

# Cisco CRS 2 Port 100 Gigabit Ethernet and 5 Port 40 Gigabit Ethernet Flexible Interface Module

## Product Overview

The Cisco® Carrier Routing System (CRS) provides outstanding economical scale, IP and optical network convergence, and a proven architecture. The Cisco CRS-X is powered by advanced portable address translation (PAT) advanced application-specific integrated circuits (ASICs), a chipset architecture based on multidimensional engineering, and Cisco IOS® XR Software, an innovative self-healing, distributed operating system.

Networks face new challenges with the Internet of Everything (IoE). Trillions of things have become Internet-ready and can start communicating with each other, as well as to applications and people. The effects of machine-directed 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 protect existing and future investments.

## Features and Benefits

The Cisco CRS 2 port 100 Gigabit Ethernet and 5 port 40 Gigabit Ethernet LAN/OTN Flexible Interface Module (Figure 1) 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 to support traffic processing with optimized power consumption
- Superior investment protection that maintains the existing Cisco CRS architecture, making it compatible with existing Cisco CRS-1 and Cisco CRS-3 line cards and physical layer interface modules (PLIMs)
- Space, cost, and power savings with 100-Gbps Cisco CPAK™ optics and 40-Gbps QSFP optics
- Flexibility through Cisco AnyPort technology, which introduces 40- to 10-Gbps breakout options
- Energy monitor functions that allow real-time power monitoring of individual components, including PLIMs and line cards, fabric, and performance route processor (PRP) through a command-line interface (CLI), beginning with Cisco IOS XR Software Release 5.1.3

**Figure 1.** Cisco CRS 2 Port 100 Gigabit Ethernet and 5 Port 40 Gigabit Ethernet LAN/OTN Flexible Interface Module



The Cisco CRS 2 port 100 Gigabit Ethernet and 5 port 40 Gigabit Ethernet LAN/OTN Flexible Interface Module connects into an existing transport network and provides 2 ports at 100 Gbps of data per port and 5 ports at 40 Gbps of data per port, for 400-Gigabit Ethernet LAN physical layer (LAN-PHY) or optical-transport-network (OTN) transport unit level 4 (OTU-4) transport. The interface module requires a 400-Gbps-capable modular services card, forwarding processor card, or label-switch-processor card for operation. It is supported across Cisco CRS 8- and 16-slot and multichassis systems, using either a Cisco CRS enhanced chassis or older chassis. The interface module can operate in either a 400- or 200-Gbps mode. The 400-Gbps mode in a Cisco CRS enhanced chassis-based system allows the interface module to deliver full 400-Gbps line-rate throughput. In the older chassis, the interface module provides 200-Gbps line rate with five 40 Gigabit Ethernet ports.

## Product Specifications

Table 1 provides specifications for the Cisco CRS 2 port 100 Gigabit Ethernet and 5 port 40 Gigabit Ethernet LAN/OTN Flexible Interface Module.

**Table 1.** Product Specifications

| Feature                       | Description   |
|-------------------------------|---|
| <b>Chassis compatibility</b>  | Compatible with all Cisco CRS 8- and 16-slot and multichassis systems with Cisco CRS-X fabric<br>* Requires 400-Gbps modular services card, forwarding processor card, or label switch processor card for operation   |
| <b>Software compatibility</b> | Cisco IOS XR Software Release 5.1.3. or later   |
| <b>Port density</b>           | Two ports of 100 Gigabit Ethernet and 5 ports of 40 Gigabit Ethernet per PLIM slot  |
| <b>Ethernet</b>               | <ul style="list-style-type: none"> <li>• IEEE 802.3ba compliant</li> <li>• 100 Gigabit Ethernet PHY monitoring</li> <li>• 40 Gigabit Ethernet PHY monitoring</li> <li>• OTU-4 (single 100-Gbps container)</li> <li>• OTU-3</li> <li>• Encapsulations: ARPA, IEEE 802.2/SAP, and IEEE 802.3/SNAP</li> <li>• IEEE 802.x flow control</li> <li>• 802.1q VLAN support and Jumbo Frames</li> <li>• IEEE 802.1p tagging</li> <li>• Source and destination MAC accounting and VLAN accounting</li> <li>• Full-duplex operation</li> <li>• 802.1Q VLAN termination</li> <li>• Per-port byte and packet counters for policy drops; oversubscription drops; cyclic-redundancy-check (CRC) error drops; packet sizes; and unicast, multicast, and broadcast packets</li> <li>• Per-VLAN byte and packet counters for policy drops; oversubscription drops; and unicast, multicast, and broadcast packets</li> <li>• Per-port byte counters for good bytes and dropped bytes</li> </ul> |

| Feature                             | Description  |
|-------------------------------------|--|
| <b>OTN (G.709 feature summary)</b>  | <ul style="list-style-type: none"> <li>• ITU G.709</li> <li>• Alarm reporting: Loss of signal (LOS), loss of OTN frame (LOF), and loss of OTN multiframe (LOM)</li> <li>• OTU backward defect indication (OTU-BDI), Optical-channel Data Unit alarm indication signal (ODU-AIS), ODU open connection indication (ODU-OCI), ODU locked (ODU-LCK), ODU backward defect indication (ODU-BDI), ODU payload type identifier mismatch (ODU-PTIM), OTU signal fail (OTU_SF_BER), and OTU signal degrade (OTU_SD_BER)</li> <li>• OTU_SF_BER and OTU_SD_BER alarms based on monitoring of OTU BIP errors with a user-configurable threshold crossing</li> <li>• Error counts: OTU Bit Interleaved Parity (BIP), OTU Backward Error Indication (BEI), ODU BIP, and ODU BEI</li> <li>• Threshold crossing alerts (TCAs) for OTU BIP errors (SM TCA) and ODU BIP errors (PM-TCA) with user-configurable threshold</li> <li>• Local (internal) and line (network) loopback</li> </ul> |
| <b>Performance</b>                  | <ul style="list-style-type: none"> <li>• 400-Gbps line-rate throughput</li> <li>• Maximum number of interface modules per chassis: 8 slots and 16 slots</li> </ul>   |
| <b>Reliability and availability</b> | <ul style="list-style-type: none"> <li>• Line-card online insertion and removal (OIR) support without affecting system</li> </ul>  |
| <b>Network management</b>           | <ul style="list-style-type: none"> <li>• Cisco IOS XR Software CLI</li> <li>• Simple Network Management Protocol (SNMP)</li> <li>• XML interface</li> <li>• CraftWorks Interface (CWI)</li> <li>• Cisco Active Network Abstraction (ANA)</li> </ul>  |
| <b>Physical dimensions</b>          | <ul style="list-style-type: none"> <li>• Occupies one-half slot on a Cisco CRS chassis</li> <li>• Weight: 8.8 lb (4 kg)</li> <li>• Height: 20.6 in. (52.2 cm)</li> <li>• Depth: 11.2 in. (28.4 cm)</li> <li>• Width: 1.8 in. (4.49 cm)</li> </ul>  |
| <b>Power</b>                        | <p>Expected value:</p> <ul style="list-style-type: none"> <li>• 200-Gbps mode: &lt;90 W</li> <li>• 400-Gbps mode: &lt;120 W</li> </ul> <p>* Energy monitor functions allow real-time power monitoring of individual components, including PLIMs and line cards, fabric, and PRP through CLI beginning with Cisco IOS XR Software Release 5.1.1</p>   |
| <b>Environmental conditions</b>     | <p>Storage temperature: -40 to 158°F (-40 to 70°C)</p> <p>Operating temperature:</p> <ul style="list-style-type: none"> <li>• Normal: 32 to 104°F (0 to 40°C)</li> <li>• Short-term: 23 to 122°F (-5 to 50°C)</li> </ul> <p>Relative humidity:</p> <ul style="list-style-type: none"> <li>• Normal: 5 to 85%</li> <li>• Short-term: 5 to 90% but not to exceed 0.024 kg water per kg of dry air</li> </ul> <p>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.</p>  |

## Approvals and Compliance

Table 2 provides the standards and compliance information for the Cisco CRS 2 port 100 Gigabit Ethernet and 5 port 40 Gigabit Ethernet LAN/OTN Flexible Interface Module.

**Table 2.** Compliance and Agency Approvals

| Feature                 | Description  |
|-------------------------|--|
|                         | <b>Cisco CRS 2 port 100 Gigabit Ethernet and 5 port 40 Gigabit Ethernet LAN/OTN Flexible Interface Module</b>  |
| <b>Safety standards</b> | <ul style="list-style-type: none"> <li>• UL/CSA/IEC/EN 60950-1</li> <li>• AS/NZS 60950.1</li> <li>• IEC/EN 60825 Laser Safety</li> <li>• FDA - Code of Federal Regulations Laser Safety</li> </ul> |

| Feature  | Description   |
|--|---|
|  | <b>Cisco CRS 2 port 100 Gigabit Ethernet and 5 port 40 Gigabit Ethernet LAN/OTN Flexible Interface Module</b>   |
| <b>EMI</b>   | <ul style="list-style-type: none"> <li>• FCC Class A</li> <li>• ICES 003 Class A</li> <li>• AS/NZS CISPR 22 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 (10V/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: Signal Ports (1 kV)</li> <li>• IEC/EN-61000-4-5: Surge DC Port (1 kV)</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> | <p>This product is designed to meet the following requirements (qualification in progress):</p> <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>  |

## Additional Specifications

Table 3 provides information about ordering Cisco CRS 100 Gigabit Ethernet pluggables.

**Table 3.** Ordering Pluggables

| 100 Gigabit Ethernet Optics   | Maximum Distance |
|---|------------------|
| 100 Gigabit Ethernet long-reach over 4 WDM Lanes (LR4) Optics (single-mode fiber) | 6.2 mi (10 km)   |
| Cisco 4-port 100G CPAK Gigabit Ethernet LR4 (10 km) Optics                        | 6.2 mi (10 km)   |
| Cisco 4-port 100G SR10 Gigabit Ethernet SR10 (100M) Optics                        | 100m - 150m      |

## 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 4.** Ordering Information

| Product Name   | Part Number                    |
|--|--------------------------------|
| Cisco CRS 2 port 100 Gigabit Ethernet and 5 port 40 Gigabit Ethernet LAN/OTN Flexible Interface Module | 2X100GE-FLEX-40                |
| Cisco 4-port 100G CPAK Gigabit Ethernet LR4 (10 km) Optics   | CPAK-100G-LR4                  |
| QSFP+ Transceiver Module for MMF, 12-Fiber MPO/MTP Connector   | QSFP-40G-SR4                   |
| QSFP Transceiver Module for Single Mode Fiber, Multi-rate Support (40G Ethernet & OTU3)                | QSFP-40GE-LR4,<br>QSFP-40G-LR4 |
| QSFP Transceiver Module for Single Mode Fiber, Multi-rate Support (40G Ethernet & OTU3), up to 40KM    | QSFP-40G-ER4                   |

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- Coordinate every step through to interworking, and deploy your solution in a predictable, efficient, accurate way
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## For More Information

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

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