Cisco CRS Modular Services Cards

Product Overview

The Cisco® Carrier Routing System (CRS) provides outstanding economical scale, IP and optical network convergence, and a proven architecture. Cisco CRS modular service cards (MSCs) are powered by advanced application-specific integrated circuits (ASICs), a chipset architecture based on multidimensional engineering, and Cisco IOS® XR Software, a unique distributed operating system.

Networks are facing new challenges with the Internet of Everything. Trillions of things have become Internet ready and can start talking to each other, as well as to applications and people. The effects of machine-driven events change network dynamics and impose entirely new service requirements. Managing bandwidth is no longer enough. Networks must become more elastic and programmable, capable of adapting and evolving. As part of an evolving and programmable network, the Cisco CRS delivers highly reliable operations and scales easily from single-chassis form factors to a massive multichassis system. Its design offers industry-leading efficiency in power consumption, cooling, and rack-space resources, while providing intelligent service-rich bandwidth capacity. The Cisco CRS supports up to 400-Gbps line rates, and its hardware is backward and forward compatible, helping to protect existing and future investments.

Cisco CRS modular service cards include the latest revision, the Cisco CRS-X Modular Services Card (Figure 1), the Cisco CRS-3 140-Gbps Modular Services Card (Figure 2), the CRS-1 Modular Services Card Revision B (Not pictured) and the CRS-1 Modular Services Line Card (not pictured). The Cisco CRS-X card offers the following advanced features and benefits:

- 400-Gbps line-rate throughput per slot, increasing the Cisco CRS capacity to 12.8 Tbps in a single chassis
- Advanced forwarding ASICs capable of supporting 100-Gbps single-flow traffic processing with optimized power consumption
- Superior investment protection that maintains the existing Cisco CRS architecture, making them compatible with existing Cisco CRS-1 and Cisco CRS-3 line cards and physical layer interface modules (PLIMs)
- Transparent and In-service migration from an existing Cisco CRS-1 or Cisco CRS-3 platform
- Space, cost, and power savings with 100-Gbps Cisco CPAK™ optics
- Flexibility through Cisco AnyPort Technology, which introduces 100-Gbps to 40-Gbps and 40-Gbps to 10-Gbps breakout options

Figure 1. Cisco CRS-X Modular Services Card

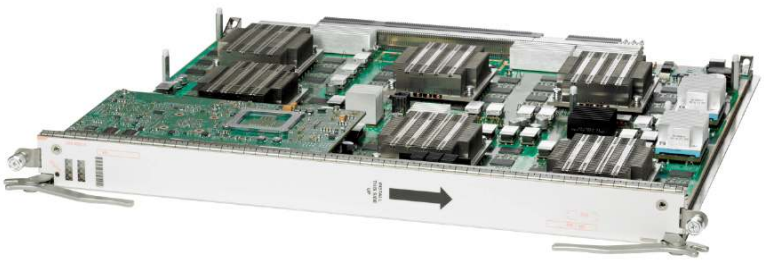

Figure 2. Cisco CRS-3 140-Gbps Modular Services Card

Product Specifications

Table 1 provides specifications for each of the Cisco CRS modular services cards.

Table 1. Product Specifications

Feature	Description			
	Cisco CRS-X MSC	**Cisco CRS-3 MSC**	**Cisco CRS-1 MSC Revision B**	**Cisco CRS-1 MSC**
Chassis compatibility	• Cisco CRS 8-slot, 16-slot, and multichassis systems with Cisco CRS-X fabric cards • Legacy Cisco CRS line-card chassis (200-Gbps mode) • Enhanced Cisco CRS line-card chassis (400-Gbps mode)	• Compatible with all current Cisco CRS-3 line-card chassis • Compatible with all current Cisco CRS-1 line-card chassis with 140-Gbps fabric cards • Compatible with 1X100GBE, 14X10GBE-WL-XFP & 20X10GBE-WL-XFP interface modules	• Compatible with 4-slot, 8-slot, 16-slot, and multichassis CRS-3 chassis • Compatible with all current Cisco CRS-1 line-card chassis	• Compatible with all current Cisco CRS-1 line-card chassis • Compatible with 4-slot, 8-slot, 16-slot, and multichassis CRS-3 chassis
Software compatibility	Cisco IOS XR Software Release 5.1.1 or later	Cisco IOS XR Software Release 4.0.0 or later	Cisco IOS XR Software Release 3.6 or later for Cisco CRS-1 Cisco IOS XR Software Release 4.0.0 or later for Cisco CRS-3	Cisco IOS XR Software Release 2.0 and 3.0 or later for Cisco CRS-1 Cisco IOS XR Software Release 4.0.0 or later for CRS-3
Interface module compatibility	400-Gbps physical interface modules, including Cisco part numbers 4x100GE-OTN and 40x10GE-WLO	Always paired with an interface module	Always paired with an interface module	Always paired with an interface module
Features and protocols	IP features: • IPv4 unicast services • IPv6 unicast services • IPv4 and IPv6 equal cost multi-path (ECMP) • IPv4/IPv6 load balancing Forwarding features: • Access control lists (ACLs/xACLs) • Quality of service (QoS) and class of service (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 IPv4 multicast features: • Protocol Independent Multicast (PIM) Forwarding • IP Multicast Priority Propagation • Multicast Reverse Path Forwarding (RPF) • Multicast Nonstop Forwarding (NSF) • Multicast Forwarding Information Base (MFIB) Multiprotocol Label Switching (MPLS) features: • MPLS forwarding • MPLS load balancing			

Feature	Description			
	Cisco CRS-X MSC	Cisco CRS-3 MSC	Cisco CRS-1 MSC Revision B	Cisco CRS-1 MSC
	• Traffic engineering and point-to-multipoint (P2MP) traffic engineering • Policy-based traffic engineering selection (PBTS) • MPLS OAM • UNI • LMP Security features: • Access control list • Unicast reverse path forwarding (uRPF) • QoS-based policy propagation through Border Gateway Protocol (QPPB) • Control packet policing (CPP) • Dynamic control plane protection (DCoPP) • GTSM RFC 3682 (formally BTSH) Error detection and fast convergence features: • Bidirectional forwarding detection (BFD) • Ethernet OAM (E-OAM), service-level agreement (SLA), 802.1ag, 802.3ah, and Y.1731 Accounting: • Cisco NetFlow • Border Gateway Protocol (BGP) policy accounting			
Memory	• 8-GB CPU memory and 2 GB per forwarding ASIC, totaling 12 GB physical memory for route tables • 2 GB of packet buffer memory per line card (4 GB [ingress and egress])	• Configurable with up to 8 GB of route table memory • 1 GB of packet buffer memory per side (2 GB total per line card [ingress and egress])	• Configurable with 2 GB of route table memory • 1 GB of packet buffer memory per side (2 GB total per line card [ingress and egress])	• Configurable with 2 GB of route table memory • 1 GB of packet buffer memory per side (2 GB total per line card [ingress and egress])
Performance	• 400-Gbps line-rate throughput • Maximum number of MSCs per chassis: 8-slot chassis (8) and 16-slot chassis (16)	• 140-Gbps line-rate throughput • Maximum number of MSCs per chassis: 4 slot (4), 8 slot (8), and 16 slot (16)	• 40-Gbps line rate performance	• 40-Gbps line rate performance
Reliability and availability	• Line-card online insertion and removal (OIR) support without affecting system • In-service software patching • Out-of-resource management • Process restart • IP fast reroute (FRR) • MPLS fast reroute (FRR)			
Network management	• Cisco IOS XR Software command-line interface (CLI) • Simple Network Management Protocol (SNMP) • Extensible Markup Language (XML) interface • CraftWorks Interface (CWI) • Cisco Active Network Abstraction (ANA)			
Power	<650W in 400-Gbps mode <450W in 200-Gbps mode * Energy monitor functionality allows real-time power monitoring of each individual component, PLIMs and line cards, fabric, PRP through CLI, with IOS XR Release 5.1.1	446W	375W	350W

Feature	Description			
	Cisco CRS-X MSC	Cisco CRS-3 MSC	Cisco CRS-1 MSC Revision B	Cisco CRS-1 MSC
Physical dimensions	Occupies one-half slot on a Cisco CRS chassis • Weight: 16.0 lb (7.26 kg) • Height: 20.6 in. (52.2 cm) • Depth: 18.62 in. (47.25 cm) • Width: 1.8 in. (4.49 cm)	Occupies one-half slot on a Cisco CRS-3 chassis • Weight: 14.75 lb (6.68 kg) • Height: 20.6 in. (52.2 cm) • Depth: 18.62 in. (47.25 cm) • Width: 1.8 in. (4.49 cm)	Occupies one slot • Weight: 12 lb (5.44 kg) • Height: 20.6 in. (52.2 cm) • Depth: 18.62 in. (47.25 cm) • Width: 1.8 in. (4.49 cm)	Occupies one slot • Weight: 18.7 lb (8.38 kg) • Height: 20.6 in. (52.2 cm) • Depth: 18.62 in. (47.25 cm) • Width: 1.8 in. (4.49 cm)
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% • Short-term: 5 to 90% but not to exceed 0.024 kg water per kg of dry air Short-term refers to a period of not more than 96 consecutive hours or a total of 360 hours but not more than 15 instances in 1 year.			
Approvals and compliance	Safety standards: • UL/CSA/IEC/EN 60950-1 • AS/NZS 60950.1 • IEC/EN 60825 Laser Safety • FDA Code of Federal Regulations Laser Safety EMI: • FCC Class A • ICES 003 Class A • AS/NZS CISPR 22 Class A • ISPR 22 (EN55022) Class A • VCCI 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 (8-kV contact, 15-kV air) • IEC/EN-61000-4-3: Radiated Immunity (10V/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: Signal Ports (1 kV) • IEC/EN-61000-4-5: Surge DC Port (1 kV) • 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			

Approvals and Compliance

Table 2 provides standards compliance information for Cisco CRS modular services cards.

Table 2. Compliance and Agency Approvals

Feature	Description			
	Cisco CRS-X MSC	Cisco CRS-3 MSC	Cisco CRS-1 MSC Revision B	Cisco CRS-1 MSC
Safety standards	• UL/CSA/IEC/EN 60950-1 • AS/NZS 60950.1 • IEC/EN 60825 Laser Safety • FDA - Code of Federal Regulations Laser Safety			
EMI	• FCC Class A • ICES 003 Class A • AS/NZS CISPR 22 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			
Immunity (basic standards)	• IEC/EN-61000-4-2: Electrostatic Discharge Immunity (8-kV contact, 15-kV air) • IEC/EN-61000-4-3: Radiated Immunity (10V/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: Signal Ports (1 kV) • IEC/EN-61000-4-5: Surge DC Port (1 kV) • 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			

Ordering Information

Table 3 provides ordering information. To place an order, visit the Cisco Ordering homepage. To download software, visit the Cisco Software Center.

Table 3. Ordering Information

Product Name	Part Number
Cisco CRS-X Modular Services Card (200G)	CRS-MSC200G
Cisco CRS-X Modular Services Card (400G)	CRS-MSC400G
Cisco CRS-X Series 200G to 400G upgrade license	XC-MSC200GTO400G
Cisco CRS-3 Modular Services Card (140G)	CRS-MSC-140G
Cisco CRS-1 Modular Services Card Revision B 40G	CRS-MSC-40G-B
Cisco CRS-1 Modular Service Card Revision B 20G	CRS-MSC-20G-B
Cisco CRS-1 Modular Services Card	CRS-MSC

Cisco Services

Services from Cisco and our partners help you get the most value from your investments in Cisco's converged IP and optical solutions, quickly and cost effectively. We can help you:

- Design, implement, and validate your solution to speed migration and cutover
- Coordinate every step through to interworking, and deploy your solution in a predictable, efficient, and accurate way
- Strengthen your team by sharing what we know

We develop award-winning services that incorporate our history of market-changing innovation, which are delivered by deeply experienced engineers using proven methods and automated tools built through more than 28 years of industry leadership.

For More Information

For more information about the Cisco CRS visit http://www.cisco.com/go/crs or contact your local account representative.

Learn more about Cisco services at http://www.cisco.com/go/spservices.

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