Cisco CRS-3 Carrier Routing System 8-Slot Back-to-Back Cabling and Upgrade Guide

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CONTENTS

Preface

Preface vii

Objective vii

Audience vii

Changes to This Document vii

Document Organization viii

Document Conventions viii

Related Cisco CRS Documentation ix

Obtaining Documentation and Submitting a Service Request x

CHAPTER 1

Introduction to the CRS-3 Back-to-Back System 1

System Overview 1

Cabling Overview 1

System Management, Alarm, and Network Clock Cabling 2

Fabric Cabling 2

PLIM Port Cabling 2

General Cabling Prerequisites 2

Space and Environmental Considerations 2

Tools and Supplies Required 2

Cables Required 3

Cable Routing Considerations 4

Raised Floor Installations 4

Cable Characteristics 4

Cable Length 4

Cable Bend Radius 5

General Cabling Procedures 5

General Safety Guidelines 5

CHAPTER 2 **Cabling for System Management, Alarms, and Network Clocking** 7

Console Port Cabling 7

Auxiliary Port Cabling 8

Management Ethernet Port Cabling 8

Alarm Module Alarm-Out Cabling 8

What to Do Next 8

CHAPTER 3 **Cabling the CRS-3 Back-to-Back System** 9

About Fabric Cabling 9

About Fabric Planes in the CRS-3 Back-to-Back System 10

Cisco Systems Fabric Cables 13

Planning Fabric Cabling 15

Chassis Cable Routing 15

Planning Cable Labels 19

Label Schema Example 20

Cabling the Fabric 21

Precautions 21

Prerequisites 22

How to Connect the Fabric Cables 22

Attach 8-Slot Chassis 23

General Fabric Cabling Procedures 24

Installing Turn Collars 24

Cleaning Cables 26

Verifying the Fabric 27

What to Do Next 31

CHAPTER 4 **Upgrading to a CRS-3 Back-to-Back System Using Cisco IOS-XR 4.3.1 or Earlier** 33

Information About Upgrading to a CRS-3 Back-to-Back System 33

Prerequisites for Upgrading to a CRS-3 Back-to-Back System 34

How to Upgrade to a CRS-3 Back-to-Back System 34

Upgrading the Fabric Cards 35

Summary Steps 35

Detailed Steps 37

What to Do Next 41

Connecting the Control Network 41
Prerequisites for Connecting the Control Network 42
What to Do Next 42
Adding a Chassis to a CRS-3 Back-to-Back System 42
Prerequisites 42
Summary Steps 42
Detailed Steps 44
Tips and Troubleshooting 47
Technical Assistance 48

CHAPTER 5 **Upgrading to a CRS Back-to-Back System Using Cisco IOS-XR 5.1.1 or Later** 49
Prerequisites for Upgrading to a CRS-3 Back-to-Back System 49
Changing the Fabric Addressing Mode 50
Changing the Fabric Addressing Mode 51
How to Upgrade to a CRS-3 Back-to-Back System 53
Upgrading the Fabric Cards 53
Prerequisites 53
Restrictions 54
Summary Steps 54
Detailed Steps 56
What to Do Next 59
Connecting the Control Network 59
What to Do Next 60
Adding an LCC to a CRS-3 Back-to-Back System 60
Prerequisites 60
Restrictions 61
Summary Steps 61
Detailed Steps 63
Tips and Troubleshooting 66
Technical Assistance 66

Preface

This preface contains the following sections:

- Objective, page vii
- Audience, page vii
- Changes to This Document, page vii
- Document Organization, page viii
- Document Conventions, page viii
- Related Cisco CRS Documentation, page ix
- Obtaining Documentation and Submitting a Service Request, page x

Objective

This guide describes how to interconnect the two 8-slot chassis that comprise the CRS Back-to-Back System . This guide supplements other chassis documentation, such as site planning and installation documents.

Audience

This guide is written for hardware installers and system administrators of Cisco routers.

This publication assumes that the user has a substantial background in installing and configuring router and switch-based hardware. The reader should also be familiar with electronic circuitry and wiring practices, and have experience as an electronic or electromechanical technician.

Changes to This Document

This table lists the technical changes to this document since it was first released.

Table 1: Changes to This Document

Date	Change Summary
January 2014	Added chapter with procedures for upgrading from Cisco IOS-XR release 5.1.1 or later.
May 2013	Initial release of this document.

Document Organization

This guide includes the following sections:

Section	Title	Description
1	Introduction to the CRS-3 Back-to-Back System, on page 1	Provides an overview of the CRS Back-to-Back System and describes what is required to interconnect system components.
2	Cabling for System Management, Alarms, and Network Clocking, on page 7	Provides information about how to provide cabling for basic system management.
3	Cabling the CRS-3 Back-to-Back System, on page 9	Describes how to physically cable the fabric planes between chassis in a Back-to-Back system
4	Upgrading to a CRS-3 Back-to-Back System Using Cisco IOS-XR 4.3.1 or Earlier, on page 33	Describes how to upgrade a single-chassis Cisco CRS-1 or Cisco CRS-3 to a CRS Back-to-Back System using Cisco IOS-XR version 4.3.1 or earlier.
5	Upgrading to a CRS Back-to-Back System Using Cisco IOS-XR 5.1.1 or Later, on page 49	Describes how to upgrade a single-chassis Cisco CRS-3 to a CRS Back-to-Back System using Cisco IOS-XR version 5.1.1 or later.

Document Conventions

This document uses the following conventions:

Caution Caution: Means *be careful*. You are capable of doing something that might result in equipment damage or loss of data.

Note Note: Means *take note* . Notes contain helpful suggestions or references to materials not contained in this manual.

Tip Note: Means *the described action saves time* . You can save time by performing the action described in the paragraph.

Warning This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the Regulatory Compliance and Safety Information document that accompanied this device. Statement 1071.

Understanding Warning Statement Numbers

Each Warning in this guide contains a Statement Number. For example, the previous warning is Statement 1071. The *Regulatory Compliance and Safety Information for the Cisco CRS-1 Carrier Routing System* booklet contains translations of every warning that appears in this guide. The compliance and safety booklet shipped with your chassis. The booklet lists translated warnings in numerical sequence, by statement number.

Related Cisco CRS Documentation

This section refers you to other documentation that contains complete planning, installation, and configuration information.

The documentation listed below is available online.

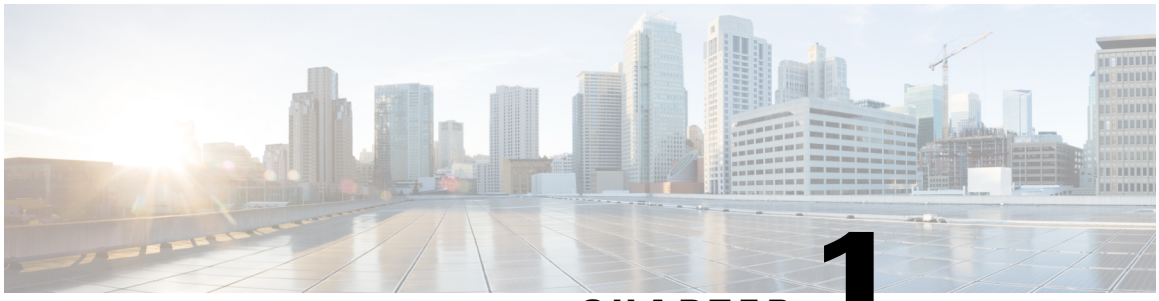
- *Cisco CRS Carrier Routing System 8-Slot Line Card Chassis Site Planning Guide*
- *Cisco CRS Carrier Routing System 8-Slot Line Card Chassis Installation Guide*
- *Cisco CRS Carrier Routing System 8-Slot Line Card Chassis Unpacking, Moving, and Securing Guide*
- *Regulatory Compliance and Safety Information for the Cisco CRS Carrier Routing System*
- *Cisco CRS Carrier Routing System 8-Slot Line Card Chassis Enhanced Router Site Planning Guide*
- *Cisco CRS Carrier Routing System 8-Slot Line Card Chassis Enhanced Router Installation Guide*
- *Cisco CRS Carrier Routing System 8-Slot Line Card Chassis Enhanced Router Unpacking, Moving, and Securing Guide*
- *Cisco CRS-1 Carrier Routing System Fiber-Optic Cleaning Guide*

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation* , which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS Version 2.0.



CHAPTER 1

Introduction to the CRS-3 Back-to-Back System

This chapter provides an overview of the CRS-3 Back-to-Back System and describes what is required to interconnect system components.

The chapter covers the following topics:

- System Overview, page 1
- Cabling Overview, page 1
- General Cabling Prerequisites, page 2
- Cable Routing Considerations, page 4
- General Cabling Procedures, page 5
- General Safety Guidelines, page 5

System Overview

The CRS 8-slot system consists of either a single chassis or back-to-back chassis. In a CRS-3 Back-to-Back System, you can connect two single, 8-slot chassis together using fabric cards and cables. The two chassis then act as a single routing entity, expanding the system from 8 to 16 slots.

The CRS-3 Back-to-Back System connects two 8-slot chassis without the fabric card chassis (FCC) or S2 cards. Instead, two 8-slot chassis are connected using a set of back-to-back cables. Migration from a single 8-slot to a B2B can be done seamlessly and in service.

The CRS-3 Back-to-Back System is supported only on CRS-3 with Performance Router Processors (PRPs). You can upgrade a CRS-1 or a CRS-3 single chassis to a CRS-3 Back-to-Back System.

Cabling Overview

CRS-3 Back-to-Back System cabling can be divided into the following groups:

1 System Management, Alarm, and Network Clock Cabling, on page 2

2 Fabric Cabling, on page 2

3 PLIM Port Cabling, on page 2

You should cable a CRS-3 Back-to-Back System in this order.

System Management, Alarm, and Network Clock Cabling

Chapter 2, "Cabling for System Management, Alarms, and Network Clocking" describes the cabling for system management connections, the optional network clock feature, and the optional external alarm feature. You must cable at least one form of system management connection before system configuration can start.

Fabric Cabling

Cabling the CRS-3 Back-to-Back System, on page 9 chapter describes the cabling between the fabric components in the two 8-slot chassis. The fabric cabling provides the data connection for traffic between two 8-slot chassis. You must complete the fabric cabling to enable data communications through the CRS-3 Back-to-Back System. There are two types of fabric cables: Trimese and Riser.

PLIM Port Cabling

All router data traffic enters the CRS-3 Back-to-Back System through lines connected to the physical layer interface modules (PLIMs). For information about PLIM cards and connectors, see the PLIM notes and installation guides on http://www.cisco.com.

General Cabling Prerequisites

The prerequisites for cabling a CRS-3 Back-to-Back System include the following:

- Adequate floor space to cable the system
- An environment that meets specifications
- Minimum system components required to create a CRS-3 Back-to-Back System
- Tools required to perform the installation
- Proper cables required to interconnect the chassis to each other and their power sources

These prerequisites are explained in the following sections:

Space and Environmental Considerations

Space, power, and environmental specifications are cited in the Cisco CRS Carrier Routing System 8-Slot Line Card Chassis Site Planning Guide and the Cisco CRS Carrier Routing System 8-Slot Line Card Chassis Enhanced Router Site Planning Guide .

Tools and Supplies Required

The following tools and supplies are required to cable the CRS-3 Back-to-Back System:

- ESD (ElectroStatic Discharge) wrist strap (for inserting optical modules)
- Torx T6 wrench (to screw or unscrew the bolt on the fabric cable connector to the S13 fabric card).
- Medium (number 2) Phillips screwdriver.
- Medium flat-blade screwdriver (1/4 inch [60 - 70 mm]). This screwdriver is optional; it is used for opening the bale latches on small form-factor pluggable [SFP] or Gigabit Interface Converter [GBIC] transceivers.
- Turn collars (to provide support and strain relief for fabric cable connections). The turn collars are supplied with the cable.
- Supply of Velcro tie wraps (to bundle cables).
- Ladder.

Cables Required

The cables listed in the below table are required for each 8-slot chassis in a CRS-3 Back-to-Back System installation.

Note The cables required for an 8-slot chassis and for a 16-slot chassis in the CRS-3 Back-to-Back System are the same.

Table 2: Cables Required to Install a CRS-3 Back-to-Back System

Cable Product ID	Description	Purpose
Trimese: CRS-B2B-CAB-*xx* = (where *xx* is the length in meters) Riser: CRS-B2B-CAB-*xx* R= (where *xx* is the length in meters)	Trimese: Carrier Routing System-Back-to-Back-Cable (Optical) Riser: Carrier Routing System-Back-to-Back-Cable (Optical), riser-rate	To interconnect fabric cards between the 8-slot chassis. **Note** 8 cables are required for each CRS-3 Back-to-Back System.
	Gigabit Ethernet cables	To connect the PRP cards between two chassis To connect console cables to the router

For more information on the range of lengths available for the Cisco CRS fabric cables, refer to the Table 3: Fabric Cables for the CRS-3 Back-to-Back System, on page 13 table that lists the product ID numbers for Cisco CRS fabric cables. Evaluate your installation for the appropriate length of fabric cable needed before ordering.

Cable Routing Considerations

In the CRS-3 Back-to-Back System, two 8-slot chassis are cabled together. Whether the cables are run overhead or under the floor, consider the airflow and cable characteristics of the combined cable sets. Ensure that your cable management structures match or exceed the total capacity of cables for the CRS-3 Back-to-Back System installation.

The following sections provide some cable routing guidelines:

Raised Floor Installations

To plan cable routing in an installation with a raised floor, consider all the characteristics of each cable required for the installation. Allow slack for cabling so that cables can be pooled under the floor for future expansion without exceeding bend radius or cable length limitations. Only use Riser cables in an installation with a raised floor. Riser cables are not rated for installation in air plenum passages, nor are they designed for use in LSZH (low smoke zero halogen) applications.

Cable Characteristics

To plan your cable runs, consider the characteristics of each cable, such as the cable length limitations, combined diameter of bundled cables (such as power cables), weight of the cable groups, and bend radius of the cable or cables. Couple these considerations with the cable infrastructure available (or needed) at your facility. The infrastructure could include structures like the overhead cabling monorail or J-hook system, sleeve and riser diameters, and distances between floors or elements of the CRS-3 Back-to-Back System.

Analyze the cabling infrastructures, risers, and racking available in your facility to determine if the capacity of the cabling management systems at your facility will accommodate the required capacities of the CRS-3 Back-to-Back System cabling.

Note Trimese fabric (CRS-B2B-CAB-xx) carries a dual flame rating: *general purpose* and *LSZH* (low smoke zero halogen). These cables are designed to connect two 8-slot chassis in the free air of the room. Route fabric cables within a room. Fabric cables are not rated for installation above ceilings, below floors, or through walls. Riser fabric cables (CRS-B2B-CAB-xxR) meet the OFNR riser cable flame rating. These cables are designed to connect two 8-slot chassis, either in the free air within a room, or, through a riser access between building floors. Riser cables are not rated for installation in air plenum passages, nor are they designed for use in LSZH (low smoke zero halogen) applications.

Cable Length

The limit of the cables is 100 m (328 ft). Consider this distance when planning the physical locations of the 8-slot chassis. For more information on the range of lengths available for the Cisco CRS fabric cables, refer to Cisco Systems Fabric Cables, page 3-5 in Chapter 3, “Cabling the CRS-3 Back-to-Back System.” Table 3-1 lists the product ID numbers for Cisco CRS fabric cables. Evaluate your installation for the appropriate length of fabric cable needed before ordering.

Cable Bend Radius

Exceeding the bend radius allowed for a cable can break the glass in the cable or cause attenuation or loss of signal. Do not bend a cable more than the allowable bend radius.

Figure 1: How a Bend Radius Is Specified, on page 5 shows an example of how a bend radius is measured for Trimese cables. In this figure, the cable has a 1 in (2.54 cm) radius. If the cable is specified to wrap around the arc that is formed by the circle with the 1-inch radius, the cable is said to have a *1-inch bend radius* . Note the following:

- For Trimese and Riser cables, the bend radius should not be less than 2".
- For Riser cables, the bend radius should not exceed the bend that is established by the strain relief collars.

Figure 1: How a Bend Radius Is Specified

General Cabling Procedures

Before you start attaching cables, determine whether you will route the interconnection cables upward or downward from the fabric card. The direction determines whether you will install the fabric cable turn collar (see Installing Turn Collars, on page 24) pointing up or down.

Handle all cables carefully. Fiber-optic cables require special care as follows:

- Do not allow a fiber-optic cable to bend in a radius smaller than the allowable bend radius specified for that cable type.
- Fiber-optic cables are glass. Do not step on fiber-optic cables or handle them roughly. Do not twist or stretch the cables.
- To keep optical connections clean, do not remove the cable dust cover until immediately before you install the cable. See Cisco CRS-1 Carrier Routing System Fiber-Optic Cleaning Guide for details.
- After you install a cable, immediately reserve each dust cover for storage by office personnel in a dust-free storage area. After all of the cables have been installed ensure that all the reserved dust covers are stored by office personnel in a dust free area for future use.
- Install clean dust covers on every unused connection.
- Consider labeling the chassis interconnection cables or creating a diagram of the cabling to ensure that the cables are connected correctly during system installation.
- Consider labeling the chassis. Consider whether each chassis must be physically positioned in sequence. Label each cable with the location of each termination as you install each cable.

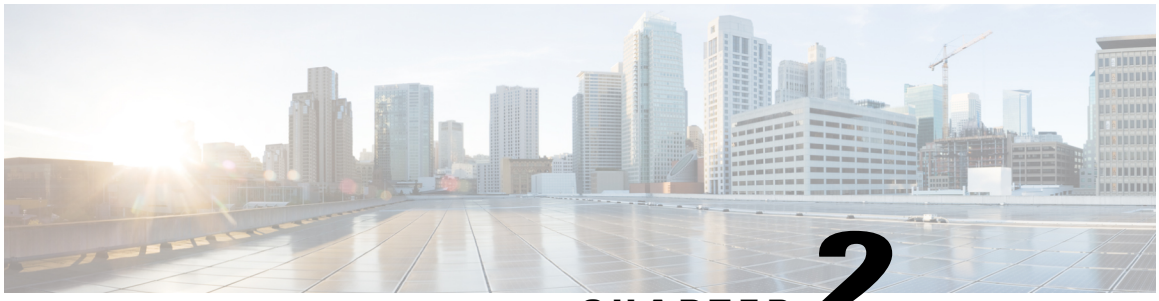
General Safety Guidelines

Before you perform any procedure in this document, review the safety guidelines in this section to avoid injuring yourself or damaging the equipment.

The following guidelines are for your safety and to protect equipment. The guidelines do not include all hazards. Be alert.

Note Review the Document Conventions, on page viii . In addition, review the safety warnings listed in Regulatory Compliance and Safety Information for the Cisco CRS Carrier Routing System before installing, configuring, or troubleshooting any installed card. This booklet is shipped with your system.

- Never attempt to lift an object that could be too heavy for you to lift by yourself.
- Keep the work area clear and dust free during and after installation. Do not allow dirt or debris to enter into any laser-based components.
- Keep tools and router components away from walk areas.
- Do not wear loose clothing, jewelry, or other items that could get caught in the router while working with cards, modules, and their associated components.
- Cisco equipment operates safely when used in accordance with its specifications and product-usage instructions.
- Do not work alone if potentially hazardous conditions exist.
- The installation must follow national and local electrical codes: in the United States, National Fire Protection Association (NFPA) 70, United States National Electrical Code; in Canada, Canadian Electrical Code, part I, CSA C22.1; in other countries, International Electrotechnical Commission (IEC) 60364, part 1 through part 7.



CHAPTER 2

Cabling for System Management, Alarms, and Network Clocking

The CRS-3 Back-to-Back System supports several options for system management connections, and it provides connections for triggering external alarms and controlling optical cable clocking. A console port connection must be established before the system can be configured and become operational. The optional external alarm and network clocking features can be cabled at any time.

This chapter describes the following cabling options:

- Console Port Cabling, page 7
- Auxiliary Port Cabling, page 8
- Management Ethernet Port Cabling, page 8
- Alarm Module Alarm-Out Cabling, page 8
- What to Do Next, page 8

Console Port Cabling

The initial configuration of an PRP takes place through the console port. Although PRPs have Ethernet ports, the Ethernet ports cannot be used until they are configured.

To connect to any of the console ports in the CRS-3 Back-to-Back System, use a rollover cable with an RJ-45 connector on the end that connects to the CRS-3 Back-to-Back System component. Typically, the other end of the rollover cable also uses an RJ-45 connector. The other end of the rollover cable may connect to a terminal, computer running terminal emulation software, or terminal server. Adapters are available to connect the RJ-45 connector on the rollover cable to a variety of serial ports. For more information on rollover cables and connectors, see the following web page:

http://www.cisco.com/en/US/docs/switches/wan/mgx/mgx_8850/software/mgx_r3/rpm/rpm_r1.5/configuration/guide/rpmappb.html#wp1003614

For information on connecting to the console port on an PRP, see the *Cisco IOS XR Getting Started Guide* .

Auxiliary Port Cabling

Auxiliary ports are provided on the PRP card for remote connections through modems. PRP auxiliary ports can be used to configure the CRS-3 Back-to-Back System.

The typical connection to the auxiliary ports uses a serial cable with RJ-45 connectors at each end. As with the rollover cable, adapters are available to connect the RJ-45 connector at the other end to a variety of serial port types. The *Cisco IOS XR Getting Started Guide* provides illustrations that show how PRP auxiliary ports are connected through modems to a remote terminal.

Management Ethernet Port Cabling

Each PRP provides a Management Ethernet port that can be used to manage the PRP through an Ethernet network. This port can also be used to download software to PRPs in the CRS-3 Back-to-Back System or transfer files to remote servers for analysis or backup storage.

The typical connection to the Management Ethernet port uses an Ethernet cable with RJ-45 connectors at each end. The other end of the cable typically connects to an Ethernet switch, hub, or router that provides connectivity between the CRS-3 Back-to-Back System and networks from which system management is desired.

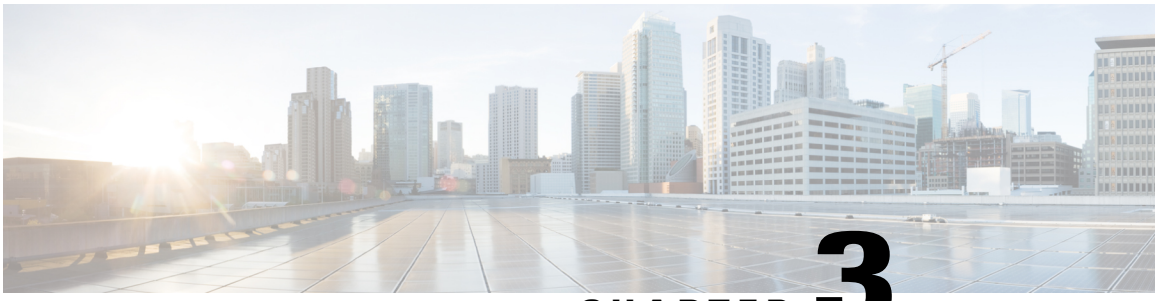
For information on connecting to the Management Ethernet port on an PRP, see the *Cisco IOS XR Getting Started Guide* .

Alarm Module Alarm-Out Cabling

Each AC or DC power shelf in 8-slot chassis contains an alarm module that monitors the status of the power shelf and provides an external interface for system alarms. The same alarm module is used in all power shelves. For more information on alarm module connections, see the Cisco CRS Carrier Routing System 8-Slot Line Card Chassis System Description .

What to Do Next

When you have completed the cabling connections described in this chapter, document these connections and forward them to the people who will configure the system. For example, if you have cabled the console port to a terminal server so that people can access the console port from a network, they need the IP address of the terminal server and corresponding port number before they can use the console port.



CHAPTER 3

Cabling the CRS-3 Back-to-Back System

The cables used to interconnect the CRS-3 Back-to-Back System chassis are optical array cables called fabric cables. This chapter describes how to physically cable the fabric planes between 8-slot chassis in a CRS-3 Back-to-Back System. This chapter is organized into the following sections:

- About Fabric Cabling, page 9
- Planning Fabric Cabling, page 15
- Cabling the Fabric, page 21
- General Fabric Cabling Procedures, page 24
- What to Do Next, page 31

About Fabric Cabling

Note The cables required for an 8-slot chassis and for a 16-slot chassis in the CRS-3 Back-to-Back System are the same.

Each CRS-3 Back-to-Back System requires 8 fabric cables. This cabling enables interchassis data communication, which is accomplished using fiber-optic bundles.

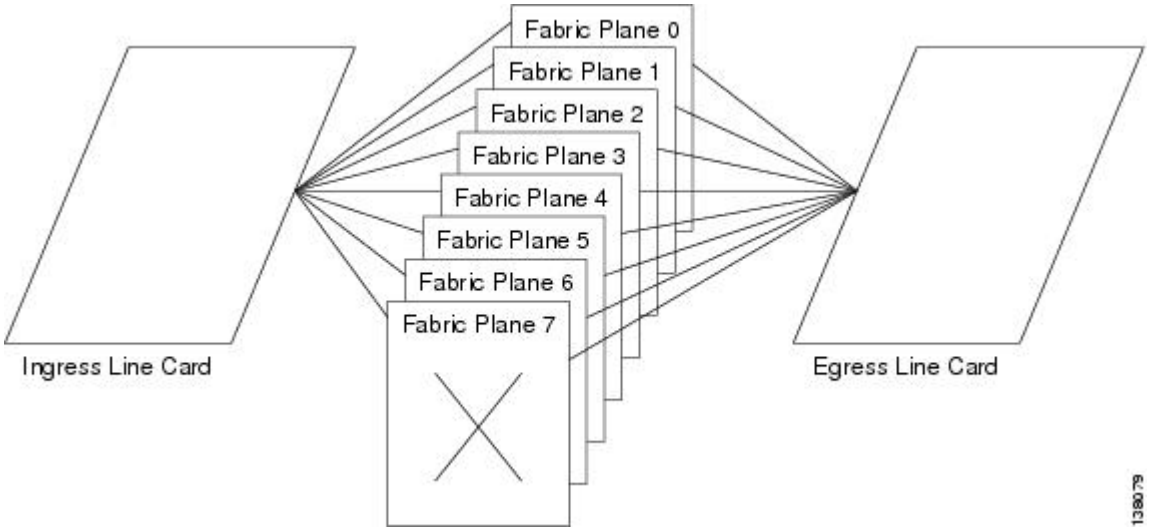
The CRS-3 Back-to-Back System uses a customized cable/connector that visually looks the same as the multichassis cable/connector with a different PIN layout. The way to distinguish the fabric cables for the CRS-3 Back-to-Back System is a label that says Back-to-Back.

This section describes the following topics:

About Fabric Planes in the CRS-3 Back-to-Back System

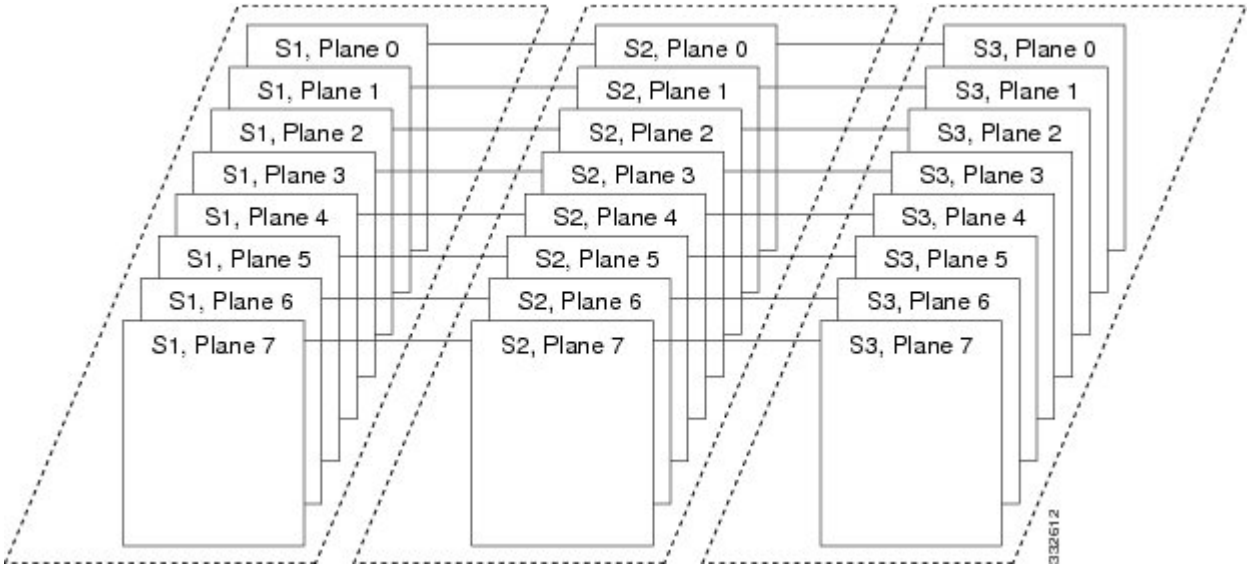
The CRS-3 Back-to-Back System has eight fabric planes that support data traffic between the lines connected to the 8-slot chassis. The below figure shows a simplified view of the relationship between the line cards and the fabric.

Figure 2: Relationship of Line Cards and Fabric Cards



In general, CRS fabric planes are divided into three components or stages, which are numbered S1, S2, and S3. Data arrives at the S1 stage then goes through the S2 stage and exits at the S3 stage to the destination line card. The figure below shows a simplified view of the relationship between the line cards and the fabric planes in a general CRS system.

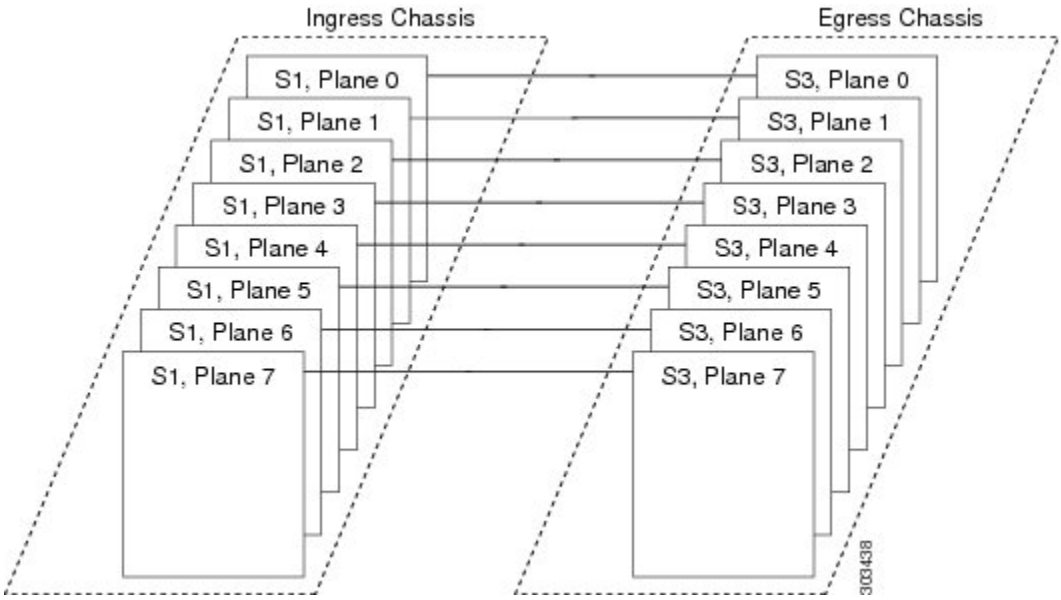
Figure 3: General CRS Fabric Plane Stages



However, in a CRS-3 Back-to-Back System, fabric planes are divided into two stages: S1 and S3. The S2 stage is no longer needed. The purpose of the S2 stage is to direct traffic to the correct egress 8-slot chassis when there are multiple egress 8-slot chassis. In the CRS-3 Back-to-Back System, there is only one egress 8-slot chassis.

Data arrives at the S1 stage in the ingress 8-slot chassis and then passes over the fabric cables to the S3 stage in the egress 8-slot chassis. The figure below shows a simplified view of the relationship between the line cards and the fabric planes in a CRS-3 Back-to-Back System.

Figure 4: CRS Back-to Back Fabric Plane Stages

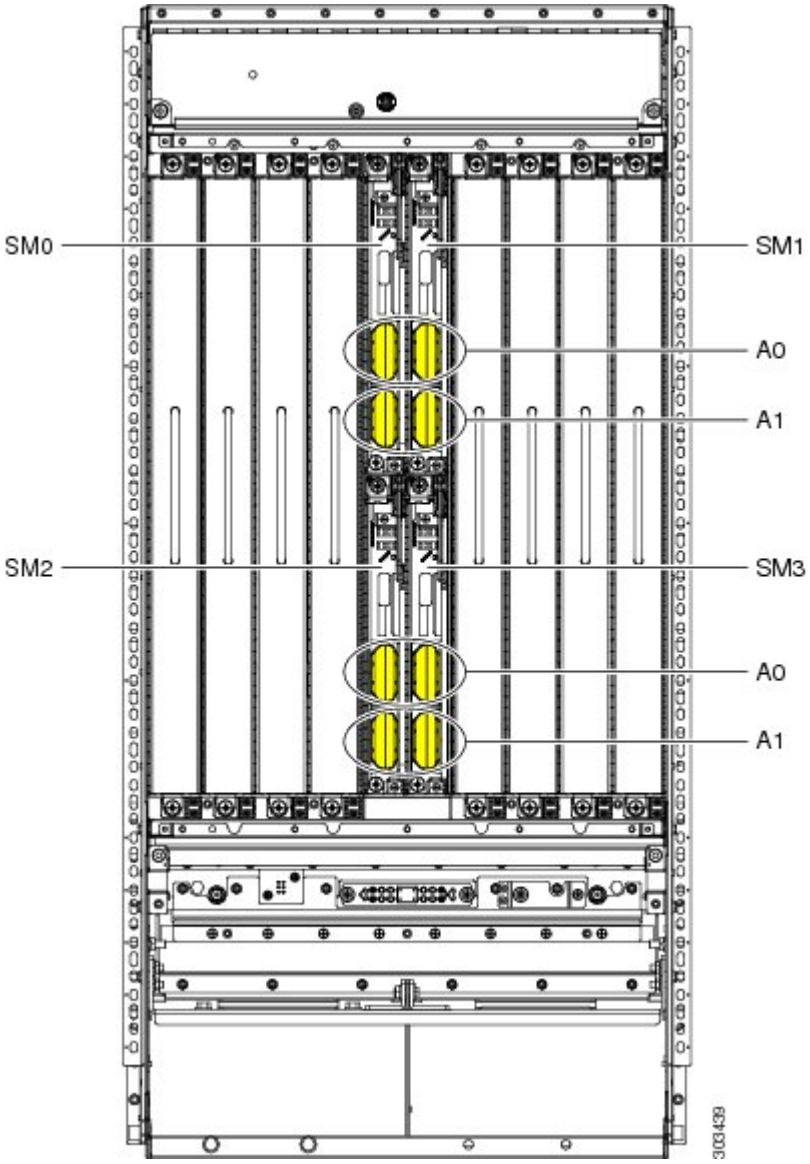


Note Refer to Figure 6: CRS-3 Back-to-Back System with Fabric Plane Interconnections, on page 16 for physical cabling examples.

In each 8-slot chassis, one S13 fabric card supports 2 fabric planes. Therefore, there are four S13 fabric cards with 8 planes. All ingress traffic enters through the S1 stage of the ingress S13 card, travels over the fabric cables and exits through the S3 stage on an S13 fabric card. Data traffic can enter through the S1 stage on one card and then exit the S3 stage on the same card.

The figure below shows the location of the S13 fabric cards in each 8-slot chassis and how the connectors are labeled on those cards.

Figure 5: How Connectors Are Numbered on S13 Cards (A0 Through A1)



Note the following:

- The fabric cards are numbered 0 through 3 and are installed in slot numbers SM 0 through SM 3.
- Each fabric card has two connectors, which are labeled A0 and A1.
- Each cable on an 8-slot chassis connects to the same connector on the other 8-slot chassis. For example, on chassis 0, the card in slot SM0 has a cable coming from the A0 connector. That cable connects to the A0 connector on the card in slot SM0 on chassis 1

.

Cisco Systems Fabric Cables

The below table lists the product ID numbers for Cisco CRS fabric cables. The cables listed in the table below can be ordered. The interconnection cables listed are shipped as a set of 8 in the meter length specified. Evaluate your installation for the appropriate length of fabric cable needed before ordering. You should try to avoid long runs of coiled cables.

In the below table, the cable name *CRS-B2B-CAB-XX* means the following:

- *CRS* is Carrier Routing System.
- *B2B* is back-to-back.
- *CAB* is cable or optical cable.
- *xx* is the length of the cable in meters.

Note The = symbol at the end of a product ID number indicates that the part is a *spare* , which means that the cable can be ordered as a spare.The R symbol at the end of a product ID number indicates that the part is a Riser cable.

Table 3: Fabric Cables for the CRS-3 Back-to-Back System

Fabric Cable Product ID	Description and Length
CRS-B2B-CAB-10	Cisco CRS-3 Back-to-Back Optical Cable 10 meters (32.8 feet)
CRS-B2B-CAB-10=	
CRS-B2B-CAB-10R	Cisco CRS-3 Back-to-Back Optical Cable Riser 10 meters (32.8 feet)
CRS-B2B-CAB-10R=	
CRS-B2B-CAB-15	Cisco CRS-3 Back-to-Back Optical Cable 15 meters (49.2 feet)
CRS-B2B-CAB-15=	
CRS-B2B-CAB-15R	Cisco CRS-3 Back-to-Back Optical Cable Riser 15 meters (49.2 feet)
CRS-B2B-CAB-15R=	
CRS-B2B-CAB-20	Cisco CRS-3 Back-to-Back Optical Cable 20 meters (65.6 feet)
CRS-B2B-CAB-20=	
CRS-B2B-CAB-20R	Cisco CRS-3 Back-to-Back Optical Cable Riser 20 meters (65.6)
CRS-B2B-CAB-20R=	

Fabric Cable Product ID	Description and Length
CRS-B2B-CAB-25	Cisco CRS-3 Back-to-Back Optical Cable 25 meters (82 feet)
CRS-B2B-CAB-25=	
CRS-B2B-CAB-25R	Cisco CRS Line Card Chassis-Fabric Chassis Riser 25 meters (82 feet)
CRS-B2B-CAB-25R=	
CRS-B2B-CAB-30	Cisco CRS-3 Back-to-Back Optical Cable 30 meters (98.43)
CRS-B2B-CAB-30=	
CRS-B2B-CAB-30R	Cisco CRS-3 Back-to-Back Optical Cable Riser 30 meters (98.43 feet)
CRS-B2B-CAB-30R=	
CRS-B2B-CAB-40	Cisco CRS-3 Back-to-Back Optical Cable 40 meters (131.2 feet)
CRS-B2B-CAB-40=	
CRS-B2B-CAB-40R	Cisco CRS-3 Back-to-Back Optical Cable Riser 40 meters (131.2 feet)
CRS-B2B-CAB-40R=	
CRS-B2B-CAB-50	Cisco CRS-3 Back-to-Back Optical Cable 50 meters (164 feet)
CRS-B2B-CAB-50=	
CRS-B2B-CAB-50R	Cisco CRS-3 Back-to-Back Optical Cable Riser 50 meters (164 feet)
CRS-B2B-CAB-50R=	
CRS-B2B-CAB-60	Cisco CRS-3 Back-to-Back Optical Cable 60 meters (197 feet)
CRS-B2B-CAB-60=	
CRS-B2B-CAB-60R	Cisco CRS-3 Back-to-Back Optical Cable Riser 60 meters (197 feet)
CRS-B2B-CAB-60R=	
CRS-B2B-CAB-70	Cisco CRS-3 Back-to-Back Optical Cable 70 meters (229.7)
CRS-B2B-CAB-70=	
CRS-B2B-CAB-70R	Cisco CRS-3 Back-to-Back Optical Cable Riser 70 meters (229.7)
CRS-B2B-CAB-70R=	

Fabric Cable Product ID	Description and Length
CRS-B2B-CAB-80	Cisco CRS-3 Back-to-Back Optical Cable 80 meters (262.5 feet)
CRS-B2B-CAB-80=	
CRS-B2B-CAB-80R	Cisco CRS-3 Back-to-Back Optical Cable Riser 80 meters (262.5 feet)
CRS-B2B-CAB-80R=	
CRS-B2B-CAB-90	Cisco CRS-3 Back-to-Back Optical Cable 90 meters (295.3feet)
CRS-B2B-CAB-90=	
CRS-B2B-CAB-90R	Cisco CRS-3 Back-to-Back Optical Cable Riser 90 meters (295.3 feet)
CRS-B2B-CAB-90R=	
CRS-B2B-CAB-100	Cisco CRS-3 Back-to-Back Optical Cable 100 meters (328 feet)
CRS-B2B-CAB-100=	
CRS-B2B-CAB-100R	Cisco CRS-3 Back-to-Back Optical Cable Riser 100 meters (328 feet)
CRS-B2B-CAB-100R=	

Planning Fabric Cabling

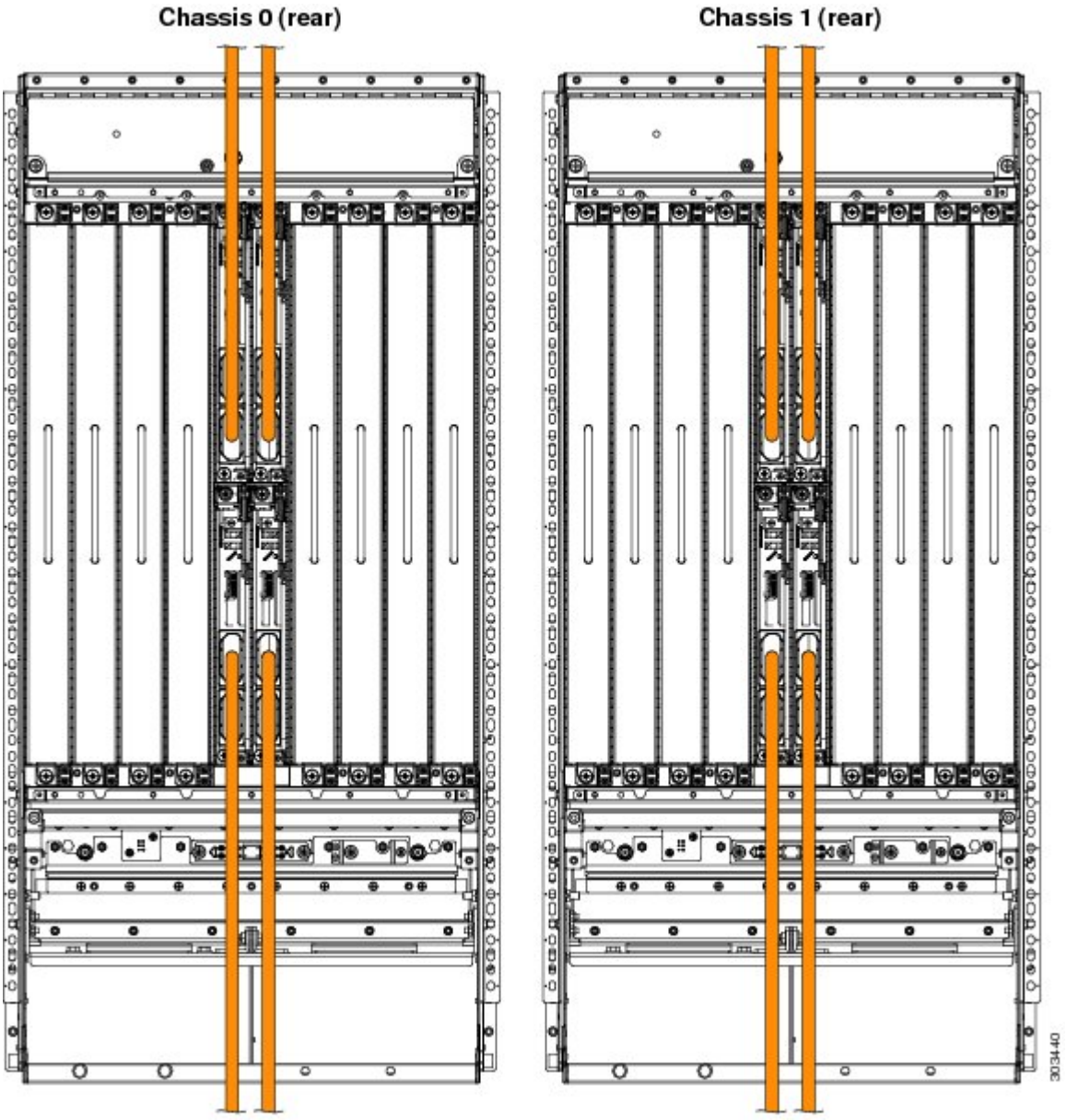
Planning the fabric cabling involves the following components:

Chassis Cable Routing

When planning your cable runs, it is convenient when cables are planned, labeled, and hung from overhead cable troughs so that the end of the cable is almost touching the floor. Allow more or less slack as cables are connected.

Before you begin cabling, develop a cabling plan for your CRS-3 Back-to-Back System. The example in the figure below shows that the cable from the top two fabric cards are routed upwards, and the cable from the bottom two fabric cards are routed downwards.

Figure 6: CRS-3 Back-to-Back System with Fabric Plane Interconnections



When preparing to cable the CRS-3 Back-to-Back System, consider the following information:

- You can connect the fabric cards in any order. For example, you can start connecting SM3 first.
- The bend radius of each fabric cable should be no smaller than the arc of the turn collar support.
- Always put the turn collar on the fabric cable *before* inserting the cable connector into the connector, as described in the Installing Turn Collars, on page 24.

- When you install a fabric cable connector into a fabric card connector, hand-tighten the screws. After you have installed all the fabric cable connectors that go on a fabric card, bundle the cables gently, in sequence, using the Velcro tie wrap on each turn collar. Use additional Velcro tie wraps as needed to route the cables.
- Fabric cables have dust covers, held on by two screws. Fabric card connectors have yellow dust covers that snap on and off. When you take dust covers off, do not put them where they can collect dust. Store unused dust covers in a clean, dust-free area.

The below figures provide a close up view of the cables attached to the fabric card.

Figure 7: Closeup of Trimese Cables Attached to Ports A0 and A1 on an S13 Card

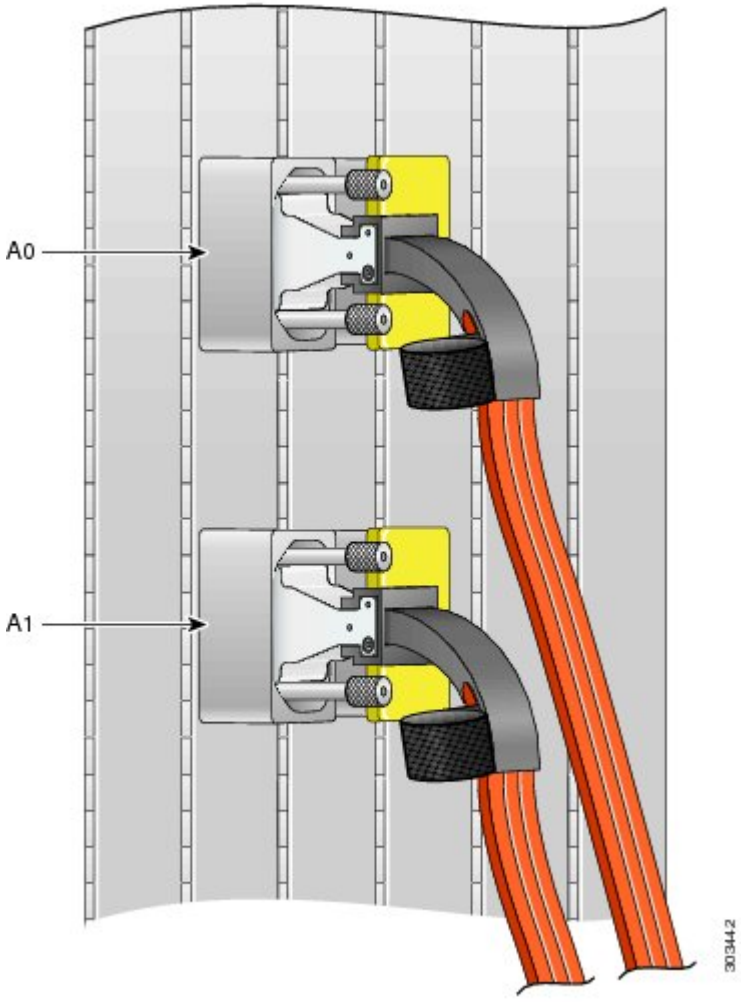
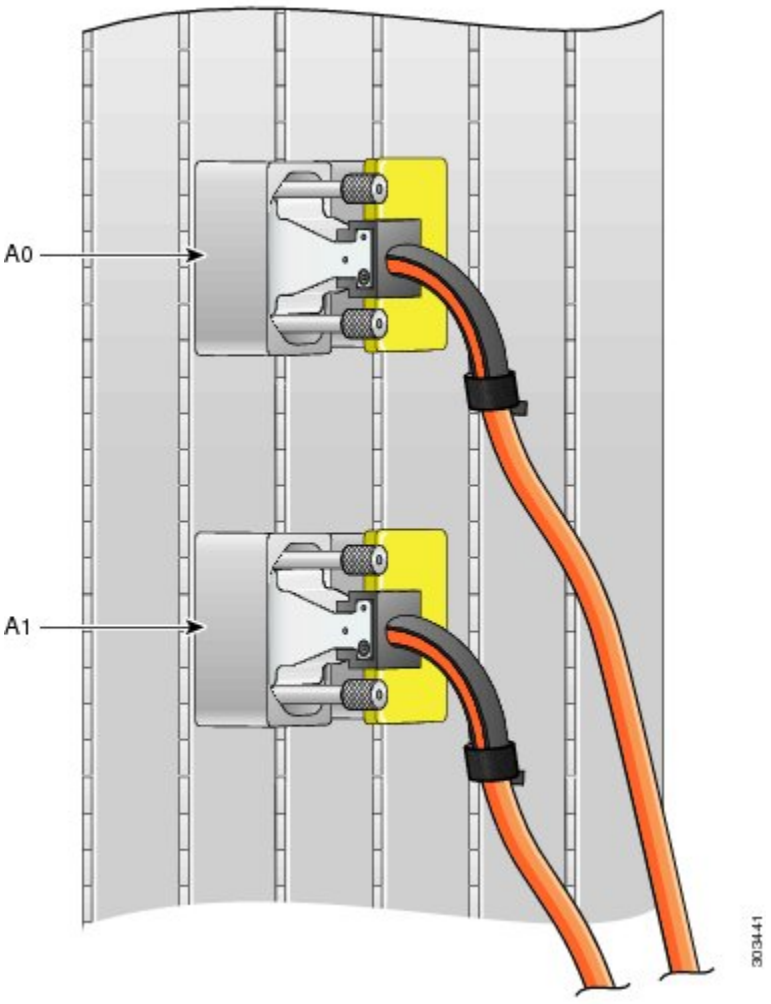


Figure 8: Closeup of Riser Cables Attached to Ports A0 and A1 on an S13 Card



Planning Cable Labels

Label cables as you unpack them. With a felt-tip pen, mark cables as *1, 2, 3* , and so on. Create a consistent labeling scheme. This section suggests a labeling scheme.

Use a label size that works best at your installation. Each label should contain the *from* and *to* port location at which either end of the cable is attached. For example, a label could contain the following information:

From:

Chassis #

Slot #/Port #

To:

Chassis #

Slot #/Port #

Where:

- Chassis # is the number for the chassis.
- *Slot #/Port #* are slot and port numbers (for example, SM3/A0, which means slot SM3, connector A0). To further explain:
  - SM0 through SM3 are slot numbers because there are 4 switch module slots that are numbered 0 through 3.
  - A0 through A1 match fabric card port numbers on the S13 card.

Label Schema Example

Note the following:

- The 8-slot chassis has four fabric card slots.
- The CRS-8-FC140/M fabric card has two connectors. For example, a fabric card in 0/SM0/SP has two connectors, 0/SM0/SP/0 and 0/SM0/SP/1.
- The fabric bundle optical connection using fabric cable between chassis are as below:

Chassis 0 Chassis 1

0/SM0/SP/0----------1/SM0/SP/0

0/SM0/SP/1----------1/SM0/SP/1

0/SM1/SP/0----------1/SM1/SP/0

0/SM1/SP/1----------1/SM1/SP/1

0/SM2/SP/0----------1/SM2/SP/0

0/SM2/SP/1----------1/SM2/SP/1

0/SM3/SP/0----------1/SM3/SP/0

0/SM3/SP/1----------1/SM3/SP/1

Note For control Ethernet cabling, see Figure 13: Connections within a CRS-3 Back-to-Back System, on page 41.

We suggest that you use a labeling schema, for example, with an Excel spreadsheet. The sample label schema shown in the below table uses the following convention: *chassis_number* /*slot_number* /*port_number* . Note the following:

- Each cable should have a minimum of two labels, one label for each end.
- Do not apply the label within 2.5 inches (6.4 cm) from the point at which the cable meets the connector, or the label will be covered by the turn collar. In addition, if the label is farther than 3.5 inches (8.9 cm) from the point at which the cable meets the connector, it might be obscured by the collar of an adjacent cable when installed. A turn collar is shown in Figure 12: Turn Collar - Riser Cable, on page 26.

Table 4: Sample Labeling Schema for Fabric Cables

Plane	Chassis 0 Label	Chassis 1 Label
0	0/SM0/A0	1/SM0/A0
1	0/SM0/A1	1/SM0/A1
2	0/SM1/A0	1/SM1/A0
3	0/SM1/A1	1/SM1/A1
4	0/SM2/A0	1/SM2/A0
5	0/SM2/A1	1/SM2/A1
6	0/SM3/A0	1/SM3/A0
7	0/SM3/A1	1/SM3/A1

Cabling the Fabric

Precautions

Please observe all precautions listed in the General Safety Guidelines, on page 5 when you perform any procedure in this chapter. The following precautions are additional reminders before you begin cabling the CRS-3 Back-to-Back System.

Warning Because invisible radiation may be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to radiation and do not stare into open apertures. Statement 125

Warning During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself. Statement 94

Warning Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. Statement 43

If a chassis power is on, assume lasers are turned on.

Never look at the ends of the fiber cables unless you are certain the laser is powered off.

The S13 card is Class 1M. Other optical cards are Class 1.

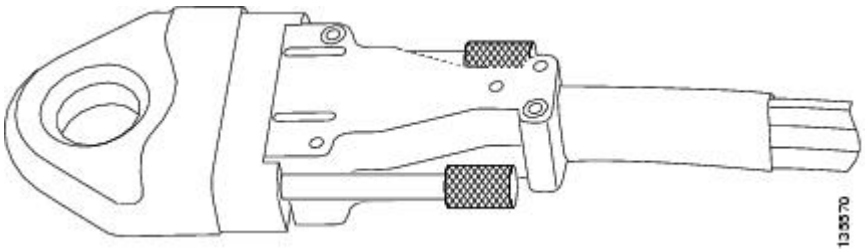
Warning For diverging beams, viewing the laser output with certain optical instruments within a distance of 100 MM. may pose an eye hazard. For collimated beams, viewing the laser output with certain optical instruments designed for use at a distance may pose an eye hazard. Statement 282

Warning Laser radiation. Do not view directly with optical instruments. Class 1M laser product. Statement 283

Caution Handle cables carefully, as described in Introduction to the CRS-3 Back-to-Back System, on page 1

Caution Cleanliness is critical to proper switch operation. To keep connections clean, do not remove the yellow dust cover from a port until you are ready to attach a cable. Do not remove the silver dust cover from a fabric cable until you are ready to attach the cable to the fabric card connector. Silver dust covers should be screwed on for security. Loosen the screws to remove the dust cover (see figure below). Store dust covers in a dust-free location.

Figure 9: Silver Dust Cover Protecting the Fabric Cable Connector



Prerequisites

Cable connection procedures assume that all 8-slot chassis and their cards are installed in accordance with site planning guidelines and that appropriate interconnection cable lengths are ordered and ready to be connected.

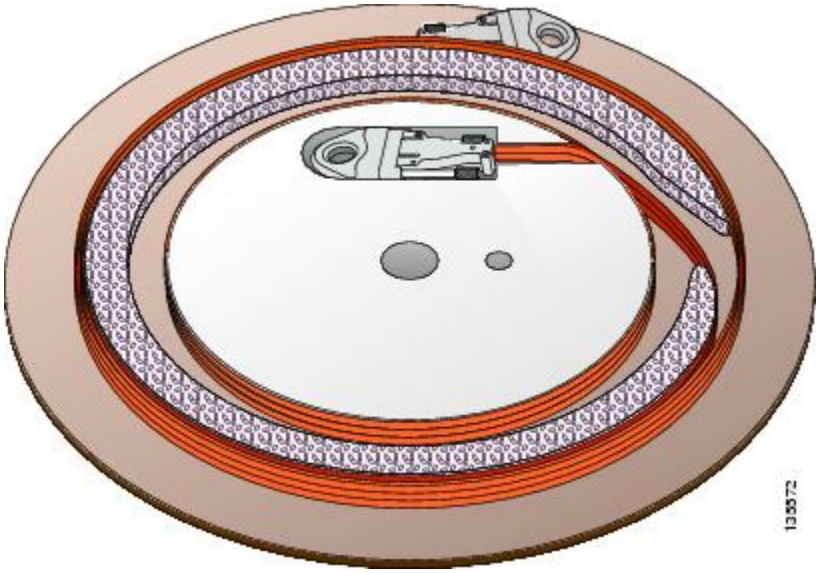
Caution All ports should have yellow dust covers on them as you begin this procedure, as shown in Figure 5: How Connectors Are Numbered on S13 Cards (A0 Through A1), on page 12.

How to Connect the Fabric Cables

The fabric cables are shipped separately from the fabric card chassis. These cables are shipped on a reel, similar to as shown in the below figure. This procedure begins with the assumption that the fabric cables have

been unpacked and positioned or hung near the chassis to which they will be connected. Packaging for Riser cables may differ from the figure below.

Figure 10: Fabric Cable—as Shipped on a Reel



You will be attaching 8 fabric cables for each 8-slot chassis. Ensure that each cable is labeled at both ends and then run each cable between the two 8-slot chassis.

Attach 8-Slot Chassis

The steps to take while attaching each cable to the 8-slot chassis follow:

SUMMARY STEPS

1. Slide the turn collar support on in the direction shown below:Top two fabric cards - all turn collars go up. Bottom two fabric cards - all turn collars go down.
2. Gently position the connector in the correct orientation (fabric card connectors and fabric cable connectors are keyed).
3. Hand-tighten the thumbscrews on the connector.
4. Repeat Steps 1 through 3 to each cable.
5. Fully tighten every connection.
6. Gently drape and group cables behind the fabric card.

DETAILED STEPS

Step 1 Slide the turn collar support on in the direction shown below:Top two fabric cards - all turn collars go up. Bottom two fabric cards - all turn collars go down.

Step 2 Gently position the connector in the correct orientation (fabric card connectors and fabric cable connectors are keyed).

Step 3 Hand-tighten the thumbscrews on the connector.

Step 4 Repeat Steps 1 through 3 to each cable.

Step 5 Fully tighten every connection.

Step 6 Gently drape and group cables behind the fabric card.

General Fabric Cabling Procedures

The following are general fabric cabling procedures you might want to use when installing or maintaining the fabric cabling:

Installing Turn Collars

The turn collar protects the fabric cable bend radius and functions as a strain-relief support. It also has a Velcro strap attached to it to bundle the cables as the cables are installed.

Here are notes to help you install a turn collar:

- The connector is keyed. One side is flat, and the other side has a diagonal cut from the corners.
- Connectors in S13 cards have the flat side on the right.
- Turn collars can be slipped onto either side of the connector, depending on whether the cable should turn up or down for proper routing through the chassis.

To install a turn collar:

SUMMARY STEPS

1. Undo the Velcro strap. See figure *Turn Collar - Trimese Cable* below.
2. Slide the cable into the turn collar until the cable is seated and snaps into place.
3. Attach the Velcro strap around the cable to hold the cable in place. See *Turn Collar - Riser Cable* figure below.

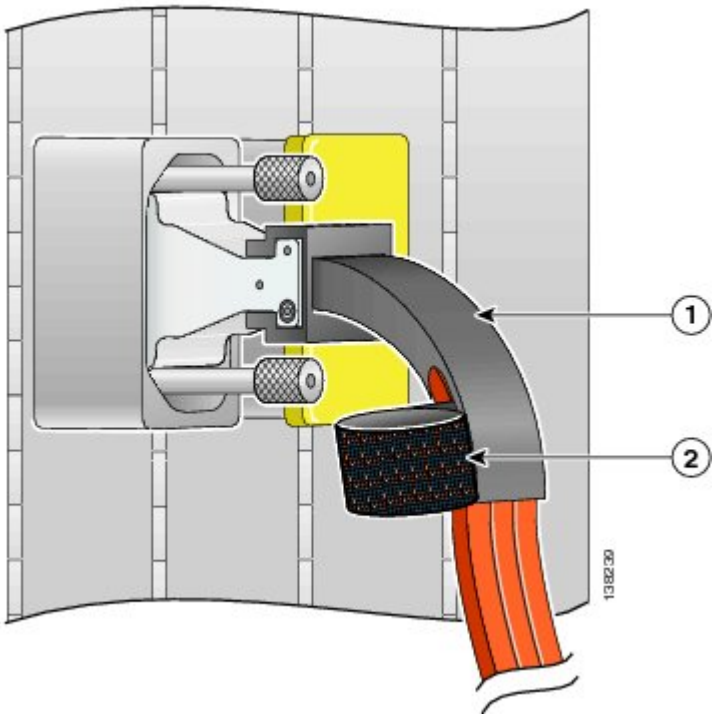
DETAILED STEPS

Step 1 Undo the Velcro strap. See figure *Turn Collar - Trimese Cable* below.

Step 2 Slide the cable into the turn collar until the cable is seated and snaps into place.
Add the collar while the cable is hanging. Since the cable is not connected, consider the direction the cable connector will go when it is connected because all fabric card and fabric cable connectors are keyed.

Step 3 Attach the Velcro strap around the cable to hold the cable in place. See *Turn Collar - Riser Cable* figure below.

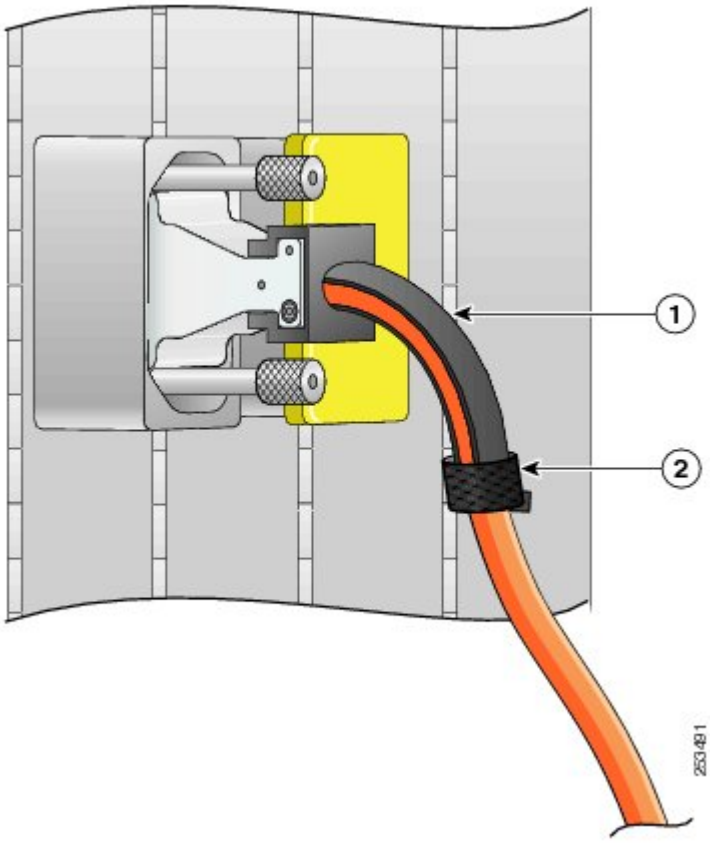
Figure 11: Turn Collar - Trimese Cable



1	Turn collar	2	Velcro strap to keep the fabric cable inside the turn collar and bundle fabric cables)

What to Do Next

Figure 12: Turn Collar - Riser Cable



1	Turn collar	2	Velcro strap (to keep the fabric cable inside the turn collar and bundle fabric cables)

Cleaning Cables

For information about cleaning fiber-optic cables, see the Cisco CRS-1 Carrier Routing System Fiber-Optic Cleaning Guide .

Verifying the Fabric

This section describes the processes for executing the commands required to verify the fabric. All commands in this mode will be run from admin mode.

SUMMARY STEPS

1. To verify the fabric card status:
2. To verify the rack status:
3. To verify the plane status and the plane mode status:
4. To verify the bundle status:
5. To verify the link status across the specific bundle, use the following command:
6. To verify the number of RX (receive) and TX (transmit) links up in the bundle across the bundle:
7. To verify the fabric connectivity across the racks:
8. To verify the back pressure group summary for the Cisco CRS-3 Back-to-Back system:

DETAILED STEPS

Step 1 To verify the fabric card status:

Example:

```
RP/0/RP0/CPU0:b2b(admin)#show platform | in SM
0/SM0/SP      FC-140G/M(H)(SP)          N/A       IOS XR RUN      PWR,NSHUT,MON
0/SM1/SP      FC-140G/M(H)(SP)          N/A       IOS XR RUN      PWR,NSHUT,MON
0/SM2/SP      FC-140G/M(H)(SP)          N/A       IOS XR RUN      PWR,NSHUT,MON
0/SM3/SP      FC-140G/M(H)(SP)          N/A       IOS XR RUN      PWR,NSHUT,MON
1/SM0/SP      FC-140G/M(H)(SP)          N/A       IOS XR RUN      PWR,NSHUT,MON
1/SM1/SP      FC-140G/M(H)(SP)          N/A       IOS XR RUN      PWR,NSHUT,MON
1/SM2/SP      FC-140G/M(H)(SP)          N/A       IOS XR RUN      PWR,NSHUT,MON
1/SM3/SP      FC-140G/M(H)(SP)          N/A       IOS XR RUN      PWR,NSHUT,MON
```

Step 2 To verify the rack status:

Example:

```
RP/0/RP0/CPU0:b2b(admin)#show controllers fabric rack all detail
Rack   Rack       Server
Num    Status     Status
----   ------     ------
0      NORMAL    PRESENT
1      NORMAL    PRESENT
```

Step 3 To verify the plane status and the plane mode status:

Example:

```
RP/0/RP0/CPU0:b2b(admin)#show controllers fabric plane all detail
  Flags: P - plane admin down,       p - plane oper down
         C - card admin down,        c - card  oper down
         A - asic admin down,        a - asic oper down
         L - link port admin down,   l - linkport oper down
         B - bundle port admin Down, b - bundle port oper down
         I - bundle admin down,      i - bundle oper down
         N - node admin down,        n - node down
         X - ctrl admin down,        x - ctrl down
```

```
         o - other end of link down  d - data down
         f - failed component downstream
         m - plane multicast down,   s - link port permanently shutdown
         t - no barrier input        O - Out-Of-Service oper down
         T - topology mismatch down  e - link port control only
         D - plane admin data down   U - issu down
         u - untunable               g - tuning in progress
         v - successfully tuned at least once
         w - most recent tuning attempt failed
         h - tuning pending          z - rx-eye measurement in progress
 Plane  Admin   Oper       up->dn   up->mcast     Down    Plane      Total       Down
 Id     State   State      counter  counter      Flags     Mode    Bundles    Bundles
 ------------------------------------------------------------------------------------
 0      UP      UP           0          0                 B2B      1          0
 1      UP      UP           0          0                 B2B      1          0
 2      UP      UP           0          0                 B2B      1          0
 3      UP      UP           0          0                 B2B      1          0
 4      UP      UP           0          0                 B2B      1          0
 5      UP      UP           0          0                 B2B      1          0
 6      UP      UP           0          0                 B2B      1          0
 7      UP      UP           0          0                 B2B      1          0
```

Step 4 To verify the bundle status:

Example:

```
RP/0/RP0/CPU0:b2b(admin)#show controllers fabric bundle port all
  Flags: P - plane admin down,       p - plane oper down
         C - card admin down,        c - card  oper down
         A - asic admin down,        a - asic oper down
         L - link port admin down,   l - linkport oper down
         B - bundle port admin Down, b - bundle port oper down
         I - bundle admin down,      i - bundle oper down
         N - node admin down,        n - node down
         X - ctrl admin down,        x - ctrl down
         o - other end of link down  d - data down
         f - failed component downstream
         m - plane multicast down,   s - link port permanently shutdown
         t - no barrier input        O - Out-Of-Service oper down
         T - topology mismatch down  e - link port control only
         D - plane admin data down   U - issu down
         u - untunable               g - tuning in progress
         v - successfully tuned at least once
         w - most recent tuning attempt failed
         h - tuning pending          z - rx-eye measurement in progress
Bundle Port    Admin     Oper
  R/S/M/P      State     State
------------------------------
 0/SM0/SP/0    UP        UP
 0/SM0/SP/1    UP        UP
 0/SM1/SP/0    UP        UP
 0/SM1/SP/1    UP        UP
 0/SM2/SP/0    UP        UP
 0/SM2/SP/1    UP        UP
 0/SM3/SP/0    UP        UP
 0/SM3/SP/1    UP        UP
 1/SM0/SP/0    UP        UP
 1/SM0/SP/1    UP        UP
 1/SM1/SP/0    UP        UP
 1/SM1/SP/1    UP        UP
 1/SM2/SP/0    UP        UP
 1/SM2/SP/1    UP        UP
 1/SM3/SP/0    UP        UP
 1/SM3/SP/1    UP        UP
```

Step 5 To verify the link status across the specific bundle, use the following command:

Example:

```
show controllers fabric bundle
 bundle port
 connection
```

Note The bundle port used in the command should be only Rack1 bundle ports. For B2B, the bundle port information is maintained only on Rack 1.This command will also help you to identify if the bundle ports are swapped across the rack.

For example:

Example:

```
RP/0/RP0/CPU0:b2b(admin)#show controllers fabric bundle 1/SM0/SP/0 connection
  Flags: P - plane admin down,       p - plane oper down
         C - card admin down,        c - card  oper down
         A - asic admin down,        a - asic oper down
         L - link port admin down,   l - linkport oper down
         B - bundle port admin Down, b - bundle port oper down
         I - bundle admin down,      i - bundle oper down
         N - node admin down,        n - node down
         X - ctrl admin down,        x - ctrl down
         o - other end of link down  d - data down
         f - failed component downstream
         m - plane multicast down,   s - link port permanently shutdown
         t - no barrier input        O - Out-Of-Service oper down
         T - topology mismatch down  e - link port control only
         D - plane admin data down   U - issu down
         u - untunable               g - tuning in progress
         v - successfully tuned at least once
         w - most recent tuning attempt failed
         h - tuning pending          z - rx-eye measurement in progress
 Bundle      Oper    Down   Plane  Total   Down      Down      Bundle   Bundle
 R/S/M/P     State   Flags   Id    Links  bp1-bp2   bp2-bp1    Port1    Port2
-------------------------------------------------------------------------------------
 1/SM0/SP/0   UP              0     72     0          0       1/SM0/SP/0 0/SM0/SP/0
   Actual connection data:
   Link Port              Expected               Actual                 State
   s3rx/1/SM0/SP/0/1      s1tx/0/SM0/SP/0/135    s1tx/0/SM0/SP/0/135    UP
   s3rx/1/SM0/SP/0/3      s1tx/0/SM0/SP/0/131    s1tx/0/SM0/SP/0/131    UP
   s3rx/1/SM0/SP/0/12     s1tx/0/SM0/SP/0/129    s1tx/0/SM0/SP/0/129    UP
   s3rx/1/SM0/SP/0/5      s1tx/0/SM0/SP/0/133    s1tx/0/SM0/SP/0/133    UP
   s3rx/1/SM0/SP/0/14     s1tx/0/SM0/SP/0/130    s1tx/0/SM0/SP/0/130    UP
   s3rx/1/SM0/SP/0/7      s1tx/0/SM0/SP/0/138    s1tx/0/SM0/SP/0/138    UP
   s3rx/1/SM0/SP/0/9      s1tx/0/SM0/SP/0/132    s1tx/0/SM0/SP/0/132    UP
   s3rx/1/SM0/SP/0/6      s1tx/0/SM0/SP/0/121    s1tx/0/SM0/SP/0/121    UP
   s3rx/1/SM0/SP/0/0      s1tx/0/SM0/SP/0/143    s1tx/0/SM0/SP/0/143    UP
   s3rx/1/SM0/SP/0/11     s1tx/0/SM0/SP/0/128    s1tx/0/SM0/SP/0/128    UP
   s3rx/1/SM0/SP/0/2      s1tx/0/SM0/SP/0/120    s1tx/0/SM0/SP/0/120    UP
   s3rx/1/SM0/SP/0/13     s1tx/0/SM0/SP/0/141    s1tx/0/SM0/SP/0/141    UP
   s3rx/0/SM0/SP/0/1      s1tx/1/SM0/SP/0/135    s1tx/1/SM0/SP/0/135    UP
   s3rx/0/SM0/SP/0/3      s1tx/1/SM0/SP/0/131    s1tx/1/SM0/SP/0/131    UP
   s3rx/0/SM0/SP/0/12     s1tx/1/SM0/SP/0/129    s1tx/1/SM0/SP/0/129    UP
   s3rx/0/SM0/SP/0/5      s1tx/1/SM0/SP/0/133    s1tx/1/SM0/SP/0/133    UP
   s3rx/0/SM0/SP/0/14     s1tx/1/SM0/SP/0/130    s1tx/1/SM0/SP/0/130    UP
   s3rx/0/SM0/SP/0/7      s1tx/1/SM0/SP/0/138    s1tx/1/SM0/SP/0/138    UP
   s3rx/0/SM0/SP/0/9      s1tx/1/SM0/SP/0/132    s1tx/1/SM0/SP/0/132    UP
   s3rx/0/SM0/SP/0/6      s1tx/1/SM0/SP/0/121    s1tx/1/SM0/SP/0/121    UP
```

Step 6 To verify the number of RX (receive) and TX (transmit) links up in the bundle across the bundle:

Example:

```
RP/0/RP0/CPU0:b2b(admin)#show controllers fabric link health
  Flags: P - plane admin down,       p - plane oper down
         C - card admin down,        c - card  oper down
```

```
          A - asic admin down,        a - asic oper down
          L - link port admin down,   l - linkport oper down
          B - bundle port admin Down, b - bundle port oper down
          I - bundle admin down,      i - bundle oper down
          N - node admin down,        n - node down
          X - ctrl admin down,        x - ctrl down
          o - other end of link down  d - data down
          f - failed component downstream
          m - plane multicast down,   s - link port permanently shutdown
          t - no barrier input        O - Out-Of-Service oper down
          T - topology mismatch down  e - link port control only
          D - plane admin data down   U - issu down
          u - untunable               g - tuning in progress
          v - successfully tuned at least once
          w - most recent tuning attempt failed
          h - tuning pending          z - rx-eye measurement in progress
 Mismatched Plane details
 ------------------------
 Plane  Admin   Oper   up->dn        Down    Total     Down
 Id     State   State  counter       Flags   Bundles   Bundles
 ------------------------------------------------------------
Link Usage Summary
------------------
                                    # of OPER UP Links
Rack              Plane Group   Min        Max      Current
Num   stage-stage  Num   Num  Required  Available  Available
----- ----------- ----- ----- --------  ---------  ---------
0        S3<-S1      0     0     25        128        36
0        S3<-S1      1     0     25        128        36
0        S3<-S1      2     0     25        128        36
0        S3<-S1      3     0     25        128        36
0        S3<-S1      4     0     25        128        36
0        S3<-S1      5     0     25        128        36
0        S3<-S1      6     0     25        128        36
0        S3<-S1      7     0     25        128        36
1        S3<-S1      0     2     25        128        36
1        S3<-S1      1     2     25        128        36
1        S3<-S1      2     2     25        128        36
1        S3<-S1      3     2     25        128        36
1        S3<-S1      4     2     25        128        36
1        S3<-S1      5     2     25        128        36
1        S3<-S1      6     2     25        128        36
1        S3<-S1      7     2     25        128        36
```

Step 7 To verify the fabric connectivity across the racks:

Example:

```
RP/0/RP0/CPU0:b2b(admin)#show controllers fabric connectivity all
  Flags: P - plane admin down,       p - plane oper down
         C - card admin down,        c - card  oper down
         A - asic admin down,        a - asic oper down
         L - link port admin down,   l - linkport oper down
         B - bundle port admin Down, b - bundle port oper down
         I - bundle admin down,      i - bundle oper down
         N - node admin down,        n - node down
         X - ctrl admin down,        x - ctrl down
         o - other end of link down  d - data down
         f - failed component downstream
         m - plane multicast down,   s - link port permanently shutdown
         t - no barrier input        O - Out-Of-Service oper down
         T - topology mismatch down  e - link port control only
         D - plane admin data down   U - issu down
         u - untunable               g - tuning in progress
         v - successfully tuned at least once
         w - most recent tuning attempt failed
         h - tuning pending          z - rx-eye measurement in progress
               To Fabric  From Fabric
 Card       In  Tx Planes  Rx Planes
 R/S/M      Use 01234567   01234567
```

```
-------------------------------------
0/1/CPU0    1   11111111   11111111
0/2/CPU0    1   11111111   11111111
0/3/CPU0    1   11111111   11111111
0/4/CPU0    1   11111111   11111111
0/6/CPU0    1   11111111   11111111
0/7/CPU0    1   11111111   11111111
0/RP0/CPU0  1   11111111   11111111
0/RP1/CPU0  1   11111111   11111111
1/0/CPU0    1   11111111   11111111
1/3/CPU0    1   11111111   11111111
1/4/CPU0    1   11111111   11111111
1/5/CPU0    1   11111111   11111111
1/6/CPU0    1   11111111   11111111
1/RP0/CPU0  1   11111111   11111111
1/RP1/CPU0  1   11111111   11111111
```

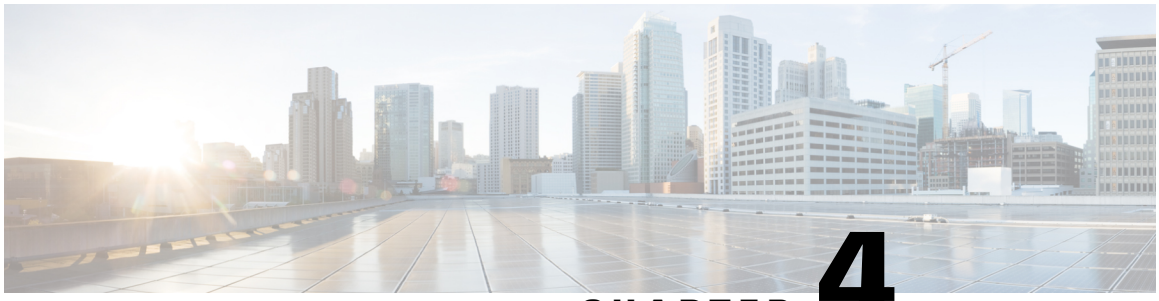
Step 8 To verify the back pressure group summary for the Cisco CRS-3 Back-to-Back system:

Example:

```
RP/0/RP0/CPU0:b2b#show controllers fabric fabric-backpressure summary
Expected BP Fabric Groups in the System:    0  2
Rack 0:   All Groups Received? :  Yes
  ------
Rack 1:   All Groups Received? :  Yes
  ------
```

What to Do Next

When the CRS-3 Back-to-Back System cabling is complete, see *Cisco IOS XR Getting Started Guide* for directions on bringing up the system.



CHAPTER 4

Upgrading to a CRS-3 Back-to-Back System Using Cisco IOS-XR 4.3.1 or Earlier

This chapter describes how to upgrade an 8-slot Cisco CRS-1 or Cisco CRS-3 single-chassis to a CRS-3 Back-to-Back System when you are using Cisco IOS-XR version 4.3.1 or earlier.

Note If you are using Cisco IOS-XR 5.1.1 or later, please see Upgrading to a CRS-3 Back-to-Back System Using Cisco IOS-XR 4.3.1 or Earlier, on page 33

This chapter contains the following sections:

- Information About Upgrading to a CRS-3 Back-to-Back System, page 33
- Prerequisites for Upgrading to a CRS-3 Back-to-Back System, page 34
- How to Upgrade to a CRS-3 Back-to-Back System, page 34
- Tips and Troubleshooting, page 47
- Technical Assistance, page 48

Information About Upgrading to a CRS-3 Back-to-Back System

The current upgrade scenario is to upgrade a 8-slot CRS-1 or CRS-3 single-chassis system to a 8-slot CRS-3 Back-to-Back System. The upgrade consists of two parts: converting a 8-slot single-chassis system to an 8-slot chassis that is back-to-back ready and installing the additional 8-slot chassis.

The difference between a single-chassis system and an 8-slot chassis that is back-to-back ready is the fabric cards. A single-chassis system uses fabric cards that are designed for single-chassis operation with all three stages of the switch fabric in each physical card. These fabric cards are commonly referred to as S123 fabric cards. A 8-slot chassis in a CRS-3 Back-to-Back System uses fabric cards that are designed for back-to-back operation with only two stages of the switch fabric. These are commonly referred to as S13 fabric cards.

Upgrading to a CRS-3 Back-to-Back System requires two components: the conversion kit and an additional 8-slot chassis. The conversion kit includes S13 fabric cards (which replace the S123 cards). The additional 8-slot chassis should include a complete chassis system (8-slot chassis) with S13 switch fabric cards and with the necessary cables to connect the two 8-slot chassis.

Prerequisites for Upgrading to a CRS-3 Back-to-Back System

Prior to upgrading, perform the following steps:

1. Prepare the CRS single-chassis system as follows:
   a. Obtain the chassis serial number of the current running system which is required for configuration. The serial number is on the chassis label and can be accessed using the **show diag chassis** command, as described in the *Cisco IOS XR Getting Started Guide* .
   b. Upgrade the ROM Monitor (ROMMON) software to version 2.07 or later, as described in the *Cisco IOS XR ROM Monitor Guide* .
2. Prepare the additional chassis as follows:
   a. Ensure that the power to the additional chassis is off.
   b. It is recommended to get the back-to-back array cables ready and not connected yet.

Software Requirements

- Cisco IOS XR Software Release 4.3.1 or later release
- ROMMON 2.07 or later version

Caution The ROMMON software must be upgraded to version 2.07 or a later version on all PRPs before a Cisco CRS-3 system is upgraded to Cisco IOS XR Software Release 4.3.1 or later release. If the router is brought up with an incompatible version of the ROMMON software, then the standby PRP may fail to boot. For instructions to overcome a boot block in the standby PRP in a single chassis system, see Cisco IOS XR *ROM Monitor Guide* .

Hardware Requirements

- Additional 8-slot chassis
- Conversion kit, which has the following components:
  - Eight S13 fabric cards (CRS-8-FC140/M)
  - PRP route processor (if you are using CRS-8-RP-B on a single chassis)

How to Upgrade to a CRS-3 Back-to-Back System

The upgrade process contains the following steps:

1. On the existing 8-slot chassis, upgrade the fabric cards. See Upgrading the Fabric Cards, on page 35.
2. Configure the control network. See Connecting the Control Network, on page 41 .
3. Add the additional 8-slot chassis. It should include a complete chassis system with HS13 switch fabric cards and the cables needed to connect the two 8-slot chassis. See Adding a Chassis to a CRS-3 Back-to-Back System, on page 42.

Upgrading the Fabric Cards

On the existing 8-slot chassis, upgrade the fabric cards from CRS-8-FC/S or CRS-8-FC140/S to the new CRS-8-FC140/M cards.

Summary Steps

On a single-chassis system, each fabric card represents two fabric planes. To avoid traffic loss during the upgrade, you must upgrade the switch fabric one plane at a time. This entails replacing each CRS-8-FC/S card or CRS-8-FC140/S card with a new CRS-8-FC140/M card and restoring service to that fabric plane before upgrading the next fabric plane.

Here are the basic steps to upgrade fabric cards from a CRS-8-FC/S card or a CRS-8-FC140/S card to a new CRS-8-FC140/M card.

SUMMARY STEPS

1. Backup the exec and admin configs on chassis 0.
2. Associate the chassis 0 serial numbers with the rack number. The following command configures chassis 0 as rack 0. Perform this command from the admin configuration.
3. Use CLI commands to prepare each FC/S fabric card (CRS-8-FC/S or CRS-8-FC140/S) for replacement with a CRS-8-FC140/M card.
4. Before you replace any FC/S cards, shut down the corresponding plane on the fabric card to be migrated using the following command (in admin config mode):
5. On the fabric card that you want to replace, disable the power using the following command:
6. Replace each FC/S card (CRS-8-FC/S or CRS-8-FC140/S) with a CRS-8-FC140/M card.
7. Bring up the CRS-8-FC140/M card, as follows:
8. Repeat *Step 4* through *Step 7* until all planes (0 through 7) are upgraded.

DETAILED STEPS

Step 1 Backup the exec and admin configs on chassis 0.

Step 2 Associate the chassis 0 serial numbers with the rack number. The following command configures chassis 0 as rack 0. Perform this command from the admin configuration.

Example:

```
dsc serial
 serialNumber
 rack 0
commit
```

Step 3 Use CLI commands to prepare each FC/S fabric card (CRS-8-FC/S or CRS-8-FC140/S) for replacement with a CRS-8-FC140/M card.

Step 4 Before you replace any FC/S cards, shut down the corresponding plane on the fabric card to be migrated using the following command (in admin config mode):

Example:

```
controllers fabric plane
 planeNumber
shutdown
controllers fabric plane
 planeNumber
 shutdown
```

Step 5 On the fabric card that you want to replace, disable the power using the following command:

Example:

```
hw-module power disable location
 rack/SMslot/SP
```

Step 6 Replace each FC/S card (CRS-8-FC/S or CRS-8-FC140/S) with a CRS-8-FC140/M card.

Step 7 Bring up the CRS-8-FC140/M card, as follows:

a) Power up the card using the following command:

Example:

```
no hw-module power disable location
 rack/SMslot/SP
```

Wait for the card to reach the IOS XR RUN state.

b) Bring up the control plane using the following commands:

Example:

```
controllers fabric plane
 planeNumber
shutdown data
controllers fabric plane
 planeNumber
 shutdown data
```

Verify that the plane state is DATA_DN/UP and the operating mode of the planes is B2B.

c) Verify that the entire card has booted and all ASICs have initialized prior to restoring the plane for traffic. Use the following command:

Example:

```
do show log | inc OPER_UP
```

d) Bring up the data plane using the following commands:

Example:

```
no controllers fabric plane
 planeNumber
 shutdown
no controllers fabric plane
 planeNumber
 shutdown
```

Verify that the plane state is UP/UP and the operating mode of the planes is B2B.

Step 8 Repeat *Step 4* through *Step 7* until all planes (0 through 7) are upgraded.

Detailed Steps

SUMMARY STEPS

1. **admin**
2. **show platform** *rack number*/**/*
3. **configure**
4. **do show controllers fabric plane all**
5. **controllers fabric plane** *planeNumber* **shutdown**
6. **commit**
7. **hw-module power disable location 0/sm***slotNumber* /**sp**
8. **commit**
9. **show platform 0/sm***slotNumber*/**sp**
10. In rack 0, remove the FC/S card (CRS-8-FC/S or CRS-8-FC140/S) for the plane that was shut down in *Step 5*.
11. In rack 0, insert the CRS-8-FC140/M card for the plane that was shut down in *Step 5*.
12. **no hw-module power disable location 0/sm***slotNumber* /**sp**
13. **commit**
14. **do show platform 0/sm***slotNumber*/**sp**
15. **do show log | inc OPER_UP**
16. **controllers fabric plane** planeNumber **shutdown data**
17. **do show controllers fabric plane** planeNumber **detail**
18. no controllers fabric plane planeNumber shutdown
19. **end**
20. Repeat *Step 2* through *Step 19* for each fabric plane.
21. **show controllers fabric plane all**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**admin** **Example:** `RP/0/RP1/CPU0:router# admin`	Places the router in administration EXEC mode. • All commands listed in this procedure should be entered on the pre-existing single-chassis system.
Step 2	**show platform** *rack number*/**/*	Displays the status of all chassis modules in the specified rack.

	Command or Action	Purpose
	Example: `RP/0/RP1/CPU0:router(admin)# show platform 1/**/*`	• Replace *rack* with the rack number of the chassis to examine. • Repeat this command for all chassis. • The state for all modules should be IOS-XR RUN. • It can take a few minutes for all chassis modules to start. **Note** The chassis module status appears only when the **show platform** command is executed in administration EXEC mode.
Step 3	**configure** **Example:** `RP/0/RP1/CPU0:router(admin)#configure`	Places the router in administration configuration mode.
Step 4	**do show controllers fabric plane all** **Example:** `RP/0/RP1/CPU0:router(admin-config)# do show controllers fabric plane all`	Displays the administrative and operational status of all eight fabric planes. • The **do** command prefix allows the EXEC mode **show** command to execute in administration configuration mode. **Caution** To prevent service interruption, do not continue until the administrative and operational status for all eight planes is UP.

Step 5	**controllers fabric plane** *planeNumber* **shutdown**
	Example:
	`RP/0/RP1/CPU0:router(admin-config)# controllers fabric plane 0 shutdown`
	Example:
	`RP/0/RP1/CPU0:router(admin-config)# controllers fabric plane 1 shutdown`
		Modifies the target configuration to shut down the specified plane number.
		• Replace the *planeNumber* parameter with the number of the plane you want to shut down.
		• The admin/operational state will be DOWN/DOWN.

Step 6	**commit** **Example:** `RP/0/RP1/CPU0:router(admin-config)# commit`	Commits the target configuration to the router running configuration. • This step shuts down the plane identified in the previous step.
Step 7	**hw-module power disable location 0/sm***slotNumber* **/sp** **Example:** `RP/0/RP1/CPU0:router(admin-config)# hw-module power disable location 0/sm0/sp`	Disables the power-on feature on a specific fabric card.

	Command or Action	Purpose
Step 8	**commit** **Example:** `RP/0/RP1/CPU0:router(admin-config)# commit`	Commits the target configuration to the router running configuration. • This step shuts down the plane identified in the previous step.
Step 9	**show platform 0/sm***slotNumber***/sp** **Example:** `RP/0/RP1/CPU0:router(admin)# show platform 0/sm0/sp`	Displays the status of the rack 0 fabric slot specified by *slotNumber* . Verify that the card is in the UNPOWERED state. **Note** The fabric card status appears only when the **show platform** command is executed in administration EXEC mode.
Step 10	In rack 0, remove the FC/S card (CRS-8-FC/S or CRS-8-FC140/S) for the plane that was shut down in *Step 5*.	Creates room for the CRS-8-FC140/M card that is required for CRS-3 Back-to-Back System operation.
Step 11	In rack 0, insert the CRS-8-FC140/M card for the plane that was shut down in *Step 5*.	Provides the hardware required for communication with the chassis.
Step 12	**no hw-module power disable location 0/sm***slotNumber* **/sp** **Example:** `RP/0/RP1/CPU0:router(admin-config)# no hw-module power disable location 0/sm0/sp` **Example:**	Re-enables the power-on feature on a specific fabric card.
Step 13	**commit** **Example:** `RP/0/RP1/CPU0:router(admin-config)# commit`	Commits the target configuration to the router running configuration.
Step 14	**do show platform 0/sm***slotNumber***/sp** **Example:** `RP/0/RP1/CPU0:router(admin)# show platform 0/sm0/sp`	Displays the status of the rack 0 fabric slot specified by *slotNumber* . Verify that the card is in the IOS XR RUN state. **Note** The fabric card status appears only when the **show platform** command is executed in administration EXEC mode.
Step 15	**do show log | inc OPER_UP** **Example:** `RP/0/RP0/CPU0:b2b(admin-config)#do show logging | inc OPER_UP`	Displays the status of the fabric ASIC. The desired output will show two fabric ASICs in service for the plane that you just upgraded. If you do not see both ASICs in the UP state, do not continue. Output appears similar to the following: • SP/0/SM0/SP:May 19 17:51:32.599 : sfe_drvr[131]: %FABRIC-FABRIC_DRVR-6-ASIC_INITIALIZED : Notify FSDB that fabricASIC/0/SM3/SP/0 is OPER_UP. • SP/0/SM0/SP:May 19 17:51:32.600 : sfe_drvr[131]: %FABRIC-FABRIC_DRVR-6-ASIC_INITIALIZED : Notify FSDB that fabricASIC/0/SM3/SP/1 is OPER_UP

	Command or Action	Purpose

Step 16	**controllers fabric plane** planeNumber **shutdown data**
	
	Example:
	controllers fabric plane `planeNumber` **shutdown data**
	
	Example:
	`RP/0/RP0/CPU0:b2b(admin-config)#controllers fabric plane 0 shutdown data`
	
	Example:
	`RP/0/RP0/CPU0:b2b(admin-config)#controllers fabric plane 1 shutdown data`
		Modifies the target configuration to bring up the control part of the specified fabric plane.
		
		The suggested admin/operational state of the plane in this state would be DATA_DN/UP, respectively.

Step 17	**do show controllers fabric plane** planeNumber **detail** **Example:** `RP/0/RP1/CPU0:router(admin-config)# do show controllers fabric plane 0 detail`	Displays the status of the plane specified by *planeNumber* . • Verify that the admin/operational state is DATA_DN/UP. • Verify that a capital “D” appears in the Down Flags column. • Wait for the plane to come up before you continue.

Step 18	no controllers fabric plane planeNumber shutdown
	
	Example:
	`RP/0/RP1/CPU0:router(admin-config)# no controllers fabric plane 0 shutdown`
	
	Example:
	`RP/0/RP1/CPU0:router(admin-config)# no controllers fabric plane 1 shutdown`
		Modifies the target configuration to bring up the specified fabric plane.
		• Verify that the admin/operational state is UP/UP.
		• This step brings up the previously shutdown plane, which is now configured to use the Back-to-Back chassis.

Step 19	**end** **Example:** `RP/0/RP1/CPU0:router(admin-config)# end`	Changes the mode from administration configuration mode to administration EXEC mode.
Step 20	Repeat *Step 2* through *Step 19* for each fabric plane.	
Step 21	**show controllers fabric plane all** **Example:** `RP/0/RP1/CPU0:router(admin)# show controllers fabric plane all`	Displays the administrative and operational status of all eight fabric planes. • Verify that all fabric planes are operational and the status is UP/UP. • The plane you just migrated should show a counter increment of 1 in both the up->dn counter and the up->mcast counter.

What to Do Next

Once these detailed steps are completed, chassis 0 will act as rack 0. It is fully populated with S13 cards. All 8 planes are operationally up and the mode is B2B.

What to Do Next

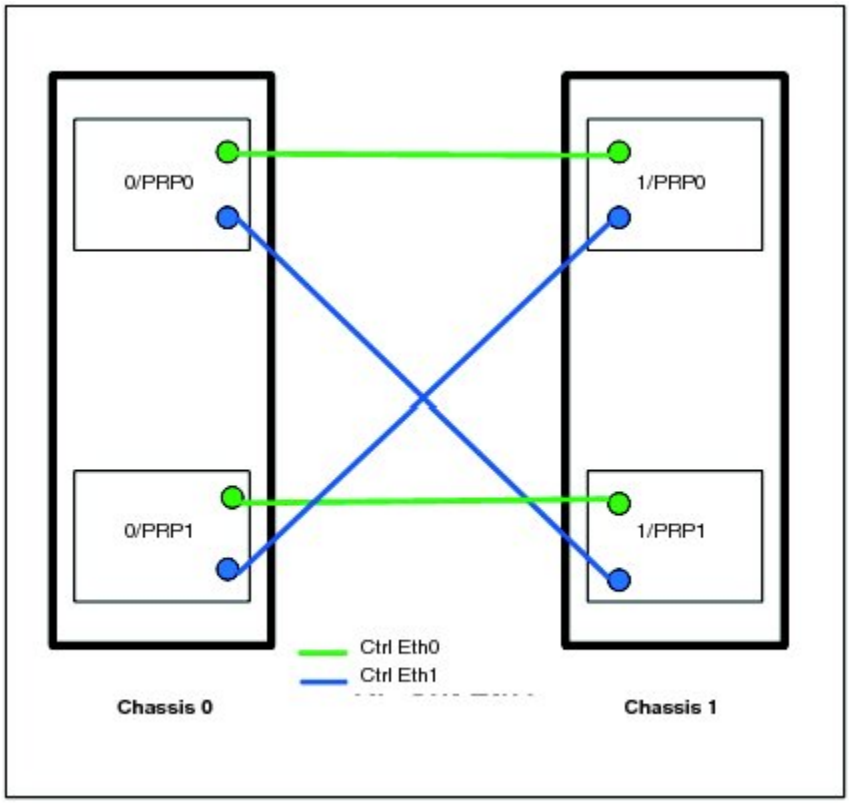
Once the chassis 0 upgrade is completed, the control network must be connected.

Connecting the Control Network

Before the additional chassis can be added to the CRS-3 Back-to-Back System, a control network must be established. The control network allows two chassis in the CRS-3 Back-to-Back System to communicate with each other. The control function is performed by the PRPs.

This figure shows how the control Ethernet ports of PRPs are interconnected.

Figure 13: Connections within a CRS-3 Back-to-Back System



Prerequisites for Connecting the Control Network

1. Obtain the serial number of the new chassis (located on front of the chassis).
2. You must have the additional chassis (chassis 1).
3. The control network must be operational and connected to all chassis.
4. The power should be off in order for the new chassis to be added.
5. You must have back-to-back Trimese cable (opticalbBundle cable) to connect the fabric card across the racks.
6. You must have PRP route processors for the new chassis.

What to Do Next

Once the control network is connected, add the additional chassis to the CRS-3 Back-to-Back System.

Adding a Chassis to a CRS-3 Back-to-Back System

This section describes how to add an additional chassis to a CRS-3 Back-to-Back System.

Prerequisites

Software Requirements

- Cisco IOS XR Software Release 4.3.1 or later release
- ROMMON 2.07 or later version
- Serial number of new chassis (can be found on front of chassis)

Hardware Requirements

- The additional 8-slot chassis.
- The control network must be operational and connected to all chassis.
- The power should be off for the additional 8-slot chassis to be added.
- PRP route processor (if you are using CRS-8-RP-B on a single chassis).

Summary Steps

Here are the basic steps to add the additional chassis to the CRS-3 Back-to-Back System:

SUMMARY STEPS

1. Backup the exec and admin configs on chassis 0.
2. Power on the second chassis (rack 1).
3. Interrupt the booting into drop the system (Active and Standby PRP) in ROMMON and verify the rack number (dumpplaneeeprom output ' 0x73rd byte) on the Active PRP.
4. Configure the Active PRP using the following command, which associates chassis 1 serial numbers with the rack number: **dsc serial** *rack serial number* **rack 1**.
5. Configure rack 1 in fabric rack install-mode using the following command: **controllers fabric rack 1 install-mode**.
6. Connect the back-to-back fabric cables for all fabric planes.
7. Boot the chassis 1 rack 1 by reset from the ROMMON prompt.
8. Verify that IOS XR RUN appears on the PRP faceplates and on the SM cards in rack 1.
9. Verify that all of the eight planes are UP/UP and the plane mode is B2B. Execute the following show command on dSC: **show controllers fabric plane all detail**. The plane state should be UP/UP and the plane mode should be B2B.
10. Check the plane status in Rack Out Install Mode using the following command: d**o show controllers fabric rack all detail**. The status should be operationally UP.
11. Remove the fabric install mode for rack 1. Execute the following command: **no controller fabric rack 1 install-mode.**
12. Verify the status of all racks using the following command: **show controllers fabric plane all detail**. The plane state and mode for all of the eight planes should be the same as described in *Step 9* .

DETAILED STEPS

Step 1 Backup the exec and admin configs on chassis 0.

Step 2 Power on the second chassis (rack 1).

Step 3 Interrupt the booting into drop the system (Active and Standby PRP) in ROMMON and verify the rack number (dumpplaneeeprom output ' 0x73rd byte) on the Active PRP.

a) Unset the BOOT variable.
b) Unset the RACK_NUM variable.
c) Also unset the TFTP_FILE and TURBOBOOT variables if they are set.
d) Enter the **sync** command to save the current changes.
e) Verify the configuration-register is set to 0x0. The configuration-register setting 0x0 prevents the PRP from syncing to the dSC by keeping the PRP in the ROMMON state.

Step 4 Configure the Active PRP using the following command, which associates chassis 1 serial numbers with the rack number: **dsc serial** *rack serial number* **rack 1**.

Step 5 Configure rack 1 in fabric rack install-mode using the following command: **controllers fabric rack 1 install-mode**.

Step 6 Connect the back-to-back fabric cables for all fabric planes.

a) Connect 0/SMx/0,1 to 1/SMx/0,1.

b) Tighten the connector screws.

Step 7 Boot the chassis 1 rack 1 by reset from the ROMMON prompt.

Step 8 Verify that IOS XR RUN appears on the PRP faceplates and on the SM cards in rack 1.

Step 9 Verify that all of the eight planes are UP/UP and the plane mode is B2B. Execute the following show command on dSC: **show controllers fabric plane all detail**. The plane state should be UP/UP and the plane mode should be B2B.

Step 10 Check the plane status in Rack Out Install Mode using the following command: d**o show controllers fabric rack all detail**. The status should be operationally UP.

Step 11 Remove the fabric install mode for rack 1. Execute the following command: **no controller fabric rack 1 install-mode.**

Step 12 Verify the status of all racks using the following command: **show controllers fabric plane all detail**. The plane state and mode for all of the eight planes should be the same as described in *Step 9* .

What to Do Next

Now, chassis 0 will act as rack 0 and chassis 1 will act as rack 1. Both the racks are fully populated with S13 cards. All of the 8 planes are operationally up and the mode is B2B. Therefore, the system (chassis 0 and chassis 1) is now one system, referred to as a back-to-back system.

Detailed Steps

SUMMARY STEPS

1. **admin**
2. **configure**
3. From the ROMMON prompt, enter the following commands.
4. **dsc serial** *serialNumber* **rack 1**
5. **controllers fabric rack 1 install-mode**
6. **commit**
7. Apply power to the new chassis (rack 1).
8. Interconnect the fabric cards between two chassis.
9. From the ROMMON prompt, enter the following commands.
10. **show platform**
11. **show controllers fabric bundle 1/sm***slotNumber*/**sp**/*bundle port* **connection**
12. **do show controllers fabric plane all detail**
13. **show controllers fabric fsdb-pla rack all**
14. **do show controllers fabric rack all detail**
15. **do show controllers fabric fabric-backpressure summary**
16. **no controllers fabric rack 1 install-mode**
17. **commit**
18. **do show controllers rack all detail**
19. **do show controllers fabric plane all detail**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**admin** **Example:** `RP/0/RP1/CPU0:router# admin`	Places the router in administration EXEC mode. • All commands listed in this procedure should be entered on the pre-existing single-chassis system.
Step 2	**configure** **Example:** `RP/0/RP1/CPU0:router(admin)#configure`	Places the router in administration configuration mode.

Step 3	From the ROMMON prompt, enter the following commands.
	
	Example:
	
	`unset BOOT`
	`unset RACK_NUM`
	`unset TFTP_FILE`
	`unset TURBOBOOT`
	`confreg 0x0`
	`sync`
	`reset`
		From the console of the PRP in the new system, send the break (CNTL+C) to disrupt the boot sequence. This places you at the ROMMON prompt. From here, issue the **set** command. This shows the current variables set on the PRP. If the variables listed are present, unset them as shown. Make sure to use sync at the end to save the changes.

Step 4	**dsc serial** *serialNumber* **rack 1** **Example:** `RP/0/RP1/CPU0:router(admin-config)# dsc serial TBA08440024 rack 1`	Configures the additional chassis as rack 1 in the multishelf system. • Replace the *serialNumber* parameter with the serial number of the additional chassis. • If you are configuring the system from a remote location, you can use a command to display the serial number. For more information, see *Cisco IOS XR Getting Started Guide.*
Step 5	**controllers fabric rack 1 install-mode** **Example:** `RP/0/RP1/CPU0:router(admin-config)# controllers fabric rack 1 install-mode`	Modifies the target configuration to change the rack 1 configuration to installation mode.
Step 6	**commit** **Example:** `RP/0/RP1/CPU0:router(admin-config)# commit`	Commits the target configuration to the router running configuration.
Step 7	Apply power to the new chassis (rack 1).	Starts up the second chassis (rack 1).
Step 8	Interconnect the fabric cards between two chassis.	Connect all fabric cables that connect the fabric planes in the new chassis to the additional chassis.

	Command or Action	Purpose

Step 9	From the ROMMON prompt, enter the following commands.
	
	Example:
	
	`confreg 0x2`
	`sync`
	`reset`
		Boots the chassis rack 1 by reset from the ROMMON prompt. Sets the config register to 0x2 and enables boot.

Step 10	**show platform** **Example:** `RP/0/RP1/CPU0:router(admin)# show platform`	Displays the status of all chassis modules. • Repeat this command for all chassis. • The state for all modules should be IOS-XR RUN. • It can take a few minutes for all chassis modules to start. • The chassis module status appears only when the show platform command is executed in administration EXEC mode.
Step 11	**show controllers fabric bundle 1/sm***slotNumber***/sp/***bundle port* **connection** **Example:** `RP/0/RP1/CPU0:router(admin)#show controllers fabric bundle 1/sm1/sp/1 connection`	Shows whether the fabric connectivity between two chassis has been successful. The bundle port value ranges from 0 to 2. In the case of wrong cabling, the CLI shows the following message: `Actual connection data: Please check bundle connection, they appear to be swapped with another bundle.`
Step 12	**do show controllers fabric plane all detail** **Example:** `RP/0/RP1/CPU0:router(admin-config)# show controllers fabric plane all detail`	Displays the status of all planes. Wait for the plane to come up before you continue.
Step 13	**show controllers fabric fsdb-pla rack all** **Example:** `RP/0/RP1/CPU0:router(admin-config)# show controllers fabric fsdb-pla rack all`	Displays fabric plane availability for every destination in the system.
Step 14	**do show controllers fabric rack all detail** **Example:** `RP/0/RP1/CPU0:router(admin-config)# do show controllers fabric rack all detail`	Displays the status of all racks and additional information for racks in installation mode. • Wait for the status in the Rack in Install and Rack out of Install columns to change to UP for all planes.
Step 15	**do show controllers fabric fabric-backpressure summary**	Displays the backpressure status for all racks. • The status for the row labeled “Rack 1: All Groups Received? :” should be “Yes.”

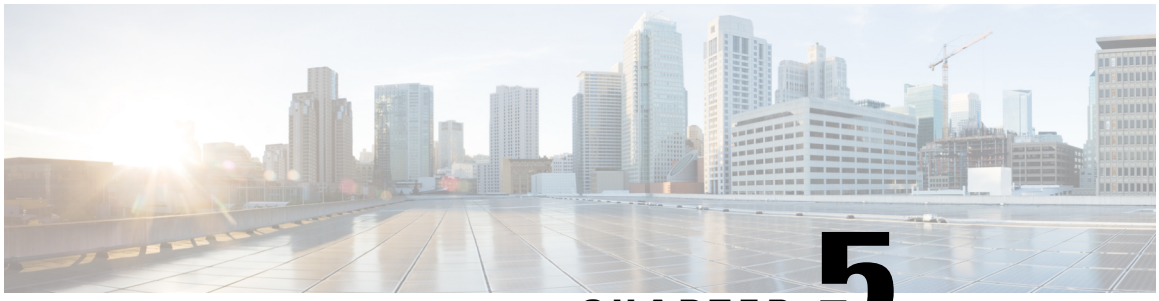
	Command or Action	Purpose
	Example: `RP/0/RP1/CPU0:router(admin-config)# do show controllers fabric fabric-backpressure summary`	
Step 16	**no controllers fabric rack 1 install-mode** **Example:** `RP/0/RP1/CPU0:router(admin-config)# no controllers fabric rack 1 install-mode`	Modifies the target configuration to change the rack 1 configuration to normal mode.
Step 17	**commit** **Example:** `RP/0/RP1/CPU0:router(admin-config)# commit`	Commits the target configuration to the router running configuration.
Step 18	**do show controllers rack all detail** **Example:** `RP/0/RP1/CPU0:router(admin-config)# do show controllers rack all detail`	Displays the status of all racks in the system. • In a properly operating system, the rack status for all racks should be Normal, and the server status should be Present.
Step 19	**do show controllers fabric plane all detail** **Example:** `RP/0/RP1/CPU0:router(admin-config)# do show controllers fabric plane all detail`	Displays the status of all planes. • Verify that a capital "D" appears in the Down Flags column. • Wait for the plane to come up before you continue.

Tips and Troubleshooting

1. Make sure to use the correct back-to-back fabric/fiber cables.
2. Before removing the install mode, verify the plane state using the command **show controllers fabric rack all detail**.
3. Remove the install mode once all the planes are migrated.

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport



CHAPTER 5

Upgrading to a CRS Back-to-Back System Using Cisco IOS-XR 5.1.1 or Later

This chapter describes how to upgrade a Cisco CRS-3 single-chassis to a CRS-3 Back-to-Back System when you are using Cisco IOS-XR version 5.1.1 or later.

Note If you are using Cisco IOS-XR 4.3.1 or earlier, please see Upgrading to a CRS-3 Back-to-Back System Using Cisco IOS-XR 4.3.1 or Earlier, on page 33

This chapter contains the following sections:

Note See also Information About Upgrading to a CRS-3 Back-to-Back System, on page 33.

- Prerequisites for Upgrading to a CRS-3 Back-to-Back System, page 49
- Changing the Fabric Addressing Mode, page 50
- Changing the Fabric Addressing Mode, page 51
- How to Upgrade to a CRS-3 Back-to-Back System, page 53
- Connecting the Control Network, page 59
- Tips and Troubleshooting, page 66
- Technical Assistance, page 66

Prerequisites for Upgrading to a CRS-3 Back-to-Back System

Before You Begin

Prior to upgrading, perform the following steps:

SUMMARY STEPS

1. Prepare the single-chassis system as follows:
2. Prepare the additional LCC as follows:
3. Follow the steps in Changing the Fabric Addressing Mode, on page 50.

DETAILED STEPS

Step 1 Prepare the single-chassis system as follows:

a) Obtain the chassis serial number of the current running system which is required for configuration. The serial number is on a chassis label and can be accessed using the **show diag chassis** command, as described in the *Cisco IOS XR Getting Started Guide* .

b) Upgrade the ROM Monitor software to version 2.08 or later, as described in the *Cisco IOS XR ROM Monitor Guide* .

Step 2 Prepare the additional LCC as follows:

a) Ensure that the power to the new LCC is off.
For more information, see the Cisco CRS Carrier Routing System 8-Slot Line Card Chassis Installation Guide .

b) It is recommended to get the back-to-back array cables ready and not connected yet.

Step 3 Follow the steps in Changing the Fabric Addressing Mode, on page 50.

Changing the Fabric Addressing Mode

Next, you must change the fabric addressing mode to 64-bit instead of 128-bit (which is the default in IOS-XR 5.1.1). This can be achieved by setting the ROMMON variable BOOT_WITH_B2B_TAIKO on all of the PRPs in the chassis.

There are two ways to perform this process, depending upon whether or not you have access to the auxiliary ports on all of the PRPs.

If you have access to the auxiliary ports on all of the PRPs, proceed as follows:

SUMMARY STEPS

1. Type the following command:
2. Type 6.
3. Type **BOOT_WITH_B2B_TAIKO**.
4. Type 1.
5. Type 0

DETAILED STEPS

Step 1 Type the following command:

Example:

```
#satori_test_nvram
```

The output appears as follows:

Example:

```
Thu Dec  5 07:29:06.940 UTC
Choose from one of the following options:
0. Quit
1. dump shadow nvram
2. dump flash
3. write shadow to flash
4. dump usb
5. get rommon variable
6. set rommon variable
7. clean all rommon variables
8. print nv hdr info
9. write to shadow
Enter option :
```

Step 2 Type 6.

The output appears as follows:

Example:

```
Enter rommon VAR to set: [TURBOBOOT]
```

Step 3 Type **BOOT_WITH_B2B_TAIKO**.

The output appears as follows:

Example:

```
Enter value to set rommon VAR: [on,disk0]
```

Step 4 Type 1.

The output appears as follows:

```
Setting BOOT_WITH_B2B_TAIKO=1 ..
Choose from one of the following options:
0. Quit
```

Step 5 Type 0

Changing the Fabric Addressing Mode

The output appears as follows:

```
Setting BOOT_WITH_B2B_TAIKO=1 ..
Choose from one of the following options:
0. Quit
```

Type 0

If you do NOT have access to the auxiliary ports on all of the PRPs, proceed as follows:

SUMMARY STEPS

1. On the active PRP, type the following command:
2. Type 6.
3. Type **BOOT_WITH_B2B_TAIKO**.
4. Type 1.
5. Type 0.
6. Bring down the standby chassis to ROMMON by typing the following commands:
7. If DRPs are present, bring them down to ROMMON as follows:

DETAILED STEPS

Step 1 On the active PRP, type the following command:

Example:

```
RP/0/RP0/CPU0:ios# run satori_test_nvram
```

The output appears as follows:

Example:

```
Thu Dec  5 07:29:06.940 UTC
Choose from one of the following options:
0. Quit
1. dump shadow nvram
2. dump flash
3. write shadow to flash
4. dump usb
5. get rommon variable
6. set rommon variable
7. clean all rommon variables
8. print nv hdr info
9. write to shadow
Enter option :
```

Step 2 Type 6.
The output appears as follows:

Example:

```
Enter rommon VAR to set: [TURBOBOOT]
```

Step 3 Type **BOOT_WITH_B2B_TAIKO**.
The output appears as follows:

Example:

```
Enter value to set rommon VAR: [on,disk0]
```

Step 4 Type 1.
The output appears as follows:

Example:

```
Setting BOOT_WITH_B2B_TAIKO=1 ..
Choose from one of the following options:
0. Quit
```

Step 5 Type 0.

Step 6 Bring down the standby chassis to ROMMON by typing the following commands:

Example:

```
>unset BOOT_WITH_B2B_TAIKO
>set BOOT_WITH_B2B_TAIKO=1
>confreg 0x2
>sync
>reset
```

Step 7 If DRPs are present, bring them down to ROMMON as follows:

a) Reboot using the following command:

Example:

```
>reload location
```

b) Press CTRL+C on both CPUs (CPU0 and CPU1) while booting, and type the following commands on both CPUs:

Example:

```
>unset BOOT_WITH_B2B_TAIKO
>set BOOT_WITH_B2B_TAIKO=1
>confreg 0x2
>sync
>reset
```

How to Upgrade to a CRS-3 Back-to-Back System

To upgrade a single-chassis system to a CRS-3 Back-to-Back System, you must complete the following tasks:

Upgrading the Fabric Cards

This section describes how to upgrade the fabric cards in a single-chassis system.

Prerequisites

Software Requirements

- Cisco IOS XR Software Release 5.1.1 or later release
- ROMMON 2.08 or later version

Caution The ROM Monitor software must be upgraded to version 2.08 or a later version on all PRPs before a Cisco CRS-3 system is upgraded to Cisco IOS XR Software Release 5.1.1 or later release. If the router is brought up with an incompatible version of the ROM Monitor software, then the standby PRP may fail to boot. For instructions to overcome a boot block in the standby PRP in a single chassis system, see Cisco IOS XR *ROM Monitor Guide* .

Hardware Requirements

Conversion kit, which has the following components:

- Eight fabric cards (CRS-8-FC140/M)
- Rear cable management (CRS-8-REAR-CM)
- PRP route processor (if you are using CRS-8-RP-B on a single chassis)

Restrictions

None.

Summary Steps

On a single-chassis system, each fabric card represents one fabric plane. To avoid traffic loss during the upgrade, you must upgrade the switch fabric one plane at a time. To do that, you must replace each CRS-8-FC/S card or CRS-8-FC140/S card with a new FC-140G/M card and restore service to that fabric plane before upgrading the next fabric plane.

Here are the basic steps to upgrade fabric cards:

SUMMARY STEPS

1. Use CLI commands to prepare each FC/S fabric card (CRS-8-FC/S or CRS-8-FC140/S) for replacement with an FC-140G/M card.
2. Before you replace any FC/S cards, shut down the plane on each card using the following command: **controllers fabric plane** *planeNumber* **shutdown**.
3. On the fabric card that you want to replace, disable the power using the following command: **hw-module power disable location** *rack* /**SM***slot* /**SP**.
4. Replace each FC/S card (CRS-8-FC/S or CRS-8-FC140/S) with an FC-140G/M card.
5. Bring up the FC-140G/M card, as follows:
6. Repeat *Step 2* through *Step 5* until all planes (0 through 7) are upgraded.

DETAILED STEPS

Step 1 Use CLI commands to prepare each FC/S fabric card (CRS-8-FC/S or CRS-8-FC140/S) for replacement with an FC-140G/M card.

Step 2 Before you replace any FC/S cards, shut down the plane on each card using the following command: **controllers fabric plane** *planeNumber* **shutdown**.

Step 3 On the fabric card that you want to replace, disable the power using the following command: **hw-module power disable location** *rack* /**SM***slot* /**SP**.

Step 4 Replace each FC/S card (CRS-8-FC/S or CRS-8-FC140/S) with an FC-140G/M card.

Step 5 Bring up the FC-140G/M card, as follows:

a) Power up the card using the following command: **no hw-module power disable location** *rack* /**SM***slot* /**SP**. Wait for the plates to reach the IOS XR RUN state.

b) For the plane to be upgraded, bring up the control plane using the following command: **controllers fabric plane** *planeNumber* **shutdown data**.

c) Verify that the entire card has booted and all asics have initialized prior to restoring the plane for traffic.

d) Bring up the data plane using the following command: **no controllers fabric plane** *planeNumber* **shutdown**. Verify that the plane state is UP/UP.

Step 6 Repeat *Step 2* through *Step 5* until all planes (0 through 7) are upgraded.

Detailed Steps

SUMMARY STEPS

1. **admin**
2. **show platform** *rack number*/**/*
3. **configure**
4. **do show controllers fabric plane all**
5. **controllers fabric plane** *planeNumber* **shutdown**
6. **commit**
7. **hw-module power disable location 0/sm***slotNumber* /**sp**
8. **commit**
9. **show platform 0/sm***slotNumber*/**sp**
10. In Rack 0, remove the FC/S card (CRS-8-FC/S or CRS-8-FC140/S) for the plane that was shut down in Step 5 .
11. In Rack 0, insert the FC-140G/M card for the plane that was shut down in Step 5 .
12. **no hw-module power disable location 0/sm***slotNumber* /**sp**
13. **commit**
14. **do show platform 0/sm***slotNumber*/**sp**
15. **do show log | inc OPER_UP**
16. **controllers fabric plane** planeNumber **shutdown data**
17. **do show controllers fabric plane** planeNumber **detail**
18. no controllers fabric plane planeNumber shutdown
19. **end**
20. Repeat Step 2 through Step 19 for each fabric plane.
21. **show controllers fabric plane all**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**admin** **Example:** `RP/0/RP1/CPU0:router# admin`	Places the router in administration EXEC mode. • All commands listed in this procedure should be entered on the pre-existing single-chassis system.
Step 2	**show platform** *rack number*/**/* **Example:** `RP/0/RP1/CPU0:router(admin)# show platform 1/**/*`	Displays the status of all LCC modules in the specified rack. • Replace *rack* with the rack number of the LCC to examine. • Repeat this command for all LCCs. • The state for all modules should be IOS-XR RUN. • It can take a few minutes for all LCC modules to start.

	Command or Action	Purpose
		Note The LCC module status appears only when the **show platform** command is executed in administration EXEC mode.
Step 3	**configure** **Example:** `RP/0/RP1/CPU0:router(admin)#configure`	Places the router in administration configuration mode.
Step 4	**do show controllers fabric plane all** **Example:** `RP/0/RP1/CPU0:router(admin-config)# do show controllers fabric plane all`	Displays the administrative and operational status of all eight fabric planes. • The **do** command prefix allows the EXEC mode **show** command to execute in administration configuration mode. **Caution** To prevent service interruption, do not continue until the administrative and operational status for all eight planes is UP.
Step 5	**controllers fabric plane** *planeNumber* **shutdown** **Example:** `RP/0/RP1/CPU0:router(admin-config)# controllers fabric plane 0 shutdown`	Modifies the target configuration to shut down the specified plane number. • Replace the *planeNumber* parameter with the number of the plane you want to shut down. • The admin/operational state will be DOWN/DOWN.
Step 6	**commit** **Example:** `RP/0/RP1/CPU0:router(admin-config)# commit`	Commits the target configuration to the router running configuration. • This step shuts down the plane identified in the previous step.
Step 7	**hw-module power disable location 0/sm***slotNumber* /**sp** **Example:** `RP/0/RP1/CPU0:router(admin-config)# hw-module power disable location 0/sm0/sp`	Disables the power-on feature on a specific fabric card.
Step 8	**commit** **Example:** `RP/0/RP1/CPU0:router(admin-config)# commit`	Commits the target configuration to the router running configuration. • This step shuts down the plane identified in the previous step.
Step 9	**show platform 0/sm***slotNumber*/**sp** **Example:** `RP/0/RP1/CPU0:router(admin)# show platform 0/sm0/sp`	Displays the status of the Rack 0 fabric slot specified by *slotNumber* . Verify that the card is in the UNPOWERED state. **Note** The fabric card status appears only when the **show platform** command is executed in administration EXEC mode.

	Command or Action	Purpose
Step 10	In Rack 0, remove the FC/S card (CRS-8-FC/S or CRS-8-FC140/S) for the plane that was shut down in Step 5 .	Creates room for the FC-140G/M card that is required for CRS-3 Back-to-Back System operation.
Step 11	In Rack 0, insert the FC-140G/M card for the plane that was shut down in Step 5 .	Provides the hardware required for communication with the LCC.
Step 12	**no hw-module power disable location 0/sm***slotNumber* **/sp** **Example:** `RP/0/RP1/CPU0:router(admin-config)# no hw-module power disable location 0/sm0/sp` **Example:**	Re-enables the power-on feature on a specific fabric card.
Step 13	**commit** **Example:** `RP/0/RP1/CPU0:router(admin-config)# commit`	Commits the target configuration to the router running configuration.
Step 14	**do show platform 0/sm***slotNumber***/sp** **Example:** `RP/0/RP1/CPU0:router(admin)# show platform 0/sm0/sp`	Displays the status of the Rack 0 fabric slot specified by *slotNumber* . Verify that the card is in the IOS XR RUN state. **Note** The fabric card status appears only when the **show platform** command is executed in administration EXEC mode.
Step 15	**do show log | inc OPER_UP** **Example:** `RP/0/RP0/CPU0:b2b(admin-config)#do show logging | inc OPER_UP`	Displays the status of the fabric asic. The desired output will show two fabric asics in service for the plane that you just upgraded. If you do not see both asics in the UP state, do not continue. Output appears similar to the following: • SP/0/SM3/SP:May 19 17:51:32.599 : sfe_drvr[131]: %FABRIC-FABRIC_DRVR-6-ASIC_INITIALIZED : Notify FSDB that superstar/0/SM3/SP/0 is OPER_UP. • SP/0/SM3/SP:May 19 17:51:32.600 : sfe_drvr[131]: %FABRIC-FABRIC_DRVR-6-ASIC_INITIALIZED : Notify FSDB that superstar/0/SM3/SP/1 is OPER_UP
Step 16	**controllers fabric plane** planeNumber **shutdown data** **Example:** `RP/0/RP0/CPU0:b2b(admin-config)#controllers fabric plane 3 shutdown data`	Modifies the target configuration to bring up the control part of the specified fabric plane. The suggested admin/operational state of the plane in this state would be DATA_DN/UP, respectively.
Step 17	**do show controllers fabric plane** planeNumber **detail**	Displays the status of the plane specified by *planeNumber* . • Verify that the admin/operational state is DATA_DN/UP.

	Command or Action	Purpose
	Example: `RP/0/RP1/CPU0:router(admin-config)# do show controllers fabric plane 0 detail`	• Verify that a capital “D” appears in the Down Flags column. • Wait for the plane to come up before you continue.
Step 18	no controllers fabric plane planeNumber shutdown **Example:** `RP/0/RP1/CPU0:router(admin-config)# no controllers fabric plane 0 shutdown`	Modifies the target configuration to bring up the specified fabric plane. • Verify that the admin/operational state is UP/UP. • This step brings up the previously shutdown plane, which is now configured to use the Back-to-Back LCC.
Step 19	**end** **Example:** `RP/0/RP1/CPU0:router(admin-config)# end`	Changes the mode from administration configuration mode to administration EXEC mode.
Step 20	Repeat Step 2 through Step 19 for each fabric plane.	
Step 21	**show controllers fabric plane all** **Example:** `RP/0/RP1/CPU0:router(admin)# show controllers fabric plane all`	Displays the administrative and operational status of all eight fabric planes. • Verify that all fabric planes are operational and the status is UP/UP. • The plane you just migrated should show a counter increment of 1 in both the up->dn counter and the up->mcast counter.

What to Do Next

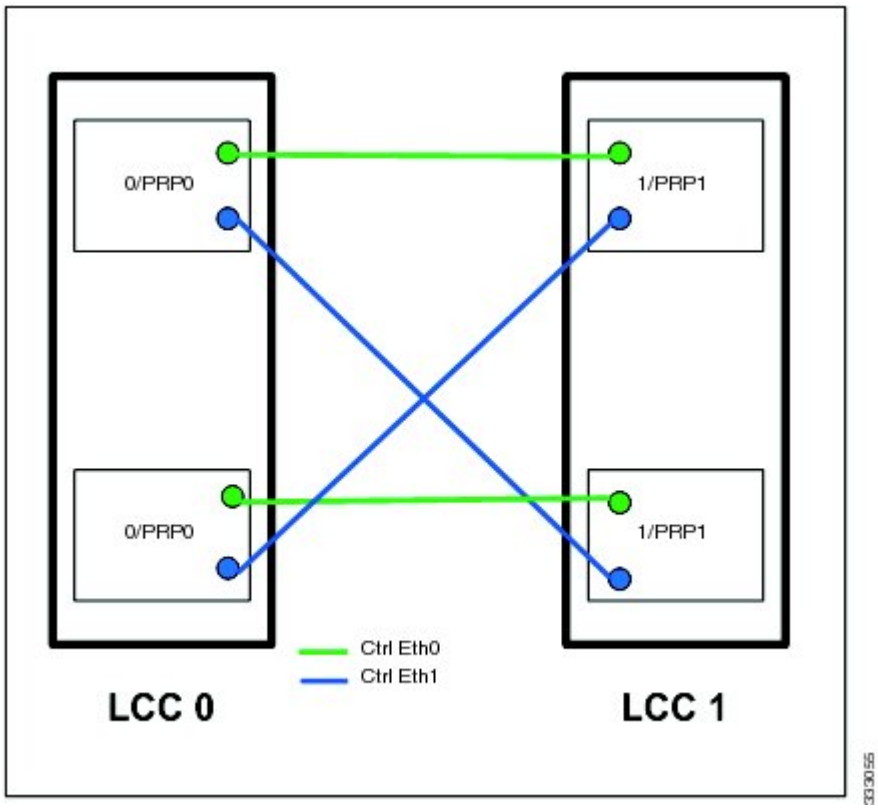
Once the Rack 0 upgrade is completed, the control network must be connected.

Connecting the Control Network

Before the additional LCC can be added to the CRS-3 Back-to-Back System, a control network must be established. The control network allows two LCCs in the CRS-3 Back-to-Back System to communicate with each other. The control function is performed by the PRPs.

The figure below shows how the control Ethernet ports of PRPs are interconnected.

Figure 14: Connections within a CRS-3 Back-to-Back System



What to Do Next

Once the control network is connected, add the additional LCC to the CRS-3 Back-to-Back System.

Adding an LCC to a CRS-3 Back-to-Back System

This section describes how to add an LCC to a CRS-3 Back-to-Back System.

Prerequisites

Software Requirements

- Cisco IOS XR Software Release 5.1.1 or later release
- ROMMON 2.08 or later version
- Serial number of new LCC (can be found on front of chassis)

Hardware Requirements

- The additional LCC.
- The control network must be operational and connected to all chassis.
- The power should be off for the LCC to be added.
- PRP route processor (if you are using CRS-8-RP-B on a single chassis)

Restrictions

None.

Summary Steps

Here are the basic steps to add the additional LCC to the CRS-3 Back-to-Back System:

SUMMARY STEPS

1. Backup the exec and admin configs on LCC0.
2. Power ON the LCC (Rack 1) chassis.
3. Interrupt the booting into drop the system (Active and Standby PRP) in ROMMON and verify the rack number (dumpplaneeeprom output ' 0x73rd byte) on the Active PRP.
4. If DRPs are present, bring down both CPUs (CPU0 and CPU1) to ROMMON while booting and type the following commands on both of the CPUs:.
5. Configure the Active PRP using the following command, which associates LCC 1 serial numbers with the rack number: **dsc serial** *rack serial number* **rack 1**.
6. Configure Rack 1 in fabric rack install-mode using the following command: **controllers fabric rack 1 install-mode**.
7. Connect the B2B fabric cables for all fabric planes.
8. Boot the LCC Rack 1 by reset from the ROMMON prompt.
9. Verify that IOS XR RUN appears on the PRP faceplates.
10. Verify that all of the eight planes are UP/UP and the plane mode is B2B. Execute the following show command on dSC: **show controllers fabric plane all detail**. The plane state should be UP/UP and the plane mode should be B2B.
11. Check the rack status using the following command: d**o show controllers fabric rack-status all detail**.
12. Remove the fabric install mode for Rack 1. Execute the following command: **no controller fabric rack 1 install-mode.**
13. Verify the status of all racks using the following command: **show controllers fabric rack all**. The plane state and mode for all of the eight planes should be the same as described in *Step 10*.

DETAILED STEPS

Step 1 Backup the exec and admin configs on LCC0.

Step 2 Power ON the LCC (Rack 1) chassis.

Step 3 Interrupt the booting into drop the system (Active and Standby PRP) in ROMMON and verify the rack number (dumpplaneeeprom output ' 0x73rd byte) on the Active PRP.

a) Unset the BOOT variable.
b) Unset the RACK_NUM variable.
c) Unset BOOT_WITH_B2B_TAIKO.
d) Set BOOT_WITH_B2B_TAIKO=1.
e) Unset the TFTP_FILE and TURBOBOOT variables if they are set.
f) Enter the **sync** command to save the current changes.
g) Verify the configuration-register is set to 0x0. The configuration-register setting 0x0 prevents the PRP from syncing to the dSC by keeping the PRP in the ROMMON state.

Step 4 If DRPs are present, bring down both CPUs (CPU0 and CPU1) to ROMMON while booting and type the following commands on both of the CPUs:.

a) Unset BOOT_WITH_B2B_TAIKO.
b) Set BOOT_WITH_B2B_TAIKO=1.
c) Enter the **sync** command to save the current changes.

Step 5 Configure the Active PRP using the following command, which associates LCC 1 serial numbers with the rack number: **dsc serial** *rack serial number* **rack 1**.

Step 6 Configure Rack 1 in fabric rack install-mode using the following command: **controllers fabric rack 1 install-mode**.

Step 7 Connect the B2B fabric cables for all fabric planes.

a) Connect 0/SMx/0,1,2 to 1/SMx/0,1,2.
b) Tighten the connector screws.

Step 8 Boot the LCC Rack 1 by reset from the ROMMON prompt.

Step 9 Verify that IOS XR RUN appears on the PRP faceplates.

Step 10 Verify that all of the eight planes are UP/UP and the plane mode is B2B. Execute the following show command on dSC: **show controllers fabric plane all detail**. The plane state should be UP/UP and the plane mode should be B2B.

Step 11 Check the rack status using the following command: d**o show controllers fabric rack-status all detail**.

Step 12 Remove the fabric install mode for Rack 1. Execute the following command: **no controller fabric rack 1 install-mode.**

Step 13 Verify the status of all racks using the following command: **show controllers fabric rack all**. The plane state and mode for all of the eight planes should be the same as described in *Step 10*.

Detailed Steps

SUMMARY STEPS

1. **admin**
2. **configure**
3. From the ROMMON prompt, enter the following commands.
4. **dsc serial** *serialNumber* **rack 1**
5. **controllers fabric rack 1 install-mode**
6. **commit**
7. Apply power to the new LCC (Rack 1).
8. Interconnects the fabric cards between two LCCs.
9. From the ROMMON prompt, enter the following commands.
10. **show platform**
11. **show controllers fabric bundle 1/sm***slotNumber*/**sp**/*bundle port* **connection**
12. **do show controllers fabric plane all detail**
13. **show controllers fabric fsdb-pla rack all**
14. **do show controllers fabric rack-status all detail**
15. **do show controllers fabric fabric-backpressure summary**
16. **no controllers fabric rack 1 install-mode**
17. **commit**
18. **do show controllers rack-status all detail**
19. **do show controllers fabric plane all detail**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**admin** **Example:** `RP/0/RP1/CPU0:router# admin`	Places the router in administration EXEC mode. • All commands listed in this procedure should be entered on the pre-existing single-chassis system.
Step 2	**configure** **Example:** `RP/0/RP1/CPU0:router(admin)#configure`	Places the router in administration configuration mode.
Step 3	From the ROMMON prompt, enter the following commands. **Example:** `unset BOOT`	From the console of the PRP in the new system, send the break (cntl+c) to disrupt the boot sequence. This places you at the rommon prompt. From here, issue the **set** command. This shows the current variables set on the PRP. If the variables listed are present, unset them as shown. Make sure to use sync at the end to save the changes.

	Command or Action	Purpose

	`unset RACK_NUM`
	`unset BOOT_WITH_B2B_TAIKO`
	`set BOOT_WITH_B2B_TAIKO=1`
	`unset TFTP_FILE`
	`unset TURBOBOOT`
	`confreg 0x0`
	`sync`
	`reset`	

Step 4	**dsc serial** *serialNumber* **rack 1** **Example:** `RP/0/RP1/CPU0:router(admin-config)# dsc serial TBA08440024 rack 1`	Configures the additional LCC as Rack 1 in the multishelf system. • Replace the *serialNumber* parameter with the serial number of the additional LCC. • If you are configuring the system from a remote location, you can use a command to display the serial number. For more information, see *Cisco IOS XR Getting Started Guide.*
Step 5	**controllers fabric rack 1 install-mode** **Example:** `RP/0/RP1/CPU0:router(admin-config)# controllers fabric rack 1 install-mode`	Modifies the target configuration to change the Rack 1 configuration to installation mode.
Step 6	**commit** **Example:** `RP/0/RP1/CPU0:router(admin-config)# commit`	Commits the target configuration to the router running configuration.
Step 7	Apply power to the new LCC (Rack 1).	Starts up the second LCC (Rack 1).
Step 8	Interconnects the fabric cards between two LCCs.	Connect all fabric cables that connect the fabric planes in the new LCC to the additional LCCs.

Step 9	From the ROMMON prompt, enter the following commands.
	
	Example:
	
	`confreg 0x2`
	`sync`
	`reset`
		Boots the LCC Rack 1 by reset from the ROMMON prompt. Sets the config register to 0x2 and enables boot.

Step 10	**show platform** **Example:** `RP/0/RP1/CPU0:router(admin)# show platform`	Displays the status of all LCC modules. • Repeat this command for all LCCs. • The state for all modules should be IOS-XR RUN. • It can take a few minutes for all LCC modules to start. • The LCC module status appears only when the show platform command is executed in administration EXEC mode.

	Command or Action	Purpose
Step 11	**show controllers fabric bundle 1/sm***slotNumber*/**sp**/*bundle port* **connection** **Example:** `RP/0/RP1/CPU0:router(admin)#show controllers fabric bundle 1/sm1/sp/1 connection`	Shows whether the fabric connectivity between two LCCs has been successful. The bundle port value ranges from 0 to 2. In the case of wrong cabling, the CLI shows the following message: `Actual connection data: Please check bundle connection, they appear to be swapped with another bundle.`
Step 12	**do show controllers fabric plane all detail** **Example:** `RP/0/RP1/CPU0:router(admin-config)# show controllers fabric plane all detail`	Displays the status of all planes. Wait for the plane to come up before you continue.
Step 13	**show controllers fabric fsdb-pla rack all** **Example:** `RP/0/RP1/CPU0:router(admin-config)# show controllers fabric fsdb-pla rack all`	Displays fabric plane availability for every destination in the system.
Step 14	**do show controllers fabric rack-status all detail** **Example:** `RP/0/RP1/CPU0:router(admin-config)# do show controllers fabric rack-status all detail`	Displays the status of all racks and additional information for racks in installation mode. • Wait for the status in the Rack in Install and Rack out of Install columns to change to UP for all planes.
Step 15	**do show controllers fabric fabric-backpressure summary** **Example:** `RP/0/RP1/CPU0:router(admin-config)# do show controllers fabric fabric-backpressure summary`	Displays the backpressure status for all racks. • The status for the row labeled “Rack 1: All Groups Received? :” should be “Yes.”
Step 16	**no controllers fabric rack 1 install-mode** **Example:** `RP/0/RP1/CPU0:router(admin-config)# no controllers fabric rack 1 install-mode`	Modifies the target configuration to change the Rack 1 configuration to normal mode.
Step 17	**commit** **Example:** `RP/0/RP1/CPU0:router(admin-config)# commit`	Commits the target configuration to the router running configuration.
Step 18	**do show controllers rack-status all detail**	Displays the status of all racks in the system.

	Command or Action	Purpose
	Example: `RP/0/RP1/CPU0:router(admin-config)# do show controllers rack-status all detail`	• In a properly operating system, the rack status for all racks should be Normal, and the server status should be Present.
Step 19	**do show controllers fabric plane all detail** **Example:** `RP/0/RP1/CPU0:router(admin-config)# do show controllers fabric plane all detail`	Displays the status of all planes. • Verify that a capital "D" appears in the Down Flags column. • Wait for the plane to come up before you continue.

Tips and Troubleshooting

1. Make sure to use the correct B2B fabric/fiber cables.
2. Before the Rack 1 install mode is removed, there will be constant Diag failure because the IngressQ bring up is halted. Online messages similar to the following may appear:

```
RP/0/RP1/CPU0:Jan 17 11:38:41.635 : online_diag_rp[338]: %DIAG-XR_DIAG-3-ERROR : (M) Fabric
 Ping Failure, 2 of 5 nodes failed(L): 1/RP0/CPU0, 1/RP1/CPU0
RP/0/RP1/CPU0:Jan 17 11:38:55.934 : online_diag_rp[338]: %DIAG-XR_DIAG-3-ERROR : (U) Fabric
 Ping Failure - destination node (Level 2) in 1/RP0/CPU0
RP/0/RP1/CPU0:Jan 17 11:39:05.498 : online_diag_rp[338]: %DIAG-XR_DIAG-3-ERROR : (UM) FIM:
 multi-nodes failure detected
```

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport