



MLNX_VPI for Windows Installation Guide

Rev 2.1.3

www.mellanox.com

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1 Introduction

1.1 Scope

This document describes how to install and test MLNX_VPI for Windows on a single host machine with Mellanox hardware installed.

1.2 Web Page and Documentation

To access the MLNX_VPI Windows Web page, please visit <http://www.mellanox.com> and navigate to Products--> InfiniBand & VPI Software/Drivers --> MLNX_VPI_Windows. The page provides access to the SW package and to reference documentation such as release notes, user manuals, FAQ, troubleshooting, and archive.

After installing MLNX_VPI (see the installation section below), you will find release notes and other documentation under the installation directory (default: Program Files\ Mellanox\ MLNX_VPI\ Documentation\").

1.3 Hardware and Software Requirements

1.3.1 Hardware Requirements

Required Disk Space for Installation

- 100 MB

Platforms

MLNX_VPI SW will install the appropriate drivers according the Mellanox network card capability, please refer to the list below:

VPI / IB / Ethernet

ConnectX / ConnectX-2 / ConnectX EN / ConnectX-2 EN IB SDR/DDR/QDR (fw-25408 Rev 2.8.0000)

Note: We recommend upgrading ConnectX and ConnectX-2 adapter cards to firmware 2.8.0000 or higher to use this release of WinOF. Please contact support@mellanox.com if you have any questions.

1.3.2 Software Requirements

Operating Systems

- Windows 7 (32 and 64 bits)
- Windows Server 2008 (32 and 64 bits)
- Windows Server 2008-R2 (64 bits only)

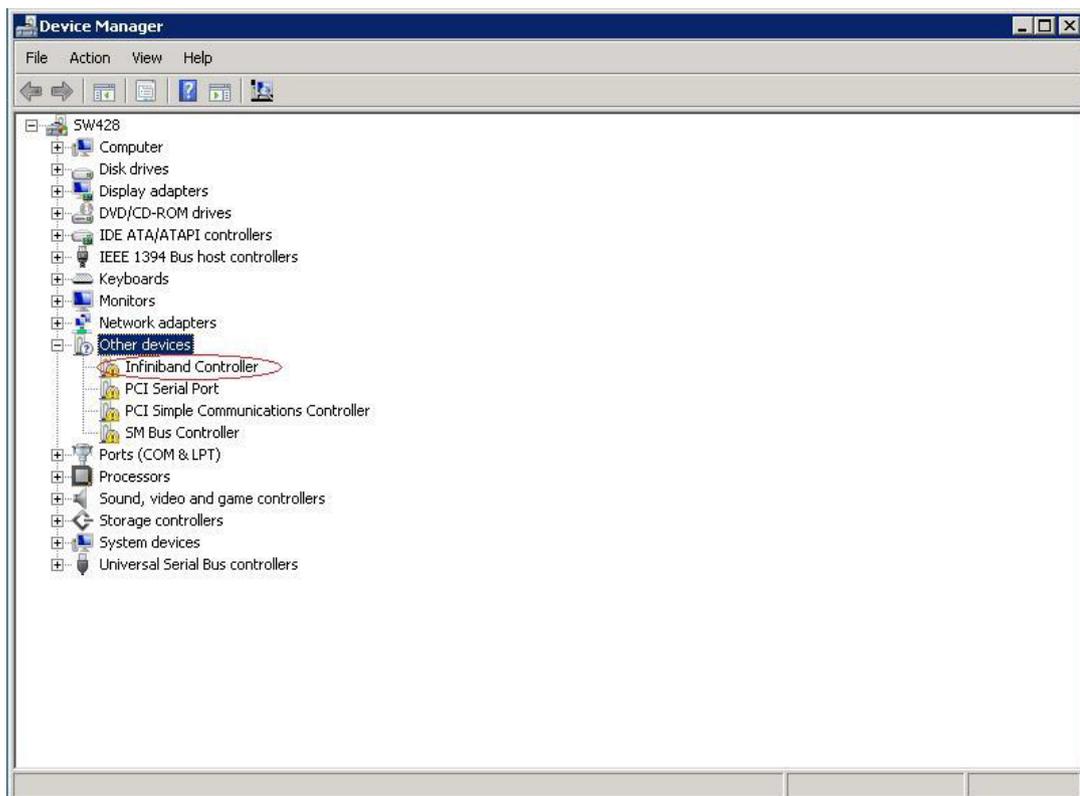
2 Identifying Mellanox Adapters on Your Machine

Step 1 Open Device Manager. Click start--> Run, and then enter “devmgmt.msc”.

Step 2. Check the Device Manager under “Other devices” “InfiniBand Controller”.

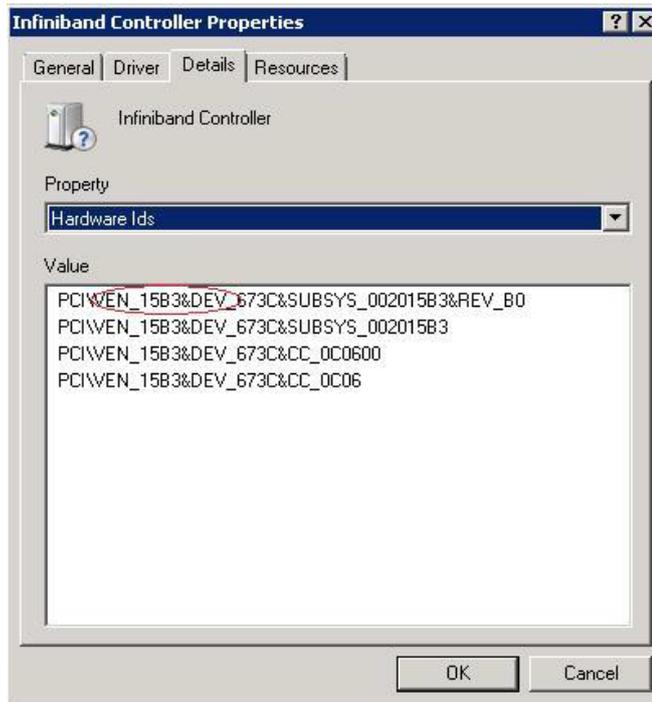
Note: If the NIC is Ethernet only, under “Other devices” in the Device Manager you see “Ethernet Controller”.

Note: If you cannot find the device, click Action --> Scan for hardware changes. If no devices are detected, check that the network adapter card(s) is correctly installed in the PCI slot or try installing the adapter card into a different PCI slot.



Step 3. Select a InfiniBand Controller entry, right-click and select Properties to display the InfiniBand Controller Properties window.

Step 4. Click the Details tab and select Hardware Ids from the Property pull-down menu.



Step 5. In the Value display box, check the fields VEN and DEV (fields are separated by '&'). In the display example above, notice the sub-string "PCI\VEN_15B3&DEV_6368": VEN is equal to 0x15B3 – this is the Vendor ID of Mellanox Technologies; and DEV is equal to 0x6368 – this is a valid Mellanox Technologies PCI Device ID.

Note: The list of Mellanox Technologies PCI Device IDs can be found in the PCI ID repository at <http://pci-ids.ucw.cz/read/PC/15b3>.

Step 6. If the PCI device does not have a Mellanox adapter ID, return to Step 3 to check another device.

Note: If you cannot find any Mellanox adapter device listed as a PCI device, make sure that the adapter card(s) is correctly installed in the adapter PCI slot. If the adapter device remains unidentified, try installing the adapter card into a different PCI slot.

3 Downloading MLNX_VPI

Follow these steps to download the appropriate MSI to your machine.

Step 1 Verify the machine architecture.

- a. Open a CMD console (Click start-->Run and enter CMD).
- b. enter the following command:

```
> echo %PROCESSOR_ARCHITECTURE%
```

On an x86 (32-bit) machine, the output will be “x86”.

On an x64 (64-bit) machine, the output will be “AMD64”.

Step 2. Go to the MLNX_VPI for Windows Web page at <http://www.mellanox.com> --> Products --> Software/Drivers --> InfiniBand & VPI SW/Drivers --> Mellanox WinOF for Windows (MLNX_WinOF_VPI)

Step 3. Download the appropriate MSI according to the architecture of your machine (see Step 1). The MSI's name has the format MLNX_WinOF_VPI_2.1.3_<arch>.msi, where *arch* can be either x86 or x64.

Note: If you download and attempt to install the incorrect MSI, the installation wizard will not allow it. For example, if you try to install a 64-bit MSI on a 32-bit machine, the wizard will display the following (or a similar) error message:



4 Installing MLNX_VPI

This sections provides instructions for two types of installation:

- “Attended Installation” (see below)

An attended installation is an installation procedure that requires frequent user intervention.

- “If you are using ConnectX®/ConnectX2 EN adapter cards, DO NOT enable any of the components displayed in the screenshot above at the end of the installation process. If you do enable, the following popup error will appear after the first reboot: “Application popup: .NET-BroadcastEventWindow.2.0.0.0.378734a.0: Oobe.exe - Unable To Locate Component : This application has failed to start because ibal.dll was not found. Re-installing the application may fix this problem”.” on page 11

An unattended installation is an automated installation procedure that requires no user intervention.

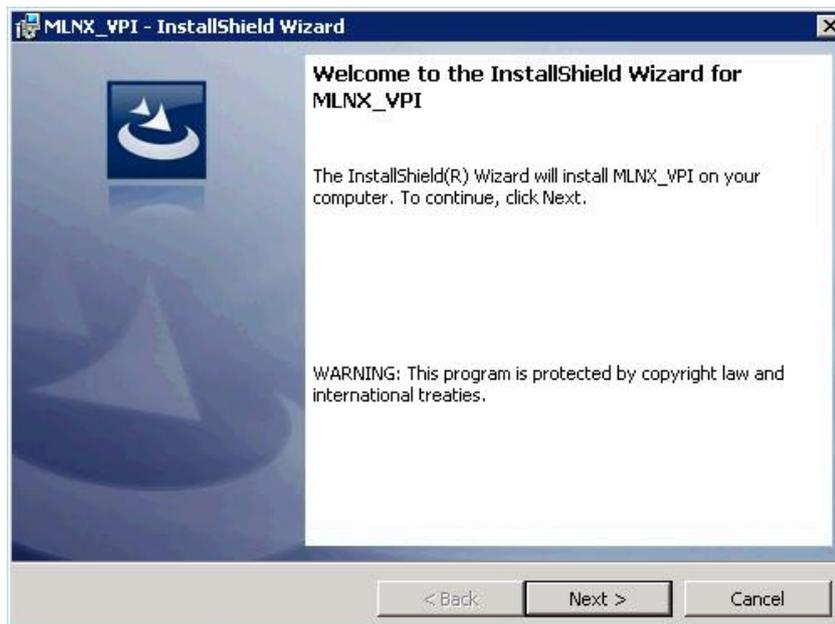
4.1 Attended Installation

Note: The installation requires administrator privileges on the machine.

Double click the MSI and follow the GUI instructions to install MLNX_VPI.

The following is an example of a MLNX_VPI x64 installation session.

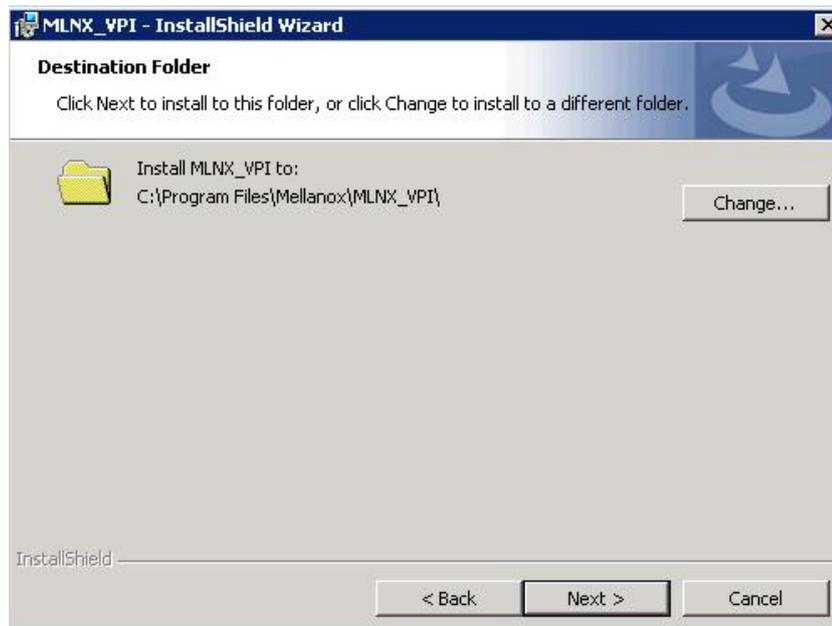
Step 1 Click Next in the Welcome screen.



Step 2. Select the “I accept the terms in the license agreement” radio button and click Next.



Step 3. Choose the destination directory for the installation.



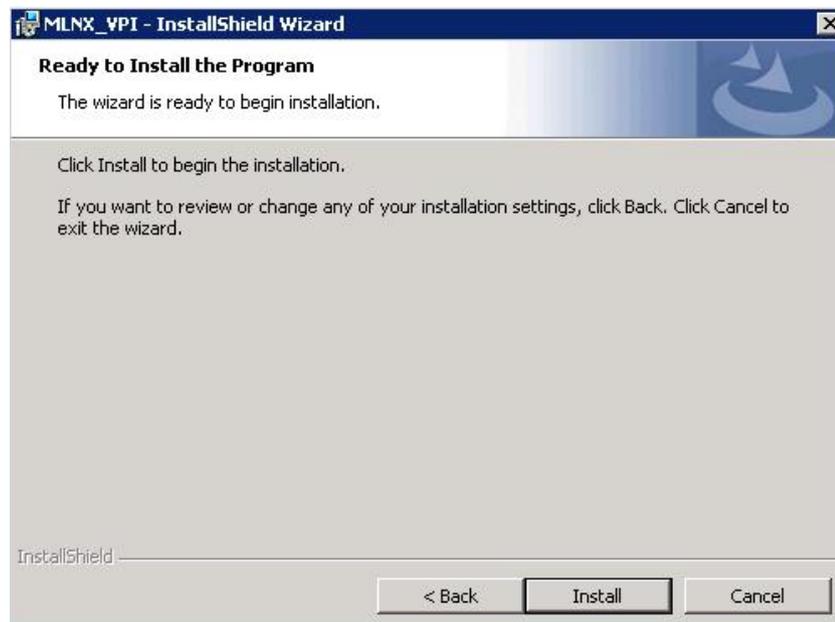
Step 4. Configure your system for maximum 10GigE performance by checking the maximum performance box.

Note: If you check the maximum performance box (see figure below), you will need to reboot your system at the end of installation.



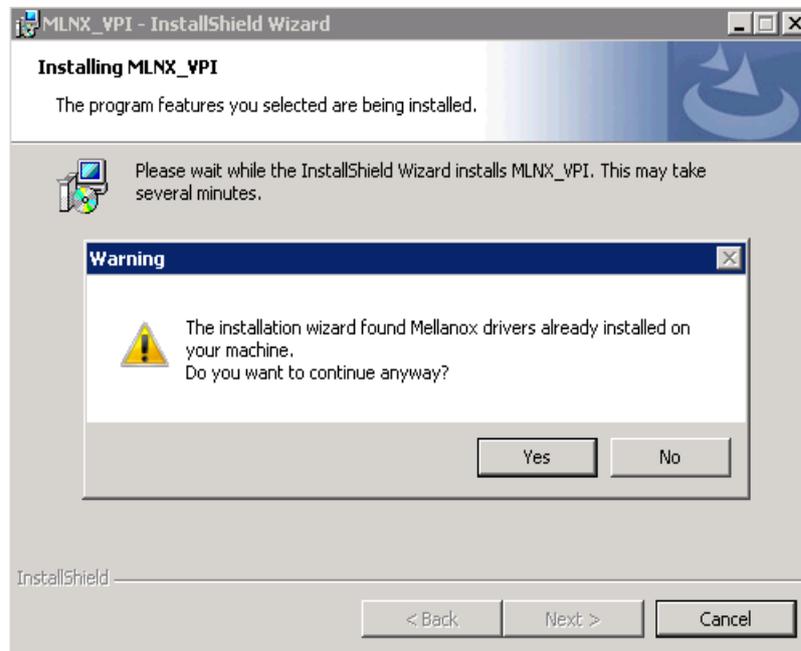
Step 5. Click Next to continue to the next performance dialog.

Step 6. To install the package components, click Install.



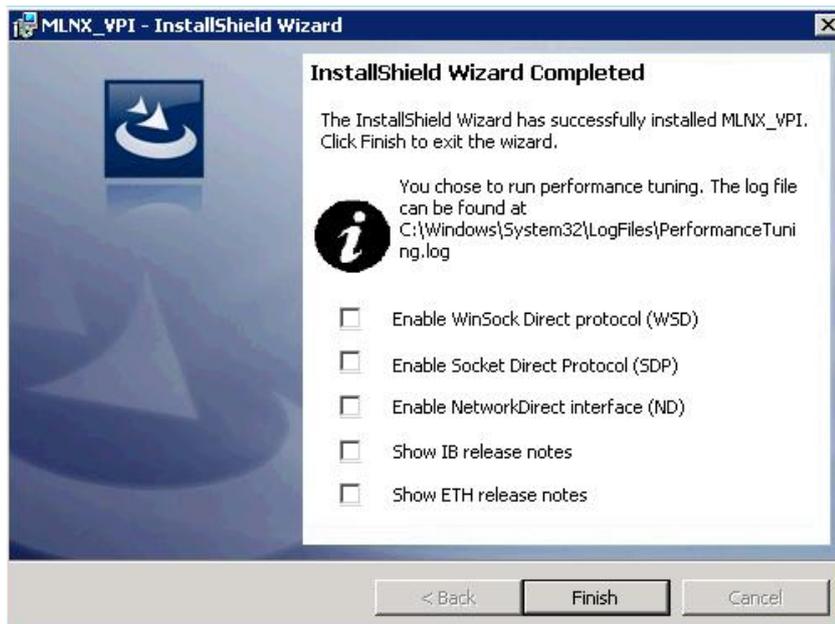
Step 7. In case of a previously installed Mellanox drivers on your machine, the MSI installer will promote the message below.

If you press "Yes", the installer will replace the old drivers with the new ones.



Step 8. In the following window, enable the components you need (if any). To complete the installation, click Finish.

Note: Even if you do not enable any of the displayed components in this step, you will be able to enable components after the installation completes – see “Port Protocol Configuration” on page 18.



Note: If you are using ConnectX®/ConnectX2 EN adapter cards, DO NOT enable any of the components displayed in the screenshot above at the end of the installation process. If

you do enable, the following popup error will appear after the first reboot: “**Application popup: .NET-BroadcastEventWindow.2.0.0.0.378734a.0: Oobe.exe - Unable To Locate Component : This application has failed to start because ibal.dll was not found. Re-installing the application may fix this problem**”.

4.2 Unattended Installation

Note: The installation requires administrator privileges on the machine.

To perform a silent/unattended installation, open a CMD console (click Start->Run and enter ‘cmd’) and enter the following command:

```
> msixec.exe /i MLNX_WinOF_VPI_2.1.3_<arch>.msi /qn
```

Note: For all command options, enter ‘msiexec.exe /?’.

Usage Example

- The following command installs MLNX_VPI in the default configuration:

```
> msiexec /i MLNX_WinOF_VPI_2.1.3_x86.msi /qn
```

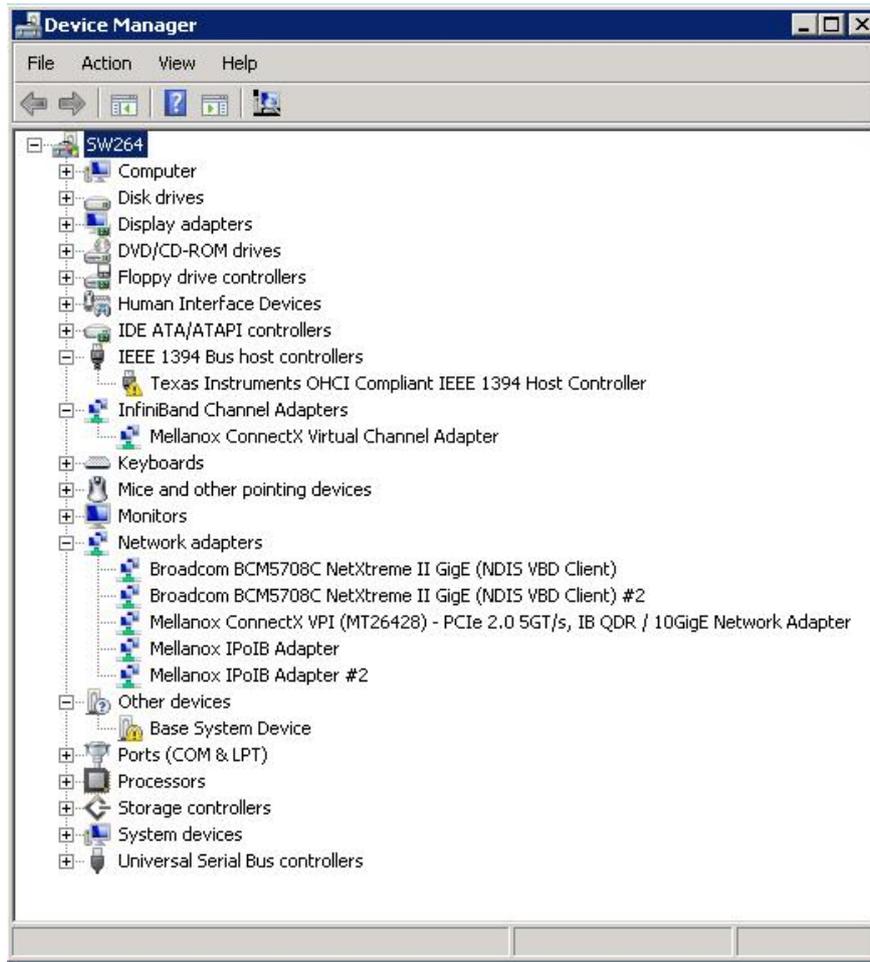
5 Upgrading MLNX_VPI

If you have a MLNX_VPI v2.1.2 package already installed in your machine, to upgrade it you can run the new MLNX_VPI package and it will automatically upgrade your current version by fully uninstalling your previous product and install the new package instead.

Note: After upgrading, the previous net interface is removed and a new one is created. Consequently, if the net interface uses static IP, after the upgrade the administrator have to re-configure the IP address.

6 Installation Results

Displaying the Device Manager will show the Mellanox adapter devices and an IPoIB (network) device for each port. Note that MLNX_VPI configures the ports of VPI cards – at installation time – to run the InfiniBand protocol. See Chapter 8: “Port Protocol Configuration” for instructions to change this configuration.



The MLNX_VPI for Windows package is installed under the directory selected in Step 3 of [Section 4.1](#). (The default installation folder is Program Files\Mellanox \MLNX_VPI.)

Note: If the cards are connected to a managed switch, there is no need to run openSM. Only one OpenSM should run per subnet.

In InfiniBand interfaces, OpenSM is installed as a disabled Windows service. To enable it, enter at the command line:

```
> sc start opensm
```

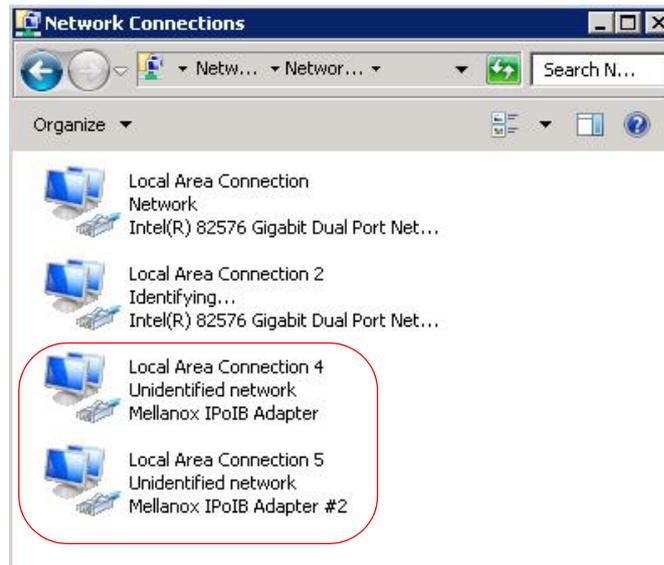
Whereas in Ethernet interfaces, there is no need to run OpenSM.

7 Assigning Port IP After Installation

By default, your machine is configured to obtain an *automatic* IP address via a DHCP server. In some cases, the DHCP server may require the MAC address of the network adapter installed in your machine. To obtain the MAC address, open a CMD console and enter the command ‘ipconfig /all’ ; the MAC address is displayed as “Physical Address”.

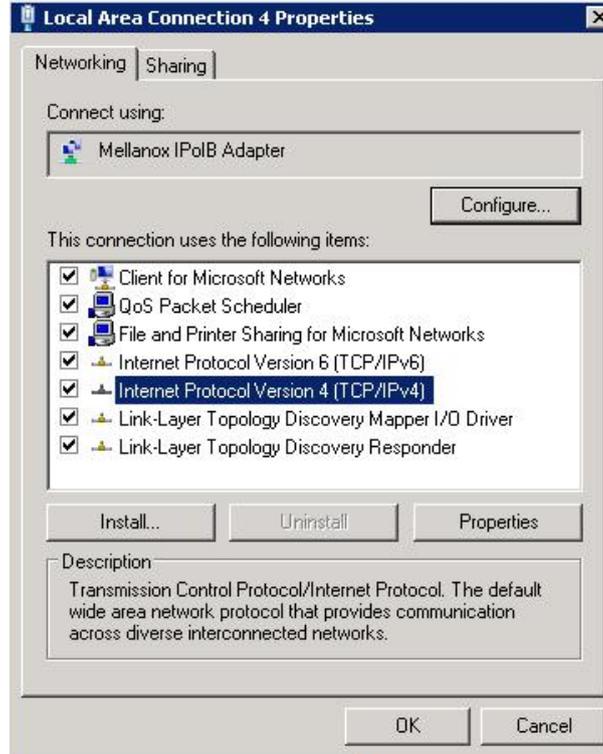
To assign a *static* IP addresses to a network port after installation, perform the following steps:

- Step 1** Open the Network Connections window. Locate Local Area Connections with Mellanox devices.



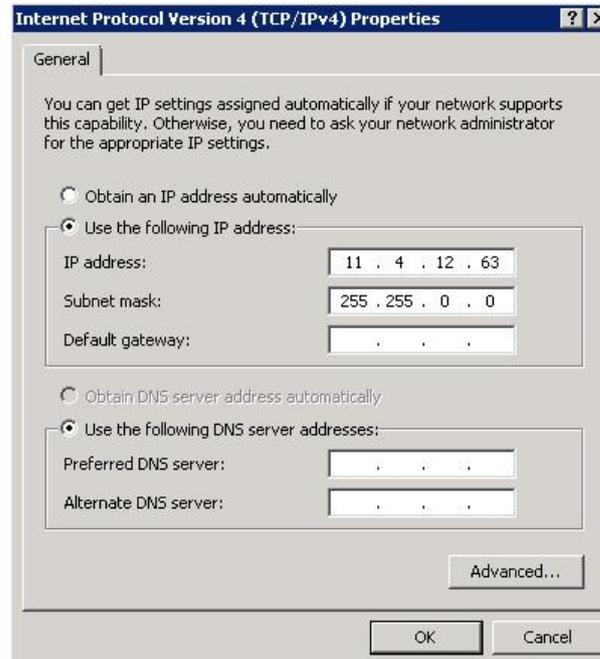
- Note:** OpenSM must be active continuously on at least one machine in the cluster to allow proper IPoIB functioning.

Step 2. Right-click a Mellanox Local Area Connection and left-click Properties.



Step 3. Select Internet Protocol Version 4 (TCP/IPv4) from the scroll list and click Properties.

- Step 4.** Select the “Use the following IP address:” radio button and enter the desired IP information. Click OK when you are done.



- Step 5.** Close the Local Area Connection dialog.

- Step 6.** Verify the IP configuration by running ‘ipconfig’ from a CMD console.

```
> ipconfig
```

```
...
```

```
Ethernet adapter Local Area Connection 4:
```

```

Connection-specific DNS Suffix . :
IP Address . . . . . : 11.4.12.63
Subnet Mask . . . . . : 255.0.0.0
Default Gateway . . . . . :

```

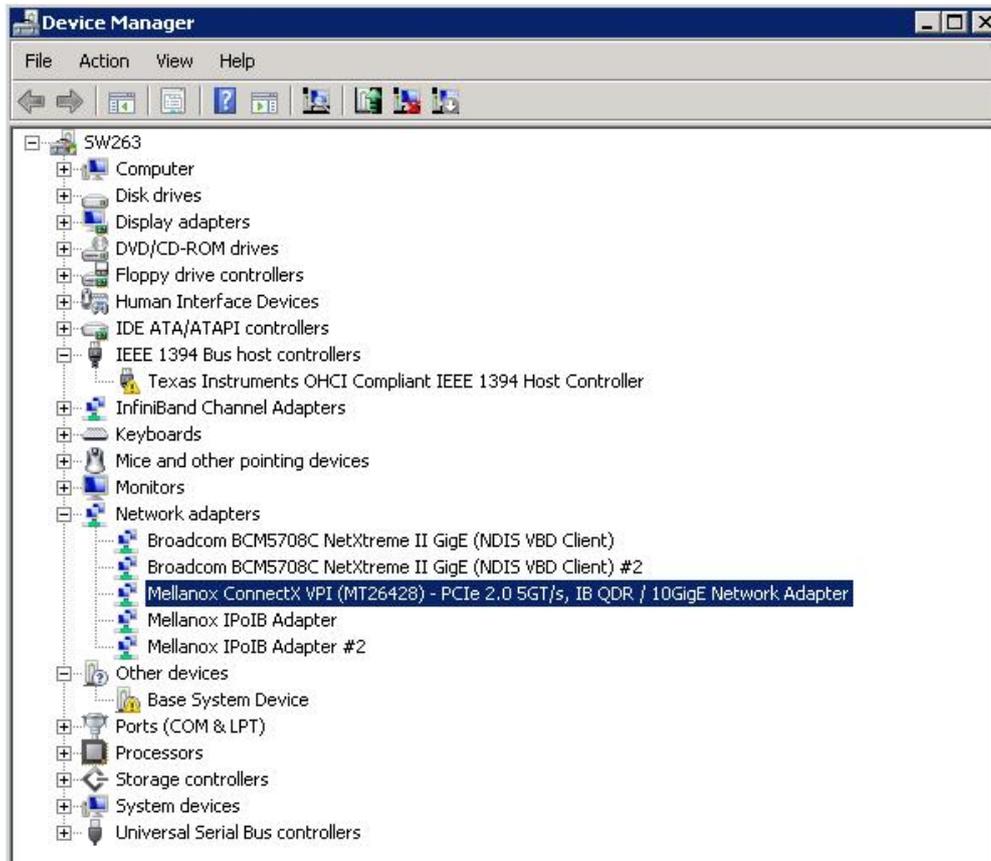
```
...
```

8 Port Protocol Configuration

After MLNX_VPI installation, it is possible to change the network protocol that runs on each port of VPI adapter cards. Each port can be set to run either InfiniBand or Ethernet.

Note: For dual port adapters only: If you wish to configure InfiniBand on one port and Ethernet on the other port, you must set Port 1 as InfiniBand.

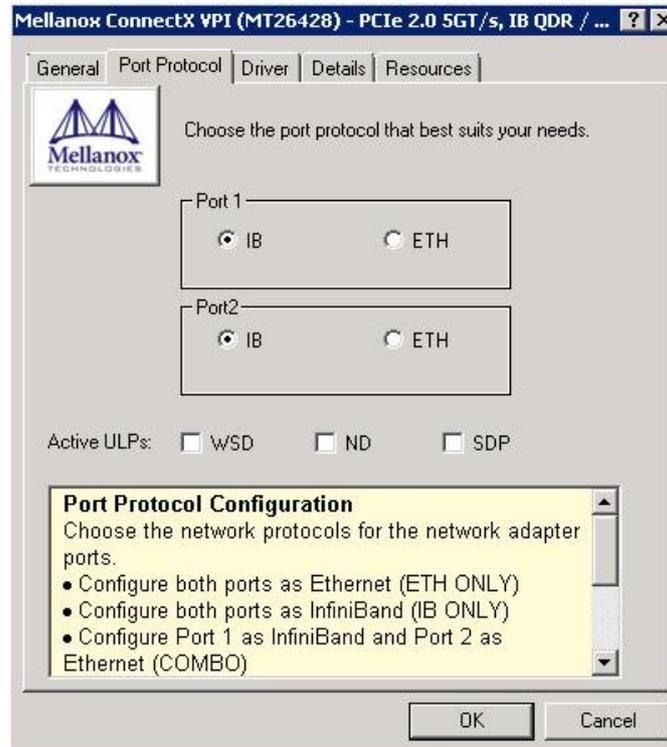
Step 1 Display the Device Manager and expand “Network adapters”.



Step 2. Right-click on the Mellanox ConnectX VPI network adapter and left-click Properties. Select the Port Protocol tab from the Properties sheet.

Note: The "Port Protocol" tab is displayed only if the NIC is a VPI (IB and ETH). If the NIC is either only IB or ETH, the tab will not be shown.

Note: The figure below is an example of the displayed Port Protocol sheet for a dual port VPI adapter card.



Step 3. In this step, you can perform two different functions: (a) Choose the desired port protocol for the available port(s), and (b) activate or deactivate the WSD, ND, and/or SDP ULPs.

Note: IB *must* be always the first port in Port 1. If you choose ETH as your first port in Port 1, then the second port in Port 2 can be only ETH.

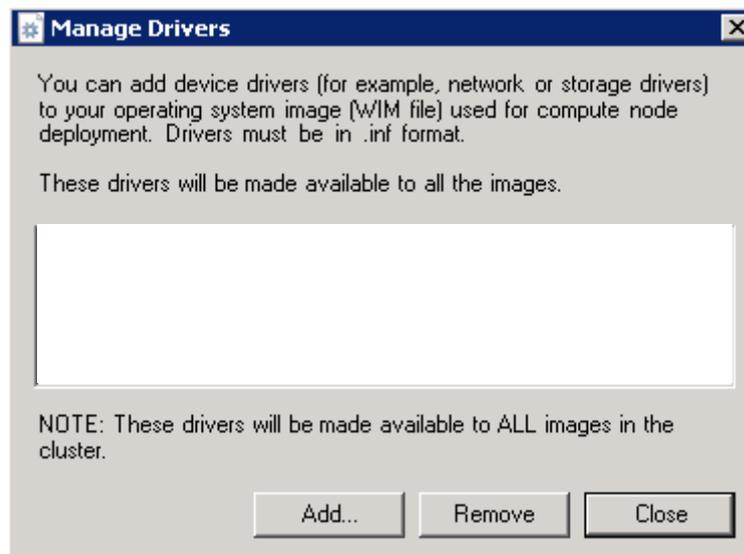
Note: WSD is not supported in Windows 7. Consequently, on this OS the WSD checkbox is grayed out and cannot be selected.

9 Advanced Configuration for InfiniBand Driver

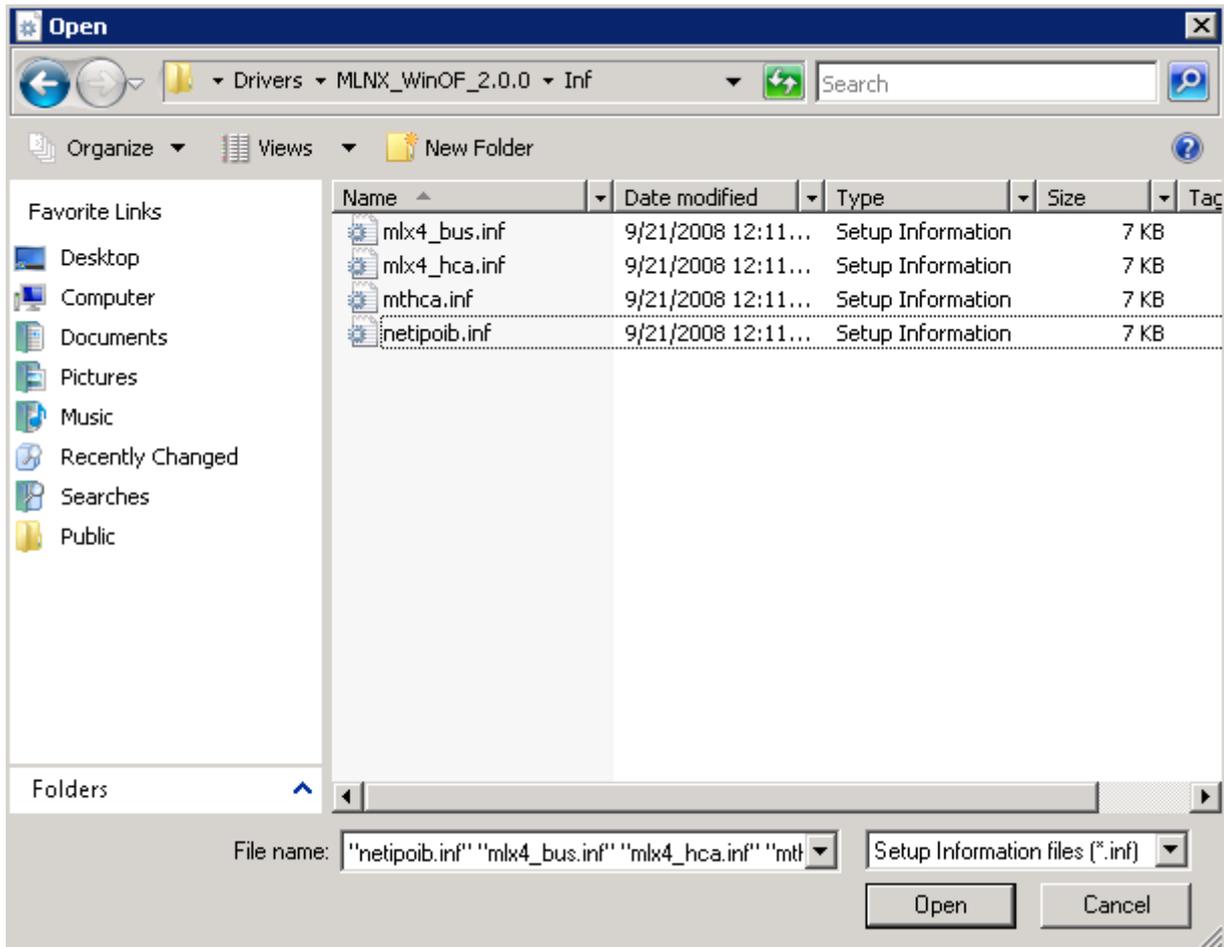
9.1 WSD Driver Installation

To perform a WSD installation for Windows 2008, Windows 2008 R2 and Windows HPC Server 2008 cluster, follow the steps below.

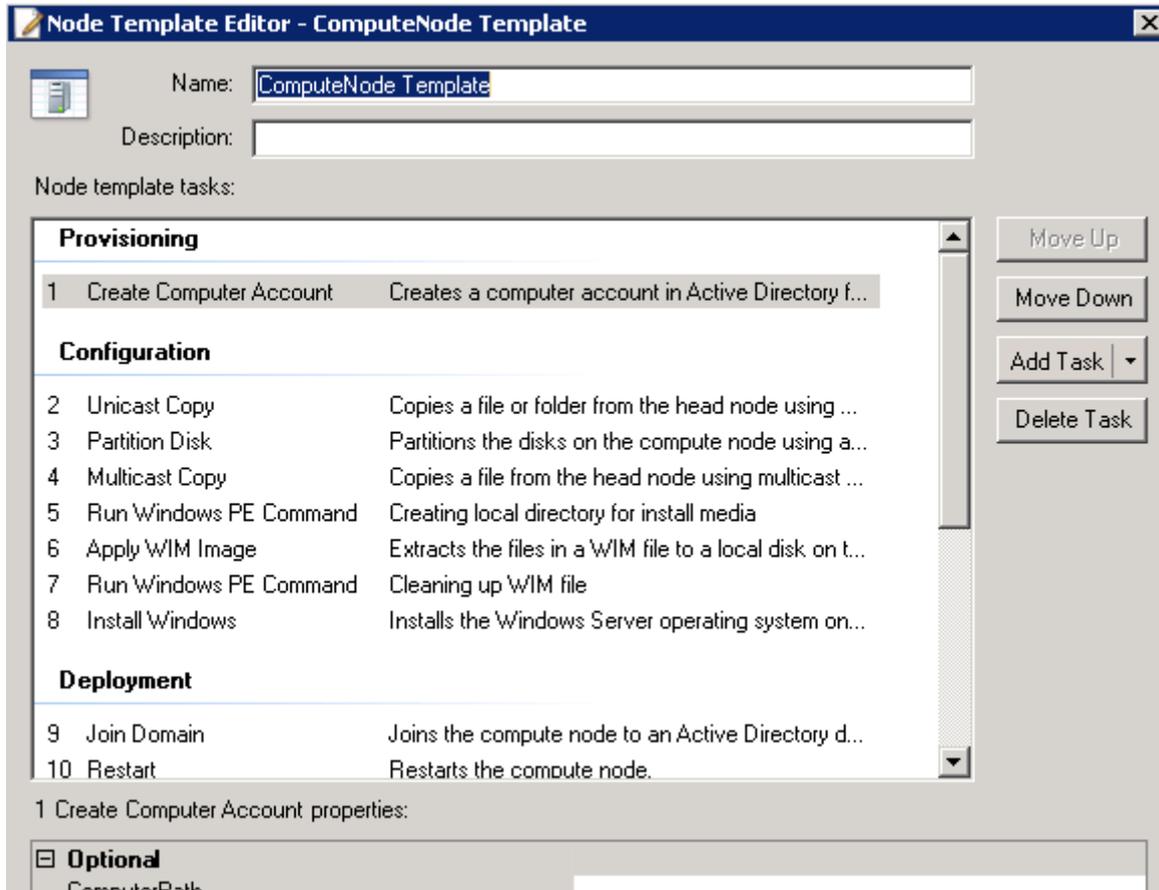
- Step 1** Extract the package Mellanox_Winof_2_1_2_inf_<ARCH>.zip to a directory in the head node.
- Step 2.** On the head node, click start--> All Programs --> Microsoft HPC Pack --> HPC Cluster Manager. Select Configuration in the navigation pane and then select To-do List. Next, Click “Manage drivers” and the following dialog will be displayed.



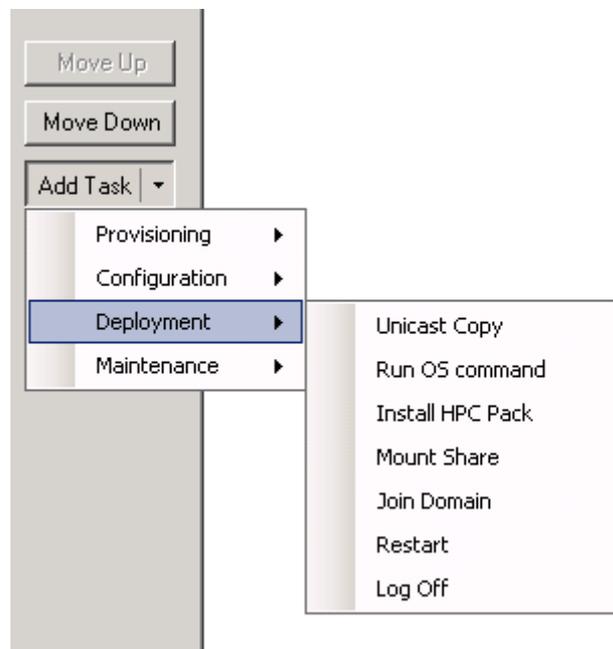
- Step 3.** Click “Add” and navigate in the Open dialog to the directory chosen in Step 1. Then go to the INF directory.



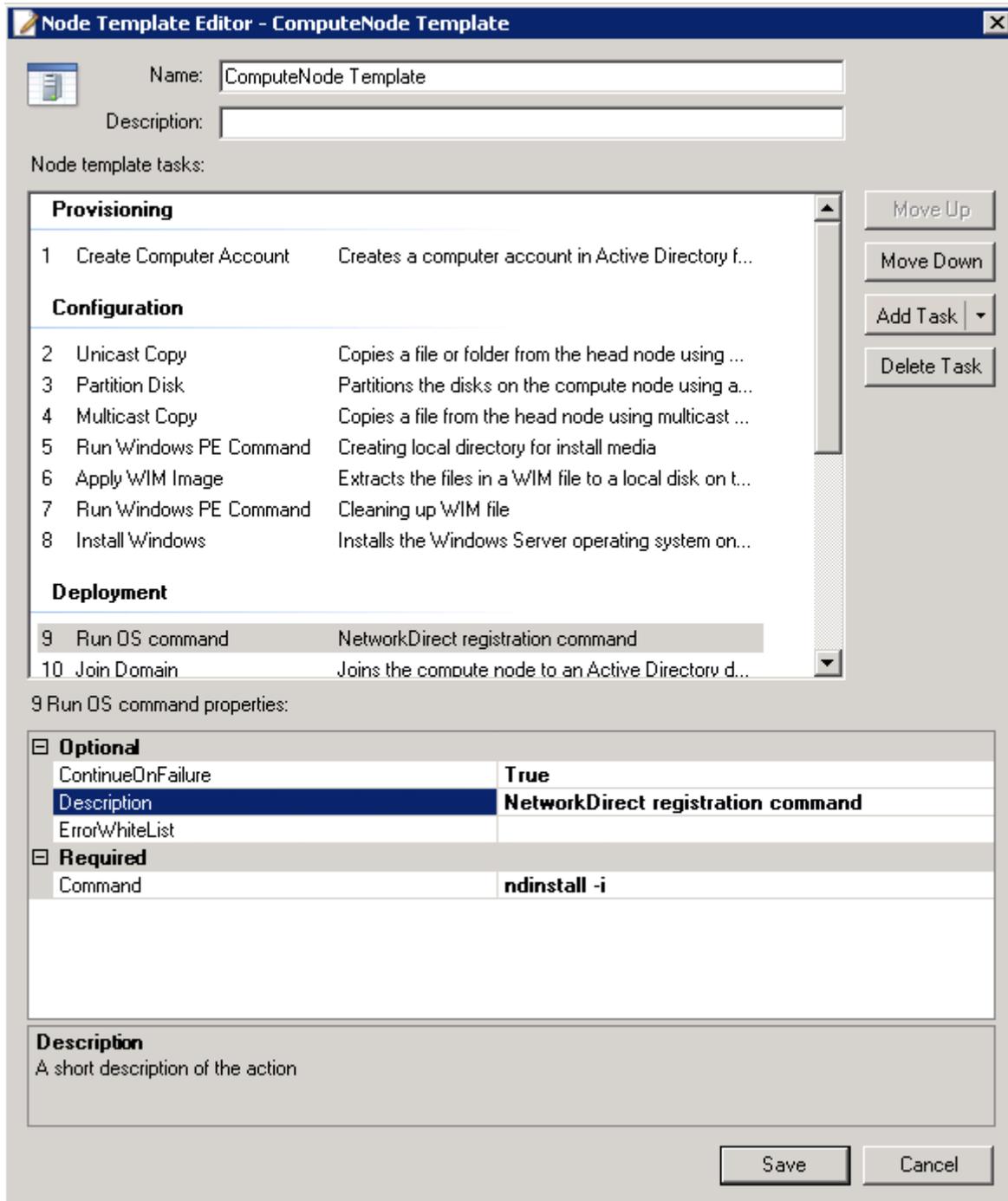
- Step 4.** Select the listed INF files and click “Open” to add the files.
- Step 5.** Click Close in “Manage drivers” dialog.
- Step 6.** To enable ND perform the following steps. Otherwise, skip to the next step.
- Select Node Templates in the Configuration pane.
 - Right click on the desired Node Template and select “edit”. An editor window is displayed (see below).



c. Click Add Task --> Deployment --> Run OS command.

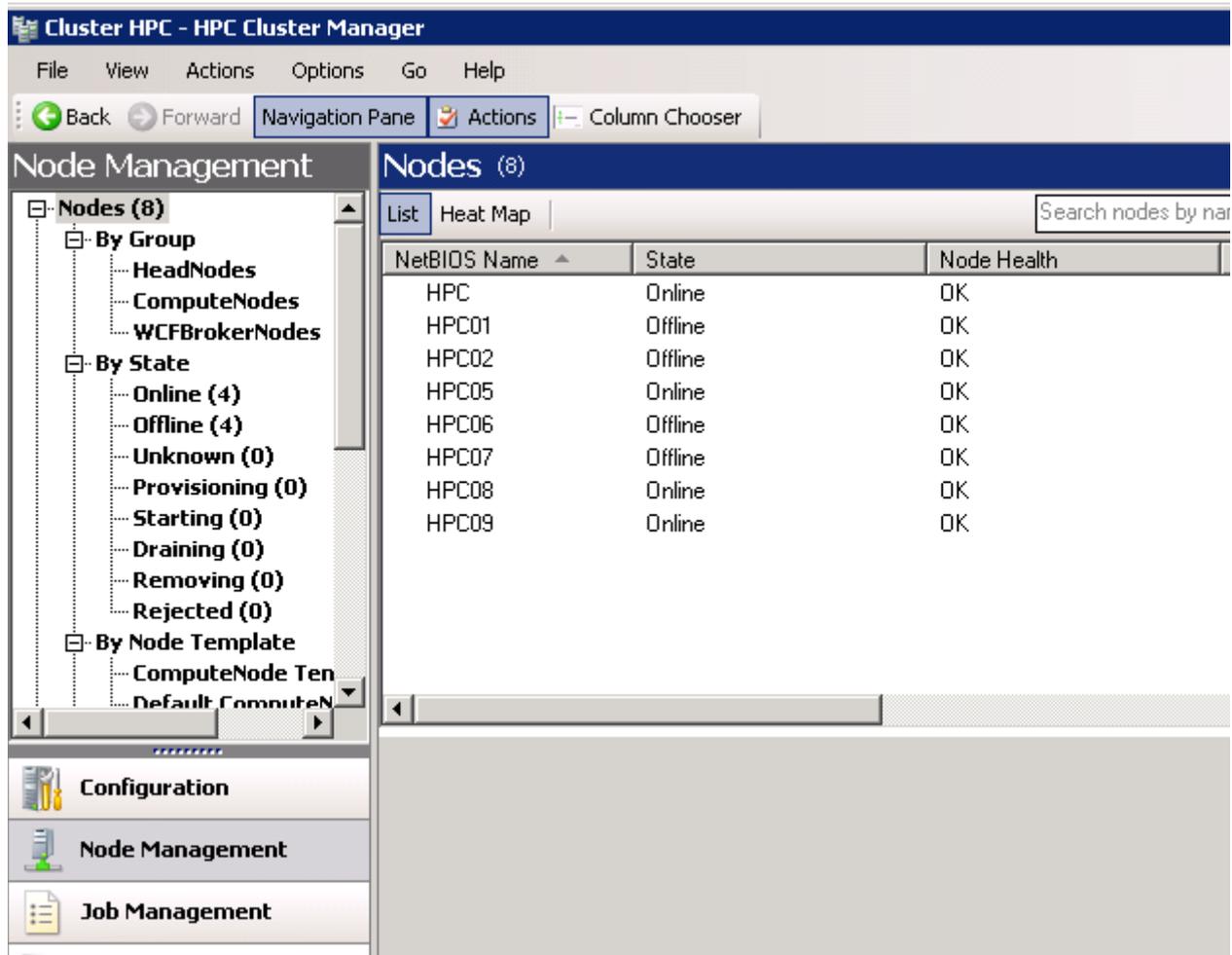


- d. Locate the new Run OS command listed under the Deployment section in the editor. Next, select in the Optional pane ContinueOnFailure to be True and enter the following text in the Description field: “NetworkDirect registration command”.
- e. In the Required pane of the editor, enter the following text in the Command field: “ndinstall -i”.

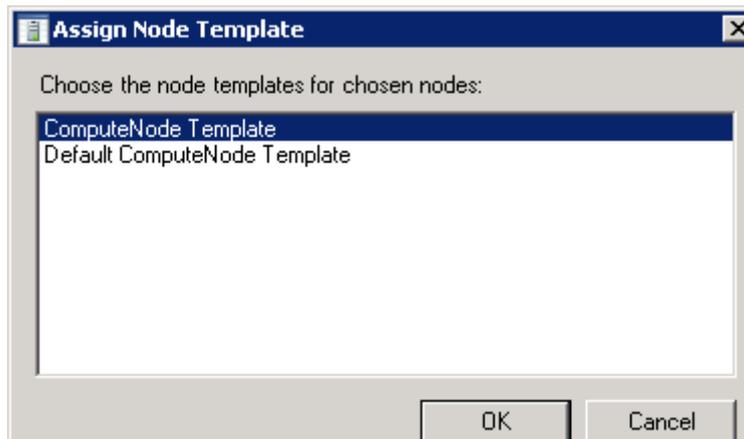


- f. Click Save. The editor window will close.

Step 7. Select “Node Management” in the navigation pane of HPC Cluster Manager.



Step 8. Right-click the desired node and select “Assign Node Template”. The following dialog will be displayed.



Step 9. Select the correct node template and click OK to start MLNX_WinOF installation on the node.

9.2 Modifying Configuration After Installation

Warning! Changes made to the Windows registry happen immediately, and no backup is automatically made. Do not edit the Windows registry unless you are confident about doing so.

9.2.1 Modifying Mellanox HCA Configuration

To modify HCA configuration after installation, perform the following steps:

- a. Open the Registry editor by clicking Start->Run and entering 'regedit'.
- b. In the navigation pane, expand HKEY_LOCAL_MACHINE->SYSTEM->CurrentControlSet->Services.
- c. Expand (in the navigation pane) the HCA driver service entry:
 - 'mtcha' for the InfiniHost family
 - 'mlx4_hca' and 'mlx4_bus' for the ConnectX family
- d. Click the Parameters entry in the expanded driver service entry to display HCA parameters.
- e. Double click the desired HCA parameter and modify it. Repeat this step for all the parameters you wish to modify.
- f. Close the Registry editor after completing all modifications.
- g. Open Device Manager and expand the correct InfiniBand Channel Adapters entry (i.e., the adapter with modified parameters).
- h. Right click the expanded HCA entry and left-click Disable. This disables the device.
- i. Right click the expanded HCA entry and left-click Enable. This re-enables the device.

Note: For the changes to take effect, you must disable and re-enable the HCA (steps *h* and *i* above).

9.2.2 Modifying IPoIB Configuration

To modify the IPoIB configuration after installation, perform the following steps:

- a. Open Device Manager and expand Network Adapters in the device display pane.
- b. Right-click the Mellanox IPoIB Adapter entry and left-click Properties.
- c. Click the Advanced tab and modify the desired properties.

Note: The IPoIB network interface is automatically restarted once you finish modifying IPoIB parameters.

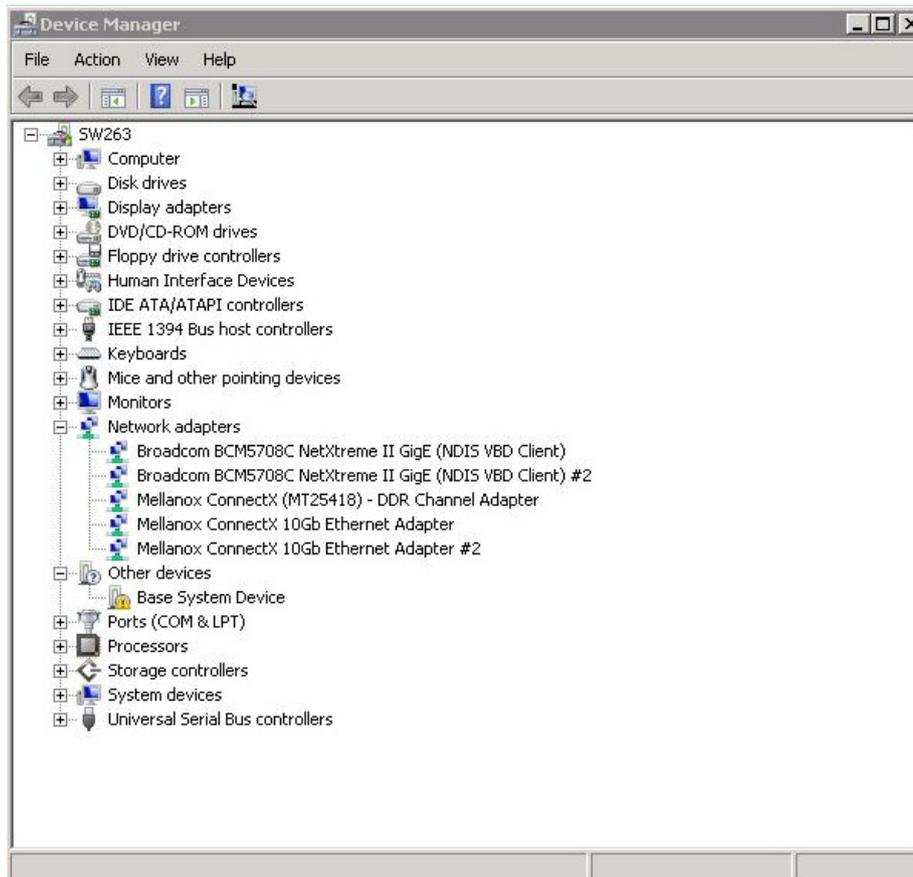
You need to restart `opensm` after modifying IPoIB configuration.

10 Advanced Configuration for Ethernet Driver

10.1 Displaying Adapter Related Information

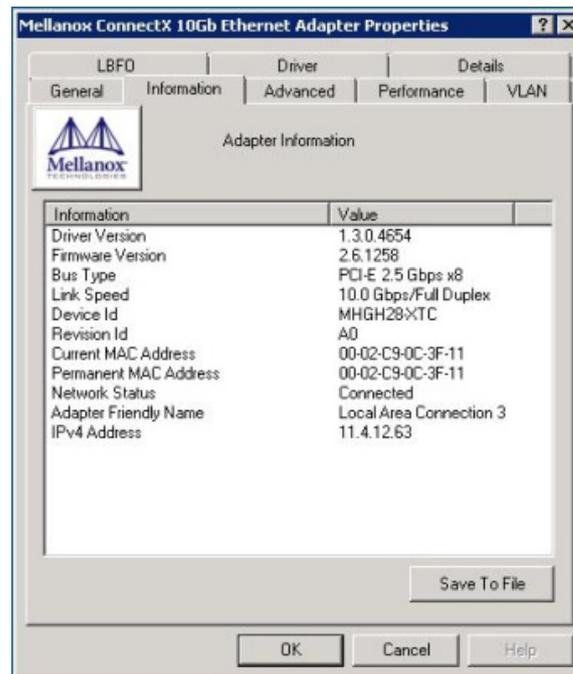
To display a summary of network adapter software-, firmware- and hardware-related information such as driver version, firmware version, bus interface, adapter identity, and network port link information, perform the following steps:

Step 1 Display the Device Manager.



Step 2. Right-click a Mellanox ConnectX 10Gb Ethernet adapter (under “Network adapters” list) and left-click Properties.

Step 3. Select the Information tab from the Properties sheet.

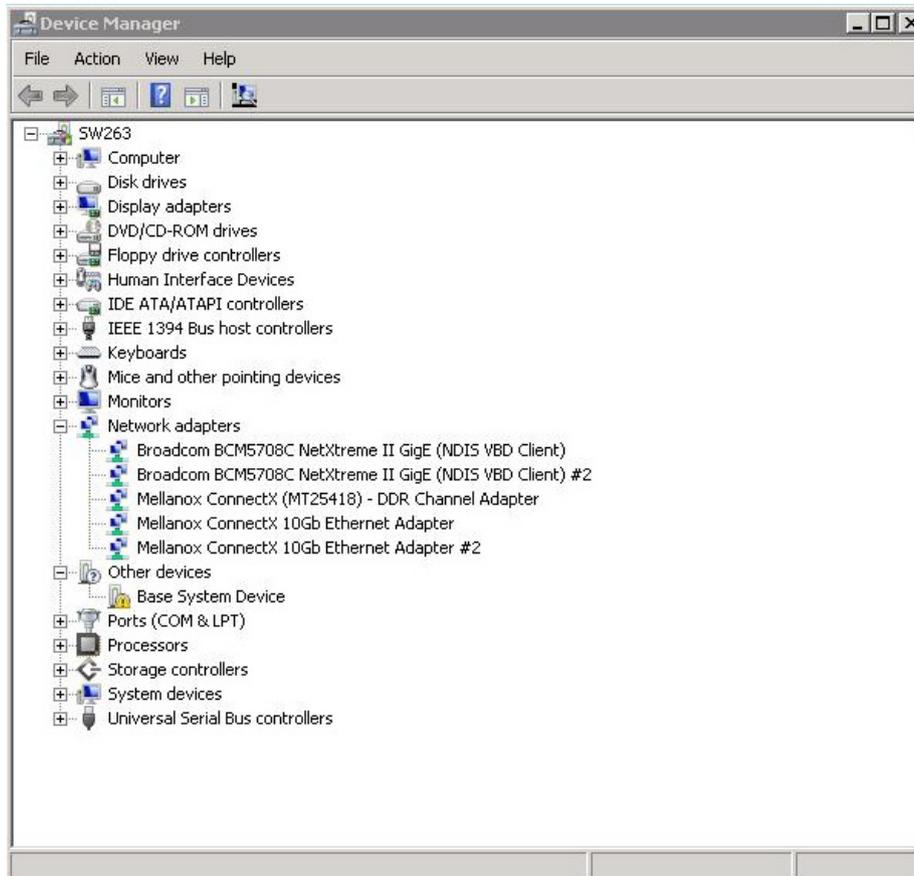


Note: To save this information for debug purposes, click Save To File and provide the output file name.

10.2 Creating a Load Balancing and Fail-Over (LBFO) Bundle

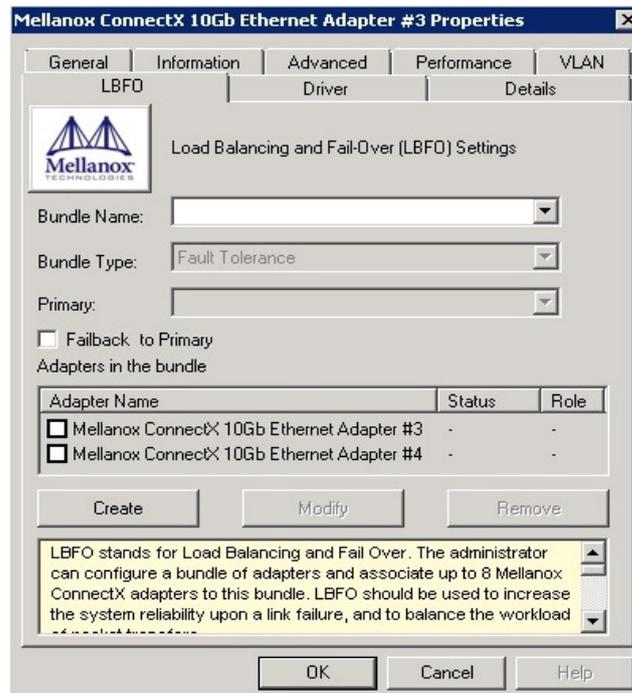
The following steps describe how to create an LBFO bundle.

Step 1 Display the Device Manager.



Step 2. Right-click a Mellanox ConnectX 10Gb Ethernet adapter (under “Network adapters” list) and left-click Properties. Select the LBFO tab from the Properties sheet.

Note: It is *not* recommended to open the Properties sheet of more than one adapter at a time.

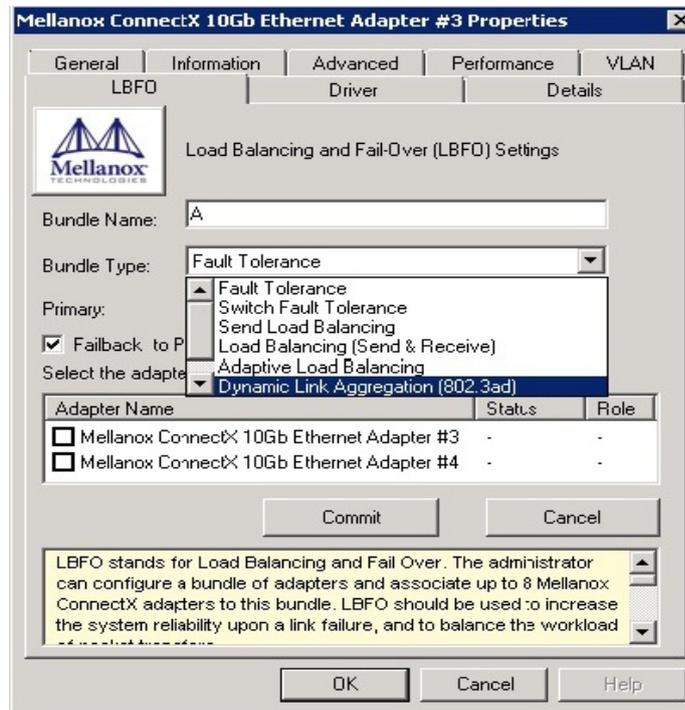


Step 3. The LBFO dialog enables creating a new bundle, modifying an existing bundle, or removing a bundle.

Note: Only Mellanox Technologies adapters can be part of the LBFO.

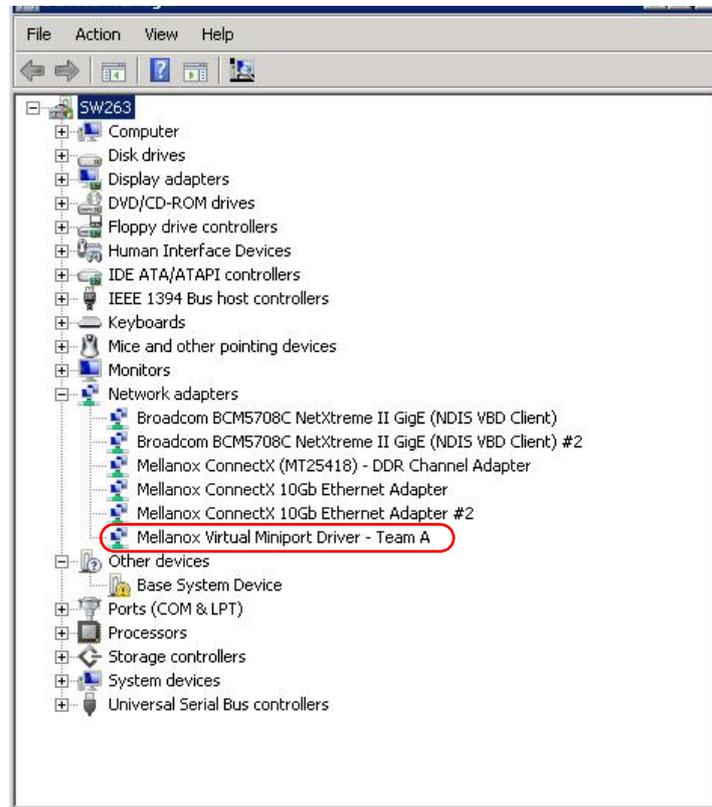
To *create* a new bundle, perform the following:

- Click the Create button
- Enter a (unique) bundle name
- Select a bundle type
- Select the adapters to be included in the bundle (that haven't been associated with a VLAN)
- Select Primary Adapter (optional)
- Click the Commit button



– The newly created virtual Mellanox adapter representing the bundle will be displayed by Device Manager under “Network adapters” in the following format (see figure below):

Mellanox Virtual Miniport Driver - Team <bundle_name>



To *modify* an existing bundle, perform the following:

- Select the desired bundle and click Modify
- Modify the bundle name, its type, and/or the participating adapters in the bundle
- Click the Commit button

To *remove* an existing bundle, select the desired bundle and click Remove. You will be prompted to approve this action.

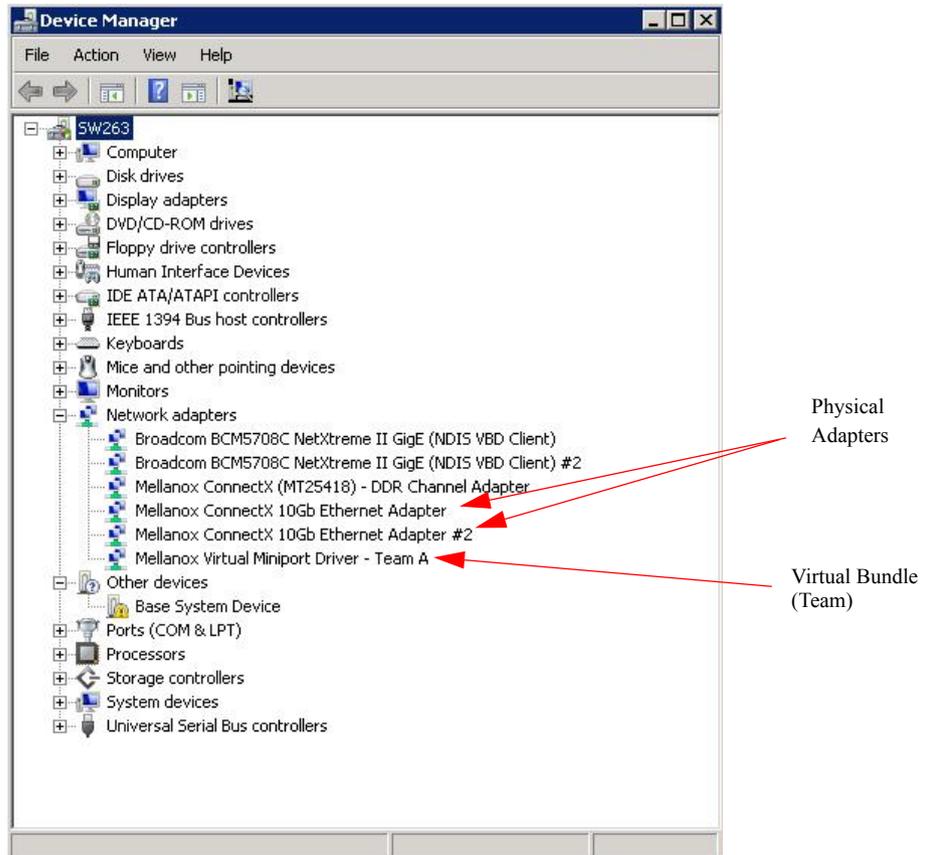
Notes on this step:

- a. Each adapter that participates in a bundle has two properties:
 1. Status: Connected/Disconnected/Disabled
 2. Role: Active or Backup
- b. Each network adapter that is added or removed from a bundle gets refreshed (i.e., disabled then enabled). This may cause a temporary loss of connection to the adapter.
- c. In case a bundle loses one or more network adapters by a create or modify operation, the remaining adapters in the bundle are automatically notified of the change.

10.3 Creating a Port VLAN

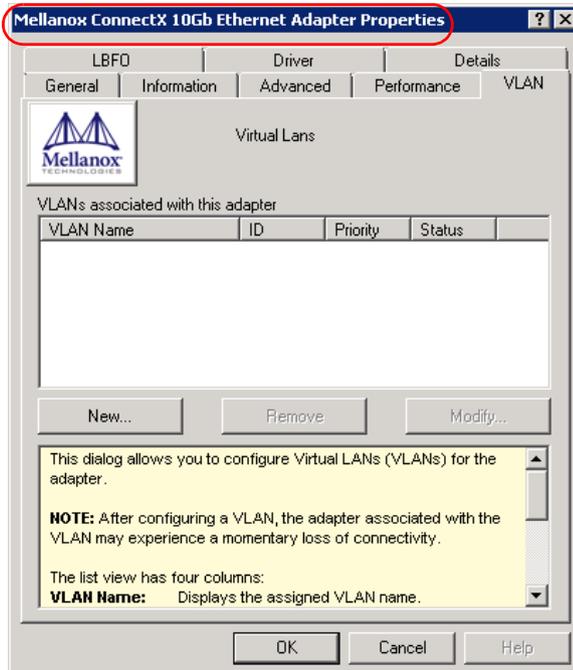
You can create a Port VLAN either on a *physical* Mellanox ConnectX EN adapter or a *virtual* bundle (team). The following steps describe how to create a port VLAN.

Step 1 Display the Device Manager.

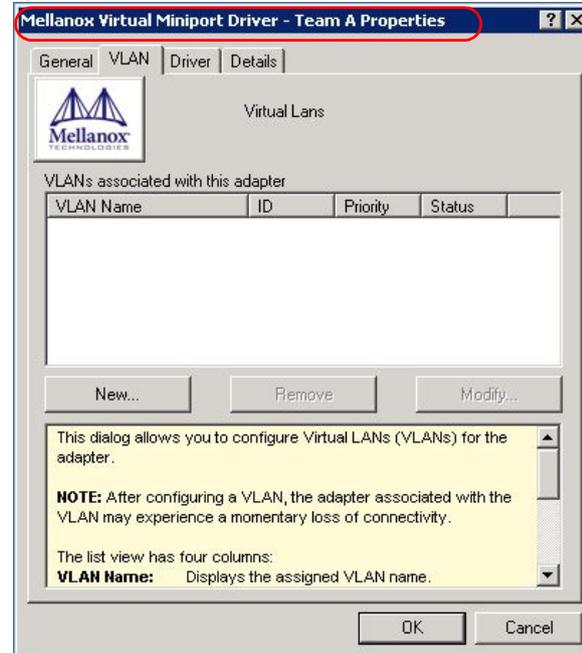


- Step 2.** Right-click a Mellanox network adapter (under “Network adapters” list) and left-click Properties. Select the VLAN tab from the Properties sheet.

Physical Adapter

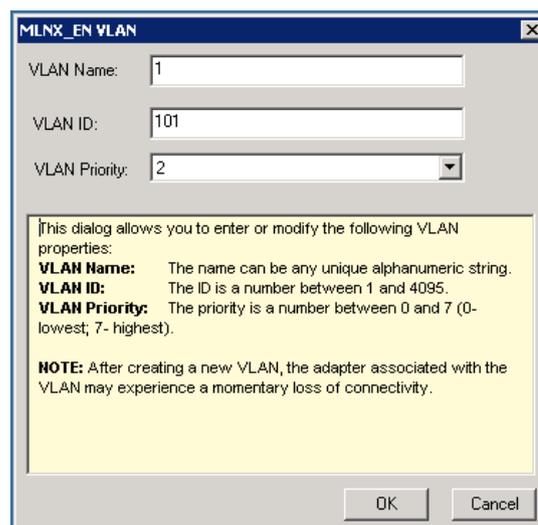


Virtual Bundle (Team)



Note: If a physical adapter has been added to a bundle (team), then the VLAN tab will not be displayed.

- Step 3.** Click New to open a VLAN dialog window. Enter the desired VLAN Name and VLAN ID, and select the VLAN Priority.

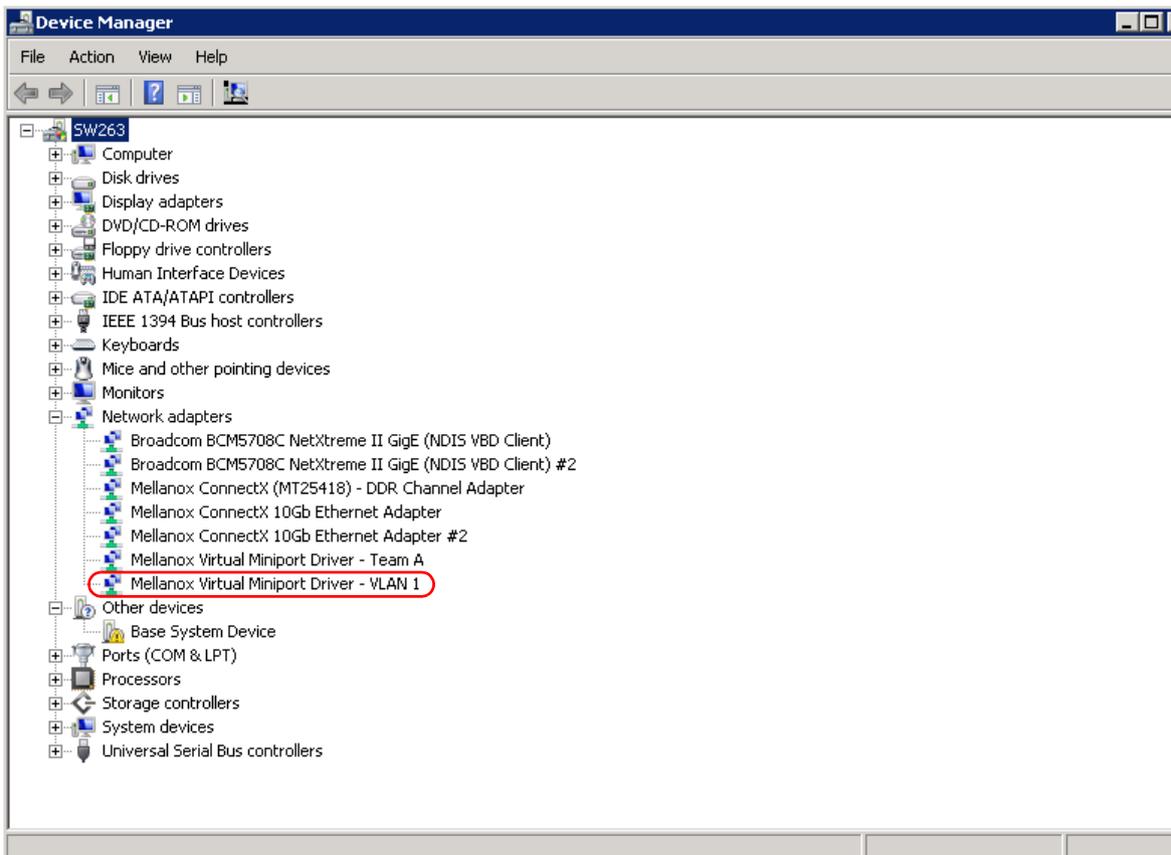


Notes

- After installing the first virtual adapter (VLAN) on a specific port, the port becomes disabled. This means that it is not possible to bind to this port until all the virtual adapters associated with it are removed.
- After creating a new VLAN, make sure to set the IP address.
- When using VLAN, the network address is configured by means of the VLAN ID. Therefore the VLAN ID on both ends of the connection must be the same.

Step 4. Verify the new VLAN(s) by displaying the Device Manager window or the Network Connections window. The newly created VLAN will be displayed in the following format:

Mellanox Virtual Miniport Driver - VLAN <name>



If you wish to assign a static IP address to the new network connection, see [Section 7, “Assigning Port IP After Installation,”](#) on page 15.

10.3.1 Removing a Port VLAN

To remove a port VLAN, perform the following steps:

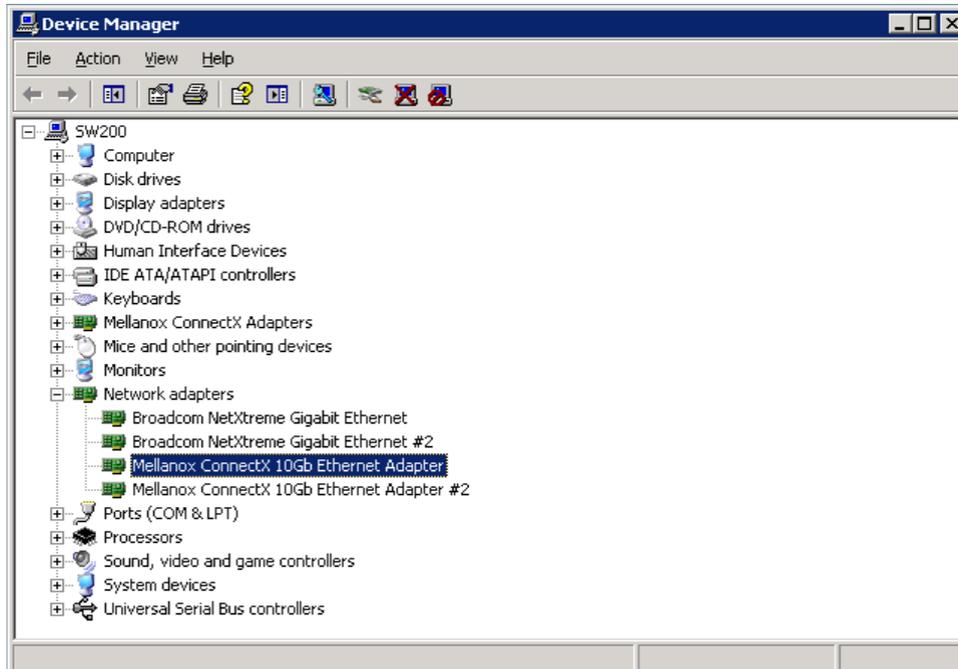
- In the Device Manager window, right-click the network adapter from which the port VLAN was created.
- Left-click Properties.
- Select the VLAN tab from the Properties sheet.

4. Select the VLAN to be removed.
5. Click Remove and confirm the operation.

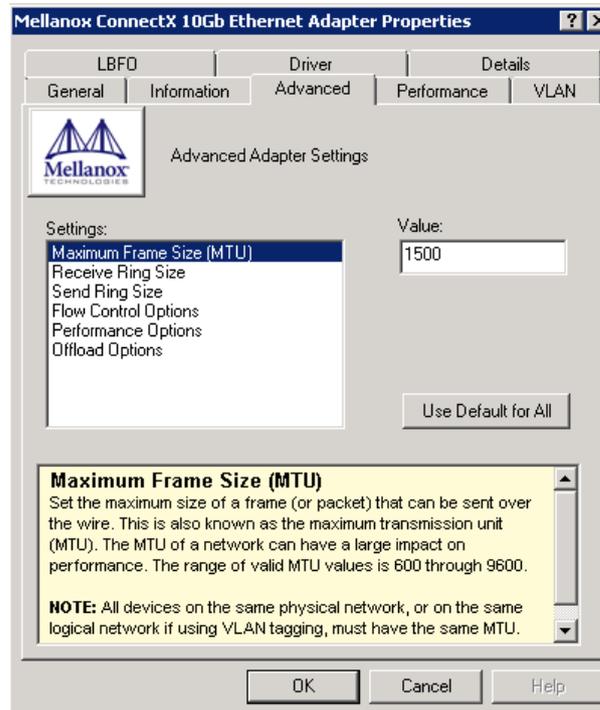
10.4 Configuring Advanced Features

The following steps describe how to configure advanced features.

Step 1 Display the Device Manager.



- Step 2.** Right-click a Mellanox network adapter (under “Network adapters” list) and left-click Properties. Select the Advanced tab from the Properties sheet.

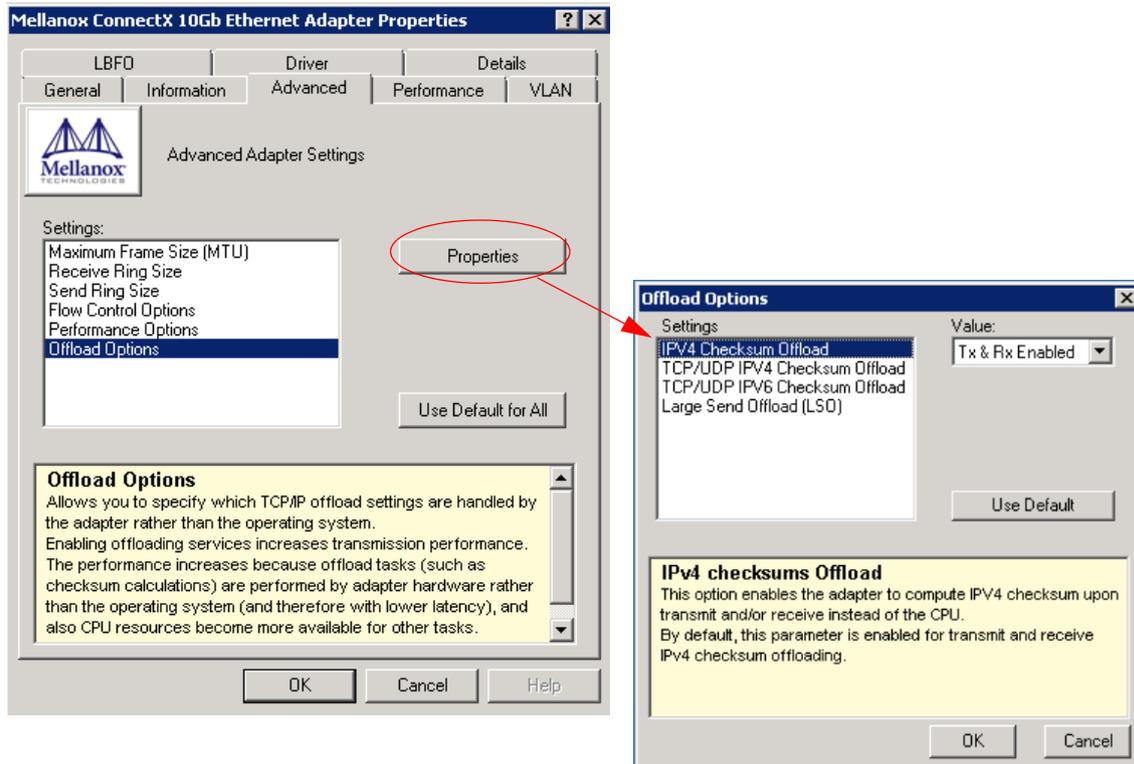


- Step 3.** Modify configuration parameters to suit your system.

Please note the following:

- For help on a specific parameter/option, check the help window at the bottom of the dialog.
- If you select one of the entries Offload Options, Performance Options, or Flow Control Options, you'll need to click the Properties button to modify parameters via a pop-up dialog. See example in the two figures below.
- A “Use Default for All” button appears on the Advanced dialog. Click this button to set all entries (and their sub-entries) to the Mellanox Ethernet driver default values. You will be prompted to approve this action.

d. If you press Cancel, then the last settings will be restored.



10.4.1 Receive Rings in RSS Mode

When Receive Side Scaling (RSS) is enabled, it uses a number of receive rings. Each ring is mapped to a unique CPU. Thus, the maximum number of receive rings is limited by the number of CPUs. As a user, you can set the number of receive rings and the first (or “base”) CPU to which the first receive ring will be mapped. For example, if you set the number of rings to four and designate CPU #2 to be the base CPU, then rings 0, 1, 2, and 3 will be mapped to CPUs 2, 3, 4, and 5, respectively.

The number of receive rings affects network throughput and CPU utilization. [Table 1 on page 37](#) provides recommendations for this parameter. The default number of receive rings in RSS mode is 4.

Table 1 - Recommended Number of Receive Rings in RSS Mode

No. of Receive Rings	Conditions
1	Low CPU utilization is required
2	Good throughput and low CPU utilization are required (default)
4 or more	Applications demand maximum throughput and maximum transactions per second

To set the number of receive rings and the base CPU, perform the following:

- a. Go to the following registry key:
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Ndis\Parameters
- b. Modify the parameter MaxNumRssCpus according to the recommendations in the table above.
- c. Set the parameter RssBaseCpu.

Note: If one or both parameters do not exist, please create them – their type is “REG_DWORD”.

- d. Reboot the machine for the changes to take effect.

10.4.1.1 Updating Firmware

The following steps describe how to burn new firmware downloaded from Mellanox Technologies' Web pages under <http://www.mellanox.com> --> Support --> Firmware Download.

Step 1 Install the firmware tools package, MFT for Windows (WinMFT), on your machine. You can download it from <http://www.mellanox.com> --> Downloads --> Management Tools. Please check also the documentation on the same Web page.

Step 2. Open a CMD console. (Click Start-->Run and enter 'cmd'.)

Step 3. Start mst.

```
> net start mst
```

Step 4. Identify your target device for firmware update.

- a. Get the list of device names on your machine.

```
> mst status
Found 2 devices:
mt25448_pciconf0
mt25448_pci_cr0
```

- b. Your Ethernet device is the one with the postfix “_pci_cr0”. In the example listed above, this will be mt25448_pci_cr0. Use the string “mtXXXXX” to identify the device type by checking the Web page <http://pci-ids.ucw.cz/read/PC/15b3>. In the example above, mtXXXXX=mt25448, and the device is a ConnectX EN.

- c. Query the existing device firmware by running the following:

```
> flint -d mt25448_pci_cr0 q
Image type:      ConnectX
FW Version:      2.6.000
Device ID:       25448
Chip Revision:   A0
Description:     Port1          Port2
MACs:            0002c90018a4      0002c90018a5
Board ID:        n/a (MT_0930110004)      !!! <---- PSID
VSD:             n/a
PSID:            MT_0930110004
```

- d. Now go to the Mellanox firmware download page at:
<http://www.mellanox.com> --> Support --> Firmware Download.
- e. Go to the correct firmware download page according to the device type identified in step (b) above.

Step 5. Using the PSID (Board ID) obtained in Step 4(c), download the appropriate firmware binary image (*.bin.zip) and unzip it.

Note: Make sure that the currently burnt firmware on your device is older than what is provided on the Web page.

Step 6. Burn the firmware image using the `flint` utility (part of your installed WinMFT).

Note: Make sure that you burn the correct binary image to your adapter card. Burning the wrong image may cause severe firmware corruption. Please review Step 4 and Step 5 above.

```
> flint -d mt25448_pci_cr0 -image <image>.bin burn
```

Note: You may need to run 'unzip' on the downloaded firmware image prior to the burn operation.

Step 7. Reboot your machine after the firmware burning is completed.

11 Uninstalling MLNX_VPI

Attended Uninstall

To uninstall MLNX_VPI on a single node, perform *one* of the following options:

- a. Click Start->Control Panel-> Programs and Features-> MLNX_VPI-> Remove. (NOTE: This requires elevated administrator privileges – see Section 1.3.2, “Software Requirements,” on page 4 for details.)
- b. Double click the MSI and follow the instructions of the install wizard.

Unattended Uninstall

To uninstall MLNX_VPI in unattended mode, open a CMD console and enter the following command:

```
> msixec.exe /x MLNX_WinOF_VPI_2.1.3_<arch>.msi /qn /forcerestart
```

Note: The `/forcerestart` parameter forces the machine to restart after uninstalling the MLNX_VPI MSI. This is recommended action for a complete uninstall procedure.

Note: For all command options, enter `msixec.exe /?`.