4524 PMC
100Base-T Adapter
Installation Guide

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Do Not Substitute Parts or Modify Equipment

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Do not install or replace the component with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

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Declaration of Conformity

(according to ISO/IEC Guide 22 and EN 45014)

Manufacturer's Name:	Interphase Corporation
Manufacturer's Address:	13800 Senlac Dallas, Texas 75234 U.S.A.

declares, that the product:

Product Name: PMC 100Base-T Adapter

Model Number: 4524

conforms to the following Standards:

Safety:	EN 60950:1988 + A1, A2
EMC:	EN 55022:1988 class A EN 50082-1 Part 1 1992

Supplementary Information:

This product complies with the requirements of the **Low Voltage Directive 73/23/EEC** and the **EMC directive 89/336/EEC**.

Dallas, July 19, 1996

Mike Jobe, Quality Manager

European Contact:

Interphase International
Astral House, Granville Way, Bicester, Oxon, England OX6 0JT
Phone: +44 (0) 1869-321222; Fax:+44 (0) 1869-247720

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APPENDIX B Connectors and Cabling

Conventions

Icon Conventions

Icons draw your attention to especially important information:

Note

The Note icon indicates important points of interest related to the current subject.

Caution

The Caution icon brings to your attention those items or steps that, if not properly followed, could cause problems in your machine's configuration or operating system.

Warning

The Warning icon alerts you to steps or procedures that could be hazardous to your health, cause permanent damage to the equipment, or impose unpredictable results on the surrounding environment.

Text Conventions

The following conventions are used in this manual. Computer-generated text is shown in typewriter font. Examples of computer-generated text are: program output (such as the screen display during the software installation procedure), commands, directory names, file names, variables, prompts, and sections of program code.

```
Computer-generated text example
```

Commands to be entered by the user are printed in **bold Courier** type. For example:

```
cd /usr/tmp
```

Pressing the return key (↵ **Return**) at the end of the command line entry is assumed, when not explicitly shown. For example:

```
/bin/su
```

is the same as:

```
/bin/su ↵ Return
```

Required user input, when mixed with program output, is printed in **bold Courier** type. References to UNIX programs and manual page entries follow the standard UNIX conventions.

When a user command, system prompt, or system response is too long to fit on a single line, it will be shown as

```
Do you want the new kernel moved into
\ vmunix?[y]
```

with a backslash at either the beginning of the continued line or at the end of the previous line.

Introduction 1

Overview

The 4524 100Base-T adapter adheres to the PMC (PCI Mezzanine Card) mechanical layout for VME-based mezzanine systems, and supports a data rate of 100Mbps. It allows you to create one or more high-speed connections between the host system and a 100Base-T network. There are no architectural or software differences between the 4524 and the 5524 used in PCI motherboard slot installations.

The 4524 provides full auto-negotiation capabilities to select full or half duplex for 100 Mb or 10 Mb connections, supporting TX (category 5 UTP copper cable) and T4 (4-pair category 3 UTP copper cable). However, the PMC specification does not allow for standard RJ-45 connections at the faceplate of the adapter. You must use a Compu-shield® slim-line type connector. A Compu-shield to RJ-45 conversion pigtail is included in the 4524 installation kit.

Product Features

- Single Compu-shield connector with RJ-45 cable converter for PMC, combining both 100Base-T and 10Base-T UTP
- Compliant with IEEE 802.3u 100Base-T standards and IEEE 802.3 10Base-T standards
- Fully PMC compliant
- Supports 100 Mbps over existing category 3 wiring (T4)
- Supports 100 Mbps over existing category 5 wiring (TX)

- Auto-selects 100 Mbps or 10 Mbps over a single physical port
- Adaptive FIFO buffering
- Four LEDs on each PMC daughtercard for status monitoring
- Multiprocessor support
- Multicast support
- Optional EEPROM interface enables easy implementation of jumperless product
- 1.5KB RX and TX FIFOs
- Ethernet frame support
- Supports 100Base-T or 10Base-T
- Plug-and-play compatible

System Requirements

System requirements for the 4524 adapter are as follows:

- Approximately 200K of free disk space for driver installation
- Single low-profile jack with RJ-45 cable converter for PMC combining both 100Base-T and 10Base-T UTP

PCI/PMC Technology

A PCI bridge provides a high bandwidth path allowing PCI masters direct access to main memory. The PCI SIG designed the PCI bus as the next generation I/O expansion bus for the computer industry. Its predecessors were ISA, EISA, and MCA. The PCI bus is a high-performance bus found in systems ranging from low-end PCs to high-end servers.

Three sizes of PCI add-in boards are defined: long, short, and variable short length. Systems are not required to support all board types. To accommodate the 5V and 3.3V signaling environments and to facilitate a smooth migration path between the voltages, three add-in board electrical types are specified: a “5 volt” board which plugs into only 5V connectors, a “universal” board which plugs into both 5V and 3.3V connectors, and a “3.3 volt” board which plugs into only 3.3V connectors.

The PMC bus was designed for low profile (for example, embedded) environments. It implements the PCI bus logic in a daughtercard (mezzanine) architecture.

100Base-T Overview

100Base-T is defined as the IEEE 802.3u standard providing a 100-megabits-per-second data rate.

The 100Base-T technology is based on the CSMA/CD signaling used for 10Base-T. This standard allows auto-negotiation of speed and duplex configurations and is defined by the IEEE 802.3u specification.

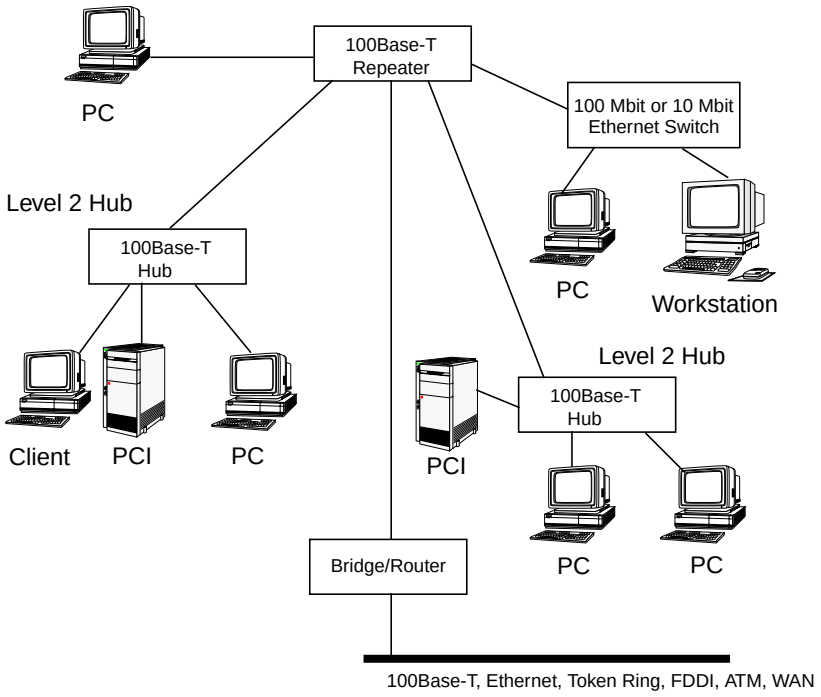

Figure 1-1. Typical 100Base-T Network

100Base-TX

The 100Base-TX adapter is based on specifications in the ANSI TP-PMD standard. 100Base-TX operates at 100Mbps over two pairs of wires. One pair is for receiving data; the other is for transmitting. The wire has an approximate impedance of 100 Ω. The wire is less than or equal to 100 meters in length.

The physical connection device (PHY) continuously monitors the receive data path for activity as a means of checking that the link is working correctly. This is done continuously during moderate to heavy traffic or even idle conditions on the network.

100Base-T4

The 100Base-T4 system operates over four pairs of wires. One pair is for transmitting data, one pair is for receiving data, and the remaining two pairs are bidirectional. So, for example, when data is being transmitted, the two bidirectional pairs and the transmit pair are all used for transmitting, while the receive pair is used for sensing collisions. This makes it possible to provide Fast Ethernet signals over standard voice-grade Category 3 unshielded twisted-pair cable.

The 100Base-T4 media system is designed to allow segments of up to 100 meters in length when using EIA/TIA Category 3, 4, or 5 unshielded twisted-pair cable.

The physical connection device (PHY) continuously monitors the receive data path for activity as a means of checking that the link is working correctly. When the network is idle, 100Base-T4 transceivers send link pulses over the segment to verify link integrity. These pulses are called Fast Link Pulses, and they are also used in the auto-negotiation mechanism, which allows a multi-speed hub to detect the operation speed of an Ethernet device that is connected to it, and to adjust the speed of the hub ports accordingly.

Auto-Negotiation

Auto-negotiation is like a rotary switch that automatically switches to the correct technology, such as 10Base-T, 100Base-TX, 100Base-T4, or a corresponding Full Duplex

mode. Once the highest performance common mode is determined, auto-negotiation passes control of the cable to the appropriate technology and becomes transparent until the connection is broken. Auto-negotiation leverages the proven link function of 10Base-T to provide robust operation over Category 3, 4, or 5 Unshielded Twisted Pair (UTP).

The following lists define the priority hierarchy for resolving multiple common abilities. That is, if both devices support both 10Base-T and 100Base-TX, auto-negotiation at both ends will connect 100Base-TX instead of 10Base-T.

The priority hierarchy for TX mode is:

1. 100Base-TX Full Duplex
2. 100Base-TX
3. 10Base-T Full Duplex
4. 10Base-T

The priority hierarchy for T4 mode is:

1. 100Base-T4
2. 10Base-T Full Duplex
3. 10Base-T

To account for technologies that existed prior to auto-negotiation, auto-negotiation passes the signals present on the receiver to the 100Base-TX and 100Base-T4 Link Monitor functions.

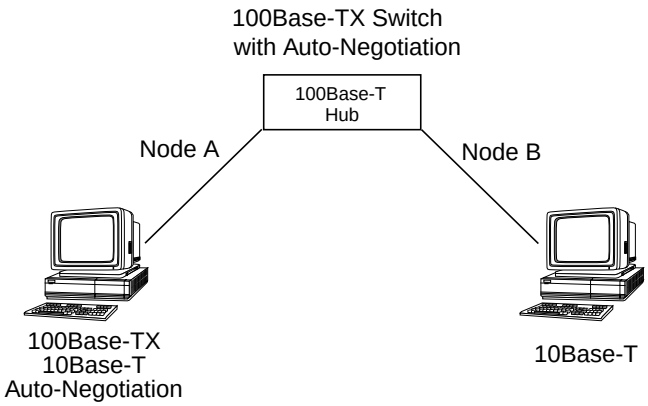

Figure 1-2. Auto-Negotiation Basic Operation

World-Wide Web Resources

You can find information related to 100Base-T technology at the following World-Wide Web sites:

- `http://www.iol.unh.edu/consortiums/fe/fast_ethernet_consortium.html`
- `http://wwwhost.ots.utexas.edu/ethernet/100mbps.html`

4524 Adapter Hardware Installation

2

Overview

The 4524 PMC 100Base-T adapter is designed to be installed in PMC (PCI Mezzanine Card) slots. This chapter describes the procedure for physically installing the 4524 adapter and includes the following:

- Unpacking the adapter board
- Installing the board in a host mezzanine slot
- Connecting the adapter board to the network

Please observe all notes, cautions, and warnings.

For technical specifications for the 4524 adapter, see *4524 Specifications* on page 19.

Caution

The adapter is packed in an antistatic bag to protect it during shipment. Keep the adapter in the protective antistatic bag until you are ready to install it in the mezzanine. To prevent damage to the adapter due to electromagnetic discharge, wear a grounding strap and handle the adapter only by its edges. Do not touch the components or any metal parts on the adapter, except for the metal faceplate.

Note

The 4524 adapter is a plug-and-play device with systems that are compliant with the PCI Local Bus Revision 2.1 specification. Systems that are not

compliant may require manual configuration via a PCI Device Configuration menu in the BIOS. Refer to your host system's documentation for PCI Device Configuration.

Unpacking the Hardware

1. Open the shipping container and carefully remove its contents.
2. Verify that you have received all items on the packing list, and inspect each item for damage. Wearing a grounding strap, remove the 4524 adapter from the antistatic bag and check for any damage that might have occurred during shipment. Return the adapter to the antistatic bag.

   If you find any omissions or damage, contact your network supplier and the carrier (for example, UPS or Federal Express) that delivered the package.
3. Return all packing materials to the shipping container and save.

   If the board must be returned, ship it in its original box (or one providing equivalent protection). Failure to do so could nullify your warranty.

Inserting the 4524 PMC Adapter

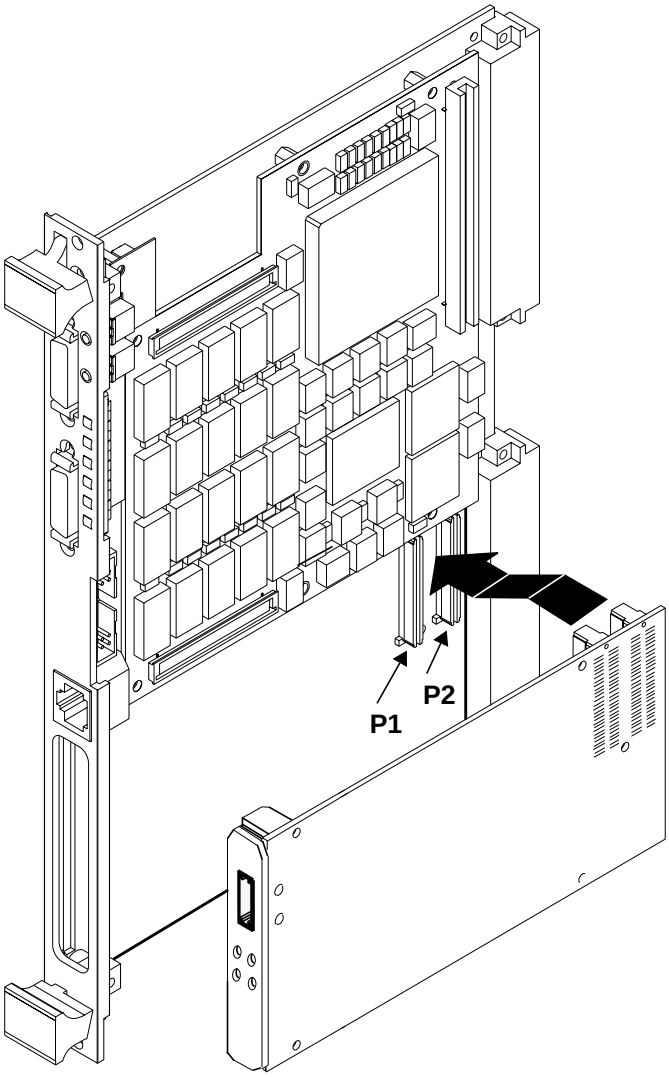

Figure 2-1. Inserting the 4524 Adapter

Warning

The motherboard you install the 4524 on must operate at the same signaling voltage level as the daughtercard, 5V only.

Warning

Your computer operates at voltages that can be lethal. Before you remove the computer cover, carefully review the steps in this procedure and observe all cautions and warnings to protect yourself and to prevent damage to the system.

1. With power disconnected and the motherboard's faceplate screws unfastened, remove the motherboard from the system chassis.
2. Remove the spring metal clip covering the mezzanine aperture on the faceplate of the motherboard.
3. Wearing a grounding strap, carefully remove the adapter from its antistatic bag.
4. Install the daughtercard as follows (Figure 2-1 illustrates the installation of a PMC adapter on a typical motherboard):
   a. Hold the 4524 adapter at an angle and insert it through the back of the motherboard's faceplate while aligning the dual mating connectors on the motherboard to the dual connectors (P1 and P2) on the daughtercard.

b. Carefully press the adapter into place. Alignment is facilitated via a standoff post and sometimes also a 5V keying pin on the motherboard and corresponding alignment holes on the daughtercard.

5. Fasten the cards together with screws.

6. Place the assembly back in the motherboard system chassis slot.

7. Connect the daughtercard to the network.

Table 2-1 describes the cables and connector that are available for the adapter:

Table 2-1. Connectors and Cabling

Connector	Medium	Configuration
Compu-shield® Series 31*	Cat 3, 4, or 5 copper	UTP cabling**
* Available from Stewart Connector Systems, Inc. ** See *Connectors and Cabling* on page 21 for pinout assignments.		

Note

For PMC compliance, the 4524 employs a low profile 8-pin jack. A pigtail is included with the adapter for converting the Compu-shield Series 31 connection to a standard RJ-45 UTP interface.

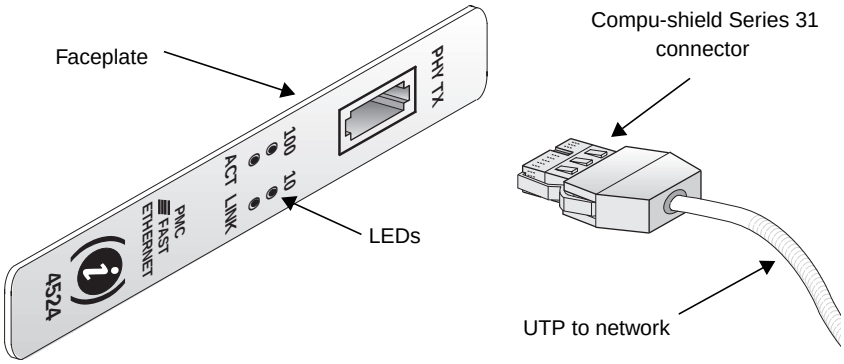

Figure 2-2. PHY TX Network Connection

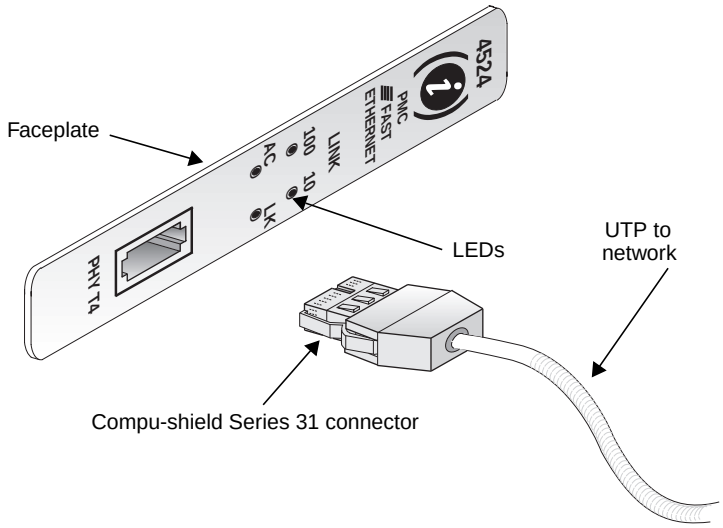

Figure 2-3. PHY T4 Network Connection

8. Turn on the power to the host computer.

Installation of the 4524 adapter hardware is complete.

Troubleshooting the 4524 Adapter

3

Overview

This chapter explains the LED functions for the 4524 adapter, and describes some common problems and possible solutions. The 4524 PMC adapter comes in two versions: the TX, for 100Base-TX, and the T4, for 100Base-T4.

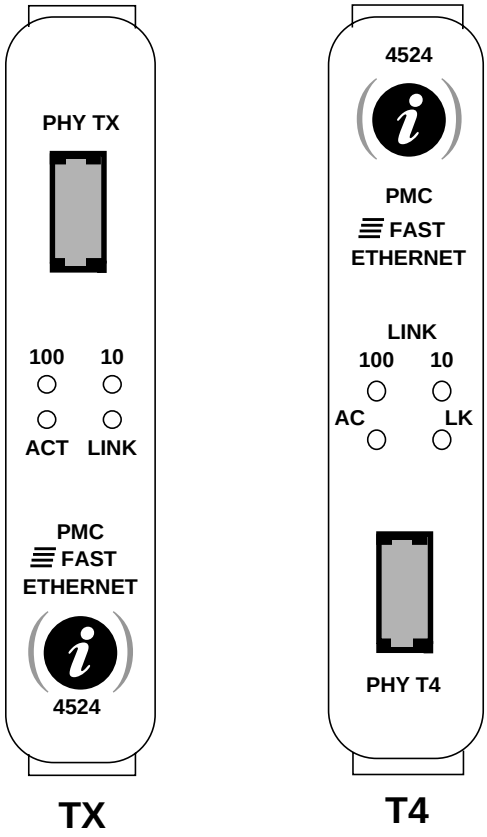

Figure 3-1. 4524 Adapter Faceplates

LEDs

When this 4524 LED . . .	Is . . .	It means . . .
100	Off	100 Mb mode is off
100	Green	100 Mb mode is on
10	Off	10 Mb mode is off
10	Green	10 Mb mode is on
ACT/AC	Off	No data is being transmitted or received across the cable.
ACT/AC	Yellow	Data is being transmitted or received across the cable.
LINK/LK	Off	There is no external link to the hub or the switch.
LINK/LK	Green	There is an external 100 Mb or 10 Mb link made to the hub or the switch.

Problems and Possible Solutions

If you are unable to resolve a problem you are experiencing, contact your network supplier.

If you are experiencing this problem . . .	Try the following possible solution(s) . . .
The system does not recognize the adapter and no LEDs light.	Check to ensure that the adapter is properly seated in the system backplane.
The LEDs light correctly, but the system does not recognize the adapter.	**1.** Cycle power. **2.** Check configuration.
The system recognizes the adapter and its LEDs light correctly, but the adapter can't communicate with other systems.	**1.** Verify that the cable being used complies with the IEEE 802.3u standard. **2.** Ping the broadcast address for the adapter interface and check whether the activity light on the hub blinks. Other active hosts must be connected to the hub, or the activity light does not blink.

4524 Specifications

A

Hardware Specifications

PMC Bus Specifications	
PCI Local Bus:	33 MHz, 32-bit PCI local bus interface 5V only DMA Master Plug-and-play compatible IEEE P1386 PMC compliant
Mechanical (Nominal)	
Width:	74 mm
Length:	149 mm
Height without front panel:	10 mm
Weight:	162.5 g
Power Requirements	0.50A at +5VDC
IEEE Compliance	IEEE 802.3 Ethernet
Operating Environment	
Temperature:	0–55 degrees C / 32–131 degrees F
Relative humidity:	10–95% noncondensing
Altitude:	-1000–15,000 feet
Air flow:	250 LFM minimum
Storage Environment	
Temperature:	-40–85 degrees C / -42–185 degrees F
Relative humidity:	10–95% noncondensing
Altitude:	-1000 to 50,000 feet

Connectors & Cables	
(T4) Compu-shield:	Category 3, 4, or 5 Copper UTP
(TX) Compu-shield:	Category 5 Copper UTP
Network Support	
(T4) SEEQ 80c240	http://www.seeq.com/80c240.shtml
(TX) National 83840	http://www.national.com/pf/DP/DP83840.html
(TX) National 83223	http://www.national.com/pf/DP/DP83223.html

Connectors and Cabling

B

Overview

The PMC specification does not allow for the standard RJ-45 jack for network connections; therefore, the 4524 adapter uses a Compu-shield low profile connector to provide connectivity. A pigtail cable is included in the installation kit for converting the Compu-shield connector to a standard RJ-45 interface.

Caution

The UTP cabling used with the 4524 adapter must comply with IEEE 802.3u standards for 100-Mbps in order to meet emissions requirements. All unused wires must be attached to the jacks at each end of the cable. No open-end wiring is allowed.

Table B-1. UTP Cable Requirements

Adapter	No. of Pairs	Type
100Base-TX	2	Category 5
100Base-T4	4	Category 3 or better
(Maximum Cable Length = 100 meters)		

Connector Pinouts

Table B-2. 100Base-TX Compu-shield Connector Pinouts

Pin	Signal	Description
1	TX+	Transmit
2	TX–	Transmit
3	RX+	Receive
4	n/a	Not Used
5	n/a	Not Used
6	RX–	Receive
7	n/a	Not Used
8	n/a	Not Used

Table B-3. 100Base-T4 Compu-shield Connector Pinouts

Pin	Signal	Description
1	TX_D1+	Transmit
2	TX_D1-	Transmit
3	RX_D2+	Receive
4	BI_D3+	Bidirectional
5	BI_D3-	Bidirectional
6	RX_D2-	Receive
7	BI_D4+	Bidirectional
8	BI_D4-	Bidirectional

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W

Product Registration Card

Please take a minute to register your Interphase product. This will enable us to notify you about software updates and product enhancements.

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E-mail Address _____

Which product did you purchase? _____
Serial Number _____
Where did you purchase this product (company name)? _____
Date Purchased _____

Number of client nodes at this site: _____
Operating System(s) being used with this product:

❑ Solaris ❑ SunOS ❑ AIX ❑ NetWare
❑ HP-UX ❑ IRIX ❑ Mac OS ❑ Windows NT
❑ PC NFS ❑ DEC Ultrix ❑ Other _____

Operating System Version: _____
Network Protocol(s) in use:

❑ TCP/IP ❑ IPX ❑ AppleTalk ❑ Other _____

We welcome your comments, ideas, and suggestions. You can fax additional comments to 214/654-5500, or send them to intouch@iphase.com

_____
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