Cisco ASR 9000 Route Switch Processor 880

The Cisco[®] ASR 9000 Route Switch Processor 880 (RSP 880) is the system processor for the Cisco ASR 9010 Router, ASR 9006 Router, and ASR 9904 Router. RSP880-LT is the system processor for ASR 9010, ASR 9006, ASR 9904, ASR 9910 Router and ASR9906 Router. It supports high-density 100 Gigabit Ethernet line cards and provides backward compatibility with the Cisco ASR 9000 Series second family of line cards (Figure 1 & Figure 2). The Cisco ASR 9000 RSP 880 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 9000 RSP 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. 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 9000 Route Switch Processor 880

Figure 2. Cisco ASR 9000 Route Switch Processor 880-LT

The ASR 9000 RSP 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-Mbps or 100-Mbps Ethernet port
  - Bidirectional time of day (ToD) with 10-MHz and 1-pps interfaces

Route-Switch-Processor Types

The ASR 9000 RSP 880 is available in two variants

1. RSP880 - service-edge-optimized and packet-transport-optimized models.
2. RSP880-LT – 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 variants 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 9000 RSP 880 are listed in Table 1.

Table 1.   Features and Benefits of the ASR 9000 RSP 880

Feature	Benefit
Highly scalable fabric	• Designed to support high 1-, 10-, and 100-Gbps port densities • Provides built-in scalability for investment protection
Fabric capacity	• 880 GB non redundant (AS9904, ASR9010 and ASR9006) • 440 GB redundant (ASR9904, ASR9010 and ASR9006) • 230Gbps per RSP on ASR9910 and ASR9906
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	• 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
Solid-state drives (SSDs)	RSP880 provides two 32GB SSD's while RSP880-LT offers two 128GB SSD which 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-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	RSP880 has 8 cores, 1.9 GHz while RSP880-LT has 4 cores, 2.4Ghz

Table 2 lists all the hardware available for the ASR 9000 RSP 880.

Table 2. Cisco ASR 9000 RSP 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
A9K-RSP880-LT-TR	ASR 9000 Route Switch Processor 880-LT for Packet Transport 16G
A9K-RSP880-LT-SE	ASR 9000 Route Switch Processor 880-LT for Service Edge 32G

Table 3 lists the technical specifications for the ASR 9000 RSP 880 and RSP 880-LT.

Table 3. Technical Specifications for Cisco ASR 9000 RSP 880 and RSP880-LT Hardware

Technical Specifications
Internal Memory
• Control of up to seven Cisco ASR 9000 Series switch fabric cards with RSP880-LT
• ASR 9000 RSP 880 for Packet Transport 16G (product number: A9K-RSP880-TR, A9K-RSP880-LT-TR): 16-GB Error-Correcting Code (ECC)-protected DRAM
• ASR 9000 RSP 880 for Service Edge 32G (product number: A9K-RSP880-SE, A9K-RSP880-LT-SE): 32-GB ECC-protected DRAM
• Solid-state disk: RSP 880 - Two 32-GB SSDs, RSP880-LT – Two 128GB SSD
• 8-GB embedded USB
• USB 2.0 Type A receptacle
Timing System
• Timing: Two independent clock source connections
• IEEE 1588 support: Copper 10-Mbps and 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
Alarms
• Alarm outputs: Critical alarm (CR), major alarm (MJ), and minor alarm (MN)
LEDs
• Amber alarm cutoff (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 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 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 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 9000 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 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 RSP 880 and RSP880-LT, which supports the Cisco ASR 9010, ASR 9006, ASR 9904 chassis, ASR 9910 (RSP880-LT Only) and ASR 9906 (RSP880-LT only), therefore providing common sparing. Cisco ASR 9000 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 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
Chassis	• ASR 9904 Chassis • ASR 9006 Chassis • ASR 9010 Chassis • ASR 9910 Chassis (RSP880-LT and A99-RSP) • ASR 9906 Chassis (RSP880-LT and A99-RSP)
Route switch processor	A9K-RSP880-TR A9K-RSP880-SE A9K-RSP880-LT-TR A9K-RSP880-LT-SE

Category	Part Number or Specification	
Line cards supported	• A9K-8X100GE-LB-SE • A9K-8X100GE-LB-TR • A9K-8X100GE-SE • A9K-8X100GE-TR • A9K-4X100GE-SE • A9K-4X100GE-TR • 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-48X10GE-1G-SE • A9K-48X10GE-1G-TR • A9K-24X10GE-1G-SE • A9K-24X10GE-1G-TR	• A9K-MOD400-SE • A9K-MOD400-TR • A9K-MOD200-SE • A9K-MOD200-TR • A9K-MOD160-SE • A9K-MOD160-TR • A9K-MOD80-SE • A9K-MOD80-TR • A9K-VSM-500 • A9K-SIP-700 • A9K-4T16GE-SE • A9K-4T16GE-TR • A9K-40GE-SE • A9K-40GE-TR • A99-12X100GE (supported with RSP880-LT and A99-RSP) • A99-8X100GE-SE (supported with RSP880-LT and A99-RSP) • A99-8X100GE-TR (supported with RSP880-LT and A99-RSP) • A9K-400G-DWDM-TR
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 70°C) • Relative humidity: 10 to 85%, 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%	
Operating humidity (short-term)	5 to 90% **Note:** Not to exceed 0.024 kg water or dry air.	
Storage temperature	-40 to 158ºF (-40 to 70ºC)	
Storage (relative humidity)	5 to 95% **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 Series 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 Series 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	

Category	Part Number or Specification
EMC standards	Cisco ASR 9000 Series 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 Series 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 Series 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 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 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: https://www.cisco.com/go/spservices.

Ordering Information

Table 5 provides ordering information for the Cisco ASR 9000 RSP 880 and RSP 880-LT.

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 and later	A9K-RSP880-TR
ASR 9000 Route Switch Processor 880 for packet transport, spare	Cisco IOS XR Software Release 5.3.0 and later	A9K-RSP880-TR =

Product Description	Supported Software Release	Part Number
ASR 9000 Route Switch Processor 880 for service edge	Cisco IOS XR Software Release 5.3.0 and later	A9K-RSP880-SE
ASR 9000 Route Switch Processor 880 for service edge, spare	Cisco IOS-XR Software Release 5.3.0 and later	A9K-RSP880-SE =
ASR 9000 Route Switch Processor 880-LT for packet transport	Cisco IOS-XR Software Release 6.2.2 and later	A9K-RSP880-LT-TR
ASR 9000 Route Switch Processor 880-LT for packet transport, spare	Cisco IOS-XR Software Release 6.2.2 and later	A9K-RSP880-LT-TR=
ASR 9000 Route Switch Processor 880-LT for service edge	Cisco IOS-XR Software Release 6.2.2 and later	A9K-RSP880-LT-SE
ASR9000 Route Switch Processor 880-LT for service edge, spare	Cisco IOS-XR Software Release 6.2.2 and later	A9K-RSP880-LT-SE=

ASR9906 is planned from IOS XR 6.4.1 onwards

To place an order, visit the Cisco Ordering Homepage and refer to Table 5.

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For More Information

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Printed in USA

C78-733763-06   08/17