

Cisco ASR 9000 Series 40 and 56 Gigabit Ethernet Line Cards

Product Overview

Remove bandwidth bottlenecks in your 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 with the Cisco® ASR 9000 Series 40 and 56 Gigabit Ethernet Line Cards. This line card delivers industry-leading 40 1-Gigabit Ethernet ports or a combination of 4 10-Gigabit Ethernet and 16 1-Gigabit Ethernet ports to any slot of a Cisco ASR 9000 Series Aggregation Services Router. 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.

Features and Benefits

The Cisco ASR 9000 Series 40 and 56 Gigabit Ethernet Line Cards are fully compatible with all Cisco ASR 9000 Series chassis except the Cisco ASR 9001 Router. No hardware upgrade to the chassis or cooling system is required to deploy these line cards.

Each line card provides simultaneous support for both Layer 2 and Layer 3 services and features. This helps operators qualify and stock a single line card that can be deployed in any combination of Layer 2 and Layer 3 applications. It also helps reduce capital expenditures (CapEx) and operating expenses (OpEx) and reduces 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 highly predictable, managed transport services while optimizing the use of network assets.

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

Table 1 lists the features and benefits of the Cisco ASR 9000 Series Ethernet line cards. Specific features and scalability are hardware and software dependent.

Table 1. Features and Benefits of Cisco ASR 9000 Series 40 and 56 Gigabit Ethernet Line Cards

Feature	Benefit
Interface Support	
Pluggable 1-Gigabit Small Form-Factor Pluggable (SFP) and 10-Gigabit Small Form-Factor Pluggable Plus (SFP+)	Provide the capability to mix and match 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.
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)	VidMon, providing real-time monitoring of video flows, including issuance of alarm upon degradation
Carrier-Grade OS	
Cisco IOS® XR Software	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 Series support of the IEEE 1588-2008 protocol provides the capability to distribute precision time

Line Card Types

The Cisco ASR 9000 Series 40 and 56 Gigabit Ethernet Line Cards are available in Service Edge Optimized and Packet Transport Optimized models.

- 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 activate advanced features on the line cards, as described in the Software Licensing section in this document.

Product Specifications

Table 2 provides product specifications for the Cisco ASR 9000 Series 40 and 56 Gigabit Ethernet Line Cards.

Table 2. Product Specifications

Description	Specification
Chassis compatibility	<ul style="list-style-type: none"> • Cisco ASR 9904, ASR 9006, ASR 9010, ASR 9912, and ASR 9922 routers
Port density	<ul style="list-style-type: none"> • 40GE - 40 ports of 1 Gigabit Ethernet per line card • 4T16GE - 4 ports of 10 Gigabit Ethernet and 16 ports of 1 Gigabit Ethernet per line card; comes in a default 40 Gigabit capacity combo mode of 2 x 10 Gigabit Ethernet + 16 x 1 Gigabit Ethernet, which can be changed to 4 x 10 Gigabit Ethernet through the command-line interface (CLI) and upgraded to full capacity of 4 x 10 Gigabit Ethernet + 16 x 1 Gigabit Ethernet through a license

Description	Specification
Ethernet	<ul style="list-style-type: none"> • 1- and 10-Gbps IEEE 802.3 compliant • 1 and 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	1- and 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
Network Equipment Building Standards (NEBS)	Cisco ASR 9000 Series Routers are designed to meet: <ul style="list-style-type: none"> • 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 104°F (5 to 40°C)
Operating temperature (short-term)¹	23 to 131°F (-5 to 55°C)
Operating humidity (nominal) relative humidity	10 to 85 percent
Storage temperature	-40 to 158°F (-40 to 70°C)
Storage relative humidity	5 to 95 percent 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)
Physical dimensions (H x W x D); weight	14 x 1.72 x 20.5 in.; 14 lb (35.56 x 4.37 x 52.07 cm; 5.53 kg)
ETSI standards	Cisco ASR 9000 Series Routers are designed to meet: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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

Description	Specification
Safety of the Cisco ASR 9000 Series 40 and 56 Gigabit Ethernet Line Cards	Cisco ASR 9000 Series Routers are designed to meet: <ul style="list-style-type: none"> • 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 line cards support a wide range of SFP and SFP+ interfaces. See the [Cisco ASR 9000 Transceiver Modules: Line Card Support](#) data sheet for a complete list.

Software Licensing

Line Card Feature Licenses

Both versions 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 Video license activates the inline video monitoring feature on a per-line-card basis. Table 3 lists the line card feature licenses.

Cisco ASR 9000 Series 40 and 56 Gigabit Ethernet Line Cards Line Cards support all features available on the Typhoon based MOD80 line cards, except that satellite interfaces (on 40X1GE card) are limited to 16 ports; ingress queuing is not supported; and there is no DWDM support.

Table 3. Feature Licenses for Cisco ASR 9000 Series 40-Port Gigabit Ethernet Line Cards

License Part Number	Feature Description
A9K-40G-AIP-TR	L3 VPN license for 40-Port GE Linecard, Transport Optimized
A9K-40G-AIP-SE	L3 VPN license for 40-Port GE Linecard, Service Edge
A9K-40G-VID-LIC	Advanced Video & Multicast License for A9K-40GE line card
A9K-IVRF-LIC	Infrastructure VRF license to activate up to 8 VRF instances per Modular line card
A9K-4T16GE-AIP-TR	L3 VPN license for 4-Port 10GE, 16-Port GE Linecard, Transport Optimized
A9K-4T16GE-AIP-SE	L3 VPN license for 4-Port 10GE, 16-Port GE Linecard, Service Edge
A9K-4T16G-VID-LIC	Advanced Video and Multicast License for A9K-4T16GE line card

System-Level Feature Licenses

Cisco ASR 9000 40 and 56 Gigabit Ethernet Line Cards also support the deployment of advanced features based on Cisco ASR 9000 Series system-level licenses. The Lawful Intercept license activates lawful intercept capabilities for surveillance of packet streams that flow through Cisco ASR 9000 ports. The Advanced Mobile license activates Synchronous Ethernet and IEEE 1588-2008 protocols to distribute precision time and frequency across the network. The Broadband Network Gateway (BNG) license allows high-scale Ethernet BNG with session and subscriber awareness. Inline video monitoring on Cisco Modular line cards can also be activated using a system-level Advanced Video license.

Table 4 lists the system licenses supported by Cisco modular line cards.

Table 4. System-Level Feature Licenses Supported by Cisco Modular Line Cards

License Part Number	Feature Description
A9K-LI-LIC	Lawful Intercept license to allow lawful intercept of packet streams for surveillance
A9K-MOBILE-LIC	Advanced Mobile license to activate Synchronous Ethernet and IEEE 1588-2008 protocols to distribute precision timing and frequency
A9K-BNG-LIC-8K	Broadband Network Gateway license to support high scale Ethernet BNG with session/subscriber awareness
A9K-SYS-VID-LIC	Advanced Video license to activate inline video monitoring capabilities for all line cards in the system

Ordering Information

Table 5 provides ordering information for the Cisco ASR 9000 Series 40 and 56 Gigabit Ethernet Line Cards.

Table 5. Ordering Information

Part Number	Product Description
A9K-40GE-TR	40-Port GE Line Card, Packet Transport Optimized, Requires SFPs
A9K-40GE-SE	40-Port GE Line Card, Service Edge Optimized, Requires SFPs
A9K-4T16GE-TR	4-Port 10GE, 16-Port GE Line Card, 40G Packet Transport Optimized, Requires SFPPs and SFPs
A9K-4T16GE-SE	4-Port 10GE, 16-Port GE Line Card, 40G Service Edge Optimized, Requires SFPPs and SFPs
A9K-2T-TR-LIC	20G Upgrade License on A9K-4T16GE-TR card to enable full capacity of 4 x 10GE + 16 x 1GE
A9K-2T-SE-LIC	20G Upgrade License on A9K-4T16GE-SE card to enable full capacity of 4 x 10GE + 16 x 1GE

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Cisco Services for the ASR 9000 Series

Through a lifecycle services approach, Cisco delivers comprehensive support to service providers to help you successfully deploy, operate, and optimize your Cisco Prime™ for Evolved Programmable Networks (EPNs) solutions. 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.

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