D-Link ®

DGE-500SX
Giga-Ether Adapter
User's Guide

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Introduction

Thank you for choosing the D-Link DGE-500SX Giga-Ether adapter for PCI Bus-equipped personal computers. The DGE-500SX is ideal for speeding up data transfers for network servers and other computers, such as those used for video-conferencing, that send and/or receive large amounts of data. The DGE-500SX also includes the newest networking technologies, such as VLAN and multicasting support, that use network bandwidth more efficiently and further help the card maximize data throughput.

System Requirements

The host computer or server using the DGE-500SX needs to meet the following minimum requirements:

- **Processor** – Pentium-class CPU or higher
- **Memory** – 32MB RAM (Linux only), all other NOSs require 64 MB RAM
- **PCI slot** – 32- or 64-bit PCI Local Bus Slot Rev. 2.1 or later
    (please refer to the motherboard User's Guide)
- **BIOS** – Latest BIOS (Contact the PC manufacturer or BIOS manufacturer's website to verify)
- **Network connection** – an IEEE 802.3z-compliant gigabit switch, modular switch port or buffered repeater
- **Operating System** – One of the following:
    Windows 95 (OSR2)

    Windows 98

    Windows NT 4.0 (Service Pack 5)

    Windows NT 2000 Beta 3

    Linux OS Kernel v2.0/2.2

    Novell Netware v3.12, Support Pack 312PTD

    Novell Netware v3.2

    Novell Netware v4.11, Support Pack 5

    Novell Netware v4.2

    Novell Netware v5.0

Gigabit Ethernet Technology

Gigabit Ethernet is an extension of IEEE 802.3 Ethernet utilizing the same packet structure, format, and support for CSMA/CD protocol, full duplex, and management objects, but with a tenfold increase in theoretical throughput over 100Mbps Fast Ethernet and a one hundred-fold increase over 10Mbps Ethernet. Since it is compatible with all 10Mbps and 100Mbps Ethernet environments, Gigabit Ethernet provides a straightforward upgrade without wasting a company's existing investment in hardware, software, and trained personnel.

The increased speed and extra bandwidth offered by Gigabit Ethernet is essential to coping with the network bottlenecks that frequently develop as computers and their busses get faster and more users use applications that generate more traffic. Upgrading key components, such as your backbone and servers to Gigabit Ethernet can greatly improve network response times as well as significantly speed up the traffic between your subnets.

Gigabit Ethernet enables fast optical fiber connections to support video conferencing, complex imaging, and similar data-intensive applications. Likewise, since data transfers occur 10 times faster than Fast Ethernet, servers outfitted with Gigabit Ethernet NIC's are able to perform 10 times the number of operations in the same amount of time.

In addition, the phenomenal bandwidth delivered by Gigabit Ethernet is the most cost-effective method to take advantage of today and tomorrow's rapidly improving switching and routing internetworking technologies. And with expected advances in the coming years in silicon technology and digital signal processing that will enable Gigabit Ethernet to

eventually operate over unshielded twisted-pair (UTP) cabling, outfitting your network with a powerful 1000Mbps-capable backbone/server connection creates a flexible foundation for the next generation of network technology products.

The DGE-500SX

Speed

The DGE-500SX transmits and receives data at one gigabit per second (1Gbps or 1000Mbps). Its full-duplex (only) operation mode enables it to transmit and receive data simultaneously, effectively doubling the amount of data being handled and giving it an actual top speed of 2Gbps. This huge amount of throughput can be used to connect highly active or bandwidth-hogging computers and servers directly to your network either through a switch port on your backbone, or through a departmental switch. The DGE-500SX also includes very large (96 KB) data buffers designed to significantly increase network performance by virtually eliminating buffer overruns.

PCI Interface

The DGE-500SX attaches to the host computer via the fast and efficient PCI bus. The host PCI slot can be either 32- or 64-bit, and should be compliant with PCI v2.1 or later. Make sure the host computer has a 64-bit PCI bus in order to take advantage of the full-duplex speed enhancement.

In addition, the DGE-550SX uses the following advanced features to maximize the utilization of the PCI bus and reduce overhead on the system CPU:

- Bus Master technology - the NIC masters the PCI bus, freeing the CPU from PCI bus management duties.

- Direct Memory Access (DMA) – enables the NIC to write directly to the system memory, freeing the CPU from many memory management duties.

- Burst transfers – full bandwidth packet bursting across the PCI bus increases the throughput for small packets by coalescing transfers.

- Memory buffers - Dual transmit and receive FIFO buffers allow for simultaneous reading and writing of data.

VLAN

The DGE-500SX supports IEEE 802.1Q VLAN tagging and filtering at the chip level, and works with any IEEE 802.1Q compliant switch. The IEEE 802.1Q standard describes a methodology by which packets of data going through networking devices can be inserted with, or stripped of, VLAN identification information. VLANs can increase the efficiency and provide extra security for your network.

Product Features

Designed for versatility and performance, the DGE-500SX adapter provides the following features:

- Fully compliant with IEEE 802.3z 1000BASE-SX Gigabit Ethernet standards and IEEE 802.3 Ethernet standards.

- Plug-and-Play installation.

- Maximum 1Gbps (1000Mbps) transmit and 1Gbps receive for a total of 2Gbps data throughput.

- Full-duplex operation only.

- PCI v2.2 compliant.

- Operates in a 32- or 64-bit, 33/66 MHz PCI Bus slot. A 32-bit PCI Bus at 33Mhz supports 1Gbps throughput, a 64-bit PCI Bus at 33Mhz supports 2Gbps.

- PCI Bus Master greatly reduces the load on the CPU, freeing it for other tasks.

- Supports IEEE 802.1Q VLAN specifications, with memory for up to 16 VLANs.

- Multi-mode SC Optical Fiber connector for network cable connection.

    Cable lengths up to 220 meters using 850nm 62.5/125 fiber optic cable.

    Cable lengths up to 500 meters using 850nm 50/125 fiber optic cable.

- Built-in 96K buffers reduce memory transfer overhead and optimize operating bandwidth, throughput, and network data integrity.

- Level-One LXT1001GMAC (Gigabit Ethernet MAC) controller containing a built-in 64 bit, 33 MHz PCI interface.

- Four LED indicators: Full Duplex, Link and Transmit / Receive, 1000Mbps.

- Driver[†] support for:

√ Windows 95 (NDIS3)	√ Windows 98 (NDIS5)
√ Windows NT 4.0 (NDIS4)	√ Windows NT 2000 Beta 3 (NDIS5)
√ Linux OS Kernel v2.0/2.2	√ Netware v4.11/4.2/5.0

[†] Check *http://www.dlink.com* for newest release of drivers.

Installation

Unpacking

CAUTION: *Under ordinary circumstances, a DGE-500SX card will not be affected by static charge as may be received through your body during handling of the unit. However, there are special circumstances where you may carry an extraordinarily high static charge, and possibly damage the card and/or your computer. It is good practice to eliminate all static electricity by touching a ground (an unpainted metal area of your computer chassis, for example) before performing any installations.*

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

- One DGE-500SX Giga-Ether Adapter Card.

- One DGE-500SX Software CD-ROM.

Installing the Adapter

1. Shut down the computer, unplug its power cord, and remove the chassis cover.

2. Insert the contact edge of the DGE-500SX card into the connector of any available PCI 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 which secures the card to the computer chassis.

4. Replace the computer's chassis cover.

5. Reconnect the computer's power cord, and switch computer power on. If the BIOS section of your computer's boot program is Plug-and-Play compliant, then at power-up the BIOS will automatically configure any newly installed DGE-500SX adapter.

NOTE: *Due to a fault in some Plug-n-Play BIOS programs, it happens occasionally that a newly installed adapter is assigned an Interrupt Number which is already assigned to another device. In such a case, the conflict of Interrupt Number will cause faults in the behavior of both devices. Then it is necessary to run the CMOS Setup utility, and manually assign a non-conflicting Interrupt Number.*

Connecting the Network Cable

Multimode (62.5/125μm or 50/125μm) fiber cabling with an IEEE recommended SC connector is required for the adapter.   Use either one duplex SC connector, or two simplex SC connectors, and observe the correct relationship between the receive (Rx) and transmit (Tx) ports on the adapter and switch. The Tx port on the switch should connect to the Rx port on the adapter. Likewise, the Rx port on the switch should connect to the Tx port on the adapter. If there is a need to monitor the adapter's faceplate LEDs, make sure the rear of the PC or workstation is accessible and leave sufficient clearance for cabling and service.

Software Installation

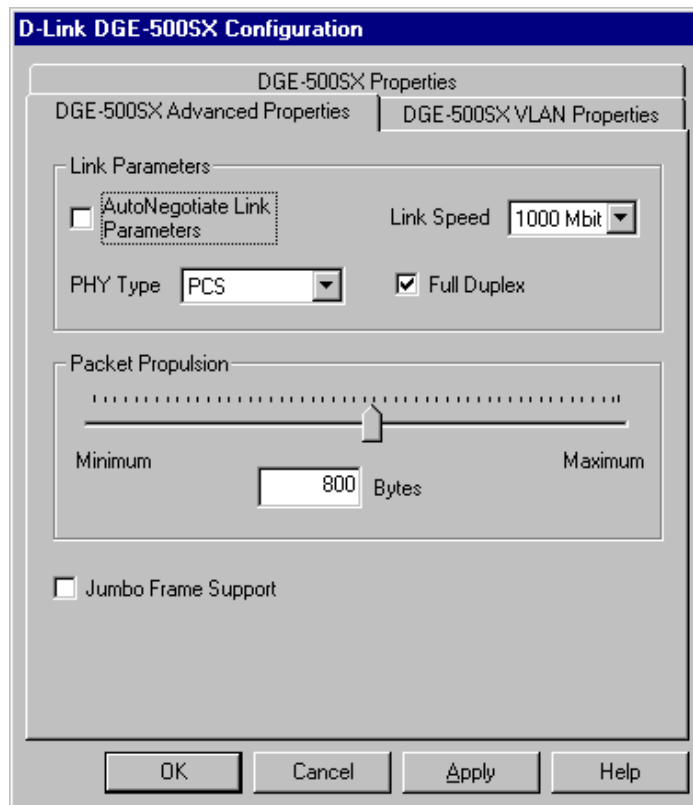### *Windows NT v4.0*

1. Make sure the network adapter has been installed in your computer, boot it up, and start Windows NT 4.0.

2. Open "My Computer" → "Control Panel" → "Networks".

3. Select "Add adapter" → "Have disk".

4. Type the following: `A:\` (where `A:` is the floppy drive) OR `D:\` (where `D:` is the CD drive).

5. Select "D-Link DGE-500SX Giga-Ether Adapter" (see below).
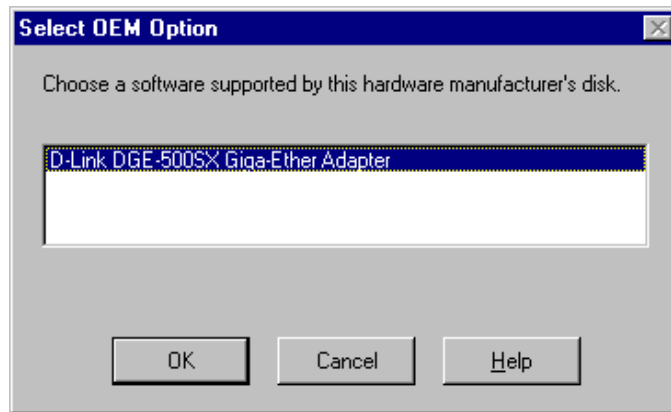
6. Click "OK" and Windows NT 4.0 will copy the files from the driver disk.

7. After the file has been copied, click "Properties" and modify the DGE-500SX configuration (see below).

8. Click "OK" after making the configuration setting changes. Windows NT 4.0 will then ask you to reboot the PC. Select "YES".

9. Restart the computer.

NetWare Server 5.0

The following is for the initial installation from the install menu. Skip this section if it is not your first time using the install menu.
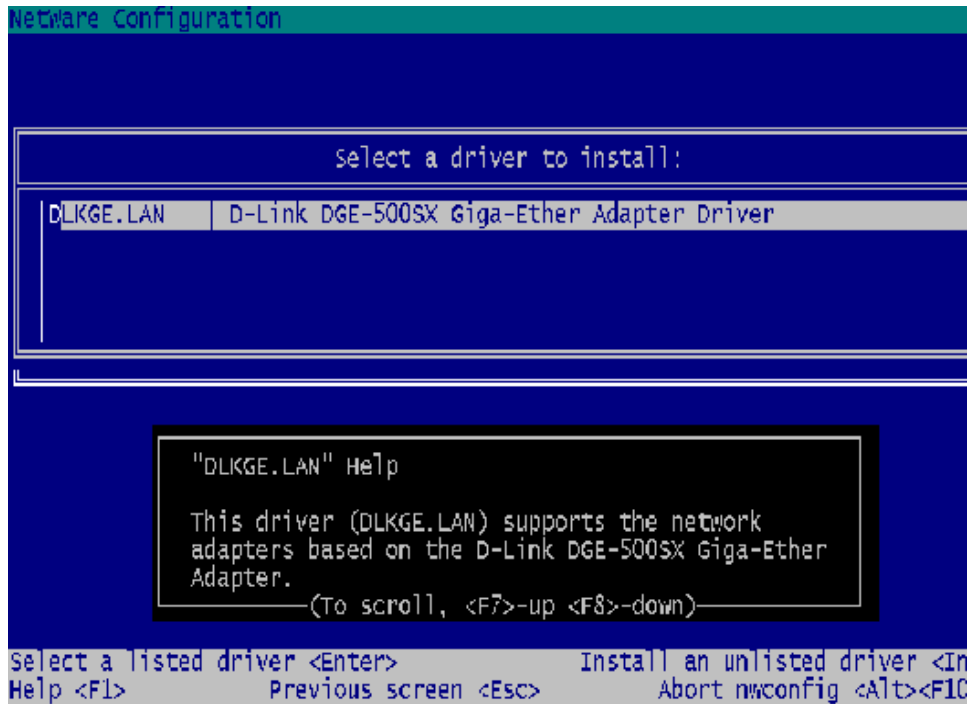
1. Start the NetWare Server by typing in the following commands:

       CD \NWSERVER

       SERVER

2. After booting up, type the following command:

       NWCONFIG

3. Select "Driver Options" → "Configure network drivers" → "Select a driver" (see below).

```
Netware Configuration

                    Select a driver to install:

 DLKGE.LAN  |  D-Link DGE-500SX Giga-Ether Adapter Driver


              "DLKGE.LAN" Help

              This driver (DLKGE.LAN) supports the network
              adapters based on the D-Link DGE-500SX Giga-Ether
              Adapter.
              ————————(To scroll, <F7>-up <F8>-down)————————

Select a listed driver <Enter>          Install an unlisted driver <In
Help <F1>            Previous screen <Esc>      Abort nwconfig <Alt><F10
```

4. Press the <Insert> key to install an unlisted driver.

5. Insert the driver diskette into the floppy disk drive or the driver CD-ROM into your CD-ROM drive (depending on which was included).

6. Press the <Enter> key to continue the installation or press <F3> to specify the directory which includes DLKGE.LDI, DLKGE.LAN. For example,

    A:\NETWARE\32BITLAN   (where A: is the floppy drive)

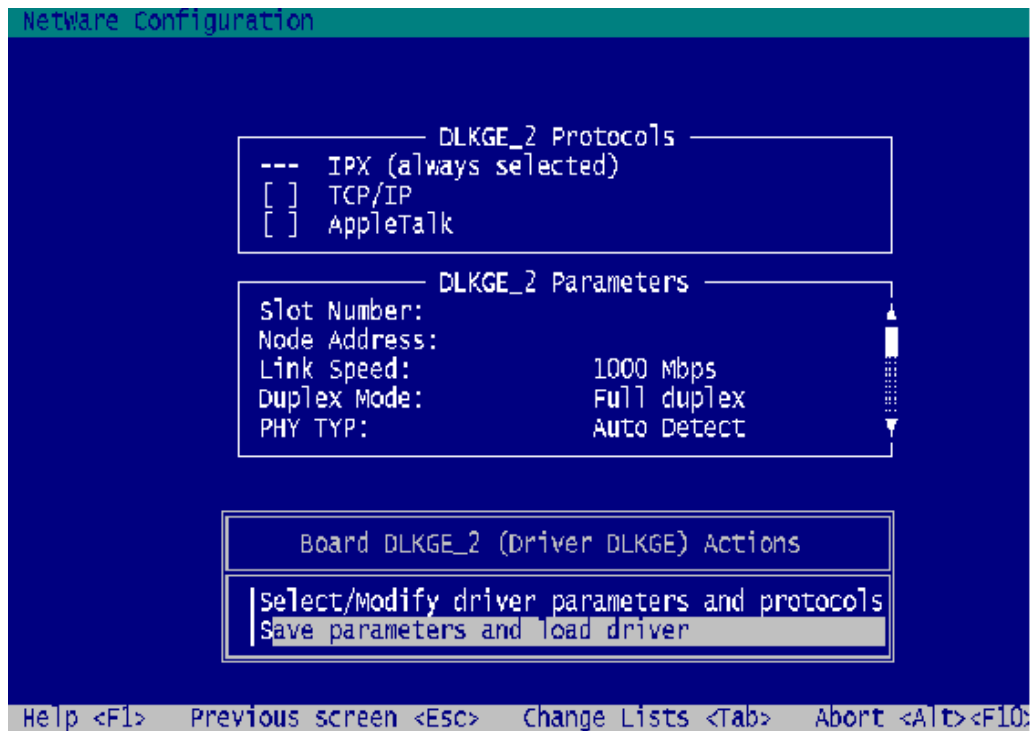   OR

    D:\NETWARE\32BITLAN (where D: is the CD-ROM drive).

7. Select "DLKGE.LAN ....".

Note: Don't copy the NLM files to your system if the version of the ones on the installation disk are older than those already on your system.

8. Specify "SLOT" and "Node Address" if necessary.

9. Select "Save parameters and load driver" after configuring the adapter settings (see below).

```
NetWare Configuration

            ─── DLKGE_2 Protocols ───
    ---   IPX (always selected)
    [ ]   TCP/IP
    [ ]   AppleTalk
            ─── DLKGE_2 Parameters ───
    Slot Number:
    Node Address:
    Link Speed:           1000 Mbps
    Duplex Mode:          Full duplex
    PHY TYP:              Auto Detect

       Board DLKGE_2 (Driver DLKGE) Actions
    ┌──────────────────────────────────────────┐
    │Select/Modify driver parameters and protocols│
    │Save parameters and load driver             │
    └──────────────────────────────────────────┘

 Help <F1>   Previous screen <Esc>   Change Lists <Tab>   Abort <Alt><F10>
```

The NetWare server will now automatically load/bind the driver.

If the driver files have already been copied to your system's Netware directory and you simply wish to load them:

1. Start the NetWare Server by typing in the following commands:

    `CD \NWSERVER`

    `SERVER.`

2. After booting up, type the following command:

    `NWCONFIG`

3. Select "Driver Options" → "Configure network drivers" → "Select a driver".

4. Select "DLKGE.LAN ...." in the Select a driver windows.

5. Specify "SLOT" and "Node Address" if necessary.

6. Select "Save parameters and load driver" after configuring the adapter settings.

The NetWare server will now automatically load/bind the driver.

Next, you will need to modify your NetWare 5.0 Server's Autoexec file. To do so, please follow these steps:

1. Start the NetWare Server by typing in the following commands:

    `CD \NWSERVER`

    `SERVER.`

2. From the Novell Server side, type the following command:

    NWCONFIG

3. Select <NCF files options>.

4. Select <Edit AUTOEXEC.NCF file>.

5. Add the following items into the server's AUTOEXEC.NCF file:

```
LOAD C:\NWSERVER\NBI.NLM

LOAD C:\NWSERVER\MSM.NLM

LOAD C:\NWSERVER\ETHERTSM.NLM

LOAD C:\NWSERVER\DLKGE SLOT=1 FRAME=Ethernet_802.3

NAME=DLKGE_1_E83

BIND IPX DLKGE_1_E83 NET=xxxx


LOAD C:\NWSERVER\DLKGE SLOT=1 FRAME=Ethernet_802.2

NAME=DLKGE_1_E82

BIND IPX DLKGE_1_E82 NET=xxxx


LOAD C:\NWSERVER\DLKGE SLOT=1 FRAME=Ethernet_II

NAME=DLKGE_1_EII

BIND IPX DLKGE_1_EII NET=xxxx


LOAD C:\NWSERVER\DLKGE SLOT=1 FRAME=Ethernet_SNAP

NAME=DLKGE_1_ESP

BIND IPX DLKGE_1_ESP NET=xxxx
```

6. Restart the server again.

Parameters supported by the DLKGE.LAN driver

SLOT 1 – Forces the driver to search for the specified card.

FULLDUPLEX – The FULL-DUPLEX parameter causes the DLKGE to operate in full-duplex mode. When operating in full-duplex mode, the DLKGE can simultaneously transmit and receive packets.

AUTONEGOTIATE – The AUTO-NEGOTIATE parameter causes the DLKGE to auto negotiate the duplex mode and link speed with the device being connected.

TXDMATHRESHOLD – The TXDMATHERESHOLD determines the I/O method used to move transmit packets from host memory to the DLKGE memory. The valid range for the TXDMATHRESHOLD is 0 - 1514. the default value is 800.

DISABLERXIP – Disables the DLKGE TCP/IP Receive Packet checksum support. By default, the DLKGE will perform TCP/IP checksum verification on received packets in hardware if the operating system supports this capability.

Due to the large number of Network Operating Systems (NOSs) supported, detailed driver[‡] software installation instructions are given in README.TXT files on the DGE-500SX Software Diskette/CD-ROM. Review the root directory README for overview information. For detailed installation instructions see the README and referenced instruction files in the subdirectory corresponding to your network operating system.

[‡] Check *http://www.dlink.com* periodically for driver upgrades.

Troubleshooting

If you experience any problems with the adapter, first confirm that the appropriate driver is loaded; that the proper grade of cable is employed for the network connection; and that the switch it is connected to is properly qualified for the application (such as 1000BASE-SX).

The DGE-500SX Adapter features four LED indicators:

- **FDX**

Steady **green** indicates the adapter is operating in Full-Duplex mode.

- **1000M**

The LED indicator lights **green** when a 1000 Mbps device is connected to the adapter.

- **Link**

Steady **green** indicates good linkage between the DGE- 500SX and its supporting server or switch.

- **TX/RX**

Flashing **green** indicates activity (transmitting or receiving) within the adapter.

Specifications

Jumperless Hardware

Media interface: Optical Fiber Transceiver SC Connector

EMI Certifications:

- FCC Class B
- CE Certification Class B
- VCCI Class B and C-Tick

Host interface: PCI Bus (Bus Master)

I/O base address assigned by Plug and Play system

Interrupt Number Assigned by Plug and Play system

Physical Dimensions: 16.2 x 9.5 cm

Environment:

- Storage: −5° to 55°C, (23° to 131° F)
- Operating: 0° to 50° C, (32° to 122° F)
- Humidity: 5% to 95% non-condensing
- Power Consumption: 7.8W

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