.26 x 1.7 x 21.81 in (43.84 x 4.33 x 55.41 cm) | 17.26 x 1.7 x 21.81 in (43.84 x 4.33 x 55.41 cm) | 17.26 x 1.7 x 25.50 in (43.84 x 4.33 x 64.77 cm) |
| Weight (lb/kg) fully configured | 21.8 lb (9.9 kg) | 32.5 lb (14.74 kg) | 22.45 lb (10.18 kg) | 23 lb (10.43 kg) | 26.12 lb (11.85 kg) |
| Power (DC) | -36 to -72 VDC power | -36 to -72 VDC power | -44 VDC min, -72 VDC max; 7.5 A min, -12 A max | -44 VDC min, -72 VDC max; 7.5 A min, -12 A max | -44 VDC min, -72 VDC max; 7.5 A min, -12 A max |
| Power (AC) | 110-240 VAC | 110-240 VAC | 100 VAC (min) to 240 VAC (max); 47 Hz (min) to 60 Hz (max); 3.5 A (min) to 5 A (max) | 100 VAC (min) to 240 VAC (max); 47 Hz (min) to 60 Hz (max); 3.5 A (min) to 5 A (max) | 100 VAC (min) to 240 VAC (max); 47 Hz (min) to 60 Hz (max); 3.5 A (min) to 5 A (max) |
| Maximum power draw | ~350 W (with optical SFPs) | ~550 W (with optical SFPs) | ~450 W (with optical SFPs) | ~525 W (with optical SFPs) | ~550 W (with optical SFPs) |
| Operating temperature | 32° to 104° F (0° to 40° C) | -32° to 104° F (0° to 40° C) | 32° to 104° F (0° to 40° C) ⁴ 32° to 131° F (0° to 55° C) ⁵ | 32° to 104° F (0° to 40° C) ⁴ 32° to 131° F (0° to 55° C) ⁵ | 32° to 104° F (0° to 40° C) ⁴ 32° to 131° F (0° to 55° C) ⁵ |
| Humidity | 5%-90% RH noncondensing | 5%-90% RH noncondensing | 5%-90% RH noncondensing | 5%-90% RH noncondensing | 5%-90% RH noncondensing |

⁴ Long term operating range.

⁵ Short term operating range.

Approvals

| | ACX5048 | ACX5096 | ACX5448 | ACX5448-D | ACX5448-M |
|---------------------------|---------|---------|---------|-----------|-----------|
| Safety Approvals | | | | | |
| CAN/CSA-C22.2 No. 60950-1 | Yes | Yes | Yes | Yes | Yes |
| UL 60950-1 | Yes | Yes | Yes | Yes | Yes |
| EN 60950-1 | Yes | Yes | Yes | Yes | Yes |
| IEC 60950-1—CB Scheme | Yes | Yes | Yes | Yes | Yes |
| EN 60825-1 | Yes | Yes | Yes | Yes | Yes |

| | ACX5048 | ACX5096 | ACX5448 | ACX5448-D | ACX5448-M |
|--|---------|---------|---------|-----------|-----------|
| EMC | | | | | |
| AS/NZS CISPR22 Class A | Yes | Yes | Yes | Yes | Yes |
| VCCI Class A | Yes | Yes | Yes | Yes | Yes |
| FCC Part 15 Class A | Yes | Yes | Yes | Yes | Yes |
| IECS-003 Issue 4 | Yes | Yes | Yes | Yes | Yes |
| BSMI CNS 13438 and NCC C6357 Taiwan Radiated Emissions | Yes | Yes | Yes | Yes | Yes |
| KN 22, Class A | Yes | Yes | Yes | Yes | Yes |
| CISPR 32/EN55032: 2012 European Radiated Emissions Class A | Yes | Yes | Yes | Yes | Yes |
| AS/NZS CISPR22 Class B | - | - | Yes | Yes | Yes |
| IECS-003 Issue 4 Class B | - | - | Yes | - | - |
| BSMI CNS 13438 and NCC C6357 Taiwan Radiated Emissions | - | - | Yes | - | - |
| CISPR 32/EN55032: 2012 European Radiated Emissions Class B | - | - | Yes | - | - |
| EN-61000-4-6 Low Frequency Common Immunity | Yes | Yes | Yes | Yes | Yes |
| EN-61000-4-11 Voltage Dips and Sags | Yes | Yes | Yes | Yes | Yes |
| CISPR 24/EN55024 Information Technology Equipment Immunity Characteristics | Yes | Yes | Yes | Yes | Yes |
| ETSI (European Telecommunications Standardization Institute) | | | | | |
| EN 300 386 V1.6.1 Telecommunication Network Equipment, Electromagnetic Compatibility Requirements | Yes | Yes | Yes | Yes | Yes |
| ETSI EN 300 019-2-1 (2000)—Storage, Class T1.2 | Yes | Yes | Yes | Yes | Yes |
| ETSI EN 300 019-2-2 (1999)—Transportation, Class T2.3 | Yes | Yes | Yes | Yes | Yes |
| ETSI EN 300 019-2-3 (2003)—Stationary Use at Weather Protected Locations, Class T3.4 | Yes | Yes | Yes | Yes | Yes |
| ETSI EN 300 019-2-3 (2003)—Stationary Use at Weather Protected Locations, Class T3.2 | Yes | Yes | Yes | Yes | Yes |
| ETSI 300753 (1997)—Acoustic Noise Emitted by Telecommunications Equipment | Yes | Yes | Yes | Yes | Yes |
| Other EMC Requirements | | | | | |
| Deutsche Telekom 1TR9 (2008) EMC Specification | Yes | Yes | Yes | Yes | Yes |
| British Telecom EMC Immunity Requirements (2007) | Yes | Yes | Yes | Yes | Yes |
| NEBS | | | | | |
| SR-3580 NEBS Criteria Levels (Level 3 Compliance) | Yes | Yes | Yes | Yes | Yes |
| GR-63-CORE: NEBS, Physical Protection | Yes | Yes | Yes | Yes | Yes |
| GR-1089-CORE: EMC and Electrical Safety for Network Telecommunications Equipment (Issue 6 compliant) | Yes | Yes | Yes | Yes | Yes |
| Telecomm Compliance | | | | | |
| Device management: NETCONF, CLI, SNMP v1/v2/v3 | Yes | Yes | Yes | Yes | Yes |
| End-to-end provisioning of E-Line, emulated LAN (ELAN), Layer 3 VPN (L3VPN), OAM, class of service (CoS) | Yes | Yes | Yes | Yes | Yes |
| Device and service-level fault management | Yes | Yes | Yes | Yes | Yes |
| Device and service-level performance management | Yes | Yes | Yes | Yes | Yes |
| Metro Ethernet Forum (MEF) | | | | | |
| MEF CE2.0 compliant | Yes | Yes | Yes* | Yes* | Yes* |

*Planned for MEF 3.0 certification in future release

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.

Ordering Information

| Product Number | Name |
|--------------------|--|
| Hardware | |
| ACX5048-AC-L2-L3 | ACX5048, 48 SFP+/SFP ports, 6 QSFP ports, redundant fans and AC power supplies; no right to use IP VPN |
| ACX5048-DC-L2-L3 | ACX5048, 48 SFP+/SFP ports, 6 QSFP ports, redundant fans and DC power supplies; no right to use IP VPN |
| ACX5096-AC-L2-L3 | ACX5096, 96 SFP+/SFP ports, 8 QSFP ports, redundant fans and AC power supplies; no right to use IP VPN |
| ACX5096-DC-L2-L3 | ACX5096, 96 SFP+/SFP ports, 8 QSFP ports, redundant fans and DC power supplies; no right to use IP VPN |
| ACX5K-L-104X10GE-S | ACX5000 Right to use 104 10GbE ports on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-16X10GE-S | ACX5000 Right to use 16 10GbE ports on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-1X10GE-S | ACX5000 Right to use a single 10GbE port on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-24X10GE-S | ACX5000 Right to use 24 10GbE ports on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-48X10GE-S | ACX5000 Right to use 48 10GbE ports on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-72X10GE-S | ACX5000 Right to use 72 10GbE ports on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-8X10GE-S | ACX5000 Right to use 8 10GbE ports on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-96X10GE-S | ACX5000 Right to use 96 10GbE ports on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-IPVPN | ACX5000 Right to use IP VPN |
| ACX5448-AC-AFO | ACX5448, 48 SFP+/SFP ports, 4 QSFP28 ports, redundant fans and AC power supplies; front to back airflow; right to use feature must be ordered separately |
| ACX5448-DC-AFO | ACX5448, 48 SFP+/SFP ports, 4 QSFP28 ports, redundant fans and DC power supplies; front to back airflow; right to use feature must be ordered separately |
| ACX5448-AC-AFI | ACX5448, 48 SFP+/SFP ports, 4 QSFP28 ports, redundant fans and AC power supplies; back to front airflow; right to use feature must be ordered separately |
| ACX5448-DC-AFI | ACX5448, 48 SFP+/SFP ports, 4 QSFP28 ports, redundant fans and DC power supplies; back to front airflow; right to use feature must be ordered separately |

| Product Number | Name |
|--------------------|---|
| ACX5K-L-104X10GE-S | ACX5000 Right to use 104 10GbE ports on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-16X10GE-S | ACX5000 Right to use 16 10GbE ports on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-1X10GE-S | ACX5000 Right to use a single 10GbE port on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-24X10GE-S | ACX5000 Right to use 24 10GbE ports on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-48X10GE-S | ACX5000 Right to use 48 10GbE ports on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-100GE-S | ACX5448 Right to use a single 100GbE; enforceable per ACX5448 system |
| ACX5K-L-IPVPN | ACX5000 Right to use IP VPN |
| ACX5K-L-L2 | ACX5000 Right to use L2 features and IGP protocols (no right to use MPLS and BGP) for sole purpose of network management |
| ACX5K-L-IP-MPLS | ACX5000 Right to use IP/MPLS features except IP-VPN |
| ACX5448-L-PE | ACX5448 right to use FIB greater than 256K and more than 512 virtual routing and forwarding tables (VRFs), up to equipment limits |
| ACX5448-CHASSIS | ACX5448 Chassis spare |
| ACX5448-FAN-AFI | ACX5448 Fan tray right |
| ACX5448-FAN-AFO | ACX5448 Fan tray left |
| ACX5K-L-IPVPN | ACX5000 Right to use IP-VPN |
| ACX5K-L-1X10GE-S | ACX5000 Right to use a single 10GbE port on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-8X10GE-S | ACX5000 Right to use 8 10GbE ports on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-24X10GE-S | ACX5000 Right to use 24 10GbE ports on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-48X10GE-S | ACX5000 Right to use 48 10GbE ports on ACX5000 system; enforceable per ACX5000 system |
| ACX5K-L-L2 | ACX5000 Right to use L2 features and IGP protocols (no right to use MPLS and BGP) for sole purpose of network management |
| ACX5448-M-AC-AFO | ACX5448-M, 44 SFP+/SFP ports (MACsec), 6 QSFP28 ports, redundant fans and AC power supplies; front to back airflow; right to use feature must be ordered separately |
| ACX5448-M-DC-AFO | ACX5448-M, 44 SFP+/SFP ports (MACsec), 6 QSFP28 ports, redundant fans and DC power supplies; front to back airflow; right to use feature must be ordered separately |
| ACX5448-M-AC-AFI | ACX5448-M, 44 SFP+/SFP ports (MACsec), 6 QSFP28 ports, redundant fans and AC power supplies; back to front airflow; right to use feature must be ordered separately |
| ACX5448-M-DC-AFI | ACX5448-M, 44 SFP+/SFP ports (MACsec), 6 QSFP28 ports, redundant fans and DC power supplies; back to front airflow; right to use feature must be ordered separately |
| ACX5448-D-AC-AFO | ACX5448-D, 36 SFP+/SFP ports, 2 CFP2 ports, 2 QSFP28, redundant fans and AC power supplies; front to back airflow; right to use feature must be ordered separately |
| ACX5448-D-DC-AFO | ACX5448-D, 36 SFP+/SFP ports, 2 CFP2 ports, 2 QSFP28, redundant fans and DC power supplies; front to back airflow; right to use feature must be ordered separately |

| Product Number | Name |
|-------------------|--|
| ACX5448-D-AC-AFI | ACX5448-D, 36 SFP+/SFP ports, 2 CFP2 ports, 2 QSFP28, redundant fans and AC power supplies; back to front airflow; right to use feature must be ordered separately |
| ACX5448-D-DC-AFI | ACX5448-D, 36 SFP+/SFP ports, 2 CFP2 ports, 2 QSFP28 ports, redundant fans and DC power supplies; back to front airflow; right to use feature must be ordered separately |
| ACX5448-M-CHASSIS | ACX5448-M Chassis spare |
| ACX5448-D-CHASSIS | ACX5448-D Chassis spare |
| ACX5448-D-FAN-AFI | ACX5448 fan tray back to front |
| ACX5448-D-FAN-AFO | ACX5448 fan tray front to back |

Software

| | |
|----------------|--|
| S-ACX-400G-A-5 | ACX5448-D and ACX5448-M software, 5 year subscription Advanced license; per 400G capacity, supports IP/MPLS, timing, CoS, EOAM, telemetry, RFC2544, with up to 256K FIB, 1K L2/L3 VPN |
| S-ACX-400G-P-5 | ACX5448-D and ACX5448-M software, 5 year subscription Premium license; per 400G capacity, includes Advanced software subscription license with full platform scale |
| S-ACX-400G-A-3 | ACX5448-D and ACX5448-M software, 3 years subscription Advanced license; per 400G capacity, supports IP/MPLS, timing, CoS, EOAM, telemetry, RFC2544, with up to 256K FIB, 1K L2/L3 VPN |
| S-ACX-400G-P-3 | ACX5448-D and ACX5448-M software, 3 year subscription premium license; per 400G capacity, includes Advanced software subscription license with full platform scale |
| S-ACX-400G-A-1 | ACX5448-D and ACX5448-M software, 1 year subscription Advanced license; per 400G capacity, supports IP/MPLS, timing, CoS, EOAM, telemetry, RFC2544, with up to 256K FIB, 1K L2/L3 VPN (renewal only) |
| S-ACX-400G-P-1 | ACX5448-D and ACX5448-M software, 1 year subscription Premium license; per 400G capacity, includes Advanced software subscription license with full platform scale (renewal only) |

About Juniper Networks

Juniper Networks brings simplicity to networking with products, solutions and services that connect the world. Through engineering innovation, we remove the constraints and complexities of networking in the cloud era to solve the toughest challenges our customers and partners face daily. At Juniper Networks, we believe that the network is a resource for sharing knowledge and human advancement that changes the world. We are committed to imagining groundbreaking ways to deliver automated, scalable and secure networks to move at the speed of business.

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