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

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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.

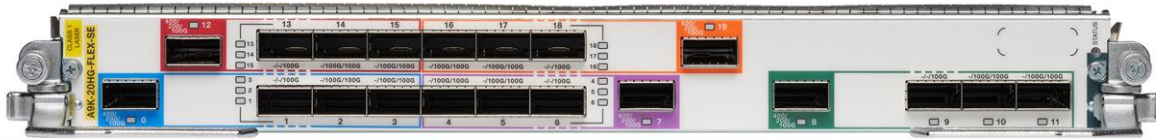


Figure 1.
Cisco ASR 9000 Series 2T Service Edge Combo Line Card - 5th Generation - SE

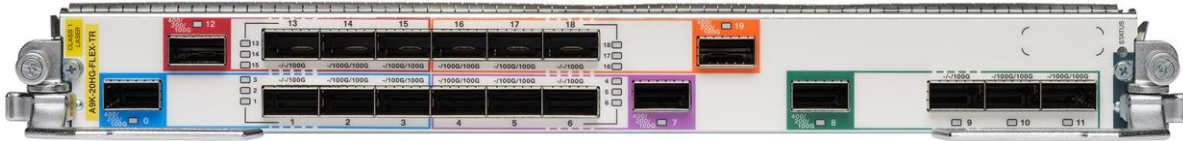


Figure 2.
Cisco ASR 9000 Series 2T Packet Transport Combo Line Card - 5th Generation - TR



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

Feature	Benefit
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	<p>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.</p> <p>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.</p>
Ethernet	<ul style="list-style-type: none"> • 100-Gbps IEEE 802.3ba compliant • 100 Gigabit Ethernet PHY monitoring • 400-Gbps 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	<ul style="list-style-type: none"> • 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	Line card Online Insertion and Removal (OIR) support without system impact

Description	Specification
availability	
Physical dimensions(includes ejector bracket/lever); (H x W x D); weight	<p>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)</p> <p>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)</p> <p>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)</p> <p>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)</p>
Operating temperature	41 to 104° F (5 to 40° C)
Operating humidity (nominal) (relative humidity)	10 to 85%
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 4000m (up to 2000m conforms to IEC, EN, UL, and CSA 60950 requirements)
ETSI/EN standards	<p>Cisco ASR 9000 Series Routers are designed to meet:</p> <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) • EN55032: Multimedia Equipment (Emissions) • EN55024: Information Technology Equipment (Immunity) • EN55035: Multimedia Equipment (Immunity) • EN50082-1/EN-61000-6-1: Generic Immunity Standard

Description	Specification
EMC standards	<p>Cisco ASR 9000 Series Routers are designed to meet:</p> <ul style="list-style-type: none"> • 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	<p>Cisco ASR 9000 Series Routers are designed to meet:</p> <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 • KN35
Safety	<p>Cisco ASR 9000 Series Routers are designed to meet:</p> <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
Network Equipment Building Systems (NEBS)	<p>Designed to meet:</p> <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

Ordering information

The ASR 9900 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 9900 Series 5th Generation High-Density Multi-Rate Gigabit Ethernet Line Card with the Flexible Consumption Model

Table 3. Ordering information for the ASR 9900 Series 5th Generation High-Density Multi-Rate Gigabit Ethernet Line Cards with the Flexible Consumption Model

Part number	Feature description	Minimum XR Release support
A9K-20HG-FLEX-FC	ASR 9000 2T Flexible Consumption Combo Line Card - 5 th Generation	XR 7.1.15
A9K-8HG-FLEX-FC	ASR 9000 800G Flexible Consumption Combo Line Card - 5 th Generation	XR 7.1.15
ESS-ED-100G-RTU1	Essentials Software RTU License (per 100G) for Edge	XR 7.1.15
ADV-ED-100G-RTU1	Advanced Software RTU License (per 100G) for Edge	XR 7.1.15

For more information, please refer to the [Cisco IOS XR Software Flexible Consumption Model Data Sheet](#).

Table 4 provides ordering information for the ASR 9900 Series 5th Generation High-Density Multi-Rate Gigabit Ethernet Line Cards with the Traditional Business Model.

Table 4. Ordering information for the ASR 9900 Series 5th Generation High-Density Multi-Rate Gigabit Ethernet Line Cards with the Traditional Business Model

Part number	Feature description	Minimum XR Release support
A9K-20HG-FLEX-SE	ASR 9000 2T Service Edge Combo Line Card - 5 th Generation	XR 7.1.15
A9K-20HG-FLEX-TR	ASR 9000 2T Packet Transport Combo Line Card - 5 th Generation	XR 7.1.15
S-A9K-20HG-IVRF	ASR 9000 License to Activate up to 8 VRFs for 2T - 5 th Generation Line Card	XR 7.1.15
S-A9K-20HG-AIP-SE	ASR 9000 Full-Scale VRF License for 2T Service Edge - 5 th Generation Line Card	XR 7.1.15
S-A9K-20HG-AIP-TR	ASR 9000 Full-Scale VRF License for 2T Packet Transport - 5 th Generation Line Card	XR 7.1.15
S-A9K-20HG-CGN	ASR 9000 Smart License In-Line CGv6 Translation for 2T - 5 th Generation Line Card	XR 7.1.15
A9K-8HG-FLEX-SE	ASR 9000 800G Service Edge Combo Line Card - 5 th Generation	XR 7.1.15

Part number	Feature description	Minimum XR Release support
A9K-8HG-FLEX-TR	ASR 9000 800G Packet Transport Combo Line Card - 5 th Generation	XR 7.1.15
S-A9K-8HG-IVRF	ASR 9000 License to Activate up to 8 VRFs for 800G - 5 th Generation Line Card	XR 7.1.15
S-A9K-8HG-AIP-SE	ASR 9000 Full-Scale VRF License for 800G Service Edge - 5 th Generation Line Card	XR 7.1.15
S-A9K-8HG-AIP-TR	ASR 9000 Full-Scale VRF License for 800G Packet Transport - 5 th Generation Line Card	XR 7.1.15
S-A9K-8HG-CGN	ASR 9000 Smart License In-Line CGv6 Translation for 800G - 5 th Generation Line Card	XR 7.1.15

Pluggable interfaces

The ASR 9000 Series 5th Generation High-Density Multi-Rate Gigabit Ethernet Line Cards support the Cisco QSFP pluggable interfaces listed in Table 5. See the [Cisco Optics Compatibility Matrix for](#) a complete list of supported pluggable interfaces.

Table 5. Cisco QSFP interfaces supported XR 7.1.15 or later by the Cisco ASR 9000 Series 5th Generation High-Density Multi-Rate Gigabit Ethernet Line Cards

Part number	40/100/400 Gigabit Ethernet QSFP optics	Maximum distance
QSFP-40G-SR4	40GBASE-SR4 QSFP Transceiver Module with MPO Connector	100m/150m
QSFP-40G-SR-BD	QSFP40G BiDi Short-Reach Transceiver	100m/150m
QSFP-4X10G-LR-S	QSFP 4x10G Transceiver Module, SM MPO, 10km, Enterprise Class	10 km
QSFP-40G-LR4	QSFP 40GBASE-LR4 OTN Transceiver, LC, 10km	10 km
QSFP-40G-ER4	QSFP 40GBASE-ER4 Transceiver Module, LC, 40km	40 km
QSFP-100G-SR4-S	100GBASE SR4 QSFP Transceiver, MPO, 100m over OM4 MMF	70m/100m
QSFP-100G-PSM4-S	100GBASE PSM4 QSFP Transceiver, MPO, 500m over SMF	500 km
QSFP-100G-SM-SR	100GBASE CWDM4 Lite QSFP Transceiver, 2km over SMF, 10-60C	2km
QSFP-100G-FR-S	100G QSFP28 Transceiver 100G-FR, 2km SMF, Duplex, LC	2km
QSFP-100G-LR4-S	100GBASE LR4 QSFP Transceiver, LC, 10km over SMF	10km
QSFP-100G-ER4L-S	100GBASE QSFP Transceiver, 40KM reach over SMF, Duplex LC	40km
QSFP-100G-CWDM4-S	100GBASE CWDM4 QSFP Transceiver, LC, 2km over SMF	2km
QDD-400G-DR4-S	400G QSFP-DD Transceiver, 400GBASE-DR4, MPO-12, 500m Parallel	500m
QDD-400G-FR4-S	400G QSFP-DD Transceiver, 400G-FR4, Duplex LC, 2km Duplex SMF	2km

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.

Cisco environmental 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

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