Onboard SCSI & Onboard LAN Controller User's Guide

RIOWORKS™

The Reliable Building Block

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Contents

Onboard Adaptec 7899W SCSI Controller

Overview

Onboard Adaptec 7899W controller is a high performance 64-bit Ultra160 SCSI chip and provides a powerful and fastest interface between the RIOWORKS motherboard and onboard SCSI devices under high-end Server/Workstation platforms. In the device support, It is full backward compatible with present SCSI devices and allows connecting to maximum 15 SCSI devices. Besides these, as the Adaptec 7899W SCSI chip fully supports the latest SCSI technology, Ultra160 SCSI specification, the maximum data transfer rate can be up to 320 MB/sec.

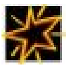
Unpacking Your M/B

Remove all items from motherboard box and make sure you have these necessary items for installing your SCSI device:

- One 68-pin SCSI cable
- One onboard SCSI User's Manual
- SCSI Driver disk(s)

About This User Guide

This manual explains how to install onboard SCSI channel in detail. Please follow the installation procedures carefully and pay special attention to the advisories.

 IMPORTANT

 WARNING

 NOTE

 Tip

Features Highlight

Bus System interface Type	❑ 66MHz, 64-bit, 3.3V PCI interface and also support 33MHz, 32-bit, 5V PCI busses ❑ Up to 160 MB/sec on each Ultra 160/m SCSI channel for total bandwidth of 320 MB/sec
CRC Checking	❑ Full Ultra 160/m and Ultra 3 SCSI Domain Validation and CRC support
Bus Mastering	❑ Support Bus mastering function
SCSI Data Transfer Rate	❑ Delivery maximum 160MB/sec theoretical data transfer rate.
Maximum Numbers of Devices	❑ Connection for up to 30 SCSI devices in two Ultra 160/m SCSI channels ❑ Allow to connect the SCSI hard disk drives, scanners and CD-ROM
Available Connector	❑ Advanced multimode Ultra 160/m SCSI I/O cell for supporting Low Voltage Differential (LVD) or single-ended devices.
Operating System Support	❑ Windows NT4.0 Server/Workstation ❑ SCO OpenServer 5.0x ❑ Microsoft Windows 98/2000 ❑ Novell NetWare 4.11/5.0 ❑ Solaris 7/8 ❑ Linux

Getting Help

If a problem arises with yours system during installation or OS operating, you should ask your dealer for help first as your system has most likely be configured by them. They always have the best idea and quick response for your symptoms. If your dealer is near to your locations, you should bring your system to them to have it quickly serviced instead of attempting to solve the problem by yourself. Besides these, RIOWORKS also provide some helpful resources to help you.

1. Select RIOWORKS ™ 's website at www.rioworks.com and navigate to this product page which contains links to product updates such as Jumper settings or BIOS updates.

2. FAQ sections on RIOWORKS Website are often helpful since other user's questions are often your own.

3. Email us at: sales@rioworks.com and we will try to answer your questions within 24 hours.

Chapter 1
Hardware Installation

This chapter will explain how to connect SCSI hard drives to the onboard SCSI connectors in detail.

1. The installation procedures

Step 1 **Setting up the IDs of SCSI device(s)**

Step 2 **Choosing proper SCSI cable(s)**

Step 3 **Connecting SCSI Devices**

WARNING

- Always leave M/B in an anti-static bag until you are going to install it into your computer as M/B contains sensitive electronic components and is easily damaged or destroyed by static electricity. Therefore, always well ground yourself by touching any unpainted metal, such as the surface of your computer's chassis before you pick it up.

NOTE

- Be sure the power is totally turned off during the onboard SCSI installation procedures until whole completing installation.

Step 1

Setting up the IDs of SCSI Device(s)

There are several things you may need to do to your SCSI devices before you connect them to onboard SCSI connector.

- ❑ **Setup the SCSI IDs**
- ❑ **Setup the termination of the SCSI devices**

1. *Setup the SCSI IDs*

Onboard Adaptec 7899W SCSI controller allows connect up to fifteen 16-bit SCSI devices that are not included the controllers itself when the Wide function is enabled. It also allows connect up to six 8-bit SCSI devices that are not included the controllers itself when the Wide function is disabled. Each device on the channel has to assign a unique SCSI ID. Otherwise, the ID will be conflicted and will cause a not predictable event.

NOTE

- ❑ Since ID setup procedure and device connection can vary from device to device, always refer to the device's documentation for specific instruction
- ❑ The default ID for onboard SCSI controller is 7, the highest priority on the SCSI bus. A user should not change the SCSI ID of the onboard SCSI controller. RIOWORKS™ and Adaptec Corp still recommend users to maintain SCSI ID at the default value, 7.
- ❑ According to the SCSI specification, on an 8-bit SCSI bus, the highest priority of SCSI ID is 7 and the lowest priority of SCSI ID is 0. Therefore, the order of the complete ID priority is :7,6,5,4,3,2,1,0; on an 16-bit SCSI bus, the highest priority of SCSI ID is 7 and the lowest priority of SCSI ID is 8. Therefore, the order of the complete ID priority is :7,6,5,4,3,2,1,0,15,14,13,12,11,10,9,8
- ❑ No two devices have the same ID number in the same SCSI channel.

- The SCSI IDs for internal devices are usually set with jumpers
- SCSI IDs for external devices are usually set with a switch on the back of the device
- If your computer will boot from a SCSI hard disk, make sure the SCSI ID 0 of the hard disk is set to 0. (Most SCSI hard disk at the factory is set ot 0)

2. Setup the termination of the SCSI devices

To ensure reliable communication on the SCSI bus, the device at the end of each cable or the end of cable itself, must have a terminator installed (or enabled). Terminators must be removed, or termination must be disabled, on devices between the ends of each cable.

Step 2

Choose the proper SCSI Cable

According to SCSI devices you are attend to use, a user needs to choose proper SCSI cables to connect to these devices. In addition, RIOWORKS™ and Adaptec Corp. always recommend users to use high-quality SCSI cable to connect to the onboard SCSI controller and SCSI devices. Poor-quality cabling can cause data corruption, parity error and other unexpected problem. High-quality cable will be also directly related to data transfer rates if users use Ultra SCSI and Fast SCSI devices.

AS the cable of external SCSI devices is vary in the quality and electrical characteristics, cables have to meet SCSI-2 standards for external SCSI devices and cables have to meet Parallel Interface SCSI standards for external SCSI devices.

Other detailed information about SCSI devices, users may refer to the appendix A (see page A-1)

68-pin Ultra160 LVD Cable

Step 3

Connecting SCSI Devices

1. Connecting internal SCSI devices

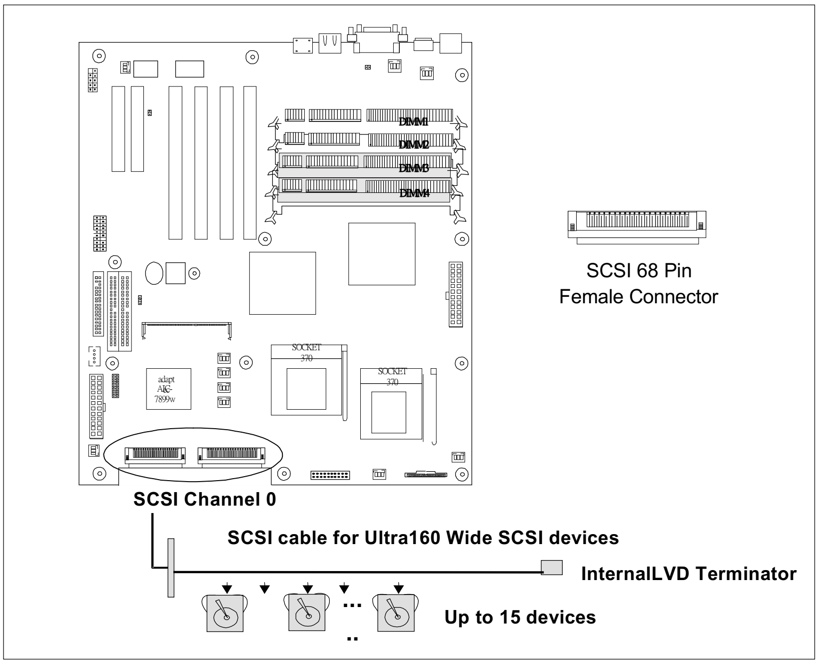
As RIOWORKS M/B is jumper-less M/B, the default value of the onboard SCSI terminations are always set to “Auto”, a user does not need to enable the termination. RIOWORKS^{TM} and Adaptec Corp not recommend a user to connect ant single-ended SCSI device to LVD bus directly. Using a device named “ Single-ended to LVD SCSI converter” to connect to single-ended SCSI device. Then connect SE devices with the converter to LVD SCSI bus.

NOTE

- ❑ The maximum devices for CH0 are fifteen exclusive the onboard SCSI controller itself.
- ❑ A user can connect your Ultra Wide devices to 68-pin onboard SCSI connector and allow connect 15 devices.

2. Connecting external SCSI devices

As RIOWORKS M/B is jumper-less M/B the default value of the onboard SCSI terminations are always set to “Auto”, a user does not need to enable the termination. RIOWORKS™ and Adaptec Corp not recommend a user to connect ant single-ended SCSI device to LVD bus directly. Using a device named “ Single-ended to LVD SCSI converter” to connect to single-ended SCSI device. Then connect SE devices with the converter to LVD SCSI bus.



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Chapter 2
Configuring SCSI BIOS

RIOWORKS M/B is a jumper-less M/B and all SCSI settings can be set through an onboard Adaptec SCSISelect (TM) utility. As this feature built on M/B, a user can easily change the settings of onboard SCSI controller and SCSI devices without opening the computer.

Adaptec SCSISelect (TM) utility also provides utilities for low-level formatting SCSI devices and scanning them for defects. For instance, the Adaptec SCSISelect (TM) utility will list the status of SCSI IDs of devices attached to the onboard SCSI connectors.

The Adaptec SCSISelect (TM) utility is only for advanced users who want to customize the configuration of onboard SCSI controller and connected devices. All default settings have been carefully chosen by RIOWORKS™ and Adaptec Corp. for maximum performance.

NOTE

- If a user does not need to change the default settings or run any SCSI disk utilities, it is not necessary to run the Adaptec SCSISelect (TM) utility Then a user can directly proceed to Chapter 3 " Driver Installation" and select which operating system is going to be operated.
-

Starting Adaptec SCSISelect (TM) utility Setup

The Adaptec SCSISelect (TM) utility is immediately activated by pressing **<Ctrl> <A>** key when the bellow message appears during rebooting the computer.

Adaptec SCSI BIOS v3.10
(C) 2001 Adaptec, Inc. All Rights Reserved.

◄◄◄ Press <Ctrl><A> for SCSISelect(TM) Utility!►►►

Using Adaptec SCSISelect (TM) Setup

In general, you use the arrow keys to highlight items and press <Enter> key select. The table 2.1 provides more detailed about how to navigate in the Adaptec SCSISelect (TM) setup using the keyboard.

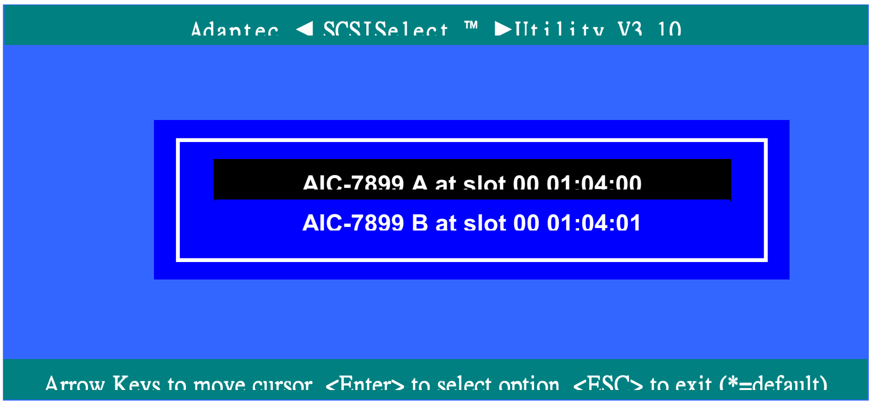
Up Arrow	Move to the previous item
Down Arrow	Move to the next item
Left Arrow	Move to the left item
Right Arrow	Move to the right item
Esc key	Main Menu – Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu – Exit current page and return to Main Menu
Enter Key	To select the option
F6 Key	Reset all option to default settings

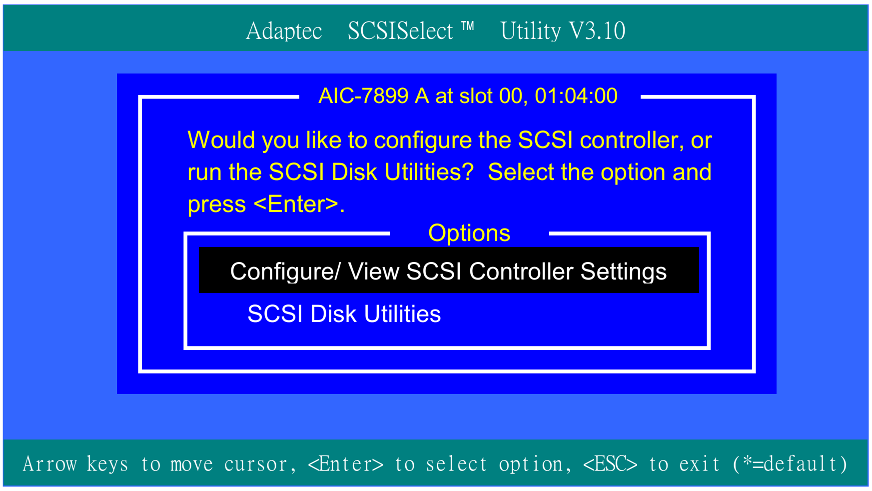
Table 2.1

Section 2.1

Setup Window

Once you enter the Adaptec SCSISelect (TM) Setup Utility, the Main Menu will appear on the screen. The Main Menu allows users to enter sub-menu from two setup functions. Using <Arrow> key to select items and press <Enter> to accept and enter the sub-menu.





WARNING

- ❑ If the configuration settings are incorrect, your onboard SCSI will not function properly

The main menu includes the following main setup categories.

Configure/View SCSI Controller Setting	Use this menu for configuring onboard Adaptec 7899W SCSI controller, boot device configuration, SCSI device configuration and other advanced configuration. See Section 2.2 for details.
SCSI Disk Utilities	This menu allows a use to perform low-level disk format and verify the media. See Section 2.3 for details.

Section 2.2

Configure/View SCSI Controller Setting

Adaptec SCSISelect ™ Utility V3.10

AIC-7899 W at slot 00, 01:04:00

Configuration

SCSI Bus Interface Definitions
SCSI Controller ID……………………………………………7
SCSI Controller Parity……………………………………Enabled
SCSI Controller Termination……………………………Enabled

Additional Options
Boot Device Configuration………………………………Press <Enter>
SCSI Device Configuration………………………………Press <Enter>
Advanced Configuration…………………………………Press <Enter>

BIOS Information

Interrupt (IRQ) Channel……………………………………11
I/O Port Address……………………………………………D400h

Arrow keys to move cursor, <Enter> to select option, <ESC> to exit (*=default)

2.2.1. Configuration Bus Interface Definitions

SCSI Controller ID

This option allows a user to set a unique SCSI ID for onboard SCSI controller.
The choices:*0,1,2,3,4,5,6,7(**Default**),8,9,10,11,12, 13, 14, 15*

SCSI Controller Parity

When set <Enabled>, the channel always checks parity to verify the correct transmission of data from your SCSI devices when reading from SCSI bus. Disabling SCSI parity checking if any attached SCSI

devices does not SCSI parity. Most currently available SCSI devices support SCSI parity. Before you set this option, please refer to the device documentation if you are not sure.
The choices: *Enabled **(Default)**, Disabled*

SCSI Controller Termination

The choices: *Enabled **(Default)**, Disabled*

2.2.2. Addition Options

2.2.2.1. Boot Device Configuration

This option configures parameters for a SCSI boot device. When you select this option, a screen similar to the figure Figure 2.2.2.1

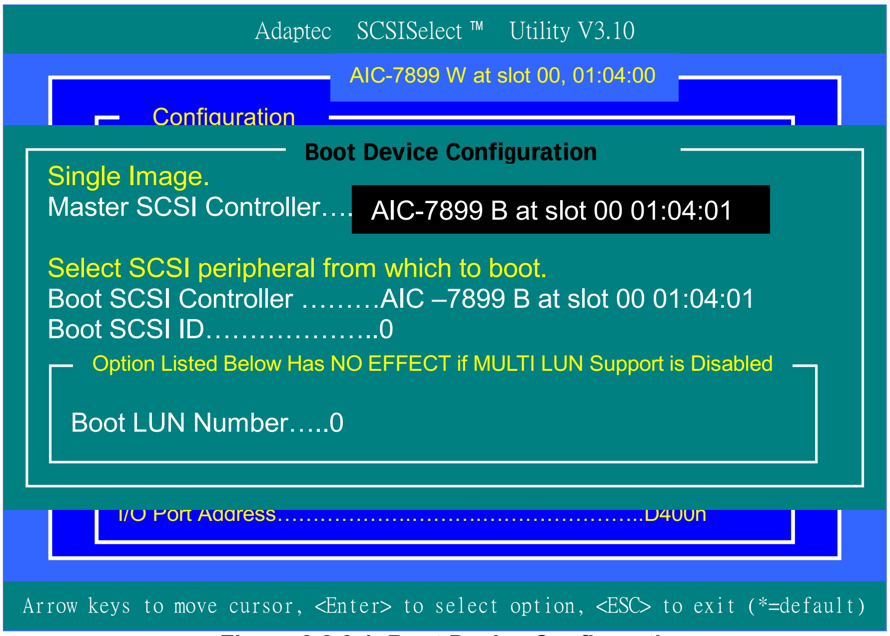


Figure 2.2.2.1. Boot Device Configuration

Boot SCSI ID

This option allows a user to assign which SCSI hard drive is to be a bootable device as each SCSI device owns a unique SCSI ID on the each SCSI channel
The choices: *0**(Default)**,1,2,3,4,5,6, 7, 8, 9,10, 11, 12, 13,14,15*

Boot LUN Number

This option allows a user to assign which LUN is to be a bootable device
The choices: *0**(Default)**,1,2,3,4,5,6, 7*
Note: Onboard Adaptec SCSI controller supports up to eight logical units.

2.2.2.2.SCSI Device Configuration

This option allows you to configure certain parameters of each SCSI device on the SCSI bus.

SCSI Device ID

This field only display SCSI ID of the specific SCSI device

Sync Transfer Rate(MB/sec)

This field specifies the maximum synchronous data transfer rate that the channel can support.
The choices: *160**(Default)**,80,53.4,40.0,32.0, 26.8, 20.0,16.0,13.4,10.0,ASYN*
NOTE: Some older SCSI-1 devices do not support 'Fast or Ultra SCSI data transfer rate(20.0,10.0)This may cause your computer to operate erratically or hang at the higher transfer rates. Reefer to the devisee's documentation and set the transfer rate accordingly.

Initiate Wide Negotiation

When set to <Yes>, 16bit, wide device that connects to onboard 68-pin SCSI connector is supported. When set to <NO>.
The choices: *Yes* ***(Default)****, No*

Enabled Disconnection

When set to <Yes> the drive is notified that it can optionally disconnect from the onboard SCSI controller. When this drive is ready to continue executing the command, it has to re-establish the link through a reconnect cycle. When set to <No>, disconnect function is not allows. If a user has more than device attached onboard SCSI connector, Set this option to be <Yes> for better performance.
The choices: *Yes* ***(Default)****, No*
NOTE: SCSI devices have the ability to disconnect from the initiator during an I/O transfer. The disconnect option frees the SCSI bus to allow other I/O processes. This option tells the onboard SCSI controller whether or not to allow a device to disconnect. Some devices run faster with disconnects enabled (typically newer devices), while some run faster with disconnects disabled (typically older devices)

Send Start Unit Command

This option determine whether the channel sends the Start Unit command (SCSI command 1B) to SCSI device for some SCSI device (most device do not require this) Enabling this option reduces the load on your computer's power supply by allowing the channel to return on SCSI device one at time when the computer boots. Otherwise, all SCSI devices turns on at the same time. Most devices require you to set a jumper before they can respond to this command.
The choices: *Yes* ***(Default)****, No*

BIOS Multiple LUN Support

If set to <Yes>, multiple LUNs are supported. When set to <No>, multiple LUNs function is not supported
LUN support is typically required for CD-ROM changer or redundant array if independent disk array (RAID) boxes the use LUNs to map drives.
The choices: *Yes, No**(Default)***

Included in BIOS Scan

This setting gives onboard SCSI controller the ability to ignore any SCSI devices attached to the SCSI bus during bootup. Onboard SCSI BIOS scans a specific SCSI ID looking for a stand-alone disk device to control. If include in BIOS scan to set to <Yes> for a SCSI ID the BIOS scans the ID and the disk device at the ID becomes accessible through Int13; if the option is set to <No> the BIOS does not scan the SCSI ID.
The choices: *Yes **(Default)**, No*

2.2.2.3. Advanced Configuration

Do not change the settings for these option unless you fully understand what they mean. To change a setting, use the cursor to highlight the option, the press <Enter> key to display a pop-up menu. Use the arrow keys to highlight a setting and press <Enter> to select it.

Reset SCSI Bus at IC Initialization

This option allows a user to set if enable or disable resetting the SCSI bus during SCSI controller's power-on initialization and after hard reset. Please disable the setting when user has two or more SCSI host adapter board inclusive onboard SCSI on the SCSI bus to prevent unwanted SCSI reset.
The choices: Enabled***(Default)***, *Disabled*

Display <Ctrl> <A> Message During BIOS Initialization

This option allows a user to set if display Adaptec SCSISelect (TM) message during system POST
The choices: Enabled***(Default)***, *Disabled*

Extended Int 13 Translation for DOS Drives>1GByte

The setting for this option enables or disables extended translation for SCSI hard disks with a capacity greater than 1Gbyte. The setting is valid only if the channel BIOS is enabled.
The choices: Enabled***(Default)***, *Disabled*

POST display Mode

This option allows a user to set the display mode the SCSISlect (TM).
The choices: Verbose***(Default)***,*Silent, Diagnostics*

SCSI Controller Int 13 Support

This setting for this option enables or disables BIOS support for Int 13h extensions. This option provides a mechanism to support disks with more than 1024 cylinder and to add support for software control of drive locking fro removable media.
The choices: Enabled***(Default)***, *Disabled: Not scan, Disabled: scan bus*

2.2.3. BIOS Information

Interrupt (IRQ) Channel

This field only displays the IRQ information of the onboard SCSI controller.

I/O Port Address

This field only displays the I/O port address information of the onboard SCSI controller.

Section 2.3

SCSI Disk Utilities

When you select SCSI Disk Utility from the main menu, SCSISelect scans the SCSI bus and lists all installed SCSI devices. A screen similar to figure 2.3.2, listing the SCSI ID assigned to each device on the SCSI bus

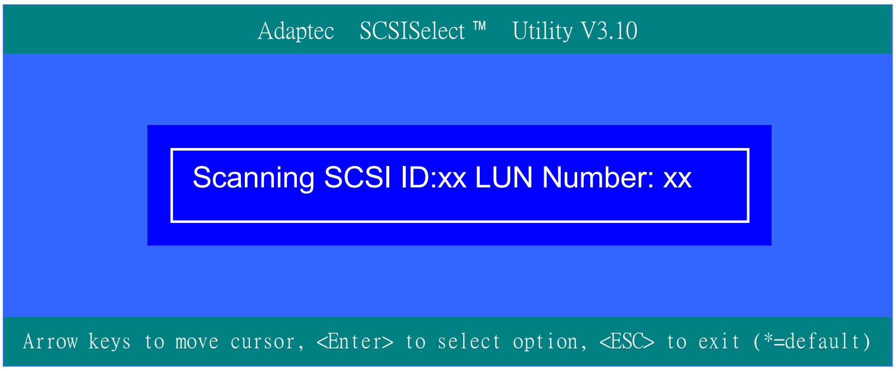


Figure 2.3.1

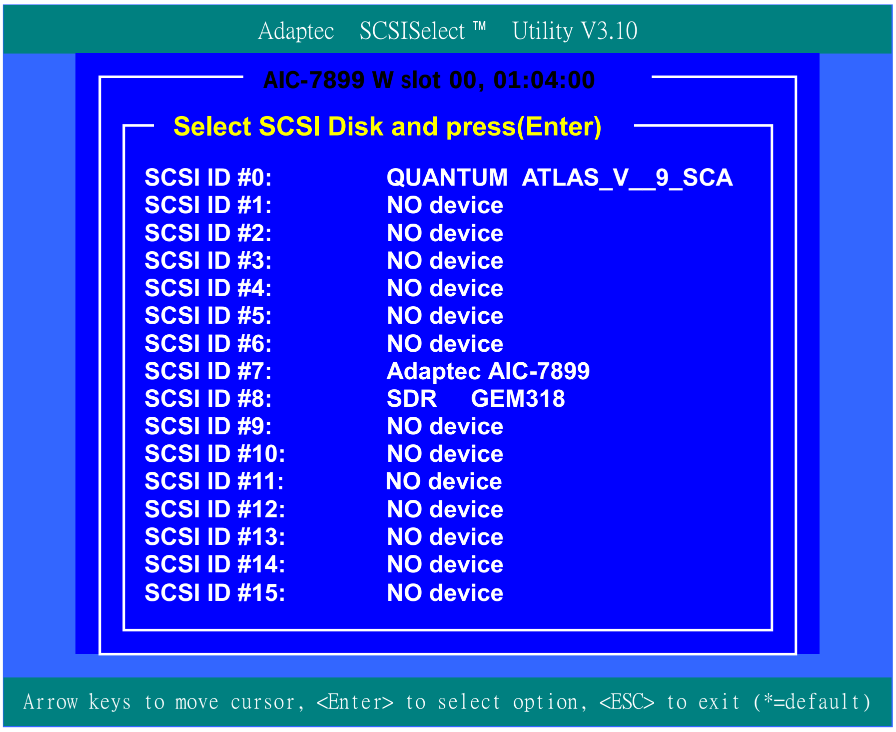
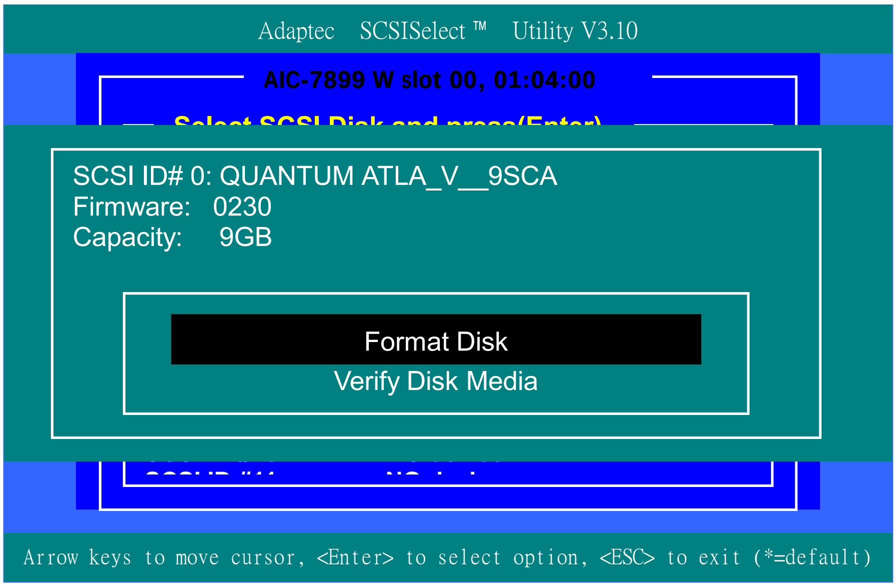

Adaptec SCSISelect ™ Utility V3.10
AIC-7899 W slot 00, 01:04:00
Select SCSI Disk and press(Enter)
SCSI ID #0: QUANTUM ATLAS_V__9_SCA
SCSI ID #1: NO device
SCSI ID #2: NO device
SCSI ID #3: NO device
SCSI ID #4: NO device
SCSI ID #5: NO device
SCSI ID #6: NO device
SCSI ID #7: Adaptec AIC-7899
SCSI ID #8: SDR GEM318
SCSI ID #9: NO device
SCSI ID #10: NO device
SCSI ID #11: NO device
SCSI ID #12: NO device
SCSI ID #13: NO device
SCSI ID #14: NO device
SCSI ID #15: NO device
Arrow keys to move cursor, <Enter> to select option, <ESC> to exit (*=default)

Figure 2.3.2



Format Disk

This option allows a user to perform a low-level format on he selected SCSI hard drive. Your fixed disk media must be low0level formatted before you can use your operating system's partitioning and file preparation utility, such as MS-DOS <**Fdisk**> and <**Format**>

The choices: Yes, No

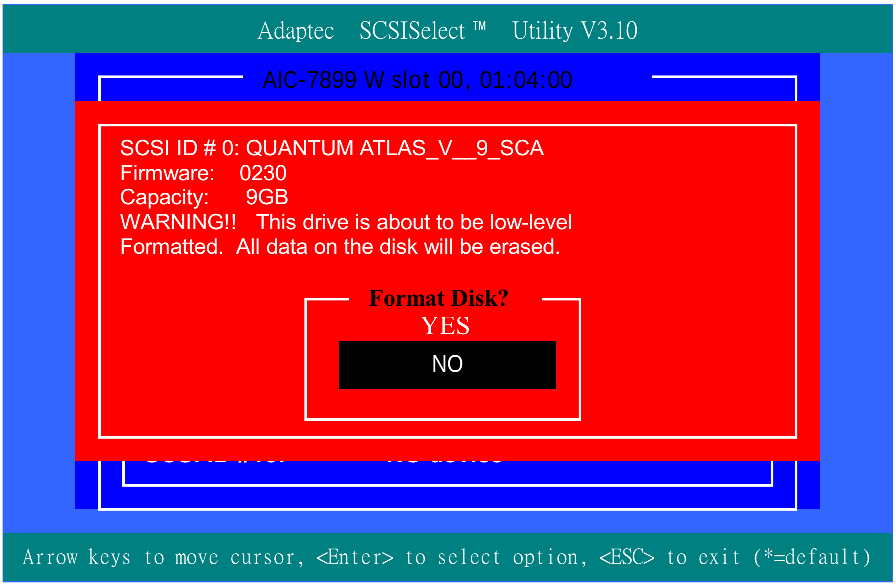
NOTE:

- ❑ All data on this specific hard disk will be erased and it may take few minutes to several hours to complete to do low-level format when you perform <Format Disk>. Therefore, Back up your data before you perform this operation.
- ❑ You can not abort low-level format once it starts
- ❑ Most SCSI disk devices are preformatted and need not to be formatted again. It may be necessary to run Format Disk on hard disk drive

or removable-media drives that were previously used with a non-Adaptec SCSI host Adaptec card.

Verify Disk Media

This option allows a user if check media defects. The utility finds bad blocks, it prompts you to reassign them.
If selected media is defective, some information will display .
NOTE: You can press <ESC> at any time to abort the < Verify disk Media> utility.



Chapter 3

Driver Installation

The onboard Adaptec 7899 W SCSI controller can operate in various operating systems through either onboard BIOS or software drivers. Hence, in this chapter, the installation procedures of the SCSI drivers in the various operating systems are going to be described in detail. Adaptec and RIOWORKS provide Windows 95/98/NT and Novell NetWare 4.2/5.0 drivers for different operating systems.

Supported OS drivers

- Windows 95/98 (Refer to Page 3-2)
- Windows NT4.0(Refer to Page 3-9)
- NetWare 4.11/5.0(Refer to Page 3-13)

Section 3.1

Windows 95/98 Driver installation

This section will describe how to install the onboard Adaptec Ultra160 SCSI driver <**adpu160m.mpd>** for Window 95/98 operating system. If you are performing a first time Windows 95/98 Installation, see < Installing the drivers when installing Windows 95/98> on page 3-4. If Windows 95/98 is already installed in your system, see < Installing the driver when Windows 95/98 is already installed> on page 3-5

NOTE

- ❑ When Windows 95/98 starts, if a dialog box <New Hardware Found> is displayed, You have to select the driver from the option <Disk Provided by Hardware Manufacturer>. Insert your Win95/98 SCSI driver disk into floppy disk drive and type a:\win98 or a:\Win98 as the path, then follow the on-screen instructions.

1. DOS Driver for CD-ROM Access

If Windows 95/98 or NetWare is already installed, or one IDE CD-ROM is attached to the onboard SCSI interface, these drivers do not need to be copied or installed. However, you may choose to install these drivers if you are having trouble-accessing CD-ROM from NetWare or Windows 95/98.

NOTE

- ❑ You do not need these drivers for Windows NT or UNIX

2. *Install CD-ROM Drivers on a DOS Bootable Hard Disk*

Step 1 Copy the files **aspi8u2.sys** and **aspicd.sys** from the DOS directory of the onboard SCSI driver disk 1to your C: drive. At the DOS prompt, type the following command and press <Enter> key.

Mkdir C:\SCSI
Copy a:\dos*.* c:\SCSI

Step 2 Modify **config.sys** for loading **aspi8u2.sys and aspicd.sys,** which is necessary for connecting a CD-ROM. Either create this file in C:\ if system do not currently have **config.sys**, or add these lines to the existing **config.sys** file. Note that you may need to change the path for the drivers.

Device=c:\scsi\aspi8u2.sys/d
Device=c:\scsi\aspicd.sys /d:aspicd0

Step 3 Modify **autoexec.bat** for loading **mscdex.exe**. Either create this file in C:\ if you do not currently have **autoexec.bat**, or add these lines to the existing **autoexec.bat** file.

C:\dos\mscdex.exe /d:aspicd0 /m:12

NOTE

- This will assign the CD-ROM to the next available drive letter, typically **D** if there is only one DOS drive. If you are using MS-DOS 5.0 and do not have **mscdex.exe**, you will need to either upgrade to MS-DOS 6.0 or above, or download mscdex.exe from Microsoft BBS or CompuServe forum.

Step 4 Reboot your system. You are now able to access your CD-ROM drive from the command line and form Windows.

3. Installing the drivers when installing Win95/98

You will need to update the Windows 95/98 Boot disk that came with your Windows 95/98 CD.. You need to do this on a system that has DOS, Windows 95/98 already installed. Follow the instruction in DOS Drivers for CD-ROM Access on the page 3-2.

Step 1 Insert the Windows 95/98 Boot disk into the floppy disk drive. Power on the system, insert the Windows 98 CD into the CD-ROM drive, and wait for system to boot up

Step 2 At the Microsoft Windows 95/98 start Menu screen select

1. Start windows 98 Setup from CD-ROM

Following the on-screen instruction to continue Windows 98 Setup. Setup will run and restart your computer. If you are given an option, always select **< 1.Start windows 98 Setup from CD-ROM**>. Windows installation will continue for some time.

Step 3 When you see the screen <**Add New Hardware Wizard**> and PCI SCSI Bus Controller is displayed, Click <**Next**>

Step 4 Select <**Search for best driver**> and then click <Next>

Step 5 Select <**Specify a location**> and enter<**a:\Win95 or Windows 98** >in the space provided. Insert the onboard SCSI driver disk. Click <**Next**>.

Step 6 When you see the <**Adaptec Ultra160 PCI SCSI Controller**> and click <**Next**>

Step 7 When you see the message <**Windows has finished installing the software that your new hardware device requires**> and click <**Finish**>

Step 8 If you are prompted to reboot the system, select <No> if you have another Adaptec Ultra160SCSI add-on card. Then repeat step 4through 8 until all Ultra160 adapters are found. Otherwise select <**Yes**>

Step 9 Follow the on-screen instruction to complete the Windows 95/98 installation.

4. Installing the driver when Windows 95/98 is already installed

To update or install the **adpu160.mpd** driver if Windows 95/98 is already installed, follow these instructions:

Step 1 Start Windows 95/98

Step 2 Using the right mouse button (Right Click), Click the <**My Computer**> icon.

Step 3 Click the item <**Properties**>

Step 4 On the tab< **Device Manager**>, Click the plus sign (+) next to the SCSI Controller icon.

Step 5 Double-click the Ultra160 Family host adapter you want to update, or if a yellow question mark labeled **PCI SCSI Bus Controller** is display, double-click the question mark.

Step 6 Insert the onboard SCSI driver disk for Win95/98 into floppy drive A

Step 7 Select the tab< **Drivers**>

Step 8 Click <**Change Driver**>. If you are prompted to select the hardware type, select <**SCSI Controller**>

Step 9 Click the <**Have Disk**> button and enter<**A:\win 95 or A:\Win98**> as the path

Step 10 Click <**OK**>

Step 11 Select the item <**Ultra160 Family host Adapter**> and click <**OK**>.

Step 12 Click <**OK**>. The driver is copied and scanned.

Step 13 You must restart your computer for changes to take effect. Click <**Yes**> to restart your computer. Click <**No**> to return to the system <Properties> Windows.

NOTE

- If Windows 95/98 can not determine the type of onboard SCSI installed in your computer, a yellow question mark labeled <Other devices> appears instead of the icon <**SCSI Controller**>. To continue, click the plus sign(+) next to the question mark; a yellow question mark labeled <PCI SCSI Bus Controller> then appear.
- If the version of Windows 95/98 you are using displays an <**Update Driver**> button instead of a <**Change Driver**> button, follow the procedures in the section <**Updating the Windows 95/98 driver**> on page 3-7

5. *Updating the Windows 95/98 driver*

To update or install the **adpu160.mpd** driver if Windows 95/98 is already installed, follow these instructions:

Step 1 Start Windows 95/98

Step 2 Using the right mouse button (Right Click), Click the <**My Computer**> icon.

Step 3 Click the item <**Properties**>

Step 4 On the tab< **Device Manager**>, Click the plus sign (+) next to the SCSI Controller icon.

Step 5 Double-click the Ultra160 Family host adapter you want to update, or if a yellow question mark labeled **PCI SCSI Bus Controller** is display, double-click the question mark.

Step 6 Insert the onboard SCSI driver disk for Win95/98 into floppy drive A

Step 7 Select the tab< **Drivers**>

Step 8 Click <**Update Driver**>.

Step 9 In the Update Device Driver wizard, select <**Yes**>, then click <**Next**>

Step 10 Under the location, type <**a:\Win95 or a: Win98**>, then click <**OK**>

Step 11 Click <**Finish**>

Step 12 At the message <**Please insert the disk labeled onboard SCSI driver disk**> and click <**OK**>

Step 13 In the copying files dialog box, the message <**The file adpu160m.mpd on the driver disk could not fou**nd> appears. Type a:\win 95 or a: \win98 and click <**OK**> to install the driver

Step 14 Click <**Yes**> to restart your computer and update the changes. To return to the <**System Properties**> Windows, click <**NO**>

Section 3.2

Windows NT4.0 Driver installation

This section will describe how to install the onboard Adaptec Ultra160 SCSI driver <**adpu160m.sys>** for Window NT operating system. If you are performing a first time Windows NT Installation, see < **Installing the drivers when installing Windows NT**> on page 3-9. If Windows NT is already installed in your system, see < **updating the Windows NT Driv**er> on page 3-11

1. I Installing the drivers when installing Windows NT

The adpu160m.sys driver is not embedded on the Windows NT4.0 installation disks (or CD-ROM) and must be added during Windows NT installation.

1-1: Completing A Fresh Windows NT4.0 Installation from Floppy Disk

Step 1 Start your system with Windows NT Boot disk in the floppy disk drive.

Step 2 When prompt, insert disk #2 in your floppy disk drive. After a few moments, you will see a blue screen. To setup Window NT now, press<Enter>

Step 3 Press <**S**> to skip auto-detection of your onboard SCSI host adapter.

Step 4 Press <**S**> again to specify an additional device.

Step 5 Press <**Enter**> to select <**Other**>and insert the onboard NT SCSI driver disk into the floppy drive

Step 6 Use arrow keys, select the following driver and press <**Enter**>
Adaptec Ultra160 Family PIC SCSI Controller (NT4.0)

Step 7 To add other additional host adapters that are not part of Ultra160 Family, press<S> and repeat from step 5 for each additional adapters and insert the appropriate driver disk.

Step 8 Press <**Enter**> to continue with windows NT operating system setup. Follow the instruction on-screen and in the Windows NT documentation to complete the installation.

1- 2: Completing A Fresh Windows NT4.0 Installation from CD-ROM

Step 1 Insert the Windows NT4.0 Setup CD into the CD-ROM drive.

Step 2 Start your system. Press<**F6**> key when you see the following message <**Setup is inspecting your computer's hardware configuration**..>

Step 3 When prompt, press <**S**> to specify an additional device.

Step 4 Press<Enter> to select <Other>; insert the onboard NT SCSI driver disk into the floppy drive.

Step 5 Use arrow keys, select the following driver and press <**Enter**>
Adaptec Ultra160 Family PIC SCSI Controller (NT4.0)

Step 6 To add other host adapters that are not part of Ultra160 Family, press<**S**> and repeat from step 5 for each additional adapters and insert the appropriate driver disk.

Step 7 Press <**Enter**> to continue with windows NT operating system setup. Follow the instruction on-screen and in the Windows NT documentation to complete the installation.

2. Updating the Windows NT Driver

To update or install the **adpu160.sys** driver if Windows NT is already installed, follow these instructions below for the version of Windows NT you are installing.

Step 1 Start Windows NT

Step 2 Click the <**Start**> button on the windows NT task bar, and then point to <**Settings**>

Step 3 Click the <**Control Panel**>

Step 4 Double-click <**SCSI Adapter**> icon.

Step 5 Click the tab <**Driver**> and then click the button <**Add**>.

Step 6 In the Install Driver window, click the <**Have Disk**>

Step 7 Insert the onboard NT SCSI driver disk into floppy drive A

Step 8 From the Copy Manufacturer's file From text box, type <**a:\NT4**> and click <**OK**>

Step 9 In the Install Driver window, Click <**OK**>

Step 10 Click the <**New**> button when asked if you want to use the currently installed driver(s)or install new one(s)

Step 11 Type <**a:\nt4>** again and click <**continue**>. The driver is now installed.

Step 12 You have to restart your computer for change to take effect. Click <**Yes**>to restart you computer. Click <**NO**> to return to SCSI Adapters windows

Section 3-3

Novell NetWare Driver Installation

This section will describe how to install the onboard Adaptec Ultra160 SCSI driver <**adpt160m.ham>** for Novell NetWare operating system- NetWare 4.11/5.0. If you are performing a first time Novell NetWare Installation, see < **Installing the drivers when installing Novell NetWare** > on page 3-13. If Novell NetWare is already installed in your system, see < updating the Novell NetWare Driver> on page 3-15

1. Installing the drivers when installing NetWare

To install adpt160m.ham driver when you install NetWare, follow the instruction below for the version of NetWare you are installing

1-1 NetWare 4.11/4.5

Step 1 Begin installing NetWare 4.11/5.0 on your server as instructed in your NetWare documentation.

Step 2 When a screen appears that asks you to select a disk driver, press <**Insert**> key

Step 3 Insert the onboard SCSI driver disk for NetWare into your floppy disk drive

Step 4 Press <**F3**> key and enter <**a:\netware**> as the path to **adpt160.ham** driver for NetWare.

Step 5 Select **adpt.ham** and press **<Enter>** key

Step 6 Select <**No**> not save existing file, <**Yes**> to save existing file **cdrom.nlm**

Step 7 Select <**No**> not save existing file, <**Yes**> to save existing file **nbi.nlm**

Step 8 Select <**No**> not save existing file, <**Yes**> to save existing file **nwpa.nlm**

Step 9 Select <**No**> not save existing file, <**Yes**> to save existing file **nwpaload.nlm**

Step 10 Select <**Save parameter and continue**> and press <**Enter**>key.

Step 11 To install additional adapters, follow the procedures from Step 5

Step 12 When complete, select <**Continue the installation**> to complete the installation.

1-2 NetWare 5.0

Step 1 Begin installing NetWare 5.0 on your server as instructed in your NetWare documentation.

Step 2 When a screen appears that asks you to select a disk driver, select <**Modify**> and press <**Enter**> key

Step 3 Select <**Storage adapters**> and press <**Enter**> key

Step 4 Select <**Insert**> key to add storage drivers.

Step 5 Select <**Insert**> key to add an unlisted driver.

Step 6 Insert the onboard SCSI driver disk for NetWare into your floppy disk drive

Step 7 Press <**F3**> key and enter <**a:netware\v5_xx**> as the path to **adpt160.ham** driver for NetWare.

Step 8 Select **adpt160.ham** and press <**Enter**> key

Step 9 Select <**Return to driver list**> and press <**enter**> key

Step 10 To install additional adapters, follow the procedures from Step 4

Step 11 When complete, select <**Continue**> to complete the installation.

2. Updating the Novell NetWare Driver

To update or install the **adpt160m.ham** driver by following these instructions if Novell NetWare is already installed. The procedures are all similar for all version of Novell NetWare. Procedures that are specific to a NetWare version are noted when necessary.

Step 1 Make a backup copy of the old driver (if it exists) before installing the new driver.

Step 2 Copy adpt160m.ham driver from the onboard SCSI driver disk for NetWare into the server's startup directory (e.g.., **c:\nwserver, c:\server40**) on your hard disk. This overwrites any existing version of the driver in the directory.

Step 3 If necessary, modify the <Load > command line in the **startup.ncf** file so that the proper path to the driver and all appropriate line options are specified. See ***Load at driver Boot on*** the Page 3-16.

The correct syntax to load the onboard Ultra160 family driver is

Load [pathname]adpt160m [options]

NOTE: Command line options are not case sensitive. Placing commas between command line options is optional. See ***Load at driver Boot on*** the Page 3-16 for possible value.

3. *Load Updating the Novell NetWare Driver*

To automatically load the adpt160m.ham at the server bootup, the **startup.ncf** file located in your server's startup directory must contain a **Load** command line that specifies the location of the driver and any appropriate command line options. Please check the documentation of your NetWare version for detailed information. For additional information on the **startup.ncf** file, also refer to your NetWare documentation.

The correct syntax to load the onboard Ultra160 family driver is

Load [pathname]adpt160m [options]

For example, the command line to load the driver from c:\nwserver directory with verbose=option on is

Load c:\nwserver\adpt160m verbose=y

To modify the startup.ncf file, follow these steps.

Step 1 Type <**load install**> at NetWare prompt and press <**Enter**> key

Step 2 Select the appropriate menu choice that follow you to edit the **startup.ncf** file

Step 3 Make the necessary changes. When you have done this, press <**ESC**> key.

Onboard Intel LAN Controller

1.Overview

RIOWRKS uses Intel 82554 GC Gigabit Ethernet LAN Controller and 82550 EY 10/100 Fast Ethernet LAN controller as the onboard network interface controllers. As known, Intel® 82550 EY 10/100 Fast Ethernet Controller can provide IEEE 802.3/802.3u 10 Base-T and 100 Base-TX compatible network environment. A user can achieve advanced manageability of the Alert on LAN II Specification by using this Intel® 82550 EY chip. Intel® 82544 GC Gigabit is a powerful LAN controller.

2.Hardware Installation

1. Go over the basic requirements in system requirements.
2. Follow the procedure in put the network adapter(s) in the computer.
3. Carefully attach the network cable(s).
4. After the network adapter is in the computer, install the network drivers.
5. Run setup to install additional networking components such as Intel® PROSet II.

Step 1 Go over the basic requirements in system requirements.

NOTE

Before installing the PRO/100 adapter, check your system for the following required or minimum configuration requirements:
One open 32-bit busmaster PCI slot

The latest BIOS for your computer
Microsoft Windows 95, 98, Me, SE, NT 4.0, or 2000, UnixWare, NetWare 3.12 or later using C spec driver, NetWare 4.11 or later, NetWare 5.x, Linux 2.2.x, or DOS.
Windows NT 4.0 requires Service Pack 5 or later.
For NetWare, Intel suggests you update to the latest Support Pack available. The required NLMs are included on the Intel CD. See the online *User's Guide* on the CD for more information.
Category 5 cabling and connector for 100 Mbps operation, category 5 or 3 cabling for 10 Mbps operation
Some advanced features require server adapters or compatible switches.
You can download the necessary software patches from Microsoft and Novell sites, as listed here:
Microsoft Service Packs for NT:
Visit the following Microsoft web site for the latest NT Service Pack information. If this site has changed, go to the main Microsoft site and search for the term Service Pack. For other Microsoft operating systems, visit the main www.microsoft.com site.

Step 2 Follow the procedure in insert the Adapter.

NOTE

If you are replacing an existing adapter with the PRO/100 adapter in Windows* 95, 98, Me, 2000, or NT, see Removing an Existing Adapter.

1. Shut down your operating system. Windows users: click the Start button, and then click Shut Down.
2. Turn off and UNPLUG the computer before removing the computer's cover.
3. Remove the cover bracket from a PCI busmaster slot by unscrewing the screw which secures it. Most computers have busmaster-enabled slots. If you have configuration problems, see your computer's documentation to determine if the PCI slots are busmaster-enabled.

4. If you want to enable the Wake On LAN* feature, see the Connect the Wake On LAN Power Cable before completing the rest of these steps. Note that this cable is not necessary if your system uses PCI busmaster 2.2 slots. Note also that not all adapters have the WOL feature.
5. Insert the PRO/100 adapter into a PCI slot and push it into the slot until it’s firmly seated. Then secure the adapter bracket with the screw you removed in step 3. Your adapter or PCI bus may vary in its actual appearance.

Removing Existing Adapters
In Windows 95, Windows 98 and Windows Me*

If you are replacing an existing adapter with a PRO/100 adapter, follow these steps *before* physically removing the adapter card:

1, Double-click **My Computer**.

2. Double-click **Control Panel**.

3. Double-click **System**.

4. Click the **Device Manager** tab.

5. Double-click **Network Adapters**.

6. Select the adapter driver listed below the Network Adapters group and click **Remove**.

7. Click **OK**.

*Removing an Existing Adapter in Windows 2000**

If you are replacing an existing adapter with a PRO/100 adapter, follow these steps *before* physically removing the adapter:

1. Double-click **My Computer**.
2. Double-click **Control Panel**.

3. Double-click **System**.
4. Click the **Hardware** tab.
5. Click the **Device Manager** button.
6. Double-click **Network Adapters**.
7. Right-click on the listing for the adapter you want to remove and click **Uninstall**.
8. Right-click on the listing for the adapter you want to remove and click **Uninstall**.
9. Click **OK**.

*Removing an Existing Adapter in Windows NT**

1. From the Control Panel, double-click the **Network** icon.
2. Click the **Adapters** tab.
3. Under the "Network Adapters" field, highlight the adapter you're removing and click the **Remove** button.
4. Click **OK**.

WARNING

Turn off and unplug power to the computer before removing its cover. Do not fail to perform this step.

Step 3 Carefully attach the network cable(s).

NOTE

Dual port adapters have two Ethernet addresses. The address for the first port (port A or 1) is printed on a label on the component side of the adapter. Add one to this address to obtain the value for the second port (port B or 2).

1. Connect a Twisted Pair Ethernet (TPE) network cable to the adapter. For dual port server adapters, connect one or two cables twisted-pair wiring. If you plan to run the adapter at 100 Mbps, it must be connected to a 100BASE-TX hub or switch (not a 100BASE-T4 hub). For 10BASE-T, use Category 3, 4, or 5 twisted-pair wiring. If you want to use this adapter in a residential environment, you must use a Category 5 cable.
2. To configure the adapter, continue with the procedures specific to your operating system outlined in Installing the Network Drivers. For dual port server adapters, read the notes in Installing Multiple Adapters. to the adapter. For 100BASE-TX, your network cable must be Category 5,

Step 4 After the adapter is in the computer, install the network drivers.

Before you begin

In order to successfully install drivers or software, you must have administrative privileges on the computer completing installation.
You can install drivers directly from the Intel CD or you can also create a floppy disk to install from. Go to Making a Floppy Disk section.

Creating an Installation Disk

Installation disks are useful when you are loading drivers on systems that do not have a CD drive or a network connection. You can create installation disks using the MAKEDISK utility or by directly copying the appropriate files to a floppy disk.
The MAKEDISK utility supports the following operating systems:

- Windows* (NT* 4.0, 2000, XP)
- NetWare*
- DOS
- DOS ODI

You can run MAKEDISK either from:

- The IntelCD
- A command prompt

●Running MAKEDISK from the Autorun screen

1. Insert the Intel CD in the CD-ROM drive.
   The CD autorun program starts. You can also manually start the autorun program by double-clicking autorun.exe in the root directory of the Intel CD.
2. Click **Create Install Disk**.
3. Click the adapter type and click **OK**.
   The Create Install Disk dialog appears.
4. Click the targeted operating system.
5. In the destination drive drop-down list, click the appropriate drive.
6. Insert a blank disk into the disk drive then click **Create Disk**.

●Running MAKEDISK from a command prompt window

1. Place a formatted disk in your drive.
2. For NetWare, skip to step 3.
   For Windows, open a command prompt window from the Start menu:
   Select Run. Type "cmd" in the Run dialog, then click OK.
3. In the command prompt window, switch to the drive that contains the files. For example, type:
   E: <Enter>
4. Change to the \MAKEDISK directory.
5. At the command line type:
   MAKEDISK (OS) A: <Enter>

where OS is the desired operating system and A: is your floppy drive letter.

Supported operating systems include:

NW = NetWare, DOS and DOS ODI
NT = Windows NT 4.0
W2K = Windows 2000
XP = Windows XP (32- and 64-bit)

For Windows 2000 and XP, the Makedisk batch file will only copy the base driver files to your floppy disk.
For Windows NT, Intel PROSet is also copied.

Step 5 Run setup to install additional networking components such as Intel® PROSet II.

Intel® PRO Intelligent Installer

The Intel® PRO Intelligent Installer enables you to install:

- Adapter drivers
- Intel® PROSet II
- Select management agents

Additional software including SNMP and DMI agents are available on the Intel CD as separate installations.

Requirements

- The computer must use one of the following operating systems: Windows* 2000, XP, or NT* 4.0.
- You must have administrative rights on the computer where you are installing the software.

Running the Installer

1. From the Intel Product Information Autorun screen (which appears when you insert the Intel CD - you can also start it by double-clicking

"Autorun.exe" from the root of the media), click the **Install Drivers and Utilities** button. The Intel® PRO Intelligent dialog box appears.

2. Click Next to continue with the installation. If the installer has not run before, a dialog box appears with the license agreement. Click **I accept** to accept the license agreement and continue with the installation.

3. In the Setup Type dialog, click:

    - **Typical** to install adapter drivers and Intel PROSet II
    - **Custom** to select the features you would like to install
    - Click **Next**.

4. If you selected Typical, click **Next** then click **Install**.
   If you selected Custom, the Custom Setup dialog appears.

    - To select or deselect a feature for installation, click the icon adjacent to the feature. If the feature has one or more sub features, use the plus (+) sign to expand the tree.
    - To change the installation location, click **Change** and then browse to the new location.
    - To ensure there is enough disk space on the local drive for the selected features, click **Disk Space**.
    - For information about how to select or deselect features, click **Help.**
    - After customizing the installation, click **Next** then click **Install**.

5. Click **Finish**.
   The Installer closes.

6. Restart your computer if prompted.

When you run the Installer, it checks to see if a previous version of the drivers or Intel PROSet II exists on your computer. If a previous version exists, that version can be upgraded. Any settings specified in the previous version are applied to the upgrade version.

Uninstalling
You can remove adapter configuration utilities and management agents using either the Intel PRO Intelligent Installer or the Add/Remove Programs feature in Windows.*
To remove base drivers, you must use the Add/Remove Programs feature.

To uninstall using the Intel Install CD:

1. From the Intel Product Information Autorun screen (which appears when you insert the Intel CD - you can also start it by double-clicking "Autorun.exe" from the root of the media), click the **Install Drivers and Utilities** button. The Intel® PRO Intelligent dialog box appears.

2. Click Next to continue.

3. In the Program Maintenance dialog, click **Modify**. The Custom Setup dialog appears.

4. To deselect a feature, click the feature. Click **Next** when you have deselected all features you would like to remove from the computer.

5. Click **Install**.

6. Click **Finish**.

To uninstall all software using the Intel CD:

You can also automatically uninstall *all* Intel networking *software* that was installed using the Intel PRO Intelligent Installer. Note that you must use the Add/Remove Programs feature to uninstall drivers.

1. From the Intel Product Information Autorun screen (which appears when you insert the Intel CD - you can also start it by double-clicking "Autorun.exe" from the root of the media), click the **Install Drivers and Utilities** button. The Intel® PRO Intelligent dialog box appears.
2. Click **Next** to continue.
3. In the Program Maintenance dialog, click **Remove** then click **Next**. The Custom Setup dialog appears.
4. Click **Remove**. The installer removes all Intel networking software.
5. Click **Finish**.

To uninstall software or drivers using the Add/Remove Programs feature:
Go to the **Add/Remove Programs utility** (Start > Settings > Control Panels > Add/Remove Programs) and select the Intel networking component you want to uninstall.

Step 6 Common Problems and Solutions

Problem	Solution
Your computer can't find the adapter	♦ Make sure the adapter is seated firmly in the slot. ♦ Download the latest drivers from the Intel support web site: http://www.intel.com/network

	♦ Try a different PCI bus master slot. See your server's documentation to identify bus master slots. ♦ Check to see if your motherboard has the latest BIOS. ♦ Make sure your PCI slots are v2.2 compatible. ♦ Try rebooting the computer. ♦ Try a different Intel adapter. ♦ If you add an adapter with a bridge chip (such as a dual-port adapter), uninstall and then reinstall all of the drivers for all installed adapters.
Diagnostics pass but the connection fails	♦ Check the responding link partner. ♦ Make sure the cable is securely attached, is the proper type and does not exceed the recommended lengths. ♦ Try another cable. ♦ Try running the Sender-Responder diagnostic Test. ♦ Make sure the duplex mode and speed setting on the adapter matches the setting on the switch. ♦ For NetWare*, make sure you specify the correct frame type in your AUTOEXEC.NCF file.
Another adapter stopped working after you installed	♦ Make sure the cable is connected.

the Intel PRO/100 adapter	♦ Make sure your PCI BIOS is current. See PCI Installation Tips. ♦ Check for interrupt conflicts and sharing problems. Make sure the other adapter supports shared interrupts. Also, make sure your operating system supports shared interrupts. ♦ Unload all PCI device drivers, then reload all drivers. ♦ Try reseating all adapters.
The adapter stopped working without apparent cause	♦ The network driver files may be damaged or deleted. Reinstall the drivers. ♦ Try reseating the adapter in its slot or different slot, if necessary. ♦ Try rebooting the computer. ♦ Try another cable. ♦ Try a different adapter. ♦ Run diagnostics.
The Link indicator light is off	♦ Run the adapter and network tests described in Test the Adapter. ♦ Make sure you've loaded the adapter driver. ♦ Check all connections at the adapter and the switch. ♦ Try another port on the switch. ♦ Try another cable.

	♦ Make sure that the link partner is configured to auto-negotiate (or forced to match adapter).
The link light is on, but communications are not properly established	♦ Make sure the proper (and latest) driver is loaded. ♦ Both the adapter and its link partner must be set to either auto-negotiate or manually set to the same speed and duplex settings. ♦ The adapter's link indicator light may be on even if communications between the adapter and its link partner have not been properly established. Technically, the link indicator light represents the presence of a carrier signal but not necessarily the ability to properly communicate with a link partner. This is expected behavior and is consistent with IEEE's specification for physical layer operation.

RX or TX light is off	♦ Make sure you've loaded the network drivers. ♦ Network may be idle; try creating traffic while monitoring the lights. ♦ Try another adapter.
The diagnostic utility reports the adapter is "Not enabled by BIOS"	♦ The PCI BIOS isn't configuring the adapter correctly. Try PCI Installation Tips.
The computer hangs when the drivers are loaded	♦ Try changing the PCI BIOS interrupt settings. See PCI Installation Tips.
The ACT light is off	♦ Make sure you've loaded the correct network drivers. ♦ The network may be idle. Try accessing a server. ♦ Try another adapter. ♦ Try another cable.
Event viewer message: A device attached to the system is not functioning	♦ In Windows NT* and NetWare, if there is a BIOS setting for "Plug and Play OS", make sure it is set to NO. For Windows 98 SE and ME, this should be set to "YES".
Windows 2000 or XP: Unable to remove PROSet	If you experience computer hangs (blue screens) after configuring network adapters with the Intel®

in SAFE mode	PROSet utility, try the following: 1. Start Windows in Safe mode. 2. Go to the Device Manger, and disable the 3. Network adapters and teams. 4. Restart the computer. 5. Windows should be operating normally if the 6. Problem was caused by the disabled adapters. To uninstall Intel PROSet, perform the following steps: 1. Start Windows in Safe mode. 2. Use the Device Manager to disable all teaming instances. 3. Restart the computer in Normal mode. 4. Using Intel PROSet, remove all teams and VLANs shown. 5. Go to the Control Panel, select Add/Remove Programs. 6. Uninstall Intel PROSet.
An adapter doesn't work after installing an adapter driver from Windows Me	♦ If you use the drivers that come with Windows Me, during an installation of Windows Me, the adapter may not function correctly. After Windows Me installs the default driver, you'll need to update all Intel adapters with the newer driver on the Intel CD. See install the Network Drivers for instructions.

	♦ If you use multiple adapters with Windows Me, you must upgrade all Intel adapters for any to function properly.
Trouble with Teaming	See notes and warnings in the Teaming page.
The computer has trouble detecting both ports on a dual port adapter	1. Upgrade all Intel adapters in the computer to the latest software. 2. Re-enumerate the bus. To force the re-numeration, uninstall or force the re-numeration, uninstall or unload the drivers for all PCI devices installed and shutdown the computer. Then restart the computer and reinstall or reload all drivers. 3. Upgrade the BIOS. 4. Set the "Plug and Play OS" option in the BIOS to "Yes" for Windows 9x and "No" for Windows NT and Novell* operating systems. This setting will vary for Windows 2000 and Linux. Adding the Intel PRO/100 S Dual Port Server Adapter through hot plug may present some difficulties. If your second port is not detected, a restart may be required. When installing this adapter in NetWare with hot plug, include the keyword "persist=1" in the load line.

	For more information, visit http:\\support.intel.com.
Windows 98 is unable to update device driver files	If you're using Windows 98 and have updated or added an adapter, you may experience a problem with device driver update files not being copied. (This is a known problem, for which Microsoft has published a Knowledge Base article, Q242150.) To resolve this problem: 1. Reboot the computer. 2. Remove the adapter via Device Manager and reboot the computer again. 3. When prompted for the adapter driver, choose the option "Display a list of all the drivers...". Then choose the adapter from the list and click Have Disk to update the drivers from the Intel CD. 4. Reboot the computer.
Install prompting for Prodd.vxd and Prokddp.vxd files in Windows 2000 or 98	If you use the Add/Remove Programs icon in the Windows Control Panel to remove an Intel adapter, and then try to install drivers from a later Intel CD, you may see a prompt asking for the following files: "Prodd.vxd" "Prokddp.vxd" This is because Windows is attempting to install the files associated with the earlier driver, which are not present on the later Intel CD. To resolve this problem, finish the installation and

	choose "Skip" when prompted for a missing file. Then, instead of removing the driver, update it with the later Intel CD. For instructions on updating the adapter driver, see the "Install the Network Drivers" section in the online guide on the Intel CD.
After upgrading operating systems, Intel PROSet is no longer available	If you are upgrading Windows operating systems and you have Intel PROSet II software installed, it will be deleted in the process. You will need to reinstall Intel PROSet II.
In Windows XP, IP addresses are lost or Intel PROSet becomes unstable with bridging enabled	With bridging enabled, Intel PROSet II does not retain adapter IP address information. If changes are made to any Intel PROSet II advanced feature after enabling bridging, the Intel PROSet II software becomes unstable.
Terminal Server support	When using Terminal Server, make sure only one session of Intel PROSet II is open at any one time. Simultaneous sessions are not supported in Intel PROSet II.

If you have any problems with basic installation, see Troubleshooting. Once you have installed the network adapter(s), you can assign them to teams (server adapters only) or set other advanced features. The configuration process varies, depending on your operating system. For more information, see the following topics.

- Intel PROSet II
- Set Up Speed and Duplex
- Set Up Teams
- Set Up VLANs
- PCI Hot Plug Support

Using Intel® PROSet II

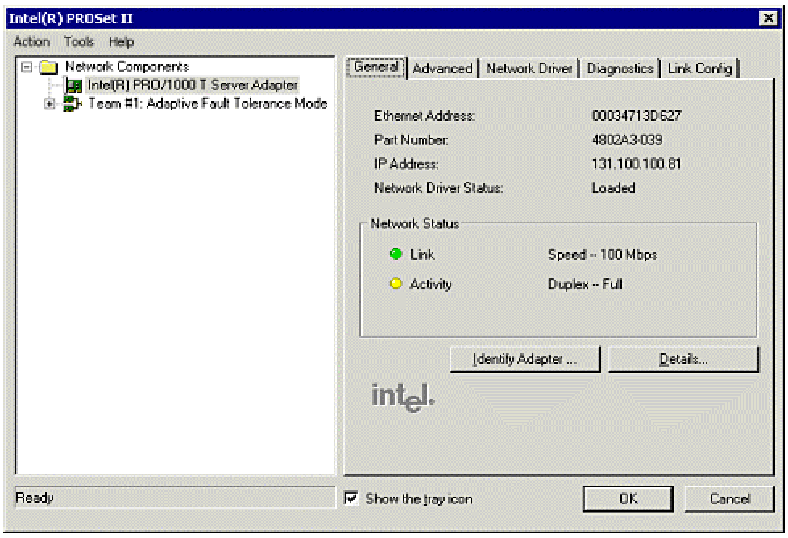
Intel® PROSet II enables you to test and configure Intel network adapters. You can install Intel PROSet II on computers running Microsoft Windows* operating systems. For details about installing Intel PROSet II, see the topic, Intel® PRO Intelligent Installer.

After installing PROSet II and restarting the computer, you'll see two icons as shown below.

System Tray Icon: ：

Control Panel Icon：

Intel PROSet II runs when you click the PROSet II tray icon or the Intel PROSet II icon in the Control Panel (shown below).
The main Intel PROSet II window is similar to the illustration below. To set advanced parameters, select the desired adapter in the left window and click the Advanced tab. You may also right-click your mouse to add the selected adapter to a team or VLAN.



Teaming features - Adapter Fault Tolerance (AFT), Switch Fault Tolerance (SFT), Adaptive Load Balancing (ALB), Fast EtherChannel* (FEC), Gigabit EtherChannel (GEC) and static 802.3ad Link Aggregation (LA) - can be configured only on server adapters. To do this, right-click on the desired adapter in the left window and follow the teaming wizard. Be sure to click OK on the main Intel PROSet window to apply your changes. See the Intel PROSet II online help for additional information.

Set Up Speed and Duplex

NOTE

This section applies to copper connections only. Fiber-based adapters operate at full-duplex and gigabit only.

In the default mode, an Intel PRO/1000 network adapter using RJ-45 connections will attempt to auto-negotiate with its link partner to determine the best setting. If no link is established with the link partner using auto-negotiation,

you may need to manually configure the adapter and link partner to the identical setting to establish link and pass packets. See the instructions below for specific steps.
When auto-negotiation is *disabled*, the possible settings available are:

10 Mbps, half duplex	10 Mbps, full duplex
100 Mbps, half duplex	100 Mbps, full duplex

NOTE

Per the IEEE specification, gigabit speed and duplex cannot be forced.

The setting you choose must be matched by the link partner.
Manually Configuring Duplex and Speed Settings
If your switch supports NWay* standard and both the adapter and switch are set to auto-negotiate, full duplex is automatic and no action is required on your part. Not all switches support auto-negotiation. Check with your network system administrator to verify whether your switch supports this feature.
Configuration is specific to the driver you're loading for your operating system.
To set a specific Link Speed and Duplex mode, refer to the section below that corresponds to your operating system.

NOTE

Gigabit speed cannot be forced. It can only be auto-negotiated.

Microsoft Windows* (98SE, Me, NT 4.0, 2000, XP)

The default setting is for auto-negotiation to be enabled. Change this only to match your link partner.

NOTE

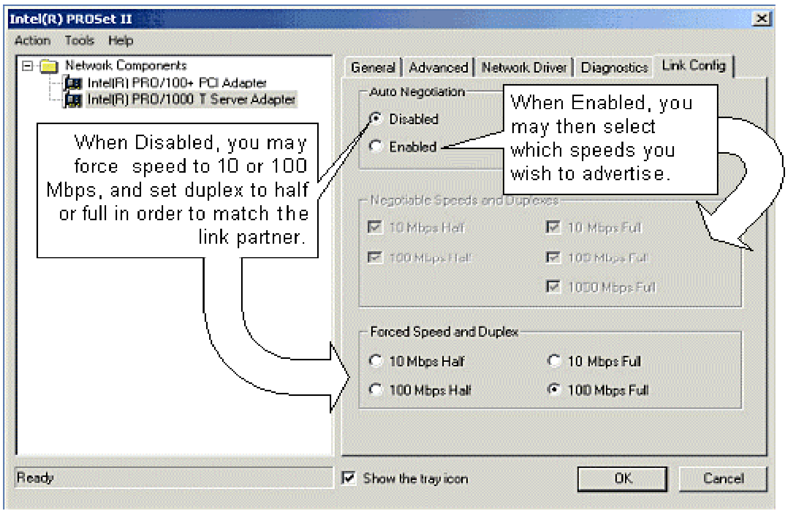
The adapter will not operate at gigabit speed (1000 Mbps) if you disable auto-negotiation.

If **Auto Negotiation** is *disabled*, this lets you specify **Forced Speed** (to 10 or 100 Mbps, but not 1000 Mbps) **and Duplex**. In this situation, the **Negotiable Speeds and Duplexes** checkboxes are disabled, since these are set to advertise speeds during auto-negotiation.

If **Auto Negotiation** is *enabled*, this enables the **Negotiable Speeds and Duplexes** checkboxes allowing specific speed advertisement and disabling the **Forced Speed and Duplex** selection buttons.

If you need to manually change the settings:

1. Double-click the **Intel PROSet II** icon from the Control Panel or System Tray.
2. Click the **Link Config** tab and highlight the desired adapter in the left window (see example below).
3. Click the **Disabled** button and then set the speed and duplex parameters that match your switch.
4. Click **OK** to finish.
5. Restart your computer if prompted.



Novell NetWare*

The default setting for auto-negotiation is enabled. Change this only to match your link partner.

NOTE

The adapter will not operate at gigabit speed (1000 Mbps) if you disable auto-negotiation.

Use keyword commands in AUTOEXEC.NCF to force speed and duplex modes as follows:

Speed = 10 | 100 *(10 Mbps, 100 Mbps)*

This should be followed by one of the following:

Forceduplex = 1 | 2 *(half, full)*

Autoneg = *see table below for settings and values*

These keywords are not available in INETCFG. To use these or any of the advanced keywords, either configure the drivers manually, or change them in

AUTOEXEC.NCF.
Default operation is auto-negotiation. In this mode, the adapter advertises all supported speed and duplex combinations, and will link at the highest common speed/ duplex combination.

Speed
If you manually set (force) speed to 10 or 100, then **both** speed and duplex must be forced, and auto-negotiation is disabled. (Also be sure that the link partner settings match this.) The Autoneg parameter is ignored.

Autoneg
Use the Autoneg parameter when more control is required. When this parameter is used, the Speed and Forceduplex parameters must **not** be specified. This parameter is a bitmap, based on the following table, that specifies which speed and duplex settings the adapter advertises to a link partner.

Setting	1000 Full	N/A	100 Full	100 Half	10 Full
Value	32	16	8	4	2

This parameter is the sum of the values of each setting to advertise. For example, to advertise 1000-Full, 100-Full, and 100-Half modes, the parameter would be set to 32 + 8 + 4 = 44.

Teaming

Teaming is a set of advanced network services which are available when two or more adapters are configured to operate as a team.

Teaming modes include:

- Adapter Fault Tolerance (AFT) - provides automatic redundancy for your adapter. If the primary adapter fails, the secondary takes over. Adapter Fault Tolerance supports two to eight adapters per team. This feature works with any hub or switch.

- Switch Fault Tolerance (SFT) - creates a failover relationship between two adapters when each adapter is connected to a separate switch. Switch Fault Tolerance supports two adapters per team. This feature works with any hub or switch. Spanning Tree Protocol (STP) can be enabled when you create a team in SFT mode. Note that SFT is currently only available on computers running Windows.
- Adaptive Load Balancing (ALB) - allows the balancing of routed protocols among two to eight adapters. Also includes adapter fault tolerance. This feature works with any switch.
- Intel Link Aggregation, Cisco EtherChannel* (FEC/GEC/802.3ad static mode) - creates a same-speed team of two to eight adapters to increase transmission and reception throughput. This also includes adapter fault tolerance and load balancing (only routed protocols). This requires a switch with Link Aggregation, FEC/GEC, or static 802.3ad capability.
- Multi-Vendor Teaming (MVT) - adds the capability to include adapters from selected other vendors in a team. If you are using a Windows-based server, the adapter names which appear in Intel® PROSet are candidates for a team.

For an overview of Teaming Options, see "Solving Server Bottlenecks with Intel Server Adapters." This document covers teaming and load balancing options. You can view this document with the Adobe Acrobat* Viewer.

NOTE

Teaming is supported on Intel PRO/100 and PRO/1000 server adapters, and certain server-oriented models from other manufacturers. (If you are running a Windows-based system, check the Intel PROSet II control panel utility to see which adapters are compatible.)

Teaming is also supported on the Intel PRO/1000 T Desktop Adapter *if* there is at least one server adapter installed.

IMPORTANT

For optimal performance, you must disable the Spanning Tree Protocol (STP) when using AFT, ALB, or FEC/GEC/802.3ad static mode teaming.

- For optimal performance, you must disable the Spanning Tree Protocol (STP) when using AFT, ALB, or FEC/GEC/802.3ad static mode teaming.

- When you create a team, a virtual adapter instance is created. In Windows 2000, this is displayed in both the Device Manager and Network and Dial-up Connections. Each virtual adapter instance is listed as "Intel® Advanced Network Services Virtual Adapter." **Do not attempt to modify (except to change protocol configuration) or remove these virtual adapter instances using Device Manager or Network and Dial-up Connections.** Changing or removing virtual adapters might result in system anomalies, including blue screens.

- Before creating a team, adding or removing team members, or changing advanced settings of a team member, make sure each team member has been configured similarly. Settings to check (In Intel PROSet, this is available in the "Advanced Settings" tab) include VLANs and QoS Packet Tagging, Jumbo Frames, and the various offloads. *Pay particular attention when using different adapter models or adapter versions because adapter capabilities vary.*

If team members implement Advanced features differently, failover and team functionality will be affected. To avoid team implementation issues:

♦ Create teams that use similar adapter types and models.

♦ Reload the team after adding an adapter or changing any Advanced features. One way to reload the team is to select a new preferred primary adapter. Although there will be a temporary loss of network connectivity as the team reconfigures, the team will maintain it's network addressing schema.

NOTE

change in network configuration requires a system reboot to take effect. Hot Add/Remove of an adapter to/from a team or VLAN is only available in Windows 2000 and XP.

Adapters Supported

Teaming options are supported on Intel PRO/100 and PRO/1000 server adapters, and on Intel desktop adapters if there is at least one server adapter installed. Selected adapters from other manufacturers are also supported. (If you are running a Windows-based system, check the Intel PROSet II control panel utility to see which adapters are compatible.)

Compatibility Notes

In Intel test labs, it was found that:

- Hot-adding non-Intel adapters to a team causes system instability. For this reason it is recommended that you restart the system or reload the team after hot-adding a non-Intel adapter to a team.
- Hardware offloading is automatically disabled when Broadcom*-based NICs are team members.

Adapter Fault Tolerance (AFT)

Adapter Fault Tolerance (AFT) provides the safety of an additional backup link between the server and switch. In the case of switch port, cable, or adapter failure, you can maintain uninterrupted network performance.
Adapter Fault Tolerance is implemented with a primary adapter and one or more backup, or secondary adapters. During normal operation, the backup adapters are listed as standby. If the link to the primary adapter fails, the link to the secondary adapter automatically takes over.

NOTE

To use AFT, you must have at least one PRO/100 or one PRO/1000 server adapter in your team, and all adapters linked to the same switch or hub. You may mix gigabit and 10/100 adapters in an AFT team.

Switch Fault Tolerance (SFT)

Switch Fault Tolerance (SFT) teaming enables you to connect two teamed adapters to two switches. Each adapter connects to a separate switch.
Switch Fault Tolerance can detect failures when they occur:

- On either teamed adapter
- On either cable connecting the teamed adapter to it's switch
- On switch ports connected to the adapters
- On either switch connected to the adapters

In SFT teams, one adapter is the primary adapter and one adapter is the secondary adapter. During normal operation, the secondary adapter is in standby mode. It does not transmit or receive traffic. If the primary adapter loses connectivity, the secondary adapter automatically takes over.
In SFT mode, the two adapters creating the team can operate at different speeds.

NOTE

SFT is currently only available on computers running Windows.

Adaptive Load Balancing (ALB)

Adaptive Load Balancing (ALB) uses software to balance the load of your server among a team of two to eight same-speed Intel adapters (must include at least one server adapter) connected to the same switch. ALB balances routable transmit traffic and IP receive traffic on computers running Windows. The software analyzes the send and transmit loading on each adapter and balances the rate across the adapters based on destination address. Adapter teams configured for ALB also provide the benefits of AFT.

NOTE

- ALB does not load balance non-routed protocols such as NetBEUI and some IPX* traffic.
- You may create an ALB team with mixed gigabit adapter and slower adapters. The load is balanced according to the adapter's capabilities and bandwidth of the channel.

Cisco EtherChannel (FEC/GEC), Intel Link Aggregation, 802.3ad Static Mode

Fast EtherChannel (FEC) and Gigabit EtherChannel (GEC) are performance technologies developed by Cisco Systems, Inc., to increase throughput between switches. To increase your server's throughput to multiple addresses, Intel has implemented Link Aggregation on server adapters that works with switches having either FEC/GEC, Intel Link Aggregation (LA) or 802.3ad (static) capability.

The transmission speed will never exceed the adapter base speed to any single address (per specification). Teams can consist of 2 to 8 adapters, but must match the capability of the switch. Adapter teams configured for FEC/GEC/Link Aggregation/802.3ad (static) also provide the benefits of fault tolerance and load balancing. In these modes, no primary adapter needs be set.

Multi-Vendor Teaming (MVT)

MVT allows teaming with a combination of Intel and non-Intel adapters. This feature is currently available under Linux* and Windows* (NT 4.0, 2000 and XP).

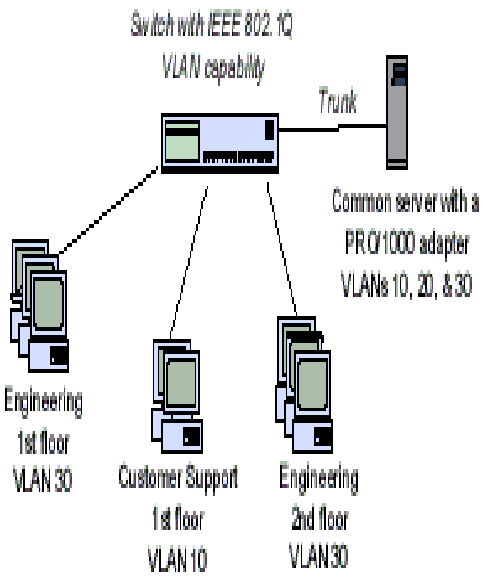
If you are running a Windows-based system, check the Intel PROSet II control panel utility to see which adapters are compatible.

MVT Design Considerations

- In order to activate MVT, you must have at least one Intel server adapter in the team, which must be designated as the primary adapter.
- A multi-vendor team can be created for any team mode, but not for VLANs.
- All members in a MVT must operate on a common feature set (lowest common denominator).

Virtual LANs

A Virtual LAN (VLAN) is a logical grouping of network devices put together as a LAN regardless of their physical grouping. VLANs let a user see and access only specified network segments and limit collision domains. This increases network performance and allows network security.



VLANs offer the ability to group computers together into logical workgroups. This can simplify network administration when connecting clients to servers that are geographically dispersed across the building, campus, or enterprise network.

Typically, VLANs consist of co-workers within the same department but in different locations, groups of users running the same network protocol, or a cross-functional team working on a joint project.

By using VLANs on your network, you may be able to:

- Improve network performance
- Limit broadcast storms
- Improve adds, moves, and changes
- Minimize security problems
- Ease your management task

VLAN Support Matrix

- Windows NT 4.0 VLANs require Service Pack 6a or later.
- To set up IEEE VLAN membership (multiple VLANs), your

adapter must be attached to a switch with IEEE 802.1Q VLAN capability.

- VLANs can co-exist with teaming (if the adapter supports both). If you do this, the team must be defined first, then you can set up your VLAN. In Windows, teams and VLANs are set up using Intel® PROSet.

IMPORTANT

When using IEEE 802.1Q VLANs, VLAN ID settings must match between the switch and those adapters using the VLANs.

Appendix 1

Troubleshooting SCSI Controller

SCSI standard, cable length, bus widths and throughput

Standard	Single-ended	Differential	LVD	Maximum Devices Inclusive SCSI Controllers
(Fast)SCSI-2	3M	25M	12M	8
(Fast) Wide SCSI-2	3M	25M	12M	16
Ultra SCSI-2	1.5M	25M	12M	8
Ultra SCSI-2	3M	-	-	4
Ultra Wide SCSI-2	-	25M	12M	16
Ultra Wide SCSI-2	1.5M	-	-	8
Ultra Wide SCSI-2	3M	-	-	4
Ultra2 SCSI	-	-	12M	8
Ultra2 Wide SCSI	-	-	12M	16
Ultra3 SCSI	-	-	12M	8
Ultra3 Wide SCSI	-	-	12M	16

Standard	Bus Width (Bits)	SCSI Sync. frequency	Bus/Throughput (MB/Sec)
(Fast)SCSI-2	8-bit	10MHz	10MB/sec
(Fast) Wide SCSI-2	16-bit	10MHz	20MB/sec
Ultra SCSI-2	8-bit	20MHz	20MB/sec
Ultra Wide SCSI-2	16-bit	20MHz	40MB/sec
Ultra2 SCSI	8-bit	40MHz	40MB/sec
Ultra2 Wide SCSI	16-bit	40MHz	80MB/sec
Ultra3 SCSI	8-bit	80MHz	80MB/sec
Ultra3 Wide SCSI	16-bit	80MHz	160MB/sec

Note

- If any device on the channel is not Ultra3 or Ultra2 capable, the channel will revert to single-ended mode. Then the maximum of cable length will follow the single-ended bus length.

Appendix 2

Troubleshooting LAN Controller

Release Note

Intel(R) Network Adapters Release Notes for version 6.1
February 27, 2002
===

Contents

- What's New in this release
- Upgrading from version 6.0
- Installing drivers in Windows* 98 or ME
- Repairing installation of utilities
- Compatibility notes for Multi Vendor Teaming
- Team setup requirement
- Help

● What's New in this release
==========================
This release contains the following new features:
Support for the Intel(R) PRO/1000 MT Desktop Adapter
Updated Intel Boot Agent utility

● Upgrading from version 6.0
==========================
The first time you run the Intel(R) PRO Intelligent Installer, the Installer automatically upgrades installed components to version 6.1. For example, if you have drivers or Intel(R) PROSet II installed, the drivers and the utility are automatically upgraded to version 6.1.
Options, including the ability to uninstall or modify installed components or install new components, are available after the Installer completes the upgrade process, the second time you run the Installer.

● Installing drivers in Windows 98 or ME
=======================================
If you cancel the Found New Hardware Wizard during driver installation, the Intel(R) PRO Intelligent Installer prompts you to reboot the computer twice to complete driver and software installs. The operating system requires reboots when it detects new hardware and you are installing drivers using the Intel Installer.
To avoid multiple reboots, use the Found New Hardware Wizard to complete driver installation.

● Repairing installation of utilities
====================================
When attempting to repair the installation of DMI or the WMI NIC provider, you must uninstall and reinstall the utility. To uninstall a utility:
1. Run the Intel(R) PRO Intelligent Installer.
2. In the Program Maintenance dialog box, select Modify.
3. In the Custom Setup dialog box, click the graphic next to the utility you would like to uninstall. Click the option Do not install this feature.
4. Follow the onscreen directions to finish the installation.
   After completing the uninstall, use the Intel(R) PRO Intelligent Installer to reinstall the utility.

● Compatibility notes for Multi Vendor Teaming
===
In Intel test labs, it was found that hot-adding a non-Intel adapter to a team causes system instability. If you do hot-add a non-Intel adapter to a team, make sure you restart the computer or reload the team.

● Team setup requirement
======================
Before adding an adapter to a team, make sure each adapter is configured the same as other adapters in the team. For team members to successfully implement teaming functionality, each team member must be configured similarly.
To check team member configuration, view each team member 楸 settings in the

Advanced tab in Intel(R) PROSet II. Settings to check include QoS Packet Tagging, Jumbo Frames, and the various offloads. If team members implement Advanced
features differently, failover and team functionality are affected.

- Help

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Main Intel web support site: http://support.intel.com

Network products information: http://www.intel.com/network

Gigabit products information:
http://www.intel.com/network/solutions/gigabit.htm
Corporate site: http://www.intel.com

Worldwide access: Intel has technical support centers worldwide. Many of the centers are staffed by technicians who speak the local languages. For a list of all Intel support centers, the telephone numbers, and the times they are open, visit http://www.intel.com/support/9089.htm.

Telephone support: US and Canada: 1-916-377-7000
(7:00 - 17:00 M-F Pacific Time)

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