

D-Link[®] DXE-810T

Single Port 10GBASE-T RJ45 PCI Express Adapter

Manual

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Introduction

Thank you for choosing the D-Link DXE-810T, the leader in value among 10 Gigabit Ethernet adapters for PCI Express bus personal computers. The D-Link DXE-810T PCI Express 10 Gigabit Ethernet Adapter is a high-performance adapter designed for the high-speed PCI Express Bus Architecture. The PCI Express 10 Gigabit Ethernet Adapter offers increased bandwidth, reliability, and more functionality than standard PCI network cards. It is specifically designed to allow throughput at rates up to 20 Gbps, eliminating the bottleneck that exists with current 32 and 64-bit PCI bus architectures.

System Requirements

Before installing the DXE-810T, check your system for the following minimum configuration requirements for optimal results.

- A motherboard that supports:
 - ♦ At least one PCIe Gen2 x4 (or more) slot
 - ♦ A chipset with native support for the installed CPU. For example:
 - H61, H67 or Z68 from B3 stepping or better for Sandy Bridge CPUs
 - B75, H77 or Z77 for Ivy Bridge CPUs
 - ♦ Dual-channel memory with support for at least 2 DIMMs (1 for each channel)
- Memory: DDR3 Memory running at 667 MHz (DDR1333) populating one DIMM per channel
- CPU: Sandy Bridge i7 or better, or Ivy Bridge i5 or better
- BIOS updated and configured to “Optimized Defaults”

Features

Designed for versatility and performance, the DXE-810T network adapter provides the following:

- Universal Bus supporting 3.3 V operation
- Compliant with IEEE 802.3an 10 Gbps Ethernet over Unshielded Twisted Pair (UTP) standards:
 - Supports up to 100 m of Cat6A or better
 - Supports Cat6 and Cat5e cables compliant with Link Segment specifications
 - Supports Auto-Negotiation (100BASE-T, 1000BASE-TX, 10GBASE-T)
 - Compliant with NBASE-T Alliance 5-speed (100M/1G/2.5G/5G/10G) draft proposal
- Supports Full Duplex at 10 Gbps
- Supports Jumbo Frames up to 16 KB
- Supports 802.3x flow control
- Supports 802.1Q VLAN Tagging
- One built-in RJ45 connector
- RJ45 LED indicators: Activity and Link/Speed
- Driver[†] support for:
 - ♦ Microsoft Windows 8.1, 8, 7
 - ♦ Microsoft Windows Server 2012R2, 2012, 2008R2
 - ♦ Windows Hyper-V

[†] Check <http://www.dlink.com> for the latest drivers.

- ♦ Linux kernel 2.6.x - 3.x.x
- ♦ VMware ESXi 5.x, 6.0 (net-tn40xx-0.3.6.12.1.x86_64.vib)

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Installation

Unpack and Inspect

CAUTION: *Under ordinary circumstances, the DXE-810T card will not be affected by static discharge caused by contact with a person's body while handling the unit. In special circumstances, the user may carry an extraordinarily high static charge so it is good practice to disperse the charge by touching a ground before handling the adapter card.*

Open the shipping carton and carefully remove all items. Ensure that the following items are included:

- One DXE-810T PCI Express 10 Gigabit Ethernet Adapter Card
- DXE-810T drivers and manual on a CD-ROM

If any of these items are missing or damaged, please contact your local reseller for a replacement.

Software Installation for Linux

1. Make clean
2. Sudo make
3. Sudo make install
4. Reboot the system

Software Installation for VMware ESXi 5.x, 6.0

1. Copy the VIB file (net-tn40xx-0.3.6.12.1.x86_64.vib) to the VMware server:

2. On the VMware server shell type:

```
esxcli software acceptance set --level CommunitySupported
```

```
esxcli software vib install -v /net-tn40xx-0.3.6.12.1.x86_64.vib
```

3. Reboot the VMware server

Software Installation

You must first install the driver software for your DXE-810T before installing the PCI Express card into your PC. Insert the CD into your PC's CD-ROM drive. The driver installation program will run automatically if you have AutoPlay enabled.

If you do not have AutoPlay enabled for your PC's CD-ROM drive, navigate to the root directory of the CD drive using Windows Explorer and double-click Autorun.exe. In the new window, click the Install Driver link to install the driver for the NIC.

The CD-ROM included with your DXE-810T is designed to make installing required software a painless and trouble-free process. Simply click on the Install Drivers link, and an Installation Wizard will guide you through the process, no matter which operating system you're running. The included Adobe Acrobat Reader, which is needed to read or print out your user manual, will also come in handy for many other applications.

Simply follow the directions in the wizard, and your DXE-810T will be installed successfully in just a few minutes, allowing you to enjoy the many advantages of connecting to an Ethernet LAN.

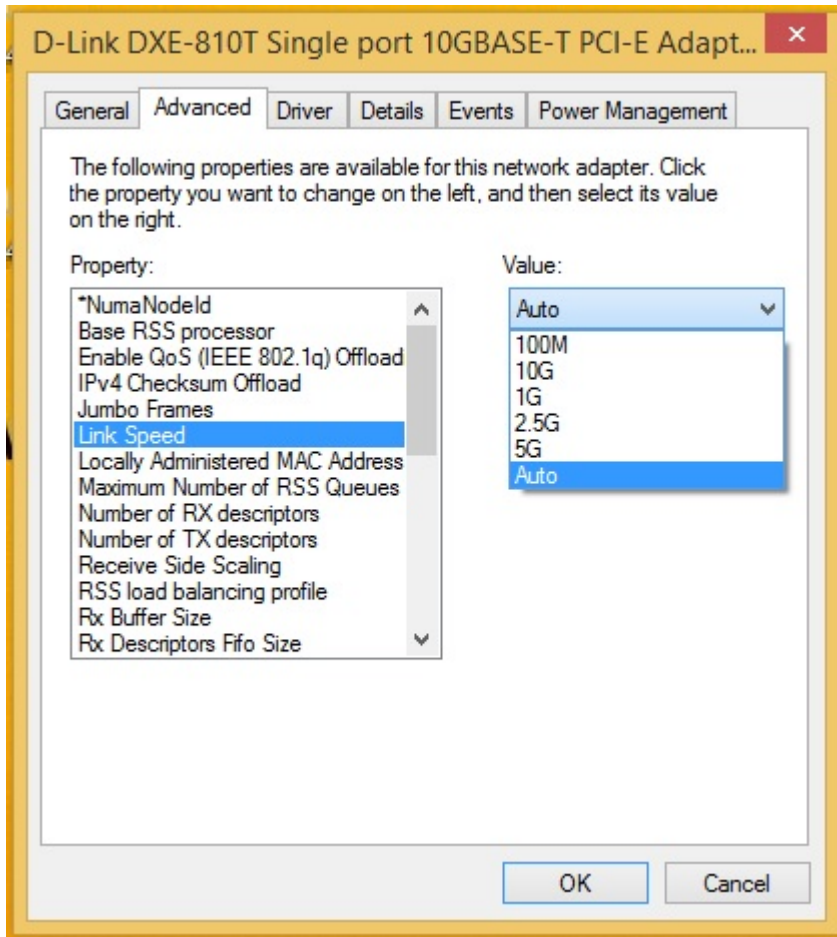
After the driver installation program is complete, you can then power off your computer and install the PCI Express card. Once you restart your PC, the DXE-810T will be ready to use.

Installing the Adapter

1. Shut down the computer, unplug its power cord, and remove the chassis cover.
(**Important:** Opening the case of your computer may compromise its warranty. Consult the computer manufacturer before opening the case to ensure that you adhere to warranty guidelines. In some cases, you may need to have the DXE-810T installed by your computer manufacturer's service technician.)
2. Insert the contact edge of the DXE-810T card into the connector of any available PCI Express Bus Master expansion slot. Press the card firmly into the connector such that the card's contacts are fully seated in the connector.
3. Install the bracket screw that secures the card to the computer chassis.
4. Reinstall the computer's chassis cover.
5. Reconnect the computer's power cord, and switch on the computer's power.

Changing the Link Speed Manually

1. Windows:
User can choose speed values in Advanced Properties as shown below.



2. Linux:

User can change link speed using the “ethtool” command, for example:

- Force 10G: “ethtool -s <ethxx> speed 10000 autoneg off”
- Force 5G: “ethtool -s <ethxx> speed 5000 autoneg off”
- Force 2.5G: “ethtool -s <ethxx> speed 2500 autoneg off”
- Force 1G: “ethtool -s <ethxx> speed 1000 autoneg off”
- Force 100M: “ethtool -s <ethxx> speed 100 autoneg off”
- Auto-Negotiation: “ethtool -s <ethxx> autoneg on”

Troubleshooting

If you experience any problems with the adapter, check:

- that the appropriate driver is loaded;
- that the proper grade of cable is used for the network connection;
- that the supporting hub is qualified for the application.

The DXE-810T adapter features these LED indicators:

Location	LED Indicator	Color	Status	Description
Per Port	Speed/Link	Green/ Amber	Solid Green	Port is operating at 5 Gbps / 2.5 Gbps / 1 Gbps / 100 Mbps connection speed
			Solid Amber	Port is operating at 10 Gbps connection speed
			Off	Link is down
	Act	Green	Blinking Green	There is activity on this port
			Off	There's no activity on this port

Specifications

EMC and Safety Certifications:

- FCC Class B
- CE Class B
- C-Tick
- BSMI

Host interface: PCI Express x4 2.0, 5 GT/s

Physical Dimensions: 133.3 mm x 121.9 mm x 21.6 mm (including profile bracket)

Environment:

- Storage temperature: -20° to 70°C (-4° to 158° F)
- Operating temperature: 0° to 40° C (32° to 104° F)
- Humidity: 10% to 90% non-condensing

Optimized Performance Tuning

This section describes possible systems and OS configuration options for general users to achieve the best performance in typical LAN environments with normal traffic.

Preinstalled Systems

The technical information in this section and beyond targets newly installed systems. Normally, on a system that meets our recommended minimum hardware requirements and a freshly installed OS, full throughput performance is expected.

However, existing systems which are already in use and have had hardware and software changes may experience lower than maximum network throughput. In this section we will provide some examples, places to check, and tips that may help improve performance in such cases.

- Check if the currently installed hardware meets our “Recommended Hardware” list:
 - ♦ Verify that latest BIOS version is loaded and “Optimized Defaults” are used.
 - ♦ Make sure the memory DIMMs match the recommended speed and are installed correctly.
 - ♦ If supported by your motherboard, using faster memory may improve performance.
- High CPU usage may degrade traffic performance:
 - ♦ Check if the specific cores being used by the NIC for traffic processing are also used by other processes.
 - ♦ D-Link Network Driver includes a CPU load balancing mechanism with optional configurations. The system administrator may change the CPU working cores assigned to the NIC to allow higher throughput.
- User should check if there are any other network applications that may degrade throughput installed:
 - ♦ Wireshark or other network analysis tools
 - ♦ Remote access tools
- Check if the TCP stack has been changed from the original code or configuration:
 - ♦ Old DLLs may influence OS behavior
 - ♦ Other NICs with full TCP offload support may have changed the default TCP stack behavior
- Firewall and antivirus interference:
 - ♦ Firewalls and antivirus software check different layers of traffic in real time, so it is possible that they may degrade performance.
- Please consult your firewall/antivirus provider for the best throughput configuration.

OS Optimization

Windows OS

Make sure the latest updates for Windows are installed. Microsoft provides Performance Tuning Guidelines for Windows Server clients:

<http://msdn.microsoft.com/en-us/windows/hardware/gg463392.aspx>

TCP/IP Tuning

Default TCP/IP optimization for Windows allows 10GbE wire speed network performance for limited time periods. Usually, TCP connections are limited by timespan and do not stay live for more than a few hours. The default Windows TCP/IP stack is optimized for WAN and long distance media connections.

For a long-lasting LAN TCP/IP connection, please refer to the Benchmark Performance Tuning section of this document for proper OS configuration.

Receive Side Scaling (RSS)

RSS is a mechanism for distributing received traffic across available processors or cores by assigning hash values to an indirection table. At least 4 cores must be allocated in order to achieve maximum throughput for bidirectional 10GbE traffic.

Linux OS

The default Linux OS optimizes IPv4 traffic for the best user experience. Usually, TCP/IP traffic will remain stable for long periods of time with no further optimization. However, some Linux distributions may have enabled different IRQ SMP affinity methods by default. See IRQ SMP affinity in the Benchmark Performance Tuning section for more details.

Benchmark Performance Tuning

Benchmark testing dedicates all of the computer's resources to test each traffic type independently. This section describes hardware and software optimization for benchmark testing.

OS Optimization

Windows OS

For best results, it is recommended that a fresh copy of the OS and all updates are installed. Microsoft provides documentation for high performance testing:

<http://msdn.microsoft.com/en-us/windows/hardware/gg463392.aspx> (Performance Tuning for Network Workload)

<http://www.microsoft.com/whdc/system/sysperf/Win7Perf.msp> (Recommended Test Methodology)

For stress-testing, the administrator may wish to optimize configuration parameters. All commands should be executed in windows CMD opened via "Run as administrator" (right-click).

Power Plan

Using the "High Performance" power plan is the best practice for a stress-test, as this would guarantee that the CPU is working at its maximum available frequency at all times.

Filtering

It is recommended to disable both Windows Firewall and Windows Base Filtering Engine (BFE). If only Windows Firewall is disabled, BFE may still have a negative impact on CPU performance.

CLI command:

```
net stop bfe
```

<https://www.myricom.com/software/myri10ge/392-how-do-i-troubleshoot-slow-myri10ge-or-mx-10g-performance.html#windows>

Receive Side Scaling (RSS)

In high-stress environments, large amounts of incoming traffic require parallel processing by a number of CPU cores. The RSS functionality is responsible for correctly directing receive-side traffic to CPU cores via hash values. Make sure RSS is enabled in Windows OS and in the NIC Properties settings before benchmark testing.

Current Status:

```
netsh interface tcp show global
```

Configuring RSS from Windows Command Prompt:

```
netsh interface tcp set global rss=enabled
```

Driver Advanced Properties Tab: Configure RSS parameters to define RSS state and cores to be used for RX traffic processing.

TCP/IP Full Offload

The DXE-810T does not use Windows Chimney interface, therefore, it is recommended to disable it during stress-testing:

Command Prompt:

```
netsh interface tcp set global chimney=disabled
```

Auto-Tuning

From Windows Vista and on, Microsoft introduced a new TCP management option called Windows Auto-Tuning. This configuration, which is enabled by default in modern systems, gives Windows OS the permission to automatically manage TCP connection parameters for better WAN performance. Administrators should disable this function before stress-testing.

Command Prompt:

```
netsh interface tcp set global autotuninglevel=disabled
```

<http://www.speedguide.net/articles/windows-7-vista-2008-tweaks-2574>

Network Throttling Index

Windows OS implements a restriction mechanism for processing non-multimedia network traffic.

The following registry key configures this index:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows
```

```
NT\CurrentVersion\Multimedia\SystemProfile NetworkThrottlingIndex=ffffff (DWORD)
```

It is recommended to change the default 0x10 to 0xFFFF_FFFF for maximum throughput.

<http://www.speedguide.net/articles/windows-7-vista-2008-tweaks-2574>

Linux OS

For best results, it is recommended that a fresh copy of the OS and all updates are installed.

Firewall

For uninterrupted benchmark testing, the best practice is to first disable active firewalls. Please follow the documentation relevant to your Linux distribution to shut down any firewalls.

IRQ SMP Affinity

D-Link network devices use round-robin interrupt allocation method. The system administrator should make sure that at least 4 cores are allocated in order to service D-Link NIC interrupts.

```
# echo <hex_bit_mask> > /proc/irq/40/smp_affinity
```

Note: Administrator will need to define the bit mask.

The following link provides more information regarding IRQ SMP affinity:

https://access.redhat.com/site/solutions/15482#4_Determine_the_correct_IRQ_SMP_affinity_mask

Benchmark Testing With Iperf

Iperf is a free tool for benchmark testing.

Iperf version 1.7.0 is preferred for testing in Windows.

Iperf version 2.0.5-2 is preferred for testing in Linux.

To achieve the best benchmark throughput results, please use the following server and client commands:

- On the receive-side machine run:

```
iperf -s -l1M -w64K -i5
```

- On the transmit-side machine run:

```
iperf -c <receive_side_ip> -t<num_of_sec> -P16 -i5 -l1M -w64K
```

Note: Commands should be executed using Command Prompt.