

# **AD386A PCIe 10 Gigabit Ethernet Card Overview**

## **HP-UX Networking**

**HP Integrity Systems**

**E0408**

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## Product Overview

The AD386A PCIe 10 Gigabit Ethernet cards have the following features and requirements. The AD386A:

- Complies with **PCIe Base Specification Rev. 1.1** or later. Reduction of Hazardous Substances (RoHS) compliant. Supports PCIe x8 lanes.
- Conforms to IEEE 10GBase-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 v3 or 11i v2 on HP Integrity servers. On HP-UX 11i v3, the **icxgbe** driver can be dynamically removed from or loaded into the kernel without rebooting.
- Supports use of **Jumbo Frames**. The **icxgbe** driver on HP-UX 11i v2 or v3 supports Jumbo Frames with a maximum transmission unit (MTU) of from 1501 to 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. Normal frames with MTUs from 257 to 1500 are also supported.
- 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.
- 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.
- 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/en/netcom.html>.
- Supports configuration through the NCWeb portion of the System Management Homepage (SMH) or command line `nwmgr` on HP-UX 11i v3. Configuration through graphic user interface SAM or command line on HP-UX 11i v2.
- **Interrupt Migration** via the `intctl` command.
- One LED indicator and one duplex LC connector. The LED is for the Link status and for Activity.
- The **10GbE Base-SR** port operates at 10 Gbit/s and only in full-duplex mode.
- Supports PCIe Error Handling when the prerequisite patches are installed:
  - for HP-UX 11i v3: the HP-UX release of March 2008. The patches included in that release are PHKL\_37099, PHKL\_37329, PHKL\_37330, PHKL\_37331, PHKL\_37510, and PHKL\_37405 available in HP-UX 11i v3 March 2008 release.
  - for HP-UX 11i v2: the HP-UX release of December 2007. The patches included in that release are PHKL\_36749, PHKL\_36750, PHKL\_36751, and PHKL\_36757 available in HP-UX 11i v2 December 2007 release.

PCIe Error Handling provides a system with improved fault-tolerance. PCIe Error Handling allows an HP-UX system to avoid a Machine Check Abort (MCA) or a High Priority Machine Check (HPMC), if a PCIe error occurs (for example, a parity error). For details, see the *PCI Error Handling Product Note: HP-UX Servers and Workstations*

- Supports PCIe online addition/replacement and deletion (**OLA/RD**) on specified systems. For instructions on performing OLA\* on HP Integrity systems running HP-UX 11i v2 and 11i v3, refer to the *Interface Card OLA\* Support Guide*. Online deletion allows you to delete the LAN card instance without a system reboot. It is available only on HP-UX 11i v3.

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- Allows you to dynamically load the **ixgbe** driver into the kernel or unload it from the kernel without a system reboot. Dynamic loading to/unloading from the kernel is available only on HP-UX 11i v3 on specified systems.
- 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**

<b>MTU</b>	<b>SNAP</b>	<b>TSO+SNAP</b>	<b>TSO</b>
9000	Yes	No	Yes
1500	Yes	No	Yes

- Does not support Accelerated Virtual I/O (AVIO) on the first release.

## Interoperability: Supported Systems and Switches

### Supported Systems

For the latest list of systems that support using the AD386A 10 Gigabit Ethernet cards, please see the *Ethernet Support Matrix* at: <http://docs.hp.com/en/supportmatrixEthernetver2.pdf/supportmatrixEthernetver2.pdf>.

### Supported Switches

As of April 15, 2008, 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.
- Fujitsu Laboratories of America, Inc. (FLA) and PFU Systems, Inc. XG800™ and XG1200™.
- HP ProCurve 10 Gigabit Ethernet switch.

### Installation Recommendations and Restrictions

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

- Slot placement.
  - Do not place the card in slots 3 or 4 (the switched slots) in rx3600 and rx6600 servers; the AD386A is not supported in the switched slots on those 2 servers.
  - To achieve best performance, HP recommends putting the card into one of the highest-performing (or “**dual-rope**”) PCIe slots. 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>.
  - Not supported on platforms where all slots are only PCI slots or PCI-X slots.
- HP recommends allocating at least 512MB of memory and 1 CPU per AD386A 10GigE card.
- Please see the *Ethernet Support Matrix* for the number of cards supported per server.
- The initial release of the card’s driver does not support Ignite-UX. Support for install kernel with **icxgbe** driver will be added in a future release.
- To configure the AD386A on HP-UX 11i v2 using SAM, please install patch PHCO\_36563 (or later).

## 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/hpicxgbeconf`), use the NCWeb (HP-UX 11i v3) or SAM(HP-UX 11i v2) 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 speed</code>	Displays the speed and duplexity of the link. The card always operates at 10Gbits/s, full duplex mode. Autonegotiation is also not supported.
<code>-x vmtu</code>	Displays the value of the virtual MTU for TCP Segmentation Offload (TSO). For details, see TCP Segmentation Offload. Default: On.
<code>-x cko</code>	Displays the driver checksum offload (CKO) settings.
<code>-x drv_pr</code>	Displays whether the adapter/driver supports large packet reassembly for incoming TCP packets.
<code>-x drv_coal</code>	Displays driver interrupt coalescing thresholds and ranges.
<code>-x drv_fctrl</code>	Displays the driver flow control settings.
<code>-x drv_mq</code>	Displays information on driver queues.
<code>-x help</code>	Displays available commands to get driver settings.
<code>-x vpd</code>	Displays HP Vital Product Data of the adapter. NOTE: The initial EFI driver version supported is 1.0.0.02. The VPD may display 1.0.0.f as the EFI driver version, but both EFI driver versions are equivalent.
<code>-X vmtu</code>	Sets the TSO vmtu value. For details, see TCP Segmentation Offload. 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.
<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 mf_cko_tx on/off	Enables/disables hardware transmit checksum offload for Multi-fragment UDP (IPv4). Multi-fragment transmit CKO will be enabled only when send CKO is enabled. Default: Off.
-X mf_cko_rx on/off	Enables/disables hardware receive checksum offload for Multi-fragment UDP (IPv4). Multi-fragment receive CKO will be enabled only when receive CKO is enabled. Default: Off.
-X drv_pr on/off	Enables / disables incoming TCP packet reassembly in the driver/adapter. Default ON. If the interface is used for forwarding, TCP packet reassembly must be disabled.
-X help	Displays available commands to change the driver settings.
-X rx_coal	Sets receive interrupt coalescing link utilization ranges. Please refer to the “Transmit/Receive Interrupt Coalescing” section in this guide.
-X tx_coal	Sets transmit interrupt coalescing link utilization ranges. Please refer to the “Transmit/Receive Interrupt Coalescing” section in this guide.
-X coal_time	Sets interrupt coalescing timer values (common to both transmit and receive). Please refer to the “Transmit/Receive Interrupt Coalescing” section in this guide.
-X rx_fctrl_on	Enables receive side flow control (generate pause frames).
-X rx_fctrl_off	Disables receive side flow control (generate pause frames).
-X tx_fctrl_on	Enables transmit side flow control (response to pause frames).
-X tx_fctrl_off	Disables transmit side flow control (response to pause frames).
-X fctrl_wmarks	Sets low and high water mark for the receive FIFO of the adapter.
-X drv_mq	Changes the number of driver queues: lanadmin -X drv_mq num_queues ppa
* 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.

**Flow Control Watermarks** -- The high water mark of the Receive FIFO at which the NIC will send XON PAUSE frames to the Link Partner and the low water mark at which NIC will send a XOFF (release PAUSE) can be changed by lanadmin -x fctrl\_wmarks <low water mark> <high water mark> <ppa>. It is expressed as a percentage of the total FIFO size. The range of values supported is: {10 – 90}. Note that if you do not set flow control water marks, the card will use its default values and the low and high water marks will be shown as 0. If you set low and high water marks for flow control, lanadmin -x drv\_fctrl will show the user specified water marks.

## 10 Gigabit Ethernet Link Settings

**Transmit/Receive Interrupt Coalescing** -- The AD386A card provides four link-utilization ranges and corresponding interrupt coalescing timers. An interrupt will be generated by the card after the interrupt coalescing time has elapsed. The interrupt coalescing timer value in turn depends on the link utilization range. The link utilization ranges and the interrupt coalescing timer value for that link utilization range 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 interrupt coalescing timers: TIM-A, TIM-B, TIM-C, TIM-D.

Here are the ranges:

Range-A 0 - R1% TIM-A

Range-B R1 - R2% TIM-B

Range-C R2 - R3% TIM-C

Range-D R3 - 100% TIM-D

The timer value is expressed in a granularity of 100ns and can be in the range {1 - 1000}. The default values are:

**Link util** : 0 - 1 1 - 10 10 - 50 50 - 100

**Timer (0.1us)** : 1 100 500 1000

The timer values can be changed by

**lanadmin -X coal\_time TIM-A TIM-B TIM-C TIM-D ppa**

where: TIM-A < TIM-B < TIM-C < TIM-D.

Note that the timer values are applicable to both transmit and receive interrupt coalescing.

The link utilization ranges for transmit interrupt coalescing can be changed by

**lanadmin -X tx\_coal R1 R2 R3 ppa**

where: R1<R2<R3 and R1, R2 and R3 are in {1 .. 99}.

The link utilization ranges for receive interrupt coalescing can be changed by

**lanadmin - X rx\_coal R1 R2 R3 ppa**

where: R1<R2<R3 and R1, R2 and R3 are in {1 .. 99}

## Checksum Offload

Checksum Offload (CKO) is enabled by default; so, there is no need to enable it explicitly. 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.

Multi-fragment Checksum Offload (MF CKO) indicates whether the card computes checksum for IPv4 multi-fragment (UDP) packets. MF CKO is disabled by default for both transmit and receive path, but can be turned ON or OFF for each path independently of the other.

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/hpicxgbeconf**. The parameters in the config file are

- HP\_ICXGBE\_CKO\_IPV4\_TX
- HP\_ICXGBE\_CKO\_IPV4\_RX
- HP\_ICXGBE\_CKO\_IPV4\_MF\_TX
- HP\_ICXGBE\_CKO\_IPV4\_MF\_RX

Editing the config file `/etc/rc.config.d/hpicxgbeconf` 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
```

```
lanadmin -X mf_cko_tx on/off ppa and
```

```
lanadmin -X mf_cko_rx on/off ppa
```

## TCP Segmentation Offload

TCP Segmentation Offload (TSO) is enabled by default; so, there is no need to enable it explicitly. 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.

To change the TSO setting on each specific interface, use an editor such as "vi" to edit the `HP_ICXGBE_VMTU` parameter in the configuration file `/etc/rc.config.d/hpicxgbeconf`. 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.

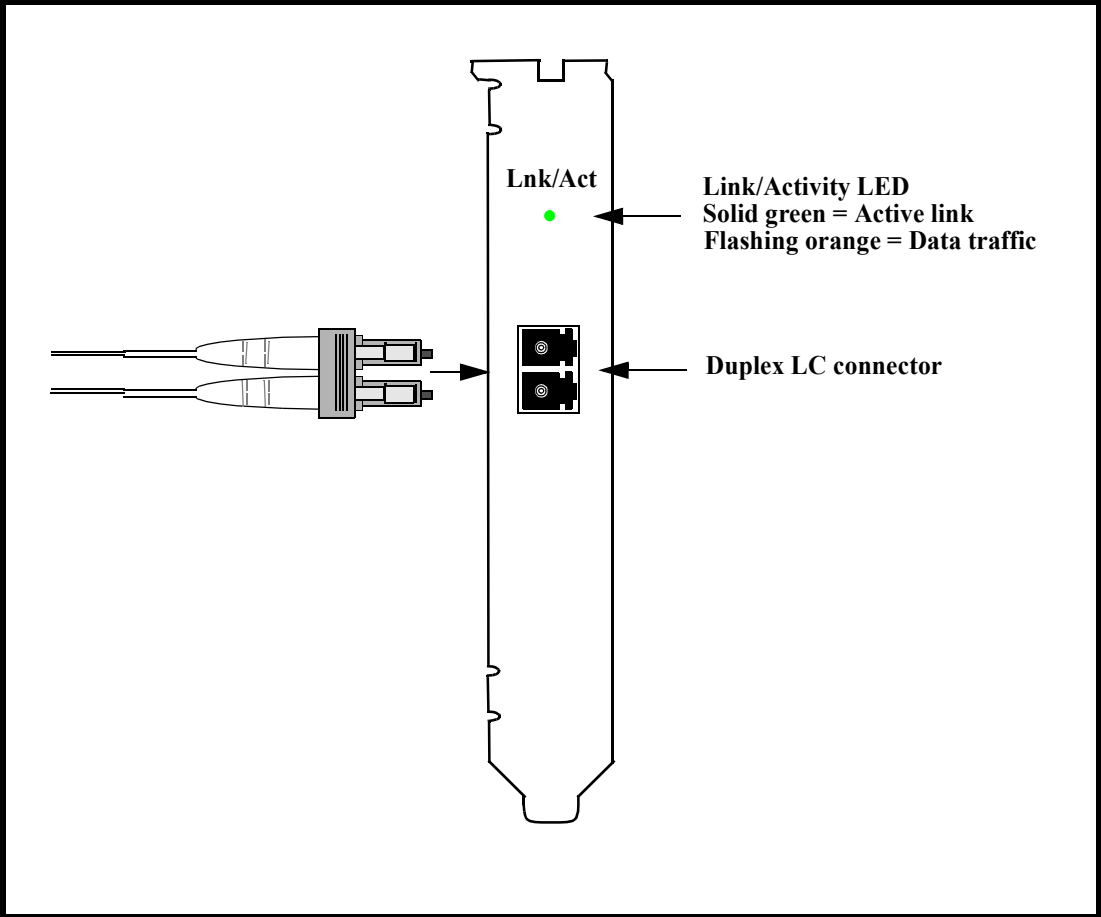
---

- When TSO is enabled, the output looks like:

```
# lanadmin -x vmtu ppa
```

```
Driver/Hardware supports TCP Segmentation Offload. Current VMTU = 32160.
```

Figure 1 AD386A PCIe 10GBase-SR 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	Nwmgr (SAM) or ifconfig or edit /etc/rc.config.d/netconf	196.6.20.2	
Subnet mask	Required if using subnetting	Subnet mask not used	Nwmgr (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	Nwmgr (SAM) or edit HP_ICXGBE_STATION_ADDRESS parameter in /etc/rc.config.d/hpicxgbeconf 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	Nwmgr (SAM) or edit /etc/hosts	host1	
MTU (Maximum Transmission Unit): Jumbo Frames	Optional	1500 bytes	Nwmgr (SAM) or edit HP_ICXGBE_MTU parameter in /etc/rc.config.d/hpicxgbeconf or temporarily: lanadmin -M	lanadmin -M 9000 ppa# (see Note 2 below)	
Transmit/Receive flow control	Optional	On	Nwmgr (SAM) or edit /etc/rc.config.d/hpicxgbeconf or temporarily: lanadmin -X	lanadmin -X rx_fctrl off lanadmin -X rx_fctrl_on lanadmin -X tx_fctrl_off lanadmin -X tx_fctrl_on	

**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 **icxgbe** driver on both HP-UX 11i v3 and HP-UX 11i v2 is 257 - 1500 for normal frames and 1501 - 9000 for Jumbo Frames.

**Operating distances for 10GBase-SR**

The operating distance is the distance between the card and the local switch or link-partner to which it is connected. The Operating distances for 10GBase-SR using multi-mode fiber (MMF) optic cable are as follows:

Description (850nm short wavelength laser)	Modal Bandwidth	Operating Distance
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 AD386A 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 10GBase-SR does not directly interface with any other form of 10 Gigabit Ethernet such as Base-LR, ER, SW, LW, or EW and other 1000Base-SX (fiber based) Gigabit Ethernet link interfaces.

**Available HP Fiber Optic Cables:**

LC-LC	
221692-B21	2m LC duplex 50/125 Multimode Fibre Channel Cable
221692-B22	5m LC duplex 50/125 Multimode Fibre Channel Cable
221692-B23	15m LC duplex 50/125 Multimode Fibre Channel Cable
221692-B26	30m LC duplex 50/125 Multimode Fibre Channel Cable
221692-B27	50m LC duplex 50/125 Multimode Fibre Channel Cable

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# A Physical, Environmental, and Regulatory Information

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

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## Card Physical and Environmental Specifications

Following are the product physical and environmental specifications of the PCIe 10 Gigabit Ethernet Card.

### Physical Specifications

Form Factor	PCIe standard height card; x8 lanes
Width	11.07 cm (.86 in)
Length	19.271 cm (7.59 in)
Thickness	2.174 cm (0.86 in)
Weight	0.213 kg (0.47 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.

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## FCC Statement (For U.S.A.)

### Federal Communications Commission Radio Frequency Interference Statement

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**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.

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## 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.

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## EMI Statement (European Community)

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**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.

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## Laser Safety Statements

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

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**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.

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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.

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**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.

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### Laser Safety - European Union - Optical Transceiver Only

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**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.

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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.

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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



Australian Government  
 Australian Communications Authority



### Supplier's Declaration of Conformity

(For compliance levels 1, 2 and 3 in Australia and Levels of Conformity 1, 2 and 3 in New Zealand)

As required by Notices under:

- section 182 of the Australian *Radiocommunications Act 1992*;
- section 134 of the New Zealand *Radiocommunications Act 1989*.

**Supplier (ie, manufacturer, importer or an authorised agent) Details:**

Name of Manufacturer, Importer or Agent	ACN, ARBN, ABN, NZCN or NZ GST Number
Viking Virtual Services	
Address of Manufacturer, Importer or Agent	ACA / MED Supplier Code Number
9 Pentland Crescent, Dudley Park	N12075
Mandurah, WA 6210	

**Product Details:**

Product Description — Brand Name, Model, Lot, Batch or Serial Number (if available)

Model AD386 Single Port Ethernet Card

**Applicable Standards Details:**

Standard Title, Number, Edition and if applicable the Test Report Number:

AS/NZS CISPR 22: 2006 Class B Measurement & Test Report No: R0801114-9 dated
15/01/2008

**Declaration:**

I hereby declare that the product mentioned above complies with the above mentioned standards and all products supplied under this Declaration will be identical to the sample identified above.

Signature of supplier / agent	Date
<i>Donna Ellassen</i>	29/03/08
Name (Print)	
Donna Ellassen	
Position in Organisation	
Manager	