XP330 NIC

User Guide

Issue 02

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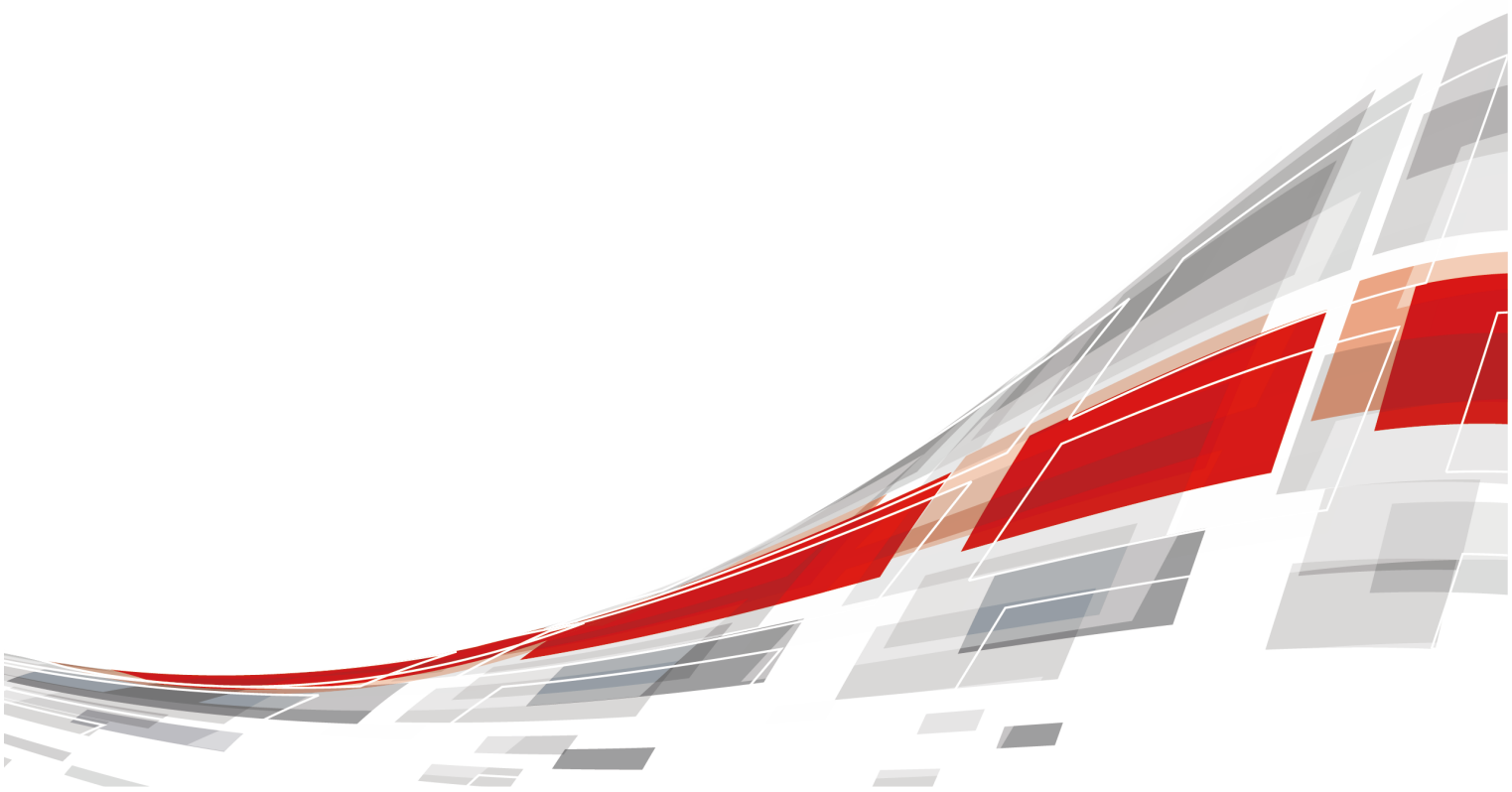

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About This Document

Purpose

This document describes the appearance, features, installation, and upgrade of the XP330 NIC card.

Intended Audience

This document is intended for:

- Enterprise administrators
- Enterprise device users

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. This symbol does not indicate human body injuries.
NOTE	Supplements the important information in the main text. **NOTE** is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Issue	Date	Description
02	2024-06-27	Added **5 Config**.
01	2022-12-09	This issue is the first official release.

Contents

About This Document ii

1 Product Overview 1

1.1 Overview 1

1.2 Appearance 1

1.3 Technical Specifications 4

2 Product Features 5

2.1 Features 5

2.2 Features Description 6

2.3 Standards and Protocols 7

3 Compatibility 8

4 Installation and Upgrade 9

4.1 Installing the Hardware 9

4.2 Installing Drivers and Upgrading Firmware 9

4.2.1 Installing the Driver 9

4.2.1.1 Preparing for Driver Installation 9

4.2.1.2 Software Package Digital Signature Verification 11

4.2.1.3 Installing the Driver 11

4.2.2 Upgrading Firmware 14

5 Config 15

5.1 Identify the port 15

5.1.1 Identifying Ports in Linux 15

5.1.2 Port identification in Windows 16

5.1.3 VMware Port Identification 17

5.2 Configuring a VLAN 19

5.2.1 Configuring a VLAN on Linux 19

5.2.1.1 Temporary effect 19

5.2.1.2 Enabling the Configuration Permanently 20

5.2.2 Configuring VLANs in Windows 20

5.2.3 Configuring VLANs on VMware 24

5.3 Configuring port bonding 27

5.3.1 Configuring Port Bonding in Linux 27

5.3.2 Configuring Port Bonding on Windows....28
5.3.3 Configuring port bonding on VMware....33
5.4 Configuring SR-IOV....37
5.4.1 Configuring Port SR-IOV in Linux....38
5.4.1.1 Enable SR-IOV....39
5.4.1.2 Create VM....40
5.4.1.3 Adding SR-IOV Network Ports....46
5.4.2 Configuring Port SR-IOV in Windows....48
5.4.2.1 Installing Hyper-V....49
5.4.2.2 Creating a Virtual Switch....57
5.4.2.3 Create VM....61
5.4.2.4 Adding SR-IOV Network Ports....67
5.4.3 Configuring Port SR-IOV in VMware....72
5.4.3.1 Enable SR-IOV....72
5.4.3.2 Adding SR-IOV Network Ports....74
5.5 Configuring VXLAN Offload....76
A Appendixes....78
A.1 Logging In to the iBMC WebUI....78
A.2 Getting Help....78
A.2.1 Collecting Fault Information....78
A.2.2 Preparing for Debugging....78
A.2.3 Using Product Documentation....79
A.2.4 Technical Support....79
A.3 Acronyms and Abbreviations....79

1 Product Overview

1.1 Overview

1.2 Appearance

1.3 Technical Specifications

1.1 Overview

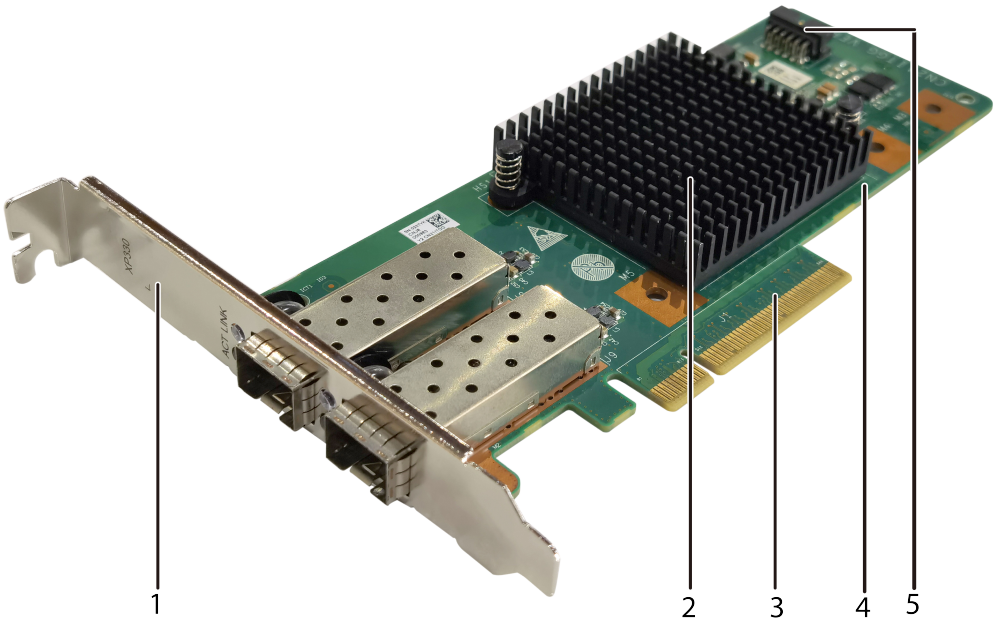
The XP330 Ethernet NIC (XP330 for short) is a PCIe card for servers. It uses the Intel X710 NIC chip and provides two 10GE SFP+ optical ports as external service ports.

1.2 Appearance

Components

Figure 1-1 shows the components of the XP330.

Figure 1-1 XP330 components



1	Bracket	2	X710+ Heat sink **NOTE** The X710 is located below the heat sink.
3	PCIe connector	4	Mainboard
5	NC-SI connector	-	-

Table 1-1 describes the components of the XP330.

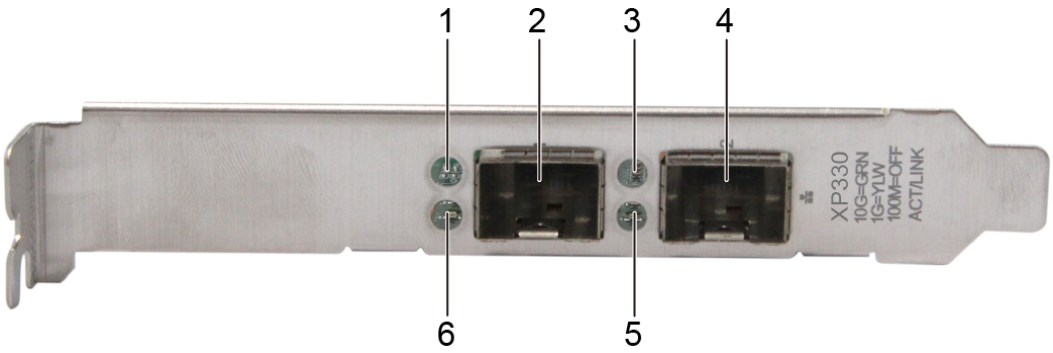
Table 1-1 XP330 component description

Name	Description
Mainboard	Includes a NIC module, network port module, and power module.
X710	A NIC chip that implements NIC functions.
Heat sink	Cools the NIC chip.
Bracket	A half-height or full-height bracket.
PCIe connector	Connects the NIC to the PCIe slot.
NC-SI connector	Network controller sideband interface, which is used for NIC sideband communication.

Panel

Figure 1-2 shows the ports on the XP330 panel.

Figure 1-2 XP330 panel



1	LNK (Link Speed) indicator 1	2	SFP+ port 1
3	LNK (Link Speed) indicator 2	4	SFP+ port 2
5	ACT (Link/Active) indicator 2	6	ACT (Link/Active) indicator 1

Indicators

The indicators on the XP330 display its working status. Table 1-2 describes the indicators on the XP330 panel.

Table 1-2 XP330 indicators

Indicator	Meaning	Color	Description
ACT (Link/ Activity) indicator	Network connection status/ Data transmission statusindicator	Green	• Steady green: The link is connected but no data is being transmitted. • Blinking: The link is connected and data is being transmitted. • Off: The link is not connected.
ACT (Link Speed) indicator	Speed indicator	Green/ Yellow	• Green steady on: A 10 Gbit/s link is connected. • Yellow steady on: A 1 Gbit/s link is connected. • Off: The link is not connected or the transmission rate is 100 Mbit/s.

1.3 Technical Specifications

Table 1-3 describes the XP330 specifications.

Table 1-3 XP330 specifications

Item	Specifications
Dimensions (H x W x D)	68.9 mm x 167.65 mm x 18.71 mm (2.71 in. x 6.60 in. x 0.74 in.)
Form factor	HHHL PCIE card
Weight	0.2 kg (including packing materials)
Maximum power consumption	8 W
Port rate	10.3125 Gbit/s
Number of ports	2
PCIe connector	PCIe 3.0 x8, compatible with PCIe 2.0
Port protocol	Ethernet
Port type	Optical port (SFP+)
Chip model/ Manufacturer	X710/Intel

2 Product Features

2.1 Features

2.2 Features Description

2.3 Standards and Protocols

2.1 Features

The XP330 provides the following features:

- Is a standard half-height half-length PCIe x8 card with a half-height or full-height bracket and fits in various application scenarios.
- Supports 2*10GE SFP+, compatible with the 1GE transmission rate (with 1G SFP optical modules).

  NOTE

  The 1GE SFP optical module must be used XP330 port provides the 1GE rate. In addition, compatibility of the OS and version must be verified.
- Supports SR-IOV, up to 128 VFs (includes PFs).
- Supports Preboot eXecution Environment (PXE) and does not support PXE VLANs.
- Supports IEEE 802.1Q VLAN.
- Supports NetQueue and Virtual Machine Queue (VMQ), supports Virtual Machine Device Queues (VMDq).
- Supports Data Plane Development Kit (DPDK).
- Supports VxLAN offload, Network Virtualization using Generic Routing Encapsulation (NVGRE) offload.
- Supports TCP/UDP/IP checksum Offload.
- Supports Transmit Segmentation Offloading (TSO).
- Supports Receive Side Scaling (RSS).
- Supports Priority Flow Control (PFC), Enhanced Transmission Selection (ETS), Data Center Bridging Exchange Protocol (DCBX).
- Supports Jumbo Frames.

- Supports network controller sideband interface (NC-SI) communication.

2.2 Features Description

PXE

PXE is used for remote boot over the Ethernet or IP network. It enables users to connect to the remote PXE server for loading an OS.

802.1Q VLAN

The XP330 supports up to 4094 VLANs.

The XP330 port does not add or delete tags to packets in the sending direction. The **VLAN_ID** is specified by the OS or Hypervisor. The XP330 port only transparently transmits packets. The XP330 port does not add or delete tags to packets in the reception direction. Instead, the packets are transparently transmitted to the upper layer (OS or Hypervisor).

SR-IOV

The XP330 ports support the Single Root I/O Virtualization (SR-IOV) feature. The entire NIC supports a maximum of 128 (2*64) VFs (includes PFs). The generated VFs can be used by VMs and mapped to VMs.

VXLAN and NVGRE

The XP330 supports the VXLAN and NVGRE network virtualization overlay technologies.

VXLAN is put forwarded by VMware, and NVGRE is put forwarded by Microsoft. VXLAN and NVGRE encapsulate packets on the layer2 data center network into layer3 network packets for transmission over the layer3 network. In this way, the layer3 network provides transmission tunnels and routes for the isolated layer2 data center network. VXLAN and NVGRE support deployment of the data center network across the IP network, and support VM deployment and migration across the IP network for virtualization applications.

VXLAN and NVGRE add special packet headers (identifiers) to layer-2 Ethernet packets to identify packet tenants (hosts). The XP330 supports hardware-based offload of VXLAN and NVGRE packet headers to reduce CPU usage and packet processing latency.

NC-SI

The XP330 supports NC-SI sideband communication. The baseboard management controller (BMC) connects to the XP330 by using the NC-SI interface and communicates with the external network by using the 10GE port of the XP330. The XP330 forwards the BMC sideband communication packets without processing them.

When the power status of the mainboard is normal or standby, the XP330 can perform NC-SI sideband communication.

2.3 Standards and Protocols

Table 2-1 lists the standards and protocols that the XP330 complies with.

Table 2-1 Standards and Protocols

Standard	Protocol
IEEE 802.3ae 10 Gigabit Ethernet	10GBASE-SR/LR
IEEE 802.1Q, 802.1p	VLAN tags and priority
IEEE 802.1Qbb	Priority-based Flow Control (PFC)
IEEE 802.1Qaz	Enhanced Transmission Selection (ETS)
IEEE 802.3az	Energy Efficient Ethernet
IEEE 802.3ad, 802.1ax Link Aggregation	Link Aggregation Control Protocol (LACP)
IEEE 802.1Qbg	Data Center Edge Virtual Switching

3 Compatibility

Make sure the optical modules used are compatible with the NIC, to avoid possible structural incompatibility and subsequent failure in removal and installation. For details about the compatible optical modules and servers, visit the compatibility list on the technical support website or contact the local sales representatives.

4 Installation and Upgrade

4.1 Installing the Hardware

4.2 Installing Drivers and Upgrading Firmware

4.1 Installing the Hardware

The XP330 is a PCIe card. For details about how to install it, see sections related to PCIe cards in maintenance and service guides of servers.

After the NIC is installed, log in to the iBMC WebUI and choose **System** > **System Info** > **Network Adapters**. For details, see the iBMC user guide of the corresponding server model.

4.2 Installing Drivers and Upgrading Firmware

Different OSs have strict requirements on the XP330 driver and firmware versions. You can compare and check the version mapping table. If the driver or firmware version of the XP330 card does not meet the requirements, install or upgrade the driver or firmware to ensure proper running of the server.

4.2.1 Installing the Driver

4.2.1.1 Preparing for Driver Installation

Before installing a driver, download the driver version mapping table and driver package. The path for obtaining the XP330 driver package varies according to the server type, but the obtaining method for different servers is the same. The following describes how to download the XP330 driver package corresponding to RHEL 7.7 from FusionServer iDriver.

The method for obtaining the product software package varies depending on the user group.

Obtain the driver package from the technical support website. For details, see **Downloading a Driver Package**.

Downloading a Driver Package

Step 1 Visit the technical support website, and choose **Software Download** > **FusionServer iDriver**.

The FusionServer iDriver version list is displayed.

Step 2 Click the target version on the **Software** tab. The **Version and Patch Software** screen is displayed.

Step 3 In the **Documentation** area, view and download the required driver version mapping table.

You can view the driver names corresponding to different OSs in the driver version mapping table. For different OSs, filter the desired card by **Card Name**, and view **System Version**, **Driver File**, and **Onboard ISO Driver contain Files**.

External Driver Version	System Vers	Driver File	Onboard ISO Driver contain Files	Card Name	Driver Version	FW Version
FusionServer iDriver-RHEL7.6-Driver-V121	RHEL 7.6	onboard_driver_RHEL7.6.iso	NIC-X710_X722_XL710_XXV710-RHEL7.6-i40e-2.15.9-1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4
			NIC-E810_X710_X722_XL710_XXV710-RHEL7.6-iavf-4.1.1-1-x86_64.tar.gz	XP330	4.1.1	8.30,0x8000bde4
FusionServer iDriver-RHEL7.7-Driver-V105	RHEL 7.7	onboard_driver_RHEL7.7.iso	NIC-X710_X722_XL710_XXV710-RHEL7.7-i40e-2.15.9-1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4
			NIC-E810_X710_X722_XL710_XXV710-RHEL7.7-iavf-4.1.1-1-x86_64.tar.gz	XP330	4.1.1	8.30,0x8000bde4
FusionServer iDriver-RHEL7.8-Driver-V107	RHEL 7.8	onboard_driver_RHEL7.8.iso	NIC-X710_X722_XL710_XXV710-RHEL7.8-i40e-2.15.9-1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4
			NIC-E810_X710_X722_XL710_XXV710-RHEL7.8-iavf-4.1.1-1-x86_64.tar.gz	XP330	4.1.1	8.30,0x8000bde4
FusionServer iDriver-RHEL7.9-Driver-V107	RHEL 7.9	onboard_driver_RHEL7.9.iso	NIC-X710_X722_XL710_XXV710-RHEL7.9-i40e-2.15.9-1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4
			NIC-E810_X710_X722_XL710_XXV710-RHEL7.9-iavf-4.1.1-1-x86_64.tar.gz	XP330	4.1.1	8.30,0x8000bde4
FusionServer iDriver-RHEL8.0-Driver-V121	RHEL 8.0	onboard_driver_RHEL8.0.iso	NIC-X710_X722_XL710_XXV710-RHEL8.0-i40e-2.15.9-1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4
			NIC-E810_X710_X722_XL710_XXV710-RHEL8.0-iavf-4.1.1-1-x86_64.tar.gz	XP330	4.1.1	8.30,0x8000bde4
FusionServer iDriver-RHEL8.1-Driver-V104	RHEL 8.1	onboard_driver_RHEL8.1.iso	NIC-X710_X722_XL710_XXV710-RHEL8.1-i40e-2.15.9-1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4
			NIC-E810_X710_X722_XL710_XXV710-RHEL8.1-iavf-4.1.1-1-x86_64.tar.gz	XP330	4.1.1	8.30,0x8000bde4
FusionServer iDriver-RHEL8.2-Driver-V107	RHEL 8.2	onboard_driver_RHEL8.2.iso	NIC-X710_X722_XL710_XXV710-RHEL8.2-i40e-2.15.9-1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4
			NIC-E810_X710_X722_XL710_XXV710-RHEL8.2-iavf-4.1.1-1-x86_64.tar.gz	XP330	4.1.1	8.30,0x8000bde4
FusionServer iDriver-RHEL8.3-Driver-V108	RHEL 8.3	onboard_driver_RHEL8.3.iso	NIC-X710_X722_XL710_XXV710-RHEL8.3-i40e-2.15.9-1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4
			NIC-E810_X710_X722_XL710_XXV710-RHEL8.3-iavf-4.1.1-1-x86_64.tar.gz	XP330	4.1.1	8.30,0x8000bde4
FusionServer iDriver-	RHEL 8.4	inbox driver(use the driver provided by the OS).		XP330	inbox	8.30,0x8000bde4
FusionServer iDriver-	RHEL 8.5	inbox driver(use the driver provided by the OS).		XP330	inbox	8.30,0x8000bde4
FusionServer iDriver-	RHEL 8.6	onboard_driver_RHEL8.6.iso	NIC-X710_X722_XL710_XXV710-RHEL8.6-i40e-2.15.9-1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4

NOTE

- **System Version**: OS version.
- **Driver File**: the ISO file that contains the target driver file. (If the **Driver File** is **inbox driver (use the driver provided by the OS)**, the driver provided by the OS is used.)
- **Onboard ISO Driver contain Files**: the driver file list contained in the ISO file.

NOTE

The *FusionServer iDriver XXX Driver Version Mapping* records all components for which drivers can be installed in an OS and corresponding driver information. If you cannot find driver information about a component in the sheet, no driver can be installed for the component in the OS.

For example, select the **RHEL** sheet in the driver version mapping table, and set **Card Name** to **XP330**. The table shows that when the OS version of XP330 is **RHEL7.7**, the corresponding driver file is **onboard_driver_RHEL7.7.iso**, and the onboard ISO driver contain file is **NIC-**<*Card Type*>**-**<*OS*>**-i40e-**<*version*>**-x86_64.rpm**.

Step 4 Download the driver package.

Based on **System Version** obtained in **Step 3**, choose the OS type in **Driver** in the **Version and Patch Software** list, select the required OS version, and download the software package of the required OS version.

For example, choose **RHEL** in the **Version and Patch Software** list, select **RHEL 7.7**, and download the software package **FusionServer iDriver-RHEL7.7-Driver-V*xxx*.zip** of RHEL 7.7.

Step 5 Decompress **FusionServer iDriver-RHEL7.7-Driver-V*xxx*.zip** to obtain **onboard_driver_RHEL7.7.iso** mentioned in **Step 3**.

Step 6 Decompress **onboard_driver_RHEL7.7.iso** to obtain the driver software package **NIC-**<*Card Type*>**-**<*OS*>**-i40e-**<*version*>**-x86_64.tgz**.

----End

4.2.1.2 Software Package Digital Signature Verification

To avoid using software packages that have been tampered with during transmission or storage, download their digital signature files for integrity check while downloading the software packages.

After the software package is downloaded from the technical support website, verify its PGP digital signature. See the *OpenPGP Signature Verification Guide*. If the software package fails the verification, do not use the software package, and contact technical support.

Before using a software package in installation or update, verify its digital signature according to the *OpenPGP Signature Verification Guide* to ensure that the software package is not tampered with.

4.2.1.3 Installing the Driver

Prerequisites

- The server hosting the XP330 has been powered on.
- You have logged in to the iBMC WebUI. For details, see **A.1 Logging In to the iBMC WebUI**.
- The driver package of the XP330 has been downloaded.
- No service is running on the server.
- Log in to the OS as an administrator or using an account with administrator rights.

Precautions

- Do not power off the server during the installation. Do not change configurations except for those involved in the installation guide.
- You must restart the system for the installed driver to take effect.

Procedure

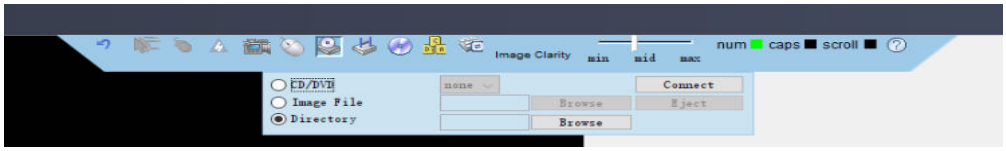
NIC-X710_X722_XL710_XXV710-RHEL7.7-i40e-2.15.9-1-x86_64.rpm is used as an example to describe the installation process. In actual operations, download the driver package based on the OS environment of the server.

Step 1 Install the XP330 driver.

1. Open the Remote Virtual Console on the iBMC WebUI. For details, see **A.1 Logging In to the iBMC WebUI**.
2. Click  on the toolbar.

   The virtual CD/DVD-ROM drive toolbar is displayed, as shown in **Figure 4-1**.

   Figure 4-1 Virtual DVD-ROM drive toolbar

3. Select **Directory** and click **Browse**.
4. Select the folder where the downloaded driver package is located.
5. Click **Connect** in the virtual CD/DVD-ROM drive toolbar.
6. Copy the driver package (for example, **NIC-X710_X722_XL710_XXV710-RHEL7.7-i40e-2.15.9-1-x86_64.rpm**) to the server OS.
7. Open the CLI.
8. Go to the directory where the driver package is located, for example, **driver**.
9. Run the **rpm -ivh NIC-X710_X722_XL710_XXV710-RHEL7.7-i40e-2.15.9-1-x86_64.rpm** command to install the driver.

   ```
   [root@localhost driver]# rpm -ivh NIC-X710_X722_XL710_XXV710-RHEL7.7-i40e-2.15.9-1-x86_64.rpm
   Preparing...                          ################################# [100%]
   Updating / installing...
      1:i40e-2.15.9-1                    ################################# [100%]
   original pci.ids saved in /usr/local/share/i40e
   Updating initramfs with dracut...
   Successfully updated initramfs.
   ```

   If "Successfully updated initramfs." is displayed, the driver is installed successfully.

Step 2 Make the driver take effect.

After the installation is complete, run the **reboot** command on the OS for the new driver to take effect.

----End

Follow-up Procedure

After the driver takes effect, perform the following operations to check whether the driver version is the target version:

Step 1 Open the CLI.

Step 2 Run the **ip a** command to query the network port name of the network device.

Step 3 Run the **ethtool -i** *X* command.

In the preceding command, *X* indicates the network port name of the network device, for example, **eno1**.

The value of **version** in the command output is the version of the driver that has taken effect.


```
[root@localhost ~]# ethtool -i eno1
driver: i40e
version: 2.15.9
firmware-version: 3.33 8.70 0x8000cf62 1.3236.0
expansion-rom-version:
bus-info: 0000:1a:00.0
supports-statistics: yes
supports-test: yes
supports-eeprom-access: yes
supports-register-dump: yes
supports-priv-flags: yes
```

----End

FAQ

- What should I do if an error message similar to the following is displayed during the driver installation?

  ```
  Verifying KMP rpms compatibility with target kernel...
  Error: One or more required packages for installing MLNX_OFED are missing.
  Please install the missing packages using your Linux distribution Package Management tool.
  Run:
  yum install tcl tk
  ......
  ```

  The possible cause is that some database files are missing in the system. Perform the following operations to resolve the problem:

  a. Confirm the missing files as prompted.

  b. Mount the system ISO file, find the missing RPM packages, and install them.

- What should I do if an error message similar to the following is displayed during the driver installation?

  ```
  linux-bl0j:/home/xxx/mlxofed/MLNX_OFED_LINUX-4.5-1.0.1.1-sles12sp3-x86_64 # ./mlnxofedinstall
  Detected sles12sp3 x86_64. Disabling installing 32bit rpms...
  Logs dir: /tmp/MLNX_OFED_LINUX.6732.logs
  General log file: /tmp/MLNX_OFED_LINUX.6732.logs/general.log
  Verifying KMP rpms compatibility with target kernel...
  Warning: libgfortran3 rpm is required to run openmpi
  libgfortran3 is available on SLES12 SDK DVD
  This program will install the MLNX_OFED_LINUX package on your machine.
  Note that all other Mellanox, OEM, OFED, RDMA or Distribution IB packages will be removed.
  Those packages are removed due to conflicts with MLNX_OFED_LINUX, do not reinstall them.

  Do you want to continue?[y/n]:y

  Error: One or more packages depends on MLNX_OFED_LINUX.
  Those packages should be removed before uninstalling MLNX_OFED_LINUX:

  libibverbs1

  To force uninstallation use '--force' flag.
  ```

  The possible cause is that some installation packages conflict and cannot be uninstalled. Perform the following operations to resolve the problem:

  Add the **--force** parameter at the end of the installation command.

  ```
  linux-bl0j:/home/xxx/mlxofed/ MLNX_OFED_LINUX-4.5-1.0.1.1-sles12sp3-x86_64 # ./mlnxofedinstall - -force
  Detected sles12sp3 x86_64. Disabling installing 32bit rpms...
  Logs dir: /tmp/MLNX_OFED_LINUX.15128.logs
  ......
  ```


4.2.2 Upgrading Firmware

The XP330 uses the X710 chip. For details about how to upgrade the firmware of the XP330, see section "Upgrading the NIC Firmware" or "Upgrading the RAID Controller Card or NIC Firmware" in the server upgrade guides.

5 Config

5.1 Identify the port
5.2 Configuring a VLAN
5.3 Configuring port bonding
5.4 Configuring SR-IOV
5.5 Configuring VXLAN Offload

5.1 Identify the port

Before performing all configuration operations, identify the ports.

5.1.1 Identifying Ports in Linux

NIC ports are identified in the OS. The following uses RHEL 8.6 as an example.

Step 1 Log in to the server OS as the **root** user, right-click on the screen, and choose **Open Terminal** from the shortcut menu to open the CLI.

Step 2 Run the **lspci |grep -i eth** command on the Linux CLI to check the PCIe functions of the NIC.

```
[root@localhost ~]# lspci |grep -i eth
16:00.0 Ethernet controller: Broadcom Inc. and subsidiaries BCM57412 NetXtreme-E 10Gb RDMA Ethernet Controller (rev 01)
16:00.1 Ethernet controller: Broadcom Inc. and subsidiaries BCM57412 NetXtreme-E 10Gb RDMA Ethernet Controller (rev 01)
38:00.0 Ethernet controller: Intel Corporation I350 Gigabit Network Connection (rev 01)
38:00.1 Ethernet controller: Intel Corporation I350 Gigabit Network Connection (rev 01)
38:00.2 Ethernet controller: Intel Corporation I350 Gigabit Network Connection (rev 01)
38:00.3 Ethernet controller: Intel Corporation I350 Gigabit Network Connection (rev 01)
b8:00.0 Ethernet controller: Mellanox Technologies MT27800 Family [ConnectX-5]
b8:00.1 Ethernet controller: Mellanox Technologies MT27800 Family [ConnectX-5]
```

Step 3 Run the **ifconfig -a** command to check that the NIC port is displayed in **eth***[num]*/**eno***[num]* format, for example, eth70 and eth71 in the command output.

NOTE

If the network port information cannot be queried by **ifconfig -a** commands, the driver is not installed. Install the driver first.


```
linux-12go:~ # ifconfig -a
eth70     Link encap:Ethernet  HWaddr 00:00:00:00:01:01
          BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)
eth71     Link encap:Ethernet  HWaddr 00:00:00:00:01:00
          BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:121 errors:0 dropped:0 overruns:0 frame:0
          TX packets:121 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:9066 (8.8 Kb)  TX bytes:9066 (8.8 Kb)
```

Step 4 Run the **ethtool -i** command to view port information.

```
linux-12go:~ # ethtool -i eth70
driver: i40e
version: 2.7.26
firmware-version: 6.01 0x80003f13 1.1927.0
expansion-rom-version:
bus-info: 0000:af:00.1
supports-statistics: yes
supports-test: yes
supports-eeprom-access: yes
supports-register-dump: yes
supports-priv-flags: yes
```

NOTE

If the command is not displayed, install the net-tools toolkit.

----End

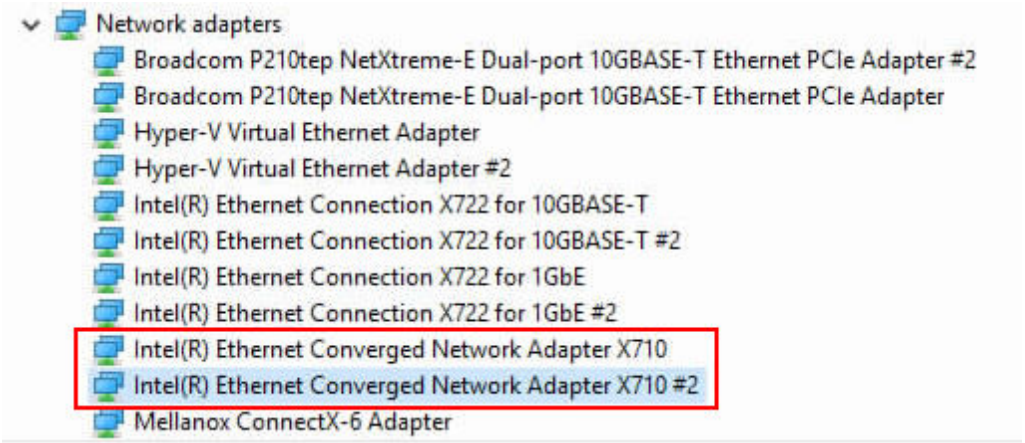
5.1.2 Port identification in Windows

NIC ports are recognized by the operating system. Let's take a 2*10GE NIC as an example for illustration in the Windows Server 2019 system.

Step 1 On a Windows Server 2019 system, open the Start menu and select Control Panel.

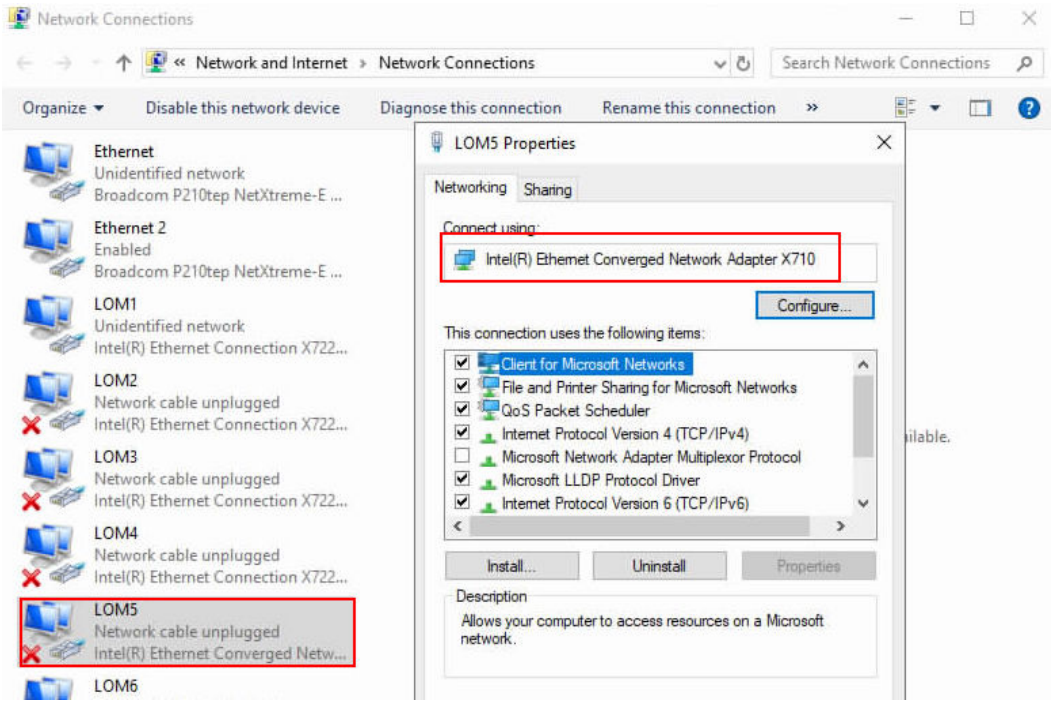
Step 2 Navigate to "Hardware > Server Manager > Device Manager" sequentially to access the Device Manager and check the NIC device, as shown**Figure 5-1**

Figure 5-1 Enter Device Manager



Step 3 Click on the "Start" menu again, then navigate to "Control Panel > Network and Internet > Network and Sharing Center > Change adapter settings." This will open the "Network Connections" window. Double-touch the name of each network connection to view its details. The network port with the keyword "X710" in the details is the P3 port of the XP330, as shown**Figure 5-2**.

Figure 5-2 Querying Network Port Names



----End

5.1.3 VMware Port Identification

The NIC port is identified in the OS. The following describes the two 25 GE Mellanox NIC XC382 in VMware ESXi 7.0 U3 as an example.

NOTICE

VMware ESXi 7.0 U3 does not have the XC382 driver by default. You need to install the NIC driver first.

Step 1 to remotely log in to Shell over SSH through the xx port as the **root** user.

Step 2 Run the following command to check the PCIe functions of the TM210:.

lspci | grep -i eth

Information similar to the following is displayed:

```
[root@localhost:~] lspci | grep -i eth
0000:16:00.0 Ethernet controller: Broadcom BCM57412 NetXtreme-E 10Gb RDMA Ethernet Controller [vmnic5]
0000:16:00.1 Ethernet controller: Broadcom BCM57412 NetXtreme-E 10Gb RDMA Ethernet Controller [vmnic6]
0000:a8:00.0 Ethernet controller: Intel Corporation I350 Gigabit Network Connection [vmnic1]
0000:a8:00.1 Ethernet controller: Intel Corporation I350 Gigabit Network Connection [vmnic2]
0000:a8:00.2 Ethernet controller: Intel Corporation I350 Gigabit Network Connection [vmnic3]
0000:a8:00.3 Ethernet controller: Intel Corporation I350 Gigabit Network Connection [vmnic4]
0000:b8:00.0 Ethernet controller: Mellanox Technologies MT27800 Family [ConnectX-5] [vmnic7]
0000:b8:00.1 Ethernet controller: Mellanox Technologies MT27800 Family [ConnectX-5] [vmnic8]
[root@localhost:~]
```

Step 3 Run the following command to query the network port names:.

esxcfg-nics -l

Information similar to the following is displayed:

```
[root@localhost:~] esxcfg-nics -l
Name    PCI          Driver      Link Speed      Duplex MAC Address       MTU    Description
vmnic1  0000:a8:00.0 igbn        Up   1000Mbps   Full   34:73:79:2e:d8:79 1500   Intel Corporation I350 Gigabit Network
Connection
vmnic2  0000:a8:00.1 igbn        Up   1000Mbps   Full   34:73:79:2e:d8:7a 1500   Intel Corporation I350 Gigabit Network
Connection
vmnic3  0000:a8:00.2 igbn        Up   1000Mbps   Full   34:73:79:2e:d8:7b 1500   Intel Corporation I350 Gigabit Network
Connection
vmnic4  0000:a8:00.3 igbn        Up   1000Mbps   Full   34:73:79:2e:d8:7c 1500   Intel Corporation I350 Gigabit Network
Connection
vmnic5  0000:16:00.0 bnxtnet     Up   10000Mbps  Full   34:73:79:bd:05:d6 1500   Broadcom BCM57412 NetXtreme-E
10Gb RDMA Ethernet Controller
vmnic6  0000:16:00.1 bnxtnet     Up   10000Mbps  Full   34:73:79:bd:05:d7 1500   Broadcom BCM57412 NetXtreme-E
10Gb RDMA Ethernet Controller
vmnic7  0000:b8:00.0 nmlx5_core  Up   25000Mbps  Full   34:73:79:91:85:18 1500   Mellanox Technologies MT27800
Family [ConnectX-5]
vmnic8  0000:b8:00.1 nmlx5_core  Up   25000Mbps  Full   34:73:79:91:85:19 1500   Mellanox Technologies MT27800
Family [ConnectX-5]
[root@localhost:~]
```

esxcli network nic list

Information similar to the following is displayed:

```
[root@localhost:~] esxcli network nic list
Name    PCI Device    Driver     Admin Status  Link Status  Speed  Duplex  MAC Address         MTU  Description
------  ------------  ---------  ------------  -----------  -----  ------  -----------------  ----  -----------
vmnic1  0000:a8:00.0  igbn       Up            Up           1000   Full    34:73:79:2e:d8:79  1500  Intel Corporation I350 Gigabit
Network Connection
vmnic2  0000:a8:00.1  igbn       Up            Up           1000   Full    34:73:79:2e:d8:7a  1500  Intel Corporation I350 Gigabit
Network Connection
vmnic3  0000:a8:00.2  igbn       Up            Up           1000   Full    34:73:79:2e:d8:7b  1500  Intel Corporation I350 Gigabit
Network Connection
vmnic4  0000:a8:00.3  igbn       Up            Up           1000   Full    34:73:79:2e:d8:7c  1500  Intel Corporation I350 Gigabit
Network Connection
vmnic5  0000:16:00.0  bnxtnet    Up            Up           10000  Full    34:73:79:bd:05:d6  1500  Broadcom BCM57412
```



```
NetXtreme-E 10Gb RDMA Ethernet Controller
vmnic6  0000:16:00.1  bnxtnet     Up          Up          10000  Full    34:73:79:bd:05:d7  1500  Broadcom BCM57412
NetXtreme-E 10Gb RDMA Ethernet Controller
vmnic7  0000:b8:00.0  nmlx5_core  Up          Up          25000  Full    34:73:79:91:85:18  1500  Mellanox Technologies
MT27800 Family [ConnectX-5]
vmnic8  0000:b8:00.1  nmlx5_core  Up          Up          25000  Full    34:73:79:91:85:19  1500  Mellanox Technologies
MT27800 Family [ConnectX-5]
[root@localhost:~]
```

----End

5.2 Configuring a VLAN

5.2.1 Configuring a VLAN on Linux

On Linux, you can temporarily or permanently enable VLAN configuration.

- If restarting the network service affects traffic processing, you can enable VLAN configuration temporarily.
- If restarting the network service does not affect traffic processing, you can enable VLAN configuration permanently.

The following uses RHEL 8.6 as an example to describe how to configure VLANs on Linux.

5.2.1.1 Temporary effect

Procedure

Step 1 Log in to the server OS as the **root** user, right-click on the screen, and choose **Open Terminal** from the shortcut menu to open the CLI.

Step 2 Run the following command to find the network port of the NIC. The eno2 port is used as an example:

```
ifconfig -a
```

Step 3 Run the following command to add a VLAN to the port, for example, to add VLAN 100 to enp125s0f0:.

```
ip link add link eno2 name eno2.100 type vlan id 100
```

Step 4 Run the following command to configure the IP address of the VLAN, which is equivalent to the IP address of the network port sub-port. For example, set the IP address 192.168.13.200/24 for enp125s0f3 port 100.

```
ip addr add 192.168.13.200/24 dev eno2.100
```

Step 5 Run the following command to enable network port eno2:

```
ip link set dev eno2.100 up
```

Step 6 Run the following commands to check the configuration result:

```
ifconfig eno2.100
```

Information similar to the following is displayed:

```
eno2.100: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
      inet 192.168.13.200  netmask 255.255.255.0  broadcast 0.0.0.0
      inet6 fe80::c6b8:b4ff:fe63:8a3e  prefixlen 64  scopeid 0x20<link>
      ether c4:b8:b4:63:8a:3e  txqueuelen 1000  (Ethernet)
```



```
RX packets 0  bytes 0 (0.0 B)
RX errors 0  dropped 0  overruns 0  frame 0
TX packets 26  bytes 3958 (3.8 KiB)
TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

NOTE

- IP addresses of different VLANs must be in different network segments (subnets).
- Use the **ip link delete eno[device].[num]** command to delete a VLAN.

----End

5.2.1.2 Enabling the Configuration Permanently

Procedure

Step 1 Log in to the server OS as the **root** user, right-click on the screen, and choose **Open Terminal** from the shortcut menu to open the CLI.

Step 2 Run the following command to find the network port of the NIC. The eno2 port is used as an example:

```
ip a
```

Step 3 Use the nmcli tool to create and configure a VLAN.

```
nmcli d
nmcli con add type vlan con-name VLAN100-on-ens4f3 dev ens4f3 id 100
nmcli con mod VLAN100-on-ens4f3 ipv4.addresses 192.16
nmcli con mod VLAN100-on-ens4f3 ipv4.gateway 192.168.1.1
nmcli con mod VLAN100-on-ens4f3 ipv4.dns 8.8.8.8
nmcli con mod VLAN100-on-ens4f3 ipv4.method manual
nmcli con up VLAN100-on-ens4f3
ip a
nmcli con show VLAN100-on-ens4f3
```

NOTE

- IP addresses of different VLANs must be in different network segments (subnets).
- *.When deleting a VLAN, first run the **nmcli con show** command to obtain the VLAN_CONNECTION_NAME; then execute the **nmcli con del VLAN_CONNECTION_NAME** command to delete the corresponding VLAN_CONNECTION_NAME. Finally, restart the network service using **systemctl restart NetworkManager**.

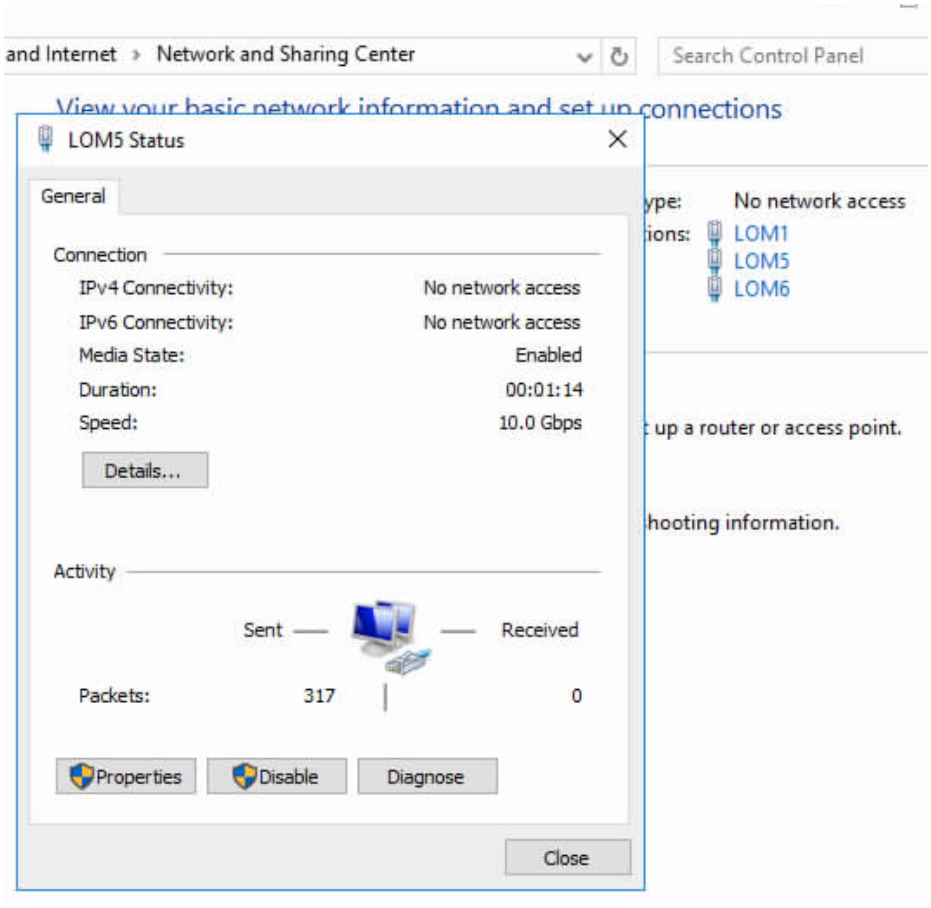
----End

5.2.2 Configuring VLANs in Windows

The following uses LOM5 as an example to describe how to configure VLANs in Windows Server 2019. This operation takes effect permanently, including the restart and AC power-on and power-off.

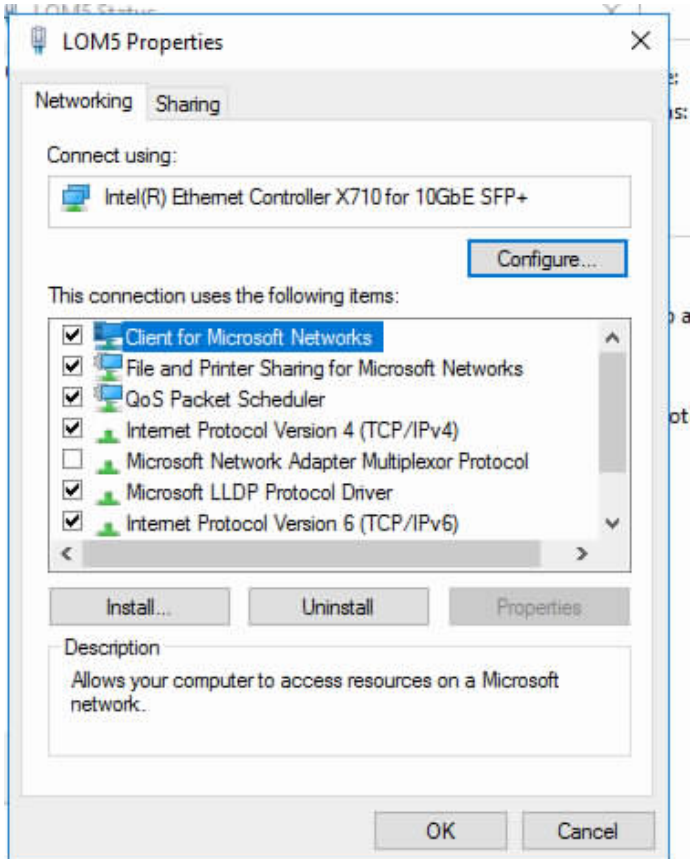
Step 1 In Windows Server 2019, open Network Manager, select a physical port for which a VLAN needs to be configured. Take LOM5 as an example, and click the network port, as shown in**Figure 5-3** .

Figure 5-3 Select NIC port



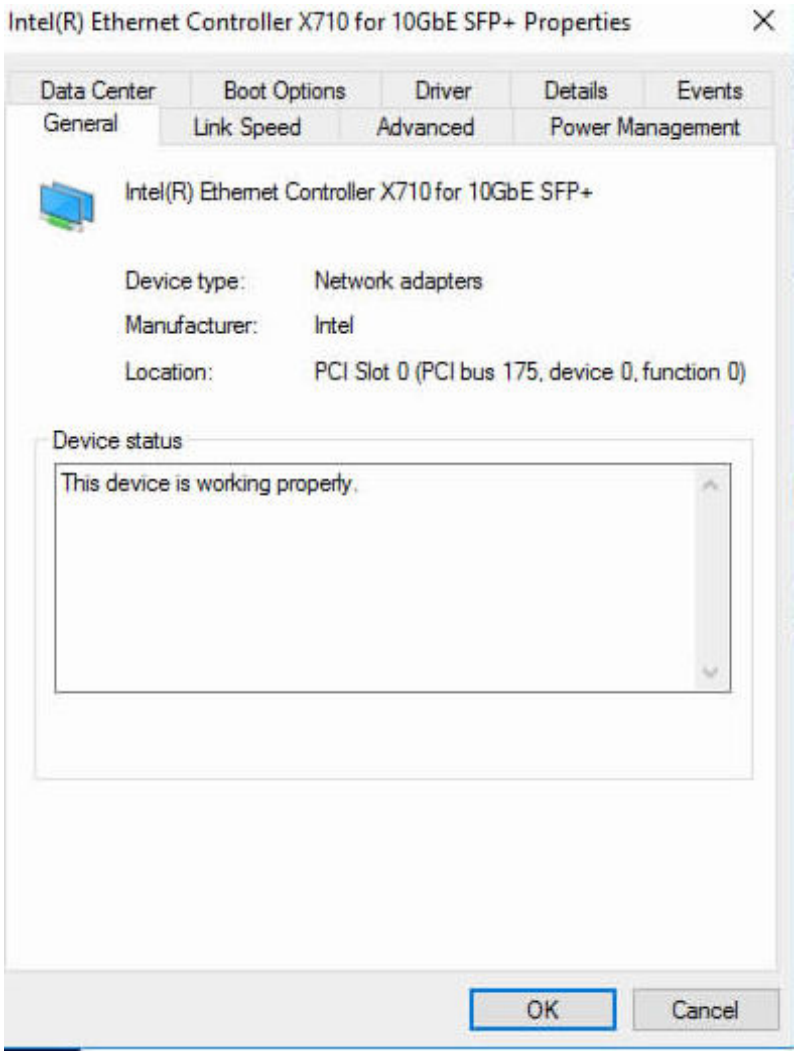
Step 2 Click Properties. The Properties screen is displayed, as shown in**Figure 5-4** .

Figure 5-4 The Properties page is displayed



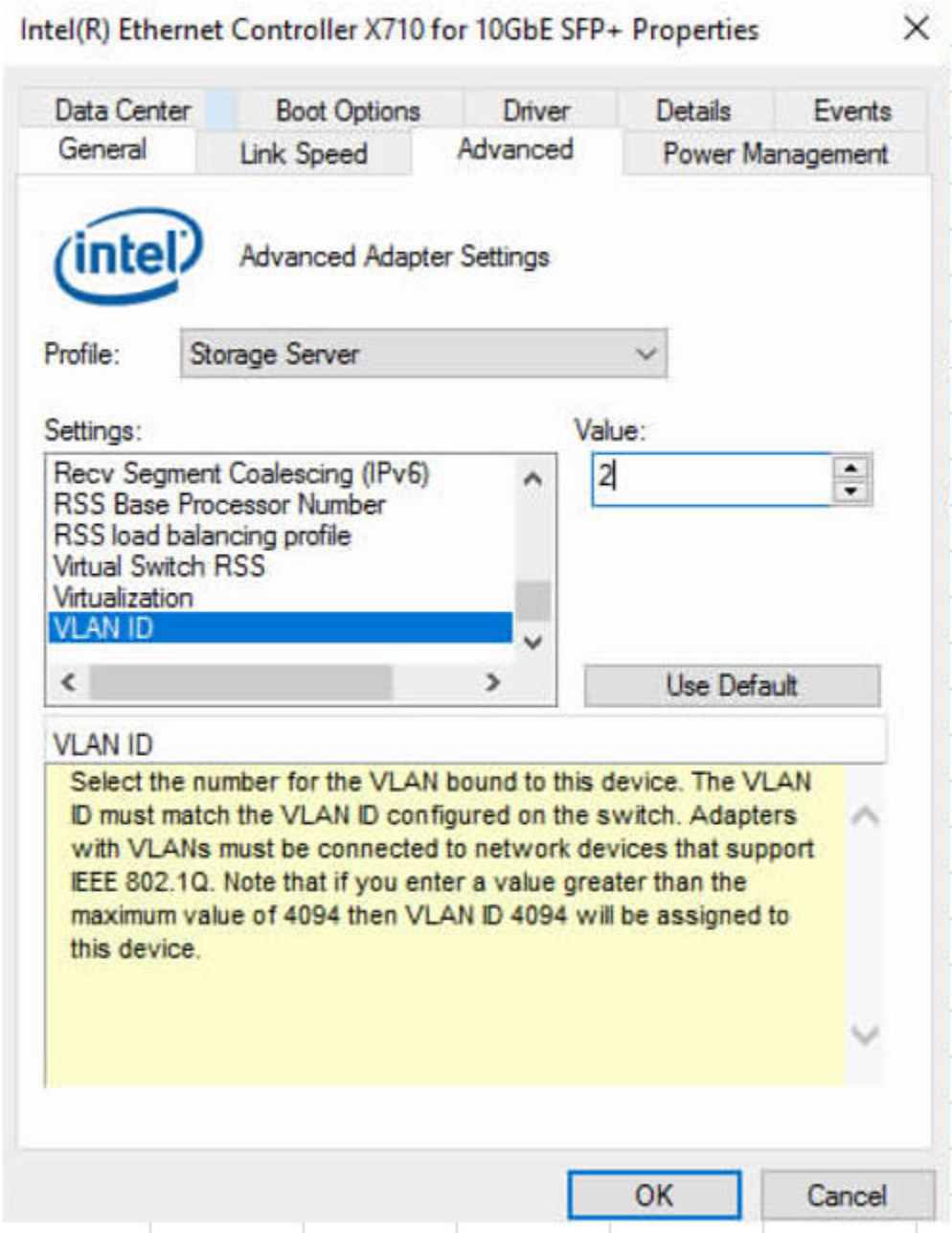
Step 3 Click Configure. The LOM5 configuration page is displayed, as shown in **Figure 5-5**.

Figure 5-5 Configuring NIC Port Properties



Step 4 Click Advanced. In the Settings drop-down list, select VLAN ID, set Value to 2, and set the VLAN ID to be used. See .

Figure 5-6 Configure VLAN ID



----End

5.2.3 Configuring VLANs on VMware

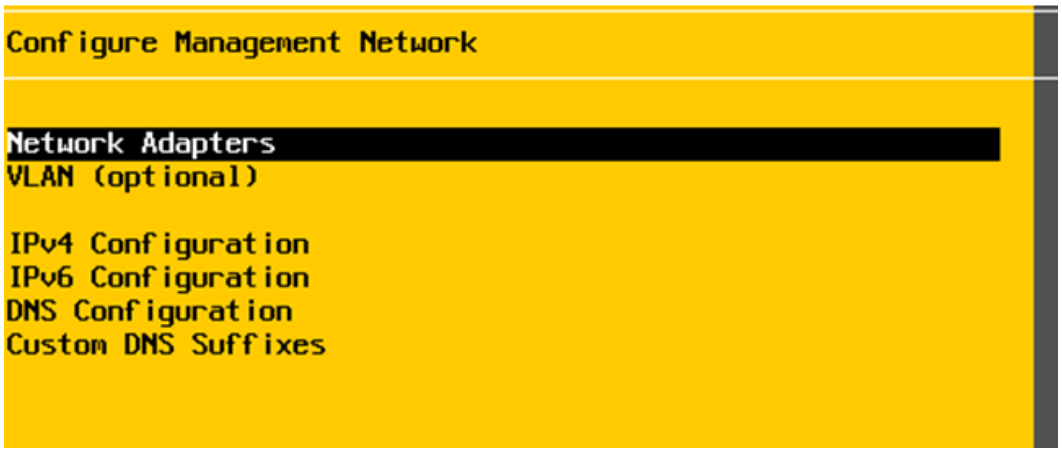
VLAN configuration in VMware ESXi includes the configuration scenarios of servers that are not managed by clusters and servers that are managed by clusters. The configuration of a non-clustered server varies across systems. This section describes the configuration for a non-clustered server in VMware ESXi 7.0 U3.

VMware ESXi 7.0 U3

Step 1 Install VMware ESXi 7.0 U3 on compute nodes and install the NIC driver.

Step 2 On the System Customization page, choose Configure Management Network & gt. Network Adapter, as shown in**Figure 5-7** .

Figure 5-7 Physical port of the NIC

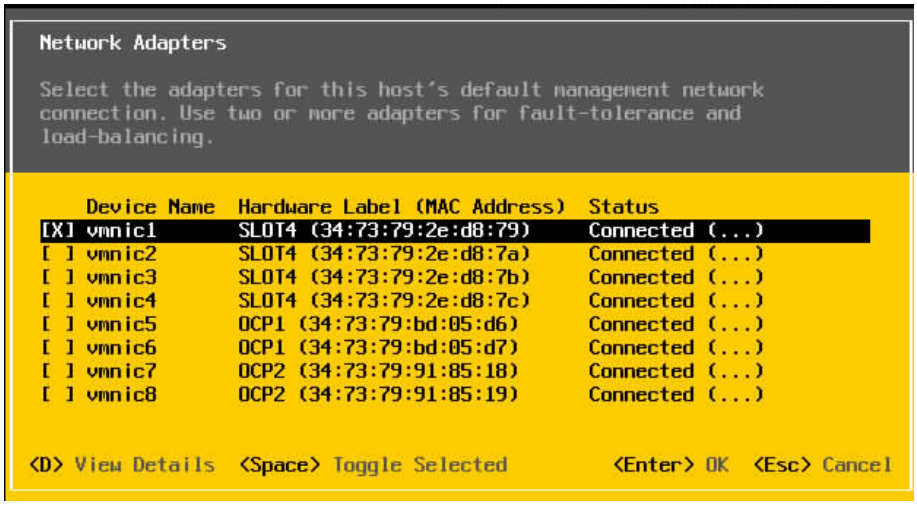


Step 3 Navigate to the "Network Adapters" screen and specify the vmnic to be used for the management network, as shown**Figure 5-8**. Confirm and exit to the Configure Management Network menu.

NOTE

- The management network refers to the PC where the vSphere Client is installed. In fact, the vmnic is also used to connect to the service network.
- In the figure, [X] indicates that the VMNIC can be used to connect to the management network. If multiple VMNICs are selected, the hypervisor (ESXi) selects the VMNIC as the default management network port to connect to the management network. The port can be switched.

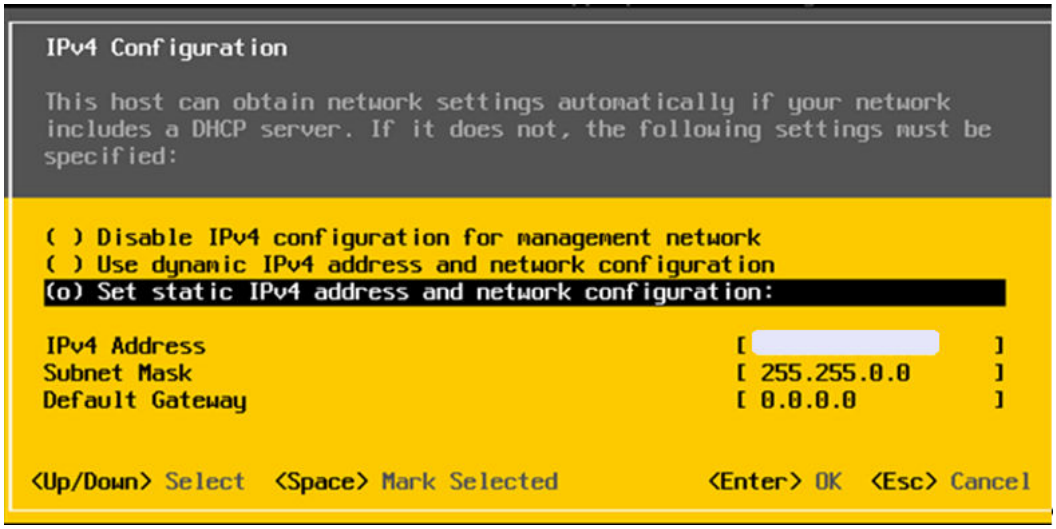
Figure 5-8 Specify the physical port for the management network



Step 4 On the Configure Management Network menu, choose IPv4 Configuration. Enter the IP address of the NIC port, as shown in **Figure 5-9**. The IP address is assigned to the vmnic connected to the management network. The IP address is first assigned to the default port vmnic, for example, vmnic0. Set the IP address to the same network segment as the NIC of the PC. Then, the ESXi can communicate with the PC. Press

Enter to confirm the setting and press **Esc** to return to the **Configure Management Network** menu.

Figure 5-9 vmnic IP address to connect to the management network



NOTE

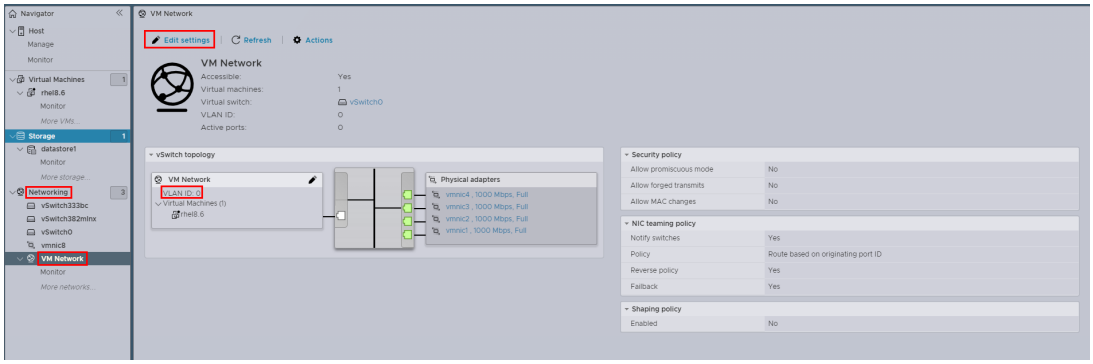
VLAN (Optional) in the Configure Management Network menu is optional. You do not need to configure VLANs for management network connections.

Step 5 Log in to the management network using the browser of a PC, and enter the account and password to access the management page, as shown in**Figure 5-10** .

Figure 5-10 VMware management main window

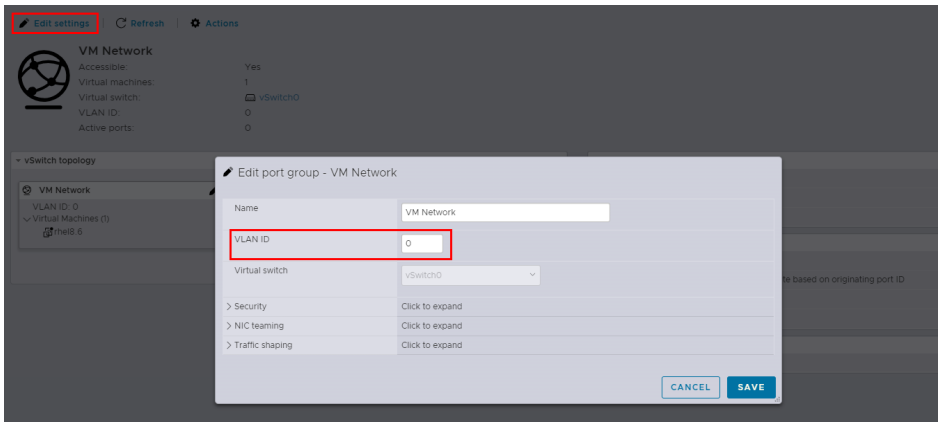
Step 6 In the navigation tree, choose Networking & gt. In the VM Network window, click Edit settings, as shown in the**Figure 5-11** .

Figure 5-11 VM Network page



Step 7 Enter the VIAN ID in the dialog box that is displayed, and click Save, as shown in **Figure 5-12**.

Figure 5-12 VM Network Edit Window



NOTE

Virtual port groups are used for service networks. You can specify a VLAN ID for a virtual port group. On the virtual port group configuration page, select None (0) or (All) 4095, or enter a value ranging from 1 to 4094. The description of different VLAN ID values is shown in the**Table 5-1** .

Table 5-1 Description of the different VLAN ID values

VLAN Tagging Mode	VLAN ID	Description
External Switch Tag (EST)	0	Virtual switches do not pass traffic associated with VLANs.
Virtual Switch Tagging (VST)	From 1 to 4094	The virtual switch marks the traffic with the tags entered.
Virtual Client Tag (VGT)	4095	Virtual machines handle VLANs. Virtual switches pass traffic from any VLAN.

----End

5.3 Configuring port bonding

5.3.1 Configuring Port Bonding in Linux

The following uses RHEL 8.6 as an example to describe how to configure port bonding.

Step 1 Log in to the server OS as the **root** user, right-click on the screen, and choose **Open Terminal** from the shortcut menu to open the CLI.

Step 2 Run the following command to locate the NIC port:.

```
ip a
```

Step 3 Use the nmcli tool to create and configure the bond mode.


```
nmcli connection add con-name bond1 ifname bond1 type bond mode 1
```

Step 4 The following uses ens66f0np0 as an example. Set ens66f0np0 to slave1.

```
nmcli connection add con-name slave1 ifname ens66f0np0 type ethernet master bond1
```

Step 5 The following uses ens66f1np1 as an example. Set ens66f1np1 to slave2.

```
nmcli connection add con-name slave2 ifname ens66f1np1 type ethernet master bond1
```

Step 6 Run the following command to configure the IP address of bond1:.

```
nmcli connection modify bond1 ipv4.method manual connection.autoconnect yes ipv4.addresses 70.176.56.79 ipv4.gateway 70.176.0.1
```

Step 7 Run the following command to enable the bond1 network:.

```
nmcli connection up bond1
```

NOTE

When deleting bond1, first run **nmcli con show** to get the con-name; then execute **bnmcli c delete bond1 slave1 slave2** to remove bond1 along with slaves slave1 and slave2. Finally, restart the network service using **systemctl restart NetworkManager**.

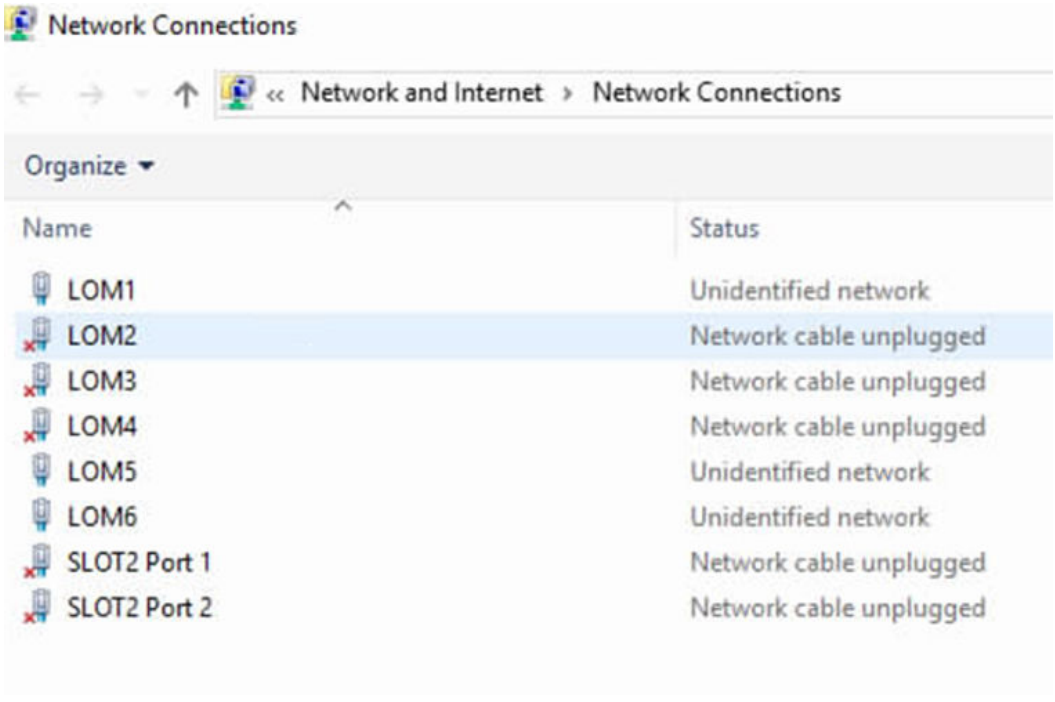
----End

5.3.2 Configuring Port Bonding on Windows

In Windows Server 2019, the following uses the XP330 as an example. Port bonding (NIC Teaming for Windows) is configured through Server Manager.

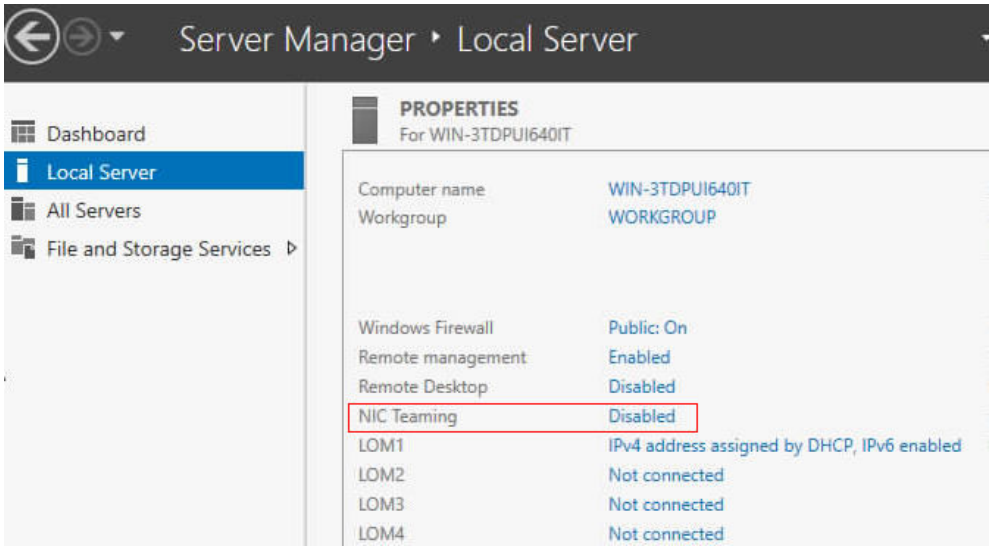
Step 1 Before configuring NIC teaming, check the existing NIC ports in the system, as shown in**Figure 5-13** .

Figure 5-13 NIC port information



Step 2 Start Server Manager and click Local Server, as shown in the**Figure 5-14** .

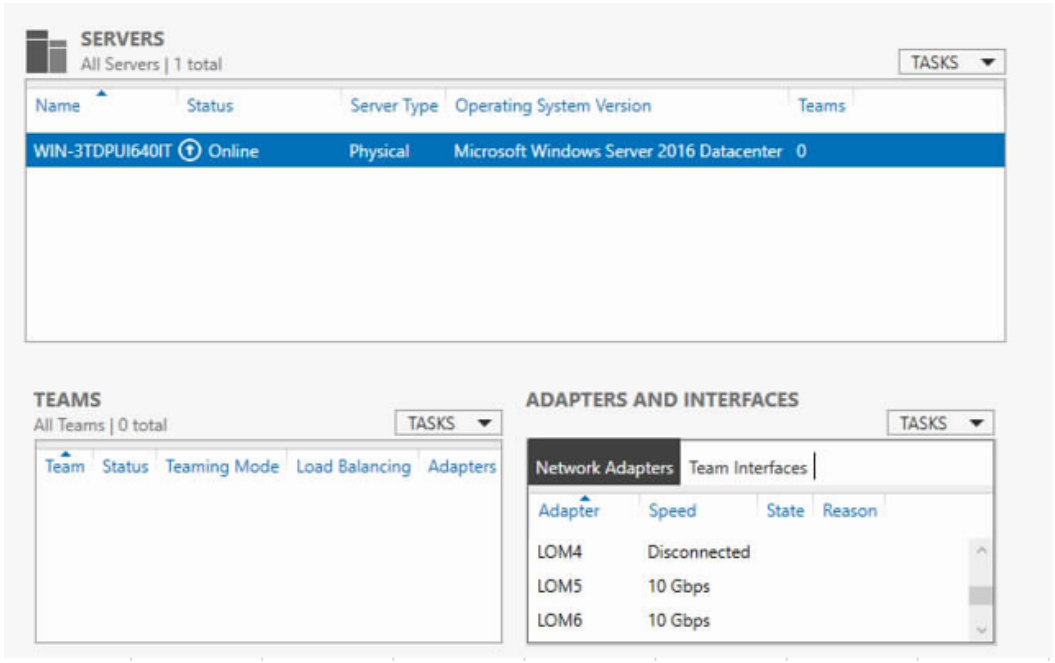
Figure 5-14 Server Manager configuration page



Step 3 Run NIC Teaming.

On the Properties page of the Local Server, click Disabled for NIC Teaming. The NIC Teaming configuration page is displayed, as shown in**Figure 5-15** .

Figure 5-15 NIC Teaming configuration page



Step 4 Create a NIC team.

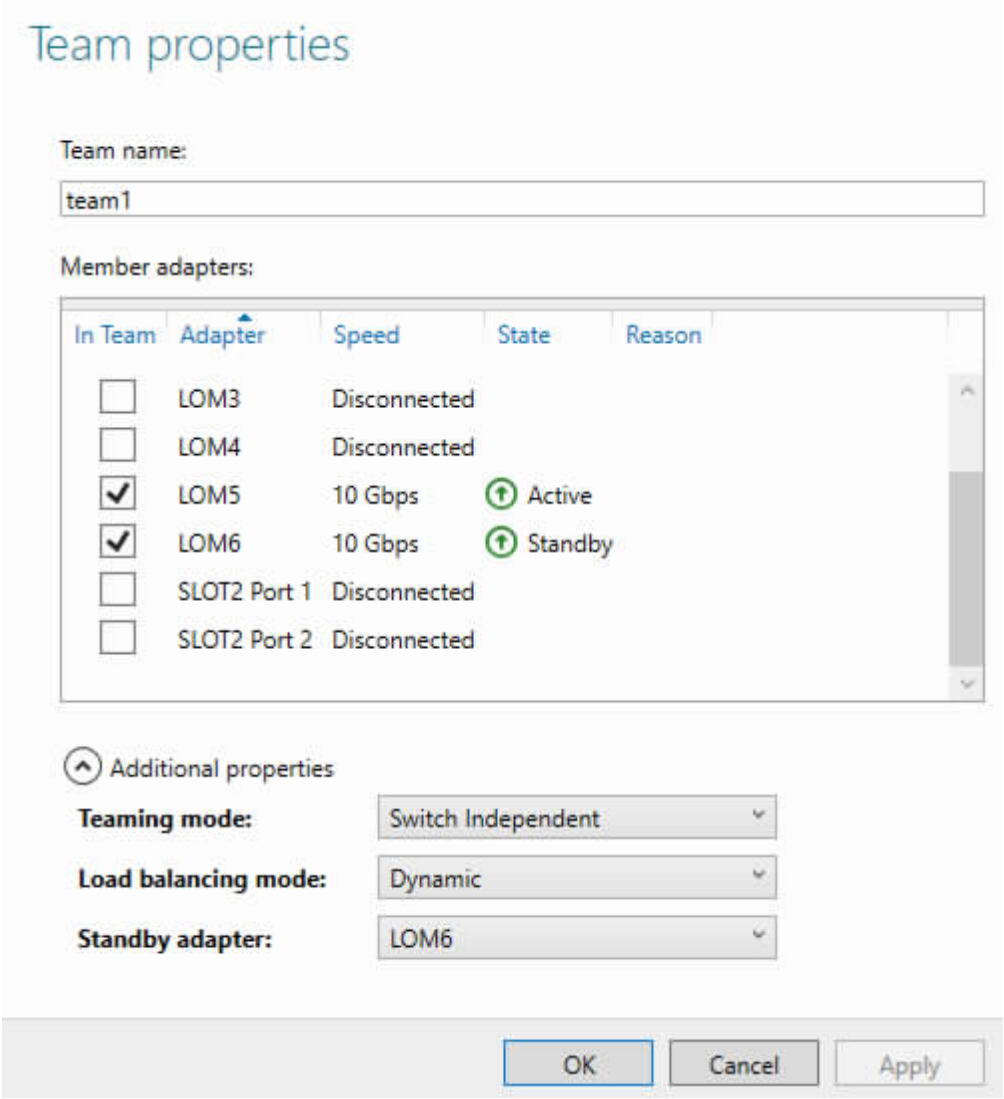
In the Teams area, select New Team from the Tasks drop-down list. The Team Properties page is displayed.

Step 5 Enter Team name and select the NIC port to be bound.

In the Addittional Properties area, select Configure Teaming mode.

Click **OK**. as shown in **Figure 5-16**.

Figure 5-16 Configuring NIC Teaming



NOTE

There are three Teaming modes: Switch Independent, Static Teaming, and LACP.

- Switch Independent can be active-backup and balancing, which are determined by the Standby adapter.
- If the value of Standby adapter is None (all adapters Active), the value is equal to balancing.
- If the standby adapter is a specified NIC port, the standby adapter is active-backup.
- Both Static teaming and LACP are link aggregation modes defined in IEEE 802.3ad. The same link aggregation configuration must be performed on the peer device. Static teaming uses the manual configuration of link aggregation parameters (static). LACP is the auto-negotiation of link aggregation parameters based on protocols.

Step 6 View the created NIC team.

On the NIC Teaming and Network Connections pages, you can view the created team1. As shown in**Figure 5-17** and **Figure 5-18**.

Figure 5-17 View NIC Teaming

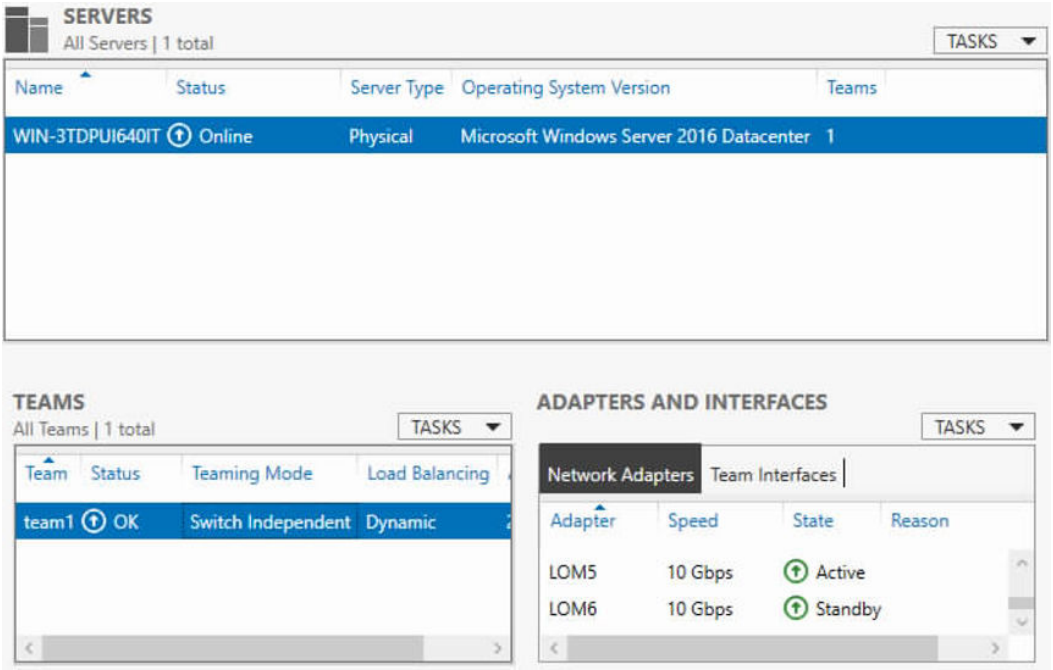
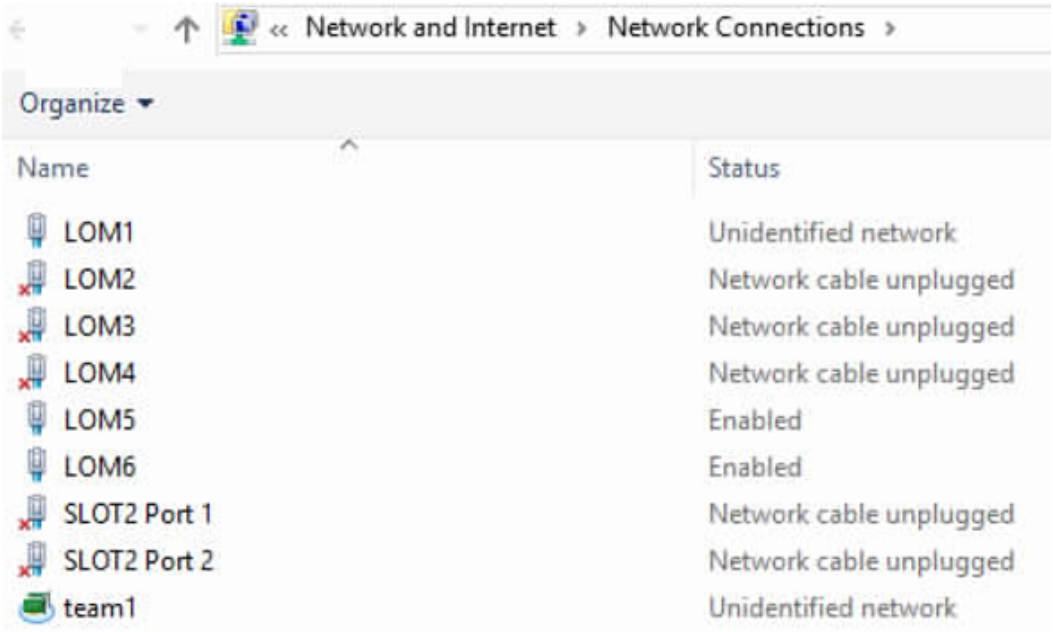


Figure 5-18 Viewing the Teaming Network Port



Step 7 Set the IP address of the NIC team.

Open the Network Manager of Windows, locate team1, click Properties, and double-click Internet Protocol Version 4 (TCP/IPv4) to configure an IP address. As shown in**Figure 5-19** and**Figure 5-20** .

Figure 5-19 Open the team1 Status page

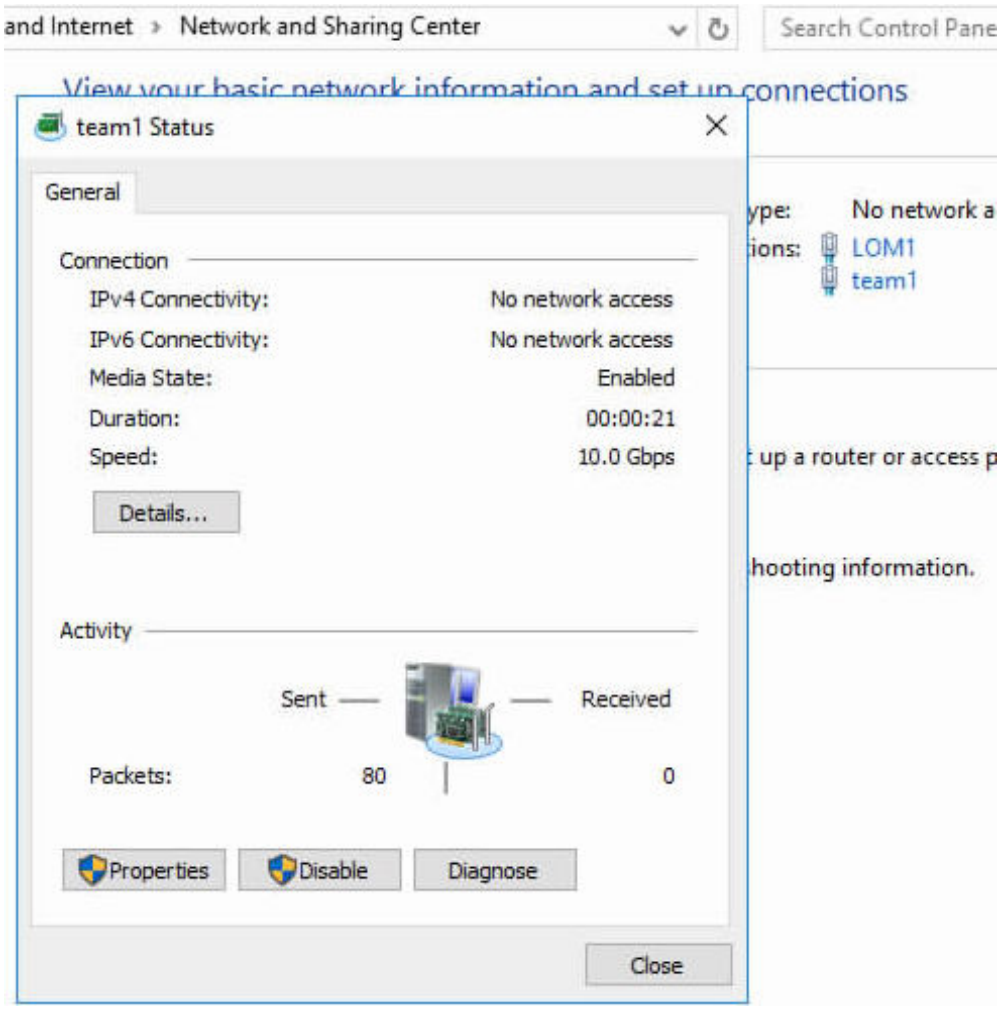
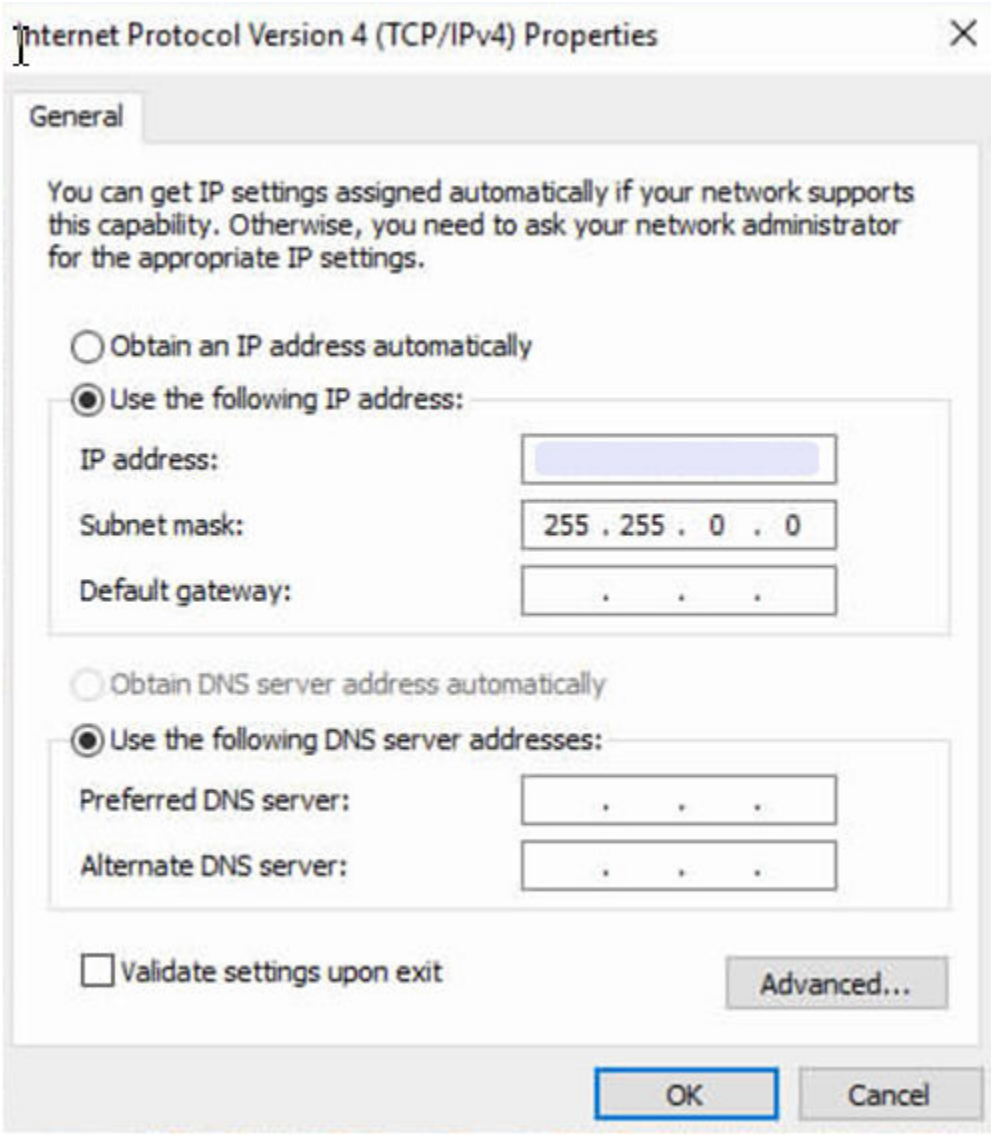


Figure 5-20 Set the IP address of the NIC team.



----End

5.3.3 Configuring port bonding on VMware

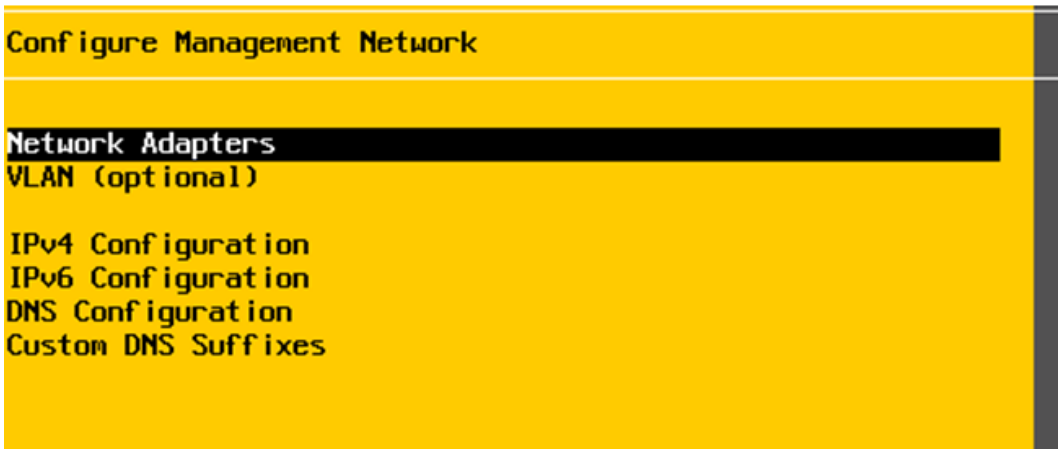
VLAN configuration in VMware ESXi includes the configuration scenarios of servers that are not managed by clusters and servers that are managed by clusters. The configuration of a non-clustered server varies across systems. This section describes the configuration for a non-clustered server in VMware ESXi 7.0 U3.

VMware ESXi 7.0 U3

Step 1 Install VMware ESXi 7.0 U3 on compute nodes and install the NIC driver.

Step 2 On the System Customization page, choose Configure Management Network & gt. Network Adapter, as shown in **Figure 5-21**.

Figure 5-21 Physical port of the NIC

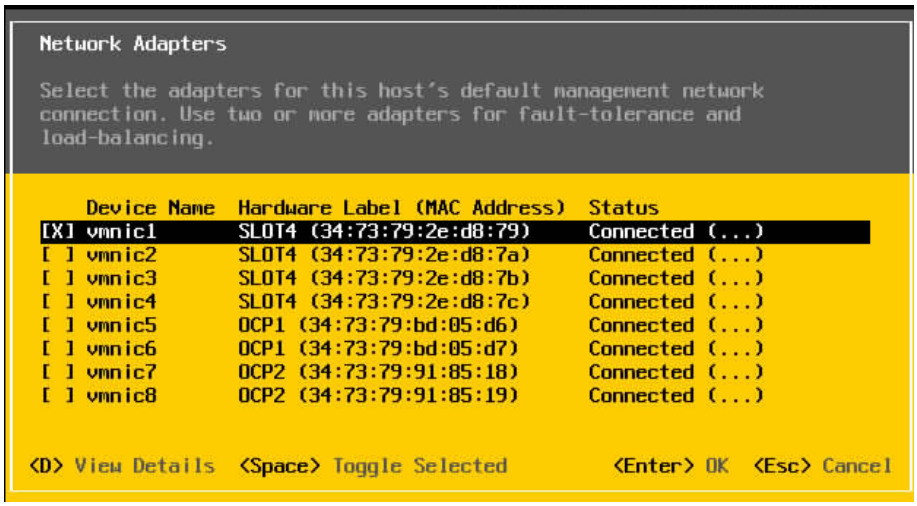


Step 3 Navigate to the "Network Adapters" screen and specify the vmnic to be used for the management network, as shown**Figure 5-22**. Confirm and exit to the Configure Management Network menu.

NOTE

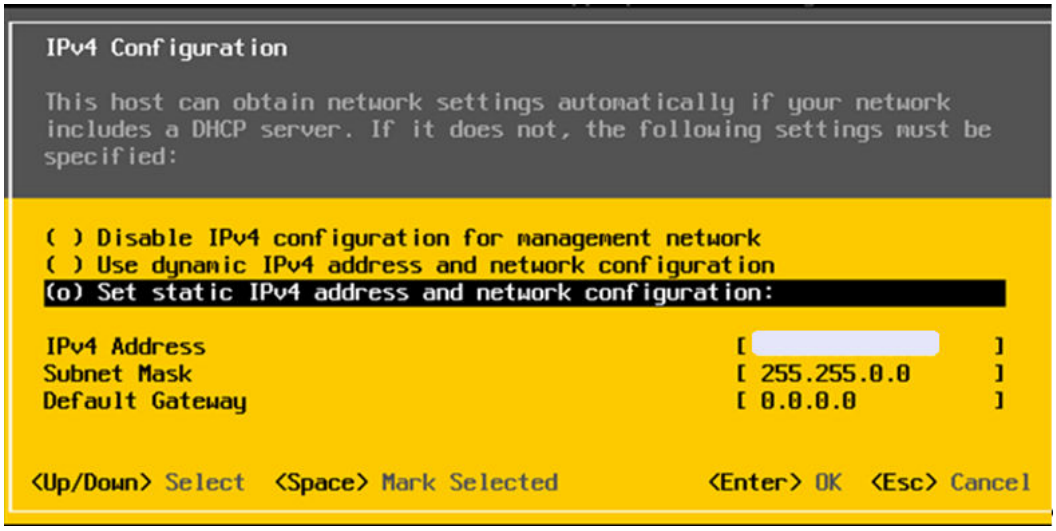
- The management network refers to the PC where the vSphere Client is installed. In fact, the vmnic is also used to connect to the service network.\
- In the figure, [X] indicates that the VMNIC can be used to connect to the management network. If multiple VMNICs are selected, the hypervisor (ESXi) selects the VMNIC as the default management network port to connect to the management network. The port can be switched.

Figure 5-22 Specify the physical port for the management network



Step 4 On the Configure Management Network menu, choose IPv4 Configuration. Enter the IP address of the NIC port, as shown in**Figure 5-23** . The IP address is assigned to the vmnic connected to the management network. The IP address is first assigned to the default port vmnic, for example, vmnic0. Set the IP address to the same network segment as the NIC of the PC. Then, the ESXi can communicate with the PC. Press **Enter** to confirm the setting and press **Esc** to return to the **Configure Management Network** menu.

Figure 5-23 vmnic IP address to connect to the management network

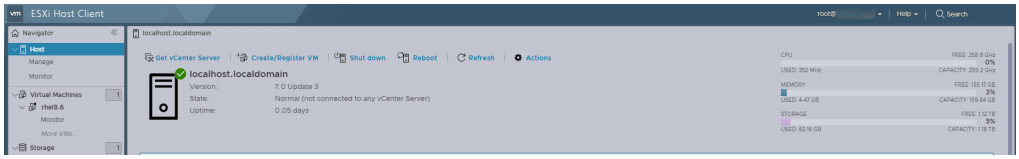


NOTE

VLAN (Optional) in the Configure Management Network menu is optional. You do not need to configure VLANs for management network connections.

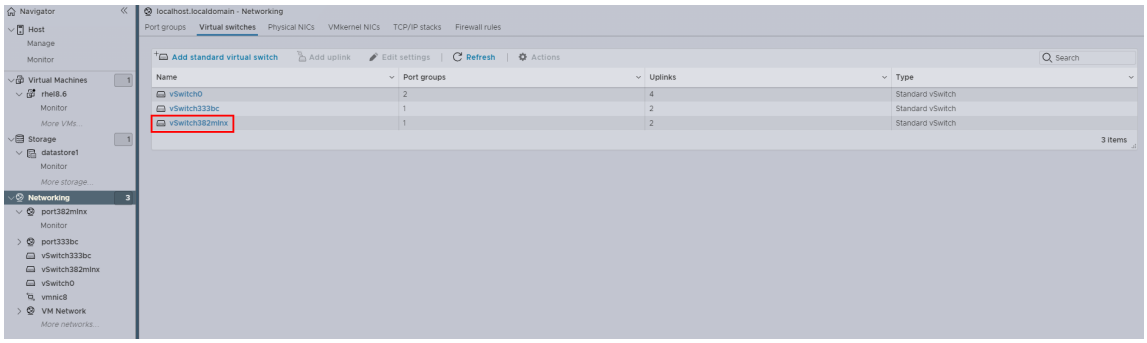
Step 5 Log in to the management network using the browser of a PC, and enter the account and password to access the management page, as shown in **Figure 5-24**.

Figure 5-24 VMware management main window



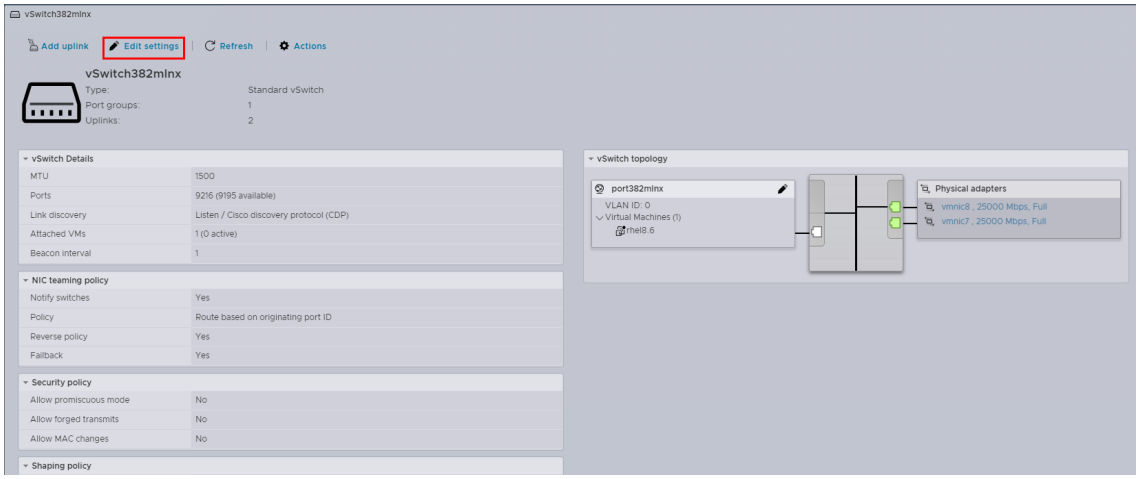
Step 6 In the navigation tree, choose Networking & gt; Virtual switches. In the right main window, click vSwitch382mlnx to be configured, as shown in **Figure 5-25**.

Figure 5-25 Networking interface



Step 7 Click Edit settings in the main window, as shown in the **Figure 5-26**.

Figure 5-26 vSwitch interface



Step 8 The Add uplink option allows you to add network ports to be bound.

Click the NIC Teaming tab and configure Load Balancing, Network Failover Detection, Notify Switches, Failback, and Failover Order. By default, vmnic7 and vmnic8 belong to Active Adapters. Select vmnic7, set vmnic7 to Standby Adapters in Mark standby, configure active and standby bonding, and click Save. As shown in **Figure 5-27** and **Figure 5-28**.

Figure 5-27 vSwitch setting screen 1

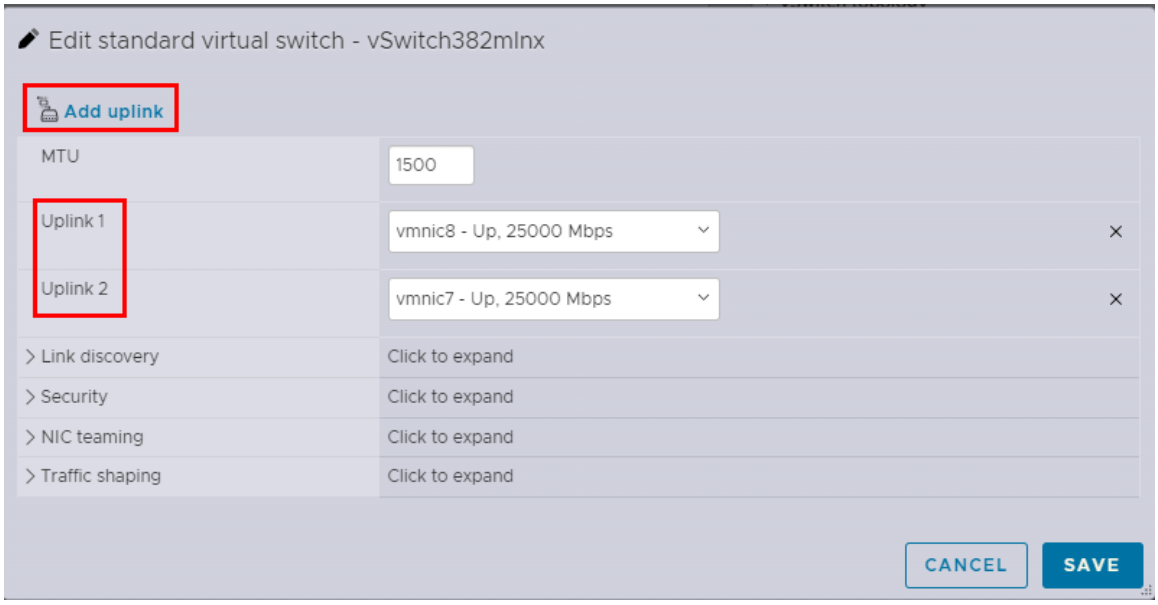
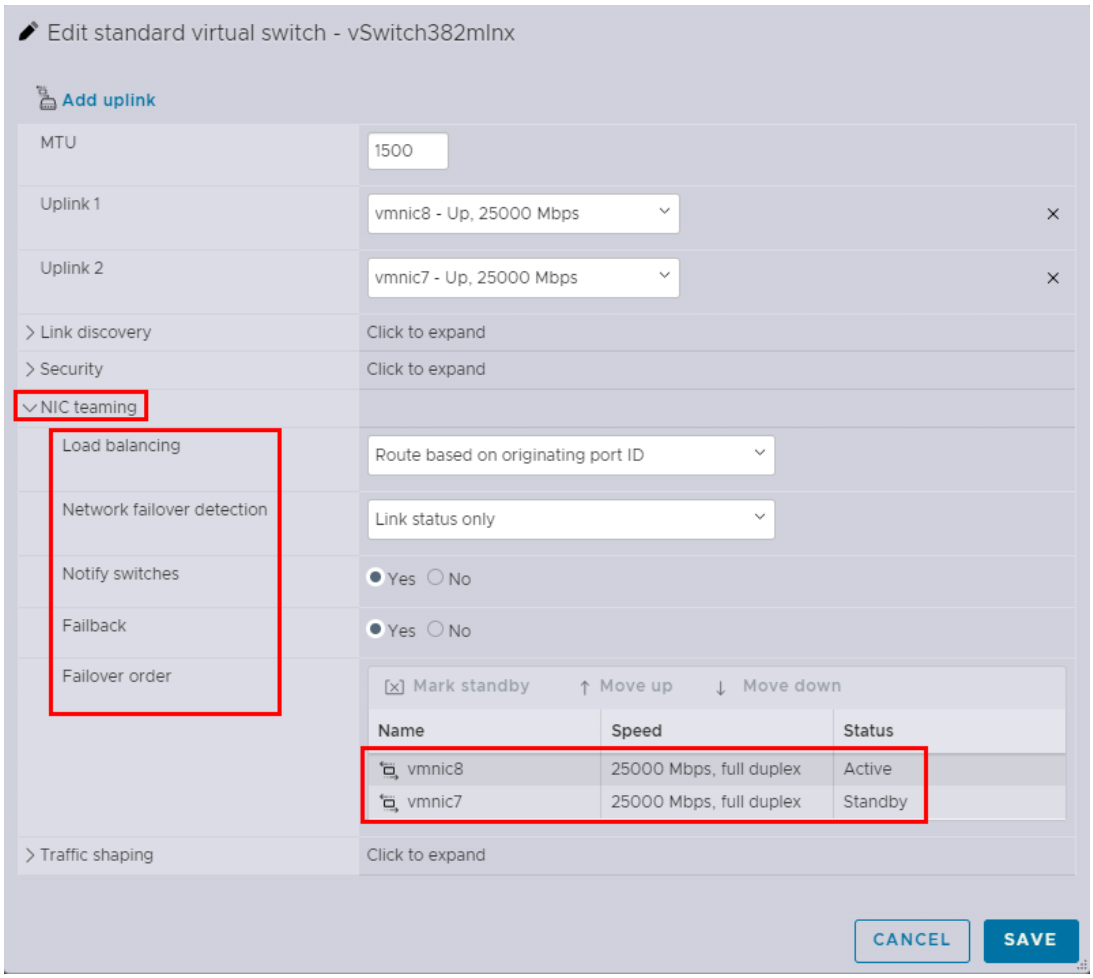


Figure 5-28 vSwitch setting screen 2



NOTE

There are four types of Load Balancing: Route based on originating port ID, Route based on source MAC hash, Route based on IP hash, and Use explicit failover order.

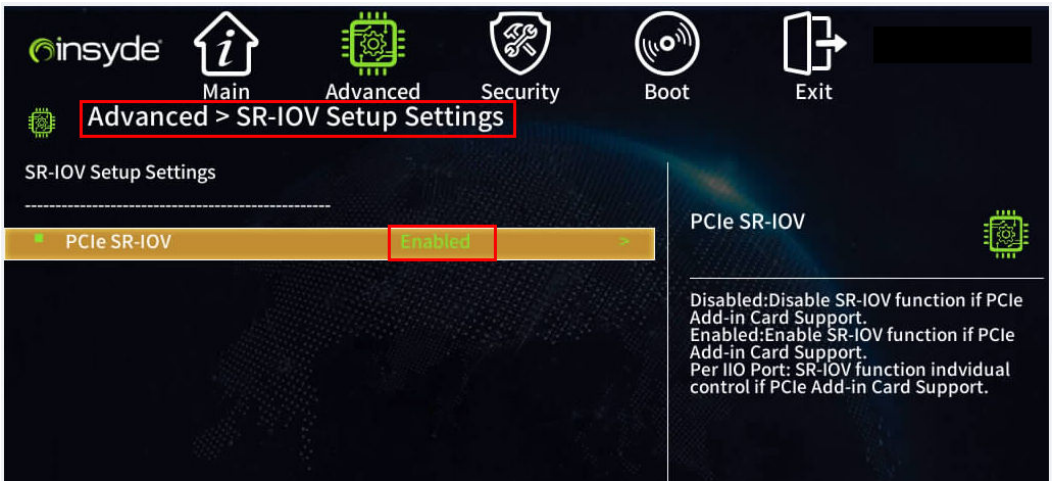
- Route based on originating port ID: Virtual switches can select uplinks based on VM port IDs on standard vSphere switches.
- Route based on source MAC hash: Virtual switches can select uplinks for virtual machines based on their MAC addresses. To calculate the VM uplinks, the virtual switch uses the VM MAC address and the number of uplinks in the NIC group.
- Route based on IP hash: The virtual switch selects the virtual machine's uplink based on the source and destination IP addresses of each packet.
- Use explicit failover order: There is no actual load balancing available for this policy. The virtual switch always uses the uplink that ranks first in the Active Adapter list and meets the failover detection criteria. If there is no uplink available in the active list, the virtual switch uses the uplink in the standby list.

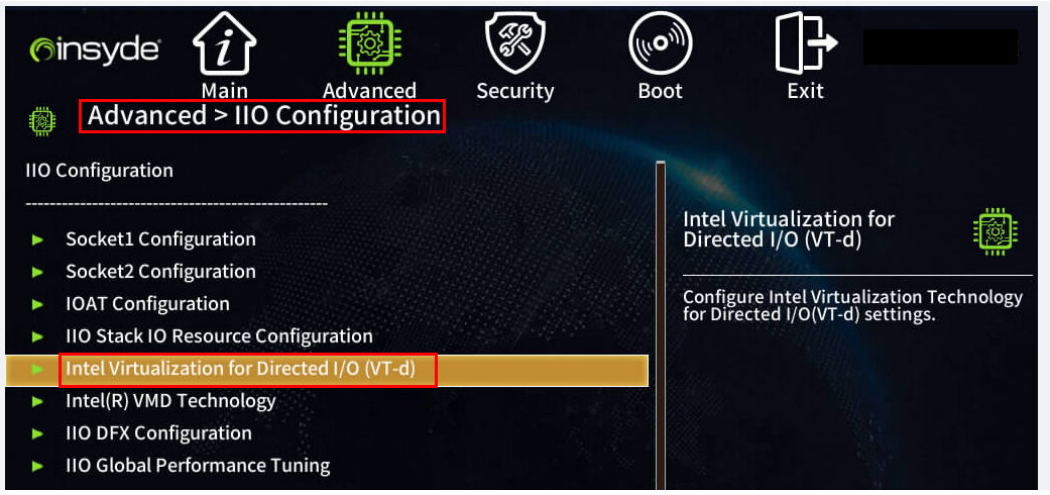
----End

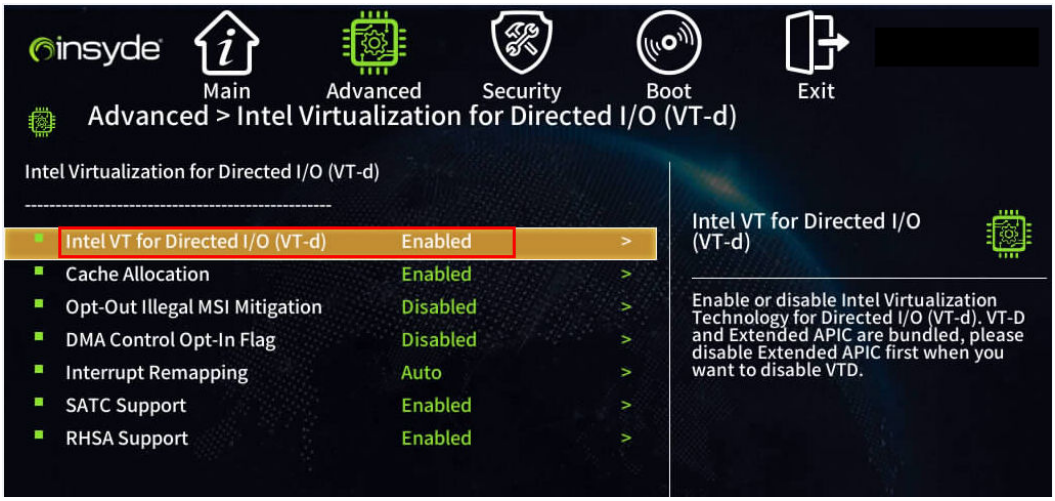
5.4 Configuring SR-IOV

Ensure that the SR-IOV and VT-d functions are enabled in the BIOS. Generally, the functions are enabled by default on servers.

If this function is disabled, perform the following steps to enable VT-d and SRIOV in the BIOS.







5.4.1 Configuring Port SR-IOV in Linux

The following uses RHEL 8.6 XP330 as an example to describe how to configure the SR-IOV for the XP330 port in Linux.

5.4.1.1 Enable SR-IOV

Step 1 Log in to the server OS as the **root** user, right-click on the screen, and choose **Open Terminal** from the shortcut menu to open the CLI.

Step 2 Add system startup parameters to the grub configuration file.

Run the **vi /etc/default/grub** command, press i to enter the editing mode, and add intel_iommu = on iommu = pt to the GRUB_CMDLINE_LINUX line.

```
GRUB_TIMEOUT=5
GRUB_DISTRIBUTOR="$(sed 's, release .*$,,g' /etc/system-release)"
GRUB_DEFAULT=saved
GRUB_DISABLE_SUBMENU=true
GRUB_TERMINAL_OUTPUT="console"
GRUB_CMDLINE_LINUX="intel_iommu=on iommu=pt crashkernel=auto resume=UUID=39a648f8-b595-44e4-b272-6c039df9b2bc rhgb quiet"
GRUB_DISABLE_RECOVERY="true"
GRUB_ENABLE_BLSCFG=true
```

After the modification is complete, press **Esc** to exit the editing mode and enter **:wq!** to save the settings and exit.

Step 3 Execute the command **grub2-mkconfig -o /boot/efi/EFI/redhat/grub.cfg** effect configuration.

Step 4 Reboot the OS.

Step 5 Run the **lspci |grep -i eth** command to find the BDF of the NIC (bus: device:). function), for example, "b8: 0.00" and "b8: 00.1" for BDF.

```
[root@localhost ~]# lspci |grep -i eth
16:00.0 Ethernet controller: Broadcom Inc. and subsidiaries BCM57412 NetXtreme-E 10Gb RDMA Ethernet Controller (rev 01)
16:00.1 Ethernet controller: Broadcom Inc. and subsidiaries BCM57412 NetXtreme-E 10Gb RDMA Ethernet Controller (rev 01)
a8:00.0 Ethernet controller: Intel Corporation I350 Gigabit Network Connection (rev 01)
a8:00.1 Ethernet controller: Intel Corporation I350 Gigabit Network Connection (rev 01)
a8:00.2 Ethernet controller: Intel Corporation I350 Gigabit Network Connection (rev 01)
a8:00.3 Ethernet controller: Intel Corporation I350 Gigabit Network Connection (rev 01)
b8:00.0 Ethernet controller: Mellanox Technologies MT27800 Family [ConnectX-5]
b8:00.1 Ethernet controller: Mellanox Technologies MT27800 Family [ConnectX-5]
```

Step 6 Run the **find / -name "sriov_numvfs"|grep -i "b8:00"** command to query the paths of all the sriov_numvfs configuration files and locate the sriov_numvfs configuration files for the BDF NIC based on the BDF number.

```
[root@localhost ~]# find / -name "sriov_numvfs"|grep -i "b8:00"
/sys/devices/pci0000:b7/0000:b7:01.0/0000:b8:00.1/sriov_numvfs
/sys/devices/pci0000:b7/0000:b7:01.0/0000:b8:00.0/sriov_numvfs
```

Step 7 Run the command **echo [num] >** [*file path*]**/sriov_numvfs**`to enable [num] Virtual Functions (VF)s.

[num] Indicates the number of enabled VFs. For example, to enable eight VFs, run the following command:

echo 1 >/sys/devices/pci0000:b7/0000:b7:01.0/0000:b8:00.0/sriov_numvfs

Step 8 Run the **lspci|grep -i "virtual function"** command to check the PCIe devices corresponding to the new VF.

```
[root@localhost ~]# lspci|grep -i "virtual function"
b8:00.2 Ethernet controller: Mellanox Technologies MT27800 Family [ConnectX-5 Virtual Function]
```


NOTE

- In this mode, the configuration fails after the driver is reloaded or the system restarts. You need to perform **Step 6**~ **Step 8** again. The maximum number of VFs supported by the NIC can be checked by querying the sriov_totalvfs in the same directory as sriov_numvfs. Run the cat sriov_totalvfs command to check the maximum number of VFs supported by the PF.
- For mellanox NICs, it is recommended to install NVIDIA MLNX_OFED or NVIDIA DOCA. After installation, the mlxconfig tool can be used to modify the maximum number of VFs supported by default for the NIC in the system.

----End

5.4.1.2 Create VM

The data in the figure are examples. The configuration depends on actual requirements.

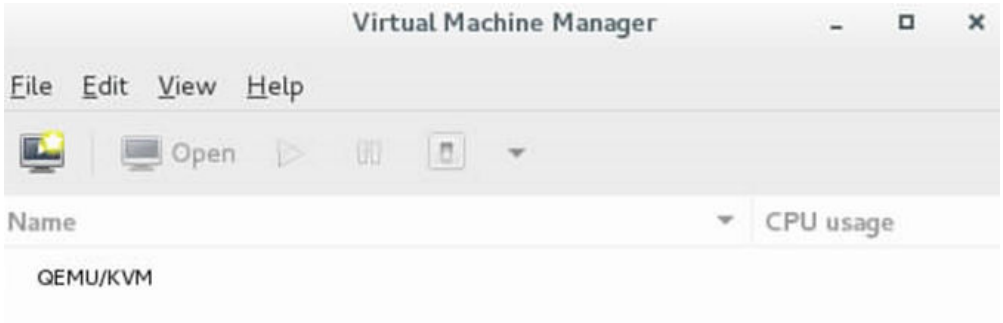
Step 1 Open the remote virtual console on the iBMC WebUI.

Step 2 Transfer the OS image file to the test host.

Step 3 Log in to the server OS as the **root** user, right-click on the screen, and choose **Open Terminal** from the shortcut menu to open the CLI.

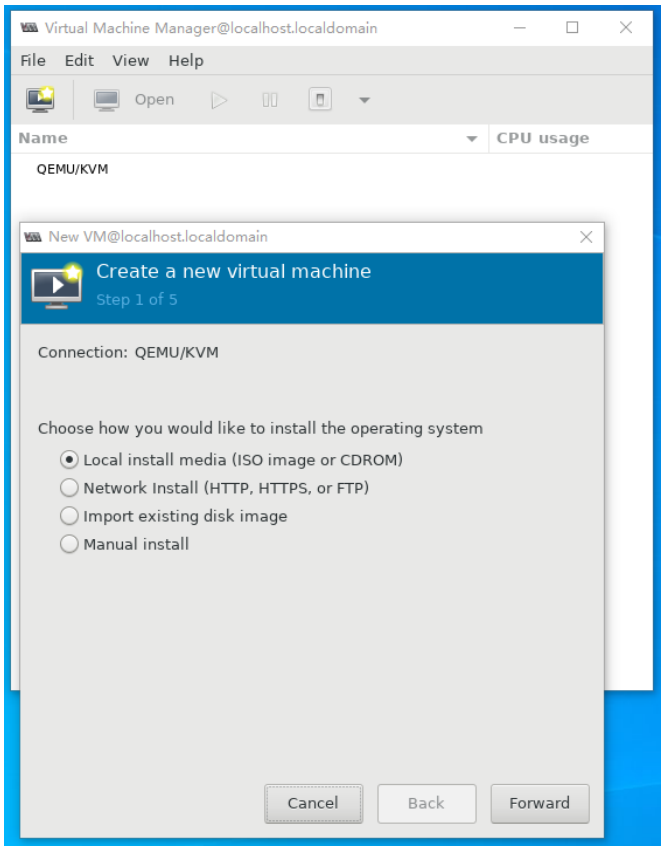
Step 4 Enter **virt-manager** in Terminal to access the VM management page, as shown in**Figure 5-29** .

Figure 5-29 Entering the VM Management Page



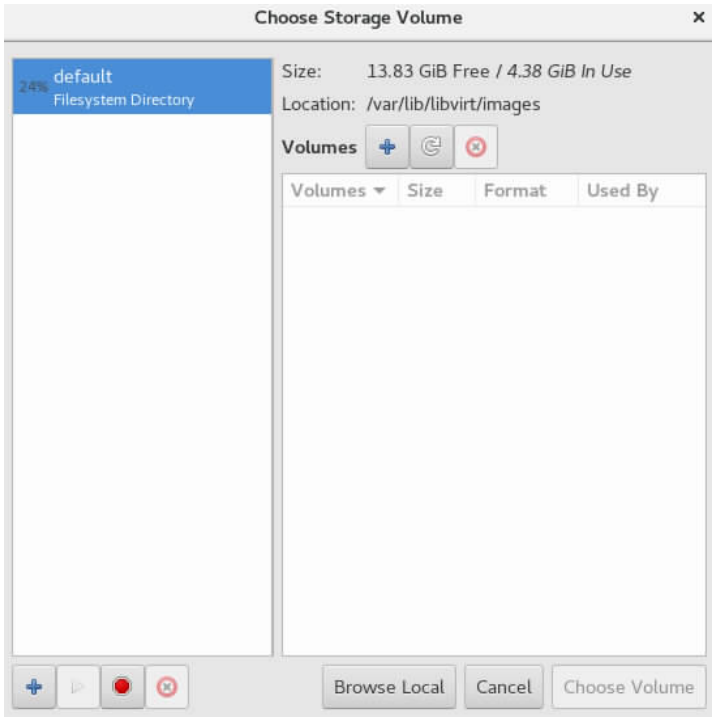
Step 5 Click on  Create Virtual Machine, select the installation method as "Local install media (ISO image or CDROM)", and click "Forward", as shown**Figure 5-30**.

Figure 5-30 Create VM



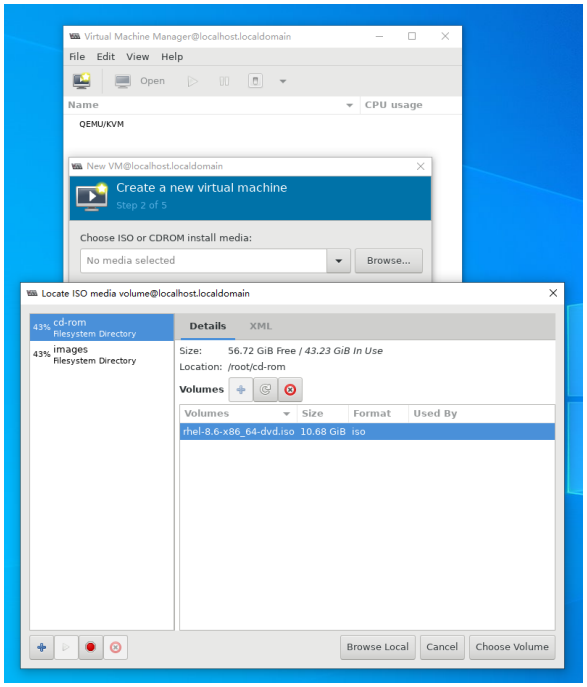
Step 6 Click Browse Local to locate the installation image, as shown in **Figure 5-31**.

Figure 5-31 Locate the installation image



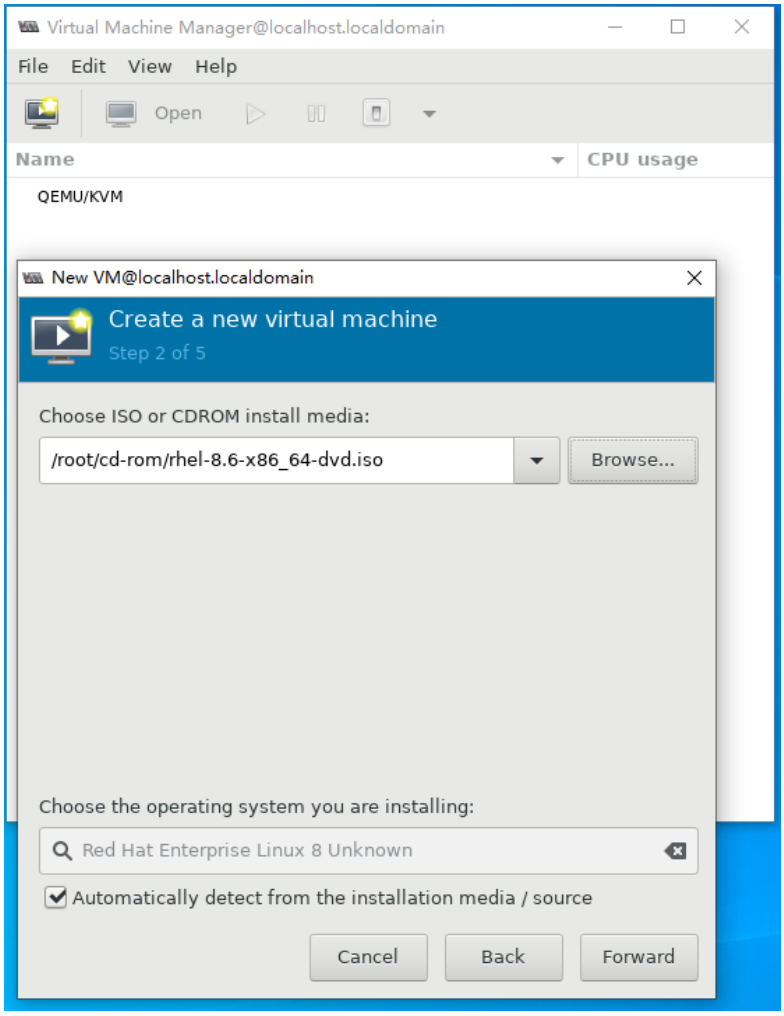
Step 7 Select the image file, for example, rhel-8.6-x86_64-dvd.iso, and click Choose Volume, as shown in **Figure 5-32**.

Figure 5-32 Selecting an image file to be installed



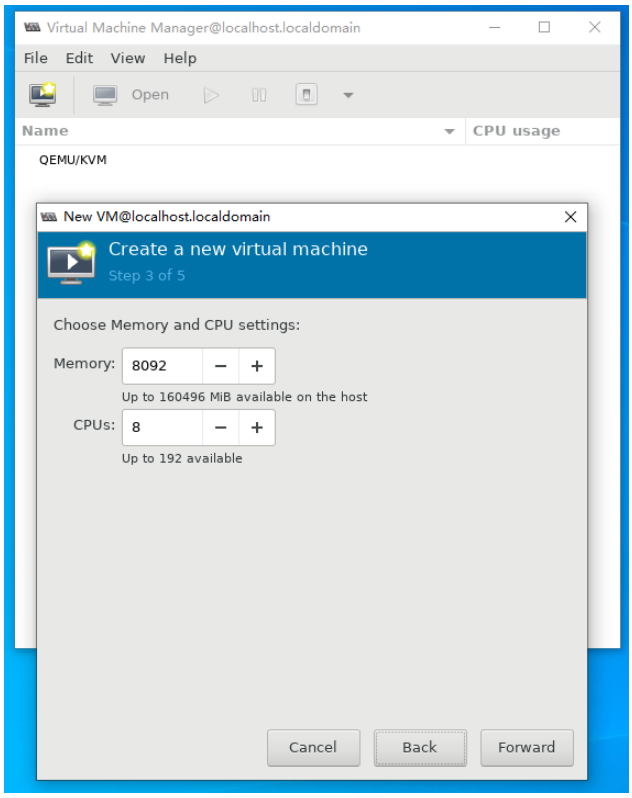
Step 8 Click Forward to select the image file, as shown in**Figure 5-33** .

Figure 5-33 Selecting an image file



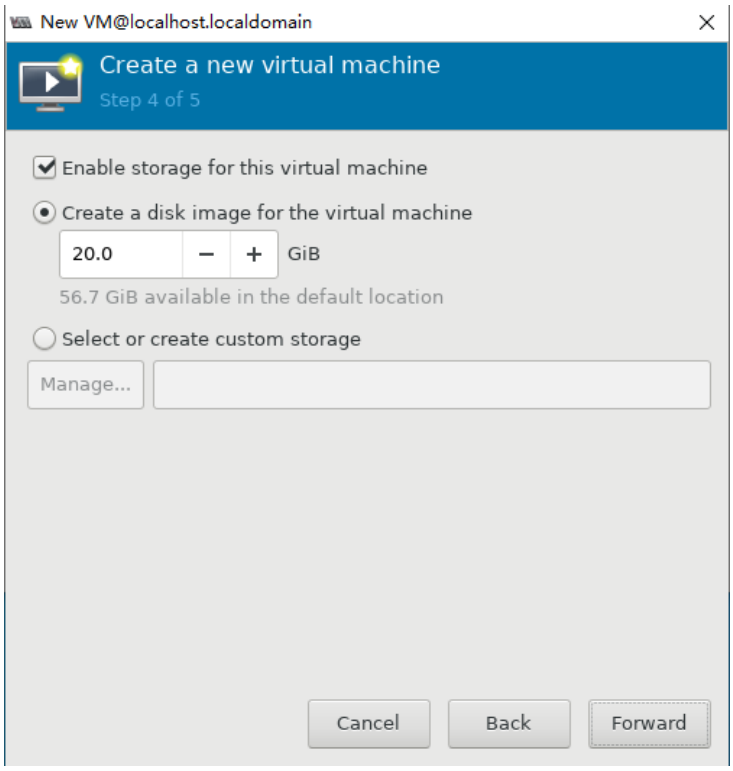
Step 9 Set the VM memory size and number of CPUs and click Forward, as shown in**Figure 5-34** .

Figure 5-34 Configuring the VM Memory Size and Number of CPUs



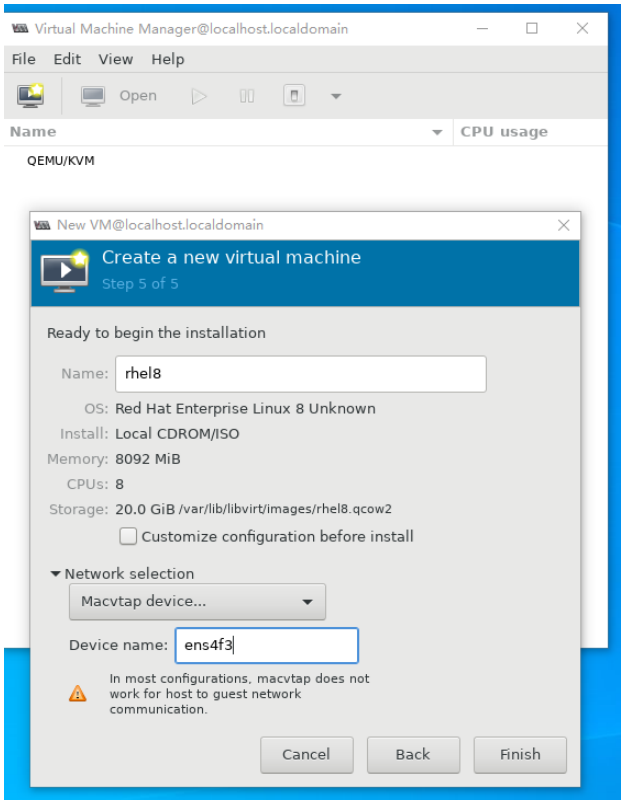
Step 10 Configure VM storage and click Forward, as shown in**Figure 5-35**.

Figure 5-35 Configuring VM Storage



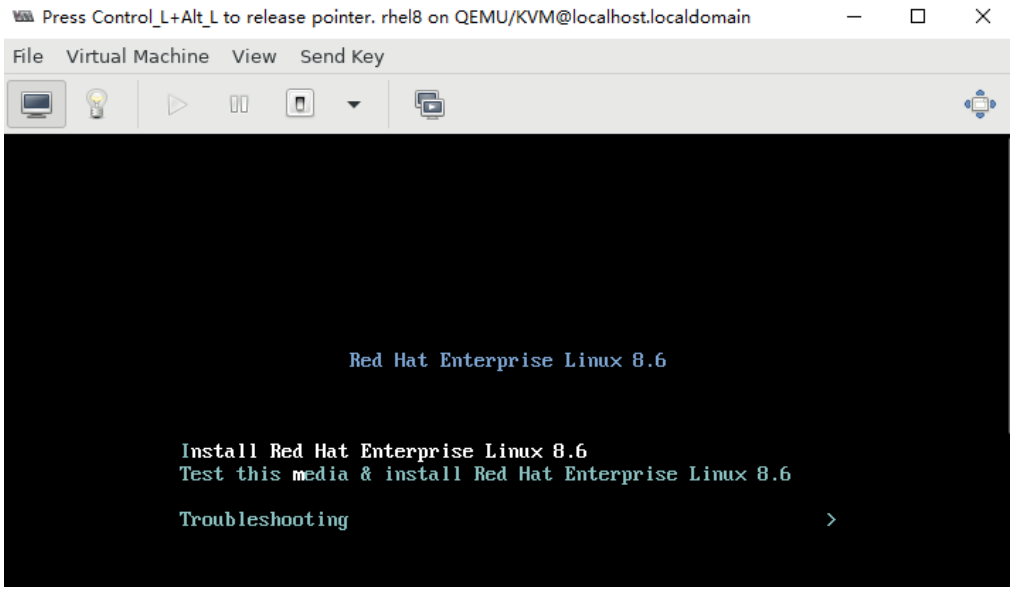
Step 11 Configure a network device. For example, select Macvtap device... Device name. and click Finish to complete the VM configuration, as shown in**Figure 5-36** .

Figure 5-36 Complete VM configuration



Step 12 Double-click the configured virtual machine  to enter the system installation interface, as shown in **Figure 5-37**.Follow the instructions in the **Server OS Installation Guide** for operation.

Figure 5-37 Entering the System Installation Page



----End

5.4.1.3 Adding SR-IOV Network Ports

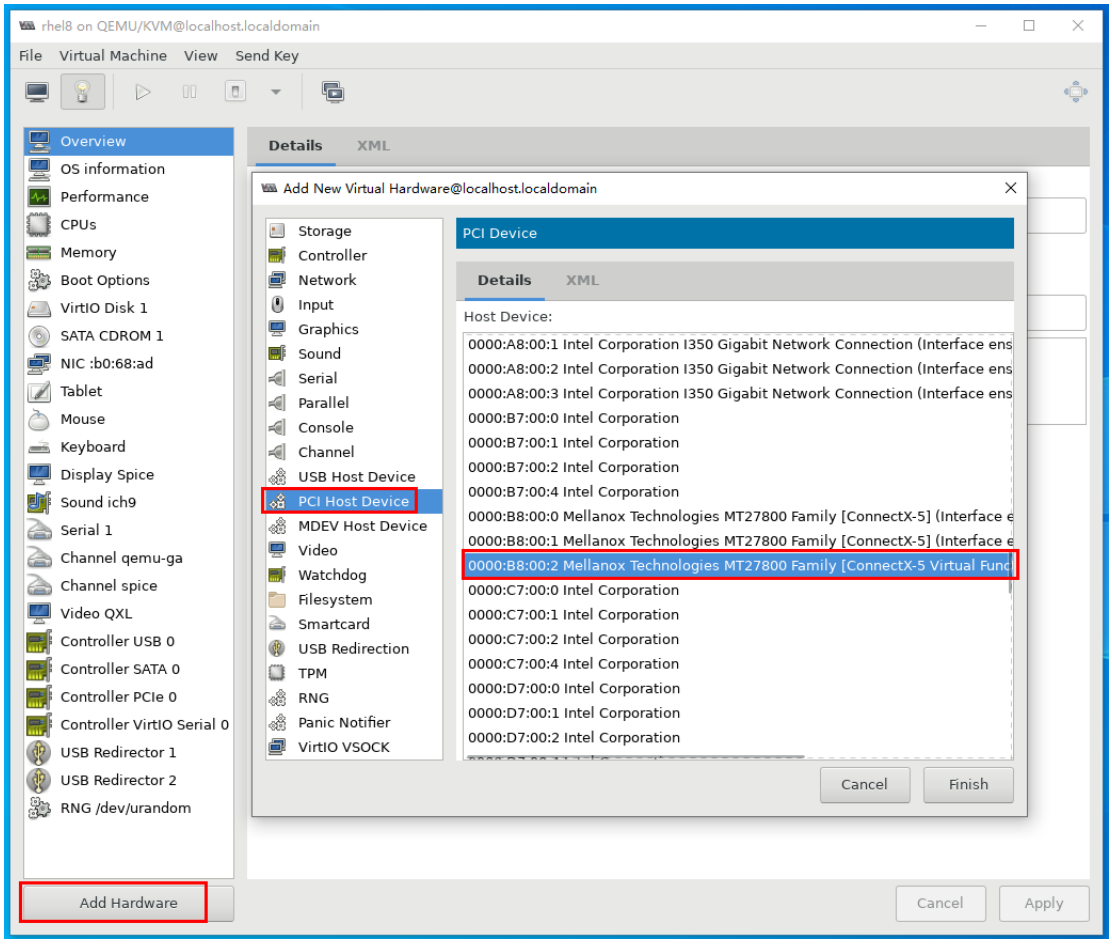
Step 1 After the VM is created, right-click the server OS as an **root** user, and choose Open Terminal from the shortcut menu.

Step 2 Run the following command to power off the VM:.

poweroff

Step 3 Under the new virtual machine configuration, select "Add Hardware > PCI Host Device" to add the created VF to the VM. Upon starting the virtual machine, the VM will have a PCIe device corresponding to the VF, as shown in**Figure 5-38**.

Figure 5-38 Adding the created VF to the VM



Step 4 Run the following command on the VM to view the network port of the VF.

ip a

Information similar to the following is displayed:

```
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
   link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
   inet 127.0.0.1/8 scope host lo
      valid_lft forever preferred_lft forever
   inet6 ::1/128 scope host
      valid_lft forever preferred_lft forever
2: enp1s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
   link/ether 52:54:00:b0:68:ad brd ff:ff:ff:ff:ff:ff
   inet 70.176.56.71/16 scope global enp1s0
      valid_lft forever preferred_lft forever
3: enp7s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
   link/ether b6:22:83:88:52:ea brd ff:ff:ff:ff:ff:ff permaddr 32:d1:45:66:93:99
4: virbr0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN group default qlen
1000
   link/ether 52:54:00:f8:29:6c brd ff:ff:ff:ff:ff:ff
   inet 192.168.122.1/24 brd 192.168.122.255 scope global virbr0
      valid_lft forever preferred_lft forever
```

----End

5.4.2 Configuring Port SR-IOV in Windows

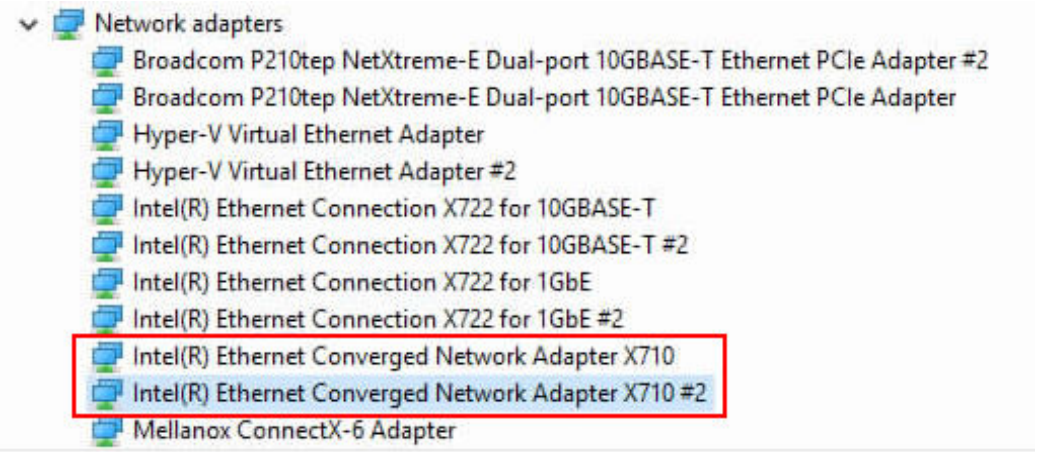
The following uses Windows Server 2019 XP330 as an example to describe how to configure port SR-IOV in Windows.

Prerequisites

The NIC SR-IOV must be enabled. The value is **Enabled** by default.

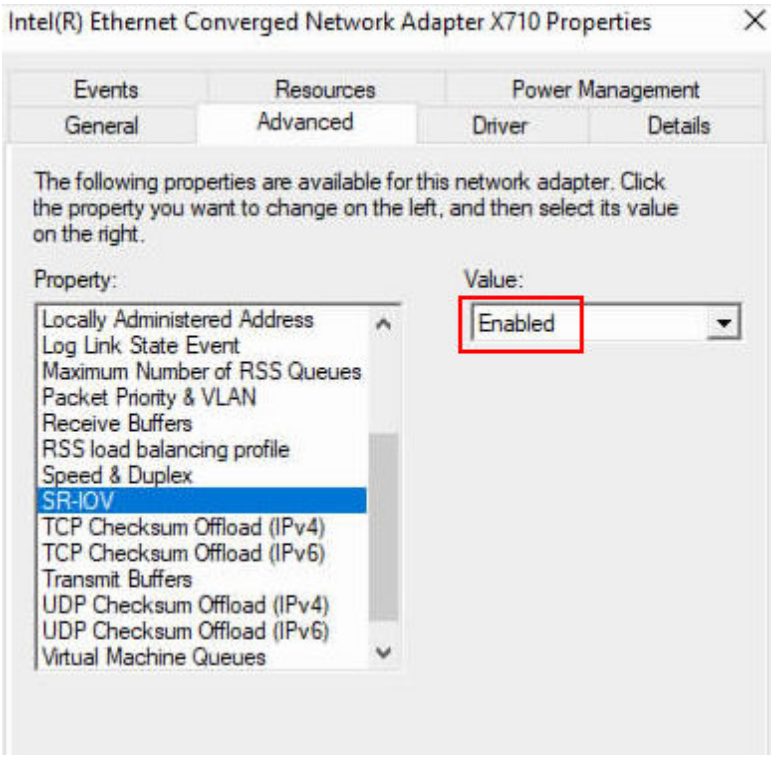
Step 1 In Device Manager, select XP330, as shown in**Figure 5-39** .

Figure 5-39 Enter Device Manager



Step 2 Select the network port to be checked, double-click the network port to display the property configuration page, click the Advanced tab, and check that the SR-IOV value is Enabled, as shown in**Figure 5-40** .

Figure 5-40 Configure properties.

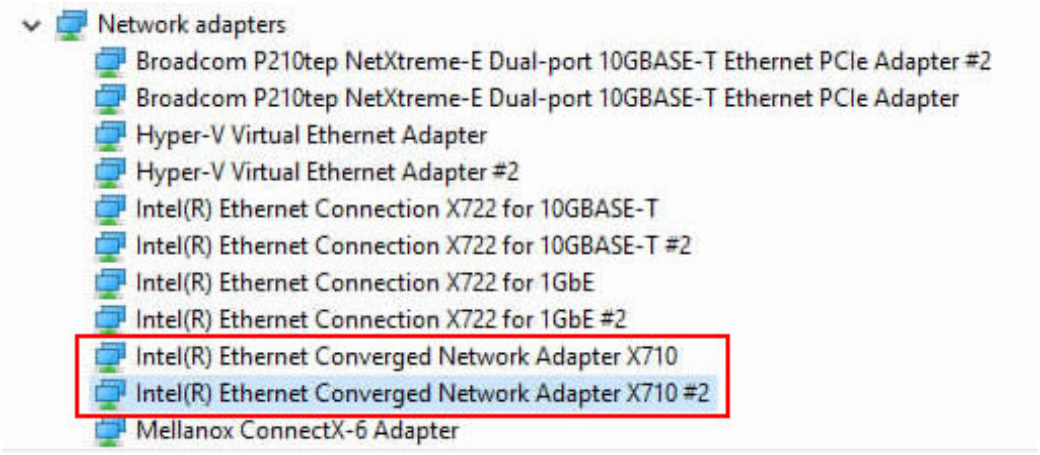


----End

5.4.2.1 Installing Hyper-V

Step 1 Open the Device Manager, as shown in**Figure 5-41** . Check whether the chipset driver and NIC driver are installed properly.

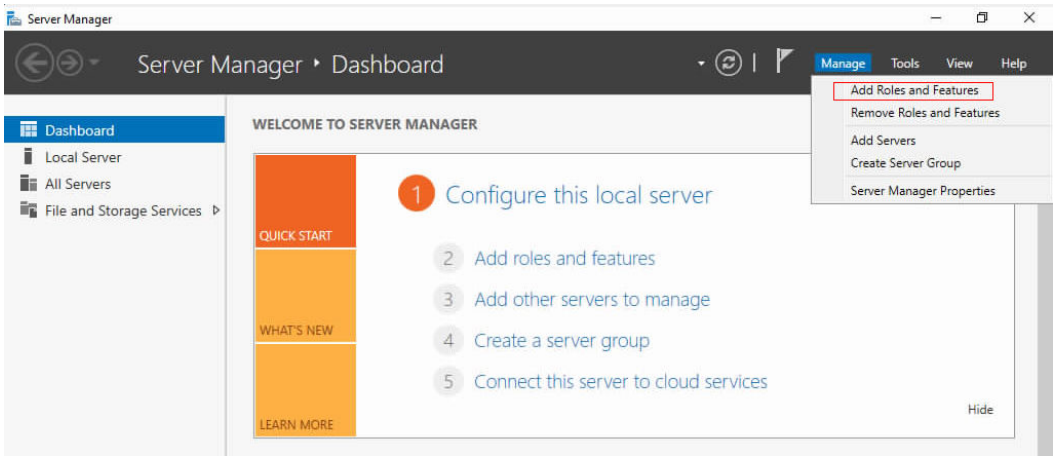
Figure 5-41 Viewing NIC Ports



- If yes, perform **Step 2**.
- If no, install the driver for the NIC.

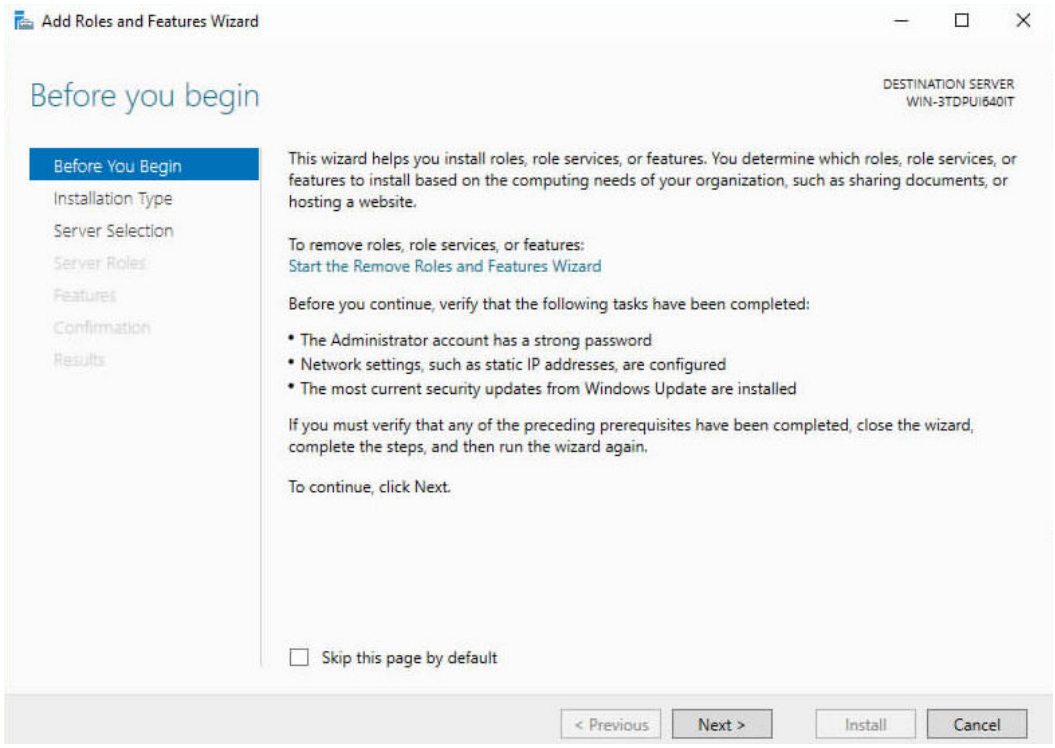
Step 2 Choose Server Manager, and choose Manage & gt from the upper right corner. Add Roles and Features, as shown in**Figure 5-42** .

Figure 5-42 Server Manager Configuration



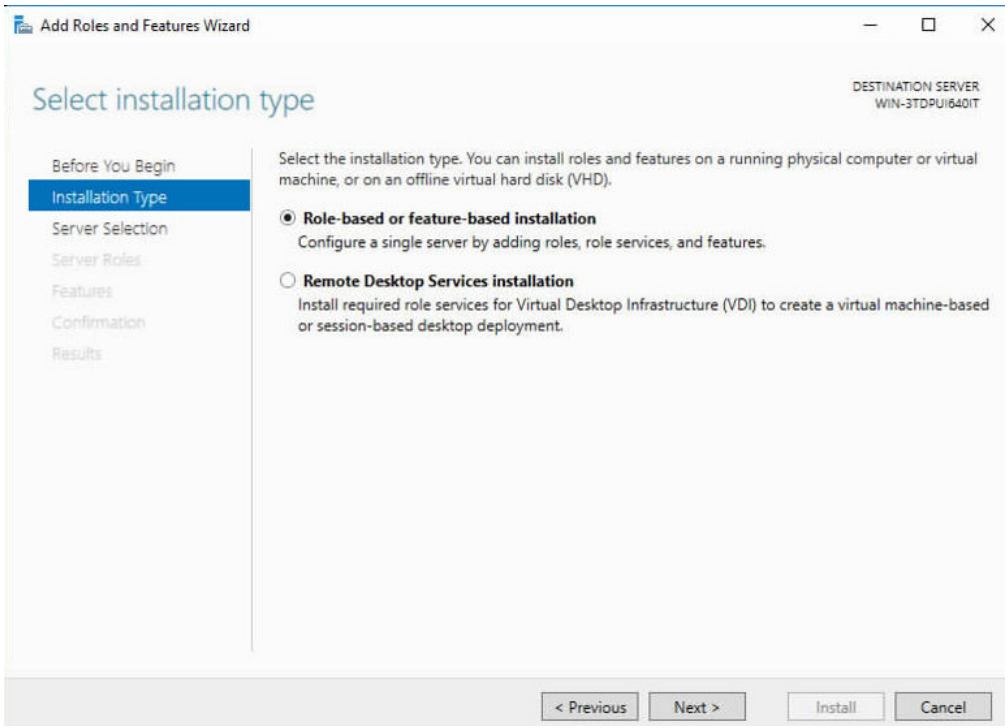
Step 3 On the Before you begin page, retain the default value and click Next. as shown in**Figure 5-43** .

Figure 5-43 Add Roles and Features Configuration



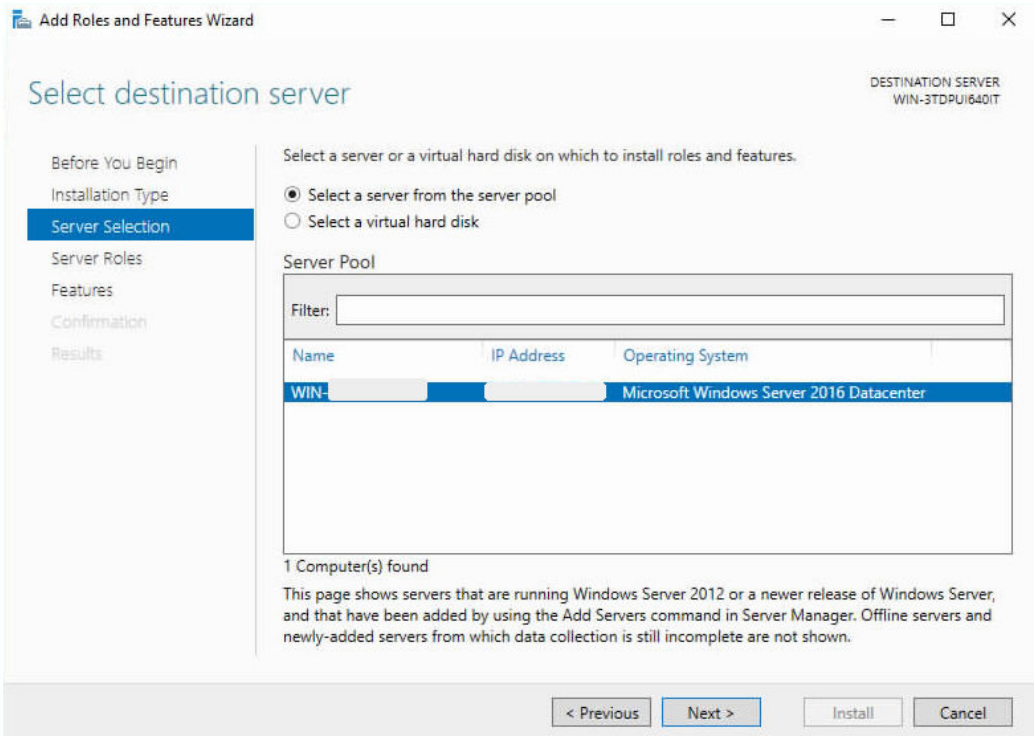
Step 4 In the Installation Type dialog box, retain the default value and click Next. as shown in**Figure 5-44**.

Figure 5-44 Select the installation mode.



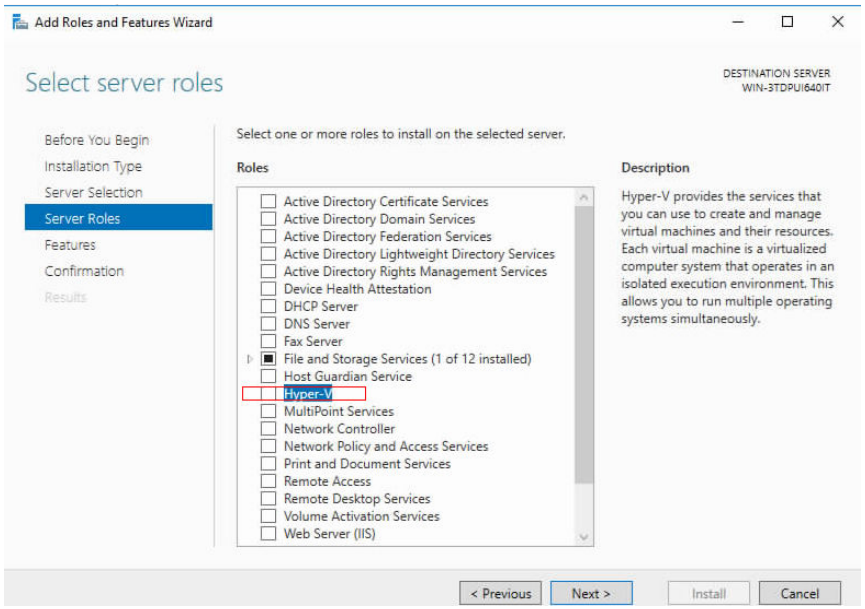
Step 5 In Server Selection, select Server in the Server Pool list, and click Next. as shown in**Figure 5-45** .

Figure 5-45 Choose Server



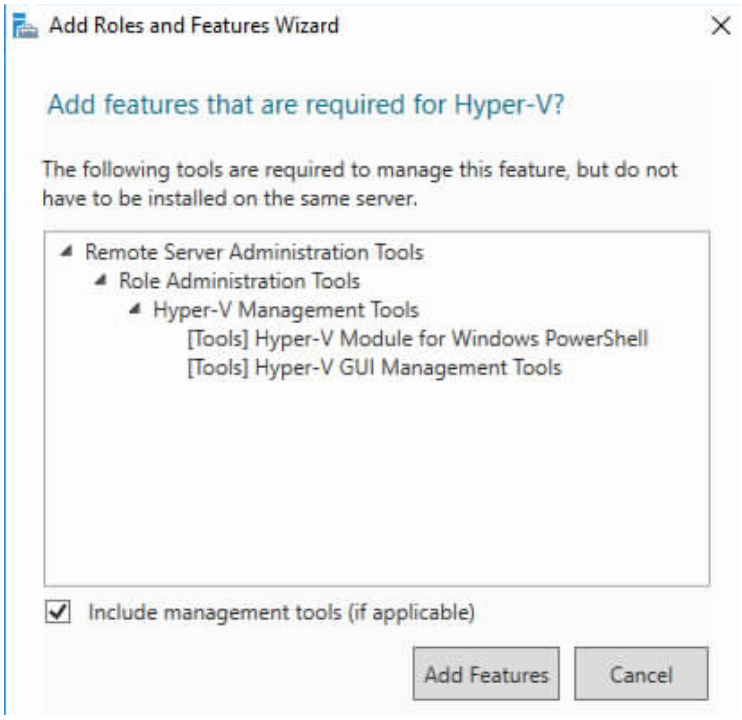
Step 6 Click Hyper-V on the Server Roles page, as shown in the**Figure 5-46** .

Figure 5-46 Select Server Role



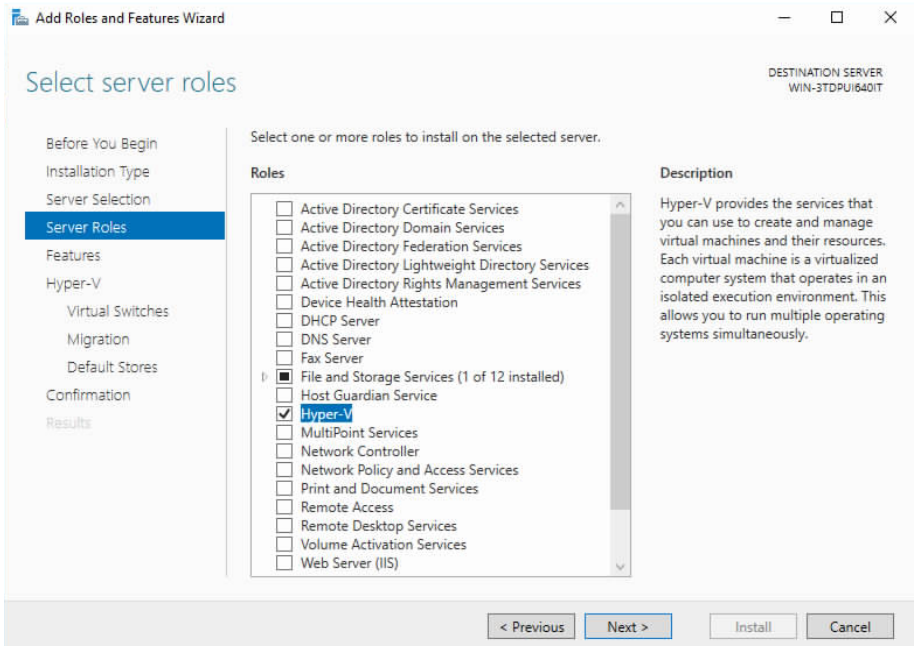
Step 7 In the displayed dialog box, click Add Features, as shown in **Figure 5-47**.

Figure 5-47 Add Features (1)



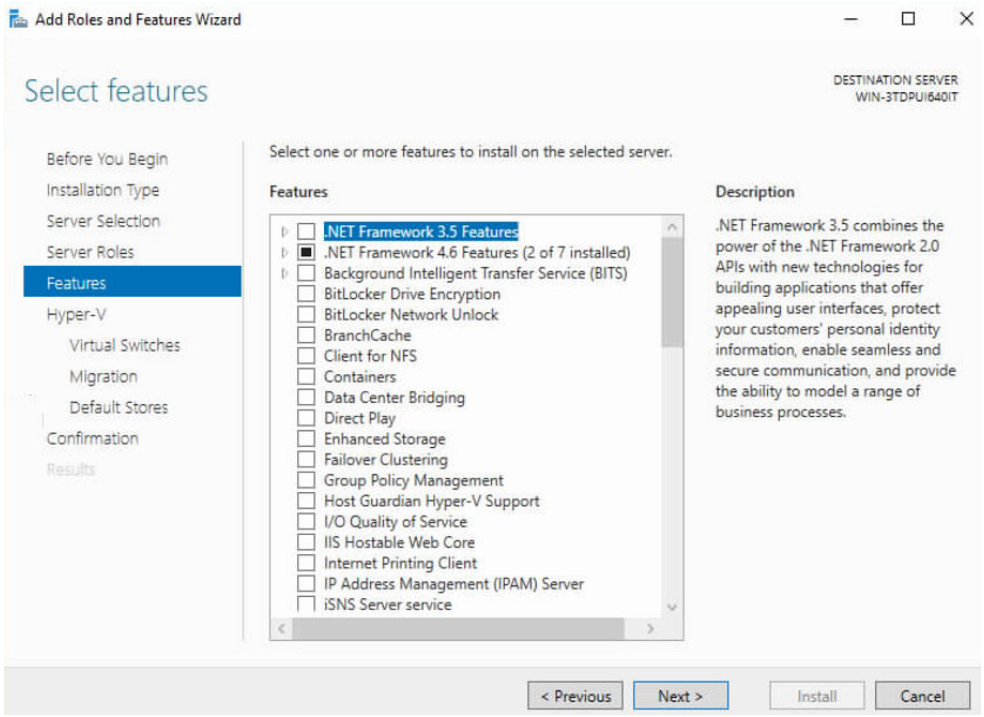
Step 8 The Server Roles page is displayed and click Next. as shown in **Figure 5-48**.

Figure 5-48 Add Features (2)



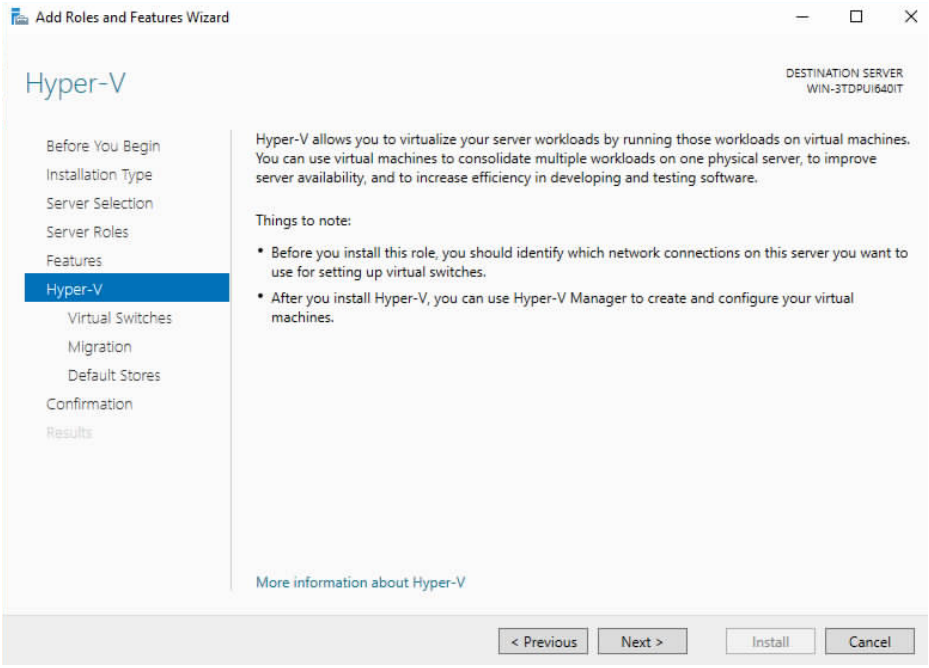
Step 9 On the Features configuration page, keep the default settings and click Next, as shown in**Figure 5-49** .

Figure 5-49 Features configuration



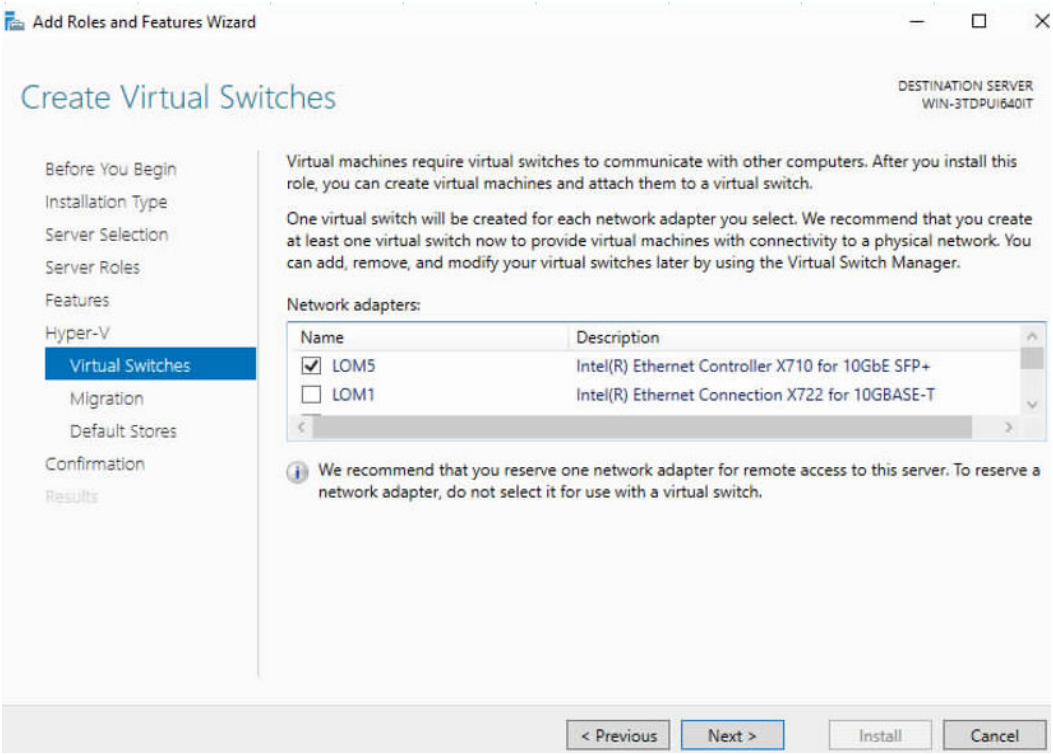
Step 10 On the Hyper-V configuration page, click Next, as shown in**Figure 5-50** .

Figure 5-50 Hyper-V Configuration



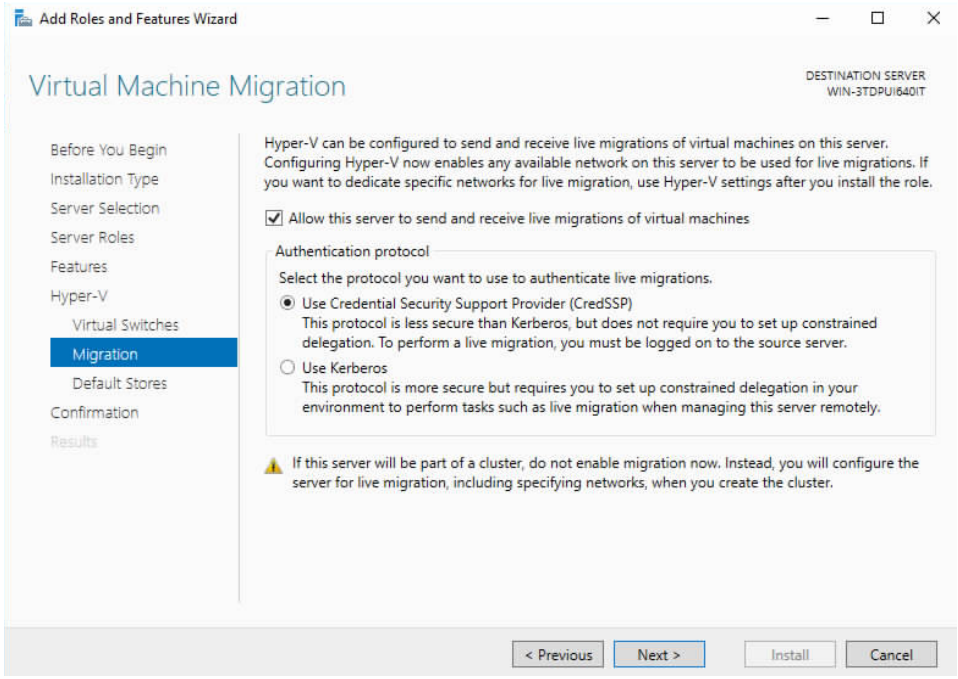
Step 11 On the Virtual Switches page, select a network port, such as LOM5, and click Next, as shown in**Figure 5-51** .

Figure 5-51 Select Network Ports



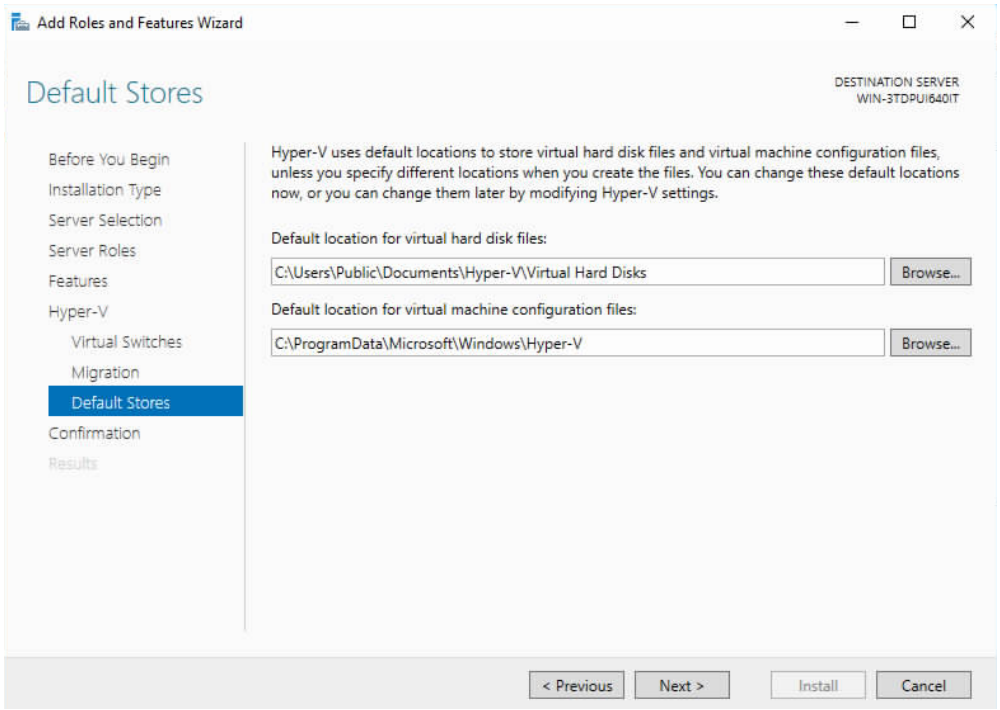
Step 12 Select Allow this server to send and receive live migrations of virtual machines on the Migration page and click Next, as shown in the**Figure 5-52** .

Figure 5-52 Migration configuration page



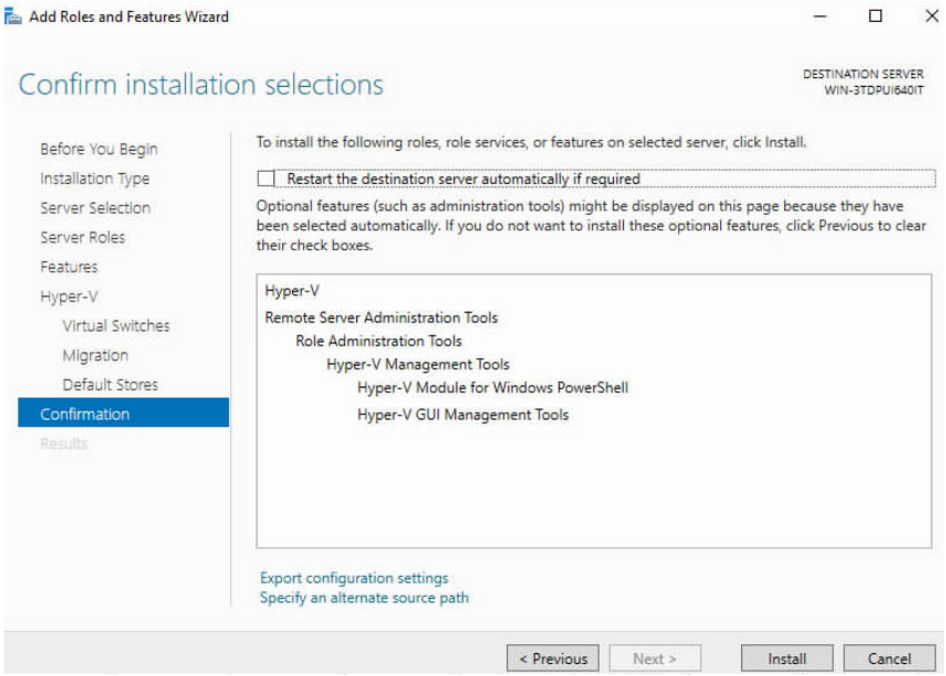
Step 13 On the Default Stores page, keep the default path and click Next. as shown in**Figure 5-53**.

Figure 5-53 Default Stores Configuration



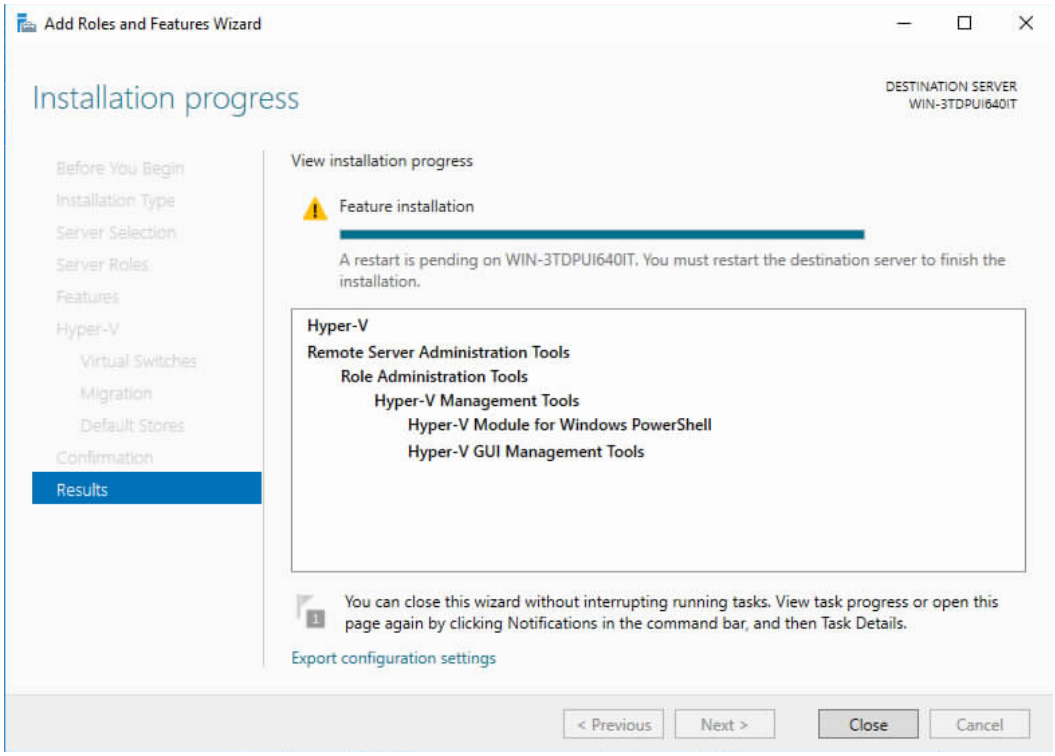
Step 14 On the Confirmation page, click Install, as shown in **Figure 5-54**.

Figure 5-54 Confirmation



Step 15 After Hyper-V is installed, click Close, as shown in the**Figure 5-55** .

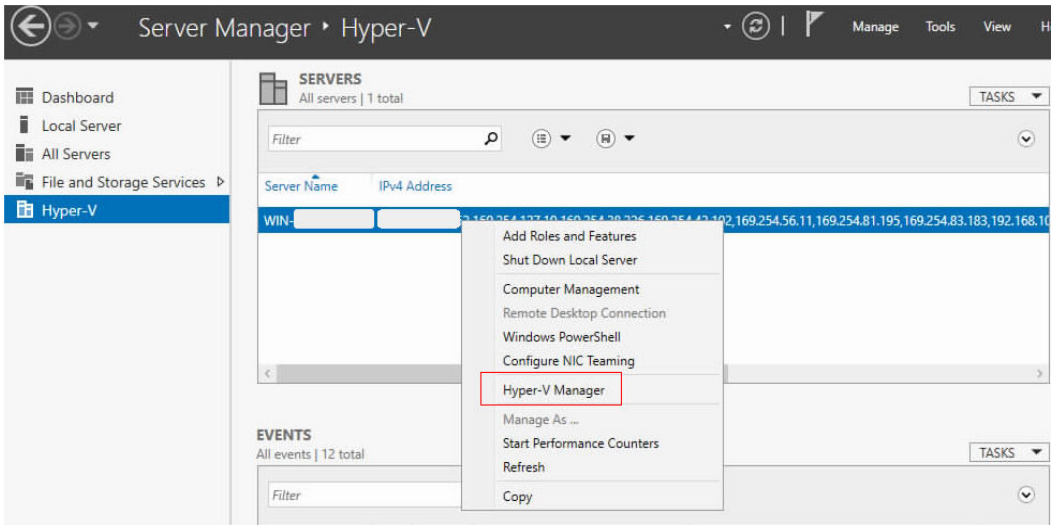
Figure 5-55 Hyper-V installation complete



Step 16 Restarting the Windows system takes effect.

Step 17 After the system restarts, you can see the Hpyer-V in the left navigation bar of the Server Manager page, as shown in the**Figure 5-56** .

Figure 5-56 View Hyper-V



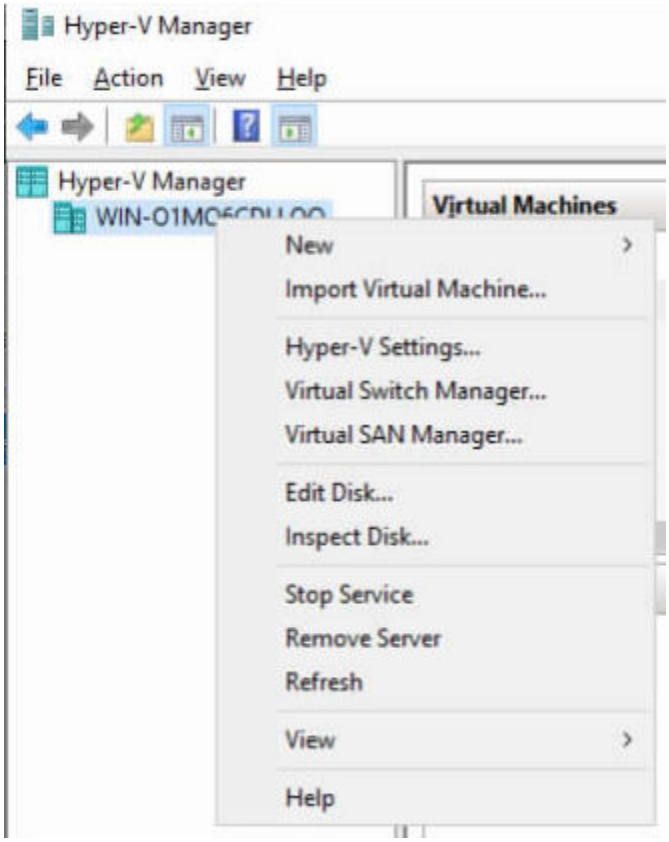
Step 18 Click Hyper-V in the navigation tree on the left. In the right, select Server in the SERVERS list. Right-click Hyper-V Manager and choose Hyper-V Manager from the shortcut menu. as shown in**Figure 5-56** .

----End

5.4.2.2 Creating a Virtual Switch

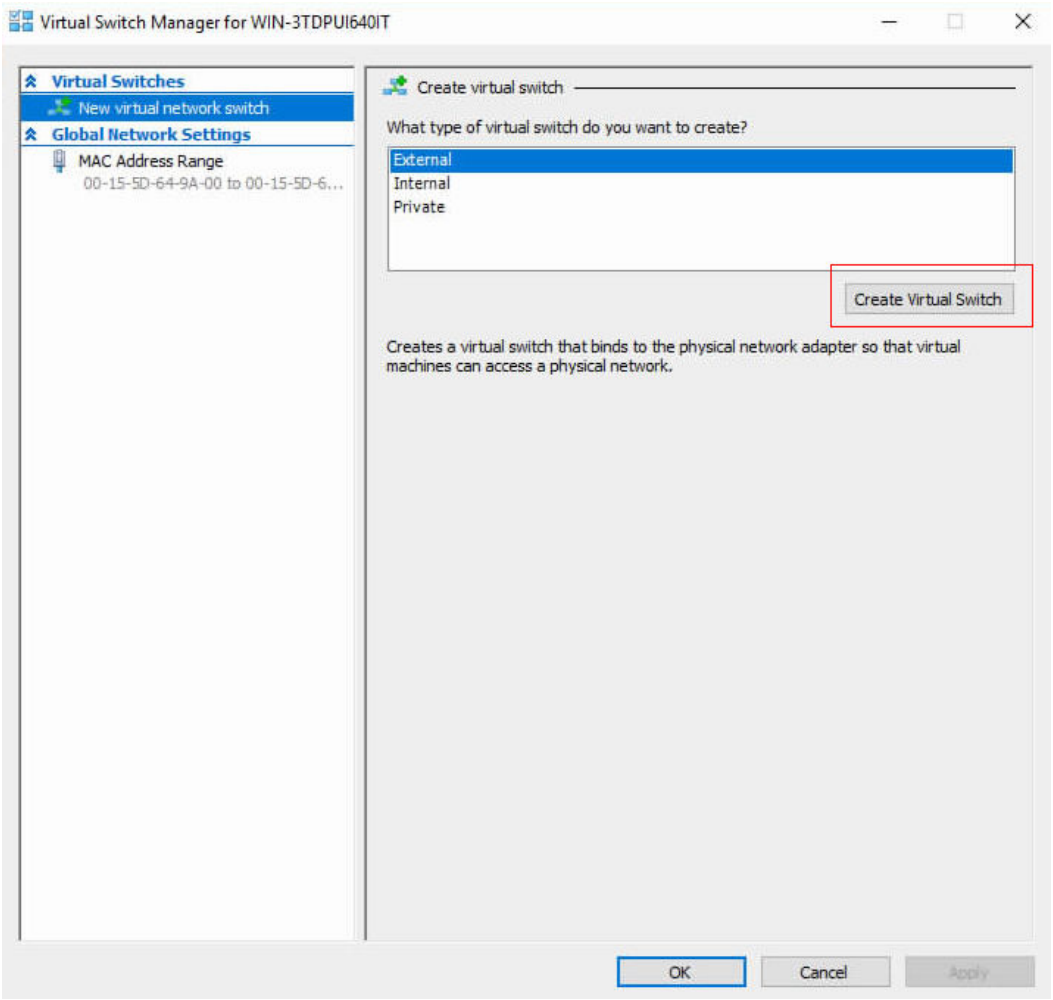
Step 1 Right-click Hyper-V, and choose Virtual Switch Manager from the shortcut menu. Configure a virtual switch. Then, the VM can add the SR-IOV network port, as shown in**Figure 5-57** .

Figure 5-57 Enter Hyper-V Manager



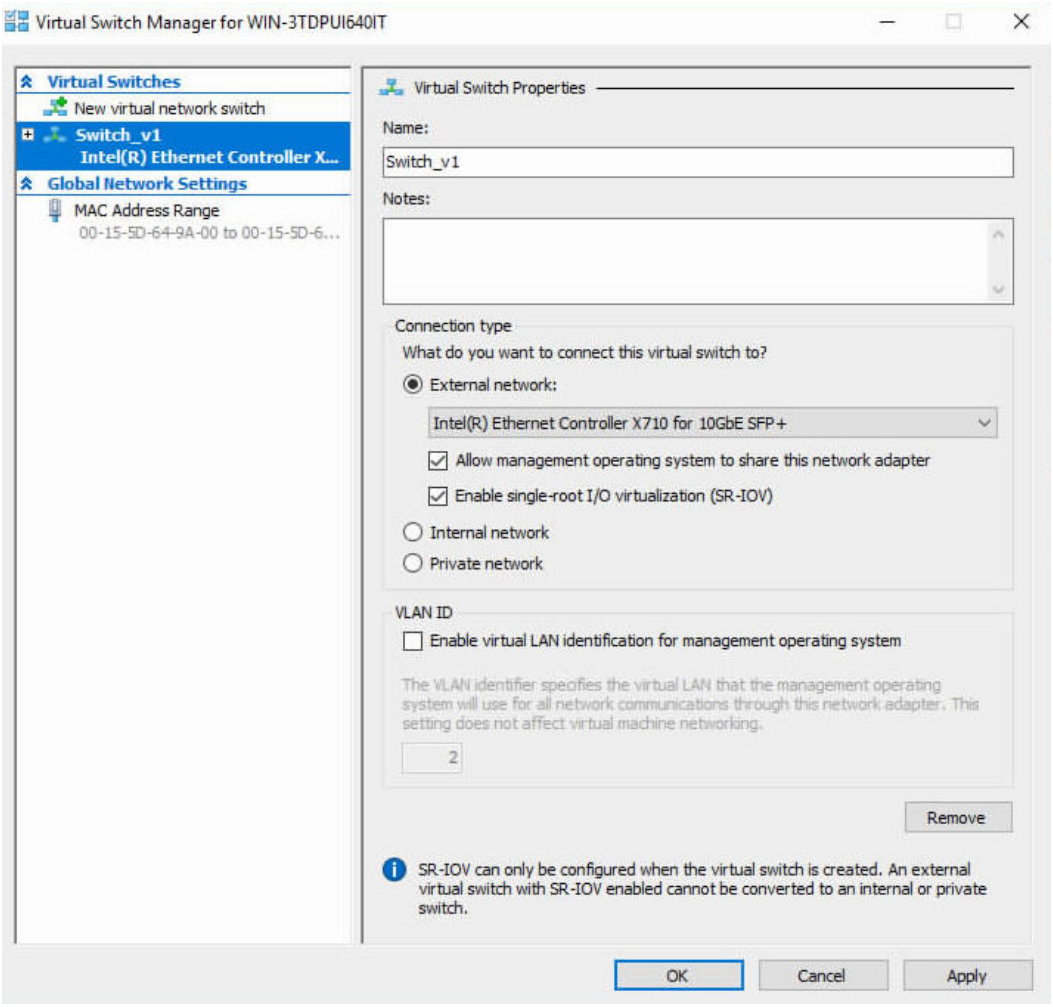
Step 2 Click Create Virtual Switch, as shown in**Figure 5-58** .

Figure 5-58 Creating a Virtual Switch



Step 3 Select an X710 network port and name it Switch_v1 (user-defined name). Select Enable single-root I/O virtualization (SR-IOV) and click Apply. In the displayed dialog box, click yes. Then click OK. as shown in**Figure 5-59**.

Figure 5-59 Associating NIC Ports



Step 4 After the configuration is complete, you can view the corresponding network port (Hyper-V Virtual Ethernet Adapter) in Device Manager, as shown in **Figure 5-60**.

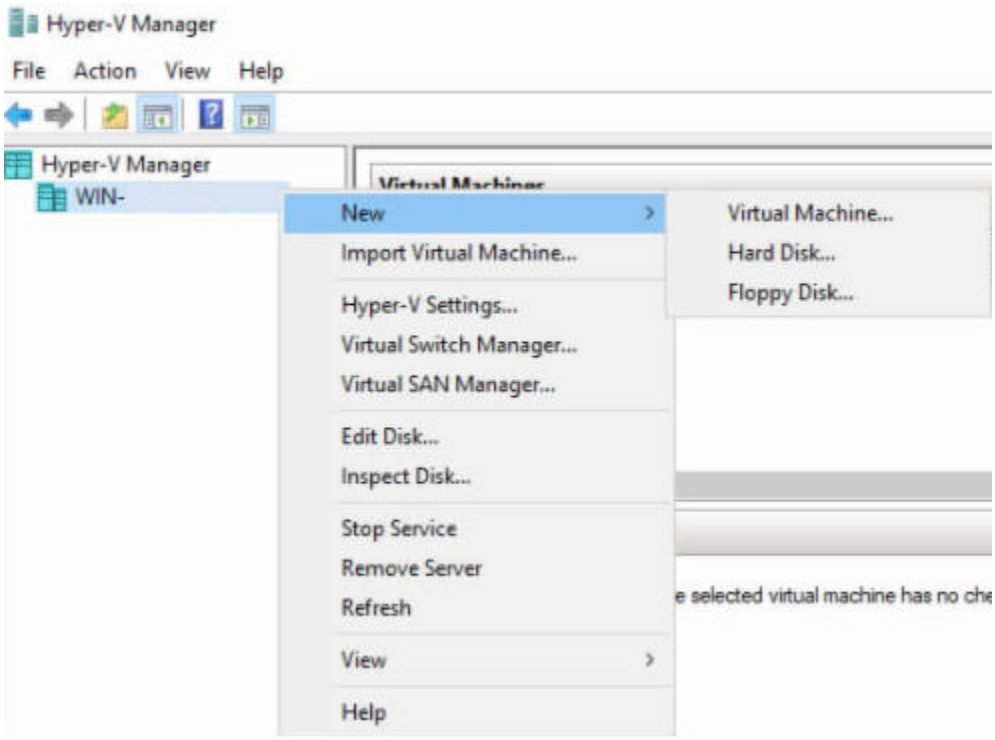
Figure 5-60 View Virtual Switch

----End

5.4.2.3 Create VM

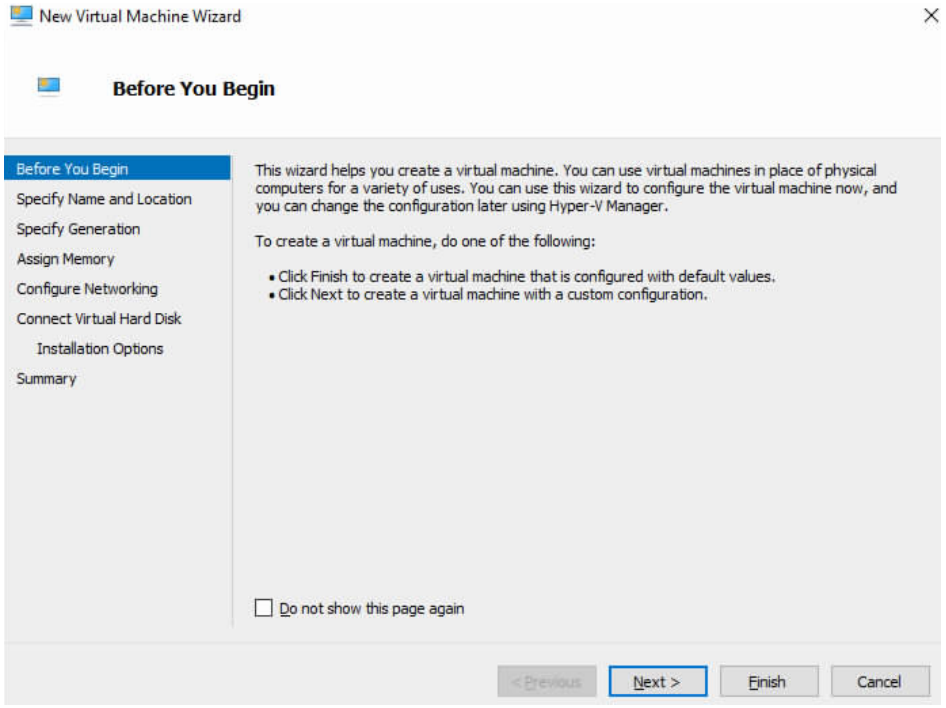
Step 1 Right-click the installed Hyper-V, and choose New & gt; Virtual Machine "Create a virtual machine, as shown in the **Figure 5-61**.

Figure 5-61 New VM



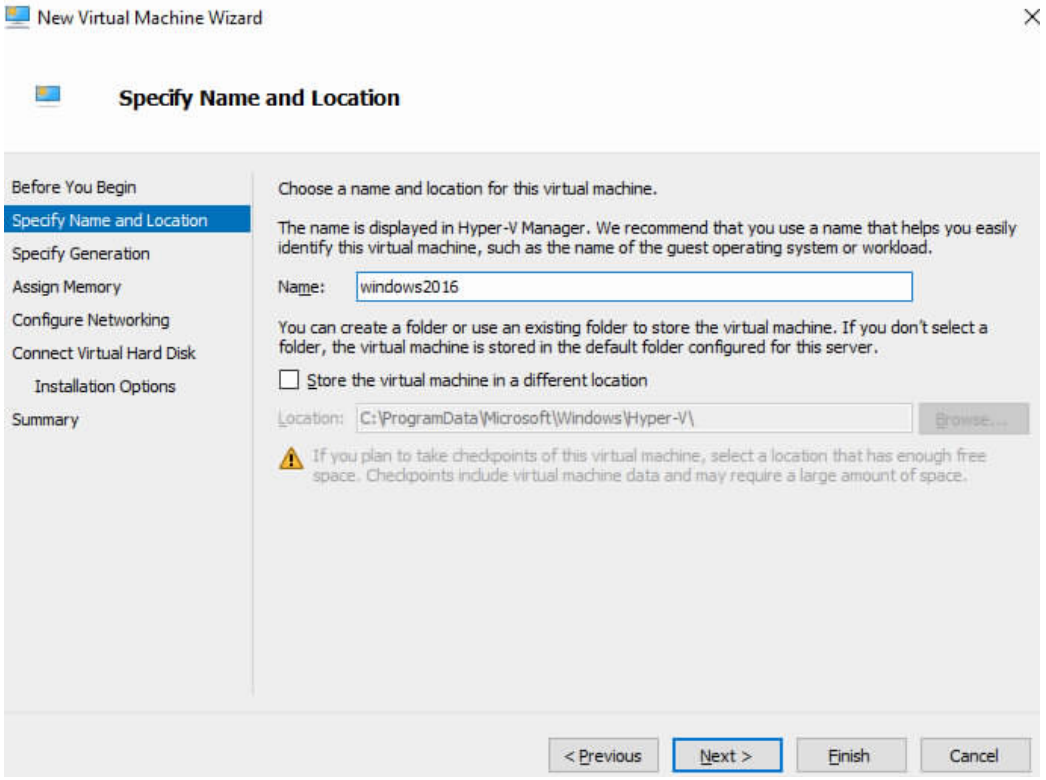
Step 2 On the Before You Begin page, retain the default settings and click Next, as shown in the**Figure 5-61** .

Figure 5-62 Precautions to Begin



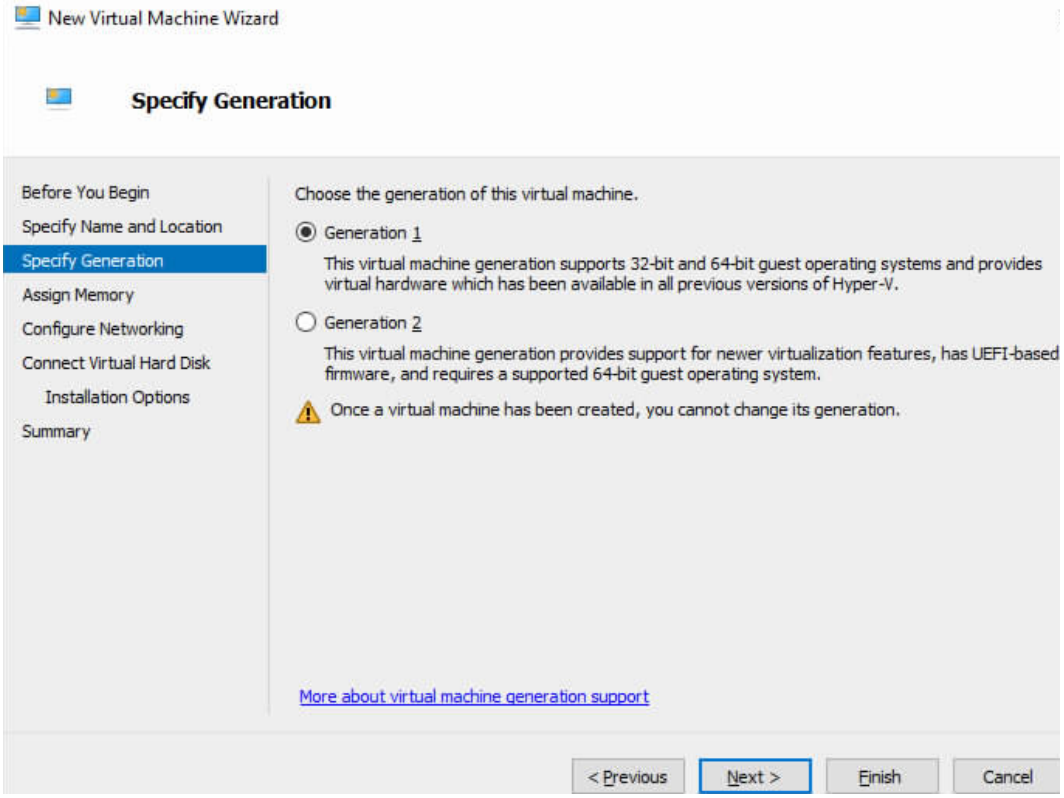
Step 3 On the Specify Name and Location page, enter the VM name, for example, Windows2016, and click Next, as shown in**Figure 5-63** .

Figure 5-63 Enter a VM name.



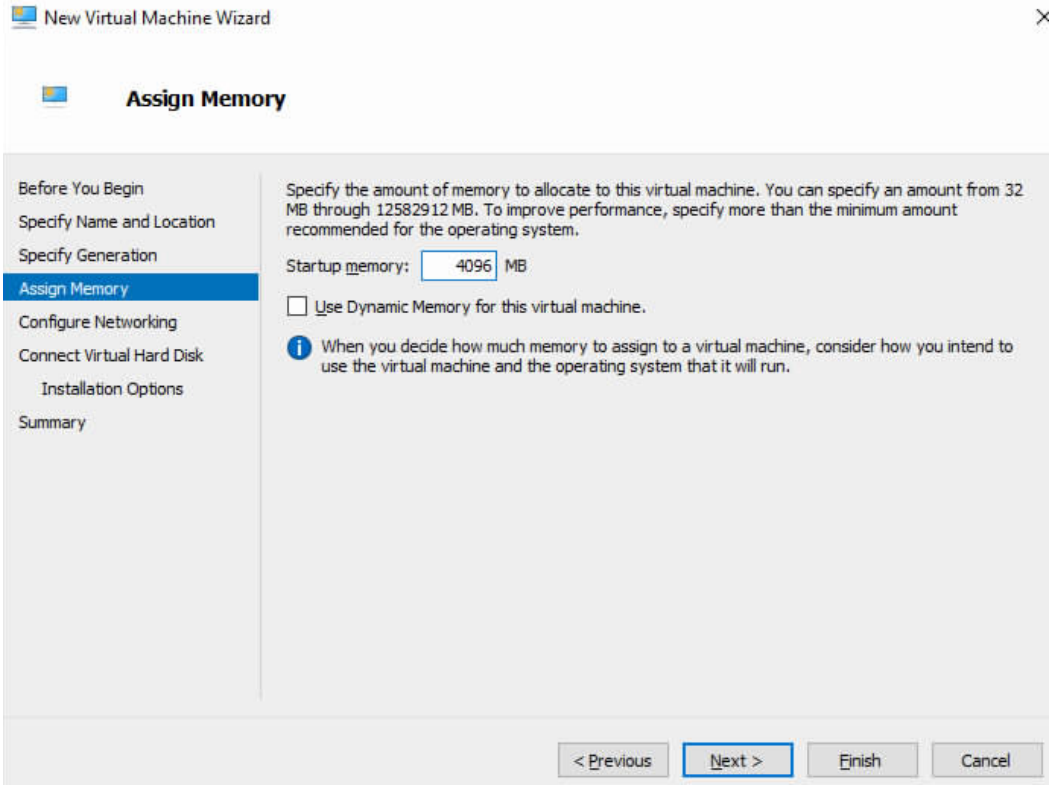
Step 4 On the Specify Generation page, specify the VM type and click Next, as shown in **Figure 5-64**

Figure 5-64 Specifying the VM Type



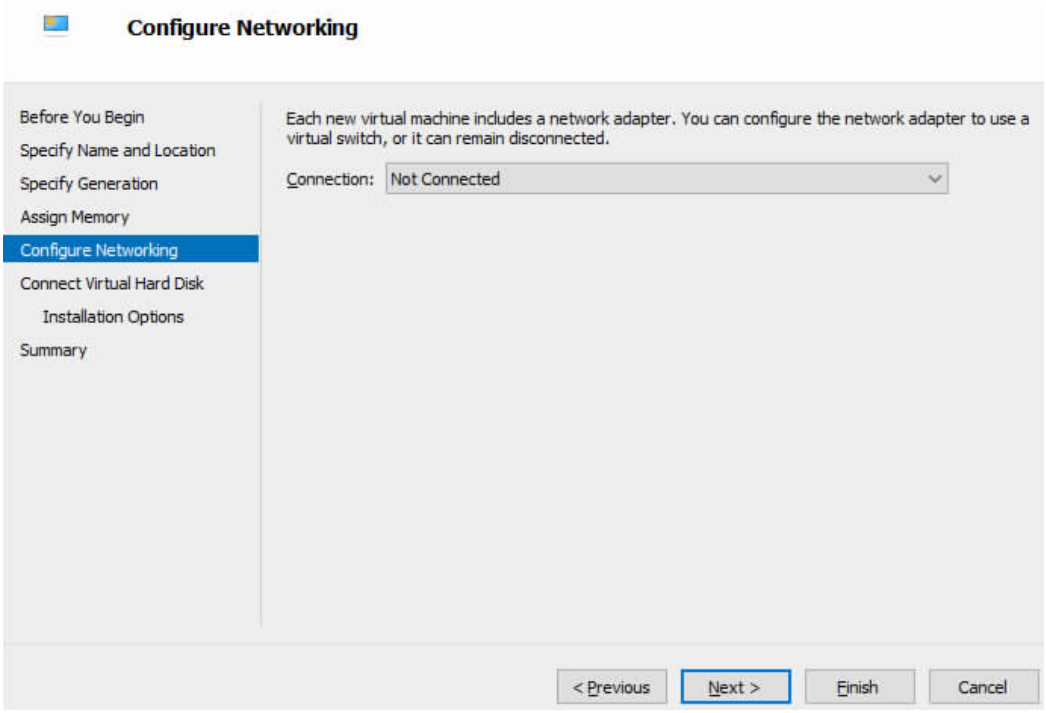
Step 5 On the Assign Memory page, click Next, as shown in**Figure 5-65** .

Figure 5-65 Allocate memory



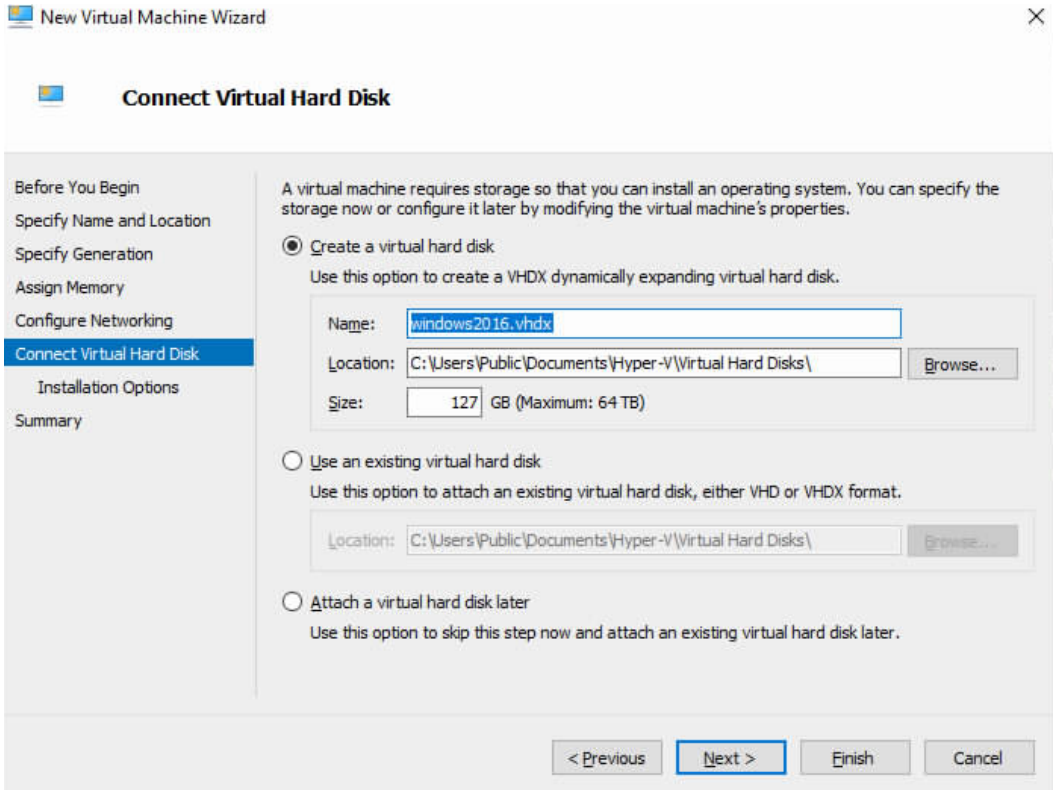
Step 6 On the Configure Networking page, select Not Connected and click Next. as shown in**Figure 5-66** .

Figure 5-66 Configuring the Network



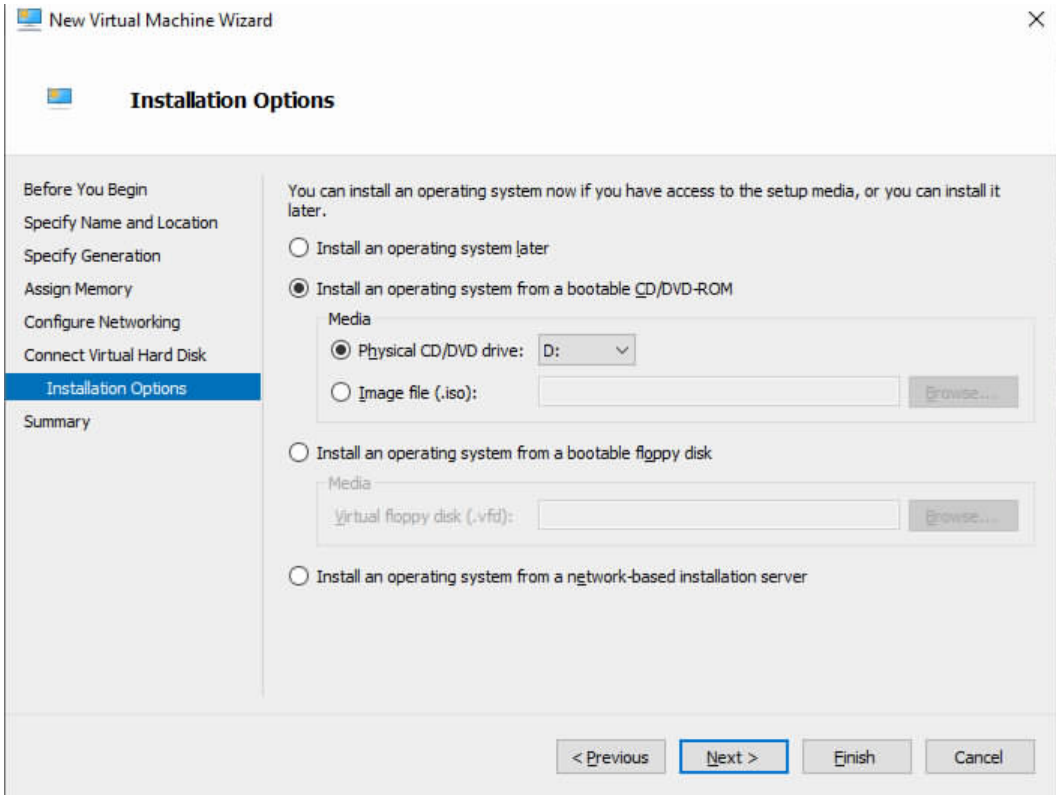
Step 7 On the Connect Virtual Hard Disk page, set hard disk parameters and click Next, as shown in **Figure 5-67**

Figure 5-67 Setting Hard Disk Parameters



Step 8 On the Installation Options page, select an installation image source and click Next. as shown in **Figure 5-68**.

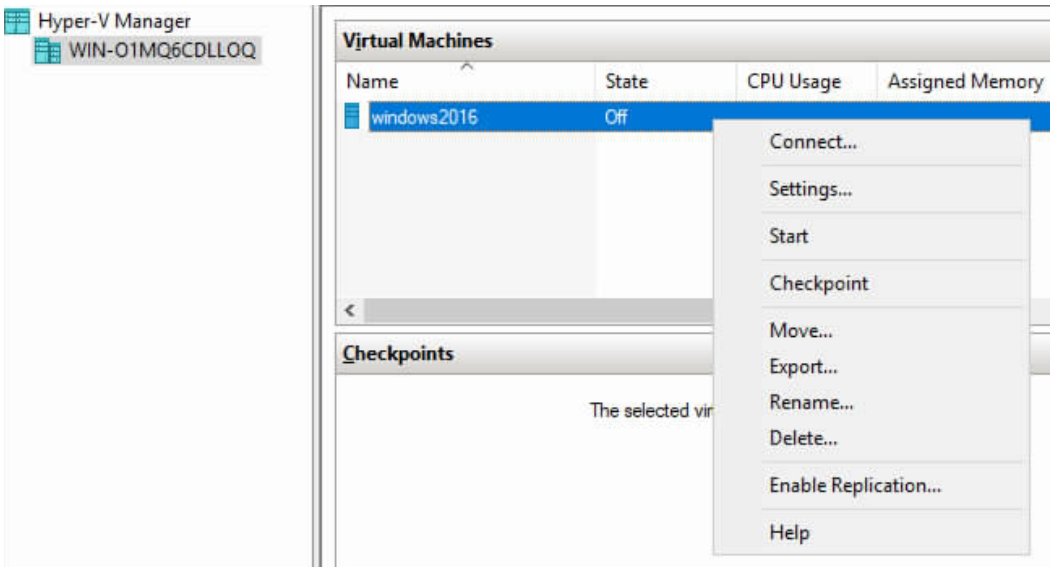
Figure 5-68 Installing a Mirror Source



Step 9 On the Summary page, click Finish to complete the VM creation.

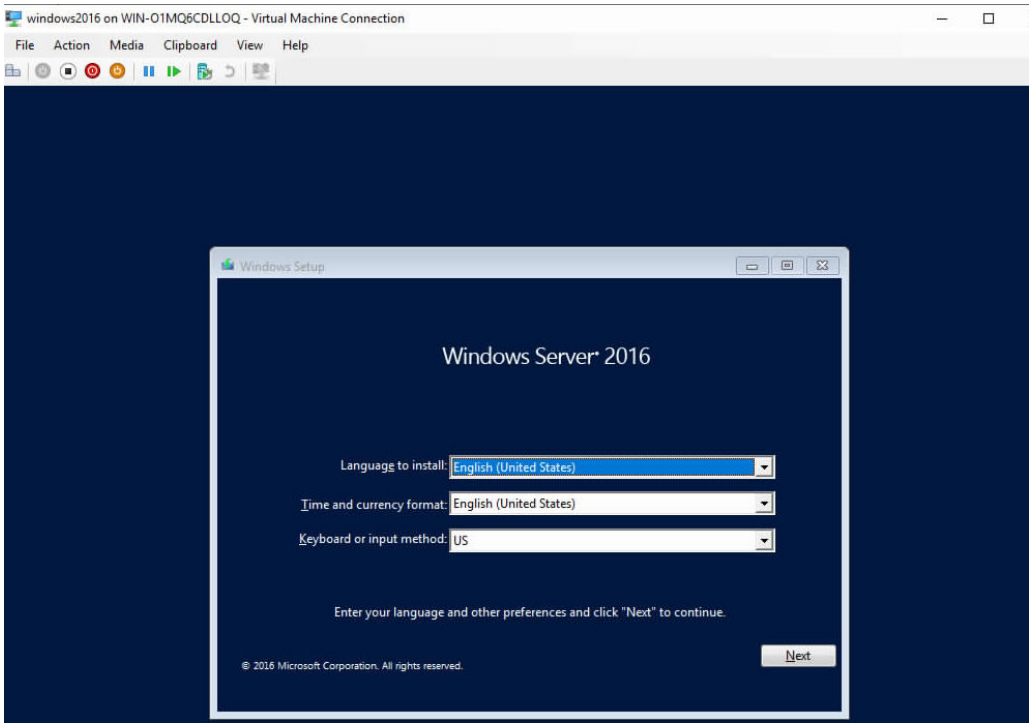
Step 10 Right-click the created VM and choose Start from the shortcut menu to start the VM, as shown in**Figure 5-69** .

Figure 5-69 Start the VM



Step 11 Double-touch the virtual machine to open the virtual machine window, and boot to the interface shown in **Figure 1-78**. Follow the instructions in the **Server OS Installation Guide** for the operation.

Figure 5-70 Entering the System Installation Page

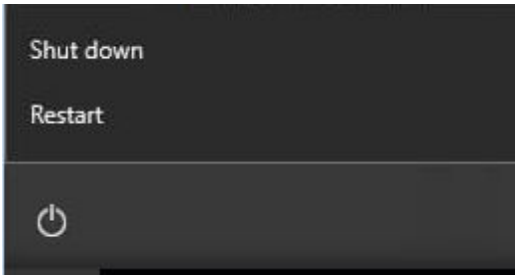


----End

5.4.2.4 Adding SR-IOV Network Ports

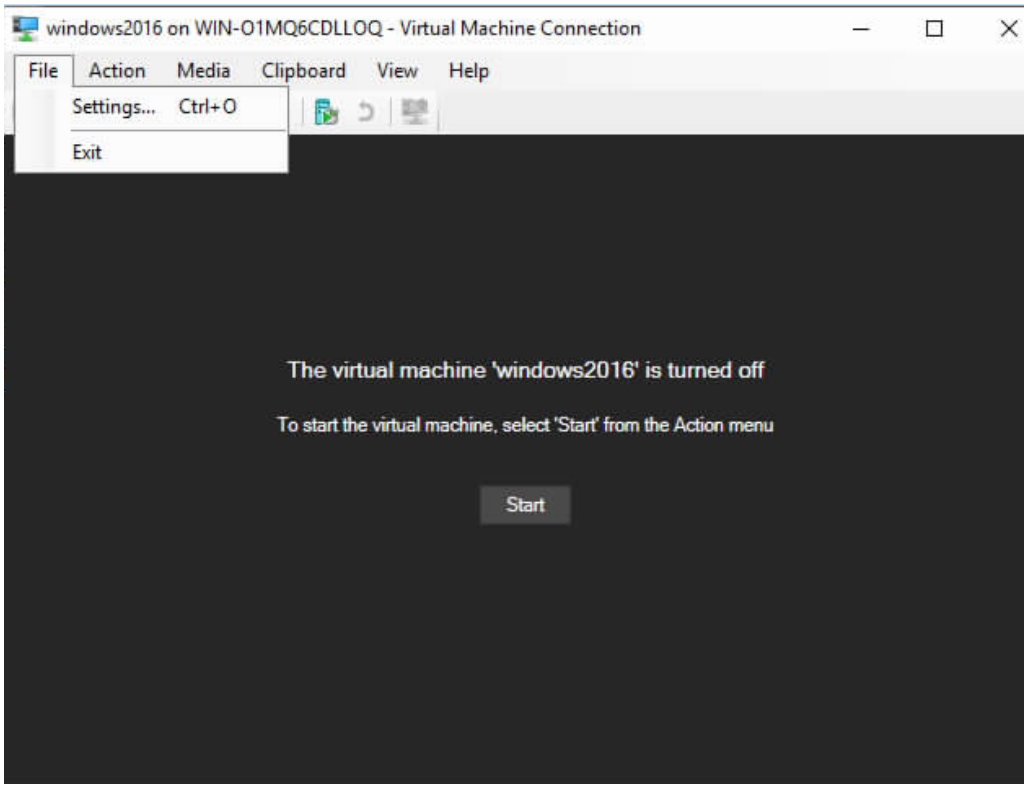
Step 1 On the VM, click Shut down to power off the VM, as shown in**Figure 5-71** .

Figure 5-71 Power off the VM



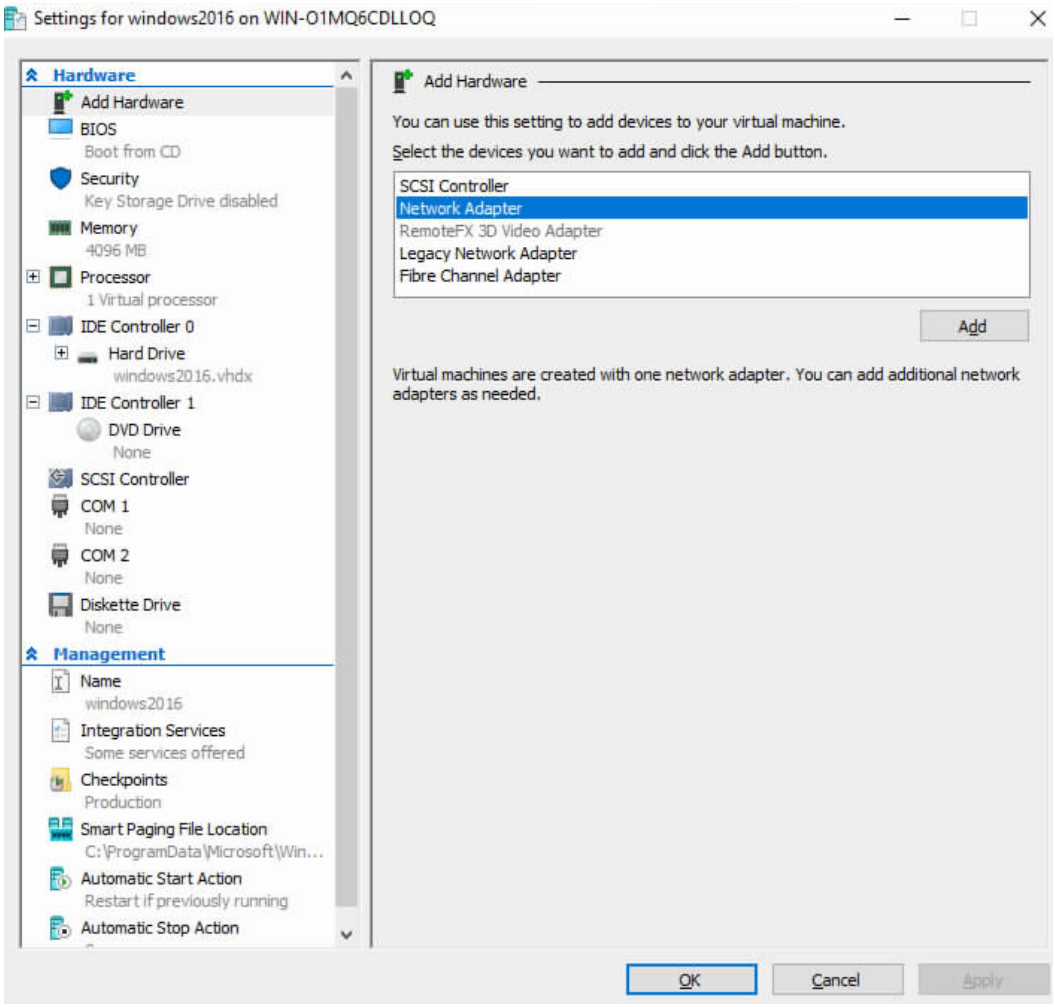
Step 2 Select File & gt; from the menu bar Settings, as shown in the **Figure 5-72**.

Figure 5-72 Start to set



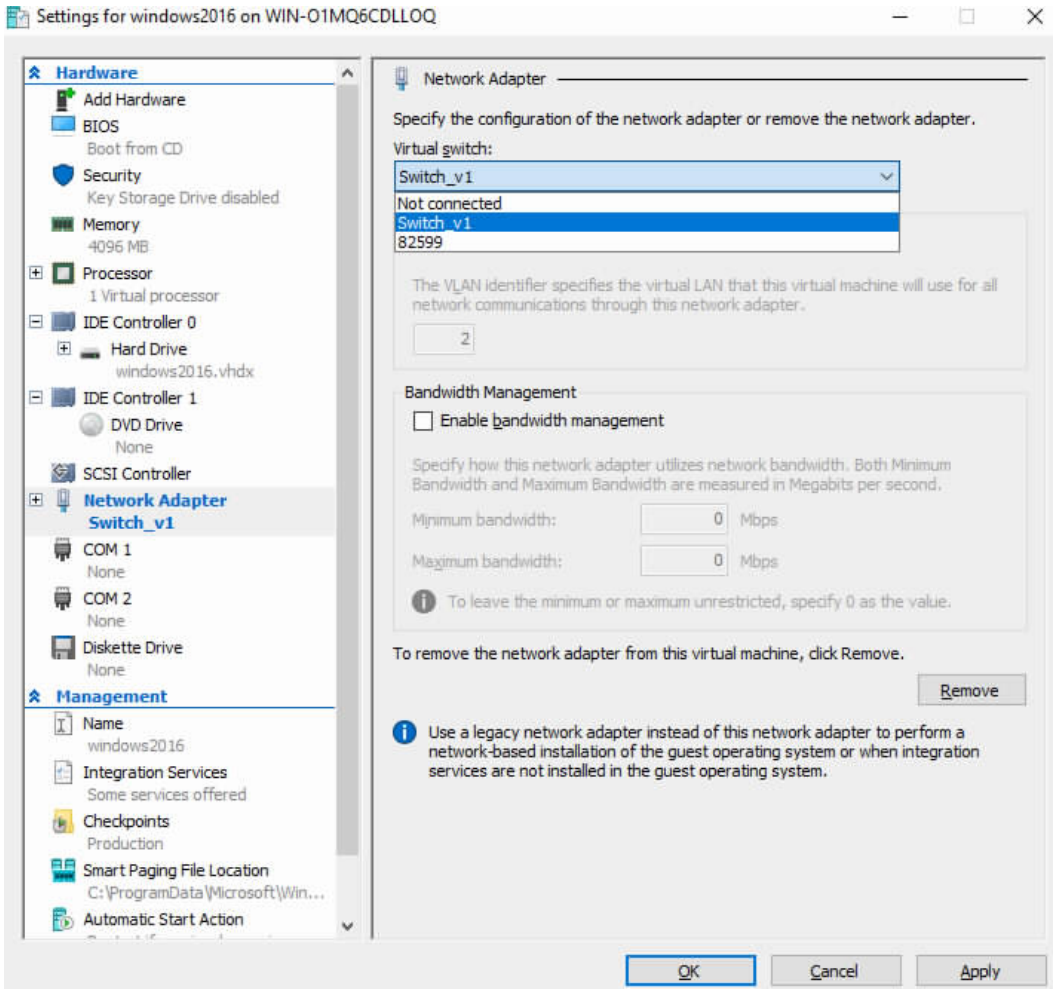
Step 3 In the navigation tree, choose Add Hardware. In the right pane, choose Network Adapter. Click Add. as shown in**Figure 5-73**.

Figure 5-73 Add Network Port



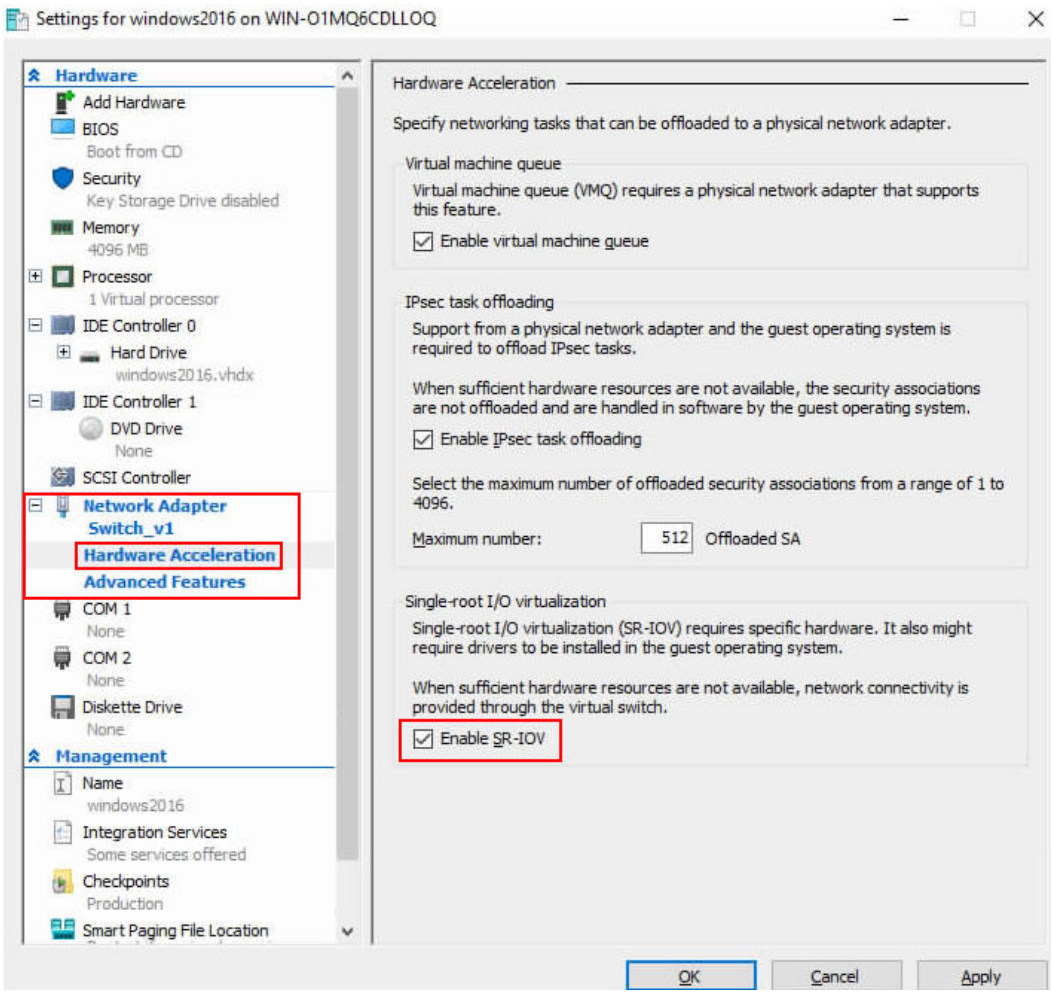
Step 4 Select Switch_v1 under Virtual Switch, as shown in**Figure 5-74** .

Figure 5-74 Select VM



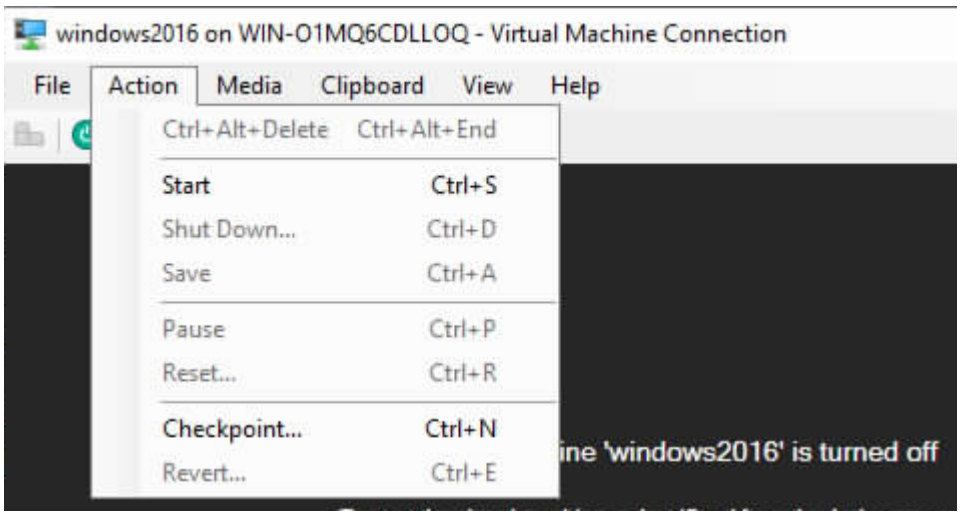
Step 5 In the navigation tree on the left, click the new⊞in front of Switch_v1, expand the options, choose Hardware Acceleration, select Enable SR-IOV in the right pane, and click OK. as shown in**Figure 5-75** .

Figure 5-75 Enable SR-IOV



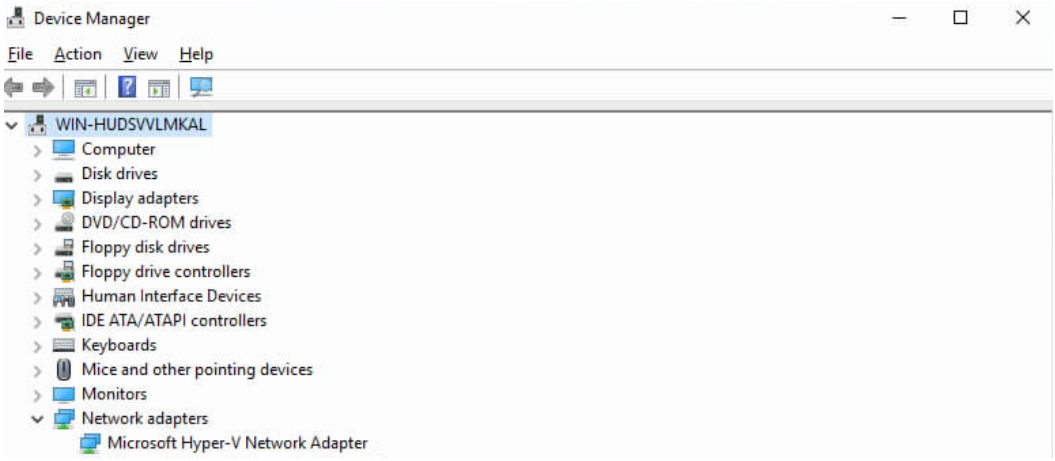
Step 6 Choose Action & gt; from the menu bar. Start to start the VM, as shown in**Figure 5-76** .

Figure 5-76 Start the VM



Step 7 Log in to the VM and access the task manager. You can find the Microsoft Hyper-V Network Adapter, as shown in**Figure 5-77** .

Figure 5-77 Viewing Virtual Network Ports



----End

5.4.3 Configuring Port SR-IOV in VMware

The following uses VMware ESXi 7.0 U3 as an example to describe how to configure port SR-IOV in VMware.

5.4.3.1 Enable SR-IOV

In VMware ESXi, SR-IOV can be enabled for cluster-managed servers and non-cluster-managed servers.

Prerequisites

The latest version of the network card driver is installed; the NIC supports SR-IOV functionality, and VMware ESXi has compatible support for the NIC's SR-IOV, which can be verified through the "**VMware Compatibility Guide**."

Step 1 to remotely log in to Shell over SSH through the xx port as the **root** user.

Step 2 Run the **esxcli network nic list** command to view the list of network devices that use the NIC driver, and determine the NIC location from the list.

Information similar to the following is displayed:

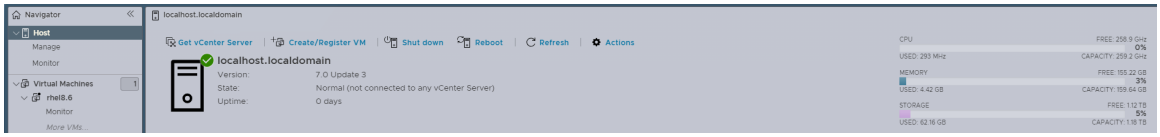
```
[root@localhost:~] esxcli network nic list
Name    PCI Device    Driver     Admin Status  Link Status  Speed  Duplex  MAC Address         MTU  Description
------  ------------  ---------  ------------  -----------  -----  ------  -----------------  ----  -----------
vmnic1  0000:a8:00.0  igbn       Up            Up            1000  Full    34:73:79:2e:d8:79  1500  Intel Corporation I350 Gigabit
Network Connection
vmnic2  0000:a8:00.1  igbn       Up            Up            1000  Full    34:73:79:2e:d8:7a  1500  Intel Corporation I350 Gigabit
Network Connection
vmnic3  0000:a8:00.2  igbn       Up            Up            1000  Full    34:73:79:2e:d8:7b  1500  Intel Corporation I350 Gigabit
Network Connection
vmnic4  0000:a8:00.3  igbn       Up            Up            1000  Full    34:73:79:2e:d8:7c  1500  Intel Corporation I350 Gigabit
Network Connection
vmnic5  0000:16:00.0  bnxtnet    Up            Up           10000  Full    34:73:79:bd:05:d6  1500  Broadcom BCM57412
NetXtreme-E 10Gb RDMA Ethernet Controller
vmnic6  0000:16:00.1  bnxtnet    Up            Up           10000  Full    34:73:79:bd:05:d7  1500  Broadcom BCM57412
```



```
NetXtreme-E 10Gb RDMA Ethernet Controller
vmnic7  0000:b8:00.0  nmlx5_core  Up    Up    25000  Full  34:73:79:91:85:18  1500  Mellanox Technologies
MT27800 Family [ConnectX-5]
vmnic8  0000:b8:00.1  nmlx5_core  Up    Up    25000  Full  34:73:79:91:85:19  1500  Mellanox Technologies
MT27800 Family [ConnectX-5]
[root@localhost:~]
```

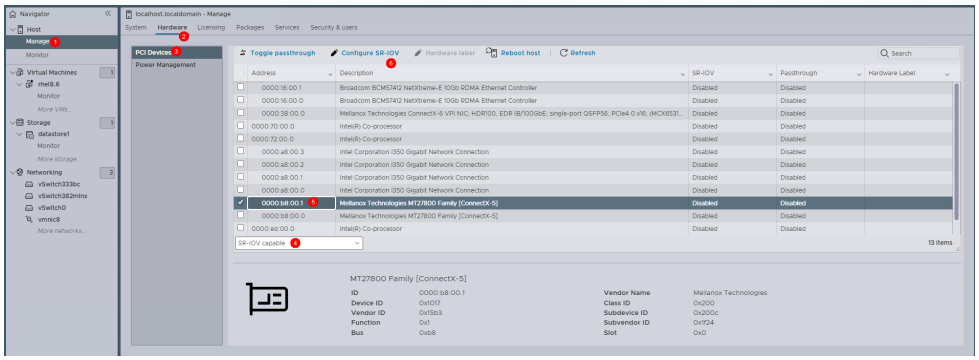
Step 3 Log in to the IP address of VMware ESXi 7.0 U3 using a browser on a PC. The main page is displayed, as shown in**Figure 5-78** .

Figure 5-78 The session dialog box is displayed.



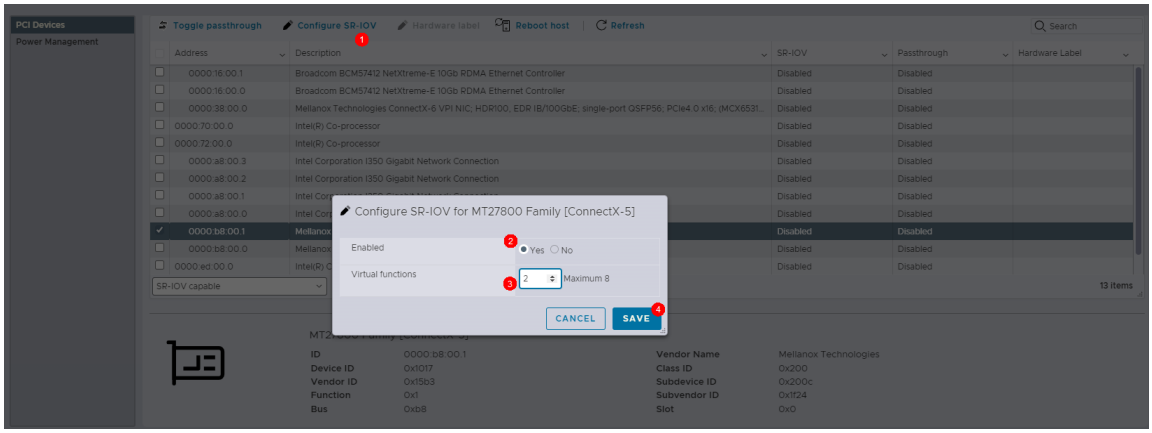
Step 4 In the navigation tree, select the host to be configured, click the Manage tab, select Hardware > PCI Devices > SR-IOV capable, and select BDF 0000 for which SR-IOV is to be configured. b8: 00.1, click Configure SR-IOV, as shown in**Figure 5-79** .

Figure 5-79 Select the port to be configured



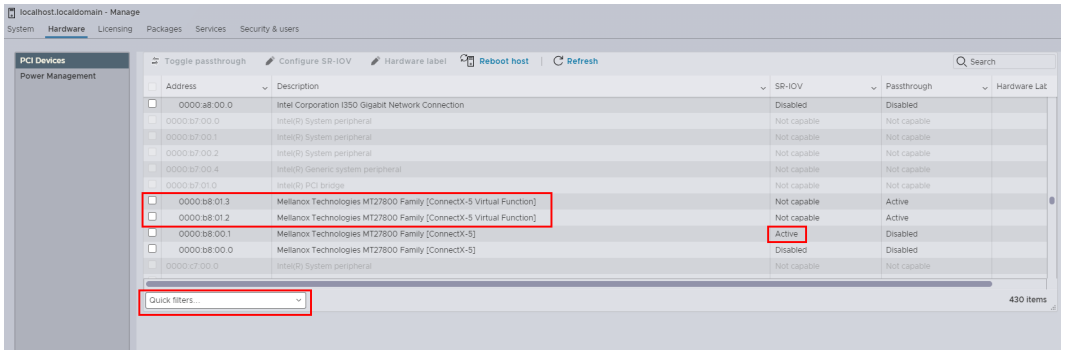
Step 5 Set Enabled to Yes and Virtual functions to the required value, as shown in the**Figure 5-80** . Click Save.

Figure 5-80 Configure parameters.



Step 6 After restarting the computer, switch to Quick filters. Check the device list. The VF device appears, as shown in the**Figure 5-81**

Figure 5-81 VF Device



Step 7 View the number of VFs successfully enabled. Assume that two VFs are enabled for each PF of the XC382. Run the **lspci | grep -i "virtual function"** command to check whether the number of PCI devices corresponding to the VFs enabled for SR-IOV is consistent with the configured parameters.

Information similar to the following is displayed:

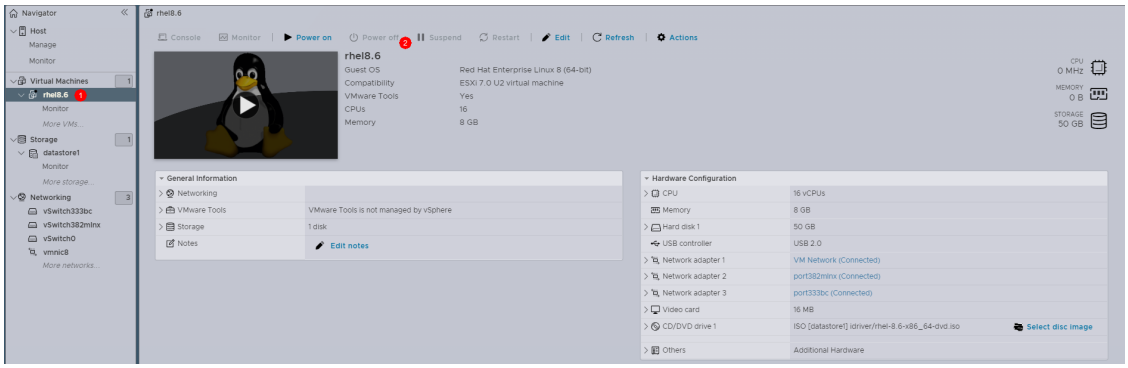
```
[root@localhost:~] lspci | grep -i "virtual function"
0000:b8:00.2 Ethernet controller: Mellanox Technologies MT27800 Family [ConnectX-5 Virtual Function]
[PF_0.184.0_VF_0]
0000:b8:00.3 Ethernet controller: Mellanox Technologies MT27800 Family [ConnectX-5 Virtual Function]
[PF_0.184.0_VF_1]
```

----End

5.4.3.2 Adding SR-IOV Network Ports

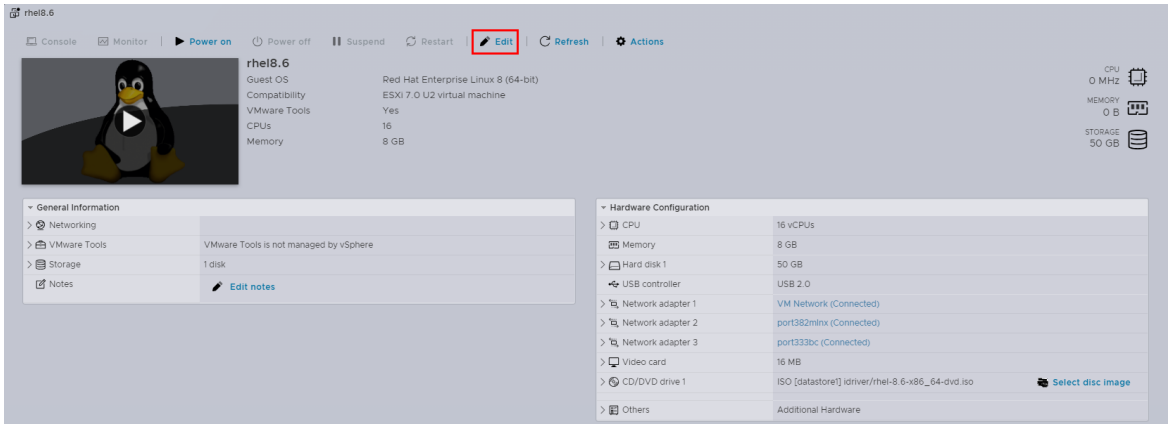
Step 1 Select the VM and click Power Off, as shown inxref .

Figure 5-82 Power off the VM

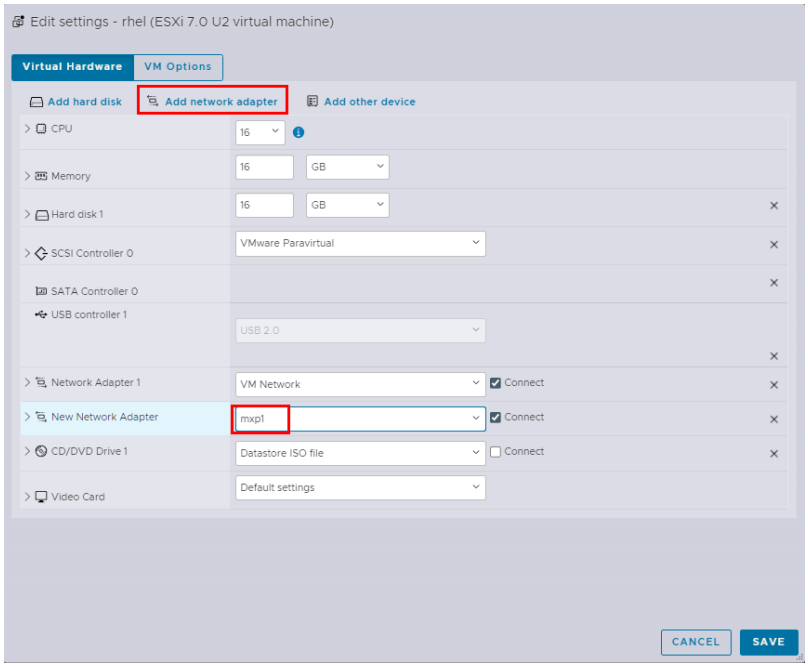


Step 2 Right-click the VM and choose Edit from the shortcut menu, as shown in the**Figure 5-83** .

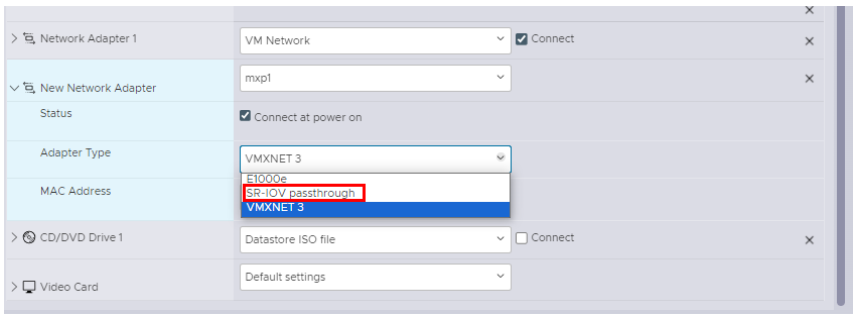
Figure 5-83 Entering the Settings screen

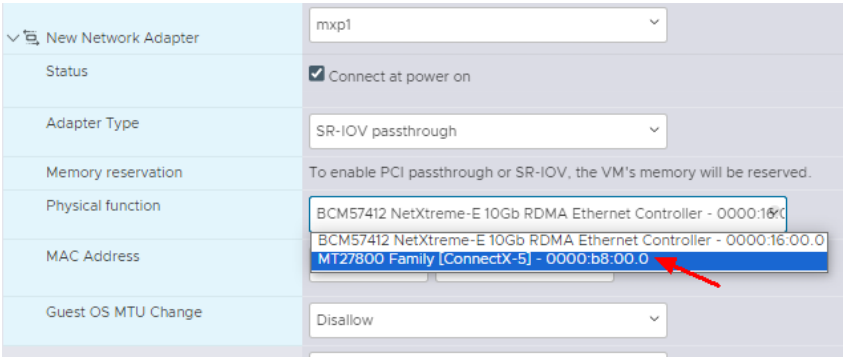


Step 3 Click Add network adapter and select mxp1.



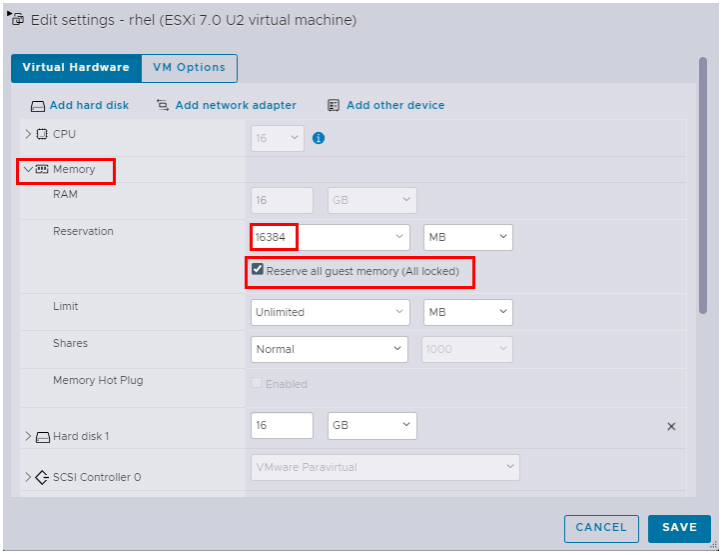
Step 4 Select SR-IOV passthrough for Adapter Type and BDF for Physical function.





Step 5 Configure Memory. In Memory, select Reserve all guest memory (All locked) and click Save. as shown in **Figure 5-84**.

Figure 5-84 Configure parameters.



Step 6 Start the VM

Step 7 Run the following command to locate the device with the SR-IOV network port:.

lspci | grep -i Ethernet | grep -i virtual

Information similar to the following is displayed:

```
1b:00.0 Ethernet controller: Mellanox Technologies MT27800 Family [ConnectX-5 Virtual Function]
```

Step 8 Install the VF driver on the VM by using the NIC of each vendor or use the iDriver.

----End

5.5 Configuring VXLAN Offload

Step 1 Log in to the server OS as the **root** user, right-click on the screen, and choose **Open Terminal** from the shortcut menu to open the CLI.

Step 2 Find the network port name for which VXLAN offload is to be configured. For example, ens65f0np0 is used.

Step 3 Run the **ethtool -K ens65f0np0 tx-udp_tnl-segmentation on tx-udp_tnl-csum-segmentation on** command to enable VXLAN offload.

Step 4 Run the **ethtool -k ens65f0np0 |grep -i udp** command to view the enable result.

```
[root@localhost ~]# ethtool -K ens65f0np0 tx-udp_tnl-segmentation on tx-udp_tnl-csum-segmentation on
[root@localhost ~]# ethtool -k ens65f0np0 |grep -i udp
tx-udp_tnl-segmentation: on
tx-udp_tnl-csum-segmentation: on
tx-udp-segmentation: off [fixed]
rx-udp-gro-forwarding: off
rx-udp_tunnel-port-offload: on
```

----End

A Appendixes

A.1 Logging In to the iBMC WebUI

For details about how to log in to the iBMC WebUI, see the iBMC user guide of the corresponding server model.

A.2 Getting Help

If a fault persists during routine maintenance or troubleshooting, contact technical support.

A.2.1 Collecting Fault Information

Collect fault information before troubleshooting.

The information includes:

- Customer company and address
- Contact person and telephone number
- Time when the fault occurred
- Detailed fault symptom
- Device types and software versions
- Measures taken and effects
- Fault severity and expected rectification deadline

A.2.2 Preparing for Debugging

Technical support engineers can assist you in further collecting fault information and rectifying the fault.

Before contacting technical support, get ready the spare parts and tools such as screwdrivers, screws, serial cables, and network cables.

A.2.3 Using Product Documentation

xFusion provides a complete documentation shipped with the device. The documentation provides guidance on how to solve common problems that occur during routine maintenance and troubleshooting.

Refer to the documentation before you contact xFusion for technical support.

A.2.4 Technical Support

xFusion provides timely and efficient technical support through:

- Local branch offices
- Secondary technical support system
- Telephone technical support
- Remote technical support
- Onsite technical support

Technical Support Website

Technical documents are available at **xFusion website**.

Knowledge Base

To obtain case study about servers, visit **Knowledge Base**.

Contact xFusion

xFusion provides comprehensive technical support and services. To obtain assistance, contact xFusion technical support as follows:

- Contact xFusion customer service center.
  - Email: **support@xfusion.com**
- Contact technical support personnel at your local xFusion branch office.

A.3 Acronyms and Abbreviations

D	
DCB	Data Center Bridging
DCBX	Data Center Bridging eXchange
DPDK	Data Plane Development Kit
E	
ETS	Enhanced Transmission Selection
EVB	Edge Virtual Bridging
L	

LACP	Link Aggregation Control Protocol
LRO	Large Receive Offload
N	
NVGRE	Network Virtualization Using Generic Routing Encapsulation
O	
OS	Operating System
P	
PCIe	PCI Express
PFC	Priority Flow Control
PXE	Preboot Execution Environment
R	
RSS	Receive Side Scaling
S	
SR-IOV	Single Root I/O Virtualization
V	
VEB	Virtual Ethernet Bridge
VF	Virtual Function
VLAN	Virtual Local Area Network
VM	Virtual Machine
VMQ	Virtual Machine Queue
VxLAN	Virtual eXtensible Local Area Network

