

ACX Series Universal Access Routers



Product Overview

ACX Series Universal Access Routers bring operational intelligence to the access and aggregation layers, providing the option to deploy Ethernet or IP/MPLS infrastructure. High precision synchronization technology, industry-leading security, and high availability features enhance QoE, while extensive OAM, built-in advanced SLA management, and rapid deployment capabilities reduce TCO. ACX Series platforms address a variety of service provider use cases—including mobile backhaul, residential, business access, and metro Ethernet aggregation—as well as enterprise use cases such as power utilities, oil and gas, mining, transportation, defense and public safety industries.

Product Description

Juniper Networks® ACX Series Universal Access Routers are Juniper's response to a shift in metro network architecture where the access and aggregation layer is extending the operational intelligence from the service provider edge to the access network. The ACX Series simplifies access and aggregation architectures by eliminating unnecessary layers and network overlays, dramatically reducing CapEx and OpEx. Based on architectural simplification and cost reduction, service providers and enterprises can adopt the true universal access paradigm enabled by the ACX Series.

ACX Series routers are optimized for converging mobile, business, and residential access services on a single platform. The ACX Series devices come in space-efficient 1 and 2.5 U chassis and support 6 to 2,560 Gbps of throughput, setting a new benchmark for port density in its product category. The ACX Series provides:

- Flexible deployment options over Ethernet or IP/MPLS infrastructure
- True pay-as-you-grow model for in-service upgrade from 1GbE to 10GbE interfaces
- High availability features such as multichassis link aggregation (MC-LAG), unified in-service software upgrade (unified ISSU), and Virtual Chassis
- Environmental or temperature hardened designs (on most models) and low power consumption, enabling deployment in extreme temperature situations such as in outside cabinets and remote points of presence (POPs)
- Built-in service engine to enable SDN-based programmability such as advanced SLA management
- Inline advanced security services such as IPsec, Network Address Translation (NAT), Media Access Control Security (MACsec), and Trusted Platform Module (TPM) management on select models
- Highly scalable and reliable hardware-based timing technology based on Juniper's intellectual property, that meets the strictest LTE-A requirements for frequency and phase synchronization to enhance quality of experience (QoE) for mobile broadband (on most models)
- Rapid deployment capabilities via Juniper Networks Junos® Space Network Management Platform and zero touch provisioning (ZTP) solutions that minimize installation, provisioning, and network management costs

Architecture and Key Components

Powered by Juniper Networks Junos operating system, the ACX Series routers complement Juniper's universal edge solutions 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.

The ACX Series delivers industry-leading performance with a range of port densities and interface types. Table 1 provides a snapshot of interfaces supported on each ACX Series model.

Integrated High Precision Timing

The ACX Series incorporates¹ highly scalable and reliable hardware-based timing technology, based on Juniper Networks intellectual property that meets the strictest LTE-A requirements for frequency and phase synchronization. Providing an accurate timing reference is one of the most significant technical and operational challenges for deployment of LTE radio access networks. ACX Series routers support Synchronous Ethernet for frequency as well as Precision Time Protocol (PTP) for both frequency and phase synchronization. Furthermore, the ACX Series allows Synchronous Ethernet and PTP to be used in a hybrid mode for the highest level of frequency (10 ppb) and phase (<500 ns) accuracy required for LTE-A. The ACX500, ACX500-O, and ACX500-O-PoE also provide an integrated GPS receiver and can act as grandmaster (GM) clock for a distributed PTP implementation, making them an ideal choice for the aggregation of small cell traffic when the backhaul is transported over the Internet.

Advanced Security Services

One of the significant challenges in the roll out of small cells is to address the security threats from easily accessible locations. The ACX500 enables advanced security services such as IPsec, MACsec, NAT, and TPM to protect against potential vulnerabilities to the network as well as subscriber traffic. Hardware acceleration through a purpose-built services engine enhances the scalability of these computational-intensive services to support a large-scale small cell deployment.

Enhanced Service Assurance, SLA Management and Ethernet OAM

The ACX Series routers provide the most comprehensive set of features. Using 802.3ah, 802.1ag, Y.1731, Two-Way Active Measurement Protocol (TWAMP) and RFC2544, mobile operators and wholesale service providers can make sure that the services being offered through ACX Series routers are meeting the desired service-level agreements.

Environmental Hardened Design

Most of the ACX Series models such as ACX500, ACX1x00, and ACX2x00, are temperature hardened and support passive cooling for outdoor deployments in extreme weather conditions. The ACX500-O and ACX500-O-PoE are based on environmentally hardened, ruggedized chassis and are IP65 compliant for outdoor deployments with no need for an enclosure or cabinet. These are designed to be pole or strand mounted alongside outdoor small cells.

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

Model	TDM (T1/E1)	GbE (copper)	GbE (combo)	GbE (SFP)	10GbE (SFP+)	40GbE (QSFP)
ACX500	-	-	4 (PoE+ support on 3 ports)	2	-	-
ACX500-O	-	3	-	3	-	-
ACX500-O-POE	-	3 with PoE+ support	-	3	-	-
ACX1000	8	8	4	-	-	-
ACX1100	-	8	4	-	-	-
ACX2000	16	8 (PoE++ support on 2 ports)	-	2	2*	-
ACX2100	16	4	4	2	2*	-
ACX2200	-	4	4	2	2*	-
ACX4000	-	-	8 (PoE++ support on 2 ports)	2	2*	-
ACX5048	-	-	-	-	48*	6
ACX5096	-	-	-	-	96*	8

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

¹All models except ACX5048 and ACX5096

Features and Benefits

ACX Series Universal Access Routers deliver new levels of programmability, reliability, and scalability to the 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.

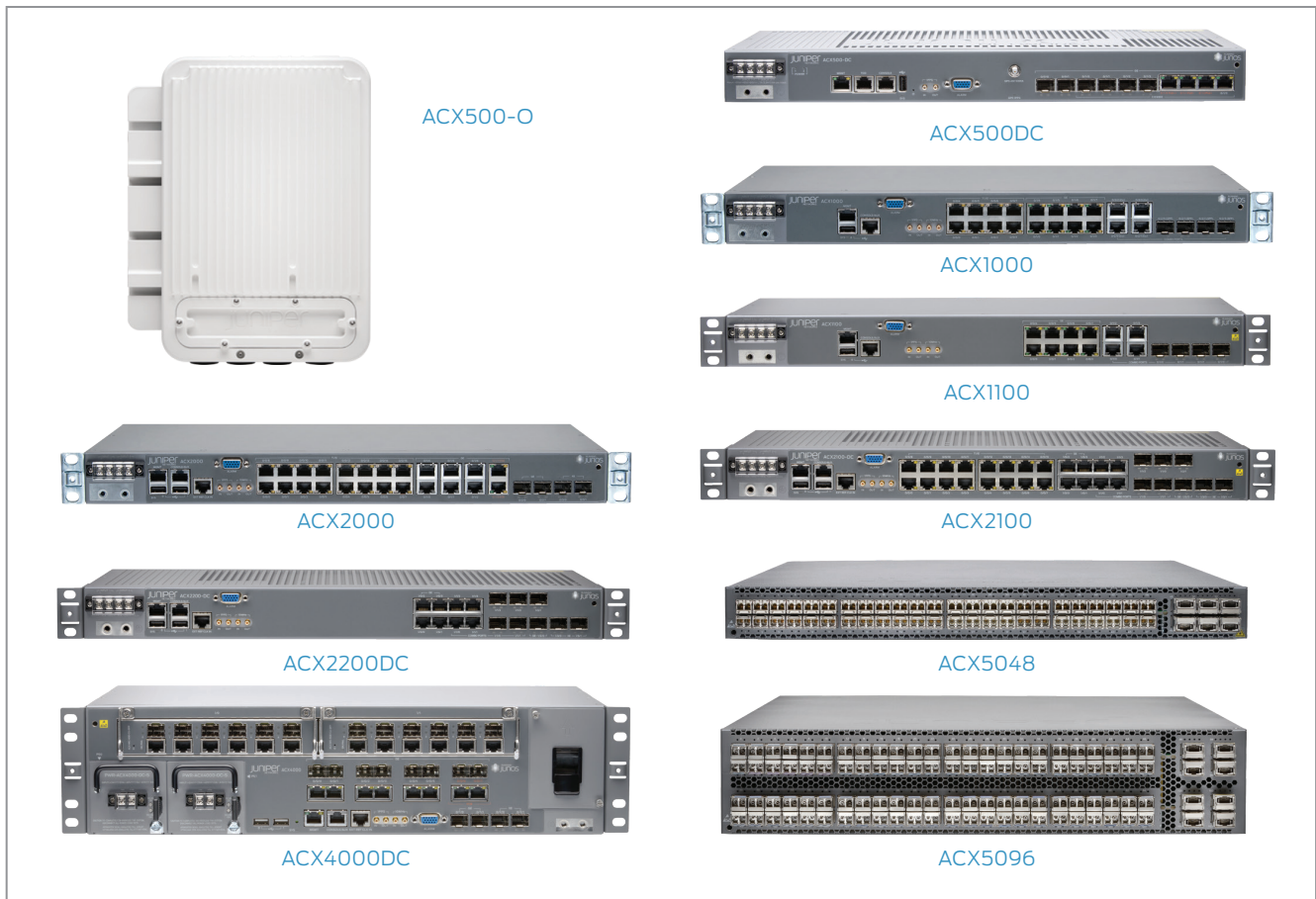
The flexibility and upgradability (mix-and-match of interface types) makes the ACX Series ideal for a wide range of applications:

- **Carrier Ethernet Aggregation:** In-service provider networks, carrier Ethernet switches, and routers are typically deployed in central office (CO) locations. Service providers use carrier Ethernet services for a variety of use cases, including connecting the residential access nodes to their respective service delivery nodes at the edge of the network, and site-to-site connectivity for enterprises. These Ethernet services are carried through an aggregation layer to reduce the number of ports required at the universal edge. The compact form factor and high port density of the ACX Series, especially the ACX5048 or ACX5096, makes it an ideal carrier Ethernet aggregation router.
- **Mobile Backhaul (macro and small cell):** Mobile backhaul is a special case in the general carrier Ethernet aggregation category. In addition to high capacity and density to address scaling requirements, the ACX Series also addresses end-user quality through high precision timing, advanced security features, and enhanced SLA management capabilities. In a typical deployment scenario, the ACX500 will be used as a small cell router, whereas the ACX1x00 or ACX2x00 will be a macro cell site router. The backhaul traffic carried over Ethernet or IP/MPLS will be aggregated by the ACX5048 before it hits the mobile core.
- **High-Performance, High Availability Enterprise Networking:** The ACX Series routing platforms deliver high performance in demanding, space-constrained, and harsh environments. This makes the ACX Series the perfect choice for high reliability, high availability, mission-critical communications networks deployed in extreme environments around the world. These include power utilities, oil and gas, mining, transportation, defense, and public safety industries.

Table 2: ACX Series Features and Benefits

Feature	Feature Description	Benefits
Scalability and modularity	<ul style="list-style-type: none"> • 6 to 2560 Gbps capacity • 10/100 Mbps, GbE, 10GbE, 40GbE • Time-division multiplexing (TDM) interfaces, T1 to OC3 	Cost optimal pay-as-you-grow model is ideal for universal access and aggregation applications.
High availability	<ul style="list-style-type: none"> • Unified in-service software upgrade (unified ISSU) • Multichassis link aggregation (MC-LAG) • Virtual Chassis, virtual ring 	ACX Series design provides high level of resiliency to ensure that critical services and customers stay connected.
Rich security services	<ul style="list-style-type: none"> • Scalable IPsec, MACsec • NAT, TPM management 	Securing data, control, and management plane for high level of protection against vulnerabilities enhances subscriber QoE.
Integrated timing	<ul style="list-style-type: none"> • Synchronous Ethernet, NTP, GPS, BITS, ToD • Precision Time Protocol (PTP) (slave, boundary clock, master clock³) 	Provides highest level of QoE for mobile broadband.
Temperature hardened	<ul style="list-style-type: none"> • -40o to +65o C 	Easy deployment in remote POPs and outside cabinets.
Zero touch provisioning	<ul style="list-style-type: none"> • Junos Space 	Rapid provisioning and service design enhances scale and minimizes TCO.
Enhanced SLA management	<ul style="list-style-type: none"> • RFC2544, Y.1564, TWAMP 	Meets the strict requirement of availability for mobile broadband and mission-critical applications.

³ Only for ACX500, ACX500-O, ACX500-O-PoE models



Specifications

This section lists basic specifications for the ACX Series routers. For further details, please refer to the hardware installation manuals on www.juniper.net/techpubs.

Specifications	ACX500, ACX500-O, ACX500-O-POE	ACX1000, ACX1100	ACX2000, ACX2100, ACX2200	ACX4000	ACX5048, ACX5096
Dimensions (W x H x D)	ACX500: 17.5x1.75x9.4 in (44.5x4.4x24 cm) ACX500-O: 8x12.3x4.3 in (20.3x31.2x10.9 cm) ACX500-O-POE: 10x16x4.7 in (25.4x40.6x11.9 cm)	17.5x1.75x9.4 in (44.5x4.4x24 cm)	17.5x1.75x9.4 in (44.5x4.4x24 cm)	17.5x4.35x9.25 in (44.5x11x23.5 cm)	ACX5048: 17.36x1.72x20.48 in (44.09x4.37x52.02 cm) ACX5096: 17.36x3.46x22.44 in (44.09x8.8x57 cm)
Weight (lb/kg) fully configured	ACX500-DC: 8.6 lb (3.9 kg) ACX500-AC: 9.26 lb (4.2 kg) ACX500-O-DC: 11 lb (5 kg) ACX500-O-AC: 11.68 lb (5.3 kg) ACX500-O-POE-DC: 13.66 lb (6.2 kg) ACX500-O-POE-AC: 14.33lb (6.5 kg)	ACX1000: 6.5 lb (2.94 kg) ACX1100: 7.8 lb (3.54 kg)	8.3 lb (3.77 kg)	23.8 lb (10.82 kg) (Fully configured with two power supply units, two Modular Interface Cards (MICs))	ACX5048: 21.8 lb (9.9 kg) ACX5096: 32.5 lb (14.74 kg)
Power (DC)	-48 V nominal or -60 V telco nominal or +24 VDC nominal	-48 V nominal or -60 V telco nominal or +24 VDC nominal	-48 V nominal or -60 V telco nominal or +24 VDC nominal	-48 V nominal or -60 V telco nominal or +24 VDC nominal	-36 to -72 VDC power
Power (AC)	90-240 V	90 to 240 VAC for ACX1100-AC* only	90 to 240 VAC for ACX2100-AC* only	90 to 240 VAC	110-240 V

Specifications	ACX500, ACX500-O, ACX500-O-POE	ACX1000, ACX1100	ACX2000, ACX2100, ACX2200	ACX4000	ACX5048, ACX5096
Maximum power draw	65 W + PoE power (80 W) (ACX500) 55 W (ACX500-O) 55 W + PoE power (80 W) (ACX500-O-POE)	50 W (ACX1000); 35 W (ACX1100-AC); 40 W (ACX1100-DC)	70 W (ACX2000); 60 W (ACX2100-AC); 80 W (ACX2100-DC)	150 W (w/o MICs); 45 W for each MIC; 65 W for each PoE++ port	~350 W (with optical SFPs) (ACX5048) ~550 W (with optical SFPs) (ACX5096)
Operating temperature	-40° to 149° F (-40° to 65° C)	-40° to 158° F (-40° to 70° C)	-40° to 149° F (-40° to 65° C) full featured	-40° to 158° F (-40° to 70° C)	32° to 104° F (0° to 40° C)
Humidity	95% RH noncondensing	95% RH noncondensing	95% RH noncondensing	95% RH noncondensing	5%-90% RH noncondensing

Approvals

Safety Approvals

- CAN/CSA-C22.2 No. 60950-1
- UL 60950-1
- EN 60950-1
- IEC 60950-1—CB Scheme
- EN 60825-1

EMC

- AS/NZS CISPR22 Class A
- EN55022 Class A
- VCCI Class B
- FCC Part 15 Class A

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

ETSI (European Telecommunications Standardization Institute)

- ETSI EN300386-2 Telecommunication Network Equipment, Electromagnetic Compatibility Requirements
- ETSI EN 300 019-2-1 (2000)—Storage, Class T1.2
- ETSI EN 300 019-2-2 (1999)—Transportation, Class T2.3
- ETSI EN 300 019-2-3 (2003)—Stationary Use at Weather-protected Locations, Class T3.2
- ETSI EN 300 019-2-4 (2003)—Stationary Use at Non-weather Protected Locations, Class 4.2H
- ETS 300753 (1997)—Acoustic Noise Emitted by Telecommunications Equipment

NEBS

- SR-3580 NEBS Criteria Levels (Level 3 Compliance)
- GR-63-CORE: NEBS, Physical Protection

- GR-1089-CORE: EMC and Electrical Safety for Network Telecommunications Equipment (Issue 6 compliant)
- GR-3108-CORE: Generic Requirements for Network Equipment in the Outside Plant (OSP)

Telecomm Compliance

- RTTE Directive 1995/5/EC
- T1 and XDSL Interfaces FCC Part 68
- Industry Canada CS-03
- JATE Green Book
- TBR 21 (XDSL only)
- E1 Interface TBR 12/13
- ACA TS016
- G.703

Management

- Device management: NETCONF, CLI, SNMP v1/v2/v3
- Comprehensive fault, configuration, accounting, performance, and security (FCAPS) management through Junos Space Network Management Platform: device-level configuration, software upgrade, alarms, script management
- End-to-end provisioning of ELINE, emulated LAN (ELAN), Layer 3 VPN (L3VPN), Synchronous Ethernet, IEEE1588-2008 (PTP), Operation, Administration, and Maintenance (OAM), class of service (CoS)
- Device and service-level fault management
- Device and service-level performance management

Metro Ethernet Forum (MEF)

- MEF CE2.0 compliant

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

Model Number	Name	Model Number	Name
ACX500-AC	ACX500 indoor unit 2x1GbE (SFP) + 4x1GbE (combo) with single AC PS, 1 U, temperature hardened, passive cooling, rack mounting options, PoE support, Junos OS	ACX2200-DC	ACX2200 unit, 2x10GbE SFP+, 4xGbE copper, 4xGbE combination (copper or fiber), 2xGbE SFP, 1 U, ETSI 300, redundant DC power, temperature hardened, passively cooled, Junos OS (optics sold separately)
ACX500-DC	ACX500 indoor unit 2x1GbE (SFP) + 4x1GbE (combo) with single DC PS, 1 U, temperature hardened, passive cooling, rack mounting options, PoE support, Junos OS	ACX2200-AC	ACX2200 unit, 2x10GbE SFP+, 4xGbE copper, 4xGbE combination (copper or fiber), 2xGbE SFP, 1 U, ETSI 300, redundant AC power, temperature hardened, passively cooled, Junos OS (optics sold separately)
ACX500-O-AC	ACX500 outdoor unit 3x1GbE (SFP) + 3x1GbE (Cu) with single AC PS, IP65 complaint for outdoor installation, pole/wall mounting options, no Power over Ethernet (PoE) support, Junos OS	ACX4000-DC	ACX4000 modular unit, 2x10GbE SFP+, 8xGbE combo (copper/fiber) with PoE++ on two ports, 2xGbE SFP, 2.5 U, ETSI 300, redundant DC power, temperature hardened, Junos OS, two configurable MIC slots (optics sold separately)
ACX500-O-DC	ACX500 outdoor unit 3x1GbE (SFP) + 3x1GbE (Cu) with single DC PS, IP65 complaint for outdoor installation, pole/wall mounting options, no PoE support, Junos OS	ACX4000-AC	ACX4000 modular unit, 2x10GbE SFP+, 8xGbE combo (copper/fiber) with PoE++ on two ports, 2xGbE SFP, 2.5 U, ETSI 300, redundant AC power, temperature hardened, Junos OS, two configurable MIC slots (optics sold separately)
ACX500-O-POE-AC	ACX500 outdoor unit 3x1GbE (SFP) + 3x1GbE (Cu) with single AC PS, IP65 complaint for outdoor installation, pole/wall mounting options, PoE support, Junos OS	ACX-MIC-6GE-CU-SFP	6xGbE copper/SFP MIC for ACX4000
ACX500-O-POE-DC	ACX500 outdoor unit 3x1GbE (SFP) + 3x1GbE (Cu) with single DC PS, IP65 complaint for outdoor installation, pole/wall mounting options, PoE support, Junos OS	ACX-MIC-4COC3-1COC12-CE	4xCHOC3/STM-1/1xCHOC12/STM-4 MIC for ACX4000
ACX500-LIC-GPS	ACX500 license to activate GPS receiver	ACX-MIC-16CHE1-T1-CE	16x T1/E1 MIC for ACX4000
ACX500-LIC-SEC	ACX500 license to activate IPsec and NAT features	ACX5048-AC-L2-L3	ACX5048, 48 SFP+/SFP ports, 6 QSFP ports, redundant fans and AC power supplies; no right to use IP VPN
ACX1000-DC	ACX1000 unit, 8xT1/E1, 8xGbE copper, 4xGbE combination (copper or SFP), 1 U, ETSI 300, dual feed DC power, temperature hardened, passively cooled, Junos OS (optics sold separately)	ACX5048-DC-L2-L3	ACX5048, 48 SFP+/SFP ports, 6 QSFP ports, redundant fans and DC power supplies; no right to use IP VPN
ACX1100-DC	ACX1100 unit, 8xGbE copper and 4xGbE combination (copper or SFP), 1 U, ETSI 300, redundant DC power supplies, temperature hardened, passively cooled, Junos OS (optics sold separately)	ACX5096-AC-L2-L3	ACX5096, 96 SFP+/SFP ports, 8 QSFP ports, redundant fans and AC power supplies; no right to use IP VPN
ACX1100-AC	ACX1100 unit, 8xGbE copper and 4xGbE combination (copper or SFP), 1 U, ETSI 300, redundant AC power, temperature hardened, passively cooled, Junos OS (optics sold separately)	ACX5096-DC-L2-L3	ACX5096, 96 SFP+/SFP ports, 8 QSFP ports, redundant fans and DC power supplies; no right to use IP VPN
ACX2000-DC	ACX2000 unit, 16xT1/E1, 2x10GbE SFP+, 8xGbE copper with PoE++ on two ports, 2xGbE SFP, 1 U, ETSI 300, dual feed DC power, temperature hardened, passively cooled, Junos OS (optics sold separately)	ACX5K-L-IPVPN	ACX5K Right to use IP VPN
ACX2100-DC	ACX2100 unit, 16xT1/E1, 2x10GbE SFP+, 4xGbE copper, 4xGbE combination (copper or fiber), 2xGbE SFP, 1 U, ETSI 300, redundant DC power, temperature hardened, passively cooled, Junos OS (optics sold separately)	ACX5K-L-1X10GE-S	ACX5K Right to use a single 10GbE port on ACX5K system; enforceable per ACX5K system
ACX2100-AC	ACX2100 unit, 16xT1/E1, 2x10GbE SFP+, 4xGbE copper, 4xGbE combination (copper or fiber), 2xGbE SFP, 1 U, ETSI 300, redundant AC power, temperature hardened, passively cooled, Junos OS (optics sold separately)	ACX5K-L-8X10GE-S	ACX5K Right to use 8 10GbE ports on ACX5K system; enforceable per ACX5K system
		ACX5K-L-16X10GE-S	ACX5K Right to use 16 10GE ports on ACX5K system; enforceable per ACX5K system
		ACX5K-L-24X10GE-S	ACX5K Right to use 24 10GE ports on ACX5K system; enforceable per ACX5K system
		ACX5K-L-48X10GE-S	ACX5K Right to use 48 10GE ports on ACX5K system; enforceable per ACX5K system
		ACX5K-L-72X10GE-S	ACX5K Right to use 72 10GE ports on ACX5K system; enforceable per ACX5K system
		ACX5K-L-96X10GE-S	ACX5K Right to use 96 10GE ports on ACX5K system; enforceable per ACX5K system
		ACX5K-L-104X10GE-S	ACX5K Right to use 104 10GE ports on ACX5K system; enforceable per ACX5K system

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.

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
Fax: +1.408.745.2100
www.juniper.net

APAC and EMEA Headquarters

Juniper Networks International B.V.
Boeing Avenue 240
1119 PZ Schiphol-Rijk
Amsterdam, The Netherlands
Phone: +31.0.207.125.700
Fax: +31.0.207.125.701

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