Cisco ASR 9000 RSP 880

The Cisco® ASR 9000 Route Switch Processor 880 is the system processor for the Cisco ASR 9010, ASR 9006, and ASR 9904 Router chassis, supporting the high-density 100 Gigabit Ethernet line cards, and it provides backward compatibility with the Cisco ASR 9000 second family of line cards (Figure 1). The Cisco ASR 9000 Route Switch Processor 880 is designed with a system architecture to accommodate new programmable deployment models and 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 9000 Route Switch Processor 880 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 9000 Route Switch Processor 880

The Cisco ASR 9000 Route Switch Processor 880 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:

- Integrated switch fabric architecture:
  - Distributed switch fabric architecture
  - Multistage low-latency nonblocking 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 dedicated 10-/100-Mbps Ethernet port
  - Bidirectional time of day (ToD) with 10-MHz and 1-packet per second (pps) interfaces

Route-Switch-Processor Types

The Cisco ASR 9000 Route Switch Processor 880 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 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 Cisco ASR 9000 Route Switch Processor 880 are listed in Table 1.

Table 1. Features and Benefits of Cisco ASR 9000 Route Switch Processor 880

Feature	Benefit
Highly scalable fabric	• Designed to support high 1-/10-/100-Gbps port densities • Provides built-in scalability for investment protection
Fabric capacity	880 GB Nonredundant 440 GB Redundant
Distributed forwarding-plane architecture	Allows line cards to support independent forwarding for enhanced performance and scale
Control-plane extension ports	Provides advantages in management, scalability, and high availability by combining the redundant pair of chassis into a single logical entity
Memoryless switch fabric	Provides transparent nonblocking low-latency packet forwarding
Virtual output queuing and arbitration	• Offers service intelligence with prioritization of traffic (unicast and multicast) • Provides 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 Series Bus (eUSB) memory port	Provides access to onboard Universal Serial Bus (USB) flash-memory devices for software image storing and upgrades
Front-pane 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	Has 8 cores, 1.9 GHz

Table 2 lists all the hardware available for the Cisco ASR 9000 Route Switch Processor 880.

Table 2. Cisco ASR 9000 Route Switch Processor 880 Hardware

Product Number	Product Description
A9K-RSP880-TR	ASR 9000 Route Switch Processor 880 for Packet Transport 16G
A9K-RSP880-SE	ASR 9000 Route Switch Processor 880 for Service Edge 32G

Table 3 lists the technical specifications for the Cisco ASR 9000 Route Switch Processor 880.

Table 3. Technical Specifications for Cisco ASR 9000 Route Switch Processor 880 Hardware

Technical Specifications
Internal Memory
• Control of up to seven Cisco ASR 9000 switch fabric cards • A9K-RSP880-TR: 16-GB Error-Correcting Code (ECC)-protected DRAM • A9K-RSP880-SE: 32-GB ECC-protected DRAM • Solid-state disk: Two 32-GB SSDs • 8-GB embedded USB • USB 2.0 Type A receptacle

Technical Specifications
Timing System
• Timing: Two independent clock source connections • IEEE 1588 support: Copper 10-/100-Mbps RJ-45 Ethernet port
GPS
• 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
• Two 100/1000BASE-T (RJ-45) LAN management ports • One console port • One auxiliary port • Four 10 Gigabit Ethernet Small Form-Factor Pluggable Plus (SFP+) virtualization cluster ports
Alarms
• Alarm outputs: Critical alarm (CR), major alarm (MJ), and minor alarm (MN)
LEDs
• Amber alarm cut-off (ACO) and lamp test • System synchronization alarm (SYNC) • GPS • Fabric-card fault indicator • SSD

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 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, 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; 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); 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 Multigigabit 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, Bidirectional Forwarding Detection (BFD) sessions, and instances of Border Gateway Protocol (BGP) Cisco NSR interfaces.

A Cisco ASR 9000 system configuration requiring high multiple-dimensional scale requires the service-edge (SE) 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. The Cisco ASR 9000 chassis have standards-compliant Precision Time Protocol Version 2 (PTPv2), GPS, DTI, and BITS connections on the route switch processor, and SyncE support natively on the line cards, giving mobile providers ample options for time and frequency synchronization. Additionally, the Cisco ASR 9000 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 9000 Route Switch Processor 880, which supports the Cisco ASR 9010, ASR 9006, and ASR 9904 chassis, therefore providing common sparing. Cisco ASR 9000 systems are designed to the same high standards of performance and reliability; they feature the same power and thermal innovations; and they can share route processors, line cards, power entry modules (PEMs), and power supplies, for maximum flexibility in your network planning.

Table 4. Product Specifications

Category	Part Number or Specification	
Route switch processor	A9K-RSP880-TR A9K-RSP880-SE	
Line cards supported	• A9K-8X100GE-LB-SE • A9K-8X100GE-LB-TR • A9K-2X100GE-TR • A9K-2X100GE-SE • A9K-1X100GE-TR • A9K-1X100GE-SE • A9K-36X10GE-TR • A9K-36X10GE-SE	• A9K-24X10GE-TR • A9K-24X10GE-SE • A9K-MOD160-SE • A9K-MOD160-TR • A9K-MOD80-SE • A9K-MOD80-TR • A9K-VSM-500
Redundancy	• 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. Height: 1.81 in. (4.60 cm) Width: 16.87 in. (42.85 cm) Depth: 24.74 in. (62.89 cm) Weight: 17.8 lb (8.07 kg)	
Environmental conditions	• Operating temperature: 32 to 104°F (0 to 40°C) • Storage temperature: -40 to 167°F (-40 to 75°C) • Relative humidity: 10 to 90%, noncondensing	
Environmental Specifications		
Operating temperature (short-term)	23 to 131ºF (-5 to 55ºC) **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)	10 to 85 percent	
Operating humidity (short-term)	5 to 90 percent **Note:** Not to exceed 0.024 kg water or dry air	
Storage temperature	-40 to 158ºF (-40 to 70ºC)	

Category	Part Number or Specification
Storage (relative humidity)	5 to 95 percent **Note:** Not to exceed 0.024 kg water or dry air.
Operating altitude	-60 to 4000m (up to 2000m conforms to IEC/EN/UL/CSA 60950 requirements)
Compliance	
Network Equipment Building Standards (NEBS)	Cisco ASR 9000 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 9000 is designed to meet these standards (qualification in progress): • 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	Cisco ASR 9000 is 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
Immunity	Cisco ASR 9000 is 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 9000 is 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 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 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 postimplementation 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 5 provides ordering information for the Cisco ASR 9000 Route Switch Processor.

Table 5. Ordering Information

Product Description	Supported Software Release	Part Number
ASR 9000 Route Switch Processor 880 for packet transport	Cisco IOS XR Software Release 5.3.0 onwards	A9K-RSP880-TR
ASR 9000 Route Switch Processor 880 for packet transport, spare	Cisco IOS XR Software Release 5.3.0 onwards	A9K-RSP880-TR =
ASR 9000 Route Switch Processor 880 for service edge	Cisco IOS XR Software Release 5.3.0 onwards	A9K-RSP880-SE
ASR 9000 Route Switch Processor 880 for service edge, spare	Cisco IOS-XR Software Release 5.3.0 onwards	A9K-RSP880-SE =

To place an order, visit Cisco Ordering Home Page or refer to Table 5.

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

Printed in USA C78-733763-00 02/15