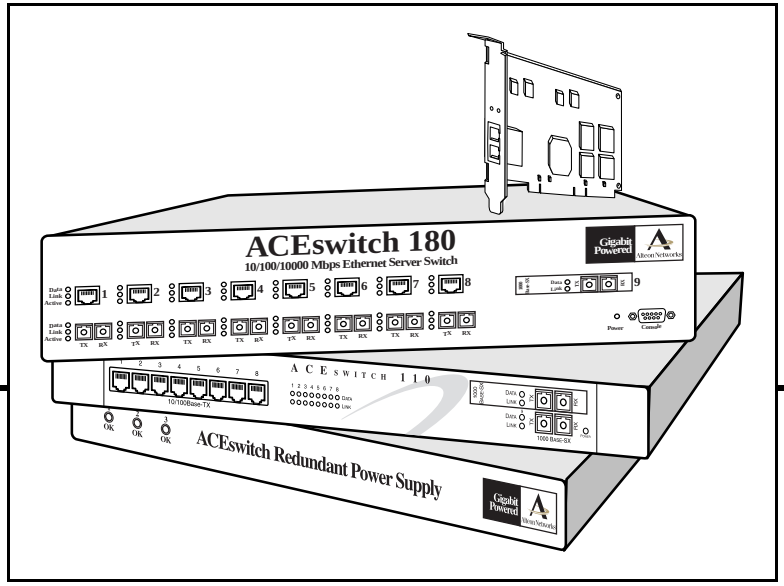
Installation and User's Guide



ACEnic™ Adapter

Network Interface Card for Solaris

Part Number: 050002, Revision C

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Regulatory Compliance

FCC Class A Notice: 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. 2. This device must accept any interference received, including interference that may cause undesired operation.

Note: 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 harmful interference in which case the user will be required to correct the interference at his own expense.

Do not make mechanical or electrical modifications to the equipment.

VCCI Class 1: The equipment is Type 1 Data Processing Equipment and is intended for use in commercial and industrial districts. It has been tested and found to comply with VCCI technical requirements for the purpose of protection against electronic interference. When used in residential districts or their peripheral areas, radio, and TV receiver units may be subject to radio interference. The operation should be done in accordance with the Instruction Manual.

CE Notice: The CE mark on this equipment indicates that this equipment meets or exceeds the following technical standards: EN50082-1, EN55022, EN60555-2, EN61000-4-1, EN61000-4-2, EN61000-4-3, EN61000-4-4, and EN61000-4-5.

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Preface

This manual describes how to install and use the following Alteon Networks™ ACEnic Adapter in the Solaris™ operating environment:

- PCI (Peripheral Component Interconnect) ACEnic Adapters
- SBus ACEnic Adapters

The procedures in this manual assume that you are a system or network administrator experienced in installing similar hardware in the Solaris environment.

How This Book Is Organized

This book is organized as follows:

Chapter 1, "About the ACEnic Adapters," describes the features of the ACEnic Adapters, and lists the hardware and software requirements for their installation and use.

Chapter 2, "Installing the Adapter Hardware," tells you how to physically install the adapters into your system, connect network cables, and interpret the adapter's LEDs.

Chapter 3, "Installing the Adapter Software," explains how to install the Gigabit Ethernet Adapter software.

Chapter 4, "Configuring the Adapters," tells you how to configure the adapter software for use in your system.

Chapter 5, "Optional Configuration," explains how to configure the adapter for use with VLANs, Jumbo Frames, and Dual Homing.

Appendix A, "Specifications," lists the hardware specifications.

UNIX Commands

This document may not include all necessary software commands or procedures. Instead, it may name software tasks and refer you to operating system documentation or the handbook that was shipped with your workstation. The type of information that you might need to use references for includes:

- Shutting down the system
- Booting the system
- Configuring devices
- Other basic software procedures

Typographic Conventions

The following table describes the meanings of the various typographic styles used in this book.

Table 1 Typographic Conventions

Typeface or Symbol	Meaning	Example
`AaBbCc123`	This type is used for names of commands, files, and directories used in explanatory text.	Edit your `.login` file. Use `ls -a` to list all files.
	It also depicts on-screen computer output.	`Host1% You have mail.`
`AaBbCc123`	This bold type appears in command examples. It shows text that must be typed in exactly as shown.	`Main#` **`sys`**
AaBbCc123	This italicized type appears in command examples as a parameter placeholder. Replace the indicated text with a real name or value when using the command.	To establish a Telnet session, type: **`telnet`** *IP-address*
	This also shows book titles, new words or terms, or words to be emphasized.	Read Chapter 6 in your *User's Guide.* These are called *class* options. You *must* be root to do this.
[ ]	Brackets appear in command examples. Items inside brackets are optional and can be included or left out as the situation demands. Either way, do not type the brackets.	**`ls`** [**`-a`**]

Shell Prompts

Table 2 Shell Prompts

Shell	Prompt
C shell	*machine_name*%
C shell superuser	*machine_name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Contacting Alteon Networks

Use the following information to access Alteon Networks Online, customer support, or sales.

- Web access:

  `http:\\www.alteon-networks.com`

  This is the URL of Alteon Networks Online Information. This web site includes product information, software updates, release notes, and white papers. The web site also includes access to Alteon Networks Customer Support for accounts under warranty or that are covered by a maintenance contract.

- E-mail access:

  `support@alteon-networks.com`

  E-mail access to Alteon Networks Customer Support is available to accounts that are under warranty or covered by a maintenance contract.

- Telephone access to Alteon Networks Customer Support:

  1-888-Alteon0 (or 1-888-258-3660)
  1-408-360-5695

  Telephone access to Alteon Networks Customer Support is available to accounts that are under warranty or covered by a maintenance contract. Normal business hours are 8 a.m. to 6 p.m. PST.

- Telephone access to Alteon Networks Sales:

  1-888-Alteon2 (or 1-888-258-3662), and press 2 for Sales
  1-408-360-5600, and press 2 for Sales

  Telephone access is available for information regarding product sales and upgrades.

CHAPTER 1

About the ACEnic Adapters

The Gigabit Ethernet adapter incorporate a new technology that transfers data at a rate of one gigabit per second—10 times the rate of a Fast Ethernet adapter. The ACEnic Adapters target the increased congestion experienced at the backbone and server levels by today's networks, while providing a future upgrade path for high-end workstations that require more bandwidth than Fast Ethernet can provide.

System Requirements

Before using the ACEnic Adapters, make sure your system meets the following system requirements:

Table 1-1 System Requirements

Category	Requirements
Hardware	
PCI	Sun™ Ultra30™ and Ultra™ Enterprise™ 450, 3000, 4000, 5000, and 6000 systems with an available PCI I/O card slot. (Up to 4 ACEnic adapters are supported per Ultra Enterprise Server.)
SBus	Sun™ Ultra™ 2 and Ultra™ Enterprise™ 3000, 4000, 5000, 6000, and 10000 systems with an available SBus I/O card slot. (Up to 4 ACEnic adapters are supported per Ultra Enterprise Server.
Software	Solaris 2.5.1 (4/97 release, or later) and 2.6.
Firmware	OpenBoot™ PROM version 3.0 or greater.

Features

Following is a list of the Gigabit Ethernet adapter features:

- Full-duplex Gigabit Ethernet interface (IEEE P802.3z)
- Standard Ethernet frame size (up to 1518 bytes)
- Jumbo Frame support (optional 9,000 byte frames for server-to-server traffic)
- Dual Homing for automatic failover if a port, switch, or NIC is down
- VLANs: up to 64 VLANs using IEEE 802.1Q tagging
- Dual DMA channels
- Adaptive interrupt frequency (maximizes network throughput; adapts to traffic load)
- ASIC with on-chip MAC and RISC processor
- Duplex SC fiber connector

PCI Models

The following features are available on the PCI cards (models 710002 and 710012):

- 33/66 MHz, 32- or 64-bit PCI bus master with adaptive DMA (33 MHz for model 710002)
- Universal dual voltage signaling (3.3V and 5V)
- PCI Local Bus Rev 2.1 compliant (6.8"x 4.2")

SBus Models

The following features are available on the SBus card (model 710003):

- 25 MHz, 64-bit bus master with adaptive DMA
- 5.75" x 3.25" card

Key Protocols and Interfaces

The ACEnic Adapters are interoperable with existing Ethernet equipment assuming standard Ethernet minimum and maximum frame size (64 to 1518 bytes), frame format, and compliance with the following standards and protocols:

- Logical Link Control (IEEE 802.2)
- Flow Control (IEEE 802.3x)
- SNMP
- Gigabit Ethernet (IEEE P802.3z)

Diagnostic Support

ACEnic Adapter RISC CPU runs on-board diagnostic at power-up.

VLANs Support

Virtual Local Area Networks (*VLANs*) are commonly used to split up groups of network users into manageable broadcast domains, to create logical segmentation of workgroups, and to enforce security policies among logical segments.

The ACEnic Adapters support up to 64 VLANs when connected to an Alteon Networks' ACEnic, ACEswitch, or ACEdirector. With multiple VLANs on an adapter, a server with a single adapter can have a logical presence on multiple IP subnets.

Refer to "Configuring VLANs" on page 5-2 for configuration information. For details about planning networks with VLANs, refer to the *ACElerate Software User's Guide*.

Jumbo Frames Support

To reduce host frame processing overhead, the Alteon Networks switches and the ACEnic, both running operating software version 2.0 or greater, can receive and transmit frames that are larger than maximum frame size allowed on normal Ethernet.

VLANs can be configured on the same NICs and switches to separate regular and Jumbo Frame traffic. End-stations with a ACEnics installed and attached to ACEswitches can communicate across both the Jumbo Frame VLANs and regular frame VLANs at the same time.

Dual Homing

Server switching networks require the capability to employ resiliency and redundancy similar to FDDI network environments. The combination of Alteon Networks NICs and switches provide the Ethernet user with this capability.

For dual homing support, you must install two ACEnics in the same host system. The NICs are configured to provide a hot-standby failover service. The switches must be configured to support Spanning Tree on both Gigabit Ethernet ports to support the ACEnic Dual Homing capability.

CHAPTER 2

Installing the Adapter Hardware

The following instructions apply to installing the ACEnic Adapter in most servers. Refer to the manuals that accompanied your server for details about performing these tasks on your particular system.

Pre-Installation

1. **Make sure your server meets the hardware and software requirements found on page 1-1.**
2. **Make sure that your system is using the latest BIOS.**
3. **Check the Alteon Networks driver CD-ROM for any `readme` files which may contain important information not available at the time this manual was printed.**
4. **If your system is active, shut it down gracefully.**

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

5. **After shutting down the server software, power OFF your system.**
6. **Remove any jewelry from your hands and wrists.**
7. **Make sure to use only insulated or nonconducting tools.**
8. **Attach the adhesive copper strip of the wrist strap (included) to the metal casing of the system. Wrap the other end twice around your wrist, with the adhesive side against your skin.**
9. **Remove the adapter from its container and check for visible signs of damage, particularly on the card's edge connector. Never attempt to install any damaged card.**
10. **Holding the adapter card by the edges, unpack it and place it on an antistatic surface.**

PCI Installation Procedure

Follow these steps when installing a PCI ACEnic Adapter in your system:

1. **Observe all pre-installation instructions and precautions found on page 2-1.**

   Before installing the adapter, the system power must be *OFF*, and proper electrical grounding procedures must be followed.

2. **Remove the server cover, and select any empty PCI slot.**

   If you do not know how to identify a PCI slot, check your server documentation or ask your system administrator.

3. **Remove the blank cover-plate from the slot that you selected. Retain the screw so that it can be replaced in a later step.**

4. **Holding the PCI card by the edges, align the adapter's connector edge with the PCI connector dock in the server.**

   NOTE – The connector dock in a 32-bit PCI slot is shorter than in 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 connector edge will remain undocked. This is perfectly normal.

5. **Applying even pressure at both corners of the card, push the PCI card until it is firmly seated in the slot.**

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

   When properly seated, the adapter's port connectors will be aligned with the slot opening, and its faceplate will be flush against the server chassis.

6. **Use the screw removed during Step 3 to secure card into place.**

7. **Replace the server cover and detach the wrist strap.**

8. **Turn the server on.**

9. **Attach network cables (see "Connecting the Network Cables" on page 2-4).**

SBus Installation Procedure

Follow these steps when installing an SBus ACEnic Adapter in your system:

1. **Observe all pre-installation instructions and precautions found on page 2-1.**

   Before installing the adapter, the system power must be *OFF*, and proper electrical grounding procedures must be followed.

2. **Remove the server cover, and select any empty SBus slot.**

   If you do not know how to identify an SBus slot, check your server documentation or ask your system administrator.

3. **Remove the blank cover-plate from the slot that you selected. Retain the screw so that it can be replaced in a later step.**

4. **Holding the SBus card by the edges, slide the card face plate into the small slot at the end of the SBus opening and align the card with the SBus connector.**

5. **Applying even pressure at both corners of the card, push the SBus card until it is firmly seated in the connector.**

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

   When properly seated, the adapter's port connectors will be aligned with the slot opening, and its faceplate will be flush against the server chassis.

6. **Use the screw removed during Step 3 to secure card into place.**

7. **Replace the server cover and detach the wrist strap.**

8. **Turn the server on.**

9. **Attach network cables (see "Connecting the Network Cables" on page 2-4).**

Connecting the Network Cables

The adapter has one SC-type connector used for attaching the server to a Gigabit Ethernet fiber segment. The ports is auto-negotiating and supports full-duplex operation.

1. **Prepare an appropriate cable.**

   The following table lists cable characteristics required for connecting to 1000Base-SX ports.

   Table 2-1 1000BASE-SX Link Characteristics

Description	62.5 Micron	50 Micron
	Shortwave (850 nm multimode fiber)	
Operating Range	2 to 260 meters	2 to 550 meters (in compliance with IEEE 802.3z)

2. **As shown in the following figure, connect one end of the cable to the ACEnic.**

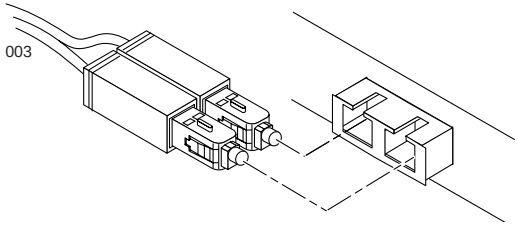

Figure 2-1 Fiber Connector for the Alteon Networks ACEnic

3. **Connect the other end of the cable to a Gigabit Ethernet network port.**

NOTE – Attached the cable connector so that the TX (transmit) port on the ACEnic is connected to the RX (receive) port of the device at the other end of the cable.

4. **Observe the adapter port LEDs for proper operation as shown in the following table.**

   Table 2-1 Port LEDs

LED	State	Description
Data	Blinking	Data detected on the port.
	On	Data detected on the port.
	Off	No data detected on the port.
Link	Blinking slowly	Port has been disabled by software.
	On	Good link.
	Off	No link; possible bad cable, bad connector, or configuration mismatch.

CHAPTER 3

Installing the Adapter Software

This chapter describes how to install the Gigabit Ethernet Adapter software.

NOTE – The adapter hardware must be properly installed in your system before installing the software.

Software Installation Procedure

NOTE – If the CD-ROM drive that you are using for software installation is attached to a remote machine, refer to your Solaris manuals for remote CD-ROM access.

1. **Become superuser (root).**
2. **Place the CD-ROM into the CD-ROM drive.**
3. **Mount the CD-ROM on a local directory.**

   If the Volume Manager (`vold`) is running on your machine, then the CD-ROM is mounted automatically under `/cdrom/acenic_rev_j` when it is loaded in the drive.

   If the Volume Manager (`vold`) is not running on your machine, create a directory called `/cdrom/acenic_rev_j` and mount the CD-ROM manually.

```
# mkdir /cdrom/acenic_rev_j
# mount -F hsfs -r /dev/sr0 /cdrom/acenic_rev_j
```

4. **Access the package directory by entering the following:**

```
# cd /cdrom/acenic_rev_j/ALTNalt
```

5. **At the prompt, type the** pkgadd **command:**

```
# pkgadd -d .
```

The screen displays a list of packages available for installation:

```
The following packages are available:
1 ALTNalt   Alteon Networks ACEnic Adapter 2.0
            (sparc) 2.0

Select package(s) you wish to process (or 'all' to process all pack-
ages). (default: all) [?, ??, q]
```

6. **Press Return.**

The pkgadd command starts the installation script.

7. **Respond to prompts in the script.**

NOTE – pkgadd keeps cycling through its script once it has started. Therefore you must quit (**q**) the program the second time the list of packages is displayed.

---

8. **When you have finished loading the software, eject the CD-ROM by entering the following commands:**

```
# cd /
# unmount /cdrom/acenic_rev_j
# eject cdrom
```

9. **Reboot the system.**

If you make changes and put the system into service before rebooting, you may experience configuration problems.

Perform this command to reboot the system:

```
# reboot -- -r
```

Troubleshooting: If the Driver Fails to Attach

If the adapter is not installed, you will see the following message when you run `pkgadd`:

```
drvconfig: Driver (alt) failed to attach
Warning: Driver (alt) successfully added to system but failed to attach
pkgadd: ERROR: postinstall script did not complete successfully
```

If this happens, halt your machine using the following commands:

```
# sync
# sync
# halt
```

Then, at the `ok` prompt, use the following command to list the system devices:

```
ok show-devs
```

ACEnic Adapter output will be displayed, similar to one of the examples below.

For PCI systems, "`pci12ae,1@1`" identifies the PCI ACEnic Adapter:

```
/SUNW,ffb@1e,0
/SUNW,UltraSPARC-II@0,0
/pci@1f,2000
/pci@1f,4000
/counter-timer@1f,1c00
/virtual-memory
/memory@0,60000000
/aliases
/options
/openprom
/chosen
/packages
/pci@1f,2000/pci12ae,1@1
/pci@1f,4000/scsi@3
/pci@1f,4000/network@1,1
/pci@1f,4000/ebus@1
/pci@1f,4000/scsi@3/tape
/pci@1f,4000/scsi@3/disk
/pci@1f,4000/ebus@1/SUNW,CS4231@14,200000
....
```

For SBus systems, "`alt@0,100000`" identifies the SBus ACEnic Adapter:

```
/SUNW,UltraSPARC@0,0
/sbus@1f,0
/counter-timer@1f,3c00
/virtual-memory
/memory@0,0
/aliases
/options
/openprom
/chosen
/packages
/sbus@1f,0/alt@0,10000
/sbus@1f,0/SUNW,bpp@e,c800000
/sbus@1f,0/SUNW,hme@e,8c00000
/sbus@1f,0/sc@f,1300000
/sbus@1f,0/eeprom@f,1200000
/sbus@1f,0/flashprom@f,0
....
```

If the appropriate ACEnic device is not listed, check that the adapter is installed and properly seated. Then restart the system and re-install the adapter software.

CHAPTER 4

Configuring the Adapters

For proper performance, once the Gigabit Ethernet Adapter software is installed on your system, it must be configured. Perform each of the following tasks to ensure proper configuration.

NOTE – If any adapter card is moved from one slot to another, the `alt` instance values in the `/etc/path_to_inst` file will be incorrect. Correct the instance values before making any adapter configuration changes. See your Solaris manuals for details on setting instance values.

Configuring the Host Files

Each adapter must be assigned a host name and an IP address. If VLANs are to be used, any specific adapter may have one host name and IP address for each VLAN (see "VLAN Configuration Process" on page 5-4).

If you are not using multiple VLANs, follow these steps when configuring the host name and IP address for your adapter:

1. **Create the `/etc/hostname.alt`<*num*> file(s) on the server.**

   There can be up to four adapters per server. Create one `/etc/hostname.alt`<*num*> file for each adapter. The number <*num*> in the filename is determined as follows:

Table 4-1 hostname Numbering

Adapter	Hostname
First	`/etc/hostname.alt0`
Second	`/etc/hostname.alt1`
Third	`/etc/hostname.alt2`
Fourth	`/etc/hostname.alt3`

For example, the first adapter in the server requires a file named `/etc/hostname.alt0` and the second adapter requires a file named `/etc/hostname.alt1`.

2. **Place the appropriate adapter host name into the** `hostname.alt<num>` **file(s).**

   The `/etc/hostname.alt<num>` file must contain the appropriate host name for the adapter.

   The host name should be different from that of any other interface. For example, `/etc/hostname.alt0` and `/etc/hostname.alt1` cannot share the same host name.

   The following example depicts the host name files required for a machine called `ace`, with four ACEnic adapters known as `ace-11`, `ace-12`, `ace-13`, and `ace-14` on the networks created for `alt0`, `alt1`, `alt2`, and `alt3`.

```
ace # cat /etc/hostname.alt0
ace-11
ace # cat /etc/hostname.alt1
ace-12
ace # cat /etc/hostname.alt2
ace-13
ace # cat /etc/hostname.alt3
ace-14
```

3. **For each host name, enter the appropriate IP address in the** `/etc/hosts` **file.**

4. **Reboot the system.**

   If you make changes and put the system into service before rebooting, you may experience configuration problems.

   Perform this command to reboot the system:

```
# reboot -- -r
```

Configuring Driver Parameters with ndd

The `ndd` (1M) utility is useful for changing configuration parameters for the adapter. Alternately, adapter parameters can be changed by manually editing the configuration files. This section describes the `ndd` utility in detail.

NOTE – Any changes made with `ndd` are temporary and will be lost when you reboot the system. To make configuration changes survive the reboot process, you will need to store driver settings in the `/etc/rc2.d/S99alteon` file (see "Saving Driver Parameters Beyond Reboot" on page 4-7).

Available Parameters

To view parameters that you can set using the ndd command, type:

```
# ndd /dev/alt '?'
```

The system will return the following:

```
?
stat_ticks                      (read and write)
send_max_coalesced_bds          (read and write)
recv_max_coalesced_bds          (read and write)
nic_tracing                     (read and write)
link_negotiation                (read and write)
dump_nic                        (read and write)
jumbo                           (read and write)
vlan?                           (read and write)
vlan_tag                        (read and write)
vlan_tag_id                     (read and write)
redund?                         (read and write)
redund                          (read and write)
fdr_filter                      (read and write)
instance                        (read and write)
```

The following table explains the ndd parameters.

Table 4-2 ndd Parameters

Parameter	Meaning
stat_ticks	Minimum number of 100 usec ticks between statistics updates. 0 is the minimum, and 100 is the default. There is no maximum limit.
send_max_coalesced_bds	Number of sends before a send complete event is set. 1 is the minimum, 127 is the maximum, and 60 is the default.
recv_max_coalesced_bds	Maximum number of receives that can be bundled into an event. 1 is the minimum, 511 is the maximum, and 6 is the default.
nic_tracing	(not currently used)
link_negotiation	Used to set IEEE 802.3z (draft) Link Negotiation to auto or off. Use a value of 0 for off, or 1 for auto. The default is 1 (auto).
dump_nic	Takes a dump of NIC memory. A system core dump will then include NIC information. Use a value of 0 to clear NIC dump memory and return it to the system, or 1 to dump current NIC information. The default is 0 (clear).
jumbo	(do not use; value is set by startup file)
vlan?	(do not use; value is set by startup file)
vlan_tag	(do not use; value is set by startup file)
vlan_tag_id	(do not use; value is set by startup file)
redund?	(do not use; value is set by startup file)
redund	(do not use; value is set by startup file)
fdr_filter	Full Duplex Repeater Filter. Turn this on if the NIC is attached to a Full Duplex Repeater. Use a value of 0 for off, or 1 for on. The default is 0 (off).
instance	Used to set the device number from which the previous data is extracted. This value can range from 0 to the number of adapters installed in the system. The default is 0.

Checking Parameter Settings

To check a current parameter setting, use the following command:

```
# ndd /dev/alt <parameter_name>
```

Setting Parameters

Follow this procedure to set parameters using the ndd utility:

1. **Check the /etc/path_to_inst file for the instance associated with particular devices.**
2. **Specify the instance for the adapter you wish to configure:**

```
# ndd -set /dev/alt instance <instance#>
```

Any subsequent ndd configuration commands will act on the adapter with the selected instance. The adapter remains selected until you specify a different instance.

3. **Specify the configuration command using the following format:**

```
# ndd -set /dev/alt <parameter> <value>
```

A list of valid parameters and values can be found in Table 4-2.

NOTE – Any changes made with ndd will be lost when you reboot the system. To make configuration changes survive the reboot process, you will need to store driver settings in the /etc/rc2.d/S99alteon file (see "Saving Driver Parameters Beyond Reboot" on page 4-7).

Auto (link) Negotiation

The default configuration for auto negotiation of the Gigabit Ethernet link is `auto`. With this setting the ACEnic Adapter will use IEEE 802.3z (draft) auto negotiation. All ACEnics and ACEswitches have auto negotiation set to `auto` as the default configuration.

If you are connecting the adapter to Gigabit Ethernet equipment that does not support auto negotiation, or if there is a problem establishing a link between the two devices, auto negotiation can be turned off (see Table 4-2 on page 4-4).

NOTE – Auto negotiation has changed in the most recent version of the IEEE 802.3z (draft). Alteon Networks Release 1 (or greater) software for the ACEnic and ACEswitch uses a different version of auto negotiation than Release 2 (or greater). If you are trying to connect a Release 1 device to a Release 2 device, you can choose to upgrade and run Release 2 on both devices, or turn auto negotiation off on both devices.

Increasing TCP/IP Performance

The TCP/IP performance of the ACEnic PCI adapter can be increased by changing the TCP/IP `ndd` values. This can be done with the `ndd`(1M) utility as follows. To avoid losing the settings through reboots, add these `ndd` parameter settings to the `/etc/rc2.d/S99alteon` startup file that you created.

Enter the following `ndd` commands to increase TCP/IP performance:

```
# ndd -set /dev/tcp tcp_recv_hiwat 65535
# ndd -set /dev/tcp tcp_xmit_hiwat 65535
# ndd -set /dev/udp udp_recv_hiwat 65535
# ndd -set /dev/udp udp_xmit_hiwat 65535
```

To avoid losing these settings when reboot occurs, add your `ndd` parameter settings to the start-up file as shown below.

Saving Driver Parameters Beyond Reboot

Any parameter changes made using `ndd` will be lost the next time your system is rebooted. To keep changes through reboot, parameter settings must be placed in a start-up file with the following filename:

```
/etc/rc2.d/S99alteon
```

For example, if you need to set Link Negotiation off for adapter 2 and increase the TCP/IP values, you could place the following lines in the `/ect/rc2.d/S99alteon` start-up file:

```
# !/sbin/sh
# Local kernel modifications
#
case "$1" in
'start')
       echo "Setting local kernel parameters...\c"
       ndd -set instance 2
       ndd -set link_negotiation 0
       ndd -set /dev/tcp tcp_recv_hiwat 65535
       ndd -set /dev/tcp tcp_xmit_hiwat 65535
       ndd -set /dev/udp udp_recv_hiwat 65535
       ndd -set /dev/udp udp_xmit_hiwat 65535
       echo""
       ..
       "
'stop'
       echo "$0: No parameters changed."
*)
       echo "Usage: $0 {start|stop}"
       ..
       "
esac
```

Capturing Dump Information

The `dump_nic` command should be used if an adapter stops operating for any reason. The dump contains internal NIC state information which can be used to troubleshoot problems.

To take a dump of an adapters state information, once the adapter has stopped operating:

1. **Select the proper adapter instance.**

```
# ndd -set /dev/alt instance <value>
```

2. **Set the adapter to dump state information in the case of a system core dump.**

```
# ndd -set /dev/alt dump_nic 1
```

3. **Force the system to take a core dump. At the `ok` prompt, type:**

```
ok sync
```

CHAPTER 5

Optional Configuration

Your Alteon Networks ACEnic Adapter can be configured to support the following options:

- VLANs: Virtual Local Area Networks (VLANs) are commonly used to split up groups of network users into manageable broadcast domains, to create logical segmentation of workgroups, and to enforce security policies among each logical segment. Up to 64 VLANs can be defined for each ACEnic Adapter on your server.
- Jumbo Frames: Standard Ethernet frames are 1,500 bytes long. When sending Ethernet traffic at Gigabit speeds, a considerable portion of the bandwidth is consumed by the overhead of handling a multitude of small packets. ACEnic Adapters and ACEswitches support Ethernet frames of 9,000 bytes. Host CPU utilization is significantly reduced and network throughput is enhanced when enabling Jumbo Frames between servers that have ACEnic Adapters.
- Dual Homing: Two ACEnic Adapters on a server can be paired for redundant operation through the use of the Dual Homing feature. If traffic on a primary connection is lost due to the failure of the adapter, cable, switch port, or switch (when the dual adapters are attached to separate switches), the secondary adapter becomes active and assumes the MAC and IP address of the primary adapter. Network sessions should be maintained after the switch-over, causing the minimum impact to the user.

The following sections explain these options in detail, and provide configuration instructions and examples for each.

NOTE – If you change any of the optional configuration parameters (VLAN, Jumbo Frame, or Dual Homing), you must reboot the system before the changes will take effect. If you make changes and do not reboot, you may experience configuration problems.

The Default Configuration

If your network does not require multiple VLANs, Jumbo Frames, or Dual Homing, you may use the default configuration, in which case no further configuration is necessary.

Configuring VLANs

An Overview of VLANs

VLANs allow you to split your physical LAN into logical subparts, providing an essential tool for increasing the efficiency and flexibility of your network.

VLANs are commonly used to separate network users into manageable broadcast domains, to create logical segmentation of workgroups, and to enforce security policies among each logical segment. Each defined VLAN behaves as its own separate network, with its traffic and broadcasts isolated from the others, increasing bandwidth efficiency within each logical group.

One example of how VLANs can be used to segment a LAN is when isolating different types of network traffic. If you wanted to utilize Jumbo Frames on a portion of your LAN, you could configure one VLAN for devices that support Jumbo Frames, and a separate VLAN for devices supporting only standard frames. By implementing VLANs, you could segregate the different frame types from each other without reorganizing your LAN into separate physical subnets.

Although VLANs are commonly used to create individual broadcast domains and/or separate IP subnets, it is sometimes useful for a server to have a presence on more than one VLAN simultaneously. Alteon Networks' ACEnic Adapter and ACEswitch products support multiple VLANs on a per port or per interface basis, allowing very flexible network configurations.

Figure 5-1 shows an example network that uses VLANs.

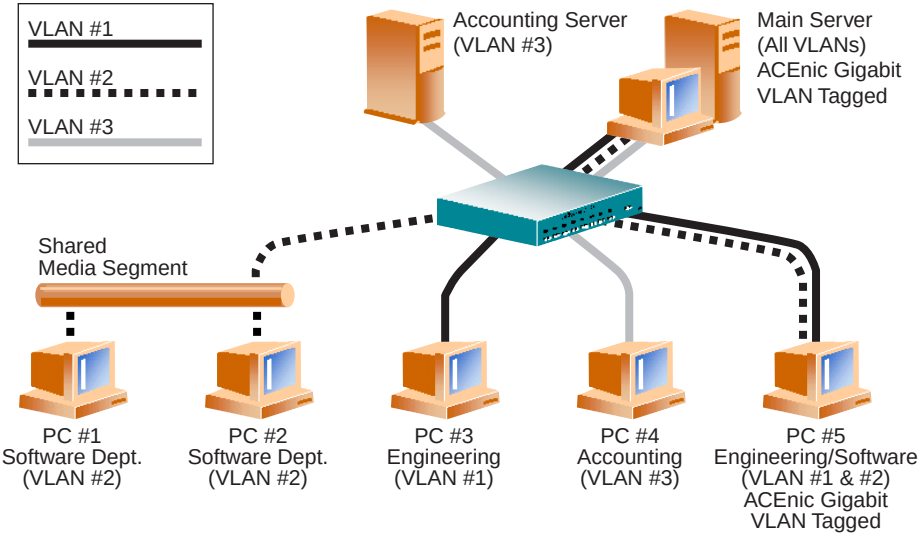

Figure 5-1 Example of Servers Supporting Multiple VLANs with Tagging NICs

The example network has the following features:

- The physical LAN network consists of a switch, two servers, and five clients.
- The LAN is logically organized into three different VLANs, each representing a different IP subnet.
- VLAN #1 is an IP subnet consisting of the Main Server, PC #3, and PC #5. This represents an engineering group.
- VLAN #2 includes the Main Server, PCs #1 and #2 via shared media segment, and PC #5. This is a software development group.
- VLAN #3 includes the Main Server, the Accounting Server and PC #4. This is an accounting group.
- The Main Server is a high-use server that needs to be accessed from all VLANs and IP subnets. The server has an ACEnic Adapter installed. All three IP subnets are accessed via the single physical NIC interface. The server is attached to one of the ACEswitch's Gigabit Ethernet ports, which is configured for VLANs #1, #2, and #3. Both the ACEnic and the connected ACEswitch port have tagging turned on. Because of the tagging VLAN capabilities of both devices, the sever is able to communicate on all three IP subnets in this network, but continues to maintain broadcast separation between all of them.
- The Accounting Server is available to VLAN #3 only. It is isolated from all traffic on VLANs #1 and #2. The switch port connected to the server has tagging turned off.
- PCs #1 and #2 are attached to a shared media hub that is then connected to the switch. They belong to VLAN #2 only, and are logically in the same IP subnet as the Main Server and PC #5. The switch port connected to this segment has tagging turned off.
- PC #3 is a member of VLAN #1, and can communicate only with the Main Server and PC #5. Tagging is not enabled on PC #3's switch port.
- PC #4 is a member of VLAN #3, and can only communicate only with the servers. Tagging is not enabled on PC #4's switch port.
- PC #5 is a member of both VLANs #1 and #2, and has an ACEnic Adapter installed. It is connected to switch port #10. Both the adapter and the switch port are configured for VLANs #1 and #2 and have tagging enabled.

VLAN tagging is only required to be enabled on switch ports that create trunk links to other ACEswitches, or on ports connected to tag-capable end-stations, such as servers or workstations with ACEnic Adapters.

VLAN Configuration Process

By default, the ACEswitch has a single VLAN configured for every port, which groups all ports into the same broadcast domain, just as if there were no VLANs at all. This default VLAN has an 802.1Q VLAN identification number of [1], with VLAN tagging for the switch port turned off.

Follow these steps when configuring VLANs:

NOTE – If you configure a VLAN for an adapter, all traffic sent or received by that adapter must be in VLANs.

---

1. **Create the `/etc/hostname.alt` file(s) on the server.**

   There can be up to four adapters per server, and up to 64 VLANs defined per adapter.

   One `hostname.alt`<*num*> file must be created for each VLAN which will be configured for each adapter on the server. Create files using the following naming format:

   ```
   /etc/hostname.alt<num>
   ```

   For each file, the number <*num*> in the filename is determined according to Table 5-1. For example, the first adapter in the server requires a file named `/etc/hostname.alt0` for its first VLAN, and a file named `/etc/hostname.alt100` for its second VLAN.

Table 5-1 `hostname` Numbering

Up to 64 VLANs	First Adapter	Second Adapter	Third Adapter	Fourth Adapter
1	/etc/hostname.alt0	/etc/hostname.alt1	/etc/hostname.alt2	/etc/hostname.alt3
2	/etc/hostname.alt100	/etc/hostname.alt101	/etc/hostname.alt102	/etc/hostname.alt103
3	/etc/hostname.alt200	/etc/hostname.alt201	/etc/hostname.alt202	/etc/hostname.alt203
...				
64	/etc/hostname.alt6300	/etc/hostname.alt6301	/etc/hostname.alt6302	/etc/hostname.alt6303

2. **Place the appropriate adapter host name into the** `hostname.alt` **file(s).**

   The `/etc/hostname.alt`<*num*> file must contain the appropriate adapter host name.

   The host name should be different from the host name of any other interface. For example, `/etc/hostname.alt0` and `/etc/hostname.alt1` cannot share the same host name.

   The following example depicts the host name files required for a machine called `ace`, with four ACEnic adapters known as `ace-11`, `ace-12`, `ace-13`, and `ace-14` on the networks created for `alt0`, `alt1`, `alt2`, and `alt3`.

```
ace # cat /etc/hostname.alt0
ace-11
ace # cat /etc/hostname.alt1
ace-12
ace # cat /etc/hostname.alt2
ace-13
ace # cat /etc/hostname.alt3
ace-14
```

3. **For each host name, enter the appropriate IP address in the** `/etc/hosts` **file.**

4. **Create the** `/etc/vlan.alt`<*num*> **file(s).**

   One corresponding `vlan.alt`<*num*> file is needed for each `/etc/host-name.alt`<*num*> file created in the previous steps (one for each VLAN being configured for each adapter on the server). Create files using the following naming format:

```
/etc/vlan.alt<num>
```

   For each file, the number <*num*> in the filename is determined according to Table 5-2. For example, the first adapter requires a file named `/etc/vlan.alt0` for its first VLAN, and a file named `/etc/vlan.alt100` for its second VLAN.

Table 5-2 VLAN Numbering

Up to 64 VLANs	First Adapter	Second Adapter	Third Adapter	Fourth Adapter
1	/etc/vlan.alt0	/etc/vlan.alt1	/etc/vlan.alt2	/etc/vlan.alt3
2	/etc/vlan.alt100	/etc/vlan.alt101	/etc/vlan.alt102	/etc/vlan.alt103
3	/etc/vlan.alt200	/etc/vlan.alt201	/etc/vlan.alt202	/etc/vlan.alt203
. . .				
64	/etc/vlan.alt6300	/etc/vlan.alt6301	/etc/vlan.alt6302	/etc/vlan.alt6303

5. **Place the appropriate VLAN ID tag into the `vlan.alt`<*num*> file(s).**

   Each VLAN must be assigned a unique identification number. Even though the maximum number of VLANs that can be configured on each adapter is 64, any particular VLAN can be assigned an identification number between 1 and 4094. The VLAN tagging format follows the guidance provided in IEEE 802.1Q (Draft 5).

   The VLAN identifier numbers must be placed into each appropriate `vlan.alt`<*num*> file to which the adapter is a member.

   Example: Consider a server with a single adapter. The server is a member of two VLANs, with VLAN identifiers 383 and 777. The contents of the first file, `/etc/vlan.alt0`, would be "383" and the contents of the second file, `/etc/vlan.alt100`, would be "777".

   Use your regular text editor to put the VLAN identifier number into the appropriate `vlan.alt`<*num*> file. Be certain that there are no spaces, blank lines, or extra characters. The identifier can be entered in decimal (e.g. 383), octal (e.g. 0577), or hexadecimal (e.g. 0x17F) format.

6. **If you are finished with all optional configuration, reboot the system.**

   Changes to the optional configuration parameters (VLAN, Jumbo Frame, or Dual Homing) do not take effect until you reboot the system. If you will be making changes to the other optional parameters during your configuration session, you may wait to reboot until those changes are complete. Otherwise, if you make changes and put the system into service before rebooting, you may experience configuration problems.

   Perform this command to reboot the system:

```
# reboot -- -r
```

Configuring Jumbo Frames Support

The ACEnics and ACEswitches support Jumbo Frames—frames of up to 9,000 bytes that are sent between servers that have ACEnic Adapters. Host CPU utilization is significantly reduced and network throughput is enhanced by sending 9,000 byte frames rather than the standard 1,500 byte Ethernet frames.

A single ACEnic Adapter on a server can support standard Ethernet frames as well as Jumbo Frames. Jumbo Frames are only sent between servers that have ACEnic Adapters. Standard Ethernet frames are used between servers that have ACEnic Adapters and all other Ethernet devices.

VLANs are used to create logical subnets that separate Jumbo Frame traffic from standard Ethernet frames. The VLAN with the VLAN ID of "383", for example, could be used by a number of servers that have ACEnic Adapters with Jumbo Frame support. The VLAN with the VLAN ID of "777" could include these same servers where the maximum frame size is 1,500 bytes.

In the example on page -6, VLAN ID "383" is configured in vlan.alt0. A `jumbo.alt0` file can be configured to enable Jumbo Frame support for this VLAN. VLAN ID "777" is configured in `vlan.alt100` on page -6. There will be no `jumbo.alt100` file since this is not a Jumbo Frame VLAN.

Table 5-3 shows the possible sequence of numbers for `jumbo.alt`<*num*> files.

Table 5-3 Jumbo Frame VLAN Numbering

Up to 64 VLANs	First Adapter	Second Adapter	Third Adapter	Fourth Adapter
1	/etc/jumbo.alt0	/etc/jumbo.alt1	/etc/jumbo.alt2	/etc/jumbo.alt3
2	/etc/jumbo.alt100	/etc/jumbo.alt101	/etc/jumbo.alt102	/etc/jumbo.alt103
3	/etc/jumbo.alt200	/etc/jumbo.alt201	/etc/jumbo.alt202	/etc/jumbo.alt203
. . .				
64	/etc/jumbo.alt6300	/etc/jumbo.alt6301	/etc/jumbo.alt6302	/etc/jumbo.alt6303

To configure Jumbo Frame support:

1. **Create the `/etc/jumbo.alt`<*num*> file.**
2. **Use your regular text editor to put the "`9000`" into the `/etc/jumbo.alt`<*num*> file.**

   Put the number "**`9000`**" in the file, without spaces or blank lines.

3. **If you are finished with all optional configuration, reboot the system.**

   Changes to the optional configuration parameters (VLAN, Jumbo Frame, or Dual Homing) do not take effect until you reboot the system. If you will be making changes to the other optional parameters during your configuration session, you may wait to reboot until those changes are complete. Otherwise, if you make changes and put the system into service before rebooting, you may experience configuration problems.

   Perform this command to reboot the system:

```
# reboot -- -r
```

Configuring Dual Homing

When two ACEnic Adapters are installed in the same server, they can be paired in a Dual Homing configuration. If traffic is not seen over the primary adapter connection due to loss of the adapter, cable, switch port, or switch (where the two adapters are attached to separate switches), the secondary adapter becomes active. When it becomes active, the secondary adapter uses the MAC and IP address originally assigned to the primary adapter. Sessions should be maintained, causing minimum impact to the user.

How Dual Homing Works

The Dual Homing feature relies on the Spanning Tree Protocol. Adapters configured for Dual Homing allow Spanning Tree Protocol packets to pass between them. This causes the Spanning Tree Protocol to detect a loop in the network, forcing the switch port connected to one of the adapters to go into blocking mode. The blocked adapter becomes the secondary.

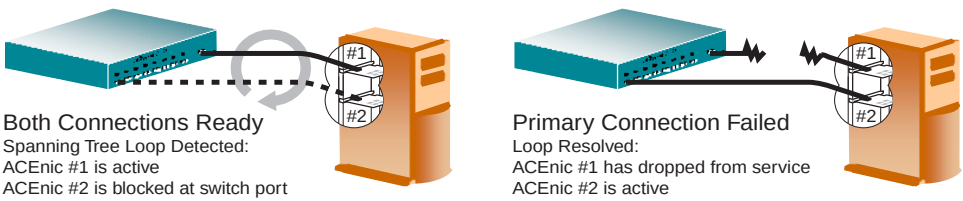

Figure 5-2 Dual Homing with Spanning Tree

If the primary connection becomes disabled for any reason, the Spanning Tree Protocol will detect the loss of the loop, and will change the switch port connecting the secondary adapter from blocking mode to forwarding mode.

Dual Homing Configuration Process

Follow this procedure to configure Dual Homing in a system with two adapters, where `/etc/hostname.alt0` is the primary adapter.

NOTE – Do not configure an `/etc/hostname.alt`<*num*> entry for the *redundant* adapter. Also, do not configure VLAN or Jumbo Frame support files for the redundant adapter. If the primary adapter fails, the secondary adapter takes on the configuration of the primary adapter. Serious configuration problems will occur if there are hostname, VLAN, or Jumbo Frame configuration files for the secondary adapter.

---

1. **Enable Spanning Tree Protocol on the switch connected to your ACEnic Adapters.**

2. **The port to which the secondary adapter is connected must be the port that blocks.**

   If there is more than one switch in the spanning tree, be certain that the secondary adapter is not attached to the root switch of the spanning tree. Also, be sure that the port path cost of the switch port connected to the secondary adapter is higher than the other ports in the loop.

   For example, in the following redundant switch configuration, the switch port connected to adapter #2 must have the highest port path cost of any of the four ports in the loop:

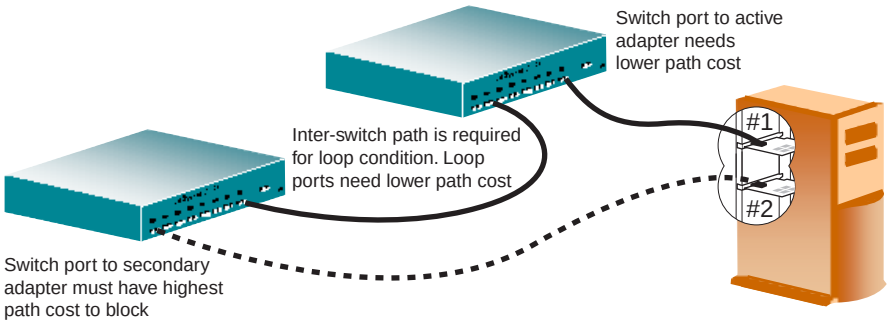

Figure 5-3 Dual Homing Path Costs

3. **Create the `/etc/redund.alt1` file.**

4. **Use your regular text editor to put the number "`0`", the instance number of the primary adapter, into the file `/etc/redund.alt1`.**

   Put the number "**`0`**" in the file, without spaces or blank lines.

5. **If you are finished with all optional configuration, reboot the system.**

   Changes to the optional configuration parameters (VLAN, Jumbo Frame, or Dual Homing) do not take effect until you reboot the system. If you will be making changes to the other optional parameters during your configuration session, you may wait to reboot until those changes are complete. Otherwise, if you make changes and put the system into service before rebooting, you may experience configuration problems.

   Perform this command to reboot the system:

```
# reboot -- -r
```

APPENDIX **A**

Specifications

1000BASE-SX Link Characteristics

Description	62.5 Micron	50 Micron
	Shortwave (850 nm multimode fiber)	
Operating Range	2 to 260 meters	2 to 550 meters (in compliance with IEEE 802.3z)

Performance Specifications

Feature	Specification
PCI clock	33 MHz max (model 710002) 66 MHz max (model 710012)
PCI Data/Address	32- and 64-bit
PCI data burst transfer rate	132 MB/second (32-bit bus) 264 MB/second (64-bit bus) 528 MB/second (64-bit bus at 66 MHz)
PCI modes	Master/slave
SBus	25 MHz, 64-bit bus master with adaptive DMA

Physical Characteristics

Dimension	Measurement
PCI Length x Width	6.8" x 4.2"
SBus Length x Width	5.75" x 3.25"

Power Requirements

Specification	Measurement
PCI operating voltage	+5 V ± 5%
PCI power consumption	7.5 Watts 1.5A @ +5VDC
SBus operating voltage	+5 V ± 5%
SBus power consumption	10 Watts 2A @ +5VDC

Environmental Specifications

Condition	Operating Specification	Storage Specification
Temperature	0° to 55° C (+32 to +131 F)	-40° to +85° C
Relative humidity	5 to 85% non-condensing (40° C, 16 hour dwells at extremes)	5 to 95% non-condensing 10° C/hour
Altitude	up to 10,000 feet	up to 35,000 feet
Shock	10g, 1/2 sine wave, 11 msec	60g, 1/2 sine wave, 11 msec
Vibration, peak to peak displacement	0.005 in. max (5 to 32 Hz)	0.1 in. max (5 to 17 Hz)
Vibration, peak acceleration	0.25g (5 to 500 Hz) (Sweep Rate = 1 octave/min.)	0.25g (5 to 500 Hz) (Sweep Rate = 1 octave/min.)