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Cisco ASR 9900 Series Third Generation Switch Fabric Card 3

Contents

The Cisco® ASR 9900 Switch Fabric Card 3 (Figures 1-3) are the next-generation switch fabrics for the Cisco ASR 9922 Router, ASR 9912 Router, ASR 9910 Router and ASR 9906 Routers, supporting high-density 100 and 400 Gigabit Ethernet line cards. The system architecture of the Cisco ASR 9900 Switch Fabric Card 3 (ASR 9900 SFC3) is designed to accommodate new programmable deployment models and convergence of Layer 2 and Layer 3 services, as required by today's wireline, Data-Center-Interconnect (DCI), and mobile aggregation applications.
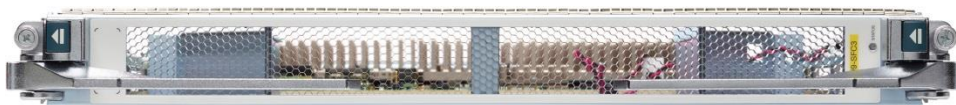

Figure 1.
Cisco ASR 9900 Series Switch Fabric Card 3

Figure 2.
Cisco ASR 9910 Switch Fabric Card 3

Figure 3.
Cisco ASR 9906 Switch Fabric Card 3

The ASR 9900 SFC3, SFC3-S, SFC3-T features provide exceptional scale, service flexibility, and high availability. Examples include:

- Distributed switch fabric architecture

- Support for up to seven ASR 9900 switch fabric cards SFC3 to provide scalability and high availability on the ASR 9922 and ASR 9912 Routers

- Support for up to five ASR 9900 switch fabric cards SFC3-S to provide scalability and high availability on the ASR 9910 Router

- Support for up to five ASR 9900 switch fabric cards SFC3-T to provide scalability and high availability on the ASR 9906 Router

- Multistage low-latency non-blocking architecture

The switch fabric is configured as a single stage of switching with multiple parallel planes, and it is responsible for transporting packets from one line card to another. Each fabric plane is a single-stage, non-blocking, packet-based, store-and-forward switch that works with the Cisco ASR 9900 Route Processor 3 and Cisco ASR 9000 Route Switch Processor RSP to support traffic management using the centralized Virtual Output Queue (VOQ) arbitration of the route processor.

The ASR 9922 and ASR 9912 chassis provide 6 + 1 redundancy using an all-active fabric-controllers configuration model that allows for distribution of the traffic load across all seven switch fabrics, taking advantage of the processing capacity of all. If a failure occurs on one fabric card, the remaining 6 active cards continue to forward traffic in the system, with hardware support for zero packet loss on fabric-card Online Insertion and Removal (OIR). Because all fabric cards are active and forwarding traffic, they are all ready to assume the full traffic load.

Compared to the ASR 9922 and ASR 9912, which can accommodate up to seven fabric cards, the ASR 9910 and ASR 9906 use up to five dedicated fabric cards in combination with the fabrics built in on the two route switch processors. As a result, the ASR 9910 and ASR 9906 can provide seven fabrics to switch the traffic.

The ASR 9910 and ASR 9906 chassis also provide 6 + 1 redundancy using an all-active fabric-controllers configuration model that allows for distribution of the traffic load across all seven switch fabrics, taking advantage of the processing capacity of all. If a failure occurs on one fabric (dedicated fabric card or route switch processor's built-in fabric), the remaining six active fabrics continue to forward traffic in the system, with hardware support for zero packet loss on fabric-card Online Insertion and Removal (OIR). Because all fabric cards are active and forwarding traffic, they are all ready to assume the full traffic load.

The switch fabric is fully redundant, with one copy of the fabric on each fabric card, and each fabric card carries enough switching capacity to meet the chassis throughput specifications.

Features and benefits of the ASR 9900 SFC3, SFC3-S and SFC3-T are listed in Table 1.

Table 1.   Features and benefits of ASR 9900 SFC3, SFC3-S and SFC3-T in XR 6.5.15 or later

Feature	Description
Highly scalable fabric	• Designed to support high 1-, 10-, 25- 40- 100- and 400-Gbps port densities • Provides built-in scalability for investment protection
Up to seven switch fabrics	Offers traffic load balancing simultaneously across up to seven fabrics On the ASR 9922 and ASR 9912 Routers, seven fabrics are located on seven dedicated fabric cards On the ASR 9910 and ASR 9906, the fabric is built in on each of the two route switch processors, and five fabrics are located on five dedicated fabric cards
Memoryless switch	Provides transparent non-blocking, low-latency packet forwarding
Fabric	Single-stage, non-blocking, and packet-based
Fabric speed	600 Gbps per fabric card
Fabric redundancy per system	N + 1 up to seven fabrics

Table 2 lists the technical specifications for the ASR 9900 SFC3, SFC3-S and SFC3-T.

Table 2.   Technical specifications for the ASR 9900 SFC3, SFC3-S and SFC3-T

Feature	Description
FPGA	Field-programmable gate array
Serial Peripheral InterfaceFlash	SPI Flash with 128 Mb
Nonvolatile RAM (NVRAM)	128Kb
Double Data Rate 4 (DDR4)	1.5 GB
Software release	Cisco IOS® XR Software Release 6.5.15 and later (for SFC3) Cisco IOS® XR Software Release 6.5.15 and later (for SFC3-S) Cisco IOS® XR Software Release 6.5.15 and later (for SFC3-T)

Cisco IOS XR Software

The Cisco ASR 9000 Series Aggregation Services Router delivers superior scale, service flexibility, and high availability into access and aggregation networks. It is powered by Cisco IOS XR Software, an innovative self-healing, distributed operating system designed for always-on operation. Cisco IOS XR Software supports a Software-Maintenance-Update (SMU) capability, which allows bug fixing or even small feature releasing without interrupting existing services. It also supports Field-Programmable Device (FPD) upgrades, which can be used to update Field-Programmable Gate Arrays (FPGAs) and more while systems are running.

Cisco ASR 9000 Series Carrier Ethernet applications include business services such as Layer 2 VPN (L2VPN) and Layer 3 VPN (L3VPN), Internet Protocol Television (IPTV), Content-Delivery Networks (CDNs), and mobile backhaul transport networks. Features supported include Ethernet Services; L2VPN; IPv4, IPv6, and L3VPN; Layer 2 and Layer 3 Multicast; IP over Dense Wavelength-Division Multiplexing (IPoDWDM); SyncE; PTP, Ethernet Operations, Administration, and Management (EOAM) and Multiprotocol Label Switching (MPLS) Operations, Administration, and Management (OAM); Layer 2 and Layer 3 Access Control Lists (ACLs); Hierarchical Quality of Service (H-QoS); Segment Routing (SR), Segment Routing v6 (SRv6), RSVP- and SR-Traffic Engineering; TI-LFA and RSVP-based FRR; EVPN; Multi-Chassis Link Aggregation (MC-LAG); Integrated Routing and Bridging (IRB); Cisco Nonstop Forwarding (NSF) and Nonstop Routing (NSR); Point-to-Multipoint Traffic Engineering (P2MP-TE) and mLDP; Lawful Intercept; Smart Call Home (SCH).

The Cisco ASR 9000 Series Multiservice Edge (MSE) and Ethernet MSE (E-MSE) capabilities allow enterprises to offer powerful business VPN services with strong Service-Level Agreement (SLA) enforcement. Such services typically require simultaneous scale increases across multiple dimensions, for example, the number of Virtual Route Forwarding (VRF) interfaces, IPv4 and IPv6 route scaling, Bidirectional Forwarding Detection (BFD) sessions, and instances of Border Gateway Protocol (BGP) Cisco NSR interfaces. A Cisco ASR 9000 Series system configuration requiring high multiple-dimensional scale requires the service-edge optimized route switch processor model to support the increased system scale.

Product specifications

Table 3 provides details about the ASR 9900 SFC3, which supports the ASR 9912 and ASR 9922 chassis (thereby providing common sparing) and the ASR 9900 SFC3-S and SFC3-T, which supports the ASR 9910 and ASR 9906 chassis, respectively. The ASR 9922, ASR 9912, ASR 9910 and ASR 9906 systems are designed to the same high standards of performance and reliability, and they feature the same power and thermal innovations.

Table 3. Product specifications

Category	Part number or specification	
Switch fabric card	A99-SFC3 (supports both ASR 9912 and ASR 9922 chassis) A99-SFC3-S (supports ASR 9910 chassis) A99-SFC3-T (supports ASR 9906 chassis)	
Part numbers of supported line cards	**5th Generation** • **A99-4T-FC** • A99-10X400GE-X-SE • A99-10X400GE-X-TR • **A99-32HG-FC** • A99-32X100GE-X-SE • A99-32X100GE-X-TR • A9K-20HG-FLEX-FC • A9K-20HG-FLEX-SE • A9K-20HG-FLEX-TR • A9K-8HG-FLEX-FC • A9K-8HG-FLEX-SE • A9K-8HG-FLEX-TR • **A99-4HG-FLEX-FC** • A99-4HG-FLEX-SE • A99-4HG-FLEX-TR • **A9K-4HG-FLEX-FC** • A9K-4HG-FLEX-SE • A9K-4HG-FLEX-TR **4th Generation** • **A99-32X100GE-FC** • A99-32X100GE-TR • A99-32X100GE-CM • **A9K-16X100GE-FC** • A9K-16X100GE-TR • A9K-16X100GE-CM • **A99-16X100GE-X-FC** • A99-16X100GE-X-SE	**3rd Generation** • **A99-12X100GE-FC** • A99-12X100GE • A99-12X100GE-CM • **A99-8X100GE-FC** • A99-8X100GE-SE • A99-8X100GE-TR • A99-8X100GE-CM • **A9K-8X100GE-FC** • A9K-8X100GE-SE • A9K-8X100GE-TR • A9K-8X100GE-CM • A9K-8X100G-LB-SE • A9K-8X100G-LB-TR • **A9K-4X100GE-FC** • A9K-4X100GE-SE • A9K-4X100GE-TR • **A9K-400GE-LAN-FC** • A9K-4X100GE • A99-48X10GE-1G-FC • A99-48X10GE-1G-TR • A99-48X10GE-1G-SE • **A9K-48X10GE-1G-FC** • A9K-48X10GE-1G-TR • A9K-48X10GE-1G-SE • A9K-48X10GE-1G-CM • **A9K-24X10GE-1G-FC** • A9K-24X10GE-1G-TR • A9K-24X10GE-1G-SE • A9K-24X10GE-1G-CM • **A9K-MOD400-FC** • A9K-MOD400-SE • A9K-MOD400-TR

Category	Part number or specification	
	• A9K-MOD400-CM • **A9K-MOD200-FC** • A9K-MOD200-SE • A9K-MOD200-TR • A9K-400G-DWDM-TR	
Redundancy	• No single point of failure • N + 1 redundancy	
Physical specifications	Each switch fabric card occupies one slot; a full-capacity redundant configuration can occupy from five to seven slots (in the Cisco ASR 9922 and ASR 9912 chassis) or from zero to five slots (in the Cisco ASR 9910 and ASR 9906 chassis), depending on the line cards used. On the ASR 9922 and ASR 9912, the fabric cards are located at the front of the chassis. On the ASR 9910 and ASR 9906, the fabric cards are located at the rear of the chassis. (Refer to the Cisco ASR 9000 Series Aggregation Services Router Overview and Reference Guide for more details)	
Physical dimensions (includes ejector bracket/lever)	**A99-SFC3:** Height: 1.63 in. (4.26 cm) Width: 16.86 in. (42.85 cm) Depth: 22.96 in. (57.66 cm) Weight: 13.36 lb (6.06 kg)	**A99-SFC3-S:** Height: 2.91 in. (7.39 cm) Width: 19.52 in. (49.58 cm) Depth: 5.84 in. (14.83 cm) Weight: 6.13 lb (2.78 kg) **A99-SFC3-T:** Height: 1.36 in. (3.45 cm) Width: 19.52 in. (49.58 cm) Depth: 5.84 in. (14.83 cm) Weight: 5.34 lb (2.42 kg)
Environmental Specifications		
Operating temperature (nominal)	32 to 104°F (0 to 40°C)	
Operating temperature (short-term)	23 to 131°F (-5 to 55°C) **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 (a total of 360 hours in any given year, but no more than 15 occurrences during that 1-year period).	
Operating humidity (nominal) (relative humidity)	5 to 90%	
Storage temperature	-40 to 158°F (-40 to 70°C)	
Storage (relative humidity)	5 to 93%	
Operating altitude	-60 to 4000m (up to 2000m conforms to IEC/EN/UL/CSA 60950 requirements)	

Category	Part number or specification
Compliance	
Network Equipment Building Standards (NEBS)	Cisco ASR 9900 is designed to meet these standards: • SR-3580: NEBS Criteria Levels (Level 3) • GR-1089-CORE: NEBS Electromagnetic Compatibility (EMC) and Safety • GR-63-CORE: NEBS Physical Protection • VZ.TPR.9205: Verizon TEEER
ETSI standards	Cisco ASR 9900 platforms are designed to meet these standards: • 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 emission	Cisco ASR 9900 platforms are designed to meet these standards: • 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 • EN 50121-4: Railway EMC
EMC standards immunity	Cisco ASR 9900 platforms are designed to meet these standards: • 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 • EN 50121-4: Railway EMC
Safety	Cisco ASR 9900 platforms are designed to meet these standards: • UL/CSA/IEC/EN 60950-1 • IEC/EN 60825 Laser Safety • ACA TS001 • AS/NZS 60950 • FDA: Code of Federal Regulations Laser Safety

Cisco Services for Cisco ASR 9000 Series Switch Fabric Cards

Through a lifecycle services approach, Cisco delivers comprehensive support to service providers to help them successfully deploy, operate, and optimize their Cisco Prime™ Evolved Programmable Networks. Cisco Services for the Cisco ASR 9000 Series Aggregation Services Routers provide the services and proven methodologies that help assure 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 about Cisco Services, contact your local Cisco account representative or visit: https://www.cisco.com/go/spservices.

Ordering information

Table 4 provides ordering information for the Cisco ASR 9900 SFC3, SFC3-S and SFC3-T.

Table 4.   Ordering information

Product description	Supported Software Release	Part number
ASR 9900 Series Switch Fabric Card 3	Cisco IOS XR Software Release 6.5.15 onwards	A99-SFC3
ASR 9900 Series Switch Fabric Card 3, Spare	Cisco IOS XR Software Release 6.5.15 onwards	A99-SFC3=
ASR 9910 Switch Fabric Card 3	Cisco IOS XR Software Release 6.5.15 onwards	A99-SFC3-S
ASR 9910 Switch Fabric Card 3, Spare	Cisco IOS XR Software Release 6.5.15 onwards	A99-SFC3-S=
ASR 9906 Switch Fabric Card 3	Cisco IOS XR Software Release 6.5.15 onwards	A99-SFC3-T
ASR 9906 Switch Fabric Card 3, Spare	Cisco IOS XR Software Release 6.5.15 onwards	A99-SFC3-T=

To place an order, visit the Cisco Ordering Homepage and refer to Table 4.

Product sustainability

Information about Cisco's environmental, social and governance (ESG) initiatives and performance is provided in Cisco's CSR and sustainability reporting.

Table 5.   Product sustainability

Sustainability Topic		Reference
General	Information on product-material-content laws and regulations	Materials
	Information on electronic waste laws and regulations, including our products, batteries and packaging	WEEE Compliance
	Information on product takeback and resue program	Cisco Takeback and Reuse Program
	Sustainability Inquiries	Contact: csr_inquiries@cisco.com
Material	Product packaging weight and materials	Contact: environment@cisco.com

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For more information

https://www.cisco.com/c/en/us/products/routers/asr-9000-series-aggregation-services-routers/index.html.

Document history

Table 6. Document history

New or Revised Topic	Described In	Date
Added new SKUs for 5th Generation linecards and updated relevant features and technical specifications across document.	Product specifications, Features and Benefits of the ASR 9000 Series SFC3, Technical Specifications for Cisco ASR 9000 Series SFC3 Hardware	April 21, 2021

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