

E1752

ASUS® PEB-G21

PCI Express x1

Network Interface Card

User Guide

First Edition
October 2004

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Introduction

Thank you for buying the ASUS PEB-G21 PCI Express x1 Network Interface Card!

This user guide tells you how to install and configure the card. It is assumed that you have adequate knowledge on PCs and some familiarity with Ethernet networks.

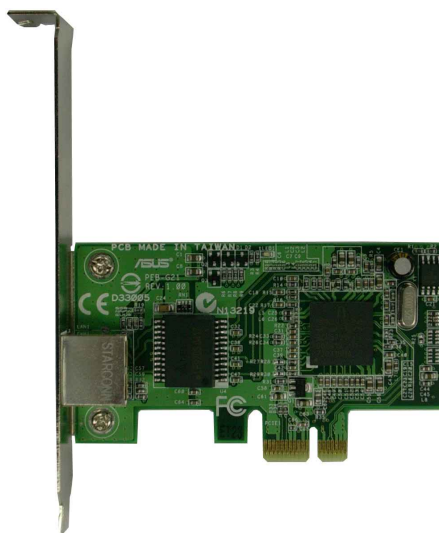
Package contents

Check the following items if present in your package. If you discover damaged or missing items, contact your retailer.

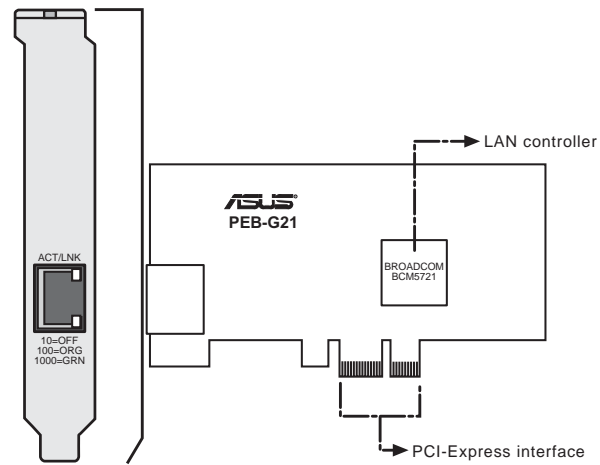
- 1 x ASUS PEB-G21 PCI Express x1 Network Interface Card
- 1 x Support CD
- 1 x User Guide

Models

The ASUS PEB-G21 network interface card comes with a standard bracket for regular PCs.



Layout



Features

PCI-Express x1 Interface

- PCI Express 1.0a host interface compliant
- x1 PCI Express lane
- Supports PXE, RPL, ASF 2.0
- ACPI and Wake-on-LAN support

Network Interface

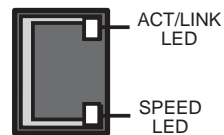
- Broadcom® BCM5721 PCI Express Gigabit Ethernet controller
- 10/100/1000 BASE-T controller with integrated transceiver
- RJ-45 LAN port

LED descriptions

The RJ-45 LAN port allows Gigabit connection to a Local Area Network (LAN). Refer to the table below for the LAN port LED indications.

LAN port LED indications

ACT/LINK LED		SPEED LED	
Status	Description	Status	Description
OFF	No link	OFF	10 Mbps connection
GREEN	Linked	ORANGE	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection



RJ-45 port

System requirements

Your PC or server should meet the following system requirements before installing the ASUS PEB-G21 network interface card:

- PCI Express x1, x4, x8 or x16 slot (PCI Express 1.0a host interface)
- optical drive
- at least 10 MB free hard disk space
- supported operating system (any of the following)
 - Windows Server 2000/2003, Windows 2003 64-bit
 - Red Hat Enterprise Linux ES 3.0 64-bit, Red Hat Enterprise Linux AS 3.0, Red Hat 9.0
 - SuSE Linux 9.1, SuSE Linux Enterprise 8.0
 - NetWare 6.5
 - Solaris 9.0
 - UnixWare 7.1.3
 - Open Server 5.0.7

Installing the network card

Follow these steps to install the card into your PC.



CAUTION! Before handling the network card, touch a bare metal portion of your PC to discharge the static electricity from your body. Wear a wrist strap grounded to the PC chassis when handling the card.

1. Unplug the power cord from the electrical socket.
2. Remove the PC cover.
3. Locate an empty, PCI Express x1 slot and remove its slot cover. Save the screw for later use.



IMPORTANT! Do not install the network card in a shared PCI Express x1 slot. Check your PC documentation to ensure that you install the card into the correct slot.

4. Carefully insert the card into the PCI Express x1 slot.
5. Secure the card with the screw that you removed earlier.
6. Replace the PC cover and plug in the power cord.

Connecting the network cable

Follow these steps to connect the card to the network.



The RJ-45 port on the network card provides a 10, 100, or 1000 Mbps connection, depending on the speed of the connected hub or switch.

1. Plug the RJ-45 connector of the twisted-pair network cable into the RJ-45 port on the card backplate.
2. Connect the other end of the network cable to an active network port.
3. Turn on the PC.

Running the installation program

The support CD that came with the PCI Express card package contains the drivers that you have to install to avail all the features of this card.

Windows® Server 2003 Advanced Server Driver Software

Installing the Driver Software

When the Windows Server 2003 system first boots up after installing a new hardware device, such as a ASUS PEB-G21 PCI Express x1 Network Interface Card, the system automatically detects the new hardware and prompts you to install the driver software for that device.



A network device driver must be installed before the ASUS PEB-G21 PCI Express x1 Network Interface Card can be used with your Windows Server 2003 system.

Using the Driver Installer

To install the adapter software for Windows Server 2003, do the following



Before beginning this procedure, verify that the Windows Server 2003 system has been upgraded to the latest version with the latest service pack applied. The following instructions are based on the latest beta versions of Server 2003.

1. Start Windows Server 2003 and log in. Note that you must have Administrator privileges to install the driver software.



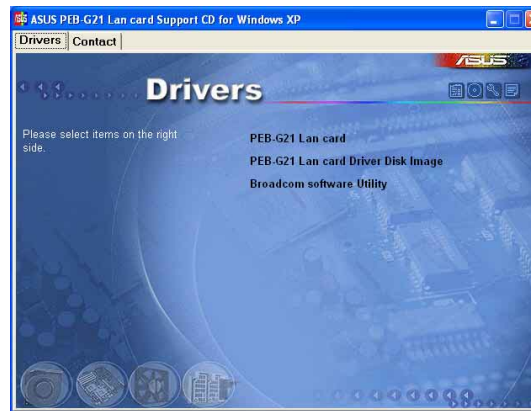
When you boot up the Windows Server 2003 system after installing the adapter card, a series of Found New Hardware windows are displayed.

2. Place the Support CD into the optical drive. The CD automatically displays the **Drivers** menu if Autorun is enabled in your computer.
If Autorun is not enabled in your computer, browse the contents of the Support CD to locate the file **ASSETUP.EXE** in the BIN folder. Double-click the **ASSETUP.EXE** file to run the installation program.

OR

From the Windows **Start** menu, click **Run** and type the following on the command line, **d:\BIN\ASSETUP.EXE** then press the Enter key.
(Assuming that **d:** is your optical drive)

The following screen appears.



3. From the **Drivers** tab, click the **PEB-G21 LAN card** item.

The following describes the items on the menu:

PEB-G21 LAN Card

Installs the PEB-G21LAN card driver.

PEB-G21 LAN Card Driver Disk Image

Allows you to create a driver disk for the PEB-G21 LAN card.

Broadcom Software Utility

Installs the Broadcom® software utility.

4. Follow the succeeding screen instructions.

Windows® 2000 Driver Software

Installing the Driver Software



The ASUS PEB-G21 PCI Express x1 Network Interface Card must be physically installed in your system prior to installing the driver software. See Installing the Hardware for details.

When the Windows 2000 system first boots up after installing a new hardware device, such as a Gigabit Ethernet Adapter, the system automatically detects the new hardware and prompts you to install the driver software for that device.

A network device driver must be installed before the Gigabit Ethernet Adapter can be used with your Windows 2000 system.

Installing the Adapter Software

To install the adapter software for Windows 2000:



Before beginning this procedure, verify that the Windows 2000 system has been upgraded to the latest version with the latest service pack applied.

When updating the adapter software on existing ASUS devices, the Advanced Property settings may not be updated unless the existing ASUS device is removed by following the instructions in the Removing the Driver Software section. You must then perform a scan for hardware changes in the device manager, followed by reinstalling the ASUS device with the current adapter software as described in the Installing the Driver Software section. Prior to uninstalling the Broadcom device, ensure to capture all Advanced Property settings because the properties will be lost.

1. Start your Windows 2000 system and log in. You must have Administrator privileges to install the driver software.
When you boot up the Windows 2000 system after installing the adapter card, a series of Found New Hardware Wizard windows are displayed.
2. In the Install Hardware Device Drivers window, click Search for a suitable driver for my device (recommended), then click Next.
3. In the Locate Driver Files window, select the applicable search location check boxes, then click Next.
4. When prompted, insert the media to be searched into your CD-ROM drive, type the path to the driver, and select OK.

Example: e:\

Where "e" is the designation of the CD-ROM drive on your system.

5. In the Driver Files Search Results window, verify that the correct path to the driver software is shown, then click Next.



If the Insert Disk screen appears, do not insert the Windows 2000 disk. Some early versions of Windows 2000 may display a spurious message prompting you to insert the Windows 2000 disk. If this occurs, leave the software and drivers CD-ROM in the drive and click OK. If asked to specify the location of the Windows 2000 CD-ROM instead, click Browse (do not use the text field) and locate the path to the ASUS PEB-G21 PCI Express x1 Network Interface Card drivers.

Windows NT® Driver Software

Installing the Driver Software

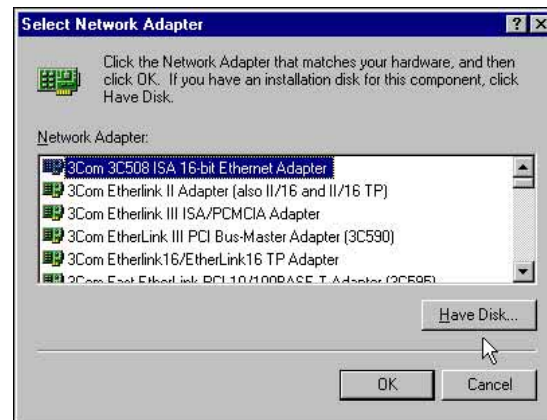


- The ASUS PEB-G21 PCI Express x1 Network Interface Card must be physically installed in your system prior to installing the driver software. See "Installing the Hardware" for details.
- A network device driver must be installed before the Gigabit Ethernet Adapter can be used with your Windows NT system. BACS2 Help files require Internet Explorer 4.0 or later to work properly.
- We recommend using Internet Explorer 5.0 to view help files.
- Hot Plug installation is not supported on dual port devices with Windows NT4.
- We recommend using Internet Explorer 5.0 to view help files.

To install the adapter software for Windows NT:

1. Verify that the Windows NT system is upgraded with Service Pack 4 or later.
2. Start your Windows NT system and log in. You must have System Administrator privileges to install the driver software.

3. Open the Control Panel.
4. In the Control Panel, double-click the Network icon.
5. When the Network window opens, select the Adapters tab.
6. To install a new adapter, select the adapter and click Add .
All previously installed drivers are listed under Network Adapters.



7. When the Select Network Adapter window opens, click Have Disk....

8. When prompted, insert the driver installation media, or choose a location to install the driver from. Type the path to the driver, and click OK.

For example, to install the adapter driver software for Windows NT, type e:\ in the Insert Disk location box (where "e:" is the designation of the CD-ROM drive on your system).



If you acquired the adapter software on floppy disk or from the ASUS support website, enter the path to where the adapter driver files reside on your system.

9. With Gigabit Ethernet Controller highlighted in the Select OEM Option window, click OK.

The adapter files are installed, then the Network window appears showing the newly installed adapter.

10. Click Close, then the Microsoft TCP/IP Properties window appears.
11. Configure the TCP/IP protocol and click OK.
12. When prompted to restart your computer, click Yes.

Installing Linux Driver Software

Installing Source RPM Package

1. Install the source RPM package:
rpm -ivh bcm5700-<version>.src.rpm
2. Change the directory to the RPM path and build the binary driver for your kernel:
cd /usr/src/{redhat,OpenLinux,turbo,packages,rpm ..}
rpm -bb SPECS/bcm5700.spec or **rpmbuild -bb SPECS/bcm5700.spec**



Note that the RPM path is different for different Linux distributions.

3. Install the newly built package (driver and man page):
rpm -ivh RPMS/i386/bcm5700-<version>.i386.rpm



Note that the force option is needed if installing on some distributions that may already contain an older version of the driver.

The driver will be installed in one of the following paths:

- 2.2.x kernels:
/lib/modules/<kernel_version>/net/bcm5700.o
 - 2.4.x kernels:
/lib/modules/<kernel_version>/kernel/drivers/net/bcm5700.o
 - 2.4.x kernels with bcm5700 driver patched in:
**/lib/modules/<kernel_version>/kernel/drivers/net/bcm/
bcm5700.o**
or
**/lib/modules/<kernel_version>/kernel/drivers/addon/
bcm5700/bcm5700.o**
2. Load the driver:
insmod bcm5700
 3. To configure the network protocol and address, refer to Linux-specific documentation.

Building Driver From TAR File

1. Create a directory and extract the TAR files:
tar xvzf bcm5700-<version>.tar.gz
2. Build the driver bcm5700.o as a loadable module for the running kernel:
cd bcm5700-<version>/src
make
3. Test the driver by loading it:
insmod bcm5700.o
4. Install the driver and man page:
make install



See the RPM instructions above for the location of the installed driver.

5. To configure network protocol and address, refer to the manuals supplied with your operating system.

Installing Novell NetWare Server 4.2/5.x/6.0 Driver Software



The following instructions outline the installation of Novell NetWare Server 4.2, 5.x, or 6.0 driver software. If you need instruction on installing Novell NetWare Server 6.5 driver software, proceed to Installing Novell NetWare Server 6.5 Driver Software.

Ensure that the server has the latest support pack available installed. The latest support packs can be found at: <http://support.novell.com/misc/patlst.htm>. You may want to create an archive disk by copying all the files from the CDRom\NetWare\Driver directory onto a floppy disk. If you choose to use the CDRom directly, ensure that the CDRom.NLM is loaded and that you are aware of the NetWare Volume name for the CD ROM that you just installed.

1. From the NetWare Server console, type LOAD NWCONFIG (or just NWCONFIG) and press Enter.
2. From the Configuration Options screen, select Driver options and press Enter.
3. Select the Configure network drivers option and press Enter.

-
4. Choose the Load an additional driver option and press Enter.
 5. Insert the CD or driver disk created using the Broadcom MakeDisk utility, and select the Install an unlisted driver option, by pressing Insert.
 6. If you are using the archive disk that you created, insert the disk into drive A: and press Enter. If you have the CD ROM mounted as a NetWare volume, press F3 and enter <Volume Name>: NetWare\Driver as the source path. Where <Volume Name> is the name of the NetWare Volume for the CD ROM and NetWare\Driver is the directory of the specific files on the CD ROM needed for this installation.
 7. The name of the driver displays.
 8. Press Enter to select the highlighted driver.
 9. A copy the driver prompt appears.
 10. Select Yes and press Enter.
 11. Select Yes and press Enter to copy the .LDI file. This is the installation script for the driver.
 12. Follow the instructions for the installation.
 13. Select Save parameters and load driver to continue.
 14. Choose Exit to return to the server console prompt.



If you are performing an initial installation of NetWare 4.2/5.x/6.0 and have more than two adapters installed, the install program will allow you to allocate the actual number of packet receive buffers needed by the adapter. During installation, the RxBuffers value should be set to 32, the minimum number of buffers the driver requires for each adapter. Although this setting affects adapter performance, it allows installation of the operating system and up to eight adapters during initial install. After installation is complete, you need to increase the number of buffers allocated to the driver.

15. After NetWare 5.x/6.0 has been successfully installed, set the minimum packet receive buffers parameter in the startup.ncf file to 1500 for each adapter in the system. Set the maximum packet receive buffers to three times the minimum packet receive buffers. Typically 4 MB of RAM is required per 1000 receive buffers.
16. In the autoexec.ncf file, delete the packet receive buffers parameter (RxBuffers=32) in the load statement for this adapter. Deleting the receive buffers phrase from the load statement resets the receive buffers parameter to the default value of 200 for this adapter.



The server must be restarted for the new configuration.

Example: The default maximum number of receive buffers for the system is 500; the default minimum is 128. Edit the startup.ncf file to have the following entries. The actual numbers will be a function of the number of ports in the system. The following is an example for a system with 8 ports installed:

```
set maximum packet receive buffers = 36000  
set minimum packet receive buffers = 12000
```

Installing Novell NetWare Server 6.5 Driver Software



The following instructions outline the installation of Novell NetWare Server 6.5 driver software. If you need instruction on installing Novell NetWare Server 4.2, 5.x, or 6.0 driver software, please proceed to Installing Novell NetWare Server 4.2/5.x/6.0 Driver Software.

Please ensure that the server has the latest support pack available installed. The latest support packs can be found at: <http://support.novell.com/misc/patlst.htm>. You may want to create an archive disk by copying all the files from the CDROM\NetWare\Driver directory onto a floppy disk. If you choose to use the CD-ROM directly, ensure that the CDROM.NLM is loaded and that you are aware of the NetWare Volume name for the CD ROM that you just installed.

1. From the NetWare Server console, type HDETECT and press Enter.
2. From Options, press Enter to accept Platform Support Module and HotPlug Support Module and continue detecting devices.
3. From Options, scroll down to select Modify and press Enter to change focus to detected devices.

-
4. Scroll down to Network boards and press Enter.
 5. From Additional Driver Options, scroll down to Modify and press Enter.
 6. Insert the CD or driver disk created using the Broadcom MakeDisk utility, and select the Add option, by pressing Insert.
 7. Select the Install an unlisted driver option, by pressing Insert.
 8. If you are using the archive disk that you created, insert the disk into drive A: and press Enter. If you have the CD ROM mounted as a NetWare volume, press F3 and enter <Volume Name>: NetWare\Driver as the source path. Where <Volume Name> is the name of the NetWare Volume for the CD-ROM and NetWare\Driver is the directory of the specific files on the CD-ROM needed for this installation.
 9. The name of the driver displays.
 10. Press Down Arrow or Tab to switch back to Additional Driver Options.
 11. Choose Return to driver summary and press Enter.
 12. Choose Continue in Options .
 13. Choose Continue from Protocol Options unless you want to configure and bind protocols before continuing. Installation is now complete.

Installing Solaris Driver Software

The driver for Solaris 8.0 is released in three formats:

1. BRCMbcme.pkg : Datastream format
2. BRCMbcme.tar.Z : Compressed and TAR file system format
3. bcmedu.img : Driver Update (DU) binary image which is used to create DU diskette.

Installing the Driver

1. Change directory to where BRCMbcme.pkg resides
2. pkgadd -d BRCMbcme.pkg

or

```
Copy BRCMbcme.tar.Z to /tmp
cd /tmp
uncompress BRCMbcme.tar.Z
tar xvf BRCMbcme.tar
pkgadd -d /tmp
```


-
3. Execute `prtconf` to determine instance number of the NIC.
 4. `ifconfig bcme[instance_number] plumb`
 5. `ifconfig bcme[instance_number] ip_address netmask....`

To make these changes permanent, follow these steps:

1. Use a text editor (e.g., `vi`) and create a file named `hostname.bcme[instance_number]` in the `/etc` directory. Add the IP address of the interface to this file, then save and exit.
2. Add a proper subnet mask to the file `/etc/netmasks`.

In Solaris 7.0 (Intel platform), the operating system only allocates 36 pages of 4K physically contiguous memory. The driver needs about 130K of physically contiguous memory per NIC. In order to use more than one NIC the O/S has to allocate more memory. This can be done by setting an O/S system variable "lomempages" in `/etc/system`. For instance, when 4 NICs are installed in a Solaris 7 system, the physically contiguous memory is calculated as follows:

4 NICs * 130K = 520 K ==> 130 pages of 4K is required.

Since this memory might be used by other driver in the system, 200 of 4K of memory is allocated. Add the following line in file /etc/system:

set lomempages=200

Installing the UNIX Driver Software: SCO OpenServer 5.0.7

Overview

This procedure describes the installation of the SCO OpenServer driver. This driver is released as a media image file containing the driver package. The media image file can be copied to the target machine directly for installation, or from an installation diskette that you can create.

Creating a Diskette

1. Copy the file VOL.000.000 to an SCO system.
2. Create a diskette using: `dd if=VOL.000.000 of=/dev/rfd0135ds18.`

Installing the Driver

1. Use custom or scoadmin software to install the SCO OpenServer driver from the media image or from the floppy created above.
2. After the package is installed, use netconfig to add the new network adapter.

-
3. After added, modify the hardware configuration in Advanced Options to change the Line Speed and Flow Control if desired. The settings for these properties are listed below:

Line Speed

- AutoNegotiate (default) (all speeds advertised)
- Fixed HalfDuplex10
- Auto HalfDuplex10 (only 10 Mbps half-duplex advertised)
- Fixed FullDuplex10
- Auto FullDuplex10 (only 10 Mbps full-duplex advertised)
- Fixed HalfDuplex100
- Auto HalfDuplex100 (only 100 Mbps half-duplex advertised)
- Fixed FullDuplex100
- Auto FullDuplex100 (only 100 Mbps full-duplex advertised)
- Auto HalfDuplex1000 (only 1000 Mbps half-duplex advertised)
- Fixed FullDuplex1000 (NOTE 1)
- Auto FullDuplex1000 (only 1000 Mbps full-duplex advertised)



1000 Mbps (1 Gbps) full-duplex fixed speed is only valid for fiber connections. For copper, twisted-pair connections, 1 Gbps can only be set through auto-negotiation with a 1 Gbps partner.

Flow Control

- Off
- AutoNegotiate (Symmetric Pause advertised) (NOTE 2) (default)
- RxPause
- TxPause
- RxPause/TxPause



-
1. Auto-negotiation of Flow Control is only valid when the Line Speed is set to AutoNegotiate (all speeds advertised or single speed advertised).
 2. A kernel relink and reboot is required before the new configuration will take effect.
-

Installing the UNIX Driver Software: UnixWare/OpenUnix 8

Overview

This procedure describes the installation procedure for the UnixWare driver. The driver is released as an installable package in datastream format.

Installing the Driver

1. Do the following to install the bcme package on the Unixware system:
 `pkgadd -d <install-path>`
 Where <install-path> is the full path name of the installable package `bcme-<version>.pkg`.
2. After the package is installed, use `netcfg` or `scoadmin network` to add the new network adapter.
3. When prompted, select the Line Speed and then select Advanced Option for Flow Control, MAC Address , and Jumbo MTU Size settings, if desired. The settings for these properties are listed below:

Line Speed

- Auto-Negotiate (default) (all speeds advertised)

-
- 10 Mbps Half-Duplex Fixed
 - 10 Mbps Half-Duplex Auto (only 10 Mbps half-duplex advertised)
 - 10 Mbps Full-Duplex Fixed
 - 10 Mbps Full-Duplex Auto (only 10 Mbps full-duplex advertised)
 - 100 Mbps Half-Duplex Fixed
 - 100 Mbps Half-Duplex Auto (only 100 Mbps half-duplex advertised)
 - 100 Mbps Full-Duplex Fixed
 - 100 Mbps Full-Duplex Auto (only 100 Mbps full-duplex advertised)
 - 1000 Mbps Half-Duplex Auto (only 1000 Mbps half-duplex advertised)
 - 1000 Mbps Full-Duplex Fixed (NOTE 1)
 - 1000 Mbps Full-Duplex Auto (only 1000 Mbps full-duplex advertised)



1000 Mbps (1 Gbps) full-duplex, fixed speed is only valid for fiber connections. For copper, twisted-pair connections, 1 Gbps can only be set through auto-negotiation with a 1 Gbps link partner.

Flow Control

- Disabled
- Auto Negotiation (Symmetric Pause advertised) (NOTE 2) (default)
- Receive Pause
- Transmit Pause
- Receive & Transmit Pause

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