

# Configuring Single Root I/O Virtualization (SR-IOV)


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# Configuring BIOS and Cisco UCS Manager Parameters

## Enabling BIOS Parameters

### Before you begin

- Ensure your BIOS policy is set up with the following options:
  - For Intel based servers, enable **Intel VT for directed IO** under **Intel Directed IO** tab.
  - For AMD based servers, enable **IOMMU** and **SVM Mode** under **Processor** tab and enable **SR-IOV** under **LOM and PCIe Slots BIOS Settings** tab.

  To update BIOS options, see, Cisco UCS Manager Server Management Guide.
- You must have a service profile already created for SR-IOV configuration. To create a Service Profile see Cisco UCS Manager Server Management Guide. Once the Service Profile is created, follow the steps in this procedure to enable the BIOS policy.

### Procedure

**Step 1** In the **Navigation** pane, click **Servers**.

**Step 2** Expand **Servers** > **Service Profiles**.

**Step 3** Expand the node for the organization that includes the service profile for which you want to enable SR-IOV BIOS parameters.

If the system does not include multi-tenancy, expand the root node.

**Step 4** Click the service profile for which you want to enable SR-IOV BIOS parameters.

**Step 5** In the **Work** pane, click the **Policies** tab.

**Step 6** On the **Policies** tab, expand **BIOS Policy**.

**Step 7** From the **BIOS Policy** drop-down list, select the BIOS policy that you have created for SR-IOV configuration.

Ensure that the BIOS policy selected satisfies the pre-requisites for this procedure.

**Step 8** Save changes and click **Yes** to reboot the server.

# Enabling SR-IOV VFs using Cisco UCS Manager GUI

To enable SR-IOV from Cisco UCS Manager, you must

- Create an SRIOV HPN Connection Policy with desired number of VFs.
- Assign the SRIOV HPN Connection Policy to a Service Profile.

### Before you begin

- Ensure that the required BIOS options are enabled before performing this procedure.

### Procedure

**Step 1** In the **Navigation** pane, click **LAN**.

**Step 2** Expand **Policies** > **root**.

**Step 3** To create SRIOV HPN Connection Policy, right click **SRIOV HPN Connection Policies**.

**Step 4** You can view and modify the created **SRIOV HPN Connection Policy** properties.

| Name | Description |
|---|---|
| **Name** field | The name of the policy.<br>This name can be between 1 and 16 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. |
| **Description** field | Brief description of the policy. |
| **Number of SRIOV HPN vnics** field | Enter an integer between 1 and 64. |
| **Transmit Queues** field | The number of descriptors in each transmit queue.<br>Enter an integer between 1 and 8. |
| **Receive Queues** field | The number of receive queue resources to allocate.<br>Enter an integer between 1 and 8. |

| Name | Description |
|---|---|
| **Completion Queues** field | The number of completion queue resources to allocate. In general, the number of completion queue resources you should allocate is equal to the number of transmit queue resources plus the number of receive queue resources.<br>Enter an integer between 1 and 16. |
| **Interrupt Count** field | The number of interrupt resources to allocate. In general, this value should be equal to the number of completion queue resources.<br>Enter an integer between 1 and 16. |

**Step 5** Provide the policy name with the desire number of SRIOV HPN vNICs and click **OK** to create **SRIOV HPN Connection Policy**.

**Step 6** In the **Navigation** pane, click **Servers**.

**Step 7** Expand **Servers** > **Service Profiles**.

**Step 8** Expand the node and service profile for the organization that contains the service profile for SR-IOV configuration.

**Step 9** Click the desired service profile for which you wish to apply the SR-IOV VFs.

**Step 10** Expand **vNIC** and select the vNIC for which you wish to apply the SR-IOV VFs.

**Step 11** In the work pane, select the **General** tab.

**Step 12** At the **Adapter Policy** drop-down list, select **SRIOV-HPN**.

**Step 13** Under the **Connection Policies** radio buttons, select **SRIOV-HPN**.

**Step 14** From the **SRIOV HPN Connection Policy** drop-down list, select the policy you have already created for SR-IOV configuration.

**Step 15** Save changes and click **Yes** to reboot the server.

# Disabling SR-IOV VFs Using Cisco UCS Manager GUI

### Procedure

**Step 1** In the **Navigation** pane, click **Servers**.

**Step 2** Expand **Servers** > **Service Profiles**.

Expand the node and service profile for the organization that contains the service profile for SR-IOV configuration.

**Step 3** Click the service profile from which you wish to remove the SR-IOV VFs.

**Step 4** Expand vNIC and select the vNIC for which you wish to disable the SR-IOV VFs.

**Step 5** In the work pane, select the **General** tab.

**Step 6** Under the **Connection Policies** radio button options, select **SRIOV-HPN**.

**Step 7** From the **SRIOV HPN Connection Policy** drop-down list, select **not set** to remove the SR-IOV connection policy.

**Step 8** Save changes and click **Yes** to reboot the server.

# Enabling SR-IOV VFs using Cisco UCS Manager CLI

To enable SR-IOV from Cisco UCS Manager, you must

- Create an SRIOV HPN Connection Policy with desired number of VFs.
- Assign the SRIOV HPN Connection Policy to a Service Profile.

### Before you begin

- Ensure that the required BIOS options are enabled before performing this procedure.

### Procedure

**Step 1** UCS-A # **scope org** *org-name*

Enters organization mode for the specified organization. To enter the root organization mode, type / as the org-name.

**Step 2** UCS-A /org # **create sriov-hpn-conn-policy** *policy-name*

Specifies the name for the SRIOV HPN connection policy.

**Step 3** UCS-A /org/sriov-hpn-conn-policy* # **set sriov-hpn-count** *sriov hpn count*

Specifies the SRIOV HPN vNICs count for the SRIOV HPN connection policy. Enter an integer between 1 and 64.

**Step 4** UCS-A /org/sriov-hpn-conn-policy* # **set transmit-queue-count** *transmit queue count*

Specifies the transmit queue count for the SRIOV HPN connection policy. Enter an integer between 1 and 8.

**Step 5** UCS-A /org/sriov-hpn-conn-policy* # **set receive-queue-count** *receive queue count*

Specifies the receive queue count for the SRIOV HPN connection policy. Enter an integer between 1 and 8.

**Step 6** UCS-A /org/sriov-hpn-conn-policy* # **set completion-queue-count** *completion-queue count*

Specifies the completion queue count for the SRIOV HPN connection policy. In general, the number of completion queue resources you should allocate is equal to the number of transmit queue resources plus the number of receive queue resources. Enter an integer between 1 and 16.

**Step 7** UCS-A /org/sriov-hpn-conn-policy* # **set interrupt-queue-count** *interrupt queue count*

Specifies the interrupt count for the SRIOV HPN connection policy. In general, this value should be equal to the number of completion queue resources. Enter an integer between 1 and 16.

**Step 8** UCS-A /org/sriov-hpn-conn-policy* # **commit-buffer**

Commits the transaction to the system.

**Step 9** UCS-A /org/sriov-hpn-conn-policy* # **exit**

**Step 10** UCS-A /org # **scope service-profile** *profile-name-for-sriov-config*

Enters the service profile for the organization that contains the service profile for SR-IOV configuration.

**Step 11** UCS-A# scope /org/service-profile # **scope vnic** *eth0/eth1*

Select a vNIC for which you wish to apply the SR-IOV VFs.

**Step 12** UCS-A /org/service-profile/vnic # **set adapter-policy SRIOV-HPN**

Sets the adapter policy as **SRIOV HPN**

**Step 13** UCS-A /org/service-profile/vnic # **enter sriov-hpn-conn-policy-ref** *sriov_hpn_connection_policy_name*

Assigns the SRIOV HPN connection policy created previously to the vNIC.

**Step 14** UCS-A /org/service-profile/vnic/sriov-hpn-conn-policy-ref* # **commit-buffer**

Commits the transaction to the system.

# Disabling SR-IOV VFs using Cisco UCS Manager CLI

To disable the SRIOV VFs, you must delete the associated SRIOV HPN connection policy.

**Procedure**

**Step 1** UCS-A # **scope org** *org-name*

Enters organization mode for the specified organization. To enter the root organization mode, type / as the org-name.

**Step 2** UCS-A /org # **scope service-profile** *service_profile_name*

Enter the service profile withing which you wish to disable the SRIOV VFs.

**Step 3** UCS-A /org/service-profile # **scope vnic** *eth0/eth1*

Select a vNIC for which you wish to apply the SR-IOV VFs.

**Step 4** UCS-A /org/service-profile/vnic # **delete sriov-hpn-conn-policy-ref** *sriov_hpn_connection_policy_name*

Deletes the SRIOV HPN Connection policy. This disables the SRIOV VFs.

**Step 5** UCS-A /org/service-profile/vnic* # **commit-buffer**

Commits the transaction to the system.

# Configuring SR-IOV VFs on the ESXi Host Server

## Installing Cisco eNIC Driver

### Before you begin

Ensure that the required BIOS parameters and SR-IOV VFs configurations are completed.

### Procedure

**Step 1** Install the enic driver on the host.

The following example shows the installation of eNIC driver on ESXi:

```
[root@localhost:/vmfs/volumes/645c8bdd-c655e553-8ba0-e8d32272f6c0] esxcli software vib
install -v /vmfs/volumes/C240M7-Standalone/nenic-2.0.10.0-1OEM.800.1.0.20143090.x86_64.vib
--no-sig-check
Installation Result
Message: The update completed successfully, but the system needs to be rebooted for the
changes to be effective.
VIBs Installed: CIS_bootbank_nenic_2.0.10.0-1OEM.800.1.0.20143090
VIBs Removed: CIS_bootbank_nenic_2.0.11.0-1OEM.800.1.0.20143090
VIBs Skipped:
Reboot Required: true
DPU Results:
[root@localhost:/vmfs/volumes/645c8bdd-c655e553-8ba0-e8d32272f6c0]
```

**Step 2** Reboot the server to load the enic driver into the running kernel.

**Step 3** After reboot, execute the command `esxcli software vib list | grep nenic` to check the driver version.

## Verifying the Total Number of SR-IOV VFs Per Ports on the Host

You can verify the total number of SR-IOV VFs in the following two ways:

### Procedure

**Step 1** Verify by logging into the VMware ESXi Host Client.:

- Login to the VMware ESXi Host Client.
- Execute the following command to check the vNIC with SR-IOV capability:

```
root@localhost:~] esxcli network sriovnic list
Name    PCI Device    Driver  Link  Speed  Duplex  MAC Address         MTU  Description
-----------------------------------------------------------------------------------------------------
vmnic0  0000:1b:00.0  nenic   Up    50000  Full    f4:ee:31:30:80:40  1500  Cisco Systems
 Inc Cisco VIC Ethernet NIC
```

The following output shows the number of VF configured on vNIC:

```
[root@localhost:~] esxcli network sriovnic vf list -n vmnic0
VF ID  Active  PCI Address      Owner World ID
0   false  00000:027:00.1   -
1   false  00000:027:00.2   -
2   false  00000:027:00.3   -
3   false  00000:027:00.4   -
4   false  00000:027:00.5   -
5   false  00000:027:00.6   -
6   false  00000:027:00.7   -
7   false  00000:027:01.0   -
```

**Step 2** Alternatively, you can also access your host from vSphere vCenter Client.

For more information on configuring SR-IOV VFs on the host, see Creating SR-IOV VFs on the Host.

After you reboot the host server, do the following:

- Login to the ESXi Host Client, and choose **Networking** > **Virtual Switches**.
- Click **Add Standard Virtual Switch**.
- Add a switch name in the **vSwitch Name** field, select the vmnic with SR-IOV capability, and click **Add**.
- In the **Port Groups** tab, click **Add Port Group**.
- In the **Add Port Group** dialog-box, add a new port group and select the switch from the **Virtual Switch** drop-down.

# Creating SR-IOV VFs on the Host

### Procedure

**Step 1** Login to your VMware ESXi Host Client.

Alternatively, you can also access your host from vSphere vCenter Client and browse to **Configure** > **Networking** > **Physical adapters**.

**Step 2** Go to **Host** > **Manage** and select the **Hardware** tab.

**Step 3** Select **PCI Devices** from the list.

**Step 4** From the drop-down list, select **SR-IOV Capable**.

The list shows all the SR-IOV capable devices.

**Step 5** Select the vNIC for which you wish to create the VFs.

**Step 6** Click **Configure SR-IOV**.

**Configure SR-IOV for Cisco VIC Ethernet NIC** window is displayed.

**Step 7** Perform the following:

| Field | Description |
|---|---|
| **Enabled** radio button | Select **Yes** to enable the configuration. |
| **Virtual functions** field | Number of VFs as configured on SRIOV connection policy that are available for the configuration. Enter an integer between 1 and 64. |

**Step 8** Click **Save** and then reboot the host server.

# Configuring the Switch

### Before you begin

Ensure that the SR-IOV VFs are configured.

### Procedure

**Step 1** Login to your VMware ESXi Host Client.

**Step 2** Navigate to **Host** > **Networking** and select the **Virtual switches** tab.

**Step 3** Click **Add Standard Virtual Switch**.

**Step 4** Enter the name for the switch.

**Step 5** Select a SR-IOV Capable Vmnic from the list.

**Step 6** Click **Add**.

**Step 7** Complete the following:

| Field | Description |
|---|---|
| **vSwitch Name** field | Enter a suitable name for the virtual switch. |
| **MTU** field | Enter the maximum transmission unit. The default is 1500 bytes. |
| **Uplink 1** drop-down list | From the drop-down list, select the PCIe devices for which you created the SR-IOVs. |
| **Link Discovery** | From the drop-down list, select the **Mode** and the **Protocol**.<br>**Note**<br>These fields remain as default. |

| Field | Description |
|---|---|
| **Security** | Choose from the following options:<br>• **Promiscuous mode**—**Accept**, **Reject**, or **Inherit from vSwitch**.<br>• **MAC address changes**—**Accept**, **Reject**, or **Inherit from vSwitch**.<br>**Forged trasmits**—**Accept**, **Reject**, or **Inherit from vSwitch**. |
| **NIC teaming** | Choose from the following:<br>• **Load balancing**—From the drop-down list choose the Load balancing. Values are: **Inherit from vSwitch**,<br>• **Network failover detection**—From the drop-down list choose the network failover detection. Values are: **Inherit from vSwitch**,<br>• **Notify switches**—Choose the notify switches. Values are **Yes**, **No**, **Inherit from vSwitch**.<br>• **Fallback**—Choose the fallback. Values are **Yes**, **No**, **Inherit from vSwitch**.<br>• **Override failover order**—From the drop-down list choose the override failover order. Values are **Yes** or **No**,<br>• **Failover order**—Choose the failover order. |
| **Traffic Shaping** | Perform the following:<br>• **Status**—Choose the status. Values are **Enabled**, **Disabled**, **Inherit from vSwitch**.<br>• **Average bandwidth**—Enter the average bandwidth.<br>• **Peek bandwidth**—Enter the peek bandwidth.<br>• **Burst size**—Enter the burst size.<br>**Note**<br>Traffic shaping policy is applied to the traffic of each virtual network adapter attached to the virtual switch. |

### What to do next

Creating a Virtual Port, on page 10

# Creating a Virtual Port

### Before you begin

Ensure that the SR-IOV VFs are configured.

### Procedure

**Step 1** Login to your VMware ESXi Host Client.

**Step 2** Go to **Host** > **Networking** and select the **Port Groups** tab.

**Step 3** Click **Add port group**.

**Add port group-New port group** window is displayed

**Step 4** Complete the following:

| Field | Description |
|---|---|
| **Name** field | Enter a suitable name for the virtual port. |
| **VLAN ID** field | Enter the VLAN ID. |
| **Virtual Switch** drop-down list | From the drop-down list, select the virtual switch. |
| **Security** | Choose from the following options:<br>• **Promiscuous mode**—**Accept**, **Reject**, or **Inherit from vSwitch**.<br>• **MAC address changes**—**Accept**, **Reject**, or **Inherit from vSwitch**.<br>**Forged trasmits**—**Accept**, **Reject**, or **Inherit from vSwitch**. |

**Step 5** Click **Add**.

# Creating a New Virtual Machine (VM)

### Before you begin

- Host with Desktop Environment
- sudo user with admin rights
- Virtualization packages are installed
- OS ISO image is copied to the host server

**Procedure**

For more information, refer to Installing OS on Guest VM on ESXi, on page 11.

# Adding SR-IOV VF on the Virtual Machine

**Before you begin**

Power off the Virtual Machine.

**Procedure**

**Step 1** In the Virtual Machine Manager, right-click on the Virtual Machine and select **Open**.

**Step 2** Click the **Show Virtual Hardware Detail** icon next to **Monitor** icon.

**Step 3** Click **Add Hardware**.

**Step 4** In the **Add New Virtual Hardware** window, select **PCI Host Device**. Under the **PCI Device Details** tab, assign a created SR-IOV VF to the Virtual Machine.

**Step 5** Click **Finish**.

**Step 6** Power on the Virtual Machine.

**What to do next**

You can now log into the virtual machine, install Cisco eNIC driver 4.7.0.5-1076.6 or later version, reboot the virtual machine, and then use the ip link command to verify the added SR-IOV VF.

# Installing OS on Guest VM on ESXi

**Before you begin**

Upload the Linux operating system ISO on the datastore.

**Procedure**

**Step 1** Right-click the host node and navigate to **vCenter** > **New Virtual machine**.

**Step 2** Select a **Creation Type** > **Create New Virtual Machine**, and click **Next**.

**Step 3** Enter a name for the folder, and click **Next**.

**Step 4** Select a compute resource, choose a node and click **Next**.

**Step 5** Select Storage and check the datastore radio-button, and click **Next**.

**Step 6** Select the compatibility ESXi 8.0 or later and click **Next**.

**Step 7** Select a guest OS version as **RHEL Linux9 (64-bit)**, and click **Next**.

**Step 8** Customize the hardware set **CPU** to 2, and **Memory values** to 4 GB.

**Step 9** Expand the **Memory** tab, and check **Reserve all guest memory (All locket)** check box.

**Step 10** Select **New CD/DVD Drive** *(Datastore ISO file)*, and check the **Connect At Power On** check box.

**Step 11** Under **CD/DVD Media**, browse and select the Linux ISO image and click **Next**.

**Step 12** Click **Finish**.

# Configuring SR-IOV VFs on the Linux Host Server

## Installing Cisco eNIC Driver

### Before you begin

Ensure that the required BIOS parameters and SR-IOV VFs configurations are completed.

### Procedure

**Step 1** Install the enic driver on the host.

Following example shows the installation of eNIC driver on RHEL:

```
[user@rack-111 drivers]# rpm -ivh kmod-enic-4.7.0.5-1076.6.rhel9u4_5.14.0_427.13.1.x86_64.rpm
Verifying...                          ################################# [100%]
Preparing...                          ################################# [100%]
Updating / installing...
   1:kmod-enic-4.7.0.5-1076.6.rhel9u4_################################# [100%]
[user@rack-111 drivers]#
```

**Step 2** Reboot the server to load the enic driver into the running kernel.

**Step 3** Execute **modinfo enic** to check enic driver is loaded.

Following example shows the output of **modinfo enic** command:

```
[user@rack-111 drivers]# modinfo enic
filename:       /lib/modules/5.14.0-427.13.1.el9_4.x86_64/extra/enic/enic.ko
version:        4.7.0.5-1076.6
retpoline:      Y
license:        GPL v2
author:         Scott Feldman scofeldm@cisco.com
description:    Cisco VIC Ethernet NIC Driver
rhelversion:    9.4
srcversion:     3A1B1E81C9641925B34D1B2
alias:          pci:v00001137d000002B7sv*sd*bc*sc*i*
alias:          pci:v00001137d00000071sv*sd*bc*sc*i*
alias:          pci:v00001137d00000044sv*sd*bc*sc*i*
alias:          pci:v00001137d00000043sv*sd*bc*sc*i*
depends:
retpoline:      Y
name:           enic
vermagic:       5.14.0-427.13.1.el9_4.x86_64 SMP preempt mod_unload modversions
sig_id:         PKCS#7
signer:         Cisco UCS Driver Signing REL Cert
```

```
sig_key:         D0:54:9A:88:88:DD:0E:7A
sig_hashalgo:    sha256
signature:       89:9C:DA:53:D1:FF:0A:DA:98:9A:7F:AF:63:29:66:EB:FF:0C:D6:65:
                 39:6C:15:40:30:6E:99:4B:2C:F0:54:2E:EB:A4:8A:33:D5:9C:41:7A:
                 A4:DB:C8:52:55:74:3A:68:F3:22:36:7B:2A:7C:7C:40:8B:7F:6D:9E:
                 A5:CF:06:F1:23:42:E6:60:DB:78:0E:46:C9:0C:BC:06:9B:02:A0:AA:
                 5A:FC:36:A3:FB:B0:FE:76:F2:EB:2F:AD:AD:84:89:61:30:7D:E9:2F:
                 5D:E1:3E:EA:7C:10:B2:42:94:CD:4F:74:19:A6:16:FE:75:B6:78:49:
                 E8:F0:4A:A9:01:BB:92:44:A9:FE:C7:CE:DB:E8:F5:08:AF:36:1E:5F:
                 30:D3:B1:5F:70:62:56:6F:C2:38:8E:F2:88:28:0F:44:29:E5:44:66:
                 34:B7:5C:A7:5E:21:C3:5D:42:D8:C0:87:CA:40:5E:C4:C0:2C:DA:26:
                 D2:25:9B:58:A8:84:C6:A6:41:B3:24:9C:D7:E6:4A:79:42:00:32:82:
                 7A:CB:36:D8:79:1D:41:1A:9E:1C:A8:0D:39:6D:C8:F1:0D:44:FA:00:
                 93:1E:A3:C9:61:AA:DE:25:4A:38:68:C3:9C:14:55:5B:D3:AC:1C:85:
                 00:FE:57:F1:DE:F7:A8:04:64:0E:5D:35:D8:AF:CF:A4
parm:           rxcopybreak:Maximum size of packet that is copied to a new buffer on receive
 (uint)
[user@rack-111 drivers]#
```

# Verifying the Total number of SR-IOV VFs per Port on the Host

### Before you begin

Ensure that Cisco eNIC driver is installed.

### Procedure

Log into the host server and run the following command and replace *interface_name* with actual interface name on the host.

**# cat /sys/class/net/*interface_name*/device/sriov_totalvfs**

### Example

Following example shows the total number for SR-IOV VFs created from SRIOV HPN Connection Policy on p1p1 interface:

```
[user@rack-111 ~]# cat /sys/class/net/p1p1/device/sriov_totalvfs
32
[user@rack-111 ~]#
```

# Creating SR-IOV VFs on the Host

Enabling SR-IOV VFs from SRIOV HPN Connection Policy does not create SR-IOV VFs on the host by default. To create SR-IOV VFs on the host, use the following procedure:

### Procedure

**Step 1** Execute the following command to create SR-IOV VFs on the host:

**# echo number_of_sriov_devices > /sys/class/net/***sriov interface_name***/device/sriov_numvfs**

**Example:**

Following example shows the creation of 6 SR-IOV VFs on p1p1 interface.

```
[user@rack-111 ~]# echo 6 > /sys/class/net/p1p1/device/sriov_numvfs
[user@rack-111 ~]#
```

**Step 2** Execute the following command to verify the SR-IOV VFs created:

**# cat /sys/class/net/interface_name/device/sriov_numvfs**

**Example:**

Following example shows the verification of SR-IOV VFs on p1p1 interface.

```
[user@rack-111 ~]# cat /sys/class/net/p1p1/device/sriov_numvfs
6
[user@rack-111 ~]#
```

**Step 3** (Optional) Alternatively, IP link command shows created SR-IOV VFs.

**# ip link show interface_name**

**Example:**

Following example shows created 6 SR-IOV VFs on p1p1 interface.

```
[user@rack-111 ~]# ip link show pipl
2: plpl:  <BROADCAST, MULTICAST, UP, LOWER_UP>mtu 9000 qdisc mq state UP mode
DEFAULT group default qlen 10 00
link/ether 98: a2:c0:66:32:80 brd ff:ff:ff:ff:ff:ff
vf 0 link/ether 00:00:00:00:00:00 brd ff:ff:ff:ff:ff:ff, spoof checking off,
link-state auto, trust off, query_rss off
vf 1 link/ether 00:00:00:00:00:00 brd ff:ff:ff:ff:ff:ff, spoof checking off,
link-state auto, trust off, query_rss off
vf 2 link/ether 00:00:00:00:00:00 brd ff:ff:ff:ff:ff:ff, spoof checking off,
link-state auto, trust off, query_rss off
vf 3 link/ether 00:00:00:00:00:00 brd ff:ff:ff:ff:ff:ff, spoof checking off,
link-state auto, trust off, query_rss off
vf 4 link/ether 00:00:00:00:00:00 brd ff:ff:ff:ff:ff:ff, spoof checking off,
link-state auto, trust off, query_rss off
vf 5 link/ether 00:00:00:00:00:00 brd ff:ff:ff:ff:ff:ff, spoof checking off,
link-state auto, trust off, query_rss off
altname enp9s0
altname eno5
[user@rack-111 ~]#
```

**Note**

After the host server reboots, the created SR-IOV VFs are removed from the host. By adding the command from Step 1 to rc.local file, the same number of SR-IOV VFs can be created each time the host server boots up.

### What to do next

You can create a new virtual machine.

# Creating a New Virtual Machine (VM)

### Before you begin

- Host with Desktop Environment
- sudo user with admin rights
- Virtualization packages are installed
- OS ISO image is copied to the host server

### Procedure

**Step 1** Verify the virtualization is enabled on the host server by using this command.

**# lscpu | grep Virtualization**

**Example:**

This example shows the Intel's virtualization technology VT-x is enabled.

```
[user@rack-111 ~]$ lscpu | grep Virtualization
Virtualization: VT-x
[user@rack-111 ~]$
```

**Step 2** Verify the KVM modules are loaded by using this command.

**# lsmod | grep kvm**

**Example:**

This example shows KVM modules are loaded in the host server.

```
[user@rack-111 ~]$ lsmod | grep kvm
kvm_intel    409600    8
kvm         1134592    1 kvm_intel
irqbypass      6384    290 vfio_pci_core, kvm
[user@rack-111 ~]$
```

**Step 3** Type **virt-manager** command at the terminal to launch Virtual Machine Manager GUI.

**Step 4** At the Virtual Machine Manager, click **File** > **New Virtual Machine** to create a new virtual machine.

**Step 5** At **New VM window**, select **Local install media (ISO image or CDROM)** option and click **Forward**.

**Step 6** At **Choose ISO or CDROM install media**, click **Browse**.

**Step 7** At **Locate ISO media volume** window, click **Browser Local**.

**Step 8** Go to the folder that has ISO image. Select ISO image and click **Open**.

**Step 9** Click **Forward**.

**Step 10** Select the desire Memory and CPU settings for the VM and click **Forward**.

**Step 11** Choose the VM's disk image size and click **Forward**.

**Step 12** Enter a name for the VM in the **Name** field and click **Finish**.

You may monitor the OS installation progress.

# Adding SR-IOV VF on the Virtual Machine

### Before you begin

Power off the Virtual Machine.

### Procedure

**Step 1** In the Virtual Machine Manager, right-click on the Virtual Machine and select **Open**.

**Step 2** Click the **Show Virtual Hardware Detail** icon next to **Monitor** icon.

**Step 3** Click **Add Hardware**.

**Step 4** In the **Add New Virtual Hardware** window, select **PCI Host Device**. Under the **PCI Device Details** tab, assign a created SR-IOV VF to the Virtual Machine.

**Step 5** Click **Finish**.

**Step 6** Power on the Virtual Machine.

### What to do next

You can now log into the virtual machine, install Cisco eNIC driver 4.7.0.5-1076.6 or later version, reboot the virtual machine, and then use the ip link command to verify the added SR-IOV VF.