

## Cisco CRS-3 4-Slot Single-Shelf System

The Cisco® CRS-3 Carrier Routing System offers industry-leading performance, advanced services intelligence, environmentally conscious design, and system longevity. The Cisco CRS-3 is powered by the Cisco QuantumFlow Array – 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 traversing the IP Next-Generation Network (NGN) in multiple directions, straining 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-3 delivers continuous, always-on operations and scales easily from numerous single-chassis form factors to a massive multi-chassis system. Its design provides an industry-leading efficiency consuming lowest power, cooling and rack-space resources for an intelligent service-rich bandwidth capacity. The CRS-3 builds on the CRS-1 being backward and forward compatible, protecting existing and future investments for decades to come.

This data sheet provides detailed product specifications for the Cisco CRS-3 4-Slot Single-Shelf System. For more information about the Cisco CRS-3 or about other available interfaces, visit: <http://www.cisco.com/go/crs>.

**Figure 1.** Cisco CRS-3 4-Slot Single-Shelf System



The Cisco CRS-3 4-Slot Single-Shelf System offers many advantages:

- Powered by QuantumFlow Array, the chipset architecture engineered for the Cisco CRS router family, which provides higher bandwidth than competing products, without any compromise on service performance. QuantumFlow Array is based on multidimensional engineering that comprises several functional components working in tandem throughout the platform.
- Powered by Cisco IOS XR Software – 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 and provide always-on operation.
- The system is completely compatible with existing and future components of the Cisco CRS family. It reuses existing Cisco CRS-1 components such as the chassis, power, fan trays, and fiber interconnects. It is also compatible with Cisco CRS-1 components such as route processors and all 40-Gbps line cards.
- More than triples capacity from 320 Gbps to 1.12 Tbps per shelf on existing power, cooling, and rack-space profile, significantly reducing carbon footprint.
- Fully redundant carrier-class configuration supports in-service upgrades from 40 Gbps per slot to 140 Gbps per slot.
- Integrated technology includes IP/MPLS routing, IP over DWDM (IPoDWDM), network virtualization with Secure Domain Routers (SDRs), fabric multicast replication, fabric quality of service (QoS), 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-3 4-Slot Single-Shelf System.

**Table 1.** Specifications of Cisco CRS-3 4-Slot Single-Shelf System

Feature	Description
<b>Product compatibility</b>	Compatible with all current Cisco CRS-3 Family Modular Services Cards (MSCs), Forwarding Processor (FP), Interface Modules (PLIM), Route Processors, and Fabric Cards. Compatible with all current Cisco CRS-1 Family Modular Services Cards (MSCs), Forwarding Processor (FP), Interface Modules (PLIM), and Route Processors.
<b>Software compatibility</b>	Cisco IOS XR Software Release 4.0.0 or later
<b>Protocols</b>	<ul style="list-style-type: none"> <li>• Cisco Discovery Protocol</li> <li>• IPv4 and IPv6 addressing</li> <li>• Internet Control Message Protocol (ICMP)</li> <li>• Layer 3 routing protocols, including: <ul style="list-style-type: none"> <li>◦ Border Gateway Protocol Version 4 (BGPv4)</li> <li>◦ Open Shortest Path First Version 2 (OSPFv2)</li> <li>◦ OSPFv3</li> <li>◦ Intermediate System-to-Intermediate System (IS-IS)</li> </ul> </li> <li>• Multicast forwarding with support for source-based and shared distribution trees and the following protocols: <ul style="list-style-type: none"> <li>◦ Protocol Independent Multicast sparse mode (PIM SM)</li> <li>◦ Bidirectional PIM</li> <li>◦ PIM Source Specific Multicast (PIM SSM)</li> <li>◦ Automatic route processing (AutoRP)</li> <li>◦ Internet Group Management Protocol (IGMP) Versions 1, 2, and 3</li> <li>◦ Multiprotocol BGP (MBGP)</li> <li>◦ Multicast Source Discovery Protocol (MSDP)</li> </ul> </li> <li>• Multiprotocol Label Switching (MPLS) <ul style="list-style-type: none"> <li>◦ MPLS Label Distribution Protocol (LDP)</li> <li>◦ Resource Reservation Protocol (RSVP)</li> <li>◦ Differentiated Services (DiffServ)-aware traffic engineering</li> </ul> </li> <li>• MPLS Traffic Engineering control plane (RFCs 2702 and 2430)</li> <li>• Routing Policy Language (RPL)</li> </ul>

Feature	Description
	<ul style="list-style-type: none"> <li>• Management <ul style="list-style-type: none"> <li>◦ Simple Network Management Protocol (SNMP)</li> <li>◦ Programmatic interfaces (Extensible Markup Language [XML])</li> </ul> </li> <li>• Security <ul style="list-style-type: none"> <li>◦ Message Digest Algorithm 5 (MD5)</li> <li>◦ IP Security (IPsec) Protocol</li> <li>◦ Secure Shell (SSHv2) Protocol</li> <li>◦ Secure FTP (SFTP)</li> <li>◦ Secure Sockets Layer (SSL)</li> </ul> </li> </ul>
<b>Components</b>	<p>Each Cisco CRS-3 4-Slot Line-Card Chassis includes:</p> <ul style="list-style-type: none"> <li>• Two Cisco CRS-1 8-Slot Line Card Chassis Route Processors (CRS-8-RP)</li> <li>• Four Cisco CRS-3 4-Slot Fabric Cards</li> <li>• Four power supplies (either DC or AC)</li> <li>• One fan tray</li> </ul> <p>Optional items follow:</p> <ul style="list-style-type: none"> <li>• Four Cisco CRS-1 or CRS-3 line cards</li> <li>• Four Cisco CRS-1 or CRS-3 PLIMs</li> </ul>
<b>Cards, ports, and slots</b>	<ul style="list-style-type: none"> <li>• 1-port OC-768c/STM-256c packet over SONET (PoS)</li> <li>• 4-port OC-192c/STM-64c PoS/Dynamic Packet Transport (DPT)</li> <li>• 16-port OC-48c/STM-16 PoS/DPT</li> <li>• 8-port 10 Gigabit Ethernet (GE)</li> <li>• 4-port 10 GE</li> <li>• 42-port 1 GE</li> <li>• 1-port OC-768c/STM-256c tunable WDMPoS</li> <li>• 4-port 10GE tunable WDMPHY</li> <li>• 14-port 10GE LAN/WAN PHY</li> <li>• 20-port 10GE LAN/WAN PHY</li> <li>• 1-port 100GE</li> <li>• CRS-1-SIP-800 carrier card</li> <li>• 2- and 4-port OC-3c/STM-1c PoS shared port adapters (SPAs)</li> <li>• 1-, 2-, and 4-port OC-48c/STM-16c PoS/RPR SPA</li> <li>• 1-port OC-192c/STM-64c PoS/RPR SPA</li> <li>• 1-port 10GE SPA</li> <li>• 2-port and 4-port Clear Channel T3/E3 SPAs</li> <li>• 2-port, 4-port, and 8-port OC-12c/STM-4 PoS SPAs</li> <li>• 2-port, 5-port, 8-port, and 10-port GE SPAs</li> <li>• 1-port 10 GE LAN/WAN-PHY SPA</li> <li>• 20-port GE flexible interface module</li> <li>• 2-port 10GE WAN/LAN-PHY flexible interface module</li> </ul>
<b>Connectivity</b>	POS, WDM, DPT, T3/E3, 100 GE, 10 GE, 1 GE
<b>Features and functions</b>	<p>IP Features</p> <ul style="list-style-type: none"> <li>• Control-plane packet handling</li> <li>• IPv4 host services</li> <li>• IPv4 unicast forwarding</li> <li>• IPv4 equal-cost multipath (ECMP)</li> <li>• IPv6 host services</li> <li>• IPv6 forwarding services</li> <li>• IPv6 ECMP</li> </ul> <p>Forwarding Features</p> <ul style="list-style-type: none"> <li>• Access control lists (ACLs)</li> <li>• Quality of service (QoS) and class of service (CoS) using Modular QoS CLI (MQC)</li> <li>• IP packet classification and marking</li> <li>• Queuing (both ingress and egress)</li> <li>• Policing (both ingress and egress)</li> <li>• Diagnostic and network-management support</li> </ul> <p>Routing Features</p> <ul style="list-style-type: none"> <li>• MBGPv4</li> <li>• OSPFv2</li> </ul>

Feature	Description
	<ul style="list-style-type: none"> <li>• OSPFv3</li> <li>• IS-IS</li> <li>• Static routes</li> <li>• RPL</li> </ul> <p>IPv4 Multicast Features</p> <ul style="list-style-type: none"> <li>• Dynamic registration using IGMP</li> <li>• Multicast Reverse Path Forwarding (RPF)</li> <li>• PIM SM</li> <li>• PIM Source Specific Multicast (PIM SSM)</li> <li>• Automatic route processing</li> <li>• MSDP</li> <li>• MBGP</li> <li>• Bidirectional PIM</li> <li>• SSM with IGMPv3</li> <li>• Explicit tracking of hosts, group, and channels for IGMPv3</li> <li>• Multicast nonstop forwarding (NSF)</li> </ul> <p>MPLS Features</p> <ul style="list-style-type: none"> <li>• MPLS forwarding and load balancing</li> <li>• LDP</li> <li>• RSVP</li> <li>• MPLS traffic-engineering features</li> <li>• User-Network Interface (UNI)</li> <li>• Link Management Protocol (LMP)</li> </ul> <p>Security Features</p> <ul style="list-style-type: none"> <li>• MD5</li> <li>• SSL</li> <li>• SSH and SFTP</li> <li>• SHTTP support</li> <li>• Control packet policing</li> <li>• IPsec</li> </ul> <p>Manageability Features</p> <ul style="list-style-type: none"> <li>• Alarms management</li> <li>• Configuration management</li> <li>• Accounting and statistics management</li> <li>• Performance management</li> <li>• Control point and network management – Generic requirements</li> <li>• Terminal services enhancements</li> <li>• Enhanced command-line interface (CLI)</li> <li>• XML interface</li> <li>• XML schemas (refer to specifications given previously)</li> <li>• Cisco Craft Works Interface (CWI)</li> <li>• Common Object Request Broker Architecture (CORBA) support</li> <li>• SNMP and MIB support (refer to specifications given previously)</li> </ul>
<b>Memory</b>	4 GB
<b>Performance</b>	1.12-Tbps switching capacity
<b>Reliability and availability</b>	<p>System Redundancy</p> <ul style="list-style-type: none"> <li>• Power module redundancy 1:1</li> <li>• Route-processor redundancy 1:1</li> <li>• Fabric card redundancy 1:4</li> <li>• Dual homing with line cards</li> <li>• Fan redundancy in single fan tray</li> <li>• Support for automatic protection switching (APS)</li> </ul> <p>Software Features</p> <ul style="list-style-type: none"> <li>• NSF using graceful restart for: IS-IS, OSPF, BGP, LDP, and RSVP</li> <li>• SONET APS (1:1)</li> <li>• Line card online insertion and removal (OIR) support</li> <li>• Fabric card OIR support</li> <li>• Out-of-resource management</li> </ul>

Feature	Description
	<ul style="list-style-type: none"> <li>• Process restartability</li> <li>• MPLS Fast Reroute (FRR)</li> <li>• Hot Standby Router Protocol (HSRP) and Virtual Router Redundancy Protocol (VRRP)</li> </ul>
<b>MIBs</b>	<p>SNMP Framework Support</p> <ul style="list-style-type: none"> <li>• SNMPv1</li> <li>• SNMPv2c</li> <li>• SNMPv3</li> <li>• MIB II, including interface extensions (RFC 1213)</li> <li>• SNMP-FRAMEWORK-MIB</li> <li>• SNMP-TARGET-MIB</li> <li>• SNMP-NOTIFICATION-MIB</li> <li>• SNMP-USM-MIB</li> <li>• SNMP-VACM-MIB</li> </ul> <p>System Management</p> <ul style="list-style-type: none"> <li>• CISCO- BULK-FILE-MIB</li> <li>• CISCO-CONFIG-COPY-MIB</li> <li>• CISCO-CONFIG-MAN-MIB</li> <li>• CISCO-FLASH-MIB</li> <li>• CISCO-MEMORY-POOL-MIB</li> <li>• Cisco FTP Client MIB</li> <li>• Cisco Process MIB</li> <li>• Cisco Syslog MIB</li> <li>• CISCO-SYSTEM-MIB</li> <li>• CISCO-CDP-MIB</li> <li>• IF-MIB (RFCs 2233 and 2863)</li> </ul> <p>Chassis</p> <ul style="list-style-type: none"> <li>• ENTITY-MIB (RFC 2737)</li> <li>• CISCO-entity-asset-MIB</li> <li>• CISCO-entity-sensor-MIB</li> <li>• CISCO-FRU-MIB (Cisco-Entity-FRU-Control-MIB)</li> </ul> <p>Fabric MIB</p> <ul style="list-style-type: none"> <li>• CISCO-Fabric-HFR-MIB</li> <li>• CISCO-Fabric-Mcast-MIB</li> <li>• CISCO-Fabric-Mcast-Appl-MIB</li> </ul> <p>Routing Protocols</p> <ul style="list-style-type: none"> <li>• BGP4-MIB Version 1</li> <li>• OSPFv1MIB (RFC 1253)</li> <li>• CISCO-IETF-IP-FORWARDING-MIB</li> <li>• IP-MIB (was RFC2011-MIB)</li> <li>• TCP-MIB (RFC 2012)</li> <li>• UDP-MIB</li> <li>• CISCO-HSRP-EXT-MIB</li> <li>• CISCO-HSRP-MIB</li> <li>• CISCO-BGP-POLICY-ACCOUNTING-MIB</li> </ul> <p>QoS</p> <ul style="list-style-type: none"> <li>• MQC-MIB (Cisco Class-Based QoS MIB)</li> <li>• CISCO-PING-MIB</li> </ul> <p>Traps</p> <ul style="list-style-type: none"> <li>• RFC 1157</li> <li>• Authentication</li> <li>• Linkup</li> <li>• Linkdown</li> <li>• Coldstart</li> <li>• Warmstart</li> </ul>
<b>Network management</b>	<ul style="list-style-type: none"> <li>• Enhanced CLI</li> <li>• XML interface</li> <li>• Cisco CWI</li> <li>• SNMP and MIB support</li> </ul>

Feature	Description
<b>Programming interfaces</b>	<ul style="list-style-type: none"> <li>• XML schema support</li> </ul>
<b>Physical dimensions</b>	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: <ul style="list-style-type: none"> <li>• 260 lb (117.93 kg) chassis with fans, power modules, and blanks (as shipped)</li> <li>• 380 lb (172.37 kg) chassis as shipped, including power shelf, fabric cards and all line cards and route processors</li> </ul>
<b>Power</b>	<ul style="list-style-type: none"> <li>• Maximum power consumption when chassis is fully configured with line cards with traffic running: 3080W</li> <li>• Chassis power supply maximum output capacity: 4kW for both DC power supply and AC power supply</li> </ul>
<b>Environmental conditions</b>	Storage temperature: –40 to 158F (–40 to 70°C) Operating temperature: <ul style="list-style-type: none"> <li>• Normal: 41 to 104F (5 to 40°C)</li> <li>• Short term: 23 to 122F (–5 to 50°C)</li> </ul> Relative humidity: <ul style="list-style-type: none"> <li>• Normal: 5 to 85 percent</li> <li>• Short-term: 5 to 90 percent but not to exceed 0.024 kg water per kg of dry air</li> </ul> <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. (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 about the Cisco CRS-3 4-Slot Single-Shelf System.

**Table 2.** Approvals and Compliance for Cisco CRS-3 4-Slot Single-Shelf System

Feature	Description
<b>Safety standards</b>	<ul style="list-style-type: none"> <li>• UL/CSA/IEC/EN 60950-1</li> <li>• IEC/EN 60825 laser safety</li> <li>• AS/NZS 60950</li> <li>• FDA – Code of Federal Regulations laser safety</li> </ul>
<b>EMI</b>	<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>• IEC/EN 61000-3-2: Power Line Harmonics</li> <li>• IEC/EN 61000-3-3: Voltage Fluctuations and Flicker</li> </ul>
<b>Immunity (basic standards)</b>	<ul style="list-style-type: none"> <li>• IEC/EN-61000-4-2: Electrostatic Discharge Immunity (8-kV Contact, 15-kV Air)</li> <li>• IEC/EN-61000-4-3: Radiated Immunity (10 V/m)</li> <li>• IEC/EN-61000-4-4: Electrical Fast Transient Immunity (2-kV Power, 1-kV Signal)</li> <li>• IEC/EN-61000-4-5: Surge AC Port (4-kV CM, 2-kV DM)</li> <li>• IEC/EN-61000-4-5: Surge Signal Ports (1 kV indoor, 2 kV outdoor)</li> <li>• IEC/EN-61000-4-5: Surge DC Port: 100V DM and 500V CM</li> <li>• IEC/EN-61000-4-6: Immunity to Conducted Disturbances (10 Vrms)</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> </ul>
<b>ETSI and EN</b>	<ul style="list-style-type: none"> <li>• EN300 386: Telecommunications Network Equipment (EMC)</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>Network Equipment Building Standards (NEBS)</b>	This product is designed to meet the following requirements (qualification in progress): <ul style="list-style-type: none"> <li>• SR-3580: NEBS Criteria Levels (Level 3)</li> <li>• GR-1089-CORE: NEBS EMC and Safety</li> <li>• GR-63-CORE: NEBS Physical Protection</li> </ul>

## System Capacity

Table 3 gives capacity information for the Cisco CRS-3 4-Slot Single-Shelf System.

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

Number of Interface Slots	Maximum Capacity per Slot	Total Capacity
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 Home Page](#) or refer to Table 4.

**Table 4.** Ordering Information for Cisco CRS-3 4-Slot Single-Shelf System

Product Name	Product Part Number
Cisco CRS-3 4-Slot Single-Shelf System	CRS-4/S

## Cisco Services

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

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## For More Information

For more information about the 4-slot, single-shelf configuration of the Cisco CRS-3 and related products, visit Cisco at <http://www.cisco.com/go/crs> or contact your local Cisco account representative.



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