XP330 NIC

User Guide

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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
	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.
	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.
	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.

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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





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.

Indicator	Meaning	Color	Description
ACT (Link/ Activity) indicator	Network connectio n status/ Data transmissi on statusindic ator	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.

Table 1-2 XP330 indicators

1.3 Technical Specifications

 Table 1-3 describes the XP330 specifications.

Table	1-3	XP330	specifications
IUNIC		/1 000	opeointoutionto

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).

D 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 Driver-	DUC: 7.0	anti-anti-anti-anti-anti-anti-anti-anti-	NIC-X710_X722_XL710_XXV710-RHEL7.6-i40e-2.15.9- 1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4
RHEL7.6-Driver- V121	RHEL 7.0	onboard_driver_RHEL7.6.IS0	NIC-E810_X710_X722_XL710_XXV710-RHEL7.6-iavf- 4.1.1-1-x86_64.tar.oz	XP330	4.1.1	8.30,0x8000bde4
FusionServer			NIC-X710_X722_XL710_XXV710-RHEL7.7-i40e-2.15.9-	XP330	2.15.9	8.30,0x8000bde4
RHEL7.7-Driver- V105	RHEL 7.7	onboard_driver_RHEL7.7.Iso	NIC-E810_X710_X722_XL710_XXV710-RHEL7.7-iavf- 4.1.1-1-x86_64_tar.pz	XP330	4.1.1	8.30,0x8000bde4
FusionServer			NIC-X710_X722_XL710_XXV710-RHEL7.8-I40e-2.15.9- 1-x86_64_rpm	XP330	2.15.9	8.30,0x8000bde4
RHEL7.8-Driver- V107	RHEL 7.8	onboard_driver_RHEL7.8.iso	NIC-E810_X710_X722_XL710_XXV710-RHEL7.8-iavf- 4.1.1-1-x86_64.tar.oz	XP330	4.1.1	8.30,0x8000bde4
FusionServer Driver-			NIC-X710_X722_XL710_XXV710-RHEL7.9-i40e-2.15.9- 1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4
RHEL7.9-Driver- V107	RHEL 7.9	onboard_driver_RHEL7.9.iso	NIC-E810_X710_X722_XL710_XXV710-RHEL7.9-iavf- 4.1.1-1-x86_64.tar.oz	XP330	4.1.1	8.30,0x8000bde4
FusionServer Driver-	DUCI 0.0	anti-and drives DUFLO 0 ins	NIC-X710_X722_XL710_XXV710-RHEL8.0-i40e-2.15.9- 1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4
RHEL8.0-Driver- V121	RHEL 0.0	onboard_driver_KHEL6.0.is0	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 Driver-		askeard drives DUELS 4 iss	NIC-X710_X722_XL710_XXV710-RHEL8.1-i40e-2.15.9- 1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4
RHEL8.1-Driver- V104	KHEL O. I	onboard_onver_kneto.1.isu	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 Driver-		ashaard driver DHELS 2 isa	NIC-X710_X722_XL710_XXV710-RHEL8.2-i40e-2.15.9- 1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4
RHEL8.2-Driver- V107	RIEL 0.2	onboard_driver_KheLo.2.iso	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 Driver-		aphoard driver DUEL 9.2 inc	NIC-X710_X722_XL710_XXV710-RHEL8.3-i40e-2.15.9- 1-x86_64.rpm	XP330	2.15.9	8.30,0x8000bde4
RHEL8.3-Driver- V108	RILL 0.5	onboard_onver_kiteto.s.iso	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 Driver-	RHEL 8.4	inbox driver(use the driver provided by the OS).		XP330	inbox	8.30,0x8000bde4
FusionServer Driver-	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

D 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-***Vxxx.zip* of RHEL 7.7.

- Step 5 Decompress FusionServer iDriver-RHEL7.7-Driver-Vxxx.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 Solution 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

" 🕼 🖉 🛆 👘 📎 💹 <	🌜 🛞 🏪 🌾 Image	Clarity min	num num	caps = scroll = ⑦
C CD/DVD	none 🕹		Connect	
O Image File		Browse	Eject	
 Directory 		Browse		

- 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**.

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 Ispci |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)
38:00.3 Ethernet controller: Intel Corporation I350 Gigabit Network Connection (rev 01)
38:00.3 Ethernet controller: Intel Corporation I350 Gigabit Network Connection (rev 01)
38:00.3 Ethernet controller: Intel Corporation I350 Gigabit Network Connection (rev 01)
38:00.1 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)
- 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 shownFigure 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 shownFigure 5-2.

					scorentier	citoria e	Stitler	 1
rganize 🔻	Disable this network device	Diagnose this co	onnection	Rename this connecti	ion »		•	6
Ethe Unic Broa	r net lentified network dcom P210tep NetXtreme-E	UOMS	5 Properties			×		
Ethe Enal Broa	met 2 iled dcom P210tep NetXtreme-E	Connec	t using: ntel(R) Ethemet (Converged Network Adap	oter X710			
Unic Unic	11 Ientified network (R) Ethernet Connection X722	This cor	nnection uses the	e following items:	Configure			
Network	12 vork cable unplugged (R) Ethernet Connection X722	N N N N N N N N N N N N N N N N N N N	File and Printer QoS Packet So Internet Protoco	Sharing for Microsoft Net sharing for Microsoft Net sheduler of Version 4 (TCP/IPv4)	tworks	Î	ilable	
Network	13 vork cable unplugged (R) Ethernet Connection X722		Microsoft Netwo Microsoft LLDP Internet Protoco	ork Adapter Multiplexor P Protocol Driver ol Version 6 (TCP/IPv6)	rotocol	~	indure:	
Network	14 vork cable unplugged (R) Ethernet Connection X722	< Ir	nstall	Uninstall	> Properties			
LON Neth Intel	15 vork cable unplugged (R) Ethernet Converged Netw	Allow	iption s your computer ork.	to access resources on a	a Microsoft			

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:.

Ispci | 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
                           Up 1000Mbps Full 34:73:79:2e:d8:7c 1500 Intel Corporation I350 Gigabit Network
vmnic4 0000:a8:00.3 igbn
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@loo	calhost:~] esx	cli netwo	rk nic list							
Name P	CI Device	Driver	Admin St	atus Link	Status Speed	i Duplex M	MAC Add	dress	MTU Des	cription
vmnic1 0	0000:a8:00.0	igbn	Up	Up	1000 Full	34:73:79:2	le:d8:79	1500	Intel Corporation	on I350 Gigabit
Network	Connection									
vmnic2 0	0000:a8:00.1	igbn	Up	Up	1000 Full	34:73:79:2	le:d8:7a 1	1500	Intel Corporatio	on I350 Gigabit
Network	Connection									
vmnic3 0	0000:a8:00.2	igbn	Up	Up	1000 Full	34:73:79:2	le:d8:7b	1500	Intel Corporation	on I350 Gigabit
Network	Connection									
vmnic4 0	0000:a8:00.3	igbn	Up	Up	1000 Full	34:73:79:2	le:d8:7c 1	1500	Intel Corporatio	on I350 Gigabit
Network	Connection	•	•	-						, in the second s
vmnic5 0	0000:16:00.0	bnxtnet	Up	Up	10000 Full	34:73:79	bd:05:d6	5 150	0 Broadcom B	CM57412

----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 inFigure 5-3.

LOM5 Status	>	C
Connection	No network access	ype: No network acces ions: UDM1 LOM5
IPv6 Connectivity: Media State:	No network access	
Duration:	00:01:14	
Speed:	10.0 Gbps	: up a router or access point
Details		
		hooting information.
Activity		
Sent —	Received	
Packets: 317	0	
Properties Oisable	Diagnose	

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

Data Center	Boot C	ptions	Driver	Details	Events
General	Link Speed		Advanced	Power Ma	nagement
inte	el(R) Ethernet	Controlle	er X710 for 10G	bE SFP+	
De	vice type:	Netw	ork adapters		
Ma	nufacturer:	Intel			
Loc	ation:	PCIS	Slot 0 (PCI bus	175, device 0,	function ()
Device sta					
DEVICE ald	tus				
This device	tus ce is working p	property.			~
This device	tus ce is working p	properly.			^
This device	tus ce is working p	property.			^
This device	tus ce is working p	property.			~
This device	tus ce is working p	properly.			< U
This devic	tus :e is working p	property.			~ ~ ~
This devic	tus ce is working p	property.			~ ~
This devic	tus ce is working p	property.			~ >
This devic	tus ce is working p	property.			~
This devic	tus ce is working p	property.			~ ~
This devic	tus ce is working p	property.			~ ~

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 .

Intel(R) Ethernet Controller X710 for 10GbE SFP+ Properties х Data Center **Boot Options** Driver Details Events General Advanced Link Speed Power Management Advanced Adapter Settings Profile: Storage Server Settings: Value: • Recv Segment Coalescing (IPv6) 2 RSS Base Processor Number RSS load balancing profile Virtual Switch RSS Virtualization VLAN ID < 3 Use Default VLAN ID Select the number for the VLAN bound to this device. The VLAN ID must match the VLAN ID configured on the switch. Adapters with VLANs must be connected to network devices that support IEEE 802.1Q. Note that if you enter a value greater than the maximum value of 4094 then VLAN ID 4094 will be assigned to this device. OK Cancel

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 shownFigure 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

Network Adapters Select the adapters for this host's default management network connection. Use two or more adapters for fault-tolerance and load-balancing.					
Device Name [X] vmnic1 [] vmnic2 [] vmnic3 [] vmnic4 [] vmnic5 [] vmnic6 [] vmnic6 [] vmnic7 [] vmnic8	Hardware Label (MAC Address) SLDT4 (34:73:79:2e:d8:79) SLDT4 (34:73:79:2e:d8:7a) SLDT4 (34:73:79:2e:d8:7b) SLDT4 (34:73:79:2e:d8:7c) OCP1 (34:73:79:bd:05:d6) OCP1 (34:73:79:bd:05:d6) OCP2 (34:73:79:91:85:18) OCP2 (34:73:79:91:85:19)	Status Connected () Connected () Connected () Connected () Connected () Connected () Connected () Connected ()			
<pre>CD> View Details</pre>	<pre>Space> Toggle Selected</pre>	<pre> Conter> OK Conter> Cancel </pre>			

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

	577C
IPv4 Configuration	
This host can obtain network settings automat includes a DHCP server. If it does not, the fo specified:	ically if your network ollowing settings must be
() Disable IPv4 configuration for management () Use dynamic IPv4 address and network conf (o) Set static IPv4 address and network config	network iguration guration:
IPv4 Address	[]
Subnet Mask	[255.255.0.0]
Default Gateway	[0.0.0.0]
<up down=""> Select <space> Mark Selected</space></up>	<pre><enter> OK <esc> Cance1</esc></enter></pre>

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

ESXi Host Client			
	Californian		
V Host Manage	🐼 Get vCenter Server 🎲 Create/Register VM 🖓 Shut down 🦓 Reboot 😋 Refresh 👁 Actions	CPU	FREE: 258.8 GHz
Monitor	Icalhost.localdomain	USED: 352 MHz	CAPACITY: 259.2 GHz
~⑦ Virtual Machines	Version: 7.0 Update 3 State: Normal (not connected to any vCenter Server)	MEMORY USED: 4.47 GB	FREE: 155.17 GB 3% CAPACITY: 159.64 GB
Monitor	Uptime: 0.05 days	STORAGE	FREE:1.12 TB 5%
More VMs		USED: 62.16 GB	CAPACITY: 118 TB

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

Edit settings C Refresh	Actions		
VM Network Accessible: Virtual machines:	Yes 1		
Virtual switch: VLAN ID: Active ports:	vSwitch0 0 0		
▼ vSwitch topology	Edit port group - VM N	letwork	
Ø VM Network	4		
VLAN ID: 0 Virtual Machines (1)	Name	VM Network	
ត្រូវThei8.6	VLAN ID	0	
	Virtual switch		te based on originating port ID
	> Security	Click to expand	
	> NIC teaming	Click to expand	
	> Traffic shaping	Click to expand	
			CANCEL

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

🕈 🦉	Wetwork and International I	et > Network Connections
Organize 🕶		
Name	^	Status
LOM1		Unidentified network
LOM2		Network cable unplugged
LOM3		Network cable unplugged
LOM4		Network cable unplugged
LOM5		Unidentified network
LOM6		Unidentified network
SLOT2 Port 1		Network cable unplugged
J SLOT2 Port 2		Network cable unplugged



Server Ma	anager • Local S	erver
📰 Dashboard	PROPERTIES For WIN-3TDPUI6401	г
Local Server	C	WINL STOP INCOME.
All Servers File and Storage Services	Computer name Workgroup	WORKGROUP
	Windows Firewall	Public: On
	Remote management	Enabled
·	Remote Desktop	Disabled
	NIC Teaming	Disabled
	LOM1	IPv4 address assigned by DHCP, IPv6 enabled
	LOM2	Not connected
	LOM3	Not connected
	LOM4	Not connected

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

All Server	s 1 total					TASKS	
Name 📩	Status	Server Type	Operating System Ver	sion	Teams		
VIN-3TDPUI640	NT 🕤 Online	Physical	Microsoft Windows S	erver 2016 Datacente	er O		
TEAMS	al	TASK	ADAPTER	S AND INTERFAC	ES	TASKS	•
TEAMS II Teams 0 tot Team Status	al Teaming Mode L	TASK	ADAPTER	S AND INTERFAC	TES	TASKS	•
Teams 0 tot Team Status	al Teaming Mode	TASK oad Balancing Ac	ADAPTER dapters Network A Adapter	S AND INTERFAC	TES faces	TASKS	•
TEAMS Ill Teams 0 tot Team Status	al Teaming Mode L	TASK oad Balancing Ac	ADAPTER dapters LOM4	S AND INTERFAC Japters Team Inter Speed S Disconnected	T ES faces tate Reason	TASKS	•
TEAMS All Teams 0 tot Team Status	al Teaming Mode L	Oad Balancing Ac	ADAPTER dapters Adapter LOM4 LOM5	S AND INTERFAC dapters Team Inter Speed S Disconnected 10 Gbps	TES faces	TASKS	•

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	5-16 (Configuring	NIC	Teaming
----------	--------	-------------	-----	---------

team1						
Member a	dapters:					
In Team	Adapter	Speed	State	Reason		
	LOM3	Disconnected				-
	LOM4	Disconnected				
~	LOM5	10 Gbps	Active			- 1
-	LOM6	10 Gbps	• Standby			
	SLOT2 Port 1	Disconnected				
	SLOT2 Port 2	Disconnected				
_						1
Addit	ional propertie	S Cuitab Is			~	
reaming	g mode:	Switch in	aependent			
Load ba	lancing mode	Dynamic			3	
Standby	adapter:	LOM6			<i>u</i>	

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 autonegotiation 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

me 📍	Status	Server Type	Operating System Version	Teams
N-3TDPUI640IT	① Online	Physical	Microsoft Windows Server 2016 Datacenter	1

All Team	s 1 total		TASKS 🔻				TA	SKS	•
Team	Status	Teaming Mode	Load Balancing	Network A	iapters Team	Interfaces			
team1	🛈 ОК	Switch Independent	Dynamic 2	Adapter	Speed	State	Reason		
				LOM5	10 Gbps	Active			~
				LOM6	10 Gbps	Standby	1		~
<			>	<)	

Figure 5-18 Viewing the Teaming Network Port

🗧 👘 👘 🖉 « Network and	Internet > Network Connections >
Organize 👻	
Name	Status
🔋 LOM1	Unidentified network
📕 LOM2	Network cable unplugged
LOM3	Network cable unplugged
LOM4	Network cable unplugged
LOM5	Enabled
LOM6	Enabled
💭 SLOT2 Port 1	Network cable unplugged
J SLOT2 Port 2	Network cable unplugged
🔳 team1	Unidentified network

Step 7 Set the IP address of the NIC team.

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

d Internet > Network and Sharing	Center 🗸 🗸	Ö	Search Control Pane
View your basic network	information and set	un.	connections
General		^	ype: No network a
Connection IPv4 Connectivity: IPv6 Connectivity:	No network access No network access		tions: 📱 LOM1 🚆 team1
Media State: Duration:	Enabled 00:00:21		
Details	10.0 Gops		c up a router or access p
Activity			hooting information.
Sent —	Received		
Packets: 80	Diagnose		
	Close		

Figure 5-19 Open the team1 Status page

ternet Protocol version 4 ((ICP/IPV4)	Prope	rties				
General							
You can get IP settings assi this capability. Otherwise, y for the appropriate IP settin	gned auton ou need to ngs.	atically ask yo	if yo ur ne	ur ne twor	etwo k ad	ork s Imini	upports strator
Obtain an IP address a	automatical	y					
• Use the following IP ad	dress:						
IP address:							
Subnet mask:		255 . 2	. 255	. 0		0	
Default gateway:						2	
Obtain DNS server add	iress autom	atically	č				
Use the following DNS	server add	esses:					
Preferred DNS server:				•			
Alternate DNS server:				•			
Validate settings upor	n exit					Adva	nced

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

Network Adapters			
VLAN (optional)			
IPv4 Configuratio			
IPv6 Configuration			
DNS Configuration			
Custom DNS Suffix	25		

Step 3 Navigate to the "Network Adapters" screen and specify the vmnic to be used for the management network, as shownFigure 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

Network Adapters	Network Adapters					
Select the adapt connection. Use load-balancing.	ers for this host's default ma two or more adapters for fault	anagement network t-tolerance and				
Device Name	Hardware Label (MAC Address)	Status				
[X] vmnic1	SLOT4 (34:73:79:2e:d8:79)	Connected ()				
[] vmnic2	SLOT4 (34:73:79:2e:d8:7a)	Connected ()				
[] vmnic3	SLOT4 (34:73:79:2e:d8:7b)	Connected ()				
[] vmnic4	SL0T4 (34:73:79:2e:d8:7c)	Connected ()				
[] vmnic5	OCP1 (34:73:79:bd:05:d6)	Connected ()				
[] vmnic6	OCP1 (34:73:79:bd:05:d7)	Connected ()				
[] vmnic7	OCP2 (34:73:79:91:85:18)	Connected ()				
[] vmnic8	OCP2 (34:73:79:91:85:19)	Connected ()				
<d> View Details</d>	<pre>Space> Toggle Selected</pre>	<pre> (Enter) OK (Esc) Cancel </pre>				

Step 4 On the Configure Management Network menu, choose IPv4 Configuration. Enter the IP address of the NIC port, as shown inFigure 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.



IPv4 Configuration					
This host can obtain network settings automatically if your network includes a DHCP server. If it does not, the following settings must be specified:					
() Disable IPv4 configuration for management n () Use dynamic IPv4 address and network config (o) Set static IPv4 address and network configu	etwork uration ration:				
IPv4 Address Subnet Mask Default Gateway	[] [255.255.0.0] [0.0.0.0]				
<pre><up down=""> Select <space> Mark Selected</space></up></pre>	<pre> K Kesc> Cancel K Kesc> Cancel Kesc> Ca</pre>				

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

Vm ESXi Host Client			
	🚺 Iocalhost localdomain		
Manage	🛱 Get vCenter Server 🛛 † 🍘 Create/Register VM 🛛 🖓 Shut down 🖓 Reboot 🚽 🕐 Refresh 👘 💠 Actions	СРИ	FREE: 258 8 GHz
Monitor	Calhost.localdomain	USED: 352 MHz	CAPACITY: 259.2 GHz
. A statut Markhan	Version: 7.0 Update 3	MEMORY	FREE: 155.17 GB
Cigo Vindai Machines	State: Normal (not connected to any vCenter Server)	USED: 4.47 GB	CAPACITY: 159.64 GB
Monitor	Uptime: 0.05 days	STORAGE	FREE:112 TB
More V/Mr		USED: 62 16 GB	CAPACITY: 118 TB
Ve Storage			

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

Avigator	« 👲	🕲 localhost.localdomain - Networking				
V 🗄 Host	P	ort groups Virtual switches Physical NICs VMkernel NICs T	CP/IP stacks Firewall rules			
Manage						
Monitor		📩 Add standard virtual switch 🛛 🚡 Add uplink 🖉 Edit	settings C Refresh 🏟 Actions			Q, Search
✓ ② Virtual Machines	1	Name ~	Port groups ~	Uplinks	Туре	~
✓		Switch0	2	4	Standard vSwitch	
Monitor		Switch333bc	1	2	Standard vSwitch	
More VMs		Switch382mInx	1	2	Standard vSwitch	
✓ Storage	1					3 items
V Catastore1						
Monitor						
More storage						
V S Networking	3					
✓						
Monitor						
> S portssspc						
vSwitch382mInx						
□ vSwitch0						
°a, vmnic8						
> 😟 VM Network						
More networks						

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

Figure 5-26 vSwitch interface

Switch382mlnx		
🚡 Add uplink 🕜 Edit setting	s C Refresh 🌣 Actions	
vSwitch382mIn	IX	
Type:	Standard vSwitch	
Uplinks:	2	
 vSwitch Details 		✓ vSwitch topology
MTU	1500	
Ports	9216 (9195 available)	V ANUE O
Link discovery	Listen / Cisco discovery protocol (CDP)	VERVICE 3, 2000 Mbps, Full
Attached VMs	1 (O active)	@rhel8.6
Beacon interval	1	
→ NIC teaming policy		
Notify switches	Yes	
Policy	Route based on originating port ID	
Reverse policy	Yes	
Failback	Yes	
- Security policy		
Allow promiscuous mode	No	
Allow forged transmits	No	
Allow MAC changes	No	
* Shaping policy		

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

Edit standard virtual switch - vSwitch382mlnx					
add uplink					
MTU	1500				
Uplink 1	vmnic8 - Up, 25000 Mbps v X				
Uplink 2	vmnic7 - Up, 25000 Mbps ~ ×				
> Link discovery	Click to expand				
> Security	Click to expand				
> NIC teaming	Click to expand				
> Traffic shaping	Click to expand				
	CANCEL				

Figure 5-28 vSwitch setting screen 2

Edit standard virtual switch - v	Switch382mInx		
add uplink			
MTU	1500		
Uplink 1	vmnic8 - Up, 25000 Mbps	~	×
Uplink 2	vmnic7 - Up, 25000 Mbps	~	×
> Link discovery	Click to expand		
> Security	Click to expand		
∼NIC teaming			
Load balancing	Route based on originating p	oort ID Y	
Network failover detection	Link status only	~	
Notify switches	• Yes O No		
Failback	• Yes O No		
Failover order	[x] Mark standby ↑	Move up ↓ Move dow	n
	Name	Speed	Status
	🛱 vmnic8	25000 Mbps, full duplex	Active
	🛱 vmnic7	25000 Mbps, full duplex	Standby
> Traffic shaping	Click to expand		
			CANCEL SAVE

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.



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 **Ispci |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) a8:00.0 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 **Ispci|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

				Virt	ual Ma	chine Manager		-		×
<u>F</u> ile	<u>E</u> dit	View	<u>H</u> elp							
E	Ę	Open				-				
Name	2						~	CPU usa	ge	
QE	MU/KV	м								

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

Figure 5-30 Create VM

📽 Virtual Machine Manager@localhost.localdomain — 🗆	\times
File Edit View Help	
🛀 📃 Open ▷ 🔟 🖪 👻	
Name v CPU usage	
QEMU/KVM	
New VM@localhost.localdomain X	
Create a new virtual machine Step 1 of 5	
Connection: QEMU/KVM	
Chaose how you would like to install the operating system	
Local install media (ISO image or CDROM)	
Network Install (HTTP, HTTPS, or FTP)	
O Import existing disk image	
🔘 Manual install	
Cancel Back Forward	

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	2 Selecting	an image	file to	be installed
-------------	-------------	----------	---------	--------------



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

• • •	
🚾 Virtual Machine Manager@localhost.localdomain — 🛛	\times
File Edit View Help	
🔛 📃 Open ▷ 🔟 🖪 👻	
Name 🔻 CPU usage	
QEMU/KVM	
📾 New VM@localhost.localdomain X	
Create a new virtual machine Step 2 of 5	
Choose ISO or CDROM install media:	
/root/cd-rom/rhel-8.6-x86_64-dvd.iso	
Choose the operating system you are installing:	
Q Red Hat Enterprise Linux 8 Unknown	
Automatically detect from the installation media / source	
Cancel Back Forward	

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**.

📟 Virtual Machine Manager@localhost.localdom	ain	- 0) X
File Edit View Help			
📑 📃 Open 🕞 🔟 🔳	~		
Name	- (CPU usa	ge
QEMU/KVM			
📾 New VM@localhost.localdomain			×
Create a new virtual mach	ine		
Choose Memory and CPU settings:			
Memory: 8092 – +			
Up to 160496 MiB available on the	nost		
CPUs: 8 - +			
Up to 192 available			
Cancel	Back	Forwar	rd

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**.

🜇 New VM@localhost.localdomain	×
Create a new virtual machine Step 4 of 5	
Enable storage for this virtual machine	
• Create a disk image for the virtual machine	
20.0 – + GiB	
56.7 GiB available in the default location	
○ Select or create custom storage	
Manage	
Cancel Back Forward	

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**.
 - 📾 Virtual Machine Manager@localhost.localdomain File Edit View Help 📃 Open 🕞 🕕 🔳 🔻 E Name CPU usage QEMU/KVM 📾 New VM@localhost.localdomain \times Create a new virtual machine Ready to begin the installation Name: rhel8 OS: Red Hat Enterprise Linux 8 Unknown Install: Local CDROM/ISO Memory: 8092 MiB CPUs: 8 Storage: 20.0 GiB /var/lib/libvirt/images/rhel8.qcow2 Customize configuration before install Network selection Macvtap device... Device name: ens4f3 In most configurations, macvtap does not work for host to guest network Α communication. Cancel Back Finish
 - 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.

📾 Press Control_L+Alt_L to release pointer. rhel8 on QEMU/KVM@localhost.localdomain \times File Virtual Machine View Send Key <u>و</u> G 8 • Red Hat Enterprise Linux 8.6 Install Red Hat Enterprise Linux 8.6 Test this media & install Red Hat Enterprise Linux 8.6 Troubleshooting

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 inFigure 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 qdise 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 1ft forever preferred 1ft forever
  inet6 ::1/128 scope host
   valid 1ft forever preferred 1ft 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 qdise 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 inFigure 5-39.

Figure 5-39 Enter Device Manager

× 🛓	Network adapters
	Broadcom P210tep NetXtreme-E Dual-port 10GBASE-T Ethernet PCIe Adapter #2
	Broadcom P210tep NetXtreme-E Dual-port 10GBASE-T Ethernet PCIe Adapter
	Hyper-V Virtual Ethernet Adapter
	Hyper-V Virtual Ethernet Adapter #2
	Intel(R) Ethernet Connection X722 for 10GBASE-T
	Intel(R) Ethernet Connection X722 for 10GBASE-T #2
	Intel(R) Ethernet Connection X722 for 1GbE
	Intel(R) Ethernet Connection X722 for 1GbE #2
	Intel(R) Ethernet Converged Network Adapter X710
	Intel(R) Ethernet Converged Network Adapter X710 #2
8	🚰 Mellanox ConnectX-6 Adapter

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.

Events	Resource	es	Power M	lanagement
General	Advanced		Driver	Details
ne following pro e property you t the right.	perties are availab vant to change or	ble for th the lef	is network adapt t, and then select Value:	er. Click t its value
og Link State E Maximum Numbe Packet Priority & Receive Buffers RSS load balanc Speed & Duplex	ivent er of RSS Queues VLAN sing profile			-
TCP Checksum TCP Checksum Transmit Buffers JDP Checksum	Offload (IPv4) Offload (IPv6) Offload (IPv4)			

----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**.

- Ø 🚡 Server Manager × • 🕲 | 🖡 Server Manager • Dashboard M Tool Add Roles and Features Remove Roles and Features WELCOME TO SERVER MANAGER Bashboard Add Servers Local Server Create Server Group All Servers Server Manager Properties 1) Configure this local server File and Storage Services 2 Add roles and features 3 Add other servers to manage WHAT'S NEW 4 Create a server group 5 Connect this server to cloud services Hide LEARN MORE
- 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**.

Add Roles and Features Wiz	ard	- 0
Before you beg	in	DESTINATION SER WIN-STDPUI6
Before You Begin Installation Type Server Selection Server Roles Features Confirmation Results	This wizard helps you install roles, role services, or features. You features to install based on the computing needs of your organ hosting a website. To remove roles, role services, or features: Start the Remove Roles and Features Wizard Before you continue, verify that the following tasks have been of • The Administrator account has a strong password • Network settings, such as static IP addresses, are configured • The most current security updates from Windows Update are If you must verify that any of the preceding prerequisites have complete the steps, and then run the wizard again. To continue, click Next.	u determine which roles, role services nization, such as sharing documents, completed: : installed been completed, close the wizard,
	Skip this page by default	

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.

Select installati	on type	DESTIN/ WIN	ATION SER	RVEI 1400
Before You Begin Installation Type Server Selection Server Roles Features Confirmation Results	Select the installation type. You can install roles and features on a rumachine, or on an offline virtual hard disk (VHD). Role-based or feature-based installation Configure a single server by adding roles, role services, and feature Configure a single services installation Install required role services for Virtual Desktop Infrastructure (VI or session-based desktop deployment.	nning physical comput res. DI) to create a virtual m	er or virt achine-b	bas

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

	zard			-	Ц
elect destinati	on server			DESTIN/ WIN	ATION SER
Before You Begin Installation Type	Select a server or a	a virtual hard disk on which from the server pool	h to install roles and features.		
Server Selection	O Select a virtual	hard disk			
Server Roles	Server Pool				
Features					
	Filter:				
	Name	IP Address	Operating System		
	WIN-		Microsoft Windows Server	2016 Datacente	er
	1 Computer(s) fou	nd		No. Database	2028
	1 Computer(s) four This page shows so and that have been newly-added serve	nd ervers that are running Wi n added by using the Add ers from which data collect	ndows Server 2012 or a newer Servers command in Server M tion is still incomplete are not	release of Wind anager. Offline s shown.	ows Serv servers ar

Figure 5-45 Choose Server



Figure 5-46 Select Server Role

elect server role:	5	DESTINATION WIN-3TDP	SERVER UI640IT
Before You Begin Installation Type	Select one or more roles to install on the selected server.	Description	
Server Selection	Antius Disenters Castificate Semicar	Hyper-V provides the services	that
Server Roles	Active Directory Certificate services Active Directory Domain Services	you can use to create and ma	nage
Features	Active Directory Federation Services Active Directory Lightweight Directory Services	Each virtual machines and their res	ources. alized
Confirmation	Active Directory Rights Management Services	computer system that operate	es in an
	Device Health Attestation DHCP Server	allows you to run multiple op	erating
	DNS Server	systems simultaneously.	
	Fax Server File and Storage Services (1 of 12 installed)		
	Host Guardian Service		
	MultiPoint Services		
	Network Controller		
	Network Policy and Access Services Print and Document Services		
	Remote Access		
	Remote Desktop Services		
	Web Server (IIS)		

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

Figure 5-47 Add Features (1)

e followii ve to be	g tools are required to manage this feature, but do not istalled on the same server.
Remot	Server Administration Tools Administration Tools Hyper-V Management Tools [Tools] Hyper-V Module for Windows PowerShell [Tools] Hyper-V GUI Management Tools



Figure 5-48 Add Features (2)

Select server role	s	DESTINATION SERVER WIN-3TDPUI640IT
Before You Begin Installation Type Server Selection	Select one or more roles to install on the selected server. Roles	Description
Server Roles Features Hyper-V Virtual Switches Migration Default Stores Confirmation Results	Active Directory Certificate Services Active Directory Domain Services Active Directory Federation Services Active Directory Lightweight Directory Services Active Directory Rights Management Services Device Health Attestation DHCP Server Fax Server Fax Server Fax Server Fax Server MultiPoint Services Network Controller Network Document Services Remote Access Remote Desktop Services Volume Activation Services Web Server (IIS) V	you can use to create and manage virtual machines and their resources. Each virtual machine is a virtualized computer system that operates in an isolated execution environment. This allows you to run multiple operating systems simultaneously.

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

Select features			DESTINATION SERVER WIN-3TDPUI640IT
Before You Begin Installation Type	Select one or more features to install on the selected se Features	rver.	Description
Server Selection Server Roles	INET Framework 3.5 Features INET Framework 4.6 Features (2 of 7 installed)	^	.NET Framework 3.5 combines the power of the .NET Framework 2.0
Features	Background Intelligent Transfer Service (BITS) BitLocker Drive Encryption		building applications that offer
Hyper-V	BitLocker Network Unlock		appealing user interfaces, protect
Virtual Switches	BranchCache Client for NFS		information, enable seamless and
Migration	Containers		secure communication, and provide
Default Stores	Data Center Bridging		business processes.
Confirmation	Enhanced Storage		
	Group Policy Management		
	Host Guardian Hyper-V Support		
	IIS Hostable Web Core		
	Internet Printing Client		
	IP Address Management (IPAM) Server		
	<	>	

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

Figure 5-50 Hyper-V Configuration

Add Roles and Features Wizard	X
Hyper-V	DESTINATION SERVER WIN-3TDPUI640IT
Before You Begin Installation Type Server Selection Server Roles Features Hyper-V Virtual Switches Migration Default Stores Confirmation Results	 Hyper-V allows you to virtualize your server workloads by running those workloads on virtual machines. You can use virtual machines to consolidate multiple workloads on one physical server, to improve server availability, and to increase efficiency in developing and testing software. Things to note: Before you install this role, you should identify which network connections on this server you want to use for setting up virtual switches. After you install Hyper-V, you can use Hyper-V Manager to create and configure your virtual machines.
	More information about Hyper-V Previous Next > Install Cancel

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

Before You Begin Installation Type Server Selection Server Roles Features	Virtual machines require v role, you can create virtua One virtual switch will be a at least one virtual switch can add, remove, and mod	DESTINATION WIN-BTC I machines and attach them to a virtual switch. created for each network adapter you select. We recommend that you now to provide virtual machines with connectivity to a physical network dify your virtual switches later by using the Virtual Switch Manager.	N SERVER PUI640IT III this u create ork. You
Before You Begin Installation Type Server Selection Server Roles Features	Virtual machines require v role, you can create virtual One virtual switch will be a at least one virtual switch can add, remove, and moo	irtual switches to communicate with other computers. After you insta I machines and attach them to a virtual switch. created for each network adapter you select. We recommend that you now to provide virtual machines with connectivity to a physical netwo dify your virtual switches later by using the Virtual Switch Manager.	ill this u create ork. You
	Network adapters:		
Hyper-V	Name	Description	1
Virtual Switches	LOM5	Intel(R) Ethernet Controller X710 for 10GbE SFP+	
Migration	LOM1	Intel(R) Ethernet Connection X722 for 10GBASE-T	
Default Stores	<		>
Confirmation Results	We recommend that y network adapter, do r	you reserve one network adapter for remote access to this server. To not select it for use with a virtual switch.	reserve

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

Before You Begin Installation Type Server Selection Server Roles Features Hyper-V Virtual Switches Migration Default Stores Confirmation Results	 Hyper-V can be configured to send and receive live migrations of virtual machines on this server. Configuring Hyper-V now enables any available network on this server to be used for live migrations. you want to dedicate specific networks for live migration, use Hyper-V settings after you install the row of Allow this server to send and receive live migrations of virtual machines Authentication protocol Select the protocol you want to use to authenticate live migrations. ● Use Credential Security Support Provider (CredSSP) This protocol is less secure than Kerberos, but does not require you to set up constrained delegation. To perform a live migration, you must be logged on to the source server. O Use Kerberos This protocol is more secure but requires you to set up constrained delegation in your environment to perform tasks such as live migration when managing this server remotely. If this server will be part of a cluster, do not enable migration now. Instead, you will configure the server for live migration, including specifying networks, when you create the cluster.
--	--

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

Add Roles and Features Wiza	rd –		×
Default Stores	DESTI	NATION SER IN-3TDPUI64	VER 10IT
Before You Begin Installation Type Server Selection Server Roles	Hyper-V uses default locations to store virtual hard disk files and virtual machine configu unless you specify different locations when you create the files. You can change these det now, or you can change them later by modifying Hyper-V settings. Default location for virtual hard disk files:	ration files, ault locatio	ons
Features	C:\Users\Public\Documents\Hyper-V\Virtual Hard Disks	Brows	se
Hyper-V	Default location for virtual machine configuration files:		
Virtual Switches	C:\ProgramData\Microsoft\Windows\Hyper-V	Brows	se
Migration			
Default Stores			
Confirmation			

Figure 5-53 Default Stores Configuration

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

Figure 5-54 Confirmation

🚡 Add Roles and Features Wiz	tard	-		×
Confirm installa	tion selections	DESTIN WIM	ATION SER N-3TDPUI64	VER 40IT
Before You Begin Installation Type	To install the following roles, role services, or features on selected server, click	k Install.		
Server Selection Server Roles	Optional features (such as administration tools) might be displayed on this pa been selected automatically. If you do not want to install these optional featu their check boxes.	age because t ures, click Prev	hey have vious to cl	lear
Hyper-V Virtual Switches Migration Default Stores	Hyper-V Remote Server Administration Tools Role Administration Tools Hyper-V Management Tools Hyper-V Module for Windows PowerShell			
Confirmation Results	Hyper-V GUI Management Tools			
	Export configuration settings Specify an alternate source path			
	< Previous Next >	Install	Cance	el

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

Figure 5-55 Hyper-V installation complete

📥 Add Roles and Features Wiza	ard		-		×
Installation prog	Iress		DESTIN	IATION SER N-3TDPUI64	IVER 40IT
	View	istallation progress			
		Feature installation			
			_		
		A restart is pending on WIN-3TDPUI640IT. You must restart the dest	tination server to	o finish th	he
	-	installation.			
Hyper-V	Ну	er-V			
	Rer	ote Server Administration Tools Role Administration Tools			
		Hyper-V Management Tools			
		Hyper-V Module for Windows PowerShell			
Confirmation		Hyper-V GUI Management Tools			
Results					
	17	You can close this wizard without interrupting running tasks. View t	task progress or	open this	s
	1	page again by clicking Notifications in the command bar, and then	Task Details.		
	Expor	configuration settings			
		< Previous Next >	Close	Cance	el

- **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

🗲 🗸 🔹 Server N	∕lanager ∙ Hyper-V		• 🕲 l 🖡	Manage	Tools	View
 Dashboard Local Server 	All servers 1 total					TASKS
 III Servers III File and Storage Services ▷ 	Server Name IPv4 Add	ress				۲
E Hyper-V	WIN-	Add Roles and Features Add Roles and Features Shut Down Local Server Computer Management Remote Desktop Connection Windows PowerShell Configure NIC Teaming	42-42-40-2,169-254-56.11,169	254.81.195,169.	254.83.183	3,192.168
	EVENTS All events 12 total	Hyper-V Manager Manage As Start Performance Counters Refresh				TASKS 1
	Filter	Сору				۲

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 inFigure 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 inFigure 5-57.

Figure 5-57 Enter Hyper-V Manager

Hyper-V Manager			
<u>File</u> <u>Action</u> <u>View</u>	Help		
💠 🤿 🙋 📷 🛛 🖬			
Hyper-V Manager	000	Virtual Machine	es
- HILL OTHE	New		>
	Import V	irtual Machine	
	Hyper-V	Settings	
	Virtual Sv	vitch Manager	
	Virtual S4	N Manager	
	Edit Disk.		
	Inspect D	isk	
	Stop Serv	ice	
	Remove	Server	
	Refresh		
	View		>
	Help		
		III.	

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

Figure 5-58 Creating a Virtual Switch

Virtual Switches	Create virtual switch
Slobal Network Settings	What type of virtual switch do you want to create?
MAC Address Range 00-15-5D-64-9A-00 to 00-15-5D-6	External Internal Private
	Create Virtual Switc
	machines can access a physical network.

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**.

Virtual Switches	T Virtual Switch Properties
Rew virtual network switch	
Switch_v1	Name:
Intel(R) Ethernet Controller X	Switch_v1
Global Network Settings	Notes:
MAC Address Range 00-15-5D-64-9A-00 to 00-15-5D-6	
	Connection type
	External network:
	Intel(R) Ethernet Controller X710 for 10GbE SFP+ V
	Allow management operating system to share this network adapter
	Enable single-root I/O virtualization (SR-IOV)
	VLAN ID
	Enable virtual LAN identification for management operating system
	The VLAN identifier specifies the virtual LAN that the management operating system will use for all network communications through this network adapter. This setting does not affect virtual machine networking.
	2
	Remove
	SR-IOV can only be configured when the virtual switch is created. An external virtual switch with SR-IOV enabled cannot be converted to an internal or private switch.

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			
Hyper-V Manager File Action View Help			
Hyper-V Manager	Nietual Machiner New	>	Virtual Machine
	Import Virtual Machine		Hard Disk Floppy Disk
	Virtual Switch Manager Virtual SAN Manager		
	Edit Disk Inspect Disk		
	Stop Service Remove Server Refresh		e selected virtual machine has no che
	View	>	
	Help		

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

📃 New Virtual Machine Wiz	ard	×
Before You	Begin	
Before You Begin Specify Name and Location Specify Generation Assign Memory Configure Networking Connect Virtual Hard Disk Installation Options Summary	This wizard helps you create a virtual machine. You can use virtual machines in place of physical computers for a variety of uses. You can use this wizard to configure the virtual machine now, and you can change the configuration later using Hyper-V Manager. To create a virtual machine, do one of the following: • Click Finish to create a virtual machine that is configured with default values. • Click Next to create a virtual machine with a custom configuration.	
	< <u>Previous</u> <u>N</u> ext > Einish Cancel	

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.

Before You Begin	Choose a name and location for this virtual machine.	
Specify Name and Location	The name is displayed in Hyper-V Manager. We recommend that you use a nam	ne that helps you easi
Specify Generation	Name: windows 2016	I WORIDAU.
Configure Networking		
Connect Virtual Hard Disk	You can create a folder or use an existing folder to store the virtual machine. If folder, the virtual machine is stored in the default folder configured for this service.	f you don't select a ver.
Installation Options	Store the virtual machine in a different location	
Summary	Location: C:\ProgramData\Microsoft\Windows\Hyper-V\	Browse
	If you plan to take checkpoints of this virtual machine, select a location this space. Checkpoints indude virtual machine data and may require a large a space. Checkpoints indude virtual machine data and may require a large a	at has enough mee mount of space.

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

Before You Begin Choose the generation of this virtual machine. Specify Name and Location Image: Consective Generation 1 Specify Generation This virtual machine generation supports 32-bit and 64-bit guest operating system virtual hardware which has been available in all previous versions of Hyper-V. Configure Networking Image: Generation 2 Connect Virtual Hard Disk This virtual machine generation provides support for newer virtualization feature formware, and requires a supported 64-bit quest operating system	tems and provides
Installation Options Summary Mere about virtual machine has been created, you cannot change its generation.	res, has UEFI-based

Step 5 On the Assign Memory page, click Next, as shown inFigure 5-65.

Figure	5-65	Allocate	memory
--------	------	----------	--------

🖳 New Virtual Machine Wiza	ard	>
Assign Mem	οιγ	
Before You Begin Specify Name and Location Specify Generation Assign Memory Configure Networking Connect Virtual Hard Disk Installation Options Summary	Specify the amount of memory to allocate to this virtual machine. You can specify an amount from 3 MB through 12582912 MB. To improve performance, specify more than the minimum amount recommended for the operating system. Startup memory: 4095 MB Use Dynamic Memory for this virtual machine. When you decide how much memory to assign to a virtual machine, consider how you intend to use the virtual machine and the operating system that it will run.	2
	< <u>P</u> revious <u>N</u> ext > <u>F</u> inish Cancel	

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

Figure 5	-66 Co	onfiguring	the	Network
----------	--------	------------	-----	---------

Before You Begin Specify Name and Location Specify Generation	Each new vir virtual switch <u>C</u> onnection:	tual machine include , or it can remain di Not Connected	es a network adapte isconnected.	r. You can configure	the network adapte	er to u:
Assign Memory						
Configure Networking						
Connect Virtual Hard Disk						
Installation Options						
Summary						

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

Before You Begin Specify Name and Location Specify Generation Assign Memory	A virtual machine requires storage so that you can install an operating system. Yo storage now or configure it later by modifying the virtual machine's properties.	ou can specify the
Configure Networking Connect Virtual Hard Disk Installation Options Summary	Name: Windows2016.vhdx Location: C: \Users\Public\Documents\Hyper-V\Virtual Hard Disks\ Size: 127 GB (Maximum: 64 TB)	Browse
	Use an existing virtual hard disk Use this option to attach an existing virtual hard disk, either VHD or VHDX for Location: C: \Users\Public\Documents\Hyper-V\Virtual Hard Disks\	mat.
	 Attach a virtual hard disk later Use this option to skip this step now and attach an existing virtual hard disk later 	ater.

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

Before You Begin Specify Name and Location Specify Generation Assign Memory	You can install an operating system now if you have access to the setup m later. Install an operating system later Install an operating system from a bootable <u>CD/DVD-ROM</u>	edia, or you can install it
Jonfigure Networking Jonnect Virtual Hard Disk	Physical CD/DVD drive: D: ~	
Installation Options Summary	Image file (.iso): Install an operating system from a bootable figppy disk Media	Browsen
	Virtual floppy disk (.vfd):	<u>B</u> rowse

- **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 inFigure 5-69.

Hyper-V Manager Virtual Machines WIN-01MQ6CDLLOQ Name State CPU Usage Assigned Memory vindows201 Connect... Settings... Start Checkpoint < Move... Checkpoints Export... Rename... The selected vir Delete ... Enable Replication... Help

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.
rigule 5-70 Ente	anny the System Installation Faye	
windows2016 on WIN-01MQ6CDL	LOQ - Virtual Machine Connection	- 🗆
File Action Media Clipboard	d View Help	
≞ 🕘 💿 🥥 🖬 🕩 🔂	5 뿐	
ſ	Windows Setun	
	Windows Server 2016	
	Language to install: English (United States)	
	Time and currency format: English (United States)	
	Keyboard or input method: US	
	Enderson because and alternative and allels (Mark as a setting	
	enter your language and other preferences and click "vext" to continue.	
	© 2016 Microsoft Corporation. All rights reserved.	

Figure 5-70 Entering the System Installation Page



5.4.2.4 Adding SR-IOV Network Ports

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

Figure 5-71 Power off the VM





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**.



OK

Cancel

Step 4 Select Switch_v1 under Virtual Switch, as shown inFigure 5-74.

Smart Paging File Location C:\ProgramData\Microsoft\Win...

Automatic Start Action
 Restart If previously running
 Automatic Stop Action

Figure 5-74 Select VM



Step 5 In the navigation tree on the left, click the new I 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.

- 🗆 X

Figure 5-75 Enable SR-IOV

Settings for windows2016 on WIN-O1MQ6CDLLOQ

۸.	Hardware	^	Hardware Acceleration
	Add Hardware		
	BIOS		Specify networking tasks that can be offloaded to a physical network adapter.
	Boot from CD		
	Security		virtual machine queue
	Key Storage Drive disabled		Virtual machine queue (VMQ) requires a physical network adapter that supports
	Memory		ons reaure.
	4096 MB		Enable virtual machine gueue
+	Processor		
	1 Virtual processor		IPsec task offloading
Ξ	IDE Controller 0		Support from a physical network adapter and the guest operating system is
	🗄 🔜 Hard Drive		required to offload IPsec tasks.
	windows2016.vhdx		10ther a fifthing the state of the second stat
Ξ	IDE Controller 1		are not offloaded and are bandled in software by the quest operating system.
	DVD Drive		
	None		
	SCSI Controller		Select the maximum number of offloaded security associations from a range of 1 tr
Ξ	Network Adapter		4096,
	Switch_v1		Maximum numbers
	Hardware Acceleration		
	Advanced Features		
-	COM 1		Single-root I/O virtualization
	None		Single-root I/O virtualization (SR-IOV) requires specific hardware. It also might
	COM 2		require drivers to be installed in the guest operating system.
	None		When sufficient hardware resources are not available, network connectivity is
	Reference Drive		provided through the virtual switch.
	None		The Finable SR-TOV
*	Management		
	I Name		
	windows2016		
	Integration Services		
	Some services offered	192	
	Checkpoints		
	Production		
	Smart Paging File Location	~	

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

Figure 5-76 Start the VM

🖳 win	dows2016 on WIN-O1N	AQ6CDLLOQ - Virti	ual Machine Connection
File	Action Media C	lipboard View	Help
⊨ (€	Ctrl+Alt+Delete	Ctrl+Alt+End	
	Start	Ctrl+S	
	Shut Down	Ctrl+D	
	Save	Ctrl+A	
	Pause	Ctrl+P	
	Reset	Ctrl+R	
	Checkpoint	Ctrl+N	
	Revert	Ctrl+E	ine windows2016 is turned off

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

📩 Device Manager	-	×
<u>Eile Action View H</u> elp		
⊨ ⇔ 🖬 🗾 💷		
✓		
> 🛄 Computer		
> 👝 Disk drives		
> 🔙 Display adapters		
> 🧟 DVD/CD-ROM drives		
> 📕 Floppy disk drives		
> 📲 Floppy drive controllers		
> 🚜 Human Interface Devices		
> 📹 IDE ATA/ATAPI controllers		
> 🥅 Keyboards		
> 🕕 Mice and other pointing devices		
> 🥅 Monitors		
🗸 🚅 Network adapters		
Microsoft Hyper-V Network Adapter		

----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 noncluster-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@l	localhost:~] es	xcli netwo	ork nic list						
Name	PCI Device	Driver	Admin S	tatus Link	Status Speed	d Duplex	MAC Ad	ldress	MTU Description
vmnic1	0000:a8:00.0	igbn	Up	Up	1000 Full	34:73:79:	2e:d8:79	1500	Intel Corporation I350 Gigabit
Networ	k Connection								
vmnic2	0000:a8:00.1	igbn	Up	Up	1000 Full	34:73:79:	2e:d8:7a	1500	Intel Corporation I350 Gigabit
Networ	k Connection								
vmnic3	0000:a8:00.2	igbn	Up	Up	1000 Full	34:73:79:	2e:d8:7b	1500	Intel Corporation I350 Gigabit
Networ	k Connection	C	1	1					1 0
vmnic4	0000:a8:00.3	igbn	Up	Up	1000 Full	34:73:79:	2e:d8:7c	1500	Intel Corporation I350 Gigabit
Networ	k Connection	C	1	1					
vmnic5	0000:16:00.0	bnxtnet	Up	Up	10000 Full	34:73:7	9:bd:05:d	6 150	0 Broadcom BCM57412
NetXtre	eme-E 10Gb R	DMA Eth	ernet Cont	troller					
vmnic6	0000:16:00.1	bnxtnet	Up	Up	10000 Full	34:73:7	9:bd:05:d	7 150	0 Broadcom BCM57412
			1	1					

NetXtreme-E 10Gb RDMA Ethernet Cor	itroller			
	* *	35 000 F 11		
vmnic/ 0000:b8:00.0 nmlx5 core Up	Up	25000 Full	34:/3:/9:91:85:18	1500 Mellanox Technologies
MT27800 Family [CompactV 5]				e
M12/800 Family [ConnectA-5]				
vmnic8_0000:b8:00.1_nmlx5_core_Un	Un	25000 Full	34.73.79.91.85.19	1500 Mellanox Technologies
	۰p	20000 1 411	2 11/21/21/21/00/11	
MT27800 Family [ConnectX-5]				
[root@looslbost:]				
[1001@10camost.~]				

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 inFigure 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 theFigure 5-80. Click Save.

Figure 5-80 Configure parameters.

PO box/cos 2 Toggle pasttrough Configure SR-10V Hardware label C Refresh Q Search Power Management Address Description SR-10V Pastdware label SR-10V Pastdware label Mardware label SR-10V Pastdware label SR-10V Pastdware label Mardware label SR-10V Pastdware label Mardware label Mardwar										
Power Management Address Description SR-IOV Pastmough Hardware Label 000016:001 Broadcom BCM37412 MetXtreme-E 100b RDMA Ethernet Controller Disabled Disabled <td></td> <td></td> <td></td> <td></td> <td></td> <td>e label 🖉 🔂 Reboot host 🕴 Ċ Refresi</td> <td>R-IOV 🔗 Hardware la</td> <td>🖋 Configure</td> <td>Toggle passthrough</td> <td>PCI Devices</td>						e label 🖉 🔂 Reboot host 🕴 Ċ Refresi	R-IOV 🔗 Hardware la	🖋 Configure	Toggle passthrough	PCI Devices
000016:001 Broadcom BCM37412 NebtSreme-E 1050 RDMA Ethernet Controller Disabled Disabled 000016:00.0 Broadcom BCM37412 NebtSreme-E 1050 RDMA Ethernet Controller Disabled Disabled 000016:00.0 Broadcom BCM37412 NebtSreme-E 1050 RDMA Ethernet Controller Disabled Disabled 0000170:00.0 Mellanova Technologies ConnectX-6 VP III/L HORTOQL EDP IB/D00EbE: single-port 05FP56; PDIe4.0 xHz; (MCX83) Disabled Disabled 0000170:00.0 Intel(P) Co-processor Disabled Disabled Disabled 0000170:00.1 Intel(P) Co-processor Disabled Disabled Disabled 000018:00.2 Intel(P) Co-processor Disabled Disabled Disabled 000018:00.2 Intel(P) Co-processor Disabled Disabled Disabled 000018:00.2 Intel(Corporation ISS0 Gigabl Network Connection Disabled Disabled 000018:00.2 Intel Corporation ISS0 Gigabl Network Connection Disabled Disabled 0000018:00.2 Intel Corporation ISS0 Gigabl Network Connection Disabled Disabled 0000018:00.2 Intel Corporation ISS0 Gigabl Network Connection Disabled Disabled 0000018:00.2 Intel Corporation ISS0 Gigabl Network Connection Disabled Disabled		🗸 Hardware Label 🗸		SR-IOV ~			0	- Description	Address	Power Management
000018000 Broadcom BCM/3742 Metthome-E 10GB PGMA Ethernet Controller Databled Databled 000018000 Metanox Technologies ConnectX-6 VPI NC; HDR000, EDP IB/2000EE; single-port GSFP56; PCIe4 0 x/6; (MCX63). Disabled Disabled 000017000 Intel®[10:c-processor Disabled Disabled Disabled 000017000 Intel®[10:c-processor Disabled Disabled Disabled 00001000 Intel®[10:c-processor Disabled Disabled 000010000 Intel®[10:c-processor Disabled Disabled 0000010000 Intel®[10:c-processor Disabled Disabled 0000010000 Intel®[10:c-processor Disabled Disabled 0000010000 Intel®[10:c-processor Disabled Disabled 0000010000 Intel Corporation 1350 Gigabh Network Comection Disabled Disabled 0000010000 Intel Corporation 1350 Gigabh Network Comection Disabled Disabled 0000010000 Intel Corporation 1350 Gigabh Network Comection Disabled Disabled 0000100000 Intel Corporation 1350 Gigabh Network Comection Disabled Disabled						b RDMA Ethernet Controller				1
0000 38 00 0 Mellanox Technologies Connective VPI NIC; HDR100, EDR IB/10000E; single-port 05FP56, PCIe4 0 x16; (MCX651). Disabled Disabled 0000 70 00 0 Intell(P) Co-processor Disabled Disabled Disabled 0000 72 00 0 Intell(P) Co-processor Disabled Disabled Disabled 0000 72 00 0 Intell(P) Co-processor Disabled Disabled Disabled 0000 72 00 0 Intell(P) Corporation 1350 Gigabl Network Connection Disabled Disabled 0000 28 00 2 Intel Corporation 1350 Gigabl Network Connection Disabled Disabled 0000 28 00 2 Intel Corporation 1350 Gigabl Network Connection Disabled Disabled 0000 28 00 2 Intel Corporation 1350 Gigabl Network Connection Disabled Disabled 0000 28 00 2 Intel Corporation 1350 Gigabl Network Connection Disabled Disabled 0000 28 00 1 Intel Corporation 1350 Gigabl Network Connection Disabled Disabled 0000 28 00 1 Intel Corporation 1350 Gigabl Network Connection Disabled Disabled			Disabled	Disabled		b RDMA Ethernet Controller	CM57412 NetXtreme-E 10Gb F	Broadcom B		(
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0000 a8 00 3 Intel Corporation ISSO Gigabit Network Connection Disabled Disabled 0000 a8 00 2 Intel Corporation ISSO Gigabit Network Connection Disabled Disabled 0000 a8 00 1 Intel Corporation ISSO Gigabit Network Connection Disabled Disabled 0000 a8 00 1 Intel Corporation ISSO Gigabit Network Connection Disabled Disabled 0000 a8 00 1 Intel Corporation ISSO Gigabit Network Connection Disabled Disabled 0000 a8 00 1 Intel Corporation ISSO Gigabit Network Connection Disabled Disabled										
O000 a8 00 2 Intel Corporation ISSO Graphit Network Connection Disabled Disabled Disabled Disabled Disabled Disabled Disabled Disabled Disabled			Disabled	Disabled		Connection	ition 1350 Gigabit Network Co	Intel Corpor		(
concession interform Configure SR-IOV for M127800 Family (ConnectX-5) Deathered			Disabled	Disabled		Connection				(
Dooplasting Configure SR-IOV for MT27800 Family [ConnectX-5]			Disabled	Disabled		· · · · · · · · · · · · · · · · · · ·		Intel Corp		(
						for MT27800 Family [ConnectX-5]	Configure SR-IOV fo	Intel Corp		(
✓ 0000.b8/00.1 Mellanox Disabled Disabled						•		Mellanox		
CO000.b8:00.0 Mellanox Enabled eyes No Disabled Disabled			Disabled	Disabled		Yes O No	Enabled	Mellanox		(
0000 ed 00.0 Intel(R) C Victual functions Disabled Disabled Disabled				Disabled			Virtual functions	Intel(R) C		(
SR-IOV capable Vincen vinceous 6 2 * Maximum 8	hs .	13 item				3 2 ♀ Maximum 8	VII COLI TOTICOOTO	~	R-IOV capable	
					-0					
						CANCEL				
MT2recor annu connector og						· ~,	oo i anniy teorineere e	MT2		
ID 000018500.1 Vendor Name Melianox Technologies				Mellanox Technologies	Vendor Name		0000:b8:00.	ID		
Device ID 0x007 Class ID 0x200 Ventor ID 0x593 Subfavior ID 0x200					Class ID Subdevice ID			Vendo		
Function 0x1 Subventor ID 0x1724				0x1f24	Subvendor ID		n 0x1	Functio	•	
Bus Oxb8 Stot OxO					Slot			Bus		

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

levices	4	Toggle passthrough	🖋 Configure SR-IOV 🛛 🖋 Hardware label 🦉 Reboot host 🕴 😷 Refresh			Q Search	ı
Power Management		Address	Description	↓ SR-IOV	 Passthrough 	~	Hardware La
		0.000:a8:00.0	Intel Corporation 1350 Gigabit Network Connection	Disabled	Disabled		
			Intel(R) PCI bridge				
		0000:b8:01.3	Mellanox Technologies MT27800 Family [ConnectX-5 Virtual Function]	Not capable	Active		
		0000:b8:01.2	Mellanox Technologies MT27800 Family [ConnectX-5 Virtual Function]	Not capable	Active		
		0000:b8:00.1	Mellanox Technologies MT27800 Family [ConnectX-5]	Active	Disabled		
		0000:b8:00.0	Mellanox Technologies MT27800 Family [ConnectX-5]	Disabled	Disabled		

Step 7 View the number of VFs successfully enabled. Assume that two VFs are enabled for each PF of the XC382. Run the Ispci | 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.

分 Navigator	~	ត្រី rhel8.6					
∨ 🗄 Host Manage		🖽 Console 🛛 Monitor 🛛 🕨	Power on ① Power off ② 11 St	ispend 🗇 Restart 🖋 Edit 📿 Refi	esh 🕴 🏟 Actions		
Monitor Virtual Machines Virtual Machines Micritor Monitor Storage View datastore1 Hearing	1		rhel8.6 Guest OS Compatibility VMware Tools CPUs Memory	Red Hat Enferprise Linux 8 (64-bit) ESXI 7.0 U2 virtual machine Yes 16 8 GB			O MHZ O B O B STORAGE 50 GB
More storane	_ 1	General Information			✓ Hardware Configuration	n	
ï Networking	3	> 👰 Networking			> 💭 CPU	16 vCPUs	
vSwitch333bc	_	> 🖻 VMware Tools	VMware Tools is not managed by vSp	here	2 Memory	8 GB	
vSwitch382mInx	_ 1	> 🖹 Storage	1 disk		> 📇 Hard disk 1	50 GB	
C vSwitch0	- 1	@ Notes	Edit notes		+ USB controller	USB 2.0	
9, vmnic8	- 1				> 🛱, Network adapter 1	VM Network (Connected)	
Hore networks	_ 1				> 🛱, Network adapter 2	port382minx (Connected)	
	- 1				> 🛱 Network adapter 3	port333bc (Connected)	
	- 1				> 📮 Video card	16 MB	
					> 🚫 CD/DVD drive 1	ISO [datastore1] idriver/rhel-8.6-x86_64-dvd.iso	Select disc image
					> 📰 Others	Additional Hardware	

Figure 5-82 Power off the VM

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

Figure 5-83 Entering the Settings screen

🛱 rhel8.6					
🗐 Console 🛛 Monitor	Power on ① Power off	uspend 💢 Restart 🖋 Edit C Refr	esh 🕴 🌣 Actions		
	rhel8.6 Guest OS Compatibility VMware Tools CPUs Memory	Red Hat Enterprise Linux 8 (64-bit) ESXI 7.0 U2 virtual machine Yes 16 8 GB			O MHZ O B SO GB
✓ General Information			- Hardware Configuration		
> 👰 Networking			> 💭 CPU	16 vCPUs	
> 🖨 VMware Tools	VMware Tools is not managed by vSp	ohere	E Memory	8 GB	
> 🖨 Storage	1 disk		> 🖂 Hard disk 1	50 GB	
🖉 Notes	🖋 Edit notes		+ USB controller	USB 2.0	
			> 🖳 Network adapter 1	VM Network (Connected)	
			> 😇, Network adapter 2	port382mlnx (Connected)	
			> 🛱 Network adapter 3	port333bc (Connected)	
			> 🖵 Video card	16 MB	
			> 🚱 CD/DVD drive 1	ISO [datastore1] idriver/rhel-8.6-x86_64-dvd.iso	Select disc image
			> 📰 Others	Additional Hardware	



🗟 Edit settings - rhel (ESXi 7.0 U2	virtual machine)		
Virtual Hardware VM Options			
🖂 Add hard disk 🔄 Add networ	k adapter 🗊 Add other device		
> 🖸 CPU	16 🖌 🜖		
> 😇 Memory	16 GB ~		
> 🕞 Hard disk 1	16 GB ~		×
> 🔆 SCSI Controller 0	VMware Paravirtual	×	×
🖾 SATA Controller 0			×
+ USB controller 1		×	
			×
> 🖳 Network Adapter 1	VM Network	✓ Connect	×
> 🔄 New Network Adapter	mxp1	✓ 🗹 Connect	×
> 🕲 CD/DVD Drive 1	Datastore ISO file	∽ □ Connect	×
> 📮 Video Card	Default settings	~	
		CANCEL	SAVE

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

			×
> 🔄 Network Adapter 1	VM Network	Connect	×
∨ 🛱 New Network Adapter	mxp1		×
Status	Connect at power on		
Adapter Type	VMXNET 3		
MAC Address	SR-IOV passthrough VMXNET 3		
> 🕲 CD/DVD Drive 1	Datastore ISO file	Connect	×
> 🖵 Video Card	Default settings	·	

〜 😇 New Network Adapter	mxp1 ~
Status	Connect at power on
Adapter Type	SR-IOV passthrough
Memory reservation	To enable PCI passthrough or SR-IOV, the VM's memory will be reserved.
Physical function	BCM57412 NetXtreme-E 10Gb RDMA Ethernet Controller - 000016K
MAC Address	MT27800 Family [ConnectX-5] - 0000:b8:00.0
Guest OS MTU Change	Disallow

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:.

Ispci | 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-csumsegmentation 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.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
0	
OS	Operating System
Р	
PCIe	PCI Express
PFC	Priority Flow Control
РХЕ	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