

Virtual Chassis User Guide for EX2200, EX3300, EX4200, EX4500 and EX4550 Switches

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Virtual Chassis User Guide for EX2200, EX3300, EX4200, EX4500 and EX4550 Switches
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Use this guide to set up and configure an EX2200, EX3300, EX4200, EX4500, or EX4550 Virtual Chassis. A Virtual Chassis is composed of a supported combination of multiple switches that operate and are managed as a single switch or network entity. Refer also to the hardware documentation for the types of switches comprising the Virtual Chassis for more details on how to physically interconnect them.

Documentation and Release Notes

To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at <https://www.juniper.net/documentation/>.

If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

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Using the Examples in This Manual

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

```
system {
  scripts {
    commit {
      file ex-script.xsl;
    }
  }
}
interfaces {
  fxp0 {
    disable;
    unit 0 {
      family inet {
        address 10.0.0.1/24;
      }
    }
  }
}
```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

```
[edit]
user@host# load merge /var/tmp/ex-script.conf
load complete
```

Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

```
commit {  
    file ex-script-snippet.xml; }
```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

```
[edit]  
user@host# edit system scripts  
[edit system scripts]
```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

```
[edit system scripts]  
user@host# load merge relative /var/tmp/ex-script-snippet.conf  
load complete
```

For more information about the **load** command, see [CLI Explorer](#).

Documentation Conventions

[Table 1 on page xv](#) defines notice icons used in this guide.

Table 1: Notice Icons







Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.
	Tip	Indicates helpful information.
	Best practice	Alerts you to a recommended use or implementation.

Table 2 on page xv defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the configure command: user@host> configure
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> show chassis alarms No alarms currently active
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces or emphasizes important new terms. Identifies guide names. Identifies RFC and Internet draft titles. 	<ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS CLI User Guide</i> RFC 1997, <i>BGP Communities Attribute</i>

Table 2: Text and Syntax Conventions (*continued*)

Convention	Description	Examples
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none">• To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level.• The console port is labeled CONSOLE.
< > (angle brackets)	Encloses optional keywords or variables.	stub <default-metric <i>metric</i> >;
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	broadcast multicast (<i>string1</i> <i>string2</i> <i>string3</i>)
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	rsvp { # Required for dynamic MPLS only
[] (square brackets)	Encloses a variable for which you can substitute one or more values.	community name members [<i>community-ids</i>]
Indentation and braces ({ })	Identifies a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
GUI Conventions		

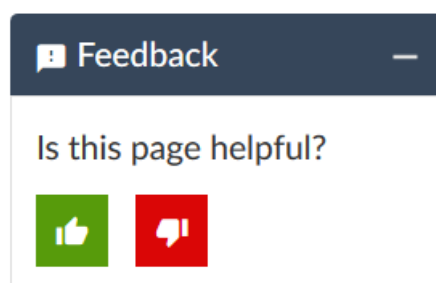
Table 2: Text and Syntax Conventions (*continued*)

Convention	Description	Examples
Bold text like this	Represents graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> In the Logical Interfaces box, select All Interfaces. To cancel the configuration, click Cancel.
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select Protocols>Ospf .

Documentation Feedback

We encourage you to provide feedback so that we can improve our documentation. You can use either of the following methods:

- Online feedback system—Click TechLibrary Feedback, on the lower right of any page on the [Juniper Networks TechLibrary](#) site, and do one of the following:



- Click the thumbs-up icon if the information on the page was helpful to you.
- Click the thumbs-down icon if the information on the page was not helpful to you or if you have suggestions for improvement, and use the pop-up form to provide feedback.
- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active Juniper Care or Partner Support Services support contract, or are

covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <https://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <https://www.juniper.net/support/warranty/>.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: <https://www.juniper.net/customers/support/>
- Search for known bugs: <https://prsearch.juniper.net/>
- Find product documentation: <https://www.juniper.net/documentation/>
- Find solutions and answer questions using our Knowledge Base: <https://kb.juniper.net/>
- Download the latest versions of software and review release notes: <https://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum: <https://www.juniper.net/company/communities/>
- Create a service request online: <https://myjuniper.juniper.net>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://entitlementsearch.juniper.net/entitlementsearch/>

Creating a Service Request with JTAC

You can create a service request with JTAC on the Web or by telephone.

- Visit <https://myjuniper.juniper.net>.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see <https://support.juniper.net/support/requesting-support/>.

1

PART

Overview

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Virtual Chassis Overview

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Virtual Chassis Overview for Switches

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Many Juniper Networks EX Series and QFX Series switches support Virtual Chassis, a flexible and scalable technology with which you can connect individual switches together to form one unit, and configure and manage the unit as a single chassis. Virtual Chassis ports (VCPs) connect member switches together to form a Virtual Chassis, and are responsible for passing all data and control traffic between member switches.

Use the following links to find the right Virtual Chassis User Guide for different EX Series and QFX Series switches if this guide doesn't cover the switches you're interested in:

- *Virtual Chassis User Guide for EX2200, EX3300, EX4200, EX4500 and EX4550 Switches* covers configuring and maintaining EX2200, EX3300, EX4200, EX4500, and EX4550 Virtual Chassis.
- *Virtual Chassis User Guide for EX8200 Switches* describes configuring and maintaining EX8200 Virtual Chassis.
- For deployments with EX9200 switches, you should plan or move to MC-LAG or Junos Fusion Enterprise architectures rather than using a Virtual Chassis. We do not recommend using EX9200 switches in a Virtual Chassis. If needed to aid in migration away from EX9200 Virtual Chassis, see *Virtual Chassis User Guide for EX9200 Switches*.
- *Virtual Chassis User Guide for Switches* describes configuring and maintaining *all other* EX Series and QFX Series Virtual Chassis.

NOTE: Virtual Chassis Fabric (VCF) is an evolution of Virtual Chassis technology. VCF configurations share some elements of Virtual Chassis technology, including configuration statements and administrative commands, but use a spine-and-leaf topology with supported QFX Series switches as spine devices and supported EX Series and QFX Series switches as leaf devices. For details on configuring and maintaining a VCF, see the *Virtual Chassis Fabric User Guide*.

Benefits of Virtual Chassis on Switches

- Simplifies configuration and maintenance: Multiple devices can be managed as a single device with the same or similar capabilities as the standalone device.
- Increases fault tolerance and high availability (HA): A Virtual Chassis can remain active and network traffic can be redirected to other member switches when a single member switch fails.

- Flattens your network and reduces networking overhead by allowing network devices to synchronize to one resilient logical device rather than to multiple physical devices.
- Enables a simplified Layer 2 network topology that minimizes or eliminates the need for loop prevention protocols such as Spanning Tree Protocol (STP).
- Provides a flexible model for expanding your network: You can easily add Virtual Chassis member switches to increase the number of access ports on your network to support more servers, computers, phones, or other devices with minimal complications to the existing network topology and switch configuration.

Virtual Chassis Basics on Switches

IN THIS SECTION

- [Connecting Member Switches with Virtual Chassis Ports | 4](#)
- [Virtual Chassis Configuration | 5](#)
- [Configuring Interfaces for a Virtual Chassis | 6](#)
- [Mixed and Non-mixed EX Series and QFX Series Virtual Chassis | 6](#)
- [Virtual Chassis Member Switch Roles | 6](#)

Virtual Chassis is a feature on Juniper Networks routing or switching devices that provides network resiliency in the form of redundant Routing Engines and network expansion flexibility with minimal impact to a configuration.

Virtual Chassis technology on switches enables you to interconnect supported combinations of EX Series and QFX Series switches into one logical device that you can configure and manage as a single unit. Switches interconnected into a Virtual Chassis are called Virtual Chassis member switches, identified by a member ID within the Virtual Chassis.

Virtual Chassis member switches are interconnected and communicate with each other using Virtual Chassis ports (VCPs).

Connecting Member Switches with Virtual Chassis Ports

A switch is not recognized by the Virtual Chassis as a member switch until it is interconnected with the master or interconnected with an existing member of the Virtual Chassis using VCPs. EX Series and QFX Series switches that can be in a Virtual Chassis might support one or more of the following VCP options:

- Network or uplink ports that support the option to be configured as VCPs. Most switches support this VCP option.

- Ports that are configured as VCPs in the default factory settings. These ports can also be converted into and used as network ports instead of as VCPs, and converted back into VCPs again if needed.
- Dedicated VCPs, which are ports that can only function as VCPs. Only a few switches have dedicated VCPs.

Available VCP options vary among the different switch models. See [“Virtual Chassis Port Options” on page 24](#) for a summary of the ports that are supported as VCPs on different switches.

When a port is set as a VCP, it cannot be used for any other purpose. If you want to use the port for another purpose, you must delete the VCP setting using the **request virtual-chassis vc-port** command. You can run this command directly on the member whose uplink VCP setting you want to delete or through the master member of the Virtual Chassis configuration.



CAUTION: Deleting a VCP in a Virtual Chassis configuration can cause the Virtual Chassis configuration to split. For more information, see [“Understanding Split and Merge in a Virtual Chassis” on page 59](#).

If redundant VCP links of the same speed are connected between the same two member switches of a Virtual Chassis, the ports automatically form a VCP Link Aggregation Group (LAG) or bundle that distributes the inter-member VCP traffic load among them. See [“Understanding Virtual Chassis Port Link Aggregation” on page 50](#) for details.

Virtual Chassis Configuration

You configure and manage nearly all aspects of an EX Series or QFX Series Virtual Chassis through the master switch of the Virtual Chassis. However, you can also configure Virtual Chassis parameters when a switch is a standalone switch not interconnected with other members yet, because any switch that supports being in a Virtual Chassis is by default a single-member Virtual Chassis with member ID 0. Upon connecting the switch with others in a Virtual Chassis, any Virtual Chassis configuration statements and uplink Virtual Chassis port (VCP) settings previously configured on the standalone switch remain part of its configuration.

You can set up an EX Series or QFX Series Virtual Chassis using a nonprovisioned or preprovisioned configuration. If you want to deterministically control the roles and member IDs assigned to the member switches when creating and managing a Virtual Chassis, use a preprovisioned configuration, which distinguishes member switches by associating their serial numbers with the member ID.

When adding new member switches to a preprovisioned Virtual Chassis, you might be able to simplify the procedure by using the autoprovisioning feature, which automatically converts the interconnecting links into VCPs when cabling the new switch into the Virtual Chassis under certain conditions and configuration settings. See [“Automatic Virtual Chassis Port \(VCP\) Conversion” on page 27](#) for details.

Configuring Interfaces for a Virtual Chassis

The member ID of an EX Series or QFX Series Virtual Chassis member switch functions as an FPC slot number. When you are configuring interfaces for a Virtual Chassis configuration, you specify the appropriate member ID as the *slot* element of the interface name.

The default factory settings for a Virtual Chassis configuration include FPC 0 as a member of the default VLAN because FPC 0 is configured as part of the **ethernet-switching** family. To include the FPC in the default VLAN, add the **ethernet-switching** family to the configurations for those interfaces.

Mixed and Non-mixed EX Series and QFX Series Virtual Chassis

A Virtual Chassis might consist of all the same type of switches or different types of switches in supported combinations.

Some combinations of switches in a Virtual Chassis comprise a *mixed Virtual Chassis*, which contains member switches that have operational differences requiring the Virtual Chassis to be configured with a mixed mode setting that enables all of the member switches to inter-operate successfully.

Some combinations of different types or models of switches can inter-operate in a Virtual Chassis without requiring the Virtual Chassis to be configured in mixed mode, such as different switches that can run the same Junos OS software image.

See [“Understanding Mixed EX Series and QFX Series Virtual Chassis” on page 35](#) for details on the different combinations of switches supported in a Virtual Chassis.

Virtual Chassis Member Switch Roles

Member switches in an EX Series or QFX Series Virtual Chassis operate in either a *master* Routing Engine role, *backup* Routing Engine role, or *linecard* role. For some mixed Virtual Chassis, the member switches in the Routing Engine role are recommended (and in some cases required) to be particular types or models of switches. Any switch supported in a Virtual Chassis can operate in the linecard role.

A standalone switch that supports Virtual Chassis is by default a single-member Virtual Chassis that is assigned member ID 0 and operates in the master Routing Engine role as the master of itself. When connected and configured into a Virtual Chassis with other member switches, the switch will be assigned a unique member ID and might take on a different role.

A nonprovisioned Virtual Chassis uses a mastership election algorithm to select the member switches that assume the master and backup roles if an existing member switch in the Routing Engine role fails or when new member switches are added. In a preprovisioned Virtual Chassis, you assign the roles to each member switch when forming the Virtual Chassis and adding or replacing member switches.

See the following for details on EX Series and QFX Series Virtual Chassis member switch roles:

- [Understanding Virtual Chassis Components on page 19](#)
- [Understanding How the Master in a Virtual Chassis Is Elected on page 43](#)

Global Management of Member Switches in a Virtual Chassis

The interconnected member switches in a Virtual Chassis operate and can be configured as a single network entity.

The serial console port and dedicated out-of-band management port on individual switches have global virtual counterparts when the switches are interconnected in a Virtual Chassis configuration. You can connect to the master switch by connecting a terminal directly to the console port of any member switch. A *virtual management Ethernet (VME)* interface allows you to remotely manage the Virtual Chassis configuration by connecting to the out-of-band management port of any member switch through a single IP address. You can perform remote configuration and administration of all member switches of the Virtual Chassis configuration using the Junos CLI through the VME interface. See [“Understanding Global Management of a Virtual Chassis” on page 46](#) for details.

When setting up a Virtual Chassis on EX Series switches that support the EZSetup script, you can run EZSetup once to specify the identification parameters for the master, and these parameters implicitly apply to all member switches of the Virtual Chassis.

On switches that support the J-Web user interface, you can view the Virtual Chassis as a single device in J-Web and apply various device management functions to all member switches of the Virtual Chassis.

High Availability Using Redundancy

Interconnecting EX Series or QFX Series switches into a Virtual Chassis increases your network’s high availability. A Virtual Chassis is more fault tolerant than a standalone switch because it can remain active, forward traffic and provide sub-second convergence in the case of a device or link failure.

Standalone switches that support only a single Routing Engine can operate with a master and a backup Routing Engine when configured into a Virtual Chassis, and therefore support some high availability features that would otherwise not be available on the switch, such as Graceful Routing Engine Switchover (GRES) for hitless failover.

You can also increase fault tolerance within a Virtual Chassis by configuring other supported high availability features. For example, configuring Link Aggregation Group (LAG) bundles that include member links on different switches in the same Virtual Chassis enables traffic traversing the LAG to be redirected from a Virtual Chassis member switch that fails to links on another active Virtual Chassis member switch.

Adaptability as an Access Switch or Distribution Switch

A Virtual Chassis configuration supports a variety of user environments because it can be composed of different types of switches. You can select different switch models to support various functions. For example, you might set up one Virtual Chassis access switch configuration composed of full Power over Ethernet (PoE) models to support users sitting in cubicles equipped with PCs and Voice over IP (VoIP) phones. You could set up another Virtual Chassis configuration with partial PoE models to support the

company's internal servers, and another to support the company's external servers. You can alternatively use a Virtual Chassis in a topology as a distribution switch.

Virtual Chassis Provisioning From the Factory-Default State Using the Phone-Home Client

Phone-home provisioning on a Virtual Chassis is a form of zero-touch provisioning (ZTP). With phone-home provisioning, when a device in the factory-default state boots up, a phone-home client (PHC) process automatically starts running on the device. The PHC gets bootstrapping information over the network from a central network management data source called the phone-home server (PHS), and installs the intended software image and configuration on the device without requiring any user interaction at the remote site.

The PHC also supports phone-home provisioning on some EX Series Virtual Chassis. Check [Feature Explorer](#) and search for **phone-home** to see the Virtual Chassis platforms that support phone-home provisioning. Phone-home provisioning on a Virtual Chassis is an extension of standalone device phone-home support.

See *Provision a Virtual Chassis Using the Phone-Home Client* for details about how the PHC works to provision a Virtual Chassis.

The PHS is usually part of a network management system (NMS) that supports phone-home provisioning. The network administrator enters the information that defines how the devices or Virtual Chassis at remote sites should be set up. An organization might have more than one PHS for redundancy.

Requirements for Phone-Home Provisioning to Work for a Virtual Chassis

The PHC only supports Virtual Chassis that meet the following conditions:

- The Virtual Chassis member devices have dedicated or default-configured VCPs.
[“Virtual Chassis Port Options” on page 24](#) explains the different VCP types and what’s supported on different platforms.

- The Virtual Chassis members are all the same type of device.

In other words, it isn’t a mixed-mode Virtual Chassis. See [“Understanding Mixed EX Series and QFX Series Virtual Chassis” on page 35](#).

- All member devices have the factory-default configuration.

The PHC process only runs when a device or Virtual Chassis is in the factory-default state.

- The Virtual Chassis member are interconnected in a ring topology using only dedicated or default-configured VCPs .

How To Enable Phone-Home Provisioning on a Virtual Chassis shows a sample EX4300 Virtual Chassis that is wired this way.

- At least one Virtual Chassis member has an active connection to the network and can access an available PHS that supports provisioning a Virtual Chassis.

The connection to the PHS can be through the Virtual Chassis VME interface or any network-facing port on any Virtual Chassis member. See [“Understanding Global Management of a Virtual Chassis” on page 46](#) for more about how the VME interface works.

RELATED DOCUMENTATION

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Understanding QFX Series Virtual Chassis

[Understanding Virtual Chassis Components | 19](#)

[Understanding Global Management of a Virtual Chassis | 46](#)

[Understanding How the Master in a Virtual Chassis Is Elected | 43](#)

[Understanding High Availability on an EX Series Virtual Chassis | 74](#)

Understanding EX Series Virtual Chassis

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This topic introduces EX Series Virtual Chassis. An EX Series Virtual Chassis is a supported combination of interconnected EX2200, EX2300, EX3300, EX3400, EX4200, EX4500, EX4550, EX4300, EX4600, or EX4650 switches operating as one logical device and managed as a single chassis. Switches in a Virtual Chassis are called *member switches*.

For information on EX8200 Virtual Chassis, see *Virtual Chassis User Guide for EX8200 Switches*.

Virtual Chassis Support on EX Series Switches

In an EX Series Virtual Chassis, you can interconnect standalone switches in the following combinations into one logical device, and manage the logical device as a single chassis:

- EX2200 Virtual Chassis, composed of up to four EX2200 switches.
- EX2300 Virtual Chassis, composed of up to four EX2300 switches or up to four EX2300 multigigabit model switches (EX2300-24MP, EX2300-48MP). Starting in Junos OS Release 18.4R1, you can also combine EX2300 multigigabit model switches with other EX2300 switches in the same Virtual Chassis, which operates as a non-mixed Virtual Chassis.
On EX2300 switches, the Virtual Chassis feature requires license. See [Understanding Software Licenses for EX Series Switches](#).
- EX3300 Virtual Chassis, composed of up to ten EX3300 switches.
- EX3400 Virtual Chassis, composed of up to ten EX3400 switches.
- EX4200 Virtual Chassis, composed of up to ten EX4200 switches.
- EX4300 Virtual Chassis, composed of up to ten EX4300 switches, including multigigabit models (EX4300-48MP). An EX4300 Virtual Chassis operates as a non-mixed Virtual Chassis if it is composed of only EX4300 multigigabit model switches, or composed of any combination of any other EX4300 switches excluding the multigigabit models. An EX4300 Virtual Chassis operates as a mixed EX4300 Virtual Chassis if it is composed of EX4300 multigigabit model (EX4300-48MP) switches mixed with any other EX4300 model switches.
- EX4500 Virtual Chassis, composed of up to ten EX4500 switches
- EX4550 Virtual Chassis, composed of up to ten EX4550 switches
- EX4600 Virtual Chassis, composed of up to ten EX4600 switches.
- EX4650 Virtual Chassis, composed of up to two or up to four EX4650-48Y switches.
Starting in Junos OS Release 19.3R1, an EX4650-48Y Virtual Chassis can have up to two member switches.
Starting in Junos OS Release 20.1R1, an EX4650-48Y Virtual Chassis can have up to four member switches.
- Mixed EX4200 and EX4500 Virtual Chassis, composed of up to ten total EX4200 and EX4500 switches
- Mixed EX4200 and EX4550 Virtual Chassis, composed of up to ten total EX4200 and EX4550 switches
- Mixed EX4200, EX4500, and EX4550 Virtual Chassis, composed of up to ten total EX4200, EX4500, and EX4550 switches

- Mixed EX4300 and EX4600 Virtual Chassis, composed of up to ten total EX4300 (excluding multigigabit models) and EX4600 switches. The member switches in the master and backup Routing Engine roles must be EX4600 switches.
- Mixed EX4500 and EX4550 Virtual Chassis, composed of up to ten total EX4500 and EX4550 switches

Table 3 on page 11 lists the initial Junos OS release that supports each EX Series Virtual Chassis combination. “N/A” indicates the combination is *not supported*. Switches must be running the same version of Junos OS software to join a Virtual Chassis, although the images might be different on different types of switches when mixed hardware models are supported together in a Virtual Chassis.

Table 3: Minimum Junos OS Release by Virtual Chassis Connection Type

Switch	EX2200 Switch	EX2300 Switch	EX3300 Switch	EX3400 Switch	EX4200 Switch	EX4300 Switch	EX4500 Switch	EX4550 Switch	EX4600 Switch	EX4650
EX2200	12.2R1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EX2300	N/A	15.1X53-D50, 18.1R2 (MP models), 18.4R1 (MP and other models)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EX3300	N/A	N/A	11.3R1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EX3400	N/A	N/A	N/A	15.1X53-D50	N/A	N/A	N/A	N/A	N/A	N/A
EX4200	N/A	N/A	N/A	N/A	9.0R1	N/A	11.1R1	12.2R1	N/A	N/A
EX4300	N/A	N/A	N/A	N/A	N/A	132X50-D10, or 18.2R1 for MP models	N/A	N/A	132X51-D25, excludes EX4300 MP models	N/A
EX4500	N/A	N/A	N/A	N/A	11.1R1	N/A	11.1R1	12.2R1	N/A	N/A
EX4550	N/A	N/A	N/A	N/A	12.2R1	N/A	12.2R1	12.2R1	N/A	N/A

Table 3: Minimum Junos OS Release by Virtual Chassis Connection Type (*continued*)

Switch	EX2200 Switch	EX2300 Switch	EX3300 Switch	EX3400 Switch	EX4200 Switch	EX4300 Switch	EX4500 Switch	EX4550 Switch	EX4600 Switch	EX4650
EX4600	N/A	N/A	N/A	N/A	N/A	132X51-D25, excludes EX4300 MP models	N/A	N/A	132X51-D25	N/A
EX4650	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	19.3R1

Basic Configuration of EX Series Virtual Chassis

Some EX Series switches can only form a Virtual Chassis with the same type of switches, while some can connect with other types of switches into a mixed-mode Virtual Chassis. See [“Understanding Mixed EX Series and QFX Series Virtual Chassis” on page 35](#) for details on the different types of switches that can be mixed in a Virtual Chassis.

You set up an EX Series Virtual Chassis by configuring Virtual Chassis ports (VCPs) on the member switches, and interconnecting the switches using the VCPs. VCPs are responsible for passing all data and control traffic between member switches in the Virtual Chassis. EX Series switches have one or more of the following VCP options:

- Network or uplink ports that you can configure into VCPs.
- Default-configured VCPs, which are configured as VCPs in the default factory configuration, but you can alternatively convert them into network or uplink ports if desired and reconvert them back into VCPs if needed.
- Dedicated VCPs, which you can only use as VCPs.

See [“Virtual Chassis Port Options” on page 24](#) for details on which ports on different EX Series switches can be VCPs.

You can increase the VCP bandwidth between any two member switches by connecting multiple VCP links between the switches. When multiple VCP links interconnect the same two member switches, the links automatically form a Link Aggregation Group (LAG) bundle if they have the same speeds. For example, if you have four 40-Gbps links configured as VCPs between two member switches, the four links form a LAG with 160 Gbps of bandwidth. Similarly, connecting two 10-Gbps links configured as VCPs between two member switches creates a LAG with 2 member links at 20 Gbps total bandwidth. However, 10-Gbps and 40-Gbps links configured as VCPs between two Virtual Chassis member switches cannot be member links of the same VCP LAG.

Within a single wiring closet, you can add a new member switch to a Virtual Chassis by cabling the member switch into the Virtual Chassis using supported VCP links. You can also easily expand a Virtual Chassis configuration beyond a single wiring closet or over a longer distance by connecting member switches together using uplink ports that are supported as VCPs.

You can set up a Virtual Chassis using either a nonprovisioned or a preprovisioned configuration. If you want to deterministically control the role and member ID assigned to each member switch, use a preprovisioned configuration. Virtual Chassis member switches can have one of three roles: master Routing Engine, backup Routing Engine, or linecard role. In some combinations of switches in a Virtual Chassis, we recommend or require that you configure certain switches into the Routing Engine roles. See [“Understanding Virtual Chassis Components” on page 19](#) for more information about Virtual Chassis roles.

You can simplify adding switches to a preprovisioned configuration by using the automatic VCP conversion feature (see [“Automatic Virtual Chassis Port \(VCP\) Conversion” on page 27](#)), which automatically converts uplink ports into VCPs on the member switches on both sides of the new VCP links as you cable them. This Virtual Chassis expansion method is also called *autoprovisioning*.

EX2200 Switches in a Virtual Chassis

You can connect up to four EX2200 and EX2200-C switches into an EX2200 Virtual Chassis. EX2200 switches can't be mixed in a Virtual Chassis with any other type of switches.

You can configure and use any EX2200 1-Gigabit Ethernet optical interfaces as VCPs. All RJ-45 interfaces, including built-in network ports with 10/100/1000BASE-T Gigabit Ethernet connectors and 1000BASE-T RJ-45 transceivers, can also be configured into VCPs. You can configure up to eight 1-Gbps interfaces configured as VCPs into a single Link Aggregation Group (LAG) bundle, so in an EX2200 Virtual Chassis, you can have a VCP LAG with a bandwidth of up to 8 Gigabit Ethernet.

EX2200 Virtual Chassis do not support other high availability features such as Graceful Routing Engine switchover (GRES), Nonstop bridging (NSB), Nonstop active routing (NSR), fast failover, and Nonstop software upgrade (NSSU).

You configure, monitor, and maintain an EX2200 Virtual Chassis is configured and managed similarly to other EX Series Virtual Chassis. See the following for details on configuring a Virtual Chassis with EX2200 switches:

- [Configuring an EX2200 Virtual Chassis \(CLI Procedure\) on page 207](#)

EX2300 Switches in a Virtual Chassis

You can connect up to four EX2300 switches into a Virtual Chassis. You can't combine EX2300 switches into a mixed Virtual Chassis with any other EX Series or QFX Series switches, but you can create a non-mixed Virtual Chassis with different models of EX2300 switches as follows:

- Any combination of up to four EX2300 and EX2300-C switches.

- Any combination of up to four EX2300 multigigabit model (EX2300-24MP and EX2300-48MP) switches.
- (Starting in Junos OS Release 18.4R1) Any combination of up to four EX2300 multigigabit model switches and other EX2300 or EX2300-C model switches. You do not need to set mixed mode.

NOTE: In Junos OS releases prior to 18.4R1, you cannot mix EX2300 multigigabit model switches with other EX2300 or EX2300-C model switches in an EX2300 Virtual Chassis.

EX2300 switches do not have default or dedicated VCP ports, but you can configure the 10-Gigabit Ethernet uplink ports as VCPs, and use those to interconnect the switches into a Virtual Chassis.

You connect EX2300 switches or EX2300 multigigabit switches into an EX2300 Virtual Chassis by configuring uplink ports as VCPs and using SFP+ transceivers. The uplink ports on EX2300 switches also support SFP transceivers, but you can't use SFP transceivers on uplink ports to form an EX2300 Virtual Chassis.

In all EX2300 Virtual Chassis, you can configure any EX2300 switch model into any member switch role (master Routing Engine, backup Routing Engine, or linecard).

On EX2300 switches, the Virtual Chassis feature requires license. See [Understanding Software Licenses for EX Series Switches](#).

You configure, monitor, and maintain an EX2300 Virtual Chassis in a similar way as other EX Series and QFX Series Virtual Chassis. See the following for details on configuring or changing the members in an EX2300 Virtual Chassis:

- *Configuring an EX2300, EX3400, or EX4300 Virtual Chassis*
- *Adding a New Switch to an Existing EX2300, EX3400, or EX4300 Virtual Chassis*
- [Removing or Replacing a Member Switch of a Virtual Chassis Configuration on page 248](#)

EX3300 Switches in a Virtual Chassis

You can interconnect up to ten EX3300 switches into a Virtual Chassis. EX3300 switches can't be mixed in a Virtual Chassis with any other type of switches.

Uplink ports 2 and 3 on EX3300 switches are configured as VCPs by default. You can change this default configuration or configure any of the other uplink ports as VCPs.

You configure, monitor, and maintain an EX3300 Virtual Chassis in a similar way as other EX Series Virtual Chassis. See the following for details on configuring or expanding a Virtual Chassis with EX3300 switches:

- [Configuring an EX3300 Virtual Chassis \(CLI Procedure\) on page 212](#)
- [Adding a New Switch to an Existing EX3300 Virtual Chassis \(CLI Procedure\) on page 234](#)

- [Removing or Replacing a Member Switch of a Virtual Chassis Configuration on page 248](#)

EX3400 Switches in a Virtual Chassis

You can connect up to ten of any models of EX3400 switches into a Virtual Chassis. EX3400 switches can't be in a Virtual Chassis with any other EX Series or QFX Series switches.

By default, the QFSP+ uplink ports on EX3400 switches are configured as VCPs, or you can configure any SFP+ uplink module ports on EX3400 switches as VCPs. You can't use uplink ports with SFP transceivers as VCPs to connect EX3400 switches into a Virtual Chassis.

You configure, monitor, and maintain an EX3400 Virtual Chassis in a similar way as other EX Series and QFX Series Virtual Chassis. See the following for details on configuring or changing the members in an EX3400 Virtual Chassis:

- *Configuring an EX2300, EX3400, or EX4300 Virtual Chassis*
- *Adding a New Switch to an Existing EX2300, EX3400, or EX4300 Virtual Chassis*
- [Removing or Replacing a Member Switch of a Virtual Chassis Configuration on page 248](#)

EX4200, EX4500, and EX4550 Switches in a Virtual Chassis

You can interconnect up to ten EX4200, EX4500, and EX4550 switches into a Virtual Chassis. You must set the Virtual Chassis to mixed mode if it is composed of EX4200 switches with EX4500 or EX4550 switches, but a Virtual Chassis with only one type of these switches or with only EX4500 and EX4550 switches operates as a non-mixed Virtual Chassis.

EX4200 switches have two built-in dedicated VCPs. EX4500 or EX4550 switches have dedicated VCPs on the Virtual Chassis module, and the EX4500 or EX4550 switch must have the PIC mode set to Virtual Chassis mode to interconnect them into a Virtual Chassis. You can also configure any SFP, SFP+, and XFP uplink ports on all of these switches into VCPs. You can use the dedicated VCPs when the switches are close together, such as in the same wiring closet. Use uplink ports configured as VCPs for switches that located farther away, such as in different wiring closets.

You configure, monitor, and maintain an EX4200, EX4500, or EX4550 Virtual Chassis in a similar way as other EX Series Virtual Chassis. See the following for details on configuring a Virtual Chassis with these switches:

- [Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) on page 217](#)
- [Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches \(CLI Procedure\) on page 228](#)

For procedures on adding a new switch to a Virtual Chassis composed of any of these switches in a wiring closet, see:

- [Adding a New EX4200 Switch to an Existing EX4200 Virtual Chassis \(CLI Procedure\) on page 236](#)
- [Adding an EX4200 Switch to a Preprovisioned EX4500 Virtual Chassis or a Preprovisioned Mixed EX4200 and EX4500 Virtual Chassis \(CLI Procedure\) on page 242](#)
- [Adding an EX4500 Switch to a Preprovisioned EX4200 Virtual Chassis \(CLI Procedure\) on page 244](#)
- [Adding an EX4500 Switch to a Nonprovisioned EX4200 Virtual Chassis \(CLI Procedure\) on page 246](#)

EX4300 Switches in a Virtual Chassis

You can interconnect up to ten EX4300 switches to form an EX4300 Virtual Chassis. EX4300 switches can form a Virtual Chassis composed entirely of EX4300 switches (not multigigabit models) or entirely of EX4300 multigigabit model (EX4300-48MP) switches as a non-mixed Virtual Chassis.

You can also connect EX4300 multigigabit model switches and other EX4300 model switches together into an EX4300 Virtual Chassis by configuring all of the member switches into mixed mode. In this case, you must also configure the non-multigigabit EX4300 member switches with a special option (**ieee-clause-82**) when setting mixed mode. The member switches in the Routing Engine role must be multigigabit model switches, and you must configure the non-multigigabit EX4300 switches into linecard role. Multigigabit model EX4300 switches can't be in a mixed Virtual Chassis with any other types of switches.

NOTE: If you remove an EX4300 member switch from a mixed EX4300 Virtual Chassis with multigigabit model members, you must disable **ieee-clause-82** port mode on the switch if you want to reconfigure it as a standalone switch or use it in any other type of mixed Virtual Chassis or any non-mixed Virtual Chassis. Otherwise, the VCPs will not connect with other members in the new Virtual Chassis.

You can have any EX4300 switches except multigigabit models in the linecard role in a mixed Virtual Chassis with EX4600 switches or QFX5100 switches. For more details on EX4300 member switches in a mixed Virtual Chassis, see [“Understanding Mixed EX Series and QFX Series Virtual Chassis” on page 35](#).

NOTE: EX4300 switches (excluding multigigabit models) can also be included as leaf nodes in a Virtual Chassis Fabric (VCF). For information on EX4300 switches in a VCF, see *Virtual Chassis Fabric Overview*.

On EX4300 switches excluding the multigigabit models, all 40-Gigabit Ethernet QSFP+ optical ports are configured as VCPs by default, and you can also configure any 10-Gigabit Ethernet uplink module ports into VCPs as needed. As a result, an EX4300 Virtual Chassis can have either 40-Gbps or 10-Gbps VCP links, or a combination of both. You can easily add new switches to a Virtual Chassis whether the switch

is installed in the same building or at a different site because the ports available to be used as VCPs are long-distance optical ports.

On EX4300 multigigabit models, the four 40-Gigabit Ethernet QSFP+ ports on the rear panel are dedicated VCPs. These are the only ports on EX4300 multigigabit model switches that you can use as VCPs, so any EX4300 Virtual Chassis that contains EX4300 multigigabit model switches can have only have VCP links that are 40-Gbps.

You configure, monitor, and maintain an EX4300 Virtual Chassis in a similar way as other EX Series and QFX Series Virtual Chassis. See the following for details on configuring and changing the members in an EX4300 Virtual Chassis:

- *Configuring an EX2300, EX3400, or EX4300 Virtual Chassis*
- *Adding a New Switch to an Existing EX2300, EX3400, or EX4300 Virtual Chassis*
- [Removing or Replacing a Member Switch of a Virtual Chassis Configuration on page 248](#)

EX4600 Switches in a Virtual Chassis

EX4600 switches can act as member switches in a non-mixed Virtual Chassis—a Virtual Chassis composed entirely of EX4600 switches—and also operate in a mixed Virtual Chassis with EX4300 switches. You can interconnect EX4300 switches (except multigigabit models, EX4300-48MP) with EX4600 switches as a mixed EX4600 Virtual Chassis.

You can interconnect up to ten EX4600 switches or a combination of up to ten EX4600 and EX4300 switches into an EX4600 Virtual Chassis. However, in a mixed Virtual Chassis with EX4600 and EX4300 switches, EX4600 switches must be in the master and backup Routing Engine roles, and EX4300 member switches must be in the linecard role. As a result, at least two of the member switches in a mixed EX4600 Virtual Chassis must be EX4600 switches in the master and backup Routing Engine roles. See [“Understanding Virtual Chassis Components” on page 19](#) for more information about Virtual Chassis member roles.

EX4600 switches do not have any ports that are configured into VCPs by default, but you can configure any 40-Gigabit Ethernet QSFP+ and 10-Gigabit Ethernet SFP+ optical ports on an EX4600 switch into VCPs. Because EX4300 switches support similar VCP options, both non-mixed and mixed EX4600 Virtual Chassis can have 40-Gbps VCP links, 10-Gbps VCP links, or a combination of both.

You configure, monitor, and maintain an EX4600 Virtual Chassis in a similar way as other EX and QFX Series Virtual Chassis. See the following for more details on configuring and changing the members in an EX4600 Virtual Chassis, including a mixed EX4600 Virtual Chassis with EX4300 switches:

- *Configuring EX4600 Switches in a Mixed or Non-Mixed Virtual Chassis*
- *Adding an EX4600 Switch to a Mixed or Non-mixed Virtual Chassis*
- [Removing or Replacing a Member Switch of a Virtual Chassis Configuration on page 248](#)

EX4650 Switches in a Virtual Chassis

Starting in Junos OS Release 19.3R1, you can interconnect up to two EX4650 switches in an EX4650 Virtual Chassis. The two member switches must be in the master and backup Routing Engine roles.

Starting in Junos OS Release 20.1R1, you can interconnect up to four EX4650 switches in an EX4650 Virtual Chassis. You should configure two member switches into the master and backup Routing Engine roles, and the remaining member switches into the linecard role.

See [“Understanding Virtual Chassis Components” on page 19](#) for more information about Virtual Chassis member roles.

EX4650 switches can’t be combined with any other type of switches in a Virtual Chassis.

EX4650 switches do not have dedicated or default-configured VCPs, but you can set any of the 40-Gigabit Ethernet QSFP+ or 100-Gigabit Ethernet QSFP28 uplink ports on the front panel (non-channelized ports 48 through 55) as VCPs. You can’t use any of the other ports (network ports 0 through 47) as VCPs.

Running the **request virtual-chassis vc-port set** command on the network ports doesn’t fail, but they will not function properly as VCPs.

An EX4650 Virtual Chassis operates the same as a QFX5120 Virtual Chassis, and you configure, monitor, and maintain it the same way as a QFX Series Virtual Chassis. See the following for more details on configuring and changing the members in an EX4650 Virtual Chassis:

- *Configuring an EX4650 or a QFX Series Virtual Chassis*
- *Adding a New Switch to an Existing EX4650 or QFX Series Virtual Chassis*
- [Removing or Replacing a Member Switch of a Virtual Chassis Configuration on page 248](#)

Release History Table

Release	Description
20.1R1	Starting in Junos OS Release 20.1R1, an EX4650-48Y Virtual Chassis can have up to four member switches.
19.3R1	Starting in Junos OS Release 19.3R1, an EX4650-48Y Virtual Chassis can have up to two member switches.
18.4R1	Starting in Junos OS Release 18.4R1, you can also combine EX2300 multigigabit model switches with other EX2300 switches in the same Virtual Chassis, which operates as a non-mixed Virtual Chassis.

RELATED DOCUMENTATION

[Virtual Chassis Overview for Switches | 2](#)[Understanding Virtual Chassis Components | 19](#)[Understanding Virtual Chassis Port Link Aggregation | 50](#)

Understanding Virtual Chassis Components

IN THIS SECTION

- [Maximum Switch Support | 20](#)
- [Virtual Chassis Ports \(VCPs\) | 24](#)
- [Master Routing Engine Role | 29](#)
- [Backup Routing Engine Role | 30](#)
- [Linecard Role | 31](#)
- [Member Switch and Member ID | 32](#)
- [Mastership Priority | 32](#)
- [Virtual Chassis Identifier \(VCID\) | 33](#)
- [Nonvolatile Storage in a Virtual Chassis | 33](#)

This topic describes the components of an EX series or a QFX Series Virtual Chassis.

- An EX Series Virtual Chassis is a supported combination of standalone EX Series switches interconnected and managed as a single chassis. This topic applies to all EX Series Virtual Chassis except EX8200 Virtual Chassis.

See *Understanding EX8200 Virtual Chassis Components* for information about EX8200 Virtual Chassis.

NOTE: We do not recommend using EX9200 switches in a Virtual Chassis, and we phased out support for that architecture as of Junos OS Release 17.1R1. For deployments with EX9200 switches, we recommend planning or moving to MC-LAG or Junos Fusion Enterprise architectures instead of using a Virtual Chassis.

- A QFX Series Virtual Chassis is a supported combination of standalone QFX3500, QFX3600, QFX5100, QFX5110, QFX5120, or QFX5200 switches interconnected and managed as a single chassis. EX4650 Virtual Chassis operate the same as QFX5120 Virtual Chassis, so most of the information in this topic

about QFX Series Virtual Chassis in general also applies to an EX4650 Virtual Chassis, with a few platform-specific support differences.

NOTE: EX4300 switches (excluding multigigabit models [EX4300-48MP]) can also be interconnected into a mixed Virtual Chassis with QFX3500, QFX3600, and QFX5100 switches.

This topic does not describe Virtual Chassis Fabric components. Instead, see *Understanding Virtual Chassis Fabric Components*.

Maximum Switch Support

IN THIS SECTION

- [Maximum Number of Switches in an EX Series Virtual Chassis | 20](#)
- [Maximum Number of Switches in a QFX Series Virtual Chassis \(Including Mixed Virtual Chassis with EX Series Switches\) | 22](#)

The maximum number of switches that a Virtual Chassis supports varies by Virtual Chassis and might also depend on the Junos OS release running on the Virtual Chassis.

Maximum Number of Switches in an EX Series Virtual Chassis

[Table 4 on page 20](#) lists the maximum number of member switches supported in an EX Series Virtual Chassis by Junos OS release.

Table 4: Maximum Member Switch Support for EX Series Virtual Chassis by Junos OS Release

Type of EX Series Virtual Chassis	Maximum Member Switches by Junos OS Release
EX2200 Virtual Chassis	12.2R1—Initial release. Up to 4 EX2200 member switches.
EX2300 Virtual Chassis	15.1X53-D50—Initial release. Up to 4 EX2300 member switches. 18.1R2—Up to 4 multigigabit EX2300 (EX2300-24MP and EX2300-48MP) member switches. 18.4R1—Starting in Junos OS Release 18.4R1, up to 4 of any model EX2300 member switches (including multigigabit models and any other EX2300 switches) can be combined in the same Virtual Chassis.

Table 4: Maximum Member Switch Support for EX Series Virtual Chassis by Junos OS Release (*continued*)

Type of EX Series Virtual Chassis	Maximum Member Switches by Junos OS Release
EX3300 Virtual Chassis	<p>11.3R1—Initial release. Up to 6 EX3300 member switches.</p> <p>12.2R1—Starting in Junos OS Release 12.2R1, an EX3300 Virtual Chassis can support up to 10 EX3300 member switches.</p>
EX3400 Virtual Chassis	15.1X53-D50—Initial release. Up to 10 EX3400 member switches.
EX4200 Virtual Chassis	9.0R1—Initial release. Up to 10 EX4200 member switches.
EX4300 Virtual Chassis	<p>13.2X50-D10—Initial release. Up to 10 EX4300 member switches.</p> <p>13.2X50-D20—Starting in Junos OS Release 13.2X50-D20, a mixed QFX Series Virtual Chassis or VCF can also contain EX4300 switches.</p> <p>18.2R1—Starting in Junos OS Release 18.2R1 with the introduction of EX4300 multigigabit model switches (EX4300-48MP), an EX4300 Virtual Chassis can contain up to 10 EX4300 multigigabit model switches as a non-mixed Virtual Chassis or a combination of EX4300 multigigabit model switches with other EX4300 switches as a mixed EX4300 Virtual Chassis.</p>
EX4500 Virtual Chassis	<p>11.1R1—Initial release. Support for up to 2 EX4500 member switches.</p> <p>11.4R1—Support for up to 10 EX4500 member switches.</p>
EX4550 Virtual Chassis	12.2R1—Initial release. Support for up to 10 EX4550 member switches.
EX4600 Virtual Chassis	13.2X51-D25—Initial release. Support for up to 10 EX4600 member switches.
EX4650 Virtual Chassis	<p>19.3R1—Initial release. Up to 2 EX4650 switches in Routing Engine roles only.</p> <p>20.1R1—Starting in Junos OS Release 20.1R1, an EX4650 Virtual Chassis can have up to 4 members.</p>

Table 4: Maximum Member Switch Support for EX Series Virtual Chassis by Junos OS Release (*continued*)

Type of EX Series Virtual Chassis	Maximum Member Switches by Junos OS Release
Mixed EX4200 and EX4500 Virtual Chassis	<p>11.1R1—Initial release. Up to 2 EX4500 member switches and up to 8 EX4200 member switches.</p> <p>11.2R1—Up to 9 EX4200 member switches.</p> <p>11.4R1—Up to 9 EX4500 member switches.</p>
Mixed EX4200 and EX4550 Virtual Chassis	12.2R1—Initial release. Up to 10 total EX4200 and EX4550 member switches.
Mixed EX4200, EX4500, and EX4550 Virtual Chassis	12.2R1—Initial release. Up to 10 total EX4200, EX4500, and EX4550 member switches.
Mixed EX4300 and EX4600 Virtual Chassis	<p>13.2X51-D25—Initial release. Up to 10 total EX4300 and EX4600 member switches. EX4600 member switches must assume Routing Engine role.</p> <p>NOTE: EX4300 multigigabit model (EX4300-48MP) switches are not supported in a mixed Virtual Chassis with EX4600 switches.</p>
Mixed EX4500 and EX4550 Virtual Chassis	12.2R1—Initial release. Up to 10 total EX4500 and EX4550 switches.
EX9200 Virtual Chassis	<p>13.2R2—Initial release. Up to 2 EX9200 switches.</p> <p>NOTE: We have phased out support for EX9200 switches in a Virtual Chassis as of Junos OS Release 17.1R1. For deployments with EX9200 switches, we recommend planning or moving to MC-LAG or Junos Fusion Enterprise architectures instead of using a Virtual Chassis configuration.</p>

Maximum Number of Switches in a QFX Series Virtual Chassis (Including Mixed Virtual Chassis with EX Series Switches)

Table 5 on page 23 lists the maximum number of member switches supported in a QFX Series Virtual Chassis by Junos OS release, including mixed QFX Series Virtual Chassis with EX Series switch members.

Table 5: Maximum Member Switch Support for QFX Series Virtual Chassis by Junos OS Release

Type of QFX Series Virtual Chassis	Maximum Member Switches by Junos OS Release
QFX3500 or QFX3600 Virtual Chassis: <ul style="list-style-type: none"> Only QFX3500 and QFX3600 switches in any combination. 	13.2X50-D15—Initial release. Up to 10 total member switches.
QFX3500 or QFX3600 mixed-mode Virtual Chassis: <ul style="list-style-type: none"> QFX3500 and QFX3600 switches in Routing Engine role with any combination of QFX3500, QFX3600, and EX4300 switches (excluding EX4300 multigigabit models) in linecard role. 	13.2X51-D20—Up to 10 total member switches.
QFX5100 Virtual Chassis: <ul style="list-style-type: none"> Only QFX5100 switches. 	13.2X51-D20—Initial release. Up to 10 member switches (except QFX5100-96S). 13.2X51-D20—Initial release for QFX5100-96S. Up to 4 member switches. 13.2X53-D25—Prior to Junos OS Release 13.2X51-D25, only up to 4 member switches can be in a QFX5100 Virtual Chassis. Starting in Junos OS Release 13.2X51-D25, you can include up to 10 QFX5100-96S switches in a mixed or non-mixed QFX5100 Virtual Chassis.
QFX5100 mixed-mode Virtual Chassis: <ul style="list-style-type: none"> QFX5100 switches in Routing Engine role with any combination of QFX5100, QFX3500, QFX3600, and EX4300 switches (excluding EX4300 multigigabit models) in linecard role. 	13.2X51-D20—Initial release. Up to 10 total member switches (except QFX5100-96S). 13.2X53-D25—Up to 10 total member switches (including QFX5100-96S).
QFX5110 Virtual Chassis: <ul style="list-style-type: none"> QFX5110 switches in Routing Engine role with any combination of supported QFX5110 and QFX5100 switches in linecard role. 	17.3R1—Initial release. Up to 10 member switches.
QFX5120 Virtual Chassis:	19.3R1—Initial release on QFX5120-48Y switches. Up to 2 member switches, both in Routing Engine role. 20.2R1—Initial release on QFX5120-48T switches. Up to 2 member switches, both in Routing Engine role. 20.3R1—Initial release on QFX5120-32C switches. Up to 2 member switches, both in Routing Engine role.

Table 5: Maximum Member Switch Support for QFX Series Virtual Chassis by Junos OS Release (*continued*)

Type of QFX Series Virtual Chassis	Maximum Member Switches by Junos OS Release
QFX5200 Virtual Chassis— <ul style="list-style-type: none"> Only QFX5200 switches. 	17.3R2 and 17.4R1—Initial release. Up to 3 member switches.

Virtual Chassis Ports (VCPs)

IN THIS SECTION

- [Virtual Chassis Port Options | 24](#)
- [Automatic Virtual Chassis Port \(VCP\) Conversion | 27](#)
- [Virtual Chassis Port Link Aggregation Groups | 28](#)

You set up a Virtual Chassis by configuring Virtual Chassis ports (VCPs) on the member switches, and interconnecting the switches using the VCPs. VCPs are responsible for passing all data and control traffic between member switches in the Virtual Chassis.

Virtual Chassis Port Options

Some switches have dedicated VCPs; you can only use these ports as VCPs and you can't reconfigure them as network ports. Dedicated VCPs allow you to interconnect switches into a Virtual Chassis without requiring any additional interface configuration.

Some switches have ports that are configured as VCPs by default. You don't need to explicitly configure those as VCPs to use them to interconnect the switches into a Virtual Chassis.

Most switches have optical or uplink ports that you can also configure as VCPs.

You must configure VCPs to interconnect switches that do not have dedicated or default-configured VCPs or to interconnect switches across greater distances than allowed by a dedicated VCP connection. Otherwise, you can mix any of the supported VCP options among the members of a Virtual Chassis, and we recommend having redundant links between any two members for resiliency or to increase member communication bandwidth. VCPs automatically bundle into a Link Aggregation Group when two or more ports operating at the same speed are configured into VCPs between the same two member switches. See [“Understanding Virtual Chassis Port Link Aggregation” on page 50](#) for details.

When adding switches to an existing Virtual Chassis or adding new redundant links between existing members, if the automatic VCP conversion feature is enabled, under the right conditions the ports on both sides of the connection will convert into VCPs automatically (see [“Automatic Virtual Chassis Port \(VCP\) Conversion” on page 27](#)).

Table 6 on page 25 summarizes the available VCP options on switches in an EX Series or QFX Series Virtual Chassis. For complete details on where dedicated VCPs, default-configured VCPs, or ports that can be configured as VCPs are located on a switch, and the supported transceivers and cables that you can use for VCP connections on the switch, see the hardware documentation for that type of switch.

Table 6: VCP Options by Switch Type

Switch	Dedicated VCPs	Default VCPs	Ports that can be configured and are supported as VCPs
EX2200	None	None	Any uplink ports All RJ-45 interfaces, including built-in network ports with 10/100/1000BASE-T Gigabit Ethernet connectors and 1000BASE-T RJ-45 transceivers
EX2300 (including multigigabit EX2300 models)	None	None	10-Gigabit Ethernet uplink ports with SFP+ transceivers NOTE: You cannot use ports with SFP transceivers as VCPs on EX2300 switches to form a Virtual Chassis.
EX3300	None	Uplink ports 2 and 3	Any of the 4 uplink ports (ports 0 through 3)
EX3400	None	All QSFP+ uplink ports (PIC slot 1, ports 0 and 1)	Any SFP+ uplink ports NOTE: You cannot use ports with SFP transceivers as VCPs on EX3400 switches to form a Virtual Chassis.
EX4200	2 ports on rear panel	None	Any uplink module ports (SFP, SFP+, or XFP) or through an SFP+ port on the EX4200-24F switch NOTE: You cannot set a 1000BASE-T copper SFP transceiver (EX-SFP-1GE-T) connection as a VCP on EX4200 switches.
EX4300	None	All QSFP+ ports	Any uplink ports installed with SFP+ or QSFP+ transceivers NOTE: On 32-port EX4300 switches, you can't use the four built-in 10-Gigabit Ethernet SFP+ ports as VCPs.

Table 6: VCP Options by Switch Type (*continued*)

Switch	Dedicated VCPs	Default VCPs	Ports that can be configured and are supported as VCPs
EX4300 Multigigabit Models (EX4300-48MP)	4 40-Gbps QSFP+ ports on rear panel	None	None
EX4500 and EX4550	Two ports on the Virtual Chassis module	None	Any SFP, SFP+, or XFP uplink module port NOTE: You cannot use SFP+ uplink ports installed with 1000BASE-T copper SFP transceivers (EX-SFP-1GE-T) as VCP connections on EX4500 and EX4550 switches.
EX4600	None	None	Any SFP+ and QSFP+ ports
EX4650	None	None	Any of the 40-Gigabit Ethernet or 100-Gigabit QSFP28 ports on the front panel (ports 48 through 55), non-channelized NOTE: The Junos OS doesn't prevent you from trying to set other ports as VCPs, but they don't operate properly as VCPs.
QFX3500 and QFX3600	None	None	Any non-channelized 40-Gigabit Ethernet QSFP+ interfaces
QFX5100	None	None	Any non-channelized 40-Gigabit Ethernet QSFP+ interfaces
QFX5110	None	None	Any 40-Gigabit Ethernet or 100-Gigabit Ethernet QSFP28 ports Any non-channelized 40-Gigabit Ethernet QSFP+ interfaces Any non-channelized 10-Gigabit Ethernet SFP+ interfaces (on QFX5110 switch models that support these ports)

Table 6: VCP Options by Switch Type (*continued*)

Switch	Dedicated VCPs	Default VCPs	Ports that can be configured and are supported as VCPs
QFX5120	None	None	<p>(QFX5120-48Y) Any of the eight 40-Gigabit Ethernet or 100-Gigabit Ethernet QSFP+ or QSFP28 ports on the front panel (ports 48 through 55), non-channelized</p> <p>(QFX5120-48T) Any of the six 40-Gigabit Ethernet or 100-Gigabit Ethernet QSFP+ or QSFP28 ports on the front panel (ports 48 through 53), non-channelized</p> <p>NOTE: Any ports other than those specified above for QFX5120-48Y and QFX5120-48T switches are not supported as VCPs. The Junos OS CLI doesn't return an error if you try to set other ports as VCPs, but they will not work properly as VCPs.</p> <p>(QFX5120-32C) Any non-channelized network ports (ports 0 through 31) installed with either 40-Gbps QSFP+ or 100-Gbps QSFP28 transceivers</p>
QFX5200	None	None	<p>Any 40-Gigabit Ethernet QSFP+ ports</p> <p>Starting in Junos OS Release 17.3R2-S4, you can also use 100-Gigabit Ethernet QSFP28 ports as VCPs on QFX5200 switches.</p>

All supported SFP, SFP+, and XFP uplink connections between EX4200, EX4500, and EX4550 switches can be configured as VCPs.

QSFP+ interfaces that have been channelized into SFP+ interfaces using a breakout cable cannot be configured into VCPs.

Automatic Virtual Chassis Port (VCP) Conversion

When the automatic VCP conversion feature is enabled and you cable a new link from a new switch being added into an existing Virtual Chassis, or add a redundant link between two members of a Virtual Chassis, ports that can be VCPs are automatically converted into VCPs under the following conditions:

- Link Layer Discovery Protocol (LLDP) or LLDP-Media Endpoint Discovery (LLDP-MED) is enabled on the interfaces for the members on both ends of the new link. The two sides exchange LLDP packets to accomplish the port conversion.
- The Virtual Chassis must be preprovisioned with the switches on both sides of the link already configured in the members list of the Virtual Chassis using the **set virtual-chassis member** command.

- The interfaces for the ports on both ends of the link are not already configured as VCPs. Both sides of the link must be in the same state to handshake and establish the VCP link.

Using automatic VCP conversion when adding a switch to a preprovisioned Virtual Chassis is also called *autoprovisioning* the new member.

For ports to be eligible for automatic VCP conversion, you must convert them back into network ports using the **request virtual-chassis vc-port delete** command if they are default-configured VCPs or you previously configured them into VCPs. Switches do not automatically convert VCPs back into network ports when you remove them from a Virtual Chassis and disconnect the links.

Automatic VCP conversion is enabled by default on all Virtual Chassis, except in the following cases:

- Starting in Junos OS Releases 15.1R7 and 14.1X53-D47, in EX2200, EX3300, EX4200, EX4500, and EX4550 Virtual Chassis, automatic VCP conversion is disabled by default. If desired, you can enable the feature by configuring the **auto-conversion** statement at the **[edit virtual-chassis]** hierarchy level on the Virtual Chassis.



CAUTION: When automatic VCP conversion is enabled in a Virtual Chassis with switches that have dedicated VCPs (EX4200, EX4500, or EX4550 Virtual Chassis), if network or uplink ports are automatically converted into VCPs to create a redundant link with a dedicated VCP connection between the same two Virtual Chassis members, you must reboot the Virtual Chassis to avoid creating a traffic loop within the Virtual Chassis. (The same issue can happen even if you manually convert the ports into VCPs to create the redundant VCP link with a dedicated VCP link, so you must also reboot the Virtual Chassis in that case to avoid traffic looping.)

- Starting in Junos OS Releases 14.1X53-D47, 17.4R2, 18.1R3, 18.2R2, and 18.3R1 for EX4300, EX4600, QFX Series Virtual Chassis and for any EX4650 and QFX5120 Virtual Chassis (which all have the automatic VCP conversion feature enabled by default), you can choose to disable the feature by configuring **no-auto-conversion** at the **[edit virtual-chassis]** hierarchy level on the Virtual Chassis. To return to the default behavior to re-enable automatic VCP conversion, delete the **no-auto-conversion** statement from the configuration.

Virtual Chassis Port Link Aggregation Groups

You can increase VCP bandwidth between member switches by configuring multiple links between the same two switches into VCP links. When multiple VCPs interconnect the same two member switches, the links automatically form a Link Aggregation Group (LAG) bundle if the VCP links are the same speed. For example, if you have two 40-Gbps QSFP+ VCP links connected between member switches, the links automatically form a LAG with 80-Gbps total bandwidth. However, 10-Gigabit SFP+ and 40-Gbps QSFP+ VCP links will not become members of the same LAG.

Within a Virtual Chassis, you can also configure network interfaces located on different Virtual Chassis member switches to form a LAG, which provides load-balancing and redundancy for network traffic that the Virtual Chassis forwards. See [“Understanding Virtual Chassis Port Link Aggregation” on page 50](#) for details on the difference between VCP LAGs and network interface LAGs within a Virtual Chassis.

Master Routing Engine Role

In a Virtual Chassis, each member switch operates in one of two roles, Routing Engine role or linecard role. When in Routing Engine role, a member switch acts as the master or backup Routing Engine.

The master Routing Engine member in the Virtual Chassis:

- Manages the member switches.
- Runs Junos OS for the switches as a master Routing Engine.
- Runs the chassis management processes and control protocols.
- Represents all the member switches interconnected within the Virtual Chassis configuration. (The hostname and other properties that you assign to this switch during setup apply to all members of the Virtual Chassis configuration.)

In a preprovisioned configuration, the Virtual Chassis master election algorithm determines which member switch in the Routing Engine role acts as the Virtual Chassis master and which acts as the backup. See [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#).

In a configuration that is not preprovisioned, called a *nonprovisioned* configuration, the Virtual Chassis selects the master and backup using the mastership priority value and secondary factors in the master election algorithm.

The remaining switches in the Virtual Chassis that are not the master or backup operate in the linecard role.

Use the following guidelines for assigning Routing Engine roles to the switches in a mixed Virtual Chassis:

- In any mixed Virtual Chassis configuration that includes EX4200 switches, EX4500 switches, or EX4550 switches, you can configure any switch in any role in any configuration.
- In a mixed EX4300 Virtual Chassis composed of EX4300 multigigabit model (EX4300-48MP) and other EX4300 model switches, you should always have EX4300 multigigabit model switches in the Routing Engine role.
- In a mixed EX4600 Virtual Chassis with EX4300 switches, EX4600 switches are always in the master Routing Engine role.
- In a mixed QFX Series Virtual Chassis made up of QFX5100 switches with QFX3500, QFX3600, or EX4300 switches, we recommend configuring QFX5100 switches into the Routing Engine role.

- In a mixed QFX Series Virtual Chassis made up of QFX3500, QFX3600, and EX4300 switches, we recommend configuring QFX3500 or QFX3600 switches into the master and backup Routing Engine roles.
- In a QFX5110 Virtual Chassis with QFX5110 and QFX5100 switches, we recommend configuring only QFX5110 switches into the Routing Engine role.
- In a two-member EX4650 or QFX5120 Virtual Chassis, configure both member switches into the Routing Engine role as master and backup member switches only (no linecard role members).

Backup Routing Engine Role

The member that functions in the backup Routing Engine role in a Virtual Chassis:

- Maintains a state of readiness to take over the master Routing Engine role if the master fails.
- Runs Junos OS for the switches as a backup Routing Engine.
- Synchronizes with the master in terms of protocol states, forwarding tables, and other information, so that it is prepared to preserve routing information and maintain network connectivity without disruption in case the master is unavailable.

The Virtual Chassis configuration must have at least two member switches in order to have a backup Routing Engine member.

In a preprovisioned configuration, the Virtual Chassis master election algorithm determines which member switch in the Routing Engine role acts as the Virtual Chassis master and which acts as the backup. See [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#).

In a nonprovisioned configuration, the Virtual Chassis selects the master and backup member switches using the mastership priority value and secondary factors in the master election algorithm.

Use the following guidelines for assigning Routing Engine roles to the switches in a mixed Virtual Chassis:

- In any mixed Virtual Chassis configuration that includes EX4200 switches, EX4500 switches, or EX4550 switches, you can configure any switch in any role in any configuration.
- In a mixed EX4300 Virtual Chassis composed of EX4300 multigigabit model (EX4300-48MP) and other EX4300 model switches, you should always have EX4300 multigigabit model switches in the master and backup Routing Engine roles.
- In a mixed EX4600 Virtual Chassis with EX4300 switches, you must use an EX4600 switch in the master role, and we strongly recommend you also configure an EX4600 switch into the backup role to help the Virtual Chassis remain stable when a routing engine switchover happens.
- In a mixed QFX Series Virtual Chassis made up of QFX5100 switches with QFX3500, QFX3600, or EX4300 switches, we recommend configuring the QFX5100 switches into the Routing Engine role.

- In a mixed QFX Series Virtual Chassis made up of QFX3500, QFX3600, and EX4300 switches, we recommend configuring only QFX3500 or QFX3600 switches into the master and backup Routing Engine roles.
- In a QFX5110 Virtual Chassis with QFX5110 and QFX5100 switches, we recommend configuring only QFX5110 switches into the Routing Engine role.
- In a two-member EX4650 or QFX5120 Virtual Chassis, configure both member switches into the Routing Engine role as master and backup member switches only (no linecard role members).

Linecard Role

A member that functions in the linecard role in a Virtual Chassis:

- Runs only a subset of Junos OS.
- Does not run the chassis control protocols.
- Can detect certain error conditions (such as an unplugged cable) on any interfaces that have been configured on it through the master.

The Virtual Chassis configuration must have at least three members in order to include a linecard member.

In a preprovisioned configuration, you can explicitly configure a member with the linecard role, which means it can't be a master or backup Routing Engine.

In a nonprovisioned configuration, the members that are not selected as master or backup operate as linecard members of the Virtual Chassis. The Virtual Chassis selects the master and backup member switches using the mastership priority value and secondary factors in the master election algorithm. A switch with a mastership priority of 0 is always in the linecard role.

In any two-member Virtual Chassis, for high availability you should configure both members into the Routing Engine role, and no members in the linecard role. Otherwise, in a Virtual Chassis with more than two members, any supported switch type can operate in linecard role.

Use the following guidelines for assigning Routing Engine and linecard roles to the switches in a QFX Series Virtual Chassis:

- In a mixed QFX Series Virtual Chassis made up of QFX5100 switches with QFX3500, QFX3600, or EX4300 switches, we recommend configuring the QFX5100 switches into the Routing Engine role. In a mixed QFX Series Virtual Chassis that does not contain QFX5100 switches, we recommend configuring QFX3500 or QFX3600 switches into the Routing Engine role.
- In a QFX5110 Virtual Chassis made up of QFX5110 and QFX5100 switches, we recommend configuring only QFX5110 switches into the Routing Engine role.

Member Switch and Member ID

Each standalone switch that supports Virtual Chassis is a potential member of a Virtual Chassis configuration. When you power on one of those switches, it has a Virtual Chassis member ID that you can see on the front-panel LCD on some switches or in **show virtual-chassis** command output. If the switch is powered on as a standalone switch, its member ID is always **0**. When you interconnect the switch into a Virtual Chassis configuration, the master member switch assigns it a member ID based on various factors such as the order in which the switch was added to the Virtual Chassis or if you defined member IDs based on switch serial numbers in the preprovisioning process.

If the Virtual Chassis configuration previously included a member switch and you physically disconnected or removed that member from the Virtual Chassis configuration, its member ID is not automatically available for assignment as part of the master's standard sequential member ID assignment. For example, you might have a Virtual Chassis configuration with member 0, member 2, and member 3, because member 1 was removed. When you add another member switch and power it on, the master assigns ID 4 to it, not ID 1. If you want to reuse a member ID from a member switch that was removed, you can *recycle* the member id (see the [request virtual-chassis recycle](#) command for details). .

The member ID distinguishes the member switches from each other. You use the member ID to:

- assign a mastership priority value to a member switch.
- configure interfaces for a member switch, similar to specifying a Juniper Networks device slot number.
- apply some operational commands to a member switch.
- display status or characteristics of a member switch.

Mastership Priority

In a nonprovisioned configuration, you can designate the role (master or backup Routing Engine role or linecard role) that a member switch assumes by configuring its mastership priority (a number from **0** through **255**). The mastership priority value is the first consideration in the master election algorithm for selecting the master of the Virtual Chassis configuration. A switch with a mastership priority of **0** never assumes the backup or master Routing Engine role.

When you power on a standalone switch, it has the default mastership priority value **128**. Because it's the only member switch in its own Virtual Chassis configuration, it's also the master member. When you interconnect a standalone switch to an existing Virtual Chassis configuration (which has its own master), we recommend that you explicitly configure the mastership priority of the members that you want to function as the master and backup.

NOTE: Configuring the same mastership priority value for both the master and backup helps to ensure a smooth transition from master to backup if the master becomes unavailable. It prevents the original master from preempting control from the backup when the backup has taken control of the Virtual Chassis configuration because the original master became unavailable.

In a preprovisioned configuration, you always assign the role of each member switch.

Virtual Chassis Identifier (VCID)

All members of a Virtual Chassis configuration share one Virtual Chassis identifier (VCID). The Virtual Chassis derives this identifier from internal parameters. When you monitor a Virtual Chassis configuration, certain interface views and the **show virtual-chassis** command display the VCID.

Nonvolatile Storage in a Virtual Chassis

EX Series and QFX Series switches store Junos OS system files in internal flash memory. In Virtual Chassis configurations, both the master and the backup switch store the configuration information for all the member switches.

Junos OS optimizes the way a Virtual Chassis stores its configuration if a member switch or the Virtual Chassis configuration shuts down improperly, as follows:

- If the master is not available, the backup switch takes on the role of the master and its internal flash memory takes over as the alternate location for maintaining nonvolatile configuration memory.
- If you take a member switch offline for repair, the master stores the configuration of the member switch.

NOTE: File storage management differs in an EX8200 Virtual Chassis; see *Understanding File Storage in an EX8200 Virtual Chassis* for details.

Release History Table

Release	Description
20.1R1	Starting in Junos OS Release 20.1R1, an EX4650 Virtual Chassis can have up to 4 members.
18.4R1	Starting in Junos OS Release 18.4R1, up to 4 of any model EX2300 member switches (including multigigabit models and any other EX2300 switches) can be combined in the same Virtual Chassis.
18.2R1	Starting in Junos OS Release 18.2R1 with the introduction of EX4300 multigigabit model switches (EX4300-48MP), an EX4300 Virtual Chassis can contain up to 10 EX4300 multigigabit model switches as a non-mixed Virtual Chassis or a combination of EX4300 multigigabit model switches with other EX4300 switches as a mixed EX4300 Virtual Chassis.
17.3R2-S4	Starting in Junos OS Release 17.3R2-S4, you can also use 100-Gigabit Ethernet QSFP28 ports as VCPs on QFX5200 switches.
15.1R7	Starting in Junos OS Releases 15.1R7 and 14.1X53-D47, in EX2200, EX3300, EX4200, EX4500, and EX4550 Virtual Chassis, automatic VCP conversion is disabled by default.
14.1X53-D47	Starting in Junos OS Releases 14.1X53-D47, 17.4R2, 18.1R3, 18.2R2, and 18.3R1 for EX4300, EX4600, QFX Series Virtual Chassis and for any EX4650 and QFX5120 Virtual Chassis (which all have the automatic VCP conversion feature enabled by default), you can choose to disable the feature by configuring no-auto-conversion at the [edit virtual-chassis] hierarchy level on the Virtual Chassis.
13.2X53-D25	Starting in Junos OS Release 13.2X51-D25, you can include up to 10 QFX5100-96S switches in a mixed or non-mixed QFX5100 Virtual Chassis.
13.2X50-D20	Starting in Junos OS Release 13.2X50-D20, a mixed QFX Series Virtual Chassis or VCF can also contain EX4300 switches.
12.2R1	Starting in Junos OS Release 12.2R1, an EX3300 Virtual Chassis can support up to 10 EX3300 member switches.

RELATED DOCUMENTATION

[Virtual Chassis Overview for Switches | 2](#)
[Understanding EX8200 Virtual Chassis Components](#)
[Understanding EX Series Virtual Chassis | 9](#)

Understanding QFX Series Virtual Chassis

[Understanding Mixed EX Series and QFX Series Virtual Chassis | 35](#)

[Configuring an EX4650 or a QFX Series Virtual Chassis](#)

[Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port | 260](#)

[Command Forwarding Usage with EX Series and QFX Series Virtual Chassis | 323](#)

[Example: Configuring an EX4200 Virtual Chassis with a Master and Backup in a Single Wiring Closet | 88](#)

[Example: Configuring an EX4500 Virtual Chassis with a Master and Backup in a Single Wiring Closet | 95](#)

[Example: Configuring an EX4200 Virtual Chassis Using a Preprovisioned Configuration File | 150](#)

Understanding Mixed EX Series and QFX Series Virtual Chassis

IN THIS SECTION

- [Mixed and Non-mixed EX Series and QFX Series Virtual Chassis Summary | 36](#)
- [Understanding the Routing Engine Role in a Virtual Chassis With Different Types of Switches | 39](#)
- [Understanding QFX5100 and QFX5110 Switches in a Virtual Chassis | 39](#)
- [Understanding EX4300, QFX3500, QFX3600, and QFX5100 Switches in a Mixed Virtual Chassis | 40](#)
- [Understanding Mixed EX4300 and EX4600 Virtual Chassis | 40](#)
- [Understanding EX4300 Multigigabit and Other EX4300 Model Switches in a Mixed EX4300 Virtual Chassis | 41](#)
- [Understanding EX4200, EX4500, and EX4550 Switches in a Mixed Virtual Chassis | 41](#)

This topic describes the requirements for a mixed Virtual Chassis.

A *mixed Virtual Chassis* includes two or more types of EX Series switches, two or more types of QFX Series switches, or a supported combination of EX and QFX Series switches, where architectural differences require the Virtual Chassis to be configured into mixed mode for the switches to interoperate.

A Virtual Chassis composed of all the same type of switch can usually operate as a *non-mixed Virtual Chassis*, which does not require you to set mixed mode. However, the following Virtual Chassis that include different models of the same product must operate in mixed mode due to architecture differences between the different models:

- An EX4300 Virtual Chassis composed of EX4300 multigigabit model (EX4300-48MP) switches mixed with any other EX4300 model switches

NOTE: An EX4300 Virtual Chassis operates as a non-mixed Virtual Chassis if it is composed of only EX4300 multigigabit model switches, or composed of any combination of any other EX4300 switches (excluding the multigigabit models).

The following combinations of different switch types can be interconnected into a non-mixed Virtual Chassis that does not require you to set mixed mode because the switches can run the same software image when in a Virtual Chassis:

- An EX Series Virtual Chassis composed of only EX4500 and EX4550 switches
- An EX2300 Virtual Chassis composed of any models of EX2300 and EX2300 multigigabit switches

NOTE: Junos OS releases prior to 18.4R1 support forming an EX2300 Virtual Chassis using only EX2300 multigigabit switches or only EX2300 switches that are not multigigabit model switches. Starting in Junos OS Release 18.4R1, EX2300, EX2300-C, and EX2300 multigigabit switches can all be combined in the same non-mixed Virtual Chassis.

- A QFX Series Virtual Chassis composed of only QFX3500 and QFX3600 switches
- A QFX5110 Virtual Chassis composed of QFX5110 and supported QFX5100 switches

QFX5200, QFX5120, EX4650, EX3400, EX3300, EX2300, and EX2200 switches cannot be part of any mixed Virtual Chassis.

Mixed and Non-mixed EX Series and QFX Series Virtual Chassis Summary

[Table 7 on page 37](#) provides a high-level overview of the EX Series and QFX Series switches allowed in the Routing Engine and line-card roles of supported mixed and non-mixed Virtual Chassis configurations. Any supported mixed or non-mixed combination of switches can be configured as a nonprovisioned or preprovisioned Virtual Chassis.

Table 7: Virtual Chassis Summary

Category	Allowed Routing Engine Members	Allowed Line Card Members
Non-mixed	QFX5200	QFX5200
	QFX5120-48Y or QFX5120-48T or QFX5120-32C (2 switches of the same model only)	None, only 2 members of the same model switch are supported in any QFX5120 Virtual Chassis, and both must be in Routing Engine role
	QFX5110	QFX5110 QFX5100 (with a "-qfx-5e-" Junos OS image)
	QFX5100	QFX5100
	QFX3600 QFX3500	QFX3600 QFX3500
	EX4650	None if only 2 members in the Virtual Chassis (both must be in Routing Engine role), or only other EX4650 switches otherwise
	EX4600	EX4600
	EX4300 multigigabit models (EX4300-48MP) only	EX4300 multigigabit models (EX4300-48MP) only
	EX4300 (any models except multigigabit models)	EX4300 (any models except multigigabit models)
	EX4200	EX4200
	EX4500	EX4500
	EX4550	EX4550
	EX3400	EX3400
	EX3300	EX3300

Table 7: Virtual Chassis Summary (*continued*)

Category	Allowed Routing Engine Members	Allowed Line Card Members
	(Prior to Junos OS Release 18.4R1) EX2300 multigigabit models (EX2300-24MP and EX2300-48MP) only, or EX2300 and EX2300-C (excluding multigigabit models) only	(Prior to Junos OS Release 18.4R1) EX2300 multigigabit models (EX2300-24MP and EX2300-48MP) only, or EX2300 and EX2300-C (excluding multigigabit models) only
	(Starting with Junos OS Release 18.4R1) EX2300, EX2300-C, and EX2300 multigigabit models (EX2300-24MP and EX2300-48MP) (any models in any combination)	(Starting with Junos OS Release 18.4R1) EX2300, EX2300-C, and EX2300 multigigabit models (EX2300-24MP and EX2300-48MP) (any models in any combination))
	EX2200	EX2200
Mixed	QFX5100	QFX5100 QFX3600 QFX3500 EX4300 (any models except multigigabit models)
	QFX3600 QFX3500	QFX3600 QFX3500 EX4300 (any models except multigigabit models)
	EX4600	EX4600 EX4300 (any models except multigigabit models)
	EX4300 multigigabit models (EX4300-48MP)	EX4300 (any models including multigigabit models)
	EX4200, EX4500, EX4550 (any of these switches in any mixed combination)	EX4200, EX4500, EX4550 (any of these switches in any mixed combination)

Understanding the Routing Engine Role in a Virtual Chassis With Different Types of Switches

When you have different types of switches in a Virtual Chassis, the combination of switches you are interconnecting determines which switches should be in the master Routing Engine role. We also recommend always configuring the same type of switch into the master and backup Routing Engine roles, to ensure that the switch operating as the master remains the same type of switch in the event of a switchover.

- In a Virtual Chassis with QFX5110 and QFX5100 switches, which is considered to be a non-mixed QFX5110 Virtual Chassis, we recommend using QFX5110 switches in the master or backup Routing Engine roles, and you can use QFX5110 or supported QFX5100 switches for the remaining members in line-card role.
- In a mixed Virtual Chassis with QFX5100 switches combined with QFX3600, QFX3500, or EX4300 switches, you should use QFX5100 switches in the master Routing Engine role, and you can use QFX5100, QFX3600, QFX3500, or EX4300 switches in the line-card role.
- In a mixed Virtual Chassis with QFX3600 or QFX3500 switches with EX4300 switches, you should use QFX3500 or QFX3600 switches in the Routing Engine role, and you can use QFX3600, QFX3500, or EX4300 switches in the line-card role.
- In a mixed EX4300 and EX4600 Virtual Chassis, EX4600 switches automatically assume the master and backup Routing Engine roles, and you can use EX4300 or EX4600 switches in the line-card role. (EX4600 switches can be in a mixed Virtual Chassis with any EX4300 model switches except multigigabit models.)
- In a mixed EX4300 Virtual Chassis with EX4300 multigigabit model (EX4300-48MP) switches and any other models of EX4300 switches, you must use EX4300 multigigabit models in the Routing Engine role, and you can use any EX4300 switches in the line-card role.
- In a mixed Virtual Chassis that includes any combination of EX4200 switches, EX4500 switches, and EX4550 switches, any switch can be configured in any role.

In most mixed Virtual Chassis, you must configure your Virtual Chassis to ensure a switch that supports operating as a master Routing Engine assumes the master Routing Engine role. Without user configuration, any switch might assume the master or backup Routing Engine role, with the exception of EX4300 switches in an EX4600 or QFX Series Virtual Chassis, which can never assume the Routing Engine role.

Understanding QFX5100 and QFX5110 Switches in a Virtual Chassis

Up to ten QFX5100 and QFX5110 switches can be interconnected using Virtual Chassis ports (VCPs) to form a *QFX5110 Virtual Chassis*, which is considered to be a non-mixed Virtual Chassis because both types of switches can run the same software image, and you do not need to configure mixed mode. A QFX5110 Virtual Chassis can contain QFX5110 and supported QFX5100 switches in any combination, but we recommend that only QFX5110 switches be in the master and backup Routing Engine roles, and QFX5100 switches only be configured into line-card role.

NOTE: A QFX5110 Virtual Chassis with QFX5100 switches can only be set up using QFX5110 and QFX5100 switches running the same Junos OS image that includes “-qfx-5e-” in the Junos OS software package filename downloaded from the Software Center. QFX5100 switches running a Junos OS image filename that includes “-qfx-5-” must first be upgraded to the “-qfx-5e-” image to join a QFX5110 Virtual Chassis. (See *Upgrading a QFX5100 Switch with a USB Device to Join a QFX5110 Virtual Chassis or Virtual Chassis Fabric*.)

QFX5100 switches can also be interconnected into a mixed Virtual Chassis with QFX3500, QFX3600, and EX4300 switches. See the next section for more information on a mixed QFX5100 Virtual Chassis.

Understanding EX4300, QFX3500, QFX3600, and QFX5100 Switches in a Mixed Virtual Chassis

A combination of up to ten EX4300 (excluding multigigabit models), QFX3500, QFX3600, and QFX5100 switches can be interconnected using VCPs to form a mixed QFX Series Virtual Chassis.

In a mixed QFX Series Virtual Chassis that includes QFX5100 switches, only QFX5100 switches should be configured into the Routing Engine role, and the remaining members can be any combination of EX4300, QFX3500, QFX3600, or QFX5100 switches configured into line-card role.

QFX3500 and QFX3600 switches can be interconnected using VCPs to form a Virtual Chassis that is non-mixed; you do not need to configure mixed mode for a Virtual Chassis composed of only QFX3500 and QFX3600 switches. QFX3500 and QFX3600 switches can also be in a mixed QFX Series Virtual Chassis with EX4300 switches. In this combination, only QFX3500 or QFX3600 switches should be configured into the Routing Engine role, and the remaining members can be QFX3500, QFX3600, or EX4300 switches configured into line-card role.

EX4300 switches (excluding multigigabit models) can also be interconnected into a mixed Virtual Chassis with EX4600 switches. See the next section for information on mixed EX4300 and EX4600 Virtual Chassis.

Understanding Mixed EX4300 and EX4600 Virtual Chassis

Any EX4300 switches (except for multigigabit models) and EX4600 switches can be interconnected into a Virtual Chassis.

In a mixed EX4300 and EX4600 Virtual Chassis:

- You can interconnect up to ten member switches.
- An EX4600 switch automatically assumes the master Routing Engine role.
- EX4300 switches cannot assume the Routing Engine role.

EX4600 switches cannot be in a mixed Virtual Chassis with any other type of switch besides EX4300 switches that are not multigigabit model switches.

Understanding EX4300 Multigigabit and Other EX4300 Model Switches in a Mixed EX4300 Virtual Chassis

You can combine EX4300 multigigabit model (EX4300-48MP) switches with other EX4300 switches into a mixed EX4300 Virtual Chassis.

NOTE: If an EX4300 Virtual Chassis has only EX4300 multigigabit model switches, or only a combination of other models of EX4300 switches, the Virtual Chassis is a non-mixed Virtual Chassis and you should not configure mixed mode.

In a mixed EX4300 Virtual Chassis:

- You can interconnect up to ten member switches.
- You must include the **ieee-clause-82** option when setting mixed mode on the EX4300 switches in the Virtual Chassis that are not multigigabit model switches. This option sets a special port mode (IEEE Clause 82) on the Virtual Chassis ports (VCPs) that enables them to communicate when interconnected with VCPs on EX4300 multigigabit switches. See *Configuring an EX2300, EX3400, or EX4300 Virtual Chassis* for details.
- Only EX4300 multigigabit model switches can be in the Routing Engine role.
- EX4300 switches that are not multigigabit model switches must be configured into line-card role.

EX4300 multigigabit switches cannot be in a mixed Virtual Chassis with any other type of switch besides other EX4300 switches.

NOTE: If you remove a non-multigigabit model EX4300 switch from a mixed EX4300 Virtual Chassis with multigigabit model members, you must disable **ieee-clause-82** port mode on the removed switch if you want to reconfigure it as a standalone switch or use it in any other type of mixed Virtual Chassis or any non-mixed Virtual Chassis. Otherwise, the VCPs will not connect with other members in the new Virtual Chassis. See [“Removing or Replacing a Member Switch of a Virtual Chassis Configuration” on page 248](#) for more details.

Understanding EX4200, EX4500, and EX4550 Switches in a Mixed Virtual Chassis

EX4200 switches, EX4500 switches, and EX4550 switches can be interconnected into a Virtual Chassis to form a mixed EX4200 and EX4500 Virtual Chassis, mixed EX4200 and EX4550 Virtual Chassis, mixed EX4500 and EX4550 Virtual Chassis, or mixed EX4200, EX4500, and EX4550 Virtual Chassis. The mixed Virtual Chassis supports up to 10 member switches regardless of whether the switches are EX4200 switches, EX4500 switches, or EX4550 switches. Any model of EX4200, EX4500, or EX4550 switch can

be interconnected into the same mixed Virtual Chassis. The master election process that decides member switch roles in a mixed Virtual Chassis is identical to the master election process in a non-mixed Virtual Chassis, so any member switch in a mixed Virtual Chassis can assume the master, backup, or line-card role.

EX4200 switches, EX4500 switches, and EX4550 switches cannot be interconnected into a Virtual Chassis with any other switches.

RELATED DOCUMENTATION

Configuring an EX2300, EX3400, or EX4300 Virtual Chassis

[Virtual Chassis Overview for Switches | 2](#)

[Understanding EX Series Virtual Chassis | 9](#)

Understanding QFX Series Virtual Chassis

[Understanding Virtual Chassis Components | 19](#)

Understanding How the Master in a Virtual Chassis Is Elected

NOTE: This topic does not apply to EX8200 Virtual Chassis.

All switches that are interconnected in a Virtual Chassis configuration are member switches of that Virtual Chassis. Each Virtual Chassis configuration has one member that functions as the *master* in a Routing Engine role and controls the Virtual Chassis configuration.

When a Virtual Chassis configuration boots, it automatically runs a master election algorithm to determine which member switch assumes the role of master. The algorithm compares the Virtual Chassis members against the following criteria (in the order listed) until only one member remains under consideration, and that member becomes the master:

1. Choose the member with the highest mastership priority.
Members have mastership priority 128 by default, and 255 is the highest possible value you can manually configure. A member with mastership priority 0 will never be elected as master (or backup), and always stays in the linecard role.
2. Choose the member that was master the last time you rebooted the Virtual Chassis.
3. Choose the member that has been in the Virtual Chassis configuration for the longest period of time.
(The member switches under consideration must have more than 1 minute between power-up times for this condition to make a difference.)
4. Choose the member with the lowest MAC address.

The master election algorithm does not consider the different switch models or platforms in the Virtual Chassis. For some Virtual Chassis that can contain different types of switches, we require or recommend you configure certain switches in the master and backup Routing Engine roles. See [“Understanding Mixed EX Series and QFX Series Virtual Chassis” on page 35](#) for details on the types of switches that can be mixed in a Virtual Chassis and which switches can or must be the master or backup members.

To make sure a specific member is elected as the master:

1. Power on only the switch that you want to configure as master of the Virtual Chassis configuration.
2. Configure the mastership priority of that member to have the highest possible value (255).
3. Continue to configure other members through the master member.
4. Power on the other members.

You usually want to assign the same (highest) mastership priority value to the members you want to be the master and backup Routing Engine members to ensure reliable graceful Routing Engine switchover (GRES) operation. The other election considerations also help keep mastership from switching back and forth rapidly between the two members under failover conditions.

You can also specify the switch roles by preprovisioning your Virtual Chassis. When you preprovision a Virtual Chassis, you manually assign the member ID and role for each switch in the Virtual Chassis. See [“Configuring an EX3300 Virtual Chassis \(CLI Procedure\)” on page 212](#), [“Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\)” on page 217](#), [Configuring an EX2300, EX3400, or EX4300 Virtual Chassis](#), or [Configuring an EX4650 or a QFX Series Virtual Chassis](#).

RELATED DOCUMENTATION

[Virtual Chassis Overview for Switches | 2](#)

[Understanding EX Series Virtual Chassis | 9](#)

[Understanding QFX Series Virtual Chassis](#)

[Understanding Virtual Chassis Components | 19](#)

Understanding Software Upgrades in a Virtual Chassis

IN THIS SECTION

● [Automatic Software Updates | 45](#)

● [Nonstop Software Upgrade | 45](#)

This topic discusses software upgrades on EX Series and QFX Series Virtual Chassis, except EX8200 Virtual Chassis. For information on software upgrades on an EX8200 Virtual Chassis, see *Understanding Software Upgrades in an EX8200 Virtual Chassis*. For information on software upgrades on a Virtual Chassis Fabric (VCF), see *Understanding Software Upgrades in a Virtual Chassis Fabric*.

In a Virtual Chassis, each member switch must be running the same version of Juniper Networks Junos operating system (Junos OS) that supports Virtual Chassis. You can install a new Junos OS release on the entire Virtual Chassis or on individual members in the Virtual Chassis by using the same CLI command that you use to install Junos OS on standalone switches—the **request system software add** command.

In a mixed Virtual Chassis, the member switches must also be running the same version of Junos OS, but you might need to specify multiple Junos OS images when manually or automatically upgrading a mixed Virtual Chassis. For example, for the same Junos OS release, an EX4200 switch runs a different Junos OS image than an EX4500 or EX4550 switch, or an EX4300 switch runs a different Junos OS image than a QFX5100 switch in a QFX5100 Virtual Chassis. You can upgrade all member switches simultaneously by specifying a path to multiple Junos OS images in the same **request system software add** command.

NOTE: Some different switch platforms can run the same Junos OS image. For example, you do not need to use multiple Junos OS images when updating a Virtual Chassis with a combination of EX4500 and EX4550 switches, or a Virtual Chassis with a combination of QFX3500 and QFX3600 switches.

You can also use the following features to upgrade software on members of a Virtual Chassis:

Automatic Software Updates

You can use the automatic software update feature on a non-mixed or mixed Virtual Chassis to automatically update the Junos OS version on member switches as you add them to the Virtual Chassis. See [“Understanding Automatic Software Update on Virtual Chassis Member Switches” on page 62](#) for more information.

If you are not configuring the automatic software update feature, we recommend that you update the new member switch to the version of Junos OS running on the Virtual Chassis before adding the member switch to the Virtual Chassis.

Nonstop Software Upgrade

You can also use nonstop software upgrade (NSSU) to upgrade Junos OS on all members of a Virtual Chassis for EX Series and QFX Series Virtual Chassis that support NSSU. NSSU provides an orderly upgrade of each member of the Virtual Chassis and takes advantage of graceful Routing Engine switchover, nonstop active routing, and link aggregation to minimize traffic disruption during the upgrade.

For more information about NSSU, see:

- *Understanding Nonstop Software Upgrade on a Virtual Chassis and Mixed Virtual Chassis*
- *Upgrading Software on a Virtual Chassis and Mixed Virtual Chassis Using Nonstop Software Upgrade*
- (For legacy EX Series switches in a Virtual Chassis) [“Upgrading Software Using Nonstop Software Upgrade on EX Series Virtual Chassis and Mixed Virtual Chassis \(CLI Procedure\)” on page 278](#)

If NSSU is not supported to upgrade a Virtual Chassis from the currently-installed release to the release you need, refer to procedures like these for some guidance:

- [Two-Member QFX Series Virtual Chassis Upgrade Procedure](#), a network configuration example on how to manually upgrade a two-member QFX Series Virtual Chassis when NSSU isn't available.

RELATED DOCUMENTATION

[Understanding Virtual Chassis Components | 19](#)

[Configuring Automatic Software Update on Virtual Chassis Member Switches | 275](#)

[Installing Software on an EX Series Switch with a Virtual Chassis or Single Routing Engine \(CLI Procedure\)](#)

[Installing Software on a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Switches \(CLI Procedure\) | 232](#)

Understanding Global Management of a Virtual Chassis

IN THIS SECTION

- [Console Port Session Redirection to Master Switch | 46](#)
- [Logical Port for Virtual Chassis Out-of-Band Management | 47](#)

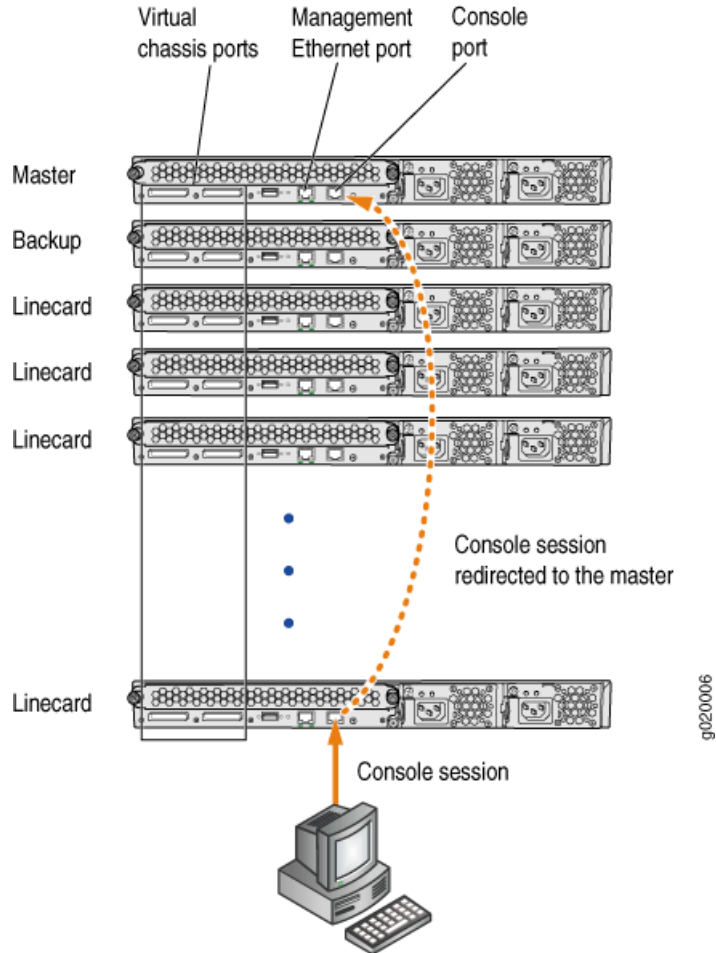
NOTE: This topic does not apply to EX8200 Virtual Chassis. See *Understanding Global Management of an EX8200 Virtual Chassis*.

A Virtual Chassis is composed of multiple switches, so it has multiple console ports and multiple out-of-band management Ethernet ports located on the switches.

Console Port Session Redirection to Master Switch

You can connect a PC or laptop directly to a console port of any member switch to set up and configure the Virtual Chassis. When you connect to the console port of any member switch, the console session is redirected to the master switch, as shown in [Figure 1 on page 47](#).

Figure 1: Console Session Redirection (EX4200 Virtual Chassis Pictured)



If the master becomes unavailable, the console session is disconnected from the old master and a new session is established with the newly elected master.

An out-of-band management Ethernet port is often referred to simply as a management Ethernet port. It uses a dedicated management channel for device maintenance and allows a system administrator to monitor and manage the switch by remote control.

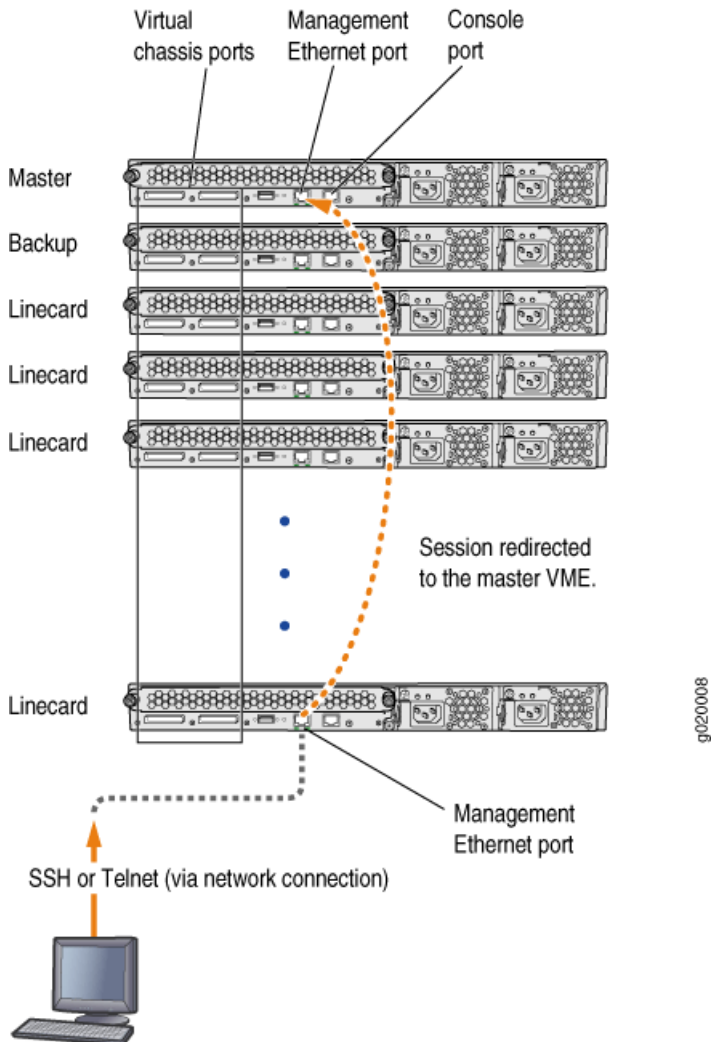
Logical Port for Virtual Chassis Out-of-Band Management

An out-of-band management Ethernet port is often referred to simply as a management Ethernet port. It uses a dedicated management channel for device maintenance and allows a system administrator to monitor and manage the switch by remote control.

The Virtual Chassis configuration can be managed remotely through SSH or Telnet using a global management interface called the virtual management Ethernet (VME) interface. The VME interface is a logical interface representing all of the out-of-band management ports on the member switches. When

you connect to the Virtual Chassis configuration using the VME interface's IP address, the connection is redirected to the master member as shown in [Figure 2 on page 48](#).

Figure 2: Management Ethernet Port Redirection to the VME Interface



You can configure an IP address for the VME global management interface at any time.

You can perform remote configuration and administration of all members of the Virtual Chassis configuration through the VME interface.

If the master management Ethernet link is unavailable, the session is redirected through the backup management Ethernet link. If there is no active management Ethernet link on the backup, the VME interface chooses a management Ethernet link on one of the linecard members, selecting the linecard member with the lowest member ID as its first choice.

NOTE: In a QFX Series Virtual Chassis with QFX5110, QFX5120, or QFX5200 switches, the VME interface doesn't redirect properly to the management interface on the backup or linecard member switches if the management link on the master member switch is down. Instead, you can use the console port on any member switch to globally configure or monitor the Virtual Chassis; this problem doesn't affect console port redirection (see ["Console Port Session Redirection to Master Switch" on page 46](#)).

RELATED DOCUMENTATION

[Understanding Virtual Chassis Components | 19](#)

[Example: Configuring an EX4200 Virtual Chassis with a Master and Backup in a Single Wiring Closet | 88](#)

[Configuring the Virtual Management Ethernet Interface for Global Management of an EX Series Virtual Chassis \(CLI Procedure\) | 268](#)

Understanding the High-Speed Interconnection of the Dedicated Virtual Chassis Ports Connecting EX4200, EX4500, and EX4550 Member Switches

Two high-speed, dedicated Virtual Chassis ports (VCPs) on the EX4200 switches and on the Virtual Chassis modules on the EX4500 and EX4550 switches enable the member switches to be interconnected and operate as a single, powerful device. When dedicated VCP interfaces are used to form a ring topology, each segment provides 64 Gbps bidirectional bandwidth on an EX4200 switch and 128 Gbps bidirectional bandwidth on an EX4500 or EX4550 switch. Because the VCP links act as point-to-point links, multiple segments of the ring can be used simultaneously. This allows the Virtual Chassis configuration bandwidth to scale as you interconnect more members within the ring topology.

RELATED DOCUMENTATION

[Understanding Virtual Chassis Components | 19](#)

[Virtual Chassis Cabling Configuration Examples for EX4200 Switches](#)

Understanding Virtual Chassis Port Link Aggregation

IN THIS SECTION

- [Virtual Chassis Network Interface LAG Among Virtual Chassis Members | 50](#)
- [Virtual Chassis Port LAG Between Two Virtual Chassis Members | 51](#)

NOTE: This topic applies to all EX Series and QFX Series Virtual Chassis, except for EX8200 Virtual Chassis. See *Understanding Virtual Chassis Port Link Aggregation in an EX8200 Virtual Chassis* for information about EX8200 Virtual Chassis link aggregation.

Within a Virtual Chassis, you can combine physical Ethernet ports to form a logical point-to-point link known as a *link aggregation group (LAG)* or *bundle*. The interfaces that are included in a LAG are sometimes referred to as member interfaces. Do not confuse this term with member switches, which refers to switches that are interconnected into a Virtual Chassis. A LAG in a Virtual Chassis can be composed of member interfaces located in different member switches in the Virtual Chassis, or composed of multiple redundant Virtual Chassis Port (VCP) links between two member switches in the Virtual Chassis, as described in the following sections.

Virtual Chassis Network Interface LAG Among Virtual Chassis Members

When setting up interfaces in a Virtual Chassis, you can configure a combination of physical Ethernet ports belonging to different member switches to form a LAG. A LAG provides more bandwidth than a single Ethernet link can provide. Additionally, link aggregation provides network redundancy by load-balancing traffic across all available links. If one of the links fails, the system automatically load-balances traffic across all remaining links.

Similarly, if a Virtual Chassis member switch that has LAG member interfaces on multiple member switches fails for any reason, the traffic traversing the LAG can be redirected through the active member switch. This setup has benefits for failover purposes and can be especially beneficial in cases when a member switch needs to be inactive for some time, such as during a software upgrade using NSSU.

NOTE: During an NSSU operation, if you try to view LAG interface status on the master Routing Engine member using the **show interfaces ae-ae-interface-number** CLI command, you might see incorrect or zero traffic counts. To work around this problem, run the command on the backup Routing Engine member instead if that member is already loaded and running.

Virtual Chassis Port LAG Between Two Virtual Chassis Members

You can configure optical uplink ports into Virtual Chassis ports (VCPs) that connect EX Series or QFX series switches together to form a Virtual Chassis. When you configure multiple uplink port VCPs connecting the same two member switches, those ports *automatically* form a LAG if the ports are configured to operate at the same link speeds. Each LAG is assigned a positive-integer identifier called a *trunk ID*. Up to 8 redundant VCP links can form a VCP LAG connecting two members in a Virtual Chassis, depending on the number of available ports that can be VCPs.

NOTE: On EX2200 and EX2200-C switches, you can also configure the RJ-45 interfaces, including built-in network ports with 10/100/1000BASE-T Gigabit Ethernet connectors and 1000BASE-T RJ-45 transceivers, into VCPs. Any interfaces on these switches that are configured as VCPs interconnecting two members will automatically form a LAG, regardless of whether the interfaces are optical transceiver interfaces, RJ-45 transceiver interfaces, or built-in network ports with 10/100/1000BASE-T Gigabit Ethernet connectors.

A VCP LAG automatically forms when any two member switches are interconnected with two or more VCP links of the same link speed in any of these configurations:

- If the VCP ports on both switches are ports you configured into VCPs or default-configured VCPs (for switches that have default VCPs).
- If the VCP ports on both switches are dedicated VCPs (for switches that have dedicated VCPs).
- In a mixed Virtual Chassis when the VCP links interconnect two different switch models.

A LAG over uplink VCPs provides higher overall bandwidth for forwarding traffic between the member switches connected by the optical VCPs, faster management communications, and greater redundancy of operations among the members than would be available without the LAG.

See [“Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port” on page 260](#) or [Configuring an EX4650 or a QFX Series Virtual Chassis](#) for information about configuring uplink ports into VCPs.

RELATED DOCUMENTATION

[Understanding EX Series Virtual Chassis | 9](#)

Understanding Aggregated Ethernet Interfaces and LACP for Switches

[Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch | 170](#)

[Example: Configuring Aggregated Ethernet High-Speed Uplinks with LACP Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch | 178](#)

[Example: Configuring an EX4200 Virtual Chassis Interconnected Across Multiple Wiring Closets | 131](#)

[Example: Configuring Link Aggregation Groups Using EX4200 Uplink Virtual Chassis Ports | 191](#)

Understanding QFX Series Virtual Chassis

Configuring an EX4650 or a QFX Series Virtual Chassis

Understanding Fast Failover in an EX Series Virtual Chassis

IN THIS SECTION

- [Supported Topologies for Fast Failover | 53](#)
- [How Fast Failover Works | 53](#)
- [Effects of Topology Changes on a Fast Failover Configuration | 58](#)

The Virtual Chassis fast failover feature is a hardware-assisted failover mechanism that automatically reroutes traffic and reduces traffic loss in the event of a link failure or switch failure in a Virtual Chassis. If a link between two members fails, traffic flow between those members must be rerouted quickly so that there is minimal traffic loss.

Fast failover is effective only for Virtual Chassis members configured in ring topologies using identical port types.

Fast failover is supported for the following Virtual Chassis:

- EX3300 Virtual Chassis
- EX4200 Virtual Chassis
- Mixed EX4200 and EX4500 Virtual Chassis
- Mixed EX4200 and EX4550 Virtual Chassis

- Mixed EX4200, EX4500, and EX4550 Virtual Chassis
- EX4500 Virtual Chassis
- Mixed EX4500 and EX4550 Virtual Chassis
- EX4550 Virtual Chassis

In any mixed Virtual Chassis, fast failover is supported for all Virtual Chassis ports (VCPs), including VCPs that provide interconnections between different types of member switches.

This topic describes the following:

Supported Topologies for Fast Failover

For fast failover to be effective, the Virtual Chassis members must be configured in a ring topology. The ring topology can be formed by using either dedicated VCPs or user-configured uplink VCPs. Fast failover is supported only in a ring topology that uses identical port types, for example, either a topology that uses all dedicated VCPs or one that uses all uplink VCPs. Fast failover is not supported in a ring topology that includes both dedicated VCPs and uplink VCPs. Fast failover is supported, however, in a Virtual Chassis configuration that consists of multiple rings.

How Fast Failover Works

When fast failover is activated, each VCP is automatically configured with a backup port of the same type (dedicated VCP, SFP uplink VCP, or XFP uplink VCP). If a VCP fails, its backup port is used to send traffic. These backup ports act as standby ports and are not meant for load-balancing traffic or any other purposes.

Fast Failover in a Ring Topology Using Dedicated VCPs

When fast failover is activated in a ring topology that uses dedicated VCPs, each VCP is automatically configured with a backup port of the same type. If a VCP fails, its backup port is used to send traffic.

[Figure 3 on page 54](#) shows normal traffic flow in a ring topology using dedicated VCPs.

Figure 3: Normal Traffic Flow in a Ring Topology Using Dedicated VCPs

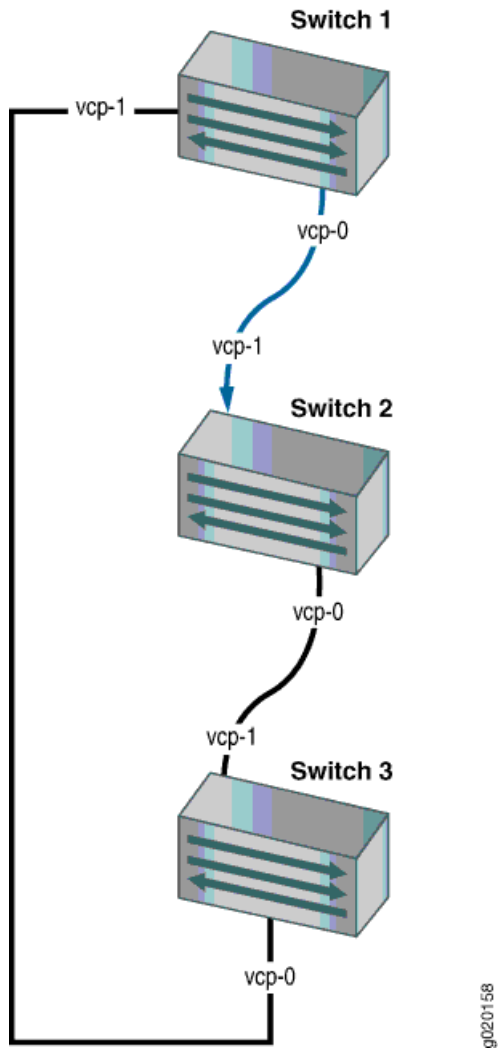
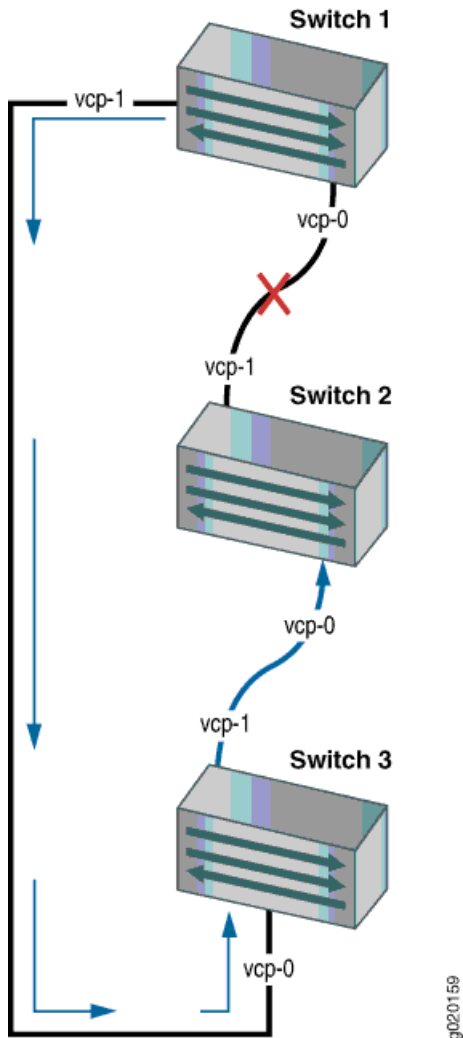


Figure 4 on page 55 shows traffic redirected by fast failover.

Figure 4: Traffic Redirected by Fast Failover After a Dedicated VCP Link Failure



When the failed link is restored, the Virtual Chassis reconfigures the topology to the topology's original state.

Fast Failover in a Ring Topology Using Uplink Module VCPs

In a ring topology that uses uplink VCPs, each uplink VCP is automatically configured with a backup uplink VCP. If an uplink VCP fails, its backup port is used to send traffic. [Figure 5 on page 56](#) shows normal traffic flow in a ring topology using SFP uplink VCPs. Normal traffic flow in a ring topology using XFP uplink VCPs is the same.

NOTE: To use SFP or XFP uplink ports as VCPs, you must configure them to be VCPs using the `request virtual-chassis vc-port` command. Once configured, they are converted into VCPs. For example, `xe-0/1/0` becomes `vc-255/1/0` after you configure it to be a VCP.

Figure 5: Normal Traffic Flow in a Ring Topology Using SFP Uplink VCPs

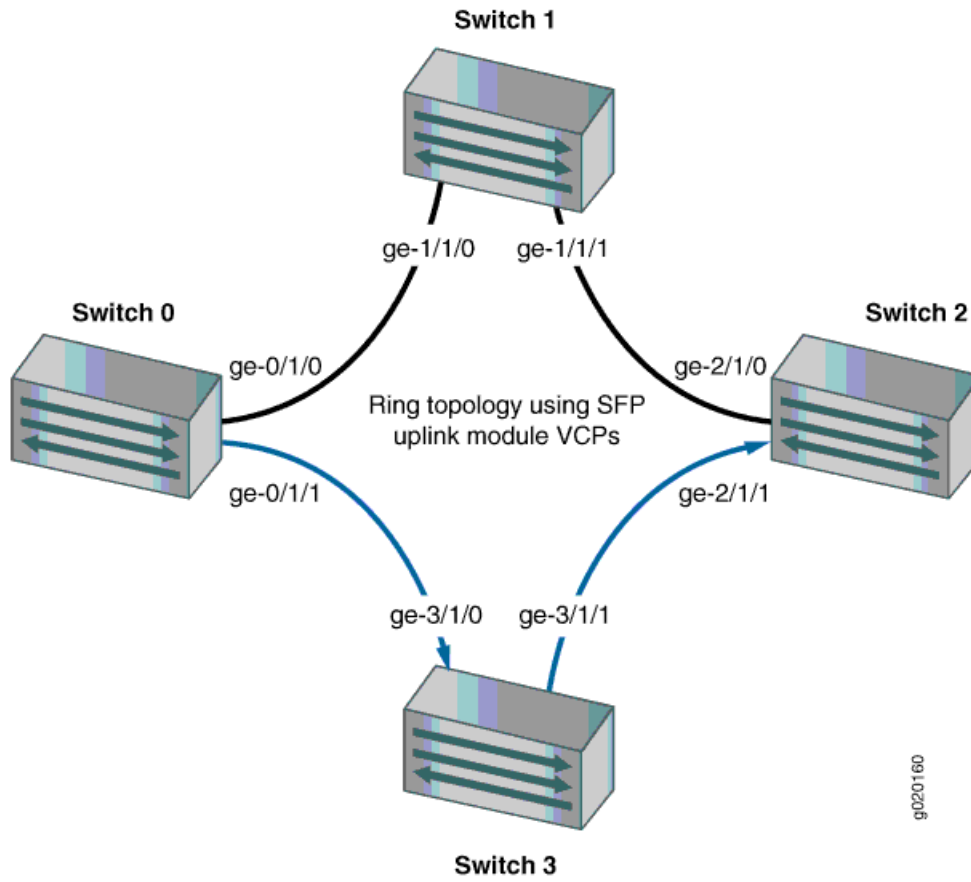
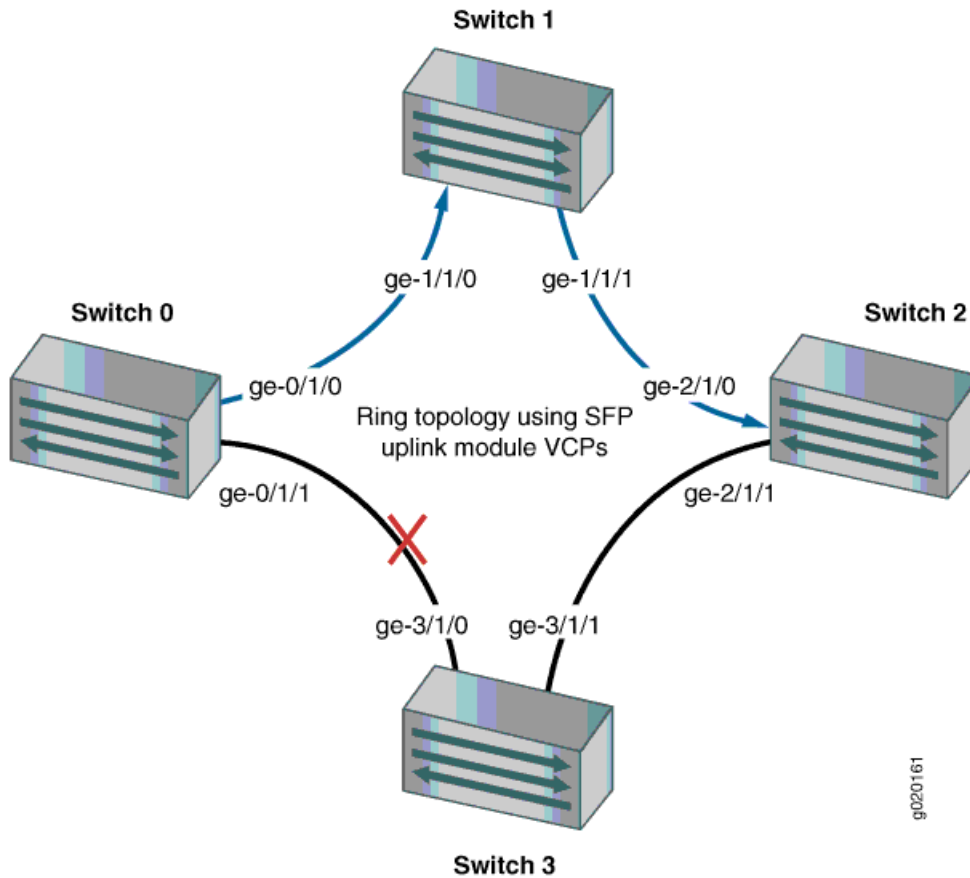


Figure 6 on page 57 shows traffic redirected by fast failover.

Figure 6: Traffic Redirected by Fast Failover After SFP Uplink VCP Link Failure



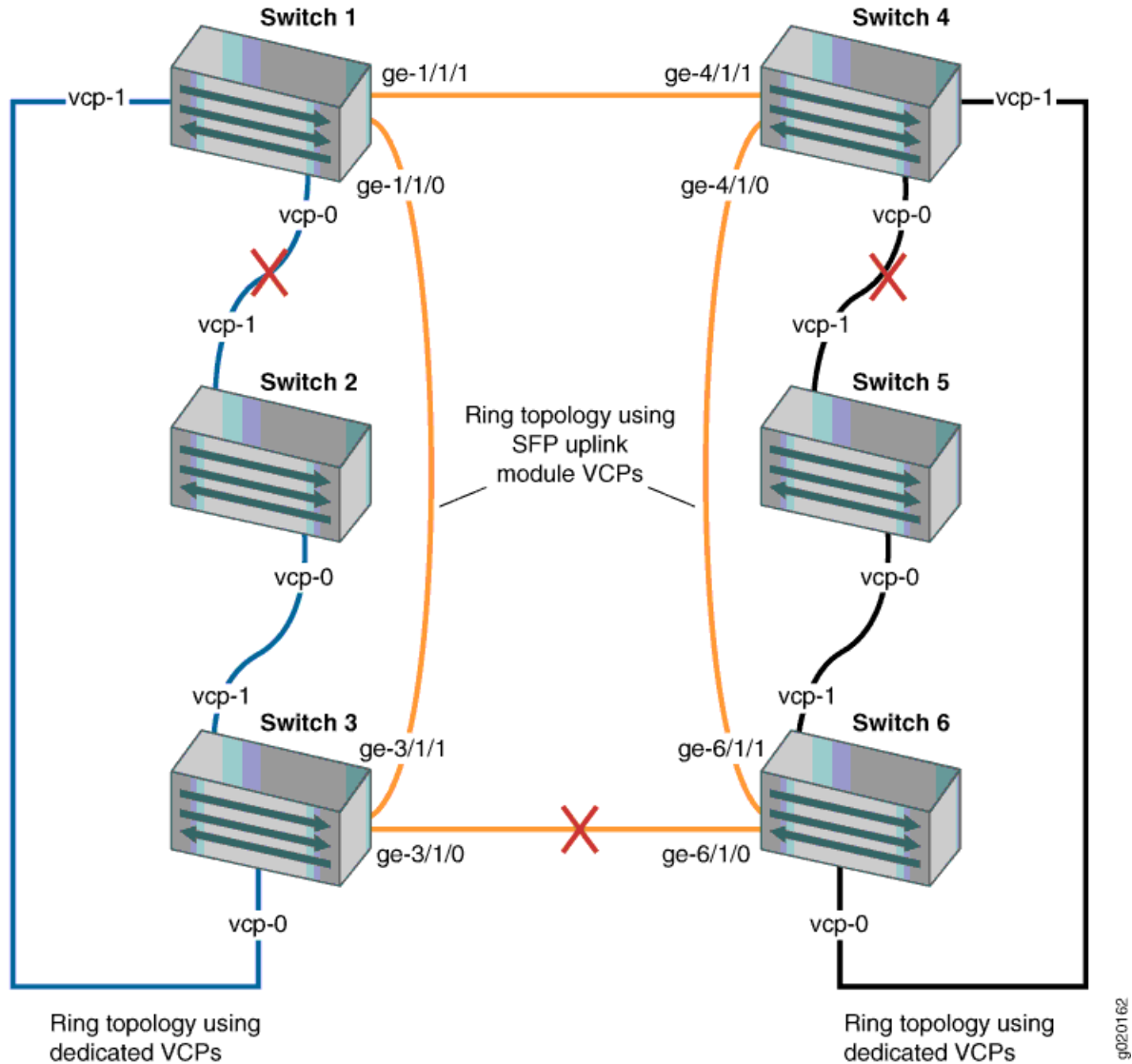
In a ring topology that uses SFP uplink VCPs, there are four ports per module. Consecutive pairs of ports are automatically configured as backup ports for each other. For example, if a Virtual Chassis member has an SFP uplink module installed, uplink module VCPs **ge-0/1/0** and **ge-0/1/1** are automatically configured as backup ports for each other. Similarly, ports **ge-0/1/2** and **ge-0/1/3** are automatically configured as backup ports for each other.

In a ring topology that uses XFP uplink module VCPs, there are only two ports per uplink module. Similarly to a topology that uses SFP uplink module VCPs, each port is automatically configured to back up the other port in the uplink module (for example, **xe-0/1/0** is the backup for **xe-0/1/1**).

Fast Failover in a Virtual Chassis Configuration Using Multiple Ring Topologies

Fast failover is supported in a Virtual Chassis configuration with a multiple-ring topology, as shown in [Figure 7 on page 58](#).

Figure 7: Traffic Redirected by Fast Failover After VCP Link Failures in a Topology with Multiple Rings



In this scenario, the Virtual Chassis configuration has three rings: two rings that use dedicated VCPs and one ring that uses SFP uplink module VCPs. Fast failover works independently on each ring. Each dedicated VCP in a ring is backed up by another dedicated VCP. Similarly, each SFP uplink module VCP is backed up by another SFP uplink module VCP. Fast failover does not support a ring topology consisting of a mix of dedicated VCPs and uplink module VCPs.

Effects of Topology Changes on a Fast Failover Configuration

When the fast failover feature is activated, topology changes to the Virtual Chassis configuration do not affect the fast failover configuration. In the event of a link or switch failure, fast failover functions normally.

RELATED DOCUMENTATION

[Understanding EX Series Virtual Chassis | 9](#)

[Example: Configuring Fast Failover on Uplink Module VCPs to Reroute Traffic When an EX4200 Virtual Chassis Switch or Intermember Link Fails | 184](#)

[Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port | 260](#)

Understanding Split and Merge in a Virtual Chassis

IN THIS SECTION

- [What Happens When a Virtual Chassis Configuration Splits | 60](#)
- [Merging Virtual Chassis Configurations | 60](#)

In a Virtual Chassis, you connect two or more switches together to form a unit that is managed as a single chassis. If member switches in the Virtual Chassis fail or you remove member switches, this disrupts the Virtual Chassis configuration. In some situations, the Virtual Chassis configuration splits into two separate Virtual Chassis, which can cause disruptions in the network if the two resulting Virtual Chassis share common resources such as global IP addresses.

The Virtual Chassis split and merge feature is a method to prevent the separate Virtual Chassis configurations from adversely affecting the network. It also enables the two parts to merge back into a single Virtual Chassis configuration.

NOTE: If a Virtual Chassis configuration splits into separate parts, we recommend that you resolve the problem that caused the Virtual Chassis configuration to split as soon as possible.

You can also use this feature to merge two active, separate Virtual Chassis (that have not previously been part of the same configuration) into one Virtual Chassis configuration.

The split and merge feature is enabled by default on EX Series and QFX Series Virtual Chassis. You can disable this feature by using the **set virtual-chassis no-split-detection** command.

What Happens When a Virtual Chassis Configuration Splits

When a Virtual Chassis configuration splits into two separate Virtual Chassis configurations, the individual member switches detect this topology change and run the master election algorithm to select a new master for each of the two Virtual Chassis configurations. The new masters then determine whether their Virtual Chassis configuration remains active. One of the configurations remains active based on the following:

- It contains both the stable master and the stable backup (that is, the master and backup from the original Virtual Chassis configuration before the split).
- It contains the stable master and the configuration is greater than half the Virtual Chassis size.
- It contains the stable backup and is at least half the Virtual Chassis size.

In accordance with the rules given in the second and third list items, if the Virtual Chassis configuration splits into two equal parts and the stable master and stable backup are in different parts, then the part that contains the stable backup becomes active.

NOTE: The number of members in the Virtual Chassis configuration includes all member switches connected to date minus the number whose Virtual Chassis member IDs have been recycled (that is, made available for reassignment). Therefore, the size of the Virtual Chassis configuration increases when a new member switch is detected and decreases when a member switch's ID is recycled.

These rules ensure that only one of the two separate Virtual Chassis configurations created by the split remains active. The member switches in the inactive Virtual Chassis configuration remain in a linecard role. For the inactive members to become active again, one of the following things must happen:

- The problem that caused the original Virtual Chassis configuration to split is resolved, allowing the two Virtual Chassis configurations to merge.
- You load the factory default configuration on the inactive members, which causes the inactive members to function as standalone switches or become part of a different Virtual Chassis configuration.

NOTE: When you remove a member switch from a Virtual Chassis configuration, we recommend that you recycle the member ID using the [request virtual-chassis recycle](#) command.

Merging Virtual Chassis Configurations

There are two scenarios in which separate Virtual Chassis merge:

- A Virtual Chassis configuration that had split into two is now merging back into a single configuration because the problem that had caused it to split has been resolved.
- You want to merge two Virtual Chassis that had not previously been configured together.

Every Virtual Chassis configuration has a unique ID (VCID) that is automatically assigned when the Virtual Chassis configuration is formed. You can also explicitly assign a VCID using the **set virtual-chassis id** command. A VCID that you assign takes precedence over automatically assigned VCIDs.

When you reconnect the separate Virtual Chassis configurations or connect them for the first time, the members determine whether or not the separate Virtual Chassis configurations can merge. The members use the following rules to determine whether a merge is possible:

- If the Virtual Chassis configurations have the same VCID, then the configurations can merge. If the two Virtual Chassis were formed as the result of a split, they have the same VCID.
- If the VCIDs are different, then the two configurations can merge only if both are active (inactive configurations cannot merge, ensuring that members removed from one Virtual Chassis configuration do not become members of another Virtual Chassis configuration). If the configurations to merge are both active and one of them has a user-configured VCID, this ID becomes the ID of the merged Virtual Chassis. If neither Virtual Chassis has a user-configured VCID, then the VCID of the configuration with the highest mastership priority becomes the ID of the merged Virtual Chassis. The resulting merged Virtual Chassis configuration is active.

When you connect two Virtual Chassis configurations:

1. Connecting the two split Virtual Chassis configurations triggers the shortest-path-first (SPF) algorithm. The SPF algorithm computes the network topology and then triggers the master election algorithm. The master election algorithm waits for the members to synchronize the topology information before running.
2. The master election algorithm merges the VCIDs of all the members.
3. Each member runs the master election algorithm to select a master and a backup from among all members with the same VCIDs. For more information, see [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#).
4. The master determines whether the Virtual Chassis configuration is active or inactive. (See [“What Happens When a Virtual Chassis Configuration Splits” on page 60](#).)
5. If the Virtual Chassis configuration is active, the master assigns roles to all members. If the Virtual Chassis configuration is inactive, the master assigns all members the role of linecard.
6. When the other members receive their role from the master, they change their role to backup or linecard. They also use the active or inactive state information sent by the master to set their own state

to active or inactive and to construct the Virtual Chassis member list from the information sent by the master.

7. If the Virtual Chassis state is active, the master waits for messages from the members indicating that they have changed their roles to the assigned roles, and then the master changes its own role to master.

NOTE: When you merge two Virtual Chassis that had not previously been part of the same Virtual Chassis configuration, any configuration settings (such as the settings for Telnet and FTP services, graceful Routing Engine switchover (GRES), fast failover, VLANs, and so on) that exist on the new master become the configuration settings for all members of the new Virtual Chassis, overwriting any other configuration settings.

RELATED DOCUMENTATION

[Disabling Split and Merge in a Virtual Chassis | 273](#)

[Assigning the Virtual Chassis ID to Determine Precedence During a Virtual Chassis Merge | 282](#)

[Example: Assigning the Virtual Chassis ID to Determine Precedence During an EX4200 Virtual Chassis Merge | 188](#)

[Understanding EX Series Virtual Chassis | 9](#)

Understanding QFX Series Virtual Chassis

Understanding Automatic Software Update on Virtual Chassis Member Switches

IN THIS SECTION

- [Automatic Software Update Basics | 63](#)
- [Automatic Software Update Restrictions | 63](#)

You can use the automatic software update feature to automatically update the Juniper Networks Junos operating system (Junos OS) version on prospective member switches as you add them to an EX Series or QFX Series Virtual Chassis.

Automatic Software Update Basics

When you have configured automatic software update on a Virtual Chassis, the Junos OS version is updated on the new member switch when you add it to the Virtual Chassis. The new member switch immediately joins the Virtual Chassis configuration and is put in the active state.

For a standalone switch to join an existing Virtual Chassis, it must be running the same version of Junos OS that is running on the Virtual Chassis master. When the master in a Virtual Chassis detects that a new switch has been added to the configuration, it checks the software version on the new switch. If the software version on the new switch is not the same as the version running on the master, the master keeps the new switch in the inactive state. If you have not enabled the automatic software update feature, you have to manually install the correct software version on each prospective member switch as it is added to the Virtual Chassis.

Automatic Software Update Restrictions

Refer to [Feature Explorer](#) to see the EX Series and QFX Series Virtual Chassis that support automatic software updates, and the Junos OS release versions where the feature was introduced on each platform. Where the automatic software update feature is supported, see the Junos OS Release Notes for the release version running on the master for any limitations in using automatic software updates between that release version and any prospective member switch release versions.



CAUTION: A QFX5100 switch running a Junos OS software image with “-qfx-5-” in the package filename *must* first be upgraded to a Junos OS software image with “-qfx-5e-” in the package filename before it can be added to a QFX5110 Virtual Chassis or VCF. The automatic software update process cannot update a switch from a “-qfx-5-” image to a “-qfx-5e-” image. See *Upgrading a QFX5100 Switch with a USB Device to Join a QFX5110 Virtual Chassis or Virtual Chassis Fabric*.

After a QFX5100 switch is installed with a “-qfx-5e-” Junos OS software image, the automatic software update process can successfully update the switch automatically with a different version of a “-qfx-5e-” Junos OS image to match the other members in the Virtual Chassis or VCF.

[Understanding Software Upgrades in a Virtual Chassis | 44](#)

[Configuring Automatic Software Update on Virtual Chassis Member Switches | 275](#)

[Example: Configuring Automatic Software Update on EX4200 Virtual Chassis Member Switches | 202](#)

Understanding Nonstop Software Upgrade on EX Series Switches

IN THIS SECTION

- [Requirements for Performing an NSSU | 66](#)
- [How an NSSU Works | 67](#)
- [NSSU Limitations | 70](#)
- [NSSU and Junos OS Release Support | 71](#)
- [Overview of NSSU Configuration and Operation | 71](#)

Nonstop software upgrade (NSSU) enables you to upgrade the software running on Juniper Networks EX Series Ethernet Switches with redundant Routing Engines and all member switches in EX Series Virtual Chassis using a single command. During the upgrade there might be minimal network traffic disruption during mastership switchover, and the extent of disruption could be dependent on the network topology, configuration, network traffic, and other environment factors .

NOTE: When an EX Series switch in a mixed Virtual Chassis is upgraded to Junos OS Release 15.1 or later from a release earlier than Release 15.1, there might be a drop in traffic for up to 60 seconds.

The following EX Series Virtual Chassis support NSSU:

- EX3300 Virtual Chassis
- EX3400 Virtual Chassis
- EX4200 Virtual Chassis
- EX4300 Virtual Chassis
- EX4500 Virtual Chassis
- EX4550 Virtual Chassis

- All mixed Virtual Chassis composed of EX4200, EX4500, and EX4550 switches
- EX4600 Virtual Chassis
- EX4650 Virtual Chassis

NOTE: An EX4650 Virtual Chassis operates the same as a QFX5120 Virtual Chassis, so for details on upgrading an EX4650 Virtual Chassis using NSSU, see *Understanding Nonstop Software Upgrade on a Virtual Chassis and Mixed Virtual Chassis* and *Upgrading Software on a Virtual Chassis and Mixed Virtual Chassis Using Nonstop Software Upgrade* instead of this topic.

- EX6200 switches
- EX8200 switches
- EX8200 Virtual Chassis

Performing an NSSU provides these benefits:

- No disruption to the control plane—An NSSU takes advantage of graceful Routing Engine switchover (GRES) and nonstop active routing (NSR) to ensure no disruption to the control plane. During the upgrade process, interface, kernel, and routing protocol information is preserved.
- Minimal disruption to network traffic—An NSSU minimizes network traffic disruption by:
 - Upgrading line cards one at a time in an EX6200 switch, EX8200 switch, or EX8200 Virtual Chassis while permitting traffic to continue to flow through the line cards that are not being upgraded.
 - Upgrading member switches one at a time in other EX Series Virtual Chassis while permitting traffic to continue to flow through the members that are not being upgraded.

To achieve minimal disruption to traffic, you must configure link aggregation groups (LAGs) such that the member links of each LAG reside on different line cards or Virtual Chassis members. When one member link of a LAG is down, the remaining links are up, and traffic continues to flow through the LAG.

NOTE: Because NSSU upgrades the software on each line card or on each Virtual Chassis member one at a time, an upgrade using NSSU can take longer than an upgrade using the **request system software add** command.

In releases prior to Junos OS Release 16.1, for EX6200 switches, EX8200 switches, and EX8200 Virtual Chassis, you can reduce the amount of time an upgrade takes by configuring line-card upgrade groups. The line cards in an upgrade group are upgraded simultaneously, reducing the amount of time it takes to complete an upgrade. See *Configuring Line-Card Upgrade Groups for Nonstop Software Upgrade*.

This topic covers:

Requirements for Performing an NSSU

The following requirements apply to all switches and Virtual Chassis:

- All Virtual Chassis members and all Routing Engines must be running the same Junos OS release.
- Graceful Routing Engine switchover (GRES) must be enabled.
- Nonstop active routing (NSR) must be enabled.

NOTE: Although nonstop bridging (NSB) does not have to be enabled to perform an NSSU, we recommend enabling NSB before performing an NSSU. Enabling NSB ensures that all NSB-supported Layer 2 protocols operate seamlessly during the Routing Engine switchover that is part of the NSSU. In releases prior to Junos OS Release 16.1, see *Configuring Nonstop Bridging on Switches (CLI Procedure)*.

- For minimal traffic disruption, you must define link aggregation groups (LAGs) such that the member links reside on different Virtual Chassis members or on different line cards.

NOTE: During an NSSU operation, if you try to view LAG interface status on the master Routing Engine member using the **show interfaces ae-ae-interface-number** CLI command, you might see incorrect or zero traffic counts. To work around this problem, run the command on the backup Routing Engine member instead if that member is already loaded and running.

The following are requirements for performing NSSU on an EX Series Virtual Chassis (excluding EX6200 or EX8200 Virtual Chassis):

- The Virtual Chassis members must be connected in a ring topology so that no member is isolated as a result of another member being rebooted. This topology prevents the Virtual Chassis from splitting during an NSSU.
- The Virtual Chassis master and backup must be adjacent to each other in the ring topology. Adjacency permits the master and backup to always be in sync, even when the switches in linecard roles are rebooting.
- The Virtual Chassis must be preprovisioned so that the linecard role has been explicitly assigned to member switches acting in a linecard role. During an NSSU, the Virtual Chassis members must maintain their roles—the master and backup must maintain their master and backup roles (although mastership will change), and the remaining switches must maintain their linecard roles.
- A two-member Virtual Chassis must have **no-split-detection** configured so that the Virtual Chassis does not split when an NSSU upgrades a member.

NOTE: For the EX4300 Virtual Chassis, you should enable the **vcp-no-hold-time** statement at the **[edit virtual-chassis]** hierarchy level before performing a software upgrade using NSSU. If you do not enable the **vcp-no-hold-time** statement, the Virtual Chassis might split during the upgrade. A split Virtual Chassis can cause disruptions to your network, and you might have to manually reconfigure your Virtual Chassis after the NSSU if the split and merge feature was disabled. For more information about a split Virtual Chassis, see [“Understanding Split and Merge in a Virtual Chassis” on page 59](#)

How an NSSU Works

IN THIS SECTION

- [EX3300, EX3400, EX4200, EX4300, EX4500, EX4600, and Mixed Virtual Chassis | 67](#)
- [EX6200 and EX8200 Switches | 68](#)
- [EX8200 Virtual Chassis | 69](#)

This section describes what happens when you request an NSSU on EX Series switches and Virtual Chassis.

NOTE: An EX4650 Virtual Chassis operates the same as a QFX5120 Virtual Chassis, so for details on upgrading an EX4650 Virtual Chassis using NSSU, see *Understanding Nonstop Software Upgrade on a Virtual Chassis and Mixed Virtual Chassis* and *Upgrading Software on a Virtual Chassis and Mixed Virtual Chassis Using Nonstop Software Upgrade* instead of this topic.

EX3300, EX3400, EX4200, EX4300, EX4500, EX4600, and Mixed Virtual Chassis

When you request an NSSU on an EX3300, EX3400, EX4200, EX4300, EX4500, or mixed Virtual Chassis:

1. The Virtual Chassis master verifies that:
 - The backup is online and running the same software version.
 - Graceful Routing Engine switchover (GRES) and nonstop active routing (NSR) are enabled.
 - The Virtual Chassis has a preprovisioned configuration.
2. The master installs the new software image on the backup and reboots it.

3. The master resynchronizes the backup.
4. The master installs the new software image on member switches that are in the linecard role and reboots them, one at a time. The master waits for each member to become online and active before starting the software upgrade on the next member.
5. When all members that are in the linecard role have been upgraded, the master performs a graceful Routing Engine switchover, and the upgraded backup becomes the master.
6. The software on the original master is upgraded and the original master is automatically rebooted. After the original master has rejoined the Virtual Chassis, you can optionally return control to it by requesting a graceful Routing Engine switchover.

EX6200 and EX8200 Switches

When you request an NSSU on a standalone switch with redundant Routing Engines:

1. The switch verifies that:
 - Both Routing Engines are online and running the same software version.
 - Both Routing Engines have sufficient storage space for the new software image.
 - Graceful Routing Engine switchover and nonstop active routing are enabled.
2. The switch installs the new software image on the backup Routing Engine and reboots it.
3. The switch resynchronizes the backup Routing Engine to the master Routing Engine.
4. The line cards in the first upgrade group (or the line card in slot 0, if no upgrade groups are defined) download the new image and then restart. Traffic continues to flow through the line cards in the other upgrade groups during this process.
5. When line cards restarted in Step 4 are online again, the line cards in the next upgrade group download the new image and restart. This process continues until all online line cards have restarted with the new software.

NOTE: If you have taken a line card offline with the CLI before you start the NSSU, the line card is not restarted and remains offline.

6. The switch performs a graceful Routing Engine switchover, so that the upgraded backup Routing Engine becomes the master.

7. The switch installs the new software on the original master Routing Engine.

To complete the upgrade process, the original master Routing Engine must be rebooted. You can do so manually or have the switch perform an automatic reboot by including the **reboot** option when you request the NSSU. After the original master has been rebooted, you can optionally return control to it by requesting a graceful Routing Engine switchover.

8. (EX6200 switch only) The original master Routing Engine reboots to complete the software upgrade.

NOTE: To complete the upgrade process on an EX8200 switch, you must intervene to reboot the original master Routing Engine. You can reboot the original master Routing Engine manually or have the switch perform an automatic reboot by including the **reboot** option when you request the NSSU.

9. (Optional) After the original master has been rebooted, you can return control to it by requesting a graceful Routing Engine switchover.

The switch can maintain normal operations with either Routing Engine acting as the master Routing Engine after the software upgrade, so you only have to perform this switchover if you want to return Routing Engine control to the original master Routing Engine.

EX8200 Virtual Chassis

When you request an NSSU on an EX8200 Virtual Chassis:

1. The master external Routing Engine verifies that:
 - It has a backup external Routing Engine that is online.
 - All Virtual Chassis members have redundant Routing Engines and the Routing Engines are online.
 - All Routing Engines are running the same software version.
 - All Routing Engines have sufficient storage space for the new software image.
 - Graceful Routing Engine switchover and nonstop active routing (NSR) are enabled.
2. The master external Routing Engine installs the new software image on the backup external Routing Engine and reboots it.
3. The backup external Routing Engine resynchronizes with the master external Routing Engine.
4. The master external Routing Engine installs the new software on the backup Routing Engines in the member switches and reboots the backup Routing Engines.

5. When the reboot of the backup Routing Engines complete, the line cards in the first upgrade group download the new image and then restart. (If no upgrade groups are defined, the line card in slot 0 of member 0 downloads the new image and restarts.) Traffic continues to flow through the line cards in the other upgrade groups during this process.
6. When line cards restarted in Step 5 are online again, the line cards in the next upgrade group (or the next sequential line card) download the new image and restart. This process continues until all online line cards have restarted with the new software.

NOTE: If you have taken a line card offline with the CLI before you start the NSSU, the line card is not restarted and remains offline.

7. The new software image is installed on the master Routing Engines, both external and internal.
8. The member switches perform a graceful Routing Engine switchover, so that the upgraded backup Routing Engines become masters.
9. The master external Routing Engine performs a graceful Routing Engine switchover so that the backup external Routing Engine is now the master.

To complete the upgrade process, the original master Routing Engines, both external and internal, must be rebooted. You can do so manually by establishing a console connection to each Routing Engine or have the reboot performed automatically by including the **reboot** option when you request the NSSU. After the original master external Routing Engine has been rebooted, you can optionally return control to it by requesting a graceful Routing Engine switchover.

NSSU Limitations

You cannot use an NSSU to downgrade the software—that is, to install an earlier version of the software than is currently running on the switch. To install an earlier software version, use the **request system software add** command.

You cannot roll back to the previous software version after you perform an upgrade using NSSU. If you need to roll back to the previous software version, you can do so by rebooting from the alternate root partition if you have not already copied the new software version into the alternate root partition.

NSSU and Junos OS Release Support

A Virtual Chassis must be running a Junos OS release that supports NSSU before you can perform an NSSU. If a Virtual Chassis is running a software version that does not support NSSU, use the **request system software add** command.

[Table 8 on page 71](#) lists the EX Series switches and Virtual Chassis that support NSSU and the Junos OS release at which they began supporting it.

Table 8: Platform and Release Support for NSSU

Platform	Junos OS Release
EX3300 Virtual Chassis	12.2 or later
EX3400 Virtual Chassis	15.1X53-D55
EX4200 Virtual Chassis	12.1 or later
EX4300 Virtual Chassis	13.2X51-D20 or later
EX4500 Virtual Chassis	12.1 or later
EX4550 Virtual Chassis	12.2 or later
Mixed EX4200 and EX4500 Virtual Chassis	12.1 or later
Mixed EX4200 and EX4550 Virtual Chassis	12.2 or later
Mixed EX4200, EX4500, and EX4550 Virtual Chassis	12.2 or later
Mixed EX4500 and EX4550 Virtual Chassis	12.2 or later
EX6200 switch	12.2 or later
EX8200 switch	10.4 or later
EX8200 Virtual Chassis	11.1 or later

Overview of NSSU Configuration and Operation

You must ensure that the configuration of the switch or Virtual Chassis meets the requirements described in [“Requirements for Performing an NSSU” on page 66](#). NSSU requires no additional configuration.

In releases prior to Junos OS Release 16.1, for EX6200 switches, EX8200 switches, and EX8200 Virtual Chassis, you can optionally configure line-card upgrade groups using the CLI. See *Example: Configuring Line-Card Upgrade Groups for Nonstop Software Upgrade on EX Series Switches*.

You perform an NSSU by executing the [request system software nonstop-upgrade](#) command. For detailed instructions on how to perform an NSSU, see the topics in Related Documentation.

Release History Table

Release	Description
16.1	In releases prior to Junos OS Release 16.1, for EX6200 switches, EX8200 switches, and EX8200 Virtual Chassis, you can reduce the amount of time an upgrade takes by configuring line-card upgrade groups.

RELATED DOCUMENTATION

[Upgrading Software Using Nonstop Software Upgrade on EX Series Virtual Chassis and Mixed Virtual Chassis \(CLI Procedure\) | 278](#)

[Upgrading Software on an EX6200 or EX8200 Standalone Switch Using Nonstop Software Upgrade \(CLI Procedure\)](#)

[Upgrading Software on an EX8200 Virtual Chassis Using Nonstop Software Upgrade \(CLI Procedure\)](#)

[Configuring Nonstop Active Routing on Switches](#)

[Configuring Graceful Routing Engine Switchover in a Virtual Chassis | 283](#)

[Example: Configuring Line-Card Upgrade Groups for Nonstop Software Upgrade on EX Series Switches](#)

Understanding Virtual Chassis Device Reachability Testing

You can use a Virtual Chassis device reachability test to verify that the connections that connect the Virtual Chassis member devices together are functioning properly. You typically use a device reachability test to verify host reachability and connectivity within a Virtual Chassis.

A Virtual Chassis device reachability test sends ping packets from one member of a Virtual Chassis to another member of a Virtual Chassis directly through the Virtual Chassis connections. The receiving Virtual Chassis member sends reply packets to confirm receipt of the ping packets from the sending device. The results of the test provide information that is helpful in verifying connectivity between Virtual Chassis member devices.

RELATED DOCUMENTATION

[Verifying Connectivity Between Virtual Chassis Member Devices](#) | 340

Understanding MAC Address Assignment on a Virtual Chassis

In a Virtual Chassis, multiple switches—each with its own set of interfaces with unique MAC addresses—are connected together to form one chassis that can be managed as a single switch. The MAC address assigned to each network-facing interface on the switch changes when the switch joins a Virtual Chassis. Because all Layer 2 traffic decisions are based on an interface's MAC address, understanding MAC address assignment is important to understanding how network traffic is forwarded and received by the Virtual Chassis. For additional information about how a network uses MAC addresses to forward and receive traffic, see *Understanding Bridging and VLANs on Switches*.

When a Virtual Chassis is formed, the MAC address of the switch in the master role becomes the system MAC base address. The Virtual Chassis assigns the system MAC base address as the MAC address for all Layer 3 interfaces within the Virtual Chassis. The Virtual Chassis also assigns the system MAC base address to the virtual management Ethernet (VME) interface and to all of the virtual LANs (VLANs) in the Virtual Chassis.

The system MAC base address does not change in the event of a switchover if the switch that was originally configured in the master role remains a member of the Virtual Chassis. If the switch that was originally configured in the master role is removed from the Virtual Chassis, the MAC address of the current member switch in the master role is assigned as the system MAC base address after the MAC persistence timer interval has expired. You can configure the MAC persistence timer interval.

For Layer 2 and aggregated Ethernet interfaces, the Virtual Chassis assigns a unique MAC address that is derived from the member switch MAC address to each interface. The assignment of a unique MAC address to each network interface helps ensure that functions that require MAC address differentiation—such as redundant trunk groups (RTGs), Link Aggregation Control Protocol (LACP), and general monitoring functions—can function properly.

NOTE: Unique MAC address assignment for Layer 2 and aggregated Ethernet interfaces in a Virtual Chassis was introduced in Junos OS Release 11.3. The same MAC address could be assigned to interfaces on different member switches in the same Virtual Chassis prior to this release.

If you reconfigure a Layer 2 interface into a Layer 3 interface, or the reverse, within a Virtual Chassis, the MAC address of that interface changes accordingly.

MAC addresses are assigned to interfaces in a Virtual Chassis automatically—no user configuration is possible or required. You can view the MAC addresses that are assigned to the interfaces by using the **show interfaces** command.

RELATED DOCUMENTATION

Understanding MAC Address Assignment on an EX Series Switch

[Configuring the Timer for the Backup Member to Start Using Its Own MAC Address, as Master of a Virtual Chassis | 270](#)

[Understanding EX Series Virtual Chassis | 9](#)

EX8200 Virtual Chassis Overview

Understanding QFX Series Virtual Chassis

Understanding High Availability on an EX Series Virtual Chassis

You increase your network's high availability (HA) when you interconnect a Juniper Networks EX Series Ethernet switch into a Virtual Chassis. A Virtual Chassis is more fault tolerant than a standalone EX series switch because it remains up when a single member switch fails, and provides sub-second convergence in the case of a device or link failure.

You can further improve HA by configuring the HA features available for your EX Series Virtual Chassis. You can, for instance, configure Link Aggregation Groups (LAG) bundles to include member links on multiple member switches in the same Virtual Chassis. This configuration increases fault tolerance because traffic traversing the LAG can be redirected to an active member switch when a single member switch fails.

A Virtual Chassis has dual Routing Engines—the switch in the master role and the switch in the backup role—and therefore supports many HA features not supported on standalone EX Series switches, such as Graceful Routing Engine Switchover (GRES) for hitless failover. For information on which of the High Availability features listed in [Table 9 on page 75](#) are supported in your EX Series Virtual Chassis, see [Feature Explorer](#).

Many HA features for the EX Series Virtual Chassis are designed to improve network resiliency after a Routing Engine switchover. [Table 9 on page 75](#) describes the effects of a Routing Engine switchover when no high availability features are enabled and when some High Availability features are enabled.

Table 9: Effects of a Routing Engine Switchover

High Availability Feature	Effect of Routing Engine Switchover
No HA features enabled	Kernel and forwarding state information is not preserved to the backup Routing Engine. A convergence process that requires all interfaces on the Virtual Chassis to be taken offline has to be performed before the Virtual Chassis returns online. The switchover can take several minutes and the Virtual Chassis does not send or receive traffic until the switchover is complete.
Graceful Routing Engine switchover (GRES) enabled	Kernel and forwarding state information is preserved on both Routing Engines, so the convergence process does not occur and the switchover happens quickly with minimal traffic loss.
Nonstop active routing (NSR), Nonstop bridging (NSB), or both enabled	<p>Layer 2 protocols that are supported by NSB are not disrupted by a Routing Engine switchover when NSB is enabled. Layer 2 protocol information for all active Layer 2 protocols is stored on both Routing Engines when NSB is enabled.</p> <p>Layer 3 protocols that are supported by NSR are not disrupted by a Routing Engine switchover when NSR is enabled. Layer 3 protocol information for all active Layer 3 protocols is stored on both Routing Engines when NSR is enabled.</p>
Graceful Protocol Restart enabled	Traffic is not interrupted during the switchover. Interface and kernel information is preserved. Graceful restart protocol extensions quickly collect and restore routing information for supported protocols from the neighboring devices.

RELATED DOCUMENTATION

[Understanding EX Series Virtual Chassis](#) | 9

2

PART

Configuration

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Configuration Examples

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- [Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch | 170](#)
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Example: Configuring an EX2200 Virtual Chassis with Four Member Switches

IN THIS SECTION

- [Requirements | 78](#)
- [Overview and Topology | 78](#)
- [Configuration | 80](#)
- [Verification | 81](#)
- [Troubleshooting the Virtual Chassis | 82](#)

A Virtual Chassis configuration is a scalable switch. You can provide secure, redundant network accessibility with an EX2200 Virtual Chassis. You can expand the Virtual Chassis configuration to include up to four EX2200 member switches to provide additional access interfaces as your office grows.

This example describes how to configure a four-member EX2200 Virtual Chassis. You can use this configuration with the same hardware and software configurations if the member switches are installed in the same or different wiring closets.

Requirements

This example uses the following hardware and software components:

- Four EX2200 switches
- Four Virtual Chassis port (VCP)-configurable optical modules.

To confirm which optical modules are supported for EX2200 switches and are VCP-configurable, see *Pluggable Transceivers Supported on EX2200 Switches*.

- Junos OS Release 12.2 or later for EX Series switches

Before you begin, be sure you have:

1. Rack-mounted the switches. See *Mounting an EX2200 Switch*.
2. Cabled the switches. See *Installing and Connecting an EX2200 Switch*.

Overview and Topology

This example shows a Virtual Chassis configuration composed of four EX2200 switches. You would typically use a four-member EX2200 Virtual Chassis to add ports at the access layer in a manner that minimized

network complexity, or to combine two EX2200 access layer switches at different sites into a single switch. A Virtual Chassis reduces network complexity by allowing a single configuration to be applied to all member switches and by minimizing the need for a loop prevention protocol like Spanning Tree Protocol (STP).

You interconnect EX2200 switches into a Virtual Chassis by configuring uplink ports connecting EX2200 member switches as Virtual Chassis ports (VCPs). You must use the uplink ports configured as VCPs regardless of whether the member switches are installed in the same or different wiring closets.

After you interconnect the switches with the uplink ports and configure them as VCPs, the VCPs are operational. The mastership priorities and member IDs are assigned by the user using the Junos OS software in this example. The software elects a master based on several criteria, including how long a member switch has belonged to the Virtual Chassis configuration. For additional details on how the master switch is elected, see [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#).

NOTE: This example uses a nonprovisioned configuration. You can explicitly assign a role for each member switch by preprovisioning the Virtual Chassis. See [“Configuring an EX2200 Virtual Chassis \(CLI Procedure\)” on page 207](#).

NOTE: We recommend that you use the **commit synchronize** command to save any configuration changes that you make to a multimember Virtual Chassis.

The topology for this example consists of four EX2200 switches.

[Table 10 on page 79](#) shows the default configuration settings for the Virtual Chassis.

Table 10: Components of the Basic Virtual Chassis Access Switch Topology

Member Switch	Hardware	Member ID	Role and Priority
switch-0	EX2200 switch	0	Master: mastership priority 255
switch-1	EX2200 switch	1	Backup: mastership priority 255
switch-2	EX2200 switch	2	Line card; mastership priority 128
switch-3	EX2200 switch	3	Line card; mastership priority 128

Configuration

Step-by-Step Procedure

To configure a Virtual Chassis with four member switches in a single wiring closet:

1. Make sure the optical ports on the member switches are properly cabled. See *Install a Transceiver*.
2. Power on switch-0 (the member switch that you want to function as the master).
3. When the CLI prompt becomes available, run the EZSetup program on switch-0, specifying the identification parameters. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* or *Connecting and Configuring an EX Series Switch (J-Web Procedure)* for details.
4. Configure switch-0 with the virtual management Ethernet (VME) interface for out-of-band management of the Virtual Chassis configuration, if desired.

```
[edit]
```

```
user@switch-0# set interfaces vme unit 0 family inet address /ip-address/mask/
```

5. Configure the mastership priority of the switches that you want to act in the master and backup roles:

```
[edit virtual-chassis]
```

```
user@switch-0# set member 0 mastership-priority 255
```

```
user@switch-0# set member 1 mastership-priority 255
```

6. Power on switch-1. The default mastership priority selection algorithm uses the amount of time powered on to assign the backup role to a switch, so powering on switch-1 before switch-2 and switch-3 helps ensure the correct roles are assigned to each member switch.
7. Power on switch-2 and switch-3. You do not need to configure the mastership priority values for these switches since they will use the default priority values of **128**.
8. Configure the optical ports on each switch as VCPs.

```
user@switch-0> request virtual-chassis vc-port set pic-slot 1 port 0
```

```
user@switch-0> request virtual-chassis vc-port set pic-slot 1 port 1
```

```
user@switch-1> request virtual-chassis vc-port set pic-slot 1 port 0
```

```
user@switch-1> request virtual-chassis vc-port set pic-slot 1 port 1
```

```
user@switch-2> request virtual-chassis vc-port set pic-slot 1 port 0
```

```
user@switch-2> request virtual-chassis vc-port set pic-slot 1 port 1
```

```
user@switch-3> request virtual-chassis vc-port set pic-slot 1 port 0
user@switch-3> request virtual-chassis vc-port set pic-slot 1 port 1
```

Verification

IN THIS SECTION

- [Verifying That the Member Switches are Present and the Roles are Properly Assigned](#) | 81

To confirm that the Virtual Chassis is operational, perform these tasks:

Verifying That the Member Switches are Present and the Roles are Properly Assigned

Purpose

Verify that the member switches are present in the Virtual Chassis and that the master switch, which has been selected by default, is the member switch that you want to function in that role.

Action

List the member switches of the Virtual Chassis configuration:

```
user@switch-0> show virtual-chassis
```

Virtual Chassis ID: 5dfe.e61f.2abc									
Virtual Chassis Mode: Enabled									
Member ID		Status	Serial No	Model	Mstr prio	Role	Mixed Neighbor List Mode	ID	Interface
0 (FPC 0)		Prsnt	GR0211195292	ex2200-24t-4g	255	Master*	NA	1	vcp-255/1/0
								3	vcp-255/1/1
1 (FPC 1)		Prsnt	GP0211420824	ex2200-24t-4g	255	Backup	NA	0	vcp-255/1/0
								2	vcp-255/1/1
2 (FPC 2)		Prsnt	GP0211464311	ex2200-24t-4g	128	Linecard	NA	1	vcp-255/1/0
								3	vcp-255/1/1
3 (FPC 3)		Prsnt	CW0210108833	ex2200-24t-4g	128	Linecard	NA	2	vcp-255/1/0
								0	vcp-255/1/1
Member ID for next new member: None									

Meaning

The `show virtual-chassis` command lists the member switches interconnected in a Virtual Chassis configuration with the member IDs that have been assigned by the master, the status of each member switch, the mastership priority values, and the roles. It also displays the neighbor members with which each member is interconnected. The output shows that all switches are in the desired **Prsnt** state and that switch-0 and switch-1 are in the master and backup roles.

Troubleshooting the Virtual Chassis

IN THIS SECTION

- [Troubleshooting the Assignment of Roles | 82](#)
- [Troubleshooting the VCPs | 82](#)

To troubleshoot the configuration of an EX2200 Virtual Chassis, perform these tasks:

Troubleshooting the Assignment of Roles

Problem

The master and backup roles are not assigned to the member switches that you want to function in these roles.

Solution

Modify the mastership priority values.

To quickly modify the mastership priority of any switch in the Virtual Chassis (in this case, member ID 1), enter the following command:

```
[edit virtual-chassis]
user@switch-0# set member 1 mastership-priority 255
```

Troubleshooting the VCPs

Problem

The VCPs are down.

Solution

1. Check to make sure that you have cabled the appropriate ports.
2. Check to make sure that the cables are seated properly.

3. Check the output of the **show virtual-chassis vc-port** command to ensure you properly configured the VCPs. Enter the **request virtual-chassis vc-port** command to reconfigure the VCPs, if needed.

RELATED DOCUMENTATION

| [Configuring an EX2200 Virtual Chassis \(CLI Procedure\) | 207](#)

Example: Configuring an EX3300 Virtual Chassis with a Master and Backup

IN THIS SECTION

- [Requirements | 83](#)
- [Overview and Topology | 84](#)
- [Configuration | 84](#)
- [Verification | 85](#)
- [Troubleshooting the Virtual Chassis | 87](#)

A Virtual Chassis configuration is a scalable switch. You can provide secure, redundant network accessibility with a basic two-member EX3300 Virtual Chassis and later expand the Virtual Chassis configuration to provide additional access ports as your office grows.

This example describes how to configure an EX3300 Virtual Chassis with a master and backup in a single wiring closet. You could use the same software configuration, however, if the EX3300 switches were connected across wiring closets.

Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.3 or later for EX Series switches
- Two EX3300 switches

Before you begin, be sure you have:

1. Rack-mounted the switches. See *Mounting an EX3300 Switch*.

2. Cabled the switches. See *Virtual Chassis Cabling Configuration Examples for EX3300 Switches*.

Overview and Topology

A Virtual Chassis configuration allows you to accommodate the networking needs of a growing office. The default configuration of a two-member Virtual Chassis includes a master and a backup switch. In addition to providing more access ports than a single switch can provide, a Virtual Chassis configuration provides high availability through redundancy.

This example shows a Virtual Chassis configuration composed of two EX3300 switches. By default, EX3300 switches have two uplink ports configured as Virtual Chassis ports (VCPs). The EX3300 Virtual Chassis is connected using these VCPs.

After you interconnect the switches with the VCPs and power on the switches, the VCPs are operational. The mastership priorities and member IDs are assigned by the software. The software elects a master based on several criteria, including how long a member switch has belonged to the Virtual Chassis configuration. For additional details, see [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#). Therefore, we recommend that you start by powering on only one member switch, the one that you want to function as the master.

NOTE: We recommend that you use the **commit synchronize** command to save any configuration changes that you make to a multimember Virtual Chassis.

The topology for this example consists of two EX3300 switches.

[Table 11 on page 84](#) shows the default configuration settings for the two-member Virtual Chassis.

Table 11: Components of the Basic Virtual Chassis Access Switch Topology

Member Switch	Hardware	Member ID	Role and Priority
SWA-0	EX3300 switch	0	Master: mastership priority 128
SWA-1	EX3300 switch	1	Backup: mastership priority 128

Configuration

Configure a Virtual Chassis with a default master and backup in a single wiring closet:

Step-by-Step Procedure

To configure a Virtual Chassis with master and backup:

1. Make sure the VCPs on the rear panel of the member switches are properly cabled. See *Virtual Chassis Cabling Configuration Examples for EX3300 Switches*.
2. Power on SWA-0 (the member switch that you want to function as the master).
3. Check the front-panel LCD to confirm that the switch has powered on correctly.
4. Run the EZSetup program on SWA-0, specifying the identification parameters. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* or *Connecting and Configuring an EX Series Switch (J-Web Procedure)* for details.
5. Configure SWA-0 with the virtual management Ethernet (VME) interface for out-of-band management of the Virtual Chassis configuration, if desired.

```
[edit]
```

```
user@SWA-0# set interfaces vme unit 0 family inet address /ip-address/mask/
```

6. (Optional, but recommended) Disable the split and merge feature:

```
[edit virtual-chassis]
```

```
user@SWA-0# set no-split-detection
```

7. Power on SWA-1.

Verification

IN THIS SECTION

- [Verifying That the Mastership Priority Is Assigned Appropriately | 85](#)
- [Verifying That the VCPs Are Operational | 86](#)

To confirm that the Virtual Chassis configuration is operational, perform these tasks:

Verifying That the Mastership Priority Is Assigned Appropriately

Purpose

Verify that the master, which has been selected by default, is the member switch that you want to function in that role.

Action

1. Check the front-panel LCD to confirm that the switch has powered on correctly and that a member ID has been assigned.
2. List the member switches of the Virtual Chassis configuration.

user@SWA-0> **show virtual-chassis**

```
Virtual Chassis ID: 0019.e250.47a0
```

Member ID	Status	Serial No	Model	Mastership priority	Role	Neighbor List ID Interface
0 (FPC 0)	Prsnt	AK0207360276	ex3300-24t	128	Master*	1 vcp-255/1/2
						1 vcp-255/1/3
1 (FPC 1)	Prsnt	AK0207360281	ex3300-24t	128	Backup	0 vcp-255/1/2
						0 vcp-255/1/3

Member ID for next new member: 2 (FPC 2)

Meaning

The **show virtual-chassis** command lists the member switches interconnected in a Virtual Chassis configuration with the member IDs that have been assigned by the master, the mastership priority values, and the roles. It also displays the neighbor members with which each member is interconnected. The output shows that SWA-0, member 0, has been assigned default mastership priority 128. Because SWA-0 is the first member to be powered on, it has the most seniority and is therefore assigned the role of master. SWA-1 is powered on after member 0, so it is assigned the role of backup. The member IDs are displayed on the front panel of the switches. Check and confirm whether the default assignment is satisfactory.

Verifying That the VCPs Are Operational

Purpose

Verify that the VCPs interconnecting the switches are operational.

Action

Display the VCPs of all the members:


```
user@SWA-0> show virtual-chassis vc-port all-members
```

```
fpc0:
```

Interface or PIC / Port	Type	Status	Speed (mbps)	Neighbor ID	Interface
1/2	Configured	Up	10000	1	vcp-255/1/2
1/3	Configured	Up	10000	1	vcp-255/1/3

```
fpc1:
```

Interface or PIC / Port	Type	Status	Speed (mbps)	Neighbor ID	Interface
1/2	Configured	Up	10000	0	vcp-255/1/2
1/3	Configured	Up	10000	0	vcp-255/1/3

Meaning

The `show virtual-chassis vc-port` command lists the interfaces that are enabled for the member switches of the Virtual Chassis configuration and shows the status of the interfaces. The output in this example shows that two of the VCPs are operational and two VCPs are not. A single cable has been used to interconnect vcp-0 of member ID 0 and vcp-0 of member ID 1. That interconnection is sufficient for the switch to be operational. However, we recommend that you connect the second set of VCPs for redundancy.

Troubleshooting the Virtual Chassis

IN THIS SECTION

- [Troubleshooting the Assignment of Roles | 87](#)
- [Troubleshooting the VCPs | 88](#)

To troubleshoot the configuration of a Virtual Chassis, perform these tasks:

Troubleshooting the Assignment of Roles

Problem

The master and backup roles are not assigned to the member switches that you want to function in these roles.

Solution

Modify the mastership priority values.

To quickly modify the mastership priority of SWA-1 (member ID 1), copy the following command and paste it into the switch terminal window:

```
[edit virtual-chassis]
user@SWA-1# set member 1 mastership-priority 255
```

Troubleshooting the VCPs**Problem**

The VCPs are down.

Solution

1. Check to make sure that you have cabled the appropriate ports.
2. Check to make sure that the cables are seated properly.

You should generally cable and interconnect both of the VCPs on the member switches, for redundancy and high availability.

RELATED DOCUMENTATION

| [Configuring an EX3300 Virtual Chassis \(CLI Procedure\) | 212](#)

Example: Configuring an EX4200 Virtual Chassis with a Master and Backup in a Single Wiring Closet

IN THIS SECTION

- [Requirements | 89](#)
- [Overview and Topology | 89](#)
- [Configuration | 91](#)
- [Verification | 91](#)
- [Troubleshooting the Virtual Chassis | 93](#)

A Virtual Chassis configuration is a scalable switch. You can provide secure, redundant network accessibility with a basic two-member EX4200 Virtual Chassis and later expand the Virtual Chassis configuration to provide additional access ports as your office grows.

This example describes how to configure an EX4200 Virtual Chassis with a master and backup in a single wiring closet:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 9.0 or later for EX Series switches
- One EX4200-48P switch
- One EX4200-24T switch
- One XFP uplink module

Before you begin, be sure you have:

1. Rack-mounted the switches.
2. Installed the uplink module. See *Installing an Uplink Module in an EX4200 Switch*.
3. Cabled the switches. See *Connecting a Virtual Chassis Cable to an EX4200 Switch*.

Overview and Topology

A Virtual Chassis configuration allows you to accommodate the networking needs of a growing office. The default configuration of a two-member Virtual Chassis includes a master and a backup switch. In addition to providing more access ports than a single switch can provide, a Virtual Chassis configuration provides high availability through redundancy.

This example shows a Virtual Chassis configuration composed of two EX4200 switches. One of the switches has an uplink module with ports that can be configured to connect to a distribution switch or customer edge (CE) router or that can be configured as Virtual Chassis ports (VCPs) to interconnect with a member switch that is located too far for the dedicated VCP cabling. (The network interfaces on EX4200-24F switches can also be configured as VCPs.) For information on configuring the uplink ports as trunk ports to a distribution switch, see *Configuring Gigabit Ethernet Interfaces (CLI Procedure)*. For an example of configuring uplink ports as VCPs, see [“Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port” on page 260](#).

By default, after you interconnect the switches with the dedicated VCPs and power on the switches, the VCPs are operational. The mastership priorities and member IDs are assigned by the software. The software elects a master based on several criteria, including how long a member switch has belonged to the Virtual

Chassis configuration. For additional details, see [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#). Therefore, we recommend that you start by powering on only one member switch, the one that you want to function as the master.

NOTE: We recommend that you use the **commit synchronize** command to save any configuration changes that you make to a multimember Virtual Chassis.

The Virtual Chassis configuration provides networking access for 50 onsite workers, who are sitting within range of a single wiring closet. The workers all use personal computers and VoIP phones. As the office grows, you can add more EX4200 switches to meet increased needs for access ports.

The topology for this example consists of two switches, one of which contains an uplink module:

- One EX4200-48P switch (SWA-0) with 48 access ports, all of which support PoE
- One EX4200-24T switch (SWA-1) with 24 access ports, including eight ports that support PoE
- One XFP uplink module, with two 10-Gigabit Ethernet ports, is installed in the EX4200-48P switch

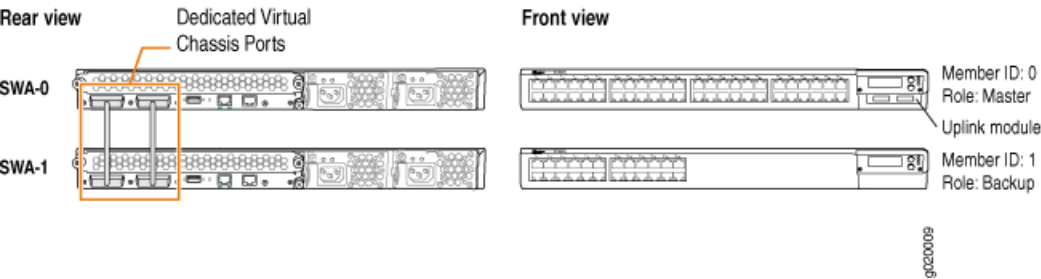
[Table 12 on page 90](#) shows the default configuration settings for the two-member Virtual Chassis.

Table 12: Components of the Basic Virtual Chassis Access Switch Topology

Member Switch	Hardware	Member ID	Role and Priority
SWA-0	EX4200-48P switch	0	Master: mastership priority 128
SWA-1	EX4200-24T switch	1	Backup: mastership priority 128

[Figure 8 on page 90](#) shows that SWA-0 and SWA-1 are interconnected with their dedicated VCPs on the rear panel. The LCD on the front displays the member ID and role. SWA-0 also includes an uplink module. Its uplink ports can be used to connect to a distribution switch.

Figure 8: Basic EX4200 Virtual Chassis with Master and Backup



Configuration

Configure a Virtual Chassis with a default master and backup in a single wiring closet:

Step-by-Step Procedure

To configure a Virtual Chassis with master and backup:

1. Make sure the VCPs on the rear panel of the member switches are properly cabled. See *Virtual Chassis Cabling Configuration Examples for EX4200 Switches*.
2. Power on SWA-0 (the member switch that you want to function as the master).
3. Check the front-panel LCD to confirm that the switch has powered on correctly.
4. Run the EZSetup program on SWA-0, specifying the identification parameters. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* or *Connecting and Configuring an EX Series Switch (J-Web Procedure)* for details.
5. Configure SWA-0 with the virtual management Ethernet (VME) interface for out-of-band management of the Virtual Chassis configuration, if desired.

```
[edit]
```

```
user@SWA-0# set interfaces vme unit 0 family inet address /ip-address/mask/
```

6. (Optional, but recommended) Disable the split and merge feature:

```
[edit virtual-chassis]
```

```
user@SWA-0# set no-split-detection
```

7. Power on SWA-1.

Verification

IN THIS SECTION

- [Verifying That the Mastership Priority Is Assigned Appropriately | 92](#)
- [Verifying That the VCPs Are Operational | 92](#)

To confirm that the Virtual Chassis configuration is operational, perform these tasks:

Verifying That the Mastership Priority Is Assigned Appropriately

Purpose

Verify that the master, which has been selected by default, is the member switch that you want to function in that role.

Action

1. Check the front-panel LCD to confirm that the switch has powered on correctly and that a member ID has been assigned.
2. List the member switches of the Virtual Chassis configuration.

user@SWA-0> [show virtual-chassis](#)

```
Virtual Chassis ID: 0019.e250.47a0
```

Member ID	Status	Serial No	Model	Mastership priority	Role	Neighbor List ID Interface
0 (FPC 0)	Prsnt	AK0207360276	ex4200-48p	128	Master*	1 vcp-0 1 vcp-1
1 (FPC 1)	Prsnt	AK0207360281	ex4200-24t	128	Backup	0 vcp-0 0 vcp-1

Member ID for next new member: 2 (FPC 2)

Meaning

The [show virtual-chassis](#) command lists the member switches interconnected in a Virtual Chassis configuration with the member IDs that have been assigned by the master, the mastership priority values, and the roles. It also displays the neighbor members with which each member is interconnected. The output shows that SWA-0, member 0, has been assigned default mastership priority 128. Because SWA-0 is the first member to be powered on, it has the most seniority and is therefore assigned the role of master. SWA-1 is powered on after member 0, so it is assigned the role of backup. The member IDs are displayed on the front panel of the switches. Check and confirm whether the default assignment is satisfactory.

Verifying That the VCPs Are Operational

Purpose

Verify that the dedicated VCPs interconnecting the switches are operational.

Action

Display the VCPs of all the members:

```
user@SWA-0> show virtual-chassis vc-port all-members
```

```
fpc0:
```

```
-----
Interface      Type      Status    Speed      Neighbor
or              (mbps)    ID        Interface
PIC / Port
vcp-0          Dedicated Up         32000      1      vcp-1
vcp-1          Dedicated Up         32000      1      vcp-0
```

```
fpc1:
```

```
-----
Interface      Type      Status    Speed      Neighbor
or              (mbps)    ID        Interface
PIC / Port
vcp-0          Dedicated Up         32000      1      vcp-1
vcp-1          Dedicated Up         32000      1      vcp-0
```

Meaning

The `show virtual-chassis vc-port` command lists the interfaces that are enabled for the member switches of the Virtual Chassis configuration and shows the status of the interfaces. The output in this example shows that two of the VCPs are operational and two VCPs are not. A single cable has been used to interconnect vcp-0 of member ID 0 and vcp-0 of member ID 1. That interconnection is sufficient for the switch to be operational. However, we recommend that you connect the second set of VCPs for redundancy.

Troubleshooting the Virtual Chassis

IN THIS SECTION

- [Troubleshooting the Assignment of Roles | 93](#)
- [Troubleshooting the VCPs | 94](#)

To troubleshoot the configuration of a Virtual Chassis, perform these tasks:

Troubleshooting the Assignment of Roles

Problem

The master and backup roles are not assigned to the member switches that you want to function in these roles.

Solution

Modify the mastership priority values.

To quickly modify the mastership priority of SWA-1 (member ID 1), copy the following command and paste it into the switch terminal window:

```
[edit virtual-chassis]  
user@SWA-1# set member 1 mastership-priority 255
```

Troubleshooting the VCPs**Problem**

The VCPs are down.

Solution

1. Check to make sure that you have cabled the appropriate ports.
2. Check to make sure that the cables are seated properly.

You should generally cable and interconnect both of the VCPs on the member switches, for redundancy and high availability.

RELATED DOCUMENTATION

[Example: Expanding an EX4200 Virtual Chassis in a Single Wiring Closet | 107](#)

[Example: Setting Up a Multimember EX4200 Virtual Chassis Access Switch with a Default Configuration | 124](#)

[Example: Configuring an EX4200 Virtual Chassis Using a Preprovisioned Configuration File | 150](#)

[Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)

[Configuring a Virtual Chassis on an EX Series Switch \(J-Web Procedure\) | 222](#)

Example: Configuring an EX4500 Virtual Chassis with a Master and Backup in a Single Wiring Closet

IN THIS SECTION

- [Requirements | 95](#)
- [Overview and Topology | 96](#)
- [Configuration | 97](#)
- [Verification | 98](#)
- [Troubleshooting the Virtual Chassis | 100](#)

A Virtual Chassis configuration is a scalable switch. You can provide secure, redundant network accessibility with a basic two-member EX4500 Virtual Chassis configuration and later expand the Virtual Chassis configuration to provide additional access ports as your office grows.

This example describes how to configure an EX4500 Virtual Chassis with a master and backup in a single wiring closet:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.1 or later for EX Series switches

NOTE: You must use Junos OS Release 11.4 or later if you are including three or more EX4500 switches in an EX4500 Virtual Chassis or a mixed EX4200 and EX4500 Virtual Chassis.

- Two EX4500 switches with Virtual Chassis modules

Before you begin, be sure you have:

1. Rack-mounted the switches. See *Mounting an EX4500 Switch*.
2. Cabled the switches but not the Virtual Chassis ports (VCPs).
3. Installed the same version of Junos OS Release 11.1 or later on both the switches

Overview and Topology

A Virtual Chassis configuration allows you to accommodate the networking needs of a growing office. The default configuration of a two-member Virtual Chassis includes a master and a backup switch. In addition to providing more access ports than a single switch can provide, a Virtual Chassis configuration provides high availability through redundancy.

After you interconnect the switches using the dedicated VCPs and power on the switches, the VCPs are operational. The mastership priorities and member IDs are assigned by the software. The software elects a master based on several criteria, including how long a member switch has belonged to the Virtual Chassis configuration. For additional details, see [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#). Therefore, we recommend that you start by powering on only one member switch, the one that you want to function as the master.

NOTE: We recommend that you use the **commit synchronize** command to save any configuration changes that you make to a Virtual Chassis.

The Virtual Chassis configuration provides networking access for onsite workers who are sitting within the range of a single wiring closet. The workers all use personal computers and VoIP phones. As the office grows, you can add EX4200 switches to meet increased needs for access ports.

The topology for this example consists of two EX4500 switches.

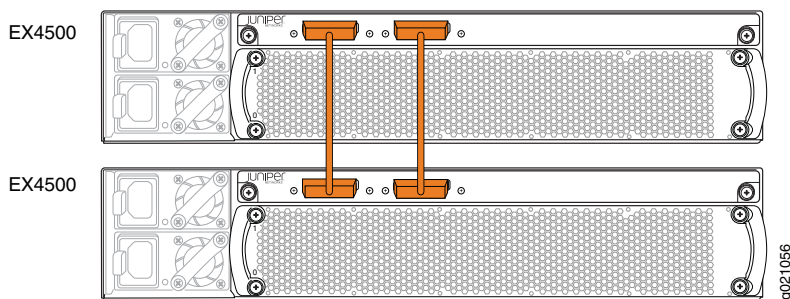
[Table 13 on page 96](#) shows the default configuration settings for the two-member Virtual Chassis.

Table 13: Components of the Basic Virtual Chassis Access Switch Topology

Member Switch	Hardware	Member ID	Role and Priority
SWA-0	EX4500 switch	0	Master: mastership priority 128
SWA-1	EX4500 switch	1	Backup: mastership priority 128

[Figure 9 on page 97](#) shows that switches SWA-0 and SWA-1 are interconnected with their dedicated VCPs on the rear panel. The LCD on the front displays the member ID and role.

Figure 9: Basic EX4500 Virtual Chassis with Master and Backup



Configuration

Configure a Virtual Chassis with a default master and backup in a single wiring closet:

Step-by-Step Procedure

To configure a Virtual Chassis with master and backup:

1. Power on SWA-0 (the member switch that you want to function as the master).
2. Power on SWA-1 (the member switch that you want to function as the backup).
3. Set the PIC mode to Virtual Chassis mode on both switches:


```
user@switch> request chassis pic-mode virtual-chassis
```
4. Run the EZSetup program on SWA-0, specifying the identification parameters. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* for details.
5. Cable the Virtual Chassis member switches together.
6. (Optional) Configure SWA-0 with the virtual management Ethernet (VME) interface for out-of-band management of the Virtual Chassis configuration, if desired:

```
[edit]
```

```
user@SWA-0# set interfaces vme unit 0 family inet address /ip-address/mask/
```

7. (Optional, but recommended) Disable the split and merge feature:

```
[edit virtual-chassis]
```

```
user@switch# set no-split-detection
```

Verification

IN THIS SECTION

- [Verifying That the Mastership Priority Is Assigned Appropriately | 98](#)
- [Verifying That the VCPs Are Operational | 99](#)

To confirm that the Virtual Chassis configuration is operational, perform these tasks:

Verifying That the Mastership Priority Is Assigned Appropriately

Purpose

Verify that the master, which has been selected by default, is the member switch that you want to function in that role.

Action

1. Check the front-panel LCD to confirm that the switch has powered on correctly and that a member ID has been assigned.
2. List the member switches of the Virtual Chassis configuration.

user@SWA-0> [show virtual-chassis](#)

Virtual Chassis ID: 0019.e250.47a0							
				Mastership		Neighbor List	
Member ID	Status	Serial No	Model	priority	Role	ID	Interface
0 (FPC 0)	Prsnt	AK0207360276	ex4500-40f	128	Master*	1	vcp-0
						1	vcp-1
1 (FPC 1)	Prsnt	AK0207360281	ex4500-40f	128	Backup	0	vcp-0
						0	vcp-1
Member ID for next new member: 2 (FPC 2)							

Meaning

The [show virtual-chassis](#) command lists the member switches interconnected in a Virtual Chassis configuration with the member IDs that have been assigned by the master, the mastership priority values, and the roles. It also displays the neighbor members with which each member is interconnected. The

output shows that SWA-0, member 0, has been assigned default mastership priority 128. Because SWA-0 is the first member to be powered on, it has the most seniority and is therefore assigned the role of master. SWA-1 is powered on after member 0, so it is assigned the role of backup. The member IDs are displayed on the front panel of the switches. Check and confirm whether the default assignment is satisfactory.

Verifying That the VCPs Are Operational

Purpose

Verify that the dedicated VCPs interconnecting the switches are operational.

Action

Display the VCPs of all the members:

```
user@SWA-0> show virtual-chassis vc-port all-members
```

```
fpc0:
```

Interface or PIC / Port	Type	Status	Speed (mbps)	Neighbor ID	Interface
vcp-0	Dedicated	Up	32000	1	vcp-1
vcp-1	Dedicated	Up	32000	1	vcp-0

```
fpc1:
```

Interface or PIC / Port	Type	Status	Speed (mbps)	Neighbor ID	Interface
vcp-0	Dedicated	Up	32000	1	vcp-1
vcp-1	Dedicated	Up	32000	1	vcp-0

Meaning

The `show virtual-chassis` command lists the interfaces that are enabled for the member switches of the Virtual Chassis configuration and shows the status of the interfaces. The output in this example shows that two of the VCPs are operational. A single cable has been used to interconnect vcp-0 of member ID 0 and vcp-0 of member ID 1. That interconnection is sufficient for the switch to be operational. However, we recommend that you connect the second set of VCPs for redundancy.

Troubleshooting the Virtual Chassis

IN THIS SECTION

- [Troubleshooting the Assignment of Roles | 100](#)
- [Troubleshooting the VCPs | 100](#)

To troubleshoot the configuration of a Virtual Chassis, perform these tasks:

Troubleshooting the Assignment of Roles

Problem

The master and backup roles are not assigned to the member switches that you want to function in these roles.

Solution

Modify the mastership priority values.

To quickly modify the mastership priority of SWA-1 (member ID 1), copy the following command and paste it into the switch terminal window:

```
[edit virtual-chassis]  
user@SWA-1# set member 1 mastership-priority 255
```

Troubleshooting the VCPs

Problem

The VCPs are down.

Solution

1. Check to make sure that you have cabled the appropriate ports.
2. Check to make sure that the cables are seated properly.

We recommend that you interconnect both of the VCPs on the member switches, for redundancy and high availability.

RELATED DOCUMENTATION

[Example: Connecting EX4500 Member Switches in a Virtual Chassis Across Wiring Closets | 141](#)

[Example: Configuring a Preprovisioned Mixed EX4200 and EX4500 Virtual Chassis | 163](#)

[Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)

Example: Expanding an EX3300 Virtual Chassis

IN THIS SECTION

- [Requirements | 101](#)
- [Overview and Topology | 101](#)
- [Configuration | 102](#)
- [Verification | 104](#)
- [Troubleshooting | 106](#)

An EX3300 Virtual Chassis is a scalable switch composed of multiple interconnected EX3300 switches.

This example describes how to configure an expanding EX3300 Virtual Chassis within a single wiring closet. The process, however, would be identical if you were connecting EX3300 member switches in different wiring closets:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.3 or later for EX Series switches
- Three EX3300 switches

Before you begin, be sure you have confirmed that the existing EX3300 Virtual Chassis configuration is operating correctly. See [“Verifying That Virtual Chassis Ports Are Operational” on page 332](#).

Overview and Topology

A Virtual Chassis configuration can be expanded without disrupting the site's network connectivity. This example describes adding a member switch to an existing Virtual Chassis configuration to provide additional access ports for connecting more PCs and voice over IP (VoIP) phones at this location. You can continue to expand the Virtual Chassis configuration with additional members in the same wiring closet, using the same procedure.

If you want to retain the roles of the existing master and backup switches, explicitly configure the mastership priority of these switches, specifying the highest possible value (255) for both the master and the backup.

During expansion, the existing Virtual Chassis configuration can remain powered on and connected to the network. Before powering up the new switch, interconnect it to the other switches using the default VCP uplink ports on the front panel. Do not run the EZSetup program on the added member switch.

This example shows an existing Virtual Chassis configuration composed of two EX3300 switches. The Virtual Chassis configuration is being expanded to include an additional EX3300 switch.

The topology for this example consists of three EX3300 switches.

[Table 14 on page 102](#) shows the configuration settings for the expanded Virtual Chassis.

Table 14: Components of the Expanded Virtual Chassis Access Switch

Member Switch	Hardware	Member ID	Role in Virtual Chassis
SWA-0	EX3300 switch	0	master; mastership priority 255
SWA-1	EX3300 switch	1	backup; mastership priority 255
SWA-2	EX3300 switch	2	linecard; mastership priority 128

Configuration

To expand a Virtual Chassis configuration to include additional member switches within a single wiring closet, perform these tasks:

NOTE: We recommend that you use the **commit synchronize** command to save any configuration changes that you make to a multimember Virtual Chassis configuration.

CLI Quick Configuration

To maintain the master and backup roles of the existing members and ensure that the new member switch functions in a linecard role, copy the following commands and paste them into the terminal window:

```
[edit]
user@SWA-0# set virtual-chassis member 0 mastership-priority 255
user@SWA-1# set virtual-chassis member 1 mastership-priority 255
```


Step-by-Step Procedure

To ensure that the existing member switches retain their current roles and to add another member switch in a linecard role:

1. Configure the mastership priority of SWA-0 (member 0) to be the highest possible value, thereby ensuring that it functions as the master of the expanded Virtual Chassis configuration.

```
[edit virtual-chassis]
user@SWA-0# set member 0 mastership-priority 255
```

2. Configure the mastership priority of SWA-1 (member 1) to be the highest possible value. This setting is recommended for high availability and smooth transition of mastership in case the original master becomes unavailable.

```
[edit virtual-chassis]
user@SWA-1# set member 1 mastership-priority 255
```

3. Interconnect the unpowered SWA-2 with SWA-0 using the default VCPs on the front panel. See *Virtual Chassis Cabling Configuration Examples for EX3300 Switches* for additional information.

4. Power on SWA-2.

You do not need to run EZSetup on SWA-2. The identification parameters that were set up for the master apply implicitly to all members of the Virtual Chassis configuration. SWA-2 functions in a linecard role, because SWA-0 and SWA-1 have been configured to the highest mastership priority values.

5. Confirm SWA-2 is now included in the Virtual Chassis configuration by checking the front-panel LCD for the member ID of this switch.

6. Cable the other VCP on SWA-2 to the Virtual Chassis.

NOTE: If you immediately cable both VCPs on SWA-2 into the existing Virtual Chassis, SWA-0 or SWA-1 might become nonoperational for several seconds. Network traffic to one of the switches is dropped during the downtime.

The switch will return to the normal operational state with no user intervention, and normal operation of the Virtual Chassis will resume after this downtime.

Verification

IN THIS SECTION

- [Verifying That the New Switch Has Been Added in a Linecard Role | 104](#)
- [Verifying That the VCPs Are Operational | 105](#)

To verify that the new switch has been added in the linecard role and that its VCPs are operational, perform these tasks:

Verifying That the New Switch Has Been Added in a Linecard Role

Purpose

Verify that SWA-2 has been added in a linecard role to the Virtual Chassis configuration.

Action

Use the [show virtual-chassis](#) command to list the member switches with their member IDs, mastership priority values, and assigned roles.

user@SWA-0> **show virtual-chassis**

Virtual Chassis ID: 0000.e255.00e0							
Member ID	Status	Serial No	Model	Mastership		Neighbor List	ID Interface
				Priority	Role		
0 (FPC 0)	Prsnt	abc123	ex3300-24t	255	Master*	1	vcp-255/1/2
						2	vcp-255/1/3
1 (FPC 1)	Prsnt	def456	ex3300-24t	255	Backup	2	vcp-255/1/2
						0	vcp-255/1/3
2 (FPC 2)	Prsnt	abd231	ex3300-24t	128	Linecard	0	vcp-255/1/2
						1	vcp-255/1/3

Meaning

The **show virtual-chassis** command lists the member switches of the Virtual Chassis configuration with the member IDs and mastership priority values. It also displays the neighbor members with which each member is interconnected. This output shows that SWA-2 has been assigned member ID 2 and has the

default mastership priority value 128. Because the mastership priority is lower than the mastership priority of the other members, SWA-2 functions in the linecard role. You can continue to add more member switches, following the same procedure. It is possible to have multiple members in linecard roles with the same mastership priority value.

Verifying That the VCPs Are Operational

Purpose

Verify that the VCPs interconnecting the member switches are operational.

Action

List the VCP interfaces on the Virtual Chassis configuration.

user@SWA-0>**show virtual-chassis vc-port all-members**

fpc0:		

Interface	Type	Status
or		
PIC / Port		
1/2	Configured	Up
1/3	Configured	Up
fpc1:		

Interface	Type	Status
or		
PIC / Port		
1/2	Configured	Up
1/3	Configured	Up
fpc2:		

Interface	Type	Status
or		
PIC / Port		
1/2	Configured	Up
1/3	Configured	Up

Meaning

The **show virtual-chassis vc-port all-members** command lists all the interfaces for the Virtual Chassis configuration. In this case, no VCPs have been configured. However, the VCPs are automatically configured and enabled when you interconnect member switches using the default VCP uplink ports. We recommend

that you interconnect the member switches using both VCPs for redundancy. The VCP interfaces are identified simply as **vcp-0** and **vcp-1**. The **fpc** number is the same as the member ID.

Troubleshooting

IN THIS SECTION

- [Troubleshooting Mastership Priority | 106](#)
- [Troubleshooting Nonoperational VCPs | 106](#)

To troubleshoot the configuration of an expanded Virtual Chassis, perform these tasks:

Troubleshooting Mastership Priority

Problem

You want to designate a different member as the master.

Solution

Change the mastership priority value or values of the switches, designating the highest mastership priority value for the switch that you want to be master.

1. Lower the mastership priority of the existing master (member 0).

```
[edit virtual-chassis]
user@SWA-0# set member 0 mastership-priority 1
```

2. Set the mastership priority of the member that you want to be the master to the highest possible value (255):

```
[edit virtual-chassis]
user@SWA-2# set member 2 mastership-priority 255
```

Troubleshooting Nonoperational VCPs

Problem

The VCP interface shows a status of **down**.

Solution

Check the cable to make sure that it is properly and securely connected to the VCPs.

RELATED DOCUMENTATION

| [Configuring an EX3300 Virtual Chassis \(CLI Procedure\) | 212](#)

Example: Expanding an EX4200 Virtual Chassis in a Single Wiring Closet

IN THIS SECTION

- [Requirements | 107](#)
- [Overview and Topology | 107](#)
- [Configuration | 109](#)
- [Verification | 111](#)
- [Troubleshooting | 113](#)

A Virtual Chassis is a scalable switch composed of multiple interconnected EX4200 and EX4500 switches.

This example describes how to configure an expanding EX4200 Virtual Chassis within a single wiring closet:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 9.0 or later for EX Series switches
- One EX4200-48P switch
- One EX4200-24T switch
- One EX4200-24P switch
- One XFP uplink module

Before you begin, be sure you have confirmed that the existing EX4200 Virtual Chassis configuration is operating correctly. See [“Verifying That Virtual Chassis Ports Are Operational” on page 332](#).

Overview and Topology

A Virtual Chassis configuration can be expanded without disrupting the site's network connectivity. This example describes adding a member switch to an existing Virtual Chassis configuration to provide additional access ports for connecting more PCs and Voice over IP (VoIP) phones at this location. You can continue

to expand the Virtual Chassis configuration with additional members in the same wiring closet, using the same procedure. If you want to expand the Virtual Chassis configuration to include member switches in another wiring closet, see [“Example: Configuring an EX4200 Virtual Chassis Interconnected Across Multiple Wiring Closets”](#) on page 131.

If you want to retain the roles of the existing master and backup switches, explicitly configure the mastership priority of these switches, specifying the highest possible value (255) for both the master and the backup.

During expansion, the existing Virtual Chassis configuration can remain powered on and connected to the network. Before powering up the new switch, interconnect it to the other switches using the dedicated VCPs on the rear panel. Do not run the EZSetup program on the added member switch.

This example shows an existing Virtual Chassis configuration composed of two EX4200 switches. The Virtual Chassis configuration is being expanded to include an EX4200-24P switch.

The topology for this example consists of:

- One EX4200-48P switch (SWA-0) with 48 access ports, all of which support Power over Ethernet (PoE)
- One EX4200-24T switch (SWA-1) with 24 access ports, including eight ports that support PoE
- One EX4200-24P switch (SWA-2) with 24 access ports, all of which support PoE
- One uplink module with two 10-gigabit ports is installed in the EX4200-48P switch. These ports can be configured as trunk ports to connect to a distribution switch or customer edge (CE) router or as Virtual Chassis ports (VCPs) to interconnect with a member switch that is located too far for dedicated VCP cabling. (The uplink module ports on the SFP and SFP+ uplink modules and the SFP network interfaces on the EX4200-24F switches can also be used for these purposes.) For information on configuring the uplink ports as trunk ports to a distribution switch, see *Configuring Gigabit Ethernet Interfaces (CLI Procedure)*. For information on configuring uplink ports as VCPs, see [“Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port”](#) on page 260.

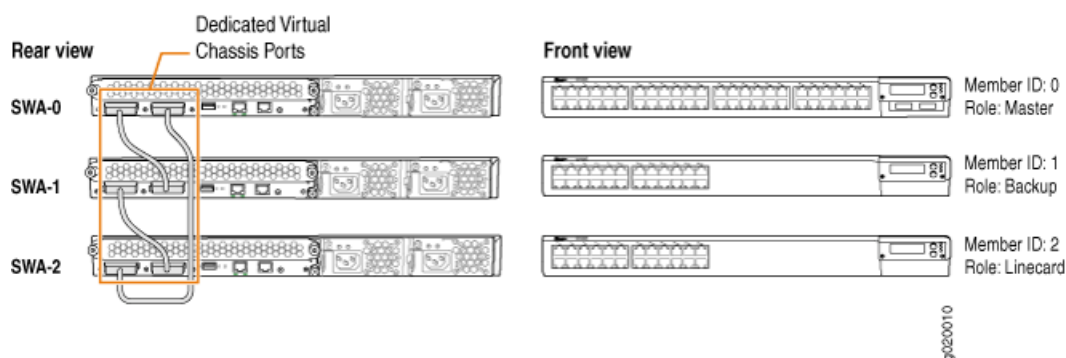
[Table 15 on page 108](#) shows the configuration settings for the expanded Virtual Chassis.

Table 15: Components of the Expanded Virtual Chassis Access Switch

Member Switch	Hardware	Member ID	Role in Virtual Chassis
SWA-0	EX4200-48P switch	0	master; mastership priority 255
SWA-1	EX4200-24T switch	1	backup; mastership priority 255
SWA-2	EX4200-24P switch	2	linecard; mastership priority 128

Figure 10 on page 109 shows that the three member switches (SWA-0, SWA-1 and SWA-2) are interconnected with their dedicated VCPs on the rear panel. The LCD on the front displays the member ID and role. SWA-0 also includes an uplink module. Its uplink ports can be used to connect to a distribution switch.

Figure 10: Expanded EX4200 Virtual Chassis in a Single Wiring Closet



Configuration

To expand a Virtual Chassis configuration to include additional member switches within a single wiring closet, perform these tasks:

NOTE: We recommend that you use the **commit synchronize** command to save any configuration changes that you make to a multimember Virtual Chassis configuration.

CLI Quick Configuration

To maintain the master and backup roles of the existing members and ensure that the new member switch functions in a linecard role, copy the following commands and paste them into the terminal window:

```
[edit]
user@SWA-0# set virtual-chassis member 0 mastership-priority 255
user@SWA-1# set virtual-chassis member 1 mastership-priority 255
```

Step-by-Step Procedure

To ensure that the existing member switches retain their current roles and to add another member switch in a linecard role:

1. Configure the mastership priority of SWA-0 (member 0) to be the highest possible value, thereby ensuring that it functions as the master of the expanded Virtual Chassis configuration.

```
[edit virtual-chassis]
user@SWA-0# set member 0 mastership-priority 255
```

2. Configure the mastership priority of SWA-1 (member 1) to be the highest possible value. This setting is recommended for high availability and smooth transition of mastership in case the original master becomes unavailable.

```
[edit virtual-chassis]
user@SWA-1# set member 1 mastership-priority 255
```

3. Interconnect the unpowered SWA-2 with SWA-0 using the dedicated VCPs on the rear panel. See *Virtual Chassis Cabling Configuration Examples for EX4200 Switches* for additional information.

4. Power on SWA-2.

You do not need to run EZSetup on SWA-2. The identification parameters that were set up for the master apply implicitly to all members of the Virtual Chassis configuration. SWA-2 functions in a linecard role, because SWA-0 and SWA-1 have been configured to the highest mastership priority values.

5. Confirm SWA-2 is now included in the Virtual Chassis configuration by checking the front-panel LCD for the member ID of this switch.

6. Cable the other VCP on SWA-2 to the Virtual Chassis.

NOTE: If you immediately cable both VCPs on SWA-2 into the existing Virtual Chassis, SWA-0 or SWA-1 might become nonoperational for several seconds. Network traffic to one of the switches is dropped during the downtime.

The switch will return to the normal operational state with no user intervention, and normal operation of the Virtual Chassis will resume after this downtime.

Verification

IN THIS SECTION

- [Verifying That the New Switch Has Been Added in a Linecard Role | 111](#)
- [Verifying That the VCPs Are Operational | 112](#)

To verify that the new switch has been added in the linecard role and that its VCPs are operational, perform these tasks:

Verifying That the New Switch Has Been Added in a Linecard Role

Purpose

Verify that SWA-2 has been added in a linecard role to the Virtual Chassis configuration.

Action

Use the [show virtual-chassis](#) command to list the member switches with their member IDs, mastership priority values, and assigned roles.

user@SWA-0> **show virtual-chassis**

Virtual Chassis ID: 0000.e255.00e0							
Member ID	Status	Serial No	Model	Mastership		Neighbor List	Interface
				Priority	Role		
0 (FPC 0)	Prsnt	abc123	ex4200-48p	255	Master*	1	vcp-0
						2	vcp-1
1 (FPC 1)	Prsnt	def456	ex4200-24t	255	Backup	2	vcp-0
						0	vcp-1
2 (FPC 2)	Prsnt	abd231	ex4200-24p	128	Linecard	0	vcp-0
						1	vcp-1

Meaning

The **show virtual-chassis** command lists the member switches of the Virtual Chassis configuration with the member IDs and mastership priority values. It also displays the neighbor members with which each member is interconnected. This output shows that SWA-2 has been assigned member ID 2 and has the

default mastership priority value 128. Because the mastership priority is lower than the mastership priority of the other members, SWA-2 functions in the linecard role. You can continue to add more member switches, following the same procedure. It is possible to have multiple members in linecard roles with the same mastership priority value.

Verifying That the VCPs Are Operational

Purpose

Verify that the dedicated VCPs interconnecting the member switches are operational.

Action

List the VCP interfaces on the Virtual Chassis configuration.

user@SWA-0>**show virtual-chassis vc-port all-members**

fpc0:		

Interface	Type	Status
or		
PIC / Port		
vcp-0	Dedicated	Up
vcp-1	Dedicated	Up
fpc1:		

Interface	Type	Status
or		
PIC / Port		
vcp-0	Dedicated	Up
vcp-1	Dedicated	Up
fpc2:		

Interface	Type	Status
or		
PIC / Port		
vcp-0	Dedicated	Up
vcp-1	Dedicated	Up

Meaning

The **show virtual-chassis vc-port all-members** command lists all the interfaces for the Virtual Chassis configuration. In this case, no VCP uplinks have been configured. However, the VCP interfaces are automatically configured and enabled when you interconnect member switches using the dedicated VCPs.

We recommend that you interconnect the member switches using both VCPs for redundancy. The VCP interfaces are identified simply as **vcp-0** and **vcp-1**. The **fpc** number is the same as the member ID.

Troubleshooting

IN THIS SECTION

- [Troubleshooting Mastership Priority | 113](#)
- [Troubleshooting Nonoperational VCPs | 113](#)

To troubleshoot the configuration of an expanded Virtual Chassis, perform these tasks:

Troubleshooting Mastership Priority

Problem

You want to designate a different member as the master.

Solution

Change the mastership priority value or values of the switches, designating the highest mastership priority value for the switch that you want to be master.

1. Lower the mastership priority of the existing master (member 0).

```
[edit virtual-chassis]
user@SWA-0# set member 0 mastership-priority 1
```

2. Set the mastership priority of the member that you want to be the master to the highest possible value (255):

```
[edit virtual-chassis]
user@SWA-2# set member 2 mastership-priority 255
```

Troubleshooting Nonoperational VCPs

Problem

The VCP interface shows a status of **down**.

Solution

Check the cable to make sure that it is properly and securely connected to the VCPs.

RELATED DOCUMENTATION

[Example: Setting Up a Multimember EX4200 Virtual Chassis Access Switch with a Default Configuration | 124](#)

[Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)

[Configuring a Virtual Chassis on an EX Series Switch \(J-Web Procedure\) | 222](#)

Example: Adding EX4500 Switches to a Preprovisioned Virtual Chassis

IN THIS SECTION

- [Requirements | 114](#)
- [Overview and Topology | 115](#)
- [Configuration | 116](#)
- [Verification | 117](#)

A Virtual Chassis is multiple switches operating as a single network entity. You might want to expand your existing Virtual Chassis by adding EX4500 switches to your Virtual Chassis configuration. You can include up to ten EX4500 switches in an EX4500 Virtual Chassis or a mixed EX4200 and EX4500 Virtual Chassis.

This example describes how to add two EX4500 switches to an existing EX4200 Virtual Chassis that was preprovisioned. A preprovisioned configuration is a Virtual Chassis configuration in which the roles are statically assigned to each member switch:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.1 or later for EX Series switches
- Two EX4200 switches interconnected into a Virtual Chassis
- Two standalone EX4500 switches with Virtual Chassis modules

Before you begin, be sure you have:

1. An operational EX4200 Virtual Chassis with two member EX4200 switches that was configured using a preprovisioned configuration.

2. Installed the same version of Junos OS Release 11.1 or later on all members of the Virtual Chassis and on the EX4500 switches.

NOTE: You must use Junos OS Release 11.4 or later if you are including three or more EX4500 switches in an EX4500 Virtual Chassis or a mixed EX4200 and EX4500 Virtual Chassis.

Overview and Topology

You can create an EX4200 Virtual Chassis by cabling two operational EX4200 switches together using the dedicated Virtual Chassis ports (VCPs) on each EX4200 switch. When you preprovision a Virtual Chassis, you configure the roles for each member switch.

[Table 16 on page 115](#) shows the configuration of the two-member EX4200 Virtual Chassis before the EX4500 member switches were added.

Table 16: Components of the EX4200 Virtual Chassis Before the EX4500 Member Switches Are Added

Member Switch	Hardware	Member ID	Role and Priority
SWA-0	EX4200 switch	0	Master
SWA-1	EX4200 switch	1	Backup

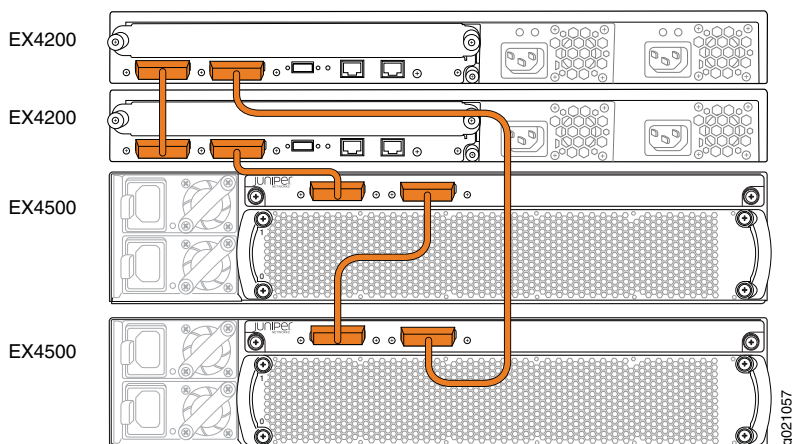
[Table 17 on page 115](#) shows the configuration of the mixed EX4200 and EX4500 Virtual Chassis after the EX4500 member switches are added to the Virtual Chassis and the roles are assigned.

Table 17: Final Mixed EX4200 and EX4500 Virtual Chassis Components

Member Switch	Hardware	Member ID	Role and Priority
SWA-0	EX4200 switch	0	Linecard
SWA-1	EX4200 switch	1	Linecard
SWA-2	EX4500 switch	2	Master
SWA-3	EX4500 switch	3	Backup

[Figure 11 on page 116](#) shows the hardware topology of the mixed EX4200 and EX4500 Virtual Chassis.

Figure 11: Mixed EX4200 and EX4500 Virtual Chassis Topology (Preprovisioned Configuration)



Configuration

Step-by-Step Procedure

To add two EX4500 switches to an existing EX4200 Virtual Chassis that was preprovisioned:

1. Log in to the EX4200 Virtual Chassis.
2. Set all member switches into mixed mode:

```
user@switch> request virtual-chassis mode mixed all-members
```

3. Reboot all member switches in the Virtual Chassis:

```
user@switch> request system reboot
```

4. Power on SWA-2 and SWA-3, the EX4500 switches.

5. Set the PIC mode to the Virtual Chassis mode on both SWA-2 and SWA-3:

```
user@switch> request chassis pic-mode virtual-chassis
```

6. On each of the switches SWA-2 and SWA-3, configure the switch as a member of the mixed EX4200 and EX4500 Virtual Chassis:

```
user@switch> request virtual-chassis mode mixed
```

7. Reboot the EX4500 switches.

8. Log in to the EX4200 Virtual Chassis and change the roles of the EX4200 member switches to **line-card**:

```
[edit virtual-chassis]
user@SWA-0# set member 0 role line-card
user@SWA-0# set member 1 role line-card
```

9. Add the EX4500 switches to the Virtual Chassis configuration:

```
[edit virtual-chassis]
user@SWA-0# set member 2 serial-number ghi789 role routing-engine
user@SWA-0# set member 3 serial-number jkl012 role routing-engine
```

10. Cable SWA-2 and SWA-3 into the Virtual Chassis using the dedicated VCPs.

NOTE: We recommend cabling one VCP into the Virtual Chassis, waiting for the new switch to be recognized by the Virtual Chassis, then cabling the other VCP on the new switch into the Virtual Chassis.

If you immediately cable both VCPs into the existing Virtual Chassis, one of the Virtual Chassis member switches might become nonoperational for several seconds. Network traffic to that member switch is dropped during the downtime.

The switch will return to the normal operational state with no user intervention, and normal operation of the Virtual Chassis will resume after this downtime.

Verification

IN THIS SECTION

- [Verifying Virtual Chassis Availability and Roles | 117](#)

To confirm that the Virtual Chassis configuration is operational, perform these tasks:

Verifying Virtual Chassis Availability and Roles

Purpose

Verify that the Virtual Chassis is up and that the member switches are in the correct roles.

Action

List the member switches and roles.

user@SWA-2> [show virtual-chassis](#)

```

Virtual Chassis ID: 0019.e250.47a0

```

Member ID	Status	Serial No	Model	Mastership priority	Role	Neighbor List	
						ID	Interface
0 (FPC 0)	Prsnt	AK02073602764	ex4200-48p	0	Linecard	1	vcp-0
						3	vcp-1
1 (FPC 1)	Prsnt	AK02073602814	ex4200-48p	0	Linecard	0	vcp-0
						2	vcp-1
2 (FPC 2)	Prsnt	AK02073602844	ex4500-40f	129	Master*	1	vcp-0
						3	vcp-1
3 (FPC 3)	Prsnt	AK02073602088	ex4500-40f	129	Backup	2	vcp-0
						0	vcp-1

Meaning

The [show virtual-chassis](#) command lists the member switches interconnected in a Virtual Chassis configuration with the member IDs that have been assigned by the master, the mastership priority values, and the roles. It also displays the neighbor members with which each member is interconnected. The output shows that the switches have the correct mastership priorities and roles.

RELATED DOCUMENTATION

Example: Connecting EX4500 Member Switches in a Virtual Chassis Across Wiring Closets	 141
Adding an EX4500 Switch to a Preprovisioned EX4200 Virtual Chassis (CLI Procedure)	 244
Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)	 217

Example: Adding an EX4500 Switch to a Nonprovisioned Virtual Chassis

IN THIS SECTION

- [Requirements | 119](#)
- [Overview and Topology | 120](#)
- [Configuration | 121](#)
- [Verification | 123](#)

A Virtual Chassis is multiple switches operating as a single network entity. You might want to expand an existing Virtual Chassis by adding EX4500 switches to it. You can include up to ten EX4500 switches in an EX4500 Virtual Chassis or a mixed EX4200 and EX4500 Virtual Chassis.

This example describes how to add two EX4500 switches to an existing EX4200 Virtual Chassis that was nonprovisioned. A nonprovisioned configuration is a Virtual Chassis whose roles were assigned automatically rather than configured statically (preprovisioned).

Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.1 or later for EX Series switches
- Two EX4200 switches interconnected into a nonprovisioned Virtual Chassis
- Two standalone EX4500 switches with Virtual Chassis modules

Before you begin, be sure you have:

1. An operational EX4200 Virtual Chassis with two member EX4200 switches that was configured using a nonprovisioned configuration.
2. Installed the same version of Junos OS Release 11.1 or later for all members of the Virtual Chassis and on the EX4500 switches.

NOTE: You must use Junos OS Release 11.4 or later if you are including three or more EX4500 switches in an EX4500 Virtual Chassis or a mixed EX4200 and EX4500 Virtual Chassis.

Overview and Topology

You can create an EX4200 Virtual Chassis by cabling two operational EX4200 switches together using the dedicated Virtual Chassis ports (VCPs) on each EX4200 switch. When you cable a Virtual Chassis using the dedicated VCPs, the switches run a master election algorithm that determines the Virtual Chassis roles for each member switch. The master election algorithm first checks the mastership priority ID. The mastership priority ID is any number between 0 and 255. The switch with the higher mastership priority ID is elected into the master role and the other switch, unless it has been configured with a mastership priority value of 0, is elected into the backup role.

The default mastership priority ID for an EX4200 or EX4500 switch is 128. Both EX4200 switches are using this default mastership priority ID in the operational EX4200 Virtual Chassis in this example.

NOTE: We recommend that you use the **commit synchronize** command to save any configuration changes that you make to a Virtual Chassis.

[Table 18 on page 120](#) shows the default configuration settings for the two-member Virtual Chassis before the EX4500 member switches are added to the Virtual Chassis.

Table 18: Components of the EX4200 Virtual Chassis Before the EX4500 Member Switches Are Added

Member Switch	Hardware	Member ID	Role and Priority
SWA-0	EX4200 switch	0	Master: mastership priority 128
SWA-1	EX4200 switch	1	Backup: mastership priority 128

[Table 19 on page 120](#) shows the configuration of the mixed EX4200 and EX4500 Virtual Chassis after the EX4500 member switches are added to the Virtual Chassis and the EX4500 switches have been configured in the master and backup roles.

Table 19: Final Mixed EX4200 and EX4500 Virtual Chassis Components

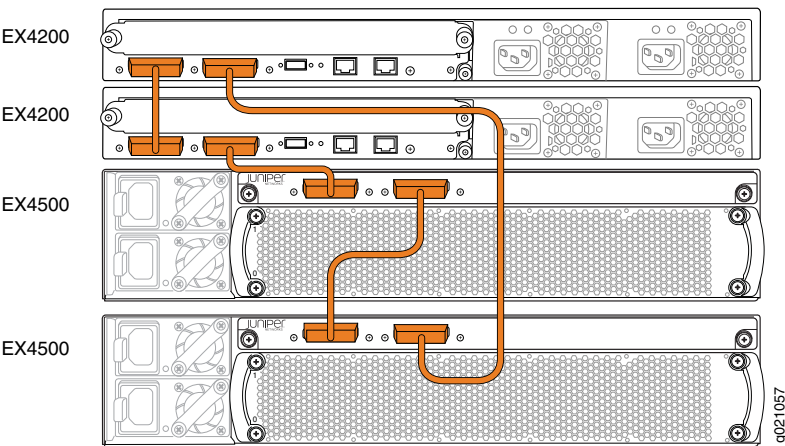
Member Switch	Hardware	Member ID	Role and Priority
SWA-0	EX4200 switch	0	Linecard: mastership priority 0
SWA-1	EX4200 switch	1	Linecard: mastership priority 0

Table 19: Final Mixed EX4200 and EX4500 Virtual Chassis Components (*continued*)

Member Switch	Hardware	Member ID	Role and Priority
SWA-2	EX4500 switch	2	Master: mastership priority 255
SWA-3	EX4500 switch	3	Backup: mastership priority 255

Figure 12 on page 121 shows the hardware topology of the mixed EX4200 and EX4500 Virtual Chassis.

Figure 12: Mixed EX4200 and EX4500 Virtual Chassis Topology (Nonprovisioned Configuration)



Configuration

Step-by-Step Procedure

To add two EX4500 switches to an existing EX4200 Virtual Chassis:

1. Log in to the EX4200 Virtual Chassis.
2. Set all member switches into mixed mode:

```
user@switch> request virtual-chassis mode mixed all-members
```

3. Reboot all member switches in the Virtual Chassis:

```
user@switch> request system reboot
```

4. Power on SWA-2, the EX4500 switch that you want to function in the master role.
5. Power on SWA-3, the EX4500 switch that you want to function in the backup role.

6. Set the PIC mode to the Virtual Chassis mode on both SWA-2 and SWA-3:

```
user@switch> request chassis pic-mode virtual-chassis
```

7. Configure SWA-2 and SWA-3 as a member of the mixed EX4200 and EX4500 Virtual Chassis:

```
user@switch> request virtual-chassis mode mixed
```

8. Reboot the EX4500 switches.
9. Cable SWA-2 into the Virtual Chassis using the dedicated VCP on the back of the EX4200 member switch and the dedicated VCP on the Virtual Chassis module in the EX4500 switch.

NOTE: We recommend cabling one VCP into the Virtual Chassis, waiting for the new switch to be recognized by the Virtual Chassis, then cabling the other VCP on the new switch into the Virtual Chassis.

If you immediately cable both VCPs into the existing Virtual Chassis, one of the Virtual Chassis member switches might become nonoperational for several seconds. Network traffic to that member switch is dropped during the downtime.

The switch will return to the normal operational state with no user intervention, and normal operation of the Virtual Chassis will resume after this downtime.

10. Cable SWA-3 into the Virtual Chassis using the dedicated VCP on the back of the EX4200 member switch and the dedicated VCP on the Virtual Chassis module in the EX4500 switch.

NOTE: We recommend cabling one VCP into the Virtual Chassis, waiting for the new switch to be recognized by the Virtual Chassis, then cabling the other VCP on the new switch into the Virtual Chassis.

If you immediately cable both VCPs into the existing Virtual Chassis, one of the Virtual Chassis member switches might become nonoperational for several seconds. Network traffic to that member switch is dropped during the downtime.

The switch will return to the normal operational state with no user intervention, and normal operation of the Virtual Chassis will resume after this downtime.

11. Log in to the Virtual Chassis and set the mastership priority for the EX4200 switches to **0** and the EX4500 switches to **255**:

```
[edit virtual-chassis]
user@SWA-0# set member 0 mastership-priority 0
user@SWA-0# set member 1 mastership-priority 0
user@SWA-0# set member 2 mastership-priority 255
user@SWA-0# set member 3 mastership-priority 255
```

NOTE: A switch with a mastership priority ID of 0 never assumes the master or backup role within a Virtual Chassis. This configuration ensures that the EX4200 member switches remain in the linecard roles even during Virtual Chassis topology changes.

If you want the EX4200 switches to assume the master or backup roles, assign the switches a mastership priority between 1 and 255.

Verification

IN THIS SECTION

- [Verifying Virtual Chassis Availability and Roles | 123](#)

To confirm that the Virtual Chassis configuration is operational, perform these tasks:

Verifying Virtual Chassis Availability and Roles

Purpose

Verify that the Virtual Chassis is up and that the member switches are in the correct roles.

Action

List the member switches and roles.

```
user@SWA-2> show virtual-chassis
```

Virtual Chassis ID: 0019.e250.47a0							
Member ID		Status	Serial No	Model	Mastership priority	Role	Neighbor List ID Interface
0 (FPC 0)		Prsnt	AK02073602764	ex4200-48p	0	Linecard	1 vcp-0
							3 vcp-1

1 (FPC 1)	Prsnt	AK02073602814	ex4200-48p	0	Linecard	0 vcp-0
						2 vcp-1
2 (FPC 2)	Prsnt	AK02073602844	ex4500-40f	255	Master*	1 vcp-0
						3 vcp-1
3 (FPC 3)	Prsnt	AK02073602088	ex4500-40f	255	Backup	2 vcp-0
						0 vcp-1
Member ID for next new member: 4 (FPC 4)						

Meaning

The [show virtual-chassis](#) command lists the member switches interconnected in a Virtual Chassis configuration with the member IDs that have been assigned by the master, the mastership priority values, and the roles. It also displays the neighbor members with which each member is interconnected. The output shows that the switches have the correct mastership priorities and roles.

RELATED DOCUMENTATION

- [Example: Connecting EX4500 Member Switches in a Virtual Chassis Across Wiring Closets | 141](#)
- [Adding an EX4500 Switch to a Nonprovisioned EX4200 Virtual Chassis \(CLI Procedure\) | 246](#)
- [Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)

Example: Setting Up a Multimember EX4200 Virtual Chassis Access Switch with a Default Configuration

IN THIS SECTION

- [Requirements | 125](#)
- [Overview and Topology | 125](#)
- [Configuration | 126](#)
- [Verification | 127](#)
- [Troubleshooting | 130](#)

You can configure a multimember EX4200 Virtual Chassis access switch in a single wiring closet without setting any parameters—by simply cabling the switches together, using the dedicated Virtual Chassis ports (VCPs). You do not need to modify the default configuration to enable these ports. They are operational by default. The Virtual Chassis configuration automatically assigns the master, backup, and linecard roles, based on the sequence in which the switches are powered on and other factors in the master election algorithm.

TIP: We recommend that you explicitly configure the mastership priority of the switches to ensure that the switches continue to perform the desired roles when additional switches are added or other changes occur. However, it is possible to use the default configuration described in this example.

This example describes how to configure a multimember Virtual Chassis in a single wiring closet, using the default role assignments:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 9.0 or later for EX Series switches
- Two EX4200-48P switches
- Four EX4200-24P switches

Overview and Topology

A Virtual Chassis configuration is easily expandable. This example shows a Virtual Chassis configuration composed of six EX4200 switches. It provides networking access for 180 onsite workers, who are sitting within range of a single wiring closet. The six combined switches are identified by a single host name and managed through a global management IP address.

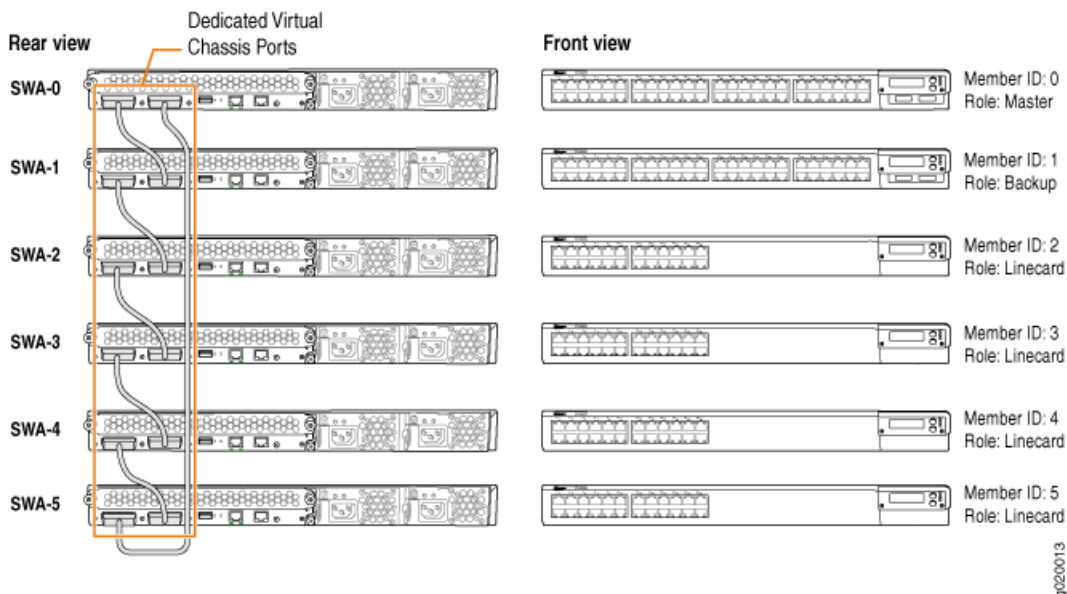
To set up a multimember Virtual Chassis configuration within a single wiring closet, you need to run the EZSetup program only once. Connect to the master and run EZSetup to specify its identification, time zone, and network properties. When additional switches are connected through the Virtual Chassis ports (VCPs), they automatically receive the same properties that were specified for the master.

The topology for this example (see [Figure 13 on page 126](#)) consists of six switches:

- Two EX4200-48P switches (SWA-0 and SWA-1) with 48 access ports, all of which support Power over Ethernet (PoE)
- Four EX4200-24P switches (SWA-2, SWA-3, SWA-4, and SWA-5) with 24 access ports, all of which support PoE

Figure 13 on page 126 shows that all the member switches are interconnected with the dedicated VCPs on the rear panel. The LCD on the front displays the member ID and role.

Figure 13: Default Configuration of a Multimember EX4200 Virtual Chassis in a Single Wiring Closet



Configuration

To configure a multimember Virtual Chassis access switch in a single wiring closet using the factory defaults, perform this task:

Step-by-Step Procedure

To configure a multimember Virtual Chassis with default role assignments:

1. Make sure the dedicated VCPs on the rear panel are properly cabled. See *Virtual Chassis Cabling Configuration Examples for EX4200 Switches* for additional information.
2. Power on the switch that you want to function as the master (SWA-0). This examples uses one of the larger switches (EX4200-48P) as the master.
3. Check the front panel LCD to confirm that the switch has powered on correctly and that a member ID has been assigned.
4. Run the EZSetup program on SWA-0, the master, specifying the identification parameters. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* for details.

5. Configure SWA-0 with the virtual management Ethernet (VME) interface for out-of-band management of the Virtual Chassis configuration, if desired.

```
[edit]
```

```
user@SWA-0# set interfaces vme unit 0 family inet address /ip-address/mask/
```

6. After a lapse of at least one minute, power on SWA-1. This example uses the second EX4200-48P switch as the backup.
7. Check the front panel LCD to confirm that the switch has powered on correctly and that a member ID has been assigned.
8. Power on SWA-2, and check the front panels to make sure that the switch is operating correctly.
9. Continue to power on the member switches one by one, checking the front panels as you proceed.

Verification

IN THIS SECTION

- [Verifying the Member IDs and Roles of the Member Switches | 127](#)
- [Verifying That the VCPs Are Operational | 128](#)

To confirm that the configuration is working properly, perform these tasks:

Verifying the Member IDs and Roles of the Member Switches

Purpose

Verify that all the interconnected member switches are included within the Virtual Chassis configuration and that their roles are assigned appropriately.

Action

Display the members of the Virtual Chassis configuration:

```
user@SWA-0> show virtual-chassis
```

```
Virtual Chassis ID: 0000.e255.00e0
```

Member ID	Status	Serial No	Model	Mastership		Neighbor List
				Priority	Role	ID Interface
0 (FPC 0)	Prsnt	abc123	ex4200-48p	128	Master*	1 vcp-0 5 vcp-1
1 (FPC 1)	Prsnt	def123	ex4200-48p	128	Backup	2 vcp-0 0 vcp-1
2 (FPC 2)	Prsnt	abd231	ex4200-24p	128	Linecard	3 vcp-0 1 vcp-1
3 (FPC 3)	Prsnt	cab123	ex4200-24p	128	Linecard	4 vcp-0 2 vcp-1
4 (FPC 4)	Prsnt	fed456	ex4200-24p	128	Linecard	5 vcp-0 3 vcp-1
5 (FPC 5)	Prsnt	jkl231	ex4200-24p	128	Linecard	0 vcp-0 4 vcp-1

Meaning

The **show virtual-chassis** command lists the member switches of the Virtual Chassis configuration with the member IDs and mastership priority values. It also displays the neighbor members with which each member is interconnected. The **fpc** number is the same as the member ID.

Verifying That the VCPs Are Operational

Purpose

Verify that the dedicated VCPs interconnecting the member switches are operational.

Action

Display the VCP interfaces.

user@SWA-0> **show virtual-chassis vc-port all-members**

fpc0:		

Interface	Type	Status
or		
PIC / Port		
vcp-0	Dedicated	Up
vcp-1	Dedicated	Up

```

fpc1:
-----
Interface      Type      Status
or
PIC / Port
vcp-0          Dedicated Up
vcp-1          Dedicated Up

fpc2:
-----
Interface      Type      Status
or
PIC / Port
vcp-0          Dedicated Up
vcp-1          Dedicated Up

fpc3:
-----
Interface      Type      Status
or
PIC / Port
vcp-0          Dedicated Up
vcp-1          Dedicated Up

fpc4:
-----
Interface      Type      Status
or
PIC / Port
vcp-0          Dedicated Up
vcp-1          Dedicated Up

fpc5:
-----
Interface      Type      Status
or
PIC / Port
vcp-0          Dedicated Up
vcp-1          Dedicated Up

```

Meaning

The **show virtual-chassis vc-port all-members** command lists the VCP interfaces that are enabled for the member switches of the Virtual Chassis configuration and shows the status of the interfaces. In this case,

no VCP uplinks have been configured. However, the VCP interfaces are automatically configured and enabled when you interconnect member switches using the dedicated VCPs. The dedicated VCP interfaces are identified simply as vcp-0 and vcp-1. They do not use the standard interface address (in which the member ID is represented by the first digit). The output in this example shows that all interfaces are operational. The **fpc** number is the same as the member ID.

Troubleshooting

IN THIS SECTION

- [Troubleshooting Mastership Priority | 130](#)
- [Troubleshooting Nonoperational VCPs | 131](#)

To troubleshoot the configuration of a multimember Virtual Chassis in a single wiring closet, perform these tasks:

Troubleshooting Mastership Priority

Problem

You want to explicitly designate one member as the master and another as backup.

Solution

Change the mastership priority value of the member that you want to function as master, assigning the highest mastership priority value to that member.

NOTE: These configuration changes are made through the current master, SWA-0.

1. Configure mastership priority of member 0 to be the highest possible value.

```
[edit virtual-chassis]
user@SWA-0# set member 0 mastership-priority 255
```

2. Set the mastership priority of another member that you want to function as the backup member as the same value:

```
[edit virtual-chassis]
user@SWA-0# set member 2 mastership-priority 255
```

Troubleshooting Nonoperational VCPs

Problem

The VCP interface shows a status of **down**.

Solution

Check the cable to make sure that it is properly and securely connected to the VCPs.

RELATED DOCUMENTATION

[Understanding How the Master in a Virtual Chassis Is Elected | 43](#)

[Example: Configuring an EX4200 Virtual Chassis with a Master and Backup in a Single Wiring Closet | 88](#)

[Example: Configuring an EX4200 Virtual Chassis Interconnected Across Multiple Wiring Closets | 131](#)

[Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)

[Configuring a Virtual Chassis on an EX Series Switch \(J-Web Procedure\) | 222](#)

Example: Configuring an EX4200 Virtual Chassis Interconnected Across Multiple Wiring Closets

IN THIS SECTION

- [Requirements | 132](#)
- [Overview and Topology | 133](#)
- [Configuration | 135](#)
- [Verification | 138](#)
- [Troubleshooting | 140](#)

An EX4200 Virtual Chassis can be composed of multiple EX4200 switches in different locations. You can install member switches in different wiring closets, interconnecting the member switches by cabling and configuring uplink module ports or SFP network ports on EX4200-24F switches as Virtual Chassis ports (VCPs).

This example shows how to use uplink VCPs to connect Virtual Chassis members that are located too far apart to be connected using the dedicated VCPs. Uplink VCPs can also be used to connect Virtual Chassis

members to form link aggregation groups (LAGs). For the latter usage, see [“Example: Configuring Link Aggregation Groups Using EX4200 Uplink Virtual Chassis Ports”](#) on page 191.

NOTE: You can also configure the SFP network ports on EX4200-24F switches as VCPs to connect Virtual Chassis member switches across wiring closets and to form LAGs.

This example describes how to configure a Virtual Chassis access switch interconnected across wiring closets:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 9.0 or later for EX Series switches
- Four EX4200 switches
- Four XFP uplink modules

Before you interconnect the members of the Virtual Chassis configuration across wiring closets, be sure you have:

1. Installed an uplink module in each member switch. See *Installing an Uplink Module in an EX4200 Switch*.
2. Powered on and connected the switch in the master role, SWA-0, and run the EZSetup program (see [Table 20 on page 134](#) for switch names used in this example). See *Connecting and Configuring an EX Series Switch (CLI Procedure)* for details.
3. Configured SWA-0 with the virtual management Ethernet (VME) interface for remote, out-of-band management of the Virtual Chassis configuration, if desired. See ["Configuring the Virtual Management Ethernet Interface for Global Management of an EX Series Virtual Chassis \(CLI Procedure\)" on page 268](#).
4. Interconnected SWA-0 and SWA-1 using the dedicated VCPs on the rear panel. SWA-1 must not be powered on at this time.
5. Interconnected SWA-2 and SWA-3 using the dedicated VCPs on the rear panel. SWA-2 and SWA-3 must not be powered on at this time.

Overview and Topology

In this example, four EX4200 switches will be interconnected in a Virtual Chassis configuration. Two of these switches (SWA-0 and SWA-1) are located in wiring closet A, and the two other switches (SWA-2 and SWA-3) are located in wiring closet B.

For ease of monitoring and manageability, we want to interconnect all four switches as members of a Virtual Chassis configuration. Prior to configuring the Virtual Chassis, we installed uplink modules in each of the member switches. In this example, uplink modules are installed in all four members so that there are redundant VCP connections across the wiring closets. If you want to expand this configuration to include more members within these wiring closets, you do not need to add any more uplink modules. Simply use the dedicated VCPs on the rear panel. The redundancy of uplink VCPs provided in this example is sufficient.

We have interconnected the switches in wiring closet A and also interconnected the ones in wiring closet B using the dedicated VCPs. The interfaces for the dedicated VCPs are operational by default. They do not need to be configured.

However, the Virtual Chassis cables that interconnect the dedicated VCPs of member switches within a single wiring closet are not long enough to connect member switches across wiring closets. Instead, we will use the fiber-optic cable connections in the uplink modules to interconnect the member switches in wiring closet A to the member switches in wiring closet B. You only need to interconnect one member switch in wiring closet A to one in wiring closet B to form the Virtual Chassis configuration. However, for

redundancy, this example connects uplink module ports from the two member switches in wiring closet A to the two member switches in wiring closet B.

We will specify the highest mastership priority value (255) for SWA-0 to make it the master before we power on SWA-1. Because SWA-0 and SWA-1 are interconnected with the dedicated VCPs, the master detects that SWA-1 is a member of its Virtual Chassis configuration and assigns it a member ID.

We configure SWA-2 in wiring closet B without running EZSetup by directly connecting to the console port. If you wish, you can run EZSetup and specify identification parameters. Later, when you interconnect SWA-2 with SWA-0, the master of the Virtual Chassis configuration, the master overwrites any conflicting parameters.

We will use SWA-2 as the backup of the Virtual Chassis configuration. If a problem occurs in wiring closet A, SWA-2 would take control of the Virtual Chassis configuration and maintain the network connections. We will configure the same mastership priority value for SWA-2 (255) that we configured for the master. Because we power on SWA-0 before we power on SWA-2, SWA-0 has additional prioritization properties that allow it to retain mastership of the Virtual Chassis configuration. We recommend setting identical mastership priority values for the master and backup members for high availability and smooth transition of mastership in case the original master becomes unavailable. (Setting identical mastership priority values for the master and backup members prevents the previous master from pre-empting the master role from the new master when the previous master comes back online.)

After we have configured SWA-2 and set one of its uplink module ports as an uplink VCP, we will interconnect its uplink VCP with an uplink VCP on SWA-0.

Finally, we will power on SWA-3. Because SWA-3 is interconnected with SWA-2 using the dedicated VCPs on the rear panel, the master will detect that SWA-3 is part of the expanded Virtual Chassis configuration and assign it member ID 3. For redundancy, we will configure an uplink VCP on SWA-3 through the master and interconnect that uplink VCP with an uplink VCP on SWA-1.

[Table 20 on page 134](#) shows the Virtual Chassis configuration settings for a Virtual Chassis composed of member switches in different wiring closets.

Table 20: Components of a Virtual Chassis Interconnected Across Multiple Wiring Closets

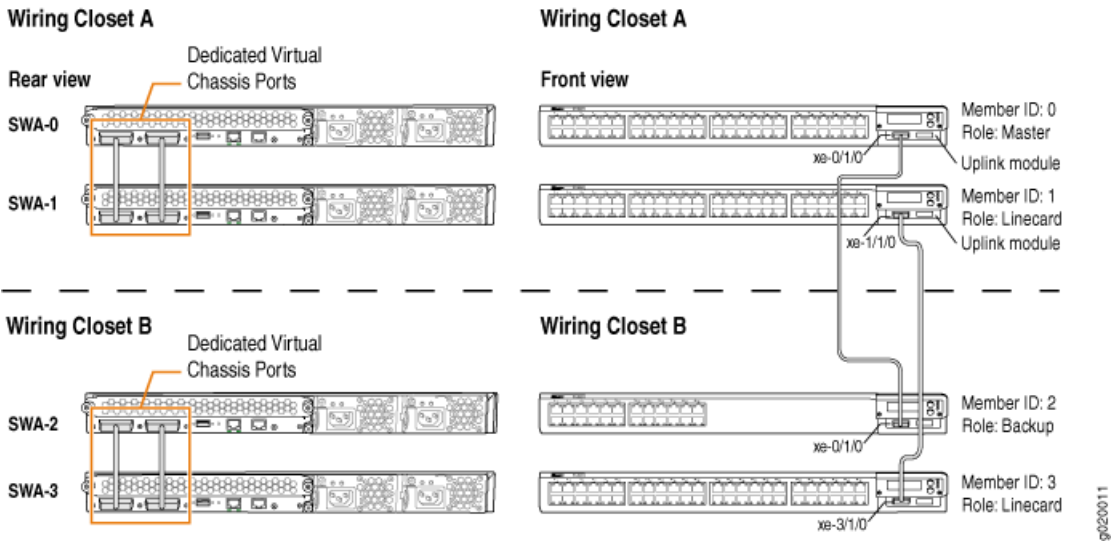
Switch	Member ID	Role and Priority	Location
SWA-0	0	master; mastership priority 255	Wiring closet A
SWA-1	1	linecard; mastership priority 128	Wiring closet A
SWA-2	2	backup; mastership priority 255	Wiring closet B

Table 20: Components of a Virtual Chassis Interconnected Across Multiple Wiring Closets (*continued*)

Switch	Member ID	Role and Priority	Location
SWA-3	3	linecard; mastership priority 128	Wiring closet B

Figure 14 on page 135 shows the different types of interconnections used for this Virtual Chassis configuration. The rear view shows the member switches within each wiring closet interconnected to each other using the dedicated VCPs. The front view shows the uplink VCPs interconnected across the wiring closets.

Figure 14: EX4200 Virtual Chassis Interconnected Across Wiring Closets



Configuration

To configure the Virtual Chassis across multiple wiring closets, perform this task:

Step-by-Step Procedure

To configure a Virtual Chassis across multiple wiring closets:

1. Configure the mastership priority of SWA-0 (member 0) to be the highest possible value (255), thereby ensuring that it functions as the master of the expanded Virtual Chassis configuration:

```
[edit virtual-chassis]
user@SWA-0# set member 0 mastership-priority 255
```

2. Prepare the members in wiring closet A for interconnecting with the member switches in wiring closet B by setting uplink VCPs for member 0 and member 1:

```
user@SWA-0> request virtual-chassis vc-port set pic-slot 1 port 0
```

```
user@SWA-0> request virtual-chassis vc-port set pic-slot 1 port 0 member 1
```

NOTE:

- For redundancy, this example configures an uplink VCP in both SWA-0 and SWA-1.
- This example omits the specification of the **member member-id** option in configuring an uplink VCP for SWA-0 (and, later, for SWA-2). The command applies by default to the switch where it is executed.

3. Prepare SWA-2 in wiring closet B for interconnecting with the Virtual Chassis configuration by configuring its mastership priority to be the highest possible value (255). Its member ID is currently 0, because it is not yet interconnected with the other members of the Virtual Chassis configuration. It is operating as a standalone switch. Its member ID will change when it is interconnected.

```
[edit virtual-chassis]
```

```
user@SWA-2# set member 0 mastership-priority 255
```

NOTE: SWA-2 is configured with the same mastership priority value that we configured for SWA-0. However, the longer uptime of SWA-0 ensures that, once the interconnection is made, SWA-0 functions as the master and SWA-2 functions as the backup.

4. Specify one uplink module port in SWA-2 as an uplink VCP. Its member ID is 0, because it is not yet interconnected with the other members of the Virtual Chassis configuration.

NOTE: The setting of the uplink VCP remains intact when SWA-2 reboots and joins the Virtual Chassis configuration as member 2.

```
user@SWA-2> request virtual-chassis vc-port set pic-slot 1 port 0
```

5. Physically interconnect SWA-0 and SWA-2 across wiring closets using their uplink VCPs. Although SWA-0 and SWA-2 have the same mastership priority value (255), SWA-0 was powered on first and thus has longer uptime. This results in SWA-0 retaining mastership while SWA-2 reboots and joins the now expanded Virtual Chassis configuration as the backup, with member ID 2.
6. Power on SWA-3. It joins the expanded Virtual Chassis configuration as member 3.

NOTE: Member ID 3 is assigned to SWA-3 because SWA-3 was powered on after members 0, 1, and 2.

7. Because SWA-3 is now interconnected as a member of the Virtual Chassis configuration, you can specify a redundant uplink VCP on SWA-3 through the master of the Virtual Chassis configuration:

```
user@SWA-0> request virtual-chassis vc-port set pic-slot 1 port 0 member 3
```

8. Physically interconnect SWA-3 and SWA-1 across wiring closets using their uplink VCPs. Both SWA-1 and SWA-3 have the default mastership priority value (128) and function in a linecard role.

NOTE: We recommend that you use the **commit synchronize** command to save any configuration changes that you make to a multimember Virtual Chassis.

Results

Display the results of the configuration on SWA-0:

```
[edit]
user@SWA-0# show virtual-chassis
  member 0 {
    mastership-priority 255;
  }
  member 1 {
    mastership-priority 128;
  }
  member 2 {
    mastership-priority 255;
  }
  member 3 {
    mastership-priority 128;
  }
}
```

Verification

IN THIS SECTION

- [Verifying the Member IDs and Roles of the Member Switches | 138](#)
- [Verifying that the Dedicated VCPs and Uplink VCPs Are Operational | 139](#)

To confirm that the configuration is working properly, perform these tasks:

Verifying the Member IDs and Roles of the Member Switches

Purpose

Verify that all the interconnected member switches are included within the Virtual Chassis configuration and that their roles are assigned appropriately.

Action

Display the members of the Virtual Chassis configuration:

user@SWA-0> [show virtual-chassis](#)

Virtual Chassis ID: 000.e255.00e0								
Member ID	Status	Serial No	Model	Mastership		Neighbor List	ID	Interface
				Priority	Role			
0 (FPC 0)	Prsnt	abc123	ex4200-48p	255	Master*	1 vcp-0		
						1 vcp-1		
						2 vcp-255/1/0		
1 (FPC 1)	Prsnt	def456	ex4200-24t	128	Linecard	0 vcp-0		
						0 vcp-1		
						3 vcp-255/1/0		
2 (FPC 2)	Prsnt	ghi789	ex4200-48p	255	Backup	3 vcp-0		
						3 vcp-1		
						0 vcp-255/1/0		
3 (FPC 3)	Prsnt	jkl012	ex4200-24t	128	Linecard	2 vcp-0		

```

2 vcp-1
1 vcp-255/1/0

```

Meaning

The **show virtual-chassis** command lists the member switches interconnected as a Virtual Chassis configuration with the member IDs that have been assigned by the master, the mastership priority values, and the roles. It also displays the neighbor members with which each member is interconnected.

Verifying that the Dedicated VCPs and Uplink VCPs Are Operational

Purpose

Verify that the dedicated VCPs interconnecting member switches in wiring closet A and the uplink VCPs interconnecting the member switches between wiring closets are operational.

Action

Display the VCP interfaces:

```
user@SWA-0> show virtual-chassis vc-port all-members
```

```
fpc0:
```

```

-----
Interface  Type           Trunk  Status    Speed    Neighbor
or         PIC / Port      ID      (mbps)    ID  Interface
vcp-0      Dedicated       1      Up        32000    1    vcp-0
vcp-1      Dedicated       2      Up        32000    1    vcp-1
1/0        Configured     -1      Up        1000     2    vcp-255/1/0

```

```
fpc1:
```

```

-----
Interface  Type           Trunk  Status    Speed    Neighbor
or         PIC / Port      ID      (mbps)    ID  Interface
vcp-0      Dedicated       1      Up        32000    0    vcp-0
vcp-1      Dedicated       2      Up        32000    0    vcp-1
1/0        Configured     -1      Up        1000     3    vcp-255/1/0

```

```
fpc2:
```

```

-----
Interface  Type           Trunk  Status    Speed    Neighbor

```

or PIC / Port		ID		(mbps)	ID	Interface
vcp-0	Dedicated	1	Up	32000	3	vcp-0
vcp-1	Dedicated	2	Up	32000	3	vcp-1
1/0	Configured	-1	Up	1000	0	vcp-255/1/0

fpc3:

Interface or PIC / Port	Type	Trunk ID	Status	Speed (mbps)	Neighbor ID	Interface
vcp-0	Dedicated	1	Up	32000	2	vcp-0
vcp-1	Dedicated	2	Up	32000	2	vcp-1
1/0	Configured	-1	Up	1000	1	vcp-255/1/0

Meaning

The dedicated VCPs are displayed as **vcp-0** and **vcp-1**. The interface on the switch that has been set as an uplink VCP is displayed as **1/0**. The member interface names of uplink VCPs are of the form **vcp-255/pic/port**—for example, **vcp-255/1/0**. In that name, **vcp-255** indicates that the interface is an uplink VCP, **1** is the uplink PIC number, and **0** is the uplink port number. The **fpc** number is the same as the member ID. The **Trunk ID** is a positive number ID assigned to the LAG formed by the Virtual Chassis. If no LAG is formed, the value is **-1**.

Troubleshooting

IN THIS SECTION

- [Troubleshooting Nonoperational VCPs | 140](#)

To troubleshoot a Virtual Chassis configuration that is interconnected across wiring closets, perform these tasks:

Troubleshooting Nonoperational VCPs

Problem

An uplink VCP shows a status of **down**.

Solution

- Check the cable to make sure that it is properly and securely connected to the ports.

- If the VCP is an uplink module port, make sure that it has been explicitly set as an uplink VCP.
- If the VCP is an uplink module port, make sure that you have specified the options (*pic-slot*, *port*, and *member*) correctly.

RELATED DOCUMENTATION

[Example: Configuring an EX4200 Virtual Chassis with a Master and Backup in a Single Wiring Closet | 88](#)

[Example: Expanding an EX4200 Virtual Chassis in a Single Wiring Closet | 107](#)

[Example: Setting Up a Multimember EX4200 Virtual Chassis Access Switch with a Default Configuration | 124](#)

[Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port | 260](#)

Example: Connecting EX4500 Member Switches in a Virtual Chassis Across Wiring Closets

IN THIS SECTION

- [Requirements | 142](#)
- [Overview and Topology | 143](#)
- [Configuration | 145](#)
- [Verification | 147](#)
- [Troubleshooting | 149](#)

An EX4500 switch can be a member of an EX4500 Virtual Chassis or a mixed EX4200 and EX4500 Virtual Chassis. An EX4500 Virtual Chassis can be composed of two to ten EX4500 switches in different wiring closets or locations. A mixed EX4200 and EX4500 Virtual Chassis can be composed of EX4200 and EX4500 switches in different locations or wiring closets provided that at least one EX4200 switch is connected to one EX4500 switch using the dedicated Virtual Chassis port (VCP) connections available on both switches.

You connect EX4500 member switches in a Virtual Chassis that are in different wiring closets by cabling them together using a 10-Gigabit Ethernet SFP+ connection. You then must configure the 10-Gigabit Ethernet SFP+ connection as a Virtual Chassis port (VCP).

This example shows how to use the 10-Gigabit Ethernet SFP+ ports on EX4500 switches to connect two EX4500 member switches that are located too far apart to be connected using the dedicated VCPs in a mixed EX4200 and EX4500 Virtual Chassis. The procedure to connect two EX4500 switches in an EX4500 Virtual Chassis is identical to the procedure shown in this example.

NOTE: Any 10-Gigabit Ethernet SFP+ connection on an EX4500 switch can be configured as a VCP. An EX4500 switch has network and uplink ports that support 10-Gigabit Ethernet SFP+ transceivers.

This example describes how to connect two EX4500 member switches across wiring closets:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.1 or later for EX Series switches

NOTE: You must use Junos OS Release 11.4 or later if you are including three or more EX4500 switches in an EX4500 Virtual Chassis or a mixed EX4200 and EX4500 Virtual Chassis.

- Two EX4500 member switches
- Four EX4200 member switches

Before you interconnect the members of the Virtual Chassis configuration across wiring closets, be sure you have:

1. Preprovisioned the Virtual Chassis. See [“Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches \(CLI Procedure\)”](#) on page 228 for details.
2. (Optional) Configured SWA-0 with the virtual management Ethernet (VME) interface if you want remote, out-of-band management of the Virtual Chassis configuration. See [“Configuring the Virtual Management Ethernet Interface for Global Management of an EX Series Virtual Chassis \(CLI Procedure\)”](#) on page 268.
3. Interconnected SWA-0, SWA-1, and SWA-2 using the dedicated VCPs.
4. Interconnected SWA-3, SWA-4, and SWA-5 using the dedicated VCPs.

Overview and Topology

In this example, two EX4500 switches and four EX4200 switches are interconnected in a mixed EX4200 and EX4500 Virtual Chassis configuration. One EX4500 switch (SWA-0) and two EX4200 switches (SWA-1 and SWA-2) are located in wiring closet A, and the other EX4500 switch (SWA-3) and the other two EX4200 switches (SWA-4 and SWA-5) are located in wiring closet B.

For ease of monitoring and manageability, we want to interconnect all six switches as members of a Virtual Chassis configuration.

We have interconnected the switches in wiring closet A and also interconnected the ones in wiring closet B using the dedicated VCPs. The interfaces for the dedicated VCPs are operational by default. They do not need to be configured.

However, the Virtual Chassis cables that interconnect the dedicated VCPs of member switches within a single wiring closet are not long enough to connect member switches across wiring closets. Instead, we will use a 10-Gigabit Ethernet SFP+ connection to interconnect the member switches in wiring closet A to the member switches in wiring closet B. You only need to interconnect one member switch in wiring closet A to one in wiring closet B to form the Virtual Chassis configuration. In this example, this connection will be made by connecting the EX4500 switches in each wiring closet together by configuring a 10-Gigabit Ethernet SFP+ connection as a VCP.

We will preprovision the entire Virtual Chassis to set the roles for all member switches.

We will first power on SWA-0 and preprovision the Virtual Chassis. We will then cable the Virtual Chassis before powering on the other member switches.

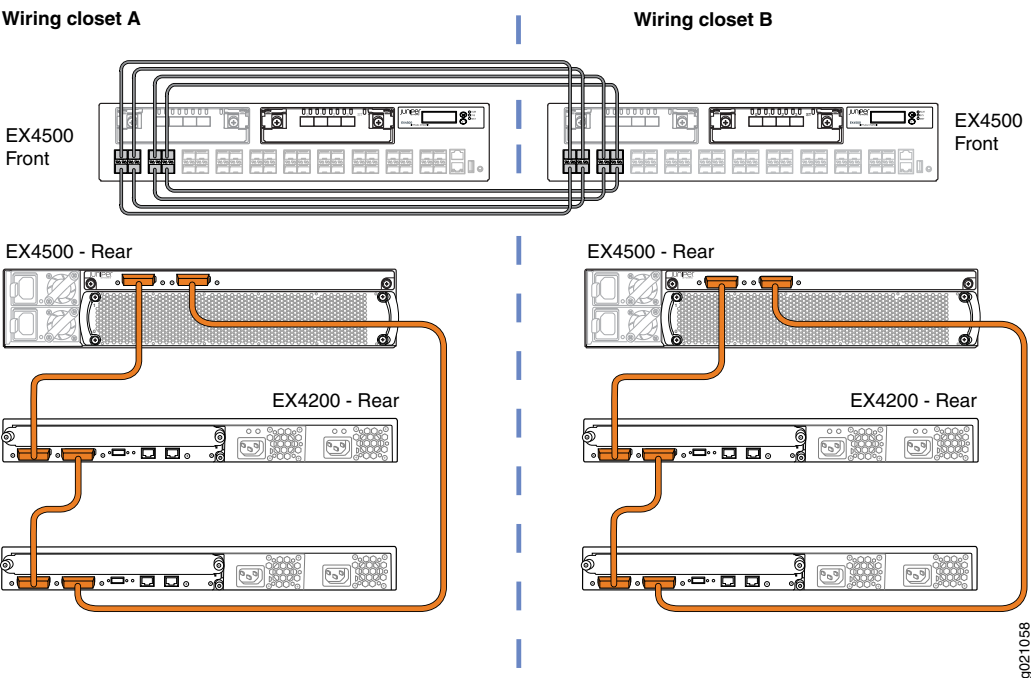
[Table 21 on page 144](#) shows the Virtual Chassis configuration settings for a Virtual Chassis composed of member switches in different wiring closets.

Table 21: Components of a Virtual Chassis Interconnected Across Wiring Closets

Switch	Model	Member ID	Role	Location
SWA-0	EX4500 switch	0	Master	Wiring closet A
SWA-1	EX4200 switch	1	Linecard	Wiring closet A
SWA-2	EX4200 switch	2	Linecard	Wiring closet A
SWA-3	EX4500 switch	3	Backup	Wiring closet B
SWA-4	EX4200 switch	4	Linecard	Wiring closet B
SWA-5	EX4200 switch	5	Linecard	Wiring closet B

Figure 15 on page 144 shows the different types of interconnections used for this Virtual Chassis configuration. The rear view shows the member switches within each wiring closet interconnected to each other using the dedicated VCPs. The front view shows the uplink VCPs interconnected across the wiring closets.

Figure 15: Mixed EX4200 and EX4500 Virtual Chassis Interconnected Across Wiring Closets



Configuration

To configure the Virtual Chassis across wiring closets, perform this task:

Step-by-Step Procedure

To configure a Virtual Chassis across wiring closets:

1. Power on SWA-0 (the EX4500 switch acting as member 0).
2. Power on SWA-3 (the EX4500 switch acting as member 3).
3. Set the PIC mode to the Virtual Chassis mode on both SWA-0 and SWA-3:

```
user@switch> request chassis pic-mode virtual-chassis
```

4. Power on the remaining switches.
5. Configure all switches individually as members of the mixed EX4200 and EX4500 Virtual Chassis:

```
user@switch> request virtual-chassis mode mixed
```

6. Reboot all switches:

```
user@switch> request system reboot
```

7. Log back into SWA-0 after the reboot has completed.
8. Run EZSetup on SWA-0 to set the parameters for the entire Virtual Chassis. See *Connecting and Configuring an EX Series Switch (CLI Procedure)*.
9. Preprovision the Virtual Chassis from SWA-0. Specify all members for the Virtual Chassis configuration, listing each switch's serial number with the desired member ID and the desired role.

```
[edit virtual-chassis]
user@SWA-0# set preprovisioned
user@SWA-0# set member 0 serial-number abc123 role routing-engine
user@SWA-0# set member 1 serial-number def456 role line-card
user@SWA-0# set member 2 serial-number ghi789 role line-card
user@SWA-0# set member 3 serial-number jkl012 role routing-engine
user@SWA-0# set member 4 serial-number mno345 role line-card
user@SWA-0# set member 5 serial-number pqr678 role line-card
```

10. Commit the configuration:

```
user@SWA-0> commit synchronize
```

11. Prepare the members in wiring closet A for interconnecting with the member switches in wiring closet B by setting the 10-Gigabit Ethernet SFP+ interfaces on SWA-0 as VCPs:

```
user@SWA-0> request virtual-chassis vc-port set pic-slot 0 port 0
user@SWA-0> request virtual-chassis vc-port set pic-slot 0 port 1
user@SWA-0> request virtual-chassis vc-port set pic-slot 0 port 2
user@SWA-0> request virtual-chassis vc-port set pic-slot 0 port 3
user@SWA-0> request virtual-chassis vc-port set pic-slot 0 port 4
user@SWA-0> request virtual-chassis vc-port set pic-slot 0 port 5
user@SWA-0> request virtual-chassis vc-port set pic-slot 0 port 6
user@SWA-0> request virtual-chassis vc-port set pic-slot 0 port 7
```

12. Prepare the members in wiring closet B for interconnecting with the member switches in wiring closet A by setting the 10-Gigabit Ethernet SFP+ interfaces on SWA-3 as VCPs:

```
user@SWA-3> request virtual-chassis vc-port set pic-slot 0 port 0
user@SWA-3> request virtual-chassis vc-port set pic-slot 0 port 1
user@SWA-3> request virtual-chassis vc-port set pic-slot 0 port 2
user@SWA-3> request virtual-chassis vc-port set pic-slot 0 port 3
user@SWA-3> request virtual-chassis vc-port set pic-slot 0 port 4
user@SWA-3> request virtual-chassis vc-port set pic-slot 0 port 5
user@SWA-3> request virtual-chassis vc-port set pic-slot 0 port 6
user@SWA-3> request virtual-chassis vc-port set pic-slot 0 port 7
```

13. Physically interconnect SWA-0 with SWA-1, then interconnect all switches in wiring closet A.
14. Physically interconnect SWA-0 with SWA-3 across wiring closets using the 10-Gigabit Ethernet SFP+ connections.
15. Physically interconnect all switches in wiring closet B.

NOTE: We recommend that you use the **commit synchronize** command to save any configuration changes that you make to a Virtual Chassis.

Results

Display the results of the configuration on SWA-0:

```
[edit virtual-chassis]
user@SWA-0# show
  member 0 {
    role routing-engine;
    serial-number abc123;
  }
  member 1 {
    role line-card;
    serial-number def456;
  }
  member 2 {
    role line-card;
    serial-number ghi789;
  }
  member 3 {
    role routing-engine;
    serial-number jkl012;
  }
  member 4 {
    role line-card;
    serial-number mno345;
  }
  member 5 {
    role line-card;
    serial-number pqr678;
  }
}
```

Verification

IN THIS SECTION

- [Verifying the Member IDs and Roles of the Member Switches | 147](#)

To confirm that the configuration is working properly, perform these tasks:

Verifying the Member IDs and Roles of the Member Switches

Purpose

Verify that all the interconnected member switches are included within the Virtual Chassis configuration and that their roles are assigned appropriately.


```
3 vcp-1
```

Meaning

The **show virtual-chassis** command lists the member switches interconnected as a Virtual Chassis configuration with the member IDs that have been assigned by the master and the roles. It also displays the neighbor members with which each member is interconnected.

Troubleshooting

IN THIS SECTION

- [Troubleshooting Nonoperational VCPs | 149](#)

To troubleshoot a Virtual Chassis configuration that is interconnected across wiring closets, perform these tasks:

Troubleshooting Nonoperational VCPs

Problem

A user-configured VCP shows a status of **down**.

Solution

- Check the cable to make sure that it is properly and securely connected to the ports.
- Make sure the VCP that it has been explicitly set as an uplink VCP.
- Make sure that you have specified the options (*pic-slot*, *port*, and *member*) correctly.

RELATED DOCUMENTATION

| [Setting an Uplink Port as a Virtual Chassis Port on an EX4500 or EX4550 Switch \(CLI Procedure\) | 266](#)

Example: Configuring an EX4200 Virtual Chassis Using a Preprovisioned Configuration File

IN THIS SECTION

- Requirements | 150
- Overview and Topology | 151
- Configuration | 155
- Verification | 159
- Troubleshooting | 163

You can deterministically control both the role and the member ID assigned to each member switch in an EX4200 Virtual Chassis configuration by creating a preprovisioned configuration file.

A preprovisioned configuration file links the serial number of each EX4200 switch in the configuration to a specified member ID and role. The serial number must be specified in the configuration file for the member to be recognized as part of the Virtual Chassis configuration.

NOTE: When you use a preprovisioned configuration, you cannot modify the mastership priority or member ID of member switches through the user interfaces.

NOTE: After you have created a preprovisioned Virtual Chassis configuration, you can use the autoprovisioning feature to add member switches to that configuration. See [“Adding a New EX4200 Switch to an Existing EX4200 Virtual Chassis \(CLI Procedure\)”](#) on page 236.

This example describes how to configure a Virtual Chassis across multiple wiring closets using a preprovisioned configuration file:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 9.0 or later for EX Series switches
- Five EX4200-48P switches

- Five EX4200-24T switches
- Four XFP uplink modules

Before you create the preprovisioned configuration of the Virtual Chassis and interconnect the members across the wiring closets, be sure you have:

1. Made a list of the serial numbers of all the switches to be connected as a Virtual Chassis configuration.
2. Noted the desired role (**routing-engine** or **line-card**) of each switch. If you configure the member with a **routing-engine** role, it is eligible to function as a master or backup. If you configure the member with a **line-card** role, it is not eligible to become a master or backup.
3. Installed an uplink module in each of the member switches that will be interconnected across wiring closets. See *Installing an Uplink Module in an EX4200 Switch*.
4. Interconnected the member switches within each wiring closet using the dedicated VCPs on the rear panel of switches. See *Connecting a Virtual Chassis Cable to an EX4200 Switch*.
5. Powered on the switch that you plan to use as the master switch (SWA-0).
6. Run the EZSetup program on SWA-0, specifying the identification parameters. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* for details.

SWA-0 is going to be configured in the example to function as the master of the Virtual Chassis configuration. Thus, the properties that you specify for SWA-0 will apply to the entire Virtual Chassis configuration, including all the member switches that you specify in the preprovisioned configuration file.

7. Configured SWA-0 with the virtual management Ethernet (VME) interface for out-of-band management of the Virtual Chassis configuration, if desired.

[edit]

```
user@SWA-0# set interfaces vme unit 0 family inet address /ip-address/mask/
```

Overview and Topology

You must select two members that you want to make eligible for election as master of the Virtual Chassis configuration. When you list these two members in the preprovisioned configuration file, you designate both members as **routing-engine**. One will function as the master of the Virtual Chassis configuration and the other will function as the backup.

You designate additional members, which are not eligible for election as master, as having the **line-card** role in the preprovisioned configuration file.

In this example, five EX4200 switches (SWA-0 through SWA-4) are interconnected with their dedicated VCPs in wiring closet A and five EX4200 switches (SWA-5 through SWA-9) are interconnected with their dedicated VCPs in wiring closet B.

SWA-0 (in wiring closet A) is going to be the master of the Virtual Chassis configuration. This example shows how to create a preprovisioned configuration file on SWA-0 for all member switches that will be interconnected in the Virtual Chassis configuration. The preprovisioned configuration file includes member IDs for the members in wiring closet A and for the members in wiring closet B.

SWA-5 (in wiring closet B) is going to be the backup of the Virtual Chassis configuration. Both SWA-0 and SWA-5 are specified in the preprovisioned configuration file with the role of **routing-engine**. All other members are specified with the role of **line-card**.

If all member switches could be interconnected with their dedicated VCPs, you could simply power on the switches after saving and committing the preprovisioned configuration file. The master detects the connection of the members through the dedicated VCPs and applies the parameters specified in the preprovisioned configuration file.

However, the Virtual Chassis cables that interconnect the VCPs of member switches within a single wiring closet are not long enough to connect member switches across wiring closets. Instead, you can configure the uplink module ports or the SFP network ports on EX4200-24F switches as VCPs to interconnect the member switches in wiring closet A to the member switch in wiring closet B. For redundancy, this example connects uplink VCPs from two member switches in wiring closet A (SWA-0 and SWA-2) to two member switches (SWA-5 and SWA-7) in wiring closet B.

NOTE: You can use interfaces on SFP, SFP+, and XFP uplink modules and the SFP network ports on EX4200-24F switches as VCPs. When an uplink module port or SFP network port is set as a VCP, it cannot be used for any other purpose. The SFP uplink module has four 1-Gbps ports; the SFP+ uplink module has four 1-Gbps or two 10-Gbps ports; the XFP uplink module has two 10-Gbps ports. The uplink module ports that are not set as VCPs can be configured as trunk ports to connect to a distribution switch.

Because this particular preprovisioned configuration is for a Virtual Chassis that is interconnected across wiring closets, we will bring up the Virtual Chassis configuration in stages. First, we power on SWA-0 (without powering on any other switches) and create the preprovisioned configuration file. Then we power on the remaining switches in wiring closet A. If we check the status of the Virtual Chassis configuration at this point by using the **show virtual-chassis** command, it will display only **member 0** through **member 4**. The members that have not yet been interconnected will not be listed.

Next power on SWA-5 without powering on the remaining switches (SWA-6 through SWA-9) in wiring closet B. Bring up SWA-5 as a standalone switch and set one of its uplinks as a VCP prior to interconnecting it with the Virtual Chassis configuration in wiring closet A. Without this setting, SWA-5 cannot be detected as a member switch by the master of the Virtual Chassis configuration.

You can set the uplink VCP of SWA-5 without running the EZSetup program by directly connecting to the console port. If you wish, you can run the EZSetup program and specify identification parameters. When you interconnect SWA-5 with the master of the Virtual Chassis configuration, the master overwrites any conflicting parameters.

After setting the VCP in SWA-5, connect this VCP with the VCP of SWA-0 in wiring closet A. SWA-5 (serial number pqr678) is specified as a **routing-engine** in the preprovisioned configuration file.

This example uses SWA-5 as the backup of the Virtual Chassis configuration. If a problem occurred in wiring closet A, SWA-5 would take control of the Virtual Chassis configuration and maintain the network connections. Specify both SWA-0 and SWA-5 as **routing-engine**. Because SWA-0 is powered on prior to SWA-5, it has additional prioritization properties that cause it to be elected as master of the Virtual Chassis configuration.

After being physically interconnected with SWA-0, SWA-5 reboots and comes up as **member 5** and as the backup of the Virtual Chassis configuration.

Power on the remaining switches (SWA-6 through SWA-9) in wiring closet B. The master can now detect that all members are present. Finally, for redundancy, configure an additional VCP on SWA-7 through the master.

The topology for this example consists of:

- Three EX4200-48P switches (SWA-0 , SWA-2, and SWA-4) in wiring closet A.
- Two EX4200-48P switches (SWA-5 and SWA-9) in wiring closet B.
- Two EX4200-24T switches (SWA-1 and SWA-3) in wiring closet A.
- Three EX4200-24T switches (SWA-6, SWA-7, and SWA-8) in wiring closet B.
- Four XFP uplink modules. Two are installed in wiring closet A and two are installed in wiring closet B.

[Table 22 on page 153](#) shows the Virtual Chassis configuration settings for a preprovisioned Virtual Chassis composed of member switches in different wiring closets.

Table 22: Components of a Preprovisioned EX4200 Virtual Chassis Interconnected Across Multiple Wiring Closets

Switch	Serial number	Member ID	Role	Uplink Module Ports	Hardware	Location
SWA-0	abc123	0	routing-engine	xe-0/1/0	EX4200-48P and XFP uplink module	Wiring closet A
SWA-1	def456	1	linecard		EX4200-24T	Wiring closet A

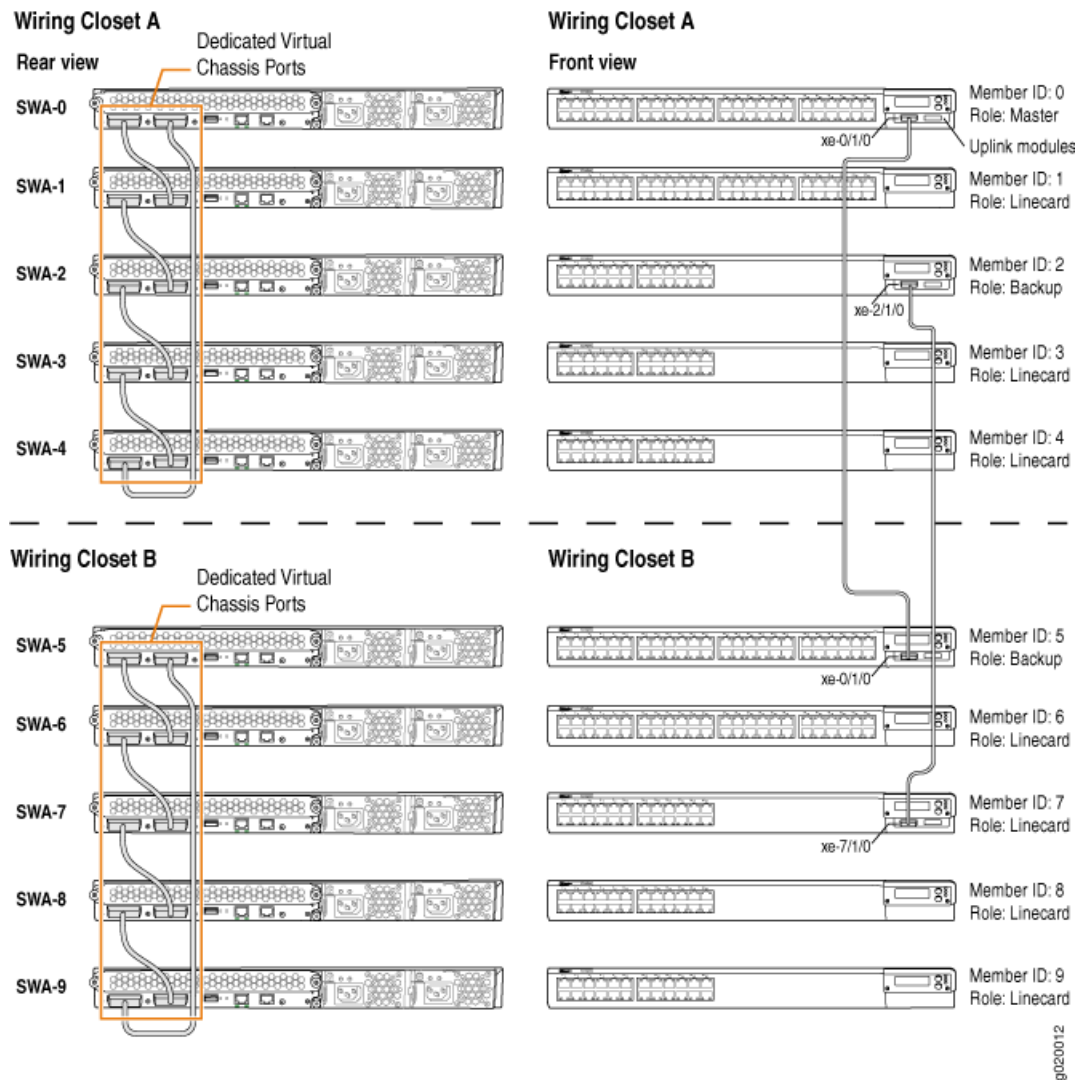
Table 22: Components of a Preprovisioned EX4200 Virtual Chassis Interconnected Across Multiple Wiring Closets (continued)

Switch	Serial number	Member ID	Role	Uplink Module Ports	Hardware	Location
SWA-2	ghi789	2	linecard	xe-2/1/0	EX4200-48P and XFP uplink module	Wiring closet A
SWA-3	jkl012	3	linecard		EX4200-24T	Wiring closet A
SWA-4	mno345	4	linecard		EX4200-48P	Wiring closet A
SWA-5	pqr678	5	routing-engine	xe-0/1/0 NOTE: The member ID of SWA-5 is 0 at the time that its uplink module port is configured as a VCP.	EX4200-48P and XFP uplink module	Wiring closet B
SWA-6	stu901	6	linecard		EX4200-24T	Wiring closet B
SWA-7	vwx234	7	linecard	xe-7/1/0	EX4200-24T and XFP uplink module	Wiring closet B
SWA-8	yza567	8	linecard		EX4200-24T	Wiring closet B
SWA-9	bcd890	9	linecard		EX4200-48P	Wiring closet B

Figure 16 on page 155 shows the different types of interconnections used for this Virtual Chassis configuration. The rear view shows that the member switches within each wiring closet are interconnected to each other using the dedicated VCPs. The front view shows that the uplink module ports that have been set as VCPs and interconnected across the wiring closets. The uplink module ports that are not set as VCPs can be configured as trunk ports to connect to a distribution switch.

NOTE: The interconnections shown in [Figure 16 on page 155](#) are the same as they would be for a configuration that was not preprovisioned across wiring closets.

Figure 16: Maximum Size EX4200 Virtual Chassis Interconnected Across Wiring Closets



Configuration

To configure the Virtual Chassis across multiple wiring closets using a preprovisioned configuration, perform this task:

NOTE: We recommend that you use the **commit synchronize** command to save any configuration changes that you make to a multimember Virtual Chassis configuration.

Step-by-Step Procedure

To create a preprovisioned configuration for the Virtual Chassis:

1. Specify the preprovisioned configuration mode:

```
[edit virtual-chassis]
user@SWA-0# set preprovisioned
```

2. Specify all the members that will be included in the Virtual Chassis configuration, listing each switch's serial number with the desired member ID and the desired role:

```
[edit virtual-chassis]
user@SWA-0# set member 0 serial-number abc123 role routing-engine
user@SWA-0# set member 1 serial-number def456 role line-card
user@SWA-0# set member 2 serial-number ghi789 role line-card
user@SWA-0# set member 3 serial-number jkl012 role line-card
user@SWA-0# set member 4 serial-number mno345 role line-card
user@SWA-0# set member 5 serial-number pqr678 role routing-engine
user@SWA-0# set member 6 serial-number stu901 role line-card
user@SWA-0# set member 7 serial-number vwx234 role line-card
user@SWA-0# set member 8 serial-number yza567 role line-card
user@SWA-0# set member 9 serial-number bcd890 role line-card
```

3. Power on the member switches in wiring closet A.
4. Prepare the members in wiring closet A for interconnecting with the member switches in wiring closet B by setting uplink VCPs for member 0 and member 2:

```
user@SWA-0> request virtual-chassis vc-port (Dedicated VCP) set pic-slot 1 port 0
user@SWA-2> request virtual-chassis vc-port set pic-slot 1 port 0 member 2
```

NOTE:

- For redundancy, this example sets an uplink VCP in both SWA-0 and SWA-2.
- This example omits the specification of the member **0** in setting the uplink for SWA-0. The command applies by default to the switch where it is executed.

5. Power on SWA-5 and connect to it. This switch comes up as member ID **0** and functions as master of itself. Although SWA-5 is listed in the preprovisioned configuration file, it is not a present member of the Virtual Chassis configuration that has been powered on thus far. In order for the master to detect SWA-5 as a connected member, you must first set an uplink VCP on SWA-5 and interconnect that VCP with the uplink VCP of SWA-0.
6. Set the first uplink of SWA-5 to function as a VCP. Because SWA-5 has been powered on as a separate switch and is still operating independently at this point, its member ID is **0**.

```
user@SWA-5> request virtual-chassis vc-port set pic-slot 1 port 0
```

NOTE: This example omits the specification of the member **0** in configuring the uplink for SWA-5 (at this point the member ID of SWA-5 is still **0**). The command applies by default to the switch where it is executed.

7. Power off SWA-5 and connect the fiber cable from SWA-5 uplink VCP **xe-0/1/0** to the uplink VCP **xe-0/1/0** on SWA-0.
8. Power on SWA-5.
9. Now that SWA-5 has been brought up as **member 5** of the Virtual Chassis configuration, power on the remaining switches (SWA-6 through SWA-9) in wiring closet B. They are interconnected with SWA-5 using the dedicated VCPs on the rear panel and are therefore detected by the master as interconnected members. If you check the status of the Virtual Chassis configuration at this point, all the members that were specified in the preprovisioned configuration file should be displayed as present. Additional configuration for member switches can now be done through the master switch.
10. Set one uplink module port of SWA-7 to function as a VCP:

```
user@SWA-0> request virtual-chassis vc-port set pic-slot 1 port 0
member 7
```

Results

Display the results of the configuration on SWA-0:

```
[edit]
user@SWA-0# show
virtual-chassis {
  member 0 {
    role routing-engine;
    serial-number abc123;
  }
  member 1 {
    role line-card;
    serial-number def456;
  }
  member 2 {
    role line-card;
    serial-number ghi789;
  }
  member 3 {
    role line-card;
    serial-number jkl012;
  }
  member 4 {
    role line-card;
    serial-number mno345;
  }
  member 5 {
    role routing-engine;
    serial-number pqr678;
  }
  member 6 {
    role line-card;
    serial-number stu901;
  }
  member 7 {
    role line-card;
    serial-number vwx234;
  }
  member 8 {
    role line-card;
    serial-number yza567;
  }
  member 9 {
    role line-card;
```



```
        serial-number bcd890;
    }
    preprovisioned;
}
```

Verification

IN THIS SECTION

- [Verifying the Member IDs and Roles of the Member Switches | 159](#)
- [Verifying That the Dedicated VCPs and Uplink VCPs Are Operational | 160](#)

To confirm that the configuration is working properly, perform these tasks:

Verifying the Member IDs and Roles of the Member Switches

Purpose

Verify that the member IDs and roles are all set as expected.

Action

Display the members of the Virtual Chassis configuration:

```
user@SWA-0> show virtual-chassis
```

Preprovisioned Virtual Chassis								
Virtual Chassis ID: 0000.e255.0000								
Member ID	Status	Serial No	Model	Mastership		Neighbor List		
				Priority	Role	ID	Interface	
0 (FPC 0)	Prsnt	abc123	ex4200-48p	129	Master*	1	vcp-0	
						4	vcp-1	
						5	1/0	
1 (FPC 1)	Prsnt	def456	ex4200-24t	0	Linecard	2	vcp-0	
						0	vcp-1	
2 (FPC 2)	Prsnt	ghi789	ex4200-48p	0	Linecard	3	vcp-0	
						1	vcp-1	

						7 1/0
3 (FPC 3)	Prsnt	jkl012	ex4200-24t	0	Linecard	4 vcp-0 2 vcp-1
4 (FPC 4)	Prsnt	mno345	ex4200-48p	0	Linecard	0 vcp-0 3 vcp-1
5 (FPC 5)	Prsnt	pqr678	ex4200-48p	129	Backup	6 vcp-0 9 vcp-1 0 1/0
6 (FPC 6)	Prsnt	stu901	ex4200-24t	0	Linecard	7 vcp-0 5 vcp-1
7 (FPC 7)	Prsnt	vwxyz234	ex4200-24t	0	Linecard	8 vcp-0 6 vcp-1 2 1/0
8 (FPC 8)	Prsnt	zya567	ex4200-24t	0	Linecard	9 vcp-0 7 vcp-1
9 (FPC 9)	Prsnt	bc7890	ex4200-48p	0	Linecard	5 vcp-0 8 vcp-1

Meaning

The output shows that all members listed in the preprovisioned configuration file are connected to the Virtual Chassis configuration. It confirms that SWA-0 (member 0) is functioning as the master of the Virtual Chassis configuration. The other switch configured with the **routing-engine** role (SWA-5) is functioning as the backup. The **Neighbor List** displays the interconnections of the member VCPs.

Verifying That the Dedicated VCPs and Uplink VCPs Are Operational

Purpose

Verify that the dedicated VCPs interconnecting the member switches within each wiring closet and the uplink module VCPs interconnecting the member switches across wiring closets are operational.

Action

Display the VCP interfaces:

```
user@SWA-0> show virtual-chassis vc-port all-members
```

fpc0:

```

-----
Interface      Type      Status  Speed      Neighbor
or              (mbps)    ID      Interface
PIC / Port
vcp-0          Dedicated Up
vcp-1          Dedicated Up
1/0            Configured Up

```

fpc1:

```

-----
Interface      Type      Status  Speed      Neighbor
or              (mbps)    ID      Interface
PIC / Port
vcp-0          Dedicated Up
vcp-1          Dedicated Up

```

fpc2:

```

-----
Interface      Type      Status  Speed      Neighbor
or              (mbps)    ID      Interface
PIC / Port
vcp-0          Dedicated Up
vcp-1          Dedicated Up
1/0            Configured Up

```

fpc3:

```

-----
Interface      Type      Status  Speed      Neighbor
or              (mbps)    ID      Interface
PIC / Port
vcp-0          Dedicated Up
vcp-1          Dedicated Up

```

fpc4:

```

-----
Interface      Type      Status  Speed      Neighbor
or              (mbps)    ID      Interface
PIC / Port
vcp-0          Dedicated Up
vcp-1          Dedicated Up

```

fpc5:

Interface or PIC / Port	Type	Status	Speed (mbps)	Neighbor ID Interface
vcp-0	Dedicated	Up		
vcp-1	Dedicated	Up		
1/0	Configured	Up		

fpc6:

Interface or PIC / Port	Type	Status	Speed (mbps)	Neighbor ID Interface
vcp-0	Dedicated	Up		
vcp-1	Dedicated	Up		

fpc7:

Interface or PIC / Port	Type	Status	Speed (mbps)	Neighbor ID Interface
vcp-0	Dedicated	Up		
vcp-1	Dedicated	Up		
1/0	Configured	Up		

fpc8:

Interface or PIC / Port	Type	Status	Speed (mbps)	Neighbor ID Interface
vcp-0	Dedicated	Up		
vcp-1	Dedicated	Up		

fpc9:

Interface or PIC / Port	Type	Status	Speed (mbps)	Neighbor ID Interface
vcp-0	Dedicated	Up		
vcp-1	Dedicated	Up		

Meaning

The dedicated VCPs interconnecting the member switches within wiring closets are displayed as **vcp-0** and **vcp-1**. The uplink module VCPs interconnecting member switches (members 0, 2, 5, and 7) across wiring closets are displayed as **1/0** and **1/1** and identified as **Configured**.

Troubleshooting

IN THIS SECTION

- [Troubleshooting Nonoperational VCPs | 163](#)

To troubleshoot a preprovisioned Virtual Chassis configuration that is interconnected across wiring closets, perform these tasks:

Troubleshooting Nonoperational VCPs

Problem

A VCP shows a status of **down**.

Solution

Check the cable to make sure that it is properly and securely connected to the ports.

RELATED DOCUMENTATION

- [Example: Configuring an EX4200 Virtual Chassis with a Master and Backup in a Single Wiring Closet | 88](#)
- [Example: Configuring an EX4200 Virtual Chassis Interconnected Across Multiple Wiring Closets | 131](#)
- [Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)
- [Configuring a Virtual Chassis on an EX Series Switch \(J-Web Procedure\) | 222](#)

Example: Configuring a Preprovisioned Mixed EX4200 and EX4500 Virtual Chassis

IN THIS SECTION

- [Requirements | 164](#)
- [Overview and Topology | 165](#)

- Configuration | 166
- Verification | 168
- Troubleshooting | 169

You can deterministically control both the role and the member ID assigned to each member switch in a mixed EX4200 and EX4500 Virtual Chassis configuration by creating a preprovisioned configuration.

NOTE: When you use a preprovisioned configuration, you cannot modify the mastership priority or member ID of member switches through the user interfaces.

This example describes how to configure a mixed EX4200 and EX4500 Virtual Chassis using a preprovisioned configuration file:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 11.1 or later for EX Series switches

NOTE: You must use Junos OS Release 11.4 or later if you are including three or more EX4500 switches in an EX4500 Virtual Chassis or a mixed EX4200 and EX4500 Virtual Chassis.

- Two EX4500 switches, each with a Virtual Chassis module
- Two EX4200 switches

Before you create the preprovisioned configuration of the Virtual Chassis and interconnect the members across the wiring closets, be sure you have:

1. Made a list of the serial numbers of all the switches to be connected as a Virtual Chassis configuration.
2. Noted the desired role (**routing-engine** or **line-card**) for each switch.
3. Ensured that the same version of Junos OS is running on all current or prospective member switches.

Overview and Topology

A preprovisioned configuration file links the serial number of each switch in the Virtual Chassis configuration to a specified member ID and role. The serial number must be specified in the configuration file for the member to be recognized as part of the Virtual Chassis configuration.

You designate additional members, which are not eligible for election as master, as having the **line-card** role in the preprovisioned configuration file.

In this example, two EX4500 switches (SWA-0 and SWA-1) are in the routing-engine role and interconnected to two EX4200 switches (SWA-2 and SWA-3) in the linecard role using dedicated Virtual Chassis ports (VCPs).

SWA-0 will be the master of the Virtual Chassis configuration. This example shows how to create a preprovisioned configuration file on SWA-0 for all member switches that will be interconnected in the Virtual Chassis configuration. The preprovisioned configuration file includes member IDs for all member switches.

SWA-1 will be the backup of the Virtual Chassis configuration. Both SWA-0 and SWA-1 are specified in the preprovisioned configuration file with the role of **routing-engine**. All other members are specified with the role of **line-card**.

After all member switches are interconnected with their dedicated VCPs, you can simply power on the switches after saving and committing the preprovisioned configuration file. The master detects the connection of the members through the dedicated VCPs and applies the parameters specified in the preprovisioned configuration file.

NOTE: You can use interfaces on SFP, SFP+, and XFP uplink modules as VCPs. When an uplink module port or SFP network port is set as a VCP, it cannot be used for any other purpose.

We will bring up the Virtual Chassis configuration in stages. First, we power on SWA-0 (without powering on any other switches) and create the preprovisioned configuration file. Then we power on the remaining switches.

The topology for this example consists of:

- Two EX4500 switches (SWA-0 and SWA-1)
- Two EX4200 switches (SWA-2 and SWA-3)

[Table 23 on page 166](#) shows the Virtual Chassis configuration settings for a preprovisioned Virtual Chassis.

Table 23: Components of a Preprovisioned Mixed EX4200 and EX4500 Virtual Chassis

Switch	Serial number	Member ID	Role	Hardware
SWA-0	abc123	0	routing-engine	EX4500 switch with a Virtual Chassis module
SWA-1	def456	1	routing-engine	EX4500 switch with a Virtual Chassis module
SWA-2	ghi789	2	line-card	EX4200 switch
SWA-3	jkl012	3	line-card	EX4200 switch

Configuration

To configure the Virtual Chassis across multiple wiring closets using a preprovisioned configuration, perform this task:

NOTE: We recommend that you use the **commit synchronize** command to save any configuration changes that you make to a multimember Virtual Chassis configuration.

Step-by-Step Procedure

To create a preprovisioned configuration for the Virtual Chassis:

1. Power on the EX4500 switch (SWA-0) in the master role..
2. Set the PIC mode to Virtual Chassis mode on SWA-0:

```
user@switch> request chassis pic-mode virtual-chassis
```

3. Set the Virtual Chassis mode to mixed:


```
user@switch> request virtual-chassis mode mixed
```

4. Reboot the switch.

5. After the switch reboots, specify the preprovisioned configuration mode:

```
[edit virtual-chassis]
user@SWA-0# set preprovisioned
```

6. Specify all members to be included in the Virtual Chassis configuration, listing each switch's serial number with the desired member ID and the desired role:

```
[edit virtual-chassis]
user@SWA-0# set member 0 serial-number abc123 role routing-engine
user@SWA-0# set member 1 serial-number def456 role line-card
user@SWA-0# set member 2 serial-number ghi789 role line-card
user@SWA-0# set member 3 serial-number jkl012 role line-card
```

7. Power on the remaining switches.

8. Set the Virtual Chassis mode to mixed on the remaining switches:

```
user@switch> request virtual-chassis mode mixed
```

9. Reboot the switches.

10. When the reboot completes, physically cable the switches together using the dedicated VCPs.

Results

Display the results of the configuration on SWA-0:

```
[edit]
user@SWA-0# show
virtual-chassis {
  member 0 {
    role routing-engine;
    serial-number abc123;
  }
  member 1 {
    role line-card;
    serial-number def456;
  }
  member 2 {
```

IN THIS SECTION

- [Verifying the Member IDs and Roles of the Member Switches | 168](#)

Verifying the Member IDs and Roles of the Member Switches

Verify that the member IDs and roles are all set as expected.

Display the members of the Virtual Chassis configuration:

Preprovisioned Virtual Chassis

Virtual Chassis ID: 0000.e255.0000

Member ID	Status	Serial No	Model	Mastership		Neighbor List	
				Priority	Role	ID	Interface
0 (FPC 0)	Prsnt	abc123	ex4500-40f	129	Master*	1 vcp-1	3 vcp-0
1 (FPC 1)	Prsnt	def456	ex4500-40f	0	Backup	0 vcp-0	2 vcp-1

2 (FPC 2)	Prsnt	ghi789	ex4200-48p	0	Linecard	1 vcp-0 3 vcp-1
3 (FPC 3)	Prsnt	jkl012	ex4200-24t	0	Linecard	2 vcp-0 0 vcp-1

Meaning

The output shows that all members listed in the preprovisioned configuration file are connected to the Virtual Chassis configuration. It confirms that SWA-0 (member 0) is functioning as the master of the Virtual Chassis configuration. The other switch configured with the **routing-engine** role (SWA-1) is functioning as the backup. The **Neighbor List** displays the interconnections of the member VCPs.

Troubleshooting

IN THIS SECTION

- [Troubleshooting Nonoperational VCPs | 169](#)

To troubleshoot a preprovisioned Virtual Chassis configuration that is interconnected across wiring closets, perform these tasks:

Troubleshooting Nonoperational VCPs

Problem

A VCP shows a status of **down**.

Solution

Check the cable to make sure that it is properly and securely connected to the ports.

RELATED DOCUMENTATION

[Adding an EX4200 Switch to a Preprovisioned EX4500 Virtual Chassis or a Preprovisioned Mixed EX4200 and EX4500 Virtual Chassis \(CLI Procedure\) | 242](#)

[Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches \(CLI Procedure\) | 228](#)

[Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)

Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch

IN THIS SECTION

- [Requirements | 170](#)
- [Overview and Topology | 171](#)
- [Configuration | 173](#)
- [Verification | 176](#)
- [Troubleshooting | 177](#)

EX Series switches allow you to combine multiple Ethernet links into one logical interface for higher bandwidth and redundancy. The ports that are combined in this manner are referred to as a link aggregation group (LAG) or bundle. The number of Ethernet links you can combine into a LAG depends on your EX Series switch model.

This example describes how to configure uplink LAGs to connect a Virtual Chassis access switch to a Virtual Chassis distribution switch:

Requirements

This example uses the following software and hardware components:

- Junos OS Release 9.0 or later for EX Series switches
- Two EX4200-48P switches
- Two EX4200-24F switches
- Four XFP uplink modules

Before you configure the LAGs, be sure you have:

- Configured the Virtual Chassis switches. See [“Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\)” on page 217](#).
- Configured the uplink ports on the switches as trunk ports. See *Configuring Gigabit Ethernet Interfaces (CLI Procedure)*.

Overview and Topology

For maximum speed and resiliency, you can combine uplinks between an access switch and a distribution switch into LAGs. Using LAGs can be particularly effective when connecting a multimember Virtual Chassis access switch to a multimember Virtual Chassis distribution switch.

The Virtual Chassis access switch in this example is composed of two member switches. Each member switch has an uplink module with two 10-Gigabit Ethernet ports. These ports are configured as trunk ports, connecting the access switch with the distribution switch.

Configuring the uplinks as LAGs has the following advantages:

- Link Aggregation Control Protocol (LACP) can optionally be configured for link negotiation.
- It doubles the speed of each uplink from 10 Gbps to 20 Gbps.
- If one physical port is lost for any reason (a cable is unplugged or a switch port fails, or one member switch is unavailable), the logical port transparently continues to function over the remaining physical port.

The topology used in this example consists of one Virtual Chassis access switch and one Virtual Chassis distribution switch. The access switch is composed of two EX4200-48P switches (SWA-0 and SWA-1), interconnected to each other with their Virtual Chassis ports (VCPs) as member switches of Host-A. The distribution switch is composed of two EX4200-24F switches (SWD-0 and SWD-1), interconnected with their VCPs as member switches of Host-D.

Each member of the access switch has an uplink module installed. Each uplink module has two ports. The uplinks are configured to act as trunk ports, connecting the access switch with the distribution switch. One uplink port from SWA-0 and one uplink port from SWA-1 are combined as LAG **ae0** to SWD-0. This link is used for one VLAN. The remaining uplink ports from SWA-0 and from SWA-1 are combined as a second LAG connection (**ae1**) to SWD-1. LAG **ae1** is used for another VLAN.

NOTE: If the remote end of the LAG link is a security device, LACP might not be supported because security devices require a deterministic configuration. In this case, do not configure LACP. All links in the LAG are permanently operational unless the switch detects a link failure within the Ethernet physical layer or data link layers.

Figure 17: Topology for LAGs Connecting an EX4200 Virtual Chassis Access Switch to an EX4200 Virtual Chassis Distribution Switch

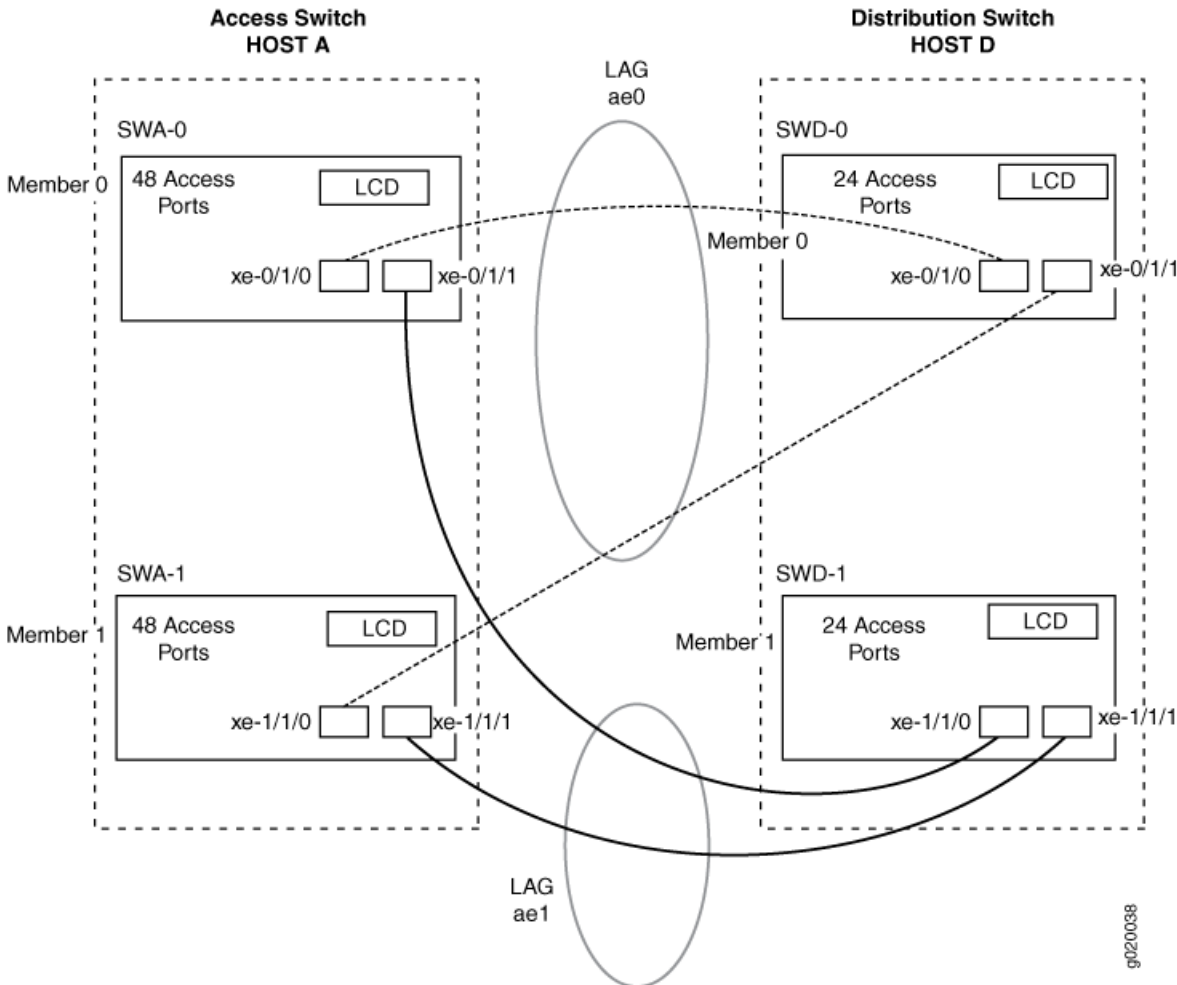


Table 24 on page 172 details the topology used in this configuration example.

Table 24: Components of the Topology for Connecting a Virtual Chassis Access Switch to a Virtual Chassis Distribution Switch

Switch	Hostname and VCID	Base Hardware	Uplink Module	Member ID	Trunk Port
SWA-0	Host-A Access switch VCID 1	EX4200-48P switch	One XFP uplink module	0	xe-0/1/0 to SWD-0 xe-0/1/1 to SWD-1

Table 24: Components of the Topology for Connecting a Virtual Chassis Access Switch to a Virtual Chassis Distribution Switch *(continued)*

Switch	Hostname and VCID	Base Hardware	Uplink Module	Member ID	Trunk Port
SWA-1	Host-A Access switch VCID 1	EX4200-48P switch	One XFP uplink module	1	xe-1/1/0 to SWD-0 xe-1/1/1 to SWD-1
SWD-0	Host-D Distribution switch VCID 4	EX4200 L-24F switch	One XFP uplink module	0	xe-0/1/0 to SWA-0 xe-0/1/1 to SWA-1
SWD-1	Host-D Distribution switch VCID 4	EX4200 L-24F switch	One XFP uplink module	1	xe-1/1/0 to SWA-0 xe-1/1/1 to SWA-1

Configuration

To configure two uplink LAGs from the Virtual Chassis access switch to the Virtual Chassis distribution switch:

CLI Quick Configuration

To quickly configure aggregated Ethernet high-speed uplinks between a Virtual Chassis access switch and a Virtual Chassis distribution switch, copy the following commands and paste them into the switch terminal window:

```
[edit]
set chassis aggregated-devices ethernet device-count 2
set interfaces ae0 aggregated-ether-options minimum-links 1
set interfaces ae0 aggregated-ether-options link-speed 10g
set interfaces ae1 aggregated-ether-options minimum-links 1
set interfaces ae1 aggregated-ether-options link-speed 10g
set interfaces ae0 unit 0 family inet address 192.0.2.0/25
set interfaces ae1 unit 0 family inet address 192.0.2.128/25
set interfaces xe-0/1/0 ether-options 802.3ad ae0
set interfaces xe-1/1/0 ether-options 802.3ad ae0
```

```
set interfaces xe-0/1/1 ether-options 802.3ad ae1
```

```
set interfaces xe-1/1/1 ether-options 802.3ad ae1
```

Step-by-Step Procedure

To configure aggregated Ethernet high-speed uplinks between a Virtual Chassis access switch and a Virtual Chassis distribution switch:

1. Specify the number of LAGs to be created on the chassis:

```
[edit chassis]
```

```
user@Host-A# set aggregated-devices ethernet device-count 2
```

2. Specify the number of links that need to be present for the **ae0** LAG interface to be **up**:

```
[edit interfaces]
```

```
user@Host-A# set ae0 aggregated-ether-options minimum-links 1
```

3. Specify the number of links that need to be present for the **ae1** LAG interface to be **up**:

```
[edit interfaces]
```

```
user@Host-A# set ae1 aggregated-ether-options minimum-links 1
```

4. Specify the media speed of the **ae0** link:

```
[edit interfaces]
```

```
user@Host-A# set ae0 aggregated-ether-options link-speed 10g
```

5. Specify the media speed of the **ae1** link:

```
[edit interfaces]
```

```
user@Host-A# set ae1 aggregated-ether-options link-speed 10g
```

6. Specify the interface ID of the uplinks to be included in LAG **ae0**:

```
[edit interfaces]
```

```
user@Host-A# set xe-0/1/0 ether-options 802.3ad ae0
```

```
user@Host-A# set xe-1/1/0 ether-options 802.3ad ae0
```

7. Specify the interface ID of the uplinks to be included in LAG **ae1**:

```
[edit interfaces]
```

```
user@Host-A# set xe-0/1/1 ether-options 802.3ad ae1
```

```
user@Host-A# set xe-1/1/1 ether-options 802.3ad ae1
```

8. Specify that LAG **ae0** belongs to the subnet for the employee broadcast domain:


```
[edit interfaces]
user@Host-A# set ae0 unit 0 family inet address 192.0.2.0/25
```

9. Specify that LAG **ae1** belongs to the subnet for the guest broadcast domain:

```
[edit interfaces]
user@Host-A# set ae1 unit 0 family inet address 192.0.2.128/25
```

Results

Display the results of the configuration:

```
[edit]
chassis {
  aggregated-devices {
    ethernet {
      device-count 2;
    }
  }
}
interfaces {
  ae0 {
    aggregated-ether-options {
      link-speed 10g;
      minimum-links 1;
    }
    unit 0 {
      family inet {
        address 192.0.2.0/25;
      }
    }
  }
  ae1 {
    aggregated-ether-options {
      link-speed 10g;
      minimum-links 1;
    }
    unit 0 {
      family inet {
        address 192.0.2.128/25;
      }
    }
  }
  xe-0/1/0 {
```

```
    ether-options {  
        802.3ad ae0;  
    }  
}  
xe-1/1/0 {  
    ether-options {  
        802.3ad ae0;  
    }  
}  
xe-0/1/1 {  
    ether-options {  
        802.3ad ae1;  
    }  
}  
xe-1/1/1 {  
    ether-options {  
        802.3ad ae1;  
    }  
}  
}
```

Verification

IN THIS SECTION

- [Verifying That LAG ae0 Has Been Created | 176](#)
- [Verifying That LAG ae1 Has Been Created | 177](#)

To verify that switching is operational and two LAGs have been created, perform these tasks:

Verifying That LAG ae0 Has Been Created

Purpose

Verify that LAG **ae0** has been created on the switch.

Action

show interfaces ae0 terse

Interface	Admin	Link	Proto	Local	Remote
ae0	up	up			
ae0.0	up	up	inet	192.0.2.0/25	

Meaning

The output confirms that the **ae0** link is up and shows the **family** and IP address assigned to this link.

Verifying That LAG ae1 Has Been Created**Purpose**

Verify that LAG **ae1** has been created on the switch

Action**show interfaces ae1 terse**

Interface	Admin	Link	Proto	Local	Remote
ae1	up	down			
ae1.0	up	down	inet	192.0.2.128/25	

Meaning

The output shows that the **ae1** link is down.

Troubleshooting**Troubleshooting a LAG That Is Down****Problem**

The **show interfaces terse** command shows that the LAG is **down**

Solution

Check the following:

- Verify that there is no configuration mismatch.
- Verify that all member ports are up.
- Verify that a LAG is part of family ethernet switching (Layer 2 LAG) or family inet (Layer 3 LAG).
- Verify that the LAG member is connected to the correct LAG at the other end.
- Verify that the LAG members belong to the same switch (or the same Virtual Chassis).

RELATED DOCUMENTATION

[Example: Configuring an EX4200 Virtual Chassis with a Master and Backup in a Single Wiring Closet | 88](#)[Example: Connecting an EX Series Access Switch to a Distribution Switch.](#)[Virtual Chassis Cabling Configuration Examples for EX4200 Switches](#)[Installing an Uplink Module in an EX4200 Switch](#)

Example: Configuring Aggregated Ethernet High-Speed Uplinks with LACP Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch

IN THIS SECTION

- [Requirements | 178](#)
- [Overview and Topology | 179](#)
- [Configuring LACP for the LAGs on the Virtual Chassis Access Switch | 179](#)
- [Configuring LACP for the LAGs on the Virtual Chassis Distribution Switch | 180](#)
- [Verification | 182](#)
- [Troubleshooting | 183](#)

EX Series switches allow you to combine multiple Ethernet links into one logical interface for higher bandwidth and redundancy. The ports that are combined in this manner are referred to as a link aggregation group (LAG) or bundle. EX Series switches allow you to further enhance these links by configuring Link Aggregation Control Protocol (LACP).

This example describes how to overlay LACP on the LAG configurations that were created in [“Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch” on page 170](#):

Requirements

This example uses the following software and hardware components:

- Junos OS Release 9.0 or later for EX Series switches
- Two EX4200-48P switches

- Two EX4200-24F switches
- Four EX Series XFP uplink modules

Before you configure LACP, be sure you have:

- Set up the Virtual Chassis switches. See [“Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\)” on page 217](#).
- Configured the uplink ports on the switches as trunk ports. See *Configuring Gigabit Ethernet Interfaces (CLI Procedure)*.
- Configured the LAGs. See [“Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch” on page 170](#).

Overview and Topology

This example assumes that you are familiar with [“Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch” on page 170](#). The topology in this example is exactly the same as the topology in that other example. This example shows how to use LACP to enhance the LAG functionality.

LACP exchanges are made between *actors* (the transmitting link) and *partners* (the receiving link). The LACP mode can be either active or passive.

NOTE: If the actor and partner are both in passive mode, they do not exchange LACP packets, which results in the aggregated Ethernet links not coming up. By default, LACP is in passive mode. To initiate transmission of LACP packets and responses to LACP packets, you must enable LACP in active mode.

By default, the actor and partner send LACP packets every second.

The interval can be fast (every second) or slow (every 30 seconds).

Configuring LACP for the LAGs on the Virtual Chassis Access Switch

To configure LACP for the access switch LAGs, perform these tasks:

CLI Quick Configuration

To quickly configure LACP for the access switch LAGs, copy the following commands and paste them into the switch terminal window:

```
[edit]
```

```
set interfaces ae0 aggregated-ether-options lacp active periodic fast
```

```
set interfaces ae1 aggregated-ether-options lacp active periodic fast
```

Step-by-Step Procedure

To configure LACP for Host-A LAGs **ae0** and **ae1**:

1. Specify the aggregated Ethernet options for both bundles:

```
[edit interfaces]
user@Host-A#set ae0 aggregated-ether-options lacp active periodic fast
user@Host-A#set ae1 aggregated-ether-options lacp active periodic fast
```

Results

Display the results of the configuration:

```
[edit interfaces]
user@Host-A# show
ae0 {
  aggregated-ether-options {
    lacp {
      active;
      periodic fast;
    }
  }
}
ae1 {
  aggregated-ether-options {
    lacp {
      active;
      periodic fast;
    }
  }
}
```

Configuring LACP for the LAGs on the Virtual Chassis Distribution Switch

To configure LACP for the two uplink LAGs from the Virtual Chassis access switch to the Virtual Chassis distribution switch, perform these tasks:

CLI Quick Configuration

To quickly configure LACP for the distribution switch LAGs, copy the following commands and paste them into the switch terminal window:

```
[edit interfaces]
set ae0 aggregated-ether-options lacp passive periodic fast
set ae1 aggregated-ether-options lacp passive periodic fast
```

Step-by-Step Procedure

To configure LACP for Host D LAGs **ae0** and **ae1**:

1. Specify the aggregated Ethernet options for both bundles:

```
[edit interfaces]
user@Host-D#set ae0 aggregated-ether-options lacp passive periodic fast
user@Host-D#set ae1 aggregated-ether-options lacp passive periodic fast
```

Results

Display the results of the configuration:

```
[edit interfaces]
user@Host-D# show
ae0 {
  aggregated-ether-options {
    lacp {
      passive;
      periodic fast;
    }
  }
}
ae1 {
  aggregated-ether-options {
    lacp {
      passive
      periodic fast;
    }
  }
}
```

Verification

IN THIS SECTION

- [Verifying the LACP Settings | 182](#)
- [Verifying That the LACP Packets Are Being Exchanged | 182](#)

To verify that LACP packets are being exchanged, perform these tasks:

Verifying the LACP Settings

Purpose

Verify that LACP has been set up correctly.

Action

Use the **show lacp interfaces *interface-name*** command to check that LACP has been enabled as active on one end.

user@Host-A> **show lacp interfaces xe-0/1/0**

Aggregated interface: ae0									
LACP state:	Role	Exp	Def	Dist	Col	Syn	Aggr	Timeout	Activity
xe-0/1/0	Actor	No	Yes	No	No	No	Yes	Fast	Active
xe-0/1/0	Partner	No	Yes	No	No	No	Yes	Fast	Passive
LACP protocol:	Receive State		Transmit State				Mux State		
xe-0/1/0	Defaulted		Fast periodic				Detached		

Meaning

The output indicates that LACP has been set up correctly and is active at one end.

Verifying That the LACP Packets Are Being Exchanged

Purpose

Verify that LACP packets are being exchanged.

Action

Use the **show interfaces aex statistics** command to display LACP information.

```
user@Host-A> show interfaces ae0 statistics
```

```
Physical interface: ae0, Enabled, Physical link is Down
  Interface index: 153, SNMP ifIndex: 30
  Link-level type: Ethernet, MTU: 1514, Speed: Unspecified, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Disabled, Minimum links needed: 1,
  Minimum bandwidth needed: 0
  Device flags      : Present Running
  Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
  Current address: 02:19:e2:50:45:e0, Hardware address: 02:19:e2:50:45:e0
  Last flapped      : Never
  Statistics last cleared: Never
    Input packets : 0
    Output packets: 0
  Input errors: 0, Output errors: 0

Logical interface ae0.0 (Index 71) (SNMP ifIndex 34)
  Flags: Hardware-Down Device-Down SNMP-Traps Encapsulation: ENET2
  Statistics      Packets      pps      Bytes      bps
  Bundle:
    Input :           0          0          0          0
    Output:           0          0          0          0
  Protocol inet
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 10.10.10/24, Local: 10.10.10.1, Broadcast: 10.10.10.255
```

Meaning

The output here shows that the link is down and that no protocol data units (PDUs) are being exchanged.

Troubleshooting

IN THIS SECTION

- [Troubleshooting a Nonworking LACP Link | 184](#)

To troubleshoot a nonworking LACP link, perform these tasks:

Troubleshooting a Nonworking LACP Link

Problem

The LACP link is not working.

Solution

Check the following:

- Remove the LACP configuration and verify whether the static LAG is up.
- Verify that LACP is configured at both ends.
- Verify that LACP is not passive at both ends.
- Verify whether LACP protocol data units (PDUs) are being exchanged by running the **monitor traffic-interface lag-member detail** command.

RELATED DOCUMENTATION

Example: Connecting an EX Series Access Switch to a Distribution Switch

Virtual Chassis Cabling Configuration Examples for EX4200 Switches

Installing an Uplink Module in an EX4200 Switch

Example: Configuring Fast Failover on Uplink Module VCPs to Reroute Traffic When an EX4200 Virtual Chassis Switch or Intermember Link Fails

IN THIS SECTION

- [Requirements | 185](#)
- [Overview and Topology | 185](#)
- [Configuration | 186](#)
- [Verification | 187](#)

The Virtual Chassis fast failover feature is a hardware-assisted failover mechanism that automatically reroutes traffic and reduces traffic loss in the event of a link or switch failure. If a link between two members fails, traffic flow between those members must be rerouted quickly so that there is minimal traffic loss.

Fast failover is enabled by default on all dedicated EX4200 Virtual Chassis ports (VCPs).

This example describes how to configure fast failover on uplink module VCPs in an EX4200 Virtual Chassis configuration:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 9.3 or later for EX Series switches
- Six EX4200-24T switches
- Four SFP uplink modules

Before you begin configuring fast failover, be sure you have:

1. Mounted the switches. See *Mounting an EX4200 Switch*.
2. Cabled the switches in a multiple-ring topology to create the Virtual Chassis configuration. See *Connecting a Virtual Chassis Cable to an EX4200 Switch*.

Overview and Topology

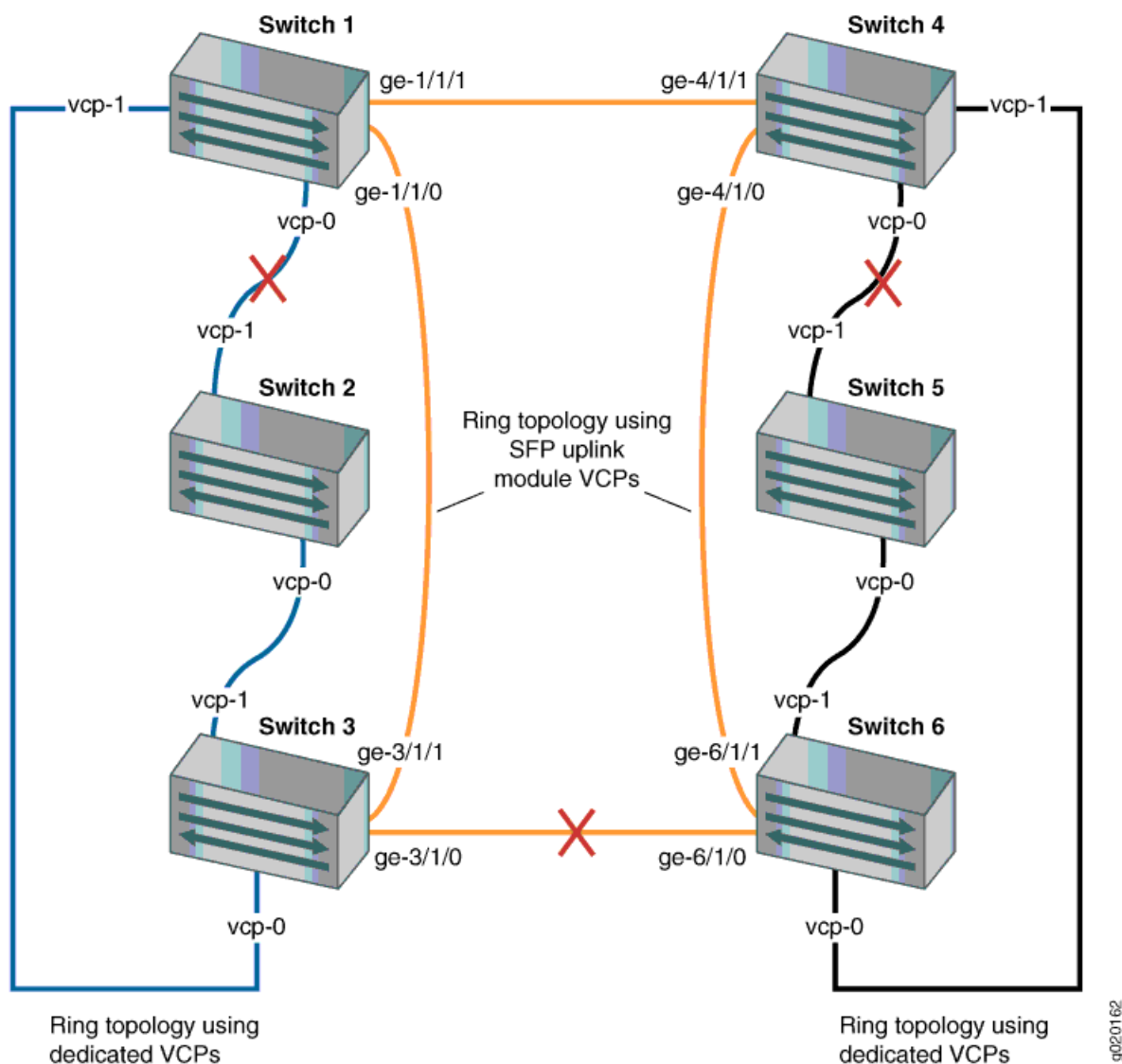
In a Virtual Chassis configuration, fast failover automatically reroutes traffic and reduces traffic loss in the event of a link failure or a member switch failure. By default, fast failover is enabled on all dedicated VCPs. If you configure uplink module ports as VCPs, you must manually configure fast failover on these ports.

For fast failover to be effective, the Virtual Chassis members must be configured in a ring topology. The ring topology can be formed by using either dedicated VCPs or user-configured uplink module VCPs. Fast failover is supported only in a ring topology that uses identical port types, for example, either a topology that uses all dedicated VCPs or one that uses all uplink module VCPs. Fast failover is not supported in a ring topology that includes both dedicated VCPs and uplink module VCPs. Fast failover is supported, however, in a Virtual Chassis configuration that consists of multiple rings.

This example shows how to enable fast failover on uplink module VCPs.

[Figure 18 on page 186](#) shows an example of a multiple-ring topology.

Figure 18: Traffic Redirected by Fast Failover After VCP Link Failures in a Topology with Multiple Rings



The topology for this example consists of six switches:

- Six EX4200-24T switches, four of which have an SFP uplink module installed (switches 1, 3, 4, and 6)

Configuration

To configure the fast failover feature on uplink module VCPs:

CLI Quick Configuration

To configure fast failover on all SFP uplink module VCPs, copy the following command and paste it into the terminal window on switch 1:

[edit]

set virtual-chassis fast-failover ge

Step-by-Step Procedure

To configure fast failover on SFP uplink module VCPs:

1. Enable fast failover on all SFP uplink module VCPs in the Virtual Chassis configuration:

```
[edit]
user@switch1# set virtual-chassis fast-failover ge
```

NOTE: We recommend that you use the **commit synchronize** command to save any configuration changes that you make to a multimember Virtual Chassis.

Results

Check the results of the configuration:

```
[edit virtual-chassis]
user@switch1# show
fast-failover {
    ge;
}
```

Verification

IN THIS SECTION

- [Verifying That Fast Failover Is Enabled | 187](#)

To confirm that fast failover is enabled on SFP uplink module VCPs in the Virtual Chassis configuration, perform this task:

Verifying That Fast Failover Is Enabled

Purpose

Verify that fast failover has been enabled in a Virtual Chassis configuration.

Action

Issue the **show virtual-chassis fast-failover** command.

```
user@switch1> show virtual-chassis fast-failover
```

```
Fast failover on dedicated VCP ports: Enabled
Fast failover on XE uplink VCP ports: Disabled
Fast failover on GE uplink VCP ports: Enabled
```

Meaning

Fast failover is enabled on all dedicated VCPs and SFP uplink module VCPs in the Virtual Chassis configuration.

RELATED DOCUMENTATION

[Configuring Fast Failover in an EX Series Virtual Chassis | 271](#)

[Disabling Fast Failover in an EX Series Virtual Chassis | 272](#)

[Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)

[Configuring a Virtual Chassis on an EX Series Switch \(J-Web Procedure\) | 222](#)

Example: Assigning the Virtual Chassis ID to Determine Precedence During an EX4200 Virtual Chassis Merge

IN THIS SECTION

- [Requirements | 189](#)
- [Overview and Topology | 189](#)
- [Configuration | 190](#)
- [Verification | 190](#)

There are two scenarios in which separate Virtual Chassis merge:

- A Virtual Chassis configuration that had split into two is now merging back into a single configuration because the problem that had caused it to split has been resolved.
- You merge two Virtual Chassis that had not previously been configured together.

You can explicitly assign a Virtual Chassis ID (VCID) so that, when two EX4200 Virtual Chassis configurations merge, the ID that you assigned takes precedence over the automatically assigned VCIDs and becomes the ID of the newly merged Virtual Chassis configuration.

This example shows how to assign the VCID on an EX4200 Virtual Chassis. This process is identical on an EX4500 Virtual Chassis and on a mixed EX4200 and EX4500 Virtual Chassis.

This example describes how to assign the VCID in an EX4200 Virtual Chassis configuration:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 9.3 or later for EX Series switches
- Two EX4200-48P switches
- Two EX4200-24T switches

Before you begin, be sure you have:

1. Installed the switches. See *Mounting an EX4200 Switch*.
2. Cabled the switches to create the Virtual Chassis configuration. See *Connecting a Virtual Chassis Cable to an EX4200 Switch*.

Overview and Topology

Every Virtual Chassis configuration has a unique ID that is automatically assigned when the Virtual Chassis configuration is formed. You can also configure a Virtual Chassis ID using the **set virtual-chassis id** command. When two Virtual Chassis merge, the Virtual Chassis ID that you assigned takes precedence over the automatically assigned Virtual Chassis IDs and becomes the ID for the newly merged Virtual Chassis configuration.

The topology for this example consists of four switches:

- Two EX4200-24T switches
- Two EX4200-48P switches

The switches are connected as a four-member Virtual Chassis configuration and are identified as switch-A, switch-B, switch-C, and switch-D. The master is switch-A.

Configuration

To assign the Virtual Chassis ID in a Virtual Chassis configuration:

CLI Quick Configuration

To assign a Virtual Chassis ID so that when two Virtual Chassis configurations merge, the ID that you assigned takes precedence over the automatically assigned Virtual Chassis IDs and becomes the ID of the newly merged Virtual Chassis configuration, copy the following command and paste it into the terminal window:

```
[edit]  
set virtual-chassis id 9622.6ac8.5345
```

Step-by-Step Procedure

To assign the Virtual Chassis ID in a Virtual Chassis configuration:

1. Assign the Virtual Chassis ID:

```
[edit]  
user@switch-A# set virtual-chassis id 9622.6ac8.5345
```

NOTE: We recommend that you use the **commit synchronize** command to save any configuration changes that you make to a multimember Virtual Chassis configuration.

Verification

IN THIS SECTION

- [Verifying That the Virtual Chassis ID Is Assigned | 190](#)

To verify that the Virtual Chassis ID has been assigned as you intended, perform these tasks:

Verifying That the Virtual Chassis ID Is Assigned

Purpose

Verify that the Virtual Chassis ID has been assigned in a Virtual Chassis configuration.

Action

Issue the **show configuration virtual-chassis id** command.

```
user@switch-A> show configuration virtual-chassis id  
id 9622.6ac8.5345;
```

Meaning

The Virtual Chassis ID has been assigned as 9622.6ac8.5345.

RELATED DOCUMENTATION

[Assigning the Virtual Chassis ID to Determine Precedence During a Virtual Chassis Merge | 282](#)

[Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)

[Configuring a Virtual Chassis on an EX Series Switch \(J-Web Procedure\) | 222](#)

Example: Configuring Link Aggregation Groups Using EX4200 Uplink Virtual Chassis Ports

IN THIS SECTION

- [Requirements | 192](#)
- [Overview and Topology | 193](#)
- [Configuration | 194](#)
- [Verification | 198](#)
- [Troubleshooting | 201](#)

You can form link aggregation groups (LAGs) between EX4200 Virtual Chassis member switches in different wiring closets using uplink Virtual Chassis ports (VCPs) and, on EX4200-24F switches, network VCPs. LAGs balance traffic across the member links, increase the uplink bandwidth, and provide increased availability. To form LAGs using uplink or network VCPs, you configure the uplink module interfaces or network interfaces on the member switches as VCPs and connect the VCPs using fiber-optic cables. For the LAGs to form, the uplink or network VCPs on each member switch that will form a LAG must operate at the same link speed and you must interconnect at least two uplink or network VCPs on each of those

members. You can connect uplink or network VCPs operating at different link speeds, but they will not form a LAG.

NOTE: The LAGs formed by VCPs are different from LAGs formed by Virtual Chassis network interfaces. For more information on LAGs formed by network interfaces, see [“Understanding Virtual Chassis Port Link Aggregation” on page 50](#).

This example shows how to configure uplink module interfaces and network interfaces as VCPs on multiple member switches of a Virtual Chassis configuration and then connect them to form LAGs:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 9.6 or later for EX Series switches
- Five EX4200 switches, one of which is an EX4200-24F model
- Two SFP uplink modules
- Two XFP uplink modules

Before you configure the uplink module interfaces and network interfaces on Virtual Chassis member switches as VCPs and interconnect the members to form a LAG, be sure you have:

1. Installed the SFP uplink modules in the SWA-0 and SWA-2 switches and installed the XFP uplink modules in the SWA-1 and SWA-3 switches. See *Installing an Uplink Module in an EX4200 Switch*.
2. Powered on SWA-0, connected it to the network, and run the EZSetup program. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* for details.
3. Configured SWA-0 with the virtual management Ethernet (VME) interface for remote, out-of-band management of the Virtual Chassis configuration, if desired. See ["Configuring the Virtual Management Ethernet Interface for Global Management of an EX Series Virtual Chassis \(CLI Procedure\)"](#) on page 268.
4. Ensured that SWA-1 is not powered on and then interconnected SWA-0 and SWA-1 using the dedicated VCPs on the rear panel.

NOTE: The interfaces for the dedicated VCPs are operational by default. They do not need to be configured.

5. Ensured that SWA-2, SWA-3, and SWA-4 are not powered on. They are not connected in any way, so when they are initially powered on they will be standalone switches.

Overview and Topology

In this example, five EX4200 switches will be interconnected to form LAGs for ease of monitoring and manageability. Two of these switches (SWA-0 and SWA-1) are located in wiring closet A and the three others (SWA-2, SWA-3, and SWA-4) are located in wiring closet B. SWA-0 will form one LAG with SWA-2 and another LAG with SWA-4, and SWA-1 will form a LAG with SWA-3.

We will use fiber-optic cables connected to the uplink and network VCPs to interconnect the member switches in wiring closet A to the member switches in wiring closet B.

We will specify the highest mastership priority value (255) for SWA-0 to make it the master before we power on SWA-1. Because SWA-0 and SWA-1 are interconnected with the dedicated VCPs, the master detects that SWA-1 is a member of its Virtual Chassis configuration and assigns it a member ID.

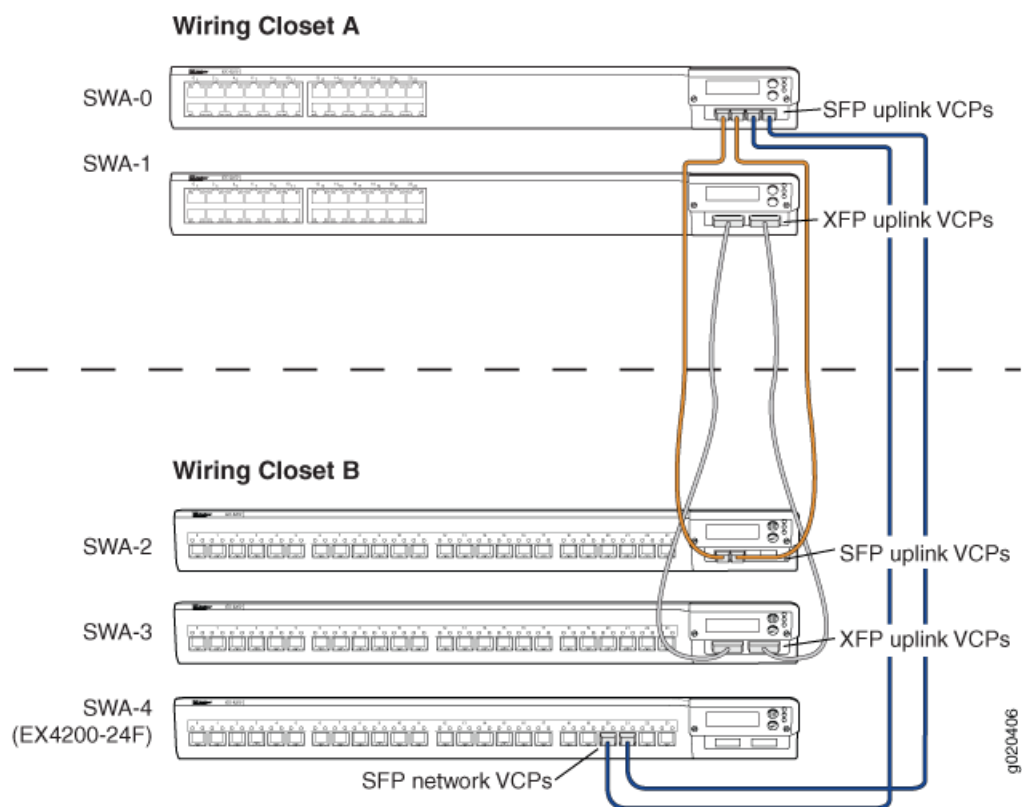
We will use SWA-2 as the backup of the Virtual Chassis configuration. We will configure the same mastership priority value for SWA-2 (255) that we configured for the master. Because we power on SWA-0 before we power on SWA-2, SWA-0 retains mastership of the Virtual Chassis configuration.

NOTE: We recommend setting identical mastership priority values for the master and backup members for high availability and smooth transition of mastership in case the original master becomes unavailable.

We will configure the uplink module interfaces on three of the switches in the wiring closet as uplink VCPs. On the EX4200-24F switch we will configure two of the network interfaces as VCPs. We will interconnect two of the SFP uplink VCPs on SWA-0 with two of the SFP uplink VCPs on SWA-2. Similarly, we will interconnect the two XFP uplink VCPs on SWA-1 with the two XFP uplink VCPs on SWA-3. Finally, we will connect the two remaining SFP uplink VCPs on SWA-0 with two network VCPs on SWA-4. As a result, three LAGs will be automatically formed.

Figure 19 on page 194 shows the interconnections used to form LAGs using uplink VCPs and the network VCPs after the procedure below has been completed.

Figure 19: EX4200 Virtual Chassis Interconnected Across Wiring Closets to Form LAGs



Configuration

To configure the Virtual Chassis uplink module interfaces and network interfaces as uplink VCPs and interconnect them between two wiring closets to form LAGs, perform this task:

Step-by-Step Procedure

To configure a Virtual Chassis across multiple wiring closets and interconnect them to form LAGs:

1. Configure the mastership priority of SWA-0 (member 0) to be the highest possible value (255), thereby ensuring that it functions as the master of the expanded Virtual Chassis configuration:

```
[edit virtual-chassis]
user@SWA-0# set member 0 mastership-priority 255
```

2. Power on SWA-1.
3. Prepare the members in wiring closet A for interconnecting with the member switches in wiring closet B by setting all of the SFP uplink module interfaces on SWA-0 and two of the uplink module interfaces on SWA-1 as uplink VCPs:

```
user@SWA-0> request virtual-chassis vc-port set pic-slot 1 port 0
user@SWA-0> request virtual-chassis vc-port set pic-slot 1 port 1
user@SWA-0> request virtual-chassis vc-port set pic-slot 1 port 2
user@SWA-0> request virtual-chassis vc-port set pic-slot 1 port 3
user@SWA-0> request virtual-chassis vc-port set pic-slot 1 port 0 member 1
user@SWA-0> request virtual-chassis vc-port set pic-slot 1 port 1 member 1
```

NOTE: This example omits the specification of the **member member-id** option in configuring the uplink VCPs for SWA-0 (and, later, for SWA-2). The command applies by default to the switch where it is executed.

4. Power on SWA-2.
5. If SWA-2 was previously configured, revert it to the factory default configuration. See *Reverting to the Default Factory Configuration for the EX Series Switch*.
6. Prepare SWA-2 in wiring closet B by configuring its mastership priority to be the highest possible value (255). Its member ID is currently 0, because it is not yet interconnected with the other members of the Virtual Chassis configuration. It is operating as a standalone switch. Its member ID will change when it is interconnected.

```
[edit virtual-chassis]
user@SWA-2# set member 0 mastership-priority 255
```

NOTE: SWA-2 is configured with the same mastership priority value that we configured for SWA-0. However, the longer uptime of SWA-0 ensures that, once the interconnection is made, SWA-0 functions as the master and SWA-2 functions as the backup.

7. Specify two of the SFP uplink module interfaces in SWA-2 as uplink VCPs. The member IDs are 0, because they are not yet interconnected with the other members of the Virtual Chassis configuration:

NOTE: The settings of the uplink VCPs remain intact when SWA-2 reboots and joins the Virtual Chassis configuration as member 2.

```
user@SWA-2> request virtual-chassis vc-port set pic-slot 1 port 0
```

```
user@SWA-2> request virtual-chassis vc-port set pic-slot 1 port 1
```

8. Power off SWA-2.
9. Physically interconnect SWA-0 and SWA-2 across wiring closets using two of the uplink VCPs on each switch.
10. Power on SWA-2. SWA-2 joins the Virtual Chassis configuration and a LAG is automatically formed between SWA-0 and SWA-2. In addition, although SWA-0 and SWA-2 have the same mastership priority value (255), SWA-0 was powered on first and thus has longer uptime. This results in SWA-0 retaining mastership while SWA-2 reboots and joins the now expanded Virtual Chassis configuration as the backup, with member ID 2.
11. Power on SWA-3.
12. If SWA-3 was previously configured, revert it to the factory default configuration.
13. Specify both XFP uplink module interfaces in SWA-3 as uplink VCPs:


```
user@SWA-3> request virtual-chassis vc-port set pic-slot 1 port 0
```

```
user@SWA-3> request virtual-chassis vc-port set pic-slot 1 port 1
```
14. Power off SWA-3.
15. Physically interconnect SWA-3 with SWA-2 using their dedicated VCPs.

16. Physically interconnect SWA-1 and SWA-3 across wiring closets using their uplink VCPs.

17. Power on SWA-3. It joins the Virtual Chassis configuration as member 3.

NOTE: Member ID 3 is assigned to SWA-3 because SWA-3 was powered on after members 0, 1, and 2.

A LAG is automatically formed between SWA-1 and SWA-3. In addition, both SWA-1 and SWA-3 have the default mastership priority value (128) and function in a linecard role.

18. Power on SWA-4.

19. If SWA-4 was previously configured, revert it to the factory default configuration.

20. Configure two of the network interfaces on SWA-4 as uplink VCPs:

```
user@SWA-4> request virtual-chassis vc-port set pic-slot 0 port 20
user@SWA-4> request virtual-chassis vc-port set pic-slot 0 port 21
```

21. Power off SWA-4.

22. Physically interconnect SWA-4 and SWA-0 across wiring closets using the network VCPs on SWA-4 and the two remaining SFP uplink VCPs on SWA-0.

23. Power on SWA-4. A LAG is automatically formed between SWA-4 and SWA-0. In addition, SWA-4 joins the Virtual Chassis configuration in the linecard role.

Results

Display the results of the configuration on SWA-0:

```
user@SWA-0> show configuration virtual-chassis
member 0 {
  mastership-priority 255;
}
member 1 {
  mastership-priority 128;
}
member 2 {
  mastership-priority 255;
}
```

IN THIS SECTION

- To confirm that the configuration is working properly, perform these tasks:

Purpose

Action

Display the members of the Virtual Chassis configuration:

Virtual Chassis ID: 0000.e255.00e0

Member ID	Status	Serial No	Model	Mastership		Neighbor List	
				Priority	Role	ID	Interface
0 (FPC 0)	Prsnt	abc123	ex4200-48p	255	Master*	1	vcp-0
						1	vcp-1
						2	vcp-255/1/0
						2	vcp-255/1/1
						4	vcp-255/0/20


```

4 vcp-255/0/21

1 (FPC 1)  Prsnt  def456      ex4200-24t    128  Linecard  0 vcp-0
              0 vcp-1
              3 vcp-255/1/0
              3 vcp-255/1/1

2 (FPC 2)  Prsnt  ghi789      ex4200-48p    255  Backup    3 vcp-0
              3 vcp-1
              0 vcp-255/1/0
              0 vcp-255/1/1

3 (FPC 3)  Prsnt  jkl012      ex4200-24t    128  Linecard  2 vcp-0
              2 vcp-1
              1 vcp-255/1/0
              1 vcp-255/1/1

4 (FPC 4)  Prsnt  mno345      ex4200-24f    128  Linecard  0 vcp-255/1/2
              0 vcp-255/1/3

```

Meaning

The **show virtual-chassis** command lists the member switches interconnected in a Virtual Chassis configuration with the member IDs that have been assigned by the master, the mastership priority values, and the roles. It also displays the neighbor members with which each member is interconnected by the dedicated VCPs, by uplink VCPs, and by network VCPs.

Verifying That the VCPs Are Operational

Purpose

Verify that the dedicated VCPs interconnecting member switches in wiring closets A and B and the uplink and network VCPs interconnecting the member switches between wiring closets are operational.

Action

Display the Virtual Chassis interfaces:

```
user@SWA-0> show virtual-chassis vc-port all-members
```

```
fpc0:
```

```
-----
Interface  Type           Trunk  Status      Speed      Neighbor
```

or PIC / Port		ID		(mbps)	ID	Interface
vcp-0	Dedicated	1	Up	32000	1	vcp-0
vcp-1	Dedicated	2	Up	32000	1	vcp-1
1/0	Configured	3	Up	1000	2	vcp-255/1/0
1/1	Configured	3	Up	1000	2	vcp-255/1/1
1/2	Configured	4	Up	1000	4	vcp-255/0/20
1/3	Configured	4	Up	1000	4	vcp-255/0/21

fpc1:

Interface or PIC / Port	Type	Trunk ID	Status	Speed (mbps)	Neighbor ID	Interface
vcp-0	Dedicated	1	Up	32000	0	vcp-0
vcp-1	Dedicated	2	Up	32000	0	vcp-1
1/0	Configured	3	Up	10000	3	vcp-255/1/0
1/1	Configured	3	Up	10000	3	vcp-255/1/1

fpc2:

Interface or PIC / Port	Type	Trunk ID	Status	Speed (mbps)	Neighbor ID	Interface
vcp-0	Dedicated	1	Up	32000	3	vcp-0
vcp-1	Dedicated	2	Up	32000	3	vcp-1
1/0	Configured	3	Up	1000	0	vcp-255/1/0
1/1	Configured	3	Up	1000	0	vcp-255/1/1
1/2		-1	Down	1000		
1/3		-1	Down	1000		

fpc3:

Interface or PIC / Port	Type	Trunk ID	Status	Speed (mbps)	Neighbor ID	Interface
vcp-0	Dedicated	1	Up	32000	2	vcp-0
vcp-1	Dedicated	2	Up	32000	2	vcp-1
1/0	Configured	3	Up	10000	1	vcp-255/1/0
1/1	Configured	3	Up	10000	1	vcp-255/1/1

fpc4:

Interface	Type	Trunk	Status	Speed	Neighbor
-----------	------	-------	--------	-------	----------

or PIC / Port		ID		(mbps)	ID	Interface
vcp-0	Dedicated	1	Down	32000		
vcp-1	Dedicated	2	Down	32000		
0/20	Configured	3	Up	1000	0	vcp-255/1/2
0/21	Configured	3	Up	1000	0	vcp-255/1/3

Meaning

The dedicated VCPs are displayed as **vcp-0** and **vcp-1**. The uplink module interfaces that have been set as uplink VCPs are displayed as **1/0**, **1/1**, **1/2**, and **1/3**. The network interfaces that have been set as VCPs are displayed as **0/20** and **0/21**. The neighbor interface names of uplink and network VCPs are of the form **vcp-255/pic/port**—for example, **vcp-255/1/0**. In that name, **vcp-255** indicates that the interface is a VCP, **1** is the uplink PIC number, and **0** is the port number. The **fpc** number is the same as the member ID. The trunk ID is a positive number ID assigned to the LAG formed by the Virtual Chassis. If no LAG is formed, the value is **-1**.

NOTE: Each switch assigns the trunk IDs to its local interfaces. As a result, the pair of interfaces that form one end of a LAG on one switch will have the same trunk ID, and the pair of interfaces that form the other end of the LAG will have the same trunk ID, but the trunk IDs on either end of the LAG might be different. For example, in [Figure 19 on page 194](#), the uplink VCPs **1/2** and **1/3** on SWA-0 form a LAG with the network VCPs **0/20** and **0/21** on SWA-4. Uplink VCPs **1/2** and **1/3** on SWA-0 both have trunk ID **4**, while network VCPs **0/20** and **0/21** on SWA-4 both have trunk ID **3**. The trunk IDs are different between the switches because SWA-0 assigns the trunk IDs for its local uplink VCPs and SWA-4 assigns the trunk IDs for its local VCPs.

Troubleshooting

IN THIS SECTION

- [Troubleshooting Nonoperational VCPs | 202](#)

To troubleshoot a Virtual Chassis configuration that is interconnected across wiring closets, perform this task:

Troubleshooting Nonoperational VCPs

Problem

An uplink VCP shows a status of **down**.

Solution

- Check the cable to make sure that it is properly and securely connected to the interfaces.
- If the VCP is an uplink module interface, make sure that it has been explicitly set as an uplink VCP.
- If the VCP is an uplink module interface, make sure that you have specified the options (*pic-slot*, *port*, and *member*) correctly.

RELATED DOCUMENTATION

[Example: Configuring an EX4200 Virtual Chassis with a Master and Backup in a Single Wiring Closet | 88](#)

[Example: Expanding an EX4200 Virtual Chassis in a Single Wiring Closet | 107](#)

[Example: Setting Up a Multimember EX4200 Virtual Chassis Access Switch with a Default Configuration | 124](#)

[Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port | 260](#)

Example: Configuring Automatic Software Update on EX4200 Virtual Chassis Member Switches

IN THIS SECTION

- [Requirements | 203](#)
- [Overview and Topology | 203](#)
- [Configuration | 204](#)
- [Verification | 204](#)

The automatic software update feature automatically updates the Junos OS version on prospective member switches as they are added to a Virtual Chassis configuration of EX4200 switches so the new member switch immediately joins the EX4200 Virtual Chassis configuration and is put in the active state. If the software version on the new switch is not the same as the version running on the master, the master keeps the new switch in the inactive state. If you have not enabled the automatic software update feature, you

will have to manually install the correct software version on each prospective member switch as it is added to the Virtual Chassis configuration.

This example describes how to configure the Virtual Chassis automatic software update feature:

Requirements

This example uses the following hardware and software components:

- Three EX4200 switches
- Junos OS Release 10.0 or later for EX Series switches

Before you begin, be sure you have:

1. Ensured that two member switches are running the same version of Junos OS for EX Series switches so that they can form the initial Virtual Chassis configuration.
2. Cabled and powered on those two switches to create the Virtual Chassis configuration. See *Connecting a Virtual Chassis Cable to an EX4200 Switch*.
3. Ensured that you know the name or the URL of the software package to be used by the automatic software update feature.
4. If you are going to perform an automatic software update, ensure that the version of Junos OS running on the Virtual Chassis is compatible with the version of Junos OS running on the prospective member switch for automatic software update. See [“Understanding Automatic Software Update on Virtual Chassis Member Switches” on page 62](#).

Overview and Topology

For a standalone EX4200 switch to join an existing Virtual Chassis configuration, it must be running the same version of Junos OS that is running on the Virtual Chassis master. If the software version on the new switch is not the same as the version running on the master, the master keeps the new switch in the inactive state.

The topology for this example consists of three EX Series switches. Two of the switches are connected in a Virtual Chassis configuration and are therefore running the same version of Junos OS for EX Series switches. The third switch is a standalone switch that is running a different software version than the Virtual Chassis member switches. In this example, we will enable the automatic software update feature on the Virtual Chassis configuration and then add the third switch to the configuration. The master will detect the presence of the new switch, check the software version running on the new switch, and, because it is not the same version currently running on the master, will update the software version on the new

switch and reboot the switch so that it can join the Virtual Chassis configuration and immediately be put in the active state.

Configuration

To configure automatic software update, perform this task:

Step-by-Step Procedure

To configure automatic software update:

1. Enable automatic software update and configure the path to the software package:

```
[edit]
user@switch# set virtual-chassis auto-sw-update package-name
/var/tmp/jinstall-ex-4200-10.0R1.1-domestic-signed.tgz
```

2. Connect the new switch to the existing Virtual Chassis configuration, and power on the switch.

Results

Check the results of the configuration:

```
[edit virtual-chassis]
user@switch# show
auto-sw-update {
  package-name /var/tmp/jinstall-ex-4200-10.0R1.1-domestic-signed.tgz;
}
```

Verification

IN THIS SECTION

- [Verifying That the Software Version Is Updated | 204](#)

To verify that the software version on the new switch has been updated and that the switch has joined the Virtual Chassis configuration, perform this task:

Verifying That the Software Version Is Updated

Purpose

Verify that the new switch has joined the Virtual Chassis configuration.

NOTE: If the software version on the new switch had not been updated successfully, the master would not allow the switch to join the Virtual Chassis configuration.

Action

Issue the **show virtual-chassis** command.

```
user@switch> show virtual-chassis
Virtual Chassis ID: 0019.e250.47a0
```

Member ID	Status	Serial No	Model	Mastership		Role	Neighbor List	
				priority			ID	Interface
0 (FPC 0)	Prsnt	AK0207360276	ex4200-24t	255		Master*	1	vcp-1
							2	vcp-0
1 (FPC 1)	Prsnt	AK0207360281	ex4200-24t	255		Backup	2	vcp-1
							0	vcp-0
2 (FPC 2)	Prsnt	AJ0207391130	ex4200-48p	128		Linecard	0	vcp-1
							1	vcp-0

Meaning

Because in the initial two-member Virtual Chassis configuration member 0 was the master and member 1 was the backup, the output shows that the new switch has been assigned member ID 2 and has been given the **Linecard** role. The **Status** field shows that member 2 is **Prsnt**, which means that it is in the active state.

RELATED DOCUMENTATION

Configuring Automatic Software Update on Virtual Chassis Member Switches 275
Adding a New EX4200 Switch to an Existing EX4200 Virtual Chassis (CLI Procedure) 236

Configuration Tasks

IN THIS CHAPTER

- [Configuring an EX2200 Virtual Chassis \(CLI Procedure\) | 207](#)
- [Configuring an EX3300 Virtual Chassis \(CLI Procedure\) | 212](#)
- [Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)
- [Configuring a Virtual Chassis on an EX Series Switch \(J-Web Procedure\) | 222](#)
- [Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches \(CLI Procedure\) | 228](#)
- [Installing Software on a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Switches \(CLI Procedure\) | 232](#)
- [Adding a New Switch to an Existing EX3300 Virtual Chassis \(CLI Procedure\) | 234](#)
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- [Adding an EX4200 Switch to a Preprovisioned EX4500 Virtual Chassis or a Preprovisioned Mixed EX4200 and EX4500 Virtual Chassis \(CLI Procedure\) | 242](#)
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- [Configuring the Virtual Management Ethernet Interface for Global Management of an EX Series Virtual Chassis \(CLI Procedure\) | 268](#)
- [Configuring the Timer for the Backup Member to Start Using Its Own MAC Address, as Master of a Virtual Chassis | 270](#)
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- [Upgrading Software Using Nonstop Software Upgrade on EX Series Virtual Chassis and Mixed Virtual Chassis \(CLI Procedure\) | 278](#)

- [Assigning the Virtual Chassis ID to Determine Precedence During a Virtual Chassis Merge | 282](#)
- [Configuring Graceful Routing Engine Switchover in a Virtual Chassis | 283](#)
- [Resetting the EX4500 Switch to Run as a Standalone Switch \(CLI Procedure\) | 284](#)
- [Enabling VLAN Pruning for Broadcast, Multicast, and Unknown Unicast Traffic in an EX Series Virtual Chassis \(CLI Procedure\) | 285](#)

Configuring an EX2200 Virtual Chassis (CLI Procedure)

You configure an EX2200 Virtual Chassis by configuring interfaces connecting EX2200 switches into Virtual Chassis ports (VCPs). Optical interfaces on EX2200 and EX2200-C switches can be configured into VCPs and can be used to connect EX2200 switches into a Virtual Chassis over short and long distances (up to 49.7 miles). All RJ-45 interfaces, including built-in network ports with 10/100/1000BASE-T Gigabit Ethernet connectors and 1000BASE-T RJ-45 transceivers, on EX2200 and EX2200-C switches can also be configured into VCPs.

An EX2200 Virtual Chassis can be configured with either:

- A preprovisioned configuration—You can deterministically control the member ID and role assigned to a member switch by tying it to its serial number.
- A nonprovisioned configuration—The master sequentially assigns a member ID to other member switches. The role is determined by the mastership priority value and other factors in the master election algorithm.

NOTE: A Virtual Chassis configuration has two Routing Engines—the master switch and the backup switch. Therefore, we recommend that you always use **commit synchronize** rather than simply **commit** to save configuration changes made for a Virtual Chassis. This ensures that the configuration changes are saved in both Routing Engines.

NOTE: You do not have to purchase a license to configure an EX2200 Virtual Chassis starting in Junos OS release 12.3R2.

Prior to Junos OS release 12.3R2, two enhanced feature licenses (EFLs)—one for the switch in the master role and another for the switch in the backup role—must be purchased to create an EX2200 Virtual Chassis. See *Understanding Software Licenses for EX Series Switches*.

This topic includes:

- [Configuring an EX2200 Virtual Chassis with a Preprovisioned Configuration File | 208](#)
- [Configuring an EX2200 Virtual Chassis with a Nonprovisioned Configuration File | 210](#)

Configuring an EX2200 Virtual Chassis with a Preprovisioned Configuration File

Preprovisioning a Virtual Chassis configuration allows you to assign the member ID and role for each switch in the Virtual Chassis.

To configure a Virtual Chassis using a preprovisioned configuration:

NOTE: We recommend that you physically cable the ports as the final step of this procedure. You can, however, configure an EX2200 Virtual Chassis while the cables are physically connected.

1. Make a list of the serial numbers of all the switches to be connected in a Virtual Chassis configuration.
2. Note the desired role (**routing-engine** or **line-card**) of each switch. If you configure the member with a **routing-engine** role, it is eligible to function in the master or backup role. If you configure the member with a **line-card** role, it is not eligible to function in the master or backup role.
3. Power on only the switch that you plan to use as the master switch.
4. Run the EZSetup program on the master switch, specifying the identification parameters. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* for details.

NOTE: The properties that you specify for the master switch apply to the entire Virtual Chassis configuration.

5. (Optional) Configure the master switch with the virtual management Ethernet (VME) interface for out-of-band management of the Virtual Chassis:

```
[edit]
user@switch# set interfaces vme unit 0 family inet address /ip-address/mask/
```

6. Specify the preprovisioned configuration mode:

```
[edit virtual-chassis]
user@switch# set preprovisioned
```

7. Specify all the members that you want included in the Virtual Chassis, listing each switch's serial number with the desired member ID and role:

```
[edit virtual-chassis]
user@switch# set member 0 serial-number abc123 role routing-engine
user@switch# set member 1 serial-number def456 role routing-engine
user@switch# set member 2 serial-number ghi789 role line-card
user@switch# set member 3 serial-number jkl012 role line-card
```

8. (Optional. Recommended for a two-member Virtual Chassis) Disable the split and merge feature:

```
[edit virtual-chassis]
user@switch# set no-split-detection
```

9. Power on the other member switches. The member IDs and roles have been determined by the configuration, so you can power on the member switches in any order.
10. On each individual member switch, configure the ports that will be used to interconnect the EX2200 member switches into VCPs.

You can configure a port on an EX2200 switch as a VCP using the following command:

```
user@switch> request virtual-chassis vc-port set pic-slot pic-slot-number port port-number
```

where *pic-slot-number* is the PIC slot number. The PIC slot number is 0 when you are configuring a built-in port as a VCP and 1 when you are configuring an uplink port as a VCP.

For instance, if you wanted to set built-in port 20 as a VCP:

```
user@switch> request virtual-chassis vc-port set pic-slot 0 port 20
```

If you wanted to set uplink port 2 as a VCP:

```
user@switch> request virtual-chassis vc-port set pic-slot 1 port 2
```

The VCPs automatically bundle into a Link Aggregation Group when two or more interfaces are configured into VCPs between the same two member switches. See [“Understanding Virtual Chassis Port Link Aggregation” on page 50](#).

NOTE: You cannot modify the mastership priority when you are using a preprovisioned configuration. The mastership priority values are generated automatically and controlled by the role that is assigned to the member switch in the configuration file. The two Routing Engines are assigned the same mastership priority value. However, the member that was powered on first has higher prioritization according to the master election algorithm. See [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#).

Configuring an EX2200 Virtual Chassis with a Nonprovisioned Configuration File

You can use nonprovisioned configuration to configure an EX2200 Virtual Chassis.

To configure the Virtual Chassis using a nonprovisioned configuration:

NOTE: We recommend that you physically cable the ports as the final step of this procedure. You can, however, configure an EX2200 Virtual Chassis while the cables are physically connected.

1. Power on only the switch that you plan to use as the master switch.
2. Run the EZSetup program on the master switch, specifying the identification parameters. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* for details.

NOTE: The properties that you specify for the master switch apply to the entire Virtual Chassis configuration.

3. (Optional) Configure the master switch with the virtual management Ethernet (VME) interface for out-of-band management of the Virtual Chassis:

```
[edit]
```

```
user@switch# set interfaces vme unit 0 family inet address /ip-address/mask/
```

4. (Optional) Configure mastership priority for the other member switches:

```
[edit virtual-chassis]
user@switch# set member 0 mastership-priority 255
user@switch# set member 1 mastership-priority 255
```

5. (Optional. Recommended for a two-member Virtual Chassis) On the master switch, disable the split and merge feature:

```
[edit virtual-chassis]
user@switch# set no-split-detection
```

6. Power on the other member switches.
7. On each individual member switch, configure the ports that will be used to interconnect the EX2200 member switches into VCPs.

You can configure a port on an EX2200 switch as a VCP using the following command:

```
user@switch> request virtual-chassis vc-port set pic-slot pic-slot-number port port-number
```

where *pic-slot-number* is the PIC slot number. The PIC slot number is 0 when you are configuring a built-in port as a VCP and 1 when you are configuring an uplink port as a VCP.

For instance, if you wanted to set built-in port 20 as a VCP:

```
user@switch> request virtual-chassis vc-port set pic-slot 0 port 20
```

If you wanted to set uplink port 2 as a VCP:

```
user@switch> request virtual-chassis vc-port set pic-slot 1 port 2
```

The VCPs automatically bundle into a Link Aggregation Group when two or more interfaces are configured into VCPs between the same two member switches. See [“Understanding Virtual Chassis Port Link Aggregation” on page 50](#).

NOTE: If you do not edit the Virtual Chassis configuration file, a nonprovisioned configuration is generated by default. The mastership priority value for each member switch is **128**. The master role is selected by default. You can change the role that is performed by the members by modifying the mastership priority. See [“Configuring Mastership of a Virtual Chassis” on page 257](#). We recommend that you specify the same mastership priority value for the desired master and backup members. In this example, the highest possible mastership priority has been assigned to two members. However, the member that was powered on first has higher prioritization according to the master election algorithm. See [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#). The other members use the default mastership priority in this example, which configures them to function in the role of linecard.

NOTE: If you want to change the member ID that the master has assigned to a member switch, use the [request virtual-chassis renumber](#) command.

RELATED DOCUMENTATION

[Virtual Chassis Overview for Switches | 2](#)

[Understanding EX Series Virtual Chassis | 9](#)

[Understanding EX2200 Virtual Chassis Hardware Configuration](#)

[Configuring Mastership of a Virtual Chassis | 257](#)

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

Configuring an EX3300 Virtual Chassis (CLI Procedure)

You must interconnect EX3300 switches using uplink ports configured as Virtual Chassis ports (VCPs). Uplink ports 2 and 3 on an EX3300 switch are configured as VCPs by default. You do not have to configure these interfaces to connect EX3300 switches together in a Virtual Chassis.

The uplink ports configured as VCPs are used to connect EX3300 switches into a Virtual Chassis in the same or different wiring closets over short and long distances (up to 6.2 miles).

NOTE: A multimember Virtual Chassis configuration has two Routing Engines, one in the master and the other in the backup. Therefore, we recommend that you always use **commit synchronize** rather than simply **commit** to save configuration changes made for a Virtual Chassis. This ensures that the configuration changes are saved in both Routing Engines.

An EX3300 Virtual Chassis can be configured with either:

- A preprovisioned configuration—Allows you to deterministically control the member ID and role assigned to a member switch by tying it to its serial number.
- A nonprovisioned configuration—The master sequentially assigns a member ID to other member switches. The role is determined by the mastership priority value and other factors in the master election algorithm.

This topic includes:

- [Configuring an EX3300 Virtual Chassis with a Preprovisioned Configuration File | 213](#)
- [Configuring an EX3300 Virtual Chassis with a Nonprovisioned Configuration File | 215](#)

Configuring an EX3300 Virtual Chassis with a Preprovisioned Configuration File

Preprovisioning a Virtual Chassis configuration allows you to assign the member ID and role for each switch in the Virtual Chassis. Preprovisioning is supported for an EX3300 Virtual Chassis.

To configure a Virtual Chassis using a preprovisioned configuration:

1. Make a list of the serial numbers of all the switches to be connected in a Virtual Chassis configuration.
2. Note the desired role (**routing-engine** or **line-card**) of each switch. If you configure the member with a **routing-engine** role, it is eligible to function in the master or backup role. If you configure the member with a **line-card** role, it is not eligible to function in the master or backup role.
3. Interconnect the member switches using uplink ports 2 and 3 of your EX3300 switches. See *Virtual Chassis Cabling Configuration Examples for EX3300 Switches*.

NOTE: For management purposes, we recommend arranging the switches in member ID sequence, either from top to bottom or from bottom to top (0–5).

4. Power on only the switch that you plan to use as the master switch. Do not power on the other switches at this time.

5. Run the EZSetup program on the master switch, specifying the identification parameters. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* for details.

NOTE: The properties that you specify for the master switch apply to the entire Virtual Chassis configuration, including all the members listed in the preprovisioned configuration file.

6. (Optional) Configure the master switch with the virtual management Ethernet (VME) interface for out-of-band management of the Virtual Chassis:

```
[edit]
user@switch# set interfaces vme unit 0 family inet address /ip-address/mask/
```

7. Specify the preprovisioned configuration mode:

```
[edit virtual-chassis]
user@switch# set preprovisioned
```

8. Specify all the members that you want to included in the Virtual Chassis configuration, listing each switch's serial number with the desired member ID and the desired role:

```
[edit virtual-chassis]
user@switch# set member 0 serial-number abc123 role routing-engine
user@switch# set member 1 serial-number def456 role line-card
user@switch# set member 2 serial-number ghi789 role line-card
user@switch# set member 3 serial-number jkl012 role line-card
user@switch# set member 4 serial-number mno345 role line-card
user@switch# set member 5 serial-number pqr678 role routing-engine
```

9. (Optional. Recommended for a two-member Virtual Chassis) Disable the split and merge feature:

```
[edit virtual-chassis]
user@switch# set no-split-detection
```

10. Power on the member switches.

NOTE: You cannot modify the mastership priority when you are using a preprovisioned configuration. The mastership priority values are generated automatically and controlled by the role that is assigned to the member switch in the configuration file. The two Routing Engines are assigned the same mastership priority value. However, the member that was powered on first has higher prioritization according to the master election algorithm. See [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#).

Configuring an EX3300 Virtual Chassis with a Nonprovisioned Configuration File

Nonprovisioned configuration can be used to configure an EX3300 Virtual Chassis.

To configure the Virtual Chassis using a nonprovisioned configuration:

1. Interconnect the member switches using uplink ports 2 and 3 on your EX3300 switches. See *Virtual Chassis Cabling Configuration Examples for EX3300 Switches*.

NOTE: For management purposes, we recommend arranging the switches in member ID sequence, either from top to bottom or from bottom to top.

2. Power on only the switch that you plan to use as the master switch (SWA-0). Do not power on the other switches at this time.
3. Run the EZSetup program on SWA-0, specifying the identification parameters. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* for details.

NOTE: The properties that you specify for SWA-0 apply to the entire Virtual Chassis configuration, including all the members interconnected through VCPs.

4. (Optional) Configure SWA-0 with the virtual management Ethernet (VME) interface for out-of-band management of the Virtual Chassis:

```
[edit]
```

```
user@SWA-0# set interfaces vme unit 0 family inet address /ip-address/mask/
```

5. (Optional) Configure mastership priority for the master, backup, and other members:

```
[edit virtual-chassis]
```

```
user@SWA-0# set member 0 mastership-priority 255
```

```
user@SWA-0# set member 3 mastership-priority 255
```

6. (Optional. Recommended for a two-member Virtual Chassis) Disable the split and merge feature:

```
[edit virtual-chassis]
```

```
user@SWA-0# set no-split-detection
```

7. Power on the member switches in sequential order, one by one.

NOTE: If you do not edit the Virtual Chassis configuration file, a nonprovisioned configuration is generated by default. The mastership priority value for each member switch is **128**. The master role is selected by default. You can change the role that is performed by the members by modifying the mastership priority. See [“Configuring Mastership of a Virtual Chassis” on page 257](#). We recommend that you specify the same mastership priority value for the desired master and backup members. In this example, the highest possible mastership priority has been assigned to two members. However, the member that was powered on first has higher prioritization according to the master election algorithm. See [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#). The other members use the default mastership priority in this example, which configures them to function in the role of linecard.

NOTE: If you want to change the member ID that the master has assigned to a member switch, use the [request virtual-chassis renumber](#) command.

RELATED DOCUMENTATION

[Example: Configuring an EX3300 Virtual Chassis with a Master and Backup | 83](#)

[Configuring Mastership of a Virtual Chassis | 257](#)

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)

This topic does not apply to a mixed Virtual Chassis configuration. For information on configuring a mixed Virtual Chassis, see [“Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches \(CLI Procedure\)” on page 228](#).

You can interconnect EX4200, EX4500, and EX4550 switches using the dedicated Virtual Chassis ports (VCPs) on the rear panel of EX4200 switches and on the Virtual Chassis module in EX4500 and EX4550 switches. You do not have to configure the interfaces for the dedicated VCPs.

If you want to interconnect member switches that are located in different racks or wiring closets, you interconnect them using optical ports configured as VCPs. See [“Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port” on page 260](#) or [“Setting an Uplink Port as a Virtual Chassis Port on an EX4500 or EX4550 Switch \(CLI Procedure\)” on page 266](#).

NOTE: A Virtual Chassis configuration has two Routing Engines, one in the master and the other in the backup. Therefore, we recommend that you always use **commit synchronize** rather than simply **commit** to save configuration changes made for a Virtual Chassis. This ensures that the configuration changes are saved in both Routing Engines.

An EX4200, EX4500, or EX4550 Virtual Chassis can be configured with either:

- A preprovisioned configuration—Allows you to deterministically control the member ID and role assigned to a member switch by tying it to its serial number.
- A nonprovisioned configuration—The master sequentially assigns a member ID to other member switches. The role is determined by the mastership priority value and other factors in the master election algorithm.

This topic includes:

- [Configuring an EX4200, EX4500, or EX4550 Virtual Chassis with a Preprovisioned Configuration File | 217](#)
- [Configuring an EX4200, an EX4500, or EX4550 Virtual Chassis with a Nonprovisioned Configuration File | 220](#)

Configuring an EX4200, EX4500, or EX4550 Virtual Chassis with a Preprovisioned Configuration File

Preprovisioning a Virtual Chassis configuration allows you to assign the member ID and role for each switch in the Virtual Chassis.

To configure a Virtual Chassis using a preprovisioned configuration:

1. Make a list of the serial numbers of all the switches to be connected in the Virtual Chassis configuration.
2. Note the desired role (**routing-engine** or **line-card**) you want for each switch. If you configure the member with a **routing-engine** role, it is eligible to function as a master or backup. If you configure the member with a **line-card** role, it is not eligible to become a master or backup.
3. Interconnect the member switches using the dedicated VCPs. See *Connecting a Virtual Chassis Cable to an EX4200 Switch* or *Connecting a Virtual Chassis Cable to an EX4500 Switch*.

NOTE: For management purposes, we recommend arranging the switches in member ID sequence, either from top to bottom or from bottom to top (0–9).

4. Power on only the switch that you plan to use as the master switch. Do not power on the other switches at this time.
5. Run the EZSetup program on the master switch, specifying the identification parameters. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* for details.

NOTE: The properties that you specify for the master switch apply to the entire Virtual Chassis configuration, including all the members listed in the preprovisioned configuration file.

6. (Optional) Configure the master switch with the virtual management Ethernet (VME) interface for out-of-band management of the Virtual Chassis configuration:

```
[edit]
user@switch# set interfaces vme unit 0 family inet address /ip-address/mask/
```

7. Specify the preprovisioned configuration mode:

```
[edit virtual-chassis]
user@switch# set preprovisioned
```

8. From the master switch, specify all the members that you want to include in the Virtual Chassis configuration, listing each switch's serial number with the desired member ID and the desired role:

```
[edit virtual-chassis]
user@switch# set member 0 serial-number abc123 role routing-engine
user@switch# set member 1 serial-number def456 role line-card
```

```

user@switch# set member 2 serial-number ghi789 role line-card
user@switch# set member 3 serial-number jkl012 role line-card
user@switch# set member 4 serial-number mno345 role line-card
user@switch# set member 5 serial-number pqr678 role routing-engine
user@switch# set member 6 serial-number stu901 role line-card
user@switch# set member 7 serial-number vwx234 role line-card
user@switch# set member 8 serial-number yza567 role line-card
user@switch# set member 9 serial-number bcd890 role line-card

```

9. (Optional. Recommended for a two-member Virtual Chassis) Disable the split and merge feature:

```

[edit virtual-chassis]
user@switch# set no-split-detection

```

10. Power on the member switches.

11. (EX4500 switches only) Verify the PIC mode setting:

```

user@switch> show chassis pic-mode

```

If the PIC mode setting is not set to **virtual-chassis**, set the PIC mode to **virtual-chassis**:

```

user@switch> request chassis pic-mode virtual-chassis

```

NOTE: This step is required if you are using the dedicated VCPs on the Virtual Chassis module to connect the Virtual Chassis.

The PIC mode setting has no impact on uplink ports that are configured as VCPs.

NOTE: You cannot modify the mastership priority when you are using a preprovisioned configuration. The mastership priority values are generated automatically and controlled by the role that is assigned to the member switch in the configuration file. The two Routing Engines are assigned the same mastership priority value. However, the member that was powered on first has higher prioritization according to the master election algorithm. See [“Understanding How the Master in a Virtual Chassis Is Elected”](#) on page 43.

Configuring an EX4200, an EX4500, or EX4550 Virtual Chassis with a Nonprovisioned Configuration File

To configure the Virtual Chassis using a nonprovisioned configuration:

1. Interconnect the member switches using the dedicated VCPs. See *Connecting a Virtual Chassis Cable to an EX4200 Switch* or *Connecting a Virtual Chassis Cable to an EX4500 Switch*.

NOTE: For management purposes, we recommend arranging the switches in member ID sequence, either from top to bottom or from bottom to top (0–9).

2. Power on only the switch that you plan to use as the master switch (SWA-0). Do not power on the other switches at this time.
3. Run the EZSetup program on SWA-0, specifying the identification parameters. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* for details.

NOTE: The properties that you specify for SWA-0 apply to the entire Virtual Chassis configuration, including all the members interconnected through VCPs.

4. (Optional) Configure SWA-0 with the virtual management Ethernet (VME) interface for out-of-band management of the Virtual Chassis configuration, if desired:

```
[edit]
user@SWA-0# set interfaces vme unit 0 family inet address /ip-address/mask/
```

5. Configure mastership priority for the master, backup, and other members, if desired:

```
[edit virtual-chassis]
user@SWA-0# set member 0 mastership-priority 255
user@SWA-0# set member 5 mastership-priority 255
```

6. (Optional. Recommended for a two-member Virtual Chassis) Disable the split and merge feature:

```
[edit virtual-chassis]
user@SWA-0# set no-split-detection
```

7. Power on the member switches in sequential order, one by one.
8. (EX4500 switches only) Enter the **show chassis pic-mode** operational mode command to verify the current PIC mode setting. If the PIC mode is currently set to **intraconnect**, enter the **request chassis pic-mode virtual-chassis** operational mode command to set the PIC mode to **virtual-chassis**. Reboot the switch to complete the procedure.

NOTE: This step is only required if you are using the dedicated VCP ports on the Virtual Chassis module.

NOTE: If you do not edit the Virtual Chassis configuration file, a nonprovisioned configuration is generated by default. The mastership priority value for each member switch is **128**. The master role is selected by default. You can change the role that is performed by the members by modifying the mastership priority. See [“Configuring Mastership of a Virtual Chassis” on page 257](#). We recommend that you specify the same mastership priority value for the desired master and backup members. In this example, the highest possible mastership priority has been assigned to two members. However, the member that was powered on first has higher prioritization according to the master election algorithm. See [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#). The other members use the default mastership priority in this example, which configures them to function in the role of linecard.

NOTE: If you want to change the member ID that the master has assigned to a member switch, use the [request virtual-chassis renumber](#) command.

RELATED DOCUMENTATION

[Example: Configuring a Preprovisioned Mixed EX4200 and EX4500 Virtual Chassis](#) | 163

[Configuring Mastership of a Virtual Chassis](#) | 257

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis](#) | 334

Configuring a Virtual Chassis on an EX Series Switch (J-Web Procedure)

IN THIS SECTION

- [Configuring an EX2200, EX2200-C, EX3300, EX4200, EX4300, EX4500, EX4550, or EX4600 Virtual Chassis \(J-Web Procedure\) | 222](#)
- [Enabling Virtual Chassis Mode on an EX8200 Switch \(J-Web Procedure\) | 224](#)
- [Configuring an EX8200 Virtual Chassis \(J-Web Procedure\) | 224](#)

Configuring an EX2200, EX2200-C, EX3300, EX4200, EX4300, EX4500, EX4550, or EX4600 Virtual Chassis (J-Web Procedure)

NOTE: This topic applies only to the J-Web Application package.

To take advantage of the scalability features of EX2200, EX2200-C, EX3300, EX4200, EX4300, EX4500, EX4550, and EX4600 switches, you can configure a Virtual Chassis. EX2200 and EX2200-C Virtual Chassis can include up to four member switches. EX3300 Virtual Chassis include up to six member switches. For Junos OS Release 14.1X53-D10 and later, EX3300 Virtual Chassis include up to 10 member switches. EX4200, EX4300, EX4500, EX4550, and EX4600 Virtual Chassis can include up to 10 member switches. You can interconnect the member switches by using dedicated Virtual Chassis ports (VCPs). You do not have to configure the interface for the dedicated VCPs. If you want to interconnect member switches that are located in different racks or wiring closets, interconnect them using 10-gigabit ports (SFP+ uplink module ports or SFP+ network ports for EX4500) configured as VCPs. EX4300, EX4550, and EX4600 switches support 10-gigabit (SFP+ expansion module ports) and 40-gigabit (QSFP+ uplink module ports or fixed ports) Ethernet interface. See [“Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port” on page 260](#).

NOTE: You can form a Virtual Chassis using EX4600 and EX4300 switches. When in a mixed Virtual Chassis consisting of EX4600 switches and EX4300 switches, the EX4600 switches can be the master, backup, or in the linecard role, while the EX4300 switches must be in the linecard role.

To configure a Virtual Chassis by using the J-Web interface:

1. Select **Configure > Virtual Chassis**.

NOTE: After you make changes to the configuration on this page, you must commit the changes for them to take effect. To commit all changes to the active configuration, select **Commit Options > Commit**. See Using the Commit Options to Commit Configuration Changes for details about all commit options.

2. The properties that you can configure are displayed.

The first section of the Virtual Chassis Configuration page displays the Virtual Chassis member configuration. The display includes a list of member switches, their member IDs, and the mastership priority.

The second section displays the operational status of the Virtual Chassis configuration, member details, and the dedicated and the configured VCPs.

3. Enter information into the page as described in [Table 25 on page 223](#).

4. Click one of the following options:

- **Add**—To add a member's configuration to the Virtual Chassis configuration, click **Add**.
- **Edit**—To modify an existing member's configuration, click **Edit**.
- **Delete**—To delete the configuration of a member, click **Delete**.

5. To configure uplink ports on EX2200, EX2200-C, and EX3300 switches and uplink module ports on EX4200, EX4300, EX4500, and EX4600 switches as VCPs , select the member in the Virtual Chassis members list and select **Action > Set Uplink Port as VCP**. Select the port from the list.

On EX4550 switches, to configure a VCP, select the member in the Virtual Chassis members list and select **Action > Set Port as VCP**. Select the port from the list.

6. To remove the VCP configuration from the uplink ports on EX2200, EX2200-C, and EX3300 switches and uplink module ports on EX4200, EX4300, EX4500, and EX4600 switches , select the member in the Virtual Chassis members list and select **Action > Delete Uplink Port as VCP**.

On EX4550 switches, to remove the VCP configuration from the port of a member, select the member in the Virtual Chassis members list and select **Action > Delete Port as VCP**.

Table 25: Virtual Chassis Configuration Fields

Field	Function	Your Action
Member Details		

Table 25: Virtual Chassis Configuration Fields (*continued*)

Field	Function	Your Action
Member ID	Specifies the identifier for the member switch.	Select an identifier (from 0 through 9) from the list. NOTE: For EX2200 Virtual Chassis, you can select the member ID (from 0 through 3) from the list.
Priority	Specifies the mastership priority to be assigned to the member.	Select a number from 1 through 255 , (255 being the highest priority and 128 , the default).
Disable Management VLAN	If you want to reserve an individual member's management Ethernet port, you can remove that port from being part of the virtual management Ethernet (VME) interface.	Click to disable the management VLAN on the port.
Refresh	Refreshes the operational status of Virtual Chassis members.	Click to refresh the operational status.

Enabling Virtual Chassis Mode on an EX8200 Switch (J-Web Procedure)

Using the J-Web interface, you can enable Virtual Chassis mode on an EX8200 switch. To enable Virtual Chassis mode:

1. Select **Configure > Virtual Chassis**. The Virtual Chassis page displays the serial number of the member switch. You need the serial number while preprovisioning the Virtual Chassis.
2. Click **Enable Virtual Chassis**.

Configuring an EX8200 Virtual Chassis (J-Web Procedure)

IN THIS SECTION

- [Preprovision the Virtual Chassis | 225](#)
- [Configure Virtual Chassis Members | 225](#)
- [Configure Virtual Chassis Ports | 226](#)

Using the J-Web interface, you can configure an EX8200 Virtual Chassis to include up to four EX8200 switches and one or two XRE200 External Routing Engines. You interconnect the member switches by connecting the management ports to the external Routing Engines, whose ports automatically function as Virtual Chassis ports (VCPs). A VCP is any port whose function is to send and receive Virtual Chassis Control Protocol (VCCP) traffic to create, monitor, and maintain the Virtual Chassis. VCPs also carry data traffic through the Virtual Chassis.

The EX8200 Virtual Chassis wizard helps to preprovision Virtual Chassis members and to configure Virtual Chassis ports.

To configure an EX8200 Virtual Chassis, select **Configure > Virtual Chassis**. The Virtual Chassis wizard is displayed. You can:

Preprovision the Virtual Chassis

If the Virtual Chassis has not been preprovisioned:

1. Select **Preprovision Virtual Chassis**. The prerequisites page is displayed.
2. Ensure that the following prerequisites are met:
 - The same version of Junos OS is running on all XRE200 Routing Engines and switches.
 - Virtual Chassis mode has been enabled on each EX8200 switch.
 - The XRE200 Routing Engines and switches have been cabled and connected.

Click **Next**. The Configure Virtual Chassis Members screen is displayed.

Configure Virtual Chassis Members

When you click **Configure Virtual Chassis Members** in the wizard, you can add a Virtual Chassis member, modify an existing Virtual Chassis member configuration, or delete the Virtual Chassis configuration for an existing member.

To add a Virtual Chassis member, click **Add**. For each member, specify:

- **Member ID**—The identifier for the member switch or the XRE200 External Routing Engine.
- **Serial Number**—The serial number of the member switch or the XRE200 External Routing Engine.
- **Management VLAN**—Click to enable or disable the management VLAN on the port.
- **Location**—A description of the location of the EX8200 member switch or external Routing Engine.
- **Role**—The role to be performed by each EX8200 member switch or each XRE200 External Routing Engine. EX8200 switches must be in the linecard role and XRE200 External Routing Engines must be in the Routing Engine role.

To edit an existing member configuration, click **Edit**.

NOTE: If you are editing an existing member configuration, you can modify only the Management VLAN option and the location of the Virtual Chassis member.

Click **Remove** to delete the Virtual Chassis configuration for an existing member.

Configure Virtual Chassis Ports

To configure Virtual Chassis ports that are needed between the switches for data traffic, select the **Configure Virtual Chassis Ports** option in the wizard.

NOTE: All XRE200 ports, the vcp-0/0 port, and any port on a Virtual Chassis Control Interface (VCCI) module are automatically VCPs. You need not configure these ports as VCPs.

1. Select the member from the list. The switch model, serial number, available ports, and configured ports are displayed. Select **All** to view details of available ports and configured ports of all the members.

NOTE: Only members with active EX8200-8XS line cards are listed. The J-Web interface does not support EX8200-2X4F40TE/PE line cards.

2. To convert network ports to Virtual Chassis ports or to convert Virtual Chassis ports to network ports, click the appropriate arrow.
3. Click **Next**. The Summary page displays the configuration changes. You can edit the configuration.

Release History Table

Release	Description
14.1X53-D10	For Junos OS Release 14.1X53-D10 and later, EX3300 Virtual Chassis include up to 10 member switches.

RELATED DOCUMENTATION

[Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)

[Setting an Uplink Port as a Virtual Chassis Port on an EX4500 or EX4550 Switch \(CLI Procedure\) | 266](#)

[Example: Configuring an EX4200 Virtual Chassis with a Master and Backup in a Single Wiring Closet | 88](#)

[Example: Configuring an EX4200 Virtual Chassis Interconnected Across Multiple Wiring Closets | 131](#)

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

Virtual Chassis Cabling Configuration Examples for EX4200 Switches

[Understanding EX Series Virtual Chassis | 9](#)

Configuring an EX8200 Virtual Chassis (CLI Procedure)

Example: Setting Up a Full Mesh EX8200 Virtual Chassis with Two EX8200 Switches and Redundant XRE200 External Routing Engines

Adding or Replacing a Member Switch or an External Routing Engine in an EX8200 Virtual Chassis (CLI Procedure)

Verifying the Member ID, Role, and Neighbor Member Connections of an EX8200 Virtual Chassis Member

Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches (CLI Procedure)

This topic explains how to configure a mixed Virtual Chassis composed of any combination of EX4200, EX4500, and EX4550 switches. For information on configuring an EX4200 Virtual Chassis, EX4500 Virtual Chassis, or EX4550 Virtual Chassis, see [“Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\)” on page 217](#).

You can configure the following mixed Virtual Chassis:

- Mixed EX4200 and EX4500 Virtual Chassis
- Mixed EX4200 and EX4550 Virtual Chassis
- Mixed EX4200, EX4500, and EX4550 Virtual Chassis
- Mixed EX4500 and EX4550 Virtual Chassis

You can configure up to ten member switches in all mixed Virtual Chassis composed of EX4200, EX4500, and EX4550 switches. You can interconnect and mix any model of EX4200, EX4500, or EX4550 switch into the same mixed Virtual Chassis, and any EX4200, EX4500, or EX4550 switch can assume the master, backup, or linecard role. You can interconnect the member switches using the dedicated Virtual Chassis ports (VCPs) or by configuring optical ports as VCPs.

This procedure uses a preprovisioned Virtual Chassis configuration. A preprovisioned configuration allows you to deterministically control the member ID and role assigned to a member switch by tying it to its serial number.

Nonprovisioned configuration is also supported for a mixed Virtual Chassis configuration. In a nonprovisioned configuration, the master sequentially assigns a member ID to other member switches and the other member switches roles are determined by the mastership priority value and other factors in the master election algorithm. See [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#).

Ensure that all switches are running the same version of Junos OS. See *Installing Software on an EX Series Switch with a Virtual Chassis or Single Routing Engine (CLI Procedure)*.

To configure a mixed Virtual Chassis:

1. Make a list of the serial numbers of all the switches to be connected in the Virtual Chassis. You can get the serial numbers in the **show chassis hardware** output or by following the instructions in *Locating the Serial Number on an EX4200 Switch or Component*, *Locating the Serial Number on an EX4500 Switch or Component*, or *Locating the Serial Number on an EX4550 Switch or Component*.
2. Decide which switches you want to act in the master and backup roles. See [“Understanding Virtual Chassis Components” on page 19](#).

3. Power and log in to the switch that you want to function in the master role. If the switch has not previously been configured, configure it. See *Connecting and Configuring an EX Series Switch (CLI Procedure)*.
4. Power and log in to the switch that you want to function in the backup role. If the switch has not previously been configured, configure it. See *Connecting and Configuring an EX Series Switch (CLI Procedure)*.
5. Power on all other member switches.
6. (EX4500 switches only) Verify the PIC mode setting:

```
user@switch> show chassis pic-mode
```

7. (EX4500 switches only) If the PIC mode was not set to Virtual Chassis mode, set the PIC mode to Virtual Chassis mode:

```
user@switch> request chassis pic-mode virtual-chassis
```

NOTE: This step is required if you are using the dedicated VCPs on the Virtual Chassis module to connect the Virtual Chassis.

The PIC mode setting has no impact on optical ports that are configured as VCPs.

8. (Mixed Virtual Chassis with EX4200 switches only) Set the Virtual Chassis mode to mixed on all member switches if your mixed Virtual Chassis includes EX4200 switches:

```
user@switch> request virtual-chassis mode mixed
```

9. If the PIC mode or the mixed mode was changed in step 7 or step 8, reboot each member switch:

```
user@switch> request system reboot
```

You can skip this step and proceed to step 11 if you did not change the PIC mode or the mixed mode.

10. After you have rebooted the switches, log into the switch that you powered on first. This switch is the master switch.
11. Run the EZSetup program on the master switch, specifying the identification parameters. See *Connecting and Configuring an EX Series Switch (CLI Procedure)*.

NOTE: The properties that you specify for the master switch apply to the entire Virtual Chassis.

12. (Optional) On the master switch, configure the virtual management Ethernet (VME) interface for out-of-band management of the Virtual Chassis, if desired:

```
[edit]
user@switch# set interfaces vme unit 0 family inet address /ip-address/mask/
```

13. On the master switch, specify the preprovisioned configuration mode:

```
[edit virtual-chassis]
user@switch# set preprovisioned
```

14. On the master switch, specify all members for the Virtual Chassis configuration, listing each switch's serial number with the desired member ID and the desired role.

NOTE: The **routing-engine** role can be assigned to any member switch, unless otherwise noted.

The **routing-engine** role can be assigned to any member switch in a mixed Virtual Chassis starting in Junos OS Release 11.4.

Ensure that you assign the **routing-engine** role to two members that are the same type of switch if you are running Junos OS Release 11.2 or 11.3..

Ensure that you assign only the **routing-engine** role to EX4500 member switches if you are running Junos OS Release 11.1.

```
[edit virtual-chassis]
user@switch# set member 0 serial-number serial-number role routing-engine
user@switch# set member 1 serial-number serial-number role routing-engine
user@switch# set member 2 serial-number serial-number role line-card
user@switch# set member 3 serial-number serial-number role line-card
user@switch# set member 4 serial-number serial-number role line-card
user@switch# set member 5 serial-number serial-number role line-card
user@switch# set member 6 serial-number serial-number role line-card
user@switch# set member 7 serial-number serial-number role line-card
user@switch# set member 8 serial-number serial-number role line-card
```



```
user@switch# set member 9 serial-number serial-number role line-card
```

15. Interconnect the member switches by using either the dedicated VCPs on the member switches (see *Connecting a Virtual Chassis Cable to an EX4200 Switch* or *Connecting a Virtual Chassis Cable to an EX4500 Switch*) or by connecting them through the optical ports that you have configured as VCPs (see [“Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port”](#) on page 260 or [“Setting an Uplink Port as a Virtual Chassis Port on an EX4500 or EX4550 Switch \(CLI Procedure\)”](#) on page 266).

NOTE: You cannot modify the mastership priority when you are using a preprovisioned configuration. The mastership priority values are generated automatically and controlled by the role that is assigned to the member switch in the configuration file.

For information on adding a switch to an existing Virtual Chassis or configuring a Virtual Chassis port (VCP) to connect member switches over long distances, see *Related Documentation*.

RELATED DOCUMENTATION

[Configuring Mastership of a Virtual Chassis | 257](#)

[Adding a New EX4200 Switch to an Existing EX4200 Virtual Chassis \(CLI Procedure\) | 236](#)

[Adding an EX4200 Switch to a Preprovisioned EX4500 Virtual Chassis or a Preprovisioned Mixed EX4200 and EX4500 Virtual Chassis \(CLI Procedure\) | 242](#)

[Adding an EX4500 Switch to a Preprovisioned EX4200 Virtual Chassis \(CLI Procedure\) | 244](#)

[Adding an EX4500 Switch to a Nonprovisioned EX4200 Virtual Chassis \(CLI Procedure\) | 246](#)

[Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port | 260](#)

[Setting an Uplink Port as a Virtual Chassis Port on an EX4500 or EX4550 Switch \(CLI Procedure\) | 266](#)

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

Installing Software on a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Switches (CLI Procedure)

You can use this procedure to upgrade or downgrade Junos OS for all member switches in an any operational mixed Virtual Chassis composed of any combination of EX4200, EX4500, or EX4550 switches.

To upgrade Junos OS for an operational mixed Virtual Chassis:

1. Download the same version of Junos OS software for each switch in the mixed Virtual Chassis.

NOTE: You must download Junos OS Release 11.4 or later if you have three or more EX4500 switches in your mixed Virtual Chassis.

NOTE: EX4500 and EX4550 switches run the same Junos OS. You only need to download one Junos OS image if you are running a mixed EX4500 and EX4550 Virtual Chassis.

2. (Optional) Back up the current software configuration to a second storage option. See the [Junos OS Installation and Upgrade Guide](#) for instructions on performing this task.
3. (Optional) Copy the software packages to the member switch acting in the master role. We recommend that you use FTP to copy the file to the `/var/tmp` directory.

This step is optional because Junos OS can also be upgraded when the software image is stored at a remote location. These instructions describe the software upgrade process for both scenarios.

4. Install the new packages on the Virtual Chassis:

```
user@switch> request system software add set [package (package)]
```

NOTE: You enter the **request system software add set [package package]** command once on the Virtual Chassis to download the software package onto all member switches in the mixed Virtual Chassis. If your mixed Virtual Chassis includes at least one EX4200 members switch, ensure that the *package* path points to one EX4200 Junos OS image and, one EX4500 Junos OS image.

You only need to download one EX4500 switch Junos OS image to upgrade a mixed Virtual Chassis because a Junos OS image for an EX4500 switch can be used to upgrade EX4500 and EX4550 switches.

Replace **package** with one of the following paths:

- For a software package in a local directory on the switch—**/var/tmp/package.tgz**.
- For a software package on a remote server:
 - **ftp://hostname/pathname/package.tgz**
 - **http://hostname/pathname/package.tgz**

where *package.tgz* is, for example, **jinstall-ex-4200-11.1R1.8-domestic-signed.tgz**.

NOTE: To abort the installation, do not reboot your Virtual Chassis; instead, finish the installation and then issue the **request system software delete package.tgz** command, where *package.tgz* is, for example, **jinstall-ex-4500-11.1R1.8-domestic-signed.tgz**. This is your last chance to stop the installation.

5. Reboot the Virtual Chassis to start the new software:

```
user@switch> request system reboot
```

6. After the reboot has completed, log in and verify that the new version of the software is properly installed for all member switches in the Virtual Chassis:

```
user@switch> show version
```

RELATED DOCUMENTATION

Adding a New Switch to an Existing EX3300 Virtual Chassis (CLI Procedure)

You can use this procedure to add an EX3300 switch to an EX3300 Virtual Chassis.

Before you begin, be sure you have:

- Mounted the new switch in a rack.
- Confirmed that the new switch is powered off.
- If you are expanding a preprovisioned configuration, made a note of the serial number (the number is on the back of the switch). You will need to edit the Virtual Chassis configuration to include the serial number of the new member switch.
- If you are expanding a preprovisioned configuration, edited the existing Virtual Chassis configuration to include the serial number of the new member switch. The parameters specified in the master Virtual Chassis configuration file are applied to the new switch after it has been interconnected to an existing member switch.

NOTE: If you are expanding a preprovisioned Virtual Chassis configuration, you can use the autoprovisioning feature to add member switches to that configuration.

- (Optional) Configured Ethernet interfaces on different member switches into the same LAG. See [“Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch”](#) on page 170

An active member switch might temporarily go down before coming back up as part of this procedure. Having traffic load-balanced across member switches using a LAG helps alleviate traffic loss during this procedure.

To add a new member switch to an existing Virtual Chassis configuration::

1. If the new member switch has been previously configured, revert that switch's configuration to the factory defaults. See *Reverting to the Default Factory Configuration for the EX Series Switch*.
2. Interconnect the unpowered new switch to one member of the existing Virtual Chassis configuration using either uplink port 2 or 3. Uplink ports 2 and 3 are configured as VCPs by default. See *Virtual Chassis Cabling Configuration Examples for EX3300 Switches*.

Connect only one VCP on the unpowered new switch to a VCP on a member switch in the existing Virtual Chassis at this point of the procedure.

NOTE: Because EX3300 switches use uplink ports configured as VCPs to form a Virtual Chassis, this step is identical for short and long distance (up to 6.2 miles) VCP connections.

3. Power on the new switch.
4. Confirm that the new member switch is now included within the Virtual Chassis configuration by checking the front-panel LCD for the member ID. It should display a member ID that is greater than 0 (1 through 5), because there is already at least one member of the Virtual Chassis configuration.

NOTE: If you are using a preprovisioned configuration, the member ID is automatically assigned to the member's serial number in the configuration file.

5. Cable the other default VCP - either uplink port 2 or 3 - on the new member switch to the Virtual Chassis.



CAUTION: If you immediately cable both VCPs on the new switch into the existing Virtual Chassis at the same time, a member switch that was already part of the Virtual Chassis might become nonoperational for several seconds. Network traffic to this switch is dropped during the downtime.

The member switch will return to the normal operational state with no user intervention, and normal operation of the Virtual Chassis will resume after this downtime.

RELATED DOCUMENTATION

Example: Expanding an EX3300 Virtual Chassis | 101

Adding a New EX4200 Switch to an Existing EX4200 Virtual Chassis (CLI Procedure)

This topic explains how to add an EX4200 switch to an existing EX4200 Virtual Chassis. For information about adding an EX4200 switch to an EX4500 Virtual Chassis or a mixed Virtual Chassis, see [“Adding an EX4200 Switch to a Preprovisioned EX4500 Virtual Chassis or a Preprovisioned Mixed EX4200 and EX4500 Virtual Chassis \(CLI Procedure\)” on page 242](#).

To add an EX4200 switch to an existing EX4200 Virtual Chassis, use the procedure that matches what you need to accomplish:

- [Adding a New Switch to an Existing Virtual Chassis Within the Same Wiring Closet | 236](#)
- [Adding a New Switch from a Different Wiring Closet to an Existing Virtual Chassis | 238](#)
- [Adding a New Switch to an Existing Preprovisioned Virtual Chassis Using Autoprovisioning and Automatic VCP Conversion | 240](#)

Adding a New Switch to an Existing Virtual Chassis Within the Same Wiring Closet

This procedure can be used to add an EX4200 switch to an EX4200 Virtual Chassis.

Before you begin, be sure you have:

- Mounted the new switch in a rack.
- Confirmed that the new switch is powered off.
- If you are expanding a preprovisioned configuration, made a note of the serial number (the number is on the back of the switch). You will need to edit the Virtual Chassis configuration to include the serial number of the new member switch.
- If you are expanding a preprovisioned configuration, edited the existing Virtual Chassis configuration to include the serial number of the new member switch. The parameters specified in the master Virtual Chassis configuration file are applied to the new switch after it has been interconnected to an existing member switch.

NOTE: After you have created a preprovisioned Virtual Chassis configuration, you can use the autoprovisioning feature to add member switches to that configuration.

- (Optional) Configured Ethernet interfaces on different member switches into the same LAG.. See [“Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch” on page 170](#)

An active member switch might temporarily go down before coming back up as part of this procedure. Having traffic load-balanced across member switches using a LAG helps alleviate traffic loss during this procedure.

To add a new member switch to an existing Virtual Chassis configuration within the same wiring closet:

1. If the new member switch has been previously configured, revert that switch's configuration to the factory defaults. See *Reverting to the Default Factory Configuration for the EX Series Switch*.
2. Interconnect the unpowered new switch to one member of the existing Virtual Chassis configuration using the dedicated Virtual Chassis ports (VCPs). Connect only one VCP on the unpowered new switch to a VCP on a member switch in the existing Virtual Chassis at this point of the procedure.
3. Power on the new switch.
4. Confirm that the new member switch is now included within the Virtual Chassis configuration by checking the front-panel LCD for the member ID. It should display a member ID that is greater than 0 (1 through 9), because there is already at least one member of the Virtual Chassis configuration.

NOTE: If you are using a preprovisioned configuration, the member ID is automatically assigned to the member's serial number in the configuration file.

5. Cable the other dedicated VCP on the new member switch to the Virtual Chassis.



CAUTION: If you immediately cable both VCPs on the new switch into the existing Virtual Chassis at the same time, a member switch that was already part of the Virtual Chassis might become nonoperational for several seconds. Network traffic to this switch is dropped during the downtime.

The member switch will return to the normal operational state with no user intervention, and normal operation of the Virtual Chassis will resume after this downtime.

Adding a New Switch from a Different Wiring Closet to an Existing Virtual Chassis

This procedure can be used to add an EX4200 switch to an EX4200 Virtual Chassis from a different wiring closet to an existing Virtual Chassis.

To add a new switch from a different wiring closet to an existing Virtual Chassis configuration, you must use a long cable to connect the members switches across wiring closets. You can use any SFP, SFP+, or XFP port and a fiber-optic cable for this purpose.

Before you begin, be sure you have:

- Installed the uplink modules needed for the Virtual Chassis configuration. See *Installing an Uplink Module in an EX4200 Switch*.
- Mounted the new switch in a rack.
- If the new member switch has been previously configured, reverted its configuration to the factory defaults. See *Reverting to the Default Factory Configuration for the EX Series Switch*.
- If you are expanding a preprovisioned configuration, made a note of the serial number (the number is on the back of the switch). You will need to edit the Virtual Chassis configuration to include the serial number of the new member switch.
- If you are expanding a preprovisioned configuration, edited the existing Virtual Chassis configuration to include the serial number of the new member switch. You can specify the role of the new member switch when you add its serial number in the Virtual Chassis configuration file. The parameters specified in the master Virtual Chassis configuration file are applied to the new switch after it has been interconnected with its uplink VCP to an existing member switch.

NOTE: After you have created a preprovisioned Virtual Chassis configuration, you can use the autoprovisioning feature to add member switches to that configuration.

To add a new member switch that is going to be interconnected with the existing Virtual Chassis configuration across wiring closets:

1. Power on the new switch.
2. Connect a laptop or terminal to the console port of the switch, or use EZSetup on the LCD Panel of the standalone switch to specify temporary identification parameters. (When you interconnect the new member switch with the existing Virtual Chassis configuration, the master will overwrite and disable any specified parameters that conflict with the Virtual Chassis parameters or assigned member configuration.)
3. Use the CLI or the J-Web interface to set one uplink module port as a VCP:


```
user@switch> request virtual-chassis vc-port set pic-slot 1 port 0
```

NOTE: If you are using a nonprovisioned configuration, you might configure the new member switch with a mastership priority value that is less than that of the existing member switches. Doing so ensures that the new member switch will function in a linecard role when it is included within the Virtual Chassis configuration.

4. Power off the new switch.
5. Interconnect the new member switch to one existing member switch in the Virtual Chassis configuration using one of the uplink module ports that you have configured as a VCP. Connect only one VCP on the unpowered new switch to a VCP on a member switch in the existing Virtual Chassis at this point of the procedure.
6. Power on the new member switch.
7. Confirm that the new member switch is now included within the Virtual Chassis configuration by checking the front-panel LCD for the member ID. It should display a member ID that is greater than 0 (1 through 9), because there is already at least one member of the Virtual Chassis configuration.

NOTE: If you are using a preprovisioned configuration, the member ID is automatically assigned to the member's serial number in the configuration file.

8. Cable another user-configured VCP on the new member switch to the Virtual Chassis, if desired.



CAUTION: If you immediately cable both VCPs on the new switch into the existing Virtual Chassis at the same time, a member switch that was already part of the Virtual Chassis might become nonoperational for several seconds. Network traffic to this switch is dropped during the downtime.

The member switch will return to the normal operational state with no user intervention, and normal operation of the Virtual Chassis will resume after this downtime.

Adding a New Switch to an Existing Preprovisioned Virtual Chassis Using Autoprovisioning and Automatic VCP Conversion

This procedure can be used to add an EX4200 switch to an existing EX4200 Virtual Chassis using autoprovisioning, where after the new switch is provisioned and cabled into the Virtual Chassis, the interconnecting links automatically convert into VCP links.

Before you begin, be sure you have:

- Installed the uplink modules needed for the Virtual Chassis configuration.
- Mounted the new switch in a rack.
- Ensured that the preprovisioned Virtual Chassis configuration has an active master. For more information, see [“Example: Configuring an EX4200 Virtual Chassis Using a Preprovisioned Configuration File” on page 150](#).
- On the master, configured the Link Level Discovery Protocol (LLDP) on the uplink module ports that will be used as VCPs. LLDP is configured by default but might have been disabled. Both sides of the new links exchange LLDP messages to accomplish automatic VCP conversion. To configure LLDP, see *Configuring LLDP (CLI Procedure)*.
- Ensured that the new member switch has the factory-default configuration. If the new member switch has been previously configured, revert its configuration to the factory defaults. See *Reverting to the Default Factory Configuration for the EX Series Switch*.
- Made a note of the serial number (the number is on the back of the switch). You will need to edit the Virtual Chassis configuration to include the serial number of the new member switch.
- Edited the existing Virtual Chassis preprovisioned configuration to include the serial number of the new member switch. The parameters specified in the master Virtual Chassis configuration file are applied to the new member switch after it has been interconnected through its uplink VCP to an existing member switch.
- Prepared an existing member switch to interconnect with the new switch through an uplink module port by ensuring that port is not set as a VCP. One of the conditions for automatic VCP conversion to be invoked is that the ports on both sides of the new link must not already be configured as VCPs.



CAUTION: When automatic VCP conversion is enabled in a Virtual Chassis with switches that have dedicated VCPs (EX4200, EX4500, or EX4550 Virtual Chassis), if network or uplink ports are automatically converted into VCPs to create a redundant link with a dedicated VCP connection between the same two Virtual Chassis members, you must reboot the Virtual Chassis to avoid creating a traffic loop within the Virtual Chassis. (The same issue can occur even if the ports are manually converted into VCPs to create the redundant VCP link with a dedicated VCP link, so the reboot is required to avoid traffic looping in that case as well.)

- Ensured that the operational modes of the uplink modules on the existing member switch and the new member switch match.
- Confirmed that the new member switch is powered off.

If the preceding conditions are not met, autoprovisioning will not work and you will need to manually configure uplink module ports on the switch to be added to the configuration to be VCPs. For more information, see [“Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port” on page 260.](#)

To add a switch to an existing preprovisioned Virtual Chassis configuration using the autoprovisioning feature:

1. Interconnect the unpowered new switch to one member of the existing Virtual Chassis configuration. Only connect one VCP on the unpowered new switch to a VCP on a member switch in the existing Virtual Chassis at this point of the procedure.
2. Power on the new member switch.
3. Confirm that the new member switch is now included in the Virtual Chassis configuration by checking the front-panel LCD for the member ID. It should display a member ID in the range from 0 through 9. The member ID is automatically assigned to the new member switch's serial number in the configuration file.
4. Cable the other VCP on the new member switch to the Virtual Chassis.



CAUTION: If you immediately cable both VCPs on the new switch into the existing Virtual Chassis at the same time, a member switch that was already part of the Virtual Chassis might become nonoperational for several seconds. Network traffic to this switch is dropped during the downtime.

The member switch will return to the normal operational state with no user intervention, and normal operation of the Virtual Chassis will resume after this downtime.

RELATED DOCUMENTATION

[Example: Expanding an EX4200 Virtual Chassis in a Single Wiring Closet | 107](#)

[Example: Setting Up a Multimember EX4200 Virtual Chassis Access Switch with a Default Configuration | 124](#)

[Example: Configuring an EX4200 Virtual Chassis Interconnected Across Multiple Wiring Closets | 131](#)

[Example: Configuring an EX4200 Virtual Chassis Using a Preprovisioned Configuration File | 150](#)

[Example: Configuring Automatic Software Update on EX4200 Virtual Chassis Member Switches | 202](#)

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

Adding an EX4200 Switch to a Preprovisioned EX4500 Virtual Chassis or a Preprovisioned Mixed EX4200 and EX4500 Virtual Chassis (CLI Procedure)

This topic explains how to add an EX4200 switch to an already configured and operational EX4500 Virtual Chassis or to a mixed EX4200 and EX4500 Virtual Chassis that was configured using a preprovisioned configuration.

To add an EX4200 switch to an EX4500 Virtual Chassis or a mixed EX4200 and EX4500 Virtual Chassis that was configured using a preprovisioned configuration:

1. Power on the EX4200 switch that will be added to the Virtual Chassis.

2. Set the Virtual Chassis mode to mixed:

```
user@switch> request virtual-chassis mode mixed
```

3. Reboot the EX4200 switch.

```
user@switch> request system reboot
```

4. Log in to the EX4500 Virtual Chassis or the mixed EX4200 and EX4500 Virtual Chassis.

5. (EX4500 Virtual Chassis only) Set the Virtual Chassis mode to mixed for all Virtual Chassis member switches:

```
user@switch> request virtual-chassis mode mixed all-members
```

NOTE: Each member switch will already have been configured in mixed mode in a mixed EX4200 and EX4500 Virtual Chassis.

6. (EX4500 Virtual Chassis only) Reboot all member switches in the EX4500 Virtual Chassis:

```
user@switch> request system reboot all-members
```

7. Add the EX4200 switch to the preprovisioned configuration:

```
[edit virtual-chassis]
user@SWA-0# set member 5 serial-number serial-number role role
```

8. If you are replacing an EX4500 switch in the **routing-engine** role with an EX4200 switch, change the role of the EX4500 switch to **line-card**:

```
[edit virtual-chassis]
user@switch# replace member 0 serial-number serial-number role routing-engine with member 0
serial-number serial-number role line-card
user@switch# replace member 1 serial-number serial-number role routing-engine with member 1
serial-number serial-number role line-card
```

9. Commit the configuration:

```
user@switch# commit synchronize
```

10. Cable one dedicated or user-configured Virtual Chassis port (VCP) on the new member switch to the existing Virtual Chassis. See *Connecting a Virtual Chassis Cable to an EX4200 Switch* or [“Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port” on page 260](#).
11. Wait for the new switch to become operational in the Virtual Chassis. Monitor the **show virtual-chassis** command output to confirm the new switch is recognized by the Virtual Chassis and is in the **Prsnt** state.



CAUTION: If you immediately cable both VCPs on the new switch into the existing Virtual Chassis at the same time, a member switch that was already part of the Virtual Chassis might become nonoperational for several seconds. Network traffic to this switch is dropped during the downtime.

The member switch will return to the normal operational state with no user intervention, and normal operation of the Virtual Chassis will resume after this downtime.

12. Cable the other dedicated or user-configured VCP on the new member switch to the Virtual Chassis.

RELATED DOCUMENTATION

[Configuring Mastership of a Virtual Chassis | 257](#)

[Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port | 260](#)

Adding an EX4500 Switch to a Preprovisioned EX4200 Virtual Chassis (CLI Procedure)

An EX4500 switch can be added to an EX4200 Virtual Chassis to create a mixed EX4200 and EX4500 Virtual Chassis. This topic explains how to add an EX4500 switch to an already configured and operational EX4200 Virtual Chassis.

To add an EX4500 switch to an EX4200 Virtual Chassis that was configured using a preprovisioned configuration:

1. Power on the EX4500 switch with the installed Virtual Chassis module.
2. Verify the PIC mode setting:

```
user@switch> show chassis pic-mode
```

3.

NOTE: Step 3 is required only if you are using the dedicated VCPs on the Virtual Chassis module of the EX4500 switch to connect the Virtual Chassis.

If the PIC mode was not set to Virtual Chassis mode, set the PIC mode to Virtual Chassis mode:

```
user@switch> request chassis pic-mode virtual-chassis
```

4. Set the Virtual Chassis mode to mixed:

```
user@switch> request virtual-chassis mode mixed
```

5. Reboot the EX4500 switch.

```
user@switch> request system reboot
```

6. Log in to the EX4200 Virtual Chassis.

7. Set the Virtual Chassis mode to mixed for all member switches:

```
user@switch> request virtual-chassis mode mixed all-members
```

8. Reboot the Virtual Chassis.

```
user@switch> request system reboot all-members
```

9. Log in to the EX4200 Virtual Chassis after the reboot is complete.

10. On the master switch, add the EX4500 switch to the preprovisioned configuration:

```
[edit virtual-chassis]
user@switch# set member member-id serial-number serial-number role role
```

11. If you are using the EX4500 switch in the master role in place of an EX4200 switch, change the EX4200 switch in the **routing-engine** role to the **line-card** role:

```
[edit virtual-chassis]
user@switch# replace member 0 serial-number serial-number role routing-engine with member 0
serial-number serial-number role line-card
user@switch# replace member 1 serial-number serial-number role routing-engine with member 1
serial-number serial-number role line-card
```

12. Commit the configuration:

```
user@switch# commit synchronize
```

13. Interconnect the EX4500 switch to one member of the existing Virtual Chassis configuration. See *Connecting a Virtual Chassis Cable to an EX4200 Switch* and *Connecting a Virtual Chassis Cable to an EX4500 Switch*.

Connect only one VCP on the EX4500 switch to a VCP on a member switch in the existing Virtual Chassis at this point of the procedure.

14. Confirm that the new member switch is now included in the Virtual Chassis configuration by checking the front-panel LCD for the member ID. It should display a member ID in the range from 0 through 9. The member ID is automatically assigned to the new member switch's serial number in the configuration file.

15. Cable the other VCP on the Virtual Chassis of the EX4500 switch to the Virtual Chassis.



CAUTION: If you immediately cable both VCPs on the new switch into the existing Virtual Chassis at the same time, a member switch that was already part of the Virtual Chassis might become nonoperational for several seconds. Network traffic to this switch is dropped during the downtime.

The member switch will return to the normal operational state with no user intervention, and normal operation of the Virtual Chassis will resume after this downtime.

RELATED DOCUMENTATION

[Adding an EX4500 Switch to a Nonprovisioned EX4200 Virtual Chassis \(CLI Procedure\) | 246](#)

[Configuring Mastership of a Virtual Chassis | 257](#)

[Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches \(CLI Procedure\) | 228](#)

[Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port | 260](#)

Adding an EX4500 Switch to a Nonprovisioned EX4200 Virtual Chassis (CLI Procedure)

An EX4500 switch can be added to an EX4200 Virtual Chassis to create a mixed EX4200 and EX4500 Virtual Chassis.

This topic explains how to add an EX4500 switch to an already configured and operational EX4200 Virtual Chassis that was configured using a nonprovisioned configuration.

Before you begin adding EX4500 switches to the Virtual Chassis:

- Ensure that a Virtual Chassis module is installed in the EX4500 switch.

To add an EX4500 switch to an EX4200 Virtual Chassis that was configured using a nonprovisioned configuration:

1. Power on the EX4500 switch.
2. Verify the PIC mode setting:

```
user@switch> show chassis pic-mode
```


NOTE: This step is required only if you are using the dedicated VCPs on the Virtual Chassis module of the EX4500 switch to connect the Virtual Chassis.

3. If the PIC mode was not set to Virtual Chassis mode, set the PIC mode to Virtual Chassis mode:

```
user@switch> request chassis pic-mode virtual-chassis
```

4. Set the Virtual Chassis mode to mixed:

```
user@switch> request virtual-chassis mode mixed
```

5. Reboot the EX4500 switch.

```
user@switch> request system reboot
```

6. Log in to the EX4200 Virtual Chassis.

7. Set the Virtual Chassis mode to mixed for all member switches:

```
user@switch> request virtual-chassis mode mixed all-members
```

8. Reboot all member switches in the Virtual Chassis.

```
user@switch> request system reboot all-members
```

9. After all members have rebooted, interconnect one dedicated VCP on the EX4500 switch with one dedicated VCP of a member EX4200 switch in the EX4200 Virtual Chassis. . See *Connecting a Virtual Chassis Cable to an EX4200 Switch* and *Connecting a Virtual Chassis Cable to an EX4500 Switch*.

NOTE: You can also connect an EX4500 switch into the Virtual Chassis by configuring an uplink port as a VCP. See [“Setting an Uplink Port as a Virtual Chassis Port on an EX4500 or EX4550 Switch \(CLI Procedure\)”](#) on page 266.

10. Log in to the Virtual Chassis.

11. Wait for the new switch to become operational in the Virtual Chassis. Monitor the **show virtual-chassis** command output to confirm the new switch is recognized by the Virtual Chassis and is in the **Prsnt** state.



CAUTION: If you immediately cable both VCPs on the new switch into the existing Virtual Chassis at the same time, a member switch that was already part of the Virtual Chassis might become nonoperational for several seconds. Network traffic to this switch is dropped during the downtime.

The member switch will return to the normal operational state with no user intervention, and normal operation of the Virtual Chassis will resume after this downtime.

12. Cable the other dedicated or user-configured VCP on the new member switch to the Virtual Chassis.

13. (Optional) Set the mastership priority of the EX4500 switch. The switches with the highest mastership priorities assume the master role and backup roles.

```
[edit virtual-chassis]
user@switch# set member member-id mastership-priority mastership-priority
```

14. (Optional) From the master switch, set the mastership priority of the other member switches:

```
[edit virtual-chassis]
user@switch# replace member member-id mastership-priority mastership-priority with member member-id mastership-priority mastership-priority
```

RELATED DOCUMENTATION

[Example: Adding an EX4500 Switch to a Nonprovisioned Virtual Chassis | 119](#)

[Adding an EX4200 Switch to a Preprovisioned EX4500 Virtual Chassis or a Preprovisioned Mixed EX4200 and EX4500 Virtual Chassis \(CLI Procedure\) | 242](#)

[Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches \(CLI Procedure\) | 228](#)

Removing or Replacing a Member Switch of a Virtual Chassis Configuration

You can remove or replace a member switch in a Virtual Chassis without disrupting network service on the other member switches. You can retain the existing configuration of the member switch and apply it

to a new member switch, or you can free up the member ID and make it available for assignment to a new member switch.

NOTE: When you add or delete member switches in a Virtual Chassis configuration, internal routing changes might cause temporary traffic loss for a few seconds. Also, if removing a member switch changes a mixed Virtual Chassis into a non-mixed Virtual Chassis, you must remove the mixed mode setting on all member switches of the Virtual Chassis and reboot the Virtual Chassis; network services are disrupted until the Virtual Chassis is up again.

This topic does not apply to:

- A Virtual Chassis Fabric (VCF).

Instead, see *Removing a Device From a Virtual Chassis Fabric* for VCF information.

- A mixed Virtual Chassis that contains EX4200, EX4500, or EX4550 switches.

Instead, see [“Removing an EX4200, EX4500, or EX4550 Switch From a Mixed Virtual Chassis \(CLI Procedure\)” on page 256](#).

- An EX8200 Virtual Chassis.

To remove or replace a member switch of any other EX Series or QFX Series Virtual Chassis, use one of the following procedures that matches what you want to do.

- [Remove a Member Switch and Make Its Member ID Available for Reassignment to a Different Switch | 249](#)
- [Remove, Repair, and Reinstall the Same Switch | 251](#)
- [Remove a Member Switch, Replace It with a Different Switch, and Reapply the Old Configuration | 252](#)
- [Replace a Member Switch With a Different Type of Switch That Changes the Virtual Chassis to Mixed Mode | 255](#)

Remove a Member Switch and Make Its Member ID Available for Reassignment to a Different Switch

To remove a switch from a Virtual Chassis without replacing it:

1. Power off and disconnect the member switch you want to remove from the Virtual Chassis.
2. If the Virtual Chassis configuration is preprovisioned, on the Virtual Chassis master, remove the removed switch's member setting from the preprovisioned configuration.

```
[edit virtual-chassis]
user@vc-master# delete member removed-member-id
```

If the Virtual Chassis configuration is nonprovisioned, change the **mastership-priority** values of each member switch as needed to reconfigure the Virtual Chassis roles. See [“Configuring Mastership of a Virtual Chassis” on page 257](#).

3. (Optional) If removing a member switch leaves only two remaining member switches in the Virtual Chassis, we recommend you disable split detection in a two-member Virtual Chassis. See [“Disabling Split and Merge in a Virtual Chassis” on page 273](#) for details.
4. Commit any configuration changes made in previous steps.
5. (For a mixed Virtual Chassis only) If removing this member switch changes the Virtual Chassis from a mixed to a non-mixed Virtual Chassis, you must also remove the mixed-mode setting from the Virtual Chassis. See [“Understanding Mixed EX Series and QFX Series Virtual Chassis” on page 35](#) for details on the combinations of switches that comprise a mixed Virtual Chassis. You must reboot the Virtual Chassis for the mode change to take effect. To do this, you can include the **reboot** option with the **request virtual-chassis mode mixed disable** command that turns off mixed mode, or reboot all member switches of the Virtual Chassis separately when ready to do so, as shown below.

```
user@vc-master> request virtual-chassis mode mixed disable all-members
user@vc-master> request system reboot all-members
```

NOTE: Step 7 describes how to remove the mixed mode and other settings from the removed switch if needed.

6. When you remove a member switch from a Virtual Chassis configuration, the master keeps that member switch’s member ID in reserve. Use the following command on the Virtual Chassis master to make that member ID available for reassignment:

```
user@vc-master> request virtual-chassis recycle member-id member-id
```

7. If you want to use the removed switch as a standalone switch, you must remove any Virtual Chassis configuration items and settings on that switch. For a smooth transition to a new role as a standalone switch, we recommend to revert the switch to its default factory configuration using the **request system zeroize** command, and then apply the configuration items you want on the switch.

If you do not want to revert to default factory settings, use commands such as the following to remove Virtual Chassis settings for the mode and VCPs from the removed switch:

- a. If you removed the switch from a mixed-mode Virtual Chassis that is not an EX4300 mixed Virtual Chassis, disable the mixed-mode setting on the switch as follows:

```
user@switch> request virtual-chassis mode mixed disable
```

If you removed a non-multigigabit model EX4300 switch from a mixed EX4300 Virtual Chassis that contains multigigabit EX4300 switches (EX4300-48MP), when you disable mixed mode, you must also disable the special **ieee-clause-82** port mode on the removed switch if you want to reconfigure it as a standalone switch or use it in any other type of mixed Virtual Chassis or non-mixed Virtual Chassis. Otherwise, the VCPs on the switch will not connect with other Virtual Chassis members or those ports will not operate properly as network ports.

In this case, to disable mixed mode and the port mode on the switch:

```
user@switch> request virtual-chassis mode mixed ieee-clause-82 disable
```

See [“Understanding EX4300 Multigigabit and Other EX4300 Model Switches in a Mixed EX4300 Virtual Chassis” on page 41](#) for more information about this special port mode on EX4300 switches.

- b. Delete the VCP settings for any ports that were used as VCPs:

```
user@switch> request virtual-chassis vc-port delete pic-slot pic-slot port port-number
```

- c. Reboot the standalone switch for settings such as mode changes to take effect.

Remove, Repair, and Reinstall the Same Switch

If you need to repair a member switch, you can remove it from the Virtual Chassis configuration without disrupting network service for the other member switches. The master stores the configuration for the member ID so that it can be reapplied when the member switch (with the same base MAC address) is reconnected.

To remove, repair, and reinstall the member switch:

1. Power off and disconnect the member switch to be repaired.
2. Repair, as necessary.
3. Reconnect the switch and power it on.

Remove a Member Switch, Replace It with a Different Switch, and Reapply the Old Configuration

If you are unable to repair a member switch, you can replace it with a different member switch of the same type while retaining the previous configuration. The master stores the configuration of the member switch that was removed. When you connect a different member switch, the master assigns a new member ID, but the old configuration is still stored under the previous member ID of the previous member switch.

To remove and replace a switch and reapply the old configuration:

1. Power off and disconnect the member switch to be replaced.

NOTE: See Step 7 in [“Remove a Member Switch and Make Its Member ID Available for Reassignment to a Different Switch” on page 249](#) for information on how to disable Virtual Chassis settings from the removed switch if you want to use that switch in a different configuration.

2. If the replacement member switch has been previously configured, revert that switch’s configuration to the factory defaults. See the **request system zeroize** command.

The replacement member switch should be powered on and running with the factory default configuration at the end of this step.

3. (Recommended for a QFX5100 Virtual Chassis under certain conditions) When you add or replace a QFX5100-24Q switch that is configured in the Routing Engine role in a QFX5100 Virtual Chassis, if the new switch has two EX4600-EM-8F expansion modules, we recommend that you set the mastership priorities on the routing engine members and the new switch to prevent a mastership switchover to the new switch until after the new switch is completely initialized in the Virtual Chassis.

Before interconnecting the new switch into the Virtual Chassis in this case, see *Add or Replace a QFX5100-24Q Switch with Two Expansion Modules in a QFX5100 Virtual Chassis* for details on why, when, and how you should do this step.

NOTE: You might need to do this even if the new switch has the default factory configuration.

4. (Required when automatic software update is not enabled on the Virtual Chassis and the new member switch is running a version of Junos OS that is different than the version of Junos OS running on the Virtual Chassis) Ensure that the correct version of Junos OS is or will be installed on the new member switch by performing *either* of the following tasks:

- Enable automatic software update on the Virtual Chassis. See [“Configuring Automatic Software Update on Virtual Chassis Member Switches” on page 275](#). The Virtual Chassis will automatically

update the software on the replacement switch in a later step when it is interconnected and recognized as part of the Virtual Chassis. The replacement switch does not require any action in this case for this step.

- Install the version of Junos OS running on the Virtual Chassis onto the new member switch before interconnecting it into the Virtual Chassis. For EX series switches, see *Installing Software on an EX Series Switch with a Virtual Chassis or Single Routing Engine (CLI Procedure)*, or for QFX Series switches, see *Software Installation and Upgrade Overview* and *Installing Software Packages on QFX Series Devices*. In this case, at the end of this step, the replacement switch will be running with the new version of the software and should have the factory default configuration.



CAUTION: You can only set up a QFX5110 Virtual Chassis with both QFX5110 and QFX5100 switches if they are running the same Junos OS image that includes “-qfx-5e-” in the software package filename (from the Junos OS Software Center). If the switch you are replacing in a QFX5110 Virtual Chassis is a QFX5100 switch that you previously installed with a “-qfx-5-” Junos OS image file, you *must* upgrade the replacement switch to a “-qfx-5e-” image instead before inserting it into the QFX5110 Virtual Chassis. See *Upgrading a QFX5100 Switch with a USB Device to Join a QFX5110 Virtual Chassis or Virtual Chassis Fabric*. The automatic software update feature can’t update a “-qfx-5-” image to a “-qfx-5e-” image.

5. Connect one link from the replacement member switch to the Virtual Chassis as follows, depending on which type of ports you are using:
 - If you are interconnecting a switch using dedicated Virtual Chassis Ports (VCPs), connect one dedicated VCP on the replacement member switch to a dedicated VCP on another member switch in the Virtual Chassis.
 - If you are interconnecting a switch using optical ports configured as VCPs:

On the replacement switch, configure the optical ports that you are using to connect to the Virtual Chassis as VCPs. (You should also configure the optical ports on the existing member switches in the Virtual Chassis where the replacement member switch will be connected, if they are not already configured.) To configure an optical port as a VCP:

```
user@switch> request virtual-chassis vc-port set pic-slot 1 port port-number
```

Connect one configured optical port VCP on the replacement switch to a configured optical port VCP on another member switch in the Virtual Chassis.

NOTE: You can set optical port VCPs on a standalone switch before interconnecting one link into an existing Virtual Chassis, or set them after connecting the link. In either case, you must set the ports as VCPs for the master to detect and complete the process of adding the switch as a member. For more information on setting up VCPs on EX Series switches, see [“Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port” on page 260](#), and for details on which ports can be configured as VCPs in a QFX Series Virtual Chassis, see [“Understanding Virtual Chassis Components” on page 19](#).

6. Confirm that the new member switch is now included in the Virtual Chassis configuration on switches with a front-panel LCD by checking the display for the member ID. It should show a member ID in the range from 0 through 9.

If you are using a switch that does not have an LCD interface, enter the **show virtual-chassis** command and view the output to confirm the switch is part of the Virtual Chassis configuration.

7. Cable the other VCP on the replacement member switch into the Virtual Chassis based on how you planned to interconnect the switch in Step 5 of this procedure.



CAUTION: If you immediately cable both VCPs on the new switch into the existing Virtual Chassis at the same time, a member switch that was already part of the Virtual Chassis might become nonoperational for several seconds. Network traffic to this switch is dropped during the downtime.

The member switch will return to the normal operational state with no user intervention, and normal operation of the Virtual Chassis will resume after this downtime.

8. IF you need to update the new member switch's current member ID to the member ID of the switch that was removed from the Virtual Chassis configuration:
 - In a nonprovisioned Virtual Chassis, issue the **request virtual-chassis renumber** command on the master member switch.
 - In a preprovisioned Virtual Chassis, on the master member switch, reconfigure the member information for the new member switch using the **[edit virtual-chassis] member** configuration statement.

To use the same member ID as the member that was replaced, associate the new switch's serial number (on the back of the switch) with the replaced member ID, as follows:

```
[edit virtual-chassis]
user@switch# set member replaced-member-ID serial-number new-member-serial-number
```


NOTE: You can alternatively use the **replace** configuration editing command to substitute the serial number of the replacement member switch for the replaced member's serial number in the existing configuration item for the replaced member.

To configure the new member switch with a different member ID, associate the new switch's serial number with the desired member ID and then delete the configuration item for the replaced member switch, as follows:

```
[edit virtual-chassis]
user@switch# set member new-member-ID serial-number new-member-serial-number
user@switch# delete member replaced-member-ID
```

Replace a Member Switch With a Different Type of Switch That Changes the Virtual Chassis to Mixed Mode

If you want to replace a member switch with a different type of switch that changes the Virtual Chassis from a non-mixed to a mixed Virtual Chassis:

1. Remove the member switch as described in [“Remove a Member Switch and Make Its Member ID Available for Reassignment to a Different Switch”](#) on page 249.
2. Use the configuration procedure for *adding a new switch to an existing Virtual Chassis* based on the type of switch you are adding. (See the list of related documentation at the bottom of this page.)

See [“Understanding Mixed EX Series and QFX Series Virtual Chassis”](#) on page 35 for the combinations of switches that comprise a mixed Virtual Chassis.

RELATED DOCUMENTATION

Adding a New Switch to an Existing EX2300, EX3400, or EX4300 Virtual Chassis

Adding an EX4600 Switch to a Mixed or Non-mixed Virtual Chassis

Adding a New Switch to an Existing EX4650 or QFX Series Virtual Chassis

[Adding a New EX4200 Switch to an Existing EX4200 Virtual Chassis \(CLI Procedure\) | 236](#)

[Adding an EX4200 Switch to a Preprovisioned EX4500 Virtual Chassis or a Preprovisioned Mixed EX4200 and EX4500 Virtual Chassis \(CLI Procedure\) | 242](#)

[Adding an EX4500 Switch to a Preprovisioned EX4200 Virtual Chassis \(CLI Procedure\) | 244](#)

[Adding an EX4500 Switch to a Nonprovisioned EX4200 Virtual Chassis \(CLI Procedure\) | 246](#)

Adding or Replacing a Member Switch or an External Routing Engine in an EX8200 Virtual Chassis (CLI Procedure)

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis](#) | 334

[Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port](#) | 260

Removing an EX4200, EX4500, or EX4550 Switch From a Mixed Virtual Chassis (CLI Procedure)

This topic explains how to remove a switch from a mixed Virtual Chassis. It also explains how to reconfigure the Virtual Chassis in cases in which you are removing the switches to convert a mixed Virtual Chassis into an EX4200 Virtual Chassis, an EX4500 Virtual Chassis, or an EX4550 Virtual Chassis.

If you want to replace a member switch of a Virtual Chassis that only contains the same type of member switches, see [“Removing or Replacing a Member Switch of a Virtual Chassis Configuration” on page 248](#).

To remove a switch from a mixed Virtual Chassis:

1. Power off and disconnect the member switch that is being removed from the Virtual Chassis.
2. If the Virtual Chassis configuration was preprovisioned, remove the switch from the preprovisioned configuration. See [“Removing or Replacing a Member Switch of a Virtual Chassis Configuration” on page 248](#). If the Virtual Chassis was nonprovisioned, change the mastership-priority values of each member switch as needed to reconfigure the Virtual Chassis roles. See [“Configuring Mastership of a Virtual Chassis” on page 257](#).

3.

NOTE: You only have to set mixed mode when configuring an EX4200 switch into a Virtual Chassis that has EX4500 or EX4550 switches. You, therefore, do not have to have this setting unless an EX4200 switch is in your Virtual Chassis.

If you are removing the last EX4200 switch from a mixed Virtual Chassis, disable mixed Virtual Chassis mode for all of the switches in the Virtual Chassis:

```
user@switch> request virtual-chassis mode mixed disable all-members
```

Reboot all member switching the Virtual Chassis to complete this step:

```
user@switch> request system reboot all-members
```

4. If you want to place the removed switch back onto the network as a standalone switch, disable mixed Virtual Chassis mode on the switch:

```
user@switch> request virtual-chassis mode mixed disable
```

5. (EX4500 switch only) Set the PIC mode on the removed switch to **intraconnect**:

```
user@switch> request chassis pic-mode intraconnect
```

You only need to perform this step if you want to put the EX4500 switch back onto the network as a standalone switch.

6. Reboot the standalone switch so the new settings can take effect.

Configuring Mastership of a Virtual Chassis

NOTE: This topic applies to all QFX Virtual Chassis and all EX Series Virtual Chassis except EX8200 Virtual Chassis.

A Virtual Chassis configuration has two Routing Engines—one is the switch in the master Routing Engine role and the other is the switch in the backup Routing Engine role. The remaining members operate in the linecard role. You can designate the role (master, backup, or linecard) that a member switch performs within any Virtual Chassis whether or not you are using a preprovisioned configuration. For details on which switches in a mixed Virtual Chassis we recommend or require you to configure into the master or backup Routing Engine role, see [“Understanding Mixed EX Series and QFX Series Virtual Chassis” on page 35](#).

NOTE: We recommend that you always use **commit synchronize** rather than **commit** to save configuration changes for a Virtual Chassis to ensure that the changes are saved on both Routing Engines.

- [Configuring Mastership Using a Preprovisioned Configuration File | 258](#)
- [Configuring Mastership Using a Configuration File That Is Not Preprovisioned | 259](#)

Configuring Mastership Using a Preprovisioned Configuration File

To configure mastership using a preprovisioned configuration:

1. Note the serial numbers of the switches that you want to function as the master and backup Routing Engines.

NOTE: Serial number values are case-sensitive.

2. Power on only the switch that you want to function as the master Routing Engine.

3. Edit the configuration to specify the preprovisioned configuration mode:

```
[edit virtual-chassis]
user@switch# set preprovisioned
```

4. Specify the serial numbers of the member switches that you want to function as master and backup, specifying their role as **routing-engine**:

```
[edit]
user@switch# set virtual-chassis member 0 serial-number abc123 role routing-engine
user@switch# set virtual-chassis member 1 serial-number def456 role routing-engine
```

NOTE: You cannot directly modify the mastership priority value when you are preprovisioning a Virtual Chassis. The mastership priority values are generated automatically and controlled by the role that is assigned to the member switch in the configuration file. The two members assigned the **routing-engine** role are assigned the same mastership priority value, **128**. However, the member that was powered on first gets priority in the master election algorithm. See [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#). Only two members can be configured with the **routing-engine** role.

5. Specify the serial numbers of any other member switches you are including in the Virtual Chassis configuration. You can also explicitly configure their role as **line-card**.

Configuring Mastership Using a Configuration File That Is Not Preprovisioned

To configure mastership of the Virtual Chassis through a configuration that is not preprovisioned:

1. Power on only the switch that you want to function as the master Routing Engine.
2. Configure the highest possible mastership priority value (**255**) for the member that you want to function as the master Routing Engine:

```
[edit virtual-chassis]
user@switch# set member 0 mastership-priority 255
```

3. Configure the same mastership priority value (continue to edit the Virtual Chassis configuration on the master) for the member that you want to be the backup Routing Engine:

```
[edit virtual-chassis]
user@switch# set member 1 mastership-priority 255
```

NOTE: You should assign the same (highest) mastership priority value to both the master and backup Routing Engine members for reliable graceful Routing Engine switchover (GRES) operation. This and the other mastership election considerations also help keep mastership from switching back and forth rapidly between the two members under failover conditions.

4. Use the default mastership priority value (**128**) for the remaining member switches or configure the mastership priority to a value that is lower than the value specified for members acting in the master and backup Routing Engine roles.

RELATED DOCUMENTATION

[Understanding Mixed EX Series and QFX Series Virtual Chassis | 35](#)

[Configuring an EX4650 or a QFX Series Virtual Chassis](#)

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

[Adding a New EX4200 Switch to an Existing EX4200 Virtual Chassis \(CLI Procedure\) | 236](#)

[Adding an EX4200 Switch to a Preprovisioned EX4500 Virtual Chassis or a Preprovisioned Mixed EX4200 and EX4500 Virtual Chassis \(CLI Procedure\) | 242](#)

[Adding an EX4500 Switch to a Preprovisioned EX4200 Virtual Chassis \(CLI Procedure\) | 244](#)

[Adding an EX4500 Switch to a Nonprovisioned EX4200 Virtual Chassis \(CLI Procedure\) | 246](#)

Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port

Use the procedures described in this topic to set up Virtual Chassis ports (VCPs) to connect two switches together in an EX Series or a QFX Series Virtual Chassis.

Switches that can be members of a Virtual Chassis might have:

- Dedicated VCPs—Ports you can use only as VCPs.
- Default-configured VCPs—Ports that are already configured into VCPs with the default factory configuration. On some switches these ports can alternatively be converted back into and used as uplink or network ports.
- Uplink or network ports that are also supported as VCPs—Ports you can configure into VCPs and convert back into uplink or network ports as needed.

If you don't have or are not using dedicated or default-configured VCPs, you need to convert supported ports into VCPs to interconnect Virtual Chassis members. When a switch has uplink or network ports that can be converted into VCPs, you can use some ports as VCPs and others as network ports or uplinks to other devices in trunk mode. When you set a port as a VCP, you can't use it for any other purpose.

You can set ports as VCPs on a standalone switch before interconnecting any links into a Virtual Chassis, or set them after interconnecting one link on the switch into an existing Virtual Chassis. Either way, after the VCP is connected into the Virtual Chassis, the master switch uses the link to detect the switch and complete the process of adding it as a member.

NOTE: Most Virtual Chassis also support *autoprovisioning*, which means that under certain conditions, when you interconnect a member switch into an existing Virtual Chassis, ports that are supported as VCPs will convert automatically into VCPs when you cable the link. This is an easy way to add member switches to a Virtual Chassis without needing to explicitly configure VCPs, but it only works if the ports on *both* sides of the link are *not already configured as VCPs*. If you want to use autoprovisioning, you might need to delete VCP settings (whether default-configured or those you previously set explicitly) on either or both sides of the links you are using to interconnect the new member switch. See [“Automatic Virtual Chassis Port \(VCP\) Conversion” on page 27](#) for details.

See [“Virtual Chassis Port Options” on page 24](#) for a list of supported VCP ports on each type of switch. For complete details about where a switch has dedicated VCPs, default-configured VCPs, or ports that can be configured as VCPs, and what transceivers and cables are supported to use for VCP connections

on that switch, see the hardware documentation for the switch. In general, even if a port is supported as a VCP, you can't use it as a VCP if it's channelized.

- [When to Configure VCPs | 261](#)
- [Prepare Virtual Chassis Member Switches Before Converting VCPs | 261](#)
- [Set Uplink Ports to Form VCP Links Between Member Switches in a Virtual Chassis | 263](#)
- [Set an Uplink Port as a VCP on a Standalone Switch | 263](#)
- [Remove a VCP Setting on an Uplink or Network Port | 264](#)

When to Configure VCPs

You typically configure a port as a Virtual Chassis Port (VCP) for one of the following reasons:

- You are configuring a Virtual Chassis composed of switches that support Virtual Chassis but do not have default-configured VCPs or dedicated VCPs.
- You are using default-configured VCPs or dedicated VCPs to interconnect members in a Virtual Chassis, and want to add redundant VCP links between members using additional ports that can be configured into VCPs.
- You want to interconnect two switches into a Virtual Chassis that have dedicated VCPs but are located in different wiring closets or sites, and the switches are farther apart than the maximum length of a dedicated VCP cable.
- You previously changed a default-configured VCP to use it as a network or uplink port, and now you want to use it as a VCP again.

We recommend that you have two uplink VCP connections within each wiring closet for redundancy. VCPs automatically bundle into a Link Aggregation Group (LAG) when two or more ports operating at the same speed are configured into VCPs between the same two member switches. See [“Understanding Virtual Chassis Port Link Aggregation” on page 50](#) for details.



CAUTION: If you set a port as a VCP to create a redundant link with a dedicated VCP connection on EX4200, EX4500, or EX4550 switches, to avoid traffic looping within the Virtual Chassis, you must reboot the Virtual Chassis after configuring the port conversion and cabling the VCP link. See [“Troubleshooting an EX Series Virtual Chassis” on page 459](#) for more information.

Prepare Virtual Chassis Member Switches Before Converting VCPs

Before converting a port into a VCP and interconnecting the switch into a Virtual Chassis:

1. Verify which ports can be used as VCPs in your particular configuration. See [“Virtual Chassis Port Options” on page 24](#) for a summary of the VCP options on switches that support Virtual Chassis, and the hardware documentation for each type of switch for complete details about the ports and installed transceivers that can be used as VCPs.
2. If you are configuring an uplink module port as a VCP, if needed, install the uplink module in the member switches that you want to interconnect.
3. Log into the switch that is or will be the master of the Virtual Chassis.

NOTE: Do not power on the other switches at this point.

4. (EX Series switches only) Run EZSetup on the switch that you are configuring to be the master member switch. Make sure the hostname and other identification, time zone, and network properties are set up on the master. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* for details. The parameters you specify for the master apply to the entire Virtual Chassis, including all the member switches that you interconnect later.
5. If you want to configure and manage the Virtual Chassis remotely, specify the VME global management interface. You can configure the VME global management interface when you are setting up the master or you can do it after completing the other configuration steps for the Virtual Chassis. See [“Configuring the Virtual Management Ethernet Interface for Global Management of an EX Series Virtual Chassis \(CLI Procedure\)” on page 268](#).
6. Configure mastership of the Virtual Chassis using either a nonprovisioned or preprovisioned configuration. See [“Configuring Mastership of a Virtual Chassis” on page 257](#) for details.

NOTE: A Virtual Chassis has two Routing Engines, one in the master role and the other in the backup role. Therefore, we recommend that you always use **commit synchronize** rather than simply **commit** to save configuration changes made for a Virtual Chassis. This ensures that the configuration changes are saved in both Routing Engines.

Before you begin to interconnect new Virtual Chassis members across long distances, such as between wiring closets:

- Prepare the existing Virtual Chassis for interconnecting with a potential member switch that is beyond the reach of a dedicated Virtual Chassis cable by setting at least one uplink VCP on an existing member of the Virtual Chassis.

- Prepare the potential member switch for interconnecting with the existing Virtual Chassis by setting at least one uplink VCP on the standalone switch.

Set Uplink Ports to Form VCP Links Between Member Switches in a Virtual Chassis

From the Virtual Chassis, you can set an uplink port on the local member or on a specified member as a VCP.

NOTE: On EX4200 switches, if you use an SFP+ uplink module, you must configure all member switches to support either 1-gigabit SFP transceivers or 10-gigabit SFP+ transceivers. See *Setting the Mode on an SFP+ or SFP+ MACSec Uplink Module*.

To set the uplink ports for the local member switch (for example, member 0) and for a different member switch (for example, member 1) to function as VCPs:

1. Set one uplink port of member 0 as a VCP. You don't need to specify the **member member-id** option, because the command applies by default on the member where it is executed. You can alternatively include the **local** option if you want to make sure the command applies only to that port locally on the switch where you're running the command.

```
user@switch> request virtual-chassis vc-port set pic-slot 1 port 0
```

2. Set one uplink port of member 1 as a VCP. This step includes the member *member-id* option because it acts on a different member switch than the local member switch.

```
user@switch> request virtual-chassis vc-port set pic-slot 1 port 0 member 1
```

NOTE: You can also connect to a member switch individually using the [request session member](#) command and set a VCP locally on that member. (You don't specify the **member** option in that case.)

Set an Uplink Port as a VCP on a Standalone Switch

You can set an uplink VCP on a standalone switch before interconnecting the link into an existing Virtual Chassis. You must set the port as a VCP for the Virtual Chassis master to detect the switch and complete the process of adding it as a member.

To set one uplink VCP on the potential member, which is currently operating as a standalone switch:

1. Power on the standalone switch.
2. Set one uplink port as a VCP. You do not need to specify the **member member-id** option, because the command applies by default on the member where it is executed.

```
user@switch> request virtual-chassis vc-port set pic-slot 1 port 0
```

NOTE: If you do specify the **member member-id** option, use member ID 0. Because the switch is not yet interconnected with the other members of the Virtual Chassis, its current member ID is 0. Its member ID will change when it is interconnected with the Virtual Chassis. It does not impact the functioning of the uplink VCP that its VCP is set with 0 as the member ID. The VCP has significance only on the local switch.

3. After you have set the uplink VCP on the standalone switch, physically interconnect its uplink port with a VCP uplink port on one of the members in the existing Virtual Chassis.

The new member switch reboots and joins the now expanded Virtual Chassis with a different member ID.

NOTE: The setting for the new member switch's uplink VCP remains intact and is not affected by the change of member ID.

4. Repeat the steps above to interconnect the new switch to another member of the Virtual Chassis or to create redundant VCP links to the same member.

Remove a VCP Setting on an Uplink or Network Port

You might want to convert a VCP back into an uplink or network port if:

- You want to use a default-configured VCP on a switch as a network or uplink port instead of as a VCP.
- You want to add a new member switch or a new VCP link in an existing Virtual Chassis using autoprovisioning, where the VCP links form automatically when you cable them *only* if the ports on both sides of the link are not already set as VCPs. (See [“Automatic Virtual Chassis Port \(VCP\) Conversion”](#) on [page 27](#) for details.)
- You remove a switch from a Virtual Chassis and want to use it as a standalone switch again.

NOTE: In this case, whenever possible we recommend that you revert the switch back to its default factory configuration to guarantee the smoothest transition back to standalone operation. See [“Removing or Replacing a Member Switch of a Virtual Chassis Configuration” on page 248](#).

To remove the VCP setting on a port:

```
user@switch> request virtual-chassis vc-port delete pic-slot slot-number port port-number
```

You usually do this on the switch with the VCP itself, so you don't need to include the **member member-id** option because the command applies by default on the member where you run it.

RELATED DOCUMENTATION

[Configuring an EX3300 Virtual Chassis \(CLI Procedure\) | 212](#)

[Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)

[Configuring a Virtual Chassis on an EX Series Switch \(J-Web Procedure\) | 222](#)

[Configuring an EX2300, EX3400, or EX4300 Virtual Chassis](#)

[Configuring an EX4650 or a QFX Series Virtual Chassis](#)

[Example: Configuring an EX4200 Virtual Chassis Interconnected Across Multiple Wiring Closets | 131](#)

[Example: Configuring an EX4200 Virtual Chassis Using a Preprovisioned Configuration File | 150](#)

[Removing or Replacing a Member Switch of a Virtual Chassis Configuration | 248](#)

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

Setting an Uplink Port as a Virtual Chassis Port on an EX4500 or EX4550 Switch (CLI Procedure)

You can set any optical port on an EX4500 switch as a Virtual Chassis port (VCP). Setting an optical port as a VCP is especially useful in cases in which you have to connect Virtual Chassis members together across a distance that is greater than the longest VCP cable can breach.

You can use the optical ports to connect EX4200 switches, EX4500 switches, and EX4550 switches together into a Virtual Chassis. All supported optical connections between EX4200, EX4500, and EX4550 switches can be configured as VCPs.

NOTE: The Virtual Chassis module for EX4500 switches is a field-replaceable unit (FRU) that is not shipped with all EX4500 switch models but can be purchased separately. See *Virtual Chassis Module in EX4500 Switches* and *EX4500 Switch Models*.



CAUTION: If you configure an uplink port as a VCP to create a redundant link with a dedicated VCP connection on EX4200, EX4500, or EX4550 switches, to avoid traffic looping within the Virtual Chassis, you must reboot the Virtual Chassis after configuring the port conversion and cabling the VCP link. See [“Troubleshooting an EX Series Virtual Chassis” on page 459](#) for more information.

Before you set an uplink port as a VCP on an EX4500 or EX4550 switch:

- Cable the uplink port connections.

To set the optical connection as a VCP:

1. Set the 10-Gigabit Ethernet SFP+ port as a VCP interface:

```
user@switch> request virtual-chassis vc-port set pic-slot pic-slot-number port port-number
```

where:

- *pic-slot-number*—The PIC slot number, which is **0** when specifying a native port, **1** when specifying a port on the uplink module in PIC slot number 1, and **2** when specifying a port on an uplink module in PIC slot number 2.
 - *port-number*—The port number on the switch or uplink module.
2. Log onto the other EX4500 switch, and set the other end of the connection as a VCP interface:

```
user@switch> request virtual-chassis vc-port set pic-slot pic-slot-number port port-number
```

RELATED DOCUMENTATION

| [Example: Connecting EX4500 Member Switches in a Virtual Chassis Across Wiring Closets](#) | 141

Setting an Uplink Port as a Virtual Chassis Port Using the LCD Panel

This topic describes how to set or delete the uplink ports as VCPs using the LCD panel.

The following procedure shows how to configure uplink module port **ge-0/1/2** as a VCP.

To set an uplink port as a VCP using the LCD panel:

1. Press **Menu** until you see **MAINTENANCE MENU**.
2. Press **Menu** until you see **REQUEST VC PORT**.
3. Press **Enter**. You will see **SET VC PORT?**.
4. Press **Enter**. You will see **SET FPC 0?**.
5. Press **Enter**. You will see **SET PIC 0?**.
6. Press **Menu** until you see **SET PIC 1?**.
7. Press **Enter**. You will see **SET PORT 0?**.
8. Press **Menu** until you see **SET PORT 2?**.
9. Press **Enter**. You will see **CONFIGURING**
10. Once the configuration has been accepted, press **Enter** to return to the **MAINTENANCE** menu.

You can also use the LCD panel to delete a VCP, thus resetting the port to an uplink port.

To reset **vcp-0/1/2** to an uplink port using the LCD panel:

1. Press **Menu** until you see **MAINTENANCE MENU**.
2. Press **Menu** until you see **REQUEST VC PORT**.
3. Press **Enter**. You will see **SET VC PORT?**.

4. Press **Menu**. You will see **DELETE VC PORT?**.
5. Press **Enter**. You will see **DELETE FPC 0?**.
6. Press **Enter**. You will see **DELETE PIC 0?**.
7. Press **Menu** until you see **DELETE PIC 1?**.
8. Press **Enter**. You will see **DELETE PORT 0?**.
9. Press **Menu** until you see **DELETE PORT 2?**.
10. Press **Enter**. You will see **CONFIGURING**
11. Once the configuration has been accepted, press **Enter** to return to the **MAINTENANCE** menu.

RELATED DOCUMENTATION

LCD Panel in EX3300 Switches

LCD Panel in EX4200 Switches

[Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)

[Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port | 260](#)

Understanding Interface Naming Conventions

Configuring the Virtual Management Ethernet Interface for Global Management of an EX Series Virtual Chassis (CLI Procedure)

NOTE: This topic does not apply to EX8200 Virtual Chassis.

If you want to configure and manage the Virtual Chassis remotely through SSH or Telnet, configure the virtual management Ethernet (VME) interface on the master of the Virtual Chassis. You can configure and manage all members of the Virtual Chassis through this single global interface by following these steps:

1. Power on the switch that you want to function as the master.

2. Check the front-panel LCD to confirm that the switch has powered on correctly.
3. Run the EZSetup program on the switch, specifying the identification parameters. See *Connecting and Configuring an EX Series Switch (CLI Procedure)*.

To configure the VME interface:

```
[edit]
```

```
user@switch# set interfaces vme unit 0 family inet address /ip-address/mask/
```

RELATED DOCUMENTATION

[Example: Configuring an EX3300 Virtual Chassis with a Master and Backup | 83](#)

[Example: Configuring an EX4200 Virtual Chassis with a Master and Backup in a Single Wiring Closet | 88](#)

[Understanding Global Management of a Virtual Chassis | 46](#)

Configuring the Timer for the Backup Member to Start Using Its Own MAC Address, as Master of a Virtual Chassis

When a backup member takes control of a Virtual Chassis because of a reset or other temporary failure, the backup member uses the MAC address of the old master switch as the system MAC base address. This process helps ensure a smooth transition of mastership with no disruption to network connectivity.

The MAC persistence timer is used in situations in which the master switch is no longer a member of the Virtual Chassis because it has been physically disconnected or removed. If the old master switch does not rejoin the Virtual Chassis before the timer elapses, the new master switch starts using its own MAC address as the system's MAC base address. For information regarding how the system MAC base address is used to assign MAC addresses to ports in a Virtual Chassis, see [“Understanding MAC Address Assignment on a Virtual Chassis” on page 73](#).

The default timer value is 10 minutes. The maximum timer value is 60 minutes.

You can disable the MAC persistence timer starting in Junos OS Release 12.1R3. When the MAC persistence timer is disabled, the MAC address of the old master switch is used as the system MAC base address; no MAC address changes occur within the Virtual Chassis even when the old master switch is no longer a member of the Virtual Chassis because it has been physically disconnected or removed.

To configure or modify the MAC persistence timer:

```
[edit virtual-chassis]
user@switch# set mac-persistence-timer minutes
```

To disable the MAC persistence timer:

```
[edit virtual-chassis]
user@switch# set mac-persistence-timer disable
```

RELATED DOCUMENTATION

Configuring an EX4650 or a QFX Series Virtual Chassis

[Understanding Virtual Chassis Components](#) | 19

Configuring Fast Failover in an EX Series Virtual Chassis

NOTE: This topic does not apply to EX2200 Virtual Chassis and EX8200 Virtual Chassis.

The Virtual Chassis fast failover feature is a hardware-assisted failover mechanism that automatically reroutes traffic and reduces traffic loss in the event of a link or switch failure. If a link between two members fails, traffic flow between those members must be rerouted quickly so that there is minimal traffic loss.

Fast failover is enabled by default on dedicated Virtual Chassis ports (VCPs). You must manually enable fast failover on uplink ports that have been configured as VCPs or on EX3300 uplink ports that are configured as VCPs by default.

Before you begin configuring fast failover, ensure that the dedicated VCPs or uplink VCPs are connected in a ring topology.

- To reenabling the fast failover feature on all dedicated VCPs in a ring:

```
[edit]
user@switch# delete virtual-chassis fast-failover vcp disable
```

- To configure the fast failover feature on all XFP uplink VCPs in a ring:

```
[edit]
user@switch# set virtual-chassis fast-failover xe
```

- To configure the fast failover feature on all SFP uplink VCPs in a ring:

```
[edit]
user@switch# set virtual-chassis fast-failover ge
```

RELATED DOCUMENTATION

[Example: Configuring Fast Failover on Uplink Module VCPs to Reroute Traffic When an EX4200 Virtual Chassis Switch or Intermember Link Fails | 184](#)

[Disabling Fast Failover in an EX Series Virtual Chassis | 272](#)

[Understanding Fast Failover in an EX Series Virtual Chassis | 52](#)

Disabling Fast Failover in an EX Series Virtual Chassis

NOTE: This topic does not apply to EX2200 Virtual Chassis and EX8200 Virtual Chassis.

Fast failover is enabled by default on dedicated Virtual Chassis ports (VCPs). You must use this procedure to manually disable fast failover on dedicated VCPs or to disable fast failover on uplink ports that you previously configured as VCPs.

- To disable the fast failover feature on all dedicated VCPs in a ring:

```
[edit]
user@switch# set virtual-chassis fast-failover vcp disable
```

- To disable the fast failover feature on all XFP uplink VCPs in a ring:

```
[edit]
user@switch# delete virtual-chassis fast-failover xe
```

- To disable the fast failover feature on all SFP uplink VCPs in a ring:

```
[edit]
user@switch# delete virtual-chassis fast-failover ge
```

RELATED DOCUMENTATION

[Example: Configuring Fast Failover on Uplink Module VCPs to Reroute Traffic When an EX4200 Virtual Chassis Switch or Intermember Link Fails | 184](#)

[Configuring Fast Failover in an EX Series Virtual Chassis | 271](#)

[Understanding Fast Failover in an EX Series Virtual Chassis | 52](#)

Disabling Split and Merge in a Virtual Chassis

The split and merge feature is enabled by default on all EX Series switches and QFX Series devices that are connected into a Virtual Chassis.

If a Virtual Chassis splits:

- Each part detects the members they can still reach and elects a new master for those members to form a smaller Virtual Chassis.
- Each part determines if it will remain the active new configuration of the original Virtual Chassis. The feature's rules ensure only one part remains active after a split.

See [“Understanding Split and Merge in a Virtual Chassis” on page 59](#) for complete details on what happens during a Virtual Chassis split or merge.

You can disable the split and merge feature in a Virtual Chassis by configuring the **no-split-detection** option on the Virtual Chassis. In this case, if the Virtual Chassis splits, both parts of the split Virtual Chassis configuration usually remain active.

However, with split detection disabled, be aware that the two resulting Virtual Chassis might not form as you might expect. For example, in a preprovisioned Virtual Chassis:

- If both of the Routing Engines end up in the same Virtual Chassis configuration after a split, the other part of the split Virtual Chassis configuration can't form and remains inactive (because it has no members that can take on the master or backup Routing Engine).
- If the Routing Engines end up in different parts of the split Virtual Chassis configuration and the rest of the member switches are configured in linecard roles, then the resulting Virtual Chassis parts might not be able to select a backup Routing Engine.

BEST PRACTICE:

We generally recommend that you:

- Keep the default setting with the split and merge feature enabled for any Virtual Chassis with more than two members.

This provides the most predictable results when a split happens, and enables the split and merge feature to perform a merge after the issues that caused the split are resolved.

- Disable split and merge on a Virtual Chassis with only two member switches by setting the **no-split-detection** option.

We have found that a two-member switch Virtual Chassis with split and merge disabled re-forms more quickly with fewer complications when a split occurs.

If you expand a two-member Virtual Chassis to include more members, you should delete the **no-split-detection** setting to re-enable split and merge feature again.

To disable the split and merge feature in a Virtual Chassis:

```
[edit]  
user@switch# set virtual-chassis no-split-detection
```

To remove this configuration item to restore the default configuration with the split and merge feature again (recommended when a two-member Virtual Chassis is expanded to have more members):

```
[edit]  
user@switch# delete virtual-chassis no-split-detection
```

RELATED DOCUMENTATION

| [Understanding Split and Merge in a Virtual Chassis](#) | 59

Configuring Automatic Software Update on Virtual Chassis Member Switches

The automatic software update feature allows you to automatically update the software version on prospective member switches as they are added so that they can join the Virtual Chassis.

NOTE: The version of Junos OS running on the Virtual Chassis must be compatible with the software running on the prospective member switch for an automatic software update to occur. For information on Junos OS compatibility and other automatic software update restrictions, see [“Understanding Automatic Software Update on Virtual Chassis Member Switches” on page 62](#).

Before you begin, ensure that you know the name or the URL of the software package to be used by the automatic software update feature.

To configure the automatic software update feature for an EX Series or QFX Series Virtual Chassis that is not a mixed-mode Virtual Chassis:

[edit]

```
user@switch# set virtual-chassis auto-sw-update package-name package-name
```

NOTE: An EX4300 Virtual Chassis with a combination of EX4300 multigigabit model switches (EX4300-48MP) and other EX4300 switches must be configured in mixed mode, and the automatic software update feature is not supported in this case.

NOTE: A QFX5110 Virtual Chassis is considered to be a non-mixed Virtual Chassis. Because both QFX5110 and QFX5100 switches in a QFX5110 Virtual Chassis run the same software image, you can use the **auto-sw-update** command with one software package name for all members.



CAUTION: A QFX5100 switch running a Junos OS software image with “-qfx-5-” in the package filename *must* first be upgraded to a Junos OS software image with “-qfx-5e-” in the package filename before it can be added to a QFX5110 Virtual Chassis or VCF. The automatic software update process cannot update a switch from a “-qfx-5-” image to a “-qfx-5e-” image. See *Upgrading a QFX5100 Switch with a USB Device to Join a QFX5110 Virtual Chassis or Virtual Chassis Fabric*.

After a QFX5100 switch is installed with a “-qfx-5e-” Junos OS software image, the automatic software update process can successfully update the switch automatically with a different version of a “-qfx-5e-” Junos OS image to match the other members in the Virtual Chassis or VCF.

To configure the automatic software update feature on a mixed Virtual Chassis containing at least one EX4200 switch and at least one EX4500 or EX4550 switch, use the **ex-4200** option when you are specifying a path to a package for the EX4200 switches and the **ex-4500** option when you are specifying a path to a package for the EX4500 or EX4550 switches, as follows:

[edit]

```
user@switch# set virtual-chassis auto-sw-update ex-4200 package-name package-name
```

```
user@switch# set virtual-chassis auto-sw-update ex-4500 package-name package-name
```

You do not need to specify the **ex4500** option when configuring automatic software update for a Virtual Chassis with only a combination of EX4500 and EX4550 switches, which does not need to run in mixed mode. Specifying only a Junos OS package name for an EX4500 switch updates the software for both EX4500 and EX4550 switches.

To configure the automatic software update feature on a mixed QFX5100 Virtual Chassis composed of QFX5100 switches and at least one other supported type of device (QFX3500, QFX3600, or EX4300 switches), you must specify a software package name for each type or family of device in the mixed Virtual Chassis:

- Specify the **qfx-5** option with the path to the Junos OS package for QFX5100 switches
- Specify the **qfx-3** option with the path to the Junos OS package for QFX3600 and QFX3500 switches
- Specify the **ex4300** option with the path to the Junos OS package for EX4300 switches

as follows:

```
[edit]
user@device# set virtual-chassis auto-sw-update qfx-5 package-name package-name
user@device# set virtual-chassis auto-sw-update qfx-3 package-name package-name
user@device# set virtual-chassis auto-sw-update ex-4300 package-name package-name
```

You can similarly specify different package names using the **ex-4600** and **ex-4300** options with the **auto-sw-update** statement to configure the automatic software update feature for a mixed EX4600 Virtual Chassis that contains EX4600 and EX4300 member switches.

If the software package is located on a local directory on the switch, use the following format for **package-name**:

/pathname/package-name

If the software package is to be downloaded and installed from a remote location, use one of the following formats:

ftp://hostname/pathname/package-name

ftp://username:prompt@ftp.hostname.net/package-name

http://hostname/pathname/package-name

RELATED DOCUMENTATION

[Understanding Automatic Software Update on Virtual Chassis Member Switches | 62](#)

[Understanding Mixed EX Series and QFX Series Virtual Chassis | 35](#)

Upgrading Software Using Nonstop Software Upgrade on EX Series Virtual Chassis and Mixed Virtual Chassis (CLI Procedure)

You can use nonstop software upgrade (NSSU) to upgrade the software running on all member switches in most EX Series Virtual Chassis with minimal traffic disruption during the upgrade.

NSSU is supported on the following EX Series Virtual Chassis platforms:

- EX3300 Virtual Chassis
- EX3400 Virtual Chassis
- EX4200 Virtual Chassis
- EX4300 Virtual Chassis
- EX4500 Virtual Chassis
- EX4550 Virtual Chassis
- All mixed Virtual Chassis composed of EX4200, EX4500, and EX4550 switches
- EX8200 Virtual Chassis

This topic covers:

- [Preparing the Switch for Software Installation | 278](#)
- [Upgrading the Software Using NSSU | 280](#)

Preparing the Switch for Software Installation

Before you begin software installation using NSSU:

- Ensure that the Virtual Chassis is configured correctly to support NSSU. Verify that:
 - The Virtual Chassis members are connected in a ring topology. A ring topology prevents the Virtual Chassis from splitting during an NSSU.
 - The Virtual Chassis master and backup are adjacent to each other in the ring topology. Adjacency permits the master and backup to always be in sync, even when the switches in linecard roles are rebooting.
 - The Virtual Chassis is preprovisioned so that the linecard role has been explicitly assigned to member switches acting in the linecard role. During an NSSU, the Virtual Chassis members must maintain their roles—the master and backup must maintain their master and backup roles (although mastership will change), and the other member switches must maintain their linecard roles.

For information on configuring a preprovisioned Virtual Chassis, see [“Configuring an EX3300 Virtual Chassis \(CLI Procedure\)” on page 212](#), [“Configuring an EX4200, EX4500, or EX4550 Virtual Chassis](#)

(CLI Procedure)” on page 217, *Configuring an EX2300, EX3400, or EX4300 Virtual Chassis*, and *Configuring an EX8200 Virtual Chassis (CLI Procedure)*.

- A two-member Virtual Chassis has **no-split-detection** configured so that the Virtual Chassis does not split when an NSSU upgrades a member.
- Verify that the members are running the same version of the software:

```
user@switch> show version
```

If the Virtual Chassis members are not running the same version of the software, use the **request system software add** command to upgrade the software on the inconsistent members.

- Ensure that nonstop active routing (NSR) and graceful Routing Engine switchover (GRES) are enabled. To verify that they are enabled, you need to check only the state of nonstop active routing—if nonstop active routing is enabled, then graceful Routing Engine switchover is enabled.

To verify that nonstop active routing is enabled:

```
user@switch> show task replication
Stateful Replication: Enabled
RE mode: Master

Protocol                Synchronization Status
-----                -
OSPF                    Complete
BGP                     Complete
PIM                     Complete
```

If nonstop active routing is not enabled (**Stateful Replication** is **Disabled**), see *Configuring Nonstop Active Routing on Switches* for information on how to enable it.

- For the EX4300 Virtual Chassis, you should enable the **vcp-no-hold-time** statement at the [edit **virtual-chassis**] hierarchy level before performing a software upgrade using NSSU. If you do not enable the **vcp-no-hold-time** statement, the Virtual Chassis may split during the upgrade. A split Virtual Chassis can cause disruptions to your network, and you may have to manually reconfigure your Virtual Chassis after the NSSU if the split and merge feature was disabled. For more information about a split Virtual Chassis, see [“Understanding Split and Merge in a Virtual Chassis” on page 59](#).
- (Optional) Enable nonstop bridging (NSB). Enabling NSB ensures that all NSB-supported Layer 2 protocols operate seamlessly during the Routing Engine switchover that is part of the NSSU.
- (Optional) Back up the system software—Junos OS, the active configuration, and log files—on each member to an external storage device with the **request system snapshot** command.

Upgrading the Software Using NSSU

This procedure describes how to upgrade the software running on all Virtual Chassis members using NSSU. When the upgrade completes, all members are running the new version of the software. Because a graceful Routing Engine switchover occurs during the upgrade, the original Virtual Chassis backup is the new master.

To upgrade all members using NSSU:

1. Download the software package. If you are upgrading the software running on a mixed Virtual Chassis, download the software packages for both switch types.
2. Copy the software package or packages to the Virtual Chassis. We recommend that you copy the file to the `/var/tmp` directory on the master.
3. Log in to the Virtual Chassis using the console connection or the virtual management Ethernet (VME) interface. Using a console connection allows you to monitor the progress of the master switch reboot.
4. Start the NSSU:
 - On an EX3300 Virtual Chassis, EX3400 Virtual Chassis, EX4200 Virtual Chassis, EX4300 Virtual Chassis, EX4500 Virtual Chassis, or EX4550 Virtual Chassis, enter:

```
user@switch> request system software nonstop-upgrade /var/tmp/package-name.tgz
```

where `package-name.tgz` is, for example, `jinstall-ex4200-12.1R2.5-domestic-signed.tgz`.

- On a mixed Virtual Chassis, enter:

```
user@switch> request system software nonstop-upgrade set
[/var/tmp/package-name.tgz /var/tmp/package-name.tgz]
```

where `[/var/tmp/package-name.tgz /var/tmp/package-name.tgz]` specifies the EX4200 and EX4500 software packages.

The switch displays status messages similar to the following messages as the upgrade executes:

```
Chassis ISSU Check Done
ISSU: Validating Image
ISSU: Preparing Backup RE
Installing image on other FPC's along with the backup

Checking pending install on fpc1
Pushing bundle to fpc1
WARNING: A reboot is required to install the software
WARNING:      Use the 'request system reboot' command immediately
```

```

Completed install on fpc1

Checking pending install on fpc2
Pushing bundle to fpc2
WARNING: A reboot is required to install the software
WARNING:      Use the 'request system reboot' command immediately
Completed install on fpc2

Rebooting fpc1
ISSU: Backup RE Prepare Done
Waiting for Backup RE reboot
GRES operational
Initiating Chassis In-Service-Upgrade
Chassis ISSU Started
ISSU: Preparing Daemons
ISSU: Daemons Ready for ISSU
ISSU: Starting Upgrade for FRUs
ISSU: Preparing for Switchover
ISSU: Ready for Switchover
Checking In-Service-Upgrade status
  Item           Status           Reason
  FPC 0           Online
  FPC 1           Online
  FPC 2           Online (ISSU)
Going to install image on master
WARNING: A reboot is required to install the software
WARNING:      Use the 'request system reboot' command immediately
relinquish mastership
ISSU: IDLE

*** FINAL System shutdown message from user@switch ***

System going down IMMEDIATELY

Shutdown NOW!
[pid 9336]

```

5. Log in after the reboot of the original master switch completes. To verify that the software on all Routing Engines in the Virtual Chassis members has been upgraded, enter the following command:

```
user@switch> show version
```

6. To ensure that the resilient dual-root partitions feature operates correctly, copy the new Junos OS image into the alternate root partitions of all members:

```
user@switch> request system snapshot slice alternate all-members
```

Resilient dual-root partitions allow the switch to boot transparently from the alternate root partition if the system fails to boot from the primary root partition.

RELATED DOCUMENTATION

[Understanding Nonstop Software Upgrade on EX Series Switches | 64](#)

[Configuring Dual-Root Partitions](#)

[Understanding Software Installation on EX Series Switches](#)

[Troubleshooting Software Installation](#)

[Understanding Nonstop Software Upgrade on EX Series Switches | 64](#)

Assigning the Virtual Chassis ID to Determine Precedence During a Virtual Chassis Merge

Every Virtual Chassis has a unique ID that is automatically assigned when the Virtual Chassis configuration is formed. You can also explicitly assign a Virtual Chassis ID using the **set virtual-chassis id** command. When two Virtual Chassis configurations attempt to merge, the Virtual Chassis ID that you assigned takes precedence over the automatically assigned Virtual Chassis IDs and becomes the ID for the newly merged Virtual Chassis configuration.

To configure the Virtual Chassis ID:

```
[edit]
user@switch# set virtual-chassis id id
```

RELATED DOCUMENTATION

[Understanding Split and Merge in a Virtual Chassis | 59](#)

Configuring Graceful Routing Engine Switchover in a Virtual Chassis

In a Virtual Chassis, one member switch is assigned the master role and has the master Routing Engine. Another member switch is assigned the backup role and has the backup Routing Engine. Graceful Routing Engine switchover (GRES) enables the master and backup Routing Engines in a Virtual Chassis configuration to switch from the master to backup without interruption to packet forwarding as a hitless failover solution. When you configure graceful Routing Engine switchover, the backup Routing Engine automatically synchronizes with the master Routing Engine to preserve kernel state information and the forwarding state.

To set up the Virtual Chassis configuration to use graceful Routing Engine switchover (GRES):

1. Set up a minimum of two switches in a Virtual Chassis configuration with mastership priority of 255:

```
[edit]
user@switch# set virtual-chassis member 0 mastership-priority 255
[edit]
user@switch# set virtual-chassis member 1 mastership-priority 255
```

2. Set up graceful Routing Engine switchover:

```
[edit]
user@switch# set chassis redundancy graceful-switchover
```

Commit the configuration.

NOTE: We recommend that you use the **commit synchronize** command to save any configuration changes that you make to a multimember Virtual Chassis.

RELATED DOCUMENTATION

[Example: Configuring an EX4200 Virtual Chassis with a Master and Backup in a Single Wiring Closet | 88](#)

[High Availability Features for EX Series Switches Overview](#)

[Understanding EX Series Virtual Chassis | 9](#)

[Understanding QFX Series Virtual Chassis](#)

Resetting the EX4500 Switch to Run as a Standalone Switch (CLI Procedure)

If you want to use an EX4500 switch as a standalone switch, we recommend that you set the PIC mode as **intraconnect**. The PIC mode setting determines whether the module that is plugged into the EX4500 switch operates as an intraconnect module or a Virtual Chassis module.

NOTE: Operating an EX4500 switch without the intraconnect module or the Virtual Chassis module is not supported.

NOTE: If you use the EX4500 switch as a standalone switch without changing the PIC mode setting to **intraconnect**, you will not be able to achieve 960 Gbps data rate throughput. Some of the bandwidth is reserved for the dedicated Virtual Chassis ports (VCPs).

The PIC mode is set to **virtual-chassis** in the factory default configuration. You cannot change the PIC mode setting in the factory default configuration; you must commit some other configuration change and then change the PIC mode setting.

To reset the PIC mode so that you can use the switch as a standalone switch:

1. Make any change to the default configuration file. For example, you could change the hostname:

```
[edit]
user@switch# set system host-name solo-4500
```

2. Commit the updated configuration file, so that it is no longer the factory default configuration:

```
[edit]
user@switch# commit
```

3. Change the setting of the PIC mode:

```
user@switch> request chassis pic-mode intraconnect
```

4. Reboot the switch to apply this changed PIC mode setting:

```
user@switch> request system reboot
```

5. Verify that the PIC mode setting has been changed to **intraconnect**:

```
user@switch> show chassis pic-mode
```

```
fpc0:
```

```
-----
Pic Mode: Intraconnect
```

RELATED DOCUMENTATION

[Verifying the Setting for the PIC Mode on an EX4500 Switch in a Virtual Chassis | 338](#)

EX4500 Default Configuration

Enabling VLAN Pruning for Broadcast, Multicast, and Unknown Unicast Traffic in an EX Series Virtual Chassis (CLI Procedure)

You can enable VLAN pruning for VLANs assigned to interfaces in an EX Series Virtual Chassis. When you enable VLAN pruning for a VLAN in a Virtual Chassis, all broadcast, multicast, and unknown unicast traffic entering that VLAN uses the shortest possible path through the Virtual Chassis to the egress VLAN interface. Enabling VLAN pruning allows you to conserve bandwidth within the Virtual Chassis, since all broadcast, multicast, and unknown unicast traffic in a VLAN is broadcast to all Virtual Chassis member switches when VLAN pruning is disabled.

BEST PRACTICE: We recommend enabling VLAN pruning when configuring a VLAN on an EX Series Virtual Chassis.

To enable VLAN pruning when configuring a VLAN:

```
[edit]
```

```
user@switch# set vlans vlan-name vlan-prune
```

RELATED DOCUMENTATION

[Configuring VLANs for EX Series Switches](#)

Configuration Statements

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auto-conversion

Syntax

```
auto-conversion;
```

Hierarchy Level

```
[edit virtual-chassis]
```

Release Information

Statement introduced in Junos OS Releases 14.1X53-D47 and 15.1R7 for EX2200, EX3300, EX4200, EX4500, and EX4550 switches.

Description

Enable automatic Virtual Chassis port (VCP) conversion (also called VCP autoprovisioning) in a Virtual Chassis.

NOTE: This statement is available only for EX Series switches in a Virtual Chassis that have automatic VCP conversion *disabled* by default—EX2200, EX3300, EX4200, EX4500, and EX4550 switches. On these EX Series switches, the automatic VCP conversion feature was *enabled* by default in Junos OS Releases prior to 14.1X53-D47 and 15.1R7. This feature is disabled by default and this statement added as of those releases to allow you to selectively enable the feature. See “[Automatic Virtual Chassis Port \(VCP\) Conversion](#)” on page 27 for details.

Configuring this statement enables the feature for the entire Virtual Chassis, and subsequently removing this statement returns the Virtual Chassis to the default behavior, in which automatic VCP conversion is disabled.

VCP links connect members in a Virtual Chassis using supported VCP ports on the member switches. Ports that are supported as VCPs and are not dedicated VCPs or configured as VCPs by default must be converted into VCPs to use them to interconnect Virtual Chassis members. You can manually convert a supported port into a VCP port using the [request virtual-chassis vc-port](#) command, or when automatic VCP conversion is enabled, a port will be automatically converted into a VCP under the following conditions:

- LLDP is enabled on the interfaces for the members on both sides of the link. The two interfaces exchange LLDP packets to accomplish the port conversion.
- The Virtual Chassis must be preprovisioned with the switches on both sides of the link already configured in the members list of the Virtual Chassis using the **set virtual-chassis member** command.
- The ports on both ends of the link are supported as VCPs and are *not* already configured as VCPs.

You might want to invoke automatic VCP conversion when adding a new switch to an existing Virtual Chassis or adding a redundant VCP link between two existing members of a Virtual Chassis.

NOTE: When automatic VCP conversion is enabled in a Virtual Chassis with switches that have dedicated VCPs (EX4200, EX4500, or EX4550 Virtual Chassis), if network or uplink ports are automatically converted into VCPs to create a redundant link with a dedicated VCP connection, you must reboot the Virtual Chassis to avoid creating a traffic loop within the Virtual Chassis. See [“Troubleshooting an EX Series Virtual Chassis” on page 459](#) for more information on this potential issue.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

[Virtual Chassis Overview for Switches | 2](#)

[Understanding Virtual Chassis Components | 19](#)

[Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port | 260](#)

auto-sw-update

Syntax

```
auto-sw-update {
  (ex-4200 | ex-4300 | ex-4500 | ex-4600 | qfx-3 | qfx-5)
  package-name package-name;
}
```

Hierarchy Level

[edit [virtual-chassis](#)]

Release Information

Statements introduced in Junos OS Release 10.0 for EX Series switches.

The **ex-4200** and **ex-4500** options introduced in Junos OS Release 12.2 for EX Series switches.

Statements introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

The **ex-4300**, **qfx-3**, and **qfx-5** options introduced in Junos OS Release 13.2X51-D20.

Statements introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

The **ex-4600** option introduced in Junos OS Release 13.2X51-D25.

Description

Enable the automatic software update feature for Virtual Chassis or Virtual Chassis Fabric (VCF) configurations.

You should only use the keywords that specify a device or device family—**ex-4300**, **ex-4600**, **qfx-3**, and **qfx-5**—when configuring automatic software update on a mixed mode Virtual Chassis or Virtual Chassis Fabric (VCF). You can simply specify the *package-name* without specifying individual device keywords in non-mixed Virtual Chassis or VCF topologies.

NOTE: The automatic software update feature is not supported for a mixed mode EX4300 Virtual Chassis with a combination of EX4300 multigigabit model (EX4300-48MP) switches and other EX4300 switches.

You must enter the **auto-sw-update** statement multiple times—once for each device family in your mixed Virtual Chassis or VCF—in most scenarios when enabling the automatic software update for a mixed Virtual Chassis or VCF.

The Junos OS package for an EX4500 switch updates the software for EX4500 and EX4550 switches. You do not, therefore, need to specify the **ex-4500** keyword when configuring automatic software update for a mixed Virtual Chassis that include EX4500 and EX4550 switches only. You also only have to enter

the **ex-4500** keyword once to configure automatic software update for all EX4500 and EX4550 member switches in the s37628)ame mixed Virtual Chassis.

The Junos OS package for a QFX3500 device updates the software for QFX3500 and QFX3600 devices. You do not, therefore, need to specify the **qfx-3** keyword when configuring automatic software update for a Virtual Chassis composed entirely of QFX3500 and QFX3600 devices. You also have to enter the **qfx-3** keyword only once to configure automatic software update for all QFX3500 and QFX3600 member devices in the same mixed Virtual Chassis.

The Junos OS package for a QFX5110 device updates the software for both QFX5110 and QFX5100 devices in a QFX5110 Virtual Chassis or VCF, so you do not need to specify the **qfx-5** keyword when configuring automatic software update for a QFX5110 Virtual Chassis or VCF composed of both types of devices.



CAUTION: A QFX5100 switch running a Junos OS software image with “-qfx-5-” in the package filename *must* first be upgraded to a Junos OS software image with “-qfx-5e-” in the package filename before it can be added to a mixed QFX5110 Virtual Chassis or VCF. The automatic software update process cannot update a switch from a “-qfx-5-” image to a “-qfx-5e-” image. See *Upgrading a QFX5100 Switch with a USB Device to Join a QFX5110 Virtual Chassis or Virtual Chassis Fabric*.

After a QFX5100 switch is installed with a “-qfx-5e-” Junos OS software image, the automatic software update process can successfully update the switch automatically with a different version of a “-qfx-5e-” Junos OS image to match the other members in the Virtual Chassis or VCF.

The remaining statement is explained separately. See [CLI Explorer](#).

Default

The automatic software update feature is disabled.

Options

package-name *package-name*—Specify the software package name or a path to a Junos OS software image to update new members being added to a Virtual Chassis or VCF. .

- If the software package is located on a local directory on the switch, use the following format for *package-name*:

/pathname/package-name

- If the software package is to be downloaded and installed from a remote location, use one of the following file access and transfer formats:

ftp://hostname/pathname/package-name

ftp://username:prompt@ftp.hostname.net/package-name

http://hostname/pathname/package-name

ex-4200—Specify a path to a Junos OS image for an EX4200 switch when enabling automatic software update for a mixed EX4200 and EX4500 Virtual Chassis, mixed EX4200 and EX4550 Virtual Chassis, or mixed EX4200, EX4500, or EX4550 Virtual Chassis.

ex-4300—Specify a path to a Junos OS image for an EX4300 switch when enabling automatic software update for a mixed Virtual Chassis or VCF. Automatic software update is not supported for mixed mode EX4300 Virtual Chassis with a combination of EX4300 multigigabit model (EX4300-48MP) switches and other EX4300 switches, and this option is not applicable in that case.

ex-4500—Specify a path to a Junos OS image for an EX4500 switch, an EX4550 switch, or both types of switches when enabling automatic software update for a mixed EX4200 and EX4500 Virtual Chassis, mixed EX4200 and EX4550 Virtual Chassis, or mixed EX4200, EX4500, or EX4550 Virtual Chassis.

The Junos OS package for an EX4500 switch updates the software for EX4500 and EX4550 switches. Therefore, you only enter this command once to upgrade the EX4500 and EX4550 member switches in the same mixed Virtual Chassis.

The **ex-4500** keyword also does not need to be specified when configuring automatic software update for a mixed EX4500 and EX4550 Virtual Chassis.

ex-4600—Specify a path to a Junos OS image for an EX4600 switch when enabling automatic software update for a mixed Virtual Chassis.

qfx-3—Specify a path to a Junos OS image for a QFX3500, QFX3600, or both types of devices when enabling automatic software update for a mixed Virtual Chassis or VCF.

qfx-5—Specify a path to a Junos OS image for a QFX5100 device when enabling automatic software update for a mixed QFX5100 Virtual Chassis or VCF. You do not need to use this option for a QFX5110 Virtual Chassis or VCF that contains both QFX5110 and QFX5100 switches because the same software image runs on either type of switch.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

[Configuring Automatic Software Update on Virtual Chassis Member Switches | 275](#)

[Understanding Software Upgrades in a Virtual Chassis | 44](#)

Understanding Software Upgrades in a Virtual Chassis Fabric

[Example: Configuring Automatic Software Update on EX4200 Virtual Chassis Member Switches | 202](#)

fast-failover

Syntax

```
fast-failover (ge | vcp disable | xe);
```

Hierarchy Level

[edit [virtual-chassis](#)]

Release Information

Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description

Enable the fast failover feature on an uplink Virtual Chassis port (VCP).

Fast failover is not supported on an EX2200 Virtual Chassis or EX8200 Virtual Chassis.

Default

Fast failover is enabled, by default, on dedicated VCPs.

Fast failover is not enabled on uplink VCPs, including the uplink ports that are, by default, configured as VCPs on an EX3300 switch.

Options

- **ge**—Enable fast failover on all Gigabit Ethernet uplink VCPs in the ring topology.
- **vcp disable**—Disable fast failover on all dedicated VCPs in the ring topology.
- **xe**—Enable fast failover on all 10-Gigabit Ethernet uplink VCPs in the ring topology.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

[Example: Configuring Fast Failover on Uplink Module VCPs to Reroute Traffic When an EX4200 Virtual Chassis Switch or Intermember Link Fails](#) | 184

[Configuring Fast Failover in an EX Series Virtual Chassis](#) | 271

[Disabling Fast Failover in an EX Series Virtual Chassis](#) | 272

graceful-restart (Enabling Globally)

Syntax

```
graceful-restart {  
  disable;  
  helper-disable;  
  maximum-helper-recovery-time seconds;  
  maximum-helper-restart-time seconds;  
  notify-duration seconds;  
  recovery-time seconds;  
  restart-duration seconds;  
  stale-routes-time seconds;  
}
```

Hierarchy Level

```
[edit logical-systems logical-system-name routing-options],  
[edit logical-systems logical-system-name routing-instances routing-instance-name routing-options],  
[edit routing-options],  
[edit routing-instances routing-instance-name routing-options]
```

Release Information

Statement introduced before Junos OS Release 7.4.

Statement introduced in Junos OS Release 9.0 for EX Series switches.

Statement introduced in Junos OS Release 12.1 for the QFX Series.

Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

Description

You configure the graceful restart routing option globally to enable the feature, but not to enable graceful restart for all routing protocols in a routing instance. To enable graceful restart globally, include the graceful-restart statement under the **[edit routing options]** hierarchy level. This enables graceful restart globally for all routing protocols. You can, optionally, modify the global settings at the individual protocol level.

NOTE:

- For VPNs, the **graceful-restart** statement allows a router whose VPN control plane is undergoing a restart to continue to forward traffic while recovering its state from neighboring routers.
- For BGP, if you configure graceful restart after a BGP session has been established, the BGP session restarts and the peers negotiate graceful restart capabilities.
- LDP sessions flap when **graceful-restart** configurations change.

Default

Graceful restart is disabled by default.

Options

The remaining statements are explained separately. See [CLI Explorer](#).

Required Privilege Level

routing—To view this statement in the configuration.

routing-control—To add this statement to the configuration.

RELATED DOCUMENTATION

Enabling Graceful Restart

Configuring Routing Protocols Graceful Restart

Configuring Graceful Restart for MPLS-Related Protocols

Configuring VPN Graceful Restart

Configuring Logical System Graceful Restart

Configuring Graceful Restart for QFabric Systems

graceful-switchover

Syntax

```
graceful-switchover;
```

Hierarchy Level

```
[edit chassis (EX Series) redundancy]
```

Release Information

Statement introduced in Junos OS Release 9.2 for EX Series switches.

Statement introduced in Junos OS Release 13.2 for the QFX Series.

Description

For switches with more than one Routing Engine, including those in a Virtual Chassis or a Virtual Chassis Fabric, configure the master Routing Engine to switch over gracefully to a backup Routing Engine without interruption to packet forwarding.

Default

Graceful Routing Engine switchover (GRES) is disabled.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

RELATED DOCUMENTATION

Example: Configuring Nonstop Active Routing on Switches

Configuring Graceful Routing Engine Switchover

[Configuring Graceful Routing Engine Switchover in a Virtual Chassis](#) | 283

Configuring Nonstop Active Routing on Switches

Installing Software on an EX Series Switch with Redundant Routing Engines (CLI Procedure)

id

Syntax

```
id id;
```

Hierarchy Level

```
[edit virtual-chassis]
```

Release Information

Statement introduced in Junos OS Release 9.3 for EX Series switches.

Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Statement introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Configure the alphanumeric string that identifies a Virtual Chassis or Virtual Chassis Fabric (VCF) configuration.

Options

id—Virtual Chassis ID (VCID), which uses the ISO family address format—for example, **9622.6ac8.5345**.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

[Example: Assigning the Virtual Chassis ID to Determine Precedence During an EX4200 Virtual Chassis Merge | 188](#)

[Assigning the Virtual Chassis ID to Determine Precedence During a Virtual Chassis Merge | 282](#)

[Configuring an EX4650 or a QFX Series Virtual Chassis](#)

[Autoprovisioning a Virtual Chassis Fabric](#)

[Preprovisioning a Virtual Chassis Fabric](#)

[Configuring an EX8200 Virtual Chassis \(CLI Procedure\)](#)

[Understanding Virtual Chassis Member ID Numbering in an EX8200 Virtual Chassis](#)

location (Virtual Chassis)

Syntax

```
location location;
```

Hierarchy Level

```
[edit virtual-chassis member member-id]
```

Release Information

Statement introduced in Junos OS Release 11.1 for EX Series switches.

Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Statement introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Set a description of the location of the Virtual Chassis or VCF member switch or external Routing Engine.

The **Location** field is visible to users who enter the **show virtual-chassis status detail** command.

Setting this description has no effect on the operation of the member device.

Options

location—Location of the current member switch or external Routing Engine. The **location** can be any single word.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

Autoprovisioning a Virtual Chassis Fabric

Preprovisioning a Virtual Chassis Fabric

Configuring an EX4650 or a QFX Series Virtual Chassis

Configuring an EX2300, EX3400, or EX4300 Virtual Chassis

Configuring EX4600 Switches in a Mixed or Non-Mixed Virtual Chassis

mac-persistence-timer

Syntax

```
mac-persistence-timer (minutes | disable);
```

Hierarchy Level

```
[edit virtual-chassis]
```

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.

Option **disable** introduced in Junos OS Release 12.2 for EX Series switches.

The maximum timer limit changed from no maximum timer limit to 60 minutes in Junos OS Release 12.2 for EX Series switches.

Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Statement introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Specify how long the Virtual Chassis or VCF continues to use the MAC address of the switch that was originally configured in the master role as the system MAC base address after the original master switch is removed from the Virtual Chassis or VCF. The system MAC base address does not change in the event of a switchover provided the switch originally configured in the master role remains a member of the Virtual Chassis or VCF.

The maximum timer limit is 60 minutes starting in Junos OS Release 12.2. There are no minimum or maximum timer limits in prior Junos OS releases.

Default

The MAC persistence timer is set to 10 minutes by default.

Options

minutes—Time in minutes that the member switch in the backup role continues to use the system MAC base address of the old master before using its own system MAC base address after the switch in the master role is physically disconnected or removed from the Virtual Chassis or VCF.

disable—Disable the MAC persistence timer. The system MAC base address never changes when the MAC persistence timer is disabled, even when the switch in the master role is physically disconnected or removed from the Virtual Chassis or VCF.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

[Configuring the Timer for the Backup Member to Start Using Its Own MAC Address, as Master of a Virtual Chassis | 270](#)

Autoprovisioning a Virtual Chassis Fabric

Preprovisioning a Virtual Chassis Fabric

mastership-priority

Syntax

```
mastership-priority number;
```

Hierarchy Level

```
[edit virtual-chassis member member-id]
```

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.

Mastership priority option **0** introduced in Junos OS Release 11.1 for EX Series switches.

Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Statement introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Assign a mastership priority value to a member of a Virtual Chassis or VCF. The mastership priority is the most important factor that determines which member assumes the master Routing Engine role in the Virtual Chassis or VCF.

A Virtual Chassis or VCF configuration has two member switches running in the Routing Engine role, one as the master and one as the backup. The remaining members operate in the linecard role. In a preprovisioned Virtual Chassis or VCF, you configure the **role** for each member by associating it with the member switch's serial number, and the Virtual Chassis assigns default mastership priorities based on the assigned role. In a non-provisioned Virtual Chassis or VCF, you can configure roles explicitly, or the mastership priorities of the members implicitly designate the role of each member based on the mastership election algorithm.

The Virtual Chassis or VCF elects the member switch with the highest mastership priority as the master Routing Engine. When two members have the same highest mastership priority value among all the members, the master election algorithm uses other factors to determine which of the two members functions as the master and which is the backup. See [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#) for all the conditions considered in mastership election.

You should assign the *same* (highest) mastership priority value to the members you want to be the master and backup Routing Engine members to ensure reliable graceful Routing Engine switchover (GRES) operation. This and other mastership election considerations also help keep mastership from switching back and forth rapidly between the two members under failover conditions.

This statement is not used for the EX8200 Virtual Chassis, which determines mastership by external Routing Engine uptime.

A switch with a mastership priority of **0** never takes the master or backup role.

Default

128

Options

number—Mastership priority value.

Range: 0 through 255

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

<i>Autoprovisioning a Virtual Chassis Fabric</i>
<i>Preprovisioning a Virtual Chassis Fabric</i>
<i>Configuring an EX4650 or a QFX Series Virtual Chassis</i>
<i>Configuring an EX2300, EX3400, or EX4300 Virtual Chassis</i>
<i>Configuring EX4600 Switches in a Mixed or Non-Mixed Virtual Chassis</i>

member

Syntax

```
member member-id {
    fabric-tree-root;
    location location;
    mastership-priority number;
    no-management-vlan;
    serial-number serial-number;
    role role;
}
```

Hierarchy Level

[edit [virtual-chassis](#)]

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.

Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Statement introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Configure a switch or an XRE200 External Routing Engine as a member of a Virtual Chassis or a Virtual Chassis Fabric (VCF) with characteristics specified by the available options.

Default

When an EX Series switch or a QFX Series devices configured in standalone mode is powered on but not interconnected through its Virtual Chassis ports (VCPs) with other member switches, its default member ID is 0.

There is no default member ID in an EX8200 or EX9200 Virtual Chassis. An EX8200 or EX9200 Virtual Chassis must be preprovisioned, and that process configures the member IDs.

Options

member-id—Identifies a specific member switch of a Virtual Chassis or VCF configuration.

The exact range for a specific Virtual Chassis or VCF depends on the number of switches allowed in the Virtual Chassis or VCF.

In an EX8200 Virtual Chassis, member IDs 0 through 7 are reserved for EX8200 member switches and member IDs 8 and 9 are reserved for the master and backup external Routing Engines.

The remaining statement options set characteristics of the Virtual Chassis or VCF member, and are explained separately.

Required Privilege Level

- system—To view this statement in the configuration.
- system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

<i>Autoprovisioning a Virtual Chassis Fabric</i>
<i>Preprovisioning a Virtual Chassis Fabric</i>
<i>Adding a Device to a Virtual Chassis Fabric</i>
<i>Configuring an EX4650 or a QFX Series Virtual Chassis</i>
<i>Configuring an EX2300, EX3400, or EX4300 Virtual Chassis</i>
<i>Configuring EX4600 Switches in a Mixed or Non-Mixed Virtual Chassis</i>
<i>Configuring an EX9200 Virtual Chassis</i>
<i>Configuring an EX4650 or a QFX Series Virtual Chassis</i>

no-management-vlan

Syntax

```
no-management-vlan;
```

Hierarchy Level

```
[edit virtual-chassis member member-id]
```

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.

Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Statement introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Remove the specified member's out-of-band management port from the virtual management Ethernet (VME) global management VLAN of the Virtual Chassis or VCF configuration.

For a member that is functioning in a linecard role, you can use this configuration to reserve the member's management Ethernet port for local troubleshooting:

```
virtual-chassis {  
  member 2 {  
    no-management-vlan;  
  }  
}
```

You cannot configure the IP address for a local management Ethernet port using the CLI or the J-Web interface. To do this, you need to use the shell **ifconfig** command.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

[Understanding Global Management of a Virtual Chassis](#) | 46

[Understanding Virtual Chassis Fabric Configuration](#)

no-split-detection

Syntax

```
no-split-detection;
```

Hierarchy Level

```
[edit virtual-chassis]
```

Release Information

Statement introduced in Junos OS Release 9.3 for EX Series switches.

Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Statement introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Disable the split and merge feature in a Virtual Chassis or VCF configuration.

The split and merge feature is enabled by default when you initially set up a Virtual Chassis. If you have only two members in your Virtual Chassis, we recommend you configure **no-split-detection** to disable the split and merge feature, which makes sure both switches remain in the correct Virtual Chassis roles in the event of a Virtual Chassis split. If you expand the two-member Virtual Chassis later to add more members, you should delete the **no-split-detection** configuration item to re-enable the split and merge feature again.

Default

The split and merge feature is enabled.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

[Understanding Split and Merge in a Virtual Chassis | 59](#)

[Example: Assigning the Virtual Chassis ID to Determine Precedence During an EX4200 Virtual Chassis Merge | 188](#)

[Disabling Split and Merge in a Virtual Chassis | 273](#)

[Assigning the Virtual Chassis ID to Determine Precedence During a Virtual Chassis Merge | 282](#)

preprovisioned

Syntax

```
preprovisioned;
```

Hierarchy Level

```
[edit virtual-chassis]
```

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.

Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Statement introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Enable the preprovisioned configuration mode for a Virtual Chassis or Virtual Chassis Fabric (VCF) configuration.

When the preprovisioned configuration mode is enabled, you cannot use the CLI or the J-Web interface to change the mastership priority or member ID of member switches.

You must use this statement to configure an EX8200 Virtual Chassis. Nonprovisioned configuration of an EX8200 Virtual Chassis is not supported.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

Preprovisioning a Virtual Chassis Fabric

[Example: Configuring an EX4200 Virtual Chassis Using a Preprovisioned Configuration File](#) | 150

Example: Setting Up a Full Mesh EX8200 Virtual Chassis with Two EX8200 Switches and Redundant XRE200 External Routing Engines

[Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\)](#) | 217

[Configuring an EX8200 Virtual Chassis \(CLI Procedure\)](#)

[Configuring an EX9200 Virtual Chassis](#)

[Configuring an EX4650 or a QFX Series Virtual Chassis](#)

[Removing or Replacing a Member Switch of a Virtual Chassis Configuration](#) | 248

redundancy (Graceful Switchover)

Syntax

```
redundancy {
  failover {
    on-disk-failure;
    on-loss-of-keepalives;
  }
  graceful-switchover;
}
```

Hierarchy Level

```
[edit chassis (EX Series)]
```

Release Information

Statement introduced in Junos OS Release 9.2 for EX Series switches.

Statement introduced in Junos OS Release 11.1 for the QFX Series.

Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

Description

Enable redundant Routing Engines on a Virtual Chassis with two or more member switches or on a Virtual Chassis Fabric, on a standalone EX6200 or EX8200 switch with more than one Routing Engine.

The remaining statements are explained separately. See [CLI Explorer](#).

Default

Redundancy is enabled for the Routing Engines.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

RELATED DOCUMENTATION

[graceful-switchover](#) | 296

[Configuring Graceful Routing Engine Switchover in a Virtual Chassis](#) | 283

[Configuring Graceful Routing Engine Switchover](#)

[Installing Software on an EX Series Switch with Redundant Routing Engines \(CLI Procedure\)](#)

[High Availability Features for EX Series Switches Overview](#)

role

Syntax

```
role (line-card | routing-engine);
```

Hierarchy Level

```
[edit virtual-chassis member member-id]
```

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.

Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Statement introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Specify the roles of the members of the Virtual Chassis or a Virtual Chassis Fabric (VCF) in a preprovisioned Virtual Chassis. For a mixed Virtual Chassis or VCF, see [“Understanding Mixed EX Series and QFX Series Virtual Chassis” on page 35](#) or *Understanding Mixed Virtual Chassis Fabric* for any recommendations or requirements for assigning the Routing Engine role based on the types of switches comprising the Virtual Chassis or VCF.

Virtual Chassis Fabric

Specify the role to be performed by each switch. In a VCF, two spine devices are configured into the Routing Engine role and the remaining spine devices and all leaf devices are configured into the **line-card** role. The role must also be associated with the member’s serial number (see [serial-number](#)).

EX Series (except EX8200 Virtual Chassis) and QFX Series Virtual Chassis

Specify the role to be performed by each member switch. Associate the role with the member’s serial number (see [serial-number](#)).

When you use a preprovisioned configuration, you cannot modify the mastership priority or member ID of member switches through the user interfaces. The mastership priority value is generated by the software, based on the assigned role:

- A member configured as **routing-engine** is assigned the mastership priority 129.
- A member configured as **line-card** is assigned the mastership priority 0.
- A member listed in the preprovisioned configuration without an explicitly specified role is assigned the **line-card** role and mastership priority 0 by default.

The configured role specifications are permanent. If both **routing-engine** members fail, a **line-card** member cannot take over as master of the Virtual Chassis configuration. You must delete the preprovisioned configuration to change the specified roles in a Virtual Chassis.

Explicitly configure two members as **routing-engine** and configure additional switches as members of the preprovisioned Virtual Chassis by specifying only their serial numbers. If you do not explicitly configure the role of the additional members, they function in a **line-card** role by default. In that case, a member that is functioning in a **line-card** role can take over mastership if the members functioning as master and backup (**routing-engine** role) both fail.

EX8200 Virtual Chassis

Specify the role to be performed by each XRE200 External Routing Engine and each EX8200 member switch. Associate the role with the member's serial number (see [serial-number](#)). An EX8200 Virtual Chassis cannot function when both external Routing Engines, which must be configured in the **routing-engine** role, have failed.

Options

- **line-card**—Enables the member to be eligible to function only in the linecard role. Any member of the Virtual Chassis or VCF configuration other than the master or backup functions in the linecard role and runs only a subset of Junos OS for EX Series switches. A member functioning in the linecard role does not run the control protocols or the chassis management processes.

A Virtual Chassis must have at least three members for one member to function in the linecard role.

In an EX8200 Virtual Chassis configuration, all member switches must be in the linecard role.

- **routing-engine**—Enables the member to function as a master or backup Routing Engine of the Virtual Chassis or VCF configuration. The master manages all members and runs the chassis management processes and control protocols. The backup synchronizes with the master in terms of protocol states, forwarding tables, and so forth, so that it is prepared to preserve routing information and maintain network connectivity without disruption in case the master is unavailable.

In a Virtual Chassis composed of EX Series switches (except EX8200 switches) or QFX Series switches, specify two and only two members in the **routing-engine** role. The software determines which of the two members assigned the **routing-engine** role functions as master, based on the master election algorithm. See [“Understanding How the Master in a Virtual Chassis Is Elected” on page 43](#). In these Virtual Chassis, the **routing-engine** role is associated with a switch. For a mixed Virtual Chassis or VCF, see [“Understanding Mixed EX Series and QFX Series Virtual Chassis” on page 35](#) or *Understanding Mixed Virtual Chassis Fabric* for specific recommendations or requirements for assigning the Routing Engine role based on the types of switches comprising the Virtual Chassis or VCF. The remaining switches are configured into the linecard role.

In an EX8200 Virtual Chassis, all XRE200 External Routing Engines must be in the **routing-engine** role.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

<i>Autoprovisioning a Virtual Chassis Fabric</i>
<i>Preprovisioning a Virtual Chassis Fabric</i>
<i>Configuring an EX2300, EX3400, or EX4300 Virtual Chassis</i>
<i>Configuring EX4600 Switches in a Mixed or Non-Mixed Virtual Chassis</i>
<i>Configuring an EX9200 Virtual Chassis</i>
<i>Configuring an EX4650 or a QFX Series Virtual Chassis</i>
Removing or Replacing a Member Switch of a Virtual Chassis Configuration 248

serial-number

Syntax

```
serial-number serial-number;
```

Hierarchy Level

```
[edit virtual-chassis member member-id]
```

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.

Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Statement introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

In a preprovisioned Virtual Chassis or Virtual Chassis Fabric (VCF), specify the serial number of each member switch to be included in the configuration. If you do not include the serial number within the configuration, the switch cannot be recognized as a member of a preprovisioned configuration. Serial number values are case-sensitive.

In an EX8200 Virtual Chassis configuration, specify the serial number of each XRE200 External Routing Engine and each EX8200 member switch to be included in the Virtual Chassis configuration. If you do not include the serial number within the Virtual Chassis configuration, the external Routing Engine or switch cannot be recognized as a member of the configuration.

Options

serial-number—Permanent serial number for the external Routing Engine or for the member switch.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

Autoprovisioning a Virtual Chassis Fabric

Preprovisioning a Virtual Chassis Fabric

Configuring an EX2300, EX3400, or EX4300 Virtual Chassis

Configuring EX4600 Switches in a Mixed or Non-Mixed Virtual Chassis

Configuring an EX9200 Virtual Chassis

| *Configuring an EX4650 or a QFX Series Virtual Chassis*

traceoptions (Virtual Chassis)

Syntax

```
traceoptions {
  file filename <files number> <no-stamp> <replace> <size size> <world-readable | no-world-readable>;
  flag flag <detail> <disable> <receive> <send>;
}
```

Hierarchy Level

[edit [virtual-chassis](#)]

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.

Option **detail** added in Junos OS Release 9.2 for EX Series switches.

Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Statement introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Define tracing operations for the Virtual Chassis or VCF.

Each Virtual Chassis or VCF member is updated with configured tracing options, and the log file is stored locally on each device.

NOTE: In a large-scale VCF, use system logging and tracing with discretion, and only for troubleshooting. These operations place an extra load on the master Routing Engine device, which can impact VCF convergence time and stability. All tracing options should be disabled during normal VCF operation. To troubleshoot particular problems, selectively enable tracing options, and disable them again after collecting the desired information.

Default

Tracing operations are disabled.

Options

detail—(Optional) Generate detailed trace information for a flag.

NOTE: Enable tracing at the detail level only while troubleshooting a particular issue, and disable it again for normal system operation.

disable—(Optional) Disable a flag.

file *filename*—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory **/var/log**.

files *number*—(Optional) Maximum number of trace files. When a trace file named ***trace-file*** reaches its maximum size, it is renamed ***trace-file.0***, then ***trace-file.1***, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

Range: 2 through 1000

Default: 3 files

flag *flag*—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements. You can include the following flags:

- **all**—All tracing operations.

TIP: The **all** flag displays a subset of logs that are generally useful in debugging issues, and for more detailed information, you can use options **all detail**. However, to avoid significantly impacting VCF stability, use this high level of tracing only for troubleshooting for a short period of time, and not during normal VCF operation.

- **auto-configuration**—Trace Virtual Chassis ports (VCPs) that have been automatically configured.
- **csn**—Trace Virtual Chassis complete sequence number (CSN) packets.
- **error**—Trace Virtual Chassis errored packets.
- **hello**—Trace Virtual Chassis hello packets.
- **krt**—Trace Virtual Chassis KRT events.
- **lsp**—Trace Virtual Chassis link-state packets.
- **lsp-generation**—Trace Virtual Chassis link-state packet generation.
- **me**—Trace Virtual Chassis ME events.
- **normal**—Trace normal events.
- **packets**—Trace Virtual Chassis packets.
- **parse**—Trace reading of the configuration.
- **psn**—Trace partial sequence number (PSN) packets.
- **route**—Trace Virtual Chassis routing information.
- **spf**—Trace Virtual Chassis SPF events.
- **state**—Trace Virtual Chassis state transitions.
- **task**—Trace Virtual Chassis task operations.

no-stamp—(Optional) Do not place a timestamp on any trace file.

no-world-readable—(Optional) Restrict file access to the user who created the file.

receive—(Optional) Trace received packets.

replace—(Optional) Replace a trace file rather than appending information to it.

send—(Optional) Trace transmitted packets.

size *size*—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named **trace-file** reaches its maximum size, it is renamed **trace-file.0**, then **trace-file.1**, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten. If you specify a maximum number of files, you also must specify a maximum file size with the **files** option.

Syntax: **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

Range: 10 KB through 1 GB

Default: 128 KB

world-readable—(Optional) Enable unrestricted file access.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

[Verifying the Member ID, Role, and Neighbor Member Connections of a Virtual Chassis Member | 330](#)

[Verifying That Virtual Chassis Ports Are Operational | 332](#)

[Troubleshooting an EX Series Virtual Chassis | 459](#)

Troubleshooting Virtual Chassis Fabric

vc-port

Syntax

```
vc-port {  
    lag-hash (packet-based | source-port-based);  
}
```

Hierarchy Level

[edit [virtual-chassis](#)]

Release Information

Statement introduced in Junos OS Release 12.1 for EX Series switches.

Description

Enable hashing of link aggregation group (LAG) network traffic over a dedicated trunk port within a Virtual Chassis, and select how the traffic within the dedicated trunk port is hashed.

BEST PRACTICE: Do not configure this statement unless you have a compelling reason to configure it. Configuration of this statement is optional and is only useful in a few types of network setups.

Default

source-port-based

Options

lag-hash—Select how to direct LAG traffic through the dedicated trunk port using either of the following options:

packet-based—Hashes all incoming LAG network traffic on the dedicated trunk port based on the packet.

source-port-based—Hashes all incoming LAG network traffic on the dedicated trunk port based on the source.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

vcp-snmp-statistics

Syntax

```
vcp-snmp-statistics;
```

Hierarchy Level

```
[edit virtual-chassis]
```

Release Information

Statement introduced in Junos OS Release 14.1X53-D40 and 15.1R5 only on EX2200, EX3300, EX4200, EX4500, EX4550, and EX8200 switches.

Statement deprecated in Junos OS Releases after 14.1X53 and 15.1.

Description

Enable SNMP monitoring of the Virtual Chassis ports (VCPs) for all VCPs in the Virtual Chassis or Virtual Chassis Fabric (VCF).

When this statement is enabled, SNMP gathers statistics on the Junos VCP MIBs. You can retrieve the statistics gathered by SNMP for these MIBs by using the *show snmp mib* command with the **walk** and **ascii** options and specifying **jnxVirtualChassisPortInPkts**.

Default

SNMP is disabled by default on devices running Junos OS.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

[Understanding EX Series Virtual Chassis | 9](#)

Understanding QFX Series Virtual Chassis

[Understanding Virtual Chassis Components | 19](#)

virtual-chassis

Syntax

```
virtual-chassis {
  aliases {
    serial-number serial-number {
      alias-name alias-name;
    }
  }
  auto-conversion;
  auto-provisioned;
  auto-sw-update {
    (ex-4200 | ex-4300 | ex-4500 | ex-4600 | qfx-3 | qfx-5)
    package-name package-name;
  }
  fast-failover (ge | vcp disable | xe);
  graceful-restart {
    disable;
  }
  id id;
  mac-persistence-timer (minutes | disable);
  member member-id {
    fabric-tree-root;
    location location;
    mastership-priority number;
    no-management-vlan;
    serial-number;
    role;
  }
  no-auto-conversion;
  no-split-detection;
  preprovisioned;
  traceoptions (Virtual Chassis) {
    file filename <files number> <size size> <world-readable | no-world-readable> <match regex>;
    flag flag ;
  }
  vc-port {
    lag-hash (packet-based | source-port-based);
  }
  vcp-no-hold-time;
  vcp-snmp-statistics;
}
```

Hierarchy Level

[edit]

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.

Statement introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Statement introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Configure a Virtual Chassis or a Virtual Chassis Fabric (VCF).

The remaining statements are explained separately. See [CLI Explorer](#).

Default

A standalone EX Series switch is a Virtual Chassis by default. It has a default member ID of 0, a default mastership priority of 128, and a default role as master.

A QFX Series device configured in standalone mode is a Virtual Chassis by default. It has a default member ID of 0, a default mastership priority of 128, and a default role as master.

A standalone XRE200 External Routing Engine or EX8200 switch is not part of an EX8200 Virtual Chassis until a Virtual Chassis configuration is set up.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

RELATED DOCUMENTATION

<i>Autoprovisioning a Virtual Chassis Fabric</i>
<i>Preprovisioning a Virtual Chassis Fabric</i>
<i>Adding a Device to a Virtual Chassis Fabric</i>
<i>Configuring an EX4650 or a QFX Series Virtual Chassis</i>
<i>Configuring an EX2300, EX3400, or EX4300 Virtual Chassis</i>
<i>Configuring EX4600 Switches in a Mixed or Non-Mixed Virtual Chassis</i>
<i>Configuring an EX9200 Virtual Chassis</i>

3

PART

Administration

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Routine Monitoring

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Command Forwarding Usage with EX Series and QFX Series Virtual Chassis

Some CLI commands can be run either on all members or on a specific member of a Virtual Chassis configuration. This functionality is referred to as command forwarding.

You can always specify that these commands be applied to all member switches in the Virtual Chassis by using the **all-members** option, or to a specific member switch by using the **member-member-id** option. If neither option is specified, the default command forwarding behavior, which varies by command, is used. See the **Default** row in [Table 26 on page 324](#) to learn the command forwarding behavior for a specific command.

For example, to collect information about a particular member switch prior to contacting Juniper Networks Technical Assistance Center (JTAC), use the **request support information member member-id** command to gather data for the specified member switch. If you want to gather this data for all member switches in the Virtual Chassis, you can enter the **request support information** command, which by default uses the **all-members** option, or the **request support information all-members** command.

[Table 26 on page 324](#) provides a list of commands that can be run either on all members of the Virtual Chassis configuration or on a specific member switch.

Table 26: Commands That Can be Run on All or Specific Members of the Virtual Chassis Configuration

Command	Purpose	all-members	member-member-id	Default
request support information	<p>Use this command when you contact JTAC about your component problem. This command is the equivalent of using the following CLI commands:</p> <ul style="list-style-type: none"> • show version • show chassis firmware • show chassis hardware • show chassis environment • show interfaces extensive (for each configured interface) • show configuration (excluding any SECRET-DATA) • show system virtual-memory 	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	all-members

Table 26: Commands That Can be Run on All or Specific Members of the Virtual Chassis Configuration (continued)

Command	Purpose	all-members	member-member-id	Default
request system partition hard-disk	Set up the hard disk for partitioning. After this command is issued, the hard disk is partitioned the next time the system is rebooted. When the hard disk is partitioned, the contents of /altroot and /altconfig are saved and restored. All other data on the hard disk is at risk of being lost.	Partitions the hard disk on all members of the Virtual Chassis configuration.	Partitions the hard disk on the specified member switch.	all-members
request system reboot	Reboot Junos OS for EX Series or QFX Series switches after a software upgrade and occasionally to recover from an error condition.	Reboots all members of the Virtual Chassis configuration.	Reboots the specified member switch.	all-members
request system snapshot	Back up the currently running and active file system.	Backs up the file systems on all members of the Virtual Chassis configuration.	Backs up the file system on the specified member switch.	all-members

Table 26: Commands That Can be Run on All or Specific Members of the Virtual Chassis Configuration (continued)

Command	Purpose	all-members	member-member-id	Default
request system storage cleanup	Free storage space on the switch by rotating log files and proposing a list of files for deletion. User input is required for file deletion.	Runs cleanup on all members of the Virtual Chassis configuration.	Runs cleanup on the specified member switch.	all-members
show log user	Display users who are viewing the system log.	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	master switch only
show system alarms	Display active system alarms.	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	all-members
show system audit	Display the state and checksum values for file systems.	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	all-members
show system boot-messages	Display initial messages generated by the system kernel upon startup. These messages are the contents of <code>/var/run/dmesg.boot</code> .	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	all-members

Table 26: Commands That Can be Run on All or Specific Members of the Virtual Chassis Configuration (*continued*)

Command	Purpose	all-members	member-member-id	Default
show system buffers	Display information about the buffer pool that the Routing Engine uses for local traffic. Local traffic is the routing and management traffic that is exchanged between the Routing Engine and the Packet Forwarding Engine within the switch, as well as the routing and management traffic from IP (that is, from OSPF, BGP, SNMP, ping operations, and so on).	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	all-members
show system connections	Display information about the active IP sockets on the Routing Engine. Use this command to verify which servers are active on a system and which connections are currently in progress.	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	all-members

Table 26: Commands That Can be Run on All or Specific Members of the Virtual Chassis Configuration (continued)

Command	Purpose	all-members	member-member-id	Default
show system core-dumps	Display a core file generated by an internal Junos OS process.	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	all-members
show system directory-usage	Display directory usage information.	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	master switch only
show system processes	Display information about software processes that are running on the switch and that have controlling terminals.	Displays information for all members of the Virtual Chassis configuration.		all-members
show system reboot	Display pending system reboots or halts.	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	all-members
show system snapshot	Display information about the backup software that is located in the /altroot and /altconfig file systems. To back up software, use the request system snapshot command.	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	all-members

Table 26: Commands That Can be Run on All or Specific Members of the Virtual Chassis Configuration (continued)

Command	Purpose	all-members	member-member-id	Default
show system software	Display the Junos OS extensions loaded on your switch.	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	all-members
show system statistics	Display systemwide protocol-related statistics.	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	all-members
show system storage	Display statistics about the amount of free disk space in the switch's file systems.	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	all-members
show system uptime	Display the current time and information about how long the switch, the switch software, and any existing protocols have been running	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	all-members
show system users	Show all users who are currently logged in.	Shows all users who are currently logged in to any members of the Virtual Chassis configuration.	Shows all users who are currently logged in to the specified member switch.	all-members

Table 26: Commands That Can be Run on All or Specific Members of the Virtual Chassis Configuration (continued)

Command	Purpose	all-members	member-member-id	Default
show system virtual-memory	Display the usage of Junos OS kernel memory, listed first by size of allocation and then by type of usage. Use show system virtual-memory for troubleshooting with JTAC.	Displays information for all members of the Virtual Chassis configuration.	Displays information for the specified member switch.	all-members

RELATED DOCUMENTATION

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

[Virtual Chassis Overview for Switches | 2](#)

[Understanding Virtual Chassis Components | 19](#)

Verifying the Member ID, Role, and Neighbor Member Connections of a Virtual Chassis Member

Purpose

You can designate the role that a member performs within a Virtual Chassis or you can allow the role to be assigned by default. You can designate the member ID that is assigned to a specific switch by creating a permanent association between the switch's serial number and a member ID, using a preprovisioned configuration. Or you can let the member ID be assigned by the master, based on the sequence in which the member switch is powered on and on which member IDs are currently available.

The role and member ID of the member switch are displayed on the front-panel LCD (for switches that have an LCD) or in the output from the **show virtual-chassis** CLI command.

Each member switch can be cabled to one or two other member switches, using either the dedicated Virtual Chassis ports (VCPs) on the rear panel, an uplink port that has been configured as a VCP, or an optical port that has been configured as a VCP. The members that are cabled together are considered neighbor members.

Action

To display the role and member ID assignments using the CLI:

```
user@switch> show virtual-chassis
```

```
Virtual Chassis ID: 0000.e255.00e0
```

Member ID	Status	Serial No	Model	Mastership		Neighbor List ID, Interface
				Priority	Role	
0 (FPC 0)	Prsnt	abc123	ex4200-48p	255	Master*	1 vcp-0 2 vcp-1
1 (FPC 1)	Prsnt	def456	ex4200-24t	255	Backup	2 vcp-0 0 vcp-1
2 (FPC 2)	Prsnt	abd231	ex4200-24p	128	Linecard	0 vcp-0 1 vcp-1

Meaning

This output verifies that three EX4200 switches have been interconnected as a Virtual Chassis configuration through their dedicated VCPs to create an EX4200 Virtual Chassis. The display shows which of the VCPs is connected to which neighbor. The first port (**vcp-0**) of member **0** is connected to member **1** and the second port of member **0** (**vcp-1**) is connected to member **2**. The FPC slots for the switches are the same as the member IDs.

The **Mastership Priority** values indicate that the master and backup members have been explicitly configured, because they are not using the default value (**128**).

NOTE: This example uses output from an EX4200 Virtual Chassis. The output, with the exception of the **Model** column, would be identical on all other Virtual Chassis.

RELATED DOCUMENTATION

[Configuring Mastership of a Virtual Chassis | 257](#)

[Configuring an EX4650 or a QFX Series Virtual Chassis](#)

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

Verifying That Virtual Chassis Ports Are Operational

Purpose

Display the status of Virtual Chassis ports (VCPs) in a Virtual Chassis or Virtual Chassis Fabric (VCF).

NOTE: VCPs are not displayed when you issue the **show interfaces** command.

Action

Display the VCPs:

```
user@switch> show virtual-chassis vc-port all-members
```

```
fpc0:
```

```
-----
Interface  Type           Trunk  Status   Speed   Neighbor
or         PIC / Port      ID      (mbps)   ID  Interface
vcp-0      Dedicated      1      Up       32000   1    vcp-0
vcp-1      Dedicated      2      Up       32000   1    vcp-1
1/0        Configured     3      Up       1000    2    vcp-255/1/0
1/1        Configured     3      Up       1000    2    vcp-255/1/1
1/2        Configured     4      Up       1000    4    vcp-255/0/20
1/3        Configured     4      Up       1000    4    vcp-255/0/21
```

```
fpc1:
```

```
-----
Interface  Type           Trunk  Status   Speed   Neighbor
or         PIC / Port      ID      (mbps)   ID  Interface
vcp-0      Dedicated      1      Up       32000   0    vcp-0
vcp-1      Dedicated      2      Up       32000   0    vcp-1
1/0        Configured     3      Up       10000   3    vcp-255/1/0
1/1        Configured     3      Up       10000   3    vcp-255/1/1
```

```
fpc2:
```

```
-----
Interface  Type           Trunk  Status   Speed   Neighbor
or         PIC / Port      ID      (mbps)   ID  Interface
```

```

vcp-0      Dedicated      1    Up      32000      3    vcp-0
vcp-1      Dedicated      2    Up      32000      3    vcp-1
1/0        Configured     3    Up      1000       0    vcp-255/1/0
1/1        Configured     3    Up      1000       0    vcp-255/1/1
1/2        Configured    -1    Down     1000
1/3        Configured    -1    Down     1000

```

fpc3:

```

-----
Interface  Type          Trunk  Status    Speed      Neighbor
or         PIC / Port   ID      (mbps)    ID  Interface
vcp-0      Dedicated     1      Up      32000      2    vcp-0
vcp-1      Dedicated     2      Up      32000      2    vcp-1
1/0        Configured     3      Up     10000      1    vcp-255/1/0
1/1        Configured     3      Up     10000      1    vcp-255/1/1

```

fpc4:

```

-----
Interface  Type          Trunk  Status    Speed      Neighbor
or         PIC / Port   ID      (mbps)    ID  Interface
vcp-0      Dedicated     1      Down     32000
vcp-1      Dedicated     2      Down     32000
0/20       Configured     3      Up      1000       0    vcp-255/1/2
0/21       Configured     3      Up      1000       0    vcp-255/1/3

```

Meaning

The dedicated VCPs are displayed as **vcp-0** and **vcp-1**. The uplink interfaces that have been set as uplink VCPs are displayed as **1/0**, **1/1**, **1/2**, and **1/3**. The network interfaces that have been set as VCPs are displayed as **0/20** and **0/21**. The neighbor interface names of uplink and network VCPs are of the form **vcp-255/pic/port**—for example, **vcp-255/1/0**. In that name, **vcp-255** indicates that the interface is a VCP, **1** is the uplink PIC number, and **0** is the port number. The **fpc** number is the same as the member ID. The trunk ID is a positive number ID assigned to the link aggregation group (LAG) formed by the Virtual Chassis. If no LAG is formed, the value is **-1**.

NOTE: This example uses output from an EX4200 Virtual Chassis. The output is similar on all other types of Virtual Chassis or for a VCF.

RELATED DOCUMENTATION

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

[Configuring an EX3300 Virtual Chassis \(CLI Procedure\) | 212](#)

[Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)

[Configuring a Virtual Chassis on an EX Series Switch \(J-Web Procedure\) | 222](#)

[Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches \(CLI Procedure\) | 228](#)

Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis

Purpose

NOTE: This topic applies only to the J-Web Application package.

You can use the J-Web monitoring functionality to view information about the switches that are members of a Virtual Chassis and their ports. J-Web monitoring is supported on EX2200, EX3300, EX4200, EX4300, EX4500, EX4550, and EX8200 switches in a Virtual Chassis. Starting with Junos OS Releases 14.1X53-D10 and 16.1R1, J-Web monitoring is supported on EX4600 switches and EX4600 switches in a Virtual Chassis.

Use the monitoring functionality to view the following information about the switches and the ports on EX2200, EX3300, EX4200, EX4300, EX4500, EX4550, and EX8200 switches that are members of a Virtual Chassis:

- Member details and how members are connected with each other
- Traffic statistics for Virtual Chassis ports (VCPs) of the selected members
- Details of the VCP packet counters

Action

To view Virtual Chassis monitoring details in the J-Web interface for a Virtual Chassis, select **Monitor > Virtual Chassis**.

To view member details for all members in the CLI, enter the following command:

```
user@switch> show virtual-chassis
```


To view VCP traffic statistics for a specific member in the CLI, enter the following command:

```
user@switch> show virtual-chassis vc-port statistics member member-id
```

To view the path a packet takes when going from a source interface to a destination interface in a Virtual Chassis configuration using the CLI, enter the following command:

```
user@switch> show virtual-chassis vc-path
```

Meaning

In the J-Web interface, the top half of the screen displays details of the Virtual Chassis configuration, such as:

- Member
- Role
- Status
- Interface
- Type
- Speed
- Neighboring Member ID
- Link Status
- Error count

NOTE: If the member switch in the Virtual Chassis is not provisioned, the member ID will be displayed as -.

Click the **Stop** button to stop fetching values from the switch, and click the **Start** button to start plotting data again from the point where it was stopped.

To view a graph of the statistics for the selected VCP of the member, click **Show Graph**.

Refresh Interval (sec)—Displays the time interval you have set for page refresh.

Click **Clear Statistics** to clear the monitoring statistics for the selected member switch. You can specify the interval at which the member details and statistics must be refreshed.

The bottom half of the screen displays a chart of the Virtual Chassis statistics and the port packet counters.

For details about the output from CLI commands, see the [show virtual-chassis](#) and [show virtual-chassis vc-port statistics](#) command summaries.

Release History Table

Release	Description
14.1X53-D10	Starting with Junos OS Releases 14.1X53-D10 and 16.1R1, J-Web monitoring is supported on EX4600 switches and EX4600 switches in a Virtual Chassis.

RELATED DOCUMENTATION

- Configuring a Virtual Chassis on an EX Series Switch (J-Web Procedure) | [222](#)
- Verifying the Member ID, Role, and Neighbor Member Connections of a Virtual Chassis Member | [330](#)

Verifying That Graceful Routing Engine Switchover Is Working in the Virtual Chassis

Purpose

Verify that a Graceful Routing Engine switchover (GRES) between two member switches acting as the master and backup routing engines in a Virtual Chassis has occurred.

Action

On the master switch, verify the member ID of the backup Routing Engine:

```
{master:0}
user@switch> show virtual-chassis
```

Virtual Chassis ID: 5efa.4b7a.aae6							
				Mastership		Neighbor List	
Member ID	Status	Serial No	Model	priority	Role	ID	Interface
0 (FPC 0)	Prsnt	BM0208105281	ex4200-24t	255	Master*	1	vcp-0
1 (FPC 1)	Prsnt	BP0208192350	ex4200-48t	255	Backup	0	vcp-0

```
Member ID for next new member: 2 (FPC 2)
```

1. Connect to the backup Routing Engine:

```
{master:0}
user@switch> request session member 1
```

```
{backup:1}
user@switch>
```

2. Verify that the backup Routing Engine is ready for switchover on member ID 1:

```
{backup:1}
user@switch> show system switchover
```

```
Graceful switchover: On
Configuration database: Ready
Kernel database: Ready
Peer state: Steady State
```

3. Switch the current backup Routing Engine to master Routing Engine:

NOTE: You must wait a minimum of two minutes between Routing Engine failovers for the Routing Engines to synchronize.

```
{backup:1}
user@switch> request chassis routing-engine master acquire
```

4. Verify that the master and backup Routing Engines have switched roles:

NOTE: Member ID 1 is now the master and member ID 0 is now the backup.

```
{master:1}
```

```
user@switch> show virtual-chassis
```

```
Virtual Chassis ID: 5efa.4b7a.aae6

                                Mastership                                Neighbor List

Member ID  Status  Serial No  Model  priority  Role  ID  Interface
0 (FPC 0)  Prsnt   BM0208105281 ex4200-24t    255  Backup  1  vcp-0
1 (FPC 1)  Prsnt   BP0208192350 ex4200-48t    255  Master* 0  vcp-0

Member ID for next new member: 2 (FPC 2)
```

Meaning

With graceful Routing Engine switchover enabled, when you initiated a switchover from the backup Routing Engine, the backup Routing Engine became the master and the master Routing Engine became the backup.

RELATED DOCUMENTATION

| [Configuring Graceful Routing Engine Switchover in a Virtual Chassis](#) | 283

Verifying the Setting for the PIC Mode on an EX4500 Switch in a Virtual Chassis

Purpose

Verify the PIC mode setting for an EX4500 or EX4550 switch in a Virtual Chassis.

Action

To verify the current PIC mode setting:

```
user@switch> show chassis pic-mode
```

```
fpc0:
-----
Pic Mode: Intraconnect
```

Meaning

The output shows that the PIC mode is currently set to Intraconnect. The Intraconnect mode sets the EX4500 as a standalone switch.

You must set the PIC mode to **virtual-chassis** if you want to connect the switch into a Virtual Chassis using the dedicated Virtual Chassis ports (VCPs) on the Virtual Chassis module. The default PIC mode setting is **virtual chassis**.

RELATED DOCUMENTATION

[Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches \(CLI Procedure\) | 228](#)

[Resetting the EX4500 Switch to Run as a Standalone Switch \(CLI Procedure\) | 284](#)

Verifying the Setting for the Virtual Chassis Mode on EX4200, EX4500, and EX4550 Switches

Purpose

You must configure EX4200, EX4500, and EX4550 switches into mixed Virtual Chassis mode if you want those switches to act as member switches in a mixed EX4200 and EX4500 Virtual Chassis, mixed EX4200 and EX4550 Virtual Chassis, or mixed EX4200, EX4500, and EX4550 Virtual Chassis. You must also configure a switch out of mixed Virtual Chassis mode if you remove the switch from a mixed Virtual Chassis. You must change the Virtual Chassis mode for all member switches in a Virtual Chassis if the Virtual Chassis is changed to a non-mixed Virtual Chassis..

Action

To display the Virtual Chassis mode of any EX4200, EX4500, or EX4550 switch:

```
user@switch> show virtual-chassis mode
```

```
fpc0:
-----
Mixed Mode: Disabled
```

Meaning

The output indicates that the switch is currently not in mixed Virtual Chassis mode.

RELATED DOCUMENTATION

[Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches \(CLI Procedure\)](#) | 228

Verifying Connectivity Between Virtual Chassis Member Devices

Purpose

Verify that a member device is reachable through the Virtual Chassis.

Action

1. Run a Virtual Chassis device reachability test:

```
user@switch> request virtual-chassis device-reachability test-name name source-fpc source-fpc-id
destination-fpc destination-fpc-id
```

2. View the test results that appear on the screen:

```
Device Reachability Statistics:
Test Name                : member0-to-member2

Performing Test: 1

56 bytes from 0: session-id 0 seq-id 0
56 bytes from 0: session-id 0 seq-id 1
56 bytes from 0: session-id 0 seq-id 2
56 bytes from 0: session-id 0 seq-id 3
56 bytes from 0: session-id 0 seq-id 4
--- sping statistics ---
Session ID                : 0
Packets Count/Sent/Received/Sendfail : 5/5/5/0
Unknown/Timedout/Duplicate packets received : 0/0/0
Round-trip Min/Avg/Max    : 181/807/3010 usec
```

Meaning

The test results confirm that the connection between the member devices within the Virtual Chassis is operating properly. The **Packets Count/Sent/Received/Sendfail** output shows that five ping packets were sent and five ping packets were returned. The **Unknown/Timedout/Duplicate packets received** field output shows that zero ping packets errors occurred during the test. The **Round-trip Min/Avg/Max** output shows that all of the test packets took between 181 and 3010 microseconds to traverse the path.

RELATED DOCUMENTATION

| [Understanding Virtual Chassis Device Reachability Testing](#) | 72

Operational Commands

IN THIS CHAPTER

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- request chassis pic-mode | 345
- request session member | 347
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- show virtual-chassis vc-port statistics | 449

clear virtual-chassis vc-port statistics

Syntax

```
clear virtual-chassis vc-port statistics
<all-members>
<interface-name>
<local>
<member member-id>
```

Release Information

Command introduced in Junos OS Release 9.0 for EX Series switches.

The options **all-members** and **local** were added in Junos OS Release 9.3 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric.

Description

Clear—reset to zero (0)—the traffic statistics counters on Virtual Chassis ports (VCPs).

Options

none—Clear traffic statistics for VCPs of all members of a Virtual Chassis or VCF.

all-members—(Optional) Clear traffic statistics for VCPs of all members of a Virtual Chassis or VCF.

interface-name—(Optional) Clear traffic statistics for the specified VCP.

local—(Optional) Clear traffic statistics for VCPs from the switch or external Routing Engine on which this command is entered.

member member-id—(Optional) Clear traffic statistics for VCPs from the specified member of a Virtual Chassis or VCF.

Required Privilege Level

clear

RELATED DOCUMENTATION

[show virtual-chassis vc-port statistics | 449](#)

[show virtual-chassis vc-port | 443](#)

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

List of Sample Output

[clear virtual-chassis vc-port statistics \(EX4200 Virtual Chassis\) on page 344](#)

[clear virtual-chassis vc-port statistics \(EX8200 Virtual Chassis\) on page 344](#)

[clear virtual-chassis vc-port statistics member 3 on page 344](#)

Sample Output

clear virtual-chassis vc-port statistics (EX4200 Virtual Chassis)

user@switch> clear virtual-chassis vc-port statistics

```
fpc0:
-----
Statistics cleared
```

clear virtual-chassis vc-port statistics (EX8200 Virtual Chassis)

user@external-routing-engine> clear virtual-chassis vc-port statistics

```
member0:
-----
Statistics cleared

member1:
-----
Statistics cleared

member8:
-----
Statistics cleared

member9:
-----
Statistics cleared
```

clear virtual-chassis vc-port statistics member 3

user@switch> clear virtual-chassis vc-port statistics member 3

```
Cleared statistics on member 3
```

request chassis pic-mode

Syntax

```
request chassis pic-mode (intraconnect | virtual-chassis)
<all-members>
<local>
<member member-id>
```

Release Information

Command introduced in Junos OS Release 11.1 for EX Series switches.

Description

Set the PIC mode on an EX4500 switch. The PIC mode command determines whether the module that is plugged into the EX4500 switch operates as an intraconnect module or a Virtual Chassis module.

NOTE: Operating an EX4500 switch without the intraconnect module or the Virtual Chassis module is not supported.

NOTE: If you use the EX4500 switch as a standalone switch without changing the PIC mode setting to **intraconnect**, you will not be able to achieve 960 Gbps data rate throughput. Some of the bandwidth is reserved for the dedicated Virtual Chassis ports (VCPs).

The PIC mode must be set to **virtual-chassis** if the EX4500 switch is cabled into a Virtual Chassis using the dedicated VCPs on the Virtual Chassis module. This is the setting in the default factory configuration. The **intraconnect** PIC mode is not supported by the default factory configuration.

If you want to use the EX4500 switch as a standalone switch, you must take several steps to reset the PIC mode as **intraconnect**. You cannot reset the PIC mode **intraconnect** simply by issuing the **request chassis pic-mode intraconnect** command. See [“Resetting the EX4500 Switch to Run as a Standalone Switch \(CLI Procedure\)” on page 284](#).

Use the [show chassis pic-mode](#) command to verify the current PIC mode setting.

The PIC mode setting is maintained through reboots even though it is set in operational mode.

You do not need to enter this command to use the Virtual Chassis module on an EX4550 switch.

Options

intraconnect—Set the PIC mode to intraconnect.

virtual-chassis—Set the PIC mode to Virtual Chassis.

all-members—(Optional) Set the PIC mode for all members of the Virtual Chassis configuration. This is the default option.

local—(Optional) Set the PIC mode on the member switch where the command is issued.

member *member-id*—(Optional) Set the PIC mode on the specified member of the Virtual Chassis configuration.

Required Privilege Level

view

RELATED DOCUMENTATION

[Verifying the Setting for the PIC Mode on an EX4500 Switch in a Virtual Chassis | 338](#)

[Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches \(CLI Procedure\) | 228](#)

[Adding an EX4500 Switch to a Preprovisioned EX4200 Virtual Chassis \(CLI Procedure\) | 244](#)

[Adding an EX4500 Switch to a Nonprovisioned EX4200 Virtual Chassis \(CLI Procedure\) | 246](#)

List of Sample Output

[request chassis pic-mode virtual-chassis on page 346](#)

[request chassis pic-mode intraconnect on page 346](#)

Sample Output

request chassis pic-mode virtual-chassis

```
user@switch> request chassis pic-mode virtual-chassis
```

request chassis pic-mode intraconnect

```
user@switch> request chassis pic-mode intraconnect
```

```
fpc0:
```

```
-----  
virtual-chassis (mode unchanged; intraconnect mode not supported on factory-default config)
```

request session member

Syntax

```
request session member member-id
```

Release Information

Command introduced in Junos OS Release 9.0 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Start a session with the specified member of a Virtual Chassis or a VCF.

Options

member-id—Member ID for the specific member of the Virtual Chassis or VCF.

Required Privilege Level

maintenance

RELATED DOCUMENTATION

[member](#) | 303

[Understanding Virtual Chassis Components](#) | 19

request system software nonstop-upgrade

Syntax

```
request system software nonstop-upgrade (package-name | set [package-name package-name])
<force-host>
<no-copy>
<no-old-master-upgrade>
<reboot >
<unlink>
```

Release Information

Command introduced in Junos OS Release 10.4 for EX Series switches.

Option **set** [*package-name package-name*] added in Junos OS Release 12.1 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D20 for the QFX Series.

Command introduced in Junos OS Release 15.1X53-D55 for EX3400 switches.

Description

Perform a nonstop software upgrade (NSSU) on a switch with redundant Routing Engines or on a Virtual Chassis or Virtual Chassis Fabric (VCF). The behavior of this command depends on the type of switch, Virtual Chassis, or VCF where you run it, as follows:

- When you run this command on any of the following Virtual Chassis or VCF configurations, NSSU upgrades all members of the Virtual Chassis:
 - EX3300, EX3400, EX4200, EX4300, EX4500, EX4550, EX4600, or EX4650-48Y Virtual Chassis
 - Mixed Virtual Chassis composed of any combination of EX4200, EX4500, and EX4550 switches, or EX4300 and EX4600 switches
 - QFX3500 and QFX3600 Virtual Chassis
 - QFX5100 Virtual Chassis
 - QFX5120-48Y, QFX5120-48T or QFX5120-32C Virtual Chassis
 - Fixed configuration of switches in a VCF (QFX3500/QFX3600 and QFX5100 switches)
 - Mixed VCF composed of any combination of QFX3500/QFX3600, QFX5100, and EX4300 switches

The original Virtual Chassis or VCF backup becomes the master. The new master automatically upgrades and reboots the original master, which then rejoins the Virtual Chassis or VCF as the backup.

- When you run this command on an EX6200 or EX8200 switch, NSSU upgrades both the backup and master Routing Engines. The original backup Routing Engine becomes the new master at the end of the upgrade.
 - On an EX6200 switch, NSSU automatically reboots the original master Routing Engine.

- On an EX8200 switch, NSSU does not automatically reboot the original master Routing Engine unless you specify the **reboot** option.
- When you run this command on an EX8200 Virtual Chassis, NSSU upgrades all master and backup Routing Engines in the Virtual Chassis, including the external Routing Engines. The original backup Routing Engines become the new master Routing Engines. NSSU does not automatically reboot the original master Routing Engines unless you specify the **reboot** option.

This command has the following requirements:

- All Virtual Chassis members, VCF members, and all Routing Engines must be running the same Junos OS release.
- You must enable Graceful Routing Engine switchover (GRES).
- You must enable Nonstop active routing (NSR).

NOTE: Although not required, we recommend you also enable nonstop bridging (NSB). NSB ensures that all NSB-supported Layer 2 protocols operate seamlessly during the Routing Engine switchover during NSSU. See *Configuring Nonstop Bridging on EX Series Switches (CLI Procedure)*.

- You must run the command from the master Routing Engine on a standalone switch or from the master on a Virtual Chassis.
- For minimal traffic disruption, you must define link aggregation groups (LAGs) such that the member links reside on different Virtual Chassis or VCF member switches (or on different line cards for EX6200 and EX8200 switches and EX8200 Virtual Chassis).
- For all Virtual Chassis (except EX8200 Virtual Chassis):
 - The Virtual Chassis members must be connected in a ring topology. A ring topology prevents the Virtual Chassis from splitting during an NSSU.
 - The Virtual Chassis master and backup must be adjacent to each other in the ring topology. With adjacent placement, the master and backup are always in sync while the switches in line-card roles are rebooting.
 - The Virtual Chassis must be preprovisioned so the line-card role is explicitly assigned to member switches acting in a line-card role. During an NSSU, the master and backup member switches must maintain their Routing Engine roles (although mastership switches to the backup), and the remaining switches must maintain their line-card roles.
 - In a two-member Virtual Chassis, you must configure **no-split-detection** so the Virtual Chassis doesn't split during NSSU.
- For Virtual Chassis Fabric:

- You can only have two members preprovisioned in the Routing Engine role. If more than two Routing Engines are configured, NSSU issues a warning message and the NSSU process stops.
- The VCF members should be connected in a spine and leaf topology. A spine and leaf topology prevents the VCF from splitting during NSSU. Each leaf device must be connected to both spine devices.
- The VCF must be preprovisioned so that the line-card role has been explicitly assigned to member switches acting in a line-card role, and likewise the Routing Engine role has been explicitly assigned to the member switches acting in a Routing Engine role. During an NSSU, the master and backup member switches must maintain their Routing Engine roles (although mastership switches to the backup), and the remaining switches must maintain their line-card roles.
- You must configure **no-split-detection** in a two-member VCF so the VCF does not split during NSSU.

Options

package-name—Location of the software package or bundle to be installed. For example:

- **/var/tmp/package-name**—For a software package or bundle installed from a local directory on the switch.
- **protocol://hostname/pathname/package-name**—For a software package or bundle downloaded and installed from a remote location. Replace **protocol** with one of the following:
 - **ftp**—File Transfer Protocol.
Use **ftp://hostname/pathname/package-name**.
To specify authentication credentials, use **ftp://<username>:<password>@hostname/pathname/package-name**.
To have the system prompt you for the password, specify **prompt** in place of the password.
The command displays an error message if a password is required and you do not specify the password or **prompt**.
 - **http**—Hypertext Transfer Protocol.
Use **http://hostname/pathname/package-name**.
To specify authentication credentials, use **http://<username>:<password>@hostname/pathname/package-name**.
The command prompts you for a password if one is required and you didn't include it.
 - **scp**—Secure copy (available only for Canada and U.S. version).
Use **scp://hostname/pathname/package-name**.
To specify authentication credentials, use **scp://<username>:<password>@hostname/pathname/package-name**.

NOTE: The **pathname** in the protocol is the relative path to the user home directory on the remote system and not the root directory.

set [*package-name package-name*]—(Mixed Virtual Chassis only) Locations of the different installation packages required by the different types of member switches. These packages must be for the same Junos OS release. See this command's **package-name** option for information about how to specify the installation packages.

force-host—(Optional) Force adding the host software package or bundle (and ignore warnings) on EX4650, QFX5100, or QFX5120 devices.

no-copy—(Optional) Install a software package or bundle, but do not save copies of the package or bundle files.

no-old-master-upgrade—(Optional) (EX8200 switches only) Upgrade the backup Routing Engine only. After the upgrade completes, the original master Routing Engine becomes the backup Routing Engine and continues running the previous software version.

reboot—(Optional) (EX8200 switches and EX8200 Virtual Chassis only) When you include the **reboot** option, NSSU automatically reboots the original master (new backup) Routing Engine after being upgraded to the new software. When you omit the **reboot** option, you must manually reboot the original master (new backup) Routing Engine using the **request system reboot** command.

NOTE: If you do not use the **reboot** option on an EX8200 Virtual Chassis, you must establish a connection to the console port on the Switch Fabric and Routing Engine (SRE) module or Routing Engine (RE) module to manually reboot the backup Routing Engines.

unlink—(Optional) Remove the software package after a successful upgrade.

Required Privilege Level

maintenance

RELATED DOCUMENTATION

[show chassis nonstop-upgrade](#) | 375

Upgrading Software on an EX6200 or EX8200 Standalone Switch Using Nonstop Software Upgrade (CLI Procedure)

Upgrading Software on an EX8200 Virtual Chassis Using Nonstop Software Upgrade (CLI Procedure)

Upgrading Software on a Virtual Chassis and Mixed Virtual Chassis Using Nonstop Software Upgrade

Upgrading Software on a Virtual Chassis Fabric Using Nonstop Software Upgrade

List of Sample Output

[request system software nonstop-upgrade \(EX4200 Virtual Chassis\) on page 352](#)

[request system software nonstop-upgrade \(EX6200 Switch\) on page 354](#)

[request system software nonstop-upgrade reboot \(EX8200 Switch\) on page 355](#)

[request system software nonstop-upgrade no-old-master-upgrade \(EX8200 Switch\) on page 356](#)

[request system software nonstop-upgrade reboot \(EX8200 Virtual Chassis\) on page 357](#)

Output Fields

This command reports feedback on the status of the request. Some functions are shared between NSSU and the in-service software upgrade (ISSU) feature, so you might see what appear to be ISSU messages as well as NSSU messages in the output from this command.

Sample Output

request system software nonstop-upgrade (EX4200 Virtual Chassis)

```
user@switch> request system software nonstop-upgrade
/var/tmp/jinstall-ex-4200-12.1R5.5-domestic-signed.tgz
Chassis ISSU Check Done
ISSU: Validating Image
ISSU: Preparing Backup RE
Installing image on other FPC's along with the backup

Checking pending install on fpc1
Pushing bundle to fpc1
WARNING: A reboot is required to install the software
WARNING:      Use the 'request system reboot' command immediately
Completed install on fpc1

Checking pending install on fpc2
Pushing bundle to fpc2
WARNING: A reboot is required to install the software
WARNING:      Use the 'request system reboot' command immediately
Completed install on fpc2

Checking pending install on fpc3
Pushing bundle to fpc3
WARNING: A reboot is required to install the software
WARNING:      Use the 'request system reboot' command immediately
Completed install on fpc3

Checking pending install on fpc4
Pushing bundle to fpc4
WARNING: A reboot is required to install the software
WARNING:      Use the 'request system reboot' command immediately
```

Completed install on fpc4

Checking pending install on fpc5

Pushing bundle to fpc5

WARNING: A reboot is required to install the software

WARNING: Use the 'request system reboot' command immediately

Completed install on fpc5

Checking pending install on fpc6

Pushing bundle to fpc6

WARNING: A reboot is required to install the software

WARNING: Use the 'request system reboot' command immediately

Completed install on fpc6

Checking pending install on fpc7

Pushing bundle to fpc7

WARNING: A reboot is required to install the software

WARNING: Use the 'request system reboot' command immediately

Completed install on fpc7

Backup upgrade done

Rebooting Backup RE

Rebooting fpc1

ISSU: Backup RE Prepare Done

Waiting for Backup RE reboot

GRES operational

Initiating Chassis In-Service-Upgrade

Chassis ISSU Started

ISSU: Preparing Daemons

ISSU: Daemons Ready for ISSU

ISSU: Starting Upgrade for FRUs

ISSU: Preparing for Switchover

ISSU: Ready for Switchover

Checking In-Service-Upgrade status

Item	Status	Reason
FPC 0	Online	
FPC 1	Online	
FPC 2	Online (ISSU)	
FPC 3	Online (ISSU)	
FPC 4	Online (ISSU)	
FPC 5	Online (ISSU)	
FPC 6	Online (ISSU)	
FPC 7	Online (ISSU)	

Going to install image on master

```

WARNING: A reboot is required to install the software
WARNING:      Use the 'request system reboot' command immediately
relinquish mastership
ISSU: IDLE

*** FINAL System shutdown message from root@switch ***

System going down IMMEDIATELY

Shutdown NOW!
[pid 9336]

```

request system software nonstop-upgrade (EX6200 Switch)

```

{master}
user@switch> request system software nonstop-upgrade
/var/tmp/jinstall-ex-6200-12.2R5.5-domestic-signed.tgz
Chassis ISSU Check Done
ISSU: Validating Image
ISSU: Preparing Backup RE
Pushing bundle to re0
NOTICE: Validating configuration against
jinstall-ex-6200-12.2R5.5-domestic-signed.tgz.
NOTICE: Use the 'no-validate' option to skip this if desired.
WARNING: A reboot is required to install the software
WARNING:      Use the 'request system reboot' command immediately
Backup upgrade done
Rebooting Backup RE

Rebooting re0
ISSU: Backup RE Prepare Done
Waiting for Backup RE reboot
GRES operational
Initiating Chassis In-Service-Upgrade
Chassis ISSU Started
ISSU: Preparing Daemons
ISSU: Daemons Ready for ISSU
ISSU: Starting Upgrade for FRUs
ISSU: Preparing for Switchover
ISSU: Ready for Switchover
Checking In-Service-Upgrade status

```

Item	Status	Reason
FPC 0	Online (ISSU)	
FPC 1	Online (ISSU)	
FPC 2	Online (ISSU)	
FPC 3	Online (ISSU)	
FPC 4	Online	
FPC 5	Online	
FPC 6	Online (ISSU)	
FPC 7	Online (ISSU)	
FPC 8	Online (ISSU)	
FPC 9	Online (ISSU)	

Going to install image on master

NOTICE: Validating configuration against
jinstall-ex-6200-12.2R5.5-domestic-signed.tgz.

NOTICE: Use the 'no-validate' option to skip this if desired.

WARNING: A reboot is required to install the software

WARNING: Use the 'request system reboot' command immediately
relinquish mastership

ISSU: IDLE

Trying to relinquish mastership before rebooting...

Resolving mastership...

Complete. The other routing engine becomes the master.

*** FINAL System shutdown message from user@switch ***

System going down IMMEDIATELY

request system software nonstop-upgrade reboot (EX8200 Switch)

```
{master}
user@switch> request system software nonstop-upgrade reboot
/var/tmp/jinstall-ex-8200-10.4R1.5-domestic-signed.tgz
Chassis ISSU Check Done
ISSU: Validating Image
ISSU: Preparing Backup RE
Pushing bundle to rel
WARNING: A reboot is required to install the software
WARNING: Use the 'request system reboot' command immediately
Backup upgrade done
Rebooting Backup RE

Rebooting rel
ISSU: Backup RE Prepare Done
```

```

Waiting for Backup RE reboot
GRES operational
Initiating Chassis In-Service-Upgrade
Chassis ISSU Started
ISSU: Preparing Daemons
ISSU: Daemons Ready for ISSU
ISSU: Starting Upgrade for FRUs
ISSU: Preparing for Switchover
ISSU: Ready for Switchover
Checking In-Service-Upgrade status
  Item           Status           Reason
  FPC 0          Online (ISSU)
  FPC 2          Offline           Offlined by CLI command
  FPC 3          Online (ISSU)
Resolving mastership...
Complete. The other routing engine becomes the master.
ISSU: RE switchover Done
ISSU: Upgrading Old Master RE
WARNING: A reboot is required to install the software
WARNING:      Use the 'request system reboot' command immediately
ISSU: Old Master Upgrade Done
ISSU: IDLE
Shutdown NOW!
[pid 2635]

*** FINAL System shutdown message from user@switch ***
System going down IMMEDIATELY

```

request system software nonstop-upgrade no-old-master-upgrade (EX8200 Switch)

```

{master}
user@switch> request system software nonstop-upgrade no-old-master-upgrade
/var/tmp/jinstall-ex-8200-10.4R1.5-domestic-signed.tgz
Chassis ISSU Check Done
ISSU: Validating Image
ISSU: Preparing Backup RE
Pushing bundle to rel
WARNING: A reboot is required to install the software
WARNING:      Use the 'request system reboot' command immediately
Backup upgrade done
Rebooting Backup RE

```

```

Rebooting rel
ISSU: Backup RE Prepare Done
Waiting for Backup RE reboot
GRES operational
Initiating Chassis In-Service-Upgrade
Chassis ISSU Started
ISSU: Preparing Daemons
ISSU: Daemons Ready for ISSU
ISSU: Starting Upgrade for FRUs
ISSU: Preparing for Switchover
ISSU: Ready for Switchover
Checking In-Service-Upgrade status

```

Item	Status	Reason
FPC 0	Online (ISSU)	
FPC 1	Online (ISSU)	
FPC 2	Online (ISSU)	
FPC 3	Offline	Offlined by CLI command
FPC 4	Online (ISSU)	
FPC 5	Online (ISSU)	
FPC 6	Online (ISSU)	
FPC 7	Online (ISSU)	

```

Resolving mastership...
Complete. The other routing engine becomes the master.
ISSU: RE switchover Done
Skipping Old Master Upgrade
ISSU: IDLE

```

request system software nonstop-upgrade reboot (EX8200 Virtual Chassis)

```

{master:9}
user@external-routing-engine> request system software nonstop-upgrade reboot
/var/tmp/jinstall-ex-xre200-11.1-20101130.0-domestic-signed.tgz
Chassis ISSU Check Done
ISSU: Validating Image
ISSU: Preparing LCC Backup REs
ISSU: Preparing Backup RE
Pushing bundle /var/tmp/jinstall-ex-xre200-11.1-20101130.0-domestic-signed.tgz to
member8
-----
WARNING: A reboot is required to install the software
WARNING:      Use the 'request system reboot' command immediately
VC Backup upgrade done
Rebooting VC Backup RE

```

Rebooting member8
ISSU: Backup RE Prepare Done
Waiting for VC Backup RE reboot
Pushing bundle to member0-backup
Pushing bundle to member1-backup
WARNING: A reboot is required to install the software
WARNING: Use the 'request system reboot' command immediately
WARNING: A reboot is required to install the software
WARNING: Use the 'request system reboot' command immediately

Rebooting member0-backup
Rebooting LCC [member0-backup]

Rebooting member1-backup
Rebooting LCC [member1-backup]
ISSU: LCC Backup REs Prepare Done
GRES operational
Initiating Chassis Nonstop-Software-Upgrade
Chassis ISSU Started
ISSU: Preparing Daemons
ISSU: Daemons Ready for ISSU
ISSU: Starting Upgrade for FRUs
ISSU: Preparing for Switchover
ISSU: Ready for Switchover
Checking Nonstop-Upgrade status
member0:

Item	Status	Reason
FPC 0	Online (ISSU)	
FPC 1	Online (ISSU)	
FPC 2	Online (ISSU)	
FPC 5	Online (ISSU)	

member1:

Item	Status	Reason
FPC 0	Online (ISSU)	
FPC 1	Offline	Offlined due to config
FPC 2	Online (ISSU)	
FPC 3	Online (ISSU)	
FPC 4	Online (ISSU)	
FPC 5	Online (ISSU)	
FPC 7	Online (ISSU)	

member0:

Item	Status	Reason
FPC 0	Online (ISSU)	
FPC 1	Online (ISSU)	
FPC 2	Online (ISSU)	
FPC 5	Online (ISSU)	

member1:

Item	Status	Reason
FPC 0	Online (ISSU)	
FPC 1	Offline	Offlined due to config
FPC 2	Online (ISSU)	
FPC 3	Online (ISSU)	
FPC 4	Online (ISSU)	
FPC 5	Online (ISSU)	
FPC 7	Online (ISSU)	

ISSU: Upgrading Old Master RE

Pushing bundle /var/tmp/incoming-package-8200.tgz to member0-master

Pushing bundle /var/tmp/incoming-package-8200.tgz to member1-master

ISSU: RE switchover Done

WARNING: A reboot is required to install the software

WARNING: Use the 'request system reboot' command immediately

Rebooting ...

shutdown: [pid 2188]

Shutdown NOW!

ISSU: Old Master Upgrade Done

ISSU: IDLE

Shutdown NOW!

*** FINAL System shutdown message from root@ ***

System going down IMMEDIATELY

request virtual-chassis device-reachability

Syntax

```
request virtual-chassis device-reachability test-name name (source-fpc source-fpc-id | source-ip-address
source-ip-address) (destination-device device-id | destination-fpc destination-fpc-id | destination-ip-address
destination-ip-address)
<probe-count count>
<probe-interval interval>
<probe-pattern pattern>
<test-count count>
<test-interval interval>
```

Release Information

Command introduced in Junos OS Release 11.2 for EX Series switches.

Description

Run a Virtual Chassis device reachability test. A Virtual Chassis device reachability test sends ping packets from one member of a Virtual Chassis to another member of a Virtual Chassis directly through the Virtual Chassis connections. The receiving Virtual Chassis member sends reply packets to confirm receipt of the ping packets from the sending device. The results of the test immediately provide information that is helpful in verifying connectivity between Virtual Chassis member devices.

Options

test-name *name*—Specify the name of the test. The name can be any single-word character string. Spaces are not allowed.

source-fpc *source-fpc-id*—Specify the FPC that sends the first ping message.

source-ip-address *source-ip-address*—Specify the source IP address that receives the ping message.

destination-device *device-id*—Specify the device in the Virtual Chassis that receives the ping message.

destination-fpc *destination-fpc-id*—Specify the FPC that receives the first ping message.

destination-ip-address *destination-ip-address*—Specify the destination IP address that receives the ping message.

probe-count *count*—(Optional) Specify the number of ping messages to send for the test. The count can be any number from 1 through 10. The default count is 5.

probe-interval *interval*—(Optional) Specify the time in seconds between the ping messages that are sent during the test. The interval can be any number from 1 through 3. The default interval is 1 second.

probe-pattern *pattern*—(Optional) Specify a payload pattern in the ping message. Enter the pattern in hexadecimal format.

test-count *count*—(Optional) Specify the number of times to run the test. The count can be any number from 1 through 3. The default count is 1.

test-interval *interval*—(Optional) Specify the time in seconds between tests when multiple tests are specified. The interval can be any number from 1 through 3. The default interval is 1.

Required Privilege Level

system-control

RELATED DOCUMENTATION

[Verifying Connectivity Between Virtual Chassis Member Devices](#) | 340

Output Fields

[Table 27 on page 361](#) lists the output fields for the **request virtual chassis device reachability** command. Output fields are listed in the approximate order in which they appear.

Table 27: request virtual chassis device reachability Output Fields

Field Name	Field Description
Test Name	The name of the test.
Performing Test	The test number.
Session ID	The session ID. This output is always 0 and not useful for Virtual Chassis device reachability tests.
Packets Count/Sent/Received/Sendfail	The number of total ping packets sent, including the total number of ping packets counted (Count), sent (Sent), received (Received), and packets that could not be sent (Sendfail).
Unknown/Timedout/Duplicate packets received	The failed pings, including the number of ping packets that failed for an unknown reason (Unknown), timed out (Timed Out), and the number of duplicate received ping packets (Duplicate packets received).
Round-trip Min/Avg/Max	The average round-trip ping time, including the shortest ping time (Min), the average ping time (Avg), and the maximum ping time (Max).

Sample Output

request virtual-chassis device-reachability test-name member0-to-member2 source-fpc 0 destination-fpc 2

user@switch> request virtual-chassis device-reachability test-name member0-to-member2 source-fpc 0 destination-fpc 2

```
Device Reachability Statistics:
Test Name                : member0-to-member2

Performing Test: 1

56 bytes from 0: session-id 0 seq-id 0
56 bytes from 0: session-id 0 seq-id 1
56 bytes from 0: session-id 0 seq-id 2
56 bytes from 0: session-id 0 seq-id 3
56 bytes from 0: session-id 0 seq-id 4
--- sping statistics ---
Session ID                : 0
Packets Count/Sent/Received/Sendfail : 5/5/5/0
Unknown/Timedout/Duplicate packets received : 0/0/0
Round-trip Min/Avg/Max    : 181/807/3010 usec
```

request virtual-chassis mode

Syntax

```
request virtual-chassis mode
  fabric
  mixed <ieee-clause-82>
  <disable>
  <reboot>
  <all-members> | <local> | <member member-id>
```

Release Information

Command introduced in Junos OS Release 11.1 for EX Series switches.

Command introduced in Junos OS Release 13.2X51-D20 for QFX Series devices.

fabric keyword introduced in Junos OS Release 13.2X51-D20 for EX Series switches and QFX Series devices in a Virtual Chassis Fabric (VCF).

Command introduced in Junos OS Release 13.2X51-D20 for VCF.

ieee-clause-82 mixed-mode option introduced for EX4300 switches mixed with EX4300 multigigabit switches in a Virtual Chassis in Junos OS Release 18.2R1.

Description

Enable devices to operate as a Virtual Chassis Fabric (VCF) by setting fabric mode, or to interoperate in a mixed Virtual Chassis or VCF by setting mixed mode. You must reboot the standalone device, Virtual Chassis or VCF for this command to take effect, and the setting persists across subsequent reboot operations. You can use the **reboot** option to automatically reboot the device when setting fabric or mixed modes.

NOTE: For devices in a mixed VCF, you can set both mixed and fabric modes in the same command and then reboot the device once for both settings to take effect.

You must set **fabric** mode on all of the devices in a VCF.

You must set **mixed** mode on all devices in a Virtual Chassis or a VCF when the devices have differences in how they interoperate. See [“Understanding Mixed EX Series and QFX Series Virtual Chassis” on page 35](#) or *Understanding Mixed Virtual Chassis Fabric* for details on which devices can be combined to form a mixed Virtual Chassis or VCF.

NOTE: You do not need to configure mixed mode if the only devices in your Virtual Chassis are the following combinations of switches. These form a non-mixed Virtual Chassis or VCF because the devices can run the same software images:

- Only EX4500 and EX4550 switches in an EX Series Virtual Chassis.
- EX2300 multigigabit switches (EX2300-24MP and EX2300-48MP models) with any other EX2300 model switches in an EX2300 Virtual Chassis.
- Only QFX3500 and QFX3600 switches in a QFX Series Virtual Chassis.
- QFX5110 and QFX5100 switches in a QFX5110 Virtual Chassis or QFX5110 VCF.

Requirements when setting **mixed** mode include:

- EX4300 switches that are not multigigabit models combined with EX4300 multigigabit model (EX4300-48MP) switches form a mixed EX4300 Virtual Chassis. In this case, when you set mixed mode on the EX4300 non-multigigabit model member switches, you must also include the **ieee-clause-82** option on those switches. This option sets a special port mode (IEEE Clause 82) on the Virtual Chassis ports (VCPs) that enables them to communicate when interconnected with VCPs on EX4300 multigigabit switches.

NOTE: If you remove an EX4300 member switch from a mixed EX4300 Virtual Chassis with multigigabit model members, you must disable **ieee-clause-82** port mode on the switch if you want to reconfigure it as a standalone switch or use it in any other type of mixed Virtual Chassis or any non-mixed Virtual Chassis. Otherwise, the VCPs will not connect with other members in the new Virtual Chassis. To do this, use the **request virtual-chassis mode mixed ieee-clause-82 disable** command and then reboot the switch. To add the switch to any other type of mixed Virtual Chassis, enable mixed mode again without this option and reboot the switch again for the change to take effect.

- Don't enable mixed mode on a standalone device or for a member switch that is in a non-mixed Virtual Chassis or VCF. Mixed mode reduces the maximum scaling numbers for some features on the standalone switch, Virtual Chassis, or VCF to accommodate different types of devices that can be interconnected.

Best practices when setting **mixed** or **fabric** mode include:

- Before cabling a device into a mixed Virtual Chassis or a VCF, to avoid potential traffic disruptions and configuration issues, on each device we recommend setting mixed mode for a mixed Virtual Chassis or VCF and setting fabric mode for a VCF. You must then reboot the device for the change or changes to take effect.

- You can also change mode settings manually after a device has been added to a Virtual Chassis or VCF if you determine the settings are not the same on all the devices.

However, if you set only some of the devices in a mixed Virtual Chassis or VCF to mixed mode, the mixed Virtual Chassis or VCF might not form. If you experience this issue, enter the **request virtual-chassis mode mixed all-members** command to force setting mixed mode on all devices in the Virtual Chassis or VCF. You can then reboot the entire Virtual Chassis or VCF, or only the devices where the mode changed. The Virtual Chassis or VCF forms when the rebooted devices are online again.

NOTE: On switches running Junos OS Release 11.4 or later, if you don't set any of the switches in a mixed EX4200 and EX4500 Virtual Chassis to mixed mode, a mixed EX4200 and EX4500 Virtual Chassis forms where one of the switches assumes the master role, and all other switches take on the linecard role. If you see this behavior, enter the **request virtual-chassis mode mixed all-members** command to set all members to mixed mode and reboot the Virtual Chassis.

Options

all-members—(Optional) Set the Virtual Chassis mode for all members of the Virtual Chassis or VCF.

disable—Disable the Virtual Chassis fabric or mixed mode setting if it was previously enabled.

The **request virtual-chassis mode mixed disable** command does not also automatically disable the mixed mode **ieee-clause-82** port mode option. To disable **ieee-clause-82** port mode on the device, you must include that option in the disable command as follows:

request virtual-chassis mode mixed ieee-clause-82 disable

fabric—Set the device into fabric mode so it can participate as a member device in a VCF.

local—(Optional) Set the Virtual Chassis mode only on the member device where the command is issued.

member *member-id*—(Optional) Set the Virtual Chassis mode on the specified member of the Virtual Chassis or VCF.

mixed <ieee-clause-82> —Set the device into mixed mode so that the device can participate in a mixed Virtual Chassis or mixed VCF.

You must set mixed mode with the **ieee-clause-82** option on EX4300 switches that are not multigigabit models when mixing them with EX4300 multigigabit (EX4300-48MP) model switches in an EX4300 Virtual Chassis.

reboot—After applying the mode change specified by the other options, reboot the device automatically.

Required Privilege Level

system-control

RELATED DOCUMENTATION

[Understanding Mixed EX Series and QFX Series Virtual Chassis | 35](#)

Understanding Mixed Virtual Chassis Fabric

[Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches \(CLI Procedure\) | 228](#)

Configuring an EX2300, EX3400, or EX4300 Virtual Chassis

Configuring EX4600 Switches in a Mixed or Non-Mixed Virtual Chassis

Configuring an EX4650 or a QFX Series Virtual Chassis

Adding a New Switch to an Existing EX2300, EX3400, or EX4300 Virtual Chassis

[Removing or Replacing a Member Switch of a Virtual Chassis Configuration | 248](#)

Verifying the Virtual Chassis Fabric Mode Settings

[Verifying the Member ID, Role, and Neighbor Member Connections of a Virtual Chassis Member | 330](#)

List of Sample Output

[request virtual-chassis mode mixed on page 366](#)

[request virtual-chassis mode fabric mixed reboot on page 366](#)

[request virtual-chassis mode mixed \(with IEEE Clause 82 mode for EX4300 switches mixed with EX4300 multigigabit switches in a Virtual Chassis\) on page 366](#)

Sample Output

request virtual-chassis mode mixed

```
user@switch> request virtual-chassis mode mixed
```

Sample Output

request virtual-chassis mode fabric mixed reboot

```
user@switch> request virtual-chassis mode fabric mixed reboot
```

Sample Output

request virtual-chassis mode mixed (with IEEE Clause 82 mode for EX4300 switches mixed with EX4300 multigigabit switches in a Virtual Chassis)

```
user@switch> request virtual-chassis mode ieee-clause-82 mixed
```


request virtual-chassis recycle

Syntax

```
request virtual-chassis recycle member-id member-id
```

Release Information

Command introduced in Junos OS Release 9.0 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Description

Make a previously used member ID available for reassignment.

When you remove a member switch from the Virtual Chassis configuration, the master reserves that member ID. To make the member ID available for reassignment, you must use this command.

NOTE: You must run this command from the Virtual Chassis member in the master role.

Options

member-id *member-id*—Specify the member ID that you want to make available for reassignment to a different member.

Required Privilege Level

system-control

RELATED DOCUMENTATION

[request virtual-chassis renumber](#) | 369

[Removing or Replacing a Member Switch of a Virtual Chassis Configuration](#) | 248

List of Sample Output

[request virtual-chassis recycle member-id 3](#) on page 367

[request virtual-chassis recycle member-id 1](#) on page 368

Sample Output

```
request virtual-chassis recycle member-id 3
```

```
user@switch> request virtual-chassis recycle member-id 3
```

Sample Output

```
request virtual-chassis recycle member-id 1
```

```
user@external-routing-engine> request virtual-chassis recycle member-id 1
```

request virtual-chassis renumber

Syntax

```
request virtual-chassis renumber member-id old-member-id new-member-id new-member-id
```

Release Information

Command introduced in Junos OS Release 9.0 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Description

Renumber a member of a Virtual Chassis configuration.

NOTE: You must run this command from the Virtual Chassis member in the master role.

Options

member-id *old-member-id*—Specify the ID of the member that you wish to renumber.

new-member-id *new-member-id*—Specify an unassigned member ID.

Required Privilege Level

system-control

RELATED DOCUMENTATION

[request virtual-chassis recycle](#) | 367

[Removing or Replacing a Member Switch of a Virtual Chassis Configuration](#) | 248

List of Sample Output

[request virtual-chassis renumber member-id 5 new-member-id 4](#) on page 369

[request virtual-chassis renumber member-id 1 new-member-id 0](#) on page 370

Sample Output

```
request virtual-chassis renumber member-id 5 new-member-id 4
```

```
user@switch> request virtual-chassis renumber member-id 5 new-member-id 4
```

request virtual-chassis renumber member-id 1 new-member-id 0

user@external-routing-engine> **request virtual-chassis renumber member-id 1 new-member-id**
0

request virtual-chassis vc-port (Dedicated VCP)

Syntax

```
request virtual-chassis vc-port set interface vcp-interface-name
  <member member-id> <disable>
```

Release Information

Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Disable or enable a Virtual Chassis port (VCP) on a dedicated VCP.

Configure a Gigabit Ethernet link on an EX8200 switch as a VCP in an EX8200 Virtual Chassis. You can use this command only to configure a link between two EX8200 member switches as a VCP link; all other links in an EX8200 Virtual Chassis are automatically VCP links.

Options

interface *vcp-interface-name*—Name of the interface to enable or disable.

If you omit **member *member-id*** in an EX4200 Virtual Chassis, EX4500 Virtual Chassis, EX4550 Virtual Chassis, mixed Virtual Chassis, this command defaults to disabling or enabling the dedicated VCP on the switch where the command is issued. The dedicated VCPs are enabled in the factory default configuration.

member *member-id*—(Optional on EX4200, EX4500, and EX4550 switches; required on EX8200 switches) Enable or disable the specified VCP on the specified member of the Virtual Chassis configuration.

This option must be specified when using this command to configure a VCP link between two EX8200 switches.

disable—(Optional) Disable the specified VCP. If you omit this keyword, the command enables the dedicated VCP.

Required Privilege Level

system-control

RELATED DOCUMENTATION

[request virtual-chassis vc-port](#) | [373](#) (Uplink VCP)

[show virtual-chassis vc-port](#) | [443](#)

[show virtual-chassis vc-port statistics](#) | [449](#)

[clear virtual-chassis vc-port statistics](#) | [343](#)

List of Sample Output

[request virtual-chassis vc-port set interface vcp-0 disable \(EX4200 Virtual Chassis\) on page 372](#)

[request virtual-chassis vc-port set fpc-slot 4 pic-slot 0 port 2 member 1 \(EX8200 Virtual Chassis\) on page 372](#)

[request virtual-chassis vc-port set interface vcp-0 member 3 disable \(EX8200 Virtual Chassis\) on page 372](#)

Sample Output

request virtual-chassis vc-port set interface vcp-0 disable (EX4200 Virtual Chassis)

```
user@switch> request virtual-chassis vc-port set interface vcp-0 disable
```

To check the results of this command, use the [show virtual-chassis vc-port](#) command.

request virtual-chassis vc-port set fpc-slot 4 pic-slot 0 port 2 member 1 (EX8200 Virtual Chassis)

```
user@external-routing-engine>
```

request virtual-chassis vc-port set fpc-slot 4 pic-slot 0 port 2 member 1

To check the results of this command, use the [show virtual-chassis vc-port](#) command.

request virtual-chassis vc-port set interface vcp-0 member 3 disable (EX8200 Virtual Chassis)

```
user@external-routing-engine> request virtual-chassis vc-port set interface vcp-0 member 3  
disable
```

To check the results of this command, use the [show virtual-chassis vc-port](#) command.

request virtual-chassis vc-port

Syntax

```
request virtual-chassis vc-port (set | delete)
<fpc-slot fpc-slot>
pic-slot pic-slot
port port-number
<member member-id | local>
```

Release Information

Command introduced in Junos OS Release 9.0 for EX Series switches.

Option **fpc-slot** introduced in Junos OS Release 10.4 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Set a port to operate as a Virtual Chassis port (VCP), or delete the VCP setting on a port. See [“Virtual Chassis Port Options” on page 24](#) for details on which ports you can set as VCPs on different switches. After setting a port as a VCP, you can’t use the port for any other purpose unless you remove the VCP setting.

If you don’t include the **member member-id** option, this command defaults to setting the port as a VCP or deleting the VCP setting on the switch where you run the command. You can alternatively set the **local** option to ensure the command applies to the specified port on the local switch where you run it.

You might experience a temporary traffic disruption immediately after creating or deleting a user-configured VCP in an EX8200 Virtual Chassis.

Some switches have ports that are dedicated VCPs (you can only use them as VCPs and for no other purpose) or that are configured as VCPs by default (set as VCPs in the default factory configuration). You do not need to explicitly set those ports as VCPs to use them to interconnect the switch into a Virtual Chassis. See [“Virtual Chassis Port Options” on page 24](#) for details.

If you don’t need a default-configured VCP to interconnect Virtual Chassis member switches, you can run this command with the **delete** option to remove the VCP setting and use the port as a regular uplink or network port. If you want to use the port as a VCP again later, then you need to run this command with the **set** option to reapply the VCP setting.

Options

set—Set a port as a VCP to convert an uplink or network port into a VCP.

delete—Delete the VCP setting on a port to convert a VCP back into an uplink or network port.

pic-slot pic-slot—Number of the PIC slot for the port on the switch.

port *port-number*—Number of the port that is to be enabled or disabled as a VCP.

member *member-id*—(Optional) Enable or disable the specified VCP on the specified member of the Virtual Chassis or VCF.

local—(Optional) Enable or disable the specified VCP on the local switch where you run the command.

Required Privilege Level

system-control

RELATED DOCUMENTATION

[request virtual-chassis vc-port \(Dedicated VCP\) | 371](#)

[show virtual-chassis vc-port | 443](#)

[show virtual-chassis vc-port statistics | 449](#)

[clear virtual-chassis vc-port statistics | 343](#)

[Virtual Chassis Port \(VCP\) Interface Names in an EX8200 Virtual Chassis](#)

[Understanding Virtual Chassis Components | 19](#)

List of Sample Output

[request virtual-chassis vc-port set pic-slot 1 port 0 on page 374](#)

[request virtual-chassis vc-port set pic-slot 1 port 1 member 3 on page 374](#)

[request virtual-chassis vc-port delete pic-slot 1 port 1 member 3 on page 374](#)

Sample Output

request virtual-chassis vc-port set pic-slot 1 port 0

```
user@switch> request virtual-chassis vc-port set pic-slot 1 port 0
```

To check the results of this command, use the [show virtual-chassis vc-port](#) command.

request virtual-chassis vc-port set pic-slot 1 port 1 member 3

```
user@switch> request virtual-chassis vc-port set pic-slot 1 port 1 member 3
```

To check the results of this command, use the [show virtual-chassis vc-port](#) command.

request virtual-chassis vc-port delete pic-slot 1 port 1 member 3

```
user@switch> request virtual-chassis vc-port delete pic-slot 1 port 1 member 3
```

To check the results of this command, use the [show virtual-chassis vc-port](#) command.

show chassis nonstop-upgrade

Syntax

```
show chassis nonstop-upgrade
```

Release Information

Command introduced in Junos OS Release 10.4 for EX Series switches.
Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Description

(EX6200 switches, EX8200 switches, EX8200 Virtual Chassis, QFX3500 and QFX3600 Virtual Chassis, and Virtual Chassis Fabric only) Display the status of the line cards or Virtual Chassis members in the linecard role after the most recent nonstop software upgrade (NSSU). This command must be issued on the master Routing Engine.

Required Privilege Level

view

RELATED DOCUMENTATION

request system software nonstop-upgrade 348
<i>Upgrading Software on an EX6200 or EX8200 Standalone Switch Using Nonstop Software Upgrade (CLI Procedure)</i>
<i>Upgrading Software on a Virtual Chassis and Mixed Virtual Chassis Using Nonstop Software Upgrade</i>
<i>Upgrading Software on a Virtual Chassis Fabric Using Nonstop Software Upgrade</i>
<i>Upgrading Software on an EX8200 Virtual Chassis Using Nonstop Software Upgrade (CLI Procedure)</i>

List of Sample Output

- [show chassis nonstop-upgrade \(EX8200 Switch\) on page 376](#)
- [show chassis nonstop-upgrade \(EX8200 Virtual Chassis\) on page 376](#)
- [show chassis nonstop-upgrade \(Virtual Chassis Fabric\) on page 377](#)

Output Fields

[Table 28 on page 376](#) lists the output fields for the **show chassis nonstop-upgrade** command. Output fields are listed in the approximate order in which they appear.

Table 28: show chassis nonstop-upgrade Output Fields

Field Name	Field Description
Item	Line card slot number.
Status	State of line card: <ul style="list-style-type: none"> • Error—Line card is in an error state. • Offline—Line card is powered down. • Online—Line card is online and running.
Reason	Reason for the state (if the line card is offline).

Sample Output

show chassis nonstop-upgrade (EX8200 Switch)

```
user@switch> show chassis nonstop-upgrade
```

Item	Status	Reason
FPC 0	Online	
FPC 1	Online	
FPC 2	Online	
FPC 3	Offline	Offlined by CLI command
FPC 4	Online	
FPC 5	Online	
FPC 6	Online	
FPC 7	Online	

show chassis nonstop-upgrade (EX8200 Virtual Chassis)

```
user@external-routing-engine> show chassis nonstop-upgrade
```

```
member0:
```

Item	Status	Reason
FPC 0	Online	
FPC 1	Online	
FPC 2	Online	
FPC 5	Online	

```
member1:
```

Item	Status	Reason
FPC 0	Online	
FPC 1	Offline	Offlined due to config
FPC 2	Online	
FPC 3	Online	
FPC 4	Online	
FPC 5	Online	
FPC 7	Online	

show chassis nonstop-upgrade (Virtual Chassis Fabric)

Item	Status	Reason
FPC 0	Online	
FPC 1	Online	
FPC 2	Online	
FPC 3	Online	
FPC 4	Online	
FPC 5	Online	

show chassis pic-mode

Syntax

```
show chassis pic-mode  
<all-members>  
<local>  
<member member-id>
```

Release Information

Command introduced in Junos OS Release 11.1 for EX Series switches.

Description

Display the PIC mode on an EX4500 switch.

The PIC mode must be set to **virtual-chassis** if the EX4500 switch is cabled into a Virtual Chassis using the dedicated Virtual Chassis ports (VCPs) on the Virtual Chassis module.

NOTE: This PIC mode setting is not used on an EX4550 switch.

The default PIC mode setting is **virtual-chassis**.

Use the **request chassis pic-mode** command to configure the PIC mode setting.

Options

none—Display the PIC mode on the member switch where the command is issued.

all-members—(Optional) Display the PIC mode for all members of the Virtual Chassis configuration.

local—(Optional) Display the PIC mode on the member switch where the command is issued.

member *member-id*—(Optional) Display the PIC mode of the specified member of the Virtual Chassis configuration.

Required Privilege Level

view

RELATED DOCUMENTATION

[request chassis pic-mode](#) | 345

[Resetting the EX4500 Switch to Run as a Standalone Switch \(CLI Procedure\)](#) | 284

Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches (CLI Procedure) | 228

List of Sample Output

[show chassis pic-mode on page 379](#)

Sample Output

show chassis pic-mode

user@switch> **show chassis pic-mode**

```
fpc0:
```

```
-----
```

```
  Pic Mode: Intraconnect
```

show system uptime

List of Syntax

[Syntax on page 380](#)

[Syntax \(EX Series Switches\) on page 380](#)

[Syntax \(QFX Series\) on page 380](#)

[Syntax \(TX Matrix Router\) on page 380](#)

[Syntax \(TX Matrix Plus Router\) on page 380](#)

[Syntax \(MX Series Router\) on page 380](#)

[Syntax \(Junos OS Evolved\) on page 381](#)

Syntax

```
show system uptime
```

Syntax (EX Series Switches)

```
show system uptime  
<all-members>  
<local>  
<member member-id>
```

Syntax (QFX Series)

```
show system uptime  
<director-group name>  
<infrastructure name>  
<interconnect-device name>  
<node-group name>
```

Syntax (TX Matrix Router)

```
show system uptime  
<all-chassis | all-lcc | lcc number | scc>
```

Syntax (TX Matrix Plus Router)

```
show system uptime  
<detail>  
<all-chassis | all-lcc | lcc number | sfc number>
```

Syntax (MX Series Router)

```
show system uptime
<all-members>
<invoke-on>
<local>
<member member-id>
```

Syntax (Junos OS Evolved)

```
show system uptime
<node node-name>
```

Release Information

Command introduced before Junos OS Release 7.4.

Command introduced in Junos OS Release 9.0 for EX Series switches.

sfc option introduced for the TX Matrix Plus router in JUNOS Release 9.6.

Command introduced in Junos OS Release 11.1 for the QFX Series.

Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

node option introduced in Junos OS Evolved Release 18.3R1.

Description

Display the current time and information about how long the router or switch, router or switch software, and routing protocols have been running.

NOTE: Time values computed from differences in timestamps can vary due to the insertion or deletion of leap-seconds between them.

The **show system uptime** command is a little different in how it displays output in Junos OS Evolved. The **show system uptime** command by itself shows system-wide uptime information. Use the **show system uptime node *node-name*** command to see node-specific uptime information, where ***node-name*** can be **re0** | **re1** | **fpc0** | **all**.

Options

none—Show time since the system rebooted and processes started.

all-chassis—(TX Matrix routers and TX Matrix Plus routers only) (Optional) Show time since the system rebooted and processes started on all the routers in the chassis.

all-lcc—(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, show time since the system rebooted and processes started for all T640 routers (or line-card chassis) connected to the TX Matrix router. On a TX Matrix Plus router, show time since the system rebooted and processes started for all connected T1600 or T4000 LCCs.

all-members—(EX4200 switches and MX Series routers only) (Optional) Show time since the system rebooted and processes started on all members of the Virtual Chassis configuration.

director-group *name*—(QFabric systems only) (Optional) Show time since the system rebooted and processes started on the Director group.

infrastructure *name*—(QFabric systems only) (Optional) Show time since the system rebooted and processes started on the fabric control Routing Engine and fabric manager Routing Engine.

interconnect-device *name*—(QFabric systems only) (Optional) Show time since the system rebooted and processes started on the Interconnect device.

invoke-on—(MX Series routers only) (Optional) Display the time since the system rebooted and processes started on the master Routing Engine, backup Routing Engine, or both, on a router with two Routing Engines.

lcc *number*—(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, show time since the system rebooted and processes started for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, show time since the system rebooted and processes started for a specific router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local—(EX4200 switches and MX Series routers only) (Optional) Show time since the system rebooted and processes started on the local Virtual Chassis member.

member *member-id*—(EX4200 switches and MX Series routers only) (Optional) Show time since the system rebooted and processes started on the specified member of the Virtual Chassis configuration. For EX4200 switches, replace *member-id* with a value from 0 through 9. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.

node *node-name*—(Junos OS Evolved only) (Optional) Display uptime information for the specified node. When **node** option is not used, display uptime information for entire system. From the system's point of view, the system booted time is the time when the system was assembled and is available in `/var/run/system_boot_time`.

node-group *name*—(QFabric systems only) (Optional) Show time since the system rebooted and processes started on the Node group.

scc—(TX Matrix routers only) (Optional) Show time since the system rebooted and processes started for the TX Matrix router (or switch-card chassis).

sfc number—(TX Matrix Plus routers only) (Optional) Show time since the system rebooted and processes started for the TX Matrix Plus router. Replace *number* with 0.

Additional Information

By default, when you issue the **show system uptime** command on the master Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the master Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

Required Privilege Level

view

RELATED DOCUMENTATION

[10-Gigabit Ethernet LAN/WAN PIC with XFP \(T640 Router\)](#)

[Routing Matrix with a TX Matrix Plus Router Solutions Page](#)

List of Sample Output

[show system uptime on page 384](#)

[show system uptime node \(for Junos OS Evolved\) on page 384](#)

[show system uptime \(QFX Series\) on page 385](#)

[show system uptime \(Junos OS Evolved\) on page 385](#)

[show system uptime node re0 \(Junos OS Evolved\) on page 385](#)

Output Fields

[Table 29 on page 383](#) describes the output fields for the **show system uptime** command. Output fields are listed in the approximate order in which they appear.

Table 29: show system uptime Output Fields

Field Name	Field Description
System booted	(Only for Junos OS Evolved when node option is not used) Time system was last booted. From the system's point of view, the system booted time is the time when the system was assembled and is available in <code>/var/run/system_boot_time</code> .
System-wide users	(Only for Junos OS Evolved when node option is not used) Number of system-wide users.
Current time	Current system time in UTC.

Table 29: show system uptime Output Fields (*continued*)

Field Name	Field Description
Time Source	Reference time source that the system is locked to.
System booted	Date and time when the Routing Engine on the router or switch was last booted and how long it has been running.
Protocols started	Date and time when the routing protocols were last started and how long they have been running.
Last configured	Date and time when a configuration was last committed. Also shows the name of the user who issued the last commit command.
time and up	Current time, in the local time zone, and how long the router or switch has been operational.
users	Number of users logged in to the router or switch.
load averages	Load averages for the last 1 minute, 5 minutes, and 15 minutes.

Sample Output

show system uptime

```
user@host> show system uptime
```

```
Current time:      2017-10-13 19:45:47 UTC
Time Source:      NTP CLOCK
System booted:    2017-10-12 20:51:41 UTC (22:54:06 ago)
Protocols started: 2017-10-13 19:33:45 UTC (00:12:02 ago)
Last configured:  2017-10-13 19:33:45 UTC (00:12:02 ago) by abc
12:45PM up 22:54, 2 users, load averages: 0.07, 0.02, 0.01
```

show system uptime node (for Junos OS Evolved)

```
user@host> show system uptime node re0
```

```
Current time: 2017-05-16 16:13:18 PDT
Node booted: 2017-05-10 15:45:29 PDT (6d 00:27 ago)
```

```
Last configured: 2017-05-10 15:31:46 PDT (6d 00:41 ago) by root
16:13:18 up 6 days, 27 min, 1 user, load averages: 2.69, 2.58, 2.57
```

show system uptime (QFX Series)

```
user@switch> show system uptime
```

```
Current time: 2017-08-27 03:12:30 PDT
Time Source: NTP CLOCK
System booted: 2017-08-13 17:11:54 PDT (1w6d 10:00 ago)
Protocols started: 2017-08-13 17:13:56 PDT (1w6d 09:58 ago)
Last configured: 2017-08-26 05:54:00 PDT (21:18:30 ago) by user
3:12AM up 13 days, 10:01, 3 users, load averages: 0.00, 0.00, 0.00
```

show system uptime (Junos OS Evolved)

```
user@router> show system uptime
```

```
System booted: 2019-02-20 19:17:52 PST (02:20:33 ago)
System-wide users: 7 users
```

Starting in Junos OS Evolved 19.1R1 release, the **show system uptime** output displays only the **System booted** and **System-wide users** information. The output does not display the details such as **Current time**, **System booted**, **Protocols started**, and **Last configured parameters**. To see node-specific uptime information, use the **node** option.

show system uptime node re0 (Junos OS Evolved)

```
user@router> show system uptime node re0
```

```
Current time: 2019-07-09 14:24:34 PDT
Time Source: NTP CLOCK
Node booted: 2019-07-03 09:59:58 PDT (6d 04:24 ago)
Protocols started: 2019-07-03 10:01:41 PDT (6d 04:22 ago)
Last configured: 2019-07-03 10:01:10 PDT (6d 04:23 ago) by root
2:24PM up 6 days, 4:24, 1 user, load averages: 1.25, 0.51, 0.36
```

show virtual-chassis active-topology

Syntax

```
show virtual-chassis active-topology
<all-members | local | member member-id>
```

Release Information

Command introduced in Junos OS Release 9.0 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Display the active topology of the Virtual Chassis or VCF with next-hop reachability information.

Options

none—Display the active topology of the member switch where you enter this command.

all-members—(Optional) Display the active topology of all members of the Virtual Chassis or VCF.

local—(Optional) Display the active topology of the switch or external Routing Engine where you enter this command.

member *member-id*—(Optional) Display the active topology of the specified member of the Virtual Chassis or VCF.

Required Privilege Level

view

RELATED DOCUMENTATION

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

List of Sample Output

[show virtual-chassis active-topology \(EX4200 Virtual Chassis\) on page 387](#)

[show virtual-chassis active-topology \(EX8200 Virtual Chassis\) on page 388](#)

[show virtual-chassis active-topology \(Virtual Chassis Fabric\) on page 389](#)

Output Fields

[Table 30 on page 387](#) lists the output fields for the **show virtual-chassis active-topology** command. Output fields are listed in the approximate order in which they appear.

Table 30: show virtual-chassis active-topology Output Fields

Field Name	Field Description
Destination ID	Specifies the member ID of the destination.
Next-hop	Specifies the member ID and Virtual Chassis port (VCP) of the next hop to which packets for the destination ID are forwarded. The next hop can be more than one device in a VCF.

Sample Output

show virtual-chassis active-topology (EX4200 Virtual Chassis)

user@switch> **show virtual-chassis active-topology**

1	1 (vcp-1)
2	1 (vcp-1)
3	1 (vcp-1)
4	1 (vcp-1)
5	8 (vcp-0) 1 (vcp-1)
6	8 (vcp-0)
7	8 (vcp-0)

8	8 (vcp-0)
---	-----------

show virtual-chassis active-topology (EX8200 Virtual Chassis)

user@external-routing-engine> **show virtual-chassis active-topology**

member0:	

Destination ID	Next-hop
1	1 (vcp-4/0/4.32768)
8	8 (vcp-0/0.32768)
9	8 (vcp-0/0.32768)
member1:	

Destination ID	Next-hop
0	0 (vcp-3/0/4.32768)
8	8 (vcp-0/0.32768)
9	8 (vcp-0/0.32768)
member8:	

Destination ID	Next-hop
0	0 (vcp-1/1.32768)
1	1 (vcp-1/2.32768)
9	9 (vcp-2/1.32768)
member9:	

Destination ID	Next-hop

0	8(vcp-1/2.32768)
1	8(vcp-1/2.32768)
8	8(vcp-1/2.32768)

show virtual-chassis active-topology (Virtual Chassis Fabric)

user@device> show virtual-chassis active-topology

fpc0:		

Destination ID	Next-hop	
1	4(vcp-255/0/2.32768)	5(vcp-255/0/3.32768)
6(vcp-255/0/1.32768)		
2	4(vcp-255/0/2.32768)	5(vcp-255/0/3.32768)
6(vcp-255/0/1.32768)		
3	4(vcp-255/0/2.32768)	5(vcp-255/0/3.32768)
6(vcp-255/0/1.32768)		
4	4(vcp-255/0/2.32768)	
5	5(vcp-255/0/3.32768)	
6	6(vcp-255/0/1.32768)	
fpc1:		

Destination ID	Next-hop	
0	4(vcp-255/0/2.32768)	5(vcp-255/0/3.32768)
6(vcp-255/0/1.32768)		
2	4(vcp-255/0/2.32768)	5(vcp-255/0/3.32768)
6(vcp-255/0/1.32768)		
3	4(vcp-255/0/2.32768)	5(vcp-255/0/3.32768)
6(vcp-255/0/1.32768)		
4	4(vcp-255/0/2.32768)	

5 5(vcp-255/0/3.32768)

6 6(vcp-255/0/1.32768)

fpc2:

Destination ID	Next-hop	
0	4(vcp-255/0/2.32768)	5(vcp-255/0/3.32768)
6(vcp-255/0/1.32768)		
1	4(vcp-255/0/2.32768)	5(vcp-255/0/3.32768)
6(vcp-255/0/1.32768)		
3	4(vcp-255/0/2.32768)	5(vcp-255/0/3.32768)
6(vcp-255/0/1.32768)		
4	4(vcp-255/0/2.32768)	
5	5(vcp-255/0/3.32768)	
6	6(vcp-255/0/1.32768)	

fpc3:

Destination ID	Next-hop	
0	4(vcp-255/0/2.32768)	5(vcp-255/0/3.32768)
6(vcp-255/0/1.32768)		
1	4(vcp-255/0/2.32768)	5(vcp-255/0/3.32768)
6(vcp-255/0/1.32768)		
2	4(vcp-255/0/2.32768)	5(vcp-255/0/3.32768)
6(vcp-255/0/1.32768)		
4	4(vcp-255/0/2.32768)	
5	5(vcp-255/0/3.32768)	
6	6(vcp-255/0/1.32768)	

fpc4:

Destination ID	Next-hop	
0	0(vcp-255/0/48.32768)	
1	1(vcp-255/0/49.32768)	
2	2(vcp-255/0/50.32768)	
3	3(vcp-255/0/51.32768)	
5	3(vcp-255/0/51.32768)	2(vcp-255/0/50.32768)
0(vcp-255/0/48.32768)	1(vcp-255/0/49.32768)	
6	3(vcp-255/0/51.32768)	2(vcp-255/0/50.32768)
0(vcp-255/0/48.32768)	1(vcp-255/0/49.32768)	

fpc5:

Destination ID	Next-hop	
0	0(vcp-255/0/48.32768)	
1	1(vcp-255/0/49.32768)	
2	2(vcp-255/0/50.32768)	
3	3(vcp-255/0/51.32768)	
4	3(vcp-255/0/51.32768)	2(vcp-255/0/50.32768)
0(vcp-255/0/48.32768)	1(vcp-255/0/49.32768)	
6	3(vcp-255/0/51.32768)	2(vcp-255/0/50.32768)
0(vcp-255/0/48.32768)	1(vcp-255/0/49.32768)	

fpc6:

Destination ID	Next-hop
0	0(vcp-255/0/0.32768)
1	1(vcp-255/0/1.32768)
2	2(vcp-255/0/2.32768)

3	3(vcp-255/0/3.32768)	
4	3(vcp-255/0/3.32768)	2(vcp-255/0/2.32768)
0(vcp-255/0/0.32768)	1(vcp-255/0/1.32768)	
5	3(vcp-255/0/3.32768)	2(vcp-255/0/2.32768)
0(vcp-255/0/0.32768)	1(vcp-255/0/1.32768)	

show virtual-chassis device-topology

Syntax

```
show virtual-chassis device-topology
<all-members | local | member member-id>
```

Release Information

Command introduced in Junos OS Release 10.4 for EX Series switches.
Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.
Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Display the device topology—the member and system IDs, the VCP numbers, and device status—for all hardware devices in the Virtual Chassis or VCF.

Options

- none**—Display the device topology for all members of the Virtual Chassis or VCF.
- all-members**—(Optional) Display the device topology for all members of the Virtual Chassis or VCF.
- local**—(Optional) Display the device topology for the switch or external Routing Engine where you enter this command.
- member member-id**—(Optional) Display the device topology for the specified member of the Virtual Chassis or VCF.

Required Privilege Level

clear

RELATED DOCUMENTATION

Understanding Virtual Chassis Port Link Aggregation 50
Understanding EX8200 Virtual Chassis Topologies

Output Fields

[Table 31 on page 393](#) lists the output fields for the **show virtual-chassis device-topology** command. Output fields are listed in the approximate order in which they appear.

Table 31: show virtual-chassis device-topology Output Fields

Field Name	Field Description
Member	Assigned member ID.

Table 31: show virtual-chassis device-topology Output Fields (*continued*)

Field Name	Field Description
Device	Assigned device ID. For an EX8200 Virtual Chassis, the member ID and the device ID are always identical.
Status	The status of the device within the Virtual Chassis or VCF. Outputs include: <ul style="list-style-type: none"> • Prsnt—Device is currently connected to and participating in the Virtual Chassis or VCF. • NotPrsnt—Device is assigned but is not currently connected.
System ID	System ID of the device. The system ID of the device is the device's MAC address.
Member (Neighbor List)	Assigned member ID of the neighbor device.
Device (Neighbor List)	Assigned device ID of the neighbor device. For an EX8200 Virtual Chassis, the member ID and the device ID are always identical.
Interface (Neighbor List)	The interface connecting the device to the neighbor.

Sample Output

show virtual-chassis device-topology

user@switch> show virtual-chassis device-topology

```
member0:
```

```
-----
                        Neighbor List
Member  Device  Status  System ID      Member  Device  Interface
   0      0    Prsnt   0021.59f7.d000    8        8    vcp-0/0
                   1        1    vcp-4/0/1
   1      1    Prsnt   0026.888d.6800    8        8    vcp-0/0
                   9        9    vcp-0/1
                   0        0    vcp-3/0/4
```

8	8	Prsnt	0000.4a75.9b7c	9	9	vcp-1/0
				0	0	vcp-1/1
				1	1	vcp-1/2
9	9	Prsnt	0000.73e9.9a57	8	8	vcp-1/0
				1	1	vcp-1/1

member1:

Neighbor List						
Member	Device	Status	System ID	Member	Device	Interface
0	0	Prsnt	0021.59f7.d000	8	8	vcp-0/0
				1	1	vcp-4/0/1
1	1	Prsnt	0026.888d.6800	8	8	vcp-0/0
				9	9	vcp-0/1
				0	0	vcp-3/0/4
8	8	Prsnt	0000.4a75.9b7c	9	9	vcp-1/0
				0	0	vcp-1/1
				1	1	vcp-1/2
9	9	Prsnt	0000.73e9.9a57	8	8	vcp-1/0
				1	1	vcp-1/1

member8:

Neighbor List						
Member	Device	Status	System ID	Member	Device	Interface
0	0	Prsnt	0021.59f7.d000	8	8	vcp-0/0
				1	1	vcp-4/0/1
1	1	Prsnt	0026.888d.6800	8	8	vcp-0/0
				9	9	vcp-0/1
				0	0	vcp-3/0/4
8	8	Prsnt	0000.4a75.9b7c	9	9	vcp-1/0
				0	0	vcp-1/1
				1	1	vcp-1/2
9	9	Prsnt	0000.73e9.9a57	8	8	vcp-1/0
				1	1	vcp-1/1

member9:

Neighbor List						
Member	Device	Status	System ID	Member	Device	Interface
0	0	Prsnt	0021.59f7.d000	8	8	vcp-0/0
				1	1	vcp-4/0/1
1	1	Prsnt	0026.888d.6800	8	8	vcp-0/0
				9	9	vcp-0/1

8	8	Prsnt	0000.4a75.9b7c	0	0	vcp-3/0/4
				9	9	vcp-1/0
				0	0	vcp-1/1
				1	1	vcp-1/2
9	9	Prsnt	0000.73e9.9a57	8	8	vcp-1/0
				1	1	vcp-1/1

show virtual-chassis device-topology (Virtual Chassis Fabric)

user@device> show virtual-chassis device-topology

fpc0:

				Neighbor List		
Member	Device	Status	System ID	Member	Device	Interface
0	0	Prsnt	100e.7eb6.a900	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
1	1	Prsnt	100e.7eb8.3a40	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
2	2	Prsnt	100e.7eb5.d700	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
3	3	Prsnt	100e.7eb5.c440	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
4	4	Prsnt	100e.7eb5.7e40	3	3	vcp-255/0/51
				2	2	vcp-255/0/50
				0	0	vcp-255/0/48
				1	1	vcp-255/0/49
5	5	Prsnt	100e.7eb5.80c0	3	3	vcp-255/0/51
				2	2	vcp-255/0/50
				1	1	vcp-255/0/49
				0	0	vcp-255/0/48
6	6	Prsnt	100e.7eb6.3b00	3	3	vcp-255/0/3
				2	2	vcp-255/0/2
				0	0	vcp-255/0/0
				1	1	vcp-255/0/1

fpc1:

				Neighbor List		
Member	Device	Status	System ID	Member	Device	Interface

0	0	Prsnt	100e.7eb6.a900	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
1	1	Prsnt	100e.7eb8.3a40	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
2	2	Prsnt	100e.7eb5.d700	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
3	3	Prsnt	100e.7eb5.c440	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
4	4	Prsnt	100e.7eb5.7e40	3	3	vcp-255/0/51
				2	2	vcp-255/0/50
				0	0	vcp-255/0/48
				1	1	vcp-255/0/49
5	5	Prsnt	100e.7eb5.80c0	3	3	vcp-255/0/51
				2	2	vcp-255/0/50
				1	1	vcp-255/0/49
				0	0	vcp-255/0/48
6	6	Prsnt	100e.7eb6.3b00	3	3	vcp-255/0/3
				2	2	vcp-255/0/2
				0	0	vcp-255/0/0
				1	1	vcp-255/0/1

fpc2:

				Neighbor List		
Member	Device	Status	System ID	Member	Device	Interface
0	0	Prsnt	100e.7eb6.a900	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
1	1	Prsnt	100e.7eb8.3a40	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
2	2	Prsnt	100e.7eb5.d700	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
3	3	Prsnt	100e.7eb5.c440	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
4	4	Prsnt	100e.7eb5.7e40	3	3	vcp-255/0/51
				2	2	vcp-255/0/50
				0	0	vcp-255/0/48

5	5	Prsnt	100e.7eb5.80c0	1	1	vcp-255/0/49
				3	3	vcp-255/0/51
				2	2	vcp-255/0/50
				1	1	vcp-255/0/49
				0	0	vcp-255/0/48
6	6	Prsnt	100e.7eb6.3b00	3	3	vcp-255/0/3
				2	2	vcp-255/0/2
				0	0	vcp-255/0/0
				1	1	vcp-255/0/1

fpc3:

				Neighbor List		
Member	Device	Status	System ID	Member	Device	Interface
0	0	Prsnt	100e.7eb6.a900	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
1	1	Prsnt	100e.7eb8.3a40	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
2	2	Prsnt	100e.7eb5.d700	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
3	3	Prsnt	100e.7eb5.c440	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
4	4	Prsnt	100e.7eb5.7e40	3	3	vcp-255/0/51
				2	2	vcp-255/0/50
				0	0	vcp-255/0/48
				1	1	vcp-255/0/49
5	5	Prsnt	100e.7eb5.80c0	3	3	vcp-255/0/51
				2	2	vcp-255/0/50
				1	1	vcp-255/0/49
				0	0	vcp-255/0/48
6	6	Prsnt	100e.7eb6.3b00	3	3	vcp-255/0/3
				2	2	vcp-255/0/2
				0	0	vcp-255/0/0
				1	1	vcp-255/0/1

fpc4:

				Neighbor List		
Member	Device	Status	System ID	Member	Device	Interface
0	0	Prsnt	100e.7eb6.a900	4	4	vcp-255/0/2

				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
1	1	Prsnt	100e.7eb8.3a40	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
2	2	Prsnt	100e.7eb5.d700	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
3	3	Prsnt	100e.7eb5.c440	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
4	4	Prsnt	100e.7eb5.7e40	3	3	vcp-255/0/51
				2	2	vcp-255/0/50
				0	0	vcp-255/0/48
				1	1	vcp-255/0/49
5	5	Prsnt	100e.7eb5.80c0	3	3	vcp-255/0/51
				2	2	vcp-255/0/50
				1	1	vcp-255/0/49
				0	0	vcp-255/0/48
6	6	Prsnt	100e.7eb6.3b00	3	3	vcp-255/0/3
				2	2	vcp-255/0/2
				0	0	vcp-255/0/0
				1	1	vcp-255/0/1

fpc5:

				Neighbor List		
Member	Device	Status	System ID	Member	Device	Interface
0	0	Prsnt	100e.7eb6.a900	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
1	1	Prsnt	100e.7eb8.3a40	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
2	2	Prsnt	100e.7eb5.d700	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
3	3	Prsnt	100e.7eb5.c440	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
4	4	Prsnt	100e.7eb5.7e40	3	3	vcp-255/0/51
				2	2	vcp-255/0/50
				0	0	vcp-255/0/48
				1	1	vcp-255/0/49

5	5	Prsnt	100e.7eb5.80c0	3	3	vcp-255/0/51
				2	2	vcp-255/0/50
				1	1	vcp-255/0/49
				0	0	vcp-255/0/48
6	6	Prsnt	100e.7eb6.3b00	3	3	vcp-255/0/3
				2	2	vcp-255/0/2
				0	0	vcp-255/0/0
				1	1	vcp-255/0/1

fpc6:

				Neighbor List		
Member	Device	Status	System ID	Member	Device	Interface
0	0	Prsnt	100e.7eb6.a900	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
1	1	Prsnt	100e.7eb8.3a40	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
2	2	Prsnt	100e.7eb5.d700	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
3	3	Prsnt	100e.7eb5.c440	4	4	vcp-255/0/2
				5	5	vcp-255/0/3
				6	6	vcp-255/0/1
4	4	Prsnt	100e.7eb5.7e40	3	3	vcp-255/0/51
				2	2	vcp-255/0/50
				0	0	vcp-255/0/48
				1	1	vcp-255/0/49
5	5	Prsnt	100e.7eb5.80c0	3	3	vcp-255/0/51
				2	2	vcp-255/0/50
				1	1	vcp-255/0/49
				0	0	vcp-255/0/48
6	6	Prsnt	100e.7eb6.3b00	3	3	vcp-255/0/3
				2	2	vcp-255/0/2
				0	0	vcp-255/0/0
				1	1	vcp-255/0/1

show virtual-chassis protocol adjacency

Syntax

```
show virtual-chassis protocol adjacency
<brief | detail | extensive>
<all-members | local | member member-id>
<system-id>
```

Release Information

Command introduced in Junos OS Release 10.4 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Display the Virtual Chassis Control Protocol (VCCP) adjacency statistics in the Virtual Chassis or VCF for all hardware devices.

Options

none—Display VCCP adjacency statistics in brief form for all members of the Virtual Chassis or VCF.

brief | detail | extensive—(Optional) Display the specified level of output. Using the **brief** option is equivalent to entering the command with no options (the default). The **detail** and **extensive** options provide identical displays.

all-members—(Optional) Display VCCP adjacency statistics in brief form for all members of the Virtual Chassis or VCF.

local—(Optional) Display VCCP adjacency statistics for the switch or external Routing Engine on which this command is entered.

member *member-id*—(Optional) Display VCCP adjacency statistics for the specified member of the Virtual Chassis or VCF.

system-id—(Optional) Display VCCP adjacency statistics for the specified member of the Virtual Chassis or VCF.

Required Privilege Level

clear

RELATED DOCUMENTATION

[Understanding Virtual Chassis Port Link Aggregation | 50](#)

Understanding the Virtual Chassis Control Protocol in an EX8200 Virtual Chassis

List of Sample Output

[show virtual-chassis protocol adjacency on page 402](#)

[show virtual-chassis protocol adjacency detail on page 403](#)

Output Fields

Table 32 on page 402 lists the output fields for the **show virtual-chassis protocol adjacency** command. Output fields are listed in the approximate order in which they appear.

Table 32: show virtual-chassis protocol adjacency Output Fields

Field Name	Field Description	Level of Output
Interface	Name of the Virtual Chassis port (VCP) interface.	All levels
System	The MAC address of the device on the receiving side of the VCP link.	All levels
State	State of the link. Outputs include: <ul style="list-style-type: none"> • Up—The link is up. • Down—The link is down. • New—The link is new. • One-way—The link is transmitting traffic in one direction. • Initializing—The link is initializing. • Rejected—The link is rejected. 	All levels
Hold, Expires in	Remaining holdtime of the adjacency.	All levels
Priority	Priority to become the designated intermediary system.	detail
Up/Down Transitions	Count of adjacency status transition changes from up to down or down to up.	detail
Last transition	Time of the last up/down transition.	detail

Sample Output

show virtual-chassis protocol adjacency

user@switch> **show virtual-chassis protocol adjacency**

```
member0:
```

```
-----
```

```
Interface
```

```
System
```

```
State
```

```
Hold (secs)
```

```
vcp-0/0.32768      0000.4a75.9b7c Up      57
vcp-0/1.32768      0000.4a75.9b7c Up      59
vcp-4/0/1.32768    0026.888d.6800 Up      57

member1:
-----
Interface          System          State          Hold (secs)
vcp-0/0.32768      0000.4a75.9b7c Up              58
vcp-0/1.32768      0000.73e9.9a57 Up              59
vcp-3/0/4.32768    0021.59f7.d000 Up              58

member8:
-----
Interface          System          State          Hold (secs)
vcp-1/0.32768      0000.73e9.9a57 Up              58
vcp-1/1.32768      0021.59f7.d000 Up              58
vcp-1/2.32768      0026.888d.6800 Up              59
vcp-2/0.32768      0021.59f7.d000 Up              59

member9:
-----
Interface          System          State          Hold (secs)
vcp-1/0.32768      0000.4a75.9b7c Up              58
vcp-1/1.32768      0026.888d.6800 Up              59
```

show virtual-chassis protocol adjacency detail

user@switch> **show virtual-chassis protocol adjacency detail**

```
member0:
-----

0000.4a75.9b7c
  interface-name: vcp-0/0.32768, State: Up, Expires in 57 secs
  Priority: 0, Up/Down transitions: 1, Last transition: 19:26:37 ago

0000.4a75.9b7c
  interface-name: vcp-0/1.32768, State: Up, Expires in 59 secs
  Priority: 0, Up/Down transitions: 1, Last transition: 19:26:37 ago

0026.888d.6800
  interface-name: vcp-4/0/1.32768, State: Up, Expires in 59 secs
  Priority: 0, Up/Down transitions: 1, Last transition: 22:06:39 ago
```

member1:

0000.4a75.9b7c

interface-name: vcp-0/0.32768, State: Up, Expires in 59 secs
Priority: 0, Up/Down transitions: 1, Last transition: 19:26:38 ago

0000.73e9.9a57

interface-name: vcp-0/1.32768, State: Up, Expires in 58 secs
Priority: 0, Up/Down transitions: 1, Last transition: 22:17:36 ago

0021.59f7.d000

interface-name: vcp-3/0/4.32768, State: Up, Expires in 58 secs
Priority: 0, Up/Down transitions: 1, Last transition: 22:06:39 ago

member8:

0000.73e9.9a57

interface-name: vcp-1/0.32768, State: Up, Expires in 58 secs
Priority: 0, Up/Down transitions: 1, Last transition: 19:26:38 ago

0021.59f7.d000

interface-name: vcp-1/1.32768, State: Up, Expires in 59 secs
Priority: 0, Up/Down transitions: 1, Last transition: 19:26:38 ago

0026.888d.6800

interface-name: vcp-1/2.32768, State: Up, Expires in 59 secs
Priority: 0, Up/Down transitions: 1, Last transition: 19:26:38 ago

0021.59f7.d000

interface-name: vcp-2/0.32768, State: Up, Expires in 57 secs
Priority: 0, Up/Down transitions: 1, Last transition: 19:26:38 ago

member9:

0000.4a75.9b7c

interface-name: vcp-1/0.32768, State: Up, Expires in 59 secs
Priority: 0, Up/Down transitions: 1, Last transition: 19:26:38 ago

0026.888d.6800

interface-name: vcp-1/1.32768, State: Up, Expires in 58 secs
Priority: 0, Up/Down transitions: 1, Last transition: 22:17:36 ago

show virtual-chassis protocol database

Syntax

```
show virtual-chassis protocol database
<brief | detail | extensive>
<all-members | local | member member-id>
```

Release Information

Command introduced in Junos OS Release 10.4 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Display the Virtual Chassis Control Protocol (VCCP) database statistics for all hardware devices within the Virtual Chassis or VCF.

Options

none—Display VCCP database statistics in brief form for all members of the Virtual Chassis or VCF.

brief | detail | extensive—(Optional) Display the specified level of output. Using the **brief** option is equivalent to entering the command with no options (the default). The **detail** option provides more output than the **brief** option. The **extensive** option provides all output and is most useful for customer support personnel.

all-members—(Optional) Display VCCP database statistics in brief form for all members of the Virtual Chassis or VCF.

local—(Optional) Display VCCP database statistics for the switch or external Routing Engine where you enter this command.

member *member-id*—(Optional) Display VCCP database statistics for the specified member of the Virtual Chassis or VCF.

Required Privilege Level

clear

RELATED DOCUMENTATION

Understanding the Virtual Chassis Control Protocol in an EX8200 Virtual Chassis

[Understanding Virtual Chassis Components](#) | 19

List of Sample Output

[show virtual-chassis protocol database on page 406](#)

[show virtual-chassis protocol database detail on page 407](#)

Output Fields

[Table 33 on page 406](#) lists the output fields for the **show virtual-chassis protocol database** command. Output fields are listed in the approximate order in which they appear.

Table 33: show virtual-chassis protocol database Output Fields

Field Name	Field Description	Level of Output
LSP ID	Link-state protocol (LSP) data unit identifier.	All levels
Sequence	Sequence number of the LSP.	All levels
Checksum	Checksum value of the LSP.	All levels
Lifetime	Remaining lifetime of the LSP, in seconds.	All levels
Neighbor	MAC address of the neighbor on the advertising system.	detail
Interface	Virtual Chassis port (VCP) interface name.	detail
Metric	Metric of the prefix or neighbor.	detail

The **extensive** output was omitted from this list. The **extensive** output is useful for customer support personnel only.

Sample Output

show virtual-chassis protocol database

user@switch> **show virtual-chassis protocol database**

```
member0:
```

```
-----
LSP ID          Sequence Checksum Lifetime
0000.4a75.9b7c.00-00    0x1dd80    0xc2e3    116
0000.73e9.9a57.00-00    0xf361    0x27e8    113
0021.59f7.d000.00-00    0x16882    0x3993    118
0026.888d.6800.00-00    0x1691f    0x82b7    116
  4 LSPs
```


member1:

```
-----
LSP ID                Sequence Checksum Lifetime
0000.4a75.9b7c.00-00  0x1dd80  0xc2e3    116
0000.73e9.9a57.00-00  0xf361   0x27e8    114
0021.59f7.d000.00-00  0x16883  0x289     116
0026.888d.6800.00-00  0x1691f  0x82b7    118
  4 LSPs
```

member8:

```
-----
LSP ID                Sequence Checksum Lifetime
0000.4a75.9b7c.00-00  0x1dd80  0xc2e3    118
0000.73e9.9a57.00-00  0xf361   0x27e8    114
0021.59f7.d000.00-00  0x16883  0x289     116
0026.888d.6800.00-00  0x16920  0xa335    116
  4 LSPs
```

member9:

```
-----
LSP ID                Sequence Checksum Lifetime
0000.4a75.9b7c.00-00  0x1dd80  0xc2e3    116
0000.73e9.9a57.00-00  0xf361   0x27e8    116
0021.59f7.d000.00-00  0x16883  0x289     114
0026.888d.6800.00-00  0x16920  0xa335    116
  4 LSPs
```

show virtual-chassis protocol database detail

user@switch> show virtual-chassis protocol database detail

member0:

```
-----
0000.4a75.9b7c.00-00 Sequence: 0x1ddbc, Checksum: 0x3111, Lifetime: 115 secs
  Neighbor: 0000.73e9.9a57.00 Interface: vcp-1/0.32768 Metric: 150
  Neighbor: 0021.59f7.d000.00 Interface: vcp-1/1.32768 Metric: 150
  Neighbor: 0026.888d.6800.00 Interface: vcp-1/2.32768 Metric: 150

0000.73e9.9a57.00-00 Sequence: 0xf381, Checksum: 0xe065, Lifetime: 114 secs
  Neighbor: 0000.4a75.9b7c.00 Interface: vcp-1/0.32768 Metric: 150
  Neighbor: 0026.888d.6800.00 Interface: vcp-1/1.32768 Metric: 150

0021.59f7.d000.00-00 Sequence: 0x168af, Checksum: 0x8b0b, Lifetime: 118 secs
```

```

Neighbor: 0000.4a75.9b7c.00 Interface: vcp-0/0.32768 Metric: 150
Neighbor: 0026.888d.6800.00 Interface: vcp-4/0/1.32768 Metric: 15

0026.888d.6800.00-00 Sequence: 0x1694e, Checksum: 0xca97, Lifetime: 115 secs
Neighbor: 0000.4a75.9b7c.00 Interface: vcp-0/0.32768 Metric: 150
Neighbor: 0000.73e9.9a57.00 Interface: vcp-0/1.32768 Metric: 150
Neighbor: 0021.59f7.d000.00 Interface: vcp-3/0/4.32768 Metric: 15

member1:
-----

0000.4a75.9b7c.00-00 Sequence: 0x1ddbc, Checksum: 0x3111, Lifetime: 115 secs
Neighbor: 0000.73e9.9a57.00 Interface: vcp-1/0.32768 Metric: 150
Neighbor: 0021.59f7.d000.00 Interface: vcp-1/1.32768 Metric: 150
Neighbor: 0026.888d.6800.00 Interface: vcp-1/2.32768 Metric: 150

0000.73e9.9a57.00-00 Sequence: 0xf381, Checksum: 0xe065, Lifetime: 116 secs
Neighbor: 0000.4a75.9b7c.00 Interface: vcp-1/0.32768 Metric: 150
Neighbor: 0026.888d.6800.00 Interface: vcp-1/1.32768 Metric: 150

0021.59f7.d000.00-00 Sequence: 0x168af, Checksum: 0x8b0b, Lifetime: 116 secs
Neighbor: 0000.4a75.9b7c.00 Interface: vcp-0/0.32768 Metric: 150
Neighbor: 0026.888d.6800.00 Interface: vcp-4/0/1.32768 Metric: 15

0026.888d.6800.00-00 Sequence: 0x1694e, Checksum: 0xca97, Lifetime: 117 secs
Neighbor: 0000.4a75.9b7c.00 Interface: vcp-0/0.32768 Metric: 150
Neighbor: 0000.73e9.9a57.00 Interface: vcp-0/1.32768 Metric: 150
Neighbor: 0021.59f7.d000.00 Interface: vcp-3/0/4.32768 Metric: 15

member8:
-----

0000.4a75.9b7c.00-00 Sequence: 0x1ddbd, Checksum: 0xfd83, Lifetime: 118 secs
Neighbor: 0000.73e9.9a57.00 Interface: vcp-1/0.32768 Metric: 150
Neighbor: 0021.59f7.d000.00 Interface: vcp-1/1.32768 Metric: 150
Neighbor: 0026.888d.6800.00 Interface: vcp-1/2.32768 Metric: 150

0000.73e9.9a57.00-00 Sequence: 0xf381, Checksum: 0xe065, Lifetime: 115 secs
Neighbor: 0000.4a75.9b7c.00 Interface: vcp-1/0.32768 Metric: 150
Neighbor: 0026.888d.6800.00 Interface: vcp-1/1.32768 Metric: 150

0021.59f7.d000.00-00 Sequence: 0x168af, Checksum: 0x8b0b, Lifetime: 116 secs
Neighbor: 0000.4a75.9b7c.00 Interface: vcp-0/0.32768 Metric: 150
Neighbor: 0026.888d.6800.00 Interface: vcp-4/0/1.32768 Metric: 15

```

```

0026.888d.6800.00-00 Sequence: 0x1694e, Checksum: 0xca97, Lifetime: 115 secs
  Neighbor: 0000.4a75.9b7c.00 Interface: vcp-0/0.32768 Metric:      150
  Neighbor: 0000.73e9.9a57.00 Interface: vcp-0/1.32768 Metric:      150
  Neighbor: 0021.59f7.d000.00 Interface: vcp-3/0/4.32768 Metric:      15

```

```

member9:
-----

```

```

0000.4a75.9b7c.00-00 Sequence: 0x1ddbd, Checksum: 0xfd83, Lifetime: 116 secs
  Neighbor: 0000.73e9.9a57.00 Interface: vcp-1/0.32768 Metric:      150
  Neighbor: 0021.59f7.d000.00 Interface: vcp-1/1.32768 Metric:      150
  Neighbor: 0026.888d.6800.00 Interface: vcp-1/2.32768 Metric:      150

```

```

0000.73e9.9a57.00-00 Sequence: 0xf381, Checksum: 0xe065, Lifetime: 117 secs
  Neighbor: 0000.4a75.9b7c.00 Interface: vcp-1/0.32768 Metric:      150
  Neighbor: 0026.888d.6800.00 Interface: vcp-1/1.32768 Metric:      150

```

```

0021.59f7.d000.00-00 Sequence: 0x168af, Checksum: 0x8b0b, Lifetime: 113 secs
  Neighbor: 0000.4a75.9b7c.00 Interface: vcp-0/0.32768 Metric:      150
  Neighbor: 0026.888d.6800.00 Interface: vcp-4/0/1.32768 Metric:      15

```

```

0026.888d.6800.00-00 Sequence: 0x1694f, Checksum: 0xa61a, Lifetime: 116 secs
  Neighbor: 0000.4a75.9b7c.00 Interface: vcp-0/0.32768 Metric:      150
  Neighbor: 0000.73e9.9a57.00 Interface: vcp-0/1.32768 Metric:      150
  Neighbor: 0021.59f7.d000.00 Interface: vcp-3/0/4.32768 Metric:      15

```

show virtual-chassis protocol interface

Syntax

```
show virtual-chassis protocol interface
<brief | detail>
<all-members | local | member member-id>
<interface-name>
```

Release Information

Command introduced in Junos OS Release 10.4 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Display information about Virtual Chassis Control Protocol (VCCP) statistics for VCCP-enabled interfaces within the Virtual Chassis or VCF.

Options

none—Display the VCCP interface statistics in brief form for all members of the Virtual Chassis or VCF.

brief | detail —(Optional) Display the specified level of output. Using the **brief** option is equivalent to entering the command with no options (the default). The **detail** option provides more output than the **brief** option.

all-members—(Optional) Display VCCP interface statistics for all members of the Virtual Chassis or VCF.

interface-name—(Optional) Display VCCP interface statistics for the specified interface.

local—(Optional) Display VCCP interface statistics for the switch or external Routing Engine where you enter this command.

member *member-id*—(Optional) Display VCCP interface statistics for the specified member of the Virtual Chassis or VCF.

Required Privilege Level

clear

RELATED DOCUMENTATION

[Understanding EX Series Virtual Chassis | 9](#)

[Understanding QFX Series Virtual Chassis](#)

[Understanding Virtual Chassis Ports in an EX8200 Virtual Chassis](#)

List of Sample Output

[show virtual-chassis protocol interface on page 411](#)

Output Fields

[Table 34 on page 411](#) lists the output fields for the **show virtual-chassis protocol interface** command. Output fields are listed in the approximate order in which they appear.

Table 34: show virtual-chassis protocol interface Output Fields

Field Name	Field Description	Level of Output
Interface	Name of the VCP.	All levels
State	State of the link. Outputs include: <ul style="list-style-type: none"> • Up—The link is up. • Down—The link is down. 	All levels
Metric	Metric of the prefix or neighbor.	All levels

Sample Output**show virtual-chassis protocol interface**

```
user@switch> show virtual-chassis protocol interface
```

```
member0:
-----
IS-IS interface database:
Interface          State      Metric
vcp-0/0.32768      Up         150
vcp-0/1.32768      Up         150
vcp-4/0/1.32768    Up         15
vcp-4/0/7.32768    Down       15

member1:
-----
IS-IS interface database:
Interface          State      Metric
vcp-0/0.32768      Up         150
vcp-0/1.32768      Up         150
vcp-3/0/4.32768    Up         15
```

```
member8:
-----
IS-IS interface database:
Interface      State      Metric
vcp-0/0.32768  Down      150
vcp-1/0.32768  Up        150
vcp-1/1.32768  Up        150
vcp-1/2.32768  Up        150
vcp-1/3.32768  Down      150
vcp-2/0.32768  Up        150
vcp-2/1.32768  Down      150
vcp-2/2.32768  Down      150
vcp-2/3.32768  Down      150

member9:
-----
IS-IS interface database:
Interface      State      Metric
vcp-0/0.32768  Down      150
vcp-1/0.32768  Up        150
vcp-1/1.32768  Up        150
vcp-1/2.32768  Down      150
vcp-1/3.32768  Down      150
```

show virtual-chassis protocol route

Syntax

```
show virtual-chassis protocol route
<all-members | local | member member-id>
<destination-id>
```

Release Information

Command introduced in Junos OS Release 10.4 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Display the unicast and multicast Virtual Chassis Control Protocol (VCCP) routing tables within the Virtual Chassis or VCF.

Options

none—Display the unicast and multicast routing tables for all members of the Virtual Chassis.

all-members—(Optional) Display the unicast and multicast routing tables for all members of the Virtual Chassis or VCF.

destination-id—(Optional) Display the unicast and multicast routing tables to the specified destination member ID for each member of the Virtual Chassis or VCF.

local—(Optional) Display the unicast and multicast routing tables on the device where you enter this command.

member *member-id*—(Optional) Display the unicast and multicast routing tables for the specified member of the Virtual Chassis or VCF.

Required Privilege Level

clear

RELATED DOCUMENTATION

[Understanding EX Series Virtual Chassis | 9](#)

[Understanding QFX Series Virtual Chassis](#)

[Understanding the Virtual Chassis Control Protocol in an EX8200 Virtual Chassis](#)

List of Sample Output

[show virtual-chassis protocol route on page 414](#)

Output Fields

Table 35 on page 414 lists the output fields for the **show virtual-chassis protocol route** command. Output fields are listed in the approximate order in which they appear.

Table 35: show virtual-chassis protocol route Output Fields

Field Name	Field Description
Dev	MAC address of the member storing the VCCP routing table.
Version	Version of the shortest-path-first algorithm that generated the routing table.
System ID	MAC address of the device.
Version	Version of the shortest-path-first (SPF) algorithm that generated the route.
Metric	The metric number to get to that device.
Interface	Name of the Virtual Chassis port (VCP) interface connecting the devices.
Via	MAC address of the next-hop device, if applicable.

Sample Output

show virtual-chassis protocol route

```
user@switch> show virtual-chassis protocol route
```

```
member0:
-----

Dev 0021.59f7.d000 ucast routing table          Current version: 21
-----
System ID      Version  Metric Interface      Via
0000.4a75.9b7c      21      150 vcp-0/1.32768 0000.4a75.9b7c
0000.73e9.9a57      21      165 vcp-4/0/1.32768 0026.888d.6800
0021.59f7.d000      21        0
0026.888d.6800      21      15 vcp-4/0/1.32768 0026.888d.6800

Dev 0021.59f7.d000 mcast routing table          Current version: 21
-----
System ID      Version  Metric Interface      Via
0000.4a75.9b7c      21
```



```

0000.73e9.9a57          21
0021.59f7.d000          21          vcp-4/0/1.32768
                                vcp-0/1.32768
0026.888d.6800          21

```

```
member1:
```

```
-----
Dev 0026.888d.6800 ucast routing table          Current version: 25
-----
```

System ID	Version	Metric	Interface	Via
0000.4a75.9b7c	25	150	vcp-0/0.32768	0000.4a75.9b7c
0000.73e9.9a57	25	150	vcp-0/1.32768	0000.73e9.9a57
0021.59f7.d000	25	15	vcp-3/0/4.32768	0021.59f7.d000
0026.888d.6800	25	0		

```
Dev 0026.888d.6800 mcast routing table          Current version: 25
-----
```

System ID	Version	Metric	Interface	Via
0000.4a75.9b7c	25			
0000.73e9.9a57	25		vcp-3/0/4.32768	
0021.59f7.d000	25		vcp-0/1.32768	
0026.888d.6800	25		vcp-3/0/4.32768	
			vcp-0/0.32768	
			vcp-0/1.32768	

```
member8:
```

```
-----
Dev 0000.4a75.9b7c ucast routing table          Current version: 39
-----
```

System ID	Version	Metric	Interface	Via
0000.4a75.9b7c	39	0		
0000.73e9.9a57	39	150	vcp-1/0.32768	0000.73e9.9a57
0021.59f7.d000	39	150	vcp-2/0.32768	0021.59f7.d000
0026.888d.6800	39	150	vcp-1/2.32768	0026.888d.6800

```
Dev 0000.4a75.9b7c mcast routing table          Current version: 39
-----
```

System ID	Version	Metric	Interface	Via
0000.4a75.9b7c	39		vcp-1/0.32768	
			vcp-2/0.32768	
			vcp-1/2.32768	
0000.73e9.9a57	39			

```
0021.59f7.d000          39
0026.888d.6800          39

member9:
-----

Dev 0000.73e9.9a57 ucast routing table          Current version: 31
-----
System ID          Version  Metric Interface      Via
0000.4a75.9b7c      31      150 vcp-1/0.32768 0000.4a75.9b7c
0000.73e9.9a57      31          0
0021.59f7.d000      31      165 vcp-1/1.32768 0026.888d.6800
0026.888d.6800      31      150 vcp-1/1.32768 0026.888d.6800

Dev 0000.73e9.9a57 mcast routing table          Current version: 31
-----
System ID          Version  Metric Interface      Via
0000.4a75.9b7c      31
0000.73e9.9a57      31          vcp-1/0.32768
                                vcp-1/1.32768
0021.59f7.d000      31
0026.888d.6800      31
```

show virtual-chassis protocol statistics

Syntax

```
show virtual-chassis protocol statistics
<all-members | local | member member-id>
<interface-name>
```

Release Information

Command introduced in Junos OS Release 10.4 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Display the Virtual Chassis Control Protocol (VCCP) statistics for all hardware devices within the Virtual Chassis or VCF.

Options

none—Display VCCP statistics for all members of the Virtual Chassis or VCF.

all-members—(Optional) Display VCCP statistics for all members of the Virtual Chassis or VCF.

interface-name—(Optional) Display VCCP statistics for the specified interface.

local—(Optional) Display VCCP statistics for the switch or external Routing Engine where you run this command.

member *member-id*—(Optional) Display VCCP statistics for the specified member of the Virtual Chassis or VCF.

Required Privilege Level

clear

RELATED DOCUMENTATION

[Understanding EX Series Virtual Chassis | 9](#)

[Understanding QFX Series Virtual Chassis](#)

[Understanding the Virtual Chassis Control Protocol in an EX8200 Virtual Chassis](#)

List of Sample Output

[show virtual-chassis protocol statistics on page 418](#)

Output Fields

Table 36 on page 418 lists the output fields for the **show virtual-chassis protocol interface** command. Output fields are listed in the approximate order in which they appear.

Table 36: show virtual-chassis protocol statistics Output Fields

Field Name	Field Description
PDU type	Protocol data unit type.
Received	Number of PDUs received since VCCP started or since the statistics were set to zero.
Processed	Number of PDUs received minus the number of PDUs dropped.
Drops	Number of PDUs dropped.
Sent	Number of PDUs transmitted since VCCP started or since the statistics were set to zero.
Rexmit	Number of PDUs retransmitted since VCCP started or since the statistics were set to zero.
Total Packets Received	Number of PDUs received since VCCP started or since the statistics were set to zero.
Total Packets Sent	Number of PDUs sent since VCCP started or since the statistics were set to zero.
LSP queue length	Number of link-state PDUs waiting in the queue for processing. This value is almost always 0.
SPF runs	Number of shortest-path-first (SPF) calculations that have been performed.
Fragments Rebuilt	Number of link-state PDU fragments that the local system has computed.
LSP Regenerations	Number of link-state PDUs that have been regenerated. A link-state PDU is regenerated when it is nearing the end of its lifetime and it has not changed.
Purges initiated	Number of purges that the system initiated. A purge is initiated if the software determines that a link-state PDU must be removed from the network.

Sample Output

show virtual-chassis protocol statistics

```
user@switch> show virtual-chassis protocol statistics
```

member0:

IS-IS statistics for 0021.59f7.d000:

PDU type	Received	Processed	Drops	Sent	Rexmit
LSP	8166	8166	0	4551	0
HELLO	1659	1659	0	1693	0
CSNP	2	2	0	3	0
PSNP	1909	1909	0	2293	0
Unknown	0	0	0	0	0
Totals	11736	11736	0	8540	0

Total packets received: 11736 Sent: 8540

LSP queue length: 0 Drops: 0

SPF runs: 9

Fragments rebuilt: 1640

LSP regenerations: 1

Purges initiated: 0

member1:

IS-IS statistics for 0026.888d.6800:

PDU type	Received	Processed	Drops	Sent	Rexmit
LSP	10909	10909	0	12088	0
HELLO	1877	1877	0	2251	0
CSNP	3	3	0	3	0
PSNP	3846	3846	0	3732	0
Unknown	0	0	0	0	0
Totals	16635	16635	0	18074	0

Total packets received: 16635 Sent: 18074

LSP queue length: 0 Drops: 0

SPF runs: 13

Fragments rebuilt: 1871

LSP regenerations: 2

Purges initiated: 0

member8:

IS-IS statistics for 0000.4a75.9b7c:

PDU type	Received	Processed	Drops	Sent	Rexmit
LSP	7935	7935	0	14865	0
HELLO	2695	2695	0	7124	0
CSNP	4	4	0	4	0
PSNP	4398	4398	0	3666	0
Unknown	0	0	0	0	0
Totals	15032	15032	0	25659	0

Total packets received: 15032 Sent: 25659

LSP queue length: 0 Drops: 0

SPF runs: 26

Fragments rebuilt: 2666

LSP regenerations: 4

Purges initiated: 0

member9:

IS-IS statistics for 0000.73e9.9a57:

PDU type	Received	Processed	Drops	Sent	Rexmit
LSP	10800	10800	0	6327	0
HELLO	1492	1492	0	2356	0
CSNP	2	2	0	2	0
PSNP	2683	2683	0	3149	0
Unknown	0	0	0	0	0
Totals	14977	14977	0	11834	0

Total packets received: 14977 Sent: 11834

LSP queue length: 0 Drops: 0

SPF runs: 19

Fragments rebuilt: 1510

LSP regenerations: 6

Purges initiated: 0

show virtual-chassis fast-failover

Syntax

```
show virtual-chassis fast-failover
```

Release Information

Command introduced in Junos OS Release 9.3 for EX Series switches.

Description

Display information about the fast failover feature in a Virtual Chassis configuration.

Required Privilege Level

view

RELATED DOCUMENTATION

- [Example: Configuring Fast Failover on Uplink Module VCPs to Reroute Traffic When an EX4200 Virtual Chassis Switch or Intermember Link Fails | 184](#)
- [Configuring Fast Failover in an EX Series Virtual Chassis | 271](#)
- [Disabling Fast Failover in an EX Series Virtual Chassis | 272](#)

List of Sample Output

[show virtual-chassis fast-failover on page 422](#)

Output Fields

[Table 37 on page 421](#) lists the output fields for the **show virtual-chassis fast-failover** command. Output fields are listed in the approximate order in which they appear.

Table 37: show virtual-chassis fast-failover Output Fields

Field Name	Field Description
Fast failover on dedicated VCP ports	Indicates fast failover status on dedicated VCPs.
Fast failover on XE uplink VCP ports	Indicates fast failover status on XFP uplink VCPs.

Table 37: show virtual-chassis fast-failover Output Fields (*continued*)

Field Name	Field Description
Fast failover on GE uplink VCP ports	Indicates fast failover status on SFP uplink VCPs.

Sample Output

show virtual-chassis fast-failover

user@switch1> **show virtual-chassis fast-failover**

```
Fast failover on dedicated VCP ports: Enabled
Fast failover on XE uplink VCP ports: Disabled
Fast failover on GE uplink VCP ports: Enabled
```


show virtual-chassis login

Syntax

```
show virtual-chassis login
```

Release Information

Command introduced in Junos OS Release 9.3 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Supply the address of the host that logged into the Virtual Chassis or VCF, or identify the location of the member switch that redirected the current session to a different member switch.

You might need this information for tracing or troubleshooting purposes.

Required Privilege Level

view

RELATED DOCUMENTATION

[request session member | 347](#)

[Understanding Global Management of a Virtual Chassis | 46](#)

List of Sample Output

[show virtual-chassis login \(Direct Login to the Master Console Port\) on page 423](#)

[show virtual-chassis login \(Backup Console Session Redirected to the Master Console Port\) on page 423](#)

Sample Output

show virtual-chassis login (Direct Login to the Master Console Port)

```
user@switch> show virtual-chassis login
```

```
Current login session initiated from host 192.0.2.3
```

show virtual-chassis login (Backup Console Session Redirected to the Master Console Port)

```
user@switch> show virtual-chassis login
```

Current login session initiated from host backup

show virtual-chassis mode

Syntax

```
show virtual-chassis mode
<all-members | local | member member-id>
```

Release Information

Command introduced in Junos OS Release 11.1 for EX Series switches.

Command introduced in Junos OS Release 13.2X51-D20 for QFX Series devices.

Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Current mode and **Future mode after reboot** fields introduced in Junos OS Release 13.2X51-D20.

Description

Display the Virtual Chassis or Virtual Chassis Fabric (VCF) mixed mode status.

Options

none—Display the Virtual Chassis or VCF mixed mode status for the device where you enter the command.

all-members—(Optional) Display the Virtual Chassis or VCF mixed mode status for all member devices in the Virtual Chassis or VCF.

local—(Optional) Display the Virtual Chassis or VCF mixed mode status for the device where you enter the command.

member *member-id*—(Optional) Display the Virtual Chassis or VCF mixed mode status for the specified member device.

Required Privilege Level

view

RELATED DOCUMENTATION

[request virtual-chassis mode | 363](#)

[Verifying the Virtual Chassis Fabric Mode Settings](#)

[Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches \(CLI Procedure\) | 228](#)

List of Sample Output

[show virtual-chassis mode \(EX4200\) on page 426](#)

[show virtual-chassis mode \(QFX5100\) on page 427](#)

Output Fields

Table 38 on page 426 lists the output fields for the **show virtual-chassis mode** command.

Table 38: show virtual-chassis mode Output Fields

Field Name	Field Description
Mixed Mode	Specifies the mixed mode status of the member switch. Mixed mode is either Enabled or Disabled .
Current mode	<p>Specifies the current mixed and fabric mode settings running on the member device or devices.</p> <p>A device reboot is required to change the fabric or mixed mode. The Current mode and Future mode after reboot are different when the mode has been changed but the device has not been rebooted.</p> <p>Outputs include:</p> <ul style="list-style-type: none"> • Fabric with mixed devices—Fabric mode and mixed mode are enabled. • Fabric with similar devices—Fabric mode is enabled and mixed mode is disabled. • Virtual Chassis with mixed devices—Fabric mode is disabled and mixed mode is enabled. • Virtual Chassis with similar devices—Fabric mode is disabled and mixed mode is disabled.
Future mode after reboot	<p>Specifies the mixed and fabric mode settings running on the member device or devices.</p> <p>A device reboot is required to change the fabric or mixed mode. The Current mode and Future mode after reboot are different when the mode has been changed but the device has not been rebooted.</p> <p>Outputs include:</p> <ul style="list-style-type: none"> • Fabric with mixed devices—Fabric mode and mixed mode are enabled. • Fabric with similar devices—Fabric mode is enabled and mixed mode is disabled. • Virtual Chassis with mixed devices—Fabric mode is disabled and mixed mode is enabled. • Virtual Chassis with similar devices—Fabric mode is disabled and mixed mode is disabled.

Sample Output

show virtual-chassis mode (EX4200)

user@switch>show virtual-chassis mode

```
fpc0:
```

```
-----
```

```
Mixed Mode: Disabled
```

Sample Output

show virtual-chassis mode (QFX5100)

user@switch>**show virtual-chassis mode**

fpc0:

Current mode : Fabric with similar devices
Future mode after reboot : Fabric with similar devices

fpc1:

Current mode : Fabric with similar devices
Future mode after reboot : Fabric with similar devices

fpc2:

Current mode : Fabric with similar devices
Future mode after reboot : Fabric with similar devices

fpc3:

Current mode : Fabric with similar devices
Future mode after reboot : Fabric with similar devices

fpc4:

Current mode : Fabric with similar devices
Future mode after reboot : Fabric with similar devices

show virtual-chassis

Syntax

```
show virtual-chassis <status>
```

Release Information

Command introduced in Junos OS Release 9.2 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Fabric ID, **Fabric Mode**, and **Route Mode** output fields introduced in Junos OS Release 13.2X51-D20.

Alias-Name output field introduced in Junos OS Release 14.1X53-D10.

Description

Display information about all members of the Virtual Chassis or VCF.

Options

none—Display information about all Virtual Chassis or VCF member devices.

status—Same output as for **show virtual-chassis** without any options.

Required Privilege Level

view

RELATED DOCUMENTATION

[show virtual-chassis active-topology | 386](#)

[show virtual-chassis protocol adjacency | 401](#)

[show virtual-chassis vc-path | 437](#)

[Understanding Mixed EX Series and QFX Series Virtual Chassis | 35](#)

[Understanding Mixed Virtual Chassis Fabric](#)

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

List of Sample Output

[show virtual-chassis \(EX2300 multigigabit model—EX2300-24MP and EX2300-48MP—Virtual Chassis\) on page 431](#)

[show virtual-chassis \(EX2300 and EX2300 multigigabit model \(EX2300-24MP, EX2300-48MP\) Virtual Chassis\) on page 432](#)

[show virtual-chassis \(EX4200 Virtual Chassis\) on page 432](#)

[show virtual-chassis \(Mixed EX4300 multigigabit model—EX4300-48MP—Virtual Chassis\) on page 433](#)

[show virtual-chassis \(EX8200 Virtual Chassis\) on page 433](#)

[show virtual-chassis \(QFX5110 Virtual Chassis\) on page 434](#)

[show virtual-chassis \(QFX5200 Virtual Chassis\) on page 435](#)

[show virtual-chassis \(QFX5100 Virtual Chassis Fabric\) on page 435](#)

Output Fields

Table 39 on page 429 lists the output fields for the **show virtual-chassis** command. Output fields are listed in the approximate order in which they appear.

Table 39: show virtual-chassis Output Fields

Field Name	Field Description
Fabric ID	(VCF only) Assigned ID used to identify the VCF.
Fabric Mode	(VCF only) Mode of the VCF: Enabled, Disabled, or Mixed.
Preprovisioned Virtual Chassis or Preprovisioned Virtual Chassis Fabric	Virtual Chassis or VCF is configured using preprovisioning.
Virtual Chassis ID	Assigned ID that applies to the entire Virtual Chassis or VCF.
Virtual Chassis Mode	<p>Mode of the Virtual Chassis or VCF. This field indicates support for the Virtual Chassis feature and, if a Virtual Chassis is configured, if it is a mixed or homogenous Virtual Chassis. Values can be:</p> <ul style="list-style-type: none"> • Enabled—The platform supports the Virtual Chassis feature. If a Virtual Chassis is currently configured, this is a homogenous Virtual Chassis (all members are the same type of switch). • Disabled—The switch does not support the Virtual Chassis feature. <p>NOTE: Switches that support the Virtual Chassis feature do not display this value. Even if a Virtual Chassis is not currently configured, those switches display Enabled in this field.</p> <ul style="list-style-type: none"> • Mixed—The platform supports the Virtual Chassis feature, and is configured as a mixed mode Virtual Chassis (members consist of more than one type of switch).

Table 39: show virtual-chassis Output Fields (*continued*)

Field Name	Field Description
Member ID	<p>Assigned member ID and FPC:</p> <ul style="list-style-type: none"> On all EX Series Virtual Chassis except EX8200 Virtual Chassis, and on a VCF, the FPC number refers to the member ID assigned to the switch. On EX8200 Virtual Chassis, member IDs are numbered 0 through 9. The FPC number indicates the slot number of the line card within the Virtual Chassis. The FPC number on member 0 is always 0 through 15. The FPC number on member 1 is always 16 through 31. The FPC number on member 2 is always 32 through 47; and so on for the members.
Status	<p>For a nonprovisioned configuration:</p> <ul style="list-style-type: none"> Prsnt for a member that is currently connected to the Virtual Chassis or VCF configuration. NotPrsnt for a member ID that has been assigned but is not currently connected. <p>For a preprovisioned configuration:</p> <ul style="list-style-type: none"> Prsnt for a member that is specified in the preprovisioned configuration file and is currently connected to the Virtual Chassis or VCF. Unprvsnd for a member that is interconnected with the Virtual Chassis or VCF configuration but is not specified in the preprovisioned configuration file.
Serial No	Serial number of the member device.
Alias-Name	<p>The user-configured alias of the member device.</p> <p>The Alias-Name field appears only if an alias has been configured for at least one device in the Virtual Chassis or VCF. Aliases are configured using the alias-name statement in the [edit virtual-chassis aliases serial-number serial-number] hierarchy.</p>
Model	Model number of the member device.
Mastership Priority or Mstr prio	Mastership priority value of the member device.
Role	<p>Role of the member device: master, backup, or linecard.</p> <p>An asterisk (*) following the Role denotes the member device on which the show virtual-chassis <status> command was issued.</p>

Table 39: show virtual-chassis Output Fields (*continued*)

Field Name	Field Description
Mixed Mode	<p>Mixed mode configuration status:</p> <ul style="list-style-type: none"> • Y for a member device configured in mixed mode. • N for a member device not configured in mixed mode. • NA for a member device that cannot be configured in mixed mode.
Route Mode	<p>The route mode of the member device:</p> <ul style="list-style-type: none"> • F for fabric (VCF) mode • VC for Virtual Chassis mode
Location	<p>Location of the member device.</p> <p>If this field is empty, the location field was not set for the device.</p>
Neighbor List ID and Interface	Member ID of the neighbor member to which this member's Virtual Chassis port (VCP) is connected, and the VCP interface name.

Sample Output

show virtual-chassis (EX2300 multigigabit model—EX2300-24MP and EX2300-48MP—Virtual Chassis)

user@switch> show virtual-chassis

```

Virtual Chassis ID: cdef.789a.bc12
Virtual Chassis Mode: Enabled

Member ID  Status  Serial No  Model          Mstr    Mixed Route  Neighbor List
prio Role   Mode  Mode  ID  Interface
0 (FPC 0)  Prsnt   ...       ex2300-24mp   128    Backup      N    VC    3  vcp-255/1/0
                                     1  vcp-255/1/2
1 (FPC 1)  Prsnt   ...       ex2300-48mp   128    Master*     N    VC    2  vcp-255/1/4
                                     0  vcp-255/1/1
2 (FPC 2)  Prsnt   ...       ex2300-24mp   128    Linecard   N    VC    3  vcp-255/1/0
                                     1  vcp-255/1/1
3 (FPC 3)  Prsnt   ...       ex2300-48mp   128    Linecard   N    VC    0  vcp-255/1/4
                                     2  vcp-255/1/5

```

show virtual-chassis (EX2300 and EX2300 multigigabit model (EX2300-24MP, EX2300-48MP) Virtual Chassis)

user@switch> show virtual-chassis status

```

Preprovisioned Virtual Chassis
Virtual Chassis ID: 9876.5432.abcd
Virtual Chassis Mode: Enabled

List
Member ID  Status  Serial No  Model          Mstr      Role      Mode Mode  ID  Interface
0 (FPC 0)  Prsnt   ...       ex2300-24mp    129      Backup    N  VC    1  vcp-255/1/3
                                     3  vcp-255/1/0
1 (FPC 1)  Prsnt   ...       ex2300-24p     129      Master*   N  VC    2  vcp-255/1/0
                                     0  vcp-255/1/1
2 (FPC 2)  Prsnt   ...       ex2300-24p     0        Linecard  N  VC    3  vcp-255/1/2
                                     1  vcp-255/1/3
3 (FPC 3)  Prsnt   ...       ex2300-48mp    0        Linecard  N  VC    2  vcp-255/1/5
                                     0  vcp-255/1/0

```

show virtual-chassis (EX4200 Virtual Chassis)

user@switch> show virtual-chassis

```

Virtual Chassis ID: 00ab.cdef.1234
Virtual Chassis Mode: Enabled

Mastership      Mixed  Neighbor List
Member ID  Status  Serial No  Model          priority  Role  Mode  ID  Interface
0 (FPC 0)  Prsnt   ...       ex4200-24t     249      Master*  N    8  vcp-0
                                     1  vcp-1
1 (FPC 1)  Prsnt   ...       ex4200-24t     248      Backup   N    0  vcp-0
                                     2  vcp-1
2 (FPC 2)  Prsnt   ...       ex4200-48p     247      Linecard N    1  vcp-0
                                     3  vcp-1
3 (FPC 3)  Prsnt   ...       ex4200-24t     246      Linecard N    2  vcp-0
                                     4  vcp-1
4 (FPC 4)  Prsnt   ...       ex4200-48p     245      Linecard N    3  vcp-0
                                     5  vcp-1
5 (FPC 5)  Prsnt   ...       ex4200-48t     244      Linecard N    4  vcp-0

```

```

6 (FPC 6)  Prsnt  ...      ex4200-48t  243  Linecard  N  5  vcp-0
6 (FPC 6)  Prsnt  ...      ex4200-48t  243  Linecard  N  7  vcp-1
7 (FPC 7)  Prsnt  ...      ex4200-24f  242  Linecard  N  6  vcp-0
7 (FPC 7)  Prsnt  ...      ex4200-24f  242  Linecard  N  8  vcp-1
8 (FPC 8)  Prsnt  ...      ex4200-24f  241  Linecard  N  7  vcp-0
8 (FPC 8)  Prsnt  ...      ex4200-24f  241  Linecard  N  0  vcp-1

Member ID for next new member: 9 (FPC 9)

```

show virtual-chassis (Mixed EX4300 multigigabit model—EX4300-48MP—Virtual Chassis)

```
user@switch> show virtual-chassis
```

```

Preprovisioned Virtual Chassis
Virtual Chassis ID: abcd.ef00.1234
Virtual Chassis Mode: Mixed

Member ID  Status  Serial No  Model          Mstr    Mixed Route Neighbor List
prio  Role  Mode  Mode  ID Interface
0 (FPC 0)  Prsnt   ...      ex4300-48mp  129  Master*  Y  VC  1  vcp-255/1/0
1 (FPC 1)  Prsnt   ...      ex4300-48mp  129  Backup   Y  VC  3  vcp-255/1/3
2 (FPC 2)  Prsnt   ...      ex4300-48mp   0  Linecard Y  VC  0  vcp-255/1/1
3 (FPC 3)  Prsnt   ...      ex4300-48t   0  Linecard Y  VC  2  vcp-255/1/3
          1  vcp-255/1/3
          3  vcp-255/1/1
          2  vcp-255/1/2

```

show virtual-chassis (EX8200 Virtual Chassis)

```
user@external-routing-engine> show virtual-chassis
```

```

Virtual Chassis ID: cdc1.1212.efef
Virtual Chassis Mode: Enabled

Member ID  Status  Serial No  Model  Mastership  Neighbor List
prio  Role  ID Interface
0 (FPC 0-15)  Prsnt   ...      ex8216   0  Linecard  8  vcp-0/0
          8  vcp-0/1

```

```

1 (FPC 16-31) Prsnt ... ex8208 0 Linecard 1 vcp-4/0/4
8 (FPC 128-143) Prsnt ... ex-xre 128 Master 8 vcp-0/0
0 vcp-3/0/4
9 vcp-1/0
1 vcp-1/2
9 vcp-1/3
0 vcp-2/0
9 vcp-2/1
0 vcp-1/1
9 (FPC 144-159) Prsnt ... ex-xre 128 Backup* 8 vcp-1/0
8 vcp-1/2
8 vcp-1/3
8 vcp-1/3

```

show virtual-chassis (QFX5110 Virtual Chassis)

user@switch> show virtual-chassis

```

Preprovisioned Virtual Chassis
Virtual Chassis ID: abab.1212.cdcd
Virtual Chassis Mode: Enabled

Mstr      Mixed Route Neighbor List
MemberID  Status Serial No  Model      prio  Role   Mode  Mode  ID Interface

0 (FPC 0) Prsnt ... qfx5110-32q 129 Backup Y VC 9 vcp-255/0/12
1 (FPC 1) Prsn ... qfx5110-32q 129 Master* Y VC 1 vcp-255/0/16
2 (FPC 2) Prsnt ... qfx5110-32q 0 Linecard Y VC 2 vcp-255/0/16
3 (FPC 3) Prsnt ... qfx5110-32q 0 Linecard Y VC 0 vcp-255/0/17
4 (FPC 4) Prsnt ... qfx5110-32q 0 Linecard Y VC 3 vcp-255/0/11
5 (FPC 5) Prsnt ... qfx5100e-24q-2p 0 Linecard Y VC 1 vcp-255/0/14
2 vcp-255/0/31
3 vcp-255/0/5
4 vcp-255/0/10
6 vcp-255/0/12
4 vcp-255/0/20

```

```

6 (FPC 6) Prsnt ...      qfx5110-48s-4c  0  Linecard  Y  VC      7 vcp-255/0/10
                                     5 vcp-255/0/49
7 (FPC 7) Prsnt ...      qfx5100e-48s-6q  0  Linecard  Y  VC      6 vcp-255/0/18
                                     8 vcp-255/0/31
8 (FPC 8) Prsnt ...      qfx5110-48s-4c  0  Linecard  Y  VC      7 vcp-255/0/21
                                     9 vcp-255/0/49
9 (FPC 9) Prsnt ...      qfx5110-32q      0  Linecard  Y  VC      8 vcp-255/0/13
                                     0 vcp-255/0/17

```

show virtual-chassis (QFX5200 Virtual Chassis)

user@switch> show virtual-chassis

```

Virtual Chassis ID: abab.1212.cdcd
Virtual Chassis Mode: Enabled

```

		Serial		Mstr		Mixed Route Neighbor List			
Member ID	Status	No	Model	prio	Role	Mode	Mode	ID	Interface
0 (FPC 0)	Prsnt	...	qfx5200-32c-r	128	Master*	N	VC	1	vcp-255/0/19
								2	vcp-255/0/26
1 (FPC 1)	Prsnt	...	qfx5200-32c-r	128	Linecard	N	VC	0	vcp-255/0/20
								2	vcp-255/0/16
2 (FPC 2)	Prsnt	...	qfx5200-32c-32q	128	Backup	N	VC	0	vcp-255/0/15
								1	vcp-255/0/18

show virtual-chassis (QFX5100 Virtual Chassis Fabric)

user@switch> show virtual-chassis

```

Preprovisioned Virtual Chassis Fabric
Fabric ID: 0123.abcd.4567
Fabric Mode: Enabled

```

		Serial		Mstr		Mixed Route Neighbor List			
Member ID	Status	No	Model	prio	Role	Mode	Mode	ID	Interface
0 (FPC 0)	Prsnt	...	qfx5100-48s	129	Master*	N	F	3	vcp-255/1/0

show virtual-chassis vc-path

Syntax

```
show virtual-chassis vc-path source-interface interface-name destination-interface interface-name
```

Release Information

Command introduced in Junos OS Release 9.6 for EX Series switches.
Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Description

Show the forwarding path a packet takes when going from a source interface to a destination interface in a Virtual Chassis or VCF configuration.

Starting in Junos OS Releases 14.1X53-D40, 15.1R5, and 16.1R3, when used in VCF configurations, this command displays additional information about next hops, including when the forwarding path has multiple possible next hops within the VCF.

Options

- source-interface *interface-name***—Name of the interface from which the packet originates in the Virtual Chassis or VCF
- destination-interface *interface-name***—Name of the interface to which the packet is being delivered in the Virtual Chassis or VCF

Required Privilege Level

view

RELATED DOCUMENTATION

Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis 334
Understanding EX Series Virtual Chassis 9
Understanding QFX Series Virtual Chassis
EX8200 Virtual Chassis Overview

List of Sample Output

- [show virtual-chassis vc-path source-interface destination-interface \(Virtual Chassis\) on page 439](#)
- [show virtual-chassis vc-path source-interface destination-interface \(Virtual Chassis Fabric\) on page 439](#)

Output Fields

[Table 40 on page 438](#) lists the output fields for the **show virtual-chassis vc-path** command. Output fields are listed in the approximate order in which they appear.

Some output field names and display order differ between the output for a Virtual Chassis and for a VCF. When this command is used to display forwarding paths in a VCF, additional fields are included in the output to show details of multiple possible next hops. The differences are described in [Table 40 on page 438](#) and shown in sample output for each mode.

Table 40: show virtual-chassis vc-path Output Fields

Field Name	Field Description
Hop	<p>The hop number along the path between the source and destination interfaces. The first hop entry (Hop 0) is the packet's source, intermediate hop information represents transitions through the members within the Virtual Chassis or VCF, and the last hop entry represents arrival at the packet's destination.</p> <p>For VCF output, each Hop entry also shows information about multiple possible next hops towards the destination. See Next-hop PFE, Interface, and Bandwidth output field descriptions for details.</p>
Member (Virtual Chassis) Member-ID (VCF)	<p>The Virtual Chassis or VCF member ID of the switch that contains the Packet Forwarding Engine for each hop through which the packet passes.</p>
PFE-Device (Virtual Chassis) PFE (VCF)	<p>The number of the Packet Forwarding Engine in each Virtual Chassis or VCF member through which a packet passes.</p> <p>For Virtual Chassis output, the Packet Forwarding Engine in each row is the next hop of the preceding Packet Forwarding Engine, including intermediate transitions through members within the Virtual Chassis.</p> <p>VCF output is expanded on multiple rows to show more information about multiple possible next hops—each hop entry is followed by one or more Next-hop PFE output fields with interface name and bandwidth information for each possible next hop.</p>
Next-hop PFE (VCF only)	<p>One or more possible next-hop Packet Forwarding Engine numbers for VCF member Member-ID. Each Next-hop entry includes the next-hops's interface name and bandwidth.</p>
Interface	<p>The name of the interface through which the Packet Forwarding Engines are connected. The interface for the first hop (Hop 0) is always the source interface.</p> <p>VCF output provides more information about multiple possible next hops for each hop entry, listing the Interface and the interface Bandwidth for each possible Next-hop PFE.</p>

Table 40: show virtual-chassis vc-path Output Fields (*continued*)

Field Name	Field Description
Bandwidth (VCF only)	The bandwidth (in Gbps) of the next-hop interface for the associated Next-hop PFE entry.

Sample Output

show virtual-chassis vc-path source-interface destination-interface (Virtual Chassis)

user@switch> **show virtual-chassis vc-path source-interface ge-0/0/0 destination-interface ge-1/0/1**

```
vc-path from ge-0/0/0 to ge-1/0/1
Hop      Member    PFE-Device    Interface
0        0         1             ge-0/0/0
1        0         0             internal-1/24
2        1         3             vcp-0
3        1         4             ge-1/0/1
```

show virtual-chassis vc-path source-interface destination-interface (Virtual Chassis Fabric)

This example shows **vc-path** command output for two source-to-destination paths in the following Virtual Chassis Fabric displayed by the **show virtual-chassis** command:

user@switch> **show virtual-chassis**

```
Preprovisioned Virtual Chassis Fabric
Fabric ID: ec56.0915.8595
Fabric Mode: Enabled

List
Member ID Status Serial No    Model          prio  Role    Mode Mode ID  Interface
1 (FPC 1) Prsnt  ...      qfx5100-24q-aa 129  Backup  N  F    7  vcp-255/0/7
                                     8  vcp-255/0/8
                                     12
vcp-255/0/12
                                     3  vcp-255/0/3
```



```

      2 vcp-255/0/2
8 (FPC 8) Prsnt ... qfx5100-24q-aa 0 Linecard N F 1 vcp-255/0/1
      2 vcp-255/0/2
9 (FPC 9) Prsnt ... qfx5100-24q-aa 0 Linecard N F 1 vcp-255/0/1
      2 vcp-255/0/2
10 (FPC 10)Prsnt ... qfx5100-24q-aa 0 Linecard N F 1 vcp-255/0/1
      2 vcp-255/0/2
11 (FPC 11)Prsnt ... qfx5100-24q-aa 0 Linecard N F 1 vcp-255/0/1
      2 vcp-255/0/2
12 (FPC 12)Prsnt ... qfx5100-24q-aa 0 Linecard N F 1 vcp-255/0/1
      2 vcp-255/0/2

```

user@switch> **show virtual-chassis vc-path source-interface xe-12/0/25 destination-interface xe-5/0/25**

```

Fabric forwarding path from xe-12/0/25 (PFE 12) to xe-5/0/25 (PFE 5)
Hop 0 Member-ID 12 PFE 12
  Next-hop PFE 1
    Interface vcp-255/0/1.32768 Bandwidth 40
  Next-hop PFE 2
    Interface vcp-255/0/2.32768 Bandwidth 40
Hop 1 Member-ID 1 PFE 1
  Next-hop PFE 5
    Interface vcp-255/0/5.32768 Bandwidth 40
Hop 1 Member-ID 2 PFE 2
  Next-hop PFE 5
    Interface vcp-255/0/5.32768 Bandwidth 40
Hop 2 Member-ID 5 PFE 5

```

user@switch> **show virtual-chassis vc-path source-interface xe-12/0/25 destination-interface xe-1/0/25**

```

Fabric forwarding path from xe-12/0/25 (PFE 12) to xe-1/0/25 (PFE 1)
Hop 0 Member-ID 12 PFE 12
  Next-hop PFE 1

```

Interface vcp-255/0/1.32768					Bandwidth	40
Hop	1	Member-ID	1	PFE	1	

show virtual-chassis vc-port

Syntax

```
show virtual-chassis vc-port
<all-members | local | member member-id>
```

Release Information

Command introduced in Junos OS Release 9.0 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Display the status of the Virtual Chassis ports (VCPs), including dedicated VCPs, default-configured VCPs, and uplink ports configured as VCPs, if present.

Options

none—Display the operational status of all VCPs of the member switch where you enter the command.

all-members—(Optional) Display the operational status of all VCPs on all members of the Virtual Chassis or VCF.

local—(Optional) Display the operational status of the switch or external Routing Engine where you enter this command.

member *member-id*—(Optional) Display the operational status of all VCPs for the specified member of the Virtual Chassis or VCF.

Required Privilege Level

view

RELATED DOCUMENTATION

[show virtual-chassis vc-port statistics | 449](#)

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

List of Sample Output

[show virtual-chassis vc-port \(EX4200 Virtual Chassis\) on page 445](#)

[show virtual-chassis vc-port \(EX8200 Virtual Chassis\) on page 446](#)

[show virtual-chassis vc-port all-members on page 447](#)

[show virtual-chassis vc-port \(QFX5120-32C Virtual Chassis\) on page 448](#)

Output Fields

Table 41 on page 444 lists the output fields for the **show virtual-chassis vc-port** command. Output fields are listed in the approximate order in which they appear.

Table 41: show virtual-chassis vc-port Output Fields

Field Name	Field Description
member name	Device or member number in the Virtual Chassis, represented as fpcnumber , membernumber , or local-re (the master member).
Interface or PIC/Port	<p>VCP name.</p> <ul style="list-style-type: none"> The dedicated VCPs in an EX4200 or EX4500 Virtual Chassis are vcp-0 and vcp-1. The dedicated VCPs in an EX4550 Virtual Chassis are VCP-1/0, VCP-1/1, VCP-2/0, and VCP-2/1. Optical ports set as VCPs are named 1/0 and 1/1, representing the PIC number and the port number. The native VCP (port 0) on an XRE200 External Routing Engine in an EX8200 Virtual Chassis is named vcp-0. The VCPs on each Virtual Chassis Control Interface (VCCI) module in an XRE200 External Routing Engine are named using the vcp-slot-number/port-number convention; for instance, vcp-1/0. The VCPs on EX8200 member switches are named using the vcp-slot-number/pic-number/interface-number convention; for instance, vcp-3/0/2. A 255 as the first number in your port number indicates that your VCP is part of a Link Aggregation group (LAG) bundle. For example, vcp-255/1/0 indicates that the dedicated VCP named vcp-1/0 is part of a LAG bundle, and vcp-255/1/0 represents an uplink port previously named xe-0/1/0 that is now part of a VCP LAG bundle.
Type	<p>Type of VCP:</p> <ul style="list-style-type: none"> Dedicated—Rear panel dedicated VCP on an EX4200 or EX4300 multigigabit model switch, a Virtual Chassis module port on EX4500 or EX4550 switch, or any VCP link connected to an XRE200 External Routing Engine in an EX8200 Virtual Chassis. Configured—Optical port configured as a VCP, which includes default-configured VCPs (set in the default factory configuration) or those that are set by a user. Auto-Configured—Optical port automatically converted into a VCP. <p>See “Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port” on page 260 or <i>Configuring an EX4650 or a QFX Series Virtual Chassis</i> for information about configuring VCPs, and “Automatic Virtual Chassis Port (VCP) Conversion” on page 27 for details on how a port is automatically converted into a VCP.</p>

Table 41: show virtual-chassis vc-port Output Fields (*continued*)

Field Name	Field Description
Trunk ID	<p>A positive-number ID assigned to a link aggregation group (LAG) formed by the Virtual Chassis. The trunk ID value is -1 if no trunk is formed. A LAG between uplink VCPs requires that the link speed be the same on connected interfaces and that at least two VCPs on one member be connected to at least two VCPs on the other member in an EX4200 or EX4500 Virtual Chassis.</p> <p>Dedicated VCP LAGs are assigned trunk IDs 1 and 2. Trunk IDs for LAGs formed with uplink VCPs therefore have values of 3 or greater.</p> <p>The trunk ID value changes if the link-adjacency state between LAG members changes; trunk membership is then allocated or deallocated.</p>
Status	<p>Interface status:</p> <ul style="list-style-type: none"> • absent—Interface is not a VCP link. • down—VCP link is down. • up—VCP link is up.
Speed (mbps)	Speed of the interface in megabits per second.
Neighbor ID/Interface	The Virtual Chassis member ID and interface of a VCP on a member that is connected to the interface or PIC/Port field in the same row as this interface.

Sample Output

show virtual-chassis vc-port (EX4200 Virtual Chassis)

user@switch> show virtual-chassis vc-port

```
fpc0:
-----
```

Interface or PIC / Port	Type	Trunk ID	Status	Speed (mbps)	Neighbor ID	Interface
vcp-0	Dedicated	1	Up	32000	1	vcp-1
vcp-1	Dedicated	2	Up	32000	0	vcp-0
1/0	Auto-Configured	3	Up	1000	2	vcp-255/1/0
1/0	Auto-Configured	3	Up	1000	2	vcp-255/1/1

show virtual-chassis vc-port (EX8200 Virtual Chassis)

```
user@external-routing-engine> show virtual-chassis vc-port
```

```
member0:
```

Interface or Slot/PIC/Port	Type	Trunk ID	Status	Speed (mbps)	Neighbor ID Interface	
vcp-0/0	Dedicated	-1	Up	1000	8	vcp-1/1
vcp-0/1	Dedicated	-1	Up	1000	8	vcp-2/0
4/0/4	Configured	-1	Up	10000	1	vcp-3/0/4
4/0/7	Configured	-1	Down	10000		
4/0/3	Configured		Absent			
4/0/2	Configured		Absent			
4/0/5	Configured		Absent			
4/0/6	Configured		Absent			
4/0/1	Configured		Absent			
4/0/0	Configured		Absent			

```
member1:
```

Interface or Slot/PIC/Port	Type	Trunk ID	Status	Speed (mbps)	Neighbor ID Interface	
vcp-0/0	Dedicated	-1	Up	1000	8	vcp-1/2
3/0/0	Configured	-1	Down	10000		
3/0/1	Configured	-1	Down	10000		
3/0/4	Configured	-1	Up	10000	0	vcp-4/0/4
3/0/5	Configured		Absent			
4/0/5	Configured		Absent			
4/0/4	Configured		Absent			

```
member8:
```

Interface or Slot/PIC/Port	Type	Trunk ID	Status	Speed (mbps)	Neighbor ID Interface	
vcp-0/0	Dedicated	-1	Down	1000		
vcp-1/0	Dedicated	-1	Up	1000	9	vcp-1/0
vcp-1/1	Dedicated	-1	Up	1000	0	vcp-0/0
vcp-1/2	Dedicated	-1	Up	1000	1	vcp-0/0
vcp-1/3	Dedicated	-1	Up	1000	9	vcp-1/3
vcp-2/0	Dedicated	-1	Up	1000	0	vcp-0/1
vcp-2/1	Dedicated	-1	Up	1000	9	vcp-1/2


```

vcp-2/2      Dedicated      -1    Down    1000
vcp-2/3      Dedicated      -1    Down    1000

member9:
-----
Interface    Type            Trunk  Status   Speed      Neighbor
or           or              ID      (mbps)   ID  Interface
Slot/PIC/Port
vcp-0/0      Dedicated       -1     Disabled 1000
vcp-1/0      Dedicated       -1     Up        1000      8    vcp-1/0
vcp-1/1      Dedicated       -1     Down      1000
vcp-1/2      Dedicated       -1     Up        1000      8    vcp-2/1
vcp-1/3      Dedicated       -1     Up        1000      8    vcp-1/3

```

show virtual-chassis vc-port all-members

user@switch> show virtual-chassis vc-port all-members

```

fpc0:
-----
Interface    Type            Trunk  Status   Speed      Neighbor
or           or              ID      (mbps)   ID  Interface
PIC / Port
vcp-0        Dedicated       1      Up        32000      1    vcp-1
vcp-1        Dedicated       2      Up        32000      0    vcp-0
1/0          Auto-Configured 3      Up        1000       2    vcp-255/1/0
1/1          Auto-Configured 3      Up        1000       2    vcp-255/1/1

fpc1:
-----
Interface    Type            Trunk  Status   Speed      Neighbor
or           or              ID      (mbps)   ID  Interface
PIC / Port
vcp-0        Dedicated       1      Up        32000      0    vcp-1
vcp-1        Dedicated       2      Up        32000      0    vcp-0
1/0          Auto-Configured -1     Up        1000       3    vcp-255/1/0

fpc2:
-----
Interface    Type            Trunk  Status   Speed      Neighbor
or           or              ID      (mbps)   ID  Interface
PIC / Port

```

```

vcp-0      Dedicated      1    Up    32000    3    vcp-1
vcp-1      Dedicated      2    Up    32000    3    vcp-0
1/0        Auto-Configured 3    Up    1000     0    vcp-255/1/0
1/1        Auto-Configured 3    Up    1000     0    vcp-255/1/1

```

```
fpc3:
```

```

-----
Interface  Type                Trunk  Status  Speed  Neighbor
or         or                ID      (mbps)  ID      Interface
PIC / Port
vcp-0      Dedicated          1      Up      32000   2      vcp-0
vcp-1      Dedicated          2      Up      32000   2      vcp-1
1/0        Auto-Configured    -1     Up      1000    1      vcp-255/1/0

```

show virtual-chassis vc-port (QFX5120-32C Virtual Chassis)

```
user@switch> show virtual-chassis vc-port
```

```
localre:
```

```
-
```

```

Interface  Type                Trunk  Status  Speed  Neighbor
or         or                ID      (mbps)  ID      Interface
PIC / Port
0/13       Auto-Configured      6      Up      100000  1      vcp-255/0/13
0/23       Auto-Configured      6      Up      100000  1      vcp-255/0/23
0/26       Auto-Configured      5      Up      40000   1      vcp-255/0/26
0/27       Configured           5      Up      40000   1      vcp-255/0/27
0/6        Configured           5      Up      40000   1      vcp-255/0/6
0/8        Auto-Configured      5      Up      40000   1      vcp-255/0/8
0/9        Auto-Configured      6      Up      100000  1      vcp-255/0/9

```

```
fpc1:
```

```
-
```

```

Interface  Type                Trunk  Status  Speed  Neighbor
or         or                ID      (mbps)  ID      Interface
PIC / Port
0/13       Auto-Configured      6      Up      100000  0      vcp-255/0/13
0/23       Auto-Configured      6      Up      100000  0      vcp-255/0/23
0/26       Auto-Configured      5      Up      40000   0      vcp-255/0/26
0/27       Configured           5      Up      40000   0      vcp-255/0/27
0/6        Configured           5      Up      40000   0      vcp-255/0/6
0/8        Auto-Configured      5      Up      40000   0      vcp-255/0/8
0/9        Auto-Configured      6      Up      100000  0      vcp-255/0/9

```

show virtual-chassis vc-port statistics

Syntax

```
show virtual-chassis vc-port statistics
<all-members | local | member member-id>
<brief | detail | extensive >
<interface-name>
```

Release Information

Command introduced in Junos OS Release 9.0 for EX Series switches.

The options **all-members**, **brief**, **detail**, **extensive**, and **local** were added in Junos OS Release 9.3 for EX Series switches.

Command introduced in Junos OS Release 13.2X50-D15 for the QFX Series.

Command introduced in Junos OS Release 13.2X51-D20 for Virtual Chassis Fabric (VCF).

Description

Display the traffic statistics collected on Virtual Chassis ports (VCPs).

Options

none—Display traffic statistics for VCPs of all members of a Virtual Chassis or VCF.

brief | detail | extensive—(Optional) Display the specified level of output. Using the **brief** option is equivalent to entering the command with no options (the default). The **detail** and **extensive** options provide identical displays.

all-members—(Optional) Display traffic statistics for VCPs of all members of a Virtual Chassis or VCF

interface-name—(Optional) Display traffic statistics for the specified VCP.

local—(Optional) Display traffic statistics for VCPs on the switch or external Routing Engine where you enter this command.

member *member-id*—(Optional) Display traffic statistics for VCPs on the specified member of a Virtual Chassis or VCF.

Required Privilege Level

view

RELATED DOCUMENTATION

[clear virtual-chassis vc-port statistics](#) | 343

[show virtual-chassis vc-port](#) | 443

List of Sample Output[show virtual-chassis vc-port statistics on page 453](#)[show virtual-chassis vc-port statistics \(EX8200 Virtual Chassis\) on page 454](#)[show virtual-chassis vc-port statistics brief on page 454](#)[show virtual-chassis vc-port statistics extensive on page 455](#)[show virtual-chassis vc-port statistics member 0 on page 457](#)**Output Fields**

[Table 42 on page 450](#) lists the output fields for the **show virtual-chassis vc-port statistics** command. Output fields are listed in the approximate order in which they appear.

Table 42: show virtual-chassis vc-port statistics Output Fields

Field Name	Field Description	Level of Output
fpcnumber	(All Virtual Chassis except EX8200 Virtual Chassis. VCF) ID of the Virtual Chassis member. The FPC number is the same as the member ID.	All levels
member number	(EX8200 Virtual Chassis only) Member ID of the Virtual Chassis member.	All levels
Interface	VCP name.	brief
Input Octets/Packets	Number of octets and packets received on the VCP.	brief, member , none
Output Octets/Packets	Number of octets and packets transmitted on the VCP.	brief, member , none
master: number	Member ID of the master Routing Engine.	All levels
Port	VCP for which RX (Receive) statistics, TX (Transmit) statistics, or both are reported by the VCP subsystem during a sampling interval—since the statistics counter was last cleared.	detail, extensive
Total octets	Total number of octets received and transmitted on the VCP.	detail, extensive
Total packets	Total number of packets received and transmitted on the VCP.	detail, extensive

Table 42: show virtual-chassis vc-port statistics Output Fields (*continued*)

Field Name	Field Description	Level of Output
Unicast packets	Number of unicast packets received and transmitted on the VCP.	detail, extensive
Broadcast packets	Number of broadcast packets received and transmitted on the VCP.	detail, extensive
Multicast packets	Number of multicast packets received and transmitted on the VCP.	detail, extensive
MAC control frames	Number of media access control (MAC) control frames received and transmitted on the VCP.	detail, extensive
CRC alignment errors	<p>Number of packets received on the VCP that had a length—excluding framing bits, but including frame check sequence (FCS) octets—of between 64 and 1518 octets, inclusive, and had one of the following errors:</p> <ul style="list-style-type: none"> • Invalid FCS with an integral number of octets (FCS error) • Invalid FCS with a nonintegral number of octets (alignment error) 	detail, extensive
Oversize packets	Number of packets received on the VCP that were longer than 1518 octets (excluding framing bits, but including FCS octets) but were otherwise well formed.	detail, extensive
Undersize packets	Number of packets received on the VCP that were shorter than 64 octets (excluding framing bits but including FCS octets) and were otherwise well formed..	detail, extensive

Table 42: show virtual-chassis vc-port statistics Output Fields (*continued*)

Field Name	Field Description	Level of Output
Jabber packets	<p>Number of packets received on the VCP that were longer than 1518 octets—excluding framing bits, but including FCS octets—and that had either an FCS error or an alignment error.</p> <p>NOTE: This definition of <i>jabber</i> is different from the definition in IEEE-802.3 section 8.2.1.5 (10Base5) and section 10.3.1.4 (10Base2). These documents define <i>jabber</i> as the condition in which any packet exceeds 20 ms. The allowed range to detect jabber is between 20 ms and 150 ms.</p>	detail, extensive
Fragments received	<p>Number of packets received on the VCP that were shorter than 64 octets (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error.</p> <p>Fragment frames normally increment because both runts (which are normal occurrences caused by collisions) and noise hits are counted.</p>	detail, extensive
Ifout errors	Number of outbound packets received on the VCP that could not be transmitted because of errors.	detail, extensive
Packet drop events	Number of outbound packets received on the VCP that were dropped, rather than being encapsulated and sent out of the switch as fragments. The packet drop counter is incremented if a temporary shortage of packet memory causes packet fragmentation to fail.	detail, extensive
64 octets frames	Number of packets received on the VCP (including invalid packets) that were 64 octets in length (excluding framing bits, but including FCS octets).	detail, extensive
65–127 octets frames	Number of packets received on the VCP (including invalid packets) that were between 65 and 127 octets in length, inclusive (excluding framing bits, but including FCS octets).	detail, extensive

Table 42: show virtual-chassis vc-port statistics Output Fields (*continued*)

Field Name	Field Description	Level of Output
128–255 octets frames	Number of packets received on the VCP (including invalid packets) that were between 128 and 255 octets in length, inclusive (excluding framing bits, but including FCS octets).	detail, extensive
256–511 octets frames	Number of packets received on the VCP (including invalid packets) that were between 256 and 511 octets in length, inclusive (excluding framing bits, but including FCS octets).	detail, extensive
512–1023 octets frames	Number of packets received on the VCP (including invalid packets) that were between 512 and 1023 octets in length, inclusive (excluding framing bits, but including FCS octets).	detail, extensive
1024–1518 octets frames	Number of packets received on the VCP (including invalid packets) that were between 1024 and 1518 octets in length, inclusive (excluding framing bits, but including FCS octets).	detail, extensive
Rate packets per second	Number of packets per second received and transmitted on the VCP.	detail, extensive
Rate bytes per second	Number of bytes per second received and transmitted on the VCP.	detail, extensive

Sample Output

show virtual-chassis vc-port statistics

user@switch> **show virtual-chassis vc-port statistics**

```
fpc0:
-----
Interface           Input  Octets/Packets      Output  Octets/Packets
internal-0/24        0          / 0                0          / 0
internal-0/25        0          / 0                0          / 0
internal-1/26        0          / 0                0          / 0
internal-1/27        0          / 0                0          / 0
```

```

vcp-0          0          / 0          0          / 0
vcp-1          0          / 0          0          / 0
internal-0/26   0          / 0          0          / 0
internal-0/27   0          / 0          0          / 0
internal-1/24   0          / 0          0          / 0
internal-1/25   0          / 0          0          / 0

```

```
{master:0}
```

show virtual-chassis vc-port statistics (EX8200 Virtual Chassis)

```
user@external-routing-engine> show virtual-chassis vc-port statistics
```

```

member0:
-----
Interface          Input Octets/Packets      Output Octets/Packets
vcp-4/0/4          43171238      /  48152      47687133      /  51891
vcp-4/0/7          0              /   0          0              /   0

member1:
-----
Interface          Input Octets/Packets      Output Octets/Packets
vcp-3/0/0          0              /   0          0              /   0
vcp-3/0/1          0              /   0          0              /   0
vcp-3/0/4          47695376      /  51899      43180556      /  48160

member8:
-----

member9:
-----

```

show virtual-chassis vc-port statistics brief

```
user@switch> show virtual-chassis vc-port statistics brief
```

```

fpc0:
-----
Interface          Input Octets/Packets      Output Octets/Packets
internal-0/24       0              /   0          0              /   0
internal-0/25       0              /   0          0              /   0
internal-1/26       0              /   0          0              /   0
internal-1/27       0              /   0          0              /   0

```



```

vcp-0          0          / 0          0          / 0
vcp-1          0          / 0          0          / 0
internal-0/26  0          / 0          0          / 0
internal-0/27  0          / 0          0          / 0
internal-1/24  0          / 0          0          / 0
internal-1/25  0          / 0          0          / 0

```

```
{master:0}
```

show virtual-chassis vc-port statistics extensive

```
user@switch> show virtual-chassis vc-port statistics extensive
```

```
fpc0:
```

```
-----
```

	RX	TX
Port: internal-0/24		
Total octets:	0	0
Total packets:	0	0
Unicast packets:	0	0
Broadcast packets:	0	0
Multicast packets:	0	0
MAC control frames:	0	0
CRC alignment errors:	0	
Oversize packets:	0	
Undersize packets:	0	
Jabber packets:	0	
Fragments received:	0	
Ifout errors:	0	
Packet drop events:	0	
64 octets frames:	0	
65-127 octets frames:	0	
128-255 octets frames:	0	
256-511 octets frames:	0	
512-1023 octets frames:	0	
1024-1518 octets frames:	0	
Rate packets per second:	0	0
Rate bytes per second:	0	0

```
...
```

```
Port: vcp-0
```

Total octets:	0	0
Total packets:	0	0
Unicast packets:	0	0
Broadcast packets:	0	0
Multicast packets:	0	0
MAC control frames:	0	0
CRC alignment errors:	0	
Oversize packets:	0	
Undersize packets:	0	
Jabber packets:	0	
Fragments received:	0	
Ifout errors:	0	
Packet drop events:	0	
64 octets frames:	0	
65-127 octets frames:	0	
128-255 octets frames:	0	
256-511 octets frames:	0	
512-1023 octets frames:	0	
1024-1518 octets frames:	0	
Rate packets per second:	0	0
Rate bytes per second:	0	0
Port: vcp-1		
Total octets:	0	0
Total packets:	0	0
Unicast packets:	0	0
Broadcast packets:	0	0
Multicast packets:	0	0
MAC control frames:	0	0
CRC alignment errors:	0	
Oversize packets:	0	
Undersize packets:	0	
Jabber packets:	0	
Fragments received:	0	
Ifout errors:	0	
Packet drop events:	0	
64 octets frames:	0	
65-127 octets frames:	0	
128-255 octets frames:	0	
256-511 octets frames:	0	
512-1023 octets frames:	0	
1024-1518 octets frames:	0	
Rate packets per second:	0	0
Rate bytes per second:	0	0

...

{master:0}

show virtual-chassis vc-port statistics member 0

user@switch>**show virtual-chassis vc-port statistics member 0**

fpc0:

Interface	Input	Octets/Packets	Output	Octets/Packets
internal-0/24	0	/ 0	0	/ 0
internal-0/25	0	/ 0	0	/ 0
internal-1/26	0	/ 0	0	/ 0
internal-1/27	0	/ 0	0	/ 0
vcp-0	0	/ 0	0	/ 0
vcp-1	0	/ 0	0	/ 0
internal-0/26	0	/ 0	0	/ 0
internal-0/27	0	/ 0	0	/ 0
internal-1/24	0	/ 0	0	/ 0
internal-1/25	0	/ 0	0	/ 0

{master:0}

4

PART

Troubleshooting

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Troubleshooting Procedures

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Troubleshooting an EX Series Virtual Chassis

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A Disconnected Member Switch's ID Is Not Available for Reassignment

Problem

Description: You disconnected a switch from the Virtual Chassis, but the disconnected switch's member ID is still displayed in the status output. You cannot reassign that member ID to another switch.

Solution

When you disconnect a member of a Virtual Chassis configuration, the master retains the member ID and member configuration in its configuration database. Output from the [show virtual-chassis](#) command continues to display the member ID of the disconnected member with a status of **NotPrsnt**.

If want to permanently disconnect the member switch, you can free up the member ID by using the [request virtual-chassis recycle](#) command. This will also clear the status of that member.

Load Factory Default Does Not Commit on a Multimember Virtual Chassis

Problem

Description: The **load factory-default** command fails on a multimember Virtual Chassis.

Solution

The **load factory-default** command is not supported on a multimember Virtual Chassis configuration. For information on how to revert the switches in the Virtual Chassis to factory default settings, see *Reverting to the Default Factory Configuration for the EX Series Switch*.

The Member ID Persists When a Member Switch Is Disconnected From a Virtual Chassis

Problem

Description: Gigabit Ethernet interfaces retain their previous slot numbers when a member switch is disconnected from the Virtual Chassis.

Solution

If a switch had been previously connected as a member of a Virtual Chassis configuration, it retains the member ID that it was assigned as a member of that configuration even after it is disconnected and operating as a standalone switch. The interfaces that were configured while the switch was a member of the Virtual Chassis configuration retain the old member ID as the first digit of the interface name.

For example, if the switch was previously member 1, its interfaces are named **ge-1/0/0** and so on.

To change the switch's member ID, so that its member ID is 0, and to rename the switch's interfaces accordingly:

1. To change the member ID to 0:

```
user@switch> request virtual-chassis renumber member-id 1 new-member-id 0
```

2. To rename the interfaces to match the new member ID:

```
[edit virtual-chassis]
user@switch# replace pattern ge-1/ with ge-0/
```

A Member Switch Is Not Participating in a Mixed Virtual Chassis

Problem

Description: A member switch in a mixed Virtual Chassis is not participating in the Virtual Chassis. The **show virtual-chassis** output indicates the member switch status is **Inactive** or **NotPrsnt**.

This issue is most likely to occur immediately after you have cabled a mixed Virtual Chassis.

Solution

The Virtual Chassis mode on the switch might not be set to **mixed** mode. If the member switch is an EX4500 switch and is cabled into the Virtual Chassis through the dedicated Virtual Chassis port (VCP), the PIC mode might also be set to **Intraconnect** instead of **virtual-chassis**.

To verify the Virtual Chassis mode:

```
user@switch> show virtual-chassis mode
```

```
fpc0:
-----
Mixed Mode: Enabled
fpc1:
-----
Mixed Mode: Enabled
fpc2:
-----
Mixed Mode: Enabled
fpc3:
-----
Mixed Mode: Enabled
fpc4:
-----
Mixed Mode: Disabled
fpc5:
-----
Mixed Mode: Enabled
```

To change the Virtual Chassis mode on a member switch (in this case, member ID 4) to **mixed** mode:

```
user@switch> request virtual-chassis mode mixed member 4
```

(EX4500 switch only) To verify the PIC mode:

```
user@switch> show chassis pic-mode
```

```
fpc0:
-----
Pic Mode: Not-Applicable
fpc1:
-----
Pic Mode: Not-Applicable
fpc2:
-----
Pic Mode: Not-Applicable
fpc3:
-----
Pic Mode: Not-Applicable
```

```
fpc4:
-----
Pic Mode: PIC 3: Intraconnect
fpc5:
-----
Pic Mode: PIC 3: virtual-chassis
```

To change the PIC mode on an EX4500 switch to **virtual-chassis** mode (in this case, member ID 4):

```
user@switch> request chassis pic-mode virtual-chassis member 4
```

The member switch must be rebooted for the Virtual Chassis mode or PIC mode setting change to take effect. To reboot the member switch (in this case, member ID 4):

```
user@switch> request system reboot member 4
```

Unknown Traffic Looping Occurs After Configuring an Uplink Port as a Redundant VCP with a Dedicated VCP

Problem

Description: In a Virtual Chassis comprised of EX4200, EX4500, or EX4550 switches, you observe unrecoverable looping of unknown unicast or multicast traffic following the addition of a redundant VCP link between two member switches, when the two members are connected by a dedicated VCP link and the redundant link was created by converting uplink ports to VCPs.

This behavior can occur whether the redundant VCP link is created by setting the ports manually as VCPs or if the automatic VCP conversion feature is invoked and converts the ports into VCPs automatically.

Solution

Reboot the Virtual Chassis to properly detect the converted VCP as a redundant link with the dedicated VCP link.

After the conversion from a network port to a VCP, the egress filter table is not updated and the redundant VCP remains enabled for forwarding, which causes the looping behavior. The reboot process detects the converted port as a VCP and brings it up as disabled for forwarding.

As a result, we do not recommend connecting redundant converted uplink VCP ports between members already connected by dedicated VCPs on an active Virtual Chassis; instead, plan to add redundant uplink VCP connections during a maintenance window that can include a Virtual Chassis reboot cycle. This recommendation also applies when adding a new member to an existing active Virtual Chassis where you are adding redundant VCP links between the new member and one of its neighbors that mix dedicated VCPs and converted uplink VCPs.

RELATED DOCUMENTATION

[Monitoring the Virtual Chassis Status and Statistics on EX Series Virtual Chassis | 334](#)

[Configuring an EX4200, EX4500, or EX4550 Virtual Chassis \(CLI Procedure\) | 217](#)

[Configuring a Mixed Virtual Chassis with EX4200, EX4500, and EX4550 Member Switches \(CLI Procedure\) | 228](#)

[Configuring a Virtual Chassis on an EX Series Switch \(J-Web Procedure\) | 222](#)