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Software and Hardware Install Guide

Document Number 106P0856

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NOTICE

This document presents information for users of the Performance Technologies Inc. (PTI) Model Software and Hardware Install Guide.

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Safety Information

This section is provided as a summary of the safety recommendations throughout this manual. Performance Technologies Inc. (PTI) recommends that all safety precautions be followed to prevent harm to yourself or the equipment. Please follow all warnings marked on the equipment.

Safety Precautions

- Follow all warnings and instructions marked on the equipment.
- Ensure that the voltage and frequency of your power source matches the voltage and frequency inscribed on the equipments electrical rating label.
- Never push objects of any kind through the openings in the equipment. Dangerous voltages may be present. Conductive foreign objects could produce a short circuit that could cause fire, electrical shock, or damage your equipment.

Symbols

The following symbols appear in this document.



NOTE: There is risk of personal injury or equipment damage. Follow the instructions.



WARNING: Hazardous voltages are present. To reduce the risk of electric shock and danger to personal health, follow the instructions.

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Section

1 Introduction

This document describes software installation procedures for PTI products. PTI software runs on intelligent serial communication controllers installed in either a UNIX or Windows NT host system, or on PTI LAN-based communication servers. Some sections of this installation guide apply only to certain host, controller or server types and are not applicable to others. In particular:

- Section 2 covers basic software installation procedures for both UNIX based systems and Windows NT systems.
- Section 3 covers configuration of PTI LAN-based servers.
- Section 4 covers configuration of the PT-CPC388 Communications Controller.
- Section 5 covers configuration of PT-VME1X1 VMEbus controllers.
- Section 6 covers configuration of the PT-VME330A/B VMEbus controller.
- Section 7 covers configuration of the PT-VME340 VMEbus controller. The PT-SBS332, PT-SBS334 SBus, PT-PCI334 and PT-CPC334 PCIBus controllers require no special configuration.
- Section 8 provides installation instructions for SunOS SBus/VME host drivers and Solaris VME host drivers.
- Section 9 covers operation of client utilities that are used to monitor and maintain PTI communications software.

Before proceeding with the software installation, you should install your hardware. For installation of embedded communication controllers, refer to the documentation you received from PTI. For installation of a LAN-based

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server, refer to Section 3 of this guide.

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Section 2

Software Installation

This section contains basic software installation instructions for UNIX and Windows NT host systems. Choose the appropriate section for your host system and follow the instructions in that section only:

Host System	Use Section
UNIX based (except Solaris)	2.1
Solaris 2.x	2.2
Windows NT	2.3
Linux	2.5

If your are installing the Protokit software and the GNU tools refer to section 2.6.

The software is shipped on CDROM. The media contains both the host-resident and controller-resident portions (when applicable) of the software package. Specifically, this includes:

- A load command file and a set of executable files for the controller or server (not applicable for a NexusWare Controller). These files contain the system-level code and the protocol application. They are transferred to the controller or server during the download procedure.

- Source files containing a host device driver for the communication controller (not included for LAN-based servers). The Windows NT host device driver is pre-compiled.

- Source files for the host-resident download, configuration and test utilities. Some products also include a background daemon process.

- Source files for the PTI Application Programming Interface (API). This is a library of subroutines to be linked with host applications

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that communicate with the protocol software. They provide a simple read/write interface to the controller's host driver or, for LAN-based servers, to TCP/IP.

2.1 Installation Instructions for UNIX Systems

The software installation procedure creates a main directory called *pti* under your current directory, and a number of subdirectories under *pti*. The default location for the *pti* directory structure is in */usr.* These installation instructions as well as other software documentation assume that the distribution is based at the directory */usr/pti.* If you choose to install the software in another location, remember to substitute your base directory for */usr/pti* when following instructions in this and other documents.

Step 1 Login as root.

Make sure that */usr/ccs/bin* is included in root's SUPATH environment variable definition in */etc/default/su*. This is necessary to enable the operating system to find the *make* utility.

Verify that the complete pathname to your compiler is specified for the CC environment variable in the file */usr/share/lib/make/make.rules* before executing any of the following installation procedures. For example, if your compiler is located in */opt/SUNWspro/bin/cc*

```
CC = /opt/SUNWspro/bin/cc
```

Step 2 Insert the CDROM into the drive and type:

```
cd /cdrom/cdrom0
./INSTALL
```

(Note that the CDROM device might have a different name on your system.)

The CDROM install script will ask you to:

(a) Select your board/server type from the list of board/server types provided.

Note: If you are installing software for a LAN server, you will be asked to select the installation package format. The choices provided are (1) *pkgadd* format, or (2) unix tar format. You

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must select choice (2) for non-Solaris systems.

(b) Enter the installation directory.

Step 3 When you run the install script, you will be asked to enter your server type(s), and operating system type. This information is used to build the PTI Application Programming Interface (API).

The choices provided for server type are (1) LAN server, (2) embedded server, or (3) both. The API will build correctly for a LAN server only if your host system includes a TCP/IP package with a standard socket interface. (This is not a problem on most UNIX systems.)

Step 4 The choices provided for operating system type are:

1. Solaris 2.x
2. SunOS (Solaris 1.x)
3. HP-UX for HP9000 Series 700
4. HP-UX for HP9000 Series 800
5. DG/UX
6. IRIX (V4)
7. IRIX (V5 or later)
8. DEC-UX
9. QNX
10. Other

If you select 'other', the script prompts you for additional information in order to determine your operating system's UNIX compatibility:

The choices provided for UNIX version are (1) UNIX System V or (2) SunOS/BSD. This determines whether the makefile runs the *ranlib* utility on the API library. This utility is not supported on UNIX System V. If you are not sure of the correct choice for your system, check your manual pages to see if *ranlib* is supported. If so, select '2'; if not, select '1'.

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The choices provided for system interface definition are (1) SVR4 or (2) SVR3. This information affects the compilation of the *MPSpoll* API routine, which uses the *poll* system call. If your system complies with SVR4, any system file descriptor can be supplied to the *poll* system call. Under SVR3, *poll* is only supported for STREAMS file descriptors. If you are not sure of the correct choice for your system, read your manual pages for the *poll* system call to determine what types of file descriptors are supported. If any system file descriptor can be used, select '1'; if only STREAMS file descriptors can be used, select '2'.

The installation script builds the portions of the software distribution that execute on the local system, with the exception of the host driver (if included). These include the API library and the download, configuration and test utilities. Except for the API archive, *libMPS.a*, which is copied to */usr/lib*, the installation script and the Makefiles it executes do not modify any files or directories outside */usr/pti*.

Step 5 Skip this step if either you installed the software in the default */usr* directory or you are installing for a NexusWare (CPC388) Product.

The load command file in the main *pti* directory is named *Cmdfile.prot*, where *prot* is a filename extension identifying a specific software product or configuration. The load command file contains the names of the executable files that are loaded to the communication controller or server. This file is used during the load procedure, and must contain the correct full pathname of each file. If you did not install the software in the default directory, the pathnames in this file are incorrect. The easiest solution is to create a symbolic link to the */usr/pti* directory. In the following example, a link is created from the alternate installation directory */home/tools*:

```
ln -s /home/tools/pti /usr/pti
```

If, for some reason, this solution is not acceptable, you must edit the command file and modify the pathname of each executable file. Below, a sample file is shown with the default pathnames and then after modification to accommodate the alternate installation directory */home/tools*. (Note that the

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details of your file may not match the examples shown here.)

```
BTYPE 0 PTI334
LOADCTLR 0 /usr/pti/Load/xstra.pci334.hdlc.0 L_0 0x405e00 0x405e00
LOADCTLR 0 /usr/pti/Load/hif.pci334.hdlc.0 L_1 0x40fe00 0x0
LOADCTLR 0 /usr/pti/Load/hdlcswap.mod.hdlc.0 L_2 0x413e00 0x0
LOADCTLR 0 /usr/pti/Load/hdlc.pci334.hdlc.0 L_3 0x414400 0x0
LOADCTLR 0 /usr/ptiX/Load/config.hdlc.0 L_4 0x402000 0x0
INIT L_0

BTYPE 0 PTI334
LOADCTLR 0 /home/tools/pti/Load/xstra.pci334.hdlc.0 L_0 0x405e00 0x405e00
LOADCTLR 0 /home/tools/pti/Load/hdlcswap.mod.hdlc.0 L_2 0x413e00 0x0
LOADCTLR 0 /home/tools/pti/Load/hdlc.pci334.hdlc.0 L_3 0x414400 0x0
LOADCTLR 0 /home/tools/pti/Load/config.hdlc.0 L_4 0x402000 0x0
INIT L_0
```


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2.2 Installation Instructions for Solaris

When you run the install script, it creates a main directory called *pti* and a number of subdirectories. The default location for the *pti* directory structure is in */opt*, with a symbolic link from the directory */opt/pti* to */usr/pti*. These installation instructions and other software documentation assume that the software is based at the symbolic directory path */usr/pti*.

Before performing the software installation, you should install your communication controller hardware. Then boot your system using the -r option so the new hardware is identified.

To install the software distribution, first login as root.

Step 1 Make sure that */usr/ccs/bin* is included in root's SUPATH environment variable definition in */etc/default/su*. This is necessary to enable the operating system to find the *make* utility.

Verify that the complete pathname to your compiler is specified for the CC environment variable in the file */usr/share/lib/make/make.rules* before executing any of the following installation procedures. For example, if your compiler is located in */opt/SUNWspro/bin/cc:*

```
CC = /opt/SUNWspro/bin/cc
```

Step 2 Insert the media into the drive and inform the volume manager that you have done so.

Step 3 Change directory to the appropriate device, and run the install script. Enter the following commands:

```
cd /cdrom/cdrom0
./INSTALL
```

The CDROM install script will ask you to:

(a) Select your board/server type from the list of board/server types provided.

Note: If you are installing software for a LAN server, you will be asked to select the installation package format. The choices provided are (1) pkgadd format, or (2) unix tar format. It is recommended to select choice (1) if you are installing our soft-

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ware products on a Solaris system.
The second option (unix tar format) is for installing products on the UNIX systems that do not support the Solaris pkgadd utility.

If you selected pkgadd format, proceed to Step 4.

If you selected tar package format, the install script asks for the complete pathname of the installation directory. The script first copies the tar file to this location and then extracts it. Proceed to Section 2.1, Step 3.

Step 4 The install script asks you to:

- Enter the complete pathname of a temporary directory to be created for the installation. The install script automatically removes this directory when the installation is complete. You must specify the full path of a directory that does not already exist.

- Choose a base directory path for the installation. The default location is /*opt*.

- Authorize the creation of a symbolic link to the installation directory, and enter the directory path for the symbolic link. The default path is */usr/pti*. These installation instructions and other software documentation assume that the distribution is based at the directory */usr/pti*. If you choose to install the software in another location, remember to substitute your base directory for */usr/pti* when following instructions in this and other documents.

- Select your server type. The choices provided are (1) LAN server, (2) embedded server, or (3) both. The API will build correctly for a LAN server only if your host system includes a TCP/IP package with a standard socket interface. (This is not a problem on most UNIX systems.)

  The install script builds the portions of the product that execute on the local system. These include the API and the download, configuration and test utilities. The API archive, *libMPS.a*, is copied to */usr/lib*. The device driver object file is copied to */usr/kernel/drv* and is loaded into the kernel.

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Step 5 Skip this step if either you accepted, in Step 4, the default symbolic link from the installation directory to */usr/pti, or you are installing for a NexusWare (CPC388).*

The load command file in the main *pti* directory contains the names of the executable files that are loaded to the communication controller or server. This file is used during the load procedure, and must contain the correct full pathname of each executable file. If you did not allow the install script to create the default symbolic link, the pathnames in the load command file is incorrect. In this case, you must edit the command file and modify the pathname of each executable file. The command file is called *Cmdfile.prot*, where *prot* is a filename extension identifying your specific protocol or configuration.

Below, a sample file is shown with the default pathnames and then after modification to accommodate the alternate installation directory */home/tools*. (Note that the details of your file will not exactly match the examples shown here.)

```
BTYPE 0 PTI334
LOADCTLR 0 /usr/pti/Load/xstra.pci334.hdlc.0 L_0 0x405e00 0x405e00
LOADCTLR 0 /usr/pti/Load/hif.pci334.hdlc.0 L_1 0x40fe00 0x0
LOADCTLR 0 /usr/pti/Load/hdlcswap.mod.hdlc.0 L_2 0x413e00 0x0
LOADCTLR 0 /usr/pti/Load/hdlc.pci334.hdlc.0 L_3 0x414400 0x0
LOADCTLR 0 /usr/ptiX/Load/config.hdlc.0 L_4 0x402000 0x0
INIT L_0

BTYPE 0 PTI334
LOADCTLR 0 /home/tools/pti/Load/xstra.pci334.hdlc.0 L_0 0x405e00 0x405e00
LOADCTLR 0 /home/tools/pti/Load/hif.pci334.hdlc.0 L_1 0x40fe00 0x0
LOADCTLR 0 /home/tools/pti/Load/hdlcswap.mod.hdlc.0 L_2 0x413e00 0x0
LOADCTLR 0 /home/tools/pti/Load/hdlc.pci334.hdlc.0 L_3 0x414400 0x0
LOADCTLR 0 /home/tools/pti/Load/config.hdlc.0 L_4 0x402000 0x0
INIT L_0
```

Step 6 Loading the Device Driver

The Solaris host device driver is loaded during the installation procedure described in Step 4 above. Thereafter, the driver is loaded automatically whenever you reboot the system. In general, you never need to manually load or unload the device driver, but the commands to do so are shown below:

To reload the driver for SBus, PCI, CMC, or PMC communications controllers, type:

```
cd /usr/pti/drivers/pt33x
make
```


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To reload the driver for VMEbus communication controllers, type:

```
cd /usr/pti/drivers/Solaris/vme
make
```

Section 7.2 of this document describes how to configure the PTI Solaris host device driver for VMEbus controllers. No configuration is required for SBus or PCIBus controllers.

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2.3 Installation Instructions for Windows NT/ Windows 2000

This chapter discusses the installation and setup of the PTI software on a Windows NT/Windows 2000 machine. The installation process for the LAN based software differs slightly from the installation processes for the embedded based software. For both installations, the following apply:

- The operating system is Windows NT version 4.0 or higher, or Windows 2000.
- There are project files which are used to build the API and each of the client applications. They were created with the Microsoft Visual C/C++ (v. 5.0) toolkit. If you want to use these project files, please use this toolkit.
- A client application should be linked with the PTI MPS Application Programmer's Interface (API). It is called libMPS.lib, and it has the functionality for both the embedded controller and the LAN server. There is a project file which is used to build this library. The library should be copied to a place where the client's projects can find and link to it. By default, it is copied to %PTI%\lib.
- In the client directory of each protocol, there is a project file for each sample test application (which are discussed in the each protocol's programmer's guide). For example, the %PTI%\sbsi\client directory has two workspaces defined; sbsisnd.dsw and sbsircv.dsw. When these programs are built, "WINNT" and "ANSI_C" must be defined at compile time, and **wsoc32.lib** and **libMPS.lib** must be linked to the client application. Furthermore, since by default the API is built non MT-Safe, the client application must be as well; thus "/ML" or "/MLd" must be specified on the compiler command line. See the file "README.THREADS" for building the API and client applications thread-safe. Also make sure the client application is built the same way as the API in terms of either Debug or Release.

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2.3.1 NT/Windows 2000 LAN Based Software Installation

This section discusses the issues pertinent only to a Windows NT/Windows 2000 software installation for LAN based PTI communications servers. The software installation is started by double-clicking on the Setup.exe application that is on the provided CD-ROM.

You will see the PTI welcome screen displayed, click next. The software licence agreement will then be displayed, read the terms and click yes to accept the agreement. You will then be asked to choose a distination folder for the installation. The defalt directory is c:\pti. The directory that you specify for the software to be installed will become your machine's *pti* directory and will have an environment variable called PTI to refer to it.

You must then select the hardware platform to install. For a LAN installation, choose an MPS server. Type in the name of the MPS server that the software will connect to. Next, type in the IP address of that server in dot notation. Both the name of the server and the IP address will then be added to the system's host table. If the host table already has an entry for that server name, the installation will continue without writing a new entry for that server. If you don't know the name of the server to connect to, just click next for the server name and IP address. You can add that information later to %SystemRoot%\system32\drivers\etc\hosts.

Finally, the installation asks if you want to reboot your computer. You must reboot your computer for the software installation to complete. Remember to reboot before you try to use the PTI software.

If you are using a LAN based PTI server, (this does not include a NexusWare server) a TFTP service must be defined. The TFTP server is not standard for the NT operating system. PTI uses the shareware product **TFTPD32 Version 1.3** by Philippe Jounin. The command file (Cmdfile.prot) that is downloaded to the server via TFTP is of type binary. If you edit the file, make sure line feeds do not get attached by the editor.

The client applications communicate with the PTI LAN server through TCP/IP. The installation process adds the **mps** service to the **services** file (%SystemRoot%\system32\drivers\etc\services). The PTI LAN server IP address must be defined in the **host** table (%SystemRoot%\system32\drivers\etc\hosts) if the server wasn't defined during installation or if the server IP changes after the installation.

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2.3.2 NT/Windows 2000 Embedded Based Software Installation

This section discusses the issues pertinent only to a Windows NT software installation for embedded PTI communications controllers. The architecture platform for the Windows NT system must be Intel x86.

NOTE: For Windows 2000 users, if you have already physically installed the embedded board(s) on your system before installin ghte PTI Software, a Found New Hardware/Files Needed Window will appear on your Windows 2000 desktop. Disregard this window until you have installed the PTI Sioftware and reboot your system.

The software installation is started by double-clicking on the Setup.exe application that is on the provided CD-ROM. You will see the PTI welcome screen displayed, click next. The software licence agreement will then be displayed, read the terms and click yes to accept the agreement. You will then be asked to choose a distination folder for the installation. The defalt directory is c:\pti. The directory that you specify for the software to be installed will become your machine's *pti* directory and will have an environment variable called PTI to refer to it.

You must then select the hardware platform to install. Choose the embedded communications controllers to install. Finally, the installation asks if you want to reboot your computer. You must reboot your computer for the software installation to complete. Remember to reboot before you try to use the PTI software.

NOTE: For Windows 2000 users, after rebooting your system, there will be a Found New Hardware/Files Needed window on your desktop. From this window, specify c:\PTI\DRIVERS\WIN_2K.

The host machine communicates with the communications controller through the device driver, ntmps.sys. During the installation, the ntmps device driver is set up to load automatically at machine startup. You can change this setting, or load and unload the driver manually through the Control Panels Devices applet.

There will be a new registry entry (ntmps) created in the HKEY_LOCAL_MACHINE / SYSTEM CurrentControlSet / Services area. Also, the event log service will be modified to enable it to log messages

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from the ntmps device driver. Remember to reboot the machine after the device driver is installed manually.

For the embedded Windows NT driver, the application which loads the card (*commload*) has to be run a little bit differently. The controller to be loaded must be specified on the command line. For instance, even if just one controller is present in the Windows NT machine, the command line for the *commload* should be: “commload -v -c 0 Cmdfile.prot” (the actual name of the command file will vary depending on the protocol software). If the controller number is not specified, the *commload* program will fail. Note, the loading of modules is not applicable for a NeuxWare Controller (CPC388).

2.4 Instructions for Linux Systems

This section describes the procedure for installing the PTI software on a Linux system. The PTI software is capable of being used in an embedded controller environment, a LAN network environment, or both. If you intend to use the PTI software for embedded applications, there are certain system requirements that must be met.

- The Linux Kernel must be Version 2.2.14 or higher. The Performance Technologies software package is tested with kernel versions included in the RedHat Linux Distributions version 6.2 and greater. Kernel versions packaged with RedHat 6.2 and greater are preferred.

- The host driver is a STREAMS-based driver, so you must install the Linux STREAMS (LiS) package on your system prior to installing the PTI product. LiS is a free SVR4-complaint STREAMS package produced by GCOM, Inc., and is freely distributed under the GNU General Public Library License. The Performance Technologies software is developed and tested with LiS Release 2.8 and above. Please review the kernel-specific information found on the GCOM website at http://www.gcom.com/home/linux/liskernel.html.

If you are running a LAN-based applicaton *only*, you do not need to install LiS on your system and may skip the following section.

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2.4.1 Installing Linux STREAMS LiS on Your System

The procedure for installing the Linux STREAMS (LiS) package on your system is given below. Note: you must be logged in as root in order to install the LiS package.

Step 1 Download the LiS source code onto your system. The following example shows the procedure for doing this (user entries are given in bold print).

Note: Please review system requirements when selecting a version of LiS. More information can be found at the GCOM website http://.gcom.com/home/linux/lis/kernel.html

root# **cd /usr/src**
root# **ftp ftp.gcom.com**
Connected to email.gcom.com.
220 email.gcom.com FTP server (Version wu 2.4.2-academ[BETA-15](4) Sat Feb 28 18:31:17 CST 1998) ready.
Name (ftp.gcom.com:root): **anonymous**
331 Guest login ok, send your complete e-mail address as password.
Password: **<your username>@<your domain name>**
<a welcome message appears>
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> **cd pub/linux/src/LiS**
<another welcome message appears>
ftp> **bin**
200 Type set to I.
ftp> **get LiS-2.8.tgz**
local: LiS-2.8.tgz remote: LiS-2.8.tgz
200 PORT command successful.
150 Opening BINARY mode data connection for LiS-2.8.tgz (436659 bytes).
226 Transfer complete.
436659 bytes received in 51.9 secs (8.2 Kbytes/sec)
ftp> **bye**
221 Goodbye.
root# **ls**
LiS-2.8.tgz linux linux-2.2.14 redhat
root#

Note in the above example that the current working directory

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was set to */usr/src* prior to downloading the compressed tar file. LiS may be installed anywhere on your system, but this is the preferred location. If you install LiS in a directory other than */usr/src*, then you must substitute the alternate directory path for */usr/src* in the remainder of this section.

Step 2 Extract the LiS source files from the compressed tar file.

```
root# tar xzf LiS-2.8.tgz
root# ls
LiS-2.8          linux            redhat
LiS-2.8.tgz      linux-2.2.14
root#
```

Step 3 Now you need to build and install LiS. Change the current working directory to the newly-extracted *LiS-2.8* directory and do a make. As part of the build process, a configuration script is run before compiling any of the LiS source files. The configuration script asks you a series of questions about various items, such as the Linux kernel version for which you are building and other system information. You should respond to the questions using the default values supplied, unless you are prompted for LiS to run the STREAM queues as kernel threads or bottom halves. The Performance Technologies host driver requires the STREAMS queues to be run as bottom halves. In the example below, "<return>" means to press the ENTER key (also called the RETURN key) without any other input. A "[...]" indicates that there is more to the prompt than is being shown in the example.

```
root# cd LiS-2.8
root# make
./Configure "invoked from main makefile" config.in

How do you want to configure STREAMS?
   l = to run in the Linux kernel
   u = to run in user level
   q = to run under QNX (may not work)
Please enter your choice [default: l] <return>

Enter directory location of your kernel source
[default: /usr/src/linux] <return>
No kernel support for SMP detected.
```


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Which version of the kernel are you building for?
[default: 2.2.14-5.0] **<return>**

How do you want to build STREAMS for the Linux kernel?
k = link with the linux kernel
m = create a kernel loadable module
Please enter your choice [default: m] **<return>**

After building STREAMS, do you want kernel loadable modules installed?
This allows you to load it by typing in "insmod streams".
y = install it for module loading
n = just leave modules for later "make modules_install"
Please enter y or n [default: y] **<return>**

Enter location of your kernel module directory
[default: /lib/modules/2.2.14-5.0/misc] **<return>**

The STREAMS queues can be run either as a bottom half task [...] or as a kernel thread [...].
t = use kernel thread
b = use bottom half processing
Please enter t or b [default: t] **b**

When you make STREAMS, do you want to use backward compatible constants in the file stropts.h? [...]
y = LiS backward compatible constants in stropts.h
n = UnixWare/Solaris compatible constants in stropts.h
Please enter y or n [default: n] **<return>**

When you make STREAMS, do you want to compile for source level debugging? [...]
y = set up for source level debugging
n = no source level debugging
Please enter y or n [default: n] **<return>**

Do you want to use shared libraries? [...]
y = use dynamic linking with shared libraries
n = use static linking
Please enter y or n [default: y] **<return>**
<the LiS source files are now compiled as the build continues. When the prompt returns, run **make install**.>
root# **make install**
<object files are moved around, device files are created, etc>

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```
root# ls -l ..
lrwxrwxrwx    1 root     root           16 Jun 19 11:56 Lis -> /usr/src/Lis-2.8
drwxr-xr-x   10 root     root         1096 Jun 19 11:50 Lis-2.8
-rw-r--r--    1 root     root       436671 Jun 19 11:45 LiS-2.8.tgz
lrwxrwxrwx    1 root     root           12 Jun 19 11:56 linux -> linux-2.2.14
drwxr-xr-x    1 root     root         4096 Mar  1 12:24 linux-2.2.14
drwxr-xr-x    7 root     root         4096 Mar  1 12.24 redhat
```

When the build is finished, you will find a new symbolic link named *LiS* in the parent directory. This link always points to the directory tree of the LiS version that is currently installed on your system (*/usr/src/LiS-2.8* in the example above). If you install a later version of LiS in the future, the symbolic link will be updated to point to the newer version as part of the build process.

Step 4 Skip this step if you installed LiS in */usr/src*.

Although LiS may be installed anywhere in the file system hierarchy, the PTI make files expect the symbolic link */usr/src/LiS* to exist. You must manually create this symbolic link and ensure that it points to the LiS directory tree. For purposes of example, assume LiS was installed in */opt/gcom*.

```
root# ln -s /opt/gcom/LiS /usr/src/LiS
root#
```

In the above example, the symbolic link */usr/src/LiS* was made to point at */opt/gcom/LiS* rather than */opt/gcom/LiS-2.8*. That is, */usr/src/LiS* is a symbolic link that points to another symbolic link (*/opt/gcom/LiS*) that points to the actual directory tree (*/opt/gcom/LiS-2.8*). In this manner, when you install a future version of LiS (and the symbolic link */opt/gcom/LiS* is automatically updated by the build process), you will not have to make any further modifications to */usr/src/LiS*.

If for some reason the above solution is unacceptable, you may also edit all the make files in the *pti* directory tree (after the PTI software is installed) and change all references to */usr/src/LiS* to */opt/gcom/LiS*. This procedure is highly discouraged, however.

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Step 5 Modify the LiS/config.in file. Use a text editor (like vi) to edit the config.in file for LiS

Change **KMODVERS=Y to KMODVERS=**

Change **STRMS_QUEUES=t** to **STRMS_QUEUES=b**

At this point LiS is built and installed on your system. You may run the *strtst* program to verify installation, if desired. Consult the LiS documentation for more information.

2.4.2 Installing the PTI Software

If you are going to create applications that use a PTI embedded controller, you must first install the Linux STREAMS (LiS) package onto your system, as described in the previous section. Do not attempt to install the PTI software until you have *completely* finished the LiS installation.

The PTI installation procedure will create a directory tree on your system whose top node is named *pti*. The default location in the file system where this directory tree is created is the */usr* directory (i.e. */usr/pti*). These installation instructions and other PTI documents assume that the distribution is based at */usr/pti*. If you choose to install the software in another location, you must substitute the alternate directory path for */usr/pti* when following instructions in this document and others. For example, if you choose to install the software in the */var/local* directory, then you must substitute */var/local/pti* for */usr/pti* in the instructions below.

The following procedure describes how to install the PTI software onto a Linux host. Note: you should be logged in as root when performing the indicated commands.

Step 1 Insert the distribution CD into the CDROM drive of your computer. Change the current working directory to the appropriate device directory and run the installation script.

<insert the distribution CD into the CDROM drive on your computer>
root# **cd /mnt/cdrom**
root# **./INSTALL**
[...]
root#

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(Note that the CDROM device might have a different name on your system)

The installation script asks you to:

a) Select your target operating system.
b) Select your board type from the list of board types provided.
c) Enter the installation directory (e.g. */usr*).
d) Authorize the creation of a symbolic link to the installation directory, and enter the directory path for the symbolic link. The default path is */usr/pti*.

Step 2 The installation script prompts you for the server type and operating system type for which the product is being built. This information is used to build the PTI Application Programming Interface (API).

The choices provided for the server type are (1) LAN server, (2) embedded server (i.e. PCIbus embedded controller), or (3) both. The API will build correctly for a LAN server only if your host system includes a TCP/IP package with a standard socket interface. This is not a problem on most Linux systems. Also, as discussed earlier, the API will build correctly for an embedded server only when the LiS package is installed in your system.

Step 3 The choices provided for the operating system type are:

1. Solaris 2.x
2. SunOS (Solaris 1.x)
3. HP-UX for HP9000 Series 700
4. HP-UX for HP9000 Series 800
5. DG/UX
6. IRIX (V4)
7. IRIX (V5 or later)
8. DEC_UX
9. QNX
10. Linux
11. Other

You should select option 10 for Linux.

Once you select the operating system, the installation script builds

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the portions of the software distribution that execute on the local system only. These portions include the API library, host driver (if applicable), and the download, configuration, and test utilities. For the most part, the installation script and the make files it executes do not modify any files or directories outside of the */usr/pti* tree. The exceptions are the API library (*libMPS.a*) that is copied into */usr/lib*, the host driver objects that are copied into the LiS directory tree (if applicable), and the object modules produced by rebuilding LiS with the PTI host driver included in the package (if applicable).

Note (for embedded applications only): If *kerneld* is enabled on your system, the LiS package will automatically be loaded into kernel memory when you open a file descriptor to an embedded controller. LiS will also be automatically unloaded from kernel memory when it has not been used for awhile. If *kerneld* is disabled, however, you must manually load the *streams* module into kernel memory prior to opening a file descriptor to an embedded controller, and you should unload it when it is no longer in use. The 'insmod' and 'rmmod' commands are used to load and unload a kernel module, respectively; 'lsmod' displays a list of all modules currently loaded in the kernel.

```
root# insmod streams
Using /lib/modules/2.2.14-5.0/misc/streams.o
root# lsmod
Module                  Size  Used by
streams               306456  0  (unused)
nfs                    28192  1  (autoclean)
lockd                  30344  1  (autoclean) [nfs]
sunrpc                 52132  1  (autoclean) [nfs lockd]
3c509                   6032  1  (autoclean)
root# rmmod streams
root#
```

Step 4 Skip this step if either you installed the PTI software in the default */usr* directory, or you are installing on a NexuxWare Controller (CPC388).

The load command file is */usr/pti/Cmdfile.prot*, where "prot" is a filename extension identifying a specific software product or configuration. The load command file contains the names of the executable files that are loaded onto the communication controller or server. This file is used during the download procedure, and must

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contain the correct full pathname of each file. Since you did not install the PTI software in the default directory, the pathnames in this file are incorrect and must be updated.

The easiest solution is to create a symbolic link named */usr/pti* that points to the alternate installation directory. For purposes of example, assume that the alternate installation directory for the PTI software is */opt/tools*.

```
root# ln -s /opt/tools/pti /usr/pti
root#
```

If for some reason this solution is not acceptable, you must edit *Cmdfile.prot* and modify the pathnames of the files. Below, a sample load command file is shown with the default pathnames, and then after modification to accommodate the alternate installation directory (*/opt/tools*). Note that the details of your command file will not exactly match the example shown here.

Before:

```
BTYPE 0 PCI334
LOADCTLR 0 /usr/pti/Load/UC.pci334.dfx.0 L_0 0x802000 0x0
LOADCTLR 0 /usr/pti/Load/hdlc.pci334.dfx.0 L_1 0x806b30 0x0
LOADCTLR 0 /usr/pti/Load/xstra.pci334.dfx.0 L_2 0x80cb40 0x80cb40
LOADCTLR 0 /usr/pti/Load/config.dfx.0 L_3 0x80a320 0x0
INIT L_2
```

After:

```
BTYPE 0 PCI334
LOADCTLR 0 /opt/tools/pti/Load/UC.pci334.dfx.0 L_0 0x802000 0x0
LOADCTLR 0 /opt/tools/pti/Load/hdlc.pci334.dfx.0 L_1 0x806b30 0x0
LOADCTLR 0 /opt/tools/pti/Load/xstra.pci334.dfx.0 L_2 Ox80cb40
0x80cb40
LOADCTLR 0 /opt/tools/pti/Load/config.dfx.0 L_3 0x80a320 0x0
INIT L_2
```

2.5 Protokit Software Installation

This section contains basic Protokit software installation instructions for Solaris 2.x host systems. This section is not applicable for NexuxWare products (CPC388).

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ProtoKit is shipped on two CDROMs: one containing the ProtoKit itself and the other containing the GNU software development tools, which are used to build software that runs in the *xSTRa* environment on a PTI server or controller.

The instructions below explain how to install Protokit and extract the GNU tools from the distribution media. Installation of the source-level debugger is described in section 2.4.2.

Follow the instructions in this section, in order, before proceeding with the installation procedures described in the remainder of this document, and before installing the source-level debugger (if applicable).

If you are using ProtoKit with an SBus or PCIbus communication controller (rather than a LAN-based server), you must install the hardware before performing the software installation. After installing the communication controller(s) as described in the User's Manual you received from Performance Technologies, boot your system using the **-r** option so the new hardware is identified.

To install the Protokit software return to section 2.2 Installation Instructions for Solaris of this manual.

2.5.1 GNU Tools Software Installation

In order to develop software to run in the *xSTRa* environment, you must use the software development tools supplied with Protokit. These are a slightly-modified version of the GNU tools from the Free Software Foundation. As the tools are originally distributed, they generate code for the machine type on which they are executed. PTI has modified the programs so that they generate code for the Motorola 68K processor or PowerQUICC processor families regardless of the machine type on which they are installed. The GNU tools for Motorola 68K are used with PTI servers and controllers based on that CPU. The GNU tools for Motorola PowerQUICC are used for all PTI platforms that use the PowerQUICC chip. Therefore, you will need to install the tools supplied with Protokit even if you are already using GNU.

The GNU software is on the second CDROM labeled *GNU Tools*. The distribution includes complete source for all the utilities as well as pre-built executables for Sun SPARC or Intel processors using Solaris 2.6 or newer.

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There are two procedures outlined below. If you are running on a Sun SPARC or Intel processor that has Solaris 2.6 or newer, use "Installing the Tools." If not, use the alternate procedure "Building and Installing the Tools." Your host must have a C compiler available to rebuild the tools.

Before running the build/installation script, you must add two directories to your PATH environment variable. By default, these are */opt/gnu68k-pti/bin* and */opt/gnu68k-pti/lib* for the Motorola 68K tools and */opt/gnuppc-pti/bin* and */opt/gnuppc-pti/lib* for the Motorola PowerQUICC tools. Once the tools have been built and/or installed, all users of the tools must also add these directories to their PATH. If you elect to build the native compiler, a default installation directory of */opt/gnu* is used, which must then also be added to your PATH.

Installing the Tools

There is no need to rebuild the tools for Sun SPARC or Intel processors running Solaris 2.6 or newer. An installation script is provided to copy the executable files for the utilities to an appropriate target installation directory. The script prompts you for the installation pathname, with a default based on the GNU target type. For instance, if you are installing the GNU tools for support of Motorola 68K platforms, the default directory is */opt/gnu68k-pti*. If you choose another pathname, the install script creates a symbolic link from */opt/gnu68k-pti* to your path.

Install the CDROM labelled *GNU Tools*. To run the GNU build/installation script, type:

```
cd /cdrom/cdrom0

INSTALL.gcc
```

The script will ask you:

Would you like to rebuild GNU tools:[y/n]:

Answer *n* to this question. Installation of the GNU tools requires between 10 to 15 Mbytes of free disk space, depending on which target you are installing. The script will ask you for the target type (Motorola 68k, PowerQUICC, or native compiler) and for the installation directory pathnames. During the installation procedure, the tools are copied to their runtime loca-

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tions.

Building and Installing the Tools

The GNU tools must be built from the source code if one of the following apply: 1) your host is not a SPARC or Intel processor running Solaris 2.6 or newer, or 2) you are running an older version of Solaris. Run the installation script as described above; the script will ask you:

Would you like to rebuild GNU tools:[y/n]:

In this case, you answer *y*. The script will ask you for the target type (Motorola 68k, PowerQUICC, or native compiler) and for the installation directory pathnames. The script will print out status of the build as it progresses; this is a lengthy operation on most computers.

NOTE: If you have elected to build the native compiler, build it again once it has completed the first build and installation procedure. Make sure that */opt/gnu* (or the installation directory name you have chosen) is in your PATH the second time you build it. The GNU software will then rebuild the native compiler using the GNU native compiler that you have just built. This is the standard GNU recommended procedure.

Building of the GNU tools requires anywhere from 50 to 100 Mbytes of additional free disk space for *each* compiler you build. During the installation procedure, the tools are built and copied to their run-time locations. The *gnutools* directory in *pti/util* can then be removed, freeing the majority of the disk space.

2.5.2 Source-Level Debugger Installation

This section describes how to build/install the PTI source-level debuggers, **gdb68k** or **gdbppc**. The debugger is based on the Free Software Foundation's GDB, and works in conjunction with the GNU software development tools. You must complete the standard Protokit and GNU installations as described previously before installing the source-level debugger.

As the names imply, **gdb68k** and **xgdb68k** are used to debug PTI Motorola 68k platforms, while **gdbppc** and **xgdbppc** are used to debug PTI Motorola PowerQUICC platforms.

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The instructions below assume that you installed Protokit in the default location, */usr/pti*. If you used an alternate base directory, be sure to make the appropriate pathname substitutions as you type the commands.

The Protokit CDROM labeled *GNU Tools* contains the GDB distribution. The source for GDB is contained in the subdirectory *gnutools/gdb-4.17*. Source for an X windows graphical user interface (GUI) for GDB is also included, and is located in the directory *gnutools/xxgdb-1.06*

The distribution includes complete source for GDB. If you purchased Protokit for Solaris 2.X, the distribution also includes pre-built executables for Sun SPARC or Intel processors using Solaris 2.6 or newer.

There are two procedures outlined below. If you are running on a Sun SPARC or Intel processor that has Solaris 2.6 or newer, use "Installing GDB." If not, use the alternate procedure "Building and Installing GDB."

To build the X windows GUI programs **xgdb68k** and **xgdbppc**, you must have X11 Release 4 or later installed on your system. You must also set your path variable to include the directory where your X11 binaries are located, in order to use the *imake* utility that is invoked by the script.

If you are using the GNU tools rather than the standard SunPro tools to build executables for your host system, edit the file *Imakefile* in *pti/util/gnutools/xxgdb-1.06* before you begin the build procedure. Modify the line that reads **`#CC=gcc -v`**, removing the **#** symbol at the start of the line. However, the *imake* program may have produced a Makefile that contains switches not supported by the GNU compiler. If so, you will have to manually pull them out of the Makefile.

xgdb68k and **xgdbppc** use the **gdb68k** and **gdbppc** utilities, respectively, and must be able to find that utility in the executable path of the current process. For example, if the **gdb68k** and **xgdb68k** utilities were installed in */opt/gnu/bin*, then that directory must be present in your PATH environment variable.

Installing GDB

There is no need to rebuild GDB for Sun SPARC or Intel processors running Solaris 2.6 or newer. An installation script is provided to copy the executable files to an appropriate target installation directory. The script prompts

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you for the installation pathname, with a default set to */opt/gnu/bin*.

Install the CDROM labelled *GNU Tools*. To run the GDB build/installation script, type:

```
cd /cdrom/cdrom0

INSTALL.gdb
```

The script will ask you:

```
Would you like to rebuild GDB programs:[y/n]:
```

Answer *n* to this question. The script will prompt you for target type, for installation directory, and whether you want to use the X Window GUI. During the installation procedure, the tools are copied to their runtime locations.

Building and Installing GDB

The GNU tools must be built from the source code if one of the following apply: 1) your host is not a SPARC or Intel processor running Solaris 2.6 or newer, or 2) you are running an older version of Solaris. Run the installation script as described above; the script will ask you:

```
Would you like to rebuild GDB programs:[y/n]:
```

In this case, you answer *y*. The script will prompt you for target type, for installation directory, and whether you want to use the X Window GUI. The script will print out status of the build as it progresses. During the installation procedure, the tools are built and copied to their run-time locations. The *gnutools* directory in *pti/util* can then be removed, freeing the majority of the disk space.

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Section 3

Network Configuration

This chapter applies to Performance Technologies Inc. (PTI) LAN-based MPS servers only. It explains how to configure the server so that it automatically loads and begins execution whenever it is powered on or reset. This configuration can be accomplished: by connecting a terminal (opening a window) on the server's console port. When a terminal is connected to the server, and the server power is cycled, the server PROM code provides an opportunity to specify its configuration by waiting five seconds before beginning the download process. If during that time you press the terminal's space bar, the PROM code prompts you for configuration information. During configuration at the console, you may either provide a complete configuration or indicate that the Bootstrap Protocol (BOOTP) is to be used to provide the complete configuration. BOOTP is supported by the MPS 800 and MPS 300/600.

During initialization, PROM code in the server uses TFTP (Trivial File Transfer Protocol) to request its runtime code from a designated client on the network. You may configure the server with up to 100 clients that are able to provide the runtime code. If a client does not respond to the TFTP request, the server tries the next client in the list. If no client responds, and the Bootstrap Protocol is not configured, the server returns to the top of the list, and begins again, retrying indefinitely. If the Bootstrap Protocol is configured, the PROM issues a Bootstrap Protocol request message starting the download process from the beginning.

Section 3.1 describes how to configure a client so it can respond to the server's TFTP requests for runtime image files. Section 3.2 describes how to configure the server with information that it needs to access the client(s) and load the runtime system and respond to connection requests from client applications.

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3.1 Configuring a Client

3.1.1 Trivial File Transfer Protocol For UNIX Systems

In order to load the server with a runtime system over the network, the server's boot prom code and the client communicate using the TFTP protocol. The file */etc/inetd.conf* configures the Internet daemon and enables the various protocols. Login as root, edit this file and find the entry for TFTP. If the entry has a **#** character at the left margin, TFTP is not enabled. Remove the **#** character. Also, delete the last portion of the line that reads:

```
-s /tftpboot
```

After editing the file, either reboot the system or kill the Internet daemon (the process name is *inetd*) and restart it with the command **inetd &**. If TFTP is already enabled, this step is not necessary.

In order for a client application to access the server during runtime operations, the service name and port number must be added to the file */etc/services* on the client. The entry should look something like this:

```
mps      5555/tcp      # TCP, normal mode
```

A client application uses the service name in the first column to establish a connection to the server through the PTI API. You should always use the service name **mps**.

The port number in the second column must be followed by **/tcp**, which specifies the protocol used to access the server. The port number shown above is an example, and may be changed, following these guidelines:

- Use values between 5000 and 65,535 (decimal), and check the existing entries in the */etc/services* file to be sure that the values you choose are not already assigned to another service.

- The port number assigned must be the same on all clients that access the server.

The final column contains an optional comment, designated by the **#** charac-

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ter.

To establish a connection to the server, the API also requires the server's logical host name and Internet address to be added to the */etc/hosts* database. An entry in this file looks something like the following example:

```
100.0.0.8          indiana indy hoosier
```

The first column contains the Internet address in the standard dotted format. In this example, the host name is **indiana**, with **indy** and **hoosier** as aliases, or nicknames, which can be substituted for the host name. The Internet address you use must be consistent with your network, and should be assigned by your system administrator. You can choose any logical name for the server, and any number of aliases. This entry should look the same in the */etc/hosts* files of all clients that access the server.

3.1.2 Trivial File Transfer Protocol For Windows NT

Having a PTI server boot over the LAN from a Windows NT machine can only be performed when the NT machine has a TFTP server running. The client TFTP server software is not standard for the NT operating system. Therefore, you will need to obtain and install this TFTP software in order to download the PTI server.

In order for a client application to access the PTI server during runtime operations, the service name and port number must be added to the services file (%SystemRoot%\system32\drivers\etc\services) on the client. The entry should look something like this:

```
mps      5555/tcp      # TCP, normal mode
```

A client application uses the service name in the first column to establish a connection to the server through the PTI API. You should always use the service name **mps**.

The port number in the second column must be followed by **/tcp**, which specifies the protocol used to access the server. The port number shown above is an example, and may be changed, following these guidelines:

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- Use values between 5000 and 65,535 (decimal), and check the existing entries in the *services* file to be sure that the values you choose are not already assigned to another service.

- The port number assigned must be the same on all clients that access the server.

The final column contains an optional comment, designated by the # character.

To establish a connection to the server, the API also requires the server's logical host name and Internet address to be added to the hosts database (%SystemRoot%\system32\drivers\etc). An entry in this file looks something like the following example:

```
100.0.0.8          indiana indy hoosier
```

The first column contains the Internet address in the standard dotted format. In this example, the host name is **indiana**, with **indy** and **hoosier** as aliases, or nicknames, which can be substituted for the host name. The Internet address you use must be consistent with your network, and should be assigned by your system administrator. You can choose any logical name for the server, and any number of aliases. This entry should look the same in the hosts database files of all clients that access the server.

3.1.3 Bootstrap Protocol

The MPS 800 and MPS 300/600 servers can be configured using the Bootstrap Protocol (BOOTP), if the client machine is a UNIX system. BOOTP is discussed in Internet Request for Comments (RFC) 951, and RFC1084. If BOOTP is to be used, the BOOTP daemon must be running at the client when the server is booted. The file */etc/inetd.conf* configures the BOOTP daemon. Login as root, edit this file and add the line:

```
bootps dgram udp wait root /usr/etc/bootpd -i /usr/etc/
bootptab
```

PTI does not provide a BOOTP daemon. See your system administrator if your system does not include one and you wish to use BOOTP.

You must connect a terminal or open a window to the server's console port

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to configure the server to use BOOTP (see section 3.2.13). When power is cycled or the server reset button is pushed, and the server is configured for BOOTP, the server broadcasts a BOOTP request message. If the host BOOTP daemon is running and an entry exists in the */usr/etc/bootptab* table for the server, then the BOOTP daemon sends a BOOTP reply message to the server. This reply can provide the server with the following information:

- Server's Internet address
- Configuration server's Internet address
- Configuration server's host name
- Configuration file name
- Internet address of gateway to configuration server

In order for your BOOTP daemon to reply to the server's BOOTP request, you must edit the */usr/etc/bootptab* file to provide an entry for the server. This entry includes the server's MAC (Ethernet) address, the server's Internet address and the full path name of a server configuration file. The MAC address is assigned to the server at the factory. You can read it at the server 300/600 console using the **E** command (see section 3.2). The MPS 800 displays the MAC address when the menu is displayed. The server's Internet address is assigned by you to meet your network's needs. The configuration file is a text file created by you. The content of this file is discussed in section 3.2.

The format of the bootptab file is not defined in the BOOTP Requests for Comments, and implementations vary. The following is a typical entry in a bootptab file:

```
# Provide an entry for the PTI MPS 300 communications
# server. The hd field defines the home directory.  The ht
# field defines the hardware type.  The ha field defines
# the  MAC (Ethernet) address of the server. The ip field
# is the host's specification of the Internet address to
# be assigned to the server.  The bf field is the full path
# name of the configuration file.
#
bootpClient:\
     :hd=/tftpboot:\
     :ht=ethernet:\
     :ha=00.03.31.02.15.D0:\
     :ip=206.251.239.143:\
     :bf=/usr/pti/mps300.config:
```


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This entry includes the Ethernet address of the server (00:03:31:02:15:D0). When the BOOTP daemon reads the server's BOOTP request, it extracts the source Ethernet address from the request and checks to see if there is a matching entry in bootptab. If a matching entry is found, the BOOTP daemon builds a BOOTP reply message using the *ip* and *bf* fields from the bootptab entry and writes the message to the server. The server reads the reply and uses TFTP to retrieve the *bf* file from the machine at the Internet address specified at *ip*.

You may specify a machine to provide the configuration file that is on a network different from that of the server. Consider the following bootptab entry:

```
# Provide an entry for the PTI MPS 600 communications
# server. The hd field defines the home directory.  The ht
# field defines the hardware type.  The ha field defines
# the  MAC (Ethernet) address of the server.  The ip field
# is the host's specification of the Internet address to
# be assigned to the server.  The sa field is the Internet
# address of the machine to provide the configuration
# file.  The T99 field specifies the Internet address of
# the gateway the server is to use to access the
# sa machine.
# The bf field is the full path name of the configuration
# file.  Since the configuration file is provided by a
# machine on a different network, use the "vendor
# specific" area of the BOOTP reply to specify the Internet
# address of a gateway. T99=0Xcefbef81 = 251.206.239.129
#
bootpClient:\
     :hd=/tftpboot:\
     :ht=ethernet:\
     :ha=00.03.31.02.15.90:\
     :ip=206.251.239.143:\
     :sa=204.250.22.30:\
     :T99=0xCEFBEF81:\
     :bf=/usr/pti/mps600.config:
```

The server's Internet address, as defined in the bootptab entry is 206.251.239.143. When this address is expressed as a 32-bit number, the first three bits are 110. Thus, the server has a Class C Internet address and its network identifier is 206.251.239. The *sa* field specifies a machine with a Class C address and its network identifier is 204.250.22. The gateway Internet address specified by the *T99* field is 206.251.239.129. It has the same

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class and network identifier as the server.

The *sa* field is the Internet address of the machine that is to provide the server with its configuration file. This machine is on a different network from the server. The *T99* field is the Internet address of the gateway the MPS is to use to access the machine at the *sa* address. The *T99* field provides the gateway's Internet address as a 32-bit hexadecimal number.

You must be logged in as super user to modify bootptab.

3.2 Configuring the Server

The server's network configuration parameters are saved in a non-volatile flash PROM. To program the parameters, you must attach a terminal to the server's console port with an RS-232 cable. The terminal should be set to 9600 baud, 8 bits, no parity. Once the terminal is attached, switch the server on and press the terminal's space bar within five seconds. When you do this the very first time after installing your server, you will see the message:

```
Formatting uninitialized FLASH prom...
```

After a slight delay, a configuration menu is displayed on the terminal screen. For an MPS 800 server, the menu looks like this:

```
    PTI Prom Version 1.0

    MPS 800 Server Configuration

    Ethernet Address: 00:11:22:33:44:55

C - Client's Internet Address
I - Server's Internet Address
E - Server's Line Electrical Interface
N - Server's Logical Name
P - Server's (Listen) Port Numbers
F - Download Command File Pathname
U - User Defined Flash Prom
R - Routing Configuration
B - Remote Configuration
T - SNTP Configuration
W - Write New Flash Program
S - Save The Configuration

D - Enter PQbug
```


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```
X - Exit And Start Download
Y - Exit, Download Then Enter PQbug
->
```

For the MPS 300/600 servers, the menu looks like this:

```
    MPS 300/600 Server Configuration
C - Client's Internet Address
I - Server's Internet Address
E - Server's Ethernet Address
N - Server's Logical Name
P - Server's (Listen) Port Numbers
F - Download Command File Pathname
G - Diagnostic Configuration
U - User Defined Flash Prom
R - Routing Configuration
L - Set Login Password
B - Remote Configuration
T - SNTP Configuration
S - Save The Configuration

D - Enter PTbug
X - Exit And Start Download
->
```

For a server in the MPS 3000 family, the menu appears as follows:

```
The Switch Reads f:HOST

   Network Parameters Configuration
C -> Client's Internet Address
I -> Server's Internet Address
E -> Server's Ethernet Address
N -> Server's Logical Name
P -> Server's (Listen) Port Numbers
F -> Download Command File Pathname
H -> Set Host's Slave Address
T -> Diagnostic Configuration
R -> Read The Switch Setting
U -> User Defined Flash Prom
L -> Set Login Password
S -> Save The Configuration

D -> Enter PTbug
X -> Exit and Start Download
Select>
```


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If a different menu is displayed on an MPS 3000 server, the rotary switch on the front panel of your server's host is in the wrong position. It must be set to position **F**.

3.2.1 Client's Internet Address

Select **C** to enter the Internet addresses of the clients that have been configured to load the server (as described in section 3.1). Addresses are entered in dotted decimal notation. You may enter up to 100 addresses, typing a carriage return after each entry, and the character **Q** to return to the menu. Insert and delete commands are available to make modification of the list easier. As you edit the list, the existing content of each location is displayed. To change the address, type the new value and press return. To insert an address preceding the currently displayed entry, type **I** followed by the new address, then return. To delete the currently displayed entry, type **D** and return. When you reach the end of the list, a marker (**0.0.0.0**) is displayed instead of the current value. At this point, you can enter an address to add to the end of the list, or press return to go back to the top of the list. Enter a **Q** to return to the main menu.

3.2.2 Server's Internet Address

Select **I** to program the server's Internet address, also in dotted notation. This value must match the address assigned to the server and entered in the */etc/hosts* database (section 3.1).

3.2.3 Server's Line Electrical Interface

This option is only supported by the MPS 800 server.

Select **E** to program the server's line electrical interface. The MPS 800 supports 8 serial ports. The ports support the RS232 and RS422 (RS530) interface standards. The assignment of interface standards to server ports is accomplished with the **E** command. There is a two port granularity on the assignment, i.e., ports zero and one must have the same assignment, ports two and three must have the same assignment, and so on.

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When you type an **E**, you are prompted to make the assignment for each of four pairs of server ports. Type a "0" to assign RS422 (RS530) to a port pair; type a "1" to assign RS232 to a port pair.

3.2.4 Server's Ethernet Address

The server's Ethernet address is assigned by the hardware manufacturer and cannot be modified. The MPS 800 displays the assigned Ethernet address with the menu. For the MPS3000 and MPS 300/600, you can select **E** to display it.

3.2.5 Server's Logical Name

Select **N** to enter the server's logical name. This can be the host name or any of the aliases assigned to the server in the clients' */etc/hosts* databases.

3.2.6 Server's (Listen) Port Numbers

Select **P** to program the server's port numbers for normal operation. First, you are prompted for the server's TCP port number, which must match the port number assigned in the clients' */etc/services* files for the TCP/normal mode service. Next, you are prompted for the server's UDP port number. Enter zero, since you will not be using this service with most PTI software products. Finally, you are prompted for the port number used by the server for broadcast connections. Broadcast connections are supported only by certain, special-purpose server protocols. You should enter zero for the broadcast port number.

3.2.7 Download Command File Pathname

Select **F** to enter the pathname of the server's load command file. This file must be present, in the same location, on all clients configured to load the server. By default, it is installed in the directory */usr/pti (*or *C:\pti* for Windows NT), and is named *Cmdfile.prot*, where *prot* is a filename extension that identifies the protocol or software configuration. Check your *pti* direc-

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tory to determine the exact name of your command file.

3.2.8 Host's Slave Address

This option applies only to MPS 3000-family servers.

Select **H** to set the base address in VMEbus space of the host's slave memory. This entry should always be set to **F**, which selects base address 0x78000000. The host's slave memory is automatically configured for slave address mode A32 D32, with the first 2 Mbytes of its memory mapped into VMEbus address space.

3.2.9 Diagnostic Configuration

Since most PTI software products do not make use of the server's diagnostic mode, you do not need to program this option.

3.2.10 Read The Switch Setting

This option applies only to MPS 3000-family servers.

Select **R** to display the current position of the rotary switch on the front panel of the server's host. It should always be set to position **F**.

3.2.11 Routing Configuration

This option applies only to MPS 800 and MPS 300/600 servers.

Select **R** to enter routing information. The MPS 800, MPS 300/600 may be booted from a host on a local network or from a host on a separate network via a gateway. Once booted, clients may access the server from both local networks and separate networks via a gateway. The routing information is stored in a table as 16 pairs of Internet addresses in decimal dot notation. The first address of each pair is a destination network, the second address is the gateway to access the network.

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For example, suppose the server's Internet address is 206.251.239.143 and the client's Internet address is 204.250.22.30. These addresses both begin with binary bits 110 and are, therefore, class C addresses but they have different network identifiers. The server accesses the client via a gateway. Suppose the gateway on the server's local area network has Internet address 206.251.239.129. This configuration is present in the server's routing tables as follows:

```
204.250.22.30          206.251.239.129
```

The first entry is the address of the client. The second is the address of the gateway on the server's local area network that the server uses to access the client.

If a client's Internet address indicates a different network identifier but there is no entry for the client in the server's routing tables, the server looks in the routing tables for a default gateway. If a network address of 255.255.255.255 exists in the table, then the server uses the corresponding gateway address as its default gateway. The following entry in the routing table indicates that the host at Internet address 206.251.239.129 is a default gateway:

```
255.255.255.255        206.251.239.129
```

If your network uses subnet addressing you can provide your subnet mask to the server with an entry in the routing tables. If a network address exists in the table that is the same as the server's Internet address, then the server interprets the corresponding gateway address as a subnet mask. For example, many sites choose to subnet class B addresses by using the third octet of to identify subnets and the fourth octet to identify hosts. This yields a subnet mask of 255.255.255.0. If the server's Internet address is 136.19.91.35, the following entry in the routing table indicates this subnet mask:

```
136.19.91.35           255.255.255.0
```

The first entry is the Internet address of the server. This cues the server to use the second entry in the table as the subnet mask.

When you select **R**, the server prompts you to enter **d** to display the table, **x** to exit from the menu item or **m** to modify the table. If you select **m**, the server prints the Internet address of the first entry. In response to this prompt, you can enter an Internet address or type **q** to quit the menu item or

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d to delete the network/gateway entry pair. If you enter an Internet address and press **Return**, the server displays the corresponding gateway Internet address. You may then enter an address for the gateway or **d** to delete the network/gateway entry pair. If you enter an address and **Return**, the server displays the next entry in the table.

3.2.12 User Defined Flash Prom

A 1024-byte area of the flash PROM is reserved for configuring product specific parameters. Most PTI software products do not require any parameters to be programmed into this area of the flash PROM. However, three features are configured by entries in this area of flash PROM.

3.2.12.1 Auto Reset

The server can be configured to perform an automatic software reset when unrecoverable errors are detected. The reset concludes with downloading the server and restarting operation. To enable the auto reset feature, the first four bytes of the user flash area (starting at offset 0) must be set to 0x00, 0x00, 0xA0 and 0xD0. If any other values are used, when the server detects an unrecoverable error it prints diagnostic information at the console device and halts.

3.2.12.2 Network Reset

The server has the ability to be reset over the Local Area Network (see *commreset* and *commload* in Section 8), and by default is set to allow this action. If security is a concern, and only a physical reset (pushing the reset button or cycling power) can be allowed, the address 0x3fe of the user defined flash prom should be set to a value other than 0x00.

3.2.12.3 System Report

The server can be configured to generate a report at the console device on a periodic basis. The System Report includes statistics on the usage of buffers and memory by the server. To enable display of the System Report, the last byte of the user flash area (offset 0x3ff) must be modified to a nonzero hexadecimal value between 1 and 0xff, which specifies the frequency in seconds for the report. The System Report is disabled by entering a zero at this offset (the factory default). See Section 8.3 for a detailed discussion of the System

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Report format and explanation of the information that it contains.

3.2.13 Login Password

The Login Password is not implemented on the MPS 800.

If you wish to restrict access to the configuration menu, select **L** to set up a login password. You are prompted to enter a password, and then prompted to retype it for verification. The characters you type are not displayed on the terminal screen, and the password is encoded in the flash PROM so that it is not readable. You may use any combination of letters, digits and special characters, up to a maximum of 64. The password is terminated with a carriage return. Once you have entered a password and saved it in the flash PROM, the server always prompts you to supply your password when you attempt to access the configuration menu. If you do not type the correct password, the configuration menu is not displayed.

3.2.14 Remote Configuration

This option applies only to the MPS 800 and MPS 300/600 servers.

The MPS 800 and MPS 300/600 servers can use the Bootstrap Protocol (BOOTP) to obtain the server configuration. The configuration is defined in a text file you provide. This text file is read by the server at boot time and is an alternative to using the console to configure the server. The server uses the Trivial File Transfer Protocol (TFTP) to read the configuration file. To use BOOTP, you must provide an entry in your host's bootptab file, and make sure your host's BOOTP daemon is executing when the PTI server is booting.

If you select **B**, the server asks you if you wish to enable remote configuration using BOOTP. If you respond **y**, and follow this with **X** to start download or **S** to save the configuration and then **X**, the server uses BOOTP to obtain its configuration. When using BOOTP, the server first clears the RAM memory version of the flash PROM information. It then initializes the RAM copy of the flash PROM using the information in the configuration file. If the configuration file is processed without error, the RAM copy of the PROM information is written back to PROM.

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You cannot use both the BOOTP protocol and the console to configure the server. To use BOOTP, you must request it with the **B** option. Once you do this, the setting is preserved in flash PROM and BOOTP is used until the option is disabled.

The Bootstrap Protocol consists of two messages: a BOOTP request and a BOOTP reply. The PTI server writes the BOOTP request and reads the BOOTP reply that is written by the BOOTP daemon executing on a BOOTP host. The reply includes the following information:

- The server's Internet address
- The server's configuration full path file name

The BOOTP daemon obtains this information from the bootptab file entry you provide. The PTI server uses TFTP to read the configuration file to obtain its configuration. Each line in the file is a configuration command. The line content that follows the # character is regarded as comment. The commands may be entered in either upper or lower case. The following are the valid commands:

CLIENT	**FILE**
SERVER	**DIAG**
NAME	**USER**
PORTS	**ROUTE**
SNTP	**ELEC**

These commands are used in the same way as when the server is being configured at the console. The discussion above provides details on how the server uses the configuration information. The following describes the format of the commands.

The CLIENT command is followed by one or more client Internet addresses separated by spaces or tabs. The format of the addresses is decimal dot notation. For example,

```
CLIENT          206.251.239.148      206.251.239.149
```

The SERVER command defines the Internet address of the MPS 800 or MPS 300/600 server. If a SERVER command is omitted from the configuration file, the server uses the Internet address provided in the BOOTP reply. Only one address is allowed with the SERVER command. For example,

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```
SERVER          206.251.239.143     # PTI MPS 600
```

The NAME command identifies the server's name. For example,

```
NAME            diamond
```

The PORTS command has up to three entries: the server's tcp port, udp port and udp broadcast port. The ports are provided as decimal numbers. For example,

```
PORTS    48879     0      0
```

The above entry indicates that the server is to use the TCP protocol and to "listen" at "well known port" 48879. In addition, the entry indicates that the UDP protocol is not to be used. These are typical assignments. The port assignments must match those in the */etc/services* file.

The FILE command defines the full path name of the PTI server's download command file. For example,

```
FILE     /usr/pti/Cmdfile.x25
```

After the server reads the configuration file and stores the content in flash PROM non-volatile memory, it retrieves */usr/pti/Cmdfile.x25* to obtain a list of the files that are to be loaded into RAM.

The DIAG command configures an MPS3000 or MPS300/600 server to run in a diagnostic mode. The command is followed by the responses to the following questions:

```
Are diagnostics supported? (y or n)
Enter diagnostic TCP port number (decimal)
Enter diagnostic UDP port number (decimal)
Invoke diagnostic mode upon exiting? (y or n)
```

If the first argument is **n**, the rest of the command is ignored. For example,

```
DIAG     n          # Diagnostics not supported
```

The USER command allows the user area of flash PROM to be set. The command is followed by a hexadecimal offset from the beginning of the user flash PROM area, and a hexadecimal value for the byte at that offset. For example, the following enables the auto reset feature;

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```
# Enable auto reset
USER            0               0
USER            1               0
USER            2               0xA0
USER            3               0xD0
```

The ROUTE command allows the user to specify three items of information that relate to TCP/IP routing:

- The Internet address of gateways that can be used to access a different network.
- The Internet address of a default gateway.
- A subnet mask.

Each ROUTE command is followed by two Internet addresses in decimal dot notation. The first address is that of a Internet destination. The second is the address of a gateway to be used to reach the destination. There are two special cases. If the destination address is 255.255.255.255, the server regards the gateway address as the default gateway. If the destination address is the same as that of the server, the server regards the corresponding gateway address as a subnet mask. For example,

```
ROUTE  204.250.22.30   206.251.239.129  # Route to 204.250.22.30
ROUTE  255.255.255.255 206.251.239.129  # Default gateway
ROUTE  206.251.239.143 255.255.255.240  # Subnet mask
```

The above defines a gateway to a remote Internet destination and the Internet address of a default gateway. In addition, assuming the server's Internet address is 206.251.239.143, the last line in the example defines a subnet mask of 255.255.255.240 or 0XFFFFFFF0.

The SNTP command allows configuration of two parameters used by the Simple Network Time Protocol (SNTP). The first parameter specifies the Internet address of the NTP server platform, and the second parameter specifies the Poll Frequency Code (see section 3.2.14 for further information):

```
SNTP            206.251.239.141     5
```

The ELEC command allows configuration of the electrical interface for MPS800 servers. The MPS800 supports 8 RS232 and RS422 (RS530) serial ports. There is a two port granularity on the assignment of electrical interfaces, i.e., ports zero and one must have the same assignment, ports two

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and three must have the same assignment, and so on. Thus, the ELEC command has 4 parameters, designating the line interface for ports 0/1, 2/3, 4/5, and 6/7. Each parameter must be either RS232 or RS530. In the example below, ports 0/1 and 4/5 are RS232 and ports 2/3 and 6/7 are RS530.

```
ELEC            RS232 RS530 RS232 RS530
```

3.2.15 SNTP Configuration

This option applies only to the MPS 800 and MPS 300/600 servers.

The MPS 800 and MPS 300/600 servers can use the Simple Network Time Protocol (SNTP) to maintain and synchronize a local system clock to a reference clock provided by a Network Time Protocol (NTP) or SNTP Server. This option provides the ability for PTI serial protocols to then timestamp serial data traffic with the Universal Coordinated Time (UTC) time of day. When used with an accurate reference clock such as that provided by Global Positioning System (GPS), this option allows the MPS server to provide timestamping capability for received serial data traffic to the nearest millisecond.

Once the **T** option is selected, you are prompted for the Internet address of the NTP server platform. This platform must be an NTP (or SNTP) server on your local subnet in order to provide clock synchronization to the nearest millisecond. After entering this address, you are prompted for the Poll Frequency Code value. This value translates into the number of seconds between polls to the NTP server, in terms of powers of 2. For instance, the value 4 designates polls to the NTP server every 16 seconds, the value 5 designates polls to the server every 32 seconds, and so on. The valid range of entries is 4 to 14, which is the complete valid range proscribed in the SNTP specification. However, for practical use with a PTI server, the subset 4 to 7 is highly recommended, and ideally, one should specify 4. If SNTP is no longer required, specifying a Poll Frequency Code of 0 will disable the SNTP feature. The factory setting is to disable SNTP.

Note: The Universal Coordinated Time is the number of seconds (and in this case, microseconds) that have elapsed since January 1, 1970 at the zero meridian of Greenwich, England. This format is used by most computer systems to provide a time value that is independent of time zone and daylight savings time concerns. Consult the Programmer's Guide(s) for the serial

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protocol(s) you have purchased for more information on how timestamps are reported.

3.2.16 Write New Flash Program

The MPS 800 supports updating the Boot Flash code in the field. This is not a part of the configuration process but can be helpful in certain maintenance situations. The command causes a program in the Boot Flash code to be copied to RAM. This program erases the existing Boot Flash code, reads a new Boot Flash image from the boot client via TFTP, programs the Boot Flash device with the image, and then transfers control to the Boot Flash device.

If you are provided with an updated Boot Flash image file, instructions on the usage of the update procedure will accompany the image.

3.2.17 Enter Debugger

The Boot Prom code includes a debugger to aid in field service. Invoking the debugger is not a part of the configuration process.

3.2.18 Exit And Start Download

Once all the network parameters have been configured, select **S** to program the flash PROM and save the configuration. This takes a few seconds. Then, select **X** to exit from the configuration menu and transfer control to the server's TFTP load program.

NOTE: If you do not save the configuration before exiting from the configuration menu, the values you changed take effect when the server is booted, but will be lost on the next reboot or when the server is powered off.

The server configuration parameters may be modified at any time by repeating the steps outlined in this section.

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3.2.19 Exit, Download Then Enter PQbug

The MPS 800 Boot Prom code includes a debugger to aid in field service. If **Y** is selected, the server downloads the runtime image but instead of transferring to the image, it transfers to the debugger instead. This command is not part of the configuration process.

NOTE: If you do not save the configuration before exiting from the configuration menu, the values you changed take effect when the server is booted, but will be lost on the next reboot or when the server is powered off.

The server configuration parameters may be modified at any time by repeating the steps outlined in this section.

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Section 4

PT-VME1X1 Controller Configuration

This chapter applies only to PT-VME131/14/151 or PT-VME161 VMEbus communication controllers. Skip this chapter if you are installing software for another controller type.

The instructions in this chapter assume that the appropriate PTI PROM is installed on your controller:

Controller Type	Socket Location
PT-VME131/141	U52
PT-VME151	U38
PT-VME161	U36

If the PROM is missing, please contact PTI to obtain a current PROM before proceeding with your installation.

To communicate with the PTI STREAMS driver, the controller must be configured as a VMEbus slave. This means that some or all of the controller's main memory is visible on the VMEbus where it can be accessed by the host driver. The slave base address and mode must be configured for compatibility with the host system in which the controller is installed.

The controller contains two software-programmable devices: an EEPROM and a flash PROM. To program these devices, you must attach a terminal to the controller's console port with an RS-232 cable. The terminal should be set to 9600 baud, 8 bits, no parity. Once the terminal is attached, switch the system on. If a **PTbug >** prompt is displayed, you must program the EEPROM, as described in section 4.1. Otherwise, you can skip this step and proceed to section 4.2, which describes how to program the flash PROM.

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4.1 Programming the EEPROM

The controller contains an EEPROM that is normally programmed at the factory. However, if a **PTbug >** prompt is displayed when you power on the controller, you must program the EEPROM as described in this section.

At the PTbug prompt, enter the command **ee 30** to display and modify the EEPROM values. A word (16 bits) is displayed at a time. A carriage return moves to the next word without modifying the value. To make a change, enter the new value at the prompt following the displayed current value, and then enter a carriage return to move to the next entry.

For a PT-VME131/141 controller, the EEPROM should be programmed with the values shown in Table 4-1. For a PT-VME151 controller, use the values shown in Table 4-2. For a PT-VME161 controller, use the values shown in Table 4-3.

The EEPROM is programmed as you enter new values. You do not need to execute a separate command to save the programming. Enter a period (".") to terminate the **ee** command. Then reset the controller or cycle the power off and back on before proceeding to the next section.

Word	Value	Description
30	B0BB	Valid word
32	0004	Boot flags--enable verbose errors, boot on power-up, no diagnostics
34	0000	Boot code source address, high
36	A000	Boot code source address, low
38	200E	Boot code destination address, high
3A	8DB0	Boot code destination address, low
3C	0000	Boot code transfer count, high
3E	6000	Boot code transfer count, low
40	200E	Boot code execution address, high
42	8DB0	Boot code execution address, low
44		Memory size:
	0000	1 Mbyte
	0001	2 Mbytes
	0002	4 Mbytes
	0003	8 Mbytes

Table 4-1. PT-VME131/141 EEPROM Programming Values

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Word	Value	Description
30	B0BB	Valid word
32	0004	Boot flags--enable verbose errors, boot on power-up, no diagnostics
34	0000	Boot code source address, high
36	D700	Boot code source address, low
38	200E	Boot code destination address, high
3A	8DB0	Boot code destination address, low
3C	0000	Boot code transfer count, high
3E	6000	Boot code transfer count, low
40	200E	Boot code execution address, high
42	8DB0	Boot code execution address, low
44		Memory size:
	0000	1 Mbyte
	0001	2 Mbytes
	0002	4 Mbytes
	0003	8 Mbytes
	0004	16 Mbytes
	0005	32 Mbytes
	0006	64 Mbytes

Table 4-2. PT-VME151 EEPROM Programming Values

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Word	Value	Description
30	B0BB	Valid word
32	0004	Boot flags--enable verbose errors, boot on power-up, no diagnostics
34	0000	Boot code source address, high
36	D900	Boot code source address, low
38	201E	Boot code destination address, high
3A	8DB0	Boot code destination address, low
3C	0000	Boot code transfer count, high
3E	6000	Boot code transfer count, low
40	201E	Boot code execution address, high
42	8DB0	Boot code execution address, low
44		Memory size:
	0000	1 Mbyte
	0001	2 Mbytes
	0002	4 Mbytes
	0003	8 Mbytes
	0004	16 Mbytes
	0005	32 Mbytes
	0006	64 Mbytes

Table 4-3. PT-VME161 EEPROM Programming Values

4.2 Programming the Flash PROM

The controller's slave configuration parameters are saved in a non-volatile flash PROM. To program the parameters, you must switch the system on and press the terminal's space bar within five seconds. When you do this the very first time after installing your controller, you will see the message:

```
Formatting uninitialized FLASH prom...
```

After a slight delay, a configuration menu is displayed on the terminal screen:

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```
The Switch Reads n:CONTROLLER


   VMEbus Parameters Configuration
A -> Slave Address Configuration
M -> Slave Address Mode
R -> Read The Switch Setting
U -> User Defined Flash Prom
L -> Set Login Password
S -> Save The Configuration

D -> Enter PTbug
X -> Exit and Start Download
Select>
```

During the controller installation procedures, you were instructed to set the hexadecimal (16-position) switch on the controller's front panel to a value between **0** and **E**. The position of the switch is reflected in the value of ***n*** in the first line of the display above. The switch position **F** is reserved for LAN-based servers, and is not valid when the controller is installed in a host backplane. If the switch is set to position **F**, you will see a different menu displayed on the screen.

4.2.1 Slave Address Configuration

Option **A** is used to set the base address for the slave memory (the address in VMEbus space where the controller's memory appears). This option allows you to select a base address for each of the 15 valid switch settings. Once this table is entered, you can change the switch setting to alter a controller's base address without reprogramming the flash PROM. If you have more than one controller installed in your system, you should program all of their slave address tables with the same values, and be sure to select a different switch setting for each controller.

When you select **A**, a prompt is displayed for the first table entry:

```
Entry #0: 0 >
```

The slave base addresses are programmed by entering a code in response to each prompt. Table 4-4 shows the codes that can be entered, with the corresponding base address for each. Be sure to select addresses within your system's VMEbus address space. Type a carriage return after each entry, and a

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prompt is displayed for the next. After the last entry, the menu is displayed again, or you may type a **Q** to return to the menu at any point.

Code	Base Address (Hex)
0	00000000
1	08000000
2	10000000
3	18000000
4	20000000
5	28000000
6	30000000
7	38000000
8	40000000
9	48000000
A	50000000
B	58000000
C	60000000
D	68000000
E	70000000

Table 4-4. Slave Base Address Codes

4.2.2 Slave Address Mode

Select **M** to set the slave address mode and memory size. When prompted for the address mode, enter **0** for A32 or **1** for A24. Most systems support A32, which is preferable, but some require A24. Next, you are prompted for a code corresponding to the slave memory size. If you selected address mode A32, use Table 4-5 to determine your memory size code. If you selected address mode A24, use Table 4-6.

Code	Memory Size (MBytes)
8	1
9	2
A	4
B	8

Table 4-5. Memory Size Codes for A32 Mode

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Code	Memory Size (MBytes)
1	1
2	2
3	4

Table 4-6. Memory Size Codes for A24 Mode

4.2.3 Read The Switch Setting

Select **R** to display the current position of the rotary switch on the controller's front panel.

4.2.4 User Defined Flash Prom

An area of the flash PROM is reserved for protocol-specific parameters. Most PTI software products do not use this area.

4.2.5 Login Password

If you wish to restrict access to the configuration menu, select **L** to set up a password. You are prompted to enter a password, and then prompted to retype it for verification. The characters you type are not displayed on the terminal screen, and the password is encoded in the flash PROM so that it is not readable. You may use any combination of letters, digits and special characters, up to a maximum of 64. The password is terminated with a carriage return. Once you have entered a password and saved it in the flash PROM, the controller always prompts you to supply your password when you attempt to access the configuration menu. If you do not type the correct password, the configuration menu is not displayed.

4.2.6 Save The Configuration

When you are satisfied with your configuration parameters, select **S** to program the flash PROM and save the configuration. This takes a few seconds.

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NOTE: If you do not save the configuration before exiting from the configuration menu, the values you changed take effect when the controller is downloaded, but will be lost on the next reload or when the system is powered off.

The configuration parameters may be modified at any time by repeating the steps outlined in this section.

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Section 5

PT-VME330A/B Controller Configuration

This chapter applies only to the PT-VME330A/B VMEbus communication controller. Skip this chapter if you are installing software for another controller type.

To communicate with the PTI STREAMS driver, a PT-VME330A/B must be configured as a VMEbus slave. This means that special "mailbox registers" in the controller's memory are visible on the VMEbus where they can be accessed by the host driver. The slave base address and mode must be configured for compatibility with the host system in which the controller is installed.

The controller contains a software-programmable EEPROM. The PROM-resident debugger, PTbug, can be used to program this device. To access PTbug, you must set all six of the utility bit switches (location U7 on the main board) to the **on** position. Next, attach a terminal to the controller's console port with an RS-232 cable. The terminal should be set to 9600 baud, 8 bits, no parity. Once the terminal is attached, switch the system on. A **PTbug >** prompt should be displayed on the terminal.

First check the EEPROM's *Boot Block*. At the prompt, enter the command **ee 1a** to display and modify the Boot Block values. A word (16 bits) is displayed at a time. A carriage return moves to the next word without modifying the value. To make a change, enter the new value at the prompt following the displayed current value, and then enter a carriage return to move to the next entry. The Boot Block should be programmed with the following values:

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Word	Value	Description
1A	B0BB	Valid word
1C		Boot flags:
	0034	1 Mbyte memory size
	003C	4 Mbyte memory size
1E	0000	Boot code source address, high
20	9000	Boot code source address, low
22	403F	Boot code destination address, high
24	B000	Boot code destination address, low
26	0000	Boot code transfer count, high
28	1000	Boot code transfer count, low
2A	403F	Boot code execution address, high
2C	B000	Boot code execution address, low

Enter a period ("**.**") to terminate the **ee** command, and then enter **ee 30** to program the *PTI-defined Area*.

Word	Value	Description
30	000D	Slave address modifier
32	001F	Slave don't care
34	*nnnn*	Slave address, high
36	*nnnn*	Slave address, low
38	0060	Master enable
3A	0000	Mode

The values *nnnn* define the base address in VMEbus space at which the controller's mailbox registers appear. You must choose an appropriate value for your host system, based on its VMEbus address range. Be sure to avoid conflicts with other VMEbus devices already installed in the system. If you are installing more than one PT-VME330A/B, each one must have a different base address. For more information on the VMEbus configuration parameters, refer to the User's Manual for the PT-VME330A/B (published by Performance Technologies).

The EEPROM is programmed as you enter new values. You do not need to execute a separate command to save the programming. When you have finished, turn the power off and change at least one of the utility bit switches to the **off** position before proceeding. (When all the switches are on, the PT-VME330A/B enters PTbug when powered is applied. With any other switch setting, it automatically executes the PTI PROM-resident boot code, which handles download of runtime software across the VMEbus.)

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Section 6

PT-VME340 Controller Configuration

This chapter applies only to the PT-VME340 VMEbus communication controller. Skip this chapter if you are installing software for another controller type.

NOTE: Before installing the PT-VME340 controller, check the eight-position DIP switch at location U2. (Holding the controller with the front panel facing you, the switches are near the lower left corner of the board.) Make sure that at least one of the switches is in the ON position. (If all eight switches are in the OFF position, the controller will not boot.)

To communicate with the PTI STREAMS driver, the controller must be configured as a VMEbus slave. This means that some or all of the controller's main memory is visible on the VMEbus where it can be accessed by the host driver. The slave base address and mode must be configured for compatibility with the host system in which the controller is installed.

The controller contains a software-programmable EEPROM. To program this device, you must attach a terminal to the controller's console port with an RS-232 cable. The terminal should be set to 9600 baud, 8 bits, no parity. Once the terminal is attached, switch the system on. If a **PTbug >** prompt is displayed, you must program the EEPROM, as described below.

First check the EEPROM's *Boot Block*. At the prompt, enter the command **ee 30** to display and modify the Boot Block values. A word (16 bits) is displayed at a time. A carriage return moves to the next word without modifying the value. To make a change, enter the new value at the prompt following the displayed current value, and then enter a carriage return to move to the next entry. The Boot Block should be programmed with the following values:

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Word	Value	Description
30	B0BB	Valid word
32		Boot flags:
	0004	1 Mbyte memory size
	0014	4 Mbyte memory size
34	0000	Boot code source address, high
36	D000	Boot code source address, low
38	200E	Boot code destination address, high
3A	8DB0	Boot code destination address, low
3C	0000	Boot code transfer count, high
3E	3000	Boot code transfer count, low
40	200E	Boot code execution address, high
42	8DB0	Boot code execution address, low

Enter a period (".") to terminate the **ee** command, and then enter **ee 50** to program the *PTI-defined Area*, defined as follows:

Word	Description
50	Slave address code
52	Slave address mode
54	Memory size

The value to be programmed into each location is determined as described below:

Slave Address Code

The word at address 50 is used to set the base address for the slave memory (the address in VMEbus space where the controller's memory appears). Table 4-4 shows the codes that can be entered, with the corresponding base address for each. Be sure to select addresses within your system's VMEbus address space.

Slave Address Mode

The word at address 52 is used to set the slave address mode. Enter **0** for A32.

Memory Size

The word at address 54 is used to set the slave memory size. Use Table 4-5 to determine your memory size code.

The EEPROM is programmed as you enter new values. You do not need to execute a separate command to save the programming. When you are finished, reset the controller or cycle the power off and back on before proceeding to the next section.

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Section 7

Host Driver Installation

If you are using an Sbus or VMEbus communication controllers installed in a host system, you must install the device driver as described in this chapter. Choose the appropriate section for your host system and follow the instructions in that section only:

Host System	Use Section
SunOS 4.x or Solaris 1.0	7.1
Solaris 2.x	7.2
Any other host system	7.1

The instructions in this chapter assume that you have already performed the basic software installation procedures described in Chapter 2. If you used a base directory path than the default (*/usr/pti* or *c:\pti* for Windows NT), you will need to adjust the instructions accordingly.

7.1 Installing the SunOS Host Driver

This section explains how to configure a SunOS system to include one or more controllers, and build a kernel that includes the PTI STREAMS host device driver.

NOTE: Before installing the SunOS host driver, you must run the INSTALL script, as described in section 2.1.

The instructions in this chapter assume that you are installing the PTI host driver for one of the following:

- The PT-SBS332 or PT-SBS334 communication controller on a Sun SPARCstation running SunOS version 4.x

Step 1 Login as *root* and edit the file */sys/sun/str_conf.c*. This file configures the system's STREAMS drivers. Near the start of the file, you will see a number of "include"" directives, in the format:

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```
#include "name.h"
```

Immediately following these directives, add the following line:

```
#include "ucs.h"
```

Below the include directives are a number of conditionally compiled external definitions in the following format:

```
#if       NNAME > 0
extern struct streamtab name_info;
#endif
```

After the last of these entries, add the following lines:

```
#if       NUCS > 0
extern struct streamtab UC_info;
#endif
```

Next, you will find a definition for an array of *fmodsw* structures, beginning with the line:

```
struct    fmodsw fmodsw[] =
```

and containing a number of entries in the following format:

```
#if       NNAME > 0
          { "name", &name_info },
#endif
```

First, if the last entry in the array does not have a comma following the right bracket (as shown above), add one. Then, following that entry, add an entry for the PTI device driver as shown below:

```
#if       NUCS > 0
          { "ucs", &UC_info },
#endif
```

Step 2 Edit the file */sys/sun/conf.c*. This file is used to configure both STREAMS and traditional drivers into the system. Find the beginning of the *cdevsw* array, which looks like this:

```
struct cdevsw  cdevsw[] =
```

Before the start of the array, add the following lines:

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```
#include "ucs.h"
#if NUCS > 0
extern struct streamtab UC_info;
#define ucstab &UC_info
#else
#define ucstab 0
#endif
```

Then, find the last entry in the array and make sure that a comma follows the right bracket. Below that, add a new entry for the PTI device driver, as follows:

```
{
  nodev,   nodev,   nodev,    nodev,   /* nnn */
  nodev,   nodev,   seltrue,  nodev,
  ucstab,  nodev,
},
```

Each entry in the *cdevsw* array should have a comment at the right margin with a number that represents the array index for the entry. You should replace the characters ***nnn*** shown above with the appropriate index for the entry you are adding. Remember this value, as it determines the major device number for the driver, which you need in order to create the device's special files in Step 8, below.

Step 3 Create a link in */sys/sundev* to the *pti* directory tree:

```
cd /sys/sundev
ln -s /usr/pti pti
```

Step 4 Run the command **arch -k** to determine your architecture-specific configuration directory. When you specify a directory path, you can imbed this command in the pathname and it will automatically substitute the correct directory name. For example:

```
cd /sys/`arch -k`/conf
```

In these instructions, paths are shown with the **arch -k** command embedded. You can type them this way, or substitute the correct directory name for your machine. If you choose to use the embedded form, note that the command is bracketed by back quote characters (`), not the regular single quote (**ô**).

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Edit the file */sys/`arch -k`/conf/files* to specify the file name that contains the source code for the PTI device driver.

Add the following lines anywhere in the file:

```
sundev/pti/drivers/pt33x/mps.c optional ucs
device-driver
sundev/pti/drivers/pt33x/mps_sunos.c optional
ucs device-driver
sundev/pti/drivers/pt33x/mps_ioctl.c optional
ucs device-driver
sundev/pti/drivers/pt33x/mps_globals.c
optional ucs device-driver
sundev/pti/drivers/common/mpsutil.c optional
ucs device-driver
```

Create a new system configuration file, using an existing file as a starting point. These files are located in the directory */sys/`arch -k`/conf*. You probably want to start with the configuration file that was used to build your current system. To determine this, you can use the showrev command, which prints information about the kernel that is currently running. The configuration name is shown in parentheses under "Kernel Revision". Copy the current configuration file (shown below as CURRENT) to a new file that you will modify to include the PTI driver:

```
cd /sys/`arch -k`/conf
cp CURRENT PTI
```

(By convention, configuration file names are in upper case characters, but you do not need to name the file *PTI*.)

Edit the new file. Near the beginning, you will see an entry specifying the configuration name that looks something like this:

```
#
# Name this kernel CURRENT.
#
ident "CURRENT"
```

Modify this entry, replacing the current name with your new configuration name.

Add the following line at the end of the file:

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```
device-driver ucs
```

Step 5 In the same directory, run the *config* program to build your new configuration (shown here as PTI):

```
/etc/config PTI
```

During its execution, *config* creates a directory in */sys/`arch -k`* with the same name as your configuration file, and builds a makefile in this directory.

Step 6 Build a new kernel. To do this, change to the directory created by *config* and run the makefile:

```
cd ../PTI
make
```

The *make* creates a new kernel named *vmunix* in the current directory. Rename your existing kernel and copy the new kernel to the root directory:

```
mv /vmunix /vmunix.save
cp vmunix /vmunix
```

It is very important that you save the existing kernel in the root directory. This way, if the system will not boot with the new kernel (because of an error in the configuration or build process), you can reboot with the saved kernel.

Step 7 Make the special files for the PTI device driver. The special files are used when opening a stream to the driver. The driver is a *cloneable device*, supporting both standard and clone open facilities.

For the clone open, you only need to create one clone device. Each process that requests a clone open specifies that device, and the system's clone device driver creates a special temporary minor device to represent the stream while it is open. This way, a process does not need to know what minor devices are already in use in order to open a unique stream. (Once it opens a stream, the process uses an *ioctl* request to associate the stream with a particular controller and link number.)

To create the clone device for the PTI driver, you need the

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major device number of the system's clone driver. Edit the file */sys/sun/conf.c* again, and find the clone driver's entry in the *cdevsw* array. (Find the start of *cdevsw*, then search for the string *"cloneopen"*.) The comment to the right of the entry shows the clone driver's major device number.

Use the *mknod* command to create the device, specifying the clone driver's major device number and, as the minor device number, the major device number of the PTI driver. In the following example, the clone driver has major device number 37, the PTI driver has major device number 107, and the clone device is created with the name *ucsclone*.

```
mknod /dev/ucsclone c 37 107
```

After creating the special file, use the *chmod* command to give the device read and write permissions:

```
chmod 666 /dev/ucsclone
```

Step 8 Reboot the system. When it comes up, it will be running the new kernel that includes the PTI driver.

7.2 Installing the Solaris Host Driver

This procedure is required only for VMEbus controllers. Skip this section if you are using Sbus, PCIbus CPC controllers.

This section explains how to configure a Solaris system to include the PTI STREAMS host device driver for operation with one or more VMEbus controllers.

Before configuring the system for the host driver, be sure to complete the basic software installation procedures described in section 2.2.

Step 1 Change directory to */usr/kernel/drv* and create a configuration file for the PTI driver. The new file must be named *mps.conf*. (The device prefix for the PTI driver is *mps*; and all driver configuration files have the suffix *.conf*. For more information about VMEbus driver configuration, refer to your Solaris manual pages for "vme" and "driver.conf".)

In the new configuration file, you must create an entry for each

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controller installed in your system. Each entry has the following format:

```
name="PTI,vme" class="vme"
btype="type"
reg=0x4d,physaddr,memory_size
interrupts=int_level,vector ;
```

Replace *type* with your communication controller type, *physaddr* with the base address of the controller's slave memory, *memory_size* with the size of the controller's memory, and *int_level* and *vector* with a unique combination of interrupt level and vector number.

The order of the entries within the configuration file determines the controller number. The first entry in the file configures controller 0, the second configures controller 1, and so on.

Determination of *type*:

The *type* string defines the type of communication controller installed, and must be selected from the following list.

Controller Model	*type* String
PT-VME131/141	**PTI131**
PT-VME151	**PTI151**
PT-VME330A/B	**PTI330**
PT-VME340	**PTI340**

Be sure to use upper case and enclose the *type* string in double quotes, as shown above and in the examples below.

Determination of *physaddr*:

The VMEbus slave address must be unique for each controller installed in the system, and must not conflict with the address of any other device in the system. You can use the following command to check the slave addresses configured for other installed devices:

```
grep reg /kernel/drv/*.conf /usr/kernel/drv
*.conf
```

Driver configuration files typically reside in */kernel/drv* and */usr/kernel/drv*, and always have the *.conf* suffix. If your system has configuration files in other directories, be sure to

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search those as well.

For the PT-VME330A/B, *physaddr* must match the slave address programmed into the controller's EEPROM, as described in Chapter 5.

For the PT-VME340, *physaddr* must correspond to the slave address code programmed into the controller's EEPROM, as described in Chapter 6. The code stored in the EEPROM can be converted to the corresponding *physaddr* value using Table 4-4.

For the PT-VME131/141 or PT-VME151, find the entry in the controller's slave address table that corresponds to the setting of the rotary switch on its front panel (the switch setting acts as an index into the table). The code stored in that entry can be converted to the corresponding *physaddr* value using Table 4-4. (The slave address table is described in section 4.2.1.)

Determination of *memory_size*:

memory_size should be equal to the actual amount of DRAM installed on the controller (typically one or four megabytes).

Determination of *int_level* and *vector*:

The int_level parameter determines the VMEbus interrupt level at which the communication controller interrupts the host. Level three is recommended.

The vector number you assign to each controller must be unique and must not conflict with the vector number of any other device in the system that is configured for the same interrupt level. You can use the following command to check the vectors and levels configured for other installed devices:

```
grep int /kernel/drv/*.conf /usr/kernel/drv/
*.conf
```

If your system has driver configuration files in other directories, be sure to search those as well.

The sample *mps.conf* file shown below configures the system for two PT-VME131 controllers, each with four megabytes of memory. (For PT-VME151 controllers, the memory size

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would be fixed at 0x40000 instead
of showing the actual size of 0x200000.) As shown in this example, you can add comments to your configuration file using the # character at the start of the line.

```
#
# Controller 0
#
name="PTI,vme" class="vme"
          btype="PTI131"
          reg=0x4d,0x10000000,0x200000
          interrupts=3,0x90;

#
# Controller 1
#
name="PTI,vme" class="vme"
          btype="PTI131"
          reg=0x4d,0x18000000,0x200000
          interrupts=3,0x91;
```

Step 2 If you have a Force CPU host processor, the PTI host device will not function unless the Force VMEbus driver is installed on the system. Edit the file *VME.conf* in the directory */kernel/drv*. (If this file does not already exist in this location, the Force VMEbus driver is not installed.) The file contains an entry that appears similar to the following:

```
vmewin=0x20000000 slavewin=0x00100000;
```

The *vmewin* parameter selects the base of slave address space. This value must be on a 256 Mbyte boundary and must be less than or equal to the lowest of your controllers' slave addresses. The minimum value for *vmewin* is 0x20000000.

The *slavewin* parameter specifies attributes for the slave window..

If you are using the Force VMEbus 1.x driver, only one parameter is specified for *slavewin*, the base address of the host processor's VMEbus slave memory. The value of 0x100000 is recommended (as shown above).

For the Force VMEbus 2.x driver, two additional parameters are specified for *slavewin*: one for the size of the slave mem-

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ory, and one for the properites of the slave window. These values should be set to 0x100000 and 0x40000 respectively, as shown below:

```
vmewin=0x20000000          slavewin=0x00100000,
0x00100000, 0x00040000;
```

Step 3 Build the driver. To do this, change to the directory where the the driver exists and run the Makefile:

```
cd /usr/pti/drivers/Solaris/vme
make
```

Step 4 Reboot your machine with the **-r** option or type **touch /reconfigure** before rebooting. When the system comes up, it will automatically load the PTI driver.

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Section

8 Client Utilities

This chapter contains information on the client utilities used to monitor and maintain the software running on embedded controllers and LAN servers in the PTI environment. The utilities are installed in the PTI *bin* directory, and referenced as *commload*, *commupdate*, *commstats*, and *commreset*. Note only, the commstats utility is applicable for the NexusWare controllers (CPC388).

8.1 The Download Program (*commload*)

Before your client application can access communication protocol software, you must load the software to the server or communication controller. For a LAN-based server, this is done automatically when the server is powered on or reset. The network load procedure is described in Appendix A.

For an embedded communication controller, or for re-downloading an individual controller in an MPS3000 server, download requires the use of the *commload* utility. If you have a LAN-based server, you can only use this program after the server has been sucessfully booted.

DESCRIPTION

For embedded controllers, the *commload* program accesses the PTI STREAMS driver to download one or more controllers according to instructions provided in the command file *Cmdfile.xxx* (the actual name of the file will vary depending on the protocol software). If the full pathname for C*mdfile.xxx* is not specified, *commload* expects to find the file in the current directory.

For LAN servers, the *commload* program can also be used to reset and download any specified controller in an MPS3000 server. To completely reset and download the entire server, the *commreset* program is recommended (see section 8.4).

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OPTIONS

-s *server*
: This parameter identifies the target server. For a LAN-based server, this is the logical host name as specified in the client's *hosts* database. For a controller installed in a backplane, *server* is the pathname of the driver's cloneable special file. If this option is not specified, the server name defaults to */dev/ucsclone* for UNIX, and \\.*PTIXpqcc* for Windows NT.

-S *service*
: For LAN-based servers, this parameter identifies the service name to be accessed, as specified in the client's *services* database. If this option is not specified, the service name defaults to *mps*. For a controller installed in a backplane, this parameter is not used.

-c *ctlrnum*
: Load only controller number *ctlrnum*, ignore load instructions in the command file for any other controller. If this option is not specified, all controllers in the command file will be loaded.

-r
: Reset (but not download) the specified controller number (-c ctlrnum). In this case, a command file should not be specified. The host card (LAN based system) can be specified by controller number 15. If the host is reset, it will initiate the tftp boot sequence as dictated in the prom code, and load the command file specified in the user programmable flash prom. If the host server has the programmable flash prom set to reject LAN reset requests (see section 3.2.11.2), then *the reset* will not succeed.

-v
: Verbose. Print the status of each step of the commload process (reset, load, exec). If this option is not specified, commload generates no output unless an error is encountered.

-i
: Will print out the version, strings of the currently loaded device driver, the PTI API library and all the modules specified in the command file (Cmdfile.xxx). This is for informational purposes only. If the "-i" option is specified, the card will not be loaded.

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To download an embedded controller, type the following command:

```
cmdload -vCmdFileprot
```

To download a single controller on a LAN-server, type the following command:

```
cmdload -c0 -sservername -vCmdFileprot
```

Be sure to replace the characters *prot* with your actual filename extension.

As shipped, the load command file contains instructions for loading controller zero. If you have a second controller installed in your system, you will need to create an additional load command file for that controller. The load command file looks something like this (for a UNIX based system):

```
BTYPE 0 PCI334_Ma
LOADCTLR 0 /usr/pti/Load/xstrapci834.dfl 0 L_0 0x405e00
0x405e00
LOADCTLR 0 /usr/pti/Load/hfipci834.dfl 0 L_1 0x410000 0x0
LOADCTLR 0 /usr/pti/Load/hdlswapmod.dfl 0 L_2 0x413e00 0x0
LOADCTLR 0 /usr/pti/Load/hdlpci834.dfl 0 L_3 0x414200 0x0
LOADCTLR 0 /usr/pti/Load/config.dfl 0 L_4 0x402000 0x0
INIT L_0
```

For a Windows NT based system, the command file looks something like this:

```
BTYPE 0 PCI334_Ma
LOADCTLR 0 c:\pti\load\xstrapci834.dfl 0 L_0 0x405e00 0x405e00
LOADCTLR 0 c:\pti\load\hfipci834.dfl 0 L_1 0x410000 0x0
LOADCTLR 0 c:\pti\load\hdlswapmod.dfl 0 L_2 0x413e00 0x0
LOADCTLR 0 c:\pti\load\hdlpci834.dfl 0 L_3 0x414200 0x0
LOADCTLR 0 c:\pti\load\config.dfl 0 L_4 0x402000 0x0
INIT L_0
```

For a second controller, make a copy of the file and modify it as follows: On the first line, which begins with BTYPE, change the 0 that follows to a 1. On each line that begins with LOADCTLR, change the 0 that follows to a 1. An example is shown below.

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```
BTYPE 1 PCI334_Ma
LOADCTLR 1 /usr/pti/Load/xstrapci334.dfx0 L_0 0x405e00
0x405e00
LOADCTLR 1 /usr/pti/Load/hifpci334.dfx0 L_1 0x410000 0x0
LOADCTLR 1 /usr/pti/Load/hdlcswapmod.dfx0 L_2 0x413e00 0x0
LOADCTLR 1 /usr/pti/Load/hdlcpci334.dfx0 L_3 0x414200 0x0
LOADCTLR 1 /usr/pti/Load/config.dfx0 L_4 0x402000 0x0
INIT L_0
```

(For any additional controllers, repeat this procedure, but replace the zeroes with 2, 3 and so on.)

To download the second controller, use *commload* exactly as described above, but specify your new load command file name. For example:

```
commload -v CmdFileCopy
```

To display the current versions the working PTI environment and what is being loaded to the controller(s), the following **commload** command can be run:

```
commload -i CmdFileHdlcpci334
```

Note, this example is using the specific command file. For this case, the output will be the following:

```
mps driver: PTI Shus/PCI bus Driver Version 3.5.7
PTI API Version 3.3.7
Controller 0: PTI xSTRa Version 7.1.9
Controller 0: PTI HIF Driver Version 4.2.6
Controller 0: PTI HDLC QUICC Driver Version 5.1.1
```

8.2 The Communications Server Update Program (*commupdate*)

The *commupdate* utility allows modification of the buffer pool configuration for the server.

To run *commupdate*, type the following:

```
commupdate
```

The utility modifies one of the executable files that is loaded to the control-

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ler. This file is located in the PTI *Load* directory and is called *config.prot.H* or *config.prot.n*, where *prot* is the same filename extension used for your download command file and the suffix *H* or *n* denotes the board number (*n*) or the host board (*H*).

The program displays default responses in parentheses. To select the default, just press return.

8.2.1 Modifying the Buffer Pool Configuration

With PTI protocol software, a portion of memory on the controller is used for buffering data as it is transferred to and from the serial ports, and for messages traveling to and from your application. This memory is divided into several pools of fixed-size buffers, each pool having buffers of a different size. The default configuration (number of pools, buffer sizes and number of buffers) varies depending on the protocol, the platform type and the amount of on-board memory.

Depending on the packet sizes used by your protocol, this default configuration may not be optimal for your application. You can configure between one and four pools, with any number of buffers in each pool. Buffers sizes may be any multiple of 16 bytes. The *commupdate* utility prints an error if the total memory required by your requested configuration exceeds the limit for your platform type.

NOTE 1: The efficiency of memory usage is increased if you configure a number of small buffers (e.g. 64 bytes each) to be used for control messages, as well as larger buffers to hold data messages. The *commstats* utility (section 8.3) can be used to monitor buffer usage.

NOTE 2: Also keep in mind that some protocols will dynamically request memory for buffers other than those configured by the *commupdate* utility. Care must be taken to reserve a sufficient amount of memory for use by the protocol. In order to ascertain the amount of memory that is available, you should use the *commstats* utility to monitor memory usage under peak load conditions (with the maximum number of links enabled).

An example of a typical buffer configuration option follows:

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```
$ commupdate

Enter config filename below (eg. /usr/pti/Load/
configh0b0)
Enter config filename: > /usr/pti/Load/configch1

Code/data/reserved areas:                400400
System memory:                            94492
Data/Message blocks:                    2572040
Drives/Stream Head:                        1064
TCP memory:                              577536
TOTAL:                                  3645532

Estimated memory available:              548772

      Communications Server Update Utility

          1    Buffer Pool Configuration
          2    System Report Setting
          3    Save Configuration File Updates
          0    Quit

      Enter Menu Item (1): > 1


Current Configuration:
Class 1
      Size          64
      Number        10000
Class 2
      Size          144
      Number        2000
Class 3
      Size          272
      Number        2000
Class 4
      Size          1040
      Number        500

You may configure up to 4 classes of data blocks, where
each class contains blocks of a different size.
You must configure at least one class.

Enter number of data block classes (4) > 4
```


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For each class, specify the block size and the number of blocks to build. Configure the class with the smallest block size first, in order up to the largest.

Note that buffer sizes will be rounded up to multiples of 16.

```
Class 1
Enter block size (64) >
Enter Number of blocks to build (10000) > 12000
Class 2
Enter block size (144) > 172
Enter Number of blocks to build (2000) >
Class 3
Enter block size (272) > 304
Enter Number of blocks to build (2000) >
Class 4
Enter block size (1040) > 528
Enter Number of blocks to build (500) > 1000

New Configuration:
Class 1
     Size          64
     Number        12000
Class 2
     Size          172
     Number        2000
Class 3
     Size          304
     Number        2000
Class 4
     Size          528
     Number        1000

Code/data/reserved areas:                  400400
System memory:                              94492
Data/Message blocks:                      2936040
Drives/Stream Head:                          1064
TCP memory:                                577536
TOTAL                                     4009532

Estimated memory available                 184772
```

Communications Server Update Utility

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```
        1    Buffer Pool Configuration
        2    System Report Setting
        3    Save Configuration File Updates
        0    Quit

    Enter Menu Item (1): > 3

Do you really want to update /usr/pti/Load/configdrH?
(n)> y

    Communications Server Update Utility

        1    Buffer Pool Configuration
        2    System Report Setting
        3    Save Configuration File Updates
        0    Quit

    Enter Menu Item (1): > 0
```


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8.3 The System Statistics Monitor Program (*commstats*)

The *commstats* utility provides remote access to the buffer and memory usage statistics on an embedded controller or LAN server. This utility may be useful when desiring to tune factory configured buffer pools for better performance.

NAME

commstats - PTI controller/server statistics query program.

SYNOPSIS

commstats [-s *server*] [-S *service*] [-c *ctrlrnum*] [-d] [-i]

DESCRIPTION

The *commstats* program uses the PTI API to communicate with the controller (whether embedded or over a Local Area Network). For LAN servers, *commstats* allows any user on the same network the ability to query statistics information for any controller on a PTI server. For embedded controllers, *commstats* allows the user the ability to monitor the statistics of any communications controller.

OPTIONS

-s *server*	This parameter identifies the target server. For a LAN-based server, this is the logical host name as specified in the client's *hosts* database. For a controller installed in a backplane, *server* is the pathname of the driver's cloneable special file. If this option is not specified, the server name defaults to */dev/ucsclone* for UNIX, and \\.*PTIXpqcc* for Windows NT.
-S *service*	For LAN-based servers, this parameter identifiethe service name to be accessed, as specified in the client's *services* database. If this option is not specified, the service name defaults to *mps*. For a controller installed in a backplane, this parameter is not used.
-c *ctrlrnum*	Specify the controller to use. If this no controller

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is specified for the embedded case, controller 0 is used. If no controller is specified for the LAN case, controller 15 (Host board) is used.

-d — Debug mode. Outputs detailed information about every stream currently active on the target controller or server. This option is provided as a debugging aid for software developers. Not valid for NexusWare Controllers.

-i — Controller identification (applies to embedded controllers only). This option causes *commstats* to display the type of controller and its geographic address (if NexusWare) Controller for every device identified by the PTI host device driver during system startup. Also included in this report will be the version string of the current PTI host device driver that is installed in the system.

NOTE

The number of buffers reported when using *commstats* will never be zero, since buffers are required on the controller/server to process the *commstats* request.

For example, to request statistics from embedded controller:

```
commstats -c0
```

To request statistics from the host board on server *alpha*:

```
commstats -salpha
```

To request statistics from the controller 1 on server *alpha*:

```
commstats -c1 -salpha
```

8.3.1 Interpreting the System Statistics Report of a Non-NexuxWare Platform

There are several factors governing the proper configuration of the buffer pools. There should be one pool defined of “smaller” buffers;

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typically, protocols require headers to be prepended to data messages, and these header buffers are usually of small size (under 64 bytes). Your provided software package may support multiple protocols, which may have different average frame sizes. An individual protocol may transfer frames of a consistent size, yet require a larger or smaller control frame to be transferred occasionally. Where supported, client requests for statistics reporting from the server may require yet another buffer size.

In addition to the buffer pool sizes, the rate at which these buffers are used must also be considered; *commstats* provides a snapshot of the current pool usage as well as the high and low watermarks for these pools. Analysis of this information can be useful in determining just how many of each buffer size should be configured to minimize the likelihood of an allocation request failing because all buffers of a given size are in use. The server will attempt to allocate a buffer from the appropriate data block pool, but if unable to obtain a buffer, will attempt to allocate the buffer from the next larger data block pool. Thus, failures to obtain buffers from a given pool may not indicate any loss of data if buffers of larger size are available to handle incoming data from the serial port.

PTI protocols are designed to accept incoming data as long as sufficient memory is available for message storage, and, where supported, use protocol mechanisms to notify the remote station to refrain from sending more data if memory is unavailable to store data. If the client application does not issue read requests to the server in a timely manner, buffer pool exhaustion can also occur. Thus, *commstats* can be used as a troubleshooting tool during client application development. An example of the output from *commstats* follows, with an explanation of how to analyze it.

```
System Report for Server: ptibox

mbufist:        cnent   878,    min   847,    max  1000
mclist:         cnent   145,    min   137,    max  150
blk1 (64):      cnent   22,     max   37,     tot  10000,     fail 0
blk2 (144):     cnent   51,     max   122,    tot  2000,      fail 0
blk3 (272):     cnent   24,     max   42,     tot  2000,      fail 0
blk4 (1040):    cnent   0,      max   0,      tot  500,       fail 0
totalcblks:     cnent   97,     max   201,    tot  14500,     fail 0
totalmblks:     cnent   97,     max   201,    tot  14500,     fail 0
memoryavail:    cnent   544992  min   256248
```

The first line includes the host name given to the server, *ptibox*. For an

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embedded controller, the line will indicate the name of the device (normally */dev/ucsclone*) and the controller number.

The next two lines apply to the buffer pools used by the TCP/IP stack on a PTI LAN-based server (e.g., an MPS600 or MPS3000). These lines do not apply to, and therefore are not shown for, embedded or slave controllers. The *mbuflist* pool is used by the TCP/IP stack for both sending and receiving data, and for other internal memory use. It reports the *current* number of available buffers, the low watermark for available buffers (*min*), and the *max*imum number of buffers that are available. The *mcllist* is a pool of buffers for use by the TCP/IP stack for transferring data from the PTI server to the client, and reports the *current* number of available buffers, the low watermark for available buffers (*min*), and the *max*imum number of buffers that are available. As more sockets are opened or smaller frame sizes are configured, more buffers are allocated from this pool.

The remaining lines of the report apply to the STREAMS message buffers that are used by protocol and serial port driver software. The following is a line-by-line explanation of this portion of the report:

dblk These lines report the usage for Data Block buffer pools. The Data Block provides storage for the message data tranferred over the serial ports and between the TCP/IP software and the protocol software. The PTI software allows the definition and configuration of up to four buffer pools. The size and number of buffers in each pool are configurable. See Section 8.2 for an explanation of how to modify the factory settings of the buffer pools.

Each line reports the size (in bytes) of each pool (in parentheses), the *current* number of Data Blocks in use, the high watermark (*max*) of allocated Data Blocks, the *tot*al number of buffers in the pool, and the number of times that an allocation request to this Data Block pool has been issued and has *fail*ed. Note that each *dblk* pool is displayed in order of ascending size of the frames it supports. If the *dblk* line for a pool displays failures, this is an indication that the buffer allocation was attempted from the following *dblk* pool.

total dblks This line is a summation of the four lines that preceed it in the report, and represents the aggregate Data Block pool usage for this controller.

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This line reports the *current* number of Data Blocks allocated by the controller, the high watermark (*max*) of allocated Data Blocks, the *tot*al number of available Data Blocks, and the number of times that an allocation request to any Data Block pool has been issued and has *fail*ed.

total mblks This line reports the Message Block pool usage. The Message Block is a structure that is allocated for each Data Block available to the system; it is a control structure that provides linkage to the Data Block and to other Message Blocks on the same queue. The total number of Message Blocks available to the controller is equal to the total number of Data Blocks configured for the controller (i.e., the aggregate number of blocks in the four defined Data Block pools - see below).

This line reports the *current* number of Message Blocks allocated by the controller, the high watermark (*max*) of allocated Message Blocks, the *tot*al number of available Message Blocks, and the number of times that an allocation request has been issued that has *fail*ed.

memory avail This line reports the *current* amount of memory available and the low watermark (*min*) since the system has been operational.

A few guidelines:

To determine the factory settings of the *dblk* pools, use the Communications Server Update Utility described in Section 8.2 to display the current settings. The *dblk* pools should only be modified if performance problems occur. You should always back up the configuration files before modifying the settings so that you can return to the factory settings.

If one or more of the *dblk* pools in the report indicate under-utilization of that pool (for instance, the *current* and *max* lines are both zero after extensive use of the controller), you might consider modifying the *dblk* pool definitions to provide more buffers of a different size *dblk* pool, and eliminate the *dblk* pool that is not being used at all.

If a *dblk* pool exhibits large numbers of failures, you may need to evaluate the frame size you are configuring for the protocol and comparing it with the current *dblk* pool definitions. If the frame size is large, the *dblk* pool of the largest number of bytes must be able to accommodate its size plus any protocol overhead.

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The number of buffers to configure for a given *dblk* pool must also be determined by running the protocol for an extended period and then examining the *max* number on the report lines. If that number is much smaller than the total number configured, consider reducing the number of those buffers and providing more buffers to another *dblk* pool.

8.3.2 Interpreting the System Statictics Report of a NexuxWare Platform

For the NexusWare controller, the *commstats* utility is used to get a simple snapshot of the system. Below is an eample of the output from running commstats:

```
System Report for Server /dev/ucsbne, Controller: 0

Current system kernel version 2.2.12-1
System has been alive 2 hrs 8 mins 56 secs
Total system memory   123428864 bytes
Free system memory    79548416 bytes
Used system memory    43880448 bytes
```

8.4 The LAN Server Reset Utility (*commreset*)

The *commreset* utility provides a method to reset a LAN server unit from a client computer. Note that for the reset function to succeed, the server must be in an operable state. The user defined flash prom may be configured (see section 3.2.11.2) to disallow this functionality if security is a concern.

There are two types of reset: a *hard* reset (default) which causes the server to react as if it has been powered down and back up, and a *soft* reset which causes the server to close all active connections in an orderly fashion.

NAME

commreset - PTI server reset program.

SYNOPSIS

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commreset [- f] [-v] [-s *server*] [server]

DESCRIPTION

The *commreset* program uses the PTI API to communicate with the LAN server, and issues a *RESET* (hard reset) or *SOFTRESET* (soft reset) ioctl command. A *RESET* command will cause the entire server to reboot and initiate a software download. A *SOFTRESET* command will cause all active connections to the server to be closed immediately, without requiring the server to be rebooted and downloaded. Regardless of the type of reset, all client applications will have to reconnect once the server is back in an operational state.

The server name can either be specified as an option (-s), or as a parameter to *commreset*.

OPTIONS

-f	This parameter requests a soft reset of the server only, i.e. all connections to the server are closed. If this parameter is not specified (default), a hard reset of the server will be performed.
-s *server*	This parameter identifies the target server. This is the logical host name as specified in the client's *hosts* database.
-S *service*	This parameter identifies the service name to be accessed, as specified in the client's *services* database. If this option is not specified, the service name defaults to *mps*.
-v	This option causes commreset to display status information during execution of the reset request.

For example to reset server *alpha*:

commreset alpha -or- commreset -s alpha

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8.5 NexusWare Configuration Program (NWC)

A special configuration utility is provided for NexusWare controller products. Source code for the configuration utility, *nwc.c*, is included with the release in the */usr/pti/util/nwc* directory.

The NWC utility reads configuration parameters for each physical connection (called a span) from a text file. Sample configuration files, *wcpFullChanT1*, *wcpFullAgraT1*, *wcpFracT1*, and *wcpAllT1* are also included in the */usr/pti/util/nwc* directory. The Sample files contain sample parameters to initialize the spans on the controller. You should modify the appropriate configuration file according to your specific site requirements.

NWC Configuration File Format

The NWC utility uses the information in the configuration file to configure spans on the controller. The parameters specified in the file define the configuration parameters for the device drivers on board the CPC388. Once all parameters have been extracted from the configuration file and validated, the NWC utility sends them IOCTLs via MPSioctl API calls to the appropriate drivers.

Each entry in the configuration file is composed of a parameter keyword followed by a corresponding parameter value (or values). The file is divided into sections, where each section configures a single entity, and contains an entry for each defined parameter. The following general rules apply:

- *Each keyword must be followed by a valid parameter on the same line, separated by white space (one or more spaces and/or tabs).*
- *Keywords and parameters may be entered in either upper or lower case.*
- *Blank lines and unrecognized entries are ignored. Comments may be included anywhere in the file (prefaced by a "#" character).*

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Configuration Parameters

The keywords and valid parameter values are listed below

Table 8-1: Configuration Parameters

Parameter	Possible Values	Description
H110clocktype	H100clocking	Specifies which clock model applies.
Clocksource	Internal Netref Netref1 Netref2 A B	Specifies where the source of reference timing originates. “internal” refers to the onboard oscillator, “netref” is short for network timing source, and A & B refers to clock source A and clock source B respectively.
H100clockmode	Standalone Slave Master_A Master_B	Specifies the board's control of the H.100 clocks. In standalone mode, the switch is standalone and does not participate on the CTBUS, whereas in Slave mode, the switch is slave to the CTBUS. Mastera means the switch is CTBUS clock A master, Masterb is CTBUS clock B master
Autofallback	Enable Disable	Specifies whether the board is to automatically fall back to the secondary reference.
Clockspeed	8hz 1544mhz 2048mhz	Specifies the speed of the NETREF clock signal.
Fallbackclock source	Internal Netref1 Netref2 A B	Specifies the clock reference to be used when automatic clock fall back occurs.

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Table 8-1: Configuration Parameters (Continued)

Connect	LINK MCC CTBUS	Specifies an H.110 circuit connection to be made. The timeslot, from device and to device are listed.
Linkid	0 - 8	Valid options correspond to the T1 lines; including the monitor port, which is 8.
Linetype	ESF D4	Specifies the framing for the target port.
Linecoding	B8ZS AMI other	Specifies the variety of Zero Code Suppression to be used on this interface.
Sendcode	Nocode Linecode Payloadcode Resetcode QRS	Specifies what type of code is being sent across the DS1 interface by the device. Nocode sends looped or normal data. Linecode sends request for line loopback. Payloadcode sends request for payload loopback. Resetcode sends loopback termination request. QRS sends a Quasi-Random Signal test pattern
Signalmode	None Robbedbit	Specifies the singaling mode used on the DS1 interface.
Transmitclock source	Local	Specifies the source of the transmit clock. This parameter should be set to local for all applications - this causes the transmit timing to be based on the H.110 switch timing reference.
Fdl	None T1403	This parameter is only valid when ESF mode is selected. This specifies whether or not FDL, the facilities data link, in enabled.
Linelength	0 - x (meters)	Specifies the length of the DSL line in meters.
Asynceven-tenable	Enable Disable	Specifies whether the DS1 line status change should be propagated as events.

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Table 8-1: Configuration Parameters (Continued)

Ais	Enable Disable	Specifies whether to assert and AIS alarm on the DS1 interface.
Ferf	Enable Disable	Specifies whether to assert an RAI alarm on the DS1 interface.
Cgroupid		Specifies the Channel Group ID. Channel Groups are groupings of 32 timeslots into the MCC controller. Usually this parameter corresponds to the Port or Link number, but may not depending on setup of the H.110 circuit.
Maxframe		Specifies the global max frame size over all channels
Channel	Byteprealigned Bitresolution Bytepostaligned Pad Mask	Specify the MCC channel number.

Running the NWC Configuration Utility

The NWC utility must be used to set the configuration parameters for the controller when it is first started. Once the controller is set up, it can be used in conjunction with HDLC based protocols.

To run the NWC utility, change directory to */usr/pti/util/nwc* and issue use the following command:

```
nwc[-v]-ffilename[-controller]
```

-v — This option causes the nwc to display detailed information as it performs the reconfiguration.

-f filename — This is used to specify the pathname of the configuration file for a set operation.

-c controller — This option specifies the controller number. If not specified, controller defaults to 0.

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Sample configuration files

The sample configuration files are provided as usable examples. They all configure the spans and the H.110 switch as identical T1 spans carrying HDLC traffic terminated by the card. Each file configures the bearer traffic differently as follows:

wcpFullChanT1 - all spans are fully channelized.
wcpFullAgraT1 - all spans are fully aggregated.
wcpFracT1 - all spans carry fractionalT1s with the first twelve DS0s aggregated and the second twelve DSs aggregated.
wcpAllT1 - combinations of these three confiburations.

NOTE

The files establish the following MPS link identifiers:

Port/Trunk	wcpFullChanT1	wcpfullAgraT1	wcpFracT1	wcpAllT1
0	0-23	2	0, 1	0-23
1	24-47	24	24, 25	24-47
2	48-71	48	48, 49	48-49
3	72-95	72	72, 73	72-73
4	128-151	128	128, 129	128
5	152-175	152	152, 153	152
6	176-199	176	176, 177	176-199
7	200-223	200	200, 201	200-223

8.6 The Asynchronous Events Monitor Program (*eventsClient*)

The *eventsClient* utility provides remote registration and receipt of asynchronouse events detected by the embedded controller. This utility may be used to monitor these events or as an example of how these events may be monitored.

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NAME

eventsClient - Performance Technologies asynchronous events monitoring program.

SYNOPSIS

EventsClient [-s *server*] [-S service] [-c *ctlrnum*]

DESCRIPTION

The *eventsClient* program uses the Performance Technologies API to communicate with the embedded controller. This allows the user to monitor, via either the backplane or a LAN, all asynchronous events detected and reported by the embedded controller.

OPTIONS

-s *server* — This parameter identifies the target server. For a LAN-based server, this is the logical host name as specified in the client's *hosts database*. For a controller installed in a backplane, *server* is the pathname of the driver's cloneable special file. If this option is not specified, the server name defaults to */dev/ucsclone* for UNIX and Linux, and \\.*PTIXpqcc* for Windows NT.

-S *service* — For LAN-based servers, this parameter identifies the service name to be accessed, as specified in the client's *services* database. If this option is not specified, the service name defaults to *mps*. For a controller installed in a backplane, this parameter is not used.

-c *ctlrnum* — Specifies the controller to use. If this option is not specified, the controller number defaults to 0. For a LAN-based controller, this parameter is not used.

Interpreting the Events Report

Whenever an asynchronous event is detected by the embedded controller, it

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sends notifications of the event to all registered connections. The following is a sample report:

```
Event type = 0x54000001, device # = 6, time stamp = 240538,
Event = 0x00000001.
```

Event type — This value identifies the type of device that detected the event and, in some cases, the type of event detected. Its values are defined in *events.h*.

device # — This value identifies the instance of the device that detected the event. For example, if the embedded controller monitors and controls eight T1 lines, this value identifies which of the eight T1 lines the event was detected on.

time stamp — This value represents the time when the event was detected, in 1/100ths of a second since the embedded software was started.

Event — This value provides more identifying information on the detected event. For example, for a T1 (framer) event, this value is defined in *tl_api.h* in the section dealing with T1 status.

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Section

9

APPENDICES

APPENDIX A: Product Warranty

Performance Technologies Inc. (hereinafter "PTI") warrants that its products sold hereunder will at the time of shipment be free from defects in material and workmanship and will conform to PTI's applicable specifications or, if appropriate, to Buyer's specifications accepted by PTI in writing. If products sold hereunder are not as warranted, PTI shall, at its option, refund the purchase price, repair, or replace the product provided proof of purchase and written notice of nonconformance are received by PTI within 12 months of shipment, or in the case of software and integrated circuits within ninety (90) days of shipment and provided said nonconforming products are returned F.O.B. to PTI's facility no later than thirty days after the warranty period expires. Products returned under warranty claims must be accompanied by an approved Return Material Authorization number issued by PTI and a statement of the reason for the return. Please contact PTI, or its agent, with the product serial number to obtain an RMA number. If PTI determines that the products are not defective, Buyer shall pay PTI all costs of handling and transportation. This warranty shall not apply to any products PTI determines to have been subject to testing for other than specified electrical characteristics or to operating and/or environmental conditions in excess of the maximum values established in applicable specifications, or have been subject to mishandling, misuse, static discharge, neglect, improper testing, repair, alteration, parts removal, damage, assembly or processing that alters the physical or electrical properties. This warranty excludes all cost of shipping, customs clearance and related charges outside the United States. Products containing batteries are warranted as above excluding batteries.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS, IMPLIED OR STATUTORY INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS. IN NO EVENT SHALL PTI BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES DUE TO BREACH OF THIS WARRANTY OR ANY OTHER OBLIGATION UNDER THIS ORDER OR CONTRACT.

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APPENDIX B: Product Return Procedure

If you find that your Performance Technologies Inc. (PTI) product must be returned for repair, please use a copy of the following form and include it with the returned product:

1 To return any equipment, you need to obtain a Return Material Authorization (RMA) number. PTI will not accept returns without an RMA number.

To obtain an RMA number, please contact the PTI's Customer Service Group at (716) 256-0248, FAX: (716) 256-0791). Outside of North America, customers should contact their PTI agent.

PTI will request the serial number of the unit and the reason for the return at the time the RMA is issued. RMA# = _____

2 What product are you returning?

What address do you want us to return the product to? If you do not give us an address it will be shipped back to the Ship To Address as listed on the invoice. Model Number: _____

3 What is the problem with the product?

Please enter in the information that the PTI Technical Support representative has given you for the reason for return of this product.

Description of problem: _____

_____

_____

_____

4 Ship to:

Return products should be shipped in the original packaging if possible. Ship via a traceable carrier and properly insure the package. No C.O.D.s are accepted and any shipping charges are non-refundable. Send your returns to:

Performance Technologies, Inc.
Attn: RMA# (Your RMA# goes here)
315 Science Parkway
Rochester, N.Y. 14620, U.S.A.

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(Customers outside of North America, should follow the return shipment instructions issued by your PTI agent.) The RMA number should be clearly marked on the outside of the shipping box to expedite correct handling at the PTI factory.

Repairs will be performed only on complete units. Return of incomplete equipment may delay the repair.

Please note that removal of original parts or product modification by a customer can void the warranty. (This does not apply to jumpers or socketed user programmable parts.)

“Out of warranty repairs” cannot proceed without a Purchase Order to cover estimated cost of the repair.

PTI will supply repair information on all returns and warrants all repairs for 90 days after product is returned to the user.

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APPENDIX C: Product Support



NOTE: If You Encounter Difficulty In Using This Performance Technologies, Inc. Product, You Can Contact Our Support Personnel In One Of Three Ways.

A) Preferred - If you have Internet services, email us at support@uconx.com. Outline your problem in detail. Please include your return email address, and a telephone number.

B) FAX - If you have FAX service, contact us at U.S. Area Code 619 627 1710. Mark you FAX to Attention: Technical Support. Outline your problem in detail. Please include your return FAX number and a telephone number.

C) Contact us via telephone at U.S. Area Code Tel. 619 627 1700. Request Technical Support. Our offices are open between 8:00 am and 5:00 pm Western Standard Time, Monday through Friday.

If you are located outside North America, we encourage you to contact the local PTI distributor or agent for support. Many of our distributors or agents maintain technical support staffs.

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APPENDIX D: Installation Notes



CAUTION: ELECTRONIC COMPONENTS ON PRINTED CIRCUIT BOARDS ARE EXTREMELY SENSITIVE TO STATIC ELECTRICITY. ORDINARY AMOUNTS OF STATIC ELECTRICITY GENERATED BY YOUR CLOTHING OR WORK ENVIRONMENT CAN DAMAGE THE ELECTRONIC EQUIPMENT. IT IS RECOMMENDED THAT WHEN INSTALLING ANY HARDWARE IN A SYSTEM OR THE COMPONENTS ON THE BOARD ITSELF THAT ANTI-STATIC GROUNDING STRAPS AND ANTI-STATIC MATS ARE USED TO HELP PREVENT DAMAGE DUE TO ELECTROSTATIC DISCHARGE.

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APPENDIX E: Network Load Procedures

After completing the hardware and software installation and the configuration procedures described in this document, the server is ready to be loaded with its runtime software. To initiate the download procedure, you can select **X** from the configuration menu, depress the reset push-button on the server's front panel (MPS 3000-family servers only), or cycle the power off and on. Any of these actions cause the server's PROM-resident boot code to automatically begin the load sequence by attempting to contact, over the Ethernet, the first Internet address in the list of clients configured to load the server. The configuration information is either entered at the console or retrieved from the Ethernet network using the Bootstrap Protocol (MPS 300 or 600 servers only) and the Trivial File Transfer Protocol. (After reset or power-on, there is an initial delay of five seconds to allow access to the configuration menu before control is transferred to the boot code.)

The Load Procedure

In the first phase of the load procedure, the server uses the Address Resolution Protocol (ARP) to contact the client. The server broadcasts an ARP request containing the client's Internet address. The client responds with a packet containing its Ethernet address. This exchange informs the server of the Ethernet address of the client. If a client does not respond within a timeout period, the server moves to the next entry in the list of clients configured to load the server.

Once the server has established contact with a client, it uses the Trivial File Transfer Protocol (TFTP) to request the load command file from the client. It supplies the client with the full pathname of the file, which you stored in the server's flash PROM as part of the configuration procedures. Using TFTP, the client transfers the file to the server a block at a time. If the client cannot locate the file, it replies with an error packet. In this case, the server attempts the load from the next client in the list

The load command file contains an entry for each executable file to be loaded, and includes the full pathname of each file. In the third and final phase of the load procedure, the server uses this information to request each required executable file from the client. These files are also transferred using TFTP. The last entry in the load command file provides startup information, which the server uses to transfer control to the runt-

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ime system. If an error occurs, generally due to a missing executable file or a corrupted load command file, the server aborts the load procedure. It then locates the next client in the list and broadcasts another ARP message to restart the load procedure.

If the server cannot successfully complete the load from any of the configured clients, it returns to the top of the list and retries the procedure with each client in turn. This process continues until the server is downloaded successfully from one of the configured clients.

MPS 3000-Family Front-Panel Display

For a server in the MPS 3000 family, the *RUN* LED on the server's front panel is used to indicate status. When the boot code initiates the load procedure, the LED begins to flash. When download is complete, the LED no longer flashes, and should remain illuminated until the server is reset or powered off. If the server is not able to load successfully, the *RUN* LED continues to flash indefinitely.

The load sequence should take 10 to 15 seconds if the server is able to contact and obtain its runtime system from the first client in the list. The sequence can require much more time if the server must attempt to load from a number of clients before meeting with success.

MPS 300/600 Front-Panel Display

The MPS 300 and MPS 600 servers have a two-line LCD display on the front panel. When the server is powered on, the following message appears on the display:

```
UconX MPS
Waiting
```

When the boot code initiates the load procedure, the "Waiting" message is replaced with "Loading". As the server obtains each executable file, it displays a character (beginning with "A" and continuing through the alphabet) on the second line following the "Loading" message. For example:

```
UconX MPS
Loading   C
```


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When download is complete, the message changes to:

```
UconX MPS
Load Complete
```

If the server is not able to load successfully, the "Loading" message may remain on the LCD display indefinitely, or an error message may be displayed.

The load sequence should take 10 to 15 seconds if the server is able to contact and obtain its runtime system from the first client in the list. The sequence can require much more time if the server must attempt to load from a number of clients before meeting with success.

Using the Console Port to Diagnose a Problem

The boot code prints a number of messages on the console port as the load proceeds, describing the sequence of events and any errors that may occur. If your server is not able to load successfully (the *RUN* LED continues to flash indefinitely or the LCD display indicates an error condition), you should attach a terminal to the console port (as described in section 3.2) to observe the output. In the example below, the server's boot code attempts to load from three clients. The first does not respond at all; the second responds but is not able to supply one of the required files; and the third completes the load successfully.

```
Sending ARP Request To 100.0.0.33
No ARP Reply

Sending ARP Request To 100.0.0.8
Received ARP Reply, Requesting Boot File /usr/UconX/
Load/Cmdfile.x25
File Obtained
Requesting File /usr/UconX/Load/UC_tcp.ucmps.x25.H
File Obtained
Requesting File /usr/UconX/Load/wan.ucmps.x25.H
File Not Found

Sending ARP Request To 100.0.0.2
Received ARP Reply, Requesting Boot File /usr/UconX/
Load/Cmdfile.x25
File Obtained
```


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```
Requesting File /usr/UconX/Load/
UC_tcp.ucmps.x25.H
File Obtained
Requesting File /usr/UconX/Load/wan.ucmps.x25.H
File Obtained
Requesting File /usr/UconX/Load/hdlc.ucmps.x25.H
File Obtained
Requesting File /usr/UconX/Load/lapb.mod.x25.H
File Obtained
Requesting File /usr/UconX/Load/plp.mod.x25.H
File Obtained
Requesting File /usr/UconX/Load/reset.mod.x25.H
File Obtained
Requesting File /usr/UconX/Load/xSTRa.ucmps.x25.H
File Obtained
Requesting File /usr/UconX/Load/config.x25.H
File Obtained
Initializing Module L_6
Init L_6 at 200BBC40
```

When BOOTP is configured on, the console log begins with messages regarding the BOOTP protocol message exchange and processing the configuration file. Each line from the configuration file is copied to the console device as it is processed. The content of this file is copied to flash PROM and then booting proceeds as shown above. The following is an example of the beginning of the console output that appears when the server is configured to use the BOOTP protocol. Following this output is output from the ARP request as described in the previous example.

```
Broadcast BOOTP Request: xid 1
BOOTP Reply: size 308, htype 1, op 2, xid 1
Bootp server: 206.251.239.140
Bootp client: 206.251.239.143
Gateway     : 0.0.0.0
Remote file: /usr/UconX/mps600.config
Requesting configuration file /usr/UconX/msp600.config
Configuration file read complete.
process #
process #   Remote configuration file for MPS diamondback.
process #   The full path name of this file is an entry
process #   in the /usr/etc/bootptab file.
process #
process NAME     diamondback1
process CLIENT   206.251.239.148
process FILE     /usr/UconX/Cmdfile.x25
process
```


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```
process SERVER   206.251.239.143  # MPS internet address
process PORTS    48879 0 0        # Must match /etc/services
process DIAG     n
process #
process #   Enable auto-reset
process USER     0x00     0x00
process USER     0x01     0x00
process USER     0x02     0xA0
process USER     0x03     0xD0
process
process ROUTE    204.250.22.30    206.251.239.129 # gateway
process #Define default gateway
process ROUTE    255.255.255.255  206.251.239.129
Saving configuration... Updating DBC bytes at 200EF110

Sending ARP Request to 206.251.239.148
```

SNMP Implementation on the MPSX00 Server

All configurable parameters saved on the non-volatile flash PROM on MPS300/600 servers can be viewed or changed using SNMP. A MIB Browser or SNMP Network Manager can query or set SNMP variables on the MPS Server by way of the MPS Server MIB once the Server has been Download with it's UCONx software. Most parameters configurable from the MPS Server Console can be configured in this way. The following lists the MPS Server MIB variable and it's corresponding console entry:

MPSsystem
- MPSsysName - Server's Logical Name
- MPScmdFile - Download Command File Pathname
- MPSbootp - Remote Configuration
- MPSsntpServAddr - SNTP Configuration - NTP Server Address
- MPSsntpFreq - SNTP Configuration - Poll Frequency Code
- MPSreboot - Resets MPS Box (not a console entry)

MPSip
- MPSipClientAddr1 - Client's Internet Address (First entry)
- MPSipClientAddr2 - Client's Internet Address (Second entry)
- MPSipServerAddr - Server's Internet Address
- MPSiptcpPortNum - Server's (Listen) Port Numbers - Enter TCP Port
- MPSipudpPortNum - Server's (Listen) Port Numbers - Enter UD Port
- MPSipBroadPortNum- Server's (Listen) Port Numbers - Enter Broad cast Port
- MPSipNetAddr1 - Routing Configuration - Modify route table - Network1
- MPSipNetAddr2 - Routing Configuration - Modify route table - Network2
- MPSipNetAddr3 - Routing Configuration - Modify route table - Network3

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MPSipGateAddr1 - Routing Configuration - Modify route table - Gateway1

MPSipGateAddr2 - Routing Configuration - Modify route table - Gateway2

MPSipGateAddr3 - Routing Configuration - Modify route table - Gateway3

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