



Cisco UCS Manager VM-FEX for Hyper-V CLI Configuration Guide, Release 2.2

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Audience

This guide is intended primarily for data center administrators with responsibilities and expertise in one or more of the following:

- Server administration
- Storage administration
- Network administration
- Network security

Conventions

Text Type	Indication
GUI elements	GUI elements such as tab titles, area names, and field labels appear in this font . Main titles such as window, dialog box, and wizard titles appear in this font .
Document titles	Document titles appear in <i>this font</i> .
TUI elements	In a Text-based User Interface, text the system displays appears in <i>this font</i> .
System output	Terminal sessions and information that the system displays appear in <i>this font</i> .

Text Type	Indication
CLI commands	CLI command keywords appear in this font . Variables in a CLI command appear in <i>this font</i> .
[]	Elements in square brackets are optional.
{x y z}	Required alternative keywords are grouped in braces and separated by vertical bars.
[x y z]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
< >	Nonprinting characters such as passwords are in angle brackets.
[]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

**Note**

Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the document.

**Tip**

Means *the following information will help you solve a problem*. The tips information might not be troubleshooting or even an action, but could be useful information, similar to a Timesaver.

**Caution**

Means *reader be careful*. In this situation, you might perform an action that could result in equipment damage or loss of data.

**Timesaver**

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

**Warning****IMPORTANT SAFETY INSTRUCTIONS**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.

SAVE THESE INSTRUCTIONS

Related Documentation

UCS Documentation Roadmaps

For a complete list of all B-Series documentation, see the *Cisco UCS B-Series Servers Documentation Roadmap* available at the following URL: <http://www.cisco.com/go/unifiedcomputing/b-series-doc>.

For a complete list of all C-Series documentation, see the *Cisco UCS C-Series Servers Documentation Roadmap* available at the following URL: <http://www.cisco.com/go/unifiedcomputing/c-series-doc>.

Microsoft Hyper-V Documentation

The following documentation is available for Cisco Virtual Machine Fabric Extender (VM-FEX) for Microsoft Hyper-V:

- For more information about virtualization using Microsoft Hyper-V, see Technical Documentation Download for System Center 2012 – Virtual Machine Manager at the following URL: <http://www.microsoft.com/en-us/download/details.aspx?id=6346>.
- For more information on Microsoft SCVMM, see System Center Virtual Machine Manager Engineering Blog at the following URL: <http://blogs.technet.com/b/scvmm/archive/2013/11/25/adopting-network-virtualization-part-i.aspx>.

Other Documentation Resources

An ISO file containing all B and C-Series documents is available at the following URL: <http://www.cisco.com/cisco/software/type.html?mdfid=283853163&flowid=25821>. From this page, click **Unified Computing System (UCS) Documentation Roadmap Bundle**.

The ISO file is updated after every major documentation release.

Follow [Cisco UCS Docs on Twitter](#) to receive document update notifications.

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly [What's New in Cisco Product Documentation](#), which also lists all new and revised Cisco technical documentation.

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

Follow [Cisco UCS Docs on Twitter](#) to receive document update notifications.



Introduction

This chapter includes the following sections:

- [Overview of Virtualization, page 1](#)
- [Overview of Cisco Virtual Machine Fabric Extender, page 1](#)
- [Virtualization with a Virtual Interface Card Adapter, page 2](#)
- [Single Root I/O Virtualization, page 2](#)
- [VM-FEX for Hyper-V, page 3](#)
- [Supported Microsoft Software Versions, page 5](#)

Overview of Virtualization

Virtualization allows you to create multiple Virtual Machines (VMs) to run in isolation, side by side on the same physical machine.

Each virtual machine has its own set of virtual hardware (RAM, CPU, NIC) upon which an operating system and fully configured applications are loaded. The operating system sees a consistent, normalized set of hardware regardless of the actual physical hardware components.

In a virtual machine, both hardware and software are encapsulated in a single file for rapid provisioning and moving between physical servers. You can move a virtual machine, within seconds, from one physical server to another for zero-downtime maintenance and continuous workload consolidation.

The virtual hardware makes it possible for many servers, each running in an independent virtual machine, to run on a single physical server. The advantages of virtualization include better use of computing resources, greater server density, and seamless server migration.

Overview of Cisco Virtual Machine Fabric Extender

A virtualized server implementation consists of one or more VMs that run as guests on a single physical server. The guest VMs are hosted and managed by a software layer called the hypervisor or virtual machine manager (VMM). Typically, the hypervisor presents a virtual network interface to each VM and performs Layer 2 switching of traffic from a VM to other local VMs or to another interface to the external network.

Working with a Cisco virtual interface card (VIC) adapter, the Cisco Virtual Machine Fabric Extender (VM-FEX) bypasses software-based switching of VM traffic by the hypervisor for external hardware-based switching in the fabric interconnect. This method reduces the load on the server CPU, provides faster switching, and enables you to apply a rich set of network management features to local and remote traffic.

VM-FEX extends the IEEE 802.1Qbh port extender architecture to the VMs by providing each VM interface with a virtual Peripheral Component Interconnect Express (PCIe) device and a virtual port on a switch. This solution allows precise rate limiting and quality of service (QoS) guarantees on the VM interface.

Virtualization with a Virtual Interface Card Adapter

A Cisco VIC adapter is a converged network adapter (CNA) that is designed for both bare metal and VM-based deployments. The VIC adapter supports static or dynamic virtualized interfaces, which includes up to 128 virtual network interface cards (vNICs).

There are two types of vNICs used with the VIC adapter—static and dynamic. A static vNIC is a device that is visible to the OS or hypervisor. Dynamic vNICs are used for VM-FEX by which a VM is connected to a veth port on the Fabric Interconnect.

VIC adapters support VM-FEX to provide hardware-based switching of traffic to and from virtual machine interfaces.

Single Root I/O Virtualization

Single Root I/O Virtualization (SR-IOV) allows multiple VMs running a variety of guest operating systems to share a single PCIe network adapter within a host server. SR-IOV allows a VM to move data directly to and from the network adapter, bypassing the hypervisor for increased network throughput and lower server CPU burden. Recent x86 server processors include chipset enhancements, such as Intel VT-x technology, that facilitate direct memory transfers and other operations required by SR-IOV.

The SR-IOV specification defines two device types:

- Physical Function (PF)—Essentially a static vNIC, a PF is a full PCIe device that includes SR-IOV capabilities. PFs are discovered, managed, and configured as normal PCIe devices. A single PF can provide management and configuration for a set of virtual functions (VFs).
- Virtual Function (VF)—Similar to a dynamic vNIC, a VF is a full or lightweight virtual PCIe device that provides at least the necessary resources for data movements. A VF is not managed directly but is derived from and managed through a PF. One or more VFs can be assigned to a VM.

SR-IOV is defined and maintained by the Peripheral Component Interconnect Special Interest Group (PCI-SIG), an industry organization that is chartered to develop and manage the PCI standard. For more information about SR-IOV, see the following URL:

<http://www.intel.com/content/www/us/en/pci-express/pci-sig-sr-iov-primer-sr-iov-technology-paper.html>

Hypervisors that support SR-IOV include Linux KVM and Microsoft Hyper-V.

The following Cisco Virtual Interface Cards support SR-IOV with VM-FEX:

- Cisco UCS M81KR Virtual Interface Card
- Cisco UCS P81E Virtual Interface Card
- Cisco UCS Virtual Interface Card 1280

- Cisco UCS Virtual Interface Card 1240
- Cisco UCS Virtual Interface Card 1225
- Cisco UCS Virtual Interface Card 1225T
- Cisco UCS Virtual Interface Card 1227
- Cisco UCS Virtual Interface Card 1227T
- Cisco UCS Virtual Interface Card 1340
- Cisco UCS Virtual Interface Card 1380
- Cisco UCS Virtual Interface Card 1385

VM-FEX for Hyper-V

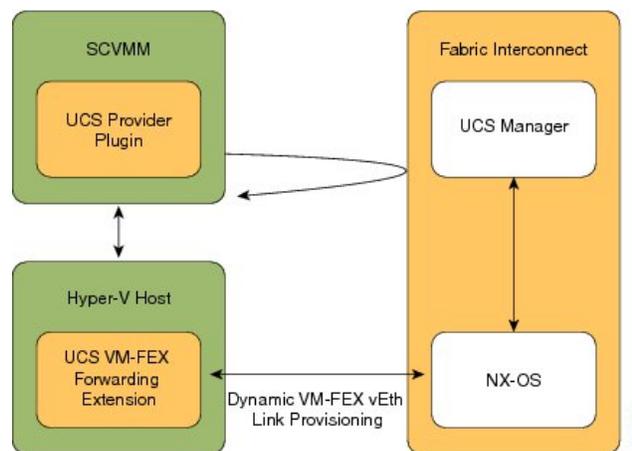
Overview of the Cisco UCS VM-FEX with Microsoft SCVMM Architecture

Cisco UCS Manager (UCSM) and Microsoft System Center Virtual Machine Manager (SCVMM) integration extends the Virtual Machine Fabric Extender (VM-FEX) technology to the Microsoft virtualization platform. The architecture allows Cisco UCSM to configure the networking objects that Microsoft SCVMM uses to set up its networking stacks. Microsoft SCVMM uses the networking objects that are created by Cisco UCSM and deploys them on the Microsoft Hyper-V host that hosts the VMs.

The Hyper-V uses Single Root I/O Virtualization (SR-IOV) technology to deploy virtual connections. The VM's interface gets mapped to the virtual function. The SR-IOV support was added to Cisco UCS Release 2.1 to allow the deployment of VM-FEX in Microsoft Hyper-V hosts, but it lacked a centralized VM network management. Release supports the management plane integration with Microsoft SCVMM and provides a centralized VM network management for the Hyper-V hosts. The deployment leverages the SR-IOV technology that is available on the Cisco virtual interface card (VIC) adapters and enables Cisco UCS fabric interconnects (FIs) to be VM aware.

Figure 1 shows the Cisco UCS VM-FEX with Microsoft SCVMM architecture.

Figure 1: Cisco UCS VM-FEX with Microsoft SCVMM Architecture



Cisco UCSM

Cisco UCSM deploys the service profiles and provisions the baremetal as part of the service profile deployment. While configuring the service profile network settings for the Hyper-V hosts, the administrators have to make sure that the SR-IOV support is enabled. The network administrator defines the networking objects, for example, the VLANs and the port profiles in Cisco UCSM. These objects get pushed to Cisco NX-OS in the fabric interconnect (FI). The server administrator installs the Cisco UCS provider plugin on Microsoft SCVMM.

Microsoft SCVMM

The Cisco UCS provider plugin enables Microsoft SCVMM to pull the networking objects from Cisco UCSM, use them natively, and deploy them on the Hyper-V hosts. The hosts that are being added to the host groups are the same servers that Cisco UCSM has deployed using the service profiles. It also pulls the network configuration that is specified in Cisco UCSM and pushes it to the Hyper-V host. When you deploy a Logical Switch on the Hyper-V host, the driver extension gets pushed to the host.

The Cisco UCS VM-FEX forwarding extension is a driver extension that is situated on the Hyper-V host. It ensures that the packets are forwarded to the fabric interconnect (FI) and the switching occurs in the FI. The FI is aware of all the MAC addresses of the VMs. The VM-FEX forwarding extension driver gets the configuration from Microsoft SCVMM and instructs Cisco NX-OS to provision a virtual Ethernet interface for virtual NICs (vNICs) that come up on the host.

Dynamic VM-FEX vEth Link Provisioning connects the Hyper-v host and Cisco NX-OS. When a VM is online or when you power on a VM, its network card sends a VIC attach using the Cisco VIC protocol and it gets dynamically connected to the FI.

Hyper-V Host

Microsoft Hyper-V is a virtualization package for Windows Server 2012 and later releases on an x86-64 hardware platform. Hyper-V uses x86 hardware virtualization extensions (for example, Intel VT-x) to implement a hypervisor that hosts VMs as userspace processes.

With VM-FEX for Hyper-V, the hypervisor performs no switching of VM traffic. Working with an installed VIC adapter, the hypervisor acts as an interface virtualizer, and performs the following functions:

- For traffic going from a VM to the VIC, the interface virtualizer identifies the source vNIC so that the VIC can explicitly tag each of the packets generated by that vNIC.
- For traffic received from the VIC, the interface virtualizer directs the packet to the specified vNIC.

All switching is performed by the external fabric interconnect, which can switch not only between the physical ports, but also between the virtual interfaces (VIFs) that correspond to the vNICs on the VMs.

Networking Terminology

Refer to the following Microsoft networking terminology for more information on the networking objects.

Logical Switch

A logical switch is the native distributed virtual switch (DVS) by Microsoft. It is a template that you can use to instantiate a virtual switch from. You can define a native switch and attach an extension to it. It is known as a switch extension.

Fabric Network

A fabric network is a logical network that has network segments (VLANs) that span across multiple sites. A fabric network can have one or more network sites.

Network Site

A network site includes site-specific network segments. It is also known as a fabric network definition (FND). A network site can have one or more network segments.

Network Segment

A network segment is also known as a VM Network Definition (VMND). It consists of a VLAN and an IP pool.

VM Network

A VM network references a network segment. It is used by the tenant as a network that the network tenants can attach their VMs to. It is the tenant's view of the network.

Virtual Port Profile

A virtual port profile is a profile that defines the quality of service (QoS)/service level agreement (SLA) for a vNIC.

Uplink Port Profile

An uplink port profile carries a list of allowed network segments for a physical network interface card (PNIC).

Reference

For more information on the networking objects, see **Configuring Logical Networking in VMM Overview** at <http://technet.microsoft.com/en-us/library/jj721568.aspx>.

Supported Microsoft Software Versions

Cisco UCS Release supports the following Microsoft software:

- SCVMM 2012 SP1
- Windows Hyper-V 2012 SP1
- SCVMM 2012 R2
- Windows Hyper-V 2012 R2

Reference

For more information on Microsoft SCVMM 2012 SP1 release, see **Description of Update Rollup 4 for System Center 2012 Service Pack 1** at <http://support.microsoft.com/kb/2879276/EN-US>.

For more information on Microsoft SCVMM 2012 R2 release, see **Description of Update Rollup 1 for System Center 2012 R2** at <http://support.microsoft.com/kb/2904734/en-us>.



CHAPTER

2

Configuring Networking Objects in Cisco UCS Manager

This chapter includes the following sections:

- [Understanding the Cisco UCSM and Microsoft SCVMM Workflow](#) , page 7
- [Configuring Service Profile Network Settings for Hyper-V Hosts](#), page 8
- [Configuring a VLAN](#), page 9
- [Configuring an IP Pool](#), page 9
- [Configuring a Fabric Network](#), page 10
- [Configuring a Network Site](#), page 10
- [Configuring a Network Segment](#), page 11
- [Configuring a VM Network](#), page 12
- [Configuring SCVMM Provider](#), page 13
- [Configuring Uplink Port Profiles](#), page 14
- [Creating a Virtual Port Profile](#), page 15
- [Configuring a Profile Client](#), page 16

Understanding the Cisco UCSM and Microsoft SCVMM Workflow

See the following steps for a complete workflow of Cisco UCSM with Microsoft SCVMM:

- 1 Configure the service profile network settings for the Hyper-V hosts.
- 2 Configure VLANs and IP pools.
- 3 Configure the fabric network sets, the fabric network, the network site, and the network segment.
- 4 Associate a VM network to the network segment.
- 5 Create a Microsoft SCVMM provider.

- 6 Create a logical switch.
- 7 Configure an uplink port profile (UPP).
- 8 Create a virtual port profile (VPP) (for example, port classification for Microsoft).
- 9 Create a port profile client for the virtual port profile (VPP) and choose the logical switch that was created under the Microsoft SCVMM provider.
- 10 Install the Cisco UCS provider plugin in SCVMM.
- 11 Create a Network Service instance on the provider. The provider fetches all the network definitions from Cisco UCSM. The users can schedule the polls for periodic updates.
- 12 Create a logical switch in SCVMM by checking the **Enable single root I/O virtualization (SR-IOV)** check box and adding Cisco UCSM's logical switch as an extension. Choose an appropriate uplink port profile and virtual port profile.
- 13 Create a VM network in SCVMM and choose the network segment from the drop-down list.
- 14 Attach the Hyper-V hosts to SCVMM.
- 15 Deploy the logical switch to the Hyper-V host.
- 16 Create a VM instance in SCVMM. Assign the VM NIC to a VM network and the port classification.
- 17 Power on the VM and load the eNIC driver on the VM. The eNIC driver now establishes a network link with the Cisco UCS fabric interconnect (FI). The FI enforces the port classification as per the assigned port profile properties.
- 18 Verify the VM vNICs in the Cisco UCSM GUI.

Configuring Service Profile Network Settings for Hyper-V Hosts

As a prerequisite for the Hyper-V host that you plan on using in the Cisco UCS cluster, configure the service profile network settings first. In the **Modify vNIC** window in the GUI, configure the dynamic vNIC connection policy on the static vNIC.

- In the **Adapter Performance Profile** panel, select an **SRIOV** adapter policy for static vNICs.
- In the **Connection Policies** panel, select **Dynamic vNIC** connection policy on one or more static vNICs that you plan on using.
- In the **Connection Policies** panel, click **Add** to create a dynamic vNIC connection policy. A new window opens.
- Select **windows** as the adapter policy for the dynamic vNIC.
- Specify the number of dynamic vNICs.
- Click **OK**.

After completing the steps outlined in this section, SR-IOV is enabled on the vNICs. For more information on configuring policies, see [Configuring Policies](#), on page 31.



Note

The service profile for VM-FEX configuration must have at least 2 eNICs created on it, one for VM-FEX and another for communication with SCVMM. If there is just one eNIC on the service profile to implement SRIOV and talk to SCVMM, the configuration will not work when a logical switch is deployed on the eNIC.

Configuring a VLAN

For more information on creating VLANs, see the CLI configuration guide for the Cisco UCSM version that you are using.

Configuring an IP Pool

Configure an IP pool in the VM tab.

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope system	Enters system mode.
Step 2	UCS-A /system # scope vm-mgmt	Enters system VM management mode.
Step 3	UCS-A /system/vm-mgmt # scope vnetset	Enters VM network set (vnetset) mode.
Step 4	UCS-A /system/vm-mgmt/vnetset # create ip-pool SCJ2-pool	Creates an IP pool.
Step 5	UCS-A /system/vm-mgmt/vnetset/ip-pool # set { <i>dhcp-support</i> <i>guid</i> <i>net-bios</i> ...} <i>ip-pool-name</i>	Sets DHCP support and Netbios mode. Note Do not configure the GUID. It is automatically generated by the Cisco UCSM.
Step 6	UCS-A /system/vm-mgmt/vnetset/ip-pool # create { <i>block</i> <i>dns-suffix</i> <i>wins-server</i> } <i>ip-pool-name</i>	Sets DNS suffix and wins-server mode.
Step 7	UCS-A /system/vm-mgmt/vnetset/ip-pool/dns-suffix # commit-buffer	Commits the transaction. Note Configuring both IPv6 and IPv4 IP pools at the same time is not supported. When configuring the IP pool blocks, only one block is supported.

The following example shows how to create an IP pool and commit the transaction:

```
UCS-A # scope system
UCS-A /system # scope vm-mgmt
UCS-A /system/vm-mgmt # scope vnetset
UCS-A /system/vm-mgmt/vnetset # create ip-pool SJC-pool
UCS-A /system/vm-mgmt/vnetset/ip-pool # create block 192.168.100.1 192.168.100.200
192.168.100.10 255.255.255.0
UCS-A /system/vm-mgmt/vnetset/ip-pool/dns-suffix # commit-buffer
UCS-A /system/vm-mgmt/vnetset/ip-pool # create dns-suffix test-cli.com
UCS-A /system/vm-mgmt/vnetset/ip-pool/dns-suffix # commit-buffer
UCS-A /system/vm-mgmt/vnetset/ip-pool # create wins-server test-wins
UCS-A /system/vm-mgmt/vnetset/ip-pool/wins-server # set ipv4-address 10.10.8.8
UCS-A /system/vm-mgmt/vnetset/ip-pool/wins-server # commit-buffer
UCS-A /system/vm-mgmt/vnetset/ip-pool/wins-server # exit
UCS-A /system/vm-mgmt/vnetset/ip-pool # scope dns-suffix test-cli.com
```

```

UCS-A /system/vm-mgmt/vnetset/ip-pool/dns-suffix # set host-name test.com
UCS-A /system/vm-mgmt/vnetset/ip-pool/dns-suffix # commit-buffer
UCS-A /system/vm-mgmt/vnetset/ip-pool # set net-bios active
UCS-A /system/vm-mgmt/vnetset/ip-pool # commit-buffer
UCS-A /system/vm-mgmt/vnetset/ip-pool # set dhcp-support supported
UCS-A /system/vm-mgmt/vnetset/ip-pool # commit-buffer
UCS-A /system/vm-mgmt/vnetset/ip-pool # exit

```

Configuring a Fabric Network

Configure a Fabric Network in the VM tab.

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope system	Enters system mode.
Step 2	UCS-A /system # scope vm-mgmt	Enters system VM management mode.
Step 3	UCS-A /system/vm-mgmt # scope vnetset	Enters VM network set (vnetset) mode.
Step 4	UCS-A /system/vm-mgmt/vnetset # create fabric-network fabric-network-name	Creates a Fabric Network.
Step 5	UCS-A /system/vm-mgmt/vnetset/fabric-network # commit-buffer	Commits the transaction.

The following example shows how to create a Fabric Network:

```

UCS-A # scope system
UCS-A /system # scope vm-mgmt
UCS-A /system/vm-mgmt # scope vnetset
UCS-A /system/vm-mgmt/vnetset # create fabric-network blizzard
UCS-A /system/vm-mgmt/vnetset/fabric-network # commit-buffer

```

Configuring a Network Site

Configure a Network Site in the VM tab.

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope system	Enters system mode.
Step 2	UCS-A /system # scope vm-mgmt	Enters system VM management mode.
Step 3	UCS-A /system/vm-mgmt # scope vnetset	Enters VM network set (vnetset) mode.

	Command or Action	Purpose
Step 4	UCS-A /system/vm-mgmt/vnetset # create fabric-network <i>fabric-network-name</i>	Creates a Fabric Network.
Step 5	UCS-A /system/vm-mgmt/vnetset/fabric-network # create network-site <i>network-site-name</i>	Creates a Network Site.
Step 6	UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site # commit-buffer	Commits the transaction.

The following example shows how to create a Network Site:

```
UCS-A # scope system
UCS-A /system # scope vm-mgmt
UCS-A /system/vm-mgmt # scope vnetset
UCS-A /system/vm-mgmt/vnetset # create fabric-network blizzard
UCS-A /system/vm-mgmt/vnetset/fabric-network # create network-site blizzard-SJC
UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site # commit-buffer
```

Configuring a Network Segment

Configure a Network Segment in the VM tab.

Before You Begin

Configure a Network Site before configuring a Network Segment.

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope system	Enters system mode.
Step 2	UCS-A /system # scope vm-mgmt	Enters system VM management mode.
Step 3	UCS-A /system/vm-mgmt # scope vnetset	Enters VM network set (vnetset) mode.
Step 4	UCS-A /system/vm-mgmt/vnetset # create fabric-network <i>fabric-network-name</i>	Creates a Fabric Network.
Step 5	UCS-A /system/vm-mgmt/vnetset/fabric-network # create network-site <i>network-site-name</i>	Creates a Network Site.
Step 6	UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site # create network-segment <i>network-segment-name</i>	Creates a Network Segment.
Step 7	UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site/network-segment # set ippool-name <i>ippool-name</i>	Sets an IP pool name.

	Command or Action	Purpose
Step 8	UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site/network-segment # set max-ports <i>max-ports-number</i>	Sets the maximum number of ports.
Step 9	UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site/network-segment # create eth-if 1301	Sets the VLAN.
Step 10	UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site/network-segment # commit buffer	Commits the transaction.
Step 11	UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site/network-segment # exit	Exits the mode.

The following example shows how to create a Network Segment with a VLAN and an IP pool:

```
UCS-A # scope system
UCS-A /system # scope vm-mgmt
UCS-A /system/vm-mgmt # scope vnetset
UCS-A /system/vm-mgmt/vnetset # create fabric-network blizzard
UCS-A /system/vm-mgmt/vnetset/fabric-network # create network-site blizzard-SJC
UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site #
create network-segment blizzard-SJC
UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site/network-segment #
set ippool-name SJC-pool
UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site/network-segment #
set max-ports 250
UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site/network-segment #
commit buffer
UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site/network-segment #
create eth-if 1301
UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site/network-segment/eth-if #
commit buffer
UCS-A /system/vm-mgmt/vnetset/fabric-network/network-site/network-segment/eth-if #
exit
```

Configuring a VM Network

Configure a VM Network in the VM tab.

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope system	Enters system mode.
Step 2	UCS-A /system # scope vm-mgmt	Enters system VM management mode.
Step 3	UCS-A /system/vm-mgmt # scope vnetset	Enters VM network set (vnetset) mode.
Step 4	UCS-A /system/vm-mgmt/vnetset # create vm-network <i>vm-network-name</i>	Creates a VM Network.

	Command or Action	Purpose
Step 5	UCS-A /system/vm-mgmt/vnetset/vm-network # set fabric-network-name <i>fabric-network-name</i>	Sets the Fabric Network.
Step 6	UCS-A /system/vm-mgmt/vnetset/vm-network # set descr <i>description</i>	(Optional) Sets the description for the VM Network.
Step 7	UCS-A /system/vm-mgmt/vnetset/vm-network # commit buffer	Commits the transaction.
Step 8	UCS-A /system/vm-mgmt/vnetset/vm-network # exit	Exits the configuration.

The following example shows how to create a VM Network:

```
UCS-A # scope system
UCS-A /system # scope vm-mgmt
UCS-A /system/vm-mgmt # scope vnetset
UCS-A /system/vm-mgmt/vnetset # create vm-network VMN-SJC
UCS-A /system/vm-mgmt/vnetset/vm-network # set fabric-network-name blizzard
UCS-A /system/vm-mgmt/vnetset/vm-network # set descr blizzard_fabric_network
UCS-A /system/vm-mgmt/vnetset/vm-network # commit-buffer
UCS-A /system/vm-mgmt/vnetset/vm-network # exit
```

What to Do Next

Configure the Network Segment from the GUI.

Configuring SCVMM Provider

Configure a SCVMM provider in the VM tab.

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope system	Enters system mode.
Step 2	UCS-A /system # scope vm-mgmt	Enters system VM management mode.
Step 3	UCS-A /system/vm-mgmt # scope microsoft	Enters Microsoft mode.
Step 4	UCS-A /system/vm-mgmt/microsoft # create vmm-provider <i>scvmm-provider-name</i>	Creates SCVMM provider.
Step 5	UCS-A /system/vm-mgmt/microsoft/vmm-provider # set { <i>description</i> <i>hostname</i> }	Sets the description and the IP address of the SCVMM provider. Note Enter the IP address of the server in this field. Due to a restriction, you cannot enter the DNS host name in the field.

	Command or Action	Purpose
Step 6	UCS-A /system/vm-mgmt/microsoft/vmm-provider # commit-buffer	

The following example shows how to create a SCVMM provider:

```
UCS-A # scope system
UCS-A /system # scope vm-mgmt
UCS-A /system/vm-mgmt # scope microsoft
UCS-A /system/vm-mgmt/vnetset/microsoft/ # create vmm-provider savbu-scvmm-02
UCS-A /system/vm-mgmt/vnetset/microsoft/vmm-provider # set hostname 10.0.0.10
UCS-A /system/vm-mgmt/vnetset/microsoft/vmm-provider # commit-buffer
```

Configuring Uplink Port Profiles

Configure the uplink port profiles in the VM tab.

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope system	Enters system mode.
Step 2	UCS-A /system # scope vm-mgmt	Enters system VM management mode.
Step 3	UCS-A /system/vm-mgmt # scope microsoft	Enters Microsoft mode.
Step 4	UCS-A /system/vm-mgmt/microsoft # scope vmm-provider <i>scvmm-provider-name</i>	Creates SCVMM provider.
Step 5	UCS-A /system/vm-mgmt/microsoft/vmm-provider # create distributed-virtual-switch <i>logical-switch-name</i>	Creates the distributed virtual switch, that is the logical switch for the profile client.
Step 6	UCS-A /system/vm-mgmt/microsoft/vmm-provider//distributed-virtual-switch # create uplink-pp <i>uplink-pp-name</i>	Creates the uplink port profile for the profile client.
Step 7	UCS-A /system/vm-mgmt/microsoft/vmm-provider//distributed-virtual-switch/uplink-pp # add network-site <i>network-site-name</i>	Adds a network site for the profile client.

	Command or Action	Purpose
Step 8	UCS-A /system/vm-mgmt/microsoft/vmm-provider//distributed-virtual-switch/uplink-pp # commit buffer	Commits the transaction.

The following example shows how to create an uplink port profile for the profile client:

```
UCS-A # scope system
UCS-A /system # scope vm-mgmt
UCS-A /system/vm-mgmt # scope microsoft
UCS-A /system/vm-mgmt/vnetset/microsoft/ # scope vmm-provider savbu-scvm-02
UCS-A /system/vm-mgmt/vnetset/microsoft/vmm-provider #
create distributed-virtual-switch LS-1
UCS-A /system/vm-mgmt/vnetset/microsoft/vmm-provider/distributed-virtual-switch #
create uplink-pp UPP-1
UCS-A /system/vm-mgmt/vnetset/microsoft/vmm-provider/distributed-virtual-switch/uplink-pp#
add network-site blizzard-SJC
UCS-A /system/vm-mgmt/vnetset/microsoft/vmm-provider/distributed-virtual-switch/uplink-pp#
commit buffer
```

Creating a Virtual Port Profile

Before You Begin

For general information about SLA port profiles and profile clients, see [Configuring Port Profiles](#).

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope system	Enters system mode.
Step 2	UCS-A /system # scope vm-mgmt	Enters system VM management mode.
Step 3	UCS-A /system/vm-mgmt # scope profile-set	Enters system VM management profile set mode.
Step 4	UCS-A /system/vm-mgmt/profile-set # create port-profile <i>profile-name</i>	Creates the specified port profile and enters system VM management profile set port profile mode. This name can be between 1 and 16 alphanumeric characters. You cannot use spaces or any special characters other than - (hyphen) and _ (underscore), and you cannot change this name after the object has been saved.
Step 5	UCS-A /system/vm-mgmt/profile-set/port-profile # set descr <i>description</i>	(Optional) Provides a description for the port profile.
Step 6	UCS-A /system/vm-mgmt/profile-set/port-profile # set max-ports <i>max-ports-number</i>	Sets the number for the maximum ports.

	Command or Action	Purpose
Step 7	UCS-A /system/vm-mgmt/profile-set/port-profile # set nw-control-policy <i>policy-name</i>	Sets the network control policy.
Step 8	UCS-A /system/vm-mgmt/profile-set/port-profile # set profile-type <i>sla-only</i>	Configures the port profile as SLA only. Note Select the type of the Port Profile as SLA Only for Hyper-V. For VM-FEX for Hyper-V, the VLANS are pushed from the network segment and not from the port profile.
Step 9	UCS-A /system/vm-mgmt/profile-set/port-profile # commit-buffer	Commits the transaction.

The following example shows how to create and configure a port profile named SanJoseProfile and commit the transaction:

```
UCS-A# scope system
UCS-A /system # scope vm-mgmt
UCS-A /system/vm-mgmt # scope profile-set
UCS-A /system/vm-mgmt/profile-set # create port-profile SanJoseProfile
UCS-A /system/vm-mgmt/profile-set/port-profile* # set descr "Blizzard-QoS"
UCS-A /system/vm-mgmt/profile-set/port-profile* # set max-ports 58
UCS-A /system/vm-mgmt/profile-set/port-profile* # set nw-control-policy access
UCS-A /system/vm-mgmt/profile-set/port-profile/vlan* # set profile-type sla-only
UCS-A /system/vm-mgmt/profile-set/port-profile* # commit-buffer
UCS-A /system/vm-mgmt/profile-set/port-profile # exit
```

What to Do Next

Create a profile client.

Configuring a Profile Client

Configure the profile client in the VM tab.

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope system	Enters system mode.
Step 2	UCS-A /system # scope vm-mgmt	Enters system VM management mode.
Step 3	UCS-A /system/vm-mgmt # scope port-profile-set	Enters system VM management profile set mode.

	Command or Action	Purpose
Step 4	UCS-A /system/vm-mgmt/profile-set # create port-profile <i>virtual-port-profile-name</i>	Creates the specified port profile and enters system VM management profile set port profile mode.
Step 5	UCS-A /system/vm-mgmt/profile-set/port-profile # create client <i>client-name</i>	Creates the port profile client and enters system VM management profile set port profile mode.
Step 6	UCS-A /system/vm-mgmt/profile-set/port-profile/client # set cluster <i>logical-switch-name</i>	Sets the cluster for the Logical Switch.
Step 7	UCS-A /system/vm-mgmt/profile-set/port-profile/client # commit-buffer	Commits the transaction. Note The Datacenter and Folder options are not supported for the SLA port profile.

The following example shows how to create a profile client:

```
UCS-A# scope system
UCS-A /system # scope vm-mgmt
UCS-A /system/vm-mgmt # scope port-profile-set
UCS-A /system/vm-mgmt/profile-set # create port-profile VPP1
UCS-A /system/vm-mgmt/profile-set/port-profile # create client test
UCS-A /system/vm-mgmt/profile-set/port-profile/client # set cluster ls1
UCS-A /system/vm-mgmt/profile-set/port-profile/client # commit-buffer
```




Configuring Microsoft SCVMM

This chapter includes the following sections:

- [About Microsoft SCVMM Dependencies, page 19](#)
- [Installing Cisco Provider Plugin in SCVMM, page 20](#)
- [Creating a Network Service Instance, page 20](#)
- [Creating a Logical Switch in SCVMM, page 21](#)
- [\(Optional\) Applying IP Pools for the VMs, page 22](#)
- [Creating a VM Network in SCVMM, page 23](#)
- [Installing the Host Server Operating System, page 24](#)
- [Obtaining the Cisco Drivers and Utilities for VM-FEX for Hyper-V, page 24](#)
- [Installing the PF Driver and VM-FEX Switch Driver, page 24](#)
- [Attaching a Hyper-V Host to Microsoft SCVMM, page 25](#)
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- [Viewing the Host-side Configuration in Windows Server 2012, page 27](#)
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- [Creating a VM in SCVMM, page 28](#)
- [Verifying VM vNICs in Cisco UCSM GUI, page 29](#)

About Microsoft SCVMM Dependencies

Refer to the following Microsoft SCVMM dependencies for installing Microsoft SCVMM:

- Active Directory (AD) Services (2008 or 2012)
The AD Domain Controller should have the following services:
 - AD DNS
 - AD DHCP (optional)

- MSSQL 2008 (and later versions) database for SCVMM data store
 - SQL command line utilities
 - Windows Assessment and Deployment Kit (ADK 8.0)



Note If you see the error message `Error while enabling Windows feature: Netfx3`, enter the following command as an administrator: `C:\> dism /online /enable-feature /featurename:netfx3 /all /source:d:\sources\sxs`, where `d:\sources\sxs` is the Windows installation folder that is mapped to your machine on the D drive.

Installing Cisco Provider Plugin in SCVMM

The Cisco provider plugin pulls the networking objects from the Cisco UCSM into Microsoft SCVMM. Complete the following steps to install the Cisco provider plugin on Microsoft SCVMM:

Before You Begin

Verify that the SCVMM server is in the same domain as the host, the host has an eNIC driver, and enable the administrator account.



Note See the Microsoft documentation for the prerequisites on bringing up the SCVMM server: <http://technet.microsoft.com/en-us/library/gg610617.aspx>

Procedure

-
- Step 1** Install the Cisco UCSM Network Service provider package, for example, **CiscoProviderUCSMInstaller_1.1.14** on Microsoft SCVMM from your local drive. The installers are located in the **Installers** directory in the ISO image, for example, `ucs-bxxx-drivers\Windows\Installers\Cisco`. When the installation is complete, the Cisco UCSM **Network Service Provider Package Setup** window appears.
- Step 2** Click **Finish** to exit the setup wizard.
-

Creating a Network Service Instance

After you install the Cisco UCSM plugin, you can launch the SCVMM GUI and add a Network Service instance in the Microsoft SCVMM GUI.

Procedure

- Step 1** In the Microsoft SCVMM GUI, click **Fabric**.
- Step 2** Under **Networking**, right-click **Network Service** and choose **Add Network Service**. The **Add Network Service** window appears. Enter the connection settings.
- Step 3** In the **General** tab in the left pane, choose a manufacturer for the Network Service from the drop-down list, for example, Cisco Systems, Inc in the **Manufacturer** field.
- Step 4** In the **Model** field, choose a model for the network service, for example, Cisco UCSM .
- Step 5** In the **Provider** field, choose a configuration provider for the network service, for example, Cisco UCSM Provider.
- Step 6** In the **Connection String** field, enter the IP address of the Cisco UCSM , for example, 10.2.2.2.
- Step 7** In the **Run as Account** field, click **Browse**. The **Select a Run as Account** window appears. Click **Select Run as Account** tab.
- Step 8** In the **Name** field, enter the name for the **Run as Account**.
- Step 9** Enter the user name and password for the **Run as Account**. The user name and password are the same that you need for the Cisco UCSM.
- Step 10** Confirm the password.
- Step 11** Check the **Validate Domain Credentials** checkbox.
- Step 12** Click **OK**. The account is displayed in the **Select a Run as Account** window. You can create a new account or manually provide the credentials.
- Step 13** Click **Next**.
- Step 14** In the **Host Groups** tab in the left pane, choose the host groups that can use the Network Service.
- Step 15** Click **Next**.
- Step 16** In the **Summary** tab in the left pane, confirm the settings and click **Finish**. Check the status of the operation in the **Jobs** window. Once the task is complete, the Cisco UCSM is added to the Network Service.
- Step 17** In the SCVMM GUI, choose the Cisco UCSM and click **Refresh**. The networking objects are pulled from the Cisco UCSM into SCVMM. Only one Cisco UCSM per SCVMM is supported.

Note Known Issue: Refreshing the Network Service in SCVMM might result in errors that are harmless. You will see the following error: **Error (2606) Unable to perform the job because one or more of the selected objects are locked by another job**.

We do not recommend that you make changes to one or more network segments; Microsoft does not support these changes. We also recommend that you do not make any changes to one or more fabric networks, network sites, or the fabric network tree.

Creating a Logical Switch in SCVMM

A logical switch contains the configuration information that controls the behavior of the virtual switches across hosts in your data center.

Procedure

- Step 1** In the Microsoft SCVMM GUI, click **Fabric** in the bottom-left pane and then click **Logical Switches** under **Networking**, and choose the **Create Logical Switch** option. The **Create Logical Switch Wizard** window appears. The **Getting Started** tab in the left pane displays the information and the prerequisites for creating a logical switch.
- Step 2** Click **Next**.
- Step 3** In the **General** tab, enter the name of the logical switch.
- Step 4** (Optional) In the **Description** field, enter the description of the logical switch.
- Step 5** Check the **Enable Single Root I/O Virtualization (SR-IOV)** check box.
- Step 6** Click **Next**.
- Step 7** In the **Extensions** tab, uncheck the **Microsoft Windows Filter** check box because the filtering extension is not allowed with the forwarding extension. This is a Microsoft restriction.
- Step 8** Choose the **Virtual Switch Extensions** that you want to use with the logical switch. Choose the logical switch as the forwarding extension. This object is pulled from the Cisco UCSM.
- Step 9** Click **Next**.
- Step 10** In the **Uplink** tab, click **Add**. The **Add Uplink Port Profile** window appears.
- Step 11** Choose the **Uplink Port Profile**.
- Step 12** Click **OK**.
- Step 13** Click **Next**.
- Step 14** In the **Virtual Port** tab, click **Add**. The **Add Virtual Port** window displays. If you created a port profile client earlier for the logical switch, you will see the name of the logical switch with the port profile in this window.
- Step 15** In the **Port Classification** field, click **Browse** and choose the default SR-IOV port profile.
- Step 16** Choose the logical switch and the associated port profile.
- Step 17** Choose **Include a virtual network adapter port profile in this virtual port**.
- Step 18** Choose the SR-IOV profile as the native virtual network adapter port profile.
- Step 19** Click **OK**.
The SR-IOV port profile is displayed in the **Virtual Port** tab.
- Step 20** Click **Next**.
- Step 21** in the left pane, click the **Summary** tab and confirm the settings.
- Step 22** Click **Finish**.
The logical switch, the uplink port profile, and the port classification are displayed in the SCVMM GUI.
-

(Optional) Applying IP Pools for the VMs

You can apply the IP pools for the VMs. This step is optional.

Procedure

- Step 1** Click **Library** in the Microsoft SCVMM GUI, select **VM Templates** under **Templates** menu.
 - Step 2** Right-click **Create VM Template**.
The **Create VM Template Wizard** window appears in the Microsoft SCVMM GUI.
 - Step 3** Click **Browse** and select a source for the new VM template.
 - Step 4** Click **OK**.
 - Step 5** In the **VM Template Name** field, enter the VM template name.
 - Step 6** (Optional) In the **Description** field, enter the VM template description.
 - Step 7** Click **Next**.
Follow the prompts in the wizard to create the VM template.
 - Step 8** Use the template as a source to install the VM.
When you select a host and review virtual machine settings on a specific network adapter, the Cisco UCSM configuration specific to the logical network is pulled into SCVMM. You can apply IP pools for the VMs by using the template.
- Note** For more information about how to configure IP pools, see the Microsoft SCVMM documentation.
-

Creating a VM Network in SCVMM

You can configure the settings for the VM network.

Procedure

- Step 1** Click **VMs and Services** in the Microsoft SCVMM GUI.
 - Step 2** Right-click **VM Networks** and select **Create VM Network**.
The **Create VM Network Wizard** window appears in the Microsoft SCVMM GUI.
 - Step 3** In the **Name** tab, specify the name of the VM network.
 - Step 4** In the **Isolation** tab, specify the name of the network manager for the VM network.
 - Step 5** (Optional) In the **Description** tab, specify the description of the VM network.
 - Step 6** Choose the logical network from the drop-down list.
The logical network is the fabric network that is created on the Cisco UCSM side.
 - Step 7** Click **Next**.
The system displays the VM network that is created for the fabric network on the Cisco UCSM side.
 - Step 8** In the **Isolation** tab, specify the isolation for the VM network.
 - Step 9** Click **Next**.
 - Step 10** Configure the settings for the VM network in the **Settings** tab.
 - Step 11** Click **Finish**.
The VM network is displayed in the Microsoft SCVMM GUI.
- Note** If you have a VM network, you can point it only to one network segment. If you have any offline VMs and they use a particular VM network, do not change the association of the VM networks. You can change the association only when the VMs are deleted.

Installing the Host Server Operating System

Before You Begin

For detailed information about installing Windows Server 2012 or Windows Server 2012 R2 with Hyper-V, see the Microsoft Windows Server 2012 or Microsoft Windows Server 2012 R2 documentation.

Procedure

- Step 1** Install Windows Server 2012 or Windows Server 2012 R2 with Hyper-V on the host server.
 - Step 2** Open the Windows Server Manager.
-

What to Do Next

Install the Cisco drivers and utilities.

Obtaining the Cisco Drivers and Utilities for VM-FEX for Hyper-V

Procedure

- Step 1** From the Cisco support site, download the Cisco UCS B-Series Blade Server Software Bundle ISO file. The Cisco UCS B-Series Blade Server Software Bundle contains drivers, installation utilities, and the Cisco UCS Provider Plugin for VM-FEX for Hyper-V.
 - Step 2** In the Cisco UCS Manager KVM settings, mount the software bundle ISO file as virtual media for access from your servers.
 - Step 3** From the host server, open the `CSCO_VIO_INSTALLER_<version>` directory in the ISO file. Insert the release version number for *version* in the directory name. For example, the directory name is `CSCO_VIO_INSTALLER_2.4.22` for Release 2.2(1).
 - Step 4** Open and read the `readme.txt` file for the latest information about installing and configuring VM-FEX for Hyper-V.
-

Installing the PF Driver and VM-FEX Switch Driver

Perform this task on the host server to install the Cisco VIO drivers and utilities.



Note The Cisco VM-FEX switch driver is installed by SCVMM when the SRIOV-enabled switches are created on the host.

Before You Begin

The Cisco UCS B-Series Blade Server Software Bundle ISO file must be mounted on the server.

Procedure

- Step 1** In Powershell on the host server, open the `CSCO_VIO_INSTALLER_<version>` directory in the contents of the mounted ISO file.
- Step 2** Run `CSCO_VIO_INSTALLER_64_<version>.msi` as administrator. Insert the release version number for *version* in the command name. For example, the command name is `CSCO_VIO_INSTALLER_64_2.4.22.MSI` for release 2.2(1).
- Step 3** Choose **Typical** or **Custom** installation. If you choose **Typical** installation, it installs eNIC and fNIC drivers. If you choose **Custom** installation, complete steps 4 through 9.
- Step 4** If necessary, expand **VIO drivers** to display the driver list.
- Step 5** Click **VIC iSCSI dump** and choose **Entire feature will be unavailable**.
Caution The installation might fail if the iSCSI driver are not deselected.
- Step 6** Click **VIC VM-FEX Forwarding Extension** and choose **Entire feature will be unavailable**.
Caution The installation might fail if the VIC VM-FEX forwarding extension driver are not deselected. The VIC VM-FEX forwarding extension is deployed from SCVMM 2012 as part of the logical switch deployment.
- Step 7** Click **VIC Teaming** and choose **Entire feature will be unavailable**.
- Step 8** Click **VIC Management** and choose **Entire feature will be unavailable**.
- Step 9** Click **Next** and follow the instructions to install the drivers.
-

Attaching a Hyper-V Host to Microsoft SCVMM

Before You Begin

- Install the operating system.
- Update the driver.
- Move the host to the same domain as the SCVMM.
- Disable the firewall.



Tip Cisco recommends that you install Hyper-V before adding the host to SCVMM. If you do not install Hyper-V before adding the host to SCVMM, a light version of Hyper-V, without a GUI, is installed.

Procedure

-
- Step 1** In Microsoft SCVMM GUI, click **VMs and Services** in the bottom-left pane and then click **All Hosts**.
- Step 2** Right-click and choose **Add Hyper-V Hosts and Clusters**.
- Step 3** In the **Credentials** tab, provide the **Run as Account** details.
Note Enter domain administrator credentials in this tab.
- Step 4** Click **Next**.
- Step 5** In the **Discovery Scope** tab, add the hostname in the **Computer Name** pane. The system discovers the host.
- Step 6** In the **Target Resources** tab, choose the host and click **Next**.
 If the Hyper-V role is not enabled on any of the selected servers, SCVMM enables the role on these servers as part of the Add Host process, that results in a restart of the server. If any of the servers have a pending restart, they are also restarted.
- Step 7** Click **OK** to continue.
- Step 8** In the **Host Settings** tab, assign the selected host to a host group.
- Step 9** Click **Next**.
- Step 10** In the **Migration Settings** tab, choose the live storage migration settings and click **Next**. The default value for live storage migration is 2.
- Step 11** Click **Finish**.
 The virtual machine host is added in the Microsoft SCVMM GUI. After the host is added to Microsoft SCVMM, verify that a connection is established between the SCVMM and the host. While attaching a host, use the management interface. After the host is added, a warning message indicates that multipath I/O is not enabled for known storage arrays on the specified host. This is a known issue with Microsoft. The recommended action is that if you want to provision the storage using SCVMM, you must enable multipath I/O for storage arrays that are being used on the host by adding the multipath I/O feature.
-

Enabling SRIOV in SCVMM Failover Cluster

Before You Begin

- All network interfaces on nodes in the cluster must have the same configuration (name, uplink VLANs and so on)
- The virtual switch must be a logical switch that can be provisioned on all Hyper-V nodes in the cluster.

Procedure

- Step 1** Bring up two nodes with latest eNIC driver version.
 - Step 2** Create a cluster with these two nodes.
 - Step 3** Install SQL on a standalone node, which is not part of the cluster.
 - Step 4** Install SCVMM on the first node in the cluster. The Microsoft documentation, <https://technet.microsoft.com/en-us/library/gg610678.aspx> provides detailed information about this.
 - Step 5** Install SCVMM on the other node in the cluster. The Microsoft documentation, <https://technet.microsoft.com/en-us/library/hh411279.aspx> provides detailed information about this.
 - Step 6** Install the Cisco Provider Plugin on the first and second node. Please note that there is no need to bring down any node in the cluster while installing the Cisco Provider Plugin.
 - Step 7** Launch SCVMM and add a Hyper-V host.
-

Viewing the Host-side Configuration in Windows Server 2012

Following these guidelines for reviewing the host-side configuration in Windows Server 2012:

- Add the host to the domain. Verify that the domain host account has the administrator rights for adding a host to the domain.
- The Cisco eNIC driver for Windows Server 2012 has the following guidelines:
 - Note that the Cisco eNIC driver is an interface that facilitates communication between supported operating systems and Cisco UCS Virtual Interface Cards.
 - Make sure that the same driver is used for the hypervisor and VM.
- Configure the SR-IOV dynamic connection policy on the adapter in the service profile.
- Make sure that the Hyper-V role is enabled when the host is added to SCVMM.
- Make sure that the forwarding extension driver is installed on the host when the logical switch is created in SCVMM.

Deploying the Logical Switch to the Hyper-V Host

After you add a host to SCVMM, you must create a logical switch and attach it to that host. While attaching the host, it installs the extension drivers from SCVMM on the host.

Before You Begin

Make sure that the data path interfaces are enabled for the Logical Switch and refresh the host.

Procedure

- Step 1** In the Microsoft SCVMM GUI, in the **Host** tab, click **Properties**.
The **Properties** window for the selected host is displayed.
- Step 2** Click the **Hardware** tab.
The available interfaces (network adapters) are displayed in the pane.
- Step 3** Choose the management interface to display the details of the interface.
The interfaces are attached to various logical switches.
- Step 4** Choose the interface that is not associated with any of the logical network connectivity to attach it to the logical switch.
- Step 5** Click the **Virtual Switches** tab.
- Step 6** Click **New Virtual Switch** and select the **New Logical Switch** option.
- Step 7** Select the logical switch from the drop-down list in the **Logical Switch** field.
- Step 8** In the **Physical Adapters** panel, select the first physical adapter.
When you select the logical switch, the uplink port profile is automatically selected for the logical switch. When you have multiple uplink port profiles, you can select one uplink port profile for the logical switch during the logical switch creation process.
- Step 9** Click **OK**.
If the same interface is used by multiple switches, a message window indicates that while SCVMM applies the changes, the host might temporarily lose the connectivity. This event might have an adverse effect on other network operations in progress.
- Step 10** Click **OK**.
The logical switch is now attached to the Hyper-V host.
-

Creating a VM in SCVMM

You can create a VM in SCVMM and attach the logical switch and the VM network to the VM vNICs.

Procedure

- Step 1** Right-click the host in the Microsoft SCVMM GUI and choose **Create Virtual Machine**. The **Create Virtual Machine Wizard** window appears.
- Step 2** Create a Virtual Machine (VM) and follow the hardware configuration steps.
Note There are multiple ways to configure the VMs. For more information, see the Microsoft documentation.
- Step 3** In the **Configure Hardware** tab, choose a network adapter for the VM.
- Step 4** In the **Connectivity** panel on the right side, click **Browse** in the **Connected to a VM network** field and choose a VM network that you created earlier.
- Step 5** Click **OK**.
- Step 6** Choose the MAC address type in the **MAC Address** field.
The MAC address can be **Dynamic** or **Static**.
Note Use the Microsoft recommended settings for the MAC address pool.

- Step 7** In the **Port Profile** field, choose the port classification as **SR-IOV**.
- Step 8** Click **Next**.
- Step 9** In the **Select Destination** tab, choose **Place the virtual machine on a host** and choose the **Destination** as **All Hosts**.
- Step 10** Click **Next**.
The destination host is highlighted.
- Step 11** Click **Next**.
- Step 12** In the **Configure Settings** tab, review the virtual machine settings and click **Next**.
- Step 13** In the **Add Properties** tab, review the settings and click **Next**.
- Step 14** In the **Summary** tab, confirm the settings and check the **Start the virtual machine after deploying it** check box.
- Step 15** Click **Create**.
The VM network is created and it is displayed in the GUI. A warning message indicates that the system cannot set bandwidth setting on the virtual adapter for the SR-IOV switch. The recommended action is to check the native virtual port profile, correct the issue, and try again.
- Step 16** Choose the VM in the GUI and click **Properties**.
- Step 17** Verify the configured properties of the VM.
- Step 18** After the VM is up, install the virtual function (VF) driver on the VM.
Use the same `CSCO_VIO_INSTALLER_64` msi file that was used in [Installing the PF Driver and VM-FEX Switch Driver](#), on page 24. For example, the command name is `CSCO_VIO_INSTALLER_64_2.4.22.MSI` for release 2.2(1).
- Step 19** Choose **Typical** or **Custom** installation. If you choose **Custom** installation, install 'Cisco VIC VMNic Ethernet' and 'VIC Ethernet Utility'.
-

Verifying VM vNICs in Cisco UCSM GUI

You can verify the VM creation status in the Cisco UCSM GUI.

Procedure

- Step 1** In the **Navigation** pane, click the **VM** tab.
- Step 2** On the **VM** tab, expand the **All** node.
- Step 3** Expand **Virtual Machines** and verify that the VM is displayed in the GUI. In the **General** tab, verify the properties of the vNIC fields. You can verify the **Name**, **MAC address**, **Profile Name**, **VMND Name**, and **Status of the vNIC** fields.
-



Configuring Policies

This chapter includes the following sections:

- [Configuring Dynamic vNIC Connection Policies, page 31](#)
- [Creating a Custom Adapter Policy for SR-IOV, page 35](#)

Configuring Dynamic vNIC Connection Policies

Dynamic vNIC Connection Policy



Note

In an SR-IOV topology, such as a Hyper-V or KVM cluster, a Virtual Function (VF) takes the place of the dynamic vNIC. The VF is essentially a restricted version of the dynamic vNIC, in which all system communication and configuration of the VF is performed through the associated physical function (PF).

The dynamic vNIC connection policy determines how the connectivity between VMs and dynamic vNICs is configured. This policy is required for Cisco UCS domains that include servers with VIC adapters on which you have installed VMs and configured dynamic vNICs.

Ethernet Adapter Policy

Each dynamic vNIC connection policy includes an Ethernet adapter policy and designates the number of vNICs that can be configured for any server associated with a service profile that includes the policy.

For Hyper-V, use the predefined Ethernet adapter policy named Windows.

Server Migration



Note If you migrate a server that is configured with dynamic vNICs, the dynamic interface used by the vNICs fails and notifies you of that failure.

When the server comes back up, assigns new dynamic vNICs to the server. If you are monitoring traffic on the dynamic vNIC, you must reconfigure the monitoring source.

Creating a Dynamic vNIC Connection Policy

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope org <i>org-name</i>	Enters organization mode for the specified organization. To enter the root organization mode, enter / as the <i>org-name</i> .
Step 2	UCS-A /org # create dynamic-vnic-conn-policy <i>policy-name</i>	<p>Creates the specified vNIC connection policy and enters organization vNIC connection policy mode.</p> <p>This name can be between 1 and 32 alphanumeric characters. You cannot use spaces or any special characters other than - (hyphen), _ (underscore), : (colon), and . (period), and you cannot change this name after the object is saved.</p> <p>Note Do not specify "default" as the value for the dynamic vNIC connection policy name. Cisco UCS Manager automatically resolves any empty policy references to "default". Any service profiles or service profile templates with only static vNICs defined will automatically reference the policy "default" when it is present. If you specify "default" for the dynamic vNIC connection policy name, then unexpected dynamic vNICs might be created on those service profiles or service profile templates.</p>
Step 3	UCS-A /org/dynamic-vnic-conn-policy # set desc <i>description</i>	<p>(Optional)</p> <p>Provides a description for the policy.</p> <p>Enter up to 256 characters. You can use any characters or spaces except ` (accent mark), \ (backslash), ^ (carat), " (double quote), = (equal sign), > (greater than), < (less than), or ' (single quote).</p> <p>If your description includes spaces or nonalphanumeric characters, you must begin and end your description with double quotation marks. The quotation marks do not appear in the description field of any show command output.</p>
Step 4	UCS-A /org/dynamic-vnic-conn-policy # set adapter-policy <i>policy-name</i>	Specifies the Ethernet adapter policy to use for this policy. The adapter policy must already exist.

	Command or Action	Purpose
Step 5	UCS-A /org/dynamic-vnic-conn-policy # set dynamic-eth { <i>dynamic-eth-num</i> off }	Specifies the number of dynamic vNICs to use for this policy. Enter an integer between 0 and 256. The default is 54. Note Components of your system may limit this number to fewer than 256 vNICs.
Step 6	UCS-A /org/dynamic-vnic-conn-policy # set protection { protected protected-pref-a protected-pref-b }	Dynamic vNICs are always protected in Cisco UCS, but this command allows you to select a preferred fabric, if any. You can choose one of the following options: <ul style="list-style-type: none"> • protected—Cisco UCS uses whichever fabric is available. • protected-pref-a—Cisco UCS attempts to use fabric A, but fails over to fabric B if necessary. • protected-pref-b—Cisco UCS attempts to use fabric B, but fails over to fabric A if necessary.
Step 7	UCS-A /org/dynamic-vnic-conn-policy # commit-buffer	Commits the transaction.

The following example shows how to create a dynamic vNIC connection policy named MyDynVnicConnPolicy that uses the system-provided Ethernet adapter policy for 12 dynamic vNICs and commit the transaction:

```
UCS-A# scope org /
UCS-A /org # create dynamic-vnic-conn-policy MyDynVnicConnPolicy
UCS-A /org/dynamic-vnic-conn-policy* # set adapter-policy
UCS-A /org/dynamic-vnic-conn-policy* # set desc "Dynamic vNIC for Eth policy"
UCS-A /org/dynamic-vnic-conn-policy* # set dynamic-eth 12
UCS-A /org/dynamic-vnic-conn-policy* # commit-buffer
UCS-A /org/dynamic-vnic-conn-policy #
```

Deleting a Dynamic vNIC Connection Policy

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope org <i>org-name</i>	Enters organization mode for the specified organization. To enter the root organization mode, enter / as the <i>org-name</i> .
Step 2	UCS-A /org # delete dynamic-vnic-conn-policy <i>policy-name</i>	Deletes the specified vNIC connection policy.
Step 3	UCS-A /org # commit-buffer	Commits the transaction.

The following example shows how to delete the dynamic vNIC connection policy named MyDynVnicConnPolicy and commit the transaction:

```
UCS-A# scope org /
UCS-A /org # delete dynamic-vnic-conn-policy MyDynVnicConnPolicy
UCS-A /org* # commit-buffer
UCS-A /org #
```

Viewing Dynamic vNIC Properties in a VM

Before You Begin

The VM must be operational.

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope system	Enters system mode.
Step 2	UCS-A /system # scope vm-mgmt	Enters VM management mode.
Step 3	UCS-A /system/vm-mgmt # show virtual-machine	(Optional) Displays the running virtual machines.
Step 4	UCS-A /system/vm-mgmt # scope virtual-machine uuid	Enters command mode for the virtual machine that contains the dynamic vNIC.
Step 5	UCS-A /system/vm-mgmt/virtual-machine # show vnic [detail]	Displays the vNIC properties.

The following example shows how to display the properties of a dynamic vNIC in a VM:

```
UCS-A# scope system
UCS-A /system # scope vm-mgmt

UCS-A /system/vm-mgmt # show virtual-machine
Virtual Machine:
  UUID: 420a00c8-934b-4ae3-6af5-2ce9b8bd0f44
  Service Profile: org-root/ls-PTS-ch6-7
  Server: sys/chassis-6/blade-7
  Status: Online
.
.
.
UCS-A /system/vm-mgmt # scope virtual-machine 420a08b0-cda7-9e0a-424f-01ec8653eea0
UCS-A /system/vm-mgmt/virtual-machine # show vnic detail

vNIC:
  Name: 4479
  Status: Online
  MAC Address: 00:50:56:8A:07:B5
  Profile Name: VM-mgmt
  Virtual Adapter: sys/chassis-1/blade-1/adapter-1/host-eth-9
  Vnic Dn: org-root/ls-PTS-ch1-1/ether-dynamic-prot-009
  Current Task:

UCS-A /system/vm-mgmt/virtual-machine #
```

Creating a Custom Adapter Policy for SR-IOV

The predefined **SRIOV** Ethernet adapter policy supports up to 32 CPU threads. If the server has more than 32 CPU threads, you must follow this procedure to create and specify a custom adapter policy that supports a number of interrupts equal to the number of CPU threads.

For more information about creating an adapter policy, see "Configuring Ethernet Adapter Policies" in the *Cisco UCS Manager CLI Configuration Guide*.

Before You Begin

Determine the number of CPU threads used by your server using the **show server cpu chassis/blade detail** command.

Procedure

	Command or Action	Purpose
Step 1	UCS-A# scope org <i>org-name</i>	Enters organization mode for the specified organization. To enter the root organization mode, type <i>/</i> as the <i>org-name</i> .
Step 2	UCS-A /org # create eth-policy <i>name</i>	Creates an Ethernet adapter policy and enters organization Ethernet policy mode. This name can be between 1 and 16 alphanumeric characters. You cannot use spaces or any special characters other than - (hyphen) and _ (underscore), and you cannot change this name after the object has been saved.
Step 3	UCS-A /org/eth-policy # set descr <i>description</i>	(Optional) Provides a description for the policy. Note If your description includes spaces, special characters, or punctuation, you must begin and end your description with quotation marks. The quotation marks will not appear in the description field of any show command output.
Step 4	UCS-A /org/eth-policy # set trans-queue count <i>1</i>	Configures the Ethernet transmit queue.
Step 5	UCS-A /org/eth-policy # set trans-queue ring-size <i>256</i>	
Step 6	UCS-A /org/eth-policy # set recv-queue count <i>4</i>	Configures the Ethernet receive queue.
Step 7	UCS-A /org/eth-policy # set recv-queue ring-size <i>512</i>	

	Command or Action	Purpose
Step 8	UCS-A /org/eth-policy # set comp-queue count 5	Configures the Ethernet completion queue.
Step 9	UCS-A /org/eth-policy # set interrupt coalescing-time 125	
Step 10	UCS-A /org/eth-policy # set interrupt coalescing-type min	
Step 11	UCS-A /org/eth-policy # set interrupt count interrupt-count	Set <i>interrupt-count</i> equal to the number of CPU threads used by the server.
Step 12	UCS-A /org/eth-policy # set interrupt mode msi-x	
Step 13	UCS-A /org/eth-policy # set offload large-receive enabled	
Step 14	UCS-A /org/eth-policy # set offload tcp-rx-checksum enabled	
Step 15	UCS-A /org/eth-policy # set offload tcp-segment enabled	
Step 16	UCS-A /org/eth-policy # set offload tcp-tx-checksum enabled	
Step 17	UCS-A /org/eth-policy # set rss receivesidescaling enabled	
Step 18	UCS-A /org/eth-policy # commit-buffer	Commits the transaction to the system configuration.

The following example configures a custom Ethernet adapter policy for SR-IOV with 40 threads and commits the transaction:

```
UCS-A# scope org /
UCS-A /org # create eth-policy SRIOV
UCS-A /org/eth-policy* # set descr "This is an Ethernet adapter policy for SR-IOV."
UCS-A /org/eth-policy* # set trans-queue count 1
UCS-A /org/eth-policy* # set trans-queue ring-size 256
UCS-A /org/eth-policy* # set recv-queue count 4
UCS-A /org/eth-policy* # set recv-queue ring-size 512
UCS-A /org/eth-policy* # set comp-queue count 5
UCS-A /org/eth-policy* # set interrupt coalescing-time 125
UCS-A /org/eth-policy* # set interrupt coalescing-type min
UCS-A /org/eth-policy* # set interrupt count 40
UCS-A /org/eth-policy* # set interrupt mode msi-x
UCS-A /org/eth-policy* # set offload large-receive enabled
UCS-A /org/eth-policy* # set offload tcp-rx-checksum enabled
UCS-A /org/eth-policy* # set offload tcp-segment enabled
UCS-A /org/eth-policy* # set offload tcp-tx-checksum enabled
UCS-A /org/eth-policy* # set rss receivesidescaling enabled
UCS-A /org/eth-policy* # commit-buffer
UCS-A /org/eth-policy #
```