Cisco ASR 9000 Series 36-Port 10 Gigabit Ethernet Line Cards

Product Overview

The Cisco® ASR 9000 Series 36-Port 10 Gigabit Ethernet Line Cards deliver an industry-leading thirty-six 10-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 today that are caused by a large increase in video-on-demand (VoD), IPTV, point-to-point video, Internet video, and cloud services traffic. These line cards deliver economical, scalable, highly available, line-rate Ethernet and IP/Multiprotocol Label Switching (IP/MPLS) edge services. The Cisco ASR 9000 Series line cards and routers are designed to provide the fundamental infrastructure for scalable Carrier Ethernet and IP/MPLS networks, allowing profitable business, residential, and mobile services (Figure 1).

Figure 1. Cisco ASR Series 9000 36-Port 10 Gigabit Ethernet Line Card

Features and Benefits

The Cisco ASR 9000 Series 36-Port 10 Gigabit Ethernet Line Cards are fully compatible with all Cisco ASR 9000 Series chassis, route switch processors (RSPs), and line cards. No hardware upgrade to the chassis or cooling system is required. Total bandwidth is dependent on the number and type of RSPs installed. The Cisco ASR 9000 Series 36-Port 10 Gigabit Ethernet Line Cards are also fully compatible with the 22-slot Cisco ASR 9922 chassis.

Each line card provides simultaneous support for both Layer 2 and Layer 3 services and features, helping operators qualify and stock a single line card that can be deployed in any combination of Layer 2 and Layer 3 applications, thereby reducing capital expenditures (CapEx) and operating expenses (OpEx), as well as reducing the time required to develop and deploy new services. The Cisco ASR 9000 Series Ethernet line cards set a new standard for Layer 2 and Layer 3 service density and scale, allowing operators to offer predictable, managed transport services while optimizing the use of network assets.

The line cards, with their synchronization circuitry and dedicated backplane timing traces for accessing the RSP's Stratum-3 subsystem, provide standards-based line-interface functions for delivering and deriving transport-class network timing, allowing support of network-synchronized services and applications such as mobile backhaul and time-division multiplexing (TDM) migration. Coupled with the proper RSP, the line cards can also be used for

applications requiring IEEE 1588v2 synchronization services. Recognizing that real-time media dominate next-generation services, Cisco has integrated media-monitoring technology into the Cisco ASR 9000 Series Ethernet line cards. This multimedia technology allows real-time monitoring and statistics collection of real-time video and voice flows, facilitating proactive maintenance and management of today's comprehensive media services.

Addressing the advantages of consolidating IP with the transport network, G.709 with Advanced Forward Error Correction (FEC) is provided. G.709 provides visibility into the transmission system to permit rapid detection and recovery from transmission-layer impairments. G.709 can also be configured for proactive protection if signal degradation is detected; it prevents traffic loss and link outages. Advanced FEC extends transmission-layer performance, delivering extended performance over an amplified system without the cost of regeneration or transponders.

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

Table 1. Features and Benefits of Cisco ASR 9000 Series 36-Port 10 Gigabit Ethernet Line Cards

Feature	Benefit
Interface Support	
Enhanced Small Form-Factor Pluggable (SFP+) interfaces	Provide the capability to mix and match10-Gigabit Ethernet interface types across a single line card. For a complete list of supported interfaces, please see the Cisco ASR 9000 Transceiver Modules: Line Card Support data sheet.
G.709 and Advanced FEC	Standard G.709 providing transmission-layer operations, administration, and maintenance (OA&M); G.709 Standard FEC and Advanced FEC for enhanced transmission system performance
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 OA&M	NetFlow, IEEE 802.1ag, IEEE 802.3ah, ITU Y.1731, IP service-level agreement (IP SLA), virtual circuit connectivity verification (VCCV), ping, and traceroute
Video monitoring (VidMon)	Provides real-time monitoring of video flows, including issuance of an alarm upon degradation
Carrier-Grade OS	
Cisco IOS® XR Software	Modular, patchable, restartable, scalable, highly available, carrier-core and edge-proven operating system
T-Class Synchronization	
Synchronous Ethernet	Derives and provides synchronization from and to Ethernet interfaces, Cisco ASR 9000 Series RSPs, and network synchronization interfaces
IEEE 1588-2008	Cisco ASR 9000 support of the IEEE 1588-2008 protocol, providing the capability to distribute precision time and frequency across the network

Line Card Types

The Cisco ASR 9000 Series 36-Port 10 Gigabit Ethernet Line Cards are available in Service Edge Optimized and Packet Transport Optimized variants.

- Service Edge Optimized line cards are designed for customer deployments requiring enhanced quality of service (QoS).
- Packet Transport Optimized line cards are designed for network deployments where basic QoS is required.

Different line card types may be mixed within 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 Cisco ASR 9000 Series 36-Port 10 Gigabit Ethernet Line Cards.

Table 2. Product Specifications

Description	Specification
Chassis compatibility	Compatible with the Cisco ASR 9000 Series 22-slot, 10-slot, and 6-slot chassis
Port density	36 ports of 10 Gigabit Ethernet per line card
Ethernet	• 10-Gbps IEEE 802.3 compliant • 10 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	• 10-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	14 x 1.72 x 20.5 in.; 18.5 lb (35.56 x 4.37 x 52.07 cm; 8.4 kg)
Network Equipment Building Standards (NEBS)	Cisco ASR 9000 Series Routers are designed to meet: • SR-3580: NEBS Criteria Levels (Level 3) • GR-1089-CORE: NEBS EMC and Safety • GR-63-CORE: NEBS Physical Protection
Operating temperature (nominal)	41 to 104ºF (5 to 40ºC)
Operating temperature (short-term)	23 to 131ºF (–5 to 55ºC) Note: Short-term refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in 1 year (total of 360 hours in any given year, but no more than 15 occurrences during that 1-year period).
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

Description	Specification
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) • 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 Cisco ASR 9000 Series Ethernet line cards support a wide range of 10 Gigabit Ethernet SFP+ pluggable interfaces. Please see the Cisco ASR 9000 Transceiver Modules: Line Card Support data sheet for a complete list.

Software Licensing

Line Card Feature Licenses

Both optimization versions of the Cisco ASR 9000 Series 36-Port 10 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 8 VRF instances and Advanced IP licenses to support up to full-scale VRF instances. The Advanced Optical license enables G.709 and FEC on a per-line-card basis. The Advanced Video license enables the inline video monitoring feature on a per-line-card basis. Table 3 lists the line card feature licenses.

Table 3. Feature Licenses for Cisco ASR 9000 Series 36-Port 10 Gigabit Ethernet Line Cards

License Part Number	Feature Description
A9K-IVRF-LIC	Infrastructure VRF license to enable up to 8 VRF instances per line card
A9K-36X10G-AIP-SE	Advanced IP license to enable full-scale VRF instances per Service Edge Optimized 36-Port 10 Gigabit Ethernet line card
A9K-36X10G-AIP-TR	Advanced IP license to enable full-scale VRF instances per Transport Optimized 36-Port 10 Gigabit Ethernet line card
A9K-36X10-OPT-LIC	Advanced Optical license to enable G.709 and FEC per 36-Port 10 Gigabit Ethernet line card
A9K-36X10-VID-LIC	Advanced Video license to enable inline video monitoring per 36-Port 10 Gigabit Ethernet line card

System-Level Feature Licenses

Cisco ASR 9000 Series 36-Port 10 Gigabit Ethernet Line Cards also support the deployment of advanced features based on Cisco ASR 9000 Series system-level licenses. The Lawful Intercept license enables lawful intercept for surveillance of packet streams that flow through Cisco ASR 9000 Series ports. The Advanced Mobile license enables the IEEE 1588-2008 protocol to distribute precision time and frequency across the network. The Broadband Network Gateway (BNG) license enables high-scale Ethernet BNG with session and subscriber

awareness. Inline video monitoring on the line cards can also be enabled using a system-level Advanced Video license. Table 4 lists the system licenses supported by the line cards.

Table 4. System-Level Feature Licenses Supported by Cisco ASR 9000 Series 36-Port 10 Gigabit Ethernet Line Cards

License Part Number	Feature Description
A9K-LI-LIC	Lawful Intercept license to enable lawful intercept of packet streams for surveillance
A9K-MOBILE-LIC	Advanced Mobile license to enable IEEE 1588-2008 protocol to distribute precision timing and frequency
A9K-BNG-LIC-8K	Broadband Network Gateway license to enable high-scale Ethernet BNG with session and subscriber awareness (BNG is not supported on the 36-Port 10 Gigabit Ethernet Line Card with XR release 4.2.2)
A9K-SYS-VID-LIC	Advanced Video license to enable inline video monitoring for all line cards in the system

Ordering Information

Table 5 provides ordering information for the Cisco ASR 9000 Series 36-Port 10 Gigabit Ethernet Line Cards. For software license part numbers, see the preceding Tables 3 and 4.

Table 5. Ordering Information

Product Description	Part Number
Cisco ASR 9000 36-Port 10GE Service Edge Optimized Line Card, requires SFP+ optics	A9K-36X10GE-SE
Cisco ASR 9000 36-Port 10GE Packet Transport Optimized Line Card, requires SFP+ optics	A9K-36X10GE-TR

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 IP Next-Generation Networks (IP NGNs). Cisco Services for the Cisco ASR 9000 Series Aggregation Services Routers provide the services and proven methodologies that help ensure service deployment with substantial return on investment, operational excellence, optimal performance, and high availability. These services are delivered using leading practices, tools, processes, and lab environments developed specifically for Cisco 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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