

AB287A PCI-X 10 Gigabit Ethernet Card Overview

HP-UX Networking

HP 9000 and HP Integrity Systems



Manufacturing Part Number:

E0107

Printed in the USA

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Product Overview

The AB287A PCI-X 10 Gigabit Ethernet cards have the following features and requirements:

- **PCI-X 133 MHz, 64-bit** operation. Best performance is achieved by putting the cards in the high-performance or “**dual-rope**” slots. To identify which slots are the high-performance (dual rope) slots in a particular system, please refer to the hardware users’ guide for each system.
- Conforms to IEEE 10 GigE Base-SR using multi-mode fiber. Operating distances from 7 ft to 984 ft (2 to 300 meters). It’s still Ethernet.
- Operates on 64-bit HP-UX 11i v2 or 11i v1 on HP Integrity and HP 9000 servers.
- Supports use of **Jumbo Frames**. The **ixgbe** driver on HP-UX 11i v1 or v2 supports Jumbo Frames with a maximum transmission unit (MTU) of 9000 bytes. Jumbo frames achieve much higher throughput than the standard 1500 MTU before reaching optimum CPU utilization. A backup server using jumbo frames to multiple clients would be an ideal setup.
- On board TCP Segmentation Offload (**TSO**) of IPv4 that can reduce the server’s load for certain applications especially ones transmitting large amounts of data. See details in the TSO section of this document.
- On board Checksum Offload (**CKO**) that increases server CPU efficiency and performance over TCP, UDP, and IPv4. See details in the CKO section of this document.
- All on board data and control structures on the 10GigE card are protected by SEC (single error correcting), DED (double error detecting) ECC (Error Correcting Code).
- Supports HP **Serviceguard** and **LAN_MONITOR mode** of Auto-Port Aggregation (**APA**) for high availability. The LACP_AUTO, FEC_AUTO, and MANUAL modes of the HP APA product are not supported.
- The HP-UX 11i v2-based version of the 10 Gigabit product supports logical multi-queues, that can substantially improve network bandwidth especially if there is a mix of applications -- because all packets are not sent to the same destination port. Beginning with the December 2005 release, this feature assigns inbound packets to receive queues based on a packet's destination-port and can be enabled to work automatically. This feature is critical to achieving good sustained throughput. Without making use of multi-queue, a single CPU will be used for interrupt processing on the receive path. If the CPU becomes over-saturated (very likely if the MTU is set to 1500, and there is a heavy traffic load), the card will not be able to sustain link rate. With multi-queue configured, different flows of traffic will be routed to different CPUs thereby helping to avoid saturating a CPU.

Driver version B.11.23.0612 supports UDP traffic over the destination port-based multi-queues.

10 Gigabit Ethernet multi-queue functionality is not available on HP-UX 11i v1.

- Supports virtual LANs (**VLANs**) to provide increased network flexibility. A Virtual LAN (VLAN) is a logical or virtual network segment that can span multiple physical network segments. VLANs isolate broadcast and multicast traffic by determining which destinations should receive that traffic, thereby making better use of switch and end-station resources. With VLANs, broadcasts and multicasts go only to the intended nodes in the virtual LAN. This feature is described in *Using HP-UX VLANs* on <http://docs.hp.com>.
- Configuration through graphic user interface SAM on HP-UX 11i v1 and HP-UX 11i v2, or SMH on HP-UX 11i v3, or command line.
- **Interrupt Migration** via the `intctl` command.
- Two LED indicators and one duplex LC connector. One LED is for the Link and one LED is for Activity.
- The **10GbE Base-SR** port operates only at 10 Gbit/s and only in full-duplex mode.

Product Overview
Product Overview

- The December 2006 web release of the HP-UX 11i v2-based version of 10 Gigabit Ethernet supports PCI-X Error Handling when the prerequisite PCIErrorHandling-00 bundle is also installed on the system. The PCI-X Error Handling feature provides a system with improved fault-tolerance. PCI-X Error Handling allows an HP-UX system to avoid a Machine Check Abort (MCA) or a High Priority Machine Check (HPMC), if a PCI-X error occurs (for example, a parity error). For details, see the *PCI Error Handling Product Note: HP-UX Servers and Workstations*.
- Supports PCI-X online addition/replacement (**OLA/R**) on supported systems. For instructions on how to perform online addition and replacement (OLAR) for PA-RISC-based systems running versions of HP-UX 11i v1 of September 2005, see *Configuring HP-UX For Peripherals*. For instructions on performing OL* for PA-RISC systems running HP-UX 11i v2 of September 2004 or later, refer to the *Interface Card OL* Support Guide*.
- Supports **64-bit management information base (MIB) statistics**. Directs the data link service (DLS) provider to return 64 bit statistics.
- Supports subnetwork-access protocol (**SNAP**) network-layer protocol encapsulation. The following table summarizes the allowable combinations of capabilities.

Table 1 SNAP Supported at all MTUs and TSO at all MTUs but Not Both Together

| MTU | SNAP | TSO+SNAP | TSO |
|------|------|----------|-----|
| 9000 | Yes | No | Yes |
| 1500 | Yes | No | Yes |

Interoperability: Supported Systems and Switches

Supported Systems

See the Ethernet support matrix on <http://docs.hp.com> under “I/O Cards and Networking Software” for the latest list of systems that support using the AB287A 10 Gigabit Ethernet card.

Supported Switches

As of December 10th 2004, the 10 Gigabit Ethernet card has been tested for interoperability and is known to interoperate well with the following 10 Gigabit Ethernet switches:

- Cisco® Catalyst® 6500.
- Extreme Networks™ Summit 400-48t.
- Foundry Net Iron™.
- Fujitsu Laboratories of America, Inc. (FLA) and PFU Systems, Inc. XG800™.
- HP ProCurve 10 Gigabit Ethernet switch.

Installation Recommendations and Restrictions

When installing the 10 Gigabit Ethernet card, be especially careful of the following recommendations and restrictions:

- For sizing purposes, allocate 512MB of memory and 1 CPU per AB287A 10GigE card.
See the Ethernet Support Matrix for the number of cards supported in presently supported systems.
- **PCI-X 133 MHz** capable card can operate at 32-bit or 64-bit modes and is supported in the following frequencies:
 - PCI-X 133. Best performance is achieved by putting the card into one of the highest-performing (or “**dual-rope**”) PCI-X 133 slot. To identify which slots are the highest performing slots in a particular system, please refer to the hardware users’ guide for each system or to the *I/O Slot Matrix - Entry Level Integrity Servers* at <http://docs.hp.com/en/hw.html#System%20Administration>.
 - PCI-X 66
 - PCI 33/66
- Dual-Rope 133MHz slots recommended
- If installed in shared slots, other card must also be a PCI-X card in PCI-X mode. If other card is PCI only card, then 10GigE card will not get claimed (error should be logged in dmesg).
- Not supported on platforms where all slots are only PCI slots or all slots are single rope only PCI-X slots.

10 Gigabit Ethernet Link Settings

This section explains the options available in `lanadmin` to support the 10 Gigabit Ethernet driver. The `lanadmin(1M)` tool is used to display and set parameters. Table 2 lists the parameters that can be set with `lanadmin -X` or displayed with `lanadmin -x`.

NOTE When your system is rebooted, settings that were made via the `lanadmin(1M)` command will be lost. To retain configuration settings permanently in the configuration file (`/etc/rc.config.d/hp1xgbeconf`), use the SAM utility or manually edit the configuration file.

Table 2 Link Card Parameters that `lanadmin` can Display (-x) or Set (-X)

| Option | Setting |
|------------------------------|--|
| <code>help</code> | Lists the <code>-X</code> or <code>-x</code> options |
| <code>-x card_info</code> | Displays adapter and driver revision and settings |
| <code>-x cko</code> | Gets the driver checksum offload (CKO) settings |
| <code>-x drv_coal</code> | Displays driver interrupt coalescing thresholds and ranges |
| <code>-x drv_fctrl</code> | Gets the driver flow control settings |
| <code>-x drv_mq</code> | Gets the number of driver queues |
| <code>-X fctrl_thresh</code> | Sets flow control threshold. Default: 75 |
| <code>-X rx_coal</code> | Sets receive interrupt coalescing ranges and frame counts Usage: <code>lanadmin -X [tx rx]_coal rng R1 R2 R3 frc A B C D timer T1 <ppa></code> Note: When using jumbo frames (9000 MTU), the optimal setting for receive interrupt coalescing is different than the default. For setting this, see the Receive Interrupt Coalescing section in this guide. |
| <code>-X tx_coal</code> | Sets transmit interrupt coalescing ranges and frame counts |
| <code>-X rx_fctrl</code> | Sets receive side flow control (generate pause frames). The range of values is: on/off. Default: On. |
| <code>-X tx_fctrl</code> | Sets transmit side flow control (response to pause frames). The range of values is: on/off. Default: On. |
| <code>-X recv_cko_on</code> | Enables hardware TCP/UDP (IPv4) checksum offload on receive. The receive side CKO is On (enabled) by default. |
| <code>-X recv_cko_off</code> | Disables hardware TCP/UDP (IPv4) checksum offload on receive. The receive side CKO is On (enabled) by default. |
| <code>-X send_cko_on</code> | Enables hardware TCP/UDP (IPv4) checksum offload on transmit. The transmit side CKO is ON (enabled) by default. For details, see Checksum Offload. When transmit cko is disabled, TSO is also implicitly disabled. |
| <code>-X send_cko_off</code> | Disables hardware TCP/UDP (IPv4) checksum offload on transmit. The transmit side CKO is ON (enabled) by default. For details, see Checksum Offload. When transmit cko is disabled, TSO is also implicitly disabled. |

Table 2 Link Card Parameters that `lanadmin` can Display (-x) or Set (-X) (Continued)

| Option | Setting |
|--|--|
| -x speed | Displays the speed and duplexity of the link. The card always operates at 10Gbits/s, full duplex mode. Autonegotiation is also not supported. |
| -X stats clear | Clears all driver and adapter statistics. |
| -x stats drv | Displays all driver and adapter statistics. |
| -X udpmf_cko_on | Enables hardware checksum offload for Multifragment UDP (IPv4). It controls both transmit and receive paths. It is valid only when send and receive cko are enabled. Default: On. |
| -X udpmf_cko_off | Disables hardware checksum offload for Multifragment UDP (IPv4). It controls both transmit and receive paths. It is valid only when send and receive cko are enabled. Default: On. |
| -x vmtu ppa | Displays the value of the virtual MTU for TCP Segmentation Offload (TSO). For details, see TCP Segmentation Offload. Default: On. |
| -X vmtu new_vmtu_value ppa | Sets the TSO vmtu value. For details, see TCP Segmentation Offload. Default: On. |
| * These options require the desired value to be specified after the option name. Some of these values may vary due to performance tuning efforts. See the Performance and Tuning Considerations section of the <i>Ethernet Support Guide</i> for more information. | |

Driver Tunable Settings Explained

Transmit Flow Control -- When enabled, the card will honour PAUSE frames received from the link partner and pause transmission for the duration of time specified in the PAUSE Frame. When off, the card will ignore PAUSE frames and continue transmission. The range of values is: {on, off}. Default value: On.

Receive Flow Control -- When enabled, the card will generate PAUSE frames whenever the received frames in the FIFO have exceeded a certain threshold. When disabled, the card will not generate PAUSE frames. The range of values supported is: {on, off}. Default value: On.

Receive Flow Control Threshold -- The threshold of the Receive FIFO at which the NIC will send PAUSE frames to the Link Partner. It is expressed as a percentage of the total FIFO size. The range of values supported is: {0 - 100}. The default value is 75%.

Transmit Interrupt Coalescing -- The 10 GigE card provides four link-utilization ranges, corresponding frame counts, and also a timer. Based on the utilization range, an interrupt will be generated after a specified number of frames have been processed by the card. The link utilization ranges and the frame counts are programmable. You can specify three range limits (Range R1, Range R2, and Range R3) that provide four utilization ranges as indicated below. Please note that the link utilization is expressed as a percentage. Corresponding to each range, we have frame counts: FRC-A, FRC-B, FRC-C, FRC-D.

Here are the ranges:

Range-A 0 - R1% FRC-A

Range-B R1 - R2% FRC-B

Range-C R2 - R3% FRC-C

Range-D R3 - 100% FRC-D

For the frame counts, the range of values is {0 - 65535}.

10 Gigabit Ethernet Link Settings

The timer value is expressed in microseconds and can be in the range {0 - 32000000}. When the value is zero, interrupts are disabled. The default values are:

Link util : 0 - 5 5 - 25 25 - 70 70 - 100
Frame Count : 32 256 512 512
Timer : 225000

Receive Interrupt Coalescing -- The 10 GigE card provides four link-utilization ranges, corresponding frame counts, and also a timer. Based on the utilization range, an interrupt will be generated after a specified number of frames have been processed by the card. The link utilization ranges and the frame counts are programmable. You can specify three range limits (Range R1, Range R2, and Range R3) that provide four utilization ranges as indicated below. Please note that the link utilization is expressed as a percentage. Corresponding to each range, we have frame counts: FRC-A, FRC-B, FRC-C, FRC-D.

Here are the ranges:

Range-A 0 - R1% FRC-A
Range-B R1 - R2% FRC-B
Range-C R2 - R3% FRC-C
Range-D R3 - 100% FRC-D

For the frame counts, the range of values is {0 - 65535}.

The timer value is expressed in microseconds and can be in the range {0 - 32000000}. When the value is zero, interrupts are disabled. The default values are:

Link util : 0 - 5 5 - 25 25 - 70 70 - 100
Frame Count : 1 64 128 512
Timer : 100

Checksum Offload

Checksum Offload (CKO) is enabled by default; so, there is no need to enable it. CKO is a performance feature that reduces a system CPU's burden by offloading computation of the TCP checksum to the network card. The transport layer always performs checksum validation using a computed checksum regardless of whether CKO is ON or OFF. When CKO is disabled (OFF), the transport layer will still validate checksums, computing them in the host CPU rather than using an offloaded computation from the network card.

You can turn CKO ON or OFF for the transmit side or for the receive side of each LAN card.

The transmit side and receive side CKO are ON (enabled) by default. To change the default setting of CKO on each specific 10 GigE LAN card, use an editor such as "vi" to edit the configuration file `/etc/rc.config.d/hp10gbeconf`. The parameters in the config file are

- HP_IXGBE_TX_CHECKSUM_OFFLOAD
- HP_IXGBE_RX_CHECKSUM_OFFLOAD
- HP_IXGBE_UDP_MF_CHECKSUM_OFFLOAD

Editing the config file `/etc/rc.config.d/hp10gbeconf` saves the configuration across reboots.

Alternatively, you can use the `lanadmin -X` command to temporarily set the ON/OFF value. Using `lanadmin`, though, will not preserve the configuration value if the system is rebooted.

You can set a new value temporarily by using the `lanadmin -X` command. The `lanadmin` commands are:

`lanadmin -X send_cko_on/off ppa` and

```
lanadmin -X recv_cko_on/off ppa
```

TCP Segmentation Offload

TCP Segmentation Offload (TSO) is enabled by default; so, there is no need to enable it. TSO offloads outbound TCP-segmentation processing to reduce CPU utilization. It allows TCP to send larger segments to the LAN card, which will then segment them to sizes appropriate for the link MTU. This can reduce the server's load for certain applications which primarily transmit large amounts of data. Not all applications benefit from TSO. Only data intensive applications that transmit large data buffers using TCP over IPv4 are improved. Systems that support hardware partitioning decrease their per-card throughput yet significantly reduce CPU utilization.

TSO is enabled by default. To change the TSO setting on each specific interface, use an editor such as “vi” to edit the configuration file, `/etc/rc.config.d/hp10gbeconf`. This is the best way to save the configuration across reboots.

Alternatively, you can use the `lanadmin` command to temporarily set the “`vmtu`” tunable to a non-zero value. Using `lanadmin`, though, will not preserve the configuration value when the system is rebooted.

- The following command will list the TSO capability of the link:

```
# lanadmin -x vmtu ppa  
Driver/Hardware supports TCP Segmentation Offload. Current VMTU = 0.
```

- The syntax of the command to temporarily set the `vmtu` is as follows (note: the X is capitalized):

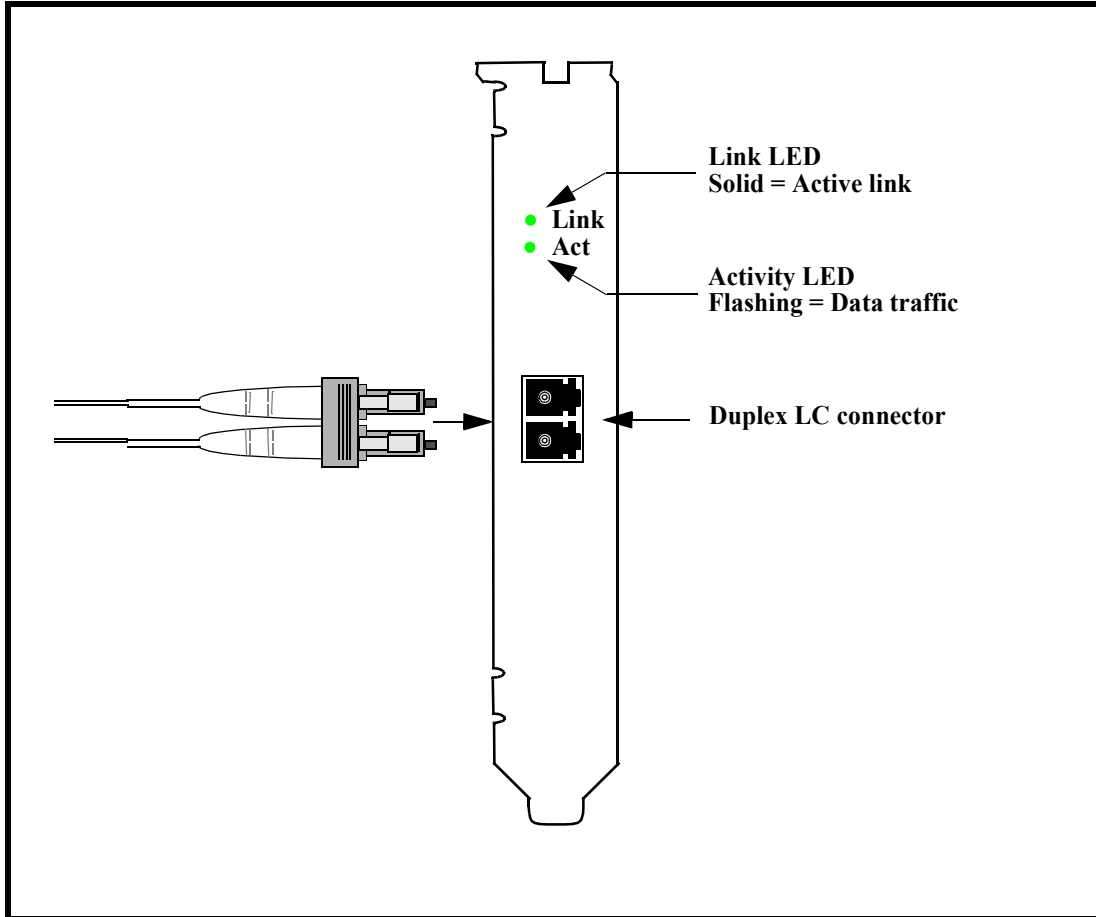
```
# lanadmin -X vmtu new_vmtu_value ppa
```

NOTE Currently only two values are allowed for the tunable “`vmtu`”: 0 and 32160. Setting “`vmtu`” to 0 disables the TSO feature, and setting it to 32160 enables it.

- When TSO is enabled, the output looks like:

```
# lanadmin -x vmtu ppa  
Driver/Hardware supports TCP Segmentation Offload. Current VMTU = 32160.
```

Figure 1 AB287A PCI-X 133Mhz 10GBaseSR 10 Gigabit Ethernet Card



Network Card Configuration Worksheet

Fill out one worksheet for each network card you are installing.

Table 3 Network Card Configuration Worksheet

| Data Type | Required/Optional | Default | How to Configure (see Note 1) | Example | Your System |
|---|--|----------------------|--|---|-------------|
| Internet Address | Required | 0.0.0.0 | SAM or ifconfig or edit /etc/rc.config.d /netconf | 196.6.20.2 | |
| Subnet mask | Required if using subnetting | Subnet mask not used | SAM or ifconfig or edit /etc/rc.config.d /netconf | 255.255.248.0 | |
| Station address | Built-in but can be optionally changed | As shown on card | SAM or edit /etc/rc.config.d /hpixgbeconf or temporarily: lanadmin -A | 0x0060b0c4012f | |
| Host name alias for this network interface (card) | Required if the system is connected to more than 1 network | None | SAM or edit /etc/hosts | host1 | |
| MTU (Maximum Transmission Unit): Jumbo Frames | Optional | 1500 bytes | SAM or edit /etc/rc.config.d /hpixgbeconf or temporarily: lanadmin -M | lanadmin -M 9000 ppa# (see Note 2 below) | |
| Receive flow control | Optional | On | SAM or edit /etc/rc.config.d /hpixgbeconf or temporarily: lanadmin -X | lanadmin -X fctrl off | |

Note 1: To configure values permanently, edit the configuration files. Using lanadmin will not preserve your settings across reboots.

Note 2: The valid MTU range for the **ixgbe** driver on HP-UX 11i v2 of September 2004 or May 2005 or later or HP-UX 11i v1 of September 2005 or later is 257 - 1500 for normal frames, and 9000 for Jumbo Frames. The jumbo frame value must be 9000; it cannot be any other number.

Operating distances for 10 GigE Base-SR using multi-mode fiber (MMF) optic cable are as follows:

| Description (850nm short wavelength laser) | Modal Bandwidth | Operating Distance |
|---|-----------------|------------------------------------|
| 62.5 micron core diameter/ 125micron cladding diameter MMF | 160 (MHz * km) | 2 to 26 meters (6.56 to 85.28 ft) |
| | 200 (MHz * km) | 2 to 33 meters (6.56 to 108.24 ft) |
| 50 micron core diameter/ 125micron cladding diameter MMF | 400 (MHz * km) | 2 to 66 meters (6.56 to 216.48 ft) |
| | 500 (MHz * km) | 2 to 82 meters (6.56 to 298.96 ft) |
| | 2000 (MHz * km) | 2 to 300 meters (6.56 to 984 ft) |

The AB287A conforms to the specifications for 10GBase-SR set forth in the IEEE Std 802.3ae™-2002. The 10GBase serial physical layer device (PHY) used in 10 GigE Base-SR does not directly interface with any other form of 10 Gigabit Ethernet such as Base-LR, ER, SW, LW, or EW or any other Ethernet link interfaces such as 1000Base-SX or 100Base-FX.

Available HP Fiber Optic Cables:

| | |
|--------------|---|
| LC-LC | |
| C7524A | Fibre Channel Cable 2m LC duplex 50/125 M/M Optical |
| AF552A | Fibre Channel Cable 15m LC duplex 50/125 M/M Optical |
| C7526A | Fibre Channel Cable 50m LC duplex 50/125 M/M Optical |
| LC-SC | |
| C7529A | Fibre Channel Cable 2m LC-SC duplex 50/125 M/M Optical |
| AF554A | Fibre Channel Cable 15m LC-SC duplex 50/125 M/M Optical |

A Physical, Environmental, and Regulatory Information

This appendix contains regulatory statements for the United States, Canada, Australia/New Zealand, Japan, and the European community.

Card Physical and Environmental Specifications

Following are the product physical and environmental specifications of the PCI-X 10 Gigabit Ethernet Card.

Physical Specifications

| | |
|-------------|---|
| Form Factor | PCI half-card form-factor PCI-X (rev 2.3) |
| PCI support | 64-bit 3.3V only 133Mhz |
| Width | 10.668 cm (4.2 in) |
| Length | 16.51 cm (6.5 in) |
| Thickness | 1.295 cm (0.51 in) |
| Weight | 0.227 kg (0.5 lb) kg |

Environmental Specifications

Temperature

Degrees F = (1.8 x Degrees C) + 32

| | |
|--|-------------------------|
| Non-operating/ storage Temperature Range (Degrees Celsius) | -40 to +70 |
| Operating Temperature Range (Degrees Celsius) | +5 to 40 |
| Recommended Operating Temperature Range (Degrees Celsius) | +10 to 40 |
| Temperature Shock Immunity - Max Rate of Change | 20 C/hr |
| Non-operating/storage Humidity Range in %RH | 90 |
| Recommended Operating Humidity Range @ 22 Degrees Celsius in %RH | 40 to 60 |
| Heat Dissipation (in Watts) | 17 |
| Maximum kV (if less than 15 kV) with no loss of function | 8 |
| Maximum kV (if less than 25 kV) with no component damage | 25 |
| Operating Altitude | 3,000 meters (9900) ft |
| Non-operating Altitude | 4,500 meters (14850) ft |

Electromagnetic Compatibility

This document contains regulatory statements for the United States and the European community.

FCC Statement (For U.S.A.)

Federal Communications Commission Radio Frequency Interference Statement

WARNING This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference and
(2) this device must accept any interference received, including interference that might cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Hewlett-Packard's system certification tests were conducted with HP-supported peripheral devices and cables, such as those received with your system. Changes or modifications to this equipment not expressly approved by Hewlett-Packard could void the user's authority to operate the equipment.

Canada

Warning: This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la classe A respecte toutes les exigences du règlement sur le matériel brouilleur du Canada.

EMI Statement (European Community)

NOTE This is a Class A product. In a domestic environment, this product may cause radio interference, in which case you may be required to take adequate measures.

Laser Safety Statements

Laser Safety Statements - U.S. FDA/CDRH - Optical (laser) Transceiver

CAUTION The optical transceiver provided on the network interface card contains a laser system and is classified as a “Class-I Laser Product” under a U.S. Department of Health and Human Services (DHHS) Radiation Performance standard according to the Radiation Control for Health and Safety Act of 1968. The Class I label and compliance statement are located on the optical transceiver.

To ensure proper use of this product, please read this instruction manual carefully and retain for future reference. Should the unit ever require maintenance, contact an authorized service location.

CAUTION Use of controls, adjustments or the performance procedures other than those specified herein may result in hazardous radiation exposure. To prevent direct exposure to laser beam, do not try to open the enclosure.

Laser Safety - European Union - Optical Transceiver Only

CAUTION The optical transceiver provided on the network interface card contains a laser system and is classified as a “Class 1 Laser Product” per EN 60825-1, Safety of Laser products. Class 1 laser products are considered safe and do not pose a biological hazard if used within the data sheet limits and instructions.

To ensure proper use of this product, please read this instruction manual carefully and retain for future reference. Should the unit ever require maintenance, contact an authorized service location.

CAUTION Use of controls, adjustments or the performance procedures other than those specified herein may result in hazardous radiation exposure. To prevent direct exposure to laser beam, do not try to open the enclosure.

There are no user serviceable parts nor any maintenance required for the optical transceiver. All adjustments are made at the factory before shipment to customers. Tampering with or any attempt to modify the optical transceiver will result in voided product warranty. It may also result in improper operation of the network card circuitry and possible overstress of the laser source. Device degradation or product failure may result.

| DECLARATION OF CONFORMITY According to ISO/IEC Guide 22 and EN 45014 | |
|---|---|
| Manufacturer's Name: | Hewlett-Packard Company Systems Interconnect Solutions Lab |
| Manufacturer's Address: | 8000 Foothills Blvd, Roseville, CA 95747 USA |
| declares, that the product | |
| Product Name: | HP PCI-X 133 MHz 10 GbE SR Fiber Adapter |
| Model Number(s): | AB287A |
| Product Options: | All |
| conforms to the following Product Specifications: | |
| Safety: | EN 60950:1999 Third Edition |
| EMC: | CISPR 22:1997 / EN 55022:1998 - Class A CNS 13438, GB 9254-1988, CFR47, Part 15 Class A CISPR 24:1997 / EN 55024:1998 IEC 61000-4-2 IEC 61000-4-3 / ENV 50204 IEC 61000-4-4 IEC 61000-4-6 |
| Supplementary Information: | |
| The product herewith complies with the requirements of the EMC Directive 89/336/EEC and carries the CE marking accordingly. | |
| 1) The Product was tested in a typical configuration with Hewlett-Packard information technology equipment. | |
|  _____ Tom Le, Hardware Engineer | |
| Cupertino, CA, January, 2005 | |
| European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department HQ-TRE, Herrenberger Straße 130, D-71034 Böblingen (FAX: + 49-7031-14-3143) | |