Cisco CRS 4-Slot Single-Shelf System

The Cisco® CRS Carrier Routing System offers industry-leading performance, advanced services intelligence, environmentally conscious design, and system longevity. The Cisco CRS is powered by a chipset architecture based on multidimensional engineering and Cisco IOS® XR Software, a unique self-healing, distributed operating system.

Packet-based data communications are being replaced by video and rich media transported on Next-Generation Networks (NGN) in multiple directions. The new traffic strains the architectural foundations of both public and private networks serving businesses and consumers. As part of the medianet, a media-aware Cisco IP NGN, the Cisco CRS delivers highly reliable operations and scales easily from numerous single-chassis form factors to a massive multi-chassis system. Its design provides industry-leading, efficiency, with very low consumption of power, cooling and rack-space resources, while providing intelligent service-rich bandwidth capacity. The Cisco CRS is backward and forward compatible, protecting existing and future investments for decades to come.

Figure 1. Cisco CRS 4-Slot Single-Shelf System

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The Cisco CRS 4-Slot Single-Shelf System (Figure 1) offers many advantages:

- The system is powered by a chipset architecture engineered for the Cisco CRS Router Family, which provides higher bandwidth than competing products, without compromising service performance. The Cisco CRS chipset is based on multidimensional engineering that includes several functional components working in tandem throughout the platform.
- The system uses Cisco IOS XR Software designed for always-on operation. Cisco IOS XR Software is the only fully modular, fully distributed internetwork operating system that uses a memory-protected, microkernel-based architecture and control-plane distribution, allowing the system to scale.
- The Cisco CRS 4-Slot Single-Shelf System offers a fully redundant carrier-class configuration.
- Integrated technology includes IP/MPLS routing, IP over dense wavelength-division multiplexing (IPoDWDM), network virtualization with secure domain routers (SDRs), fabric multicast replication, fabric quality of service (QoS), Cisco NetFlow accounting, and Carrier-Grade IPv6 (CGv6) to provide outstanding quality of experience (QoE) at the lowest total cost of ownership (TCO).

Product Specifications

Table 1 gives specifications of the Cisco CRS 4-Slot Single-Shelf System.

Table 1. Specifications of Cisco CRS 4-Slot Single-Shelf System

	CRS-4/S
Feature	**Description**
Product compatibility	Compatible with all current Cisco CRS Family modular services cards (MSCs), forwarding processor (FP), Interface Modules (PLIMs), route processors, and fabric cards.
Software compatibility	Cisco IOS XR Software Release 4.0.0 or later

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 (IS-IS)
	• Multicast forwarding with support for source-based and shared distribution trees and the following protocols:
	  ◦ Protocol Independent Multicast sparse mode (PIM SM)
	  ◦ Bidirectional PIM
	  ◦ PIM Source Specific Multicast (PIM SSM)
	  ◦ Automatic route processing (AutoRP)
	  ◦ Internet Group Management Protocol (IGMP) Versions 1, 2, and 3
	  ◦ Multiprotocol BGP (MBGP)
	  ◦ Multicast Source Discovery Protocol (MSDP)
	• Multiprotocol Label Switching (MPLS)
	  ◦ MPLS Label Distribution Protocol (LDP)
	  ◦ Resource Reservation Protocol (RSVP)
	  ◦ Differentiated Services (DiffServ)-aware traffic engineering
	• MPLS Traffic Engineering control plane (RFCs 2702 and 2430)
	• Routing Policy Language (RPL)
	• Management
	  ◦ Simple Network Management Protocol (SNMP)
	  ◦ Programmatic interfaces (Extensible Markup Language [XML])
	• Security

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	CRS-4/S
Feature	**Description**
	◦ Message Digest Algorithm 5 (MD5) ◦ IP Security (IPsec) Protocol ◦ Secure Shell (SSHv2) Protocol ◦ Secure FTP (SFTP) ◦ Secure Sockets Layer (SSL)
Components	Each Cisco CRS 4-Slot line-card chassis includes: • Two Cisco CRS 8-Slot line card chassis route processors (CRS-8-RP) • Four Cisco CRS 4-Slot fabric cards • Four power supplies (either DC or AC) • One fan tray Optional items follow: • Four Cisco CRS line cards • Four Cisco CRS PLIMs
Cards, ports, and slots	• 1-port OC-768c/STM-256c packet over SONET (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 (GE) • 4-port 10 GE • 42-port 1 GE • 1-port OC-768c/STM-256c tunable WDMPoS • 4-port 10GE tunable WDMPHY • 14-port 10GE LAN/WAN PHY • 20-port 10GE LAN/WAN PHY • 1-port 100GE • CRS-1-SIP-800 carrier card • 2- and 4-port OC-3c/STM-1c PoS shared port adapters (SPAs) • 1-port, 2-port, and 4-port OC-48c/STM-16c PoS/RPR SPA • 1-port OC-192c/STM-64c PoS/RPR SPA • 1-port 10GE SPA • 2-port and 4-port Clear Channel T3/E3 SPAs • 2-port, 4-port, and 8-port OC-12c/STM-4 PoS SPAs • 2-port, 5-port, 8-port, and 10-port GE SPAs • 1-port 10 GE LAN/WAN-PHY SPA • 20-port GE flexible interface module • 2-port 10GE WAN/LAN-PHY flexible interface module • Flexible SPA and 6-port 10GE PLIM
Connectivity	POS, WDM, DPT, T3/E3, 100 GE, 10 GE, 1 GE
Features and functions	IP features • Control-plane packet handling • IPv4 host services • IPv4 unicast forwarding • IPv4 equal-cost multipath (ECMP) • IPv6 host services • IPv6 forwarding services • IPv6 ECMP Forwarding features • Access control lists (ACLs) • Quality of service (QoS) and class of service (CoS) using Modular QoS CLI (MQC) • IP packet classification and marking • Queuing (both ingress and egress) • Policing (both ingress and egress) • Diagnostic and network-management support Routing features

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	CRS-4/S
Feature	**Description**
	• MBGPv4 • OSPFv2 • OSPFv3 • IS-IS • Static routes • RPL IPv4 multicast features • Dynamic registration using IGMP • Multicast Reverse Path Forwarding (RPF) • PIM SM • PIM Source Specific Multicast (PIM SSM) • Automatic route processing • MSDP • MBGP • Bidirectional PIM • SSM with IGMPv3 • Explicit tracking of hosts, group, and channels for IGMPv3 • Multicast nonstop forwarding (NSF) MPLS features • MPLS forwarding and load balancing • LDP • RSVP • MPLS traffic-engineering features • User-Network Interface (UNI) • Link Management Protocol (LMP) Security features • MD5 • SSL • SSH and SFTP • SHTTP support • Control packet policing • IPsec Manageability features • Alarms management • Configuration management • Accounting and statistics management • Performance management • Control point and network management - Generic requirements • Terminal services enhancements • Enhanced command-line interface (CLI) • XML interface • XML schemas (refer to specifications given previously) • Cisco Craft Works Interface (CWI) • Common Object Request Broker Architecture (CORBA) support • SNMP and MIB support (refer to specifications given previously)
Memory	4 GB
Performance	1.12-Tbps switching capacity
Reliability and availability	System redundancy • Power module redundancy 1:1 • Route-processor redundancy 1:1 • Fabric card redundancy 1:4 • Dual homing with line cards • Fan redundancy in single fan tray • Support for automatic protection switching (APS)

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	CRS-4/S
Feature	**Description**
	Software features • NSF using graceful restart for: IS-IS, OSPF, BGP, LDP, and RSVP • SONET APS (1:1) • Line card online insertion and removal (OIR) support • Fabric card OIR support • Out-of-resource management • Process restartability • MPLS Fast Reroute (FRR) • Hot Standby Router Protocol (HSRP) and Virtual Router Redundancy Protocol (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 (RFCs 2233 and 2863) Chassis • ENTITY-MIB (RFC 2737) • CISCO-entity-asset-MIB • CISCO-entity-sensor-MIB • CISCO-FRU-MIB (Cisco-Entity-FRU-Control-MIB) Fabric MIB • CISCO-Fabric-HFR-MIB • CISCO-Fabric-Mcast-MIB • CISCO-Fabric-Mcast-Appl-MIB Routing protocols • BGP4-MIB Version 1 • OSPFv1MIB (RFC 1253) • CISCO-IETF-IP-FORWARDING-MIB • IP-MIB (was RFC2011-MIB) • TCP-MIB (RFC 2012) • UDP-MIB • CISCO-HSRP-EXT-MIB • CISCO-HSRP-MIB • CISCO-BGP-POLICY-ACCOUNTING-MIB QoS • MQC-MIB (Cisco Class-Based QoS MIB) • CISCO-PING-MIB

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	CRS-4/S
Feature	**Description**
	Traps • RFC 1157 • Authentication • Linkup • Linkdown • Coldstart • Warmstart
Network management	• Enhanced CLI • XML interface • Cisco CWI • SNMP and MIB support
Programming interfaces	• XML schema support
Physical dimensions	Chassis height: 30.0 in. (76.2 cm) Chassis width: 17.643 in. (44.813 cm) Chassis depth: 30.28 in. (76.91 cm) Weight: • 260 lb (117.93 kg) chassis with fans, power modules, and blanks (as shipped) • 380 lb (172.37 kg) chassis as shipped, including power shelf, fabric cards and all line cards and route processors
Power	• Maximum power consumption when chassis is fully configured with line cards with traffic running: 3080W • Chassis power supply maximum output capacity: 4kW for both DC power supply and AC power supply
Environmental conditions	Storage temperature: -40 to 158℉ (-40 to 70℃) Operating temperature: • Normal: 41 to 104℉ (5 to 40℃) • Short term: 23 to 122℉ (-5 to 50℃) Relative humidity: • Normal: 5 to 85 percent • Short-term: 5 to 90 percent but not to exceed 0.024 kg water per kg of dry air **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. (It 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 gives approval and compliance information for the Cisco CRS 4-Slot Single-Shelf System.

Table 2. Approvals and Compliance for Cisco CRS 4-Slot Single-Shelf System

	CRS-4/S
Feature	**Description**
Safety standards	• UL/CSA/IEC/EN 60950-1 • IEC/EN 60825 laser safety • 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 • IEC/EN 61000-3-2: Power Line Harmonics • IEC/EN 61000-3-3: Voltage Fluctuations and Flicker

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	CRS-4/S
Feature	**Description**
Immunity (basic standards)	• IEC/EN-61000-4-2: Electrostatic Discharge Immunity (8-kV Contact, 15-kV Air) • IEC/EN-61000-4-3: Radiated Immunity (10 V/m) • IEC/EN-61000-4-4: Electrical Fast Transient Immunity (2-kV Power, 1-kV Signal) • IEC/EN-61000-4-5: Surge AC Port (4-kV CM, 2-kV DM) • IEC/EN-61000-4-5: Surge Signal Ports (1 kV indoor, 2 kV outdoor) • IEC/EN-61000-4-5: Surge DC Port: 100V DM and 500V CM • IEC/EN-61000-4-6: Immunity to Conducted Disturbances (10 Vrms) • 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
Network Equipment Building Standards (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 gives capacity information for the Cisco CRS 4-Slot Single-Shelf System.

Table 3. System Capacity for Cisco CRS 4-Slot Single-Shelf System

Chassis	Number of Interface Slots	Maximum Capacity per Slot	Total Capacity
CRS-4/S	4	140 Gbps per slot ingress + 140 Gbps per slot egress	1.12 Tbps per single-shelf system

Ordering Information

To place an order, visit the Cisco ordering homepage or refer to Table 4.

Table 4. Ordering Information for Cisco CRS 4-Slot Single-Shelf System

Product Name	Product Part Number
Cisco CRS 4-Slot Single-Shelf System	CRS-4/S

Cisco Services

Cisco Services make networks, applications, and the people who use them work better together.

Today, the network is a strategic platform in a world that demands better integration between people, information, and ideas. The network works better when services, together with products, create solutions aligned with business needs and opportunities.

The unique Cisco Lifecycle approach to services defines the requisite activities at each phase of the network lifecycle to help ensure service excellence. With a collaborative delivery methodology that joins the forces of Cisco, our skilled network of partners, and our customers, we achieve the best results.

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For More Information

For more information about the Cisco CRS 4-Slot, Single-Shelf System, the Cisco CRS, other available interfaces, and related products, visit Cisco at http://www.cisco.com/go/crs or contact your local Cisco account representative.

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