Oracle® Dual Port 25/100 Gb Ethernet Adapter User's Guide, Mellanox

Part No: F42362-02
June 2022

Oracle Dual Port 25/100 Gb Ethernet Adapter User's Guide, Mellanox

Part No: F42362-02

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info` or visit `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs` if you are hearing impaired.

Référence: F42362-02

Accès aux services de support Oracle

Les clients Oracle qui ont souscrit un contrat de support ont accès au support électronique via My Oracle Support. Pour plus d'informations, visitez le site `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info` ou le site `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs` si vous êtes malentendant.

Contents

Using This Documentation

- **Overview** – Provides specifications and describes how to install and administer the Oracle Dual Port 25/100 Gb Mellanox Ethernet Adapter.
- **Audience** – Technicians, system administrators, and authorized service providers.
- **Required knowledge** – Advanced experience troubleshooting and replacing hardware.

In this document, the term “adapter” refers to the Oracle Dual Port 25/100 Gb Mellanox Ethernet Adapter, the term “x86” refers to 64-bit and 32-bit systems manufactured using processors compatible with the AMD64, Intel Xeon, or Intel Pentium product families, the term SPARC refers to 64 bit systems such as T8-1, T8-2, T8-4 and M8-8 servers, and the term “Oracle Solaris” refers to latest software version (i.e. Oracle Solaris 11.4) supported on x86 and SPARC server systems.

The Oracle Dual Port 25/100 Gb Mellanox Ethernet adapter cards are based on the Mellanox ConnectX®-5 integrated circuit devices.

Product Documentation Library

Documentation and resources for this product and related products are available at https://docs.oracle.com/en/servers/management.html.

Understanding the Installation Process

The following topic(s) provide an overview of the installation process for the Oracle Dual Port 25/100 Gb Mellanox Ethernet Adapter:

Related Information

- "Understanding the Adapter" on page 15
- "Confirming Specifications and Requirements" on page 19
- "Updating Software and Firmware" on page 23
- "Verifying the Mellanox Network Driver" on page 25
- "Installing the Adapter" on page 29

Installation Task Overview (Oracle Solaris x86/64)

Step	Description	Links
1.	Understand the adapter.	"Understanding the Adapter" on page 15
2.	Confirm the adapter specifications and technical requirements.	"Confirming Specifications and Requirements" on page 19
3.	Ensure that the minimum required Oracle Solaris software version is installed.	"Hardware and Software Requirements" on page 22
4.	Verify that the driver bundled in the Oracle Solaris software is loaded.	"View the `mlxne` Driver (Oracle Solaris x86/64)" on page 25
5.	Install and verify the adapter.	"Install the Adapter" on page 32
6.	Boot over the network.	"Configuring the Network" on page 37
7.	(Optional) Configure Jumbo Frames	"Configuring Jumbo Frames " on page 51
8.	(Optional) Configure VLANs.	"Configuring VLANs" on page 57

Step	Description	Links
9.	(Optional) If required, remove the driver.	“Remove the `mlxne` Driver (Oracle Solaris x86/64)” on page 62
10.	(Optional) Configure a link aggregation in an Oracle Solaris x86 environment.	“Configuring a Link Aggregation (Oracle Solaris x86/64)” on page 55
11.	If required, troubleshoot adapter issues in an Oracle Solaris X86 environment.	“Troubleshooting the Adapter (Oracle Solaris x86/64)” on page 67

Installation Task Overview (Linux)

Step	Description	Links
1.	Understand the adapter.	“Understanding the Adapter” on page 15
2.	Confirm the adapter specifications and technical requirements.	“Confirming Specifications and Requirements” on page 19
3.	Ensure that the minimum required Oracle Solaris software version is installed.	“Hardware and Software Requirements” on page 22
4.	Verify that the driver bundled in the Oracle Solaris software is loaded.	“View the Linux `mlxne` Network Driver” on page 26
5.	Install and verify the adapter.	“Install the Adapter” on page 32 “Verify the Adapter Installation (Linux)” on page 34
6.	Boot over the network.	“Configuring the Network” on page 37
7.	(Optional) Configure jumbo frames.	“Configuring Jumbo Frames ” on page 51
8.	(Optional) Configure VLANs.	“Configuring VLANs” on page 57
9.	(Optional) If required, remove the driver.	“Remove the mlxne Driver (Linux)” on page 61
10.	Upgrade the adapter.	“Install the Upgrade Package” on page 63

Related Information

- “Installation Task Overview (Windows)” on page 12

Installation Task Overview (Windows)

Step	Description	Links
1.	Understand the adapter.	“Understanding the Adapter” on page 15

Step	Description	Links
2.	Confirm the adapter specifications and technical requirements.	“Confirming Specifications and Requirements” on page 19
3.	Ensure that the minimum required Oracle Solaris software version is installed.	“Hardware and Software Requirements” on page 22
4.	Verify that the driver bundled in the Oracle Solaris software is loaded.	“Verify the Windows `mlxne` Network Driver ” on page 27
5.	Install the adapter and verify the installation.	“Install the Adapter” on page 32 “Verify the Adapter Installation (Windows)” on page 35
6.	Boot over the network.	“Configure the Network Interface (Windows)” on page 38
7.	(Optional) Configure jumbo frames.	“Configure Jumbo Frames (Windows)” on page 52
8.	(Optional) Configure a VLAN.	“Configure VLANs (Windows)” on page 58
9.	(Optional) If required, remove the driver.	“Remove the `mlxne` Driver (Windows)” on page 61
10.	Upgrade the adapter.	“Install the Upgrade Package” on page 63

Related Information

- “Installation Task Overview (Linux)” on page 12
- “Understanding the Adapter” on page 15

Understanding the Adapter

These topics provide an overview of the adapter:

Related Information

- “Understanding the Installation Process” on page 11
- “Confirming Specifications and Requirements” on page 19
- “Updating Software and Firmware” on page 23
- “Verifying the Mellanox Network Driver” on page 25
- “Installing the Adapter” on page 29
- “Configuring the Network” on page 37
- “Configuring Jumbo Frames ” on page 51
- “Configuring VLANs” on page 57
- “Removing the Driver” on page 61

Shipping Kit Contents

The carton in which the adapter was shipped contains these items:

- Adapter with a low-profile bracket attached
- *Dual Port Ethernet Adapter Where To Find* documentation

Related Information

- “Adapter Overview” on page 16
- “Front Panel Connectors and LEDs” on page 17

Adapter Overview

The content in this document applies to the following Oracle Dual Port 25/100 Gb Mellanox Ethernet Adapters:

- Oracle Dual Port 25 Gb Ethernet Adapter, Mellanox
- Oracle Dual Port 100 Gb Ethernet Adapter, Mellanox

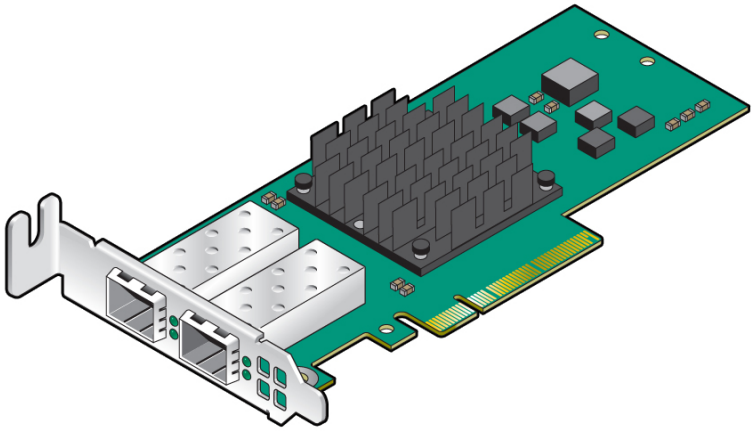
Note - Performance may be limited depending on the server configuration in which the 100 GbE Adapter Card is being used. Maximum performance of the 100 GbE Adapter Card can only be achieved on systems supporting PCIe 4.0 with 16 data lanes.

- Oracle Dual Port 100 Gb Ethernet Adapter, Mellanox for Mezzanine form factor (for factory installation) (X86 Server Support Only).

Note - The Dual Port 25/100 Gb Mellanox Ethernet Adapters are based on the Mellanox ConnectX®-5 integrated circuit devices.

TABLE 1 Performance Specifications - Oracle Dual Port 25/100 Gb Mellanox Ethernet

Feature	Specification
Data rate	■ 25 GbE Adapter: 1/10/25 Gb/s Ethernet ■ 100 GbE Adapter: 10/25/40/100 Gb/s Ethernet ■ 100 GbE Adapter, Mezzanine Form Factor: 10/25/40/100 Gb/s Ethernet (x86 Server Support Only)
Bus type	■ 25 GbE Adapter: PCIe 4.0: SERDES @ 8.0GT/s, 8 lanes (2.0 and 1.1 compatible) ■ 100 GbE Adapter: PCIe 4.0: SERDES @ 8.0GT/s, 16 lanes (2.0 and 1.1 compatible) ■ 100 GbE Adapter, Mezzanine Form Factor: PCIe 4.0: SERDES @ 8.0GT/s x16 lanes (2.0 and 1.1 compatible) (X86 Server Support Only)
Bus width	■ 25 GbE Adapter: 8-lane PCIe bus connector ■ 100 GbE Adapter: PCIe 4.0 x16 bus can supply a maximum bandwidth of 128Gb/s only (=16 * 8GT/s, including overhead),and therefore cannot support 200Gb/s when both network ports of MCX556A-ECAT run at 100Gb/s.
Conforms to Ethernet standard	802.3
PreBoot Drivers	Mellanox provided PreBoot drivers are a multiprotocol remote boot technology that support remote Boot over InfiniBand (BoIB) and over Ethernet Using Mellanox Virtual Protocol Interconnect (VPI) technologies available in ConnectX® adapters, PreBoot drivers give IT Managers’the choice to boot from a remote storage target (iSCSI target) or a LAN target (Ethernet Remote Boot Server) using a single ROM image on Mellanox ConnectX products. FlexBoot is based on the open source project iPX.

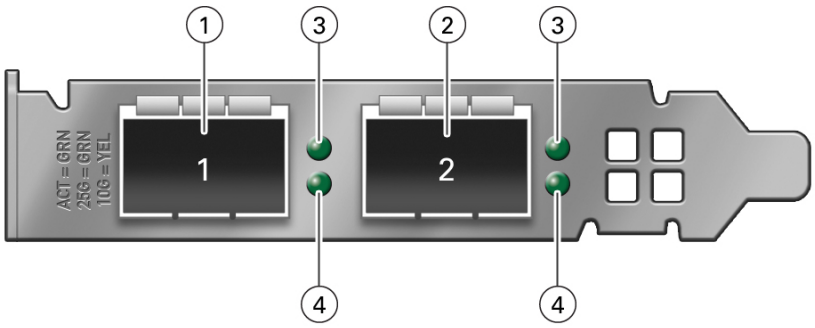


Related Information

- “Shipping Kit Contents” on page 15
- “Front Panel Connectors and LEDs” on page 17

Front Panel Connectors and LEDs

On the front panel, two LEDs display the port speed and activity for each port. Both ports operate at the same speed. This figure and the table explain the meaning of the LEDs for ports 1 and 2. The LEDs are the same for a full panel and a half-height panel.



Note - If your adapter is installed horizontally, the ports are numbered 1 and 2, left to right. In a vertical orientation, the ports are numbered 1-2 bottom to top.

No.	Description	Device	Mbit
1	Port 1		
2	Port 2		
3	Activity LED	Off	No activity
		Blinking Green	Traffic flowing activity
4	Link LED	Off	No link
		Solid Green	Linked at 25 Gbps
		Solid Yellow	Linked at 1 Gbps or 10 Gbps

Related Information

- “Shipping Kit Contents” on page 15
- “Adapter Overview” on page 16
- “Confirming Specifications and Requirements” on page 19

Confirming Specifications and Requirements

These topics provide technical information and airflow precautions you need to understand before installing the adapter:

Related Information

- “Understanding the Installation Process” on page 11
- “Understanding the Adapter” on page 15
- “Updating Software and Firmware” on page 23
- “Verifying the Mellanox Network Driver” on page 25
- “Installing the Adapter” on page 29
- “Configuring the Network” on page 37
- “Configuring Jumbo Frames ” on page 51
- “Configuring VLANs” on page 57
- “Removing the Driver” on page 61

Physical Specifications

Adapter Type	Physical Specifications
25 Gb	Size: 2.71 in. x 5.6 in. (68.90mm x 142.24 mm) Low profile; Connector: Dual SFP28 Ethernet (copper and optical)
100 Gb	Size: 2.71 in. x 5.6 in. (68.90mm x 142.24 mm)

Adapter Type	Physical Specifications
	Low profile; Connector: Dual QSFP28 InfiniBand and Ethernet (copper and optical)
100 Gb Mezzanine Form Factor (X86 Server Support Only)	Size: 4.52in. x 2.99in. (115mm x 76mm); Connector: Dual QSFP28 Ethernet (copper and optical)

Related Information

- “Electrical Specifications” on page 20
- “Environmental Specifications” on page 21
- “Hardware and Software Requirements” on page 22

Electrical Specifications

Adapter Type	Power and Cable Support
25 Gb	Voltage: 12V
	■ Typical Power: Passive Cable 9.5W ■ Maximum Power: Passive Cable 11.8W ■ Maximum Power: 1.5W Active Cable 15.1W
100 Gb	Voltage: 12V
	■ Typical Power: Passive Cable 16.2W ■ Typical Power: Passive Cable 19.0W ■ Maximum Power: 1.5 Active Cables 22.3W ■ Maximum Power: 2.5W Active Cables 24.6W **Note -** Typical power is for ATIS traffic load. Maximum power available through QSFP28 port: 5W
100 Gb Mezzanine Form Factor (X86 Server Support Only)	Voltage: 12V
	Typical Power: **Note -** Typical power is for ATIS traffic load. ■ 12V_Edge: Passive Cables,16.5W ■ 12V_Edge: 2.2W Active Cables, 21.7 ■ 3.3V Edge: Passive Cables: 0.33W ■ 2.2W Active Cables: 0.33W **Note -** 12V and 3.3V Edge Standby and Maximum power for Passive and Active Cables = TBD Maximum Power:

Adapter Type	Power and Cable Support
	■ 12V_Edge: Passive Cables,19.3 W ■ 12V_Edge: 2.2W Active Cables, 24.5 ■ 3.3V Edge: Passive Cables: 0.33W ■ 2.2W Active Cables: 0.33W Maximum power available through QSFP28 port: 2.2W

Related Information

- “Physical Specifications” on page 19
- “Environmental Specifications” on page 21
- “Hardware and Software Requirements” on page 22

Environmental Specifications

Adapter	Enviromental Specifications
25 Gb	Temperature: ■ Operational: 0°C to 55°C ■ Non-operational: -40°C to 70°C
	Altitude (Operational): 3050m Humidity: 90% relative humidity Airflow: Mellanox Airflow Specifications
100 Gb	Temperature: ■ Operational: 0°C to 55°C ■ Non-operational: -40°C to 70°C
	Humidity (Operational and Non-operational): 90% relative humidity Altitude (Operational): 3050m Airflow: Mellanox Airflow Specifications
100 Gb Mezzanine Form Factor (X86 Server Support Only)	Temperature: ■ Operational: 0°C to 55°C ■ Non-operational: -40°C to 70°C
	Humidity (Operational and Non-operational): 90% relative humidity

Adapter	Enviromental Specifications
	Altitude (Operational): 3050m Airflow: Cable Type: Passive and Active (2.2W Active Cable (85°C cage limit)) ■ Active Mode @55C (HSK to Port): 300LFM ■ Standby Mode @45C (HSK to Port): 100LFM ■ Active and Standby Cold Aisle @35C (Port to HSK): NA

Related Information

- “Physical Specifications” on page 19
- “Electrical Specifications” on page 20
- “Hardware and Software Requirements” on page 22

Hardware and Software Requirements

Hardware and software support changes over time. For the latest information concerning I/O options that are supported by your server, refer to the Product Page.

For the latest list of supported platforms and operating systems, refer to the“Servers and Operating Systems Supported” in *Product Notes for Mellanox Connect ®-5 Ex Ethernet PCIe Adapter Cards for Oracle x86 Server*

For Oracle Solaris OS systems, the minimum supported version is required, which is Oracle Solaris 11.4 SRU33.

Related Information

- “Physical Specifications” on page 19
- “Electrical Specifications” on page 20
- “Environmental Specifications” on page 21
- “Updating Software and Firmware” on page 23

Updating Software and Firmware

This topic provides information on updating the adapter software and firmware:

Note - For the latest list of supported platforms and operating systems, see “Hardware and Software Requirements” on page 22.

Related Information

- “Understanding the Installation Process” on page 11
- “Understanding the Adapter” on page 15
- “Confirming Specifications and Requirements” on page 19
- “Verifying the Mellanox Network Driver” on page 25
- “Installing the Adapter” on page 29
- “Configuring the Network” on page 37
- “Configuring Jumbo Frames ” on page 51
- “Configuring VLANs” on page 57
- “Removing the Driver” on page 61

x86 Systems: Firmware Update Tool Overview

For Oracle x86 servers, use one of the following firmware tools to update the firmware.

- Oracle System Assistant (OSA), a built-in tool on x86 servers or a USB thumb drive shipped with the server, which contains the firmware update tool. Refer to the text files in OSA for instructions on updating your firmware.
- Hardware Management Pack (HMP), which includes the firmware update tool. Refer to the text files in HMP for instructions on updating your firmware.

- The `fwupdate` Automatic Mode command. For more information on this command, refer to the Hardware Management Pack 2.3.x Documentation (`http://docs.oracle.com/cd/E52095_01/index.html`).

Related Information

- “x86 Systems: Firmware Update Tool Overview ” on page 23
- “Verifying the Mellanox Network Driver” on page 25

SPARC Systems: Solaris Image

Oracle Solaris 11.4 SU33 is the minimum software version required for Oracle SPARC servers.

To update the Solaris OS image on a SPARC system, use the Oracle Solaris 11.4 Image Packing System . For more details. see Adding and Updating Software in Oracle® Solaris 11.4 (`https://docs.oracle.com/cd/E53394_01/html/E54739/index.html`)

Verifying the Mellanox Network Driver

These topics instruct how to view the verify the installation of the Mellanox Network Driver.

Description	Links
Verify the driver is present on an Oracle Solaris x86 platform.	"View the `mlxne` Driver (Oracle Solaris x86/64)" on page 25
View the mlx5 network driver installed on a Linux platform.	"View the Linux `mlxne` Network Driver" on page 26
Load the mlx5 network driver on a Windows platform.	"Verify the Windows `mlxne` Network Driver " on page 27

Note - For a list of supported operating systems and Oracle servers, see "Servers and Operating Systems Supported" in *Product Notes for Mellanox Connect ®-5 Ex Ethernet PCIe Adapter Cards for Oracle x86 Server*

Related Information

- "Understanding the Installation Process" on page 11
- "Updating Software and Firmware" on page 23
- "Installing the Adapter" on page 29

▼ View the `mlxne` Driver (Oracle Solaris x86/64)

The `mlxne` driver comes bundled in the Oracle Solaris software.

Note - The Oracle Solaris 11.4 SU33 is the first release to support this adapter. You can install or upgrade to this release, but the version of the driver must be the same on both the client and the server.

1. **Check the version of the Oracle Solaris SRU.**

   You must have at least Oracle Solaris 11.4 SU33 installed. For example:

```
$ pkg info entire
Name: entire
     Summary: entire incorporation including Support Repository Update
              (Oracle Solaris 11.4.22.4.0).
     ...
     <output omitted>
     ...
    Version: 0.5.22 (Oracle Solaris 11.4.22.4.0)
```

   See "Hardware and Software Requirements" on page 22 for more information.

2. **Check the version of the `mlxne` driver.**

```
# pkg info mlxne
```

View the Linux `mlxne` Network Driver

The `mlxne` driver for the Oracle Dual 25/100 Port Ethernet Adapter (Mellanox CX Adapter) is bundled in with the Oracle Linux operating system currently installed on your Oracle server. Use the following steps to view the installed version of the `mlxne` network driver.

1. **To check the version of the `mlxne` driver installed, type:**

```
# modinfo mlxne
```

   The output should be similar to this:

```
filename:       /lib/modules/4.14.35-1902.3.2.el7uek.x86_64/kernel/drivers/net/ethernet/
mellanox/mlx5/core/mlxne.ko.xz
version:        5.0-0
license:        Dual BSD/GPL
description:    Mellanox Connect-IB, ConnectX-4 core driver
author:         Eli Cohen <eli@mellanox.com>
srcversion:     986DA10F36F7BD4395E5964
alias:          pci:v000015B3d0000A2D3sv*sd*bc*sc*i*
alias:          pci:v000015B3d0000A2D2sv*sd*bc*sc*i*
alias:          pci:v000015B3d0000101Csv*sd*bc*sc*i*
alias:          pci:v000015B3d0000101Bsv*sd*bc*sc*i*
alias:          pci:v000015B3d0000101Asv*sd*bc*sc*i*
alias:          pci:v000015B3d00001019sv*sd*bc*sc*i*
alias:          pci:v000015B3d00001018sv*sd*bc*sc*i*
alias:          pci:v000015B3d00001017sv*sd*bc*sc*i*
alias:          pci:v000015B3d00001016sv*sd*bc*sc*i*
```

```
alias:          pci:v000015B3d00001015sv*sd*bc*sc*i*
alias:          pci:v000015B3d00001014sv*sd*bc*sc*i*
alias:          pci:v000015B3d00001013sv*sd*bc*sc*i*
alias:          pci:v000015B3d00001012sv*sd*bc*sc*i*
alias:          pci:v000015B3d00001011sv*sd*bc*sc*i*
depends:        ptp,mlxfw
retpoline:      Y
intree:         Y
name:           mlxne
vermagic:       4.14.35-1902.3.2.el7uek.x86_64 SMP mod_unload modversions
```

2. **To view additional information about the driver, type:**

```
# ethtool -i enp59s0f0
```

The output should be similar to this:

```
driver: mlxne
version: 5.0-0
firmware-version: 16.29.1414 (ORC0000000003)
expansion-rom-version:
bus-info: 0000:3b:00.0
supports-statistics: yes
supports-test: yes
supports-eeprom-access: no
supports-register-dump: no
supports-priv-flags: yes
```

Related Information

- “Verify the Windows mlxne Network Driver ” on page 27

Verify the Windows mlxne Network Driver

If the server uses Windows10, Windows8, Windows7, or Windows Vista XP, perform this procedure to verify the mlxne network driver.

1. **Log in to the server as the administrator.**
2. **Open the Microsoft Device Manager and locate the ORACLE_SSM flash drive.**
   The ORACLE_SSM flash drive contains the mlxne driver.
3. **Right-click the mlxne network driver and choose Update Driver.**
4. **Choose the Broadcom NIC driver for your OS.**

5. **Reboot the server.**

6. **Verify that the driver is installed.**

   See “Verify the Adapter Installation (Windows)” on page 35.

Related Information

- “View the Linux mlxne Network Driver” on page 26
- “Installing the Adapter” on page 29

Installing the Adapter

These topics describe how to install the adapter:

Description	Links
Order additional hardware.	“Adapter Description” on page 29 “Cable and Transceiver Overview” on page 30
Follow cable cautions.	“Cable Cautions” on page 31
Understand the connectors.	“Front Panel Connectors and LEDs” on page 17
Install the adapter and transceivers.	“Install the Adapter” on page 32
Verify the adapter installation.	“Verify the Adapter Installation (Linux)” on page 34 “Verify the Adapter Installation (Windows)” on page 35 “Verify the Adapter Installation (Oracle Solaris x86/64)” on page 35

Related Information

- “Understanding the Adapter” on page 15
- “Confirming Specifications and Requirements” on page 19
- “Updating Software and Firmware” on page 23
- “Verifying the Mellanox Network Driver” on page 25
- “Configuring the Network” on page 37

Adapter Description

The Oracle Dual Port 25/100 Gb Mellanox Ethernet Adapter card comes with the factory default mode of 25 or 100 and supports direct attach cables or transceiver.

Adapter Type	Part Number
Oracle Dual Port 25 Gb Mellanox Ethernet Adapter	■ 7603662, factory installed ■ 7603663, Xoption
Oracle Dual Port 100 Gb Mellanox Ethernet Adapter	■ 7603322, factory installed ■ 7603661, Xoption
Oracle Dual Port 100 Gb Mellanox Ethernet Adapter, Mezzanine form factor (X86 Server Support Only)	■ 7603323, factory installed

Related Information

- "Cable Cautions" on page 31
- "Install the Adapter" on page 32
- "Verify the Adapter Installation (Linux)" on page 34
- "Verify the Adapter Installation (Windows)" on page 35

Cable and Transceiver Overview

The Oracle Dual Port 25 /100 Gb Mellanox Ethernet Adapter card comes with a factory default port mode of 2x25Gb/e (25 Gb) or 2X100Gb/e (100 Gb) or 2x100 Gb/e (Mezzanine 100 Gb for x86 Server Support only). The adapter card supports the following cabling option solutions:

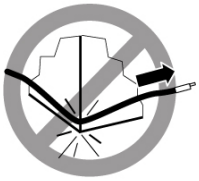
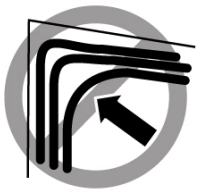
Note - Check the adapter product page for available transceivers and cables at `https://www.oracle.com/networking/index.html`.

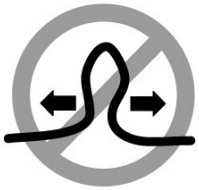
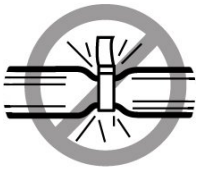
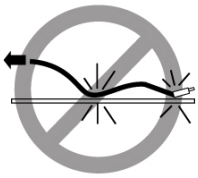
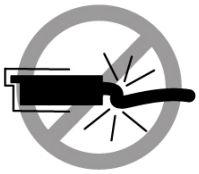
- Copper:
  - 25 GbE Adapter: The direct attach copper (DAC) solution has the SFP28 transceiver attached.
    - The straight through SFP28 to SPF28 passive copper cable is available in 1, 2, 3, or 5 meters.
    - The splitter QSFP28 to 4 SFP28 direct-attach copper cable is available in 1, 2, 3, or 5 meters. The QSFP28 end of the direct-attached copper splitter cable connects to switch port and the two pigtails connect to the SFP28 ports 1 and 2 on the adapter.
  - 100 GbE Adapter: The direct attach copper (DAC) solution has the QSFP28 transceiver attached.
    - The straight through QSFP28 to QSPF28 passive copper cable is available in 1, 2, 3, or 5 meters.

- Fiber Optical:
  - 25 GbE Adapter: A SFP28 25GBase-SR or SFP28 25GBase-LR transceiver connects to the adapter's port.
    - The straight through Duplex LC Terminated Multi-mode fiber cable, which is available maximum lengths of 70 meters (multi mode OM3), 100 meters (multi-mode OM4), and 10 kilometers (single mode OS1). One end of the fiber optical cable connects to the SFP transceiver on the adapter, while the other end connects to a SFP transceiver in a switch or other device that is configured for 25 GbE speed.
  - 100 GbE Adapter: A QSFP28 transceiver connects to the adapter's port.
    - The straight through fiber optical cable is available is available in 10, 20, 50, or 100 meters. One end of the fiber optical cable connects to the QSFP transceiver on the adapter, while the other end connects to a QSFP transceiver in a switch or other device that is configured for 100 GbE speed.

Cable Cautions

To prevent data cable damage, you must follow these cautions.

	Do not uncoil the cable, as a kink might occur. Hold the coil closed as you unroll the cable, pausing to allow the cable to relax as it is unrolled.		Do not step on the cable or connectors. Plan cable paths away from foot traffic or rolling loads.
	Do not pull the cable out of the shipping box, through any opening, or around any corners. Unroll the cable as you lay it down and move it through turns.		Do not bend the cables to a radius tighter than 85 mm (3.4 inches). Ensure that cable turns are as wide as possible.
	Do not twist the cable to open a kink. If it is not severe, open the kink by unlooping the cable.		Do not pack the cable to fit a tight space. Use an alternative cable route.

	Do not straighten the cable to correct a bend that is too tight. Leave the cable bend as is.		Do not hang the cable for a length more than 2 meters (7 feet). Minimize the hanging weight with intermediate retention points.
	Do not drop the cable or connectors from any height. Gently set the cable down, resting the cable connectors on a stable surface.		Do not cinch the cable with hard fasteners or cable ties. Use soft hook-and-loop fastener for bundling and securing cables.
	Do not drag the cable or its connectors over any surface. Carry the entire cable to and from the points of connection.		Do not force the cable connector into the receptacle by pushing on the cable. Apply connection or disconnection forces at the connector only.

Related Information

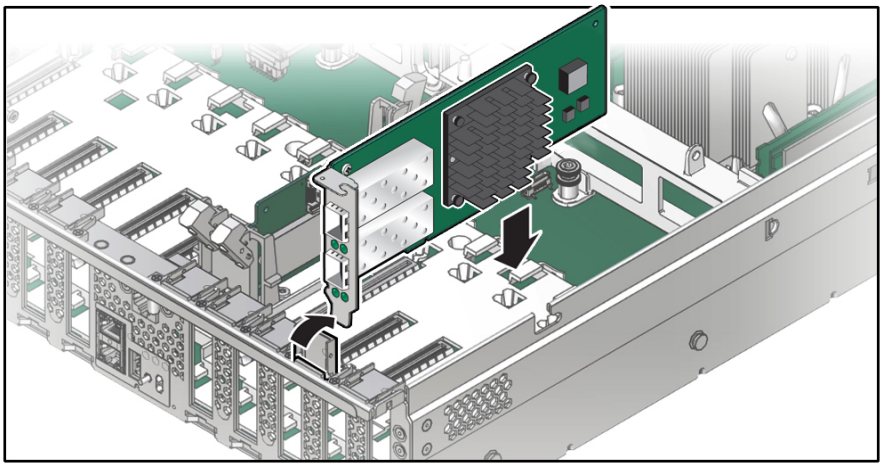
- “Adapter Description” on page 29
- “Install the Adapter” on page 32

▼ Install the Adapter

These instructions describe the basic tasks required to install the adapter. Refer to the server's installation or service manual for specific PCIe installation instructions.

1. **Halt and power off the server.**
2. **Power off all of the peripherals connected to the server.**
3. **Open the server chassis.**
4. **Attach an antistatic wrist strap to the server chassis.**
5. **Remove the slot cover from the chassis.**

6. **Holding the adapter by the edges, align the card edge connector with the PCIe slot.**



7. **Slide the adapter face plate into the small slot at the end of the PCIe opening.**

8. **Applying even pressure at both corners of the adapter, push the adapter until it is firmly seated in the slot.**

Caution - Do not use excessive force when installing the adapter into the PCIe slot. You might damage the adapter's PCIe connector. If the adapter does not seat properly when you apply even pressure, remove the adapter, and carefully reinstall it.

9. **Detach the wrist strap and close the server.**

10. **Verify the installation.**

Follow the instructions in the appropriate section:

- “Verify the Adapter Installation (Linux)” on page 34
- “Verify the Adapter Installation (Windows)” on page 35

Related Information

- “Adapter Description” on page 29
- “Cable Cautions” on page 31

Verify the Adapter Installation (Linux)

- **To verify the new network interface instances for the adapter, use the following Linux commands: `nmcli`, `ip`, and `ethtool`. For example:**

  - **To use the `nmcli` command, type:**

    ```
    # nmcli | grep -i mel -A 1 -B 1
    ```

    The output should be similar to this:

    ```
    enp59s0f0: unmanaged
            "Mellanox MT28800"
            ethernet (mlx5_core), EC:0D:9A:D4:29:2C, hw, mtu 4500
    --
    enp59s0f1: unmanaged
            "Mellanox MT28800"
            ethernet (mlx5_core), EC:0D:9A:D4:29:2D, hw, mtu 4500
    ```

  - **To use the `ip` and `ethtool`commands, type:**

    ```
    # ip link show
    ```

    The output should be similar to this:

    ```
    1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN mode DEFAULT
     group default qlen 1000
        link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    2: eno2: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc mq state DOWN mode
     DEFAULT group default qlen 1000
        link/ether 00:10:e0:db:12:9f brd ff:ff:ff:ff:ff:ff
    5: enp59s0f0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 4500 qdisc mq state DOWN mode
     DEFAULT group default qlen 1000
        link/ether ec:0d:9a:d4:29:2c brd ff:ff:ff:ff:ff:ff
    6: enp59s0f1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 4500 qdisc mq state UP mode
     DEFAULT group default qlen 1000
        link/ether ec:0d:9a:d4:29:2d brd ff:ff:ff:ff:ff:ff

     [root@nsn159-108 ~]# ethtool -i enp59s0f0
    driver: mlx5_core
    version: 5.0-0
    firmware-version: 16.29.1414 (ORC0000000003)
    expansion-rom-version:
    bus-info: 0000:3b:00.0
    ```

```
supports-statistics: yes
supports-test: yes
supports-eeprom-access: no
supports-register-dump: no
supports-priv-flags: yes
```

Related Information

- “Adapter Description” on page 29
- “Install the Adapter” on page 32
- “Verify the Adapter Installation (Windows)” on page 35

▼ Verify the Adapter Installation (Windows)

1. **Click Control Panel.**
2. **Click Network Connection.**

   If the driver is installed correctly, the adapter name *Oracle Dual Port 25/100 Gb Ethernet Adapter* is displayed in the Network Adapters folder.
3. **In the Administration tool, click Computer Management → Device Manager → Network Adapter.**
4. **Check the driver version.**

   For example, the driver version for Microsoft Windows 12/16 is v20.6.123.0.

Related Information

- “Install the Adapter” on page 32
- “Configuring the Network” on page 37

▼ Verify the Adapter Installation (Oracle Solaris x86/64)

1. **Power on the server, and then boot the server.**
2. **Check the version of the Oracle Solaris SRU.**

   You must have at least Oracle Solaris 11.4 SRU33 installed. For example:

```
$ pkg info entire
Name: entire
```

```
 Summary: entire incorporation including Support Repository Update
          (Oracle Solaris 11.4.33.1.0).
 ...
 <output omitted>
 ...
Version: 0.5.23 (Oracle Solaris 11.4.33.1.0)
```

See “Hardware and Software Requirements” on page 22 for more information.

3. **Verify that the adapter is properly installed and recognized by the OS.**

```
# grep mlxne /etc/path_to_inst
```

If the adapter is properly installed, you should see output similar to this:

```
grep mlxne /etc/path_to_inst
"/pci@2,0/pci8086,2f08@3/pci108e,3044@0" 0 "mlxne"
"/pci@2,0/pci8086,2f08@3/pci108e,3044@0,1" 1 "mlxne"
```

Related Information

- “Install the Adapter” on page 32
- “Configuring the Network” on page 37

Configuring the Network

These topics describe how to configure the network for the Ethernet adapter:

Description	Links
Configure the network interface.	“Configure the Network Interface (Windows)” on page 38 “Configure the Network Interface (Oracle Solaris x86/64)” on page 38
Boot over the network.	“Boot Options” on page 39 “Boot Over the Network (PXE)” on page 39 “Boot Over a 10GbE Network (Oracle Solaris x86/64 and Linux)” on page 40
Install and Verify RDMA on Converged Ethernet.	“Install RoCE (Linux)” on page 46 “Install RoCE in Windows Kernel Mode” on page 46 “Install RoCE in Windows User Mode” on page 47 “Install RoCE in VMware ESXi” on page 47 “Verify RoCE in Windows” on page 48

Related Information

- “Updating Software and Firmware” on page 23
- “Verifying the Mellanox Network Driver” on page 25
- “Installing the Adapter” on page 29
- “Configuring Jumbo Frames ” on page 51
- “Configuring VLANs” on page 57

Configure the Network Interface (Windows)

Use the Network and Sharing Center to configure the network settings for the `mlx5_core` adapter. These steps are for Microsoft Windows7.

1. **Ensure that the adapter is installed.**
2. **Click Start > Control Panel > Network and Sharing Center > Change Adapter Settings.**
3. **Select Oracle Dual Port 25/100 Gb Ethernet Adapter and click Change Settings of This Connection.**

Related Information

- “Boot Options” on page 39
- “Installing RoCE” on page 46

Configure the Network Interface (Oracle Solaris x86/64)

1. **Display the `mlxne` instances.**

```
# dladm show-phys
```

For more information, refer to the Oracle Solaris `dladm` man page.

The output should be similar to this:

```
LINK        MEDIA         STATE     SPEED     DUPLEX     DEVICE
net9        Ethernet      up         25000     full      mlxne1
net8        Ethernet      up         25000     full      mlxne0
```

2. **Set up the `mlxne` interfaces.**

For more information, refer to the Oracle Solaris `ipadm` man page. Your `ipadm` command might look similar to this:

```
#ipadm create-ip net4
# ipadm create-addr -T static -a local=10.2.3.4/24 net4/v4
```

This command creates another address `10.2.3.5/24` on interface `net1`, but marks the address down until explicitly marked up:

```
#ipadm create-addr -T static -d -a 10.2.3.5/24 net4/v4
```

This command marks the address object `net4/v4a` up that was previously marked down.

```
#ipadm up-addr net4/v4a
```

Boot Options

The adapter supports these boot options:

- UEFI with PXE with option ROM (Oracle x86/64)
- UEFI with iSCSI with option ROM (Oracle SPARC and Oracle x86/x64)

Note - For systems supporting Oracle Solaris, see the *Oracle Solaris Advanced Installation Guide* for information about boot options and instructions on how to create a boot server.

Related Information

- “Boot Over the Network (PXE)” on page 39
- “Boot Over a 10GbE Network (Oracle Solaris x86/64 and Linux)” on page 40

▼ Boot Over the Network (PXE)

PXE network boot is an environment for booting computers using a network interface independently of available data storage devices (such as hard disks) or installed OS. No boot media is required on the client system. With PXE, you can install an OS on an x86-based client over the network by using DHCP.

- **Boot over the network using PXE.**

Note - For systems supporting Oracle Solaris, see the booting / PXE instructions in the *Oracle Solaris 11 Installation Guide*: Network-Based Installations at: `http://docs.oracle.com/cd/E23823_01/index.html`

Related Information

- “Boot Over a 10GbE Network (Oracle Solaris x86/64 and Linux)” on page 40

- “Installing RoCE” on page 46

Boot Over a 10GbE Network (Oracle Solaris x86/64 and Linux)

1. **Obtain the MAC address of the first adapter port by checking the label of the adapter.**

   On the adapter, the MAC address on the label is for the first port. The second port's MAC address is the MAC address from the label, plus 1.

   Note -Auto negotiation is not supported when booting with Linux over the network.

2. **Set up the PXE boot server with the MAC addresses.**

3. **Plug the Ethernet cable into the adapter's port.**

4. **Power on the server.**

5. **Press the F2 key or the Control-E keys to go to the BIOS menu.**

6. **Go to the Boot - Boot Device Priority screen and ensure that the boot order of the network devices is higher than the hard drive.**

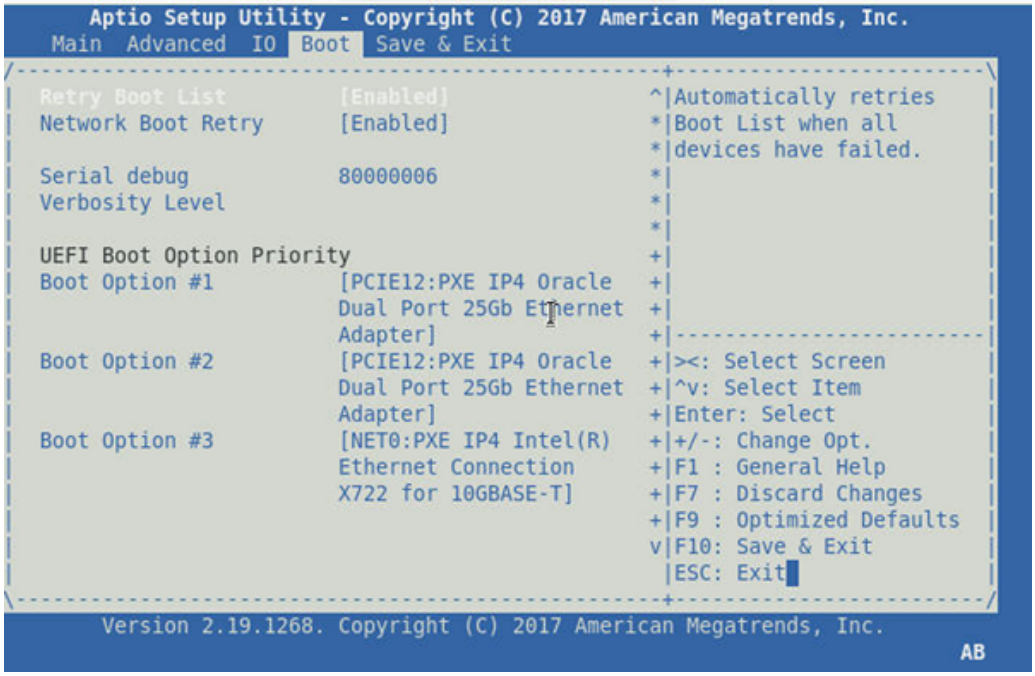
7. **Press F10 to save the boot configuration changes and exit BIOS.**

   The server should reboot after saving the boot configuration.

8. **On Oracle platforms, press F12 to install the OS from the network.**

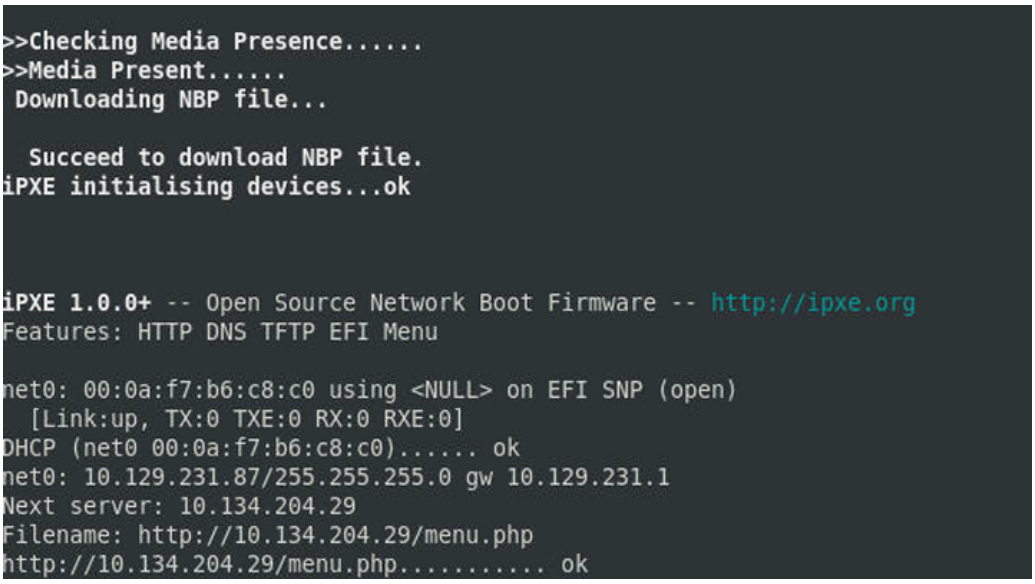
   If the cable is connected to the correct port, you should see the MAC address that you assigned to your PXE server displayed by BIOS. If your platform does not support the F12 key, you might need to boot from the BIOS.

9. **Choose a boot option from the Setup Utility screen, for example:**

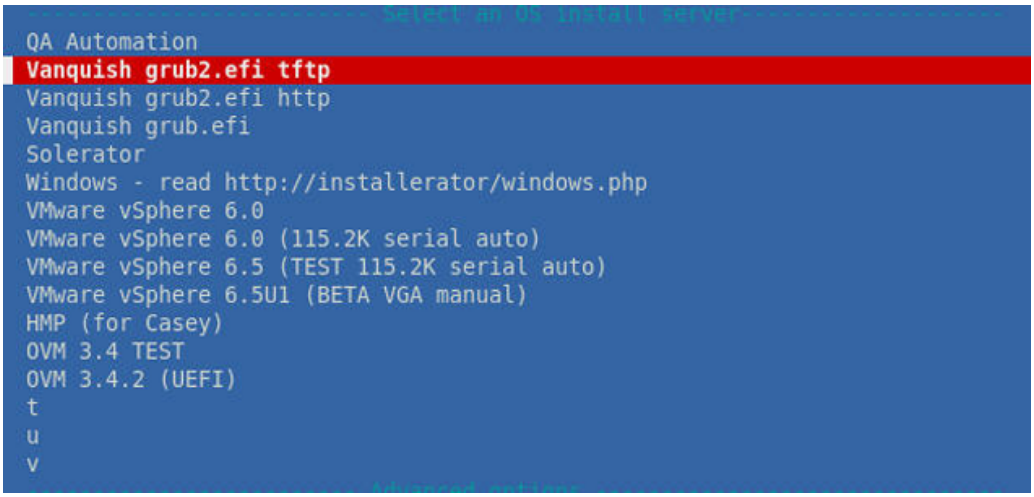


10. **Press F10 to save and exit.**

The host will perform a PXE boot from the Oracle Dual Port (25 Gb or 100 Gb) Ethernet adapter port, DHCP, and the UEFI PXE boot server response. This screen appears.



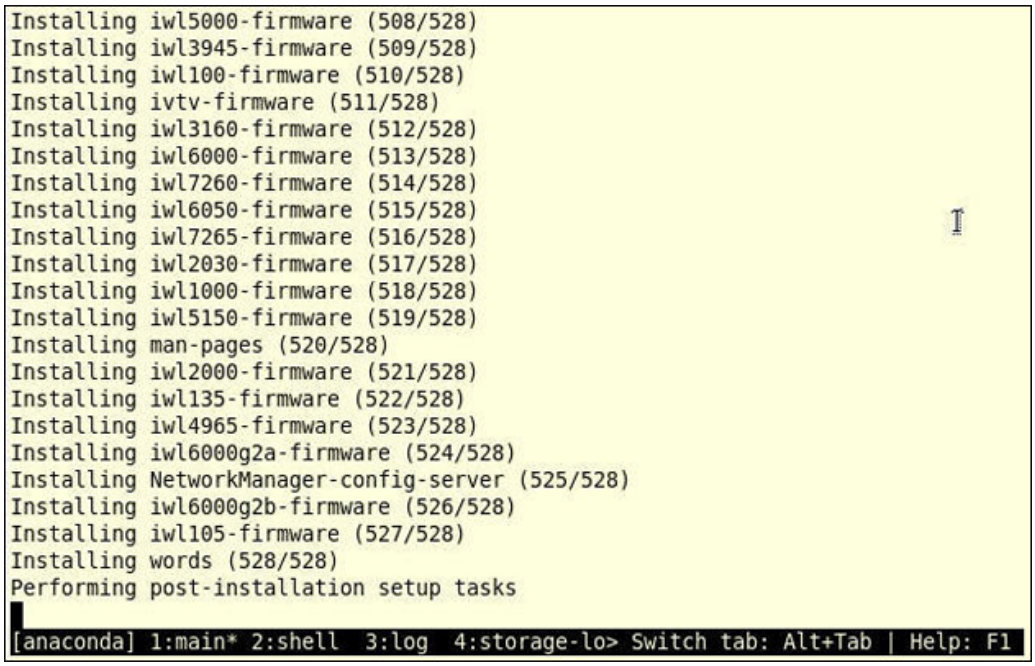
11. **Choose the UEFI PXE boot server using TFTP protocol, for example:**



12. **Select Oracle Linux OS from the UEFI PXE boot server for the OS installation, for example:**

13. **Ensure that the OS installation begins on the Oracle Dual Port (25 Gb or 100 Gb) Ethernet adapter, for example:**

14. **Ensure that the OS installer completes and begins the post-installation steps, for example:**



15. **After the OS installation completes, change the boot device priority to boot from hard disk to boot up the newly installed OS. For further details, see Modifying Boot Behavior in the Oracle Solaris Administrative Guide or Modify the Boot Order (BIOS) in the Oracle x9 Server Administration Guide.**

    Unless you change the boot device priority, the OS installation process repeats.

Related Information

- “Boot Over the Network (PXE)” on page 39
- “Installing RoCE” on page 46

Installing RoCE

The RDMA software allows computers in a network to exchange data in main memory without involving the processor, cache, or OS of either computer. RDMA can improve throughput and performance because it frees up resources, and it can also facilitate a faster data transfer rate. RDMA over Converged Ethernet (RoCE) is the network protocol that allows RDMA over an Ethernet network.

RoCE functionality is available in user mode and kernel mode application for Windows. RoCE PF and SRIOV VF are available in single function mode and in multifunction mode (NIC Partitioning mode). You can install and configure RoCE in Windows, Linux, and VMWare.

Refer to these site(s) for more information on supporting RoCE:

- Windows – `https://technet.microsoft.com/en-us/library/jj134210(v=ws.11).aspx`
- VMware – Refer to the VMware web site for RoCE support information.

▼ Install RoCE (Linux)

- **Install the Oracle RDMA meta RPM from the Oracle public `yum` repository to retrieve the RoCE stack. For example:**

  a. **Point your `yum` repository to:**

  ```
  #yum install
  ```

  The `yum install` command installs all the RPMs needed for the RoCE stack to function properly.

▼ Install RoCE in Windows Kernel Mode

RoCE functionality is available in user mode and kernel mode application. Starting with the Windows Server 2012 release, the RDMA capability in the NIC for SMB file traffic is enabled if both ends are enabled for RDMA. Broadcom NDIS miniport `mlxnend.sys` starting with version 20.6.2 supports RoCEv1 and RoCEv2 with the NDKPI interface. The default setting is RoCEv1.

1. **Upgrade the NIC NVRAM using the appropriate board packages. In CCM or in UEFI HII, enable support for RDMA.**

2. **Enable each miniport.**

   You can go to the adapter's Advanced Properties page and set Network Direct Functionality to Enabled for each BCM5741X miniport.

   You can also run this command in the PowerShell window:

   ```
   Set-NetAdapterAdvancedProperty -RegistryKeyword *NetworkDirect -RegistryValue 1
   ```

3. **Verify that RDMA is enabled.**

   These PowerShell commands return `true` if Network Direct is enabled.

   ```
   a. Get-NetOffLoadGlobalSetting
   b. Get-NetAdapterRDMA
   ```

▼ Install RoCE in Windows User Mode

RoCE functionality is available in user mode and kernel mode application. Perform this procedure before you run a user mode application that writes to NDSPI.

1. **Copy the `bxndspi.dll` user mode driver file to the `C:\Windows\System32` directory.**

2. **Install the driver.**

   ```
   rundll32.exe .\bxndspi.dll,Config install|more
   ```

▼ Install RoCE in VMware ESXi

Before You Begin

You must have at least ESXi-6.5.0 GA build 4564106 installed before you perform this procedure.

You must also have at least ESX6.5 L2 driver version 20.6.9.0 (RoCE supported L2 driver) installed.

1. **Ensure that the MLXNENET L2 driver is installed with the `disable_roce=0` module parameter.**

   If the driver is not already installed with the parameter, set the module parameter:

```
# esxcfg-module -s "disable_roce=0" mlxnenet
```

2. **Copy the** *mlxneroce-driver version*`.vib` **file in the** `/var/log/vmware` **directory.**

```
$ esxcli software vib install --no-sig-check -v mlxneroce-driver version.vib
```

3. **Reboot the machine.**

4. **Verify that the drivers are installed correctly.**

```
# esxcli software vib list | grep mlxneroce
```

Tip - By default, ECN is disabled for RoCE traffic. To disable RoCE traffic, use the `tos_ecn=0` module parameter for `mlxneroce`.

Verifying RoCE

▼ Verify RoCE in Windows

1. **Create a file share on the remote system and open that share.**

   Open that share with Windows Explorer or the `net use` command. To avoid a speed bottleneck when the hard disk is reading or writing, use a RAM disk as the network share.

2. **Run these commands from the PowerShell.**

```
Get-SmbMultichannelConnection | fl *RDMA*
ClientRdmaCapable : True
ServerRdmaCapable : True
```

   If both Client and Server are `True`, any file transfers over this SMB connection use SMB.

3. **Enable or disable SMB Multichannel support.**

   On the Server side:

```
Enable: Set-SmbServerConfiguration -EnableMultiChannel $true
Disable: Set-SmbServerConfiguration -EnableMultiChannel $false
```

   On the Client side:

```
Enable: Set-SmbClientConfiguration -EnableMultiChannel $true
```

```
Disable: Set-SmbClientConfiguration -EnableMultiChannel $false
```

Note - By default, the driver sets up two RDMA connections for each network share per IP address (on a unique subnet). You can increase the number of RDMA connections by adding multiple IP addresses, each with different a subnet, for the same physical port under test. Multiple network shares can be created and mapped to each link partner using the unique IP addresses that you created.

Configuring Jumbo Frames

Jumbo frames can support up to 9500 MTU. The default value is 1500 MTU.

These topics describe how to configure jumbo frames:

Related Information

- “Understanding the Installation Process” on page 11
- “Verifying the Mellanox Network Driver” on page 25
- “Installing the Adapter” on page 29
- “Configuring the Network” on page 37
- “Configuring VLANs” on page 57

Configure Jumbo Frames (Linux)

To configure jumbo frames on network interfaces such as the Oracle Dual Port 25/100 Ethernet Adapter, see *Oracle Linux 7 Setting Up Networking* (`https://docs.oracle.com/en/operating-systems/oracle-linux/7/network/`).

Note - The maximum supported MTU on the Oracle Dual Port 25/100 Ethernet Adapter (Mellanox CX Adapter) is 9179.

Configure Jumbo Frames (Windows)

1. **Click Control Panel.**
2. **Click Device Manager and open the Network Adapters folder.**
3. **Right-click the Oracle Dual 25G Ethernet Adapter and choose Properties.**
4. **Click Configure.**
5. **Highlight the jumbo frames item and select the desired setting.**
6. **Click Apply for each port.**

Related Information

- “Configure Jumbo Frames (Linux)” on page 51
- “Configuring VLANs” on page 57

Change the MTU Permanently (Oracle Solaris x86/64)

- **Perform one of these actions to permanently change the MTU.**
  - Add this line in the `/etc/driver/drv/mlxne.conf` file and reboot the server.

    `default_mtu =` *desired-frame-size;*

    where the *desired-frame-size* value can range from `1500` to `9500`.

    Note - For additional information, see: Enabling Support for Jumbo Frames (`https://docs.oracle.com/cd/E36784_01/html/E37475/ggtwf.html`)

  - Type:

    ```
    # dladm set-linkprop -p mtu=9500 net0
    ```

Change the MTU Temporarily (Oracle Solaris X86/64)

- **Change the MTU temporarily with the `dladm`(1M) command.**

For example, where the device name is `xnet0`, this command increases MTUs to the maximum:

```
# dladm set-linkprop [-t] -p mtu=9500 net0
```

The temporary setting lasts only until the next reboot of the server.

Configuring a Link Aggregation (Oracle Solaris x86/64)

These topics describe how to configure link aggregation using the Oracle Solaris x86 OS:

▼ Configure a Link Aggregation (Oracle Solaris x86/64)

The example in this procedure aggregates sample interfaces `mlxne0`, `mlxne1`, `mlxne2`, and `mlxne3`. Arbitrary key numbers (`1` and `2`) are used for each aggregation.

Note - This procedure changes the contents of the `/etc/aggregation.conf` file.

- **Configure the link aggregation containing the `mlxne` interfaces in the default mode.**

  For example:

```
# dladm create-aggr -l net5 -l net6 aggr1
# dladm show-aggr
# ipadm create-ip aggr1
# ipadm create-addr -a 192.1.1.14/24 aggr1
```

  For additional information, refer to these topics:

  - Managing Network Datalinks in Oracle® Solaris 11 (`https://docs.oracle.com/cd/E53394_01/html/E54788/index.html`)
  - Oracle Solaris `ifconfig 1 M` and `dladm(5)`) man pages in the *Oracle man pages section 1M: System Administration Commands* (`https://docs.oracle.com/cd/E26502_01/html/E29031/intro-1m.html#scrolltoc`).

Display Information About a Link Aggregation (Oracle Solaris x86/64)

The `ipadm` and `dladm` commands provide different details about link aggregations, as shown in these examples.

- **Use the appropriate command to obtain the desired results.**

  - **Use the `ifconfig` command to examine the details about a link aggregation.**

```
# ifconfig aggr1
aggr1: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 32
 inet 192.2.2.84 netmask ffffff00 broadcast 192.2.2.255
 ether 0:15:17:75:ff:81

# ifconfig aggr2aggr2: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500
 index 33
 inet 193.2.2.84 netmask ffffff00 broadcast 193.2.2.255
 ether 0:15:17:75:ff:83
```

  - **Use the `dladm show-aggr` command to show link aggregation status.**

For more information, refer to: Managing Network Datalinks in Oracle® Solaris 11 (`https://docs.oracle.com/cd/E53394_01/html/E54788/index.html`).

Delete a Link Aggregation (Oracle Solaris x86/64)

1. **Delete the IP interface that is configured over the link aggregation.**

   For example: type:

   `# ipadm delete-ip` *ip-aggr1*

   where `ip-aggr1` is the IP interface over the link aggregation.

2. **Delete each unwanted link aggregation.**

   For example:

```
# dladm delete-aggr aggr2
# dladm delete-aggr aggr2
```

Configuring VLANs

These topics explain how to configure VLANs:

Related Information

- "Understanding the Installation Process" on page 11
- "Configuring the Network" on page 37
- "Removing the Driver" on page 61

VLANs Overview

Virtual LANs enable you to divide the network into subnetworks without having to add to the physical network environment. The subnetworks are virtual and use the same physical network resources. VLANs facilitate network administrations because the smaller groups are easier to maintain.

You can create VLANs according to various criteria, but each VLAN must be assigned a VLAN tag or VLAN ID (VID). The VID is a 12-bit identifier between 1 and 4094 that identifies a unique VLAN.

Note - If you configure a VLAN virtual device for an Ethernet adapter, all traffic sent or received by that Ethernet adapter must be in VLAN-tagged format.

Related Information

- “Configure VLANs (Linux)” on page 58
- “Configure VLANs (Windows)” on page 58

Configure VLANs (Linux)

To configure VLANs on network interfaces such as the Oracle Dual Port 25/100 Ethernet Adapter, see *Oracle Linux 7 Setting Up Networking* (`https://docs.oracle.com/en/operating-systems/oracle-linux/7/network/`).

Configure VLANs (Oracle SPARC)

To configure VLANs on network interfaces such as the Oracle Dual Port 25/100 Ethernet Adapter, see *Oracle® VM Server for SPARC 3.6 Administration Guide* `https://docs.oracle.com/cd/E93612_01/html/E93617/assigningusingvlans.html`.

▼ Configure VLANs (Windows)

1. **Click Control Panel.**
2. **Click Network Connection.**
3. **Click the folder icon from the sub-manual bar.**
4. **Right-click the Oracle Dual Port 25/100 Gb Mellanox Ethernet Adapter port, then select Properties.**
5. **Click Configure.**
6. **Click VLAN, then click New.**
7. **Type `VLAN` and the *ID* (for example, type `VLAN10`).**
8. **Click OK.**

9. **Open the Local Connections for VLAN window from the Network Connections window (Control Panel → Network Internet → Network Connections).**
10. **Right-click the Properties button, and select the TCP/IPv4 port in the list.**
11. **Click the Properties button, and fill in the desired IP address.**
12. **Click Subnet Mask.**

    The value `255.255.255.0` is displayed.
13. **Click OK.**
14. **Repeat Step 3 through Step 10 until all the network ports are VLAN configured.**

Note - Ensure that the firewall is configured to allow VLAN traffic. Otherwise, the VLAN might not operate properly.

Related Information

- "Configure VLANs (Linux)" on page 58

▼ Configure VLANs (Oracle Solaris x86)

1. **Determine the types of links that are used in the server.**

```
# dladm show-phys
LINK              MEDIA               STATE      SPEED  DUPLEX    DEVICE
net15             Ethernet            up         10000  full      mlxne1
net14             Ethernet            up         10000  full      mlxne0
```

2. **Create a VLAN link over a datalink.**

```
# dladm create-vlan -l link -v vid vlan-link
```

where *link* specifies the link where the VLAN interface is being created, *vid* indicates the VLAN ID number, and *vlan-link* specifies the name of the VLAN, which can also be an administratively-chosen name.

3. **Verify the VLAN configuration.**

```
# dladm show-vlan
```

4. **Create an IP interface over the VLAN.**

```
# ipadm create-ip interface
```

where *interface* uses the VLAN name.

Configure VXLANs (Oracle Solaris x86)

VXLAN is a Layer 2 technology that enables you to create a Layer 2 network on top of a Layer 3 network, thereby providing further network isolation. VXLAN provides a virtual Layer 2 network that stretches over multiple physical Layer 2 networks. Provisioning resources in a cloud environment is not restricted to a single physical Layer 2 network. Physical servers can be a part of an VXLAN network, as long as they are connected by IPv4 or IPv6 networks.

1. **Determine the types of links that are used in the system.**

```
# dladm show-phys
LINK              MEDIA               STATE      SPEED  DUPLEX    DEVICE
net15             Ethernet            up         10000  full      mlxne1
net14             Ethernet            up         10000  full      mlxne0
```

2. **Create an IP interface over the VXLAN.**

```
# dladm create-vxlan -p addr=10.10.10.1,vni=100 vxlan1
# dladm create-vxlan -p addr=10.10.10.1,vni=101 vxlan2
```

3. **Verify the VXLAN configuration.**

```
# dladm show-vxlan
LINK                ADDR                    VNI   MGROUP
vxlan1              10.10.10.1              100   224.0.0.1
vxlan2              10.10.10.1              101   224.0.0.1
```

Removing the Driver

It is not necessary to remove a driver when its associated device is removed from a server. However, if you want to clean up your file systems or conserve space, you can easily remove a driver.

The following topic(s) explain how to remove the `mlxne` device driver:

Description	Links
Remove the driver on a Linux system.	“Remove the mlxne Driver (Linux)” on page 61
Remove the driver on a Windows system.	“Remove the `mlxne` Driver (Windows)” on page 61
Remove the driver on an Oracle Solaris system.	“Remove the `mlxne` Driver (Oracle Solaris x86/64)” on page 62

Related Information

- “Verifying the Mellanox Network Driver” on page 25

▼ Remove the mlxne Driver (Linux)

- **Type:**

```
#rmmod mlxne_core
```

Related Information

- “Remove the `mlxne` Driver (Windows)” on page 61
- “Remove the mlxne Driver (Linux)” on page 61

▼ Remove the `mlxne` Driver (Windows)

1. **Click Control Panel.**

2. **Click Device Manager and open the Network Adapters folder.**
3. **Right-click the Oracle Dual 25/100 Gb Ethernet Adapter and choose Uninstall.**
4. **Click OK.**

Related Information

- “Remove the mlxne Driver (Linux)” on page 61
- “Upgrading the Adapter (Linux)” on page 63

Remove the mlxne Driver (Oracle Solaris x86/64)

To remove a driver from an Oracle Solaris system environment, use the `rem_drv(1M)` command, and then delete the driver module and configuration file from the module path. A driver cannot be used again until that driver is reinstalled with `add_drv(1M)`.

For additional information, see the Oracle Solaris `rem-drv(1M)` man page at https://docs.oracle.com/cd/E36784_01/html/E36871/rem-drv-1m.html#REFMAN1Mrem-drv-1m

- **Remove the `mlxne` driver.**

  For example:

```
#rem_drv  mlxne
```

Upgrading the Adapter (Linux)

These topics explain how to upgrade the firmware on the Oracle Dual Port 25/100 Gb Mellanox Ethernet Adapter and verify the upgrade.

The `upgrade` command compares the package version against the currently installed package version to determine if an upgrade should be performed. The command does not check the versions of the individual components in the NVM against those within the specified package file. Therefore, it is important that package files from the same source with the same versioning scheme or format are used for a specific controller.

These topics describe how to upgrade the adapter:

- "Install the Upgrade Package" on page 63
- "Verify the Upgrade" on page 64

Install the Upgrade Package

Use the `bnxtnvm` utility to install the NVM upgrade package file.

1. **Log in to your server.**
2. **Determine the version and description of the package file that is currently installed.**

   For example:

   ```
   $ bnxtnvm pkgver filename.pkg -v
   Package File: filename.pkg
   Package version: 1.0.0
   ```

3. **Change to the `NVRAM_Images` directory.**
4. **Determine how you want to install the package.**

a. **Install a package file.**

```
$ bnxtnvm install filename.pkg
```

Replace the *filename* with the package name.

b. **Install multiple packages for multiple controller types.**

```
$ bnxtnvm install *.pkg
```

This command installs multiple packages for multiple controller types by using a wildcard in the *filename* argument. The correct packages are automatically installed into the supported controller devices based on PCI Device-IDs.

c. **Install a package that is newer than the one you have.**

```
$ bnxtnvm upgrade *.pkg
```

This command checks the discovered and supported devices.

For more information on the packages, refer to the `readme.txt` file in the `bnxtnvm` directory of the firmware package.

5. **Verify the upgrade.**

See "Verify the Upgrade" on page 64.

Verify the Upgrade

For more information on the packages, refer to the `readme.txt` file in the `bnxtnvm` directory of the firmware package.

1. **Log in to your server.**

2. **Determine which version of the package is installed.**

For example:

```
$ bnxtnvm pkgver
Device: ens2f1d1
Package version: 20.06.04.01
```

To display more details about the device and the currently installed package, use the `-v` option to enable maximum verbosity.

Related Information

- “Installing the Adapter” on page 29

Troubleshooting the Adapter (Oracle Solaris x86/64)

These topics describe how to troubleshoot the installation and operation of the Oracle Dual Port 25/100 Gb Mellanox Ethernet Adapter on an Oracle SPARC or x86 server running the Oracle Solaris 11.4 OS. These topics cover basic installation issues and are not intended to be comprehensive.

Related Information

- "Updating Software and Firmware" on page 23
- "Verifying the Mellanox Network Driver" on page 25
- "Installing the Adapter" on page 29
- "Removing the Driver" on page 61

▼ Analyze Why the Device Link Is Missing (Oracle Solaris x86/64)

When you use the `ifconfig` or `ipadm` commands and you see an error message similar to the one below, perform these steps.

```
...
cannot open mlxne0; link doesn't exist
...
```

1. **Check the OS.**

   To plumb the driver, refer to the Oracle Solaris `ipadm (1M)` man page. For information on the network interface parameters, refer to the Oracle Solaris `ifconfig (1M)` man page (https://docs.oracle.com/cd/E36784_01/html/E36871/makehtml-id-7.html#scrolltoc).

2. **Check that the adapter is seated properly in its slot, that the cables are properly attached, and that the LEDs are functioning.**

3. **Ensure that the device is installed.**

   Use the `prtconf` or the `scanpci` command to verify that the device is installed. For more information, refer to the Oracle Solaris `prtconf (1M)` man page or the `scanpci` man page (https://docs.oracle.com/cd/E36784_01/html/E36871/makehtml-id-7.html#scrolltoc).

4. **If the device exists, check the `/etc/driver_aliases` file to ensure that the file contains a `mlxne` entry that corresponds to the name for the device.**

5. **If the entry exists, check the `/etc/path_to_inst` file to ensure that the file contains a `mlxne` entry.**

   Removing a device and reseating it in another slot does not always clean up the device tree. If this occurs, you must remove the device tree and reboot the server. For more information, refer to Managing Network Virtualization and Network Resources in Oracle® Solaris 11.2 (https://docs.oracle.com/cd/E36784_01/html/E36813/index.html).

Related Information

- “Recover From a Port Hang (Oracle Solaris x86/64)” on page 68
- “Analyze Slow Network Performance (Oracle Solaris x86/64)” on page 69
- “Analyze Why the Link Is Not Up After Back-To-Back Cable Connection (Oracle Solaris x86/64)” on page 71
- “Analyze Why Changing the MTU Does Not Correctly Set the Link Property (Oracle Solaris x86/64)” on page 71

▼ Recover From a Port Hang (Oracle Solaris x86/64)

1. **Perform one of these actions.**

   - If the interface encounters a soft hang, replumb the device. For instructions, refer to the Oracle Solaris `ipadm (1M)` man page (https://docs.oracle.com/cd/E36784_01/html/E36871/makehtml-id-7.html#scrolltoc).
   - If the interface encounters a hard hang, reboot the server.

- If the interface encounters an additional hard hang, capture the trace information by using the `dtrace` command.

  For example:

  ```
  # dtrace -F -m 'mlxne{trace(timestamp)}'
  >/tmp/dtrace.out
  ```

  For more information, refer to the Oracle Solaris `dtrace(1M)` man page (https://docs.oracle.com/cd/E36784_01/html/E36871/makehtml-id-7.html#scrolltoc).
- If the server is panicked, retrieve the crash dump in `/var/crash`.
- If the interface encountered a hard hang or a panic, file a CR at My Oracle Support.

  Attach the last page of the `dtrace` command output or the crash dump file to the CR.

2. **Check the driver statistics. Refer to the Oracle Solaris man pages for details.**
3. **Use these parameters for performance tuning in the `mlxne.conf` file.**

Parameters	Description
`rx_itr`	Interval of receive interrupts `0` to `4080`, `25` (`50` usec) by default.
tx_itr	Interval of transmit interrupts `0` to `4080`, `25` (`50` usec) by default.
`rx_limit_per_intr`	Maximum number of packet to receive per interrupt16 ~ 4096, 1024 by default.
`rx_copy_threshold`	Packet size to determine bcopy or not during receive0 ~ 9216, 128 by default.
`tx_copy_threshold`	Packet size to determine bcopy or not during transmit0 ~ 9216, 128 by default.

Related Information

- “Analyze Why the Device Link Is Missing (Oracle Solaris x86/64)” on page 67
- “Analyze Slow Network Performance (Oracle Solaris x86/64)” on page 69
- “Analyze Why the Link Is Not Up After Back-To-Back Cable Connection (Oracle Solaris x86/64)” on page 71
- “Analyze Why Changing the MTU Does Not Correctly Set the Link Property (Oracle Solaris x86/64)” on page 71

▼ Analyze Slow Network Performance (Oracle Solaris x86/64)

The adapter supports several driver parameters that affect the performance of the ports.

1. **View the network performance.**

   ```
   # truss -p PID
   ```

2. **Look for NIS, DNS, and network routing outages.**

   If you find any issues, fix them before proceeding.

3. **View the I/O statistics to ensure that there are no bottlenecks on the disk.**

   ```
   # iostat -xcn 5
   ```

   If you discover a bottleneck, set the logging to dump to the `/tmp` directory. Then retest to ensure that the new configuration improved performance.

4. **Use the `vmstat` and the `mpstat` commands to check that none of these conditions exist:**

   - CPU is pegged.
   - CPU is receiving too many interrupts.
   - Memory is low.
   - Page faults are occurring.
   - Contention for resources causes too many spins on mutex (`smtx`).

   For more information, refer to the Oracle Solaris vmstat (1M) man page or the mpstate (1M) man page (`https://docs.oracle.com/cd/E36784_01/html/E36871/makehtml-id-7.html#scrolltoc`).

   If the performance issue points to the driver, profile the call stack for `mlxne` by using the `DTrace` script. For more information about the `DTrace` script, go to My Oracle Support.

Related Information

- “Analyze Why the Device Link Is Missing (Oracle Solaris x86/64)” on page 67
- “Recover From a Port Hang (Oracle Solaris x86/64)” on page 68
- “Analyze Why the Link Is Not Up After Back-To-Back Cable Connection (Oracle Solaris x86/64)” on page 71
- “Analyze Why Changing the MTU Does Not Correctly Set the Link Property (Oracle Solaris x86/64)” on page 71

Analyze Why the Link Is Not Up After Back-To-Back Cable Connection (Oracle Solaris x86/64)

1. **Ensure that the correct cable type is being used.**

   See “Adapter Description” on page 29.

2. **Check that the switch ports have been configured to operate in the mode in which the adapter is running.**

Related Information

- “Analyze Why the Device Link Is Missing (Oracle Solaris x86/64)” on page 67
- “Recover From a Port Hang (Oracle Solaris x86/64)” on page 68
- “Analyze Slow Network Performance (Oracle Solaris x86/64)” on page 69
- “Analyze Why Changing the MTU Does Not Correctly Set the Link Property (Oracle Solaris x86/64)” on page 71

Analyze Why Changing the MTU Does Not Correctly Set the Link Property (Oracle Solaris x86/64)

The `dladm` command might display this message:

```
# dladm: warning: cannot set link property 'mtu' on 'net0': link busy
```

It is possible that some objects defined on the link need to be removed or plumbed down.

- **Remove and retry the command.**

```
# dladm set-linkprop -p mtu=9500 net0
```

For more information, refer to the Oracle Solaris`dladm (1M)` man page ((`https://docs.oracle.com/cd/E36784_01/html/E36871/makehtml-id-7.html#scrolltoc`).

Related Information

- “Analyze Why the Device Link Is Missing (Oracle Solaris x86/64)” on page 67
- “Recover From a Port Hang (Oracle Solaris x86/64)” on page 68
- “Analyze Slow Network Performance (Oracle Solaris x86/64)” on page 69
- “Analyze Why the Link Is Not Up After Back-To-Back Cable Connection (Oracle Solaris x86/64)” on page 71

Glossary

A

adapter The Oracle Dual Port 25/100 Gb Mellanox Ethernet Adapter.

D

DAC Direct attached cables.

DHCP Dynamic Host Configuration Protocol. Part of the application layer in the Internet protocol suite.

DNS Domain name system. Translates human-readable domain names into numerical identifiers.

E

EEPROM Electronically erasable programmable read-only memory.

EMI Electromagnetic interference. The interference caused by the magnetic fields of electronic components.

G

Gb Gigabyte.

GbE Gigabit Ethernet.

Gbps Gigabits-per-second.

GT	Gigabit-transfer.
GTps	Gigatransfers per second.

L

LC/LC	Little Connector fiber optic cable that connects the transceiver to the adapter. This LC connector is on a small form-factor pluggable transceiver. LC connectors have replaced SC connectors in corporate networking environments because of their smaller size.
LFM	Linear Feet per minute.
link aggregation	Link aggregation enables several physical ports to be bundled into a single logical channel.
LOM	LAN-on-motherboard. A LAN design.

M

MAC	Media access control. Enables the use of a unique address for each device on a network.
Mb	Megabit.
MTU	Maximum transmission unit. The MTU (payload without the Ethernet header) affects how jumbo frames function.

N

NIS	Network Information Service. Originally known as Yellow Pages, NIS is a protocol for distributed system configuration data.

P

PCIe	Peripheral Component Interconnect Express.
PF	Physical function.

PXE Preboot execution environment. Enables clients to boot over a network interface, independent of the OS or other devices.

R

RDMA Remote Direct Memory Access. Allows computers in a network to exchange data in main memory without involving the processor, cache, or OS of either computer.

RX Response. The automatic response mechanism used by Ethernet PAUSE frames.

S

SPI Serial peripheral interface. A type of flash memory.

SRC Source code. The SRC RPM is used in Linux to build the driver kernel files.

T

TCP Transmission Control Protocol. Part of the transport layer of the Internet protocol suite.

transceiver The 25GbE SFP28 optical transceiver that both ports in the adapter use to transmit data.

TX Generation. The automatic generation mechanism used by the Ethernet PAUSE frames.

U

UDP User Datagram Protocol. Part of the transport layer of the Internet protocol suite.

UEFI Unified Extensible Firmware Interface. Manages the operations between hardware firmware and the OS during the boot time.

V

VF Virtual function.

VID	VLAN identifier. A 12-bit identifier in an Ethernet header.
VLAN	Virtual LAN. Splits the physical LAN into logical subparts. Multiple VLANs are supported on a single port, enabling a server with a single adapter to have a logical presence on multiple IP subnets.
VXLAN	Virtual eXtensive LAN. A tunneling mechanism for providing isolated virtual Layer 2 (L2) segments that can span multiple physical L2 segments.

Index

R

S

T

U

V

W