Cisco CRS Multichassis System

The Cisco® Carrier Routing System (CRS) 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.

The increasing demand for bandwidth, propelled by new devices, cloud technologies, machine-to-machine communication, and media-rich applications, presents a capacity challenge in core networks. Expanding the core capacity with the Cisco CRS is a transparent, cost-effective process. Built for the next generation of Internet technologies, the Cisco CRS delivers continuous, always-on operations, capable of scaling from a single-chassis deployment into a massive multichassis system.

Scaling from a single-chassis to a multichassis system allows service providers to expand their network without increasing the complexity of their routing architecture. A Cisco CRS multichassis system consists of two major elements: a line card chassis (LCC) and a fabric card chassis (FCC). The LCC hosts performer route processor (PRP) cards, the first and third stages of switch fabric cards, and line cards that provide the physical interface and process data packets. The FCC hosts the second stage of the switch fabric cards. The LCC and FCC are connected by a set of optical cables. Expanding your core network capacity is a smooth process for the Cisco CRS, supported by in-service hardware and software upgrades.

Network capacity can be increased in incremental steps with the back-to-back capabilities of the Cisco CRS 8-Slot and CRS16-Slot Line Card Chassis. When more network capacity is needed, chassis can be added to the system without complicating the network architecture. Existing CRS 8-slot LCCs can be paired back to back and are scalable to match the capacity of a CRS 16-slot LCC. With these capabilities, the CRS system offers an unprecedented level of investment protection.

A Cisco CRS 16-slot back-to-back system (Figure 1) allows network operators to double the network capacity without the need for an FCC to handle the multidirectional data flow. A back-to-back system is also called a 2+0 system because it includes two LCCs and zero FCCs. A CRS back-to-back multichassis system provides the same capacity and capabilities as a traditional 2+1 multichassis deployment (two LCCs and one FCC). The 2+0 back-to-back system has all the benefits of a 2+1 multichassis system while mitigating capital expenditures (CapEx) and operating expenses (OpEx) by eliminating the immediate need for an FCC. Pairing two LCCs to create a CRS back-to-back system does not require any dedicated slots for interconnection; switch fabric cards and optical cables connect the chassis to form a single logical system that maintains full bandwidth between chassis.

Figure 1. Cisco CRS 16-Slot Back-to-Back (2+0) System

The system does not require topology changes, providing a smooth, uninterrupted path for expanding to a full-scale multichassis system. The 2+0 back-to-back system can be transparently migrated to a full-scale multichassis system while in service by adding a Cisco CRS FCC and up to eight additional CRS LCCs.

The flexible and scalable design of the Cisco CRS is used for all types of deployment scenarios, scaling from single-chassis deployments to massive multichassis systems. The CRS multichassis system supports configurations from 2+1 up to 9+1, as well as the 2+0 configuration. Tables 1 and 2 show how the CRS scales from a single chassis to a back-to-back system and into a multichassis system.

Table 1. Cisco CRS Multichassis Scaling Options

Chassis	CRS 8-Slot	CRS 8-Slot 2+0 Back to Back
		
Chassis compatibility (product part numbers)	CRS-8/S CRS-8/S-B	CRS-8/S CRS-8/S-B
Aggregate switching capacity	2.24 Tbps	4.48 Tbps
Number of forwarding slots	8	16

Table 2. Cisco CRS Multichassis Scaling Options

Chassis	CRS 16-Slot	CRS 16-Slot 2+0 Back to Back	CRS 16-Slot X+1 Multichassis (X = 3 to 9)
			
Chassis compatibility (product part numbers)	CRS-16/S CRS-16/S-B	CRS-16/S CRS-16/S-B	CRS-16/S CRS-16/S-B CRS-FC24
Aggregate switching capacity	6.4 Tbps to 12.8 Tbps	12.8 Tbps to 25.6 Tbps	Up to 922 Tbps
Number of forwarding slots	16	32	Up to 1152

A Cisco CRS multichassis system provides the following advantages:

- Expands the network capacity without increasing the complexity of network and routing architecture
- Supports in-service migration from a single chassis to a back-to-back system to a full-scale multichassis system
- Supports a mix of 40-Gbps,140-Gbps, and 400-Gbps line card chassis in a single system
- Supports a mix of 40-Gbps, 140-Gbps, and 400-Gbps line cards in single line card chassis
- The CRS 8-slot and CRS 16-slot LCCs use the same back-to-back cables

Expanding a Single Chassis to a Back-to-Back System

Upgrading to a Cisco CRS back-to-back system requires two components: the conversion kit and an additional LCC - an additional 8-slot LCC to pair with an 8-slot LCC or an additional16-slot LCC to pair with a 16-slot LCC. Tables 3 and 4 list product part numbers and descriptions for upgrading a single 16-slot or 8-slot chassis to a 2+0 back-to-back system.

Table 3. Components for Upgrading a Cisco CRS 8-Slot Single-Shelf System to a Back-to-Back System

Product Part Number	Quantity	Product Description
CRS-8-B2B Bundle	1	Conversion kit for upgrading to a 2+0 8-slot back-to-back system

Table 4. Components for Upgrading a Cisco CRS 16-Slot Single-Shelf System to a Back-to-Back System

Product Part Number	Quantity	Product Description
CRS-16-B2B Bundle	1	Conversion kit for upgrading to a 2+0 16-slot back-to-back system

Expanding to a Full Multichassis System

To expand beyond a back-to-back system, a fabric card chassis is needed for interconnections to multiple Cisco CRS 16-slot systems. The interconnectivity of FCCs and Cisco CRS16-slot systems allows the system capacity of the Cisco CRS to gracefully scale from 6.4 to 922 Tbps. The key components for upgrading to a full-scale multichassis system are shown in Table 5.

Table 5. Components for Upgrading to a Full Multichassis System

Product Part Number	Quantity	Product Name and Description
CRS-16-MC-B	1	CRS Multichassis System Bundle
CRS-16-MC140-Conv=	1	CRS Multichassis conversion kit

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