

D-Link[®]

Model DFE-550TX Ethernet / Fast Ethernet Adapter for PCI Bus with WOL User' s Guide

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Introduction

Thank you for choosing the D-Link DFE-550TX - the value leader among Fast Ethernet adapters for the PCI-Bus. This introduction gives a general description of the newer networking technologies found on the DFE-550TX.

ACPI Power Management

The DFE-550TX adapter complies with the Advanced Configuration and Power Interface 1.0 (ACPI) specifications. ACPI is a new open industry specification providing power management support systems through hardware and operating system cooperation. The DFE-550TX can reduce power consumption by entering Sleep mode along with the host computer. Although in Sleep mode, the network interface card (NIC) will continue to monitor the LAN looking for wake-up packets.

Wake On LAN

Wake On LAN (WOL) is an ACPI function allowing a powered down (sleeping) computer to be powered ON from a remote station. To use the WOL feature, the NIC must be WOL capable and the motherboard of the PC must be ACPI compliant.

While powered-down computers Sleep, WOL enabled NICs monitor LAN traffic for valid Wake-up frames. When one is received, the NIC will immediately wake-up and send a signal to the motherboard to power ON the computer.

Some uses for the WOL feature include:

- Forgot a document and out of town? Send a Wake-up signal to your computer and retrieve the needed file.

- Initiate long routines and reports before you get to work.
- Transfer files when the network traffic is low (during late hours).
- Power ON your PC before you arrive to work.
- The MIS department can upgrade software on computers after hours from a remote station.

WOL is very helpful in limiting the power consumption of PCs, workstations, and kiosks.

Flow Control

The DFE-550TX implements IEEE 802.3x compliant flow control for full duplex, which provides traffic management functions for full-duplex operation. Flow control allows for enhanced full duplex operation with switches. When operating at full duplex (requiring a direct connection to a switch) and the switch's data buffer is about to overflow, a Pause frame will be transmitted to the DFE-550TX. The ensuing idle time keeps the buffer from overflowing and prevents data from being lost. This enhancement can improve network throughput, avoid collisions and prevent lost data, helping the network achieve optimal performance.

IP Multicasting

The DFE-550TX uses chip-level address filtering when implementing IP Multicasting (defined in RFC 1112). This hardware-based implementation provides a huge performance increase over other interface cards. Formerly, broadcast packets were used for multicasting, but they are a less than ideal solution for transmitting packets to groups. This is because broadcast packets reach every terminal on the network, creating undue traffic and occupying CPU time on all computers.

IP Multicasting is a much better way to send data to groups,

especially since routers and even switches can filter packets so they only reach those stations that are part of the group. The DFE-550TX goes one step further by examining multicast packets on the card itself (rather than using the computer's CPU) and only accepting those packets for the group(s) in which the host belongs, thus conserving CPU utilization.

This can be very useful since more and more multicast data, such as corporate messages to employees, stock quotes, video and audio conferencing, and database replication is transmitted on today's networks.

IP Multicasting can eliminate an organization's need to maintain parallel networks for voice, video and data.

DMI/Desktop Management Interface

DMI is an Operating System/Network Operating System-independent management framework that allows system vendors to support multiple market/customer segments with a single management strategy. DMI lowers the Total Cost of Ownership (TCO) by providing a common framework for managing desktop systems, mobile systems and servers.

DMI supports a management schema (Management Information Format [MIF]), allowing manageable components to be described within various platforms in a standard descriptive language. MIFs are extensible, allowing the DFE-550TX to export value-added management capabilities. These value-added management features enable remote troubleshooting and higher quality management of computer resources.

IEEE802.1p Priority Tagging

With the growing number of network applications, local area networks (LANs) must deliver data for a wide variety applications. Email, file transfers, database queries, voice over IP (VoIP), video-

conferencing and multimedia must all be delivered to the end-user's. Some of the traffic, such as video-conferencing, is of a higher priority, with a slight delay of packets resulting in noticeable degeneration of video and audio quality, while other traffic, such as email will not be noticeably affected by tiny delays. The large number of programs run over today's networks serves to impede the ability to deliver time-critical data. Even if bandwidth is not usually a problem on your network, during peak hours bursts in network traffic can result in the delay of time-critical traffic.

IEEE802.1p defines seven levels of prioritization for Ethernet packets. High priority packets will be sent through a network using 802.1p-compliant switches first. Lower priority packets will be transferred whenever bandwidth is available. When properly setup, this ensures that time-critical data arrives on time and is not affected by other traffic.

IEEE802.1Q VLANs

The IEEE802.1Q VLAN can help improve network performance and security by segmenting the network into VLANs. IEEE802.1Q VLANs can limit broadcast and node-to-node (unicast) traffic to a single VLAN. This limits the effects of broadcast storms and provides additional security for your network.

To set up GVRP VLANs, which support dynamic registration, the adapter should be connected to a switch with GVRP VLAN capability.

For VLANs to function, the computer in which this NIC is installed must be using Windows 95 or later as its operating system.

Product Features

Designed for high performance and versatility, the DFE-550TX

Adapter provides the following features:

- Plug and Play installation.
- Complies with the IEEE 802.3 10Base-T and 802.3u 100Base-TX Ethernet standards.
- RJ-45 connector for standard network cable connection.
- 100Mbps Fast Ethernet or 10Mbps Ethernet data transfer rates, automatically configured by NWay auto-negotiation.
- Full duplex or half-duplex operation, also NWay configured.
- PCI Bus Master direct memory access for high throughput and low CPU utilization.
- ACPI 1.0 power management compliant.
- Wake-On-LAN power-saving feature allows sleeping PCs to be woken up and used via remote stations.
- IEEE 802.3x Flow Control enabled with full duplex operation, allowing enhanced operation when directly connected to a switch.
- IEEE 802.1Q/VLAN Tagging supported
- VLAN registration using IEEE802.1Q GVRP standard
- IEEE 802.1p Tagging supported
- IP Multicast packet filtering reduces CPU utilization and conserves network bandwidth.
- Sixteen packet counters provide a full range of network management statistics.
- DL10050B D-Link's own 32-bit intelligent Ethernet controller.
- Large 2Kb Tx, 2Kb Rx FIFO buffers synchronize transmissions and buffer data to help prevent packet loss.
- Three LED indicators: Link/Act, Speed (10/100), Full/Half Duplex.
- Drivers for all leading Network Operating Systems.

Installation

Installation of the DFE-550TX 10/100 NWay Ethernet Adapter requires installing the hardware first. Once the interface card has been installed into the host computer, the software can be installed.

Unpacking

CAUTION: *Under ordinary circumstances, a DFE-550TX interface card will not be affected by static electricity. However, it is good practice to eliminate static charges by touching a sizable metal object before handling the adapter card.*

Open the shipping carton and carefully remove all items. In addition to this User's Guide, ascertain that you have:

- One DFE-550TX Ethernet Adapter Card.
- DFE-550TX Software CD-ROM.
- WOL Cable.
- Multi Language Installation Guide

Installing the Adapter

1. Shut down the computer, unplug its power cord, and remove the cover.
2. If your order does not include the Boot ROM option, go ahead to Step 3. If your order includes the Boot ROM option, then install the Boot ROM Chip by plugging the chip into the Boot ROM Socket on the DFE-550TX card. The notched end of the Boot ROM Chip must be aligned with the notched end of the Boot ROM Socket. Opposite alignment will destroy the Boot ROM Chip!

3. Firmly insert the contact edge of the DFE-550TX card into any available PCI Bus expansion slot.
4. Install the bracket screw to secure the card to the computer chassis.
5. At this point, refer to section *Connecting the WOL Cable* to install the WOL Cable between the NIC and the PC motherboard.
6. Replace the computer cover.
7. Reconnect the computer power cord, and switch the computer power on. If the BIOS section of your computer boot program is Plug and Play compliant, then at power-up the BIOS will automatically configure itself for the newly installed DFE-550TX adapter.

NOTE: *Due to a fault in some Plug-n-Play BIOS programs, it happens occasionally that a newly installed adapter is assigned an IRQ Number which is already assigned to another device. In such a case, the conflicting IRQ Numbers (IRQ numbers must be unique) will cause faults in the behavior of both devices. If this happens, it is necessary to run the CMOS Setup utility, and manually assign a non-conflicting Interrupt Number to the DFE-550TX.*

Connecting the WOL Cable

The WOL Cable[†] is an interconnect cable with standard 3-pin connectors on each end. Please follow the procedures listed below to ensure proper installation of the WOL cable.

[†] The WOL Cable is an optional component of your DFE-550TX kit. If a cable is not included in your kit, purchase the cable through your local computer retailer.

1. Connect either end connector of the WOL Cable to the NIC WOL Connector. Both ends of the WOL Cable are identical, so either end may be used.
2. Examine the PC motherboard and/or refer to the manual for the motherboard to locate the corresponding WOL Connector on the motherboard. The actual location is system dependent, but the motherboard may have a label beside the WOL Connector. After you have located the WOL connector on the motherboard, connect the cable.
3. Power-ON the PC and press <Delete> or <F1> when prompted to enter the PCI/ISA BIOS CMOS Setup. Enable the WOL function or the power-ON function of the PC. The name of this function is system dependent, but may be located in a category heading titled something like *Power Management*. Refer to your computer's manual for more information regarding the CMOS Setup Utility and BIOS settings.

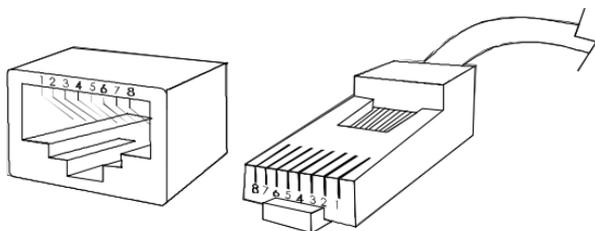
NOTE: *If your system's motherboard WOL Connector does not fit the WOL Cable or does not have 3 pins, do not attempt to force a connection or alter the components to fit. Doing so could permanently damage your computer.*

Connecting the Network Cable

Category 5 UTP cable qualifies for both 100BASE-TX Fast Ethernet and 10BASE-T Ethernet cabling rules. The maximum length of any single cable segment is 100 meters. Please keep in mind, however, that the maximum cable run between any two stations in a collision domain is 205m.

Connecting for 100Mbps Fast Ethernet

Category 5 UTP cable is required for Fast Ethernet operation. The maximum cable run between the DFE-550TX and the supporting hub or switch is 100m. The cable must be *straight-through* (not a *crossover* cable), with an RJ-45 plug at each end. Make the network connection by plugging one end of the cable into the RJ-45 jack of the DFE-550TX, and the other end into a normal (non-Uplink) port on the supporting device.



Connecting for 10Mbps Ethernet

Category 3, Category 4, and Category 5 UTP cable, as well as EIA/TIA-568 100-ohm STP cable all meet Ethernet cabling requirements. The maximum cable run between the DFE-550TX and the supporting hub or switch is 100 meters. The cable must be *straight-through* (not a *crossover* cable) with an RJ-45 connector at each end. Make the network connection by plugging one end of the cable into the RJ-45 jack of the DFE-550TX, and the other end into a normal (non-Uplink) port on the supporting device.

Note: The DFE-550TX will use NWay to automatically detect whether it is connected at 10Mbps or 100Mbps and configure itself accordingly. The duplex mode will likewise be auto-negotiated by NWay at the same time, allowing the host computer to be up and running on the network as soon as possible with a minimum of trouble.

Software Installation

On account of the great variety of network environments in which the DFE-550TX may be used, the instructions for software installation are given as README files on the DFE-550TX Software CD-ROM. Review the root directory and locate the subdirectory containing the appropriate software for use with your network operating system. Access the README file for overview information. For full installation details, see the README file and the referenced instruction files in the sub-directory.

Verification/Diagnostic Program

This test program verifies configuration of the DFE-550TX as set by the installation procedure, and assists with isolation of any faults in operation. Verification and testing procedures are optional, and will only be useful in the unusual event that there is a fault, such as an interrupt number conflict among your computer expansion cards. If your installation provides normal operation, you might choose to skip these procedures.

The Verification/Diagnostic Program provides two levels of testing: adapter function testing and network operation testing. Adapter testing includes a variety of diagnostic procedures.

Adapter testing does not require substitution of a loopback cable. All procedures of the Adapter test may be carried out with the network cable connection in place.

For the network operation test, the cable connecting your station with its supporting hub must be in place. Network testing involves the broadcast transmission of test packets from the primary station. The test cannot be fully implemented unless a second station on the LAN is available to the network operation test, in order to return the test packets to the primary station.

To run the Verification/Diagnostic Program, proceed with these steps:

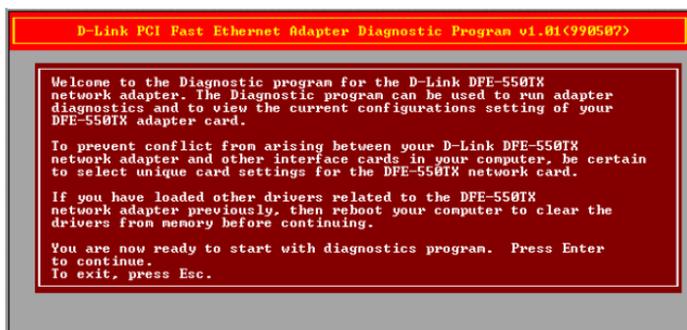
Adapter Function Test

1. Insert the DFE-550TX Software CD-ROM in an available drive (here shown as drive A). At the DOS prompt (here shown as >), key in:

```
> A:\DIAG.EXE
```

and <RETURN>. The opening screen of the Verification/Diagnostic program will appear.

NOTE: Read the README.TXT, on the CD-ROM, to choose the appropriate diagnostic program for your operating system.



2. Review the reported configuration data before proceeding to Step 3.
3. The Configuration Data screen also features a Diagnostic Menu. Follow the cues at the foot of the screen to select and run the Adapter Basic Diagnostic program. The adapter function test results will appear onscreen. In the Loopback test, test signals are intercepted and reflected at the MAC level without reaching the network cable. If the results are normal, then go ahead to the Network Operation test, starting with Step 4.

Network Operation Test

4. If you have access to a second station on the LAN, then skip ahead to Step 5. If you do not have access to a second station on the LAN, then the network test will be limited to blind transmission of test packets (none of which will be returned to the primary station). Follow the cues at the foot of the screen to select and run the Network Diagnostic program. Observe the *Packets Sent* line to see a steadily and rapidly increasing packet count. This will indicate normal transmission onto the LAN, and will be the end of your Verification/Diagnostic run. Skip the remaining steps shown below.
5. Remove the DFE-550TX Software CD-ROM from your station's (the primary station's) CD-ROM drive, and insert it into an available drive of a second station on your LAN. At the DOS prompt (here shown as >), key in:

```
> A:\DIAG.EXE
```

and <RETURN>. The opening screen of the Diagnostic program will appear onscreen at the second station. Follow the cues at the foot of the screen to select and run the Network Test program at the second station. The second station then begins broadcasting test packets, and at the same time is also ready to receive and return test signals transmitted from the primary station newly installed DFE-550TX.

6. Return to the primary station and follow the cues at the foot of the screen to select and run the Network Diagnostic program. Observe the *Packets Sent* and *Packets Received* lines to see that they track together (always showing equal count numbers), which verifies normal network operation.

The most likely causes of failure for any of the diagnostic tests are incorrect options settings, option settings that conflict with the settings of other boards or improper installation. In the event of any failure in diagnostic tests, refer to the *Troubleshooting* section of this guide.

Troubleshooting

If you experience any problems with the adapter, first verify that the appropriate driver is loaded, that the proper grade of cable is employed for the network connection, and that the supporting hub is functioning properly.

1. Ascertain that the adapter card is fully and firmly seated in the slot connector.
2. Check the length and rating of connecting cables.
3. Ascertain that the adapter PCI slot is not deactivated at the BIOS level. The CMOS Setup utility in PCI computers ordinarily provides the option to activate or deactivate PCI slots.
4. Replace the adapter in question with a verified adapter and run NIC (software) diagnostic tests.
5. Install the questioned adapter in another PCI computer and run the tests again.
6. Remove all other PCI adapters from the computer and run the tests again. If the verification/diagnostic run is then normal, then there is probably an interrupt number conflict which will have to be resolved manually by a CMOS Setup utility run after you have reinstalled all of the expansion cards.

The DFE-550TX Adapter features three LED indicators to assist in network diagnostics:

- LINK/ACT Indicator
A steady *green* LED indicates that the card is receiving power and there is a good link between the DFE-550TX and the device it is connected to. The LED will flash when the adapter is sending or receiving data.
- 100M Indicator
This LED shows steady green (ON) when operating at 100Mbps. It is dark (OFF) when connected at 10Mbps.
- FULL (duplex) Indicator
This LED is ON for full duplex connections and OFF when connected at half duplex.

Specifications

Network Type:

- Fast Ethernet 100Base-TX
IEEE 802.3u standard for 100Mbps baseband CSMA/CD local area network
- Ethernet 10BASE-T
IEEE 802.3 standard for 10Mbps baseband CSMA/CD local area network

Jumperless Hardware

NWay Auto-negotiation enabled

Media interface: RJ-45

- Interface controller: D-Link DL10050B

EMI Compatibility:

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

Host interface: PCI 2.1/2.2 Bus (Bus Master)

Physical Dimensions: 12.0 cm x 5 cm

Environment:

- Storage: -25° ~ 55°C (-13° ~ 131°F)
- Operating: 0° ~ 50°C (32° ~ 122°F)
- Humidity: 10% to 90% non-condensing

Power Consumption: 1 Watts max

PCB Layer: 2 layers

Software drivers for:

- Microsoft Windows 95 , 98, 98 SE
- Microsoft Windows 2000
- Microsoft NT 3.51 / 4.0
- Microsoft Windows for Workgroups 3.11
- Microsoft Client for DOS
- NDIS 2 driver
- NDIS 3 driver
- NDIS 4 driver
- NDIS 5 driver
- Novell NetWare Client for DOS
- Novell NetWare Client 32 for DOS
- Novell NetWare Server 3.12, 3.2, 4.11, 4.2, 5.0, 5.1
- ODI for DOS driver
- 32 bit ODI LAN driver
- NCSA
- FTP PC/TCP
- Packet Driver
- SCO Open Server 5.0.x
- RPL boot ROM
- PXE Boot ROM
- DMI Driver
- Install program

- Diagnostic.
- Microsoft Windows Millennium Edition
- NetWare 5.1

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URL: www.dlink.com E-MAIL: tech@dlink.com, support@dlink.com

Registration Card

Print, type or use block letters.

Your name: Mr./Ms _____ Dept. _____

Organization: _____

Your title at organization: _____

Telephone: _____ Fax _____

Organization's full address: _____

Country : _____

Date of purchase (Month/Day/Year) : _____

Product Model	Product Serial No.	* Product installed in type of computer (e.g., Compaq 486)	* Product installed in computer serial No.

(* Applies to adapters only)

Product was purchased from:

Reseller's name: _____

Telephone: _____ Fax: _____

Reseller's full address: _____

Answers to the following questions help us to support your product:

1. Where and how will the product primarily be used?

Home Office Travel Company Business Home Business Personal Use

2. How many employees work at installation site?

1 employee 2-9 10-49 50-99 100-499 500-999 1000 or more

3. What network protocol(s) does your organization use ?

XNS/IPX TCP/IP DECnet Other _____

4. What network operating system(s) does your organization use ?

D-Link LANsmart Novell NetWare NetWare Lite SCO Unix/Xenix PC NFS
 3Com 3+Open Banyan Vines DECnet Pathwork Windows NT Windows NTAS
 Windows '95 Other _____

5. What network management program does your organization use ?

D-View HP OpenView/Windows HP OpenView/Unix SunNet Manager Novell NMS
 NetView 6000 Other _____

6. What network medium/media does your organization use ?

Fiber-optics Thick coax Ethernet Thin coax Ethernet 10BASE-T UTP/STP
 100BASE-TX 100BASE-T4 100VGAnyLAN Other _____

7. What applications are used on your network?

Desktop publishing Spreadsheet Word processing CAD/CAM
 Database management Accounting Other _____

8. What category best describes your company?

Aerospace Engineering Education Finance Hospital Legal Insurance/Real Estate
 Manufacturing Retail/Chainstore/Wholesale VAR System house/company
 Government Transportation/Utilities/Communication Other _____

9. Would you recommend your D-Link product to a friend?

Yes No Don't know yet



TO: _____

D-Link®