Cisco CRS-1 16-Slot Single-Shelf System

The Cisco® CRS-1 Carrier Routing System is the industry's first carrier router offering continuous system operation, unprecedented service flexibility, and system longevity. The Cisco CRS-1 is powered by Cisco IOS® XR Software – a unique self-healing, distributed operating system designed for always-on operation while scaling system capacity up to 92 Tbps. The innovative system architecture combines the Cisco Silicon Packet Processor, the first programmable 40-Gbps application-specific integrated circuit (ASIC), with the Cisco Service Separation Architecture for unprecedented service flexibility and speed to service. The Cisco CRS-1 marks a new era in carrier IP Communications by powering the foundation for network and service convergence today while protecting investments for decades to come.

This data sheet provides detailed product specifications for the Cisco CRS-1 16-Slot Single-Shelf System. For more information about the Cisco CRS-1 or about other interfaces available for the Cisco CRS-1, visit: http://www.cisco.com/go/crs.

Figure 1.

Product Specifications

Table 1. Product Specifications

Feature	Description
Compatibility	Compatible with all current Cisco CRS-1 Modular Services Cards (MSC), Interface Modules (PLIM), route processors, and fabric cards
Software Compatibility	Cisco IOS® XR Software Release 2.0, 3.0, 3.2 or higher
Protocols	Cisco Discovery Protocol IPv4 and IPv6 addressing Internet Control Message Protocol (ICMP) Layer 3 routing protocols, including Border Gateway Protocol Version 4 (BGPv4), Open Shortest Path First Version 2 (OSPFv2), OSPFv3, Intermediate System-to-Intermediate System Protocol (IS-IS) Multicast forwarding with support for source-based and shared distribution trees and the following protocols: • Protocol Independent Multicast sparse mode (PIM-SM) • Bi-directional PIM (Bidir-PIM) • PIM Source Specific Multicast (PIM SSM) • Automatic route processing (AutoRP) • Internet Group Management Protocol (IGMP) versions 1,2 and 3 • Multiprotocol BGP (MBGP)

Feature	Description	
	• Multicast Source Discovery Protocol (MSDP) Multiprotocol Label Switching (MPLS) • MPLS Label Distribution Protocol (LDP) • Resource Reservation Protocol (RSVP) • Diffserv Aware TE MPLS Traffic Engineering control plane (RFCs 2702 and 2430) Route Policy Language (RPL) Management • Simple Network Management Protocol (SNMP) • Programmatic interfaces (XML) Security: • Message Digest Algorithm (MD5) • IP Security (IPSec) Protocol • Secure Shell (SSHv2) • Secure FTP (SFTP) • Secure Sockets Layer (SSL) • Packet over SONET/SDH (POS) • RFC 1619/2615, Point-to-Point Protocol (PPP) over SONET/SDH • RFC 1662, PPP in High-Level Data Link Control (HDLC)-like framing • RFC 2615, PPP over SONET/SDH • HDLC	
Components	Each CRS-1 16-Slot Line-Card Chassis includes: • Two route processors (CRS-16-RP) • Two CRS-1 16 fan controllers • Eight CRS-1 16 fabric cards • Two Power Shelves (either DC, AC type Wye, AC type Delta) • Two alarm cards • Two fan trays • One fan filter Optional items: • 16 CRS-1 line cards • 16 CRS-1 PLIMs	
Cards/Ports/Slots	• 1-port OC-768c/STM-256c packet over Synchronous Optical Network (POS) • 4-port OC-192c/STM-64c POS/Dynamic Packet Transport (DPT) • 16-port OC-48c/STM-16 POS/DPT • 8-port 10 Gigabit Ethernet • 4-port 10 Gigabit Ethernet • CRS1-SIP-800 Carrier Card • 4-Port OC-3/STM-1 POS SPA • 8-Port 1 Gigabit Ethernet SPA • 1-port OC-768c/STM-256c Tunable WDMPOS • 4-port 10GE Tunable WDMPHY	
Connectivity	POS, WDM, DPT, 10 Gigabit Ethernet, 1 Gigabit Ethernet	
Features and Functions	IP features: • IPv4 unicast services • IPv6 unicast services • IPv4/IPv6 ECMP • IPv4/IPv6 Load Balancing Forwarding features: • Access control lists (ACLs/xACLs) • Quality of service/class of service (QoS/CoS) using Modular QoS CLI (MQC) • IP packet classification/marking • Queuing (both ingress and egress) • Policing (both ingress and egress) • Diagnostic and network management support Optical features:	IPv4 multicast features: • Multicast Reverse Path Forwarding (RPF) • Multicast Nonstop Forwarding (NSF) • Multicast Forwarding Information Base (MFIB) MPLS features: • MPLS forwarding • MPLS load balancing • UNI • LMP Security features: • Control packet policing • Dynamic control plane protection • GTSM RFC 3682 (Formally BTSH)

Feature	Description	
	• Line rate 42.8 Gbps ±4.6 ppm • Duplex LC faceplate optical connector • Full C-band tunable laser • Configurable Tx optical power (–19 dBm to +1 dBm) • Tx and Rx optical power monitoring • Optical power monitoring accuracy ±2 dB	
Memory	Configurable with 2GB or 4GB of memory per CRS-16-RP	
Performance	1.2 Tbps switching capacity	
Reliability and Availability	System Redundancy: • Power shelf redundancy 1:1 • Fan tray redundancy 1:1 • Fan controller redundancy 1:1 • Alarm card redundancy 1:1 • Route processor redundancy 1:1 • Fabric card redundancy 1:8 Software Features: • NSF using graceful restart for – ISIS, OSPF, BGP, LDP, and RSVP • SONET automatic protection switching (APS) (1:1) • Line-card online insertion and removal (OIR) support • Fabric card OIR support • Out of resource management • Process Re-startability • MPLS Fast Reroute (FRR) • Hot Standby Router Protocol/Virtual Router Redundancy Protocol (HSRP/VRRP)	
MIBs	SNMP Framework Support: • SNMPv1 • SNMPv2c • SNMPv3 • MIB II, including interface extensions (RFC 1213) • SNMP-FRAMEWORK-MIB • SNMP-TARGET-MIB • SNMP-NOTIFICATION-MIB • SNMP-USM-MIB • SNMP-VACM-MIB System Management: • CISCO- BULK-FILE-MIB • CISCO-CONFIG-COPY-MIB • CISCO-CONFIG-MAN-MIB • CISCO-FLASH-MIB • CISCO-MEMORY-POOL-MIB • Cisco FTP Client MIB • Cisco Process MIB • Cisco Syslog MIB • CISCO-SYSTEM-MIB • CISCO-CDP-MIB • IF-MIB (RFC 2233/RFC 2863) Quality of Service (QoS): • MQC-MIB (Cisco Class-Based QoS MIB) • CISCO-PING-MIB	Chassis: • ENTITY-MIB (RFC 2737) • CISCO-entity-asset-MIB • CISCO-entity-sensor-MIB • CISCO-FRU-MIB (Cisco-Entity-FRU-Control-MIB) Fabric: • CISCO-Fabric-HFR-MIB • CISCO-Fabric-Mcast-MIB • CISCO-Fabric-Mcast-Appl-MIB Routing Protocols: • BGP4-MIB Version 1 • OSPFv1-MIB (RFC 1253) • CISCO-IETF-IP-FORWARDING-MIB • IP-MIB (was RFC 2011-MIB) • TCP-MIB (RFC 2012) • UDP-MIB • CISCO-HSRP-EXT-MIB • CISCO-HSRP-MIB Traps: • RFC 1157 • Authentication • Linkup • Linkdown • Coldstart • Warmstart
Network Management	• Enhanced command-line interface (CLI) • Extensible Markup Language (XML) interface • Craft Works Interface (CWI) • Simple Network Management Protocol (SNMP) and MIB support	
Programmatic Interfaces	XML Schema Support	

Feature	Description
Physical Dimensions	Chassis Height: • 84 in. (213.36 cm) Chassis Width: • 23.6 in. (59.944 cm) Chassis Depth: • 36 in. (91.44 cm) • 39.718 in. (100.844 cm), including cable-management system and front cover Weight: • 939 lb (425 kg) as shipped, chassis only with build in rack and fan trays installed • 1008 lb (457 kg) chassis only as shipped, including power shelves, without power modules, and with build in rack • 1595 lb (723kg) chassis fully configured, using all card slots, power shelves, and cosmetics, and with build in rack
Power	• Maximum power consumption when chassis is fully configured with line cards with traffic running: 9630W • Chassis power supply maximum output capacity: 13.2kW for both DC power supply and AC power supply
Environmental Conditions	Storage Temperature: -40℃ to 70℃ (-40℉ to 158℉) Operating Temperature: • Normal: 5℃ to 40℃ (41℉ to 104℉) • Short term: -5℃ to 50℃ (23℉ to 122℉) short term Relative Humidity: • Normal: 5% to 85% • Short-term: 5% to 90% but not to exceed 0.024 kg water/kg of dry air 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. (This refers to a total of 360 hours in any given year, but, no more than 15 occurrences during that 1-year period.)

Approvals and Compliance

Table 2. Compliance and Agency Approvals

Feature	Description
Safety Standards	• UL/CSA/IEC/EN 60950-1 • IEC/EN 60825 Laser Safety • ACA TS001 • AS/NZS 60950 • FDA – Code of Federal Regulations Laser Safety
EMI	• 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
Immunity (Basic 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
ETSI and EN	• EN300 386: Telecommunications Network Equipment (EMC) • EN55022: Information Technology Equipment (Emissions) • EN55024: Information Technology Equipment (Immunity) • EN50082-1/EN-61000-6-1: Generic Immunity Standard

Feature	Description
Network Equipment Building Systems (NEBS)	This product is designed to meet the following requirements (qualification in progress): • SR-3580: NEBS Criteria Levels (Level 3) • GR-1089-CORE: NEBS EMC and Safety • GR-63-CORE: NEBS Physical Protection

System Capacity

Table 3. System Capacity

Number of Interface Slots	Maximum Capacity/Slot	Total Capacity
16	40 Gbps/slot ingress + 40 Gbps/slot egress	1.2 Tbps/16-Slot Single-Shelf System

Ordering Information

To place an order, visit: Cisco Ordering Home Page

Table 4. Ordering Information

Product Part Number	Product Name
CRS-16/S	Cisco CRS-1 16-Slot Carrier Routing System/Single

To Download the Software

To download Cisco IOS Software, visit: Cisco Software Center.

Service and Support

Cisco offers numerous innovative services programs to accelerate customer success. These programs are delivered through a unique combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. Cisco services help you to protect your network investment, optimize network operations, and prepare the network for new applications to extend network intelligence and the power of your business. For more information about Cisco services, visit: Cisco Technical Support Services or Cisco Advanced Services.

For More Information

For more information about the Cisco CRS-1 16-Slot Single-Shelf System, contact your local account representative or visit Cisco at: http://www.cisco.com/go/crs.

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