CHAPTER 24

Virtual Switching System Support

The Virtual Switching technology is the process of combining two standalone distribution switches found in the local distribution layer into a single management point.

The Virtual Switching System functions and appears as a single switch to the wiring closet and the core layer. You can also create Virtual Switching Systems with a pair of standalone switches available in the core layer.

After the conversion of two distribution switches into one Virtual Switching System, the wiring closet switch creates a port bundle to the Virtual Switching System.

Creating a port bundle allows you to manage Standalone switches, easily. This is because the port bundle has to manage only a single virtual port to the Virtual Switching System.

This Virtual Switching technology is implemented in Lan Management Solutions (LMS) by providing a Virtual Switching System Configuration Tool under Resource Manager Essentials (RME).

This GUI based conversion tool allows you to select two compatible standalone switches and guides you to convert those standalone switches into one Virtual Switching System.

During the conversion process, the Virtual Switching System Configuration tool generates the required CLI commands, based on your inputs. It pushes this configuration to the devices using the protocol order provided in **RME > Admin > Config Mgmt > Transport settings**.

Note Only VSS-capable standalone Cisco Catalyst 6000 switches can be converted into a Virtual Switching System.

Prerequisites for Conversion

Before you convert Standalone switches to a Virtual Switching System, you must ensure that:

- Candidate devices that are to be converted to a Virtual Switching System are managed by LMS so that they can use this conversion tool.
- Fresh Inventory and Config Collection has been carried out successfully.
- Only VSS-capable IOS Software Modularity images are running on the Standalone switches.

Virtual Switching System Configuration Process

Two Standalone distribution switches can be converted into a single Virtual Switching System by using the Virtual Switching System Configuration Tool available in RME. This process of converting to Virtual Switching Systems can also be done for core layer switches.

Before proceeding with conversion, ensure that the prerequisites are met.

For more information, see Prerequisites for Conversion.

To convert standalone switches to a Virtual Switching System:

1. Select Devices for VSS Configuration
2. Perform Hardware Checks for the Two Selected Devices
3. Perform Software Compatibility Checks for the Two Selected Devices
4. Generate Compliance Report
5. Define Configuration Parameters
6. Deploy Commands on the Two Switches to Enable VSS Mode

Select Devices for VSS Configuration

You need to select two switches and convert them into one Virtual Switching System. Only VSS-capable Standalone devices can be converted to Virtual Switching System.

The Virtual Switching System Configuration Tool consists of a customized device selector. This device selector displays only VSS-capable devices with their sysObjectIDs.

Example

You can select two standalone Cisco Catalyst 6000 switches to be converted to a Virtual Switching System.

Perform Hardware Checks for the Two Selected Devices

After you select two devices, sequential hardware checks are carried out by the Virtual Switching System Configuration tool on these two devices to ensure hardware compliance.

The hardware checks carried out are:

- RAM size check

  The RAM sizes in MB of both the selected devices are compared.

  If you try to convert one device with 450 MB RAM and another device with 512 MB RAM into a Virtual Switching System, a warning message is displayed. However, you are allowed to proceed with the conversion.

- Supervisor Type check

  The Supervisor types of both the selected devices are compared. You cannot convert one device with Supervisor4 and another device with Supervisor3 into a Virtual Switching System. Only Supervisor4 is supported for VSS Configuration.

- Modules not supported in VSS mode

  Ideally all modules available in the two selected devices must support VSS mode. But if there are any modules that are not supported, they are listed here.

- Physical Connectivity check

  Both selected devices should have physical connectivity. This enables you to convert them to the Virtual Switching System mode.

Perform Software Compatibility Checks for the Two Selected Devices

After the hardware compatibility check is successfully done, the selected devices undergo a software compatibility check.

The software compatibility checks are:

- Switch mode check

  Check whether both devices are in standalone non-VSS modes.

  You cannot convert a Standalone switch and a Virtual-mode configured switch into a Virtual Switching System.

- IOS Software Modularity Image check

  Both selected devices must be running VSS-capable IOS Software Modularity images in native IOS mode. An image is considered VSS-capable if it consists of SXH towards the end of the image name.

  Example

  The image, 12.2(99)SXH is considered VSS-capable because it consists of SXH towards the end of the image name.

Generate Compliance Report

After the hardware and software compatibility checks have been completed, a Compliance report is generated. This report indicates the various attributes considered for the checks and the status of the checks.

If there are any instances of non-compliance, you need to restart the conversion process to address these non-compliances.

You are allowed to proceed to the next step only if both hardware and software compatibility checks are successful.

Example

If there is an instance of non compliance of the devices towards minimum IOS software image version, you need to upgrade the software images in the two devices to the minimum recommended version.

A link is provided to the software image upgrade page along with the compliance report, if the minimum software requirement is not met. You can use this link to upgrade the software images in the devices to the minimum IOS software image version.

Define Configuration Parameters

After successful compliance of both the devices, you need to define configuration parameters for both devices.

The configuration definition includes:

- Specifying the Domain Number for the Virtual Switching System configuration
- Assigning one switch as the Active switch and the other as the Standby switch
- Entering the Port Channel Numbers for both switches
- Selecting 10 Gigabit Ethernet Interfaces for both switches.

Deploy Commands on the Two Switches to Enable VSS Mode

After you have defined the configuration parameters, the Conversion Work Order page is displayed. This page lists the various CLI commands that you must download to the two devices. This is to convert the switches into a Virtual Switching System.

These CLI commands are generated by the Virtual Switching System Configuration tool. You need to deploy the CLI commands on the devices.

RME uses various protocols such as Telnet, SSH, RCP, SCP, and TFTP to deploy the commands on the devices. The protocols are tried out in the order specified in RME. If the first protocol in sequence cannot log into the device, the next protocol in the order is tried out. This is done until a suitable protocol is found.

For more information on how to change the protocol order, see Defining Protocol Order.

The devices reboot after the CLI commands have been deployed onto them. One switch is transformed to function as an Active switch and the other as a Standby switch.

After successful conversion, the running configuration of the VSS setup is copied to its startup configuration. The individual switches are then moved to the Suspended state in RME.

The new Virtual Switching System is added to Device Credentials Repository (DCR) with display name, same as the IP address of the Active switch followed by _VSS.

Note After conversion, irrespective of whether an Active or Standby switch boots up first, the conversion to Virtual Switching System takes place successfully. The IP address of the Active device is added to DCR.

Converting Switches from Standalone to VSS Mode

The Lan Management Solution (LMS) provides support for Virtual Switching Systems through a conversion tool in Resource Manager Essentials (RME).

You can use this Virtual Switching System Configuration Tool to convert VSS-capable Standalone switches to a Virtual Switching System. This GUI-based tool is a wizard that guides you through the conversion process.

Before you start converting Standalone switches to a Virtual Switching System, you need to ensure that the prerequisites are met.

For more information, see Prerequisites for Conversion.

To convert Standalone switches to a Virtual Switching System:

Step 1 Select **Resource Manager Essentials > Tools > Virtual Switching System Configuration > VSS Conversion**.

The Virtual Switching System Configuration dialog box appears.

Step 2 Select two Standalone switches that are VSS-compliant from the Device Selector to convert to a Virtual Switching System.

This device selector is customized to display only Standalone switches that are VSS-compliant.

See the topic Using RME Device Selector in the section Adding and Troubleshooting Devices Using Device Management.

Step 3 Click **Convert to VSS Mode**.

- If the switches are compatible, the Checking the Hardware and Software Requirements dialog box appears.
- If the switches are not compatible, an error message is displayed and the conversion is terminated. In this case, you must restart the conversion process.

For more information on the hardware and software checks, see Table 24-1.

Table 24-1 Hardware and Software Check

Properties	Device 1	Device 2
Hardware Checks		
RAM Size	The RAM size in MB for Device 1.	The RAM size in MB for Device 2.
Supervisor Type	The Supervisor type for Device 1.	The Supervisor type for Device 2.
Modules not supported in VSS mode	The module names of those modules in Device 1 that do not support VSS mode.	The module names of those modules in Device 2 that do not support VSS mode.
Physical Connectivity	The IP address through which Device 1 is connected.	The IP address through which Device 2 is connected.
Result	Whether the devices satisfy the hardware check.	
Software Checks		
Properties	**Device 1**	**Device 2**
VSS Mode	The current mode of Device 1.	The current mode of Device 2.
Image Version	The software image version in Device 1	The software image version in Device 2.
Result	Whether the devices satisfy the software check.	

When the RAM size of both the devices are not equal, a warning message is displayed. However, you will be allowed to continue with the conversion.

Step 4 Click **Next**.

The Define Configuration Parameters dialog box appears.

Step 5 Enter the required information as shown in Table 24-2

Table 24-2 Define Configuration Parameters

Field	Description
Virtual Switching System Configuration	
Enter Domain Number	Domain number to be used by the Virtual Switching System. It can be any number between 1 to 255. This domain number is common for both the switches.

Table 24-2 Define Configuration Parameters

Field	Description
Device Name: 1	
Select Switch Number	Either • Check Switch No.1 if you want to assign Device 1 as Switch No. 1 (Active Switch). Or • Check Switch No.2 if you want to assign Device 1 as Switch No. 2 (Standby Switch). You cannot assign both Device1 and Device 2 as Switch No.1. If Device 1 is assigned Switch No.1 then Device 2 should be assigned as Switch No.2 and vice versa. If you select Device 1 or Device 2, as Switch No. 1 or Switch No. 2, the configuration of the second switch is erased and the configuration of the first switch is copied to the second switch. The first switch becomes the Active Switch and the second switch becomes the Standby Switch.
Select Port Channel Number	Port Channel for Device 1. Enter a port channel number for the switch. The Port channel must be different for each switch.
Select Interface	Interface for Device 1. This list box lists the 10 Gigabit Ethernet interfaces. Select the interface for the device from the list box. You can select a maximum of two interfaces for a Virtual Switching System. Use the Control Key to select two interfaces. Only VSS capable 10 Gigabit line cards are displayed. Currently Supervisor 4 and 6708 10 Gigabit cards are available for selection.

Table 24-2 Define Configuration Parameters

Field	Description
Device Name: 2	
Select Switch Number	Either: • Check Switch No.1 if you want to assign Device 2 as Switch No. 1 (Active Switch). Or • Check Switch No.2 if you want to assign Device 2 as Switch No. 2 (Standby Switch). You cannot assign both Device1 and Device 2 as Switch No.1. If Device 1 is assigned Switch No.1 then Device 2 should be assigned as Switch No.2 and vice versa. If you select Device 1 or Device 2, as Switch No. 1 or Switch No. 2, the configuration of the second switch is erased and the configuration of the first switch is copied to the second switch. The first switch becomes the Active Switch and the second switch becomes the Standby Switch.
Select Port Channel Number	The Port channel for Device 2. Enter a port channel number for the switch. The Port channel must be different for each switch.
Select Interface	The Interface for Device 2. This list box lists the 10 Gigabit Ethernet interfaces. Select the interface for the device from the list box. You can select a maximum of two interfaces for a Virtual Switching System. Use the Control Key to select two interfaces. Only VSS capable 10 Gigabit line cards are displayed. Currently Supervisor 4 and 6708 10 Gigabit cards are available for selection.

Step 6 Click **Next**.

The Work Order page appears with the CLI commands that need to be downloaded to each of the switches so that they can be converted into one Virtual Switching System.

Step 7 Click **Finish**.

- If the conversion succeeded, a message is displayed that the two switches have been converted to a single Virtual Switching System.
- If the conversion failed, an error message is displayed indicating the reason for failure. The reason could be that the CLI commands were not properly deployed to the devices.

Note You cannot set priorities for the two Standalone switches which are considered for VSS conversion. Both the Standalone switches have default equal priority.

Support for Virtual Switching Systems in RME

The various applications in RME such as Syslog, Inventory Management, Reporting, Software Management and Configuration Management provide support for Virtual Switching Systems.

The implication of Virtual Switching System support to these RME applications is discussed below:

Inventory Management

The Virtual Switching System is considered as a single switch by Inventory. However Inventory collection happens for both switches.

You can generate a Detailed Device Report for the Virtual Switching System. The output of this report consists of information on the Active and the Standby switch.

For more information on how to generate a Detailed Device Report, see Generating a Detailed Device Report.

Configuration Management

After the conversion, the Virtual Switching System will have a single unified configuration. RME Configuration management provides support for Virtual Switching Systems by managing the configuration of the switch.

You can use RME Configuration Management to:

- Archive the device configurations
- Determine out-of-sync configuration files
- View the configuration version tree
- Compare the revisions of configurations
- Compare the archived configuration with a baseline template
- Deploy a version of configuration on the device

For more information on Configuration Management, see Archiving Configurations and Managing Them Using Archive Management.

You can also use NetConfig and Config Editor to configure Interfaces on a VSS device.

For more information on using NetConfig and Config Editor, see:

- Making and Deploying Configuration Changes Using NetConfig
- Editing and Deploying Configurations Using Config Editor

Syslog

The Syslog messages are sent from the Active switch of the Virtual Switching System to the RME server. These messages are treated like any other Syslog message from any other device types. The Syslog reports can also be generated for the Syslogs received from the Active switch of the Virtual Switching System.

For more information on Syslogs, see Enabling and Tracking Syslogs Using Syslog Analyzer and Collector.

Software Management - Software Distribution

RME Software Management is enhanced to support distribution of software images to a Virtual Switching System. Software Management uses the Master Chassis - Active Supervisor for software distribution.

Software Distribution through RME Software Management varies based on the software image or patch image considered for distribution.

Distribution of the Base Image

Distributing the software Base image consists of:

a. Copying the new software image to the Master switch, Flash storage partition.

b. Copying the same software image to the corresponding slave switch Flash storage partition.

   If Master Flash storage is **`disk0`** the software image will be copied to **`slave-disk0`** Flash storage of the Slave switch.

c. Loading the Active switch.

d. Loading the Slave switch.

e. Activating the software image on both the flash storages.

f. Rebooting the Master switch.

Distribution of Patch Image

Distribution of software base image consists of:

a. Copying of the new patch image to the Master switch, Flash storage partition.

b. Copying the same Patch image to the corresponding Slave switch, Flash storage partition.

   If Master Flash storage is **`disk0,`** the patch image will be copied to **`slavedisk0`** Flash storage of the Slave switch.

c. Loading the Active switch.

d. Loading the Slave switch.

e. Activating the Patch image on both the Flash storages.

   You are allowed to reload the device to activate patch images, only if you have selected Reload if required option while scheduling the Patch distribution job.

- When you reload, the standby Route Processor(RP) on slave switch is reset.
- The device reboots as soon as the installed code starts running.
- A manual switchover to the redundant supervisor engine for a dual processor redundant system takes place.

Note You can only distribute Patch images to a Virtual Switching System running VSS-capable IOS Software Modularity image in Install mode.

For more information on Software Distribution, see Software Distribution.

Software Management - Scheduling a Software Distribution Job

Scheduling a Software Management distribution job for Virtual Switching Systems is almost similar to that of any Standalone switch. In addition to the verifications performed by Software management, there are few verifications that are carried out for Virtual Switching Systems.

Software management verifies:

- If VSS-capable IOS Software Modularity images are running on the devices.

  The prerequisite for VSS is that the devices should have VSS-capable IOS Software Modularity images running on them. So if you select an image that is not a VSS-capable IOS Software Modularity image, the software distribution job cannot be performed.

- If the RAM space available on the two devices are compatible.

  RAM checks are carried out only for Master switch supervisors and not for Slave switch supervisors.

- If there is an identical Slave switch storage partition with enough space for the selected Master switch storage partition.

For more information on Software Distribution, see:

- Distributing by Devices [Basic]
- Distributing by Devices [Advanced]
- Distributing by Images
- Remote Staging and Distribution
- Patch Distribution

Converting Switches from Virtual to Standalone Mode

Virtual Switching System refers to the conceptual switch that is created by converting two VSS-capable standalone switches into one switch. You can also convert Virtual Switching Systems back to Standalone switches.

To convert Virtual Switching Systems into Standalone switches:

Step 1 Locate the original configurations of the two switches.

These configurations maybe available as files on your server. If not, locate them from the Configuration Archive of RME.

For more information on locating the configurations, see Using the Configuration Version Tree.

You can continue with this procedure even if the original configuration files are not available. You can manually reconfigure the individual switches if required.

Step 2 Back up the current VSS setup configuration.

They may be required for future conversions.

Step 3 Connect to the VSS setup using Telnet and:

a. Remove all the loop back interfaces on the VSS.

Run the command **`no loopback`** for each loop back address on the switch.

This removes the loop back addresses from the switch.

b. Go to the running configuration of the VSS setup and configure the IP address on the physical interface of the Standby switch.

This IP address must be in a subnet that is not the physical interface of the Active switch.

After the IP Address is configured on the physical interface, the Standby chassis is accessible through the management IP address.

c. Save this configuration change by running the **`write mem`** command.

The configuration is saved to the NVRAM of the corresponding device.

d. Run the command **`switch convert mode stand-alone`** in Enable mode.

This command will reload the Active switch and release the switch from VSS setup.

Step 4 Connect to the VSS setup using Telnet. You must use the IP address configured in Step 3b.

Step 5 Run the command **`switch convert mode stand-alone`** in Enable mode.

The switches are now in Standalone mode. You can access them using their own management addresses.

Step 6 Either:

- Add the two devices into DCR of CiscoWorks, if they do not exist there. To do this go to **Common Services > Device and Credentials > Device Management**

  For more information see *CiscoWorks Common Services Online Help*.

Or

- Change the device states if the devices are in Suspended state in RME. This allows the two devices to be managed again by RME.

Note Alternatively, you can refer to the VSS Reverse Conversion wizard for the procedures for converting Virtual Switching Systems to Standalone switches. To access the wizard, go to **Resource Manager Essentials > Tools > Virtual Switching System Configuration > VSS Reverse Conversion**.

Use Case: Converting Standalone Switches into a Virtual Switching System

Case:

You are a network administrator and you want to convert two standalone switches into a Virtual Switching System by using the Virtual Switching System Configuration Tool available in RME.

Solution:

To convert Standalone switches to a Virtual Switching System:

Step 1 Select **Resource Manager Essentials > Tools > Virtual Switching System Configuration > VSS Conversion**.

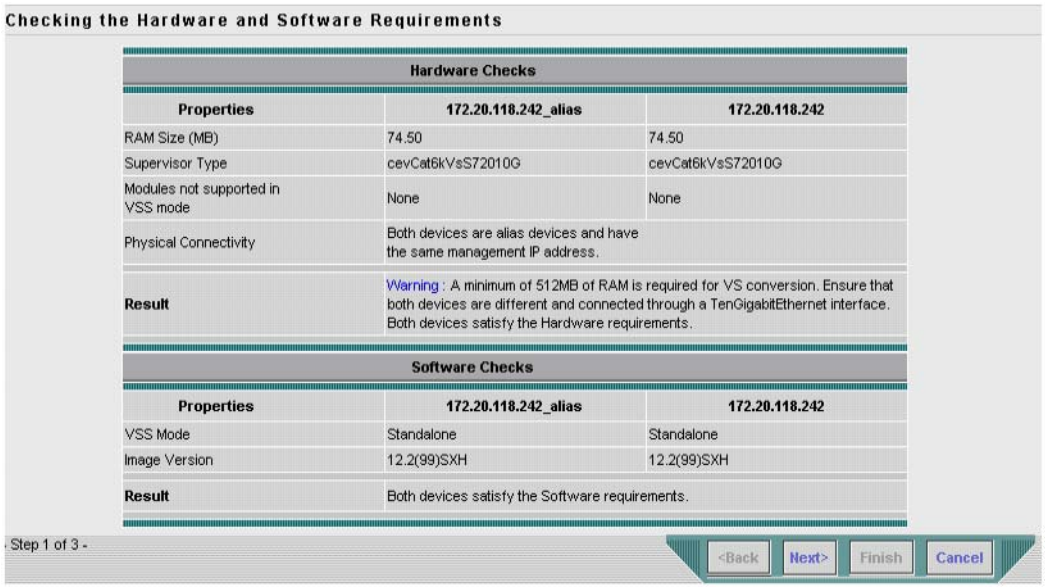
The Virtual Switching System Configuration dialog box appears.

Step 2 Select 10.77.118.242 and 10.77.118.242_alias, two Standalone switches that are VSS-compliant from the Device Selector to convert to a Virtual Switching System.

Step 3 Click **Convert to VSS Mode**.

Figure 24-1 displays the hardware and software check results dialog box.

Figure 24-1 Hardware and Software Check



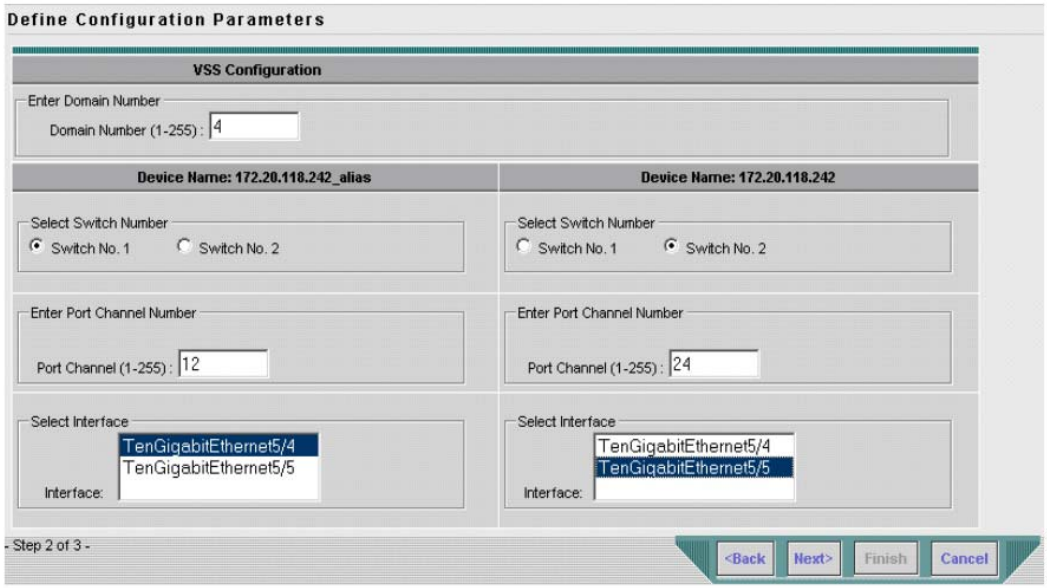
Step 4 Click **Next**.

The Define Configuration Parameters dialog box appears.

Step 5 Enter the required information:

Figure 24-2 depicts the Define Configuration Parameters dialog box with the values filled up.

Figure 24-2 Define Configuration Parameters



Step 6 Click **Next**.

The Work Order page appears with the CLI commands that need to be downloaded to each of the switches so that they can be converted into one Virtual Switching System.

Step 7 Click **Finish**.

A message is displayed that the two switches have been converted to a single Virtual Switching System.

After successful conversion, the running configuration of the VSS setup is copied to its startup configuration. The individual switches are then moved to the Suspended state in RME.

The new VSS switch is added to Device Credentials Repository (DCR) with display name, same as the IP address of the Active switch followed by _VS

So, the IP address of the Virtual Switching System is **10.77.118.242_VSS**