

Cisco ASR 9910 and ASR 9906 Route Switch Processor

The Cisco® ASR 9910 and ASR 9906 Route Switch Processor (A99-RSP) is the next-generation system processor for the Cisco ASR 9910 and ASR 9906 Routers (Figure 1). It supports high-density 100 Gigabit Ethernet line cards and provides backward compatibility with the Cisco ASR 9000 Series second family of line cards. The Cisco ASR 9910 and ASR 9906 RSP system architecture 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 Radio Access Network (RAN) aggregation applications.

The ASR 9910 and ASR 9906 RSP brings the time-tested and robust carrier-class capabilities of Cisco IOS® XR Software to the Carrier Ethernet edge. The operating system supports true software process modularity. And it allows each process to run in separate protected memory, including each routing protocol, along with multiple instances of control, data, and management planes supported. The software also supports distributed route processing.

Figure 1. Cisco ASR 9910 and ASR 9906 Route Switch Processor



The ASR 9910 and ASR 9906 RSP is designed to deliver the high scalability, performance, and fast convergence required for today's and tomorrow's demanding video, cloud, and mobile services. These features provide exceptional scale, service flexibility, and high availability. Some examples include:

- Hybrid switch fabric architecture along with Cisco ASR 9910 and ASR 9906 Fabric Cards:
 - Distributed switch fabric architecture
 - Uses the integrated switch fabrics located on the RSPs
 - Also uses the switch fabrics located on dedicated switch fabric cards
 - Control of up to seven switch fabrics (two located on the RSP and five on dedicated switch fabric cards) to provide same scalability and high availability as on the Cisco ASR 9922 Router and ASR 9912 Router chassis
 - Multistage, low-latency, non-blocking architecture
 - Service intelligence and traffic prioritization

- Superior network-timing capabilities with support for:
 - Centralized Building Integrated Timing Supply (BITS)
 - Precision Time Protocol (PTP), or IEEE 1588-2008, through a dedicated 10-Mbps or 100-Mbps Ethernet port
 - Bidirectional Time of Day (ToD) with 10-MHz and 1-pps interfaces

Route Switch Processor Types

The ASR 9910 and ASR 9906 RSP is available in service-edge-optimized and packet-transport-optimized models. The service-edge-optimized version offers the higher amount of memory that is essential for large-scale, comprehensive service deployment. Both versions of the route switch processor support service-optimized, as well as transport-optimized, line cards. Different line cards can be mixed on the same chassis, providing maximum design flexibility.

Features and benefits of the ASR 9910 and ASR 9906 RSP are listed in Table 1.

Table 1. Features and Benefits of the ASR 9910 and ASR 9906 RSP

Feature	Benefit
Highly scalable fabric	<ul style="list-style-type: none"> • Designed to support high 1-, 10-, and 100-Gbps port densities • Provides built-in scalability for investment protection
Fabric capacity	<ul style="list-style-type: none"> • 12 Tbps (non-redundant) switching capacity per ASR 9910 router • 11 Tbps (N+1 redundant) switching capacity per ASR 9910 router • 1610 Gbps (non-redundant) switching capacity per ASR 9910 line card slot • 1380 Gbps (N+1 redundant) switching capacity per ASR 9910 line card slot • 230 Gbps bidirectional switching capacity per RSP to each line card slot • Control of up to seven switch fabrics (two located on the RSP and five on dedicated switch fabric cards) • Offers traffic load balancing simultaneously across up to seven fabrics
Distributed forwarding-plane architecture	Allows line cards to support independent forwarding for enhanced performance and scale
Memoryless switch fabric	Provides transparent nonblocking, low-latency packet forwarding
Virtual output queuing and arbitration	<ul style="list-style-type: none"> • Offers service intelligence with prioritization of traffic (unicast and multicast) • Provides an efficient congestion-management mechanism and avoids problems related to head-of-line blocking
Centralized arbiter	Uses an efficient credit mechanism to help ensure transparent switchover with zero packet loss
IEEE 1588 support	Delivers timing services over the packet network efficiently and reliably
Two independent clock source connections: BITS and Synchronization Supply Unit (SSU) DTI	Offers redundant, centralized network synchronization support
Two 32-GB Solid-State Drives (SSDs)	Allows storing of core dumps and helps reduce the system Mean Time To Repair (MTTR)
Embedded Universal Serial Bus (eUSB) memory port	Provides access to onboard Universal Serial Bus (USB) flash-memory devices for software image storing and upgrades
Front-panel external USB 2.0 port	Provides access to USB flash-memory devices for quick software image loading and recovery
Front-panel LEDs	Provides visual indication of route switch processor status (active or standby), power management, and activity on SSD
Management ports	Provides easy access to system console
Processor	8 cores, 1.9 GHz

Table 2 lists all the hardware available for the ASR 9910 and ASR 9906 RSP.

Table 2. Cisco ASR 9910 and ASR 9906 RSP Hardware

Product Number	Product Description
A99-RSP-TR	ASR 9910 and ASR 9906 Route Switch Processor for Packet Transport 16 Gb
A99-RSP-SE	ASR 9910 and ASR 9906 Route Switch Processor for Service Edge 32 Gb

Table 3 lists the technical specifications for the ASR 9910 and ASR 9906 RSP.

Table 3. Technical Specifications for Cisco ASR 9910 and ASR 9906 RSP Hardware

Technical Specifications
Internal Memory <ul style="list-style-type: none"> Control of up to seven switch fabrics (two located on the RSP and five on dedicated switch fabric cards) ASR 9910 and ASR 9906 RSP for Packet Transport 16 Gb (product number: A99-RSP-TR): 16-GB Error-Correcting Code (ECC)-protected DRAM ASR 9910 and ASR 9906 RSP for Service Edge 32 Gb (product number: A99-RSP-SE): 32-GB ECC-protected DRAM Solid-state drive: Two 32-GB SSDs 8-GB embedded USB USB 2.0 Type A receptacle
Timing System <ul style="list-style-type: none"> Timing: Two independent clock source connections IEEE 1588 support: Copper 10-Mbps and 100-Mbps RJ-45 Ethernet port
GPS <ul style="list-style-type: none"> ToD (RS-422 and RS-232) 1-pps RS-422 or 1.0/2.3 50-ohm RF connector 10-MHz in/out 1.0/2.3 50-ohm RF connector
Management <ul style="list-style-type: none"> Two 100/1000BASE-T (RJ-45) LAN management ports One console port One auxiliary port
Alarms <ul style="list-style-type: none"> Alarm outputs: Critical alarm (CR), Major alarm (MJ), and Minor alarm (MN)
LEDs <ul style="list-style-type: none"> Amber Alarm Cutoff (ACO) and lamp test System Synchronization alarm (SYNC) GPS Fabric-card fault indicator SSD

Software

The Cisco ASR 9900 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), ROM monitor (ROMmon), and more while systems are running.

Cisco ASR 9900 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; 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); MPLS Traffic Engineering Fast Reroute (MPLS TE-FRR); 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); Lawful Intercept; Smart Call Home (SCH); and Multigigabit Service Control (MGSCP).

The Cisco ASR 9900 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 9900 Series system configuration requiring high multiple-dimensional scale requires the service-edge optimized route switch processor model to support the increased system scale.

Timing synchronization is an integral part of traditional circuit-based networks, so the availability of equivalent functions in next-generation Ethernet-based architectures has quickly become a critical requirement. Cisco ASR 9900 Series chassis have standards-compliant Precision Time Protocol Version 2 (PTPv2), GPS, DTI, and BITS connections on the route switch processor, along with SyncE support natively on the line cards, which gives mobile providers ample options for time and frequency synchronization. Additionally, the Cisco ASR 9900 Route Switch Processor supplies centralized clocking functions throughout the system, providing consolidated timing distribution and recovery to and from the line cards.

Product Specifications

Table 4 provides details about the Cisco ASR 9910 and ASR 9906 RSP, which supports the Cisco ASR 9910 and ASR 9906 chassis. Cisco ASR 9910 and ASR 9906 Series systems are designed to the same high standards of performance and reliability. They feature the same power and thermal innovations, and they can share line cards for maximum flexibility in your network planning.

Table 4. Product Specifications

Category	Part Number or Specification	
Route switch processor	A99-RSP-TR A99-RSP-SE	
Line cards supported	ASR 9910 <ul style="list-style-type: none"> • A99-12x100GE • A99-12x100GE-CM • A99-8X100GE-SE • A99-8X100GE-TR • A99-8x100GE-CM • A9K-8X100GE-LB-SE • A9K-8X100GE-LB-TR • A9K-8X100GE-SE • A9K-8X100GE-TR • A9K-8X100GE-CM 	ASR 9906 <ul style="list-style-type: none"> • A99-12x100GE • A99-12x100GE-CM • A99-8X100GE-SE • A99-8X100GE-TR • A99-8x100GE-CM • A9K-8X100GE-LB-SE • A9K-8X100GE-LB-TR • A9K-8X100GE-SE • A9K-8X100GE-TR • A9K-8X100GE-CM

Category	Part Number or Specification
	<ul style="list-style-type: none"> • A9K-4X100GE-SE • A9K-4X100GE-TR • A9K-400G-DWDM-TR • A9K-MOD400-SE • A9K-MOD400-TR • A9K-MOD200-SE • A9K-MOD200-TR • A9K-48X10GE-1G-TR • A9K-48X10GE-1G-SE • A9K-24X10GE-1G-TR • A9K-24X10GE-1G-SE • A9K-2X100GE-SE • A9K-2X100GE-TR • A9K-1X100GE-SE • A9K-1X100GE-TR • A9K-36X10GE-SE • A9K-36X10GE-TR • A9K-24X10GE-SE • A9K-24X10GE-TR • A9K-4T16GE-SE • A9K-4T16GE-TR • A9K-40GE-SE • A9K-40GE-TR • A9K-MOD160-SE • A9K-MOD160-TR • A9K-MOD80-SE • A9K-MOD80-TR • A9K-VSM-500
	<ul style="list-style-type: none"> • A9K-4X100GE-SE • A9K-4X100GE-TR • A9K-400G-DWDM-TR • A9K-MOD400-SE • A9K-MOD400-TR • A9K-MOD200-SE • A9K-MOD200-TR • A9K-48X10GE-1G-TR • A9K-48X10GE-1G-SE • A9K-24X10GE-1G-TR • A9K-24X10GE-1G-SE • A9K-VSM-500
Redundancy	<ul style="list-style-type: none"> • No single point of failure • 1 + 1 route switch processor redundancy (both route switch processors must be of the same kind) • Software redundancy
Physical specifications	Each route switch processor occupies 1 slot; a redundant route switch processor configuration occupies 2 slots. <ul style="list-style-type: none"> • Height: 1.74 in. (4.42 cm) • Width: 15.88 in. (40.34 cm) • Depth: 24.63 in. (62.56 cm) • Weight: 17.8 lb (8.09 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)
Compliance	
Network Equipment Building Standards (NEBS)	The ASR 9900 Series is designed to meet these standards: <ul style="list-style-type: none"> • 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

Category	Part Number or Specification
ETSI standards	<p>The ASR 9900 Series is designed to meet these standards (qualification in progress):</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) • EN55024: Information Technology Equipment (Immunity) • EN50082-1/EN-61000-6-1: Generic Immunity Standard
EMC standards emission	<p>The ASR 9900 Series is designed to meet these standards:</p> <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 • EN 50121-4: Railway EMC
EMC standards immunity	<p>The ASR 9900 Series is designed to meet these standards:</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 • EN 50121-4: Railway EMC
Safety	<p>The ASR 9900 Series is designed to meet these standards:</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

Cisco Services for Cisco ASR 9910 and ASR 9906 Series Route Switch Processors

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 Cisco ASR 9900 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 9900 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 5 provides ordering information for the Cisco ASR 9910 and 9906 RSP.

Table 5. Ordering Information

Product Description	Supported Software Release	Part Number
ASR 9910 and ASR 9906 Route Switch Processor optimized for packet transport	Cisco IOS XR Software Release 6.0.1 and later when used with the ASR 9910 Cisco IOS XR Software Release 6.3.1 and later when used with the ASR 9906	A99-RSP-TR
ASR 9910 and ASR 9906 Route Switch Processor optimized for packet transport, spare	Cisco IOS XR Software Release 6.0.1 and later when used with the ASR 9910 Cisco IOS XR Software Release 6.3.1 and later when used with the ASR 9906	A99-RSP-TR=
ASR 9910 and ASR 9906 Route Switch Processor optimized for service edge	Cisco IOS XR Software Release 6.0.1 and later when used with the ASR 9910 Cisco IOS XR Software Release 6.3.1 and later when used with the ASR 9906	A99-RSP-SE
ASR 9910 and ASR 9906 Route Switch Processor optimized for service edge, spare	Cisco IOS XR Software Release 6.0.1 and later when used with the ASR 9910 Cisco IOS XR Software Release 6.3.1 and later when used with the ASR 9906	A99-RSP-SE=

To place an order, visit the [Cisco Ordering Homepage](#) and refer to Table 5.

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



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