Cisco ASR 9000 Series 4-Port and 8-Port 100 Gigabit Ethernet Line Cards

Product Overview

The Cisco® ASR 9000 Series 4-port Line Card and 8-port 100 Gigabit Ethernet Line Card deliver industry-leading high density, with line-rate 100 Gigabit Ethernet ports, to any slot of a Cisco ASR 9000 Series Aggregation Services Router. These high-capacity line cards are designed to remove bandwidth bottlenecks in the network that are caused by a large increase in video-on-demand (VoD), IPTV, point-to-point video, Internet video, and cloud services traffic. A single 100 Gigabit Ethernet port can now replace large 10 Gigabit Ethernet link aggregation bundles to simplify network operations. Based on Cisco CPAK™ technology, this line card has flexible interfaces that support 100 Gigabit Ethernet, 40 Gigabit Ethernet and 10 Gigabit Ethernet modes, so it gives customers the flexibility to mix and match interface types on the same line card.

For example, with the help of Cisco CPAK 10x10G-LR optics, a single 100 Gigabit Ethernet port can be divided into 10x10 Gigabit Ethernet ports using breakout cables or patch panels for unprecedented density and scale. These different interface modes can be configured easily through the command line interface (CLI) without resetting or restarting the line card. Using a “green design,” these line cards also let customers put an unused slice in power-saving mode to reduce power consumption. With these capabilities, the ASR 9000 Series line cards (Figure 1 and Figure 2) and routers provide the fundamental infrastructure for scalable Carrier Ethernet and IP/Multiprotocol Label Switching (IP/MPLS) networks, promoting profitable business, residential, and mobile services.

Figure 1. Cisco ASR 9000 Series 8-Port 100 Gigabit Ethernet Line Card

Figure 2. Cisco ASR 9000 Series 4-Port 100 Gigabit Ethernet Line Card

Features and Benefits

Both the ASR 9000 Series 4-port and 8-port 100 Gigabit Ethernet line cards are fully compatible with Cisco ASR 9006 Router, ASR 9010 Router, ASR 9904 Router, ASR 9912 Router, and ASR 9922 Router. However, their chassis may require a hardware update for the cooling and power systems, because the line cards offer industry-leading, high-density 100 Gigabit Ethernet throughput. The 4-port and 8-port line cards are both designed to support full line rate in non-oversubscribed fashion.

In fact, the line cards set a new standard for Layer 2 and Layer 3 service density and scale, allowing operators to offer highly predictable, managed transport services while optimizing the use of network assets. The 10x10G Cisco CPAK breakout option further increases the capability of each line card to support large-scale aggregation, data center interconnect (DCI), and the 10 Gigabit Ethernet Satellite Network Virtualization (nV) System mode on the ASR 9000 Series Router. These versatile capabilities help operators qualify and stock one type of line card that can be deployed in any combination of Layer 2, Layer 3, DCI, or aggregation applications, thereby reducing capital expenditures (CapEx) and operating expenses (OpEx), as well as reducing the time required to develop and deploy new services.

The ASR 9000 Series can extend 100 Gigabit Ethernet transport over an IP-over-dense-wave-division-multiplexing (IPoDWDM) network when used with the Cisco ONS 15454 DWDM transponder solution. Distances of up to 3000 kilometers can be achieved while using the optical protection capabilities of the DWDM network.

Table 1 lists the features and benefits of the Cisco ASR 9000 Series line card. Specific feature and scale support is hardware and software dependent.

Table 1. Features and Benefits of Cisco ASR 9000 Series 4-Port and 8-Port 100 Gigabit Ethernet Line Cards

Feature	Benefit
Interface Support	
Cisco CPAK Pluggable interfaces	Provide the capacity to mix and match 100 Gigabit Ethernet interface types across a single line card. For a complete list of supported interfaces, see the Cisco ASR 9000 Transceiver Modules: Line Card Support data sheet.
Scalable and Integrated Multiservice Support	
Layer 2 and Layer 3 services	Combined IP, MPLS, Ethernet, Layer 2 VPN (L2VPN), and Layer 3 VPN (L3VPN) services
Evolutionary Monitoring	
Carrier-class operations, administration, and maintenance (OAM)	NetFlow, IEEE 802.1ag, IEEE 802.3ah, ITU Y.1731, IP service-level agreement (IP SLA), virtual circuit connectivity verification (VCCV), ping, and traceroute
Carrier-Class OS	
Cisco IOS® XR Software	Modular, patchable, scalable, highly available, carrier-core and edge-proven operating system

Line Card Types

The ASR 9000 Series 4-port and 8-port 100 Gigabit Ethernet line cards are available in service edge optimized and packet transport optimized variants.

- The service edge optimized line cards are designed for customer deployments requiring enhanced quality of service (QoS).
- The packet transport optimized line cards are designed for network deployments where basic QoS is required.
- Each of the variants supports two further specializations. That is, they support either LAN/WAN/OTN unified PHY CPAK ports or LAN PHY-only CPAK ports. Ordering information and minimum Cisco IOS XR Software release information are specified in Table 5.

Different line card types can be used in the same system.

Feature licenses are also available to turn on advanced features on the line cards, as described in the “Software Licensing” section later in this document.

Product Specifications

Table 2 provides product specifications for the ASR 9000 Series 4-port and 8-port 100 Gigabit Ethernet line cards.

Table 2. Product Specifications

Description	Specification
Chassis compatibility	Compatible with the Cisco ASR 9006, ASR 9010, ASR 9904, ASR 9912 and ASR 9922 chassis
Port density	4-ports and 8 ports of 100 Gigabit Ethernet per line card
Ethernet	• 100-Gbps IEEE 802.3ba compliant • 100 Gigabit Ethernet PHY monitoring • IEEE 802.x flow control • Full-duplex operation • Per-port byte and packet counters for policy drops; oversubscription drops; cyclic redundancy check (CRC) error drops; packet sizes; and unicast, multicast, and broadcast packets
Performance	• 100-Gbps line-rate throughput per port
Options	Each line card is available as either a service edge optimized (enhanced QoS) or packet transport optimized (basic QoS) line card
Reliability and availability	Line card online insertion and removal (OIR) support without system impact
Physical dimensions (H x W x D); weight	8-port 100 Gigabit Ethernet Line Card: 14.5 x 1.63 x 22.02 in.; 28 lb (est.) (368.3 mm x 41.4 mm x 559.3 mm; 12.7 kg) 4-port 100 Gigabit Ethernet Line Card: 14.5 x 1.63 x 22.02 in.; 28 lb (est.) (368.3 mm x 41.4 mm x 559.3 mm; 12.7 kg)
Operating temperature	41 to 104ºF (5 to 40ºC)
Operating humidity (nominal) (relative humidity)	10 to 85%
Storage temperature	-40 to 158ºF (-40 to 70ºC)
Storage (relative humidity)	5 to 95% **Note:** Not to exceed 0.024 kg of water per kg of dry air
Operating altitude	-60 to 4000m (up to 2000m conforms to IEC, EN, UL, and CSA 60950 requirements)
ETSI standards	Cisco ASR 9000 Series Routers are designed to meet: • EN300 386: Telecommunications Network Equipment (EMC) • ETSI 300 019 Storage Class 1.1 • ETSI 300 019 Transportation Class 2.3 • ETSI 300 019 Stationary Use Class 3.1 • EN55022: Information Technology Equipment (Emissions) • EN55024: Information Technology Equipment (Immunity) • EN50082-1/EN-61000-6-1: Generic Immunity Standard
EMC standards	Cisco ASR 9000 Series Routers are designed to meet: • FCC Class A • ICES 003 Class A • AS/NZS 3548 Class A • CISPR 22 (EN55022) Class A • VCCI Class A • BSMI Class A • IEC/EN 61000-3-2: Power Line Harmonics • IEC/EN 61000-3-3: Voltage Fluctuations and Flicker
Immunity	Cisco ASR 9000 Series Routers are designed to meet: • IEC/EN-61000-4-2: Electrostatic Discharge Immunity (8kV Contact, 15kV Air) • IEC/EN-61000-4-3: Radiated Immunity (10V/m) • IEC/EN-61000-4-4: Electrical Fast Transient Immunity (2kV Power, 1kV Signal) • IEC/EN-61000-4-5: Surge AC Port (4kV CM, 2kV DM) • IEC/EN-61000-4-5: Signal Ports (1kV) • IEC/EN-61000-4-5: Surge DC Port (1kV) • IEC/EN-61000-4-6: Immunity to Conducted Disturbances (10Vrms)

Description	Specification
	• IEC/EN-61000-4-8: Power Frequency Magnetic Field Immunity (30A/m) • IEC/EN-61000-4-11: Voltage DIPS, Short Interruptions, and Voltage Variations
Safety	Cisco ASR 9000 Series Routers are designed to meet: • UL/CSA/IEC/EN 60950-1 • IEC/EN 60825 Laser Safety • ACA TS001 • AS/NZS 60950 • FDA: Code of Federal Regulations Laser Safety

Pluggable Interfaces

The ASR 9000 Series 4-port and 8-port 100 Gigabit Ethernet line cards support the Cisco CPAK pluggable interfaces listed in Table 3. See the Cisco ASR 9000 Transceiver Modules: Line Card Support data sheet for a complete list of supported pluggable interfaces.

Table 3. Cisco CPAK Interfaces Supported by the Cisco ASR 9000 Series 4-Port and 8-port 100 Gigabit Ethernet Line Cards

Part Number	100 Gigabit Ethernet CPAK Optics	Maximum Distance
CPAK-100G-LR4	100 Gigabit Ethernet long-reach, 1310 nm single-mode fiber	10 km
CPAK-100G-SR10	100 Gigabit Ethernet short-reach, 850 nm multimode fiber	100m-150m
CPAK-10x10G-LR	10x10 Gigabit Ethernet breakout optics, long-reach 1310 nm multimode fiber; can be used with breakout cables or breakout patch panel	10 km

Software Licensing

Line Card Feature Licenses

Both optimization versions of the ASR 9000 Series 4-port and 8-port 100 Gigabit Ethernet line cards support optional per-line-card feature licenses to turn on advanced features. Layer 3 VPN licenses provide access to VPN routing and forwarding (VRF) instances on a per-line-card basis. They include the Infrastructure VRF license to support up to eight VRF instances and Advanced IP licenses to support up to full-scale VRF instances. Table 4 lists the line card feature licenses.

Table 4. Feature Licenses for Cisco ASR 9000 Series 4-port and 8-Port 100 Gigabit Ethernet Line Cards

License Part Number	Feature Description
A9K-400G-IVRF	Infrastructure VRF license to activate up to 8 VRF instances per 4-port 100GE line card
A9K-400G-AIP-SE	Advanced IP license to turn on full-scale VRF instances per service edge optimized 4-port 100GE line card
A9K-400G-AIP-TR	Advanced IP license to activate full-scale VRF instances per packet transport optimized 4-port 100GE line card
A9K-400G-CGN-LIC	IPv6 inline carrier grade NAT license for 4-port 100 Gigabit Ethernet line card
A9K-400G-OPT-LIC	Advanced Optical license for 4-port 100 Gigabit Ethernet line card
A9K-800G-IVRF	Infrastructure VRF license to turn on up to 8 VRF instances per 8-port 100 Gigabit Ethernet line card
A9K-800G-AIP-SE	Advanced IP license to activate full-scale VRF instances per service edge optimized 8-port 100 Gigabit Ethernet line card
A9K-800G-AIP-TR	Advanced IP license to turn on full-scale VRF instances per packet transport optimized 8-port 100 Gigabit Ethernet line card
A9K-800G-CGN-LIC	IPv6 inline carrier grade NAT license for 8-port 100 Gigabit Ethernet line card
A9K-800G-OPT-LIC	Advanced Optical license for 8-port 100 Gigabit Ethernet line card

Table 5 provides ordering information for the ASR 9000 Series 4-port and 8-port 100 Gigabit Ethernet line cards.

Table 5. Ordering Information

Product Description	Part Number	Minimum XR Release Support
Cisco ASR 9000 8-port 100GE "LAN-only" Service Edge Optimized Line Card, Requires CPAK optics	A9K-8X100G-LB-SE	XR 5.3.0
Cisco ASR 9000 8-port 100GE "LAN-only" Service Edge Optimized Line Card licensed for Packet Transport, Requires CPAK optics	A9K-8X100G-LB-TR	XR 5.3.0
Cisco ASR 9000 8-port 100GE "LAN/WAN/OTN" Service Edge Optimized Line Card, Requires CPAK optics	A9K-8X100GE-SE	XR 5.3.1
Cisco ASR 9000 8-port 100GE "LAN/WAN/OTN" Packet Transport Optimized Line Card, Requires CPAK optics	A9K-8X100GE-TR	XR 5.3.1
Cisco ASR 9000 4-port 100GE "LAN/WAN/OTN" Service Edge Optimized Line Card, Requires CPAK optics	A9K-4X100GE-SE	XR 5.3.1
Cisco ASR 9000 4-port 100GE "LAN/WAN/OTN" Packet Transport Optimized Line Card, Requires CPAK optics	A9K-4X100GE-TR	XR 5.3.1

Downloading the Software

Visit the Cisco Software Center to download Cisco IOS Software.

Cisco Services for the Cisco ASR 9000 Series

Through a lifecycle services approach, Cisco delivers comprehensive support to service providers to help them successfully deploy, operate, and optimize their Cisco IP Next-Generation Networks. Cisco Services for the Cisco ASR 9000 Series Aggregation Services Routers provide services and proven methodologies that help ensure service deployment with substantial ROI, operational excellence, optimal performance, and high availability. These services are delivered using leading practices, tools, processes, and lab environments developed specifically for ASR 9000 Series deployments and post-implementation support. The Cisco Services team addresses your specific requirements, mitigates risk to existing revenue-generating services, and helps accelerate time to market for new network services.

For More Information

For more information about Cisco Services, contact your local Cisco account representative or visit http://www.cisco.com/go/spservices.

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