Example: Configuring a Virtual Chassis Using a Preprovisioned Configuration File

You can deterministically control both the role and the member ID assigned to each member switch in a Virtual Chassis configuration by creating a preprovisioned configuration file.

A preprovisioned configuration file links the serial number of each EX 4200 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.

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, has having the linecard role in the preprovisioned configuration file.

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 Switch to an Existing Virtual Chassis Configuration (CLI Procedure).

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 Release 9.0 or later for EX-series switches
- Five EX 4200-48P switches
- Five EX 4200-24T switches
- Four EX-UM-2XFP 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 linecard) 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 linecard 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 EX3200 or 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

In this example, five EX 4200 switches (SWA-0 through SWA-4) are interconnected with their dedicated VCPs in wiring closet A and five EX 4200 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 linecard.

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 use the fiber cable connections in the uplink modules to interconnect the member switches in wiring closet A to the member switch in wiring closet B. For redundancy, this example connects uplink module ports 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 as VCPs. When an uplink module 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 status 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 EX 4200-48P switches (SWA-0 , SWA-2, and SWA-4) in wiring closet A.
- Two EX 4200-48P switches (SWA-5 and SWA-9) in wiring closet B.
- Two EX 4200-24T switches (SWA-1 and SWA-3) in wiring closet A.
- Three EX 4200-24T 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 1 shows the Virtual Chassis configuration settings for a preprovisioned Virtual Chassis composed of member switches in different wiring closets.

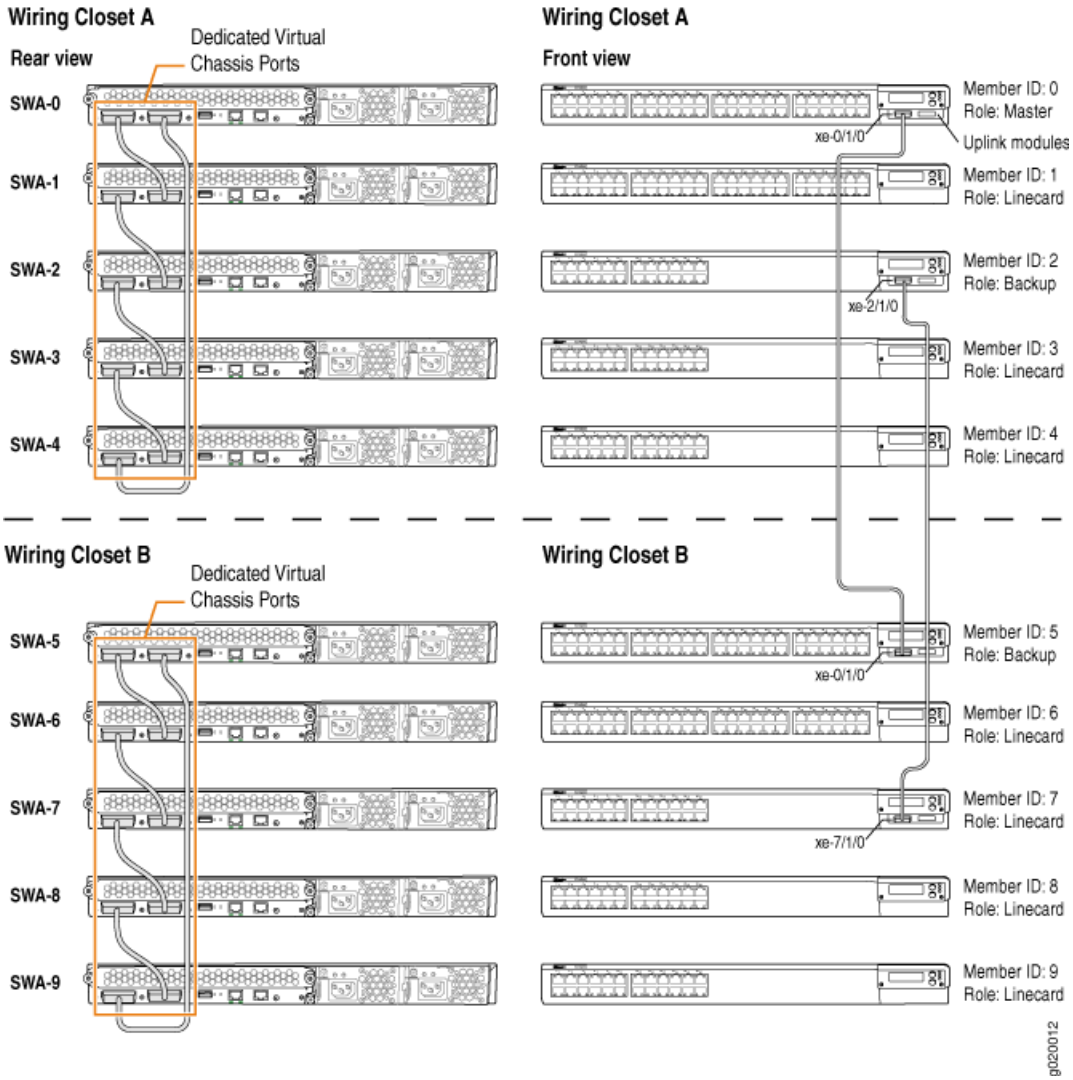
Table 1: Components of a Preprovisioned Virtual Chassis Interconnected Across Multiple Wiring Closets

Switch	Serial number	Member ID	Role	Uplink Module Ports	Hardware	Location
SWA-0	abc123	0	routing-engine	xe-0/1/0	EX 4200-48P and XFP uplink module	Wiring closet A
SWA-1	def456	1	linecard		EX 4200-24T	Wiring closet A
SWA-2	ghi789	2	linecard	xe-2/1/0	EX 4200-48P and XFP uplink module	Wiring closet A
SWA-3	jkl012	3	linecard		EX 4200-24T	Wiring closet A
SWA-4	mno345	4	linecard		EX 4200-48P	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.	EX 4200-48P and XFP uplink module	Wiring closet B
SWA-6	stu901	6	linecard		EX 4200-24T	Wiring closet B
SWA-7	vwx234	7	linecard	xe-7/1/0	EX 4200-24T and XFP uplink module	Wiring closet B
SWA-8	yza567	8	linecard		EX 4200-24T	Wiring closet B
SWA-9	bcd890	9	linecard		EX 4200-48P	Wiring closet B

Figure 1 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 1 are the same as they would be for a configuration that was not preprovisioned across wiring closets.

Figure 1: Maximum Size Virtual Chassis Interconnected Across Wiring Closets



Configuration

To configure the Virtual Chassis across multiple wiring closets using a preprovisioned configuration:

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 linecard
user@SWA-0# set member 2 serial-number ghi789 role linecard
user@SWA-0# set member 3 serial-number jkl012 role linecard
user@SWA-0# set member 4 serial-number mno345 role linecard
user@SWA-0# set member 5 serial-number pqr678 role routing-engine
user@SWA-0# set member 6 serial-number stu901 role linecard
user@SWA-0# set member 7 serial-number vwx234 role linecard
user@SWA-0# set member 8 serial-number yza567 role linecard
user@SWA-0# set member 9 serial-number bcd890 role linecard
```

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  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 linecard;
        serial-number def456;
    }
    member 2 {
```

```
    role linecard;
    serial-number ghi789;
  }
  member 3 {
    role linecard;
    serial-number jkl012;
  }
  member 4 {
    role linecard;
    serial-number mno345;
  }
  member 5 {
    role routing-engine;
    serial-number pqr678;
  }
  member 6 {
    role linecard;
    serial-number stu901;
  }
  member 7 {
    role linecard;
    serial-number vwx234;
  }
  member 8 {
    role linecard;
    serial-number yza567;
  }
  member 9 {
    role linecard;
    serial-number bcd890;
  }
  preprovisioned;
}
```

Verification

To confirm that the configuration is working properly, perform these tasks:

- Verifying the Member IDs and Roles of the Member Switches on page 8
- Verifying That the Dedicated VCPs and Uplink VCPs Are Operational on page 9

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 status
Preprovisioned Virtual Chassis
Virtual Chassis ID: 0000.e255.0000
                                                Mastership          Neighbor List
Member ID  Status   Serial No    Model      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    vwx234       ex4200-24t        0  Linecard   8  vcp-0
                                                                  6  vcp-1
                                                                  2  1/0

8 (FPC 8)  Prsnt    yza567       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, which was the intention of the configuration procedure. 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 Virtual Chassis 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       Type            Status    Speed        Neighbor
or                                        (mbps)     ID   Interface
PIC / Port
vcp-0           Dedicated       Up
vcp-1           Dedicated       Up
1/0             Configured      Up

fpc6:
--------------------------------------------------------------------------
Interface       Type            Status    Speed        Neighbor
or                                        (mbps)     ID   Interface
PIC / Port
vcp-0           Dedicated       Up
vcp-1           Dedicated       Up

fpc7:
--------------------------------------------------------------------------
Interface       Type            Status    Speed        Neighbor
or                                        (mbps)     ID   Interface
PIC / Port
vcp-0           Dedicated       Up
vcp-1           Dedicated       Up
1/0             Configured      Up
```

```
fpc8:
--------------------------------------------------------------------------
Interface        Type            Status    Speed        Neighbor
or                                         (mbps)     ID   Interface
PIC / Port
vcp-0            Dedicated       Up
vcp-1            Dedicated       Up

fpc9:
--------------------------------------------------------------------------
Interface        Type            Status    Speed        Neighbor
or                                         (mbps)     ID   Interface
PIC / Port
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

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 Topics

- Example: Configuring a Virtual Chassis with a Master and Backup in a Single Wiring Closet
- Example: Configuring a Virtual Chassis Interconnected Across Multiple Wiring Closets
- Configuring a Virtual Chassis (CLI Procedure)
- Configuring a Virtual Chassis (J-Web Procedure)

Published: 2009-10-02