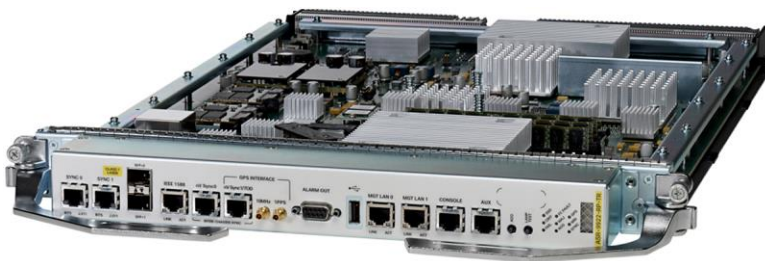


## Cisco ASR 9900 Route Processor

The Cisco® ASR 9900 Route Processor - Figure 1 - is the first generation of system processors available for the Cisco ASR 9912 Router and ASR 9922 Router chassis. The Cisco ASR 9900 Route Processor is designed with a system architecture to accommodate convergence of Layer 2 and Layer 3 services as required by today's service providers in wireline, data center interconnect (DCI), and Radio Access Network (RAN) aggregation applications.

The Cisco ASR 9900 Route Processor 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. The capabilities of Cisco IOS XR Software allow 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 9900 Route Processor



The Cisco ASR 9900 Route Processor 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 unprecedented scale, service flexibility, and high availability:

- Switch fabric architecture along with Cisco ASR 9900 Fabric Cards:
  - Distributed switch fabric architecture
  - Control of up to seven Cisco ASR 9900 Switch Fabric Cards to provide scalability and high availability on 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) and DOCSIS® Timing Interface (DTI) timing reference systems
  - Precision Time Protocol (PTP), or IEEE 1588-2008, through dedicated 10/100-Mbps Ethernet port
  - Bidirectional time of day (ToD) with 10MHz and 1-pps interfaces

## Route Processor Types

The Cisco ASR 9900 Route Processor is available in service-edge-optimized and packet-transport-optimized models. The service-edge-optimized version offers a higher amount of memory essential for large-scale comprehensive service deployment. Both versions of the route 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 Cisco ASR 9900 Route Processor are listed in Table 1.

**Table 1.** Features and Benefits of Cisco ASR 9900 Route Processor

Feature	Benefit
Highly scalable fabric	<ul style="list-style-type: none"> <li>Designed to support high 1/10/100-Gbps port densities</li> <li>Provides built-in scalability for investment protection</li> </ul>
Control of up to seven 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
Control plane extension ports	Combining the redundant pair of chassis into a single logical entity provides advantages in management, scalability, and high availability.
Memoryless switch fabric	Provides transparent nonblocking low-latency packet forwarding
Virtual output queuing and arbitration	<ul style="list-style-type: none"> <li>Offers service intelligence with prioritization of traffic (unicast and multicast)</li> <li>Provides efficient congestion management mechanism and avoids problems related to head-of-line blocking</li> </ul>
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 16-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 on board USB flash memory devices for software image storing and upgrades
Front-pane external Universal Serial Bus (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 processor status (active or standby), power management, and activity on compact flash and hard disk drive (HDD)
Management ports	Provides easy access to system console

Table 2 lists all the hardware that ships with the Cisco ASR 9900 Route Processor.

**Table 2.** Cisco ASR 9900 Route Processor Hardware

Product Number	Product Description
ASR-9900-RP-TR and ASR-9900-RP-SE	Route processor, bidirectional nonblocking fabric, controller, two 16-GB SSDs; includes the following: <ul style="list-style-type: none"> <li>Control of up to seven Cisco ASR 9900 switch fabric cards</li> <li>Memory internal               <ul style="list-style-type: none"> <li>6-GB Error-Correcting Code (ECC)-protected DRAM for ASR-9900-RP-TR</li> <li>12-GB ECC-protected DRAM for ASR-9900-RP-SE</li> </ul> </li> <li>Solid state disk: two 16-GB SSDs</li> <li>8-GB embedded USB</li> <li>Memory external               <ul style="list-style-type: none"> <li>USB 2.0 Type A receptacle</li> </ul> </li> <li>Timing system               <ul style="list-style-type: none"> <li>Timing: Two independent clock source connections</li> </ul> </li> </ul>

Product Number	Product Description
	<ul style="list-style-type: none"> <li>◦ IEEE 1588 support: Copper 10/100-Mbps RJ-45 Ethernet port</li> <li>◦ GPS               <ul style="list-style-type: none"> <li>◦ ToD (RS422 and RS232)</li> <li>◦ 1-pps RS422 or 1.0/2.3 50-ohm RF connector</li> <li>◦ 10MHz in/out 1.0/2.3 50-ohm RF connector</li> </ul> </li> <li>• Management               <ul style="list-style-type: none"> <li>◦ Two 100/1000 BASE-T (RJ-45) LAN management ports</li> <li>◦ One console port</li> <li>◦ One auxiliary port</li> <li>◦ Two 10-GE Small Form-Factor Pluggable Plus (SFP+) virtualization cluster ports</li> </ul> </li> <li>• Alarms               <ul style="list-style-type: none"> <li>◦ Alarm outputs: Critical alarm (CR), major alarm (MJ), and minor alarm (MN)</li> </ul> </li> <li>• LEDs               <ul style="list-style-type: none"> <li>◦ Amber alarm cut-off (ACO) and lamp test</li> <li>◦ System synchronization alarm (SYNC)</li> <li>◦ Compact Flash activity (CF)</li> <li>◦ Solid State Drive (SSD)</li> <li>◦ Fan tray visual indicator (UFAN/LFAN)</li> </ul> </li> </ul>

## Software

The Cisco ASR 9000 Series Aggregation Services Routers 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 software maintenance update (SMU) capability which allows bug fixing or even small feature releasing without interrupting existing services. Software also supports Field Programmable Device (FPD) upgrades which can be used to update field programmable gate arrays (FPGAs), (ROM monitor) ROMmon, etc., 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; EOAM and Multiprotocol Label Switching (MPLS) OAM; Layer 2 and Layer 3 access control lists (ACLs); H-QoS; MPLS Traffic Engineering Fast Reroute (MPLS TE-FRR); Multichassis 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 Multi Gigabit Service Control (MGSCP).

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, BFD sessions, and instances of Border Gateway Protocol (BGP) Cisco NSR interfaces. A Cisco ASR 9900 system configuration requiring high multiple dimensional scale requires the service-edge optimized A9K-RP-SE model to support the increased system scale.

Timing synchronization is an integral part of traditional circuit-based networks, so the availability of equivalent functionality in next-generation Ethernet-based architectures has quickly become a critical requirement. The Cisco ASR 9900 chassis have standard compliant PTPv2, GPS, DTI, and BITS connections on the route processor, and SyncE support natively on the line cards, giving mobile providers ample options for time and frequency synchronization. Additionally, the Cisco ASR 9900 Route Processor supplies centralized clocking functions throughout the system, providing consolidated timing distribution and recovery to and from the line cards.

## Product Specifications

Table 3 provides details about the Cisco ASR 9900 Route Processor which supports the Cisco ASR 9912 and Cisco ASR 9922 chassis, therefore providing common sparing. The Cisco ASR 9922 Route Processor is used only on the ASR 9922 chassis, and can be used if no common sparing with Cisco ASR 9912 is desired. Both Cisco ASR 9922 and ASR 9912 systems are designed to the same high standards of performance and reliability, feature the same power and thermal innovations, and can share route processors, line cards, power entry modules (PEMs), and power supplies, for maximum flexibility in your network planning.

**Table 3.** Product Specifications

Category	Part Number or Specification
<b>Route processor</b>	ASR-9900-RP-TR ASR-9900-RP-SE  For simplicity and common sparing, this route processor is introduced on Cisco IOS XR Release 4.3.2, and supports both Cisco ASR 9912 and ASR 9922 chassis.
<b>Route processor</b>	ASR-9922-RP-TR ASR-9922-RP-SE  This route processor is introduced on Cisco IOS XR Release 4.2.2 and supports Cisco ASR 9922 chassis only.
<b>Line Cards Supported</b>	<ul style="list-style-type: none"> <li>• A9K-2X100GE-TR</li> <li>• A9K-2X100GE-SE</li> <li>• A9K-1X100GE-TR</li> <li>• A9K-1X100GE-SE</li> <li>• A9K-36X10GE-TR</li> <li>• A9K-36X10GE-SE</li> </ul>
	<ul style="list-style-type: none"> <li>• A9K-24X10GE-TR</li> <li>• A9K-24X10GE-SE</li> <li>• A9K-MOD160-SE</li> <li>• A9K-MOD160-TR</li> <li>• A9K-MOD80-SE</li> <li>• A9K-MOD80-TR</li> <li>• A9K-VSM-500</li> </ul>
<b>Redundancy</b>	<ul style="list-style-type: none"> <li>• No single point of failure</li> <li>• Route processor redundancy (both route processors must be of the same kind)</li> <li>• Software redundancy</li> </ul>
<b>Physical Specifications</b>	Each Route Processor occupies one slot; a redundant route processor configuration Occupies two slots in Cisco ASR 9922 and ASR 9912 chassis <ul style="list-style-type: none"> <li>• Height: 1.81" (4.60 cm)</li> <li>• Width: 16.87" (42.85 cm)</li> <li>• Depth: 24.74" (62.89 cm)</li> <li>• Weight: 13 lb (5.90 kg)</li> </ul>
<b>Environmental conditions</b>	<ul style="list-style-type: none"> <li>• Operating temperature: 32 to 104°F (0 to 40°C)</li> <li>• Storage temperature: -40 to 167°F (-40 to 75°C)</li> <li>• Relative humidity: 10 to 90%, noncondensing</li> </ul>
<b>Environmental Specifications</b>	
<b>Operating temperature (nominal)</b>	
<b>Operating temperature (short-term)</b>	23 to 131°F (-5 to 55°C) <b>Note:</b> 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).

Category	Part Number or Specification
<b>Operating humidity (nominal) (relative humidity)</b>	10 to 85 percent
<b>Operating humidity (short-term)</b>	5 to 90 percent <b>Note:</b> Not to exceed 0.024 kg water or dry air
<b>Storage temperature</b>	-40 to 158°F (-40 to 70°C)
<b>Storage (relative humidity)</b>	5 to 95 percent <b>Note:</b> Not to exceed 0.024 kg water or dry air.
<b>Operating altitude</b>	-60 to 4000m (up to 2000m conforms to IEC/EN/UL/CSA 60950 requirements)
<b>Compliance</b>	
<b>Network Equipment Building Standards (NEBS)</b>	Cisco ASR 9900 is designed to meet these standards: <ul style="list-style-type: none"> <li>• SR-3580: NEBS Criteria Levels (Level 3)</li> <li>• GR-1089-CORE: NEBS Electromagnetic Compatibility (EMC) and Safety</li> <li>• GR-63-CORE: NEBS Physical Protection</li> <li>• VZ.TPR.9205: Verizon TEEER</li> </ul>
<b>ETSI standards</b>	Cisco ASR 9900 is designed to meet these standards (qualification in progress): <ul style="list-style-type: none"> <li>• EN300 386: Telecommunications Network Equipment (EMC)</li> <li>• ETSI 300 019 Storage Class 1.1</li> <li>• ETSI 300 019 Transportation Class 2.3</li> <li>• ETSI 300 019 Stationary Use Class 3.1</li> <li>• EN55022: Information Technology Equipment (Emissions)</li> <li>• EN55024: Information Technology Equipment (Immunity)</li> <li>• EN50082-1/EN-61000-6-1: Generic Immunity Standard</li> </ul>
<b>EMC standards</b>	Cisco ASR 9900 is designed to meet these standards: <ul style="list-style-type: none"> <li>• FCC Class A</li> <li>• ICES 003 Class A</li> <li>• AS/NZS 3548 Class A</li> <li>• CISPR 22 (EN55022) Class A</li> <li>• VCCI Class A</li> <li>• BSMI Class A</li> <li>• IEC/EN 61000-3-2: Power Line Harmonics</li> <li>• IEC/EN 61000-3-3: Voltage Fluctuations and Flicker</li> <li>• EN 50121-4: Railway EMC</li> </ul>
<b>Immunity</b>	Cisco ASR 9900 is designed to meet these standards: <ul style="list-style-type: none"> <li>• IEC/EN-61000-4-2: Electrostatic Discharge Immunity (8kV Contact, 15kV Air)</li> <li>• IEC/EN-61000-4-3: Radiated Immunity (10V/m)</li> <li>• IEC/EN-61000-4-4: Electrical Fast Transient Immunity (2kV Power, 1kV Signal)</li> <li>• IEC/EN-61000-4-5: Surge AC Port (4kV CM, 2kV DM)</li> <li>• IEC/EN-61000-4-5: Signal Ports (1kV)</li> <li>• IEC/EN-61000-4-5: Surge DC Port (1kV)</li> <li>• IEC/EN-61000-4-6: Immunity to Conducted Disturbances (10Vrms)</li> <li>• IEC/EN-61000-4-8: Power Frequency Magnetic Field Immunity (30A/m)</li> <li>• IEC/EN-61000-4-11: Voltage DIPS, Short Interruptions, and Voltage Variations</li> <li>• EN 50121-4: Railway EMC</li> </ul>
<b>Safety</b>	Cisco ASR 9900 is designed to meet these standards: <ul style="list-style-type: none"> <li>• UL/CSA/IEC/EN 60950-1</li> <li>• IEC/EN 60825 Laser Safety</li> <li>• ACA TS001</li> <li>• AS/NZS 60950</li> <li>• FDA: Code of Federal Regulations Laser Safety</li> </ul>

## Cisco Services for Cisco ASR 9000 Route Processors

Through a lifecycle services approach, Cisco delivers comprehensive support to service providers to help them successfully deploy, operate, and optimize their 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 <http://www.cisco.com/go/spservices>.

## Ordering Information

Table 4 provides ordering information for the Cisco ASR 9900 Route Processor.

**Table 4.** Ordering Information

Product Description	Supported Software Release	Part Number
Route Processor optimized for packet transport	Cisco IOS XR Software Release 4.3.2 onwards	ASR-9900-RP-TR
Route Processor optimized for packet transport, spare	Cisco IOS XR Software Release 4.3.2 onwards	ASR-9900-RP-TR=
Route Processor optimized for service edge	Cisco IOS XR Software Release 4.3.2 onwards	ASR-9900-RP-SE
Route Processor optimized for service edge, spare	Cisco IOS-XR Software Release 4.3.2 onwards	ASR-9900-RP-SE=
Route Processor optimized for packet transport, ASR 9922 only	Cisco IOS-XR Software Release 4.2.2 onwards	ASR-9922-RP-TR
Route Processor optimized for packet transport, spare, ASR 9922 Only	Cisco IOS-XR Software Release 4.2.2 onwards	ASR-9922-RP-TR=
Route Processor optimized for service edge, ASR 9922 only	Cisco IOS-XR Software Release 4.2.2 onwards	ASR-9922-RP-SE
Route Processor optimized for service edge, spare, ASR 9922 only	Cisco IOS-XR Software Release 4.2.2 onwards	ASR-9922-RP-SE=

To place an order, visit [Cisco Ordering Home Page](#) or refer to Table 4.



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