

Quad Supervisor VSS Deployment on Catalyst 4500 Switches Configuration Example

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Introduction

This document describes how to configure the quad supervisor Virtual Switching System (VSS) on the Catalyst 4500. The quad supervisor VSS has been an option on the Catalyst 6500 for a few years now, however this technology is new to the Catalyst 4500 and might not perform the way you are used to.

It is possible to install four supervisors (2 per each chassis) and build quad-sup VSS setup. In such setup one chassis contains a supervisor that acts as a VSS Active and is responsible for control-plane for the whole VSS setup, while the other supervisor on the same chassis acts as In-chassis Standby (ICS). The second chassis contains one supervisor that acts as a VSS Standby (that is, supervisor to which VSS will failover in case of VSS Active failure) while the other acts as ICS.

Quad-sup VSS behavior on the Catalyst 4500 depends on the Cisco IOS XE[®] version that is used. Originally for quad-sup VSS setups, ICS supervisors stay in ROMMON at any given time with all uplink ports able to forward data. There is no automatic mechanism for the ICS to automatically take over (that is, participate in VSS from control plane perspective) in the event of failure.

In Version 03.08.00E and later, the Catalyst 4500 supports ICS supervisors in Route Processor Redundancy (RPR) mode that improves quad-sup functionality and failover behavior in case of supervisor failure which allows automatic failover between all supervisors in case of the failure.

Prerequisites

Requirements

Cisco recommends that you have knowledge of VSS technology before you install quad supervisors.

In order to set up a quad supervisor VSS on the Catalyst 4500 with Supervisor 7, your supervisors need to run Cisco IOS XE Version 3.4.0 or later. You will also need to ensure your ROM version is 15.0(1r) SG7 or later.

In order to set up quad supervisor VSS on the Catalyst 4500 with Supervisor 8, your supervisors need to run Cisco IOS XE version 3.6.0 or later. You will also need to ensure your ROM version is 15.1(1r) SG4 or later.

In order to set up quad supervisor VSS on the Catalyst 4500 with ICS that runs in RPR mode, your supervisors need to run Cisco IOS XE version 3.8.0 or later. You will also need to ensure your ROM version is 15.1(1r)SG6 or later.

Stateful Switchover (SSO) redundancy between in-chassis active supervisors requires either IP Base or enterprise Services license level.

Components Used

The information in this document is based on two Catalyst 4507R+E chassis that contain redundant Supervisor 7Es.

Cisco recommends that your Virtual Switch Link (VSL) consist of redundant connections. In this example there are redundant 10G links between each supervisor.

In Version 03.08.00E and earlier, Cisco DOES NOT support "active standby" while in quad supervisor VSS. The redundant supervisor in each chassis will remain in ROMMON and have to be manually booted upon primary supervisor failure. In Version 03.08.00E and later, ICS supervisors will be in RPR mode.

Standalone 4500



Standalone 4500



The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Asymmetric Chassis Support

Catalyst 4500 and Catalyst 4500-X VSS require the same supervisor engine type in both chassis. **The chassis must contain the same number of slots**, even if their linecards differ or their slots are empty. Provided the number of slots in the two chassis match, the chassis can differ in type (that is, +E and -E chassis can be in a single VSS).

Configure

Verify Before You Start

In order to deploy quad supervisor VSS on the Catalyst 4500, use Supervisor 8 in order to ensure a few settings are in place:

1. Ensure the minimum software requirements are met. This example shows Version 03.08.01E with ROM version 15.1(1r)SG6. `4K_SW1#show version | i Cisco IOS Software|ROM:`
Cisco IOS Software, IOS-XE Software, Catalyst 4500 L3 Switch Software
(cat4500es8-UNIVERSALK9-M), Version 03.08.01.E RELEASE SOFTWARE (fc2) ROM: 15.1(1r)SG6
2. Ensure that the current supervisors are all in the SSO redundancy mode. **Note:** A minimum license level of IP Base is required for SSO (LAN Base will only run in RPR). `4K_SW1#show redundancy`

```
Redundant System Information :
```

```
-----  
Available system uptime = 1 day, 10 hours, 4 minutes  
Switchovers system experienced = 0  
Standby failures = 0  
Last switchover reason = none
```

```

Hardware Mode = Duplex
Configured Redundancy Mode = Stateful Switchover
Operating Redundancy Mode = Stateful Switchover
Maintenance Mode = Disabled
Communications = Up

```

3. Ensure that the correct boot register variable is set to ensure the switch will boot as expected. Cisco recommends 0x2102 as the configuration register value. This ensures that the switch boots to the Cisco IOS XE version noted in the boot statement.

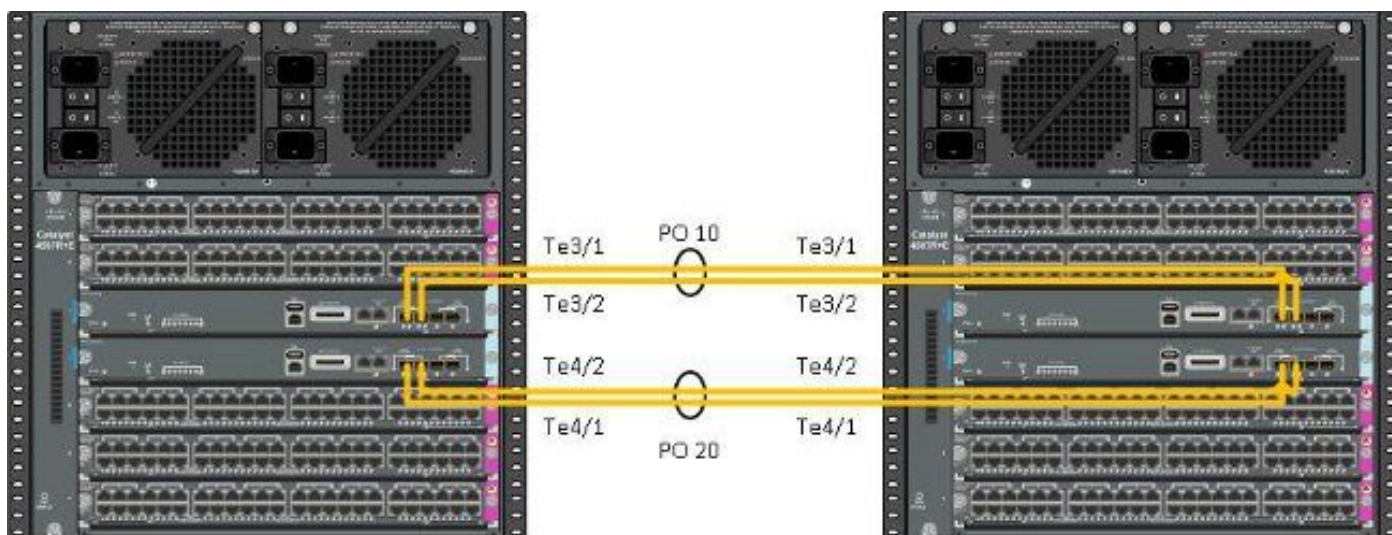

```

4K_SW1#show bootvar
BOOT variable = bootflash:cat4500es8-universalk9.SPA.03.08.01.E.152-4.E1.bin,1;
CONFIG_FILE variable = BOOTLDR variable = Configuration register is 0x2102 Standby BOOT variable = bootflash:cat4500es8-universalk9.SPA.03.08.01.E.152-4.E1.bin,1; Standby CONFIG_FILE variable = Standby BOOTLDR variable = Standby Configuration register is 0x2102

```

Cable and Configure

In this example, four 10G fiber connections between each chassis are used to form the VSL. The connections utilize the 10G ports on the supervisors.



Note: There are multiple ways to cable this solution and the example here is only one possible way.

Complete these steps in order to configure the switches:

1. Set the virtual domain and switch number on each switch. The switch virtual domain numbers configured on the two switches **MUST** be identical.


```

4K_SW1(config)#switch virtual domain 200
Domain ID 200 config will take effect only after the exec command 'switch convert mode virtual' is issued
4K_SW1(config-vs-domain)#switch 1
4K_SW2(config)#switch virtual domain 200
Domain ID 200 config will take effect only after the exec command 'switch convert mode virtual' is issued
4K_SW2(config-vs-domain)#switch 2

```
2. Create the port-channels and add the member links. Unlike the domain numbering shown previously, the port-channel numbers **MUST NOT** be identical.


```

4K_SW1(config-if)#switchport
4K_SW1(config-if)#switchport mode trunk
4K_SW1(config-if)#switch virtual link 1
4K_SW1(config-if)#exit

```


Convert the Switches to Virtual (ROMMON Mode / Earlier Than Version 03.08.00E)

The switches now need to be converted into the VSS, however unlike a traditional single supervisor VSS the process requires you to stage each set of supervisors.

1. Reload the peer supervisor in each chassis and hold in ROMMON.

Note: You need to ensure that you have console access into the supervisor and can quickly stop the boot process.

Active Supervisors in Each Chassis

```
4K_SW1#redundancy reload peer  
Reload peer [confirm]  
4K_SW1#  
Preparing to reload peer
```

Peer Supervisors in Each Chassis

```
***** The system will autoboot in 5 seconds *****
```

```
Type control-C to prevent autobooting.
```

```
. .
```

```
Autoboot cancelled..... please wait!!!
```

```
rommon 1 > [interrupt]
```

```
rommon 1 >
```

Both chassis should have one active supervisor and one supervisor in the ROMMON state before you proceed. Next, enter the **switch convert mode virtual** command in order to convert the two active supervisors into VSS.

```
4K_SW1#switch convert mode virtual
```

```
This command will convert all interface names  
to naming convention "interface-type switch-number/slot/port",  
save the running config to startup-config and  
reload the switch.
```

```
Do you want to proceed? [yes/no]: yes
```

```
Converting interface names
```

```
Building configuration...
```

```
Compressed configuration from 6329 bytes to 2912 bytes[OK]
```

```
Saving converted configuration to bootflash: ...
```

```
Destination filename [startup-config.converted_vs-20140704-053736]?
```

```
7146 bytes copied in 1.404 secs (5090 bytes/sec)
```

```
Rebooting the switch
```

```
*Jul 4 05:37:40.501: %SYS-5-RELOAD: Reload requested by Exec.
```

```
Reload Reason: Reason unspecified. 4K_SW2#switch convert mode virtual
```

```
This command will convert all interface names  
to naming convention "interface-type switch-number/slot/port",  
save the running config to startup-config and  
reload the switch.
```

```
Do you want to proceed? [yes/no]: yes
```

```
Converting interface names
Building configuration...
Compressed configuration from 5819 bytes to 2786 bytes[OK]
Saving converted configuration to bootflash: ...
Destination filename [startup-config.converted_vs-20140704-053752]?
5831 bytes copied in 0.416 secs (14017 bytes/sec)
Rebooting the switch
```

```
*Jul 4 05:37:54.072: %SYS-5-RELOAD: Reload requested by Exec.
Reload Reason: Reason unspecified.
```

Note: The switch ports on the peer supervisors actively pass traffic even when the supervisor is in a ROMMON state.

Once the supervisors have been converted and reloaded into VSS, the next step is to place them in a ROMMON state and convert the peer supervisors into VSS. Since the active supervisors are in VSS, you can simply run a single command in order to reload the entire shelf. Do not forget to stop them both at ROMMON.

```
4K_SW1#redundancy reload shelf
Reload the entire shelf [confirm]
Preparing to reload this shelf

<Snippet>

***** The system will autoboot in 5 seconds *****

Type control-C to prevent autobooting.
.
Autoboot cancelled..... please wait!!!
rommon 1 > [interrupt]

rommon 1 >
```

Once the previously active supervisors are stopped at ROMMON, manually boot the peer supervisors and convert them to VSS.

Once the two supervisors are booted and active, you need to perform a few configuration changes in order to ensure the new supervisors join the VSS. Remember the peer supervisors were reloaded before the conversion to VSS, so they are unable to parse some of the configuration upon loading. The safest way to ensure all the configuration is applied is to repeat the steps performed previously. You might also need to default the interfaces before you reconfigure the port-channel.

```
4K_SW1(config)#switch virtual domain 200
4K_SW1(config-vs-domain)#switch 1

4K_SW1(config)#int po10
4K_SW1(config-if)#switchport
4K_SW1(config-if)#switchport mode trunk
4K_SW1(config-if)#switch virtual link 1
```

```
MESSAGE:
You are configuring VSL on interface Po10.
There are member ports already attached to the port channel.
Remove all member ports before configuring as VSL Port-Channel.
```

Active Supervisor

```
4K_SW1(config)#default int range te3/1-2, te4/1-2
```

Reapply Configuration to Port-channel 10

```
4K_SW1(config)#int po10
```

```
4K_SW1(config-if)#switch virtual link 1
```

```
*Jul 4 07:25:29.532: %SPANTREE-6-PORTDEL_ALL_VLANS: Port-channel10
deleted from all Vlans
```

Configure Member Ports

```
4K_SW1(config)#int range te3/1-2,te4/1-2
```

```
4K_SW1(config-if-range)#switchport mode trunk
```

```
4K_SW1(config-if-range)#channel-group 10 mode on
```

Reapply Configuration to Port-channel 20

```
4K_SW2(config)#int po20
```

```
4K_SW2(config-if)#switch virtual link 2
```

```
*Jul 4 07:35:29.532: %SPANTREE-6-PORTDEL_ALL_VLANS: Port-channel20 deleted from all Vlans
```

Configure Member Ports

```
4K_SW2(config)#int range te3/1-2,te4/1-2
```

```
4K_SW2(config-if-range)#switchport mode trunk
```

```
4K_SW2(config-if-range)#channel-group 20 mode on
```

Convert Both Switches to VSS

```
4K_SW1#switch convert mode virtual
```

This command will convert all interface names to naming convention "interface-type switch-number/slot/port", save the running config to startup-config and reload the switch.

```
Do you want to proceed? [yes/no]: yes
```

```
Converting interface names
```

```
Building configuration...
```

```
Compressed configuration from 6329 bytes to 2911 bytes[OK]
```

```
Saving converted configuration to bootflash: ...
```

```
Destination filename [startup-config.converted_vs-20140704-080809]?
```

```
7146 bytes copied in 0.116 secs (61603 bytes/sec)
```

```
Rebooting the switch 4K_SW2#switch convert mode virtual
```

This command will convert all interface names to naming convention "interface-type switch-number/slot/port", save the running config to startup-config and reload the switch.

```
Do you want to proceed? [yes/no]: yes
```

```
Converting interface names
```

```
Building configuration...
```

```
Compressed configuration from 5819 bytes to 2785 bytes[OK]
```

```
Saving converted configuration to bootflash: ...
```

```
Destination filename [startup-config.converted_vs-20140704-080834]?
```

```
5831 bytes copied in 0.984 secs (5926 bytes/sec)
```


Rebooting the switch

Once the supervisors reload, they should now form in VSS. You should now have two active supervisors and two supervisors that sit in ROMMON and await a manual boot. Peer supervisors remain in ROMMON and need to be manually booted up in order to accept control plane traffic.

Troubleshoot

There is currently no specific troubleshooting information available for this configuration.

Verify

Use this section to confirm that your configuration works properly.

```
4K_SW1#show switch virtual
```

Executing the command on VSS member switch role = VSS Active, id = 2

```
Switch mode : Virtual Switch
Virtual switch domain number : 200
Local switch number : 2
Local switch operational role: Virtual Switch Active
Peer switch number : 1
Peer switch operational role : Virtual Switch Standby
```

Executing the command on VSS member switch role = VSS Standby, id = 1

```
Switch mode : Virtual Switch
Virtual switch domain number : 200
Local switch number : 1
Local switch operational role: Virtual Switch Standby
Peer switch number : 2
Peer switch operational role : Virtual Switch Active
```

```
4K_SW1#show switch virtual redundancy
```

Executing the command on VSS member switch role = VSS Active, id = 2

```
My Switch Id = 2
Peer Switch Id = 1
Last switchover reason = user forced
Configured Redundancy Mode = Stateful Switchover
Operating Redundancy Mode = Stateful Switchover
```

```
Switch 2 Slot 14 Processor Information :
```

```
-----
Current Software state = ACTIVE
Image Version = Cisco IOS Software, Catalyst 4500 L3 Switch Software
(cat4500e-UNIVERSALK9-M), Version 15.2(2)E, RELEASE SOFTWARE (fc3)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Fri 27-Jun-14 05:55 by prod_rel_team
BOOT = bootflash:cat4500e-universalk9.SPA.03.05.02.E.152-1.E2.bin,1;
Configuration register = 0x102 (will be 0x2102 at next reload)
Fabric State = ACTIVE
Control Plane State = ACTIVE
```

Switch 1 Slot 4 Processor Information :

```
-----  
Current Software state = STANDBY HOT (switchover target)  
Image Version = Cisco IOS Software, Catalyst 4500 L3 Switch Software  
(cat4500e-UNIVERSALK9-M), Version 15.2(2)E, RELEASE SOFTWARE (fc3)  
Technical Support: http://www.cisco.com/techsupport  
Copyright (c) 1986-2014 by Cisco Systems, Inc.  
Compiled Fri 27-Jun-14 05:55 by p  
BOOT = bootflash:cat4500e-universalk9.SPA.03.05.02.E.152-1.E2.bin,1;  
Configuration register = 0x102 (will be 0x2102 at next reload)  
Fabric State = ACTIVE  
Control Plane State = STANDBY
```

Executing the command on VSS member switch role = VSS Standby, id = 1

show virtual switch redundancy is not supported on the standby

Related Information

- [Quad Supervisor RPR for Cisco Catalyst 4500-E Switches White Paper](#)
- [Catalyst 4500 Series Switch Software Configuration Guide, Release IOS XE 3.4.xSG and IOS 15.1\(2\)SGx](#)
- [Technical Support & Documentation - Cisco Systems](#)