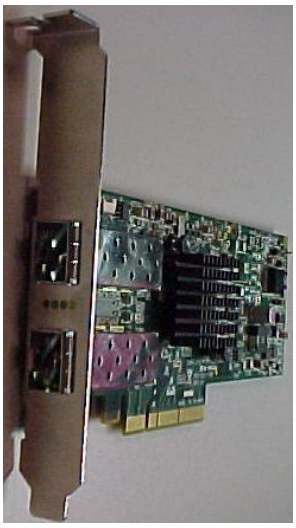
# N-TGE-SFP-01

## PCIe 2-Port 10GBase-SR/LR SFP+ Fiber NIC

## User Guide



- High bandwidth 10Gbps or 1Gbps Network Speed
- Supports IEEE 802.3x Full-Duplex Flow Control
- Compliant with PCIe 2.0 Interface, PCIe 1.1 compatible
- Supports Jumbo Frames up to 10 Kbytes
- Supports VLAN Tx/Rx acceleration (HW VLAN stripping/insertion)
- RoHS compliant

# Contents

# Cautions and Warnings


Circuit devices are sensitive to static electricity, which can damage their delicate electronics. Dry weather conditions or walking across a carpeted floor may cause you to acquire a static electrical charge.

To protect your device, always:

- Touch the metal chassis of your computer to ground the static electrical charge before you pick up the NIC.
- Pick up the NIC by holding it on the left and right edges only.

Before installing the N-TGE-SFP-01, ensure that the system meets the hardware and software requirements listed.

Any PCI slot with the proper configuration is acceptable for connection. If the card is installed in a PCI slot with fewer lanes than the card requires then the adapter card will not provide the optimum data transfer. When more than one PCI slot is available make sure to use the PCI slot with the proper configuration.

## *Safety Warnings*


These products are not intended for use in life support products where failure of a product could reasonably be expected to result in death or personal injury. Anyone using this product in such an application without express written consent of an officer of Transition Networks does so at their own risk, and agrees to fully indemnify Transition Networks for any damages that may result from such use or sale.

**Installation Instructions**: Read all installation instructions before connecting the equipment to the power source.

**Over-temperature**: This equipment should not be operated in an area with an ambient temperature exceeding the maximum recommended.

**During Lightning - Electrical Hazard**: During periods of lightning activity, do not work on the equipment or connect or disconnect cables.

**Equipment Installation**: This equipment should be installed, replaced, or serviced only by trained and qualified personnel.

**Equipment Disposal**: Disposal of this equipment should be in accordance to all national laws and regulations.

**Local and National Electrical Codes**: This equipment should be installed in compliance with local and national electrical codes.

# 1. Introduction

## *Overview*

Transition Networks' N-TGE-SFP-01 is a 10 Gigabit Ethernet Fiber SFP+ to PCIe x8 bus Network Interface Card (NIC) that fully complies with IEEE 802.3ae 10GBase-SR/LR and IEEE 802.3z 1GBase-X standards.

It provides up to 20Gbps full-duplex bandwidth capacity to support high-end servers. It is suitable for data center, enterprise, SMB, and cloud computing applications.

## *Package Contents*

Before you start installing the PCIe 10GBase-SR/LR Fiber Adapter, verify that the package contains the following items:

- ☐ N-TGE-SFP-01 10G NIC
- ☐ Low Profile Mounting Bracket
- ☐ Product Documentation Postcard (33504)

The LAN Driver and this User's Manual are at www.transition.com.

Please notify your sales representative immediately if any of the above items are missing or damaged.

## *Models / Part Numbers*

| Part Number | Description |
|---|---|
| N-TGE-SFP-01 | PCIe 2-Port 1GBase-X SFP and 10GBase-SR/LR SFP+ Fiber NIC. |

Note that SFP and SFP+ Modules are sold separately. For Transition Networks SFP/XFP Optical Transceivers see http://www.transition.com/TransitionNetworks/Landing/SFP-XFP/SFP-XFP.aspx.

# 2. Installation

## *Installing the N-TGE-SFP-01 NIC*

The following instructions apply to installing the N-TGE-SFP-01 NIC in most systems. Refer to the manual(s) supplied with your system for details about performing these tasks on your particular system.

To install the N-TGE-SFP-01 NIC, perform the following steps:

**Warning**

Before installing the NIC, ensure the system power is OFF and unplugged from the power outlet, and that proper electrical grounding procedures have been followed.

1. Make sure the power is off before removing the cover.
2. Remove the system cover and select any empty PCIe slot. See Figure 1 below.
   If you do not know how to identify a PCIe slot, refer to your system documentation.

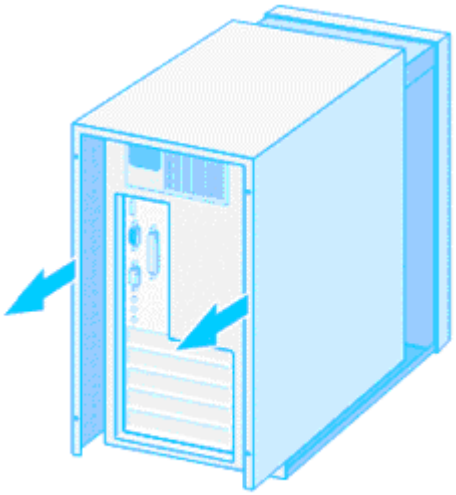


Figure 1 Removing the PC Cover

3. Select an empty, non-shared PCIe slot and remove the faceplate. Keep the faceplate in a safe place. You may need it for future use. See Figure 2 below.

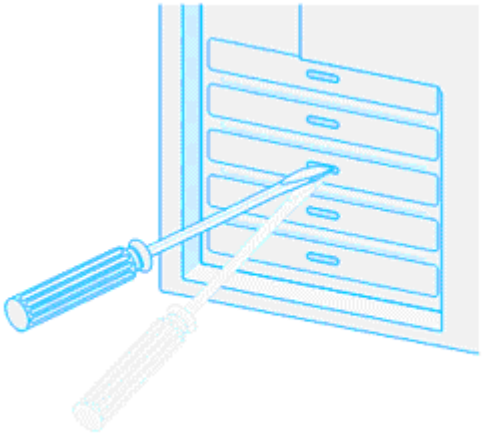


Figure 2 Removing the Faceplate From PCIe slot

**Note**: If you cannot locate or don't know how to find a PCIe slot, refer to the documentation that came with your system.

4. Take the N-TGE-SFP-01 NIC from the shipping package and store the packaging material in a safe location. A Low Profile bracket is includedwith the NIC; install the optional bracket if the installation device requires it.

**Caution**

Wear a grounding device and observe electrostatic discharge precautions when installing the NIC in a system. Failure to observe this caution could result in damage to the NIC.

5. Applying even pressure at both corners of the NIC, push the NIC until it is firmly seated in the PCIe slot. Make sure the NIC is securely seated. See Figure 3 below.

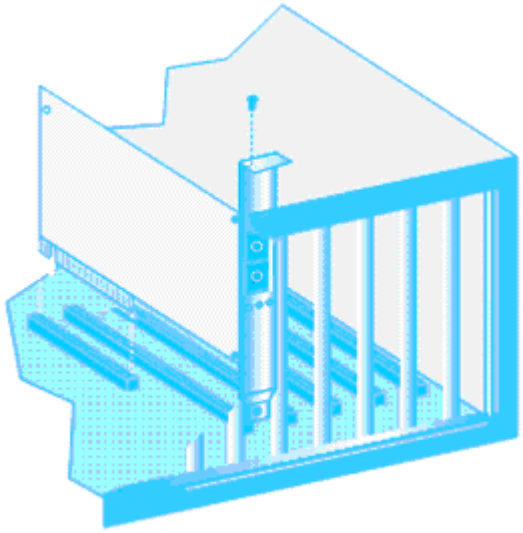


Figure 3

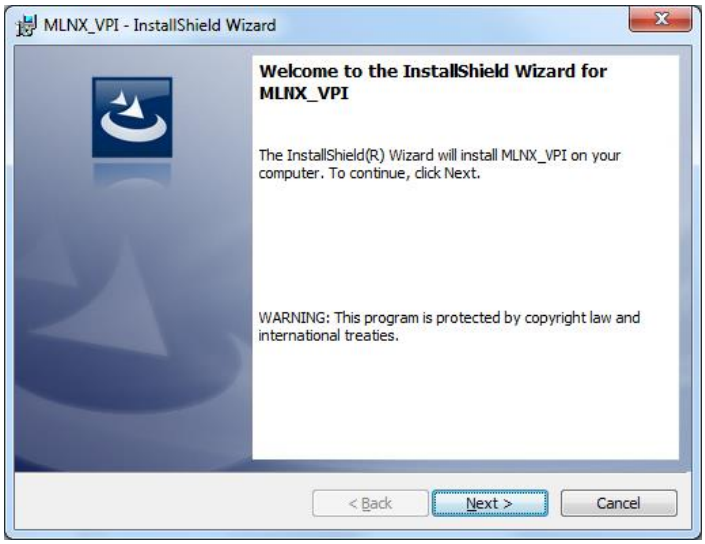
6. Put the system's cover back on and fasten it with the screws removed in Step 2 above.
7. Connect the fiber optic cable.
8. Disconnect any personal antistatic devices.
9. Power the system on.

# *Downloading and Installing the Driver*

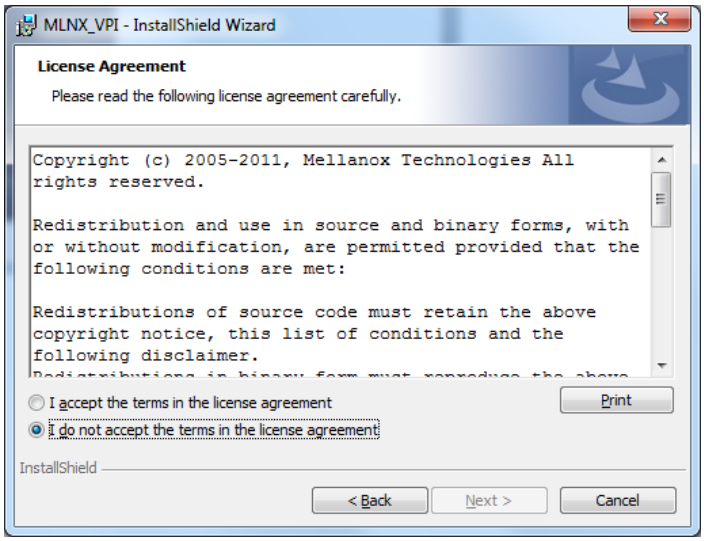
After installing the N-TGE-SFP-01 NIC, if the system does not automatically do so, download the driver from www.transition.com and follow the procedure below.

## *MLNX_VPI* Installation

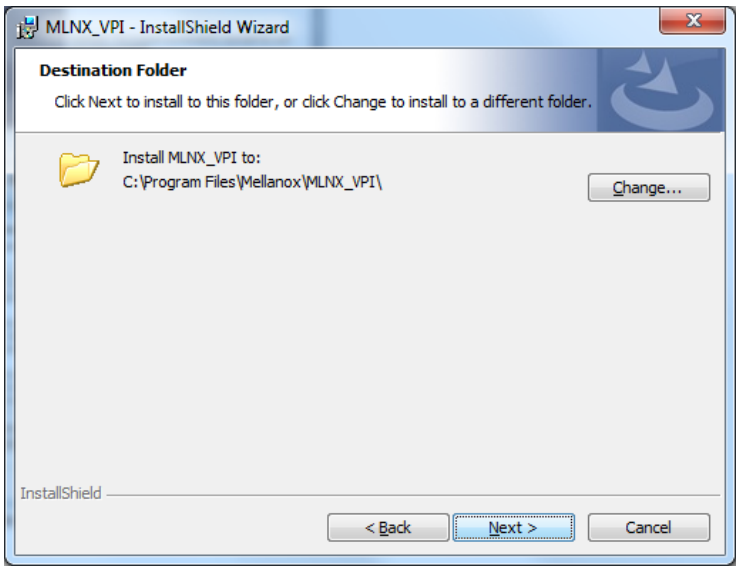
1. At the Driver install location, double click on "*MLNX_VPI_WinOF-3_2_0_win7_x64.exe*". The *Preparing to Install...* screen displays for a few moments, and then the Welcome screen displays.



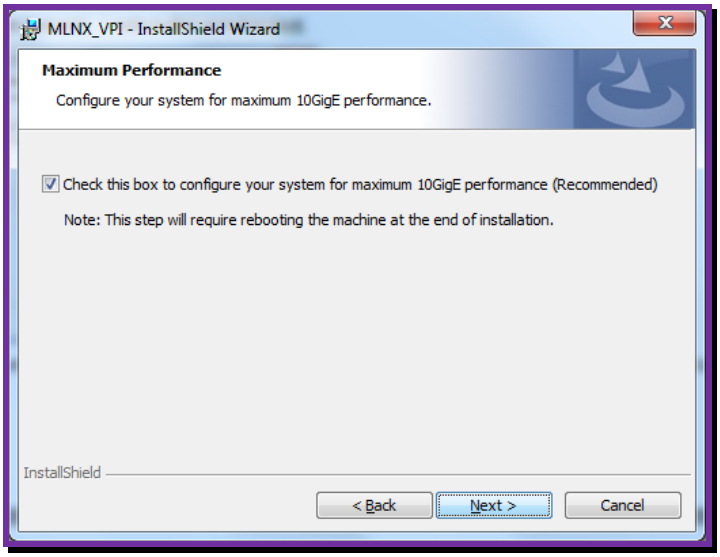

2. Click the **Next** button.



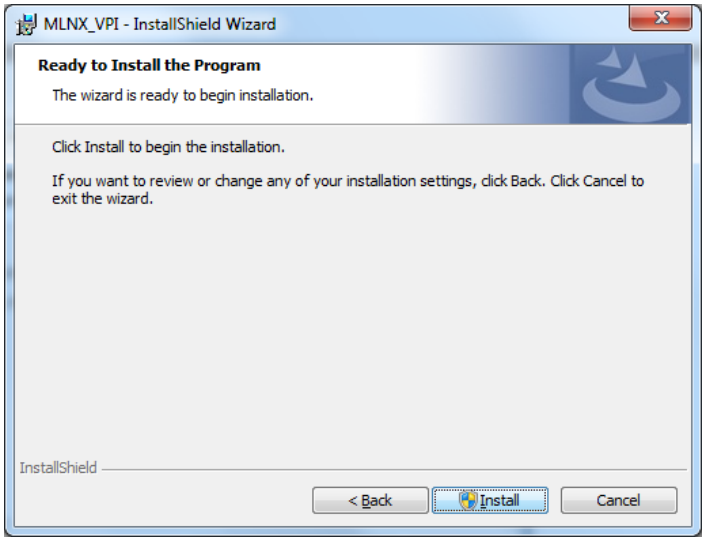

3. Select the "**I accept ...**" radio button and click **Next**.



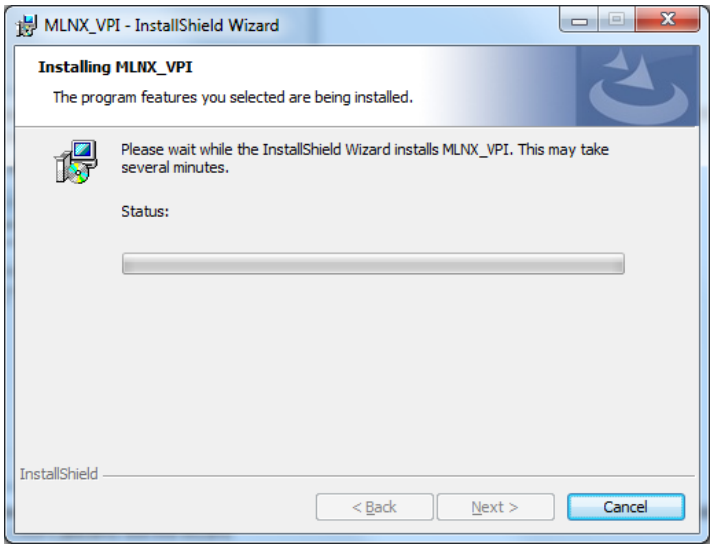

4. Click **Next** to accept the default Destination folder (*C:\Program Files\Mellanox\MLNX_VPI*) **or** click **Change...** and navigate to another location and click **Next**.




5. At the Maximum Performance screen, check or uncheck the box to configure your system for maximum 10GigE performance (Recommended). **Note**: If checked, this step will require rebooting the machine at the end of installation.
6. Click the **Next** button.

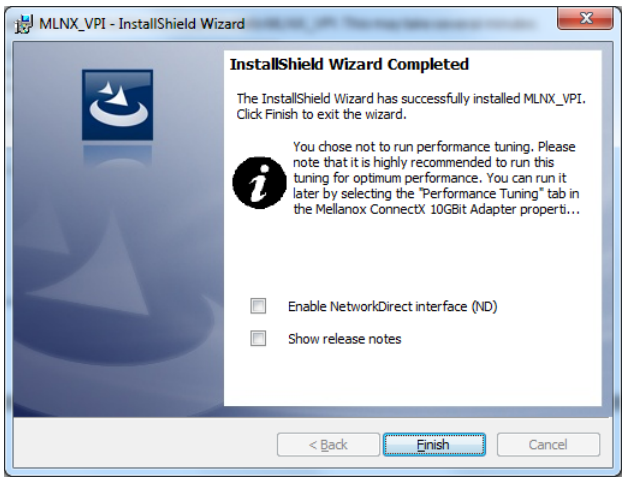


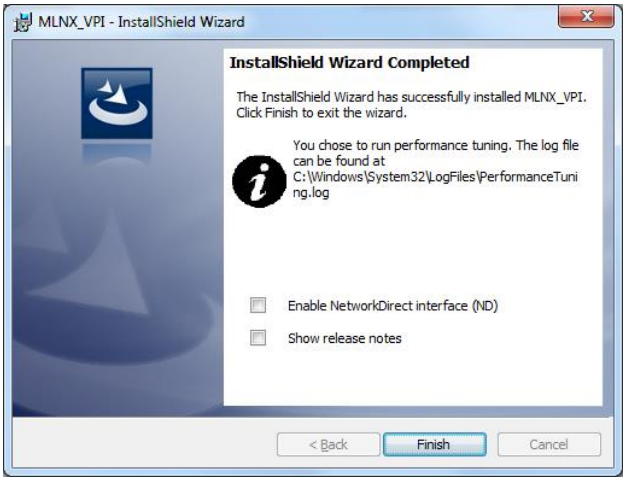

7. At the **Ready to Install** screen, click the **Install** button. If you want to review or change any of your installation settings, click **Back**. Click **Cancel** to exit the wizard.
8. If a User Access Control (UAC) screen displays, select **Yes**. The install process begins and a Status screen displays.




9. Please wait while the InstallShield Wizard installs MLNX_VPI. This may take several minutes.

10. An *InstallShield Wizard Completed* screen displays; the informational note that displays depends on whether you chose to run performance tuning in step 5 above.




11. At the InstallShield Wizard Completed screen, observe any informational notes and check or uncheck the displayed options:

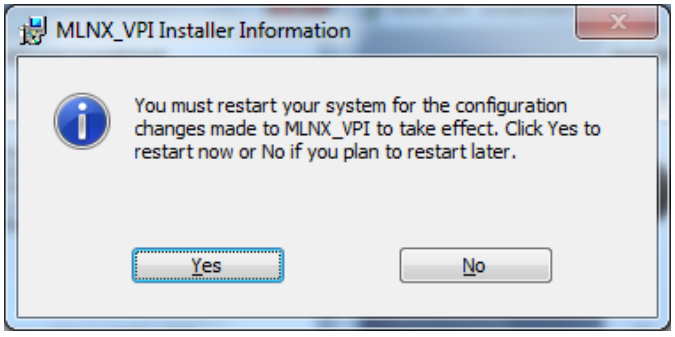
    □ Enable NetworkDirectinterface (ND)

    □ Show release notes

12. Click the **Finish** button. The Release Notes display if the option was checked in step 11 above. The MLNX_VPI application installs at the Destination folder (e.g., by default at *C:\Program Files\Mellanox\MLNX_VPI*) or another location as selected in step 5 above.

    The log file can be found at *C:\Windows\System32\LogFiles\PerformanceTuning.log*.

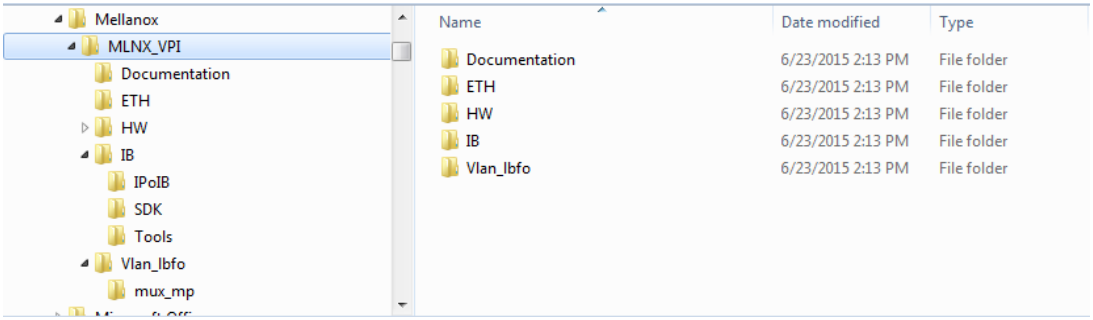
13. The MLNX_VPI Installer Information dialog displays indicating that "*You must restart your system for the configuration changes made to MLNX_VPI to take effect. Click **Yes** to restart now or **No** if you plan to restart later*."



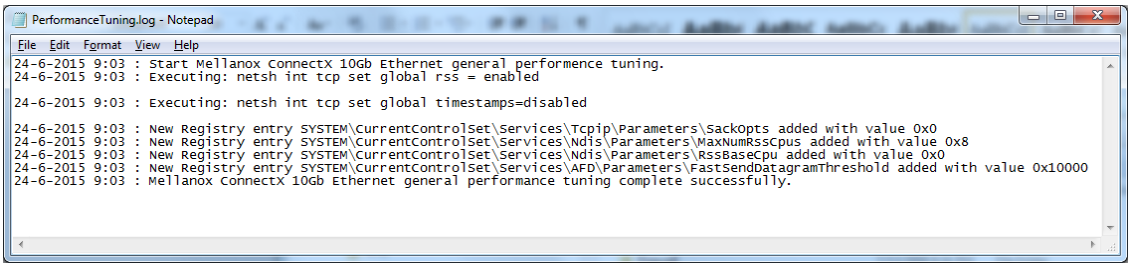

14. Click **Yes** to restart now or **No** if you plan to restart later.

15. Reboot the machine if you unchecked the "10GigE performance (Recommended)" checkbox option in step 5.

An example of the install destination folder (*C:\Program Files\Mellanox\MLNX_VPI*) is shown below




Below is an example of the log file found at *C:\Windows\System32\LogFiles\PerformanceTuning.log*.




## *Additional Driver Information*

See http://www.mellanox.com/related-docs/prod_software/Mellanox_EN_for_Linux_User_Manual_v2_2-1_0_1.pdf for the Linux driver manual.

## *PXE Remote Boot Information*

The N-TGE-SFP-01 supports the Mellanox ConnectX® EN PXE solution that enables booting servers from an IP-based LAN environment. To enable or disable PXE use the MFT tools. To disable, delete the PXE ROM image from the flash. To enable, place the PXE ROM image to the flash. This software is based on the open source Etherboot/gPXE project (see www.etherboot.org). For more details go to www.mellanox.com Products > Ethernet SW/Drivers > ConnectX EN PXE. Mellanox® is a registered trademark of Mellanox Technologies, Ltd.

## *SFP/SFP+ Optical Modules*

SFP+ transceiver modules can be used to connect fiber optic cables to the NIC card, greatly increasing the cable reach. Note that the NIC cards are shipped without SFP modules.

### Inserting the SFP/SFP+ Module

To insert the module into the cage:

1. Open the module's locking mechanism.
2. Make sure that the male connectors on the module will align with the female connectors inside of the cage. Also check that there is no dirt or foreign matter in the module or in the cage.
3. Insert the module into the adapter card module cage.
4. Close the locking mechanism.

**Note**: If you insert a 1G SFP module in the NIC, you must also use a 1G SFP at the connected equipment. If you insert a 10G SFP module in the NIC, you must also use a 10G SFP at the connected equipment.

To remove the module from the cage:

1. Unlock the locking mechanism by opening the handle.
2. Pull the module out of the cage.

# 3. LED Indicators

The NIC has two LEDs located on the bracket.

The green LED, when lit, indicates that the driver is running and a valid physical connection between nodes exists. If the green LED is blinking, it indicates a problem with the physical link.

The yellow LED when lit, indicates a valid data activity link; this is the logical link. The yellow LED lights when the network is discovered over the physical link.

A valid data activity link without data transfer is designated by a constant yellow LED indication.

A valid data activity link with data transfer is designated by a blinking yellow LED indication.

If the LEDs are not active, either the physical link or the logical link (or both) connections have not been established.

| LED | Color | Function |
|---|---|---|
| Port 1 LINK | Green | Physical Link; Constant on indicates a good physical link.<br>Blinking indicates a problem with the Physical link. |
| Port 1 ACT | Amber | Data Activity; Blinking indicates Data Transfer.<br>Constant on indicates no Data Transfer. |
| Port 2 LINK | Green | Physical Link; Constant on indicates a good physical link.<br>Blinking indicates a problem with the Physical link. |
| Port 2 ACT | Amber | Data Activity; Blinking indicates Data Transfer.<br>Constant on indicates no Data Transfer. |

# 4. Network Parameters

| | |
|---|---|
| ***Multi-mode Fiber 62.5/125um, 50/125um*** | |
| 10G-SR Full Duplex | 850nm (Wavelength)<br>300m (OM3,50/125μm) |
| ***Single-mode Fiber 9/125 um*** | |
| 10G-LR Full Duplex | 1310nm or 1550nm<br>(Wavelength) 10Km |

**Note**: The supported fiber type and transmission distance depend on the SFP/SFP+ module installed in the NIC's SFP slot. Note that SFP and SFP+ modules are sold separately.

# 5. Technical Specifications

## *Standards*

ETHERNET – IEEE Std 802.3ae 10 Gigabit Ethernet —IEEE Std 802.3ak 10GBASE-CX4 —IEEE Std 802.3ap Backplanes, including FEC —IEEE Std 802.3ad Link Aggregation and Failover —IEEE Std 802.1Q VLAN tags, .1p Priorities —IEEE P802.1au D2.0 Congestion Notification —IEEE P802.1az D0.2 Enhanced Transmission Selection —IEEE P802.1bb D1.0 Priority-based Flow Control —Jumbo frame support (10KB) —128 MAC/VLAN addresses per port – IEEE Std 802.3z 1 Gigabit Ethernet

TCP/UDP/IP STATELESS OFFLOAD —TCP/UDP/IP checksum offload —TCP Large Send (< 64KB) or Giant Send (64KB-16MB) Offload for segmentation —Receive Side Scaling (RSS) up to 32 queues —Line rate packet filtering

ADDITIONAL CPU OFFLOADS —RDMA over Converged Ethernet —FC checksup offload —VMDirect Path support —Traffic steering across multiple cores —Intelligent interrupt coalescence —Compliant to Microsoft RSS and NetDMA

HARDWARE-BASED I/O VIRTUALIZATION —Single-Root IOV —Address translation and protection —Dedicated adapter resources and guaranteed isolation —Multiple queues per virtual machine —Hardware switching between guest OSs —Enhanced QoS for vNICs —VMware NetQueue Support

STORAGE SUPPORT —T11.3 FC-BB-5 FCoE

### Fiber Optic Cable

- 62.5/125, 50/125$\mu$m multi-mode
- 9/125$\mu$m single-mode

### Data Transfer Mode/Speed

- Full duplex (Default)
- 10Gbps speed (14,880,000 pps)
- 1Gbps speed (1,190,476 pps)

### Diagnostics LEDs on Bracket

- Port 1 LNK, Port 1 ACT
- Port 2 LNK, Port 2 ACT

### OS Support

RedHat Enterprise Linux v5, VMware ESXi 4.0 Server, Windows Server 2003 (Service Pack 2) or Server 2003 R2, Windows 2008 Server, Windows 7 64-bit, XenServer 5.6.

## Specifications

| | |
|---|---|
| **Bus Slot** | PCIe 2.0 Compliant; PCIe 1.1 compatible;<br>Fits x8 or x16 slots |
| **PCI Express Interface** | 2.5GT/s or 5.0GT/s link rate x8 (20+20GB/s or 40+40Gb/s bidirectional bandwidth |
| **SFP+ module power dissipation** | Up to 1.0 W (Power Level I module) |
| **Ambient Temperature** | 0° to 50° C |
| **Operating Temperature** | 0° to 40° C |
| **Humidity** | 5% to 90% |
| **Emissions** | Complies with EMI Standard<br>FCC Class B<br>CE Mark |
| **Dimensions** | 168 mm (L) x 64 mm (H);<br>6.61 inches (L) x 2.52 inches (H) |
| **Weight** | 0.07 Kg (2.47 Oz.) |
| **Warranty** | Lifetime |

# 6. Troubleshooting

If the N-TGE-SFP-01 NIC fails, isolate and correct the fault by determining the answers to the following questions and then taking the indicated action:

1. Verify that section 5. Technical Specifications (page 13) are met.
2. Verify that section 2. Installation instructions on page 4 were followed.
3. Is the green LINK LED lit indicating link up?

   NO

   • Ensure the switch port is not down.
   • Remove the failed adapter and reboot the system.
   • Reseat the NIC in its PCI slot or insert the NIC in a different PCI slot.
   • If the PCI slot is known to be functional, replace the adapter.
   • Contact Tech Support. See Contact Us on page 18.

   YES

   • Proceed to step 4.
4. Is the amber ACT LED blinking indicating traffic is present?

   NO

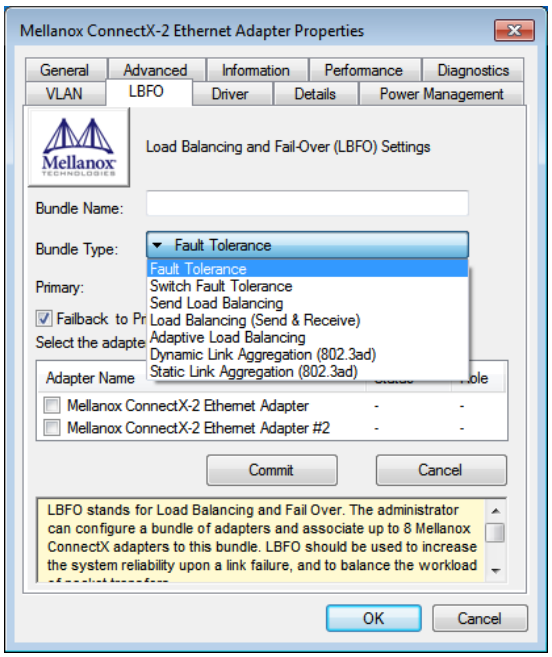
   • Check the cables for proper connection.
   • Ensure that the cable is connected on both ends or use a known working cable
   • If there is port activity, disconnect / reconnect the cable to restart the initialization process.
   • Restart the workstation to restart the initialization process.
   • Contact Tech Support. See Contact Us on page 18.
5. Check the log file found at *C:\Windows\System32\LogFiles\PerformanceTuning.log*. For example:

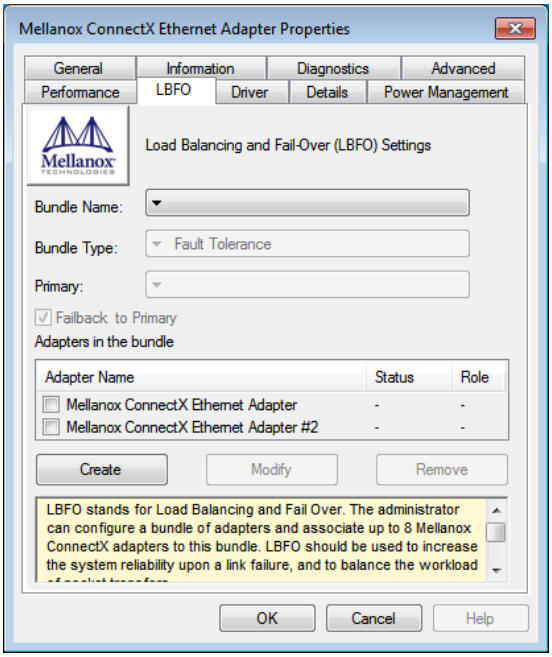
```
24-6-2015 9:03 : Start Mellanox ConnectX 10Gb Ethernet general performence tuning.
24-6-2015 9:03 : Executing: netsh int tcp set global rss = enabled


24-6-2015 9:03 : Executing: netsh int tcp set global timestamps=disabled


24-6-2015 9:03 : New Registry entry SYSTEM\CurrentControlSet\Services\Tcpip\Parameters\SackOpts added with
value 0x0
24-6-2015 9:03 : New Registry entry SYSTEM\CurrentControlSet\Services\Ndis\Parameters\MaxNumRssCpus added
with value 0x8
24-6-2015 9:03 : New Registry entry SYSTEM\CurrentControlSet\Services\Ndis\Parameters\RssBaseCpu added
with value 0x0
24-6-2015 9:03 : New Registry entry
SYSTEM\CurrentControlSet\Services\AFD\Parameters\FastSendDatagramThreshold added with value 0x10000
24-6-2015 9:03 : Mellanox ConnectX 10Gb Ethernet general performance tuning complete successfully.
```

5. Check theRelease Notes for new features, changes, and known issues *at C:\Program Files\Mellanox\MLNX_VPI\Documentation* by default.

## *Load Balancing and Fail-Over (LBFO) Settings*

Load Balancing and Fail Over (LBFO) lets an administrator configure a 'bundle' of adapters and associate up to eight adapters to this bundle. LBFO should be used to increase the system reliability upon a link failure, and to balance the workload of packet transfers.




The following LBFO types are supported:

**Fault Tolerance** - provides redundancy through automatic fail-over from an active adapter to a standby adapter in case of switch port, cable, or adapter failure.

**Send Load Balancing** - provides transmit traffic load balancing and fault tolerance in the event of switch port, cable, or adapter failure. In this mode, the transmit traffic is balanced across member adapters based on the source and destination nodes. Note that only one adapter accepts all receive traffic.

**Team attributes**
Primary: Sets the designated primary adapter of the team.
Status: Shows the status of the specific adapter. Values are *Connected*, *Disconnected*, *Disabled*.
Role: Shows the current role of the adapter in the team. Values are: *Active* and *Backup*.

**Note:** The N-TGE-SFP-01 uses an IC manufactured by Mellanox.

- Only Mellanox-based ConnectX Mellanox adapters can be part of the bundle.
- The bundle can contain up to eight Mellanox-based ConnectX adapters.
- All the adapters in the bundle must have the same RSS, MTU, Offloading options, and LBFO type. If you attempt to add or modify an adapter with non-compatible properties, this adapter will be removed from the bundle and an event log will be issued.
- With the Primary adapter disconnected, a different adapter may takethe Active role.

# 7. Warranty and Contact Information

## *Warranty*

### Limited Lifetime Warranty

Effective for Products Shipped May 1, 1999 and After. Every Transition Networks labeled product purchased after May 1, 1999, and not covered by a fixed-duration warranty will be free from defects in material and workmanship for its lifetime. This warranty covers the original user only and is not transferable.

This warranty does not cover damage from accident, acts of God, neglect, contamination, misuse or abnormal conditions of operation or handling, including over-voltage failures caused by use outside of the product's specified rating, or normal wear and tear of mechanical components. If the user is unsure about the proper means of installing or using the equipment, contact Transition Networks free technical support services.

Transition Networks will, at its option:

- Repair the defective product to functional specification at no charge
- Replace the product with an equivalent functional product
- Refund a portion of purchase price based on a depreciated value

**Return Authorization**

To return a defective product for warranty coverage, contact Transition Networks's technical support department for a return authorization number. See Contact Us below for ways to contact Transition Networks' technical support department.

### Return Instructions

Send the defective product postage and insurance prepaid to the following address:

Transition Networks, Inc.
10900 Red Circle Drive
Minnetonka, MN 55343 USA
Attn: RETURNS DEPT: CRA/RMA # _____

Failure to properly protect the product during shipping may void this warranty. The return authorization number must be written on the outside of the carton to ensure its acceptance. We cannot accept delivery of any equipment that is sent to us without a CRA or RMA number.
CRA's are valid for 60 days from the date of issuance. An invoice will be generated for payment on any unit(s) not returned within 60 days.

Upon completion of a demo/ evaluation test period, units must be returned or purchased within 30 days. An invoice will be generated for payment on any unit(s) not returned within 30 days after the demo/ evaluation period has expired.

The customer must pay for the non-compliant product(s) return transportation costs to Transition Networks for evaluation of said product(s) for repair or replacement. Transition Networks will pay for the shipping of the repaired or replaced in-warranty product(s) back to the customer (any and all customs charges, tariffs, or/and taxes are the customer's responsibility).
Before making any non-warranty repair, Transition Networks requires a $200.00 charge plus actual shipping costs to and from the customer. If the repair is greater than $200.00, an estimate is issued to the customer for authorization of repair. If no authorization is obtained, or the product is deemed 'not repairable', Transition Networks will retain the $200.00 service charge and return the product to the customer not repaired. Non-warranted products that are repaired by Transition Networks for a fee will carry a 180-day limited warranty. All warranty claims are subject to the restrictions and conventions set forth by this document.

Transition Networks reserves the right to charge for all testing and shipping incurred, if after testing, a return is classified as "No Problem Found."

THIS WARRANTY IS YOUR ONLY REMEDY. NO OTHER WARRANTIES, SUCH AS FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSED OR IMPLIED. TRANSITION NETWORKS IS NOT LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE OR THEORY. AUTHORIZED RESELLERS ARE NOT AUTHORIZED TO EXTEND ANY DIFFERENT WARRANTY ON TRANSITION NETWORKS'S BEHALF.

## *Contact Us*

**Technical support**

Technical support is available 24-hours a day

US and Canada: 1-800-260-1312

International: 00-1-952-941-7600

**Transition now**

Chat live via the Web with Transition Networks Technical Support.

Log onto www.transition.com and click the **Transition Now** link.

**Web-based seminars**

Transition Networks provides seminars via live web-based training.

Log onto www.transition.com and click the **Learning Center** link.

**E-Mail**

Ask a question anytime by sending an e-mail to our technical support staff.

techsupport@transition.com

**Address**

Transition Networks
10900 Red Circle Drive
Minnetonka, MN 55343, U.S.A.
Telephone: 952-941-7600
Toll free: 800-526-9267
Fax: 952-941-2322

# 8. Compliance Information

## *Declaration of Conformity*

### Declaration of Conformity

*Transition Networks, Inc.*
Manufacturer's Name

*10900 Red Circle Drive, Minnetonka, Minnesota 55343 U.S.A.*
Manufacturer's Address

***Declares that the products:***

**N-TGE-SFP-01**

PCIe 2-Port 10GBase-SR/LR SFP+ Fiber NIC

***Conform to the following Product Regulations:***

FCC Part 15, Subpart B, Class B.
CISPR 22:A1:2000+A2:2002;ICES-003:2004, Class B

EMI: EN55022:2006, EN61000-3-2:2000, EN61000-3-3:1995+A1/2001+A2/2005, and EN61000-6-3:2001
EMS: EN55024/1998+A1:2001+A2:2003, EN61000-4-2:2001, EN61000-4-3:2002+A1:2002,
EN61000-4-4:2004, EN61000-4-5:2001, EN61000-4-6:2003, and EN61000-4-11:2001

**I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standards(s).**

| *Minnetonka, Minnesota* | *April 29, 2015* | *Stephen Anderson* | |
|---|---|---|---|
| Place | Date | Signature | |
| | | *Stephen Anderson* | *Vice President of Engineering* |
| | | Full Name | Position |

28141B

## *Electronic Emission Notices*

### Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the FCC Part 15, Subpart B, Class B. CISPR 22:A1:2000+A2:2002;ICES-003:2004, Class B

### European Community (CE) Electromagnetic Compatibility Directive

This equipment has been tested and found to comply with the protection requirements of European Emission Standard EN55022 and EN55024.

| | |
|---|---|
| **EMI** | EN55022:2006<br>EN61000-3-2:2000<br>EN61000-3-3:1995+A1/2001+A2/2005<br>EN61000-6-3:2001 |
| **EMS** | EN55024/1998+A1:2001+A2:2003 |
| | EN61000-4-2:2001 |
| | EN61000-4-3:2002+A1:2002 |
| | EN61000-4-4:2004 |
| | EN61000-4-5:2001 |
| | EN61000-4-6:2003 |
| | EN61000-4-11:2001 |

# 9. Record of Revisions

| Rev | Date | Notes |
|---|---|---|
| A | 6/26/15 | Manual released for N-TGE-SFP-01. |
| B | 1/22/18 | Update information on PXE remote boot, contact, and 1Gbps SFP. |

# Appendix A - Windows 7 Throughput Optimization Tips

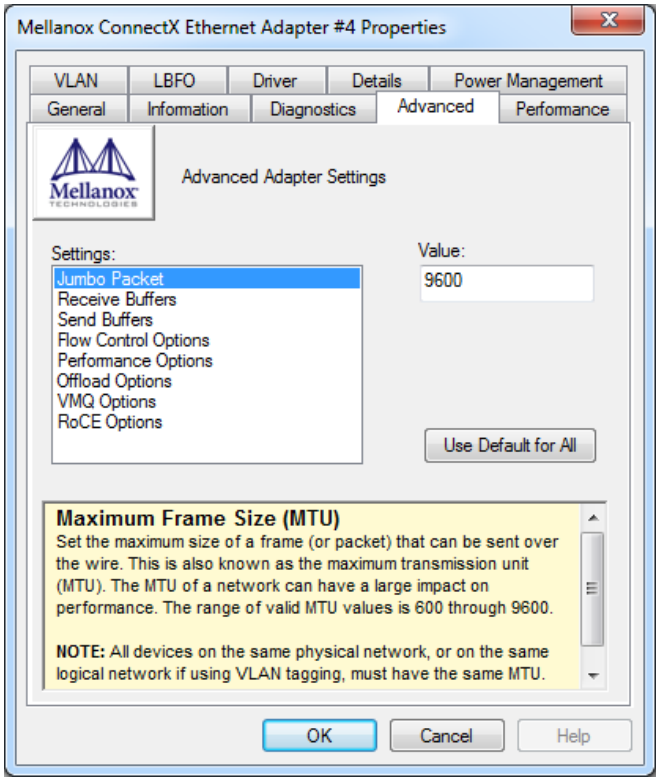
When used in Windows 7, the default settings for a 10Gb NIC may result in throughput that is lower than desired. The reduced throughput is often due to bottlenecks within Windows, and not necessarily a limitation of the 10Gb NIC. In a test bed using Desktop PCs that utilize 2nd generation i5 processors, and the program NTtTCP to measure TCP performance, we observed good TX throughput and not-so-good RX throughput. This section reveals NIC parameters that can be adjusted to compensate for the Windows bottlenecks and improve throughput on a Transition Networks N-TGE-SFP-01 10Gb NIC:

**1. Use Jumbo Frames.** Increasing the MTU from 1500 to 9600 will have a two-fold effect in current Windows 7 desktops. Most importantly, it greatly reduces the frames per second required to achieve line-rate during data transfer, which in-turn reduces the Desktop PC's resource requirements during large data transfers. Data transfers that are CPU bound at the default MTU will benefit greatly from using Jumbo Frames. Additionally, using 9K Jumbo Frames will increase the max theoretical payload throughput from 9.4Gbps to 9.9Gbps.

Using commodity desktop PCs with 4th Generation i5 processors, we have observed data receive rates that peaked in the 3-5Gbps range, when all NIC settings were at defaults. Changing the Jumbo Packet setting from 1500 to 9600 increased the data transfer throughput to 8+Gbps on these PCs.

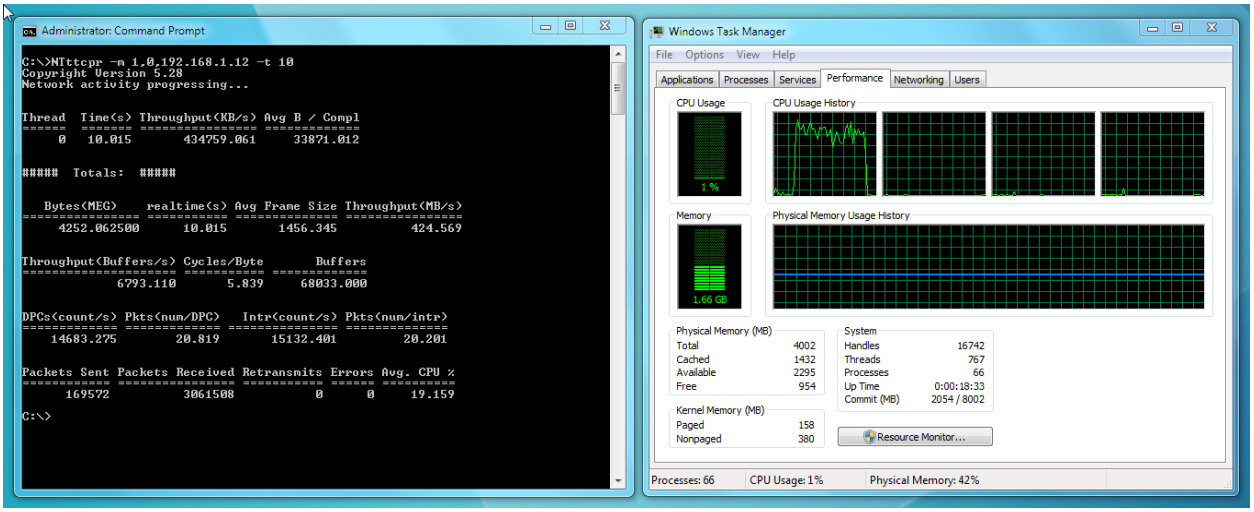
To change the max MTU, navigate to:

Control Panel → Network and Internet → Network and Sharing Center → Change Adapter Settings → Local Area Connection 'X' → Properties → Configure → Advanced Tab → Jumbo Packet



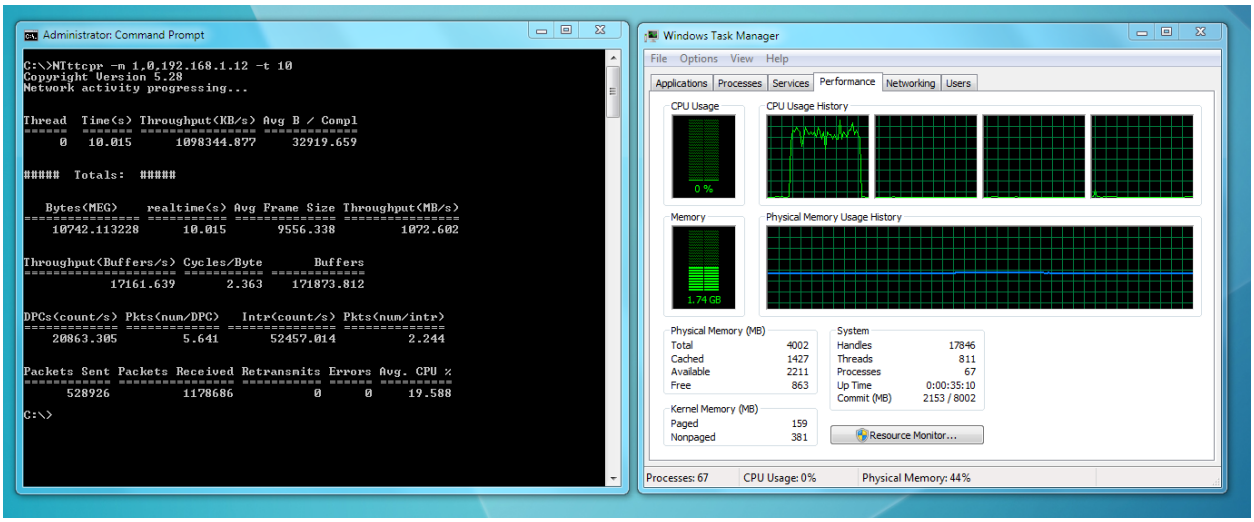
## Baseline NTtTCP example 1- All NIC settings at default:

**424MB/s (3.39Gbps receive throughput, consuming most of one CPU core)**




**All NIC settings at default except Jumbo Frames set to 9600:**

**1072MB/s (8.57Gbps receive throughput, with comparable CPU consumption)**



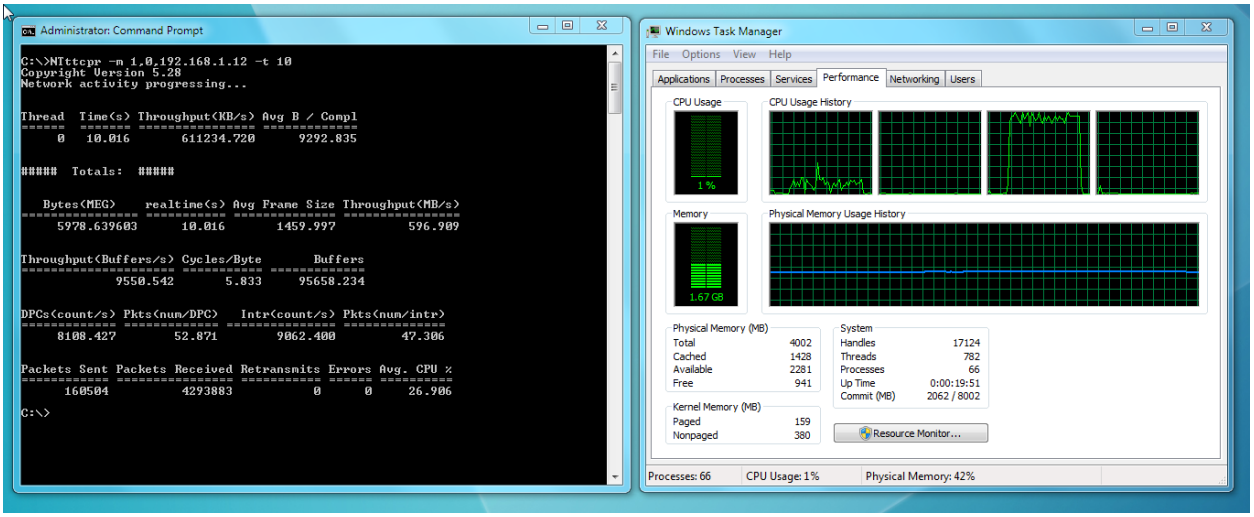
## 2. Use multithreaded applications for data transfer

Receiving data at 10Gbps in a Windows 7 environment is CPU intensive, even when offloading is enabled. Spreading that work across multiple CPU cores can reduce the possibility of the application becoming CPU bound, and increase the throughput during data transfer.

Using the same i5 Desktop PCs, as the Jumbo Frame tests, we can see the performance differences between using single-threaded and multi-threaded data transfer applications.

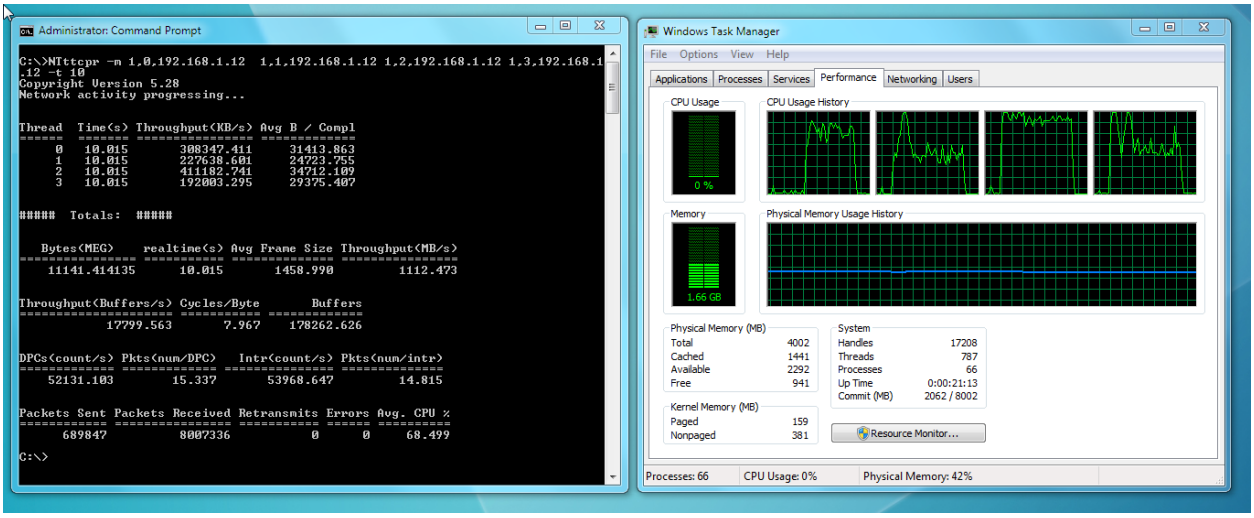
**Baseline 2 - Single threaded NTtTCP example:**

**596MB/s (4.77Gbps of payload throughput, with 26.9% CPU utilization)**




**Multi threaded NTtTCP example:**

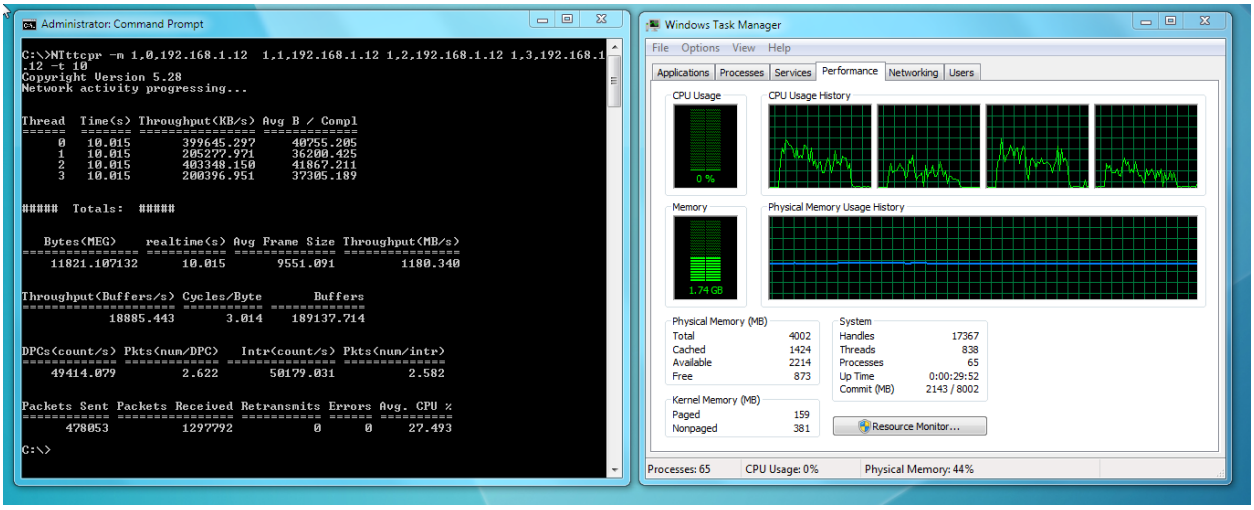
**1112MB/s (8.90Gbps throughput and 68.5% CPU utilization)**



# 3. Combine Jumbo Frames and Multithreading to maximize throughput while minimizing CPU utilization

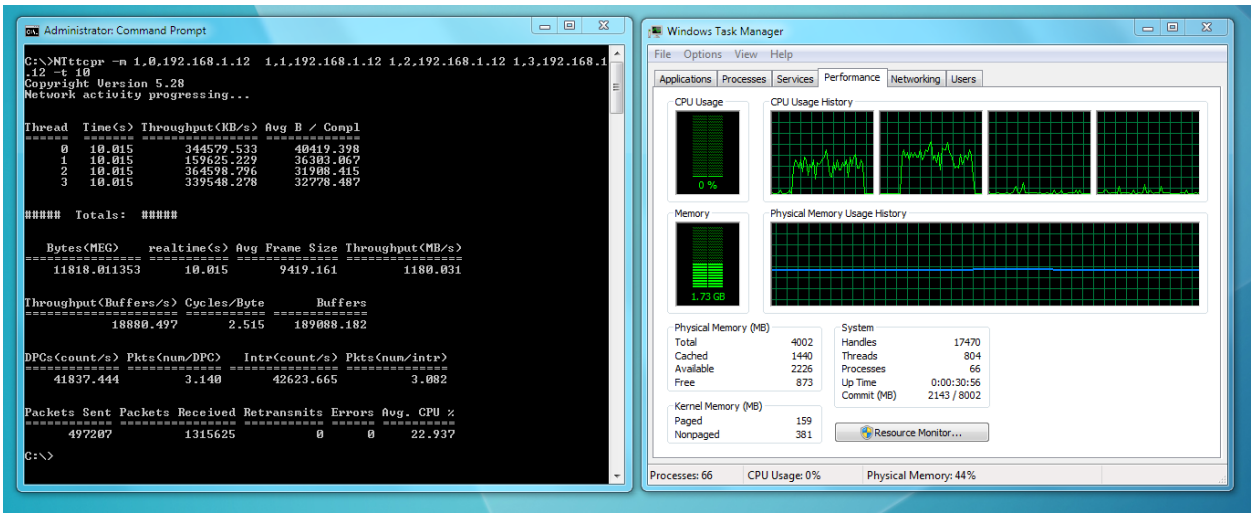
### Multithreaded Application + Jumbo Frames example 1:

1180MB/s (9.40Gbps of payload throughput and 27.5% CPU utilization)




### Multithreaded Application + Jumbo Frames example 2:

1180MB/s (9.40Gbps of payload throughput and 22.9% CPU utilization)



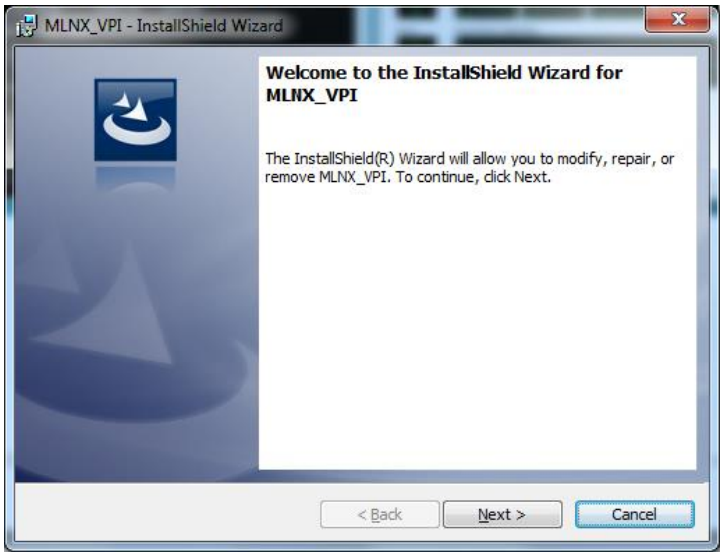
# Appendix B - Modify, Repair, Remove, or Uninstall the Driver

After you have installed the driver, you can then modify, repair, or remove the driver using the following Program Maintainence procedures.

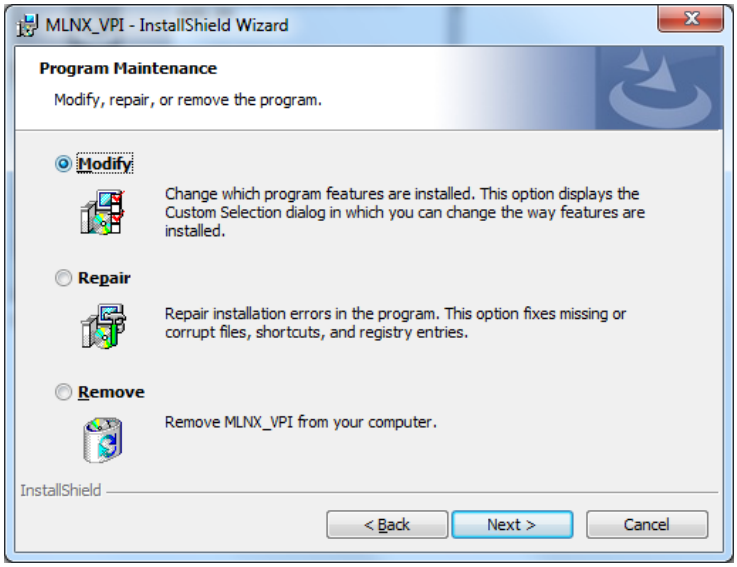
### Modify the Installed Driver

The ***Modify*** Program Maintainance option lets you change which program features are installed. This option displays the Custom Selection dialog in which you can change the way features are installed.

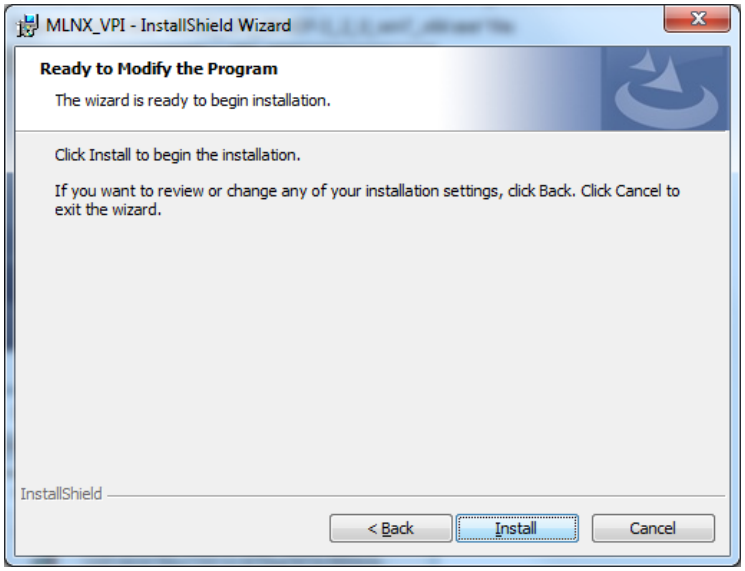
1. Double click on the "*MLNX_VPI_WinOF-3_2_0_win7_x64.exe*" file.



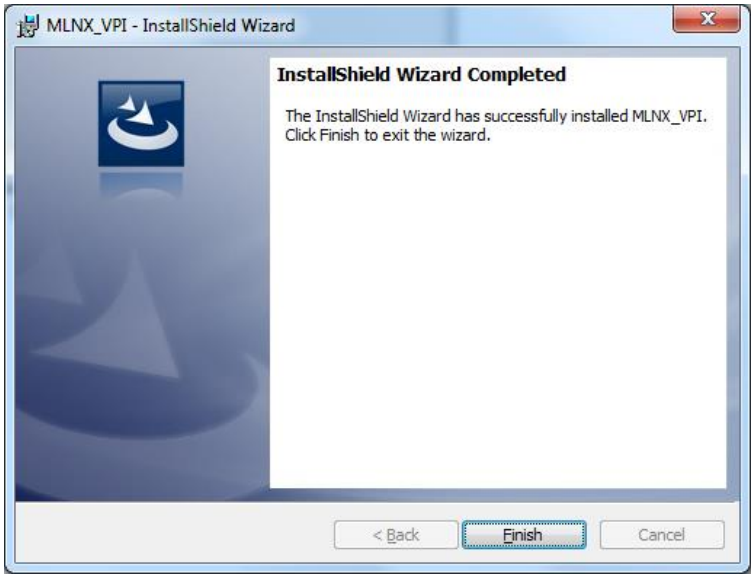

2. Click the **Next** button.




3. Select the *Modify* radio button and click **Next**.




4. Click **Install** to begin to modify the installation. If a UAC screen displays, click **Yes** to continue.

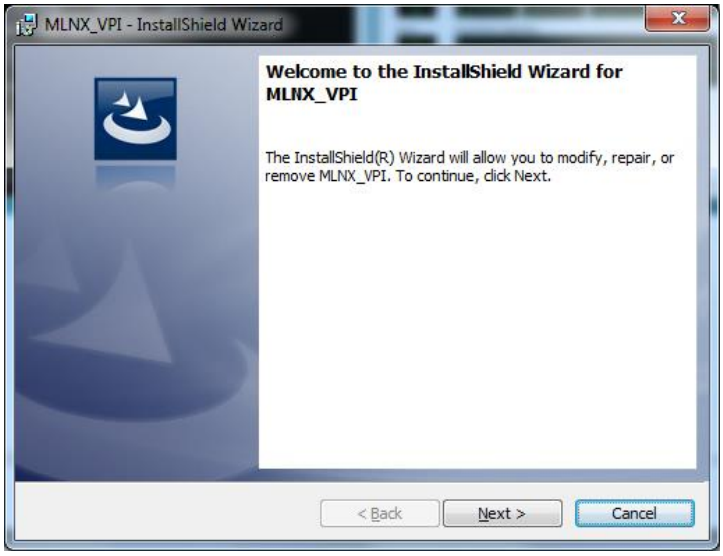



5. When the *Wizard Completed* screen displays, click the **Finish** button. The modify procedure is complete.

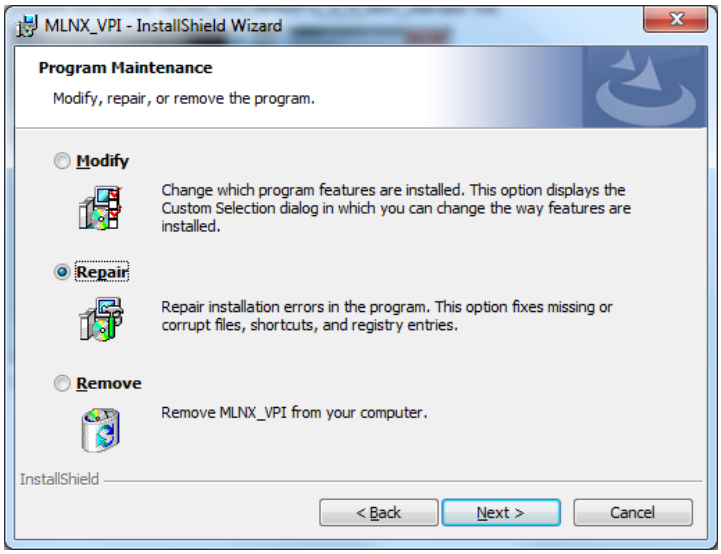
**Repair the Installed Driver**

The ***Repair*** Program Maintainance option repairs installation errors in the program. This option fixes missing or corrupt files, shortcuts, and registry entries.

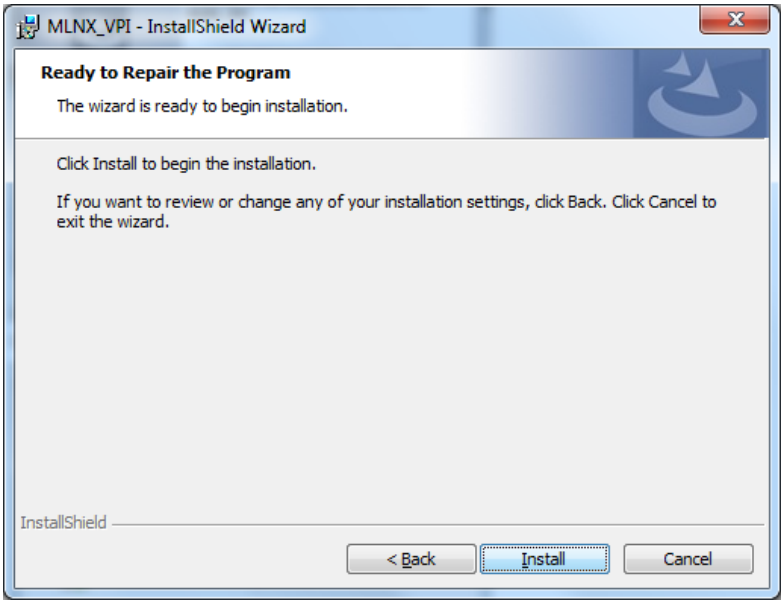
1. Double click on the "*MLNX_VPI_WinOF-3_2_0_win7_x64.exe*" file.



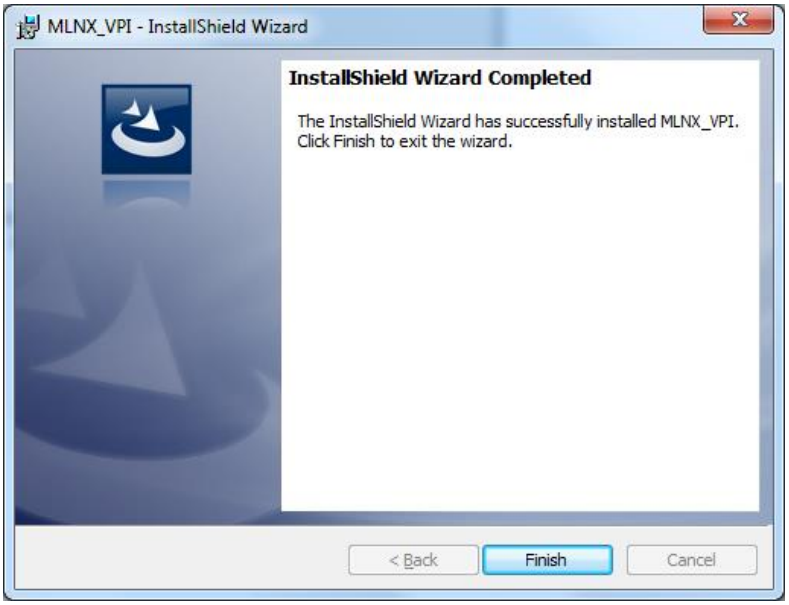

2. Click the **Next** button.




3. Select the *Repair* radio button and click **Next**.




4. Click the **Install** button to begin.

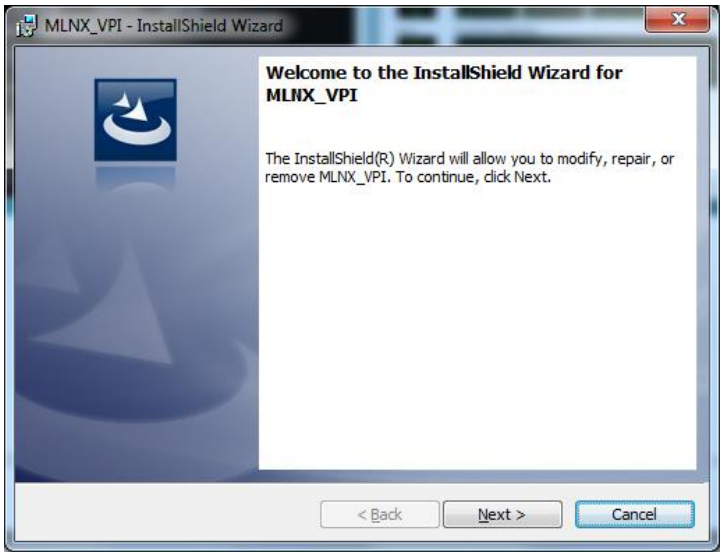



5. When the *Wizard Completed* screen displays, click the **Finish** button. The repair procedure is complete.

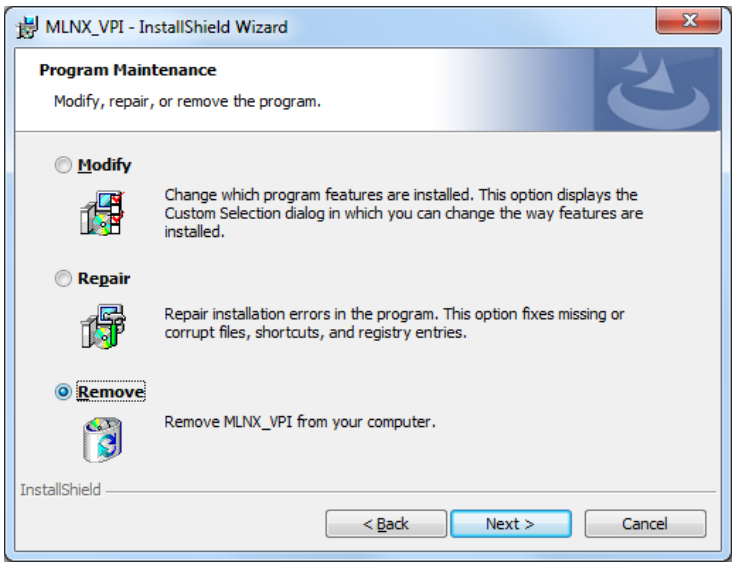
**Remove the Installed Driver**

The ***Remove*** Program Maintainance option removes the MLNX_VPI driver from your computer.

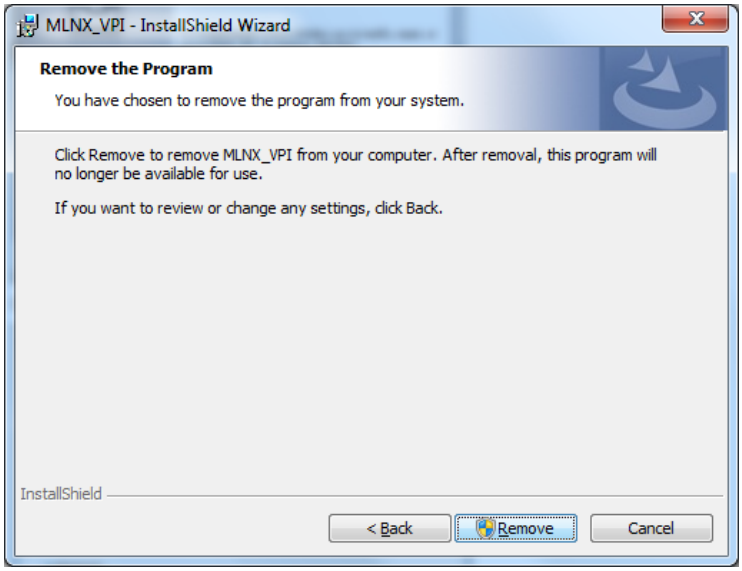
1. Double click on the "*MLNX_VPI_WinOF-3_2_0_win7_x64.exe*" file.



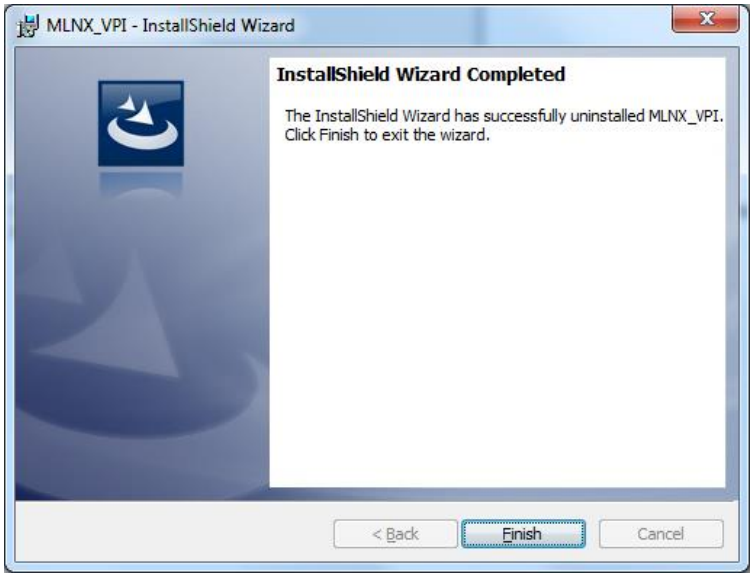

2. Click the **Next** button.




3. Select the *Remove* radio button and click **Next**.




4. Click the **Remove** button to remove the MLNX_VPI driver from your computer. After removal, this program will no longer be available for use.



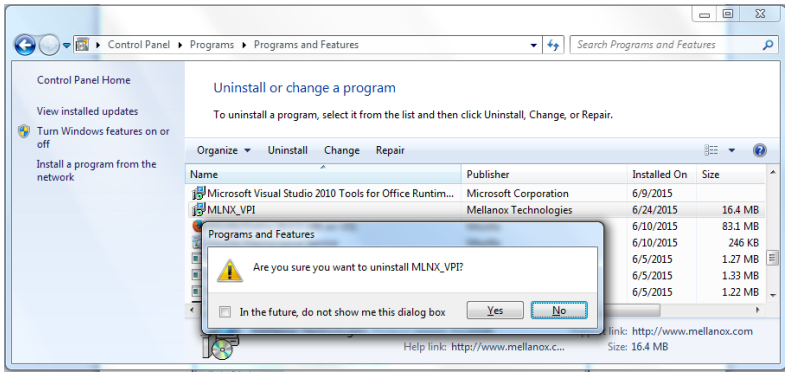

5. Click the **Finish** button to exit the wizard.

# Uninstall the Driver

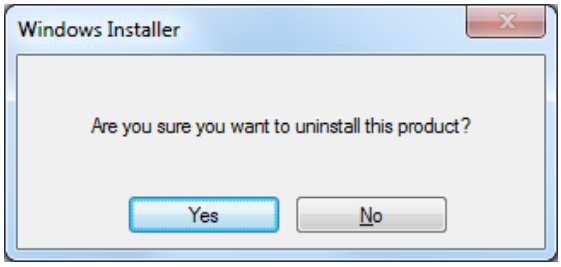
### Uninstalling MLNX_VPI - Attended Uninstall

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

1. Click Start-> Control Panel-> Programs and Features-> MLNX_VPI-> Remove.
   **Note**: This requires elevated administrator.




2. Double click the .exe and follow the instructions of the install wizard.
3. Click Start-> All Programs-> Mellanox Technologies-> MLNX_VPI-> Uninstall MLNX_VPI.




4. At the *Are you sure ...?* prompt, click **Yes**.

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