Solaris 8 (Intel Platform Edition) Device Configuration Guide

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Contents

Preface

This document provides information about IA hardware devices that are supported in the Solaris™ 8 computing environment.

Note - In this document, the term “IA” refers to the Intel 32–bit processor architecture, which includes the Pentium, Pentium Pro, Pentium II, Pentium II Xeon, Celeron, Pentium III, and Pentium III Xeon processors and compatible microprocessor chips made by AMD and Cyrix.

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CHAPTER 1

Configuring Devices

This chapter describes how to use Solaris 8 *Intel Platform Edition* Device Configuration Assistant software, manufacturers' device configuration media, and documentation to solve configuration problems. The next chapter contains Device Reference Pages and describes how to use them to configure your Intel 32–bit processor architecture (IA) system to run in the Solaris operating environment.

Identifying and Correcting Problems

Use the Solaris 8 *Intel Platform Edition* Device Configuration Assistant program to identify devices and the resources each device uses. If there is a problem, you must provide device names and resource parameters so the Configuration Assistant can pass this information to the Solaris kernel.

Physical Address Extension (PAE) Mode

With the release of Pentium Pro, Intel introduced a mode called PAE (physical address extension) on its advanced processors. By using PAE, Solaris *Intel Platform Edition* can address up to 32 Gbytes of physical memory. Individual processes are still limited to a maximum of 3.5 Gbytes of virtual address space.

PAE mode enables you to run multiple instances of databases and memory-intensive applications, and to support large numbers of online users on your machine.

It is best to use PCI disk controllers that support dual address cycle (DAC) in your machine because they can transfer data to and from any physical location. Other cards are limited to 4 Gbytes of physical memory; as a result, performance might slow down because the system needs to copy additional memory to transfer data.

Caution - Some device drivers are not yet able to take advantage of PAE mode. PCI device drivers written by Sun have been tested on IA machines with more than 4 Gbytes of memory. Its OEM partners intend to test their machines with devices they supply on IA machines with more than 4 Gbytes of memory. In some cases, however, if you add a third-party device driver to your system, it might become unstable, and panics and data corruption might result. If your system becomes unstable and you need that driver, you must disable PAE mode.

Disabling PAE Mode

To disable support for PAE mode, follow these steps:

1. **Reboot your machine.**

2. **Interrupt autoboot by pressing the Escape key.**
   The Solaris Device Configuration Assistant starts.

3. **Press F2_Continue until the Boot Solaris screen is displayed.**

4. **Press F4_Boot Tasks.**
   The Boot Tasks screen is displayed.

5. **Select View/Edit Property Settings.**
   The View/Edit Property Settings screen is displayed.

6. **Press F4_Create.**
   The Create Property screen is displayed.

7. **In the Specify Property Name field, type** `mmu-modlist` **and press Enter.**

8. **In the Specify Value field, type** `mmu32` **and press Enter.**
   The message “Updating Saved Configuration information...” is displayed on the Updating screen. When the property and value are saved successfully, the View/Edit Property Settings screen is displayed.

9. **Press F2_Back.**
   The Boot Tasks screen is displayed.

10. **Press F3_Back.**
    After drivers on your machine are loaded, the Boot Solaris screen is displayed.

11. Continue booting your machine as you normally would.

ISA Devices

If your system hangs or resets when you scan for ISA devices, perform these tasks (in order, as explained in the next three sections) until you can successfully complete the scan.

- Identify a problem with an existing device.
- Find and resolve resource conflicts.
- Provide information about the device manually.

Identifying a Problem With an Existing Device

1. **Consult the manufacturer's documentation. Ensure that the device is properly configured and does not conflict with other devices in the system.**

2. **Boot the Solaris 8 (Intel Platform Edition) Device Configuration Assistant from the boot diskette or the installation CD.**

3. **Select Specific Scan to identify the devices that are automatically detected.**

4. **Select the device that you think caused the hang, and start the scan.**
   - If the scan doesn't hang, the problem might be due to the order in which the devices were scanned. Go to Step 5.
   - If the scan hangs, there is probably a hardware conflict. Verify that the device is in your machine. Double check for conflicts by consulting the manufacturer's documentation for all installed hardware. Proceed to "Finding and Resolving Resource Conflicts" on page 12.

5. **Scan for each remaining device in the system.**

   If the hang is caused by a "software probe conflict," you might be able to prevent the hang by scanning for each device in a different order from the one used to scan for all devices.

6. **When the scan is successful, go to the Boot Solaris menu and select a device to boot from.**
   - If you plan to boot or install from a CD-ROM, select CD.
   - If you plan to boot or install using the network and your machine is registered as a netinstall client, select NET.
   - If you plan to boot from the machine's installed hard disk, select DISK.

7. **Boot and install the Solaris software.**

Finding and Resolving Resource Conflicts

1. **Boot the Solaris 8 (Intel Platform Edition) Device Configuration Assistant from the boot diskette or the installation CD.**

2. **Select Specific Scan to identify only the automatically detected devices.**

3. **Select each device in the system that did not cause the initial hang.**

4. **Go to the Device Tasks menu, select View/Edit Devices, and examine the list of devices provided to determine if the problem device conflicts with another device.**

Note - This method might not work if a hardware conflict interferes with the ability of the device scan to correctly determine the configuration of a device.

- If a conflict is found for a device that requires setting jumpers and switches, turn the system off, manually change settings for the problem device, turn the system on, boot the Configuration Assistant, and go to Step 5.
- If a conflict is found for a device that requires a manufacturer's configuration utility, do the following:

a. **Insert the manufacturer's configuration utility diskette.**

b. **Change device settings.**

c. **Boot the Solaris 8 (Intel Platform Edition) Device Configuration Assistant from the boot diskette or the installation CD, and go to Step 5.**

   If a conflict is not found, go to Step 2 in "Providing Information About the Device Manually" on page 13. You don't have to reboot.

5. **Select Specific Scan.**

6. **When the scan is successful, go to the Boot Solaris menu and select a device to boot from.**
   - If you plan to boot or install from a CD-ROM, select CD.
   - If you plan to boot or install using the network and your machine is registered as a netinstall client, select NET.
   - If you plan to boot from the machine's installed hard disk, select DISK.

7. **Boot and install the Solaris software.**

Providing Information About the Device Manually

1. **Boot the Solaris 8 (Intel Platform Edition) Device Configuration Assistant from the boot diskette or the installation CD.**

2. **If all other devices have been found by selective scanning, select View/Edit Devices from the Device Tasks menu and manually add the name of the problem device.**

   The program should warn you if there is a conflict.

3. **When the scan is successful, go to the Boot Solaris menu and select a device to boot from.**
   - If you plan to boot or install from a CD-ROM, select CD.
   - If you plan to boot or install using the network and your machine is registered as a netinstall client, select NET.
   - If you plan to boot from the machine's installed hard disk, select DISK.

Note - If the device hangs again when attempting to go the Boot Solaris menu or the device does not function, contact your support provider.

Unrecognized Devices

Issue	What to Do
How a known ISA or EISA device can be recognized by the Configuration Assistant software	The I/O port address chosen for the unrecognized device might conflict with the I/O port adress of another system device. Provide nonconflicting address information for the unrecognized device using the system BIOS, the EISA configuration utility (ECU), or the configuration programs supplied by the hardware manufacturer. The Configuration Assistant uses that information to identify that device for the Solaris environment.

Identifying ISA or EISA Devices—Sample Procedure

To set the configuration parameters for an ISA or EISA adapter, run the manufacturer's ECU. This utility must be run every time an ISA or EISA board is added, removed, or moved to a different bus slot. Although the function of this utility is standardized, implementations vary among manufacturers, each providing unique user interface screens or menus.

1. **Boot DOS.**

Note - Back up the board manufacturer's EISA configuration diskette before using it to configure your hardware.

2. **For each ISA or EISA add-in adapter to be configured, copy the EISA `.cfg` and `.ovl` configuration files from the board manufacturer's configuration diskette to the system EISA configuration diskette.**

3. **Run the ECU.**
   The program is called `CF.EXE` or `CFG.EXE`.

4. **For each device, set the appropriate configuration parameters and any special operating modes.**

Autobooting

Issue	What to Do

How to recover if your machine fails to autoboot	If you have a loopback serial cable between COM1 and COM2 with autobooting enabled, use the `eeprom` command to set one of the following properties:
	`eeprom com1-noprobe=true`
	or
	`eeprom com2-noprobe=true`

Using Manufacturers' Configuration Programs

Self-Identifying Plug and Play ISA Devices

Issue	What to Do
How to activate Plug and Play mode	Set the switch to Plug and Play mode, and plug the device into the system. The software will configure it automatically.

PCI Devices

Issue	What to Do
How to control the assignments of IRQs to PCI devices	In the chipset configuration of the system, verify that an IRQ is enabled for PCI bus use. After checking IRQs used by ISA devices, assign as many available IRQs to PCI devices as possible so the PCI bus can resolve device conflicts.

System BIOS

Issue	What to Do
How to use the system BIOS to change device settings	Refer to the manufacturer's documentation for the method of accessing the BIOS setup for your system and the features it provides.
How to set up a cachable region in system memory for American Megatrends, Inc. (AMI) BIOS	For the best performance, make the cachable region equal to the total memory installed in the system.

Configuring Video Display Devices, Monitors, Keyboards, and Pointing Devices

The `kdmconfig` program attempts to identify and configure the hardware devices required for running the Common Desktop Environment (CDE) or other windowing system. These devices include the video controller, monitor, keyboard, and pointing device. `kdmconfig` is automatically run during system startup and if it detects that any of the required hardware has changed, it gives you the chance to test or change the new configuration. `kdmconfig` can also be run from the command line.

After all the required devices have been specified, `kdmconfig` lets you test the configuration by putting up a simple test display. Click Yes to accept the current configuration; otherwise, click No or press any key to reconfigure.

`kdmconfig` might not be able to properly identify some supported hardware devices. In these instances, use `kdmconfig` to manually specify the devices.

Ethernet Device Configuration

Duplex Settings

An Ethernet adapter and its link partner (such as a hub, switch, or another network adapter connected via a crossover cable) must operate at the same duplex settings.

- If the adapter and link partner support NWay media autonegotiation, both devices should automatically select optimal speed and duplex mode.
- If NWay autonegotiation is not supported or is not configured on either the adapter or its link partner, both devices must be explicitly set to run at the same duplex mode. A device usually defaults to half-duplex operation if it can't determine the link partner's duplex capabilities.

  - A hub or switch that supports full-duplex operation usually has a mechanism that sets duplex mode on a per-device or per-port basis. Setting speed, duplex mode, or both in this manner usually disables NWay autonegotiation for the device or port.
  - A network adapter supported by the `dnet` device driver must have its duplex mode set in the driver's `.conf` file. See the device driver man page for details.

    Operating speed can sometimes be set in the driver's `.conf` file, but NWay autonegotiation might be disabled when using this method.

A device is usually able to detect the speed (but not the duplex mode) of its link partner, even without NWay autonegotiation.

Connector Types

Device Reference Pages specify the supported connector type where appropriate. All network devices are assumed to work at 10 Mbps only, unless otherwise specified in the Device Reference Pages. Following are network connectors and the media they support.

Connector	Supported Media	Comments	Speed
RJ-45	10BASE-T	Category-3 Twisted Pair cable	10 Mbps
RJ-45	100BASE-TX	Category-5 Twisted Pair cable	100 Mbps
BNC	10BASE2	Coax cable (“Thin” Ethernet cable)	10 Mbps
AUI	10BASE5	Shielded Twisted Pair (“Thick” Ethernet cable)	10 Mbps

100–Mbps Ethernet Performance

Some PCI motherboards contain DMA chipsets that are unable to support 100-Mbps Fast Ethernet. The Solaris environment does not support 100-Mbps PCI network operation on systems containing the slow chipsets. This problem affects PCI cards only.

These chipsets are known to exhibit this problem:

- 82430LX (Mercury)
- 82450GX (Orion) (A and B steppings only)

These chipsets do *not* exhibit this problem:

- 82430NX (Neptune)
- 82430FX (Triton)
- 82430HX (Triton II)
- 82440FX (Natoma)
- 82450GX (Orion) (C0 stepping and later)

In particular, PCI cards supported by the `dnet` and `iprb` drivers don’t perform well on machines with the problem chipsets. You must decide whether the performance on a particular machine is adequate for the intended purpose.

Postinstallation Configuration

Replacing a Network Card

If you replace your network adapter with one that uses a different network driver, before rebooting the second time, rename the /etc/hostname.*olddriver*0 file as follows:

```
# mv /etc/hostname.olddriver0 /etc/hostname.newdriver0
```

Note - Any time you add, remove, or replace hardware, run the Configuration Assistant utility.

After renaming the driver, perform a reconfiguration boot for your changes to take effect:

```
# touch /reconfigure
# reboot
```

CHAPTER 2

Device Reference Pages

This chapter describes how to use Device Reference Pages to configure your Intel 32–bit processor architecture (IA) system to run in the Solaris operating environment and to solve configuration problems.

Using Device Reference Pages

Only devices that require special configuration for running Solaris *Intel Platform Edition* have Device Reference Pages.

- Refer to the device manufacturer's documentation for procedures to change device settings.
- Run the manufacturer's DOS utility if available.
- When moving adapters for inspection and configuration, note how cables are inserted in sockets. Some connectors are keyed to prevent incorrect insertion; others are not.
- If a device has selectable configuration parameters, you usually choose the default settings. The Device Reference Pages show settings the Solaris software supports and indicate known conflicts.

The following table shows the Device Reference Pages provided with Solaris 8 *Intel Platform Edition.*

Device Type	Solaris Driver Name	Where to Find Device Reference Pages
Disk Interface	`ata`	"IDE/Enhanced IDE Disk Controller (Including ATAPI CD-ROM)" on page 23
SCSI Host Bus Adapters	`adp`	"Adaptec AHA-2940, 2940W, 2944W, 3940, 3940W HBAs" on page 26
	`cadp`	"Adaptec AHA-2940AU, 2940U, 2940U Dual, 2940UW, 2940UW Dual, 2940U2, 2940U2B, 2940U2W, 2944UW, 2950U2B, 3940AU, 3940AUW, 3940AUWD, 3940U, 3940UW, 3944AUWD, 3950U2B HBAs" on page 28
	`pcscsi`	"AMD PCscsi, PCscsi II, PCnet-SCSI and QLogic QLA510 HBAs" on page 31
	`ncrs`	"Compaq 32-bit Fast SCSI-2 Controller" on page 32
	`cpqncr`	"Compaq 32-bit Fast Wide SCSI-2, Wide Ultra SCSI, Dual Channel Wide Ultra SCSI-3 Controllers" on page 33
	`ncrs`	"LSI Logic (formerly Symbios Logic or NCR) 53C810, 53C810A, 53C815, 53C820, 53C825, 53C825A, 53C860, 53C875, 53C875J, 53C876, 53C895 HBAs" on page 35
	`symhisl`	"LSI Logic (formerly Symbios) 64-bit PCI Dual Channel Ultra2 SCSI 53C896 HBAs" on page 37
	`blogic`	"Mylex (BusLogic) BT-946C, BT-948, BT-956C, BT-956CD, BT-958, BT-958D HBAs" on page 39
SCSI Disk Arrays/ RAID Controllers	`mega`	"American Megatrends MegaRAID 428 SCSI RAID Controller" on page 42

Device Type	Solaris Driver Name	Where to Find Device Reference Pages
	smartii	"Compaq SMART-2, SMART-2DH, SMART-2SL Array Controllers" on page 44
	dpt	"DPT PM2024, PM2044W, PM2044UW, PM2124, PM2124W, PM2144W, PM2144UW SCSI and PM3224, PM3224W, PM3334W, PM3334UW SCSI RAID HBAs" on page 45
	chs	"IBM PC ServeRAID SCSI, ServeRAID II Ultra SCSI, ServeRAID-3 Ultra2 SCSI HBAs" on page 47
	mlx	"Mylex DAC960PD-Ultra, DAC960PD / DAC960P, DAC960PG, DAC960PJ, DAC960PL, DAC960PRL-1, DAC960PTL-1 Controllers" on page 48
Ethernet Network Adapters	elxl	"3Com EtherLink XL (3C900, 3C900-COMBO, 3C900B-COMBO, 3C900B-TPC, 3C900B-TPO), Fast EtherLink XL (3C905-TX, 3C905-T4, 3C905B-TX, 3C905B-T4)" on page 50
	pcn	"AMD PCnet Ethernet (PCnet-PCI, PCnet-PCI II, PCnet-Fast)" on page 52
	cnft	"Compaq NetFlex-3, Netelligent Controllers" on page 53
	dnet	"DEC 21040, 21041, 21140, 21142, 21143 Ethernet" on page 56
	ieef	"Intel EtherExpress PRO / 100 (82556)" on page 60
	iprb	"Intel EtherExpress PRO / 100B (82557), EtherExpress PRO / 100+ (82558, 82559)" on page 61

Device Type	Solaris Driver Name	Where to Find Device Reference Pages
Token Ring Network Adapters	`mtok`	“Madge Smart 16/4 Token Ring” on page 62
Audio Cards	`sbpro`	“Analog Devices AD1848 and Compatible Devices” on page 64
	`sbpro`	“Creative Labs Sound Blaster Pro, Sound Blaster Pro-2” on page 68
	`sbpro`	“Creative Labs Sound Blaster 16, Sound Blaster AWE32, Sound Blaster Vibra 16” on page 70
PC Card (PCMCIA) Hardware	`pcic`	“PC Card Adapters” on page 72
	`pcelx`	“3Com EtherLink III (3C589) PC Card” on page 75
	`pcser`	“Modem and Serial PC Card Devices” on page 78
	`pcram`	“SRAM and DRAM PC Card Devices” on page 81
	`pcata`	“Viper 8260pA, SanDisk Flash, or Any PC Card ATA Devices” on page 84

Disk Interface

IDE/Enhanced IDE Disk Controller (Including ATAPI CD-ROM)

Solaris Device Driver:	`ata`
Device Type:	Hard disk or CD-ROM controller
Supported Configuration:	Two drives per controller, up to four IDE drives if both primary and secondary interfaces are available

Preconfiguration Information

If there are two IDE drives on the same controller, one must be set to “master” and the other to “slave.” Typically, if there is both an IDE hard disk drive and an IDE CD-ROM drive, the hard disk drive is the master, and the CD-ROM drive is the slave, but this isn’t mandatory. If there is only one drive on a controller, it must be set to master.

Supported Settings

Primary controller:

- IRQ Level: 14
- I/O Address: 0x1F0

Secondary controller:

- IRQ Level: 15
- I/O Address: 0x170

If an IDE CD-ROM drive is installed, the system BIOS parameter for that device should be:

- Drive Type: Not installed

If an enhanced IDE drive is installed, set the system BIOS as follows:

- Enhanced IDE Drive: Enabled

Note - If the BIOS supports autoconfiguration, use this facility to set the number of heads, cylinders, and sectors for the IDE hard disk drive. If this capability is not supported by the BIOS, use the settings provided by the disk manufacturer.

Known Problems and Limitations

- The Panasonic LK-MC579B and the Mitsumi FX34005 IDE CD-ROM drives cannot be used to install the Solaris operating environment and are not supported.
- Several vendors ship PCI-equipped machines with IDE interfaces on the motherboard. A number of these machines use the CMD-604 PCI-IDE controller. This chip provides two IDE interfaces. The primary IDE interface is at I/O address 0x1F0 and the secondary interface at 0x170. However, this chip cannot handle simultaneous I/O on both IDE interfaces. This defect causes the Solaris software to hang if both interfaces are used. Use only the primary IDE interface at address 0x1F0.
- You cannot boot from the third or fourth IDE disk drives, although you can install Solaris software on them.
- The Solaris Volume Management software does not work with the Sony CDU-55E CD-ROM drive no matter how it is configured (as the master or the slave). Comment out the following line in the file `/etc/vold.conf` to prevent `vold` from hanging the controller:

```
# use cdrom drive /dev/rdsk/c*s2 dev_cdrom.so cdrom%d
```

- NEC CDR-260/CDR-260R/CDR-273 and Sony CDU-55E ATAPI CD-ROM drives might fail during installation.

- Some systems may have problems booting from IDE drives that are larger than 512 Mbytes, even though the install to the drive succeeds. Disable logical block addressing, and reduce the CMOS geometry information for the drive to be less than 1024 cylinders.
- The Sony CDU-701 CD-ROM drive must be upgraded to use firmware version 1.0r or later to support booting from the CD.

SCSI Host Bus Adapters

Adaptec AHA-2940, 2940W, 2944W, 3940, 3940W HBAs

Solaris Device Driver:	adp
Device Type:	SCSI-2
Adapters:	Adaptec AHA-2940, AHA-2940W, AHA-2944W, AHA-3940, AHA-3940W
Chips:	Adaptec AIC-7850, AIC-7860, AIC-7870, AIC-7880, AIC-7895
Bus Type:	PCI

Preconfiguration Information

The Plug N Play SCAM Support option is not supported.

Known Problems and Limitations

- To use the AHA-3940 or AHA-3940W adapters, the motherboard must have a BIOS that supports the DEC PCI-to-PCI Bridge chip on the host bus adapter.
- User-level programs have exhibited problems on some PCI systems with an Adaptec AHA-2940 or AHA-2940W card, including the following motherboard models:

  - PCI motherboards with a 60-MHz Pentium chip, with PCI chipset numbers S82433LX Z852 and S82434LX Z850. The part numbers of the Intel motherboards are AA616393-007 and AA615988-009.
  - PCI motherboards with a 90-MHz Pentium chip, with PCI chipset numbers S82433NX Z895, S82434NX Z895, and S82434NX Z896. The part number of the

Intel motherboard is 541286-005. (Some Gateway 2000 systems use this motherboard.)

- The AA-619772-002 motherboard with 82433LX Z852 and 82434LX Z882 chips causes random memory inconsistencies. Return the motherboard to the vendor for a replacement.

If problems with user-level programs occur, use the BIOS setup to turn off write-back CPU caching (or all caching if there is no control over the caching algorithm).

- If the AHA-2940 SCSI adapter does not recognize the Quantum Empire 1080S HP 3323 SE or other SCSI disk drive, reduce the Synchronous Transfer rate on the Adaptec controller to 8 Mbps.
- The AHA-3940 has been certified by Adaptec to work on specific systems; however, some testing has shown that the Solaris operating environment works properly in some of those systems and not in others.

Configuration Procedure

Using the Adaptec configuration utility:

- Configure each SCSI device to have a unique SCSI ID, and on the adapter's Advanced Configuration Options setup menu, set the Plug N Play SCAM Support option to Disabled.
- If there is more than one controller (or an embedded controller), try to use one IRQ per controller.
- Enable bus mastering for the slots with your host bus adapters, when the choice is given.
- For older disk drives, tape drives, and most CD-ROM devices, make sure the maximum SCSI data transfer speed is set to 5.0 Mbps.
- Enable support for disks larger than 1 Gbyte if applicable.

Adaptec AHA-2940AU, 2940U, 2940U Dual, 2940UW, 2940UW Dual, 2940U2, 2940U2B, 2940U2W, 2944UW, 2950U2B, 3940AU, 3940AUW, 3940AUWD, 3940U, 3940UW, 3944AUWD, 3950U2B HBAs

Solaris Device Driver:	`cadp`
Device Types:	SCSI, SCSI with Ultra SCSI option, SCSI-3, Ultra SCSI
Adapters:	Adaptec AHA-2940AU, AHA-2940U, AHA-2940U Dual, AHA-2940UW, AHA-2940UW Dual, AHA-2940U2, AHA-2940U2B, AHA-2940U2W, AHA-2944UW, AHA-2950U2B, AHA-3940AU, AHA-3940AUW, AHA-3940AUWD, AHA-3940U, AHA-3940UW, AHA-3944AUWD, AHA-3950U2B
Chips:	Adaptec AIC-7880, AIC-7880 (Rev B), AIC-7890, AIC-7890A, AIC-7890AB, AIC-7891B, AIC-7895, AIC-7896, AIC-7897
Bus Type:	PCI

Preconfiguration Information

- The Plug N Play SCAM Support option is not supported.
- If the BIOS is enabled on the card, ensure that the Adaptec SCSISelect BIOS option Reset SCSI Bus at IC Initialization (under the Advanced Configuration Options menu) is set to Enabled. Run the SCSISelect utility by pressing Ctrl-A when you see the Adaptec banner during system boot.
- If the adapter is being used in a multi-initiator configuration:
  - Ensure that the system boot disk is not on the shared (clustered) bus.
  - Set the Reset SCSI Bus at IC Initialization option to Disabled.
  - Set the Host Adapter BIOS option (under the Advanced Configuration Options menu) to Disabled:Not scan.
  - Edit the `/kernel/drv/cadp.conf` file and add the property:

```
allow-bus-reset=0
```

- Reboot the system after you install patches.

Known Problems and Limitations

- The `cfgadm`(1M) `replace_device` command is unreliable when used to replace a disk attached to an HBA controlled by the `cadp`(7D) driver.

  To replace such a disk, use the `cfgadm remove_device` command followed by a `cfgadm insert_device` command, for example:

```
cfgadm -x remove_device c0::dsk/c0t4d0
cfgadm -x insert_device c0
```

- The `cadp.bef` realmode driver only supports 10 adapters at boot time. Therefore, ensure that the boot disk is attached to one of the first 10 adapters. Note that all targets will be available for installation and use by the Solaris `cadp` (protected mode) driver.
- Running the `format`(1M) command on a Seagate ST19171W 9 GB disk drive fails.
- Some motherboards have problems supporting channel B with boards based on the Adaptec AIC-7895 chip, such as the AHA-2940U Dual and the AHA-2940UW Dual series. The problem arises because the BIOS doesn't properly assign two interrupts for PCI interrupts INTA and INTB on the slot containing the AIC-7895 chip. This causes devices connected to channel B to fail, and messages about timeouts and resets on those devices to appear on the console.

  For example, this problem occurs on the Intel PR440FX (Providence) dual Pentium Pro motherboard, with BIOS revisions up to and including 1.00.08.DI0. For that motherboard, a workaround is to set the "Advanced / PCI IRQ Mapping" feature to "To ISA Legacy IRQs." A similar workaround might apply to other motherboards with problems supporting channel B.

  Another possible workaround is noted on Adaptec's Web site at `http://www.adaptec.com/support/faqs/aha394x.html`.
- If you experience problems when using a narrow SCSI CD-ROM drive on the internal wide interface, disable "negotiate wide," "negotiate sync," or both for that device in the Adaptec configuration utility.
- If you experience problems when using the narrow internal connector, then disable "de-selection" in the Adaptec configuration utility.

- The Fujitsu narrow disk (M1603SAU) has been observed reselecting with an invalid queue tag ID. This is a violation of the SCSI protocol and it causes the `cadp` driver to behave erroneously. Because this is difficult to guard against, it is best to disable tagged queuing for these targets.

  Use the `iostat -E` command to determine if you have a Fujitsu M1603S-512 disk. If you do, edit the `/kernel/drv/cadp.conf` file and add the property `target`*n* `-scsi -options=0x1f78`, where *n* is the target number.
- The IBM external wide disk (DFHSS2W, Revision 1717) is not supported.

Configuration Procedure

Using the Adaptec configuration utility:

- Configure each SCSI device to have a unique SCSI ID. On the Advanced Configuration Options menu, set Plug N Play SCAM Support to Disabled.

  Ensure that devices on either end of the SCSI chain are terminated. When mixing wide (16 bits) and narrow (8 bits) devices on the same wide chain, ensure that a wide device is at the end of the chain. If a narrow device is placed at the end of the chain, the wide devices on the same chain only have the low byte terminated, and this is an illegal configuration.
- If there is more than one controller (or an embedded controller), try to use one IRQ per controller.
- Enable bus mastering for the slot(s) with your host bus adapter(s), when asked.
- For older disk drives, tape drives, and most CD-ROM devices, make sure the maximum SCSI data transfer speed is set to 5.0 Mbps.
- Enable support for disks larger than 1 Gbyte if applicable.

AMD PCscsi, PCscsi II, PCnet-SCSI and QLogic QLA510 HBAs

Solaris Device Driver:	`pcscsi`
Device Type:	SCSI
Adapter:	QLogic QLA510
Chips:	AMD 53C974 (PCscsi), 53C974A (PCscsi II), Am79C974 (PCnet-SCSI) (SCSI device only) QLogic FAS974
Bus Type:	PCI
Systems Supported:	PCnet-SCSI chip is integrated in the HP Vectra XU 5/90 and Compaq Deskpro XL systems

Preconfiguration Information

Only the SCSI portion of the PCnet-SCSI host bus adapter is discussed here; the net portion requires a separate Solaris driver (`pcn`). See “AMD PCnet Ethernet (PCnet-PCI, PCnet-PCI II, PCnet-Fast)” on page 52for configuration information about Ethernet capabilities.

Known Problems and Limitations

- Occasional data corruption has occurred when `pcn` and `pcscsi` drivers in HP Vectra XU 5/90 and Compaq Deskpro XL systems are used under high network and SCSI loads. These drivers do not perform well in a production server.

  A possible workaround is to disable the `pcn` device with the system BIOS and use a separate add-in network interface.

- The SCSI Tagged Queuing option is not supported.

Compaq 32-bit Fast SCSI-2 Controller

Solaris Device Driver:	`ncrs`
Device Type:	SCSI-2
Adapter:	Compaq Integrated 32-bit Fast-SCSI-2/P, 53C810 chip
Bus Type:	PCI

This is a third-party driver developed by Compaq Computer Corporation. For support and information about possible updates to this driver, contact Compaq at `http://www.compaq.com`.

Preconfiguration Information

Supported Settings

• BIOS Hard Drive Geometry:	<= 1 GB: 64 Heads, 32 Sectors
	> 1 GB: 255 Heads, 63 Sectors

Compaq 32-bit Fast Wide SCSI-2, Wide Ultra SCSI, Dual Channel Wide Ultra SCSI-3 Controllers

Solaris Device Driver:	`cpqncr`
Device Type:	SCSI
Adapters:	Compaq 32-bit Fast Wide SCSI-2, Wide Ultra SCSI, and Dual Channel Wide Ultra SCSI-3 Controllers in Compaq Servers: 825 Add-on PCI, Integrated 825 PCI, 875 Add-on PCI, Integrated 875 PCI, Integrated 876 PCI
Bus Type:	PCI

This is a third-party driver developed by Compaq Computer Corporation. For support and information about possible updates to this driver, contact Compaq at `http://www.compaq.com`.

Preconfiguration Information

- Ensure that the Compaq 825, 875, or 876 PCI controller is in one of the PCI slots in the server.

Configuration Procedure

1. **Install the Solaris software.**

2. **Modify the driver configuration file** `/kernel/drv/cpqncr.conf`**.**

   This file specifies the valid configurable parameters for the driver:

   - `tag_enable`: This property enables or disables tagged queuing support by the driver and can be set to the following values:
     - 0 - Disabled (Default)

- 1 - Enabled

- `alrm_msg_enable`: This property enables or disables Alarm messages due to faults in the Compaq Storage system connected to the 825, 875, or 876 controller. The valid values are:
  - 0 - Disabled
  - 1 - Enabled (Default)
- `debug_flag`: This property enables or disables debug messages from the driver. The valid values are:
  - 0 - Disabled (Default)
  - 1 - Enabled
- `queue_depth`: This property specifies the number of active requests the driver can handle for a controller. The maximum and default value for this property is 37; the minimal value is 13. You can reduce the value to support multiple controllers if you cannot allocate enough memory while trying to load the driver.
- `board_id`: This property specifies additional controller IDs the driver has to support. The driver currently supports Compaq 825, 875, and 876 controllers. It recognizes the board ID for Compaq 825 Fast Wide SCSI-2, Compaq 875 Wide Ultra SCSI, and Compaq Dual Channel Wide Ultra SCSI-3 controllers by default.
- `ignore-hardware-nodes`: Set this property to 0 if present.

3. To activate the configuration changes, as root type:

```
# touch /reconfigure
# reboot
```

LSI Logic (formerly Symbios Logic or NCR) 53C810, 53C810A, 53C815, 53C820, 53C825, 53C825A, 53C860, 53C875, 53C875J, 53C876, 53C895 HBAs

Solaris Device Driver:	`ncrs`
Device Type:	SCSI
Adapters:	LSI Logic (formerly Symbios Logic or NCR) 53C810, 53C810A, 53C815, 53C820, 53C825, 53C825A, 53C860, 53C875, 53C875J, 53C876, 53C895
Bus Type:	PCI

Preconfiguration Information

Known Problems and Limitations

- Because the LSI Logic BIOS and the Solaris `fdisk` program might be incompatible, use the DOS version of `FDISK` (or equivalent utility) to create an entry in the `FDISK` partition table before installing the Solaris software. Create at least a 1-cylinder DOS partition starting at cylinder 0. If the DOS partition isn't created, the system won't reboot after Solaris installation.
- An add-in card with the 53C815, 53C820, 53C825, or 53C825A controller can only be used in a bus-mastering PCI slot. On motherboards with only two PCI slots, both of the PCI slots are usually bus-master capable. On motherboards with three or more PCI slots, and on motherboards with several embedded PCI controllers, some of the PCI slots may not be bus-master capable.
- Some PCI motherboards with the LSI Logic SDMS BIOS and an embedded 53C810 or 53C810A controller do not work correctly with the 53C820, 53C825, and 53C825A add-in cards that also have an LSI Logic SDMS BIOS. Upgrading the motherboard BIOS, the add-in card, or both may prevent these conflicts.
- On some early PCI systems with the 53C810 chip on the motherboard, the interrupt pin on the chip is not connected. Such a system cannot be used with Solaris software.

- Do not attempt to connect wide targets to the narrow connector of the cards listed as supporting narrow disks. These configurations are not supported.
- If your adapter supports the LSI Logic SCSI Configuration utility, which can be accessed by pressing Control-C, do not change the value of the Host SCSI ID (an option under the Adapter Setup menu) to anything but 7.
- If you experience problems with old target devices, add the following entry to the `/kernel/drv/ncrs.conf` file:

```
targetN-scsi-options = 0x0;
```

  where *N* is the ID of the failing target.

- If you are using a Conner 10805 narrow SCSI drive, you might see warnings like:

```
WARNING: /pci@0,0/pci1000,f@d(ncrs0):
invalid reselection(0,0)
WARNING: /pci@0,0/pci1000,f@d/sd@0,0(sd0):
SCSI transport failed: 'reset: retrying command'
```

  You can suppress these warnings by disabling tagged queuing in the `ncrs.conf` file. See the `ncrs`(7D) man page.

- On some Pentium motherboards (Intel NX chipset) using P90 or slower processors, `ncrs` hangs and this message is displayed on the console:

```
WARNING: /pci@0,0/pci1000,3@6(ncrs0)
Unexpected DMA state:active dstat=c0<DMA-FIFO-empty,
master-data-parity-error>
```

  This is an unrecoverable state; the system will not install using the `ncrs` driver.

- The `ncrs` driver supports at least Revision 4 of the 53C875 chipset. Previous revisions were pre-release versions of the chip, so there might still be a few in circulation.
- In rare circumstances, when using an SDT7000/SDT9000 tape drive, you see this message on the console:

```
Unexpected DMA state: ACTIVE. dstat=81<DMA-FIFO-empty,illegal-instruction>
```

  In these instances, the system recovers and the tape drive remains usable. You can still use the `tar` command to add or extract files to or from the tape in the drive.

LSI Logic (formerly Symbios) 64-bit PCI Dual Channel Ultra2 SCSI 53C896 HBAs

Solaris Device Driver:	`symhisl`
Device Type:	SCSI
Adapters:	SYM22910 (both channel A and B support SE and LVD mode), SYM21002 (channel A supports SE only, channel B supports both SE and LVD mode)
Chip:	SYM53C896
Bus Type:	PCI

Preconfiguration Information

Known Problems and Limitations

- For Ultra2 SCSI LVD transfer, make sure you use an Ultra2 SCSI LVD-compliant SCSI cable. Also, for best performance, keep the devices 6–8 inches apart.
- If both the 53C896 chip and an older 53C8*xx* chip are embedded on the motherboard, when your system boots, the system BIOS recognizes the older 53C8*xx* chip first. In this case, wait until the newer version of the Symbios SDMS BIOS, which supports the newer 53C896 chip, recognizes all 53C8*xx* chips embedded on your motherboard before proceeding.

  To prevent the older BIOS utility from coming up, reflash the older 53C8*xx* BIOS of the add-in controller.

  You can download the latest Symbios SDMS BIOS from `http://www.symbios.com/techsupport/pci_sw.htm#Symbios CPI BIOS & Flash Utility`.
- Due to a hardware problem in revisions B0 and C0 of the 53C896 chip, the `symhisl` driver does not work properly with 64-bit PCI slots. The `symhisl` driver issues a SCSI bus reset when the problem occurs. To avoid this problem, upgrade to revision C1 of the 53C896 chip.

  Other revisions of the 53C896 chip might exhibit hardware incompatibilities with earlier PCI chips and designs. For a complete list of errata about each revision of the 53C896 chip, see LSI Logic's Web site (`http://www.lsil.com`).

- Under some conditions, LVD technology may exhibit firmware incompatibilities. If you experience SCSI errors with a correctly configured LVD SCSI bus, contact the manufacturer for updated firmware.

Mylex (BusLogic) BT-946C, BT-948, BT-956C, BT-956CD, BT-958, BT-958D HBAs

Solaris Device Driver:	`blogic`
Device Type:	SCSI
Adapters:	Mylex (BusLogic) BT-946C, BT-948, BT-956C, BT-956CD, BT-958, BT-958D
Bus Type:	PCI

This is a third-party driver developed by BusLogic, which is now owned by Mylex Corporation. For support and information about possible updates to this driver, contact Mylex at `http://www.mylex.com`.

Preconfiguration Information

- If your BT-946C PCI card is labeled Rev. A or B, it needs to be supported in ISA emulation mode; use I/O address 0x334.

Note - Look at the card itself to find the revision level. The revision of the card is not provided in the manufacturer's documentation.

- If your BT-946C is labeled Rev. C, it can be supported in native PCI mode. To do this, select "Advanced option," and choose "NO" for the "Host Adapter I/O Port Address as default" option.
- If your PCI card is model BT-956C or model BT-946C Rev. E, it can also be supported in native PCI mode. To do this, disable the "Set ISA Compatible I/O Port (PCI Only)" option.
- If your board model ends in "C", you must enter the AutoSCSI configuration utility and check the termination.

Supported Settings

- IRQ Level: 5, 6, 7, 8, 9, 10, 11, 12, 14, 15
- I/O Address: 0x334, 0x230, 0x234, 0x130, 0x134

Note - I/O addresses are dynamically configured for BT-946C Rev. C PCI adapters.

Known Problems and Limitations

- Do not run the `drvconfig` utility during heavy I/O involving disks and tapes because doing so can cause data overrun errors.
- Data overrun errors may occur under high stress when your system is configured with multiple disks.
- If problems occur during Solaris installation, set the Interrupt Pin number of the "Configure Adapter" option in the manufacturer's AutoSCSI utility as follows:

Slot	Interrupt Pin
0	A
1	B
2	C

  For more information, see the sections "Configuration for Non-Conforming PCI Motherboards" and "Handling Motherboard Variations" in the documentation that comes with your board.

- Early versions of Rev. A, B, and C of the BT-946C may not work with the Solaris operating environment.

  Upgrade to at least Firmware 4.25J, BIOS 4.92E, and AutoSCSI 1.06E, if you have BT946C Rev. B. Upgrade the controller to at least BT946C Rev. E.

Configuration Procedure

BT-946C, Rev. A and B Only

Insert the board into the bus master slot, and using the AutoSCSI utility:

- If the boot disk is larger than 1 Gbyte, set the “Adapter BIOS Supports Space > 1 GB (DOS) only” option to Yes.
- Put the adapter in ISA-compatible mode by setting the value for “Set Host Bus Adapter I/O Port Address as Default” to No.
- Ensure the Advanced option “BIOS Support for > 2 Drives (DOS 5.0 or above)” is set to No.
- Configure the IRQ and BIOS address values manually if your PCI motherboard is not fully PCI-specification compliant. If the system hangs while installing the Solaris software, do the following:

  - Check the IRQ jumpers on the motherboard, if any.
  - Run the CMOS utility to set the IRQ and BIOS addresses, if any.
  - Run the AutoSCSI utility.

  All the settings should match each other. If you need to manually configure the BIOS address, you may have to check jumpers JP4 and JP5.

BT-946C (Rev. C) and BT-956C

Insert the board into the bus master slot, and using the AutoSCSI utility:

- If the boot disk is larger than 1 Gbyte, set the “Adapter BIOS Supports Space > 1 GB (DOS) only” option to Yes.
- Choose the defaults, except set the 5.1 “BIOS Support for > 2 Drives (DOS 5.0 or above)” to No.

Configuring Multiple Devices

Follow these guidelines when adding a second Mylex PCI controller to a system.

- The already installed PCI board must be the primary controller.
- The primary controller must have an I/O address that precedes the secondary controller in “Supported Settings” (as listed from left to right). For example, the primary controller can use an I/O address of 0x234, as long as the secondary controller uses either 0x130 or 0x134. The I/O address of each board is determined by its slot. Try different slots until the first card works as the primary controller.
- Disable the BIOS on the secondary controller.
- Wide-mode PCI adapters will support targets greater than 7 if the proper entries are added to the system configuration files: `/kernel/drv/sd.conf` (for disk) and `/kernel/drv/st.conf` (for tape).

SCSI Disk Arrays / RAID Controllers

American Megatrends MegaRAID 428 SCSI RAID Controller

Solaris Device Driver:	`mega`
Device Type:	SCSI RAID
Adapter:	American Megatrends MegaRAID 428 SCSI RAID
Bus Type:	PCI

This is a third-party driver developed by American Megatrends, Inc. For support and information about possible updates to this driver, contact American Megatrends at `http://www.ami.com`.

Configuration Procedure

- Contact American Megatrends to get the optional `megamgr` configuration utility.
- The MegaRAID controller cannot be configured by editing the `/kernel/drv/mega.conf` file.
- Follow this procedure to configure and use more than one logical drive. If the `/kernel/drv/sd.conf` file is not carefully edited, the system might panic upon reboot.

1. **Press Control-M while the system is starting up to configure the controller and all logical drives.**

2. **Install the Solaris software and reboot.**

   You will only see a single logical drive available during installation.

3. **In the** `/kernel/drv/sd.conf` **file, add additional drives by duplicating the existing entry for** `target=0` **and incrementing the** `lun` **field by one for each additional logical drive you want the Solaris software to recognize.**

   For example, if you have a total of three logical drives configured on your adapter, you would add the following lines:

```
name="sd" class="scsi"
   target=0 lun=1;
name="sd" class="scsi"
   target=0 lun=2;
```

4. **Reboot.**

   After the system reboots, you can use additional drives.

Compaq SMART-2, SMART-2DH, SMART-2SL Array Controllers

Solaris Device Driver:	`smartii`
Device Type:	Disk Array
Adapters:	Compaq SMART-2, SMART-2DH, SMART-2SL Array Controllers
Bus Type:	PCI
Systems Supported:	Internal and external SCSI drives on Compaq servers

This is a third-party driver developed by Compaq Computer Corporation. For support and information about possible updates to this driver, contact Compaq at `http://www.compaq.com`.

Preconfiguration Information

- These controllers only support SCSI disk drives. SCSI tape drives and CD-ROM drives are not supported.
- The boot device *must* be logical drive 0 on the *primary* controller. Even though the BIOS lets you configure any controller as the primary controller, it will only let you boot from logical drive 0 on that controller.

Known Problems and Limitations

- If disks on a *failed* drive are replaced by hot-plugging during I/O, the system panics.
- Firmware version 1.26 of the SMART-2 PCI controller is slow. For best results, use firmware version 1.36.

DPT PM2024, PM2044W, PM2044UW, PM2124, PM2124W, PM2144W, PM2144UW SCSI and PM3224, PM3224W, PM3334W, PM3334UW SCSI RAID HBAs

Solaris Device Driver:	`dpt`
Device Type:	SCSI, SCSI RAID
Adapters:	DPT PM2024, PM2044W, PM2044UW, PM2124, PM2124W, PM2144W, PM2144UW SCSI DPT PM3224, PM3224W, PM3334W, PM3334UW SCSI RAID
Bus Type:	PCI

This is a third-party driver developed by DPT. For support and information about possible updates to this driver, contact DPT at `http://www.dpt.com`.

Preconfiguration Information

- DPT PM3224 *only*: The EPROM should not be before version 7A.
- DPT PM2024 and PM2124 *only:* The EPROM should not be before version 6D4.
- Don’t use an adapter with a SmartROM before version 3.B.
- Ensure that the controller board is installed in a PCI bus-mastering slot.
- If the firmware version of the controller is before 7A, or if your computer memory is ECC or does not check parity, disable PCI parity checking.

Known Problems and Limitations

During the system boot, if you see a message that a DPT controller driver cannot be installed, the motherboard installed in your system probably has ECC memory or does not check parity; disable PCI parity checking.

Supported Settings

- I/O Address: Auto

IBM PC ServeRAID SCSI, ServeRAID II Ultra SCSI, ServeRAID-3 Ultra2 SCSI HBAs

Solaris Device Driver:	`chs`
Device Type:	SCSI RAID
Adapters:	IBM PC ServeRAID SCSI, ServeRAID II Ultra SCSI, ServeRAID-3 Ultra2 SCSI
Bus Type:	PCI

This is a third-party driver developed by Compaq Computer Corporation. For support and information about possible updates to this driver, contact Compaq at `http://www.compaq.com`.

Preconfiguration Information

Known Problems and Limitations

To prevent data loss, a SCSI disk drive that is not defined to be part of any physical pack within a logical drive won't be accessible through the Solaris operating environment.

Mylex DAC960PD-Ultra, DAC960PD/DAC960P, DAC960PG, DAC960PJ, DAC960PL, DAC960PRL-1, DAC960PTL-1 Controllers

Solaris Device Driver:	`mlx`
Device Type:	SCSI-2 RAID
Adapters:	Mylex DAC960PD-Ultra (PCI-to-UltraSCSI) DAC960PD/DAC960P (PCI-to-SCSI) DAC960PG (PCI-to-SCSI) DAC960PJ (PCI-to-SCSI) DAC960PL (PCI-to-SCSI) DAC960PRL-1 (PCI-to-SCSI) DAC960PTL-1 (PCI-to-SCSI)
Bus Type:	PCI

Preconfiguration Information

- The choice of SCSI target ID numbers is limited. Assuming the maximum number of targets per channel on the particular controller is MAX_TGT, the SCSI target IDs on a given channel should range from 0 to (MAX_TGT – 1). See the vendor documentation for more information.
- SCSI target IDs on one channel can be repeated on other channels.

  Example 1: The 5-channel models support a maximum of four targets per channel, that is, MAX_TGT = 4. Therefore, the SCSI target IDs on a given channel should range from 0 to 3.

  Example 2: The 3-channel models support a maximum of seven targets per channel, that is, MAX_TGT = 7. Therefore, the SCSI target IDs on a given channel should range from 0 to 6.

Known Problems and Limitations

- If a SCSI disk drive is not defined to be part of any physical pack within a system drive, it is automatically labeled as a standby drive. If any SCSI disk drive within a system drive fails, data on a standby drive may be lost due to the standby replacement procedure. This replacement procedure will overwrite the standby drive if the failed disk drive is configured with any level of redundancy (RAID levels 1, 5, and 6) and its size is identical to the size of the available standby drive.

  Therefore, even though a standby drive is physically connected, the system denies access to it so no data can be accidentally lost.

- Other than the standby rebuild of disk drives, which is described in the manufacturer's user's guide, these controllers do not support hot-plugging.

  To add or remove devices, shut down the system, add or remove the devices, reconfigure the HBA using the vendor's configuration utility, and reconfigure-reboot (`b -r`) your system.

- The driver does not support variable-length tape drives or multivolume backup or restore for tape drives connected to the controller.

- Due to a Mylex firmware limitation, on older cards, SCSI tape and CD-ROM devices will not function reliably when attached on a channel that also contains SCSI hard disk drives. However, on newer PCI SCSI cards such as the DAC960PG and DAC960PJ, this limitation has not been observed. The latest firmware for any Mylex card can be obtained from its Web site.

  A tape block size greater than 32 Kbytes cannot be used. To be certain of correct SCSI device operation on all cards, use SCSI tape and CR-ROM devices only on an otherwise unused channel and with a fixed block size of 32 Kbytes or less.

- Long tape commands (erasing a large tape) might fail because the Mylex controllers have a one-hour timeout maximum for the command.

- Enable tag queuing only for SCSI disk drives that are officially tested and approved by Mylex Corporation for the DAC960 controller family. Otherwise, disable tag queuing to avoid problems.

- The command `mt erase` works but might report the following error message when it gets to the end of the tape:

```
/dev/rmt/0 erase failed: I/O error
```

  This message can be ignored.

Ethernet Network Adapters

3Com EtherLink XL (3C900, 3C900-COMBO, 3C900B-COMBO, 3C900B-TPC, 3C900B-TPO), Fast EtherLink XL (3C905-TX, 3C905-T4, 3C905B-TX, 3C905B-T4)

Solaris Device Driver:	`elxl`
Device Type:	Network (Ethernet)
Adapters:	3Com EtherLink XL (3C900, 3C900-COMBO, 3C900B-COMBO, 3C900B-TPC, 3C900B-TPO) Fast EtherLink XL (3C905-TX, 3C905-T4, 3C905B-TX, 3C905B-T4)
Bus Type:	PCI

Preconfiguration Information

Supported Settings

• Media Type:	Auto Select

Known Problems and Limitations

3C905B cards in a Compaq ProLiant 6500 can fail to generate interrupts. There is no known workaround for this problem. However, since some slots appear to be more prone to the problem than others, moving the card to another PCI slot might help.

Also, successive reboots of the machine have succeeded in getting the card out of the wedged state.

AMD PCnet Ethernet (PCnet-PCI, PCnet-PCI II, PCnet-Fast)

Solaris Device Driver:	pcn
Device Type:	Network (Ethernet)
Adapter:	AMD PCnet
Chips:	PCnet-PCI, PCnet-PCI II, PCnet-Fast
Bus Type:	PCI

Preconfiguration Information

Known Problems and Limitations

The Solaris pcn driver does not support IRQ 4.

Compaq NetFlex-3, Netelligent Controllers

Solaris Device Driver: `cnft`

Device Type: Network (Ethernet)

Adapters:

- Compaq NetFlex-3/P and:
  - 10BASE-T UTP Module (included)
  - 10/100BASE-TX UTP Module (optional)
  - 100VG-AnyLAN UTP Module (optional)
  - 100BASE-FX Module (optional)
- Compaq Netelligent 10 T PCI UTP with TLAN 2.3 or TLAN 3.03
- Compaq Netelligent 10/100 TX PCI UTP with TLAN 2.3 or TLAN 3.03
- Compaq NetFlex-3 PCI with TLAN 2.3 and:
  - 10BASE-T UTP Module (included)
  - 10/100BASE-TX UTP Module (optional)
  - 100VG-AnyLAN UTP Module (optional)
  - 100BASE-FX Module (optional)
- Compaq NetFlex-3 DualPort 10/100TX PCI UTP
- Compaq Integrated NetFlex-3 10/100 T PCI with AUI on ProLiant 2500
- Compaq Integrated NetFlex-3 10/100 T PCI UTP/BNC on Deskpro 4000/6000 and ProLiant 800
- Compaq Netelligent 10 T PCI UTP Version 2 with TLAN 3.03
- Compaq Netelligent 10/100 T PCI UTP Version 2 with TLAN 3.03

Bus Type: PCI

This is a third-party driver developed by Compaq Computer Corporation. For support and information about possible updates to this driver, contact Compaq at `http://www.compaq.com`.

Preconfiguration Information

- Insert a 10BASE-T UTP, 10/100BASE-TX UTP, 100BASE-FX, or 100VG-AnyLAN UTP module into the NetFlex-3 PCI controller base unit. For Netelligent and DualPort controllers, this step is not required.

Supported Settings

NetFlex-3/P controllers:

- IRQ Level: 2(9), 3, 4, 5, 6, 7, 10, 11

Netelligent controllers:

- IRQ Level: 2(9), 3, 4, 5, 6, 7, 10, 11, 12, 14, 15

Known Problems and Limitations

- Trying to remove NetFlex-3 controllers configured at the same IRQ produces the error message: "Couldn't remove function . . . . from *ipl, irq*".
- Configuring a NetFlex-3 controller and a NetFlex-2 controller on the same IRQ line on the same server could result in one of the controllers not being available. Configure the two cards to different IRQ lines.
- To get good performance for 100BASE, full duplex operation, the media speed and duplex mode have to be forced to 100 and 2, respectively.
- Both the UTP and AUI interfaces are supported by the Integrated NetFlex-3 controller on the ProLiant 2500. However, net booting is supported only using the UTP interface.
- Netbooting is supported only using the UTP interface on the ProLiant 800 and Deskpro 4000/6000.

Configuration Procedure

1. **Install the Solaris software.**

2. **Modify the driver configuration file** `/platform/i86pc/kernel/drv/cnft.conf`**.**

   This file specifies the valid configurable parameters for the driver:

   - `duplex_mode`: This property forces the duplex mode for the controller. It can be set to:
     - 0 - Autoconfigure (Default)

- 1 - Half duplex
- 2 - Full duplex

- `media_speed`: This property sets the media speed for the controller. This option can be used to force the 10/100BASE-TX to 10- or 100-Mbps operation. The media speed is autoconfigured by default. The valid values are:
  - 0 - Autoconfigure (Default)
  - 10 - Force 10-Mbps media speed
  - 100 - Force 100-Mbps media speed
- `max_tx_lsts`, `max_rx_lsts`, `tx_threshold`: These properties tune driver performance. The valid values are:

Property	Valid Values	Default Value
`max_tx_lsts`	4 to 16	16
`max_rx_lsts`	4 to 16	16
`tx_threshold`	2 to 16	16

- `debug_flag`: Set this property to 1 or 0 to enable or disable debug messages from the driver. Debug messages are disabled by default.
- `mediaconnector`: Set to 1 to enable the AUI interface for the Integrated NetFlex-3 controller on ProLiant 2500 systems or to enable the BNC interface on the Integrated NetFlex-3 controller on the ProLiant 800 and Deskpro 4000/6000. The UTP interface is the default (0).
- `board_id`: Set this property to support additional PCI controllers. The format of the `board_id` is 0x*VVVVDDDD*, where *VVVV* means vendor ID and *DDDD*, device ID. More than one ID can be specified, if required.

3. To activate the configuration changes, as root type:

```
# touch /reconfigure
# reboot
```

DEC 21040, 21041, 21140, 21142, 21143 Ethernet

Solaris Device Driver: `dnet`

Device Type: Network (Ethernet)

Adapters: DEC 21040, 21041, 21140, 21142, 21143

Bus Type: PCI

Preconfiguration Information

The PCI configuration process varies from system to system. Follow the instructions provided by the vendor.

Supported Settings

These successfully tested 21040/21041/21140/21142/21143-based adapters are supported.

Name/Model	Part/Version	Chip 21*xxx*	10 MB Media	100 MB Media	Notes
Adaptec ANA-6911A/C	–	143PA	T B	X	
Adaptec ANA-6911A/TX	–	143PA	T	X	
AsanteFAST	09-00087-11 D	140AA	T	X	B
CNet PowerNIC CN935E	A	041AA	T B		
Cogent EM110 T4	110101-01	140	T B	4	
Cogent EM110TX	110001-02 06	140AB	T	X	
Cogent EM110TX	110001-03 01	140AB	T	X	
Cogent EM110TX	110001-03 14	140AC	T	X	
Cogent EM440 QUAD	440001-01 01	140AC	T	X	B

Name/Model	Part/Version	Chip 21*xxx*	10 MB Media	100 MB Media	Notes
Cogent EM960C	960001-03 06	040AA	T B A		
Cogent EM960C	960001-04 02	040AA	T B A		1
Cogent EM960TP	960001-03 07	040AA	T		
Cogent EM960TP	960001-04 01	040AA	T		
Cogent EM964 QUAD	964001-00 01	040AA	T		
Compex ReadyLINK ENET32	B2	040AA	T B A		
D-Link DE530CT	A2	040AA	T B		
D-Link DE530CT	D2	041AA	T B		
D-Link DE530CT+	A1	040AA	T B		
DEC EtherWORKS 10/100	DE500 RevD01	140AC	T	X	5, C
DEC EtherWORKS PCI 10/100	DE500-XA RevC01	140AB	T	X	5, C
Diversified Tech	651205025 1.2	140AC	T	X	A
Kingston KNE40BT	2001585 A00	041AA	T B		
Kingston KNE100TX	2001837-000.A00	140AC	T	X	B
Kingston KNE100TX	2001837-000.B00	140AC	T	X	D
Kingston KNE100TX	9920219-001.B00	140AB	T	X	B
Kingston KNE100TX	9920219-002.B00	140AC	T	X	D
Linksys LNE100TX	8EFPCI01..B1-1	140AB	T	X	6
Linksys LNE100TX	8EFPCI01..B1-3	140AC	T	X	6
NetGear	FA310TX-C2	140AE	T	X	
NetGear	FA310TX-C6	140AF	T	X	
Osicom (Rockwell) RNS2300	320109-02	140AB	T	X	

Name/Model	Part/Version	Chip 21*xxx*	10 MB Media	100 MB Media	Notes
Osicom (Rockwell) RNS2340 QUAD	320112-00	140AB	T	X	2
SMC 8432BT	60-600510-003 A	040AA	T B		
SMC 8432BT	60-600528-001 A	041AA	T B		
SMC 8432BT	61-600510-010 B	040AA	T B		
SMC 8432BTA	60-600510-003 A	040AA	T B A		
SMC 8432BTA	61-600510-000	040AA	T B A		
SMC 8432T	60-600528-001 A	041AA	T		
SMC 9332BDT	60-600542-000 A	140AC	T	X	B
SMC 9332DST	60-600518-002 A	140	T	X	3
SMC 9332DST	61-600518-000 B	140	T	X	3
Znyx ZX311	SA0027 01	041AA	T B A		
Znyx ZX312	SA0011 04	040AA	T B A		1
Znyx ZX314 QUAD	PC0009-05	040AA	T		
Znyx ZX314 QUAD	SA0014-05	040AA	T		
Znyx ZX315 DUAL	SA0015 X2	040AA	T B		
Znyx ZX342	PC0012 X2	140	T	X	4
Znyx ZX344 QUAD	SA0019 X2	140AA		X	
Znyx ZX345	SA0025 X1	140AB	T	X	B
Znyx ZX346 QUAD	SA0026 X1	140AC	T	X	A
Znyx ZX348 DUAL	SA0028 X2	140AC	T	X	B

10 MB Media Codes:

- T—Twisted Pair (10BASE-T)

- B—BNC (10BASE2)
- A—AUI (10BASE5)

100 MB Media Codes:

- X—100BASE-TX (Category 5 Unshielded Twisted Pair)
- 4—100BASE-T4

Notes:

- 1—BNC/AUI jumper on board must be set to select between those two media.
- 2—First port is the bottom one (closest to board edge connector).
- 3—STP (Shielded Twisted Pair) medium is not supported.
- 4—Board has separate jacks for 10 Mbytes and 100 Mbytes.
- 5—Only tested on 10BASE-T network.
- 6—Only works on 100TX network.
- A—ICS 1890Y PHY chip.
- B—National Semiconductor DP83840 PHY chip.
- C—National Semiconductor DP83223V PHY chip.
- D—National Semiconductor DP83840VCE PHY chip.

Known Problems and Limitations

- The adapters and configurations listed above are supported by the `dnet` driver, and additional boards will be supported in the future.
- On multiport cards, the first port is the top port, *except* on the Osicom (Rockwell) RNS2340, the first port is the bottom port.
- If the `dnet` driver fails to determine the correct speed and duplex mode, and performance drops, set the speed and duplex mode using the `dnet.conf` file. See the discussion of duplex settings in “Ethernet Device Configuration” on page 16.
- The `dnet` driver incorrectly counts carrier lost or no carrier errors while in full-duplex mode. There is no carrier signal present when in full-duplex mode, and it should not be counted as an error.
- Version 4 SROM formats are not supported.

Intel EtherExpress PRO/100 (82556)

Solaris Device Driver:	`ieef`
Device Type:	Network (Ethernet)
Adapter:	Intel EtherExpress PRO/100 (82556)
Bus Type:	PCI
Connector:	RJ-45

Preconfiguration Information

Known Problems and Limitations

This driver provides 100-Mbps Ethernet support; however, the driver does not currently transfer the data at rates expected of a 100-Mbps interface.

Intel EtherExpress PRO/100B (82557), EtherExpress PRO/100+ (82558, 82559)

Solaris Device Driver:	`iprb`
Device Type:	Network (Ethernet)
Adapters:	Intel EtherExpress PRO/100B (82557) EtherExpress PRO/100+ (82558, 82559)
Bus Type:	PCI
Connector:	RJ-45

Preconfiguration Information

Known Problems and Limitations

IA based systems with the Intel EtherExpress PRO/100B or the Intel EtherExpress PRO/100+ might hang when the interface is brought down at the very instant that a packet is being received.

To avoid this, wait until the system is experiencing light or no network traffic before bringing the interface down.

Token Ring Network Adapters

Madge Smart 16/4 Token Ring

Solaris Device Driver:	`mtok`
Device Type:	Network (Token ring)
Adapters:	Madge Smart 16/4 PCI Ringnode/Bridgenode Smart 16/4 PCI Presto
Bus Type:	PCI

This is a third-party driver developed by Madge Networks. For support and information about possible updates to this driver, contact Madge at `http://www.madge.com/Home/Home.asp`.

Preconfiguration Information

Known Problems and Limitations

When the `mtok` driver is enabled, the following messages appear when the system startup scripts run `ifconfig`:

```
configuring network interfaces: ip_rput: DL_ERROR_ACK for 29
errno 1, unix0
ip: joining multicasts failed on mtok0
will use link layer broadcasts for multicast
```

These messages can be ignored.

Configuration Procedure

Various hardware settings on the adapter, such as the ring speed and DMA channel, can be set with switches on the adapter or using a configuration utility supplied on the MDGBOOT diskette shipped with your Ringnode. Refer to the documentation supplied with the Ringnode for detailed instructions.

When choosing hardware settings:

- Ensure that your Ringnode does not use the same IRQ as other adapters in your PC—and for AT Ringnodes, not the same DMA channel and I/O address.
- Make sure the selected ring speed matches that of the ring you want to connect to.

Note that a configuration utility must almost always be used to select features of the adapter (for example, ring speed). If the adapter isn't functioning properly, try alternate features, such as PIO instead of DMA, different I/O addresses, and so on.

Audio Cards

Analog Devices AD1848 and Compatible Devices

Solaris Device Driver:	`sbpro`
Device Type:	Audio
Chips:	Analog Devices AD1848, Compatible Devices (on computer motherboard or add-in card)
Bus Types:	ISA

Note - The features and interfaces that are supported by the Solaris `sbpro` driver are described in the `audio`(7I) and `sbpro`(7D) man pages.

Compatible Device Information

Selected AD1848-based devices are supported by the `sbpro` device driver. Some audio devices based on other compatible chips are also supported.

Although many audio devices claim to be compatible with other audio devices, they are not always compatible at the hardware level and are not supported by the Solaris software. “Tested Compatible Devices” on page 64 shows which devices have been tested with the Solaris operating environment.

Some cards based on the AD1848 or compatible chips also support advanced audio features that the `sbpro` driver does not currently support.

Tested Compatible Devices

The following AD1848 and compatible devices have been tested:

- Compaq Deskpro XL Business Audio with built-in AD1847 chip
- Turtle Beach Tropez card with CS4231 chip

Some other 100 percent hardware-compatible devices might also function using the `sbpro` driver; however, they have not been tested or certified with the Solaris operating environment.

The Turtle Beach Tropez card might interfere with the operation of other ISA devices in the system. If installing a Tropez card in the system causes such devices to fail, run the configuration program that came with the device to select a different I/O base address for the card.

Preconfiguration Information

Note - Many audio devices come with a software utility that allows you to select the IRQ and DMA settings. Often, this utility does not record parameters in nonvolatile memory but in a configuration file used by DOS to set the card's configuration at each reboot. This type of configuration file is not used by the Solaris software and does not affect the operation of the card with the Solaris operating environment.

- Output volume is controlled by software. Turn the volume thumbwheel to the maximum volume setting if you don't hear any sound.
- Consult the manufacturer's documentation to determine if the microphone jack for your device is a mono jack or a stereo jack. Be sure your microphone plug matches; if it doesn't, use a suitable adapter.
- Line-in and aux jacks typically require line level voltages, such as output from a tape or CD player line-out jack or from a powered (battery-operated) microphone. Mic jacks typically require lower voltages. Consult the manufacturer's documentation for your device's requirements.

Supported Settings

If your card supports Plug and Play, your device resources are configured automatically. Use the following settings for devices that *don't* support Plug and Play. Defaults are shown in **this typeface**.

Compaq Deskpro XL Business Audio With Built-in AD1847 Chip

- I/O Address: **0x530**, 0x604, 0xE80, 0xF40

The sbpro driver automatically chooses an unused DMA channel and IRQ line for the device.

Note - The sbpro support for the AD1848 and compatibles uses one DMA channel for both play and record; simultaneous play/record is not supported.

Turtle Beach Tropez Card With CS4231 Chip

- I/O Address:

  0x530

  The MWSS I/O address on the Turtle Beach Tropez card is 0x530 at power-up. It can only be changed by software after the system is booted, and the Solaris operating environment does not do that. Therefore, the Tropez card is only supported at I/O address 0x530.

The sbpro driver automatically chooses an unused DMA channel and IRQ line for the device.

Note - The Tropez card comes with a software utility for selecting the IRQ, DMA, and MWSS compatibility I/O address settings used by the card. However, that utility does not record those parameters in nonvolatile memory, but in a configuration file used by DOS to set the card's configuration at each reboot. This type of configuration file is not used by the Solaris software and does not affect the operation of the card with the Solaris operating environment.

Known Problems and Limitations

- Any Crystal Semiconductor CS4231-based devices supported by this driver are programmed in AD1848-compatibility mode. This driver does not include support for advanced CS4231 features; in particular, simultaneous play/record.
- Some devices can detect that the IRQ is "in use" by another device in the system. If this occurs, the driver prints an error message like the following, and you must change the IRQ setting of either the audio device or the conflicting device.

  ```
  sbpro: MWSS_AD184x IRQ 7 is 'in use.'
  ```

  Some devices are not able to detect such a conflict. The driver will try to use the card, but that will likely result in the system hanging when the card is first used. Thus, it is important to check that the IRQ that does not conflict with another device.

- Although the `sbpro` driver supports A-law encoding on AD1848 and compatible devices, `audiotool` does not and produces an error message if you select A-law encoding. Use `audioplay`(1) to play A-law encoded audio files, or use `audioconvert`(1) to convert the A-law sample into a format that `audiotool` will accept, such as 16-bit linear. User-written applications can select A-law format using the `sbpro` driver on AD1848 and compatible devices.

Compaq Deskpro XL Business Audio With Built-in AD184x Chip

- Some system units have the headphone jack wired with its Left and Right channels reversed, so you hear Left output in your right ear and vice versa. The line-out jack at the back of the unit works as expected.
- The quality of sound is better when using an external microphone and speakers, not the ones built into the keyboard.

Creative Labs Sound Blaster Pro, Sound Blaster Pro-2

Solaris Device Driver:	`sbpro`
Device Type:	Audio
Adapters:	Creative Labs Sound Blaster Pro Sound Blaster Pro-2
Bus Type:	ISA

Note - The features and interfaces that are supported by the Solaris `sbpro` driver are described in the `audio`(7I) and `sbpro`(7D) man pages.

Preconfiguration Information

- The Sound Blaster Pro card cannot share IRQ settings with any other card installed in your system. If the hardware-jumpered IRQ setting conflicts with any other device, change the IRQ on the Sound Blaster card to one listed under "Supported Settings." The most common conflicts occur with the LPT1 parallel port or a network card.
- Output volume is controlled by software. Be sure the volume thumbwheel on the back of the card is turned all the way up to the maximum volume setting; otherwise you may not hear any sound.
- The microphone jack on the back of the Sound Blaster Pro card is a mono jack. If your microphone has a stereo plug, convert it to mono using an appropriate adapter.

Supported Settings

If your card supports Plug and Play, your device resources are configured automatically. Use the following settings for devices that *don't* support Plug and Play.

Defaults are shown in **this typeface**.

- IRQ Level: 2, **5**, **7**, 10
- I/O Address: **0x220**, 0x240
- DMA Channel: 0, **1**, 3

Known Problems and Limitations

The ISA version IBM Token Ring and compatible adapters will not work in a system that contains a Sound Blaster card configured at the default I/O port address (0x220). If possible, move the Sound Blaster card to port address 0x240; otherwise, remove the Sound Blaster device from the system.

Creative Labs Sound Blaster 16, Sound Blaster AWE32, Sound Blaster Vibra 16

Solaris Device Driver:	`sbpro`
Device Type:	Audio
Adapters:	Creative Labs Sound Blaster 16 Sound Blaster AWE32 Sound Blaster Vibra 16
Bus Type:	ISA

Note - The features and interfaces that are supported by the Solaris `sbpro` driver are described in the `audio`(7I) and `sbpro`(7D) man pages.

Preconfiguration Information

- For Sound Blaster 16 cards that have an on-board SCSI subsystem, the audio subsystem needs its own I/O (port) address and an IRQ, distinct from those of the SCSI subsystem.
- Output volume is controlled by software. Be sure the volume thumbwheel on the back of the card is turned all the way up to the maximum volume setting; otherwise you may not hear any sound.
- Microphone input is treated as a mono source; however, all the jacks on the back of the Sound Blaster cards are stereo jacks. If your microphone has a mono plug, convert it to stereo using an appropriate adapter.

Supported Settings

If your card supports Plug and Play, your device resources are configured automatically. Use the following settings for devices that *don't* support Plug and Play.

Defaults are shown in **this typeface**.

- IRQ Level: 2, **5**, 7, 10
- I/O Address: **0x220**, 0x240, 0x260, 0x280
- 8-bit DMA Channel: 0, **1**, 3
- 16-bit DMA Channel: **5**, 6, 7

Known Problems and Limitations

- The Sound Blaster card cannot share IRQ settings with any other card installed in your system. The most common conflicts occur with the LPT1 parallel port or a network card.

  If your device is not a Plug and Play device and a hardware-jumpered IRQ setting conflicts with another device, change the IRQ jumper setting on the Sound Blaster card to one listed under “Supported Settings.”

- Non-Plug and Play Sound Blaster 16, Sound Blaster Vibra 16, and Sound Blaster AWE32 cards are all recognized as Sound Blaster 16 cards.
- The ISA version IBM Token Ring and compatible adapters will not work in a system that contains a Sound Blaster card that is configured at the default I/O port address (0x220). If possible, move the Sound Blaster card to port address 0x240; otherwise, remove the Sound Blaster device from the system.

PC Card (PCMCIA) Hardware

PC Card Adapters

Solaris Device Driver:	`pcic`
Bus Type:	PC Card
Connectors:	Up to eight Type I, II, or III sockets

Caution - The Intergraph TD-30/TD-40 machine might lock up. To avoid this, ground yourself by touching some metal on the computer case while inserting and removing the PC Card devices. The `prtconf` command output might mistakenly indicate that the device is in two sockets. If inserting and removing the card is not detected and the machine hangs, reset the machine.

Preconfiguration Information

- Install your add-in PC Card adapter prior to Solaris installation.
- Some systems have their built-in PC Card adapter disabled by default. Enable it prior to Solaris installation.
- Requirements for a system depend on the combination of devices to be used. A typical two-socket system needs at least 8 Kbytes of address space, 16 bytes of I/O space, and three free IRQs. Following are general guidelines:

Address space	At least 8 Kbytes are required with 4 Kbytes per socket in the 640K-1MB range (not necessarily contiguous); if there are three sockets, at least 12 Kbytes are needed
I/O space	At least 8 and preferably 16 bytes per socket
IRQs	One per socket, plus an IRQ for the `pcic` device driver itself

Configuration Procedure

Initial Installation and Configuration

1. **Consult the Configuration Assistant for address space, I/O space, and IRQs already used by system devices.**
2. **Insert the PC Card adapter.**
3. **Install the Solaris software.**
4. **Reboot the system.**

Adding PC Card Support to a Previously Installed System

1. **Become root.**
2. **Do a reconfiguration reboot to reallocate resources:**

```
# touch /reconfigure
# reboot
```

3. **Insert the PC Card adapter and turn on the machine.**
4. **Boot the system so that the PC Card device driver begins running with the new resources allocated.**

Allocating IRQs

1. **Boot with the Configuration Assistant so you can review the resource usage.**

2. **Select View/Edit Devices from the Device Tasks menu, and review the list of devices to see how many IRQs are being used.**

   There are 16 IRQs, from 0-15. Several IRQs are already assigned. For example, IRQ 3 is reserved for the second serial port, COM2, and IRQ 7 is reserved for the parallel port.

3. **If your system has a COM2 port or a parallel port that is not being used, delete the device to free the IRQ resource for a PC Card.**

   a. **Select the serial port device using IRQ 3 or the parallel port using IRQ 7, and choose Delete Device.**

   b. **Choose Continue to return to the Device Tasks menu.**

   c. **Save the configuration.**

4. **Boot the Solaris software.**

3Com EtherLink III (3C589) PC Card

Solaris Device Driver:	`pcelx`
Device Type:	Network (Ethernet)
Adapter:	3Com EtherLink III (3C589)
Bus Type:	PC Card

Preconfiguration Information

- IBM ThinkPad 760E series systems and systems using the TI PCI1130 PCI-to-CardBus chip (such as the Dell Latitude XPi CD) *only*: *Before* bringing the system onto the network, put the PC Card into 8-bit mode by creating a file called `/kernel/drv/pcelx.conf` containing `force-8bit=1;` .
- It is not possible to boot or install the Solaris software using a 3Com EtherLink III PC Card device.
- If the 3Com PC Card device is recognized, the `pcelx` driver is automatically loaded, ports and IRQs allocated, and special files created (if they don't already exist). No manual configuration of the hardware is necessary or possible.

Known Problems and Limitations

Network services are automatically started when the system is booted. These services are not started when a network interface is added or shut down after the system has been brought up.

Configuration Procedure

Initial Installation and Configuration

1. **Install the Solaris software.**
2. **Boot the system.**
3. **Insert the 3Com EtherLink III PC Card device.**

Identifying an Unrecognized Card

If you insert a 3C589 card and it isn't recognized (no special files created), use the `prtconf` command to try to identify the problem.

1. **Become root.**

2. **Run the `prtconf -D` command to see if your 3C589 card is recognized.**

   A recognized device will appear in the `prtconf` output. For example:

```
# prtconf -D
. . .
pcic, instance #0 (driver name: pcic)
 . . .
 network, instance #0 (driver name: pcelx)
```

3. **If `pcelx` does not appear in the `prtconf` output, there is a problem with the PC Card adapter configuration or with the hardware. Check to see whether the problem is with the card or the adapter by trying to use the card on another machine and by seeing if it works on the same machine using DOS.**

Configuring Two or More Cards

Because the 3C589 card is not supported during Solaris installation, you must update network configuration files before one can be used as a network interface.

1. **Create a `/etc/hostname.pcelx#` file (where # is a socket number) to specify the host name to be associated with this interface.**

2. **Add an IP address for the new host name to the file `/etc/inet/hosts`.**

3. **Ensure that the associated network is listed in `/etc/inet/netmasks`.**

4. **Ensure that the Name Service Switch `/etc/nsswitch.conf` configuration file includes the network and local services you need.**

5. **Reboot the system.**

Note - This process is described in *System Administration Guide, Volume 3*.

Special Files

Device naming in `/dev` follows standard LAN device naming except that the PPA (physical point of attachment) unit number is the socket where the card resides, not the instance. That is, for the `pcelx` driver, `/dev/pcelx0` (or PPA 0 of `/dev/pcelx`) is the card in socket 0, while a card in socket 1 is `/dev/pcelx1` (or PPA 1 of `/dev/pcelx`). See the `pcelx`(7D) man page.

Hot-Plugging

If you remove the 3C589 card, any information you send is discarded, and no error messages are given.

When you reinsert the card in the *same* socket, the device operates normally. The behavior is similar to temporarily disconnecting the device from the network.

Modem and Serial PC Card Devices

Solaris Device Driver:	`pcser`
Device Type:	Modem and serial PC Card devices based on the 8250, 16550, or compatible UART at speeds up to 115 Kbps
Bus Type:	PC Card

Preconfiguration Information

If a PC Card modem or serial device is recognized, the `pcser` device driver is automatically loaded, ports and IRQs allocated, and special files created (if they don't already exist).

Configuration Procedure

Initial Installation and Configuration

1. **Install the Solaris software.**
2. **Boot the system.**
3. **Insert the modem or serial device.**

Identifying an Unrecognized Device

If you insert a PC Card modem or serial device and it isn't recognized (no special files are created under `/dev/cua` or `/dev/term`), use the `prtconf` command to try to find the problem.

1. **Become root.**
2. **Run the `prtconf -D` command to see if your modem or serial device is recognized.**

   An unrecognized device will appear at the end of the `prtconf` output. For example:

```
# prtconf -D
. . .
pcic, instance #0 (driver name: pcic)
  . . .
  pccard111.222 (driver not attached)
```

3. **If your device is not recognized "**`(driver not attached)`**", use the** `add_drv` **command to add the name of your device as another known alias for** `pcser` **devices.**

   For example, type the following at the command line:

```
# add_drv -i'"pccard111.222"' pcser
```

Note - Include the double quotes in single quotes to keep the shell from stripping out the double quotes. Use the identification string listed in the `prtconf` output. Use the entire string in the `add_drv` command. See `add_drv`(1M).

Misidentifying a Recognized Device

1. **Run the** `prtconf -D` **command to see if your modem or serial device is erroneously recognized as a memory card.**

   If the device is *incorrectly* recognized as a memory card, for example, the output of the `prtconf` command could show:

```
# prtconf -D
. . .
pcic, instance #0 (driver name: pcic)
 . . .
 memory, instance #0 (driver name: pcmem)
  pcram, instance #0 (driver name: pcram)
```

2. **Use the Configuration Assistant to identify the memory resource conflict, and add correct information for the device on the View/Edit Devices menu.**

   The problem is typically a resource conflict between device memory settings. See "Identifying and Correcting Problems" in the Configuring Devices chapter of this book.

   Another possible cause for this problem is when the PC Card adapter chip is not fully supported, as with machines not listed in the *Solaris 8 (Intel Platform Edition) Hardware Compatibility List*.

3. **To work properly with the Solaris operating environment, all devices must be accounted for, even those the Solaris environment does not support. The Configuration Assistant software accounts for all devices in your system.**

Additional Configuration

When adding a new serial port or modem to the system, you often need to edit configuration files so that applications can use the new communications port. For example, the `/etc/uucp/devices` file needs to be updated to use UUCP and PPP. See "Overview of UUCP" in *System Administration Guide, Volume 3*.

Special Files

The serial devices in `/dev/term` and `/dev/cua` are named by socket number. A card inserted in socket 0 is `pc0`, and socket 1 is `pc1`. See `pcser`(7D).

Hot-Plugging

If a PC Card modem or serial device is unplugged while in use, the device driver returns errors until the card is replaced in the socket.

The device must be closed and reopened with the card reinserted before the device begins working again. The restart process depends on the application. For example, a `tip` session automatically exits when a card in use is unplugged. To restart the system, you must restart the `tip` session.

SRAM and DRAM PC Card Devices

Solaris Device Driver:	`pcram`
Device Types:	Static RAM (SRAM), Dynamic RAM (DRAM)
Bus Type:	PC Card

Note - Flash RAM devices are not supported.

Preconfiguration Information

If a PC Card memory device is recognized, the `pcram` device driver is automatically loaded, the physical address allocated, and special files created (if they don't already exist).

Known Problems and Limitations

- The Solaris `pcmem` driver is not capable of handling "combo" memory cards with multiple types of memory on them (for example, combined SRAM and nonvolatile FLASH). Inserting such a card into a system running the Solaris software may cause a system panic.
- Because the PC Card memory device is designed as a pseudo-floppy diskette type, the only utility that can be used for formatting is `fdformat`(1).

Configuration Procedure

Initial Installation and Configuration

1. **Install the Solaris software.**
2. **Boot the system.**
3. **Insert the card.**

Identifying an Unrecognized Device

If you insert a memory device and it isn't recognized (no special files created), use the `prtconf` command.

1. **Become root.**

2. **Run the `prtconf -D` command to display the configuration recognized by the system.**

   A recognized device will appear in the `prtconf` output. For example:

```
# prtconf -D
.  .  .
pcic, instance #0 (driver name: pcic)
   .  .  .
  memory, instance #0 (driver name: pcmem)
      pcram, instance #0 (driver name: pcram)
```

3. **If your memory device does not appear at the end of the `prtconf` output, it is not supported and cannot be used with the `pcram` device driver.**

Special Files

The special files created for PC Card memory devices act like disks and have names in the form `/dev/dsk/c#t#d#p#` or `/dev/dsk/c#t#d#s#`. See `pcram`(7D). Abbreviations used in the names are:

`c#` Controller #

`t#` Card technology type #, defined as follows:

`0` Null—no device

`1` ROM

`2` OTPROM (One Time PROM)

`3` UV EPROM

`4` EEPROM

`5` Flash EPROM

`6` SRAM

`7` DRAM

`d#` Device region of type #, usually zero

`p#` `fdisk` partition #

`s#` Solaris slice #

Note - A device name can be specified either by a partition name (`p#`) or a slice name (`s#`), but not both.

Using PC Card Memory Devices

Since the Solaris Volume Management software recognizes PC Card memory devices, no special `vold` configuration is required.

- **If you don't want to use `vold` to manage your PC Card memory devices, comment out the `"use pcmem"` line in the `/etc/vold.conf` file.**

To comment out a line, insert a # character at the beginning of the line.

PC Card memory devices don't need to have file systems on them, though typically, before using a new PC Card memory card, you will want to create a file system on it. DOS PCFS is the best format to use. (You can use virtually any file system format on a PC Card memory card, but most other file system formats are platform-dependent, making them unsuitable for moving data between different types of machines. See "Using a PCMCIA Memory Card" in the *OpenWindows Advanced User's Guide*.)

Note - If you want to redirect the output of a `tar` command (or `dd` or `cpio`) to a PC Card memory device, first create a file system on the card, using the `fdformat` command without arguments. The card must be reformatted before it can be written on again.

Hot-Plugging

If a memory card is removed while in use, the device driver returns errors until the memory card is inserted into the appropriate socket. Close and reopen the device with the card reinserted, and the memory card will work.

- If you remove the card while in use as a file system, unmount the file system using the `umount` command. Then reinsert the card and remount the file system using the `mount` command.
- If you remove the card and interrupt a `tar` or `cpio` process, stop the process, reinsert the card, and restart the process.

Viper 8260pA, SanDisk Flash, or Any PC Card ATA Devices

Solaris Device Driver:	`pcata`
Device Type:	ATA PC Card
Adapters:	Viper 8260pA SanDisk Flash Or any PC Card ATA device
Bus Type:	PC Card

Preconfiguration Information

If a PC Card ATA device is recognized, the `pcata` device driver is automatically loaded, IRQs allocated, devices nodes created, and special files created (if they don't already exist).

Known Problems and Limitations

- `vold` does not support `pcata`. File systems must be mounted manually.
- You need to `umount` the file system before removing the disk.
- The `ufs` file systems on removable media (PC Card ATA) should have one of the `'onerror={panic, lock, umount}'` mount options set.

Configuration Procedure

Initial Installation and Configuration

1. **Install the Solaris software.**
2. **Boot the system.**
3. **Insert the PC Card ATA device.**

Identifying an Unrecognized Card

If you insert a PC Card ATA device and it isn't recognized (no special files are created), use the `prtconf` command to try to identify the problem.

1. **Run the `prtconf -D` command to see if your `pcata` card is recognized.**

   A recognized device will appear at the end of the `prtconf` output. For example:

```
# prtconf -D
. . .
pcic, instance #0 (driver name: pcic)
  . . .
  disk, instance #0
```

2. **If `pcata` does not appear in the `prtconf` output, there is a problem with the PC Card adapter configuration or with the hardware.**

   Check to see whether the problem is with the card or the adapter by trying to use the card on another machine and by seeing if it works on the same machine using DOS.

Special Files

For PC Card devices, nodes are created in `/devices` that include the socket number as one component of a device name that the node refers to. However, the `/prtc/dev` names and the names in `/dev/dsk` and `/dev/rdsk` do follow the current convention for ATA devices, which do not encode the socket number in any part of the name. See the `pcata`(7D) man page.

Hot-Plugging

- If you want to remove the disk, you must unmount the file system.
- Use the `mkfs_pcfs`(1M) command to create a `pcfs` file system:

```
# mkfs -F pcfs /dev/rdsk/c#d#p0:d
```

  To mount a `pcfs` file system, type:

```
# mount -F pcfs /dev/dsk/c#d#p0:c /mnt
```

  For more information, see the `pcfs`(7FS) and `mount`(1M) man pages.

- If you want to create a `ufs` file system, use the `newfs` command and type:

```
# newfs /dev/rdsk/c#d#s#
```

To mount a `ufs` file system, type:

```
# mount -F ufs /dev/dsk/c#d#s# /mnt
```

For more information, see the `newfs`(1M) and `mount`(1M) man pages.

- To create a Solaris partition, run the `format` command and go to the Partition menu. For more information, see the `format`(1M) man page.