Cisco ASR 9000 Series 5th Generation High-Density Multi-Rate Line Cards: 2 Terabit and 0.8 Terabit Cards Data Sheet

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Product overview

The Cisco® ASR 9000 Series 5th Generation High-Density Multi-Rate Line Cards deliver industry-leading high density, with line-rate 100, 200, and 400 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 QSFP technology, this line card has flexible interfaces that support 400 Gigabit Ethernet, 200 Gigabit Ethernet, 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 and offers operators the readiness for mass-scale networking.

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 card 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.

Features and benefits

The ASR 9000 Series 5th Generation High-Density Multi-Rate Line Cards are fully compatible with the Cisco ASR 9006 Router, ASR 9010 Router, ASR 9904 Router, ASR 9906 Router, ASR 9910 Router, ASR 9912 Router, and ASR 9922 Router. However, the chassis may require a hardware update for the fabric cards, RP/RSP card, and cooling systems. The multi-rate port line cards are designed to support full line rate, non-over subscribed traffic.

This power-optimized line card, at such high density and scale, allows customers to reduce Capital Expenditures (CapEx) and Operating Expenses (OpEx) while offering highly predictable, managed transport services for Core and Peering applications. The Cisco QSFP breakout option further increases the capability of each line card to support large-scale aggregation as well as the 10 Gigabit Ethernet Satellite Network Virtualization (nV) System mode on the ASR 9000 Series Router.

The Cisco A9K-20HG-FLEX-SE and A9K-20HG-FLEX-TR line cards (Figures 1 and 2) provide 20 ports of 100G or 5 ports of 200G or 5 ports of 400G, or a combination of ports not to exceed 2T in total. Five of the 20 ports can be upgraded to 400GE through a license on a per-port basis. These line cards use QSFP28/QSFP-DD form factor transceivers and can be used in any of the ASR 9000 Series of modular chassis.

The Cisco A9K-8HG-FLEX-SE and A9K-8HG-FLEX-TR line cards (Figures 3 and 4) provide 8 ports of 100G or 2 ports of 200G or 2 ports of 400G, or a combination of ports not to exceed 0.8T in total. Two of the 8 ports can be upgraded to 400GE through a license on a per-port basis. These line cards use QSFP28/QSFP-DD form factor transceivers and can be used in any of the ASR 9000 Series of modular chassis.

These cards are supported starting with Cisco IOS XR Software Release 7.1.15.

The QSFP-DD optics have the same mechanical characteristics and cage size as the QSFP28 optics, and the same ports can act as 10 GE (via breakout options), 40 GE, 100 GE, 200 GE, or 400 GE, therefore allowing operators to migrate to 400 GE at their own pace as the need arises.
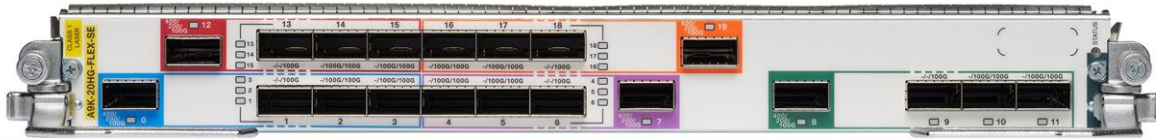
Figure 1.
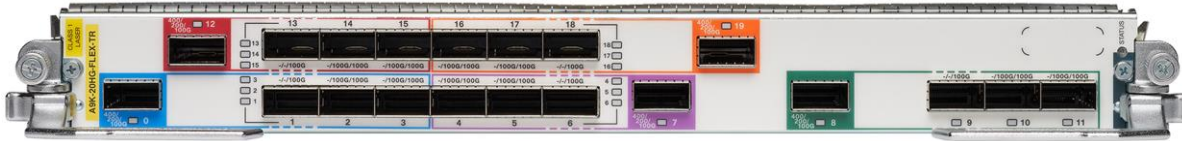Cisco ASR 9000 Series 2T Service Edge Combo Line Card – 5th Generation – SE

Figure 2.
Cisco ASR 9000 Series 2T Packet Transport Combo Line Card – 5th Generation – TR

Figure 3.
Cisco ASR 9000 Series 800G Service Edge Combo Line Card – 5th Generation – SE

Figure 4.
Cisco ASR 9000 Series 800G Packet Transport Combo Line Card – 5th Generation – TR

Table 1 lists the features and benefits of the 5th Generation Multi-Rate Cards. Specific feature and scale support is hardware and software dependent.

Table 1. Features and benefits: XR 7.1.15 or later of Cisco ASR 9000 Series 5th Generation High-Density Multi-Rate Line Cards

Feature	Benefit
Interface support	
Cisco QSFP pluggable interfaces	Provide the capacity to mix and match 40,100, and 400 Gigabit Ethernet interface types across a single line card (for a complete list of supported pluggable interfaces, see the Cisco Optics Compatibility Matrix)
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 trace route
Carrier-class OS	
Cisco IOS® XR Software (64-bit)	Modular, patchable, scalable, highly available, carrier core and edge-proven operating system

Line card types

The ASR 9000 Series 5th Generation High-Density Multi-Rate Gigabit Ethernet Line Cards are available in the service-edge- and packet-transport-optimized variants.

- The service-edge-optimized line card is designed for customer deployments requiring enhanced service scale.

- The packet-transport-optimized line card is designed for customer deployments requiring basic service scale.

Feature licenses are also available to turn on 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 5th Generation High-Density Multi-Rate Gigabit Ethernet Line Card.

Table 2.   Product specifications

Description	Specification
Chassis compatibility	Compatible with the Cisco ASR 9006, ASR 9010, ASR 9904, ASR 9906, ASR 9910, ASR 9912, and ASR 9922 chassis
Port density	**2 Terabit Line Card:** 15 QSFP28 ports capable of 10Gb, 40Gb, and 100Gb Ethernet traffic support. 5 QSFP-DD ports capable of 10Gb, 40Gb, 100Gb, 200Gb, and 400Gb Ethernet traffic support. **0.8 Terabit Line Card:** 6 QSFP28 ports capable of 10Gb, 40Gb, and 100Gb Ethernet traffic support. 2 QSFP-DD ports capable of 10Gb, 40Gb, 100Gb, 200Gb, and 400Gb Ethernet traffic support.
Ethernet	100-Gbps IEEE 802.3ba compliant 100 Gigabit Ethernet PHY monitoring 400-Gbos IEEE 802.3bs compliant - 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 QSFP28 port 400-Gbps line-rate throughput per QSFP-DD port
Options	Each line card is available as either a service-edge-optimized or packet-transport-optimized line card
Reliability and availability	Line card Online Insertion and Removal (OIR) support without system impact
Physical dimensions(includes ejector bracket/lever); (H x W x D); weight	2T Service Edge Combo Line Card – 5th Generation: 1.63 x 15.58 x 23.80 in.; 24.15 lb (41.4 x 395.7 x 604.5 mm; 10.95 kg) 2T Packet Transport Combo Line Card – 5th Generation: 1.63 x 15.58 x 23.80 in.; 24.15 lb (est.) (41.4 x 395.7 x 604.5 mm; 10.95 kg) 800G Service Edge Combo Line Card – 5th Generation: 1.63 x 15.58 x 23.80 in.; 21.70 lb (41.4 x 395.7 x 604.5 mm; 9.84 kg) 800G Packet Transport Combo Line Card – 5th Generation: 1.63 x 15.58 x 23.80 in.; 21.70 lb (41.4 x 395.7 x 604.5 mm; 9.84 kg)
Operating temperature	41 to 104°F (5 to 40°C) **Note:** Limitations may apply when using high-power optics
Operating humidity (nominal) (relative humidity)	10 to 85%

Description	Specification
Storage temperature	–40 to 158°F (–40 to 70°C)
Storage (relative humidity)	5 to 95% **Note:** Not to exceed 0.024 kg of water per kg of dry air
Operating altitude	–60 to 4000 m (up to 2000 m conforms to IEC, EN, UL, and CSA 60950 requirements)
ETSI/EN 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) • EN55032: Multimedia Equipment (Emissions) • EN55024: Information Technology Equipment (Immunity) • EN55035: Multimedia 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 CISPR 32 Class A • CISPR 22/CISPR 32 Class A • EN55022/EN55032 Class A • CCI Class A • CNS-13438 Class A • KN32 Class A • IEC/EN 61000-3-2: Power Line Harmonics • IEC/EN 61000-3-3: Voltage Fluctuations and Flicker • EN50121-4 Railway applications Part 4: Emission and immunity of the signaling and telecommunications apparatus • EN50121-3-2 Railway applications Part 3-2: Rolling stock - Apparatus
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 • KN35

Description	Specification
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
Network Equipment Building Systems (NEBS)	Designed to meet: • SR-3580: NEBS Criteria Levels (Level 3) • GR-1089-CORE: NEBS EMC and Safety • GR-63-CORE: NEBS Physical Protection

Ordering information

The ASR 9000 Series 5th Generation High-Density Multi-Rate Gigabit Ethernet Line Cards are available to order through two commercial models, the Flexible Consumption Model (FCM) and the Traditional Business Model.

The Flexible Consumption Model offers a built-in "pay-as-you-grow" structure that lowers initial start-up costs with the ability to add more capacity overtime as needed. Software subscription provides feature upgrades and helps defer the payment of software value for the initial purchase.

Table 3 provides ordering information for the ASR 9000 Series 5th Generation High-Density Multi-Rate Gigabit Ethernet Line Card with the Flexible Consumption Model

Table 3. Ordering information for the ASR 9000 Series 5th Generation High-Density Multi-Rate Gigabit Ethernet Line Cards with the Flexible Consumption Model

Part number	Feature description
A9K-20HG-FLEX-FC	ASR 9000 2T Flexible Consumption Combo Line Card - 5th Generation
A9K-8HG-FLEX-FC	ASR 9000 800G Flexible Consumption Combo Line Card - 5th Generation
ESS-ED-100G-RTU1	Edge Essentials Software RTU License per 100G
ADV-ED-100G-RTU1	Edge Advantage w/o Essentials Software RTU License per 100G
ADN-ED-100G-RTU1	Edge Advantage w/ Essentials Software RTU License per 100G
ESS-ED-400G-RTU1	Edge Essentials Software RTU License per 400G
ADV-ED-400G-RTU1	Edge Advantage w/o Essentials Software RTU License per 400G
ADN-ED-400G-RTU1	Edge Advantage w/ Essentials Software RTU License per 400G
ESS-ED-100G-SIA5	Edge Essentials SIA per 100G 60-120 months
ESS-ED-100G-SIA3	Edge Essentials SIA per 100G 36-59 months
ESS-ED-400G-SIA5	Edge Essentials SIA per 400G 60-120 months

Part number	Feature description
ESS-ED-400G-SIA3	Edge Essentials SIA per 400G 36-59 months
ADV-ED-100G-SIA5	Edge Advantage w/o Essentials SIA per 100G for 60-120 months
ADV-ED-100G-SIA3	Edge Advantage w/o Essentials SIA per 100G for 36-59 months
ADV-ED-400G-SIA5	Edge Advantage w/o Essentials SIA per 400G for 60-120 months
ADV-ED-400G-SIA3	Edge Advantage w/o Essentials SIA per 400G for 36-59 months
ADN-ED-100G-SIA5	Edge Advantage w/ Essentials SIA per 100G for 60-120 months
ADN-ED-100G-SIA3	Edge Advantage w/ Essentials SIA per 100G for 36-59 months
ADN-ED-400G-SIA5	Edge Advantage w/ Essentials SIA per 400G for 60-120 months
ADN-ED-400G-SIA3	Edge Advantage w/ Essentials SIA per 400G for 36-59 months

For more information, please refer to the Cisco IOS XR Software Flexible Consumption Model Data Sheet.

Table 4 provides ordering information for the ASR 9000 Series 5th Generation High-Density Multi-Rate Gigabit Ethernet Line Cards with the Traditional Business Model.

Table 4. Ordering information for the ASR 9000 Series 5th Generation High-Density Multi-Rate Gigabit Ethernet Line Cards with the Traditional Business Model

Part number	Feature description
A9K-20HG-FLEX-SE	ASR 9000 2T Service Edge Combo Line Card - 5th Generation
A9K-20HG-FLEX-TR	ASR 9000 2T Packet Transport Combo Line Card - 5th Generation
S-A9K-20HG-IVRF	ASR 9000 License to Activate up to 8 VRFs for 2T - 5th Generation Line Card
S-A9K-20HG-AIP-SE	ASR 9000 Full-Scale VRF License for 2T Service Edge - 5th Generation Line Card
S-A9K-20HG-AIP-TR	ASR 9000 Full-Scale VRF License for 2T Packet Transport - 5th Generation Line Card
S-A9K-20HG-CGN	ASR 9000 Smart License In-Line CGv6 Translation for 2T - 5th Generation Line Card
A9K-8HG-FLEX-SE	ASR 9000 800G Service Edge Combo Line Card - 5th Generation
A9K-8HG-FLEX-TR	ASR 9000 800G Packet Transport Combo Line Card - 5th Generation
S-A9K-8HG-IVRF	ASR 9000 License to Activate up to 8 VRFs for 800G - 5th Generation Line Card
S-A9K-8HG-AIP-SE	ASR 9000 Full-Scale VRF License for 800G Service Edge - 5th Generation Line Card
S-A9K-8HG-AIP-TR	ASR 9000 Full-Scale VRF License for 800G Packet Transport - 5th Generation Line Card
S-A9K-8HG-CGN	ASR 9000 Smart License In-Line CGv6 Translation for 800G - 5th Generation Line Card

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.

Product sustainability

Information about Cisco's environmental sustainability policies and initiatives for our products, solutions, operations, and extended operations or supply chain is provided in the "Environment Sustainability" section of Cisco's Corporate Social Responsibility (CSR) Report.

Reference links to information about key environmental sustainability topics (mentioned in the "Environment Sustainability" section of the CSR Report) are provided in the following table:

Sustainability topic	Reference
Information on product material content laws and regulations	Materials
Information on electronic waste laws and regulations, including products, batteries, and packaging	WEEE compliance

Cisco makes the packaging data available for informational purposes only. It may not reflect the most current legal developments, and Cisco does not represent, warrant, or guarantee that it is complete, accurate, or up to date. This information is subject to change without notice.

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Document history

Table 5.   Document history

New or Revised Topic	Described In	Date
Updated the Ordering information section with new license SKU content for both Traditional and FCM models. **Updated relevant features and technical specifications across document.**	Ordering information	August 12, 2021

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