

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

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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 <u>www.transition.com.</u>

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 <u>http://www.transition.com/TransitionNetworks/Landing/SFP-XFP/SFP-XFP.aspx</u>.

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:



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.

 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 included with the NIC; install the optional bracket if the installation device requires it.



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.

	PI - InstallShield Wizard
Destinat Click Ne:	ion Folder xt to install to this folder, or click Change to install to a different folder.
D	Install MLNX_VPI to: C:\Program Files\Mellanox\MLNX_VPI\
InstallShield -	< Back Next > Cancel

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

HUNX_VPI - InstallShield Wizard
Maximum Performance Configure your system for maximum 10GigE performance.
Check this box to configure your system for maximum 10GigE performance (Recommended) Note: This step will require rebooting the machine at the end of installation.
InstallShield < <u>B</u> ack Cancel

- 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.

HLNX_VPI - InstallShield Wizard	J
Ready to Install the Program The wizard is ready to begin installation.	
Click Install to begin the installation.	
If you want to review or change any of your installation settings, dick Back. Click Cancel to exit the wizard.	
InstallShield Cancel	

- 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.

	/PI - InstallShield Wizard
Installin The pro	IG MLNX_VPI Ogram features you selected are being installed.
17	Please wait while the InstallShield Wizard installs MLNX_VPI. This may take several minutes.
	Status:
InstallShield	
	< <u>B</u> ack <u>N</u> ext > Cancel

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.

闄 MLNX_VPI - InstallShield Wi	zard	B MLNX_VPI - InstallShield Wizard
2	InstallShield Wizard Completed The InstallShield Wizard has successfully installed MLNX_VPI. Click Finish to exit the wizard. You chose not to run performance tuning. Please note that it is highly recommended to run this tuning for optimum performance. You can run it later by selecting the "Performance Tuning" tab in the Mellanox ConnectX 10GBit Adapter properti	InstallShield Wizard Completed The InstallShield Wizard has successfully installed MLNX_VPI. Click Finish to exit the wizard. You chose to run performance tuning. The log file can be found at can be found at to grid for the system 32/LogFiles \PerformanceTuning.log
2	Enable NetworkDirect interface (ND) Show release notes	Enable NetworkDirect interface (ND) Show release notes
	< Back Finish Cancel	< Back Finish Cancel

- 11. At the InstallShield Wizard Completed screen, observe any informational notes and check or uncheck the displayed options:
 - □ Enable NetworkDirectinterface (ND)
 - $\hfill\square$ 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."

	VPI Installer Informatio	n X
1	You must restart your s changes made to MLNX restart now or No if you	ystem for the configuration VPI to take effect. Click Yes to plan to restart later.
	Yes	No

- 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

4 퉲 Mellanox	*	Name	Date modified	Туре
■ MLNX_VPI		Documentation	6/23/2015 2:13 PM	File folder
Documentation		ETH	6/23/2015 2:13 PM	File folder
LETH		\mu HW	6/23/2015 2:13 PM	File folder
⊳ i iii HW		\mu IB	6/23/2015 2:13 PM	File folder
▲ ⊯ IB ⊯ IPoIB		🐌 Vlan_lbfo	6/23/2015 2:13 PM	File folder
🐌 sdk				
🌗 Tools				
4 퉲 Vlan_lbfo				
📔 mux_mp	-			

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

PerformanceTuning.log - Notepad	<u> </u>
Eile Edit Format View Help	
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\KssBaseCpu added with value 0x0 24-6-2015 9:03 : New Registry entry SYSTEM/CurrentControlSet\Services\Ndis\Parameters\KssBaseCpu added with value 0x0 24-6-2015 9:03 : New Registry entry SYSTEM/CurrentControlSet\Services\AB\Parameters\FastSendDatagramThreshold added with value 0x10000 24-6-2015 9:03 : Mellanox ConnectX 10Gb Ethernet general performance tuning complete successfully.	Ŧ

Additional Driver Information

<u>See http://www.mellanox.com/related-docs/prod_software/Mellanox_EN_for_Linux_User_Manual_v2_2-</u> 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 <u>www.etherboot.org</u>). For more details go to <u>www.mellanox.com</u> 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. Blinking indicates a problem with the Physical link.
Port 1 ACT	Amber	Data Activity; Blinking indicates Data Transfer. Constant on indicates no Data Transfer.
Port 2 LINK	Green	Physical Link; Constant on indicates a good physical link. Blinking indicates a problem with the Physical link.
Port 2 ACT	Amber	Data Activity; Blinking indicates Data Transfer. Constant on indicates no Data Transfer.

4. Network Parameters

Multi-mode Fiber 62.5/125um, 50/125um			
10G-SR Full Duplex 850nm (Wavelength) 300m (OM3,50/125µm)			
Single-mode Fiber 9/125 um			
10G-LR Full Duplex	1310nm or 1550nm (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, 50/125μm multi-mode
- \square 9/125 μ 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

- D Port 1 LNK, Port 1 ACT
- D 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; 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 FCC Class B CE Mark	
Dimensions	168 mm (L) x 64 mm (H); 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\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.

Mellanox ConnectX-2 Ethernet Adapter Properties	Mellanox ConnectX Ethernet Adapter Properties
General Advanced Information Performance Diagnostics	General Information Diagnostics Advanced
VLAN LBFO Driver Details Power Management	Performance LBFO Driver Details Power Management
Load Balancing and Fail-Over (LBFO) Settings	Load Balancing and Fail-Over (LBFO) Settings
Bundle Name:	Bundle Name:
Bundle Type: Fault Tolerance Eault Tolerance	Bundle Type:
Primary: Switch Fault Tolerance	Primary:
Send Load Balancing Failback to Pr Load Balancing (Send & Receive)	✓ Failback to Primary
Select the adapte Adaptive Load Balancing	Adapters in the bundle
Adapter Name Static Link Aggregation (802.3ad)	Adapter Name Status Role
Mellanox ConnectX-2 Ethemet Adapter	Mellanox ConnectX Ethemet Adapter
Mellanox ConnectX-2 Ethernet Adapter #2	Mellanox ConnectX Ethemet Adapter #2
Commit Cancel	Create Modify Remove
LBFO stands for Load Balancing and Fail Over. The administrator can configure a bundle of adapters and associate up to 8 Mellanox ConnectX adapters to this bundle. LBFO should be used to increase the system reliability upon a link failure, and to balance the workload	LBFO stands for Load Balancing and Fail Over. The administrator can configure a bundle of adapters and associate up to 8 Mellanox ConnectX adapters to this bundle. LBFO should be used to increase the system reliability upon a link failure, and to balance the workload
OK Cancel	OK Cancel Help

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.

<u>Status</u>: 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 take the 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 <u>www.transition.com</u> and click the **Transition Now** link.

Web-based seminars

Transition Networks provides seminars via live web-based training.

Log onto <u>www.transition.com</u> 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				
	<u>Transition</u>	n Networks, Inc.		
<u>10900 R</u>	ed Circle Drive, Mir Me	nnetonka, Minnesota 55 Hanna Minnesota 55	<u>343 U.S.A.</u>	
	Declares ti	hat the products:		
	N-TGE-SFP-01			
	onjorm to the jouo	wing Product Kegulati	ons:	
	FCC Part 1: CISPR 22:A1:2000+A	5, Subpart B, Class B. .2:2002;ICES-003:2004, Class B		
EMI: EN55022:2 EM8: EN3 EN610	006, EN61000-3-2:2000, EN61 5024/1998+A1:2001+A2:2003 00-4-4:2004, EN61000-4-5:200	000-3-3:1995+A1/2001+A2/2005, am , EN61000-4-2:2001, EN61000-4-3:2 01, EN61000-4-6:2003, and EN61000	nd EN61000-6-3:2001 2002+A1:2002,)-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	State /	- lener	
Pace	Date	stepher a	Signature	
		<u>Stephen Anderson</u> FüllName	Vice President of Engineering Position 201415	

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.

9. Record of Revisions

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

Trademarks

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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 \rightarrow Network and Internet \rightarrow Network and Sharing Center \rightarrow Change Adapter Settings \rightarrow Local Area Connection 'X' \rightarrow Properties \rightarrow Configure \rightarrow Advanced Tab \rightarrow Jumbo Packet

Mellanox ConnectX Ether	met Adapter	#4 Prope	erties	×
VLAN LBFO	Driver	Details	Powe	r Management
General Information	Diagnos	stics A	Advanced	Performance
Advar	nced Adapter	Settings		
Settinas:			Value:	
Jumbo Packet			9600	
Feceive Buffers Send Buffers Flow Control Options Performance Options Offload Options VMQ Options RoCE Options			Use De	fault for All
Maximum Frame Size (MTU) Set the maximum size of a frame (or packet) that can be sent over the wire. This is also known as the maximum transmission unit (MTU). The MTU of a network can have a large impact on performance. The range of valid MTU values is 600 through 9600. NOTE: All devices on the same physical network, or on the same logical network if using VLAN tagging, must have the same MTU. 				
	0		Cancel	Help

Baseline NTtTCP example 1- All NIC settings at default:

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

G Administrator: Command Prompt	👰 Windows Task Manager		
C:\>NTttcpr -m 1,0,192.168.1.12 -t 10 Copyright Version 5.28 Network activity progressing	File Options View Help Applications Processes Services	Performance Networking Users	
Thread Time(=> Throughput(KB/=>) Avg B / Compl 0 10.015 434759.061 33871.012	CPU Usage CPU Usage	Piistory	
##### Totals: ###### Bytes(MEG) realtime(s) Avg Frame Size Throughput(MB/s)	1%		
4252.062500 10.015 1456.345 424.569	Memory Physical Me	emory Usage History	
Throughput(Baffers/=>) Cycles/Byte Buffers 6793.110 5.839 68033.000	1.66 GB		
DPCs(count/s) Pkts(nun/DPC) Intr(count/s) Pkts(nun/ints) 14683.275 20.819 15132.401 20.201	Physical Memory (MB) Total 4002	System Handles 16742	
Packets Sent Packets Received Retransmits Errors Avg. CPU x 169572 3061588 0 0 19.159	Cached 1432 Available 2295 Free 954	Threads 767 Processes 66 Up Time 0:00:18:33 Commit (MB) 2054 / 8002	
C:\>	Kernel Memory (MB) Paged 158 Nonpaged 380	Resource Monitor	
	 Processes: 66 CPU Usage: 1%	6 Physical Memory: 42%	

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

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

Administrator: Command Prompt	🔲 🗉 🔀 📲 Windows Task Manager	
C:\NTttcpr =m 1.0.192.168.1.12 -t 10 Copyright Vergion 5.28 Network activity progressing	File Options View Help Applications Processes Services Performance Networking Users	
Thread Time(s) Throughput(KB/s) Aug B / Comp1 0 10.015 1098344.877 32919.659	CPU Usage History	
ннини lotals: нинин Bytes(MEG) realtime(s) Avg Frame Size Throughput(MB/s)		
10742.113228 10.015 9556.338 1072.602	Physical Memory Usage History	
Throughput(Buffers/s) Cycles/Byte Buffers 17161.639 2.363 171873.812	1,74 (3)	
DPCs(count/s) Pkts(num/DPC) Intr(count/s) Pkts(num/intr)	Physical Memory (MB) System	
20863.305 5.541 52457.014 2.244 Packets Sent Packets Received Retransmits Errors Avg. CPU X 528926 1128686 0 0 19 588	Total 4002 Handles 17846 Cached 1427 Threads 811 Available 2211 Processes 67 Free 863 Up Time 0:00:35:10	
0:>>	Kernel Memory (MB) Commt (MB) 215.3 / 8002 Paged 159 % Resource Monitor	
	Processes: 67 CPU Usage: 0% Physical Memory: 44%	

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)

an Administrator: Command Prompt	🗆 💷 🔀 🕞 Windo	vs Task Manager			
C:\>NTttcpr -m 1,0,192.168.1.12 -t 10 Capyright Version 5.28 Network activity progressing	File Opt Applicatio	ons View Help	rformance Networking Users		
Thread Time(s) Throughput(KB/s) Aug B / Comp1 0 10.016 611234.720 9292.835	CPU U	sage CPU Usage His			
Bytes(MEG) realtine(s) Avg Frane Size Throughput(ME/s) 5978.639603 18.016 1459.997 596.909	Memo	% Physical Memo	ry Usage History		
Throughput(Buffers/s) Cycles/Byte Buffers 9550.542 5.833 95658.234		7 68			
DPCs(count/s) Pkts(num/DPC) Intr(count/s) Pkts(num/intr) 8108.427 52.871 9062.400 47.306	Physic Total	al Memory (MB) 4002 4 1428	System Handles 17124 Threads 782]	
Packets Sent Packets Received Retransmits Errors Avg. CPU × 160504 4293883 0 0 26.906	Availa Free	ole 2281 941	Processes 66 Up Time 0:00:19:51 Commit (MB) 2062 / 8002		
€: \>	Reme Paged Nonpa	159 ged 380	Resource Monitor]	
	+ Processes:	56 CPU Usage: 1%	Physical Memory: 42%		

Multi threaded NTtTCP example:

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

🚾 Administrator: Command Prompt	🐺 Windows Task Manager
C:\>NTttcpr -m 1,0,192.168.1.12 1,1,192.168.1.12 1,2,192.168.1.12 1,3,192.168.1	File Options View Help
.12 -t 10 Copyright Version 5.28	Applications Processes Services Performance Networking Users
Network activity progressing	CPU Usage — CPU Usage History
Thread Time(s) Throughput(KB/s) Avg B / Compl	
0 10.015 308347.411 31413.863	
1 10.015 227036.001 24723.755 2 10.015 411182.741 34712.109	
5 10.015 172003.275 27575.407	
##### Totals: #####	Memory Physical Memory Usage History
Rutes(MEC)	
11141.414135 10.015 1458.990 1112.473	
Throughput(Buffers/s) Cycles/Byte Buffers	
17799.563 7.967 178262.626	Physical Memory (MB) System
DPCs(count/s) Pkts(num/DPC) Intr(count/s) Pkts(num/intr)	Cached 1441 Threads 787
52131.103 15.337 53968.647 14.815	Available 2292 Processes 66 Free 941 Up Time 0:00:21:13
	Commit (MB) 2062 / 8002
COOMER COURT COMPARENT COMPARENTE COMPARENT COMPAR	Paged 159
689847 8007336 0 0 68.499	Nonpaged 381 Tresource Munitor
	Processes 66 CPU Usage: 0% Physical Memory: 42%

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)

Administrator: Command Prompt	🛒 Windows Task Manager
C:\>NTttcpr -m 1,0,192.168.1.12 1,1,192.168.1.12 1,2,192.168.1.12 1,3,192.168.1 .12 -t 10 Copyright Version 5.28 Network activity progressing	File Options View Help Applications Processes Services Performance Networking Users CPU Usage CPU Usage History
Thread Time(s) Throughput(KB/s) Avg B / Compl 0 18.015 344579.533 40419.398 1 18.015 159625.229 35303.067 2 18.015 354598.796 31908.415 3 18.015 339548.278 32778.487	
###### Totals: ##### Bytes(MEG) realtime(s) Avg Frame Size Throughput(ME/s) 11818.011353 10.015 9419.161 1180.031	Memory Physical Memory Usage History
Throughput(Buffers/s) Cycles/Byte Buffers	1.73 GB
18880.497 2.515 189088.182	Physical Memory (MB) System
DPCs(count/s) Pkts(nun/DPC) Intr(count/s) Pkts(nun/intr) 411837.444 3.148 42523.665 3.082	107al +1040 Threads 12470 Cached 1440 Threads 804 Available 2226 Processes 66 Free 873 Up Time 0:00:30:55
Packate Sant Packate Received Detwarenite Europe Aug. (PU y	Commit (MB) 2143 / 8002
497207 1315625 0 0 22.937	Paged 159 Nonpaged 381
C:\>	Processes: 66 CPU Usage: 0% Physical Memory: 44%

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.

MLNX_VPI - InstallShield Wiz	Welcome to the InstallShield Wizard for MLNX_VPI The InstallShield(R) Wizard will allow you to modify, repair, or remove MLNX_VPI. To continue, click Next.
2	< Back Next > Cancel

2. Click the Next button.



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

1	HLNX_VPI - InstallShield Wizard	×
	Ready to Modify the Program The wizard is ready to begin installation.	5
	Click Install to begin the installation.	
	If you want to review or change any of your installation settings, dick Back. Click Cancel exit the wizard.	to
	InstallShield < <u>Back</u> Canc	el

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

2	InstallShield Wizard Completed The InstallShield Wizard has successfully installed MLNX_VPI. Click Finish to exit the wizard.
	< Back Einish Cancel

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.

🛃 MLNX_VPI - Ir	nstallShield Wizard	
Program Maintenance Modify, repair, or remove the program.		
○ <u>M</u> odify	Change which program features are installed. This option displays the Custom Selection dialog in which you can change the way features are installed.	
• Repair	Repair installation errors in the program. This option fixes missing or corrupt files, shortcuts, and registry entries.	
⊙ <u>R</u> emove	Remove MLNX_VPI from your computer.	
InstallShield ———	< Back Next > Cancel	

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

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

MLNX_VPI - InstallShield Wizard InstallShield Wizard Completed		
2	The InstallShield Wizard has successfully installed MLNX_VPI. Click Finish to exit the wizard.	
	< Back Finish Cancel	

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.

🛃 MLNX_VPI - In	istallShield Wizard			
Program Main Modify, repair,	tenance , or remove the program.			
© <u>M</u> odify				
1	Change which program features are installed. This option displays the Custom Selection dialog in which you can change the way features are installed.			
© Re <u>p</u> air				
F	Repair installation errors in the program. This option fixes missing or corrupt files, shortcuts, and registry entries.			
<u> <u> <u> </u> <u> </u></u></u>				
8	Remove MLNX_VPI from your computer.			
InstallShield				
	< <u>Back</u> Next > Cancel			

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

HLNX_VPI - InstallShield Wizard	×
Remove the Program You have chosen to remove the program from your system.	5
Click Remove to remove MLNX_VPI from your computer. After removal, this program will no longer be available for use.	
If you want to review or change any settings, dick Back.	
InstallShield Cancel	:

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.

剧 MLNX_VPI - InstallShield Wizard		×	
	InstallShield Wizard Co The InstallShield Wizard has Click Finish to exit the wizard	Completed s successfully uninstalled MLNX_VF d.	ч.
	< <u>B</u> ack	Einish Cancel	

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.

🗸 🗢 🗹 🔹 Control Panel 🕨	Programs Programs and Features	- 4 9 S€	arch Programs and Fea	itures		
Control Panel Home View installed updates Turn Windows features on or	Uninstall or change a program To uninstall a program, select it from the list and then	change a program ogram, select it from the list and then click Uninstall, Change, or Repair.				
off Install a program from the network	Organize 🔻 Uninstall Change Repair			8== -	0	
	Name	Publisher	Installed On	Size		
	🕼 Microsoft Visual Studio 2010 Tools for Office Runtim	Microsoft Corporation	6/9/2015			
	BMLNX_VPI	Mellanox Technologies	6/24/2015	16.4	MB	
	Programs and Features	The second secon	6/10/2015 6/10/2015	83.1 24	. MB 6 KB	
	6/5/2015	1.27	MB			
		Are you sure you want to uninstall MLNX_VPI: 6/5/2015			MB	
	In the future, do not show me this dialog box	Yes No	6/5/2015	1.22	MB	
	Help link: ht	tp://www.mellanox.c	Link: http://www.r Size: 16.4 MB	nellanox.c	om	

- 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.

Windows Installer	
Are you sure you want to uninstall this product?	
Yes <u>N</u> o	

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



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