



GIGABIT

GIGABIT —SX
NETWORK INTERFACE CARD
& DRIVER



PHOBOS®



PHOBOS®
DATA PROPULSION LABS

PHOBOS P1000 PCI
1000BASE—SX NIC
(NETWORK INTERFACE CARD)
& DRIVER MANUAL

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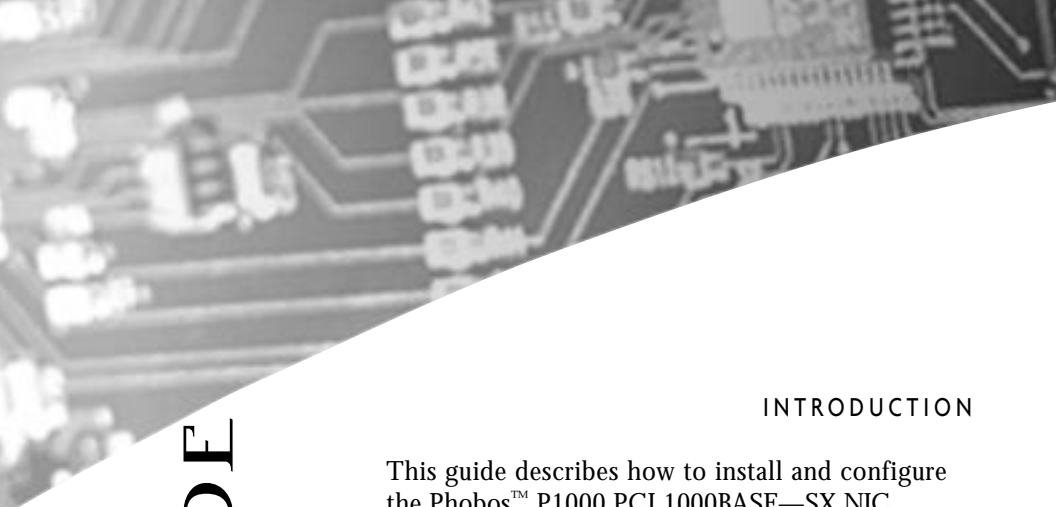
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ABOUT THIS GUIDE

INTRODUCTION

This guide describes how to install and configure the Phobos™ P1000 PCI 1000BASE—SX NIC, referred to as the "P1000," and Phobos' PhobosLink Port Aggregation Software.

HOW TO USE THIS GUIDE

The following table shows where to find specific information in this guide:

IF YOU ARE LOOKING FOR	TURN TO
P1000 Features	chapter 1
Instructions for inspecting the P1000	chapter 2
Instructions for connecting to network	chapter 2
Installing the P1000 NIC	chapter 2
Installing the Driver Software	chapter 3,4,5,6
Configuring PhobosLink Software	chapter 7
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CONVENTIONS

The following are text and icon conventions that are used throughout this guide:

Text Conventions

- Items in **bold** should be typed in as they appear.
- Items in *italics* are produced by the system.
- Items offset by [brackets] are keys that you should press when instructed to do so.
- Commands appear in single quotes, like this: 'command'

Important Notices

CAUTION:

These notes include directions that you must follow to avoid immediate system damage or loss of data.

NOTE:

These notes call attention to important features or instructions.

INTRODUCTION

The P1000 is a 32/64-bit Network Interface Card (NIC) for use in workstations and servers with PCI 2.1 compliant expansion slots.

The P1000 operates at 1000Mbps at both half and full duplex. The P1000 also supports PhobosLink Port Aggregation Software allowing up to 2Gbps Full Duplex of network throughput.

The P1000 has driver support for the following operating system:

- IRIX
- Windows NT
- Solaris
- Linux

The instructions for installing the P1000 on IRIX, Windows NT, Linux and Solaris are described in this manual. Additional instructions can be found at the Phobos web site at www.phobos.com

NIC FEATURES

The P1000 gives you the following capabilities:

- Incredible throughput and reduced latency with full-duplex 1000Mbps bandwidth.
- Supports industry standard 32/64 bit PCI bus
- PhobosLink Port Aggregation Software allowing up to 4Gbps throughput on a single logical network connection by trunking 4 P1000s.
- Complies with the IEEE 802.3z Gigabit Ethernet standard and 802.x standard frame-based control and full-duplex operation.
- Large independent on-board Receive and Transmit FIFOs
- On-board IP checksumming and flexible buffer alignment to reduce CPU utilization
- Independent Descriptor Based RX & TX DMA channels provide- for low CPU utilization with maximum performance without host intervention.

LINK & INSTALL NETWORK HARDWARE

CHAPTER

2

This chapter describes how to install the P1000 in your computer and connect it to a network.

INSPECTING THE P1000

Before installing the P1000 in your computer, inspect the P1000 for obvious damage that may have occurred in shipping.

The package should contain the following items:

- Phobos™ P1000 10/100Base—SX PCI NIC
- P1000 Driver manual
- P1000 & PhobosLink™ Driver Disk

If you find any omissions or damage, contact your network supplier and the carrier that delivered the package immediately.

CAUTION:

The P1000 is packed in an anti-static bag to protect it from static charges. Before removing the P1000 NIC from the bag, touch the metal chassis of your computer. You can maintain grounding by wearing a wrist ground strap attached to the chassis.

INSTALLING THE P1000

The P1000 must be placed in one of the PCI bus slots available.

To install the P1000, power down the computer, remove the cover, and select an empty PCI slot. Remove the bracket from the back of the computer corresponding to the PCI slot selected. Ground yourself to the computer chassis to prevent static discharge. Insert the P1000 board into the PCI slot. Secure the board firmly with the set screw that holds it to the bracket. Inspect the P1000 to make sure that the board is completely inserted into the PCI slot. The set screw should easily secure the P1000 in place.

CONNECTING TO THE NETWORK

This section describes how to connect 1000Mbps network cables to the P1000.

NOTE:

Connect the P1000 to the network before loading the driver.

The backplate of the P1000 contains a SC connector. For Gigabit Ethernet networks, the P1000 uses standard fiber optic cable pairs. To establish a valid connection, remove the protective rubber inserts from the SC connector and from the cable. Then insert the cable into the P1000 and also in the 1000Base—SX hub/switch.

Linux® IRIX DRIVER & STALL SOFTWARE

CHAPTER

3

LOGIN

You need to be logged on as a root user to install the software.

1. Power up your system. If the system is already on, type **su** and press [ENTER] then continue with step 3:
2. Type **root** at the login prompt and press [ENTER].
3. Enter the root password and press [ENTER]. The prompt sign will change to a number sign (#).

If you do not know the root password for the system, contact your system administrator.

INSERT AND MOUNT THE CD

1. Insert the CD into the CD-ROM drive.
2. Type **df** at the prompt and press [ENTER] to verify that 'mediad' is running.

If 'mediad' is not running, use the 'hinv' command to determine the SCSI address of your CD-ROM drive. Type **hinv** and press [ENTER].

3. Use the 'mount' command to mount the CD-ROM drive. Type `mount -r /dev/dsk/dks1d#s7` substituting the SCSI address of the CD-ROM drive for the # character, and press [ENTER].

INSTALL THE DRIVER

1. Type `inst` and press [ENTER]. The prompt will change to `Inst>`.
2. Specify the location of the software.

For systems using the IRIX™ 6.5 operating system, type
`from /CDROM/6.5/dist` and press [ENTER]

3. Type `go` and press [ENTER].
4. Type `quit` and press [ENTER] to leave install.
5. Reboot the system by typing `shutdown -g0` and press [ENTER].
6. Verify that the P1000 is installed correctly. Type `ifconfig pge0`

You should see a message similar to the following:

```
pge0: flags=822<BROADCAST, NOTRAILERS, MULTICAST>
```

You can now use 'ifconfig' to configure the interface. Please see Silicon Graphics' IRIX™ Advanced Site and Server Administration Guide for further information on configuring network devices.

INSTALLING DRIVER SOFTWARE

SETTING THE OPERATING DUPLEX ON THE P1000

The P1000 can operate at either half-or full-duplex mode. The P1000 supports IEEE standard 802.3x.

Phobos Corporation provides a simple utility for viewing and changing the P1000 settings. This utility is called "pge_control." This utility is also available with a graphical user interface, called "PGEControl." Both are found in the `/usr/bin` directory.

To view or change speed settings, you can use either the text-based or graphical interface utility.

Type the following on one line, making the appropriate substitutions, and press [ENTER]:

```
pge_control [-i interface] [-d {half|full}]
```

To set the duplex mode of interface pge0 to full-duplex, type `/usr/bin/pge_control -i pge0 -d full` and press [ENTER].

To see the current settings of all Phobos pge NICs, type `/usr/bin/pge_control` and press [ENTER].

Changing the speed setting with the text-based utility:

1. Type `/usr/bin/PGEControl` and press [ENTER].

The screen shown in figure 3-1 will appear.

2. Enter the desired settings in the appropriate boxes.
3. Click on "Quit."

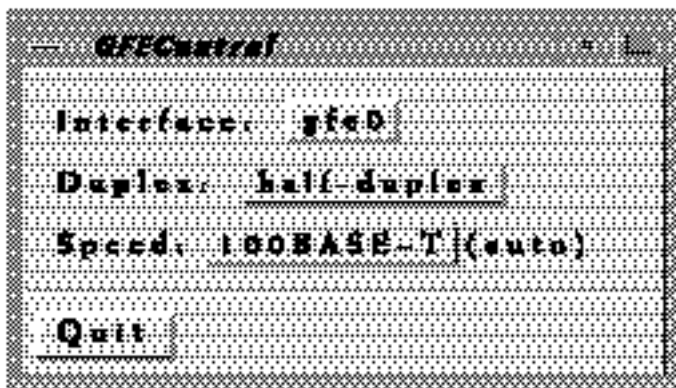


FIGURE 3-1

LOADING AND CONFIGURING PHOBOSLINK

This part of the chapter shows you how to install and configure PhobosLink, the port aggregation software from Phobos. The P1000 NIC is configurable into any combination of logical and physical interfaces using the Phobos Installation software. For example, you can configure 33 P1000 ports as a single trunk, creating aggregate bandwidth of up to 3Gbps.

The installation is the same as for the P1000 driver software. Refer to instructions given earlier in Chapter 3. IRIX must be up and running. Use the installation disk (CDROM) that came with your P1000. The NIC should already be installed in your machine.

INSTALLING DRIVER SOFTWARE

Install the P1000 by following the steps previously described in this Chapter.

1. Launch the PhobosLink application by typing:

```
# plink_config
```

Once the software is loaded, the screen shown in figure 4-1 will appear: In this window, you create links by selecting interfaces from the “Available Interfaces” window.

2. Click “Create Group.” A new group will appear in the window representing your new trunk.
3. Highlight the desired interfaces that you want to link in the “Available Interfaces” window. This window lists all the P1000 interfaces available on your machine.
4. Click “Add Interface.” If you make a mistake, highlight the interface and use the “Remove” button; this puts it back in the “Available Interfaces” window.
5. Select the PhobosLink Connection Type. The connection types are:
 - **SYMMETRIC:** Use this setting if the ports on the P1000 are connected to a switch that supports trunking.
 - **ASYMMETRIC:** Use this setting if the ports on the P1000 in the group are connected to a switch (or switches) that do not support trunking. Under this setting, the P1000 will balance the outgoing load across all the ports in the group, but incoming data will only be received on one port.

- **FAILOVER ONLY:** This setting enables only failover capability. Only one port will be used at a time, with the link(s) serving as backup. **NOTE:** that the Symmetric and Asymmetric trunking modes also support failover. Use this setting only to obtain failover functionality without trunking.
6. Repeat the steps above to create other groups or trunks. You can delete groups by highlighting the group and clicking on “Delete Group.”
 7. Click “OK.” See figure 5-1



FIGURE 5-1
See Chapter 7 for more detail on the PhobosLink features.

LOADING AND CONFIGURING THE ADAPTERS

This chapter shows you how to install and configure the P1000 software drivers for Windows NT. Installation follows standard Windows NT procedures; if you have any questions about installation, please refer to your Windows NT documentation.

The P1000 NIC should already be physically installed in your machine, and Windows NT should be up and running. Use the installation disk (CD-ROM) that came with your P1000.

If the P1000 NIC is already installed in the computer and you reinstall Windows NT, the NIC will be recognized incorrectly during the installation process. You will need to delete the drivers installed by Windows and reinstall the P1000 drivers.

LOADING THE P1000 SOFTWARE

1. Insert the installation disk into your machine's disk drive.
2. Open "Control Panel."
3. Open "Network." The network configuration window will appear.

4. Select "Adapters." A list of available adapters will appear in the list window.
5. Click on "Add."
6. Click on "Have Disk" and enter the drive where you inserted the installation disk. For example, if you are using Window NT 4 and the CD-ROM is in the 'd' drive, you would type 'd:\winnt4'. The OEM Option window will appear. This window lists the software you can install.
7. Select the software you want to install. There are two choices: the P1000 Fast Ethernet adapter and PhobosLink, the port aggregation software. Details on installing and configuring PhobosLink is described later in this manual. The software will load and the newly installed adapters will appear in the adapter window. If you chose PhobosLink, jump to the PhobosLink section for configuration options, otherwise continue with step 8 now.
8. Click on "Close." You will also need to click on "Close" again to exit out of the Network Control panel. At this point, the dialog appears for assigning network addresses.

ASSIGNING NETWORK ADDRESSES

The next step is to assign a network address to each of the ports on the P1000. If you have installed more than one card, remember that you need to assign addresses for each port. If you don't have the IP address information, see your system administrator.

1. Open the TCP/IP window. There are two options: you can enter the address information or, if you have a DHCP server, you can let the DHCP server automatically assign an IP address.
2. Select DHCP (if you have a DHCP server) or enter the network address information. You must enter data for the IP address, subnet mask, and default gateway.
3. Repeat step 2 for each port: select the port in the selection window and enter the address information.
4. Click on "Close."
5. Reboot your machine.

INSTALLING DRIVER SOFTWARE

CONFIGURING THE NIC DUPLEX MODE

The P1000 can operate at either in half- or full-duplex mode.

1. Open “Control Panel.”
2. Open “Network.”
3. Click on the “Adapters” tab on the top of the window.
4. Highlight the port you want to configure and click on “Properties.”
A window will appear where you can select from the following options:
 - Auto-Negotiation (default):
Automatically selects the duplex mode.
 - Half Duplex:
Forces the connection to 1000 Mbps in half-duplex mode.
 - Full Duplex:
Forces the connection to 1000 Mbps in full-duplex mode.
5. Select the operating mode.
6. Click OK.

LOADING AND CONFIGURING PHOBOSLINK

This chapter shows you how to install and configure PhobosLink, the port aggregation software from Phobos. The P1000 NIC is configurable into any combination of logical and physical interfaces using

the Phobos Installation software. For example, you can configure a single logical interface using 3 P1000 ports as a single trunk, creating aggregate bandwidth of 3Gbps.

The installation is the same as for the P1000 driver software. Refer to the beginning of Chapter 4. Windows NT should be up and running. Use the installation disk that came with your P1000. The NIC should already be installed in your machine.

1. Install PhobosLink by following steps 1–7 in Chapter 3: “Loading the Software.” Once the software is loaded, the screen shown in figure 4-1 will appear: In this window, you create links by selecting interfaces from the “Available Interfaces” window.
2. Click “Create Group.” A new group will appear in the window representing your new trunk.



FIGURE 4-1

3. Highlight the desired interfaces that you want to link in the

INSTALLING DRIVER SOFTWARE

“Available Interfaces” window. This window lists all the P1000 interfaces available on your machine.

4. Click “Add Interface.” If you make a mistake, highlight the interface and use the “Remove” button; this puts it back in the “Available Interfaces” window.
5. Select the PhobosLink Connection Type. The connection types are:
 - **SYMMETRIC:** Use this setting if the ports on the P1000 are connected to a switch that supports and is configured for trunking. For example, Cisco’s Fast EtherChannel or Sun Trunking.
 - **ASYMMETRIC:** Use this setting if the ports on the P1000 in the group are connected to a switch (or switches) that do not support trunking. Under this setting, the P1000 will balance the outgoing load across all the ports in the group, but incoming data will only be received on one port.
 - **FAILOVER ONLY:** This setting enables only failover capability. Only one port will be used at a time, with the link(s) serving as backup. **NOTE:** that the Symmetric and Asymmetric trunking modes also support failover. Use this setting only to obtain failover functionality without trunking.
6. Repeat the steps above to create other groups or trunks. You can delete groups by highlighting the group and clicking on “Delete Group.”
7. Click “OK.” See figure 4-1

The next step is to close the Network Control panel so that you can assign addresses to your newly created trunks. The procedure is the same as described in Chapter 3:Assigning Network Addresses.”

8. Follow the steps 1–4 in “Assigning Network Addresses” in Chapter 3 to give your new trunks proper network addresses.
9. Reboot your machine.

LINUX SOFTWARE

CHAPTER 5

LOADING AND CONFIGURING THE ADAPTERS

This chapter shows you how to install and configure the P1000 software drivers for Linux. Installation follows standard Linux procedures; if you have any questions about installation, please refer to your Linux documentation.

The P1000 NIC should already be physically installed in your machine, and Linux should be up and running. Use the installation disk (CD-ROM) that came with your P1000.

The following are generic instructions for installing RedHat Linux. Other versions of Linux will be similar but not necessarily the same.

The object modules were compiled without MODVERSIONS and should work on kernels with close revisions to 2.0.36, 2.2.1 and 2.2.5. If insmod complains about kernel versions mismatch, use insmod -f to force the load of the module.

1. Login as root or use the SU command to become root. If the machine is already on and is logged in as a user, use the steps below to gain access to the root account:

Use the 'su' command to login as root:

```
su [ENTER]
```

The system will then request the root password.

```
Password:"root password" [ENTER]
```

2. Mount the CD

First place the CD in the CD-ROM drive. Then mount the CD_ROM

by typing:

```
# mount /mnt/cdrom [ENTER]
```

3. The appropriate modules are copied from the CD to /lib/modules/2.x.x/net by running a shell script called install_phoboslink.sh

```
# cd /mnt/cdrom/linux [ENTER]
```

```
# sh ./install_phoboslink.sh [ENTER]
```

4. Run insmod to install the single port driver.

```
# insmod p1000 [ENTER]
```

5. If you want trunking capabilities, you will need to run insmod again to install the PhobosLink software.

```
# insmod plink [ENTER]
```

At this point, you must setup PhobosLink as described on page 20 before continuing.

6. The new network interface name is 'pgeX' (or 'plinkX' if you are using PhobosLink) where X is the number of the card. Verify that the new interface is present by using the 'ifconfig -a' command:

```
# ifconfig -a [ENTER]
```

Which should return:

```
pge0: flags=822<BROADCAST,NOTRAILERS>
```

7. Then assign an address to the interface and add the address to the routing table.

For example.

```
# ifconfig pgeX 192.0.2.1 netmask 255.255.255.0 broadcast 192.0.2.255  
# route add -net 192.0.2.0 netmask 255.255.255.0 dev pgeX [ENTER]
```

INSTALLING DRIVER SOFTWARE

CONFIGURING THE INTERFACE

You can manually configure the interface or use 'linuxconf' to configure the interface. These instructions are for manually configuring the interface and must be executed for each card.

1. Create the file /etc/sysconfig/network-scripts/ifcfg-pgeX or ifcfg-plinkX (where X corresponds to the interface number)
2. Edit the file created to add the following information with the appropriate values.

For example;

DEVICE=pge0 (or plink0 if using PhobosLink)

IPADDR=192.0.2.1

NETMASK=255.255.255.0

NETWORK=192.0.2.0 (This is the logical AND of the IPADDR & NETMASK)

BROADCAST=192.0.2.255 (This is the logical OR of the NETWORK and the inverse of the NETMASK)

ONBOOT=yes

3. Edit the file /etc/conf.modules

Add the lines:

```
alias pgeX p1000
```

```
alias plinkX plink
```

4. Use the 'ifup' command to determine if the interface is working.

```
# ifup pgeX
```

or

```
# ifup plinkX (if you are using PhobosLink)
```


INSTALLING DRIVER SOFTWARE

LOADING AND CONFIGURING PHOBOSLINK

This part of the chapter shows you how to install and configure PhobosLink, the port aggregation software from Phobos. The P1000 NIC is configurable into any combination of logical and physical interfaces using the Phobos Installation software. For example, you can configure 3 P1000 ports as a single trunk, creating aggregate bandwidth of up to 3Gbps.

The installation is the same as for the P1000 driver software. Refer to Chapter 3. Linux must be up and running. Use the installation disk (CDROM) that came with your P1000. The NIC should already be installed in your machine.

Install the P1000 by following the steps previously described in this Chapter.

1. Launch the PhobosLink application by typing:

```
# plink_config
```

Once the software is loaded, the screen shown in figure 4-1 will appear: In this window, you create links by selecting interfaces from the “Available Interfaces” window.

2. Click “Create Group.” A new group will appear in the window representing your new trunk.



FIGURE 5-1

3. Highlight the desired interfaces that you want to link in the “Available Interfaces” window. This window lists all the P1000 interfaces available on your machine.
4. Click “Add Interface.” If you make a mistake, highlight the interface and use the “Remove” button; this puts it back in the “Available Interfaces” window.

INSTALLING DRIVER SOFTWARE

5. Select the PhobosLink Connection Type. The connection types are:
 - **SYMMETRIC:** Use this setting if the ports on the P1000 are connected to a switch that supports and is configured for trunking. For example, Cisco's Fast EtherChannel or Sun Trunking.
 - **ASYMMETRIC:** Use this setting if the ports on the P1000 in the group are connected to a switch (or switches) that do not support trunking. Under this setting, the P1000 will balance the outgoing load across all the ports in the group, but incoming data will only be received on one port.
 - **FAILOVER ONLY:** This setting enables only failover capability. Only one port will be used at a time, with the link(s) serving as backup. **NOTE:** that the Symmetric and Asymmetric trunking modes also support failover. Use this setting only to obtain failover functionality without trunking.
6. Repeat the steps above to create other groups or trunks. You can delete groups by highlighting the group and clicking on "Delete Group."
7. Click "OK." See figure 5-1

See Chapter 7 for more detail on the PhobosLink features.

INSTALL SOLARIS DRIVER SOFTWARE

CHAPTER 6

This chapter shows you how to install and configure the P1000 software drivers for Solaris. Installation follows standard Solaris procedures; if you have any questions about installation, please refer to your Solaris documentation.

The P1000 NIC should already be physically installed in your machine, and Solaris should be up and running. Use the installation disk (CD-ROM) that came with your P1000.

LOADING P1000 DRIVER

Login as root or use the SU command to become root.

CAUTION:

If you do not know the root password for the system, contact your system administrator.

1. If the machine is already on and is logged in as a user, use the steps below to gain access to the root account:

Use the 'su' command to login as root

```
su [ENTER]
```

The system will then request the root password.

```
Password:"root password" [ENTER]
```

2. Mounting the CD

First place the CD in the CD-ROM drive. It is recommended that you use the command 'volcheck' to mount the CD-ROM drive. To start, type:

```
# volcheck [ENTER]
```

3. Add the driver packages

To install the Phobos drivers, add the Phobos packages :

For Solaris 2.6 and 2.7 32-bit mode on a Sparc, type

```
# pkgadd -d /cdrom/phobos/solaris/sparc
```

or for Solaris on 2.7 64-bit mode on a Sparc, type

```
# pkgadd -d /cdrom/phobos/solaris/sparc64
```

or for Solaris on 2.5.1, 2.6 and 2.7 on a x86, type

```
# pkgadd -d /cdrom/phobos/solaris/x86
```

At this point, you will see the installation options:

The following packages are available:

1. PHBSLINK Phobos' PhobosLink Trunking Software

2. PHBSP1000 Phobos P1000 Adapter Driver

**Select package(s) you wish to process (or 'all'
to process all packages).**

You can either select the package by number or press -

a - to install all of the packages (recommended)

q - to quit

4. Configure the Hosts File

After installing the Phobos driver software, you must create a host-name.pge<num> file for the adapter's Ethernet interfaces. You must also create both an IP address and a host name for its Ethernet interfaces in the /etc/hosts file.

INSTALLING DRIVER SOFTWARE

Create an `/etc/hostname.pge<num>` file, where `<num>` corresponds to the instance number of each interface you plan to use. If you wanted to use all of the adapter's interfaces then you would need to create four files: For Example

Filename	Instance Number
<code>/etc/hostname.pge4</code>	4

- * The `/etc/hostname.pge<num>` file must contain the hostname for the appropriate network interface.
- * The host name should have an IP address and should be entered in the `/etc/hosts` file.

5. Reboot your system by typing either

```
# boot -r  
or  
# reboot
```

CONFIGURING THE DUPLEX MODE

The P1000 fast ethernet NIC can operate at either half-duplex or full-duplex mode. Phobos Corporation provides a simple utility for viewing and changing the NIC settings. The command line version of this utility is called `"pge_control"` and the graphic version is called `"PGEControl."`

1. Using `pge_control`

To see what the current settings on the interface card(s) are just issue the command without any arguments:

```
# /usr/bin/pge_control [ENTER]
```

The output will look something like:

```
pge0: half-duplex
```

The syntax for the `pge_control` command is:

```
pge_control [-i interface] [-d {half | full}]
```

To set the duplex mode of interface `pge1` to full-duplex:

```
# /usr/bin/pge_control -i pge1 -d full
```

To see the current settings of all Phobos pge NICs:

```
# /usr/bin/pge_control
```

If you are unsure of your network link speed and duplex mode, use the factory defaults of auto-speed sense and half-duplex. Changing the speed setting with the graphic-based utility:

1. Type `/usr/bin/PGEControl` and press [ENTER].

The screen shown in figure 6-1 will appear.

2. Enter the desired settings in the appropriate boxes.

3. Click on "Quit."

INSTALLING DRIVER SOFTWARE

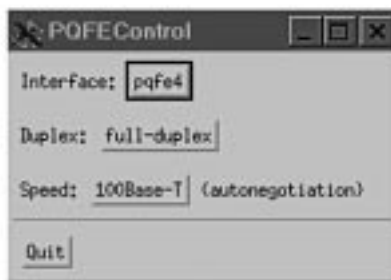


FIGURE 6-1

Now use the 'ifconfig' command to activate the new interfaces. For example, to activate the interface pge0, type;

```
# ifconfig pge0 plumb
```

The interface is now active and can be configured. (See Solaris manual for further instructions on configuring network interfaces.)

LOADING PHOBOSLINK DRIVER

This chapter shows you how to install and configure PhobosLink, the port aggregation software from Phobos. The P1000 NIC is configurable into any combination of logical and physical interfaces using the Phobos Installation software. For example, you can configure 4 P1000 ports as a single trunk, creating aggregate bandwidth of 4Gbps.

The installation is the same as for the P1000 driver software. Refer to the beginning of Chapter 6. Solaris must be up and running. Use the installation disk (CDROM) that came with your P1000. The NIC should already be installed in your machine.

1. Install the P1000 and PhobosLink drivers by following steps 1-3 in the section "Load and Configuring the P1000 Driver", previously described in this Chapter. Make sure the 'all' drivers are installed in step 3.

2. Configure the Hosts File

After installing the Phobos driver software, you must create a `hostname.plink<num>` file for the adapter's Ethernet interfaces. You must also create both an IP address and a host name for its Ethernet interfaces in the `/etc/hosts` file.

Create an `/etc/hostname.plink<num>` file, where `<num>` corresponds to the instance number of each interface you plan to use. If you wanted to use all of the adapter's interfaces then you would need to create four files: For Example

Filename	Instance Number
<code>/etc/hostname.plink4</code>	4

* Do not create `/etc/hostname.plink<num>` files for Phobos Quadport 10/100 PCI adapter interfaces you plan to leave unused.

* The `/etc/hostname.plink<num>` file must contain the hostname for the appropriate network interface.

* The host name should have an IP address and should be entered in the `/etc/hosts` file.

5. Reboot your system by typing either

```
# boot -r  
or  
# reboot
```

INSTALLING DRIVER SOFTWARE

CONFIGURING PHOBOSLINK

1. Launch the PhobosLink application by typing:

```
# plink_config
```

Once the software is loaded, the screen shown in figure 4-1 will appear: In this window, you create links by selecting interfaces from the “Available Interfaces” window.

2. Click “Create Group.” A new group will appear in the window representing your new trunk.



FIGURE 6-1

3. Highlight the desired interfaces that you want to link in the “Available Interfaces” window. This window lists all the P1000 interfaces available on your machine.
4. Click “Add Interface.” If you make a mistake, highlight the interface and use the “Remove” button; this puts it back in the “Available Interfaces” window.
5. Select the PhobosLink Connection Type. The connection types are:
 - **SYMMETRIC:** Use this setting if the ports on the P1000 are connected to a switch that supports and is configured for trunking. For example, Cisco’s Fast EtherChannel or Sun Trunking.
 - **ASYMMETRIC:** Use this setting if the ports on the P1000 in the group are connected to a switch (or switches) that do not support trunking. Under this setting, the P1000 will balance the outgoing load across all the ports in the group, but incoming data will only be received on one port.
 - **FAILOVER ONLY:** This setting enables only failover capability. Only one port will be used at a time, with the link(s) serving as backup. **NOTE:** that the Symmetric and Asymmetric trunking modes also support failover. Use this setting only to obtain failover functionality without trunking.

See Chapter 7 for more detail on the PhobosLink features.

6. Repeat the steps above to create other groups or trunks. You can delete groups by highlighting the group and clicking on “Delete Group.”
7. Click “OK.” See figure 6-1

Now use the ‘ifconfig’ command to activate the new interfaces. For example, to activate the interface plink0, type;

```
# ifconfig plink0 plumb
```

The interface is now active and can be configured. (See Solaris manual for further instructions on configuring network interfaces.)

INCREASING TCP/IP PERFORMANCE

The TCP/IP performance of the Phobos PCI adapter can be increased by changing the TCP high water mark to 64K. This can be done with the `ndd` utility as follows.

1.As superuser (root), type:

```
# ndd -set /dev/tcp tcp_xmit_hiwat 65535
# ndd -set /dev/tcp tcp_recv_hiwat 65535
# ndd -set /dev/tcp tcp_cwnd_max 65534
```

The changes take effect immediately and affect all the networking interfaces in the system. The changes are lost when you reboot the system.

SETTING UP PORT AGGREGATION

CONFIGURING PHOBOSLINK

This chapter explains the settings available with the PhobosLink software application.

With PhobosLink, ports can be grouped into three basic group types: symmetric trunking, asymmetric trunking, and fail-over only.

- **Symmetric Trunking** - Should be used when the ports in the group are connected to a switch that supports trunking. In this case, be sure that the corresponding ports on the switch are also configured as a trunk; otherwise the connection will not work properly. In this mode, packets will be sent and received symmetrically on all the ports in the group.
- **Asymmetric Trunking** - Should be used when the P1000 ports in the group are connected to a legacy switch that does not support trunking. In this mode, packets will be transmitted on all the ports in the group, but only one of the ports will be used to receive incoming traffic.
- **Failover-only Mode** - Disables trunking entirely, so that only one port in the group will be used at once. All three modes support automatic fail-over functionality, switching network traffic to a different

port if one of the ports goes down; the failover-only mode is provided only for situations in which utilizing multiple ports at once is undesirable.

ADVANCED SETTINGS

The advance features of PhobosLink include the ability to chose the algorithm used for balancing the network traffic load across the different ports in a group or trunk. These options are only available trunking is enabled. It allows you to select between three different algorithms for choosing the port on which to transmit an outgoing packet. (The port on which incoming packets are received is determined by the switch or host on the other side of the connection.) Currently three transmit policies are available: Adaptive, Fixed, and Round-Robin.

- **Adaptive Mode** - (the default) Dynamically assigns packets going to a particular destination Ethernet address to the least heavily loaded port.
- **Fixed Mode** - Uses a static assignment scheme based on the destination address, and is equivalent to the transmit policy used by most trunking switches.
- **Round-robin Mode** - Causes packets to be transmitted alternately over all the ports in the group regardless of destination address.

NOTE: Round-robin mode does NOT preserve packet ordering, and therefore should only be used with protocols such as TCP/IP that don't require packet order to be maintained. We recommend using the Adaptive or Fixed policy for typical situations in which a server is connected through a switch to a network containing many clients, and using the Round-Robin policy when two server-class machines must be connected together directly with a high-bandwidth dedicated connection composed of multiple physical 100Mbs links. In this latter situa

tion, the Adaptive and Fixed policies typically used by switches and other trunking drivers would not improve the performance of the dedicated connection beyond that of a single 100Mbps link, since only a single source/destination address pair is involved and therefore only a single link would ever be utilized.

CONFIGURING PRIORITY TRUNKING

An additional feature of PhobosLink is the ability to do “Priority Trunking”. Another way of describing this feature is bandwidth management on the NIC. With priority trunking, specific network traffic that is transmitted out the NIC can be limited based on layer 3 and layer 4 criteria. The layer 3 options include:

- IP
- IPX
- AppleTalk
- Other.

The layer 4 options include:

- Internet Protocol- TCP, UDP, ICMP, and other
- Destination Address
- Socket Number - http, ftp, smtp, and other

Unless configured otherwise, no priority trunk groups exist. To create a priority trunk group, click on the “Priority Trunking” button found on the PhobosLink properties window. The action will bring up the following window.



FIGURE 7-1

From this window, priority settings are created, deleted, and modified. The order of the priorities can also be rearranged.

To create a new priority, press on the “Add Priority” button and the following window will appear:



FIGURE 7-2

At this point, the features are added to the trunking priority. Begin creating the priority by selecting between the protocols of IP, IPX, AppleTalk and 'other'. The 'other' value allows the user to define the protocol value as defined in RFC 1700

If the IP protocol is selected, additional information can be added to the priority being created. These additional network descriptions are activated by checking the box found to the left of each feature. The first feature is Internet Protocol. With this feature, you can select between TCP, UDP, ICMP, and other internet protocols. The 'other' value allows the user to enter an additional value which corresponds to the information found in RFC 1700

The second feature to limit priority is by destination address. This feature includes both an IP address and subnet mask. For example, if you wanted to limit the accounting department's access to a server and the accounting department used the subnet of 10.1.x.x, you would type 10.1.1.1 as the address and 255.255.0.0 as the subnet mask. This would restrict network traffic destined for that subnet to the number of ports assigned.

The third feature is based on socket number. The choices are http, ftp, smtp, and 'other'. The 'other' value allows the user to define additional sockets available on the server.

After the criteria is selected, the last value inputted is the number of ports within the trunk that the network traffic described is limited to. This value can't be larger than the number of ports in the entire group.

This chapter gives you basic troubleshooting tips. If you are having problems, check the following:

1. Check LEDs

Make sure the link light is active. The green link light on the back of the P1000 should light when the fiber optic cable is plugged in. If the link light is not active, check the light on the switch/hub on the other end of the cable.

Each Phobos P1000 NIC has three LEDs and one 1000 PCI connector, as shown in Figure 8-1.

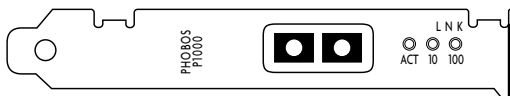


FIGURE 8-1

If you experience any problems, first make sure the driver is loaded,

2. Check cable length.

Make sure the cable segment is compliant with 1000Base-SX recommendations (see Section **A-1**). The length should not exceed 2000 meters.

3. Make sure the card is seated correctly in the slot.

Examine the PCI slot with the P1000 to make sure the card is completely seated in the slot.

WINDOWS NT TROUBLESHOOTING

1. Make sure speed setting is correct.

The network speed is determined by the switch/hub connected to the P1000. Use Properties to configure the speed of the P1000. If connected to a switch, the switch must also be configured properly. If the switch and the P1000 are unable to correctly negotiate their speeds, manually set the speed setting using the Properties' (see page 2-2) for the P1000 and force the switch port (see switch manufacturer's guide included with your switch).

2. Make sure the interface is recognized.

Use the network control panel to configure and display network interface information. Make sure the P1000 or PhobosLink driver is displayed in the Bindings window.

From a DOS Prompt, type 'ipconfig' to display the protocol information. You should see something like this:

example: ~> ipconfig

Ethernet adapter PhbsLink1:

```
IP Address . . . . .: 101.100.99.98
Subnet Msk . . . . .: 255.255.0.0
Default Gateway.: 101.100.255.255
```

BASIC TROUBLESHOOTING

3. Make sure you can use 'ping' to find a host on the same subnet.

The command 'ping' is used to test network operation. Being able to "ping" on the same subnet proves that the NICs are functioning and configured properly.

The following is an example of a ping on the same subnet.

```
example: ~> /etc/ping 123.45.67.89
```

```
PING 123.45.67.89 (123.45.67.89) : 56 data bytes
```

```
64 bytes from 123.45.67.89: icmp_seq=0 ttl=225 time=1 ms
64 bytes from 123.45.67.89: icmp_seq=1 ttl=225 time=1 ms
64 bytes from 123.45.67.89: icmp_seq=2 ttl=225 time=1 ms
64 bytes from 123.45.67.89: icmp_seq=3 ttl=225 time=1 ms
```

```
----123.45.67.89 PING Statistics-----
```

```
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max = 1/1/1ms
```

4. Experiencing slow performance.

Make sure you are running the latest service pack and any other fixes released from Microsoft.

Contact technical support.

SPECIFICATIONS

This appendix lists the specifications for the Phobos P1000.

P1000 CARD SPECIFICATIONS

NETWORK INTERFACE

1000Base-SX	Ethernet IEEE 802.3z industry standard for a 1000Mbps baseband DSMA/CD local area network
-------------	---

PHYSICAL DIMENSIONS

Length:	16.68 cm (6.57 in)
Height:	8.76 cm (3.45 in)

ENVIRONMENTAL OPERATING RANGE

Operating temperature:	0° to 70° C (32° to 158° F)
Humidity:	10% to 90% (noncondensing)
Altitude:	Below 3,000 meters (9,840 ft)

POWER REQUIREMENTS

Ratings:	+5V \pm 5% @ 500mA max, 3.75 W max
	+12V \pm 5% @ 160mA max

Phobos Corporation provides several ways to obtain driver support. You can visit our web site, send E-mail, or call our support line.

DRIVER SUPPORT OFF THE NET

Phobos Corporation's home web page is located at:
[HTTP://WWW.PHOBOS.COM](http://www.phobos.com)

We maintain the last driver release at the FTP site:
[FTP.PHOBOS.COM](ftp://phobos.com)

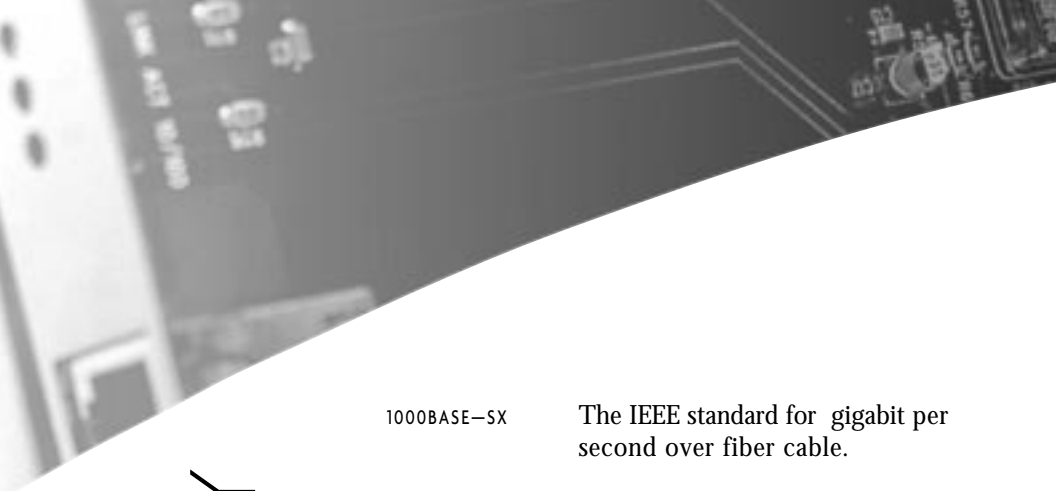
Located in the directory:
[dist/](#)

You can receive technical support by sending E-mail to:
[SUPPORT@PHOBOS.COM](mailto:support@phobos.com)

TECHNICAL SUPPORT THROUGH PHOBOS CORPORATION

Technical support can also be obtained by calling Phobos Corporation between 0800 and 1700 Mountain Standard Time:

1 (800) 925-4266 or, call **1 (801) 474-9200**



GLOSSARY

1000BASE—SX	The IEEE standard for gigabit per second over fiber cable.
ADAPTIVE MODE	A trunking algorithm. Dynamically assigns packets going to a particular destination Ethernet address to the least heavily loaded port.
AGGREGATION	See Trunking.
ASYMMETRIC	PhobosLink setting for non-trunking switches. This setting allows PhobosLink to perform trunking with switches not designed with trunking logic.
BUS	An electronic pathway along which signals are transmitted from one area of a computer to another.
CONFIGURATION	The software settings that allow different hardware components of a computer system to communicate with one another.
DRIVER	A program, usually resident in server or workstation memory, that controls network hardware (such as NICs

or controllers) or implements the protocol stacks through which higher-level applications communicate with the network hardware.

FAILOVER	PhobosLink setting for a redundant connection. If a cable or port goes down, the network traffic will automatically switch to the other available ports.
FIXED MODE	A trunking algorithm. Uses a static assignment scheme based on the destination address, and is equivalent to the transmit policy used by most trunking switches.
INTERFACE	See Port.
PRIORITY TRUNKING	Bandwidth management on the NIC. With priority trunking, specific network traffic that is transmitted out the NIC can be limited based on layer 3 and layer 4 criteria.
PORT	A physical network connection on the NIC.
ROUND-ROBIN MODE	Trunking algorithm. Causes packets to be transmitted alternately over all the ports in the group regardless of destination address.
SERVER	A device that provides access to network services, such as printers or applications, in a client-server computing environment.
SYMMETRIC	PhobosLink mode for switches that support trunking. With this setting, PhobosLink can create a trunk of up to 4 ports, providing 400 Mbps bandwidth for transmitting and receiving packets from a single PCI NIC.

GLOSSARY

TRANSCIVER

A hardware device that links a node to a network cable; it is both a transmitter and a receiver.

TRUNKING

The ability to turn multiple physical ports into one logical connection. The trunked ports will appear as one network connection to the rest of the network but the throughput will be the aggregate of the ports within the trunk.



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ETCERA

FCC CLASS B CERTIFICATION STATEMENT

Phobos Corporation
Model No: P1000
FCC ID: AOU-DE500A
Made in U.S.A.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference,
2. This device must accept any interference received, including interference that may cause undesired operation.

WARNING:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules, and the Canadian Department of Communications Equipment Standards entitled, "Digital Apparatus," ICES-003. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no

guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from the one which the receiver is connected to.
- Consult the dealer or an experienced radio/TV technician for help.

The user may find the following booklet prepared by the Federal Communications Commission helpful:

THE INTERFERENCE HANDBOOK

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 004-000-00345-4.

For more information regarding the above, please contact Phobos Corporation at: P.O. BOX 57184 SALT LAKE CITY, UT 84157-0184.

CISPR 22 COMPLIANCE

This device complies with the EMC directive of the European Community and meets or exceeds the following technical standard:

EN55022 - Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.

This device complies with the CISPR 22 standard.

CISPR 22 COMPLIANCE

WARNING:

This is a Class B product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

CE NOTICE:

- Marking by the symbol CE indicates compliance of this equipment to the EMC directive of the European Community. Such marking is indicative that this equipment meets or exceeds the following technical standards:
- EN 55022 - "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment."
- EN 50082-1 - "Electromagnetic compatibility - Generic immunity standard Part 1: residential, commercial, and light industry."
- IEC 801-2 - "Electromagnetic compatibility for industrial-process measurement and control equipment Part 2: Electrostatic discharge requirements." - Severity level 3.
- IEC 801-3 - "Electromagnetic compatibility for industrial-process measurement and control equipment Part 3: Radiated electromagnetic field requirements." - Severity level 2.
- IEC 801-4 - "Electromagnetic compatibility for industrial-process measurement and control equipment Part 4: Electrical fast transient/burst requirements." - Severity level 2.

For information regarding the "Declaration of Conformity" or the CE notice for this NIC please contact Phobos Corporation at:

P.O. BOX 57184 SALT LAKE CITY, UTAH, 84157-0184.

OTHER PHOBOS CORP. NETWORK PRODUCTS

Phobos Corporation is dedicated to creating the world's best networking products. Our line of network interface cards are everywhere in the industry, providing reliable, cost-effective solutions to networking problems. Available in several operating platforms, we have just the solution you need. See the brief descriptions below, or visit our website at: WWW.PHOBOS.COM.

GIGABIT ETHERNET

If yours is an extremely fast network, the Phobos P1000 PCI 1000Base—SX Network Interface Card is a perfect solution to link file servers, server farms, and other applications. The P1000 delivers incredible throughput with reduced latency, and it replaces multiple 10/100Mbps NICs, conserving important server slots and simplifying your network. And with PhobosLink Software, you can combine up to four P1000s, giving you an aggregate bandwidth of up to 4Gpbs.

QUADPORT FAST ETHERNET

Free up valuable server slots with the Phobos Quadport PCI (4)10/100Base—TX Network Interface Card. They support multiplexing switches at scalable bandwidths of up to 800 Mbps (full-duplex) by combining multiple links in parallel to form a single, high-speed logical link. Add PhobosLink Port Aggregation Software and you can combine as many as eight Quadport NICs to create an aggregate bandwidth of up to 3.2Gbps over standard Category 5 cabling.

FAST ETHERNET

The Phobos G130 Fast Ethernet network interface card provides 100Mbps connectivity to Silicon Graphics Indy workstations and Challenge S servers. The G130's 32-bit mastering capabilities minimize host CPU utilization and maximizes performance. The driver support options are IRIX 5.3, 6.2, or later.

The Phobos E-100 Fast Ethernet network interface card provides 100Mbps connectivity to Silicon Graphics Indigo² workstations and Challenge M servers. The Phobos E100 NIC fits into the EISA slot and has driver options for IRIX 5.3, 6.2 or later.

The Phobos H100 Fast Ethernet network NIC provides 100Mbps connectivity to Hewlett Packard 700, J, and D series EISA-based workstations and servers. The H100 gives improved 100Mbps performance for standard applications in a 10Mbps Ethernet environment. The driver supports both HP-UX 9.x and HP-UX 10.x

The Phobos P100-G provides 100Mbps full-duplex connectivity for Silicon Graphics O2, Octane and Origin series servers and workstations. The P100-G supports IRIX 5.3, 6.2, and 6.5.

The Phobos P100-H 10/100Base-TX network interface card offers 32-bit bus mastering connectivity to Hewlett Packard PCI Bus-based workstations and servers while offering full-duplexing capabilities. The P100-H supports HP-UX 10.20+.

PHOBOSLINK™ SOFTWARE

Let PhobosLink, the new multi-platform software suite from Phobos, optimize the performance and availability of your network. PhobosLink Port Aggregation software controls multiple Ethernet communication ports or network interface cards, allowing ports to be bound together to form one or more logical links, increasing the bandwidth of your network segment. PhobosLink can link up to thirty-two Phobos 10/100Base—TX ports to create an aggregate bandwidth of up to 3.2Gbps; and as many as four Phobos gigabit Ethernet ports can be combined to create an aggregate bandwidth of up to 4Gbps. PhobosLink supports Ciscos' Fast Etherchannel technology, and is compatible with Fast Ethernet and Gigabit Ethernet. It gives you bandwidth scalability, provides network managers a flexible, high-speed solution, and is available for Silicon Graphics IRIX, Hewlett Packard HP-UX, Sun Microsystems Solaris, Microsoft Windows NT.

Our product line continues to grow. Please visit our web site at: WWW.PHOBOS.COM for current information.

2060 east 2100 south

salt lake city, utah 84109

T) 801-474-9200

F) 801-474-9201

WWW.PHOBOBOS.COM