

Gigabit Ethernet Adapters



User Manual for all PCI-X and CompactPCI-X Models Utilizing Intel 82546 chipset.

NOTE:

PCI-X is backwards compatible to PCI 32-bit and 64-bit slots. Read further for additional information

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AEI's Gigabit Ethernet Family of Adapters utilizing the Intel 8254x chipset may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request.

Contact your local AEI sales office or your distributor to obtain the latest specifications and before placing your product order.

Copies of documents which have an ordering number and are referenced in this document, or other AEI literature may be obtained by calling +951-699-8740 or by visiting AEI's website at <http://www.aei-it.com>

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Revision History

Revision	Revision Date	Description
1.0	June 21, 2004	Initial Publication Release.
1.1	June 1, 2009	Part number update, and elimination of PacketEngine™ data.

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9. ENTIRE AGREEMENT: This Agreement sets forth the entire agreement and understanding between you and AEI with respect to the subject matter hereof and supersedes and cancels all previous negotiations, agreements, commitments, and writings in respect to the subject matter hereof.

CHAPTER 1. Introduction

ORDERING CODES:

Part #	Assembly #	Description
AEI-CP1200C	CP1200TX	CompactPCI-X Dual Port Gigabit Ethernet Card
AEI-1000F	AEI-1000F	PCI-X Fiber Optic Gigabit Ethernet Card
AEI-1200C	AEI-1200C	PCI-X Dual Port Gigabit Ethernet Card
AEI-1200F	AEI-1200F	PCI-X Dual Port Fiber Gigabit Ethernet Card
AEI-1400C	AEI-1400C	PCI-X Quad Gigabit Ethernet Card, copper

*** Other part numbers may be applicable (all Intel 8254x cards).*

CONTENTS OF YOUR SHIPMENT

Included with your adapter are the following:

- Antistatic caddy (used for protecting the adapter when stored or shipped). Keep the adapter in its packaging until ready for installation.
- CD-ROM with Gigabit Ethernet driver software and documentation.

FUNCTIONAL DESCRIPTION

The AEI Gigabit Ethernet Server Adapter targets the increased congestion experienced at the backbone and server in today's networks, and provides a future upgrade path for high-end workstations that require more bandwidth than Fast Ethernet can provide.

The AEI Gigabit Ethernet Server Adapter connects a PCI or PCI-X (or CompactPCI, depending on version) compliant server or workstation to a Gigabit Ethernet network. This adapter incorporates a technology that transfers data at a maximum rate of one gigabit per second—10 times the rate of Fast Ethernet adapters.

The AEI Gigabit Ethernet Server Adapter is a 32/64-bit, 33/66/100/133Mhz PCI-X (or CompactPCI) network interface cards that contains multiple independent Gigabit ports on one adapter. The AEI Gigabit Ethernet Server Adapters conserve valuable I/O slots in Servers.

AEI Gigabit Ethernet Server Adapters are the perfect solution for a cost effective, instant performance boost over existing Category 5 UTP copper cabling for getting high-powered networking.

AEI Gigabit Ethernet Server Adapters are the ideal solution for implementing multiple network segments, mission-critical high-powered networking applications and environments within high performance servers.

AEI Gigabit Ethernet Server Adapters ease network congestion, simplify network management, and provide the highest server throughput available while minimizing CPU utilization. Its multiple independent 10/100/1000 Gigabit Ethernet ports provide users of data-intensive applications with the highest levels of system performance together with extra redundancy.

AEI Gigabit Ethernet Server Adapters have an integrated hardware acceleration that performs TCP/UDP/IP checksum offload and TCP segmentation. The host processing offloads accelerators frees CPU for application processing

DESIGN CHARACTERISTICS

AEI's Gigabit Ethernet Cards supports auto-negotiation between 32/64-bit, 33/66/100/133 MHz data paths, and 10/100/1000 copper. PCI-X cards are also designed to support PCI 32-bit slots, PCI 64-bit slots, and any PCI-X bus slot. Cards are keyed to support both 3.3V and 5V computer systems. If installing in a PCI 32-bit slot, check mainboard for obstacles to 64-bit connector.

Built utilizing PCI-X technology, the CompactPCI versions support PICMG standard PCI specifications, and also embedded PCI-X single board computers. It is uniquely designed with integrated magnetic transformers, low profile surface mount discrete components, a high precision oscillator, and other high-end components. The result is a card that is highly reliable, resistant to damage, fault tolerant, and performance that is unparalleled. The Gigabit adapters are fully interoperable with existing Fast Ethernet or Gigabit Ethernet hubs, switches and routers.

BOOT ROM SUPPORT

AEI designs its server class Gigabit adapters with Boot ROM support, and offers embedded programming services (no charge) for all popular operating systems. Thus, OEMs can utilize distribution servers to ease installation, and provide seamless integration of AEI Gigabit adapters into its designs.

FULLY INTEROPERABLE

AEI Gigabit Ethernet Server Adapters offer the most cost effective way to migrate to Gigabit Ethernet. The adapters are fully interoperable with existing Category 5 UTP backbone allowing a scalable upgrade to Gigabit Ethernet without replacing the existing network infrastructure. The only other hardware modification needed is the backbone switch.

FEATURES

- Ten times the throughput of standard Fast Ethernet cards.
- Nway auto negotiation / automatic sensing and switching between 10 Mbps / 100 Mbps/ 1000Mbps AND half or full duplex operation.
- 32/64-bit Auto Sense Data Path
- Easy to install and configure.
- Half or Full Duplex operation.
- Cross Platform support for a broad range of operating systems and architectures.
- DMA Bus Mastering for lower CPU utilization.
- Access multiple network segments and conserve valuable PCI/PCI-X slots
- Easy, cost-effective 10/100/1000 migration over existing Category-5 cabling
- Multi-Gigabit scalability and increased uptime through advanced server features
- CompactPCI only: 3U form factor with front panel I/O connectors.
- CompactPCI only: option 6U kit.
- CompactPCI only: eliminates the need for carrier cards!

SPECIFICATIONS

Detailed Product Datasheets are available over the Internet at www.aei-it.com

APPLICATIONS

- Proxy, application, file, and print servers.
- SOHO to Enterprise network environments.

- Storage Area Networks (SAN)
- Network Attached Storage (NAS)
- Network segmentation (for network security purposes)
- Firewalls, gateways and routers.
- 1U/2U low profile servers.

CHAPTER 2. Installing the Hardware

SYSTEM REQUIREMENTS

Before installing the Gigabit Ethernet Adapter, make sure your system meets the requirements listed for your operating system.


- Minimum 128MB RAM (64MB for NetWare)
- 32-bit or 64-bit PCI v2.2 or PCI-X v1.0 slot; or CompactPCI 3u or 6u slot.

OPERATING SYSTEMS SUPPORTED


- NDIS 5 for Windows 98, Win ME, Win2000, Win XP
- NDIS 4 for Windows 95B
- NDIS 4 for Windows NT 4.0
- NDIS 2 and ODI for DOS
- Novell Netware 3.12, 4.X, 5.X (w/ Support Pack 3 or the most recent NetWare 5 Support Pack)
- UnixWare 2.12 / 7.X
- Sun Solaris (x86) 2.6/ 2.7/ 2.8
- Linux 2.2 / 2.4
- FreeDSD
- OS/2
- OpenUnix & UnixWare
- DOS
- VxWorks (Per WindRiver, the 82546 driver built into OS, contact WindRiver for additional information). Refer to Chapter 3 for additional information.

Intel Device Drivers are available for download at :

http://downloadfinder.intel.com/scripts-df/Product_Filter.asp?ProductID=991

 **LINUX NOTE** – Although the driver should work with many Linux kernel versions and distributions, it has only been tested on Red Hat, Suze, Mandrake, and Debian Linux referenced distributions for i386, IA64, and PA-RISC processors (kernel version 2.4.x). Furthermore, the driver has only been tested as a loadable module.

Any problems or questions, please call AEI at 951-296-2022. We do have the expertise to support custom Linux driver development for OEM customers.

 **NetWare NOTE** - You can get the appropriate updates from the Novell support website <http://www.novell.com/productupdate/patchlist.html>.

SAFETY PRECAUTIONS



WARNING - The adapter is being installed in a system that operates with voltages that can be lethal. Before you remove the cover of your system, you must observe the following precautions to protect yourself and to prevent damage to the system components.

- Remove any metallic objects or jewelry from your hands and wrists.
- Make sure to use only insulated or non-conducting tools.
- Verify that the system is powered OFF and unplugged before accessing internal components.
- Installation or removal of adapters must be performed in a static-free environment. The use of a properly grounded wrist strap or other personal antistatic devices and an antistatic mat is strongly recommended.


PRE-INSTALLATION CHECKLIST

1. Check AEI's web site at <http://www.aei-it.com> for the latest driver and documentation updates.
2. Check that your server meets the hardware and software requirements listed under "System Requirements" above.
3. Verify that your system is using the latest BIOS.
4. If installing adapter Software from CD-ROM or floppy, enter the path where the adapter Software is located on your system.
5. If your system is active, shut it down.
5. When system shut down is complete, power OFF and unplug your system.
6. Holding the adapter card by the edges, remove it from its shipping package and place it on an antistatic surface.
7. Check the adapter for visible signs of damage (The card's edge connector or J1/J2 connectors, RJ-45 or other external connectors). Never attempt to install any damaged adapter. If the adapter is damaged, report it to AEI.

ADAPTER INSTALLATION PROCESS

The following instructions apply to installing the gigabit Ethernet adapter in most systems. Refer to the manuals that were supplied with your system for details about performing these tasks on your particular system.

1. Review the “Pre-Installation Checklist” above.
2. Before installing the adapter, ensure the system power is OFF and unplugged from the power outlet, and that proper electrical grounding procedures have been followed.
3. Refer to your system documentation to determine the appropriate slot, and insert the card in accordance with the system manufacturer’s guidelines. If you are not sure how to insert the card, please contact AEI for technical assistance, or referral to a computer professional in your area.

 Note: ALWAYS Hold the card by the edges.


NOTE – A 32-bit PCI slot is shorter than a 64-bit PCI slot. Although the adapter is designed to fit in either slot type, when installed in a 32-bit PCI slot, part of the adapter’s card edge connector will remain undocked. This is perfectly normal.

5. Applying even pressure at both corners of the card, push the adapter card until it is firmly seated in the slot. When properly seated, the adapter’s port connectors will be aligned with the slot opening, and its faceplate will be flush against the system chassis.



Caution—Do not use excessive force when seating the card, as this may damage the system or the adapter. If the card resists seating, remove it from the system, realign it, and try again.

6. Secure the adapter with the adapter clip or screw.
7. Connect the LAN cabling to the card, and any network peripherals (hubs, switches, etc.) prior to powering up the system.

 Note: Some operating systems require this connectivity be established prior to “seeing” the adapter.

8. As applicable, replace the cover the computer

9. Power the system on.

Once the system returns to proper operation, the adapter hardware is fully installed. You must next connect the network cables.

CONNECTING THE NETWORK CABLES

The AEI Gigabit Ethernet Card (“C” version) has RJ-45 connectors used for attaching the system to an Ethernet copper-wire segment. When automatic link negotiation is disabled, the port can be configured for 10 Mbps, 100 Mbps, signaling either half-duplex or full-duplex operation. Speeds of 1000 Mbps is only obtainable through Auto-Negotiation.


The AEI Gigabit Ethernet Card (“F” version) has fiber optic connectors for attaching the system to a compatible link partner, or an IEEE 802.3z compliant gigabit switch. Upon connecting the system to the network and power is supplied, the adapter performs auto-negotiation and attempts to establish the connection at 1000 Mbps full-duplex, only.

Perform the following procedure for connecting a network cable to the Gigabit Ethernet Adapter:

1. Prepare an appropriate cable. Table 1 lists the cable characteristics for connecting to 10/100/1000BASE-T ports, and Table 2 lists the cable characteristics for connecting to 1000BASE-SX-LX fiber optic ports:

Table 1. 10/100/1000BASE-T Cable Specifications

Port Type	Connector	Media	Maximum Distance
10BASE-T	RJ-45	Cat. 3, 4, or 5 UTP	100 meters (328 feet)
100/1000BASE-T	RJ-45	Cat. 5 UTP (or better)	100 meters (328 feet)

 NOTE – 1000BASE-T signaling requires four twisted pairs of Category 5 balanced cabling, as specified in ISO/IEC 11801:1995 and EIA/TIA-568-A (1995) and tested using procedures defined in TIA/EIA TSB95.

AEI recommends Belden Cable’s DataTwist 600e (or better) for copper gigabit connectivity. Cat-5 and even Cat-6 may experience cross-talk problems that may inhibit performance.

Table 2. 1000BASE-SX/LX Fiber Optic Cable Specifications

Port Type	Connector	Media	Maximum Distance
1000BASE-SX-LX	Fiber Optic	50 um multimode	550 meters (1,804 feet)
1000BASE-SX-LX	Fiber Optic	62.5 um multimode	260 meters (853 feet)



Caution – The fiber optic ports contain a Class 1 laser device. When the ports are disconnected, always cover them with the provided plug. Exposed ports may cause skin or eye damage.

2. Connect one end of the cable to the Adapter.
3. Connect the other end of the cable to the appropriate Ethernet network port or fiber optic port.



NOTE – Once the cable is properly connected at both ends, the adapter port LEDs should be functional.

For longer distances, call for custom transceiver installation.

CHAPTER 3. Installing Drivers & Software

AEI's Gigabit Ethernet adapters use the Intel 8254x device driver, which is already built into most popular operating systems. A copy of the device driver is also made available through our website (www.aei-it.com). If you need a CD-ROM, please contact AEI prior to ordering.

For updated software and documentation, please go to www.aei-it.com.

Reference the individual product web pages for most a current listing of operating systems supported.

If you need assistance installing a device driver, please, contact your reseller or local computer professional to obtain product support.

VXWORKS – SPECIAL INSTRUCTIONS

The driver is included in your OS distribution, and is plug and play. Please, contact WindRiver directly. They can be reached at:

Corporate Headquarters	Silicon Valley Office
500 Wind River Way	201 Moffett Park Drive
Alameda, CA 94501	Sunnyvale, CA 94089-1322
(800) 545-WIND (9463)	Tel: (408) 542-1500
Tel: (510) 748-4100	
Fax: (510) 749-2010	

<http://www.windriver.com/>

Per Wind River, the Intel 8254x device driver is embedded in the operating system, and is plug & play. AEI's technical support staff has not yet tested for interoperability as of the date of this publication. Any questions, please call our technical support team.

All Other Operating Systems

Use the Intel 82546 device driver built into your operating system. If you have any problems installing the appropriate driver, please contact the valued added reseller who sold you the AEI product. Otherwise, call AEI's Technical Support Team.

CHAPTER 4. Advanced Server Features

AEI's Gigabit adapters utilize the popular Intel 82546 chipset, which comes with numerous advanced server features built into its architecture. Hardware acceleration offloads tasks from the host processor including TCP/UDP/IP checksum calculations and TCP segmentation. IEEE 802.3ad Link aggregation, failover, and load balancing are offered, Jumbo Frame, VLAN, and other features. The adapter is also fully compliant with Gigabit EthernetChannel and Fast EtherChannel trunking algorithms. (switch dependant 802.3ad [LACP]) See the individual product webpage for more advanced server features!

PORT AGGREGATION (TRUNKING), FAILOVER, LOAD BALANCING

The Intel 8254x Ethernet Controller used in the AEI Gigabit Ethernet design supports IEEE 802.3ad (Link Aggregation Control Protocol, and Failover). This standard requires the user to install “capable switches” in their network topology to support Link Aggregation, Fast EtherChannel, or Gigabit EtherChannel technology.

Also compatible with Failover Group utilities contained in Windows, Linux, Solaris and other operating systems.

HOST (TCP/IP) OFFLOAD FEATURES

1. Transmit TCP Segmentation
Increased throughput and lower CPU utilization. Compatible with large send offload features found in Windows 2000 and Windows XP.
2. IP, TCP, and UDP checksum off-loading capabilities on RX and TX
Reduced host CPU utilization and higher throughput.
3. Advanced packet filtering
16 exact matched (unicast or multicast)
4096-bit hash filter for multicast frames
Promiscuous (unicast/multicast) transfer mode
Optional filtering of erred frames
4. Descriptor ring management hardware for TX and RX
Optimized fetching and write-back mechanisms for efficient system memory and PCI bandwidth usage.

VLAN SUPPORT

AEI's Gigabit Ethernet Cards supports IEEE 802.1Q VLAN support with VLAN tag insertion and stripping and packet filtering for up to 4096 VLAN tags. This enables the IT staff to easily create multiple virtual LAN segments

JUMBO FRAME SUPPORT

AEI's Gigabit Ethernet cards support Jumbo frames up to 16KB for high throughput and large data transfers on networks supporting jumbo frames.

NOISE IMPEDIANCE

AEI Gigabit Ethernet Server Cards implement state-of-the-art DSP architecture utilizing digital adaptive equalization, echo cancellation, cross-talk cancellation, and baseline wander cancellation. The result is a robust 1000 Mb/s performance in noisy environments and despite severe cable installation problems.

CISCO & OTHER SWITCH COMPATIBILITY

AEI Gigabit Ethernet Cards, along with PacketEngine Software offer unparalleled operability and functionality with Cisco switches, and all other industry leading switching peripherals.

CHAPTER 5. Intentionally Left Blank

CHAPTER 6. Troubleshooting

No technical issues at time of printing.

Please reference the individual product webpage to augment the information contained in this manual. Any conflict, the information contained in the website shall take precedence.

CHAPTER 7. Regulatory

FCC CLASS B NOTICE

The equipment complies with Class B Part 15 of the FCC Rules. Operation is subject to the following two conditions: 1) The device may not cause harmful interference, and 2) This equipment must accept any interference received, including interference that may cause undesired operation.

The equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. The equipment generates, uses and can radiate radio-frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If the equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for assistance.

Do not make mechanical or electrical modifications to the equipment.



Caution — If the device is changed or modified without the permission of AEI, the user may void his or her authority to operate the equipment.

CE NOTICE

The CE mark on this equipment indicates that this equipment meets or exceeds the following technical standards: EN55022:1998, EN55024:1998, and EN60950:1992.

CHAPTER 8. AEI Contact Information

AEI Intelligent Technologies

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