

Reference Guide for the Model MA401 802.11b Wireless PC Card



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M1-MA401NA-2
November 2002

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Statement of Conditions

In the interest of improving internal design, operational function, and/or reliability, NETGEAR reserves the right to make changes to the products described in this document without notice.

NETGEAR does not assume any liability that may occur due to the use or application of the product(s) or circuit layout(s) described herein.

Certificate of the Manufacturer/Importer

It is hereby certified that the Model MA301 Wireless PCI Adapter has been suppressed in accordance with the conditions set out in the BMPT- AmtsblVfg 243/1991 and Vfg 46/1992. The operation of some equipment (for example, test transmitters) in accordance with the regulations may, however, be subject to certain restrictions. Please refer to the notes in the operating instructions.

Federal Office for Telecommunications Approvals has been notified of the placing of this equipment on the market and has been granted the right to test the series for compliance with the regulations.

VCCI Statement

This equipment is in the Class B category (information equipment to be used in a residential area or an adjacent area thereto) and conforms to the standards set by the Voluntary Control Council for Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in such residential areas.

When used near a radio or TV receiver, it may become the cause of radio interference. Read instructions for correct handling.



Federal Communications Commission (FCC) Compliance Notice: Radio Frequency Notice

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

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

NOTE: 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. 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: (1) Reorient or relocate the receiving antenna, (2) Increase the separation between the equipment and receiver, (3) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected, (4) Consult the dealer or an experienced radio/TV technician for help.

Federal Communications Commission (FCC) Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20 cm (8 inches) during normal operation.

EN 55 022 Statement

This is to certify that the Model MA301 Wireless PCI Adapter is shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC, Article 4a. Conformity is declared by the application of EN 55 022 Class B (CISPR 22).

Compliance is dependent upon the use of shielded data cables.

Canadian Department of Communications Radio Interference Regulations

This digital apparatus (Model MA301 Wireless PCI Adapter) does not exceed the Class B limits for radio-noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

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Preface

About This Reference Guide

Thank you for purchasing the NETGEAR™ MA401 802.11b Wireless PC Card.

The MA401 PC Card provides high-speed 11 Mbps access between your computer and other 802.11b compliant wireless devices.



Note: If you are unfamiliar with networking, routing, and wireless communications, refer to [Appendix B, “802.11b Wireless Networking Basics,”](#) to become more familiar with the terms and procedures used in this manual.

This reference manual assumes that the reader has basic to intermediate computer and Internet skills. However, basic computer network, Internet, and wireless technologies tutorial information is provided in the Appendices.

This guide uses the following typographical conventions:

<i>italics</i>	Book titles, commands, and directory names.
<code>courier font</code>	Screen text, user-typed command-line entries.
Initial Caps	Menu titles and window and button names.
[Enter]	Named keys in text are shown enclosed in square brackets. The notation [Enter] is used for the Enter key and the Return key.
[Ctrl]+C	Two or more keys that must be pressed simultaneously are shown in text linked with a plus (+) sign.
ALL CAPS	DOS file and directory names.

Chapter 1

Introduction

This chapter introduces the features, package contents, and appearance of the NETGEAR MA401 802.11b Wireless PC Card.

About the MA401 802.11b Wireless PC Card

The MA401 802.11b Wireless PC Card gives you ultimate mobility in your office or while you are traveling. It frees you from traditional Ethernet wiring and helps you create a wireless network for sharing your broadband cable or DSL Internet access among multiple PCs in and around your home. It is designed for notebook computers running Microsoft Windows. It is both 16-bit PCMCIA and 32-bit CardBus compatible and works in any available PCMCIA or CardBus slot.

Its auto-sensing capability allows packet transfer at 11Mbps for maximum throughput, or dynamic range shifting to the lower speeds due to distance or operating limitations in an environment with a lot of electromagnetic interference.

It provides reliable, standards-based 802.11b LAN connectivity that is protected with industry-standard security. It works with Windows® 95B, 98, ME, NT4, 2000, and XP operating systems.

Key Features and Related NETGEAR Products

The MA401 PC Card provides the following features:

- Reliable IEEE 802.11b standard-based wireless technology.
- Supports roaming between access points when configured in Infrastructure mode.
- 11Mbps high rate speed. Wireless nodes negotiate to operate in the optimal data transfer rate. In a noisy environment or when the distance between the wireless nodes is far, the wireless nodes automatically fall back to operate at the lower transfer rate of two or one Megabit per second.

- Highest level of data encryption using 128-bit Shared Key WEP data encryption method. Lower level of data encryption or no data encryption is available to simplify your network setup or to improve data transfer rate.

The following Netgear products can be configured to communicate with the MA401 PC Card.

- WAB102 Dual Band Access Point
- WAB501 Dual Band PC Card
- MA101 802.11b Wireless USB Adapter
- ME102 802.11b Wireless Access Point
- MA311 802.11b Wireless PCI Adapter
- MR314 802.11b Wireless Cable/DSL Router
- MA701 802.11b Wireless Compact Flash Card

What's in the Box?

The product package should contain the following items:



Figure 1-1: MA401 Package Contents

- MA401 802.11b Wireless PC Card
- Installation Guide for the Model MA401 802.11b Wireless PC Card
- *A Model MA401 Resource CD*, including:
 - Driver and Configuration Utility Software
 - Reference Guide for the Model MA401 802.11b Wireless PC Card in Adobe Acrobat PDF file format

- Reference Guide for the Model MA401 802.11b Wireless PC Card in HTML format
- Warranty Card
- Support Information Card

If any of the parts are incorrect, missing, or damaged, contact your NETGEAR dealer. Keep the carton, including the original packing materials, in case you need to return the product for repair.

The Model MA401 Wireless PC Card has two interfaces. The 16-bit PCMCIA Type II connector connects to any notebook PC with an available PCMCIA or CardBus slot. The wireless interface of the MA401 Wireless PC Card remains outside of the notebook PC chassis when the wireless PC card is inserted into a notebook. The green LED indicates the wireless link condition of the MA401 Wireless PC Card with another wireless node or the associated access point.

A Road Map for ‘How to Get There From Here’

The introduction and adoption of any new technology can be a difficult process. Wireless technology has removed one of the barriers to networking: running wires. It allows more people to try networking while at the same time exposes them to the inherent complexity of networking. General networking concepts, set up, and maintenance can be difficult to understand. In addition, wireless technology adds issues, such as range, interference, signal quality, and security to the picture.

To help overcome potential barriers to successfully using wireless networks, the table below identifies how to accomplish such things as connecting to a wireless network, assuring appropriate security measures are taken, browsing the Internet through your wireless connection, exchanging files with other computers and using printers in the combined wireless and wired network.

Table 1-1. A Road Map for How to Get There From Here ...

If I Want To ... ?	What Do I Do?	What's Needed?	How Do I?
Connect to a wireless network	1. Identify the wireless network name (SSID) and, if used the wireless security settings. 2. Set up the MA401 802.11b Wireless PC Card with the settings from step 1.	1. A wireless network 2. A notebook PC within the operating range of the wireless network. For guidelines about the range of 802.11b wireless networks, please see "Observe Location and Range Guidelines" on page 2-2.	To set up the MA401, see Chapter 2, "Installing the MA401 802.11b Wireless PC Card" and follow the instructions provided. To learn about wireless networking technology, please see Appendix B, "802.11b Wireless Networking Basics" for a general introduction.

Table 1-1. A Road Map for How to Get There From Here ...

If I Want To ... ?	What Do I Do?	What's Needed?	How Do I?
Protect my wireless connection from snooping, hacking, or information theft. Note: Secure Internet sites such as banks and online merchants use encryption security built into browsers like Internet Explorer and Netscape. Any wireless networking security features you might implement are in addition to those already in place on secure Internet sites.	1. Assure that the wireless network has security features enabled. 2. Configure my MA401 with the security settings of the wireless network. 3. Use Windows security features.	1. A wireless network with authentication and WEP encryption enabled. 2. Wireless networking equipment that supports WEP encryption, such as the MA401 and all Netgear wireless networking products.	To learn about wireless networking security, please see "Authentication and WEP Encryption" on page B-3. To use WEP security features, please see "Enabling Basic Wireless Security Features" on page 3-1 and configure your MA401 accordingly.

Table 1-1. A Road Map for How to Get There From Here ...

If I Want To ... ?	What Do I Do?	What's Needed?	How Do I?
Connect to the Internet over my wireless network.	1. Activate my wireless link and verify my network connection. 2. Open an Internet browser such as Internet Explorer or Netscape Navigator.	1. An active Internet connection like those from cable or DSL service providers. 2. A wireless network connected to the cable or DSL Internet service through a cable/DSL router as illustrated in "Using the MA401 to Connect to a Wireless Network Access Point in Infrastructure Mode" on page 2-4. 3. TCP/IP Internet networking software installed and configured on my notebook PC according to the requirements of the Internet service provider 4. A browser like Internet Explorer or Netscape Navigator.	To configure your MA401 in Infrastructure Mode, please see "Detailed Infrastructure Mode Setup Instructions for Various Version of Windows" on page 2-7, and locate the section for your version of Windows. To get assistance with configuring the TCP/IP Internet software on a PC, please see Appendix C, "Preparing Your PCs for Network Access"

Table 1-1. A Road Map for How to Get There From Here ...

If I Want To ... ?	What Do I Do?	What's Needed?	How Do I?
Exchange files between my wirelessly connected notebook computer and other computers in a combined wireless and wired network.	1. Use the Windows Network Neighborhood feature to browser for computers in the combined wireless and wired network. 2. Browse the hard drive of the target computer in the network in order to locate the directory or files you want to work with. 3. Use the Windows Explorer copy and paste functions to exchange files between the computers.	1. The notebook computer I am using to connect to the wireless network needs to be configured with the Windows Client and File and Print Sharing. 2. The notebook computer I am using to connect to the wireless network needs to be configured with the same Windows Workgroup or Domain settings as the other Windows computers in the combined wireless and wired network. 3. Any Windows networking security access rights such as login user name/ password that have been assigned in the Windows network or for sharing particular files must be provided when Windows prompts for such information. 4. If so-called Windows 'peer' Workgroup networking is being used, the drive, file system directory, or file need to be enabled for sharing.	To get assistance Windows networking software, please see Appendix C, "Preparing Your PCs for Network Access" for typical configuration scenarios or refer to the Help system included with your version of Windows. Windows Domain settings are usually managed by corporate computer support groups. Windows Workgroup settings are commonly managed by individuals who want to set up small networks in their homes, or small offices. To get assistance with setting up Windows networking, refer to the Help and Support information that comes with the version of the Windows operating systems you are using.

Table 1-1. A Road Map for How to Get There From Here ...

If I Want To ... ?	What Do I Do?	What's Needed?	How Do I?
Use printers in a combined wireless and wired network.	1. Use the Windows Printers and Fax features to locate available printers in the combined wireless and wired network. 2. Use the Windows Add a Printer wizard to add access a network printer from the notebook PC you are using to wirelessly connect to the network. 3. From the File menu of an application such as Microsoft Word, use the Print Setup feature to direct your print output to the printer in the network.	1. The notebook computer I am using to connect to the wireless network needs to be configured with the Windows Client and File and Print Sharing. 2. The notebook computer I am using to connect to the wireless network needs to be configured with the same Windows Workgroup or Domain settings as the other Windows computers in the combined wireless and wired network. 3. Any Windows networking security access rights such as login user name/ password that have been assigned in the Windows network must be provided when Windows prompts for such information. 4. If so-called Windows 'peer' networking is being used, the printer needs to be enabled for sharing.	Windows Domain settings are usually managed by corporate computer support groups. Windows Workgroup settings are commonly managed by individuals who want to set up small networks in their homes, or small offices. To get assistance with setting up Windows networking, refer to the Help and Support information that comes with the version of the Windows operating systems you are using. To get assistance with setting up printers in Windows, refer to the Help and Support information that comes with the version of the Windows operating systems you are using.

Chapter 2

Installing the MA401 802.11b Wireless PC Card

This chapter describes how to set up your MA401 802.11b Wireless PC Card for wireless connectivity on your Wireless Local Area Network (WLAN).



Note: Computers can connect over 802.11b wireless networks at a range of several hundred feet indoors. With this distance, and because walls do not always block wireless signals, others outside your immediate area could access your network. Therefore, it is important to take appropriate steps to secure your network from unauthorized access. The MA401 802.11b Wireless PC Card provides highly effective security features which are covered in [“Enabling Basic Wireless Security Features” on page 3-1](#). Netgear strongly recommends you deploy the security features appropriate to your needs.

What You Will Need Before You Begin

You need to verify your computer meets the minimum system requirements and identify the wireless network configuration settings of the WLAN where you will connect before you can configure your wireless pc card and connect.

Verify System Requirements

Before installing the MA401 802.11b Wireless PC Card, please make sure that these minimum requirements have been met:

- You must have a Pentium Class notebook computer with an available PCMCIA or Cardbus slot.
- A CD-ROM drive.
- 5 Mbytes of free hard disk space.
- Some versions of Windows may ask for the original Windows operating system installation files to complete the installation of the MA401 driver software.

Observe Location and Range Guidelines

Computers can connect over 802.11b wireless networks indoors at a maximum range of approximately 500 feet. However, the operating distance or range of your wireless connection can vary significantly based on the physical location of the computer with the MA401 802.11b Wireless PC Card. For best results, avoid potential sources of interference, such as:

- Large metal surfaces
- Microwaves
- 2.5 GHz Cordless phones

In general, 802.11b wireless devices can communicate through walls. However, if the walls are constructed with concrete, or have metal, or metal mesh, the 802.11b wireless network effective range will decrease if such materials are between the devices.

Two Basic Operating Modes

The MA401 PC Card, like all 802.11b adapters, can operate in the following two basic modes:

- **Infrastructure Mode:** An 802.11 networking framework in which devices and computers communicate with each other by first going through an Access Point (AP).

For example, this mode is used when computers in a house connect to an Access Point that is attached to a router which lets multiple computers share a single Cable or DSL broadband Internet connection.

- **Ad-Hoc Mode:** An 802.11 networking framework in which devices or computers communicate directly with each other, without the use of an access point (AP).

For example, Ad-Hoc Mode is used when two Windows computers are configured with file and print sharing enabled and you want to exchange files directly between them.

Both of these configuration options are available with the MA401 PC Card.

MA401 Default Wireless Configuration Settings

If this is a new wireless network installation, use the factory default settings to set up the network and verify wireless connectivity. If this is an addition to an existing wireless network, you will need to identify the wireless configuration and security parameters already defined.

Note: All NETGEAR, Inc. 802.11b wireless access products use the same factory settings as the MA401 and will work without any configuration changes.

Your MA401 802.11b Wireless PC Card factory default basic settings are:

- **SSID: Wireless**
Note: In order for the MA401 PC Card to communicate with a wireless access point or wireless adapter, all devices must be configured with the same SSID.
- **Mode (Infrastructure or Ad Hoc): Infrastructure**

Using the MA401 to Connect to a Wireless Network Access Point in Infrastructure Mode

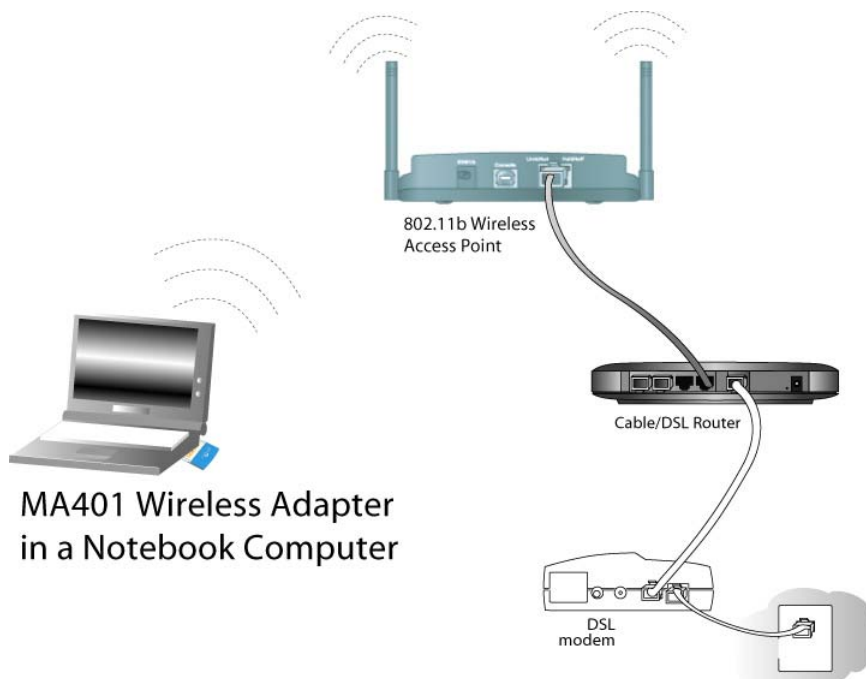


Figure 2-1: NETGEAR MA401 Wireless PC Card in Infrastructure Mode

This section provides instructions for setting up the MA401 802.11b Wireless PC Card. The procedures below include the following:

- **A Simplified Quick Installation Procedure**
Use this method if you are an experienced computer user who does not need detailed instructions for every step in the process.
- **Thorough Step-by-step Installation Instructions for Each Version of Windows**
If you have limited to moderate computer experience, use the procedure that corresponds to the version of Windows you are using.

For Experienced Computer Users Installing a MA401 to Operate In Infrastructure Mode



Note: If an earlier version of the Netgear MA401 Wireless PC Card was previously installed on your notebook, you must remove the old driver and utilities before you can install the new PC Card and software.

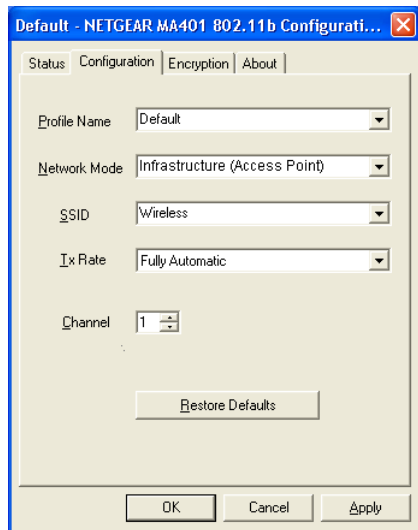
1. **Insert the MA401 PC Card into your computer.**
 - a. Power on your notebook and let the operating system boot up completely.
 - b. Locate an available PCMCIA or CardBus slot on the side of your notebook. If your notebook computer has two PCMCIA or CardBus slots, the MA401 wireless PC Card can be inserted into either slot.
 - c. Hold the PC Card with the Netgear logo facing up and insert it into the PC card slot.
2. **Install the MA401 driver and configuration utility software.**
 - a. Insert the *Model MA401 Resource CD* into your CD-ROM drive.
 - b. Follow the Windows prompts to complete the installation of the MA401 software.
For Windows 2000, click Yes to continue at the Digital Signature Not Found warning. Netgear has tested the MA401 to assure that it is compatible with Windows 2000.

When the installation is complete, you will see the icon below in the Windows System Tray.



3. **Configure your wireless adapter.**

- a. Click on the SysTray icon and select Advanced Configuration to launch the configuration utility



- b. The MA401 default settings are as follows:

- SSID: **Wireless**
- Mode (Infrastructure or Ad Hoc): **Infrastructure**
- WEP encryption not enabled.

- c. If your WLAN settings are different from the Netgear default settings, run the wireless LAN configuration utility you just installed and make whatever configuration changes are needed.

4. **Verify wireless connectivity to your network.**

Verify connectivity by using a browser such as Netscape or Internet Explorer to connect to the Internet, or check for file and printer access on your network.

Note: If you cannot connect, please see the [“Troubleshooting Tips” on page 2-29](#). Also, for problems with accessing network resources, the Windows Client and File and Print Sharing software might not be installed and configured properly on your computers. Please refer to [“Preparing Your PCs for Network Access” on page C-1](#).

Detailed Infrastructure Mode Setup Instructions for Various Version of Windows

If you have limited to moderate computer experience, use the procedure below that corresponds to the version of Windows you are using.

For Windows XP Users Installing a MA401



Note: If an earlier version of the Netgear MA401 Wireless PC Card was previously installed on your notebook, you must remove the old driver and utilities before you can install the new PC Card and software.

1

Insert the MA401 PC Card into your computer.

- a. Power on your notebook and let the operating system boot up completely.
- b. Insert the *Model MA401 Resource CD* into your CD-ROM drive.
- c. Locate an available PCMCIA or CardBus slot on the side of your notebook. If your notebook computer has two PCMCIA or CardBus slots, the MA401 wireless PC Card can be inserted into either slot.
- d. Hold the PC Card with the Netgear logo facing up and insert it into the PC card slot.

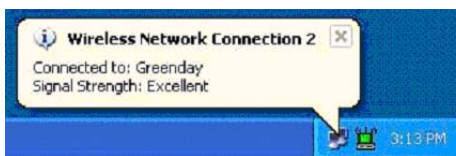
2

Install the MA401 driver and configuration utility software.

- a. After inserting the MA401, the Found New Hardware Wizard is displayed. Select **Install the software automatically (Recommended)** click **Next**.
- b. Windows XP looks into the CD-ROM for the necessary software to be installed. The wizard will automatically install both the driver and the configuration utility onto the hard drive.
- c. After the installation completes, click **Finish** to close the wizard.
- d. After installing the MA401, Windows XP will display a "Wireless Network Connection #" message.
- e. Click on the **X** to close this message.
- f. You should see the MA401 system tray icon on the right in the lower right portion of the Windows task bar.



Windows XP Found New Hardware Wizard



Windows XP Wireless Network Connection Alert

Note: The Netgear and Windows XP utilities let you set up your MA401. The Netgear installation utility defaults to turning off the Windows XP utilities. You cannot use both at the same time. The Netgear screens are presented in step 3 below.



MA401 LAN Configuration Utility System Tray Icon

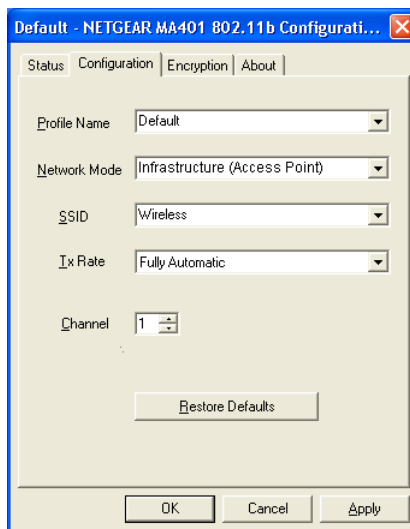
3

Configure your wireless adapter.

a. The MA401 default settings are as follows:

- SSID: **Wireless**
- Mode (Infrastructure or Ad Hoc): **Infrastructure**
- WEP encryption not enabled.

b. Click on the System Tray icon to run the wireless LAN configuration utility to verify or change your settings as needed



MA401 Configuration Utility

Note: If your WLAN settings are different from the Netgear default settings, you will not get a connection. Configure your MA401 accordingly.

4

Verify wireless connectivity to your network.

The MA401 has an LED labeled LINK that indicates the wireless link condition of the station. Solid green indicates a good connection. Blinking indicates attempting to connect. Off indicates the card is turned off or not fully plugged in.

Verify connectivity by accessing the Internet or network resources.

Note: If you cannot connect, please see the [“Troubleshooting Tips” on page 2-29](#). Also, for problems with accessing network resources, the Windows Client and File and Print Sharing software might not be installed and configured properly on your computers. Please refer to [“Preparing Your PCs for Network Access” on page C-1](#).

For Windows 98/ME Users Installing a MA401



Note: If an earlier version of the Netgear MA401 Wireless PC Card was previously installed on your notebook, you must remove the old driver and utilities before you can install the new PC Card and software.

1

Insert the MA401 PC Card into your computer.

- a. Power on your notebook and let the operating system boot up completely.
- b. Have the Windows 98 or ME operating system installation files handy. Windows 98/ME needs these files to complete the creating and installation of new network adapter hardware drivers.
- c. Insert the *Model MA401 Resource CD* into your CD-ROM drive.
- d. Locate an available PCMCIA or CardBus slot on the side of your notebook. If your notebook computer has two PCMCIA or CardBus slots, the MA401 wireless PC Card can be inserted into either slot.
- e. Hold the PC Card with the Netgear logo facing up and insert it into the PC card slot.

2

Install the MA401 driver and configuration utility software.

- a. After inserting the MA401 PC card, the Windows 98/ME Add New Hardware Wizard dialog box is displayed. Click **Next**, select **Search for the best driver for your device (Recommended)** and click **Next** again.
- b. Windows 98/ME prompts for the location of the driver software. Click the CD-ROM drive box and click **Next** to proceed. The wizard will install both the driver and the configuration utility. If Windows requests the Windows operating system files, insert the Windows 98/ME CD and follow the prompts to proceed.
- c. After the installation completes, click **Finish** to close the wizard.
- d. Click **Yes** when asked if you want to reboot the system.
- e. You should now see the Windows system tray icon on the right in the lower right portion of the Windows task bar.



Windows 98/ME Add Hardware Wizard



MA401 LAN Configuration Utility System Tray Icon

3

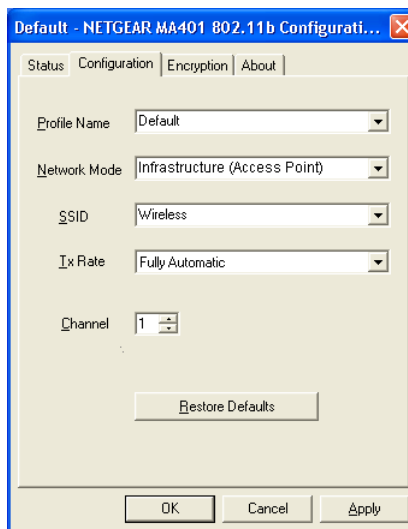
Configure your wireless adapter.

a. The MA401 default settings are as follows:

- SSID: **Wireless**
- Mode (Infrastructure or Ad Hoc): **Infrastructure**
- WEP encryption not enabled.

b. Click on the System Tray icon to run the wireless LAN configuration utility you just installed to verify your settings and make whatever configuration changes may be needed

Note: If your WLAN settings are different from the Netgear default settings, you will not get a connection. Configure your MA401 accordingly.



MA401 Configuration Utility

4

Verify wireless connectivity to your network.

The MA401 has an LED labeled LINK that indicates the wireless link condition of the station. Solid green indicates a good connection. Blinking indicates attempting to connect. Off indicates the card is turned off or not fully plugged in.

Verify connectivity by accessing the Internet or network resources.

Note: If you cannot connect, please see the [“Troubleshooting Tips” on page 2-29](#). Also, for problems with accessing network resources, the Windows Client and File and Print Sharing software might not be installed and configured properly on your computers. Please refer to [“Preparing Your PCs for Network Access” on page C-1](#).

For Windows 2000 Users Installing a MA401



Note: If an earlier version of the Netgear MA401 Wireless PC Card was previously installed on your notebook, you must remove the old driver and utilities before you can install the new PC Card and software.

1

Insert the MA401 PC Card into your computer.

- a. Power on your notebook and let the operating system boot up completely.
- b. Have the Windows 2000 operating system installation files handy. Windows 2000 needs these files to complete the creating and installation of new network adapter hardware drivers.
- c. Insert the *Model MA401 Resource CD* into your CD-ROM drive.

Note: You may need to be logged on to Windows 2000 with administrator rights to complete the installation of new hardware to your PC.
- d. Locate an available PCMCIA or CardBus slot on the side of your notebook. If your notebook computer has two PCMCIA or CardBus slots, the MA401 wireless PC Card can be inserted into either slot.
- e. Hold the PC Card with the Netgear logo facing up and insert it into the PC card slot.

2

Install the MA401 driver and configuration utility software.

- a. After inserting the MA401, the Windows Found New Hardware Wizard dialog box is displayed. Click **Next**, select **Search for the best driver for your device (Recommended)** and then click **Next** again.
- b. When Windows 2000 prompts for the location of the driver software, select the CD-ROM drive. Clicking **Next** to proceed.
- c. If Windows 2000 warns about a Digital Signature Not Found, click **Yes** to continue. Netgear has tested the MA401 to assure that it is compatible with Windows 2000. If Windows requests the Windows operating system files, insert the Windows 2000 CD and follow the prompts to proceed.
- d. Click **Finish** to close the wizard. Click **Yes** to reboot the system.
- e. You should now see the Windows system tray icon in the Windows task bar.



Windows 2000 Found New Hardware Wizard



MA401 LAN Configuration Utility System Tray Icon

3

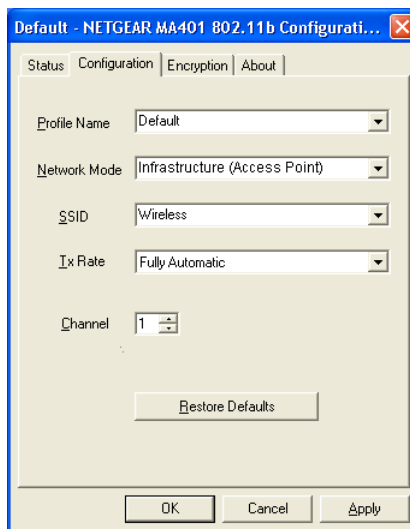
Configure your wireless adapter.

a. The MA401 default settings are as follows:

- SSID: **Wireless**
- Mode (Infrastructure or Ad Hoc): **Infrastructure**
- WEP encryption not enabled.

b. Click on the System Tray icon to run the wireless LAN configuration utility you just installed to verify your settings and make whatever configuration changes may be needed

Note: If your WLAN settings are different from the Netgear default settings, you will not get a connection. Configure your MA401 accordingly.



MA401 Configuration Utility

4

Verify wireless connectivity to your network.

The MA401 has an LED labeled LINK that indicates the wireless link condition of the station. Solid green indicates a good connection. Blinking indicates attempting to connect. Off indicates the card is turned off or not fully plugged in.

Verify connectivity by accessing the Internet or network resources.

Note: If you cannot connect, please see the [“Troubleshooting Tips” on page 2-29](#). Also, for problems with accessing network resources, the Windows Client and File and Print Sharing software might not be installed and configured properly on your computers. Please refer to [“Preparing Your PCs for Network Access” on page C-1](#).

For Windows 95B Users Installing a MA401



Note: If an earlier version of the Netgear MA401 Wireless PC Card was previously installed on your notebook, you must remove the old driver and utilities before you can install the new PC Card and software.

1

Insert the MA401 PC Card into your computer.

- a. Power on your notebook and let the operating system boot up completely.
- b. Have the Windows 95 version B operating system installation files handy. Windows 95 needs these files to complete the creating and installation of new network adapter hardware drivers.

Note: The MA401 driver supports Windows 95/B and above. Windows 95 and Windows 95A are not supported.
- c. Insert the *Model MA401 Resource CD* into your CD-ROM drive.
- d. Locate an available PCMCIA or CardBus slot on the side of your notebook. If your notebook computer has two PCMCIA or CardBus slots, the MA401 wireless PC Card can be inserted into either slot.
- e. Hold the PC Card with the Netgear logo facing up and insert it into the PC card slot.

2

Install the MA401 driver and configuration utility software.

- a. After inserting the MA401 PC card, the Windows 95 Add New Hardware Wizard is displayed. Click **Next**, select **Search for the best driver for your device (Recommended)** and click **Next** again.
- b. Windows 95B prompts for the location of the driver software. Click the CD-ROM drive box and follow the prompts, clicking **Next** to proceed. The wizard will automatically install both the driver and the configuration utility. If Windows requests the Windows operating system files, insert the Windows 95B CD and follow the prompts to proceed.
- c. After the installation completes, click **Finish** to close the wizard.
- d. Click **Yes** when asked if you want to reboot the system.
- e. You should now see the Windows system tray icon on the right in the lower right portion of the Windows task bar.



Windows 95B Add Hardware Wizard



MA401 LAN Configuration Utility
System Tray Icon

3

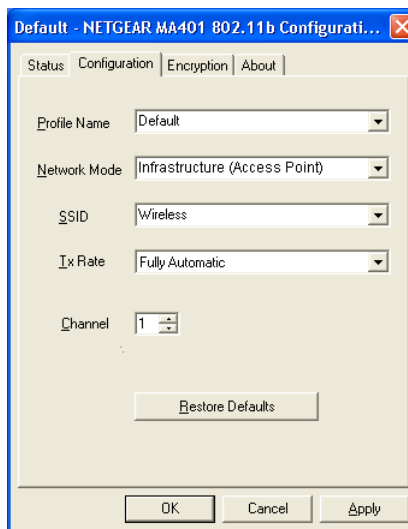
Configure your wireless adapter.

a. The MA401 default settings are as follows:

- SSID: **Wireless**
- Mode (Infrastructure or Ad Hoc): **Infrastructure**
- WEP encryption not enabled.

b. Click on the System Tray icon to run the wireless LAN configuration utility you just installed to verify your settings and make whatever configuration changes may be needed

Note: If your WLAN settings are different from the Netgear default settings, you will not get a connection. Configure your MA401 accordingly.



MA401 Configuration Utility

4

Verify wireless connectivity to your network.

The MA401 has an LED labeled LINK that indicates the wireless link condition of the station. Solid green indicates a good connection. Blinking indicates attempting to connect. Off indicates the card is turned off or not fully plugged in.

Verify connectivity by accessing the Internet or network resources.

Note: If you cannot connect, please see the [“Troubleshooting Tips” on page 2-29](#). Also, for problems with accessing network resources, the Windows Client and File and Print Sharing software might not be installed and configured properly on your computers. Please refer to [“Preparing Your PCs for Network Access” on page C-1](#).

For Windows NT4 Users Installing a MA401



Note: If an earlier version of the Netgear MA401 Wireless PC Card was previously installed on your notebook, you must remove the old driver and utilities before you can install the new PC Card and software.

1

Insert the MA401 PC Card into your computer.

Note: Windows NT4 is not a plug-and-play operating system and does not automatically detect and prompt you for installation of the PC Card driver. The driver installation has to be initiated manually.

- a. Power on your notebook and let the operating system boot up completely.
- b. Have the Windows NT4 operating system installation files handy. Windows NT needs these files to complete installation of new network adapter hardware drivers.

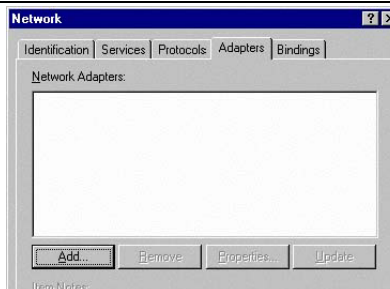
Note: You may need to be logged on to NT4 with administrator rights to complete the installation of new hardware to your PC.

- c. Insert the *Model MA401 Resource CD* into your CD-ROM drive.
- d. Locate an available PCMCIA or CardBus slot on the side of your notebook. If your notebook computer has two PCMCIA or CardBus slots, the MA401 wireless PC Card can be inserted into either slot.
- e. Hold the PC Card with the Netgear logo facing up and insert it into the PC card slot.

2

Install the MA401 driver and configuration utility software.

- a. From the Windows NT desktop, click Start => Settings => Control Panel.
- b. Double-click on the **Network** icon to display the screen at the right.
- c. Click on the **Adapter** tab and click **Add**. You will see the screen at the right.
- d. Click Have Disk, and when prompted, type in **x:\winnt** as the path to the *Model MA401 Resource CD* where **x** is the drive letter of the CD-ROM drive in your PC. Click **OK** to proceed.
- e. The Select OEM Option window seen at the right opens listing the drivers from which to choose. Select **NETGEAR MA401 Wireless PC Card** and click **OK**.



Windows NT4 Add Network Adapter Tab Page



Windows NT4 Select OEM Page

2

Install the MA401 driver and configuration utility software, continued.

- f. The Resources and Properties window opens. Refer to the Wireless parameter configuration chapter and modify any entry if necessary. Click on **OK**.
- g. The system returns back to the Network window. Click on **Close**.
- h. If TCP/IP is enabled, the system will prompt you for an IP address or use DHCP. Answer accordingly.
- i. When prompted, click **Yes** to reboot the system.

You should now see the Windows system tray icon on the right in the lower right portion of the Windows task bar.

Note: The I/O Address and IRQ settings should be unique and not conflict with any other device settings in you system. If there is a system resource conflict, please check Windows NT Diagnostics and find a free I/O address and IRQ.



MA401 LAN Configuration Utility
System Tray Icon

3

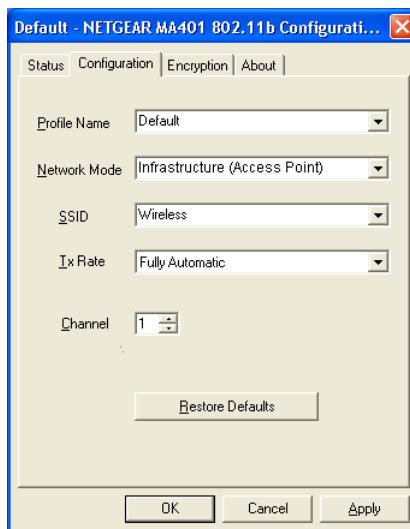
Configure your wireless adapter.

a. The MA401 default settings are as follows:

- SSID: **Wireless**
- Mode (Infrastructure or Ad Hoc): **Infrastructure**
- WEP encryption not enabled.

b. Click on the System Tray icon to run the wireless LAN configuration utility you just installed to verify your settings and make whatever configuration changes may be needed

Note: If your WLAN settings are different from the Netgear default settings, you will not get a connection. Configure your MA401 accordingly.



MA401 Configuration Utility

4

Verify wireless connectivity to your network.

The MA401 has an LED labeled LINK that indicates the wireless link condition of the station. Solid green indicates a good connection. Blinking indicates attempting to connect. Off indicates the card is turned off or not fully plugged in.

Verify connectivity by accessing the Internet or network resources.

Note: If you cannot connect, please see the [“Troubleshooting Tips” on page 2-29](#). Also, for problems with accessing network resources, the Windows Client and File and Print Sharing software might not be installed and configured properly on your computers. Please refer to [“Preparing Your PCs for Network Access” on page C-1](#).

Using the MA401 to Connect in Ad-Hoc Mode

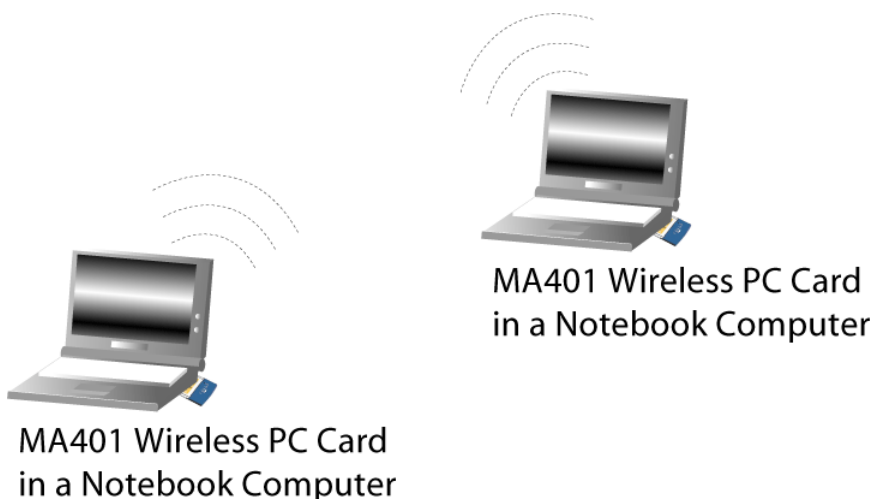


Figure 2-2: NETGEAR MA401 Wireless PC Card in Ad-Hoc Mode

Ad-Hoc Mode is an 802.11 networking framework in which devices or computers communicate directly with each other, without the use of an access point (AP). For example, Ad-Hoc Mode is used when two Windows computers are configured with file and print sharing enabled and you want to exchange files directly between them. This section provides instructions for setting up the MA401 802.11b Wireless PC Card in Ad-Hoc mode.

Installing a MA401 to Operate in Ad-Hoc Mode



Note: If an earlier version of the Netgear MA401 Wireless PC Card was previously installed on your notebook, you must remove the old driver and utilities before you can install the new PC Card and software.

1

Insert the MA401 PC Card into your computer.

- a. Power on your notebook and let the operating system boot up completely.
- b. Insert the *Model MA401 Resource CD* into your CD-ROM drive.
- c. Locate an available PCMCIA or CardBus slot on the side of your notebook. If your notebook computer has two PCMCIA or CardBus slots, the MA401 wireless PC Card can be inserted into either slot.
- d. Hold the PC Card with the Netgear logo facing up and insert it into the PC card slot.

2

Install the MA401 driver and configuration utility software.

- a. Follow the installation instructions for your version of windows found on the previous pages
- b. If prompted, click **Yes** to reboot the system.
- c. You should now see the Windows system tray icon on the right in the lower right portion of the Windows task bar.

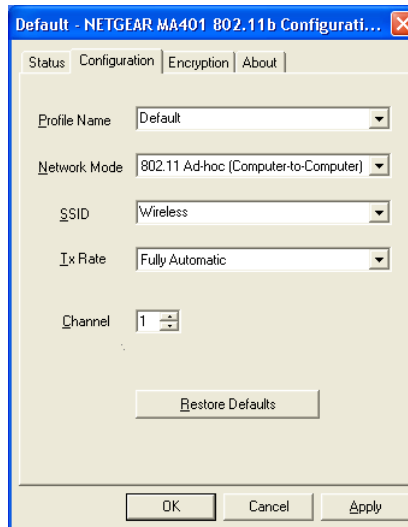


MA401 LAN Configuration Utility
System Tray Icon

3

Configure your wireless adapter.

- a. Click on the System Tray icon to run the wireless LAN configuration utility you just installed to verify your settings and make whatever configuration changes may be needed.
- b. Set the MA401 as follows:
 - SSID: **Wireless**
 - Mode (Infrastructure or Ad Hoc): **Ad-Hoc**
 - WEP encryption: assure that both computers are configured with the same WEP parameters, if enabled.
- c. If you want to connect to a computer-to-computer (ad hoc) network and both computer-to-computer and access point (infrastructure) networks are within range of your computer, then select **Computer-to-computer (ad hoc) networks only**.



MA401 Configuration Utility

4

Verify wireless connectivity between the computers.

The MA401 has an LED labeled LINK that indicates the wireless link condition of the station. Solid green indicates a good connection. Blinking indicates attempting to connect. Off indicates the card is turned off or not fully plugged in.

Verify connectivity by accessing resources on either computer.

Note: If you cannot connect, please see the [“Troubleshooting Tips” on page 2-29](#). Also, the Windows File and Print Sharing Client might not be installed and configured properly on both computer. Please refer to [“Preparing Your PCs for Network Access” on page C-1](#).

MA401 Wireless Connection Indicators

The MA401 802.11b Wireless PC Card provides the following two indicators which give you feedback on the status of your wireless connection:

- The green LED on the MA401 802.11b Wireless PC Card indicates the wireless link condition of the MA401 Wireless PC Card with another wireless node or associated access point.
- The SysTray icon is on the System Tray portion of the taskbar in the Microsoft Windows desktop. The color of this icon indicates the status of the wireless connection.

Interpreting the LED on the MA401



- If the LED is on, the card is plugged in to the notebook PC.
- If the LED is on and is a steady green, the MA401 has a connection with an access point or another 802.11b device.
- If the LED is blinking, the MA401 is trying to establish a connection but is unable to do so.

If the LED is blinking, check the following:

- If your Wireless Radio setting in the SysTray popup menu is turned off
- If your configuration matches the wireless network settings
- Try moving to a different location where the wireless signal quality is better

Interpreting System Tray Icon Colors

The SysTray (System Tray) resides on one end of the taskbar in the Microsoft Windows desktop. The wireless LAN configuration utility installation for the MA401 Wireless PC Card adds a configuration and status reporting utility icon in the SysTray.



Color	Condition	Description
Red	The wireless PC Card has no connection to any other wireless node.	The wireless PC Card is not able to link to any Access Point or the link between the wireless PC Card and the access point is lost. Check your configuration or try moving to a location where the wireless signal quality is better.
Yellow	The wireless PC Card has a connection with another wireless node.	The link condition between the wireless PC Card and the associated access point is weak. Try moving to another location where the wireless signal quality is better, such as closer to the wireless access point. Also, look for any possible sources of interference such as a 2.5GHZ cordless phone or a large metal surface.
Green	The wireless PC Card has a connection with another wireless node.	The wireless PC Card has established good communication with an access point and the signal quality is strong.

Troubleshooting Tips

If you have problems getting wirelessly connected to your network, try the tips below.

Symptom	Cause	Solution
The LED on the PC Card is off	The wireless PC card is not inserted into the slot properly or the proper wireless MA401 PC Card software is not loaded.	• Remove and reinsert the wireless PC Card. • Check the device manager in Windows to see if the PC Card is properly recognized in the Windows operating system. Reload the driver if necessary. • Try to install the MA401 in a different PCMCIA slot on your system if one is available.
The LED is blinking repeatedly.	The wireless PC Card is attempting to connect to access point but cannot connect.	• The access point may not be powered on. • The access point and the PC card are not configured with the same wireless parameters. Check the SSID and WEP settings.
I am associated with an Access Point, but I cannot see the other computers on the Ethernet side of the network.	This could be a physical layer problem or a network configuration problem.	• Check to make sure that the Access Point is physically connected to the Ethernet network. • Make sure that the IP addresses and the Windows networking parameters are all configured correctly. Please refer to “Preparing Your PCs for Network Access” on page C-1

Chapter 3

Protecting Your Wireless Connection

The absence of a physical connection between nodes makes wireless links vulnerable to information theft. This chapter describes how to use the basic security features of the MA401 802.11b Wireless PC Card to protect your connection.

Enabling Basic Wireless Security Features

There are several ways you can strengthen the security of your wireless connection.

- Enable Wired Equivalent Privacy (WEP) encryption of the wireless data communications.
- Change the factory default SSID setting of the MA401 802.11b Wireless PC Card.

In addition to the MA401 wireless security features, you should also configure appropriate LAN network security features such as requiring a user name and password to access the shared resources in your network.

Netgear strongly recommends that, at a minimum, you configure your wireless network to use an SSID other than the default setting. The procedures below identify how to change the SSID and WEP encryption settings of your MA401 802.11b Wireless PC Card.

Identifying the Wireless Network Name (SSID) and WEP Security Settings

1. For a new wireless network, print this form, fill in the configuration parameters and put it in a safe place for possible future reference.

For an existing wireless network, print this form and fill in the configuration parameters. The person who set up or is responsible for the network will be able to provide this information.

- **Wireless Network Name (SSID):** The Service Set Identification (SSID) identifies the wireless local area network. **Wireless** is the default MA401 SSID. However, you may customize it by using up to 32 alphanumeric characters. Netgear recommends that you write your customized SSID on the line below.

Note: The SSID in the wireless Access Point is the SSID you configure in the wireless pc card. For the access point and wireless nodes to communicate with each other, all must be configured with the same SSID.

Wireless network name (SSID): _____

- **WEP Security Encryption key:** The default WEP encryption key number is 1, and the default key size is 64 bits.

Note: The key number as well as the key value used by both the Wireless Access Point and wireless nodes must be the same. If they are different, you will not be able to connect.

WEP Encryption Key Size, circle one: 64 or 128 bits

WEP Encryption Passphrase, if used: _____

A Passphrase is used to automatically generate the WEP hexadecimal numbers for the key. If the wireless network Access Point uses a Passphrase, you can also use that here. Otherwise, you will have to manually enter the hexadecimal numbers.

WEP Hexadecimal Numbers: _____

The WEP Hexadecimal Numbers are needed if a Passphrase is not used in the wireless network Access Point but rather if the key is manually entered.

2. Use the procedures below to configure basic security settings in the MA401.

Setting the Wireless Network Name (SSID)

The MA401 PC Card allows you to restrict access to your wireless communications based on the SSID and WEP keywords. These settings must match the settings of the wireless Access Point. Follow the steps below to perform this procedure.

1. Run the Config Utility and select the Configuration tab page.

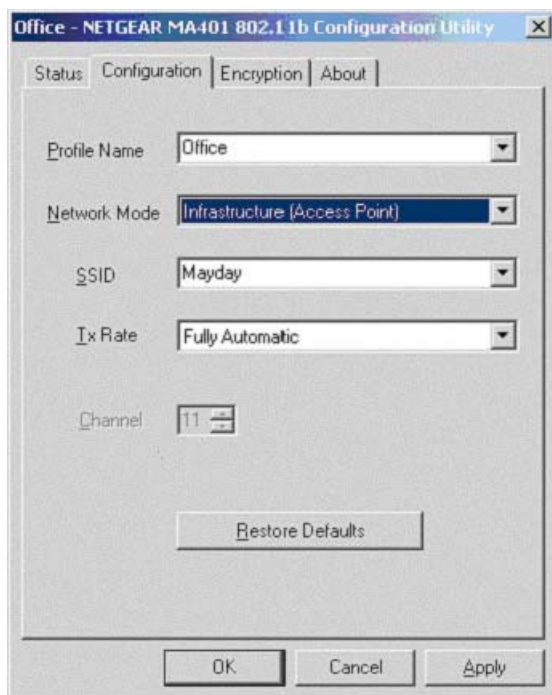


Figure 3-1: Changing the SSID

2. To change the SSID, enter a new SSID.
Note: The characters are case sensitive.
3. Click Apply or OK for the changes to take effect.

Configuring WEP Encryption Security

The MA401 PC Card allows you to restrict access to your wireless network based on WEP keywords. Following the steps below to perform this procedure.

1. Run the Config Utility and select the Encryption tab page.

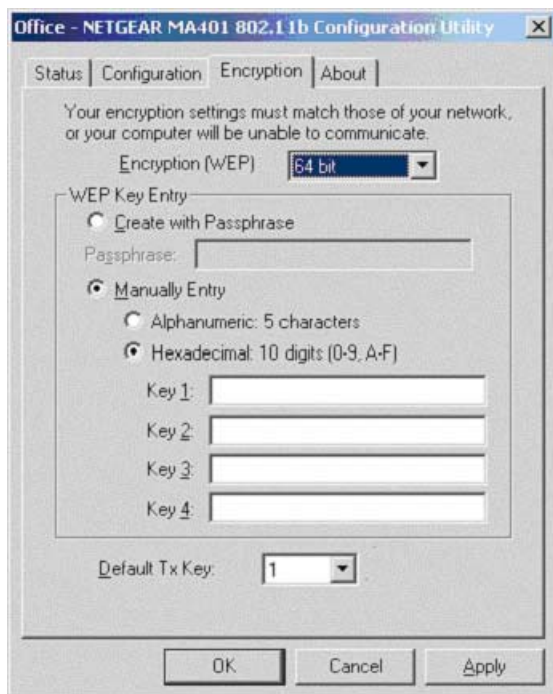


Figure 3-2: Configuring WEP Encryption

2. Select the WEP encryption strength you will use. The choices are:

- 64-bit WEP data encryption
- 128-bit WEP data encryption

Note: A larger encryption key requires more processing to encode/decode the messages. Larger encryption key lengths may slow the communications process response times.

3. Check the Create with Passphrase radio button and enter the passphrase from the configuration worksheet you filled out in the procedure above. When you click the Apply button, the configuration manager utility will automatically generate the WEP keys.

Note: The characters are case sensitive. Be sure to use the same passphrase when configuring the other wireless devices that will communicate with this wireless pc card.

4. Click Apply then OK for the changes to take effect.

Appendix A

Technical Specifications

This appendix provides technical specifications for the MA401 802.11b Wireless PC Card.

Antennae	2 Integrated internal diversity antennae
Radio Data Rate	1, 2, 5.5, 11Mbps (Auto Rate Sensing)
Frequency	2.4GHz to 2.5GHz Direct Sequence Spread Spectrum (DSSS)
Maximum Range	<u>Outdoor Environment</u> <u>Indoor Environment</u> 1Mbps -1650 ft (503 m) 1Mbps - 500 ft (152 m) 2Mbps -1320 ft (402 m) 2Mbps - 400 ft (122 m) 5.5Mbps -1155 ft (352 m) 5.5Mbps - 270 ft (82 m) 11Mbps – 835 ft (255 m) 11Mbps – 175 ft (53 m)
Power Consumption	5V DC, typically 245mA in full Transmit (TX), 185mA in full Receive (RX), and 90mA in Standby
RF Output Power	Typically 15dBm
Receive Sensitivity	Typically -92dBm@1Mbps; -88dBm@2Mbps; -87dBm@5.5Mbps; -84dBm@11Mbps
Emissions	FCC, CE, TELEC, C-TICK
Bus interface	PCMCIA type II PC Card
Provided drivers	Microsoft Windows 95/B, 98, NT4, 2000, ME, XP
Dimensions	L: 145 mm (5.7 in.) W: 97 mm (3.8 in.) H: 14 mm (0.56 in.)
Weight	44.5 g (1.5 oz)
Status LED	Wireless Link
Operating Environment	Operating temperature: 0 to 55 degree C
Safety	US: UL1950
Encryption	40-bit (also called 64-bit) and 128-bit WEP data encryption
Warranty	Limited 3-year warranty

Appendix B

802.11b Wireless Networking Basics

This chapter provides an overview of IP networks, routing, and wireless networking.

Related Publications

As you read this document, you may be directed to various RFC documents for further information. An RFC is a Request For Comment (RFC) published by the Internet Engineering Task Force (IETF), an open organization that defines the architecture and operation of the Internet. The RFC documents outline and define the standard protocols and procedures for the Internet. The documents are listed on the World Wide Web at www.ietf.org and are mirrored and indexed at many other sites worldwide.

Wireless Networking

The MA401 Wireless PC Card conforms to the Institute of Electrical and Electronics Engineers (IEEE) 802.11b standard for wireless LANs (WLANs). On an 802.11b wireless link, data is encoded using direct-sequence spread-spectrum (DSSS) technology and is transmitted in the unlicensed radio spectrum at 2.5GHz. The maximum data rate for the wireless link is 11 Mbps, but it will automatically back down from 11 Mbps to 5.5, 2, and 1 Mbps when the radio signal is weak or when interference is detected.

The 802.11b standard is also called Wireless Ethernet or Wi-Fi by the Wireless Ethernet Compatibility Alliance (WECA, see <http://www.wi-fi.net>), an industry standard group promoting interoperability among 802.11b devices.

Wireless Network Configuration

The 802.11b standard offers two methods for configuring a wireless network - ad hoc and infrastructure.

Ad-hoc Mode (Peer-to-Peer Workgroup)

In an ad hoc network, computers are brought together as needed; thus, there is no structure or fixed points to the network - each node can generally communicate with any other node. There is no Access Point involved in this configuration. This mode enables you to quickly set up a small wireless workgroup and allows workgroup members to exchange data or share printers as supported by Microsoft Networking in the various Windows operating systems. Some vendors also refer to ad hoc networking as Peer-to-Peer group networking.

In this configuration, network packets are directly sent and received by the intended transmitting and receiving stations. As long as the stations are within range of one another, this is the easiest and least expensive way to set up a wireless network.

Infrastructure Mode

With a wireless Access Point, you can operate the wireless LAN in the infrastructure mode. This mode provides wireless connectivity to multiple wireless network devices within a fixed range or area of coverage, interacting with wireless nodes via an antenna.

In the infrastructure mode, the wireless access point converts airwave data into wired Ethernet data, acting as a bridge between the wired LAN and wireless clients. Connecting multiple Access Points via a wired Ethernet backbone can further extend the wireless network coverage. As a mobile computing device moves out of the range of one access point, it moves into the range of another. As a result, wireless clients can freely roam from one Access Point domain to another and still maintain seamless network connection.

Extended Service Set Identification (ESSID)

The Extended Service Set Identification (ESSID) is one of two types of Service Set Identification (SSID). In an ad-hoc wireless network with no access points, the Basic Service Set Identification (BSSID) is used. In an infrastructure wireless network that includes an access point, the Extended Service Set Identification (ESSID) is used, but may still be referred to as SSID.

An SSID is a thirty-two character (maximum) alphanumeric key identifying the wireless local area network. Some vendors refer to the SSID as network name. For the wireless devices in a network to communicate with each other, all devices must be configured with the same SSID.

Authentication and WEP Encryption

The absence of a physical connection between nodes makes the wireless links vulnerable to eavesdropping and information theft. To provide certain level of security, the IEEE 802.11 standard defines two types of authentication methods:

- **Open System** -- Open System authentication is a null algorithm which requires an system identifier but does not encrypt the wireless data. With Open System authentication, a wireless PC can join any network merely by providing the SSID and receive any messages that are not encrypted.
- **Shared Key** -- Shared Key authentication is an algorithm where both the transmitting node and the receiving node share an authentication key to perform a checksum on the original message. With Shared Key authentication, only those PCs that possess the correct authentication key can join the network.

By default, IEEE 802.11 wireless devices operate in open system network mode. That is, they do not encrypt the data being transmitted over the wireless network.

Wired Equivalent Privacy (WEP)

Wired Equivalent Privacy (WEP) data encryption is utilized when the wireless nodes or access points are configured to operate in Shared Key authentication mode. There are two shared key methods implemented in most commercially available products, 64-bit and 128-bit WEP data encryption.

The 64-bit WEP data encryption method, allows for a five-character (40-bit) input. Additionally, 24 factory-set bits are added to the forty-bit input to generate a 64-bit encryption key. The 24 factory-set bits are not user-configurable. This encryption key will be used to encrypt/decrypt all data transmitted via the wireless interface. Some vendors refer to the 64-bit WEP data encryption as 40-bit WEP data encryption since the user-configurable portion of the encryption key is 40 bits wide.

The 128-bit WEP data encryption method consists of 104 user-configurable bits. Similar to the forty-bit WEP data encryption method, the remaining 24 bits are factory set and not user configurable. Some vendors allow passphrases to be entered instead of the cryptic hexadecimal characters to ease encryption key entry.

Wireless Channel Selection

IEEE 802.11 wireless nodes communicate with each other using radio frequency signals in the ISM (Industrial, Scientific, and Medical) band between 2.4Ghz and 2.5Ghz. Neighboring channels are 5Mhz apart. However, due to spread spectrum effect of the signals, a node sending signals using a particular channel will utilize frequency spectrum 12.5Mhz above and below the center channel frequency. As a result, two separate wireless networks using neighboring channels (for example, channel 1 and channel 2) in the same general vicinity will interfere with each other. Applying two channels that allow the maximum channel separation will decrease the amount of channel cross-talk, and provide a noticeable performance increase over networks with minimal channel separation.

The radio frequency channels used are listed in [Table 3-1](#):

Table 3-1. 802.11 Radio Frequency Channels

Channel	Center Frequency	Frequency Spread
1	2412Mhz	2399.5Mhz - 2424.5Mhz
2	2417Mhz	2404.5Mhz - 2429.5Mhz
3	2422Mhz	2409.5Mhz - 2434.5Mhz
4	2427Mhz	2414.5Mhz - 2439.5Mhz
5	2432Mhz	2419.5Mhz - 2444.5Mhz
6	2437Mhz	2424.5Mhz - 2449.5Mhz
7	2442Mhz	2429.5Mhz - 2454.5Mhz
8	2447Mhz	2434.5Mhz - 2459.5Mhz
9	2452Mhz	2439.5Mhz - 2464.5Mhz
10	2457Mhz	2444.5Mhz - 2469.5Mhz
11	2462Mhz	2449.5Mhz - 2474.5Mhz
12	2467Mhz	2454.5Mhz - 2479.5Mhz
13	2472Mhz	2459.5Mhz - 2484.5Mhz

Note: The available channels supported by the wireless products in various countries are different.

The preferred channel separation between the channels in neighboring wireless networks is 25 MHz (5 channels). This means that you can apply up to three different channels within your wireless network. There are only 11 usable wireless channels in the United States. It is recommended that you start using channel 1 and grow to use channel 6, and 11 when necessary, as these three channels do not overlap.

Appendix C

Preparing Your PCs for Network Access

This appendix describes how to prepare your PCs to connect to the Internet through the MA401 802.11b Wireless PC Card.

Preparing Your Computers for TCP/IP Networking

Computers access the Internet using a protocol called TCP/IP (Transmission Control Protocol/Internet Protocol). Each computer on your network must have TCP/IP installed and selected as its networking protocol. If a Network Interface Card (NIC) is already installed in your PC, then TCP/IP is probably already installed as well.

Most operating systems include the software components you need for networking with TCP/IP. Windows® 95 or later includes the software components for establishing a TCP/IP network.

In your TCP/IP network, each PC and the wireless access point must be assigned a unique IP addresses. Each PC must also have certain other TCP/IP configuration information such as a subnet mask (netmask), a domain name server (DNS) address, and a default gateway address. In most cases, you should install TCP/IP so that the PC obtains its specific network configuration information automatically from a DHCP server during startup.

Configuring Windows 95, 98, and ME for TCP/IP Networking

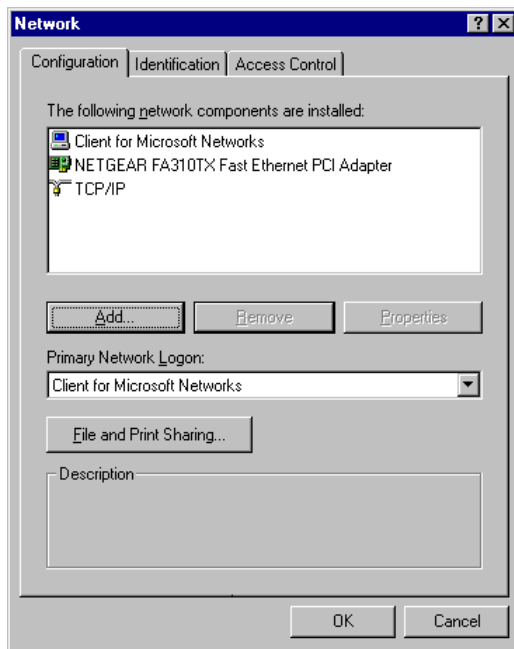
As part of the PC preparation process, you may need to install and configure TCP/IP on your PC. Before starting, locate your Windows CD; you may need to insert it during the TCP/IP installation process.

Install or Verify Windows Networking Components

To install or verify the necessary components for IP networking:

1. On the Windows taskbar, click the Start button, point to Settings, and then click Control Panel.
2. Double-click the Network icon.

The Network window opens, which displays a list of installed components:



You must have an Ethernet adapter or an MA401, the TCP/IP protocol, and the Client for Microsoft Networks.



Note: It is not necessary to remove any other network components shown in the Network window in order to install the adapter, TCP/IP, or Client for Microsoft Networks.

If you need to add TCP/IP:

- a. Click the Add button.
- b. Select Protocol, and then click Add.

- c. Select Microsoft.
- d. Select TCP/IP, and then click OK.

If you need to add the Client for Microsoft Networks:

- a. Click the Add button.
- b. Select Client, and then click Add.
- c. Select Microsoft.
- d. Select Client for Microsoft Networks, and then click OK.

If you need to add File and Print Sharing for Microsoft Networks:

- a. Click the Add button.
- b. Select Client, and then click Add.
- c. Select Microsoft.
- d. Select File and Print Sharing for Microsoft Networks, and then click OK.

- 3. Restart your PC for the changes to take effect.

Enabling DHCP to Automatically Configure TCP/IP Settings in Windows 95B, 98, and ME

After the TCP/IP protocol components are installed, each PC must be assigned specific information about itself and resources that are available on its network. The simplest way to configure this information is to allow the PC to obtain the information from a DHCP server in the network.

You will find there are many similarities in the procedures for different Windows systems when using DHCP to configure TCP/IP.

The following steps will walk you through the configuration process for each of these versions of Windows.

1

Locate your **Network Neighborhood** icon.

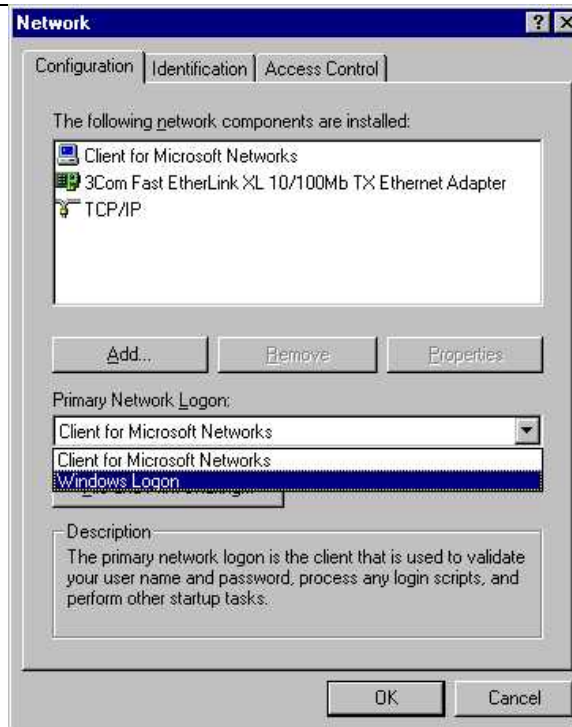
- If the Network Neighborhood icon is on the Windows desktop, position your mouse pointer over it and right-click your mouse button.
- If the icon is not on the desktop,
 - Click **Start** on the task bar located at the bottom left of the window.
 - Choose **Settings**, and then **Control Panel**.
 - Locate the **Network Neighborhood** icon and click on it. This will open the Network panel as shown below.

2

Verify the following settings as shown:

- Client for Microsoft Networks exists
- Ethernet adapter is present
- TCP/IP is present
- **Primary Network Logon** is set to Windows logon

Click on the **Properties** button. The following TCP/IP Properties window will display.

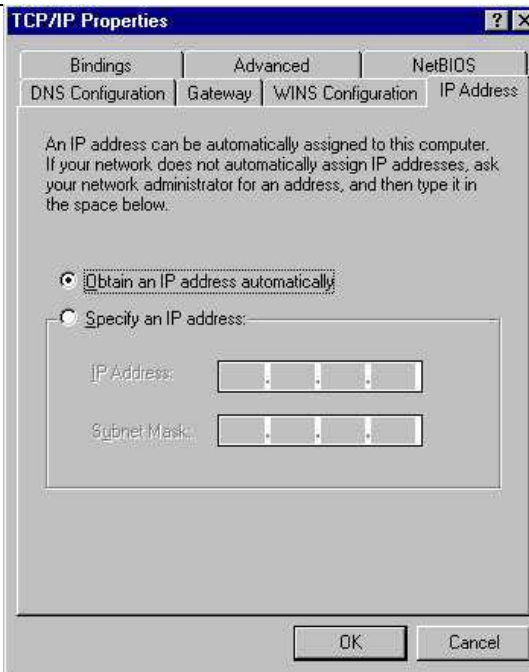


3

- By default, the **IP Address** tab is open on this window.
- Verify the following:
Obtain an IP address automatically is selected. If not selected, click in the radio button to the left of it to select it. This setting is required to enable the DHCP server to automatically assign an IP address.
- Click **OK** to continue.

Restart the PC.

Repeat these steps for each PC with this version of Windows on your network.



Selecting Windows' Internet Access Method

1. On the Windows taskbar, click the Start button, point to Settings, and then click Control Panel.
2. Double-click the Internet Options icon.
3. Select "I want to set up my Internet connection manually" or "I want to connect through a Local Area Network" and click Next.
4. Select "I want to connect through a Local Area Network" and click Next.
5. Uncheck all boxes in the LAN Internet Configuration screen and click Next.
6. Proceed to the end of the Wizard.

Verifying TCP/IP Properties

After your PC is configured and has rebooted, you can check the TCP/IP configuration using the utility *winipcfg.exe*:

1. On the Windows taskbar, click the Start button, and then click Run.
2. Type **winipcfg**, and then click OK.

The IP Configuration window opens, which lists (among other things), your IP address, subnet mask, and default gateway.

3. From the drop-down box, select your Ethernet adapter.

The window is updated to show your settings, which should match the values below if you are using the default TCP/IP settings that NETGEAR recommends for connecting through a router or gateway:

- The IP address is between 192.168.0.2 and 192.168.0.254
- The subnet mask is 255.255.255.0
- The default gateway is 192.168.0.1

Configuring Windows NT, 2000 or XP for IP Networking

As part of the PC preparation process, you may need to install and configure TCP/IP on each networked PC. Before starting, locate your Windows CD; you may need to insert it during the TCP/IP installation process.

Install or Verify Windows Networking Components

To install or verify the necessary components for IP networking:

1. On the Windows taskbar, click the Start button, point to Settings, and then click Control Panel.
2. Double-click the Network and Dialup Connections icon.
3. If an Ethernet adapter is present in your PC, you should see an entry for Local Area Connection. Double-click that entry.
4. Select Properties.

5. Verify that ‘Client for Microsoft Networks’ and ‘Internet Protocol (TCP/IP)’ are present. If not, select Install and add them.
6. Select ‘Internet Protocol (TCP/IP)’, click Properties, and verify that “Obtain an IP address automatically is selected.
7. Click OK and close all Network and Dialup Connections windows.
8. Then, restart your PC.

DHCP Configuration of TCP/IP in Windows XP, 2000, or NT4

You will find there are many similarities in the procedures for different Windows systems when using DHCP to configure TCP/IP.

The following steps will walk you through the configuration process for each of these versions of Windows.

DHCP Configuration of TCP/IP in Windows XP

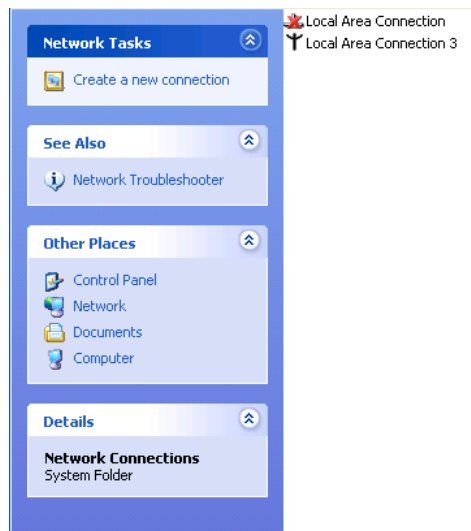
1

Locate your **Network Neighborhood** icon.

- Select **Control Panel** from the Windows XP new Start Menu.
- Select the **Network Connections** icon on the Control Panel. This will take you to the next step.

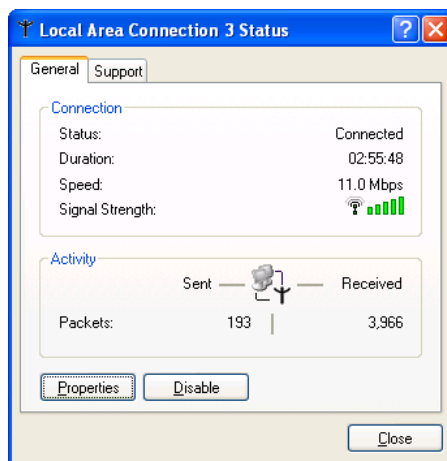
2

- Now the Network Connection window displays.
The Connections List that shows all the network connections set up on the PC, located to the right of the window.
- Right-click on the **Connection with the wireless icon** and choose **Status**.



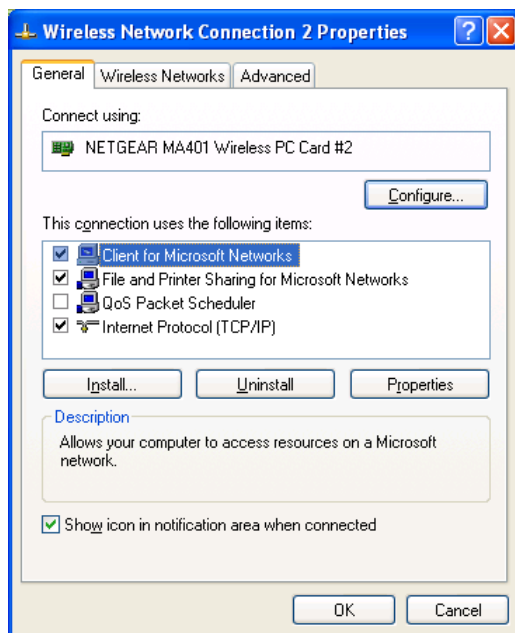
3

- Now you should be at the Local Area Network Connection Status window. This box displays the connection status, duration, speed, and activity statistics.
- Administrator logon access rights are needed to use this window.
- Click the **Properties** button to view details about the connection.



4

- The TCP/IP details are presented on the Support tab page.
- Select **Internet Protocol**, and click **Properties** to view the configuration information.

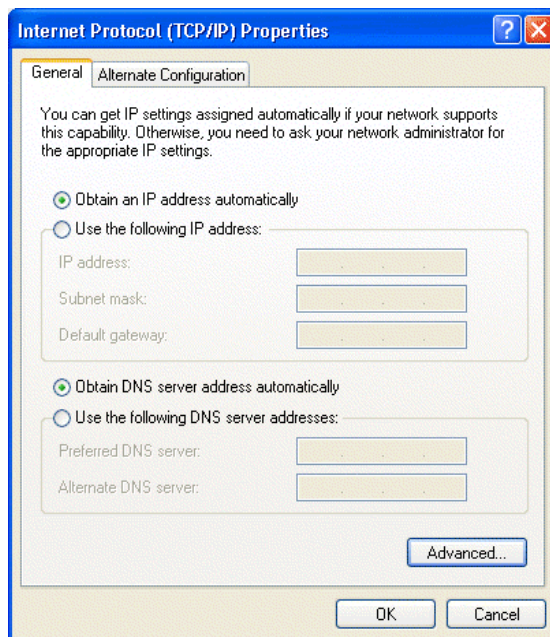


5

- Verify that **Obtain an IP address automatically** radio button is selected.
- Verify that **Obtain DNS server address automatically** radio button is selected.
- Click the **OK** button.

This completes the DHCP configuration of TCP/IP in Windows XP.

Repeat these steps for each PC with this version of Windows on your network.



DHCP Configuration of TCP/IP in Windows 2000

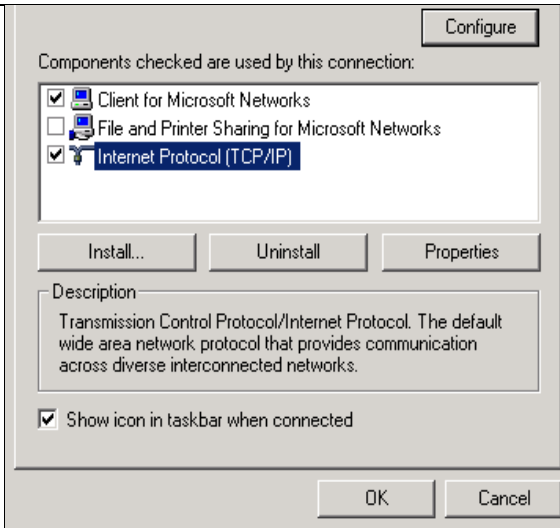
Once again, after you have installed the network card, TCP/IP for Windows 2000 is configured. TCP/IP should be added by default and set to DHCP without your having to configure it. However, if there are problems, you may need to know how to do it manually. Remember, Cox only sets up TCP/IP dynamically, (i.e., it uses DHCP to obtain TCP/IP settings). Following are the steps to configure TCP/IP with DHCP for Windows 2000.

1

- Click on the **My Network Places** icon on the Windows desktop. This will bring up a window called Network and Dial-up Connections.
- Right click on **Local Area Connection** and select **Properties**.

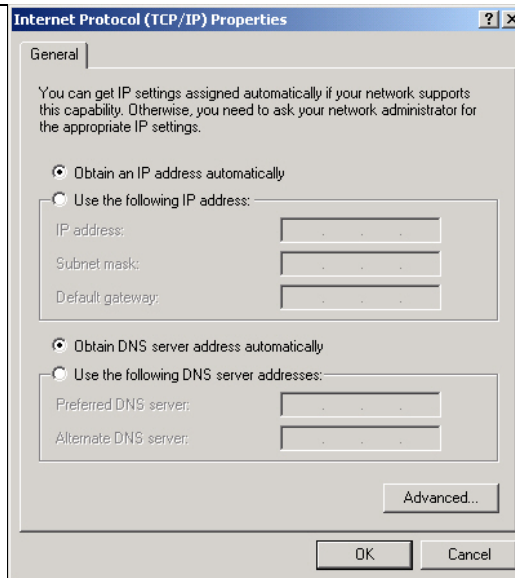
2

- The **Local Area Connection Properties** dialog box appears.
- Verify that you have the correct Ethernet card selected in the **Connect using:** box.
- Verify that at least the following two items are displayed and selected in the box of “Components checked are used by this connection:”
 - Client for Microsoft Networks and
 - Internet Protocol (TCP/IP)
- Click **OK**.



3

- With Internet Protocol (TCP/IP) selected, click on **Properties** to open the Internet Protocol (TCP/IP) Properties dialogue box.
- Verify that
 - **Obtain an IP address automatically** is selected.
 - **Obtain DNS server address automatically** is selected.
- Click **OK** to return to Local Area Connection Properties.

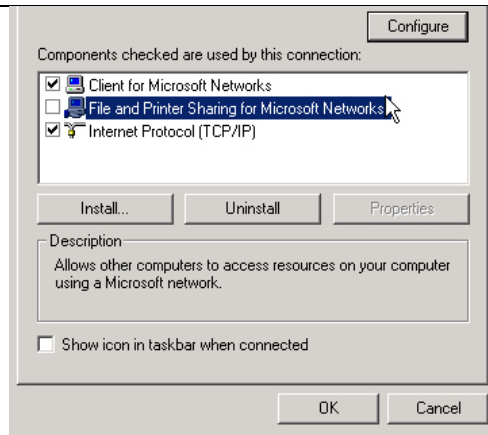


4

- Click **OK** again to complete the configuration process for Windows 2000.

Restart the PC.

Repeat these steps for each PC with this version of Windows on your network.



DHCP Configuration of TCP/IP in Windows NT4

Once you have installed the network card, you need to configure the TCP/IP environment for Windows NT 4.0. Again, remember Cox only sets up TCP/IP dynamically (i.e., it uses DHCP to obtain TCP/IP settings).

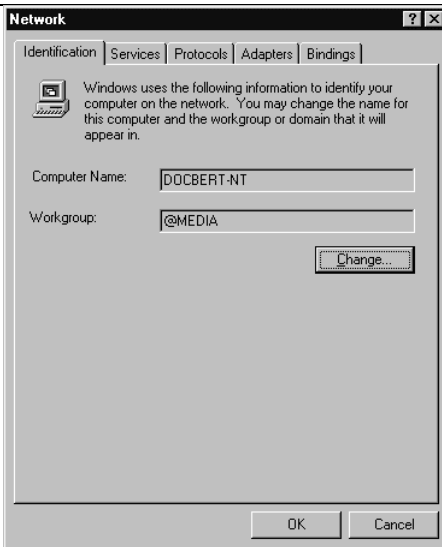
Following are the procedures you use to configure TCP/IP with DHCP in Windows NT 4.0.

1

- Open the Control Panel window.
- To do this, you need to choose **Settings** from the Start Menu, and then select **Control Panel**.
- This will display Control Panel window.

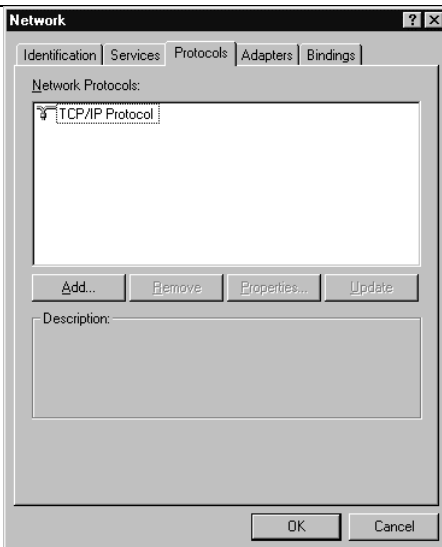
2

- Double-click the **Network** icon in the Control Panel window.
- The Network panel will display.
- Select the **Protocols** tab to continue.



3

- Highlight the **TCP/IP Protocol** in the **Network Protocols** box, and click on the **Properties** button.

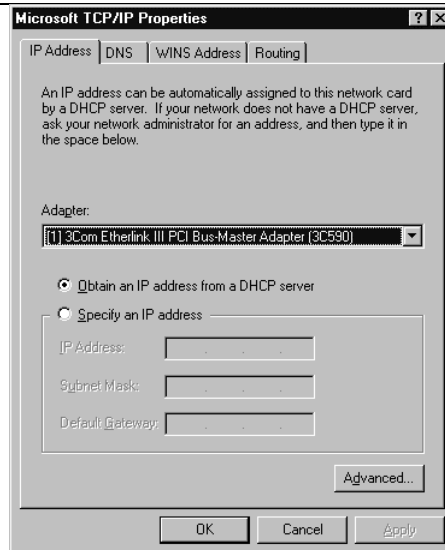


4

- The **TCP/IP Properties** dialog box now displays.
- Click the **IP Address** tab.
- Select the radio button marked **Obtain an IP address from a DHCP server**.
- Click **OK**. This completes the configuration of TCP/IP in Windows NT.

Restart the PC.

Repeat these steps for each PC with this version of Windows on your network.



Verifying TCP/IP Properties for Windows XP, 2000, and NT4

To check your PC's TCP/IP configuration:

1. On the Windows taskbar, click the Start button, and then click Run.
The Run window opens.
2. Type **cmd** and then click OK.
A command window opens
3. Type **ipconfig /all**

Your IP Configuration information will be listed, and should match the values below if you are using the default TCP/IP settings that NETGEAR recommends for connecting through a router or gateway:

- The IP address is between 192.168.0.2 and 192.168.0.254
- The subnet mask is 255.255.255.0
- The default gateway is 192.168.0.1

4. Type **exit**

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