

# NETGEAR<sup>®</sup>

IEEE 802.11a Wireless PCI Adapter

54 Mbps

Model HA311



**User's Guide**

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**NETGEAR, INC.**  
4500 Great America Parkway  
Santa Clara, CA 95054  
USA  
Phone: 1-888-NETGEAR  
E-mail: support@NETGEAR.com  
www.NETGEAR.com

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# CHAPTER 1—INTRODUCTION

Congratulations on your purchase of **NETGEAR's HA311 802.11a Wireless PCI Adapter**. This wireless PCI adapter enables you to network various PC's together without physically laying any wire and delivers high-speed wireless performance – up to 54 Mbps, 72 Mbps in turbo mode. It provides small business networks with reliable, standards-based 802.11a wireless LAN connectivity that is protected with industry-standard security against unauthorized access. NETGEAR's 802.11a solution is interference-free and coexists with 802.11b and Bluetooth™ devices. It works with Windows® 98 SE, ME, NT 4.0, 2000, and XP operating systems.



## Benefits

- ◆ Blazing speeds – up to 54 Mbps, 72 Mbps in turbo mode.
- ◆ Ultra-reliable, standards-based IEEE 802.11a wireless LAN networking.
- ◆ Highest level of industry standard security with WEP encryption
- ◆ Free from interference, it coexists with IEEE 802.11b and Bluetooth™ devices.

## Features

The key *features* of the NETGEAR HA311 802.11a Wireless PCI Adapter are:

- ◆ Reliable IEEE 802.11a standards-based wireless technology.
- ◆ Roaming support between access points when configured in infrastructure mode.
- ◆ Up to 72 Mbps high-speed rate in Turbo mode. Wireless nodes automatically negotiate optimal data transfer rates. In a noisy environment or when the distance between the wireless nodes is far, the wireless nodes automatically fall back to operate at the lowest transfer rate of 6 Mbps.
- ◆ Secure 40/64-bit/128-bit/152-bit WEP encryption provides secure data communication and increased protection from wireless eavesdroppers.
- ◆ Extensive coverage and available bandwidth with eight (8) non-overlapping channels in the 5 GHz band (5.15 to 5.35 GHz).
- ◆ Designed for desktop PCs running Microsoft Windows® 98SE, ME, NT 4.0, 2000, and XP operating systems

## Package Contents

This product package should contain:

- ◆ One HA311 802.11a Wireless PCI Adapter with an integral antenna
- ◆ One HA311 Wireless PCI Adapter Resource CD-ROM
- ◆ One HA311 User's Guide (this manual)
- ◆ One Support Information Card
- ◆ One Warranty and registration card



Please call your reseller or customer support in your area if there are any wrong, missing, or damaged parts. You can refer to the Support Information Card for the telephone number of customer support in your area. You should keep the Support Information Card, along with the original packing materials, and use the packing materials to repack the HA311 Wireless PCI Adapter if you need to return it for repair.

To qualify for product updates, product support, and product warranty registrations, register online on the NETGEAR Web page at:

<http://www.NETGEAR.com>.

## System Requirements

Before installing the HA311 Wireless PCI Adapter, please make sure that these minimum requirements have been met:

- ◆ You must have a Pentium III Class PC with an available PCI 2.2 compliant slot.
- ◆ 5 Mbytes of free hard drive space.

- ◆ Windows XP, 2000, ME, NT 4.0 or Windows 98 Second Edition installed.

## Related NETGEAR IEEE 802.11a Products

- ◆ HE102 802.11a Wireless Access Point
- ◆ HA501 802.11a Wireless CardBus Adapter
- ◆ HR814 802.11a Cable/DSL Internet Gateway Router

## About This Guide

This User's Guide will show you how to install and use NETGEAR's HA311 802.11a Wireless PCI Adapter. With a few simple steps, you can connect your PCs to create a flexible and reliable network.

## Get Started Now!

The HA311 802.11a Wireless PCI Adapter is easy to install. You need only to complete these five steps, which should take about 10 to 15 minutes:

- ❶ Install the HA311 utility software.
- ❷ Install the HA311 Wireless PCI Adapter.
- ❸ Install the HA311 Wireless PCI Adapter driver.
- ❹ Configure the HA311 network settings.
- ❺ Test the network connection status.

To begin the installation process, turn to page 8, *Chapter 2—Installation*.

## CHAPTER 2—INSTALLATION

This chapter provides step-by-step instructions on how to install the HA311 802.11a Wireless PCI Adapter.

Before installing the HA311 hardware into your PC, you will need to use the HA311 Installation program to install the HA311 driver utility software.

**Note:** Windows 98 SE and Windows ME users may need the Windows CD or Cabinet files to complete the installation of the HA311 Wireless PCI Adapter software. If the Windows installation files (a.k.a. Cabinet files with the .CAB file extension) have already been installed on your PC, please make sure that your Windows CD is available prior to installation. The Cabinet files are commonly located in **C:\WINDOWS\OPTIONS\INSTALL\** or **C:\WINDOWS\OPTIONS\CABS\**.

### Step 1—Install the HA311 Utility Software

Follow these steps to install the NETGEAR HA311 Wireless PCI Adapter Utility software and driver in a Windows 98 SE, Windows ME, Windows NT 4.0, Windows 2000, or Windows XP computer.

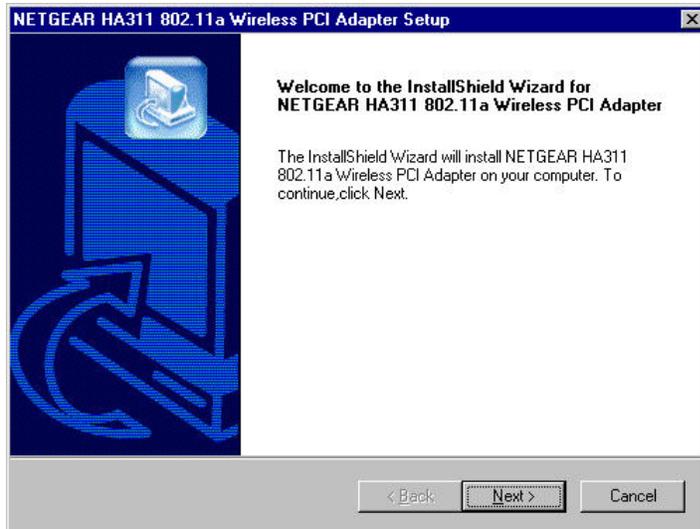
1. Turn on your PC and logon to Windows, if applicable.

**Note:** *If you are using Windows NT or 2000, you will need administrative privileges to access the Windows desktop.*

2. Insert the **HA311 Resource** CD-ROM into your computer's CD-ROM drive. From the Windows desktop, double-click the **My Computer** icon.

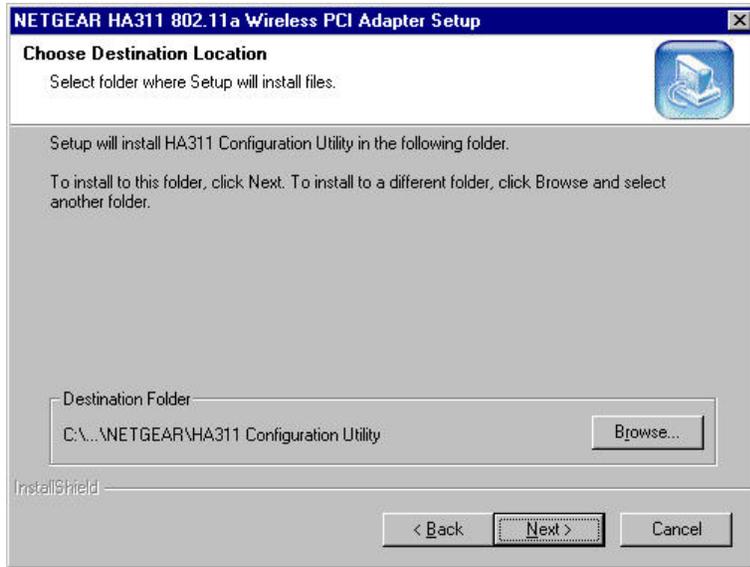
Double-click the CD-ROM drive letter (such as **D:**) to look at the contents of the CD-ROM.

3. Double-click the **SETUP** application icon to start the installation procedure. The InstallShield Wizard will open and display the NETGEAR HA311 Setup window, as shown here.

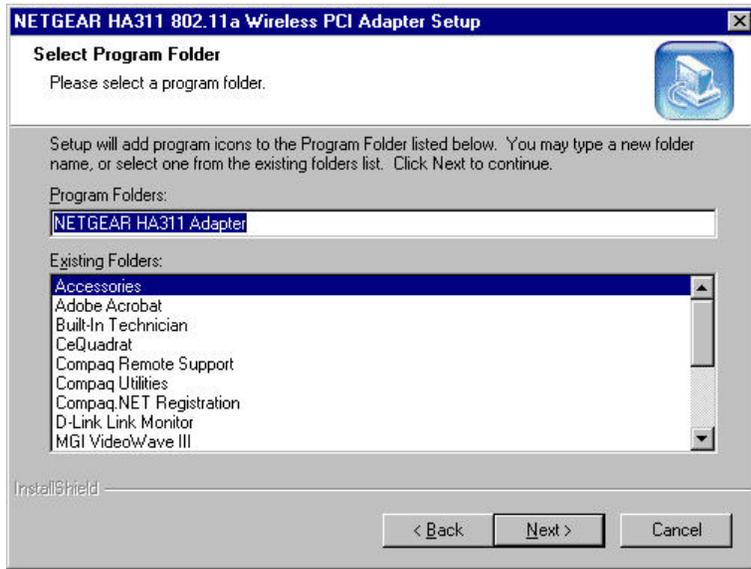


4. Click **Next** to continue.

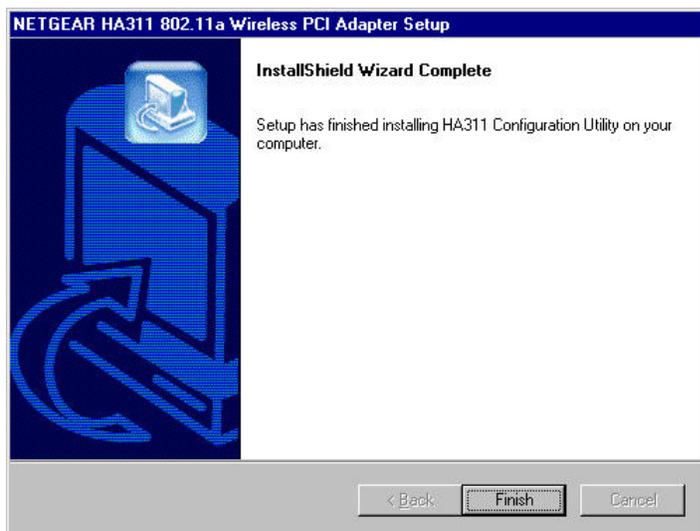
5. Select a destination folder for the HA311 Utility and click **Next** to continue.



6. Select the name for the HA311 Utility's Program folder or enter a name in the Program Folders field, then click **Next** to continue.



7. The setup program will install the utility and the HA311 driver files. Click **Finish** to complete the installation.



8. *If you are using Windows 98 SE or Windows ME*, insert the Windows installation CD if prompted.

The HA311 installation program will automatically launch the Microsoft WMI Installation Wizard to install the Windows Management Instrumentation (WMI) Core Components on your computer if they haven't already been installed. Follow the instructions to complete the WMI installation.



To continue the installation process for your HA311, proceed to ***Step 2—Install the HA311 Wireless PCI Adapter***, on the next page.

## Step 2—Install the HA311 Wireless PCI Adapter

### HARDWARE DESCRIPTION

The HA311 Wireless PCI Adapter has two interfaces:

- ◆ A 32-bit PCI connector that connects to any PC with an available PCI slot.
- ◆ A wireless interface that remains outside of the PC chassis when the Wireless PCI Adapter is inserted into a PC.

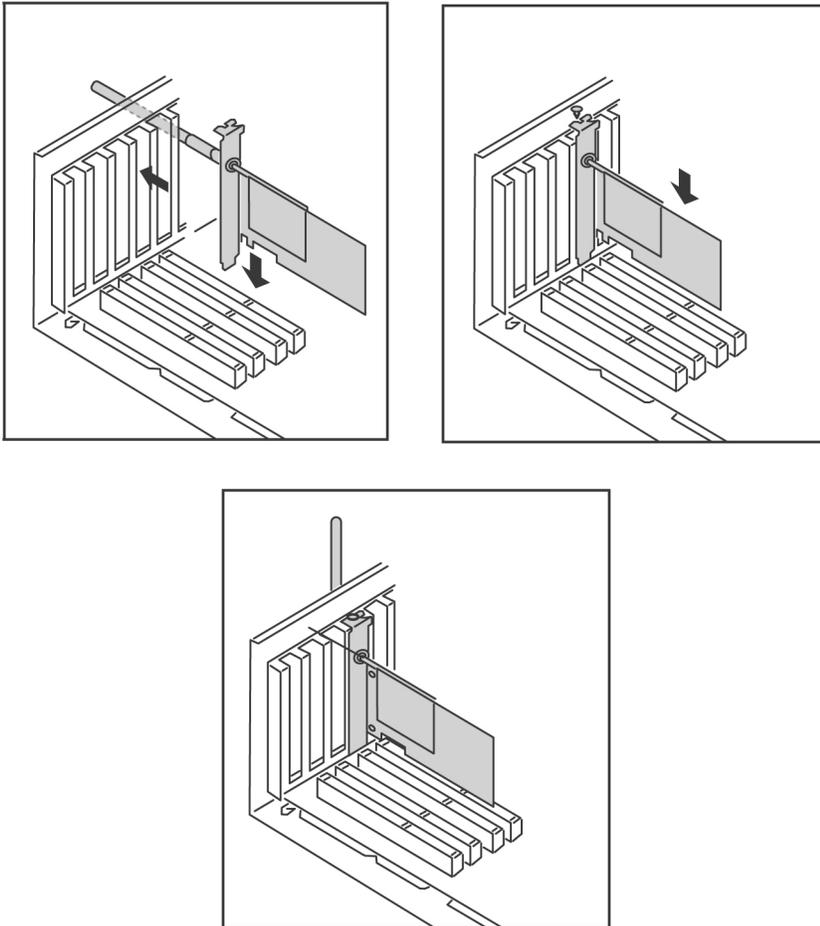
There are two green LEDs, **Network (NWK)** and **Power (PWR)**, that indicate the wireless link condition of the HA311 Wireless PCI Adapter with another wireless node or the associated Access Point.

### HARDWARE INSTALLATION

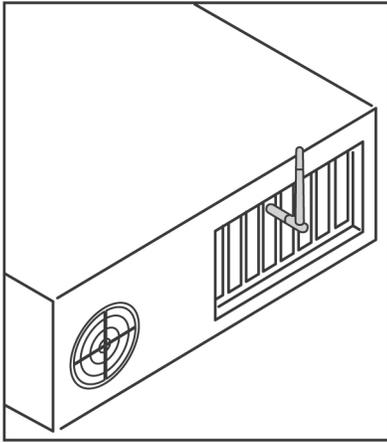
To install the HA311 Wireless PCI Adapter on your PC, please follow the instructions below:

1. Turn off your PC and unplug the power cord.
2. Remove the PC cover.
3. Choose an available PCI slot and remove the corresponding back plate from the PC chassis.

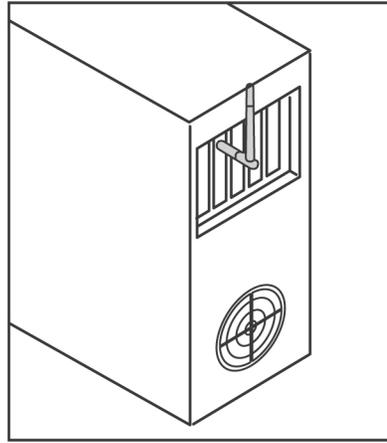
4. Insert the HA311 Wireless PCI Adapter into the PCI slot as displayed in these illustrations:



The HA311 Wireless PCI Adapter card should be firmly fitted and screwed into the PCI slot.



If you are using a **desktop PC case**, it will look like this once installed.



If you are using a **tower PC case**, it will look like this once installed.

5. Restore the PC cover and reconnect the power cord to the PC. Make sure the HA311 antenna is pointing upwards to ensure the best reception.

To continue the installation process for your HA311, proceed to **Step 3—Install the HA311 Wireless PCI Adapter Driver**, on the next page.

### Step 3—Install the HA311 Wireless PCI Adapter Driver

Once you have installed the HA311 Wireless PCI Adapter, you will need to make sure the appropriate driver is installed on your PC. To do this, please follow these steps:

*If you are using Windows NT 4.0*, please follow the instructions on page 21.

#### FOR WINDOWS XP, 2000, ME, AND 98 SE USERS

1. Turn on your PC and logon to Windows, if applicable.
2. *For Windows 98 SE and Windows ME users*, Windows automatically will detect the newly installed HA311 Wireless Adapter and prompt you to restart your computer in the **System Setting Changes** message window. Click **Yes** to restart your computer.

*For Windows 2000 users*, Windows 2000 automatically will find the new HA311 Wireless PCI Adapter and display the **Digital Signature Not Found** message window. Click **Yes** to allow Windows 2000 to install the driver and initialize the HA311 Wireless PCI Adapter.

For Windows XP users, the **Found New Hardware Wizard** window automatically will detect the new HA311 Wireless PCI Adapter and then display the **Hardware Installation** window (as shown below).



The Hardware Installation window indicates that HA311 has not passed Windows logo testing.

Click the **Continue Anyway** button to allow Windows 2000 to install the driver and initialize the HA311 Wireless PCI Adapter.

Click **Finish** to close the **Found New Hardware Wizard**.

3. Restart your PC, if prompted.

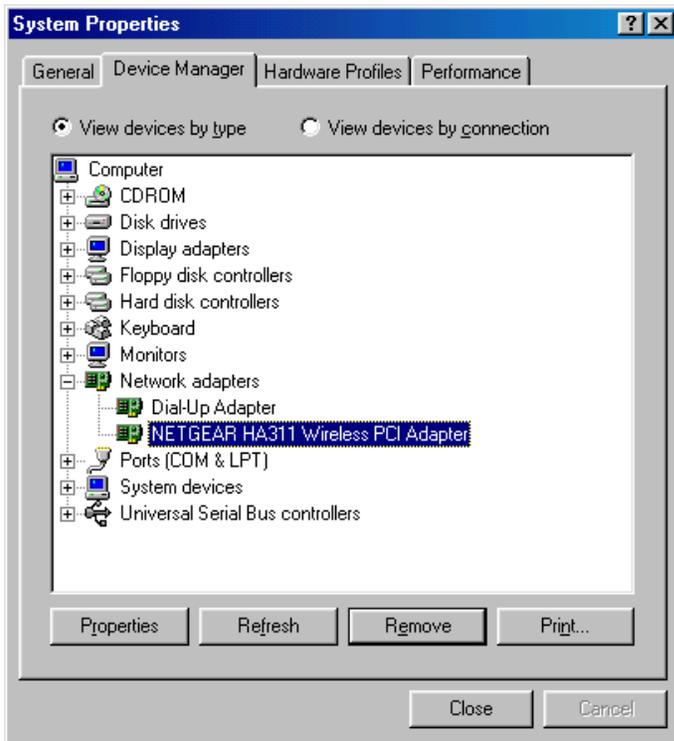
Please proceed to the next page, *Verifying Driver Installation*.

## Verifying Driver Installation

After you have completed *Step 3—Install the HA311 Wireless PCI Adapter Driver* on the previous pages, we suggest you follow these instructions to verify that the HA311 Wireless PCI Adapter driver has been successfully installed on your PC.

1. From the Windows Desktop, double-click the **My Computer** icon.
2. Double-click the **Control Panel** icon, and then double-click the **System** icon.
3. Click the **Device Manager** folder tab.
4. Double-click **Network Adapters**. Locate the NETGEAR HA311 Wireless PCI Adapter selection (as shown on the next page), and if there is no yellow exclamation mark or red cross symbol on or beside it, then it has been successfully installed.

(If one of these symbols does appear, then there was a problem with installation. Refer to *Appendix A—Troubleshooting*, on page 40 for more information.)



5. Double-click **NETGEAR HA311 Wireless PCI Adapter**. The **Device Status** window will appear and should indicate that the HA311 Wireless PCI Adapter is functioning properly.

To continue the installation process for your HA311, proceed to **Step 4—Configure the HA311 Network Settings**, on page 23.

## FOR WINDOWS NT 4.0 USERS

1. Turn on your computer and logon to Windows, if applicable.
2. From the Windows NT desktop, double-click the **My Computer** icon.
3. Double-click the **Control Panel** icon, and then double-click the **Network** icon.
4. Click the **Adapter** tab and click the **Add** button to continue.
5. The Select Network Adapter dialog box will be displayed and list a number of network adapter cards. Insert the **HA311 Wireless PCI Adapter Resource** CD-ROM into your CD-ROM drive. Click **Have Disk...**
6. In the Insert Disk dialog box, enter **D:\** in the field provided, assuming that D: is the driver letter for your CD-ROM drive. Click **OK**.
7. The Select OEM Option dialog box will be displayed and list the drivers from which to choose. Select **NETGEAR HA311 Wireless PCI Adapter** and click **OK**.
8. The Resources and Properties dialog box will be displayed. Modify the IRQ or Memory Base if necessary. Click **OK**.
9. The Network dialog box will be displayed. Click **Close**.
10. If TCP/IP is enabled, the system will prompt you for an IP address or use DHCP. Answer accordingly.
11. Click **Yes** when prompted if you want to reboot your PC.

Please proceed to the next page, *Verifying NT 4.0 Driver Installation*.

## Verifying NT 4.0 Driver Installation

After you have completed *Step 3—Install the HA311 Wireless PCI Adapter Driver for Windows NT 4.0 Users* on the previous page, we suggest you follow these steps to verify that the HA311 Wireless PCI Adapter driver has been successfully installed on your PC.

1. From the Windows NT desktop, double-click the **My Computer** icon.
2. Double-click the **Control Panel** icon, and then click the **Devices** tab. A list of devices installed in the system will be shown. Scroll down the list to locate the *NETGEAR HA501 driver* entry. The Wireless Adapter entry should indicate that the Wireless Adapter is started.

To continue the installation process for your HA311, proceed to *Step 4—Configure the HA311 Network Settings*, on the next page.

## Step 4—Configure the HA311 Network Settings

NETGEAR supplies you with the HA311 Wireless PCI Adapter Configuration Utility program to provide information on your wireless network, such as signal quality and link conditions, and to let you modify the various configurable wireless parameters, such as SSID, enable the Turbo mode, etc.

### **Windows XP Users:**

*To enable Turbo Mode or configure the 152-bit WEP Encryption for HA311 on Windows XP, You need to disable the Zero Configuration feature first and invoke the HA311 Wireless PCI Adapter Utility later. The Zero Configuration feature can be disabled in the **Wireless Network Connection Properties** window by unchecking the “**Use windows to configure my wireless network settings**” default setting.*

To launch the HA311 Configuration Utility:

- ◆ Select the **HA311 Configuration Utility** from the **NETGEAR HA311 Adapter Programs** group or double-click the **HA311 icon** that appears in the Windows System Tray.

## ABOUT THE HA311 SYSTRAY APPLICATION

The SysTray (System Tray) resides on one end of the taskbar in the Microsoft Windows Desktop. It displays interface icons for memory-resident applications that execute continuously in the background, such as the clock, speaker volume, and virus detection. The wireless LAN configuration utility installation for the HA311 Wireless PCI Adapter will add a configuration and status reporting utility icon in your SysTray.



HA311 Wireless PCI Adapter SysTray icon

Once you have completed the utility installation, the Windows SysTray will show the icon in different colors, as described here:

Icon color	Ad-hoc mode	Infrastructure mode
Red	The Wireless PCI Adapter has not initiated communication with any other wireless node.	Either the Wireless PCI Adapter is not able to link to any access point, or the link between the Wireless PCI Adapter and the access point is lost.
Yellow	N/A	The link condition between the Wireless PCI Adapter and the associated access point is weak.
Green	The Wireless PCI Adapter has communicated successfully with another wireless node.	The Wireless PCI Adapter has established good communication with an access point and the signal is strong.

Double-click the **Wireless PCI Adapter SysTray** icon to activate the wireless LAN configuration utility for the HA311 Wireless PCI Adapter. You can click any of the folder tabs in the NETGEAR HA311 802.11a Configuration Utility dialog box to view the current status or modify operational parameters.

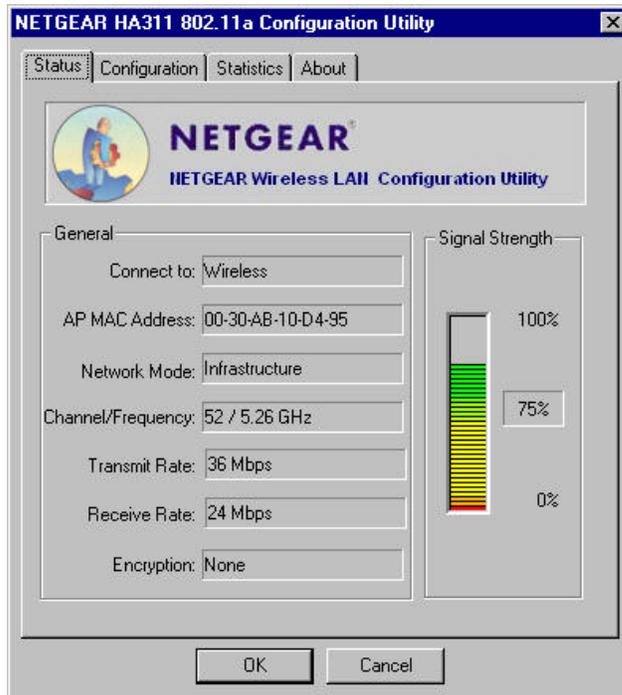
- ◆ For detailed information on configuring the HA311, refer to *Chapter 3—Configuring the HA311 Wireless PCI Adapter*, on page 28.
- ◆ For detailed information on wireless networking, refer to *Chapter 4—Wireless Network Fundamentals*, on page 33.

To continue the installation process for your HA311, proceed to **Step 5—Test the Network Connection Status**, on the next page.

## Step 5—Test the Network Connection Status

Follow these steps to verify that the HA311 Wireless PCI Adapter has been successfully installed and that your wireless access is functioning properly.

1. Start the NETGEAR HA311 802.11a Configuration Utility and click the **Status** tab.
2. The Status section of the HA311 Configuration Utility dialog box will display the current condition of the wireless LAN.



This chart describes the information shown in the Status section of the dialog box:

STATUS	DESCRIPTION
<b>Connect to</b>	Displays the association of the access point or other wireless node in ad-hoc mode.
<b>AP MAC Address</b>	Shows the MAC address of the associated access point when the HA311 Wireless PCI Adapter is configured in infrastructure mode.
<b>Network Mode</b>	Indicates the configuration mode used -- 802.11a ad-hoc mode, ad-hoc mode, or infrastructure mode. <ul style="list-style-type: none"> <li>• <i>802.11a ad-hoc mode</i>: the wireless nodes form their own local network where the end nodes communicate peer-to-peer without an access point.</li> <li>• <i>Ad-hoc mode</i>: offers higher data throughput than 802.11a ad-hoc mode, but does not use beaconing or authentication.</li> <li>• <i>Infrastructure mode</i>: the wireless node searches all available wireless channels to associate with an access point. The default value for Network mode is Infrastructure.</li> </ul>
<b>Channel/Frequency</b>	Shows the current channel and frequency in use. The wireless channel in use will be between 36 and 64.
<b>Transmit Rate</b>	Shows the current maximum transmit data rate of the wireless node. The possible data rates supported are: 54 Mbps, 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, 12 Mbps, 9 Mbps, and 6 Mbps. It can go up to 72 Mbps if the turbo mode is enabled.
<b>Receive Rate</b>	Shows the current receive data transfer rate of the wireless node.
<b>Encryption</b>	Indicates if the WEP encryption is enabled or disabled.
<b>Signal Strength</b>	Displays the signal strength of the radio frequency signal received by the wireless node.

3. Click **OK** when you are done.

**Congratulations, you have successfully installed NETGEAR's HA311 Wireless PCI Adapter!**

# CHAPTER 3—CONFIGURING THE HA311

## 802.11A WIRELESS PCI ADAPTER

NETGEAR supplies you with a wireless LAN configuration utility program to provide information on your wireless network, such as signal quality and link conditions, and to let you modify the various configurable wireless parameters.

Now that the HA311 802.11a Wireless PCI Adapter has been installed, you can use the **HA311 802.11a Configuration Utility** to view and customize configuration settings and features.

The HA311 Configuration Utility contains four sections:

- 1 - Status
- 2 - Configuration
- 3 - Statistics
- 4 - About

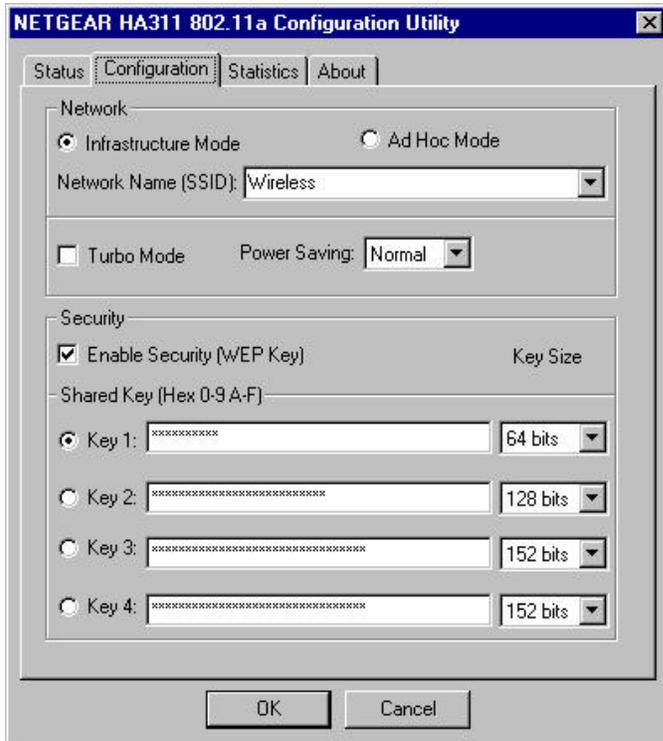
**Note:** The above sections are always available by clicking on the tab at the top of the Configuration Utility window.

### Status Section

Please turn to page 26 to learn more about the Status section of the Configuration Utility.

## Configuration Section

The **Configuration** section of the NETGEAR HA311 802.11a Configuration Utility dialog box shows you the configuration parameters of the wireless LAN and allows you to modify them.



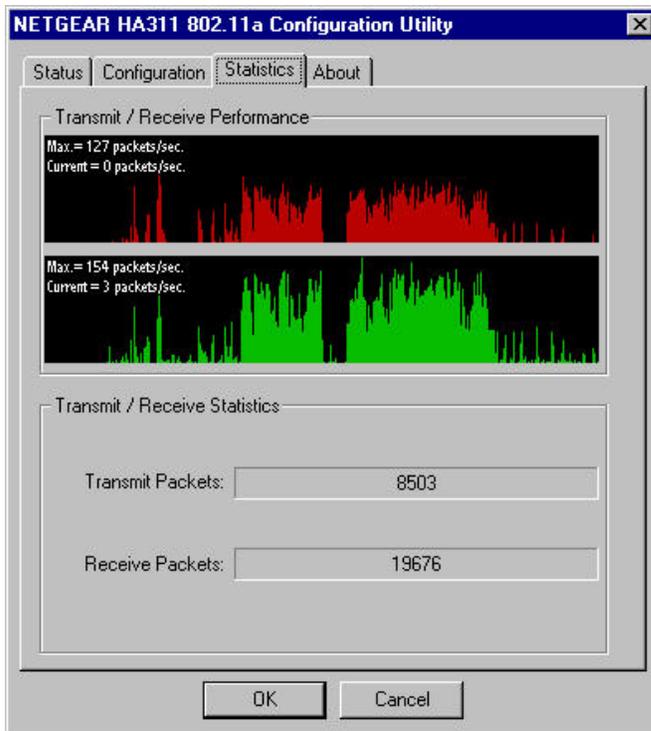
Make your selections and click **OK** to continue.

This table describes the options available from the Configuration section:

CONFIGURATION	DESCRIPTION
<b>Network</b>	Configurable between ad-hoc and infrastructure modes. In 802.11 ad-hoc mode, the wireless nodes form their own local network where the end nodes communicate peer-to-peer without an access point. In infrastructure mode, the wireless node searches all available wireless channels to associate with an access point.
<b>Network Name (SSID)</b>	Enter a 32-character (maximum) service set ID in this field; the characters are case sensitive. When the wireless node is operating in ad-hoc mode, this field operates as the basic service set ID (BSSID). All wireless nodes in the same network should use the same BSSID. When in infrastructure mode, this field defines the extended service set ID (ESSID). The ESSID assigned to the wireless node is required to match the access point ESSID in order for the wireless node to communicate with the access point.
<b>Turbo Mode</b>	Enabling turbo mode allows the wireless node to transmit or receive at a higher rate, up to 72 Mbps.
<b>Power Saving</b>	Supports optional power management to conserve battery life in Infrastructure mode. The three possible settings are off, normal, and maximum. The HA311 “wakes up” every 10-beacon interval to listen to the normal mode, but “wakes up” every 100-beacon interval in the maximum power saving mode.
<b>Security: Enable Security</b>	Sets the data encryption level for the wireless node. The data encryption level must be the same between all wireless nodes and access points within the same network. The possible values for the data encryption level are Disable, 64 bits, 128 bits, and 152 bits. (The 64-bit data encryption is also called 40-bit data encryption by some vendors.) For more information on data encryption, please refer to Chapter 4--Wireless Network Fundamentals. Unchecking the Enable Security (WEP Key) box or setting the data encryption level to Disable is to not use any encryption; this is also called Open System data encryption. Setting the data encryption level to 64-bit configures the wireless node to use the 40-bit (also called 64-bit) Shared Key data encryption method. Use of 128-bit and 152-bit Shared Key data encryption methods are also possible.
<b>Shared Key Entries</b>	The HA311 device with WEP enabled uses a WEP key to encrypt and decrypt information. An HA311 Wireless PCI Adapter can support up to four WEP keys.

## Statistics Section

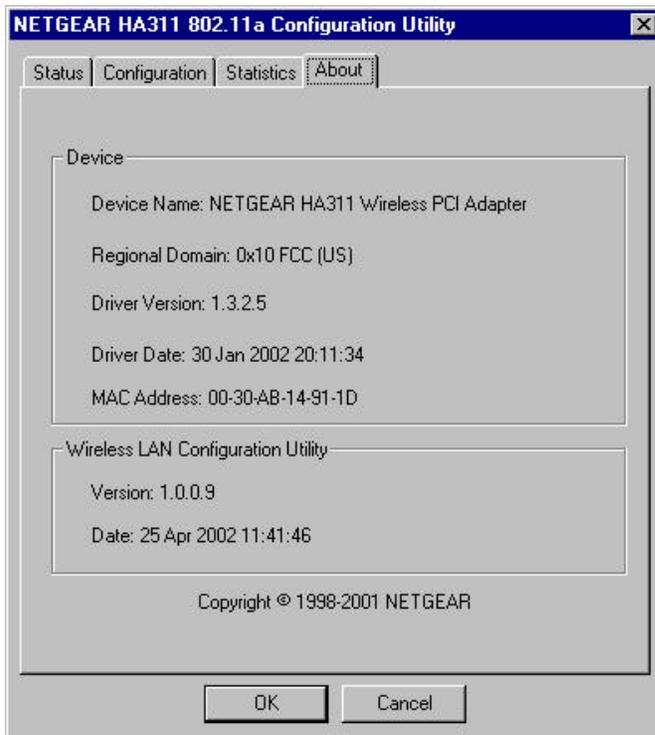
The **Statistics** section of the NETGEAR HA311 802.11a Configuration Utility dialog box indicates the real-time Rx/Tx packets performance in graph form and also displays the performance statistics in figures.



Click **OK** to continue.

## About Section

The **About** section of the NETGEAR HA311 802.11a Configuration Utility dialog box shows the release information of both the device driver for the Wireless PCI Adapter and the wireless LAN configuration utility software.



Click **OK** to continue.

# CHAPTER 4—WIRELESS NETWORK FUNDAMENTALS

## Wireless Network Configuration

### AD-HOC MODE (PEER-TO-PEER WORKGROUP)

The Institute of Electrical and Electronics Engineers (IEEE) standard for wireless LANs (WLANs), 802.11- offers two methods for configuring a wireless network — ad-hoc and infrastructure. 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. It 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 workgroup 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.

To set up an ad-hoc workgroup operating with standard protocols, do the following:

- ◆ Set all stations to connect in Ad-hoc mode (or Peer-to-Peer workgroup mode).

- ◆ Set all stations to use the same network name (or SSID).
- ◆ Set all stations to use the same wireless channel for communication.
- ◆ Set all stations to disable the WEP encryption key, or set all stations to use an identical WEP encryption key as used by the Access Point.

## **INFRASTRUCTURE MODE**

With a wireless access point, you can put the wireless LAN into Infrastructure mode. It provides wireless connectivity to multiple wireless network devices within a fixed range or area of coverage, interacting with a wireless node 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 HE102 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.

To set up an infrastructure network operating with standard protocols, do the following:

- ◆ Set all wireless stations to connect in infrastructure mode
- ◆ Set all stations to use the same network name (or SSID).
- ◆ Set all wireless access points to use the same network name (or ESSID).
- ◆ Set all stations to disable the WEP encryption key, or set all stations to use an identical WEP encryption key as used by the Access Point.

- ◆ Set up wireless channels used by individual access points. (It is not necessary to set channels on the stations as the stations will automatically scan through all channels for the nearest access point.)

## **Service Set Identification (SSID)**

The Service Set Identification (SSID) is a thirty-two alphanumeric character (maximum) string identifying the wireless local area network. Some vendors refer to the SS ID as network name. For stations to communicate with each other, all stations must be configured with the same SSID.

A wireless LAN consisting of nodes operating in Ad-hoc configuration without an access point is called a Basic Service Set (BSS). All nodes in a BSS must use the same Basic Service Set ID (BSSID).

In an infrastructure configuration with access points, multiple BSS can be configured to form an Extended Service Set (ESS). In this configuration, the access points are configured with the same Extended Service Set ID (ESSID). Wireless clients configured with the same ESSID can freely roam from one Access Point domain to another and still maintain seamless connection to the network

## Authentication and WEP Encryption

The absence of a physical connection between nodes makes the wireless links vulnerable to information theft. To provide a certain level of security, IEEE 802.11 standard has defined two types of authentication methods, Open System and Shared Key. Open System authentication is a null algorithm. 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. By default, IEEE 802.11 wireless devices operate in an open system network.

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 three shared key methods implemented in Netgear's 802.11a solutions: the standard based forty-bit WEP data encryption and 128-bit WEP data encryption plus the extended 152-bit WEP data encryption.

The forty-bit WEP data encryption method allows for a five-character (forty-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 may refer to the forty-bit WEP data encryption as 64-bit WEP data encryption since the actual encryption key used in the encryption process is 64 bits wide.

The 128-bit WEP data encryption method consists of 104 configurable bits and the 152-bit WEP data encryption method consists of 128 configurable bits. Similar to the forty-bit WEP data encryption method, the remaining 24 bits are factory set and not user configurable.

Encryption Key Size	# of Hexadecimal Digits	Example of Hexadecimal Key Content
64-bit (24+40)	10	4C72F08AE1
128-bit (24+104)	26	4C72F08AE19D57A3FF6B260037
152-bit	32	4C72F08AE19D57A3FF6B26003715DAC2

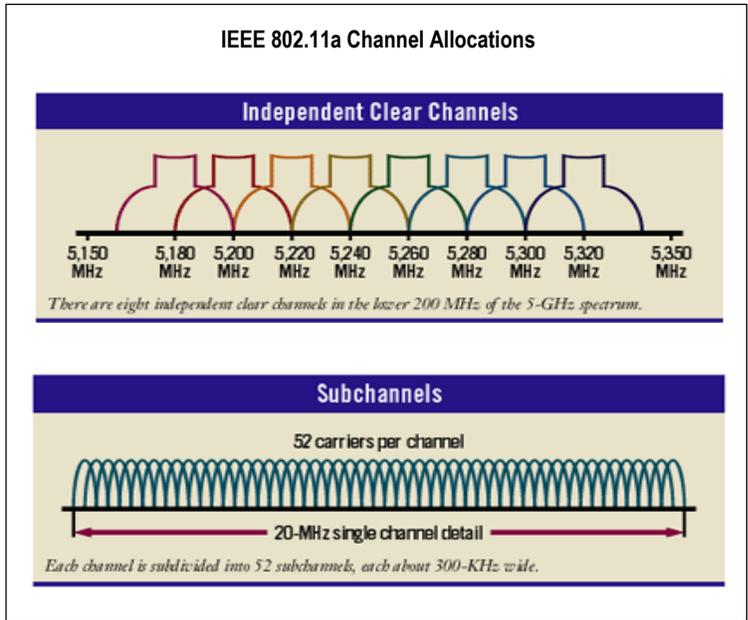
## Wireless Channel Selection

IEEE 802.11a utilizes 300 MHz of bandwidth in the 5 GHz Unlicensed National Information Infrastructure (U-NII) band. Though the lower 200 MHz is physically contiguous, the FCC has divided the total 300 MHz into three distinct domains, each with a different legal maximum power output.

U-NII Band	Low	Middle	High
Frequency (GHz)	5.15 – 5.25	5.25 – 5.35	5.725 – 5.825
Max. Power Output	50 mW	250 mW	1W

**Note:** The high band is not supported in HA311 Wireless PCI Adapter.

IEEE 802.11a uses Orthogonal Frequency Division Multiplexing (OFDM), a new encoding scheme that offers certain benefits over a spread spectrum in channel availability and data rate. The 802.11a uses OFDM to define a total of 8 non-overlapping 20 MHz channels across the 2 lower bands; each of these is divided into 52 subcarriers and each carrier is approximately 300 KHz wide. By comparison, 802.11b uses only 3 non-overlapping channels.



The HE102 user can use eight channels in non-turbo mode.

TURBO MODE: OFF	
Channel	Frequency
36	5.18 GHz
40	5.20 GHz
44	5.22 GHz
48	5.24 GHz
52	5.26 GHz
56	5.28 GHz
60	5.30 GHz
64	5.32 GHz

The HE102 user can use three channels in turbo mode.

TURBO MODE: ON	
Channel	Frequency
42	5.21 GHz
50	5.25 GHz
58	5.29 GHz

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

## APPENDIX A—TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
<b>No lights are lit on the Wireless PCI Adapter.</b>	The wireless card is not inserted into the PCI slot on your desktop PC properly Or the proper HA311 Wireless PCI Adapter driver is not loaded.	<ul style="list-style-type: none"> <li>• Remove and reinsert the Wireless PCI Adapter.</li> <li>• Check the device manager in Windows to see if the adapter card is properly recognized in the Windows operating system. Reload the driver if necessary.</li> <li>• Try to install the Wireless PCI Adapter in different PCI slot if it's available.</li> </ul>
<b>The two LED's are blinking alternately.</b>	The Wireless PCI Adapter is not associated to any access point properly. You may not have configured the wireless parameters of the wireless nodes to be the same as the access point.	<ul style="list-style-type: none"> <li>• The access point may not be powered on.</li> <li>• The access point and the HA311 Wireless PCI Adapter are not configured with the same wireless parameters. Check the SSID, Turbo mode option, and WEP encryption settings.</li> <li>• The access point may be out of range. Try moving the system closer to the access point or readjusting the antenna on the access point. You may also move the access point to a higher location for better signal reception by the Wireless PCI Adapter.</li> </ul>
<b>I am associated and connected to an access point, but I cannot see the other computers on the Ethernet side of the network.</b>	This could be a physical layer problem or a network configuration problem.	<ul style="list-style-type: none"> <li>• Check to make sure that the access point is physically connected to the Ethernet network.</li> <li>• Make sure that the IP addresses and the Windows networking parameters are all configured correctly.</li> </ul>

## APPENDIX B—GENERAL SPECIFICATIONS

Model	HA311 802.11a Wireless PCI Adapter		
Radio Data Rate	6, 9, 12, 18, 24, 36, 48, 54, 72 for Turbo mode (Auto rate capable)		
Frequency	5.15 ~ 5.25 GHz (lower band) for US/Canada, Japan 5.25 ~ 5.35 GHz (middle band) for US/Canada		
Operating Range:	Outdoor environment	Indoor environment	
	@ 6 Mbps	1200 ft.	300 ft.
	@ 54 Mbps	100 ft.	60 ft.
Encryption	40-bit (also called 64-bit), 128-bit or 152-bit WEP data encryption		
Bus interface	32-bit PCI		
Provided drivers	Microsoft Windows 98SE, NT 4.0, 2000, Millennium, XP		
Dimensions	L: 174.3 mm (6.9 in) W: 133.7 mm (5.3 in) H: 21.6 mm (0.85 in)		
Weight	102 g (3.8 oz)		
Status LEDs	Power and Network		
Electromagnetic Compliance	FCC Part 15 Class B and Class E		
Environmental Specifications	Operating temperature: 0 to 60° C Operating humidity: 5-95%, non-condensing		
Warranty	Limited 3-year warranty		

# APPENDIX C—REGULATORY COMPLIANCE

## **Trademarks**

NETGEAR is a registered trademark of NETGEAR, INC. Windows is a registered trademark of Microsoft Corporation. Other brand and product names are trademarks or registered trademarks of their respective holders. Information is subject to change without notice. All rights reserved.

## **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**

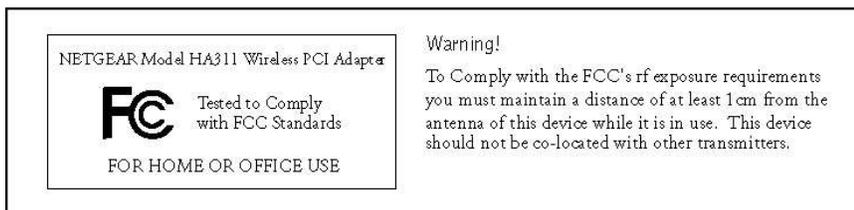
It is hereby certified that the Model HA311 Wireless PCI Adapter has been suppressed in accordance with the conditions set out in the BMPT- AmtsblVfg 243/1991 and Vfg 46/1992. The operation of some equipment (for example, test transmitters) in accordance with the regulations may, however, be subject 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.

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

Netgear, Inc., 4500 Great America Parkway, Santa Clara, CA 95054, (408) 907-8000, declares under our sole responsibility, that 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.

**Radio Frequency Interference Requirements**

This device is restricted to indoor use due to its operation in the 5.15 to 5.25 GHz frequency range. FCC requires this product to be used indoors for the frequency range 5.15 to 5.25 GHz to reduce the potential for harmful interference to co-channel Mobile Satellite systems. High power radars are allocated as primary users of the 5.25 to 5.35 GHz and 5.65 to 5.85 GHz bands. These radar stations can cause interference with and /or damage this device.

**Canadian Department of Communications Radio Interference Regulations**

This digital apparatus (Model HA311 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.

# NETGEAR®

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NETGEAR, Inc.  
4500 Great America Parkway  
Santa Clara, CA 95054 USA  
Phone: 1-888-NETGEAR  
E-mail: [support@NETGEAR.com](mailto:support@NETGEAR.com)  
[www.NETGEAR.com](http://www.NETGEAR.com)



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