Reference Manual for the NETGEAR ProSafe 802.11g Wireless Access Point WG302

NETGEAR

NETGEAR, Inc.
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BETA
December 2005

Technical Support

Please register to obtain technical support. Please retain your proof of purchase and warranty information.

To register your product, get product support or obtain product information and product documentation, go to *http://www.NETGEAR.com*. If you do not have access to the World Wide Web, you may register your product by filling out the registration card and mailing it to NETGEAR customer service.

You will find technical support information at: *http://www.NETGEAR.com/* through the customer service area. If you want to contact technical support by telephone, see the support information card for the correct telephone number for your country.

Trademarks

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Statement of Conditions

NOTE: 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.

NOTE: Modifications made to the product, unless expressly approved by Netgear, could void the user’s authority to operate the equipment. NETGEAR does not assume any liability that may occur due to such condition.

FCC Statement.

Declaration of Conformity

We Netgear,
4500 Great America Parkway
Santa Clara, CA 95054, USA
Tel: +1 408 907 8000
declare under our sole responsibility that the product(s)
WG302 *(Model Designation)*
802.11g ProSafe Wireless Access Point *(Product Name)*
complies with Part 15 of FCC Rules.

Declaration of Conformity

Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

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 and correct the interference by one or more of the following measures:

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

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Placement and Range Guidelines

Indoors, computers can connect over 802.11 wireless networks at a maximum range of several hundred feet for 802.11b/g devices. However, the operating distance or range of your wireless connection can vary significantly, based on the physical placement of the wireless access point.

For best results, identify a location for your wireless access point according to these guidelines:

- Away from potential sources of interference, such as PCs, large metal surfaces, microwaves, and 2.4 GHz cordless phones.
- In an elevated location such as a high shelf that is near the center of the wireless coverage area for all mobile devices.

Failure to follow these guidelines can result in significant performance degradation or inability to wirelessly connect to the wireless access point.

RF Exposure Warning for North America, and Australia

Warning! To meet FCC and other national safety guidelines for RF exposure, the antennas for this device (see below) must be installed to ensure a minimum separation distance of 20cm (7.9 in.) from persons. Further, the antennas shall not be colocated with other antenna or radio transmitter.
We declare that the product is limited in CH1~CH11 by specified firmware controlled in the USA.

Antenna Statement for North America and Australia

In addition to its own antenna, the WG302 device has been approved for use with the following detachable antennas and antenna cables.

Approved Antennas	Antenna Gain and type	Approved Antenna Cable	Antenna Cable Length
NETGEAR ANT24D18	14 dBi, directional outdoor/indoor	NETGEAR ACC-10314-01 thru 05	30 m
NETGEAR ANT2409	8.5 dBi, omnidirectional outdoor/indoor	NETGEAR ACC-10314-01 thru 05	10 m
NETGEAR ANT24O5	5 dBi, ceiling/wall indoor	NETGEAR ACC-10314-01 thru 05	NA

a. WG302 maximum radiated power in North America and Australia: 19 dBm ñ cable loss + antenna gain

Please go to *www.netgear.com/go/wg102_fcc* for an updated list of wireless accessories approved to be used with the WAG302 in North America and Australia.

Industry Canada Compliance Statement

This Class B Digital apparatus meets all the requirements of the Canadian Interference Causing Equipment Regulations ICES 003.

Cet appareil numerique de classe B respecte les exigences du reglement du Canada sur le materiel brouilleur NMB-003.

The device is certified to the requirements of RSS-210 for 2.4 GHz spread spectrum devices. The use of this device in a system operating either partially or completely outdoors may require the user to obtain a license for the system according to the Canadian regulations. For further information, contact your local Industry Canada office.

IC statement

Operation is subject to the following two conditions:
1) This device may not cause interference and
2) This device must accept any interference, including interference that may cause undesired operation of the device.
This device has been designed to operate with an antenna having a maximum gain of 4.59352 dBi. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.

IMPORTANT NOTE:

IC Radiation Exposure Statement:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Règlement d’Industry Canada

Les conditions de fonctionnement sont sujettes à deux conditions:

1) Ce périphérique ne doit pas causer d’interférence et.
2) Ce périphérique doit accepter toute interférence, y compris les interférences pouvant perturber le bon fonctionnement de ce périphérique.

Europe - EU Declaration of Conformity

A printed copy of the EU Declaration of Conformity certificate for this product is provided in the WG302 product package.

Ėesky [Czech]	NETGEAR, Inc. tímto prohlašuje, že tento NETGEAR ProSafe 802.11g Wireless Access Point WG302 je ve shodi se základnimi požadavky a dalšími pøislušnými ustanoveními smirnice 1999/5/ES.
Dansk [Danish]	Undertegnede NETGEAR, Inc. erklærer herved, at følgende udstyr NETGEAR ProSafe 802.11g Wireless Access Point WG302 overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
Deutsch [German]	Hiermit erklärt NETGEAR, Inc., dass sich das Gerät NETGEAR ProSafe 802.11g Wireless Access Point WG302 in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.
Eesti [Estonian]	Käesolevaga kinnitab NETGEAR, Inc. seadme NETGEAR ProSafe 802.11g Wireless Access Point WG302 vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
English	Hereby, NETGEAR, Inc., declares that this NETGEAR ProSafe 802.11g Wireless Access Point WG302 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
Español [Spanish]	Por medio de la presente NETGEAR, Inc. declara que el NETGEAR ProSafe 802.11g Wireless Access Point WG302 cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
Ελληνική [Greek]	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ NETGEAR, Inc. ΔΗΛΩΝΕΙ ΟΤΙ NETGEAR ProSafe 802.11g Wireless Access Point WG302 ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.
Français [French]	Par la présente NETGEAR, Inc. déclare que l'appareil NETGEAR ProSafe 802.11g Wireless Access Point WG302 est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.

Italiano [Italian]	Con la presente NETGEAR, Inc. dichiara che questo NETGEAR ProSafe 802.11g Wireless Access Point WG302 è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
Latviski [Latvian]	Ar šo NETGEAR, Inc. deklarç, ka NETGEAR ProSafe 802.11g Wireless Access Point WG302 atbilst Direktîvas 1999/5/EK bûtiskajâm prasîbâm un citiem ar to saistîtajiem noteikumiem.
Lietuviø [Lithuanian]	Šiuo NETGEAR, Inc. deklaruoja, kad šis NETGEAR ProSafe 802.11g Wireless Access Point WG302 atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.
Nederlands [Dutch]	Hierbij verklaart NETGEAR, Inc. dat het toestel NETGEAR ProSafe 802.11g Wireless Access Point WG302 in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.
Malti [Maltese]	Hawnhekk, NETGEAR, Inc., jiddikjara li dan NETGEAR ProSafe 802.11g Wireless Access Point WG302 jikkonforma mal-tiijiet essenzjali u ma provvedimenti orajn relevanti li hemm fid-Dirrettiva 1999/5/EC.
Magyar [Hungarian]	Alulírott, NETGEAR, Inc. nyilatkozom, hogy a NETGEAR ProSafe 802.11g Wireless Access Point WG302 megfelel a vonatkozó alapvetõ követelményeknek és az 1999/5/EC irányelv egyéb elõírásainak.
Polski [Polish]	Niniejszym NETGEAR, Inc. oœwiadcza, ¿e NETGEAR ProSafe 802.11g Wireless Access Point WG302 jest zgodny z zasadniczymi wymogami oraz pozosta³ymi stosownymi postanowieniami Dyrektywy 1999/5/EC.
Português [Portuguese]	NETGEAR, Inc. declara que este NETGEAR ProSafe 802.11g Wireless Access Point WG302 está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.
Slovensko [Slovenian]	NETGEAR, Inc. izjavlja, da je ta NETGEAR ProSafe 802.11g Wireless Access Point WG302 v skladu z bistvenimi zahtevami in ostalimi relevantnimi doloèili direktive 1999/5/ ES.
Slovensky [Slovak]	NETGEAR, Inc. týmto vyhlasuje, že NETGEAR ProSafe 802.11g Wireless Access Point WG302 spåòa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
Suomi [Finnish]	NETGEAR, Inc. vakuuttaa täten että NETGEAR ProSafe 802.11g Wireless Access Point WG302 tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
Svenska [Swedish]	Härmed intygar NETGEAR, Inc. att denna *[utrustningstyp]* står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

Bestätigung des Herstellers/Importeurs

Es wird hiermit bestätigt, daß das NETGEAR ProSafe 802.11g Wireless Access Point WG302 gemäß der im BMPT-AmtsblVfg 243/1991 und Vfg 46/1992 aufgeführten Bestimmungen entstört ist. Das vorschriftsmäßige Betreiben einiger Geräte (z.B. Testsender) kann jedoch gewissen Beschränkungen unterliegen. Lesen Sie dazu bitte die Anmerkungen in der Betriebsanleitung.

Das Bundesamt für Zulassungen in der Telekommunikation wurde davon unterrichtet, daß dieses Gerät auf den Markt gebracht wurde und es ist berechtigt, die Serie auf die Erfüllung der Vorschriften hin zu überprüfen.

Certificate of the Manufacturer/Importer

It is hereby certified that the NETGEAR ProSafe 802.11g Wireless Access Point WG302 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.

Product and Publication Details

Model Number:	WG302
Publication Date:	December 2005
Product Family:	Product Family
Product Name:	NETGEAR ProSafe 802.11g Wireless Access Point WG302
Home or Business Product:	Business
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Chapter 1
About This Manual

This chapter describes the intended audience, scope, conventions, and formats of this manual.

Audience, Scope, Conventions, and Formats

This reference manual assumes that the reader has basic to intermediate computer and Internet skills. However, basic computer network, Internet, firewall, and VPN technologies tutorial information is provided on the NETGEAR website.

This guide uses the following typographical conventions:

Table 1-1. Typographical Conventions

italics	Emphasis, books, CDs, URL names
bold	User input
`fixed`	Screen text, file and server names, extensions, commands, IP addresses

This guide uses the following formats to highlight special messages:

➡	**Note:** This format is used to highlight information of importance or special interest.

➡	**Tip:** This format is used to highlight a procedure that will save time or resources.

⚠	**Warning:** Ignoring this type of note may result in a malfunction or damage to the equipment.

This manual is written for the WG302 Wireless Access Point according to these specifications:

Table 1-2. Manual Scope

Product Version	NETGEAR ProSafe 802.11g Wireless Access Point WG302
Manual Publication Date	December 2005

Note: Product updates are available on the NETGEAR, Inc. Web site at *http://kbserver.netgear.com/products/WG302.asp*.

How to Use This Manual

The HTML version of this manual includes the following:

- Buttons, > and <, for browsing forwards or backwards through the manual one page at a time
- A button that displays the table of contents and an button. Double-click on a link in the table of contents or index to navigate directly to where the topic is described in the manual.
- A button to access the full NETGEAR, Inc. online knowledge base for the product model.
- Links to PDF versions of the full manual and individual chapters.

How to Print this Manual

To print this manual you can choose one of the following several options, according to your needs.

- **Printing a Page in the HTML View**.

  Each page in the HTML version of the manual is dedicated to a major topic. Use the *Print* button on the browser toolbar to print the page contents.

- **Printing a Chapter**.

  Use the *PDF of This Chapter* link at the top left of any page.

- Click the *PDF of This Chapter* link at the top right of any page in the chapter you want to print. The PDF version of the chapter you were viewing opens in a browser window.
- Your computer must have the free Adobe Acrobat reader installed in order to view and print PDF files. The Acrobat reader is available on the Adobe Web site at *http://www.adobe.com*.
- Click the print icon in the upper left of the window.

➡	**Tip:** If your printer supports printing two pages on a single sheet of paper, you can save paper and printer ink by selecting this feature.

- **Printing the Full Manual**.

  Use the *Complete PDF Manual* link at the top left of any page.

  - Click the Complete PDF Manual link at the top left of any page in the manual. The PDF version of the complete manual opens in a browser window.
  - Click the print icon in the upper left of the window.

➡	**Tip:** If your printer supports printing two pages on a single sheet of paper, you can save paper and printer ink by selecting this feature.

Chapter 2
Introduction

This chapter introduces the NETGEAR ProSafe 802.11g Wireless Access Point WG302. Minimal prerequisites for installation are presented in "System Requirements" on page 2-6.

About the NETGEAR ProSafe 802.11g Wireless Access Point WG302

The NETGEAR ProSafe 802.11g Wireless Access Point WG302 is the basic building block of a wireless LAN infrastructure. It provides connectivity between Ethernet wired networks and radio-equipped wireless notebook systems, desktop systems, print servers, and other devices.

The WG302 provides wireless connectivity to multiple wireless network devices within a fixed range or area of coverage, interacting with a wireless network interface card (NIC) via an antenna.Typically, an individual in-building access point provides a maximum connectivity area with about a 300 foot radius. The NETGEAR ProSafe 802.11g Wireless Access Point WG302 can support a small group of users in a range of several hundred feet. Most access points are rated between 30-70 users simultaneously.

The NETGEAR ProSafe 802.11g Wireless Access Point WG302 acts as a bridge between the wired LAN and wireless clients. Connecting multiple WG302 Wireless Access Points via a wired Ethernet backbone can further lengthen 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 to another and still maintain seamless connection to the network.

The auto-sensing capability of the WG302 Wireless Access Point allows packet transmission at up to 108 Mbps, or at reduced speeds to compensate for distance or electromagnetic interference.

Key Features

The WG302 Wireless Access Point is easy-to-use and provides solid wireless and networking support.

Supported Standards and Conventions

The following standards and conventions are supported:

- **Standards Compliant.** The Wireless Access Point complies with IEEE 802.11g standards for Wireless LANs.
- **WEP support.** Support for WEP is included. 64-bit, 128-bit, and 152-bit keys are supported.
- **Full WPA and WPA2 support.** WPA and WPA2 enterprise class strong security with RADIUS and certificate authentication as well as dynamic encryption key generation. WPA-PSK and WPA2-PSK pre-shared key authentication without the overhead of RADIUS servers but with all of the strong security of WPA.
- **Multiple BSSIDs.** Support for multiple BSSIDs. When one AP is connected to a wired network and a set of wireless stations it is referred to as a Basic Service Set (BSS). The Basic Service Set Identifier (BSSID) is a 32-character unique identifier attached to the header of packets sent over a WLAN that differentiated one WLAN from another when a mobile device tries to connect to the network.
- **DHCP Client and Server Support.** DHCP provides a dynamic IP address to PCs and other devices upon request. The WG302 can obtain network information from a DHCP server on your network. The AP can also act as a DHCP server and provide network information for wireless clients.
- **SNMP Support.** Support for Simple Network Management Protocol (SNMP) Management Information Base (MIB) management.

Key Features

The WG302 provides solid functionality, including these features:

- Multiple Operating Modes
  - **Wireless Access Point.** Operates as a standard 802.11g.
  - **Point-to-Point Bridge.** In this mode, the WG302 only communicates with another bridge-mode wireless station. You must enter the MAC address (physical address) of the other bridge-mode wireless station in the field provided. You should use wireless security to protect this communication.

  - **Point-to-Multi-Point Bridge.** Select this only if this WG302 is the “Master” for a group of bridge-mode wireless stations. The other bridge-mode wireless stations must be set to Point-to-Point Bridge mode, using this WG302's MAC address. They then send all traffic to this “Master,” rather than communicate directly with each other. You should use wireless security to protect this traffic.
  - **Wireless Repeater.** In this half-duplex mode, the WG302 only communicates with another repeater-mode wireless station. You must enter the MAC address of both adjacent repeater-mode wireless stations in the fields provided. You should use wireless security to protect this communication.

- **AutoCell RF Management.** AutoCell provides advanced automated RF management that improves performance and enhances security.
- **Rogue Access Point Detection.** For enhanced security, you can scan the wireless network to detect rogue access points.
- **Hotspot Settings.** You can allow all HTTP (TCP, port 80) requests to be captured and re-directed to the URL you specify.
- **Upgradeable Firmware.** Firmware is stored in a flash memory and can be upgraded easily, using only your Web browser, and can be upgraded remotely.
- **Access Control.** The Access Control MAC address filtering feature can ensure that only trusted wireless stations can use the WG302 to gain access to your LAN.
- **Security Profiles.** When using multiple BSSIDs, you can configure unique security settings (encryption, MAC filtering, etc.) for each BSSID.
- **Simple Configuration.** If the default settings are unsuitable, they are easy to change.
- **Hidden Mode.** The SSID is not broadcast, assuring only clients configured with the correct SSID can connect.
- **Configuration Backup.** Configuration settings can be backed up to a file and restored.
- **Secure and Economical Operation.** Adjustable power output allows more secure or economical operation.
- **Power over Ethernet.** Power can be supplied to the WG302 over the Ethernet port from any 802.3af compliant mid-span or end-span source such as the NETGEAR FSM7326P Managed Power over Ethernet Layer 3 managed switch.
- **Autosensing Ethernet Connection with Auto Uplink Interface.** Connects to 10/100 Mbps IEEE 802.3 Ethernet networks.
- **LED Indicators.** Power, test, LAN speed, LAN activity, and wireless activity are easily identified.

- **Virtual APs.** A single AP is segregated into multiple individual virtual APs simulating multiple APs in a single system. This segregation allows you to enforce different security mechanisms for different clients on the same AP. Virtual AP also provides better control over broadcast and multicast traffic for increased network performance.
- **Wireless VLAN Support.** Short for virtual LAN, a network of computers that behave as if they are connected to the same network even though they may actually be physically located on different segments of a LAN. VLANs are configured through software rather than hardware, which makes them extremely flexible. VLANs are very useful for user/host management, bandwidth allocation and resource optimization.
- **World Mode.** With world mode enabled, the Access Point provides radio channel settings for client devices that associate with the Access Point. A visitor from Europe using world mode on a client device can associate with an Access Point in North Carolina and automatically switch to the correct channel settings

AutoCell—The Self-Organizing Wireless Network

AutoCell™, an embedded control system for 802.11 WLANs. AutoCell increases available bandwidth and reduces WLAN installation and operating costs significantly.

AutoCell is completely automatic: It is a continuous communication system that relies on a lightweight protocol to monitor changes on the wireless domain while keeping overhead very low. Among AutoCell's inherent advantages:

- Elimination of manual site surveys and channel maps
- Dynamic load balancing
- Plug-and-play-implementation
- Transparent fault recovery and failover

Since AutoCell is completely self-organizing, it holds human intervention to a minimum. That reduces the people costs associated with deployment, management, and maintenance—making 802.11 WLANs practical, efficient, and cost-effective.

802.11g Standards-based Wireless Networking

The NETGEAR ProSafe 802.11g Wireless Access Point WG302 provides a bridge between Ethernet wired LANs and 802.11g compatible wireless LAN networks. It provides connectivity between Ethernet wired networks and radio-equipped wireless notebook systems, desktop systems, print servers, and other devices.

The WG302 also supports the following wireless features:

- Distributed coordinated function (CSMA/CA, Back off procedure, ACK procedure, retransmission of unacknowledged frames)
- RTS/CTS handshake
- Beacon generation
- Packet fragmentation and reassembly
- Short or long preamble
- Roaming among access points on the same subnet

Autosensing Ethernet Connections with Auto Uplink

The WG302 can connect to a standard Ethernet network. The LAN interface is autosensing and capable of full-duplex or half-duplex operation.

The wireless access point uses Auto Uplink™ technology. The Ethernet port automatically senses whether the Ethernet cable plugged into the port should have a ‘normal’ connection such as to a computer or an ‘uplink’ connection such as to a switch or hub. That port will then configure itself correctly. This feature eliminates any concerns about crossover cables, as Auto Uplink will accommodate either type of cable to make the right connection.

Wireless Multimedia (WMM) Support

WMM is a subset of the 802.11e standard. WMM allows wireless traffic to have a range of priorities, depending on the kind of data. Time-dependent information, like video or audio, has a higher priority than normal traffic. For WMM to function correctly, Wireless clients must also support WMM.

Compatible and Related NETGEAR Products

For a list of compatible products from other manufacturers, see the Wireless Ethernet Compatibility Alliance Web site (WECA), see *http://www.wi-fi.net*).

The following NETGEAR products work with the WG302 Wireless Access Point:

- WAG511 ProSafe 108 Mbps Dual Band PC Card
- WAG311 ProSafe 108 Mbps Dual Band PCI Card
- WG311T 802.11g 108 Mbps Wireless PCI Card
- WG511T 802.11g 108 Mbps Wireless CardBus Adapter
- WG511 802.11g 54 Mbps Wireless CardBus Adapter
- WG111 801.11g 54 Mbps Wireless Bridge

System Requirements

Before installing the WG302, make sure you have the following equipment and that your system meets these requirements:

- A 10/100 Mbps Local Area Network device such as a hub or switch.
- The Category 5 UTP straight through Ethernet cable with RJ-45 connector included in the package, or one like it
- A 100-240 V, 50-60 HZ AC power source.
- A Web browser for configuration such as Microsoft Internet Explorer 6.0 or above, or Netscape Navigator 4.78 or above.
- At least one computer with the TCP/IP protocol installed.
- 802.11g or 802.11b-compliant devices, such as the NETGEAR WG511 Wireless Adapter.

What's In the Box?

The product package should contain the following items:

- NETGEAR ProSafe 802.11g Wireless Access Point WG302.
- Power adapter and cord.
- Straight through Category 5 Ethernet cable.
- Reference Manual for the NETGEAR ProSafe 802.11g Wireless Access Point WG302.
- *Resource CD for the NETGEAR ProSafe 802.11g Wireless Access Point WG302*.
- Support Registration card.

Contact your reseller or customer support in your area if there are any missing or damaged parts. See 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 WG302 if you need to return it for repair. To qualify for product updates and product warranty registrations, we encourage you to register on the NETGEAR Web site at: *http://www.NETGEAR.com*.

Hardware Description

This section describes the WG302 front and rear hardware functions.

Front Panel

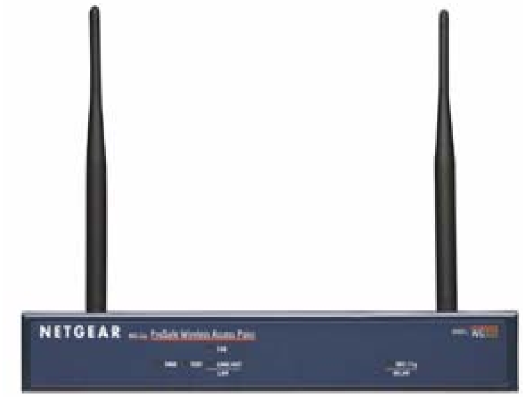


Figure 2-1

Viewed from left to right, the WG302 has these status LEDs: PWR, TEST, LAN, and 802.11g WLAN.

LED	Description	
PWR	Power Indicator	
	Off	No power. If this LED does not come on with the power adapter and cord correctly installed, see Chapter 6, “Troubleshooting.
	On	Power is on.
TEST	Self Test Indicator	
	Blink	Indicates self test, loading software, or system fault (if continues). Note: This LED may blink for a minute before going off.
LAN	Ethernet link indicator	
	Off	No connection detected on the Ethernet link
	Amber On	10 Mbps Ethernet link detected
	Amber Blink	Data is being transmitted or received on the 10 Mbps Ethernet link
	Green On	100 Mbps Fast Ethernet link detected.
	Green Blink	Data is being transmitted or received on the 100 Mbps Ethernet link

LED	Description	
802.11g WLAN	Wireless LAN Link Activity Indicator (2.4 MHz)	
	Off	No wireless link activity.
	Green Blink	Wireless link activity.

Rear Panel

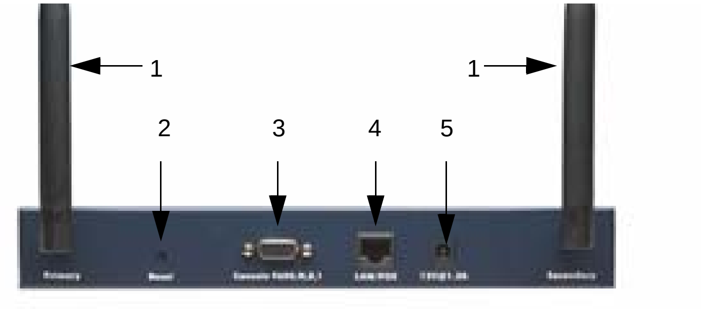


Figure 2-2

Viewed from left to right, the back of the WG302 provides the following:

1. Left and Right Detachable Antennas.The WG302 provides two detachable antennas.
2. Reset button. This restores the default factory settings.
3. Serial Console Port. Use the male DB-9 serial port for serial DTE connections.
4. RJ-45 Ethernet LAN/POE Port. Use the WG302 Ethernet RJ-45 port to connect to an Ethernet LAN through a device such as a hub, switch, router, or Power Over Ethernet (POE) switch.
5. Power socket. This connects to the WG302 power adapter.

Chapter 3
Basic Installation and Configuration

This chapter describes how to set up your NETGEAR ProSafe 802.11g Wireless Access Point WG302 for wireless connectivity to your LAN. This basic configuration enables computers with 802.11b or 802.11g wireless adapters to do such things as connect to the Internet or access printers and files on your LAN..

> **Note:** Indoors, computers can connect over 802.11g wireless networks at ranges of several hundred feet or more. This distance can allow for others outside your area to access your network. It is important to take appropriate steps to secure your network from unauthorized access. The WG302 Wireless Access Point provides highly effective security features which are covered in detail in Appendix B, "Wireless Networking Basics". Deploy the security features appropriate to your needs.

You need to prepare the following three things before you can establish a connection through your wireless access point:

- A location for the WG302 that conforms to the Wireless Equipment Placement and Range Guidelines below.
- The wireless access point connected to your LAN through a device such as a hub, switch, router, or Cable/DSL gateway.
- One or more computers with properly configured 802.11b or 802.11g wireless adapters.

Wireless Equipment Placement and Range Guidelines

The range of your wireless connection can vary significantly based on the location of the wireless access point. The latency, data throughput performance, and notebook power consumption of wireless adapters also vary depending on your configuration choices.

> **Note:** Failure to follow these guidelines can result in significant performance degradation or inability to wirelessly connect to the WG302. For complete performance specifications, see Appendix A, "Specifications.

For best results, place your wireless access point:

- Near the center of the area in which your PCs operate.
- In an elevated location such as a high shelf where the wirelessly connected PCs have line-of-sight access (even if through walls).
- Away from sources of interference, such as PCs, microwaves, and 2.4 GHz cordless phones.
- Away from large metal surfaces.

Putting the antenna in a vertical position provides best side-to-side coverage. Putting the antenna in a horizontal position provides best up-and-down coverage.

If you use multiple access points, it is better if adjacent access points use different radio frequency Channels to reduce interference. The recommended Channel spacing between adjacent access points is five Channels (for example, use Channels 1 and 6, or 6 and 11).

The time it takes to establish a wireless connection can vary depending on both your security settings and placement.

Cabling Requirements

The WG302 Wireless Access Point connects to your LAN via twisted-pair Category 5 Ethernet cable with RJ-45 connectors.

Default Factory Settings

When you first receive your WG302, the default factory settings are set as shown in the following table. You can restore these defaults with the Reset button on the rear panel — see "Hardware Description" on page 2-7.

Feature	Factory Default Settings
User Name (case sensitive)	admin
Password (case sensitive)	password
Operating Mode	Access Point
Access Point Name	netgearxxxxxx where xxxxxx are the last six digits of the wireless access point's MAC address
Built-in DHCP client	DHCP client disabled, it uses the default IP address

Feature	Factory Default Settings
IP Configuration	IP Address: 192.168.1.128 Subnet Mask: 255.255.255.0 Gateway: 0.0.0.0
802.11g Network Name (SSID)	NETGEAR-0
Broadcast Network Name (SSID)	Enabled
802.11g Radio Frequency Channel	Managed automatically by AutoCell (default), if AutoCell is disabled, channel 11 is the default
Super-G Mode	Disabled
WEP/WPA	Disabled
MAC Access Control	Disabled
AutoCell RF Management AutoCell Enhanced RF Security AutoCell Rogue Device Detection	Enabled Disabled Disabled
Restricting connectivity based on MAC Access Control List	Disabled
Time Zone	GMT
Time Zone Adjust for Daylight Saving TIme	Disabled
SNMP	Disabled
VLAN (802.1Q)	Disabled
Load Balancing	Disabled
WMM Support	Disabled

Understanding WG302 Wireless Security Options

Your wireless data transmissions can be received well beyond your walls by anyone with a compatible adapter. For this reason, use the security features of your wireless equipment. The WG302 Wireless Access Point provides highly effective security features which are covered in detail in this chapter. Deploy the security features appropriate to your needs.

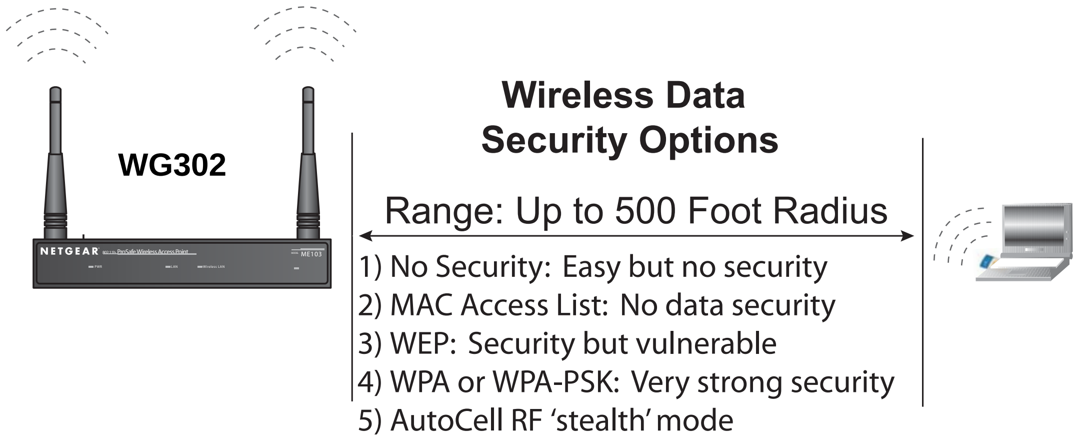

WG302
Wireless Data
Security Options
Range: Up to 500 Foot Radius
1) No Security: Easy but no security
2) MAC Access List: No data security
3) WEP: Security but vulnerable
4) WPA or WPA-PSK: Very strong security
5) AutoCell RF 'stealth' mode

Figure 3-1

There are several ways you can enhance the security of your wireless network:

- **Restrict Access Based on MAC address.** You can restrict access to only trusted PCs so that unknown PCs cannot wirelessly connect to the WG302. MAC address filtering adds an obstacle against unwanted access to your network, but the data broadcast over the wireless link is fully exposed.
- **Turn Off the Broadcast of the Wireless Network Name (SSID).** If you disable broadcast of the SSID, only devices that have the correct SSID can connect. This nullifies the wireless network 'discovery' feature of some products such as Windows XP, but the data is still fully exposed to a determined person using specialized test equipment like wireless sniffers.
- **Use WEP.** Wired Equivalent Privacy (WEP) data encryption provides data security. WEP Shared Key authentication and WEP data encryption will block all but the most determined eavesdropper.
- **Use IEEE 802.1x.** IEEE 802.1x is the standard for passing the Extensible Authentication Protocol (EAP) over an 802.11 wireless network using a protocol called EAP Encapsulation Over LANs (EAPOL). This is a newer, more secure standard than Static WEP.
- **Use WPA, WPA-PSK, WPA2, or WPA2-PSK.** Wi-Fi Protected Access (WPA and WPA2) data encryption provides data security. The very strong authentication along with dynamic per frame rekeying of WPA make it virtually impossible to compromise. Because this is a new standard, wireless device driver and software availability may be limited.

- **Use AutoCell Enhanced RF Security 'Stealth Mode.'** In addition to standard encryption and security mechanisms such as WEP and WPA, the WG302 AutoCell feature provides self-organizing micro cells for an additional level of privacy for enterprises. In this mode, AutoCell shrinks the size of coverage to the minimum to reach clients but also shrinks the size of the beacons that access points use to announce their presence. This mode makes an enterprise wireless LAN nearly invisible to users outside an office building. AutoCell clients such as the NETGEAR WAG511 are highly-recommended for Enhanced RF Security.

Installing the WG302 Wireless Access Point

Before you install the WG302 Wireless Access Point, make sure that your Ethernet network is up and working. You will be connecting the access point to the Ethernet network. Then computers with 802.11b or 802.11g wireless adapters will be able to communicate with the Ethernet network. In order for this to work correctly, verify that you have met all of the system requirements, shown in "System Requirements" on page 2-6.

1. Set up the WG302 Wireless Access Point.

> **Tip:** Before mounting the WG302 in a high location, first set up and test the WG302 to verify wireless network connectivity.

a. Prepare a computer with an Ethernet adapter. If this computer is already part of your network, record its TCP/IP configuration settings.

b. Configure the computer with a static IP address of 192.168.0.210 and 255.255.255.0 for the Subnet Mask.

c. Connect an Ethernet cable from the WG302 to the computer.

d. Turn on your computer, connect the power adapter to the WG302 and verify the following:

– The PWR power light goes on.

– The LAN light of the wireless access point is lit when connected to a powered on computer.

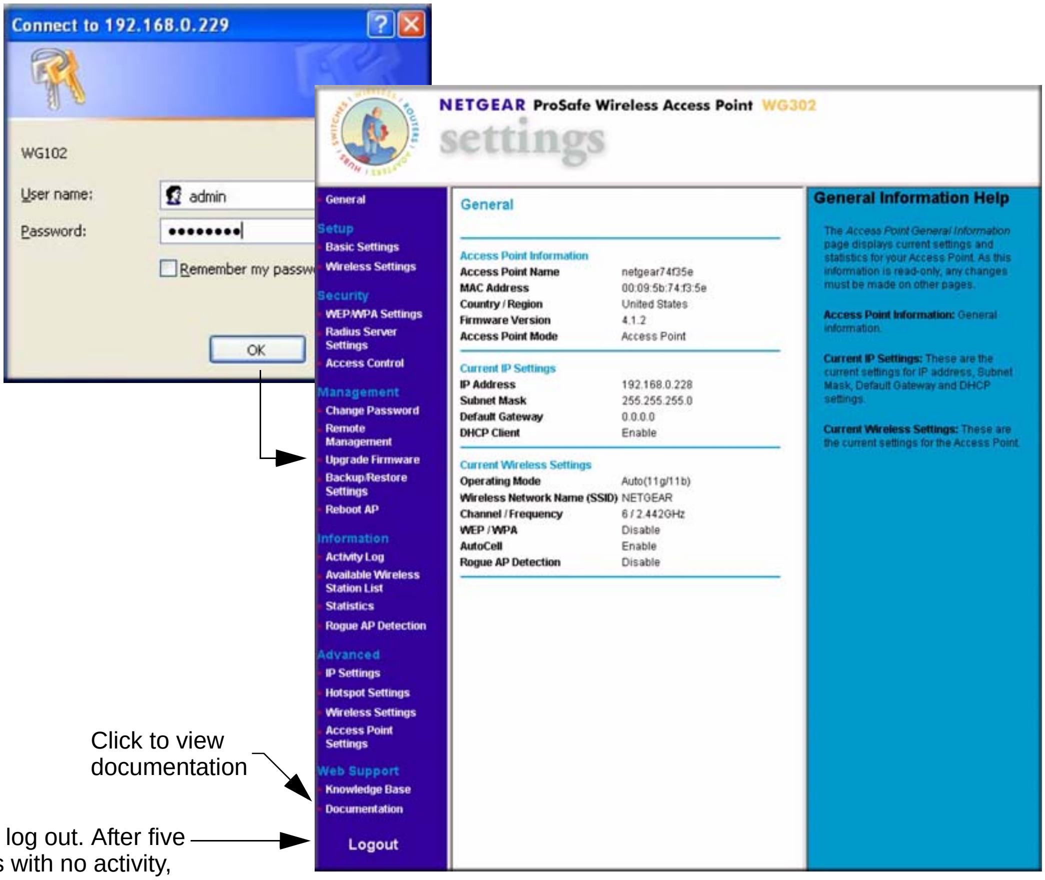
2. Configure LAN and wireless access.

a. Use your Web browser to connect to the WG302.

– Enter **192.168.1.128** in the address field of your browser.

– When prompted, enter **admin** for the user name, and **password** for the password, both in lower case letters.

The Web browser displays the WG302 main menu and General page, as shown below.



Connect to 192.168.0.229

WG102

User name: admin

Password: ••••••••

□ Remember my passw

OK

General

Access Point Information	
Access Point Name	netgear74f35e
MAC Address	00:09:5b:74:f3:5e
Country / Region	United States
Firmware Version	4.1.2
Access Point Mode	Access Point
Current IP Settings	
IP Address	192.168.0.228
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DHCP Client	Enable
Current Wireless Settings	
Operating Mode	Auto(11g/11b)
Wireless Network Name (SSID)	NETGEAR
Channel / Frequency	6 / 2.442GHz
WEP / WPA	Disable
AutoCell	Enable
Rogue AP Detection	Disable

General Information Help

The *Access Point General Information* page displays current settings and statistics for your Access Point. As this information is read-only, any changes must be made on other pages.

Access Point Information: General information.

Current IP Settings: These are the current settings for IP address, Subnet Mask, Default Gateway and DHCP settings.

Current Wireless Settings: These are the current settings for the Access Point.

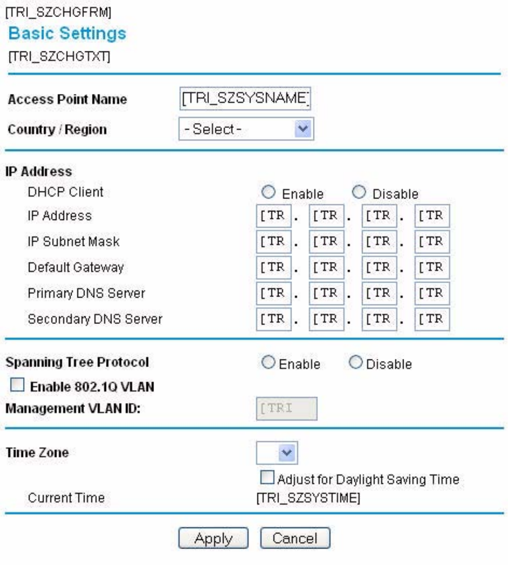
Click to view documentation

Click to log out. After five minutes with no activity, you are logged out automatically.

Figure 3-2

b. Click the Basic Settings link to view the Basic Settings menu.

c. Configure the settings for your network and click **Apply**.



[TRI_SZCHGFRM]

Basic Settings

[TRI_SZCHGTXT]

Access Point Name [TRI_SZSYSNAME]

Country / Region - Select -

IP Address

DHCP Client ○ Enable ○ Disable

IP Address [TR . [TR . [TR . [TR

IP Subnet Mask [TR . [TR . [TR . [TR

Default Gateway [TR . [TR . [TR . [TR

Primary DNS Server [TR . [TR . [TR . [TR

Secondary DNS Server [TR . [TR . [TR . [TR

Spanning Tree Protocol ○ Enable ○ Disable

□ Enable 802.1Q VLAN

Management VLAN ID: [TRI

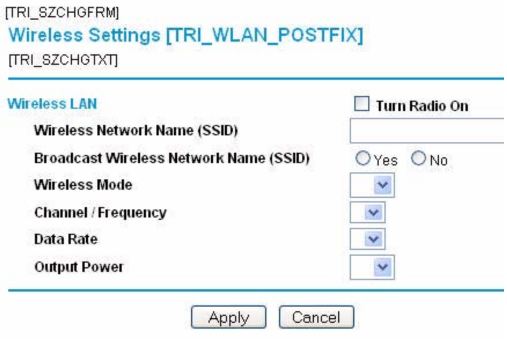
Time Zone

□ Adjust for Daylight Saving Time

Current Time [TRI_SZSYSTIME]

Figure 3-3

d. Click Wireless Settings in the Setup section of the main menu to view the Wireless Settings menu.



[TRI_SZCHGFRM]

Wireless Settings [TRI_WLAN_POSTFIX]

[TRI_SZCHGTXT]

Wireless LAN □ Turn Radio On

Wireless Network Name (SSID)

Broadcast Wireless Network Name (SSID) ○ Yes ○ No

Wireless Mode

Channel / Frequency

Data Rate

Output Power

Figure 3-4

e. Enter the wireless settings. See the online help or "Wireless Settings" on page 3-11 for full instructions.

➡	**Note:** In the USA, the Region is preset according to regulatory requirements and cannot be changed. In other areas, you can and must set the Region. It may not be legal to operate the wireless access point in a region other than one of those identified in this field.

Now that you have finished the setup, you are ready to deploy the WG302 in your network. If needed, you can now reconfigure the computer you used for this process back to its original TCP/IP settings.

3. Deploy the WG302 Wireless Access Point

a. Disconnect the WG302 and put it where you will deploy it. The best location is elevated, such as wall mounted, or on the top of a cubicle, at the center of your wireless coverage area, and within line of sight of all the mobile devices.

b. Lift the antenna on either side to be vertical.

> **Note:** Consult the antenna positioning and wireless mode configuration information in the Advanced Configuration chapter of this manual.

c. Connect an Ethernet cable from your WG302 Wireless Access Point to a LAN port on your router, switch, or hub.

> **Note:** By default, the WG302 is set with the DHCP client disabled. If your network uses dynamic IP addresses, you must change this setting.

d. Connect the power adapter to the wireless access point, and plug the power adapter in to a power outlet. The PWR, LAN, and WLAN lights should light up.

4. Verify wireless connectivity

Using a computer with an 802.11b or 802.11g wireless adapter with the correct wireless settings needed to connect to the WG302 (SSID, WEP/WPA, MAC ACL, etc.), verify connectivity by using a browser such as Mozilla Firefox, Netscape, or Internet Explorer to browse the Internet, or check for file and printer access on your network.

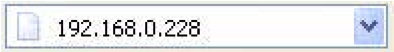
> **Note:** If you are unable to connect, see Chapter 6, “Troubleshooting

Logging in to the WG302 Using Its Default IP Address

The default IP address of your access point is 192.168.1.128. The WG302 is set, by default, for the DHCP client to be disabled.

Note: The computer that you use to connect to the WG302 should be configured with an IP address that starts with 192.168.1.x and a Subnet Mask of 255.255.255.0.

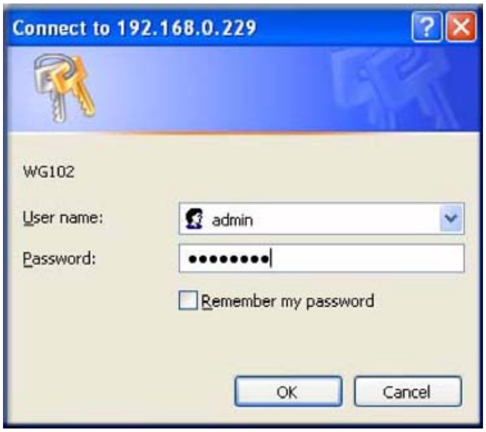
1. Open a Web browser such as Internet Explorer, Netscape Navigator, or Mozilla Firefox.
2. Connect to the WG302 by entering its default address of **http://192.168.1.128** into your browser.



192.168.0.228

Figure 3-5

3. A login window like the one shown below opens:



Connect to 192.168.0.229

WG102

User name: admin

Password: ••••••••

□ Remember my password

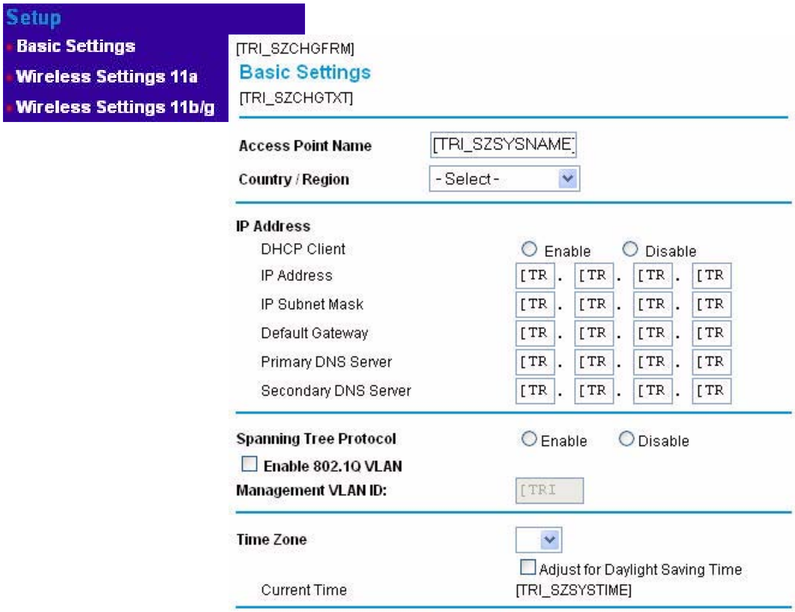
Figure 3-6

4. Log in by using the default user name of **admin** and default password of **password**.

   Once you have entered your access point name, the Web browser finds the WG302 Wireless Access Point and displays the main menu as shown in Figure 3-2 on page 3-6.

Basic IP Settings

To configure the basic settings of your wireless access point, click Basic Settings in the Setup section of the WG302 main menu. The Basic Settings menu appears, as shown in Figure 3-7.



[TRI_SZCHGFRM]
Basic Settings
[TRI_SZCHGTXT]

Access Point Name [TRI_SZSYSNAME]
Country / Region - Select -

IP Address
DHCP Client ○ Enable ○ Disable
IP Address [TR . [TR . [TR . [TR
IP Subnet Mask [TR . [TR . [TR . [TR
Default Gateway [TR . [TR . [TR . [TR
Primary DNS Server [TR . [TR . [TR . [TR
Secondary DNS Server [TR . [TR . [TR . [TR

Spanning Tree Protocol ○ Enable ○ Disable
□ Enable 802.1Q VLAN
Management VLAN ID: [TRI

Time Zone
□ Adjust for Daylight Saving Time
Current Time [TRI_SZSYSTIME]

Figure 3-7

The Basic Settings default values described in the following list work for most users and situations.

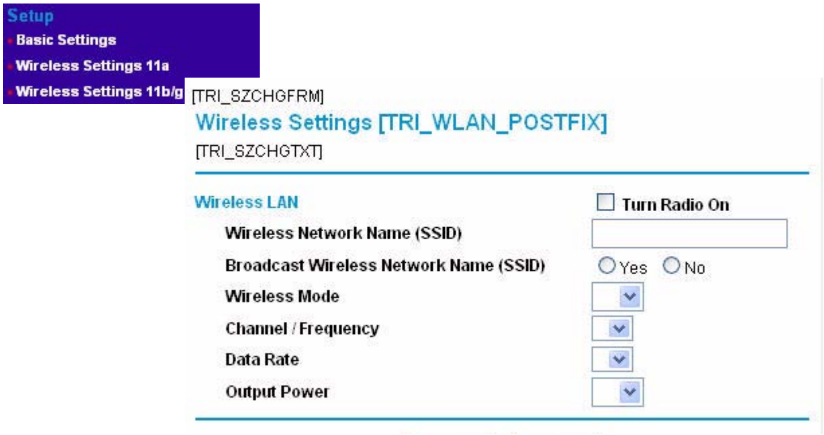
- **Access Point Name.** This unique name is the access point NetBIOS name. The default Access Point Name is on the bottom label of the WG302. You can modify the default name with a unique name up to 15 characters long. The default is netgearxxxxxx, where xxxxxxx represents the last six digits of the WG302 MAC address.
- **DHCP Client:** By default, Dynamic Host Configuration Protocol (DHCP) client is disabled. After installation (“Installing the WG302 Wireless Access Point” on page 3-5), you can enable DHCP to let the wireless access point get its TCP/IP configuration from the DHCP server on your network. The wireless access point gets the IP address, subnet mask and the default gateway settings automatically from the DHCP server if DHCP is enabled.
- **IP Address.** The default IP address is 192.168.1.128. To change it, enter an unused IP address from the address range used on your LAN (factory default: 192.168.1.128); or enable DHCP.

- **IP Subnet Mask.** Enter the subnet mask value used on your LAN (factory default: 255.255.255.0).
- **Default Gateway.** Enter the IP address of the Gateway for your LAN. For more complex networks, enter the address of the router for the network segment to which the wireless access point is connected (factory default: 0.0.0.0).
- **DNS Server.** Enter the IP address of the DNS (Domain Name Server) you wish to use (factory default: 0.0.0.0.
- **Enable 802.1Q VLAN.** Check the box Enable 802.1Q VLAN to enable the WG302 to process VLAN membership information.
- **Time Zone.** Select the Time Zone to match your location. If your location uses daylight saving, check the box Adjust for Daylight Saving Time.
- The Current Time, as used on the wireless access point, is displayed.

➡	**Note:** You must have an Internet connection to get the current time.

Wireless Settings

To configure the wireless settings, click Wireless Settings in the Setup section of the WG302 main menu. The Wireless Settings menu appears, as shown in Figure 3-8.



[TRI_SZCHGFRM]

Wireless Settings [TRI_WLAN_POSTFIX]

[TRI_SZCHGTXT]

Wireless LAN

□ Turn Radio On

Wireless Network Name (SSID)

Broadcast Wireless Network Name (SSID) ○ Yes ○ No

Wireless Mode

Channel / Frequency

Data Rate

Output Power

Figure 3-8

The Wireless Settings menu options are discussed below.

> **Note:** Channel selection and power management are automatically adjusted by the AutoCell Auto RF Management option. The Auto RF Management option is enabled by default.

- **Country/Region.** This is the region where the WG302 can be used. It may not be legal to operate the wireless features of the wireless access point in a region other than one of those identified in this field. For products sold in the United States, the default country domain is preset. Also, the channel is set to 11. For products sold outside the United States, unless a country domain is selected, the channel cannot be changed.
- **Turn Radio On.** On by default, you can also turn off the radio to disable access through this device. This can be helpful for configuration, network tuning, or troubleshooting activities.
- **Operating Mode.** Select the desired wireless operating mode. The options are:
  - Auto (802.11g/802.11b): Both 802.11g and 802.11b wireless stations can be used. This is the default.
  - 802.11g Only: Only 802.11g wireless stations can be used.
  - 802.11b Only: All 802.11b wireless stations can be used. 802.11g wireless stations can still be used if they can operate in 802.11b mode.
- **Channel.** This sets which operating frequency is used. You should not need to change the channel unless you notice interference problems, or if you are setting up the WG302 near another access point.The wireless channel range is 1 to 11 for USA and Canada and 1 to 13 for Europe and Australia. The default is channel 11.

  > **Note:** AutoCell automatically adjusts the channel selection when the Auto RF Management option is used. The AutoCell Auto RF Management option is enabled by default.

  - Access points use a fixed channel. You can select the channel to provide the least interference and best performance. In the USA and Canada, 11 channels are available.
  - If you use multiple access points, it is better if adjacent access points use different channels to reduce interference. The recommended channel spacing between adjacent access points is five channels (for example, use channels 1 and 6, or 6 and 11).

– In “Infrastructure” mode, wireless stations normally scan all channels, looking for an access point. If more than one access point can be used, the one with the strongest signal is used. This can only happen when the access points use the same SSID.

See *http://documentation.netgear.com/reference/enu/wireless/index.htm* for more information on wireless channels.

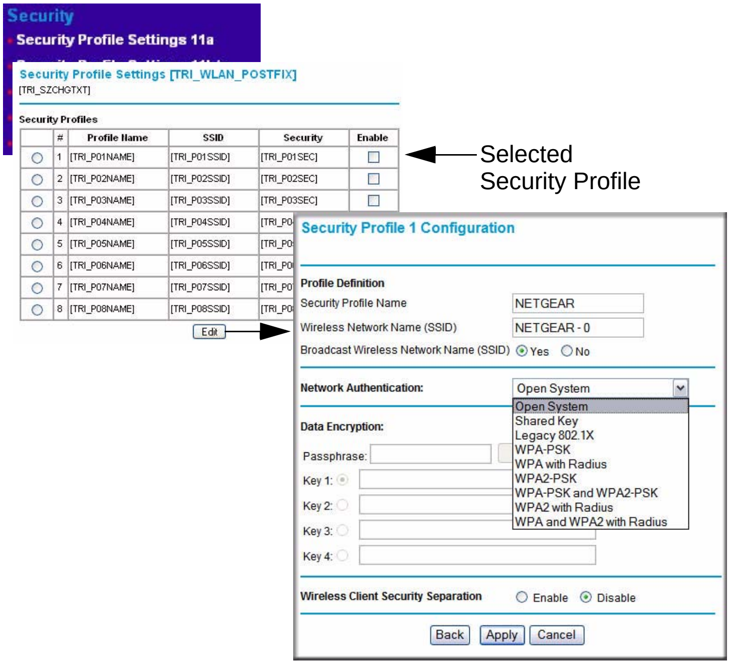
- **Data Rate.** Shows the available transmit data rate of the wireless network. The default is Best.
- **Output Power.** Set the transmit signal strength of the access point (AP). The options are full, half, quarter, eighth, and min. Decrease the transmit power if two or more APs are close together and use the same channel frequency. The default is Full.

Security Profiles

Security profiles let you configure unique security settings for each SSID. The WG302 supports up to eight SSIDs. The Security Profile Settings menu is shown to the right.

To edit a security profile, select it from the list, and click Edit.

The Security Profile Configuration page opens for that profile.



Security Profile Settings [TRI_WLAN_POSTFIX]
[TRI_SZCHGTXT]

Security Profiles

	#	Profile Name	SSID	Security	Enable
○	1	[TRI_P01NAME]	[TRI_P01SSID]	[TRI_P01SEC]	□
○	2	[TRI_P02NAME]	[TRI_P02SSID]	[TRI_P02SEC]	□
○	3	[TRI_P03NAME]	[TRI_P03SSID]	[TRI_P03SEC]	□
○	4	[TRI_P04NAME]	[TRI_P04SSID]	[TRI_P0	
○	5	[TRI_P05NAME]	[TRI_P05SSID]	[TRI_P0	
○	6	[TRI_P06NAME]	[TRI_P06SSID]	[TRI_P0	
○	7	[TRI_P07NAME]	[TRI_P07SSID]	[TRI_P0	
○	8	[TRI_P08NAME]	[TRI_P08SSID]	[TRI_P0	

Edit

Security Profile 1 Configuration

Profile Definition

Security Profile Name: NETGEAR

Wireless Network Name (SSID): NETGEAR - 0

Broadcast Wireless Network Name (SSID) ● Yes ○ No

Network Authentication: Open System

Open System
Shared Key
Legacy 802.1X
WPA-PSK
WPA with Radius
WPA2-PSK
WPA-PSK and WPA2-PSK
WPA2 with Radius
WPA and WPA2 with Radius

Data Encryption:

Passphrase:

Key 1: ●

Key 2: ○

Key 3: ○

Key 4: ○

Wireless Client Security Separation ○ Enable ● Disable

Back Apply Cancel

Figure 3-9

The settings for Security Profile Configuration are explained below.

- **Security Profile Name.** Use a name that makes it easy to recognize the profile, and to tell profiles apart.

- **Wireless Network Name (SSID).** The SSID is also known as the wireless network name. The SSID separates network traffic from different wireless networks. To connect any wireless device to a wireless network, you need to use the SSID. The WG302 default SSID is: NETGEAR-0 for the first profile, NETGEAR-1 for the second, and so on. You can enter a value of up to 32 alphanumeric characters. Some concepts regarding the SSID are explained below:
  - Using the same SSID is essential. Devices with different SSIDs cannot communicate with each other. However, some access points allow connections from wireless stations that have their SSID set to “any” or whose SSID is blank (null).
  - A Basic Service Set (BSS) is a group of wireless stations and a single access point, all using the same SSID.
  - An Extended Service Set (ESS) is a group of wireless stations and multiple access points, all using the same ID (ESSID).
  - Different access points within an ESS can use different channels. To reduce interference, adjacent access points *should* use different channels.
  - Roaming is the ability of wireless stations to connect wirelessly when they physically move from one ESS to another. The wireless station automatically changes to the access point with the least interference or best performance.

Note: The AutoCell Auto RF Management option enhances the roaming, interference, and channel selection of an extended wireless network.

- **Broadcast Wireless Network Name (SSID).** This field lets you turn off the SSID broadcast. If you do so, then only stations that know the SSID can connect. Disabling the SSID broadcast somewhat hampers the wireless network ‘discovery’ feature of some products. The default is to enable SSID broadcast.

Note: Broadcast Wireless Network Name (SSID) is turned off if you enable the AutoCell Enhanced RF Security option (disabled by default).

Network Authentication

The WG302 Wireless Access Point is set by default as an open system with no authentication. When setting up Network Authentication, bear in mind the following:

- If you are using Access Point mode, then all options are available. In other modes such as Repeater or Bridge, some options may be unavailable.
- Not all wireless adapters support WPA or WPA2. Windows XP and Windows 2000 with Service Pack 3 do include the client software that supports WPA. However, client software is required on the client. Consult the product documentation for your wireless adapter and WPA or WPA2 client software for instructions on configuring WPA2 settings.

You can configure the WG302 to use the types of network authentication shown in the table below.

Network Authentication Types	
Open System	Can be used with WEP encryption, or no encryption.
Shared Key	WEP must be used. At least one shared key must be entered.
Legacy 802.1x	You must configure the Radius Server Settings to use this option.
WPA-PSK	You must use TKIP encryption, and enter the WPA passphrase (Network key).
WPA with Radius	You must configure the Radius Server Settings to use this option.
WPA2-PSK	WPA2 is a later version of WPA. Only select this if all clients support WPA2. If selected, you must use AES encryption, and enter the WPA passphrase (Network key).
WPA-PSK and WPA2-PSK	This selection allows clients to use either WPA (with TKIP) or WPA2 (with AES). If selected, encryption must be TKIP + AES. The WPA passphrase (Network key) must also be entered.
WPA2 with Radius	WPA2 is a later version of WPA. Only select this if all clients support WPA2. If selected, you must use AES encryption, and configure the Radius Server Settings Screen.
WPA and WPA2 with Radius	This selection allows clients to use either WPA (with TKIP) or WPA2 (with AES). If selected, encryption must be TKIP + AES, and you must also configure the Radius Server Settings Screen

Data Encryption

Select the data encryption that you want to use. The available options depend on the Network Authentication setting above (otherwise, the default is None). The Data Encryption settings are explained in the table below:

Data Encryption Settings	
None	No encryption is used.
64 bits WEP	Standard WEP encryption, using 40/64 bit encryption.

Data Encryption Settings	
128 bits WEP	Standard WEP encryption, using 104/128 bit encryption.
152 bits WEP	Proprietary mode that will only work with other wireless devices that support this mode.
TKIP	This is the standard encryption method used with WPA.
AES	This is the standard encryption method for WPA2. Some clients may support AES with WPA, but this is not supported by this Access Point.
TKIP + AES	This setting supports both WPA and WPA2. Broadcast packets use TKIP. For unicast (point-to-point) transmissions, WPA clients use TKIP, and WPA2 clients use AES.

The Passphrases and Keys are explained below:

- **Passphrase.** To use the Passphrase to generate the WEP keys, enter a passphrase and click the Generate Keys button. You can also enter the keys directly. These keys must match the other wireless stations.
- **Key 1, Key 2, Key 3, Key 4.** If using WEP, select the key to be used as the default key. Data transmissions are always encrypted using the default key. The other keys can only be used to decrypt received data.
- **WPA Passphrase (Network Key).** If using WPA-PSK, enter the passphrase here. All wireless stations must use the same passphrase (network key). The network key must be from 8 to 63 characters in length.

Wireless Client Security Separation

If enabled, the associated wireless clients will not be able to communicate with each other. This feature is used for hotspots and other public access situations. The default is Disabled.

Before You Change the SSID and WEP Settings

For a new wireless network, print or copy this form and fill in the settings. For an existing wireless network, the person who set up or is responsible for the network can provide this information. Be sure to set the Regulatory Domain correctly as the first step. Store this information in a safe place.

- **SSID*:*** The Service Set Identification (SSID) identifies the wireless local area network. You may customize it by using up to 32 alphanumeric characters. Write your SSID on the line.

  SSID: ________________________________

  Note: The SSID in the wireless access point is the SSID you configure in the wireless adapter card. All wireless nodes in the same network must be configured with the same SSID.
- **Authentication**
  Circle one: Open System or Shared Key. Choose “Shared Key” for more security.

  Note: If you select shared key, the other devices in the network will not connect unless they are set to Shared Key and have the same keys in the same positions as those in the WG302.
- **WEP Encryption Keys**
  For all four 802.11b keys, choose the Key Size. Circle one: 64, 128, or 152 bits

  Key 1: ________________________________

  Key 2: ________________________________

  Key 3: ________________________________

  Key 4: ________________________________
- **WPA-PSK (Pre-Shared Key)WPA2-PSK (Pre-Shared Key)**
  Record the WPA-PSK key:Record the WPA2-PSK key:

  Key: ______________________________ Key: ______________________________
- **WPA RADIUS Settings**
  For WPA, record the following settings for the primary and secondary RADIUS servers:

  Server Name/IP Address: Primary ________________ Secondary ________________

  Port: ________________________________

  Shared Secret: ________________________________
- **WPA2 RADIUS Settings**
  For WPA2, record the following settings for the primary and secondary RADIUS servers:

  Server Name/IP Address: Primary ________________ Secondary ________________

  Port: ________________________________

  Shared Secret: ________________________________

Use the procedures described in the following sections to configure the WG302.

Setting up and Testing Basic Wireless Connectivity

Follow the instructions below to set up and test basic wireless connectivity. After this is done, then you can set up wireless security settings appropriate to your needs.

1. Connect to the WG302.

In the address field of your Web browser, enter the default LAN address of **http://192.168.1.128**. Log in with the user name of **admin** and default password of **password**, or using the LAN address and password that you set up.

2. Click the Wireless Settings link in the main menu of the WG302.

The default SSID is NETGEAR-0.

> **Note:** The SSID of any wireless access adapters must match the SSID you configure in the NETGEAR ProSafe 802.11g Wireless Access Point WG302. If they do not match, you will not get a wireless connection to the WG302.

3. Select the Country/Region in which the wireless interface will operate.

4. For now, do not make other changes

5. Click **Apply** to save your changes.

> **Note:** If you are configuring the WG302 from a wireless computer and you change the SSID, channel, or security settings, you will lose your wireless connection when you click Apply. You must then change the wireless settings of your computer to match the new settings.

6. Configure and test your PCs for wireless connectivity.

Set up the wireless adapters of your PCs so that they all have the same SSID and channel that you configured in the WG302. Check that they have a wireless link and are able to obtain an IP address by DHCP from the WG302.

Now that your PCs can connect to the WG302, you can configure the wireless security.

Configuring the Radius Server Settings

Use the following steps to view or change the Radius Server Settings.

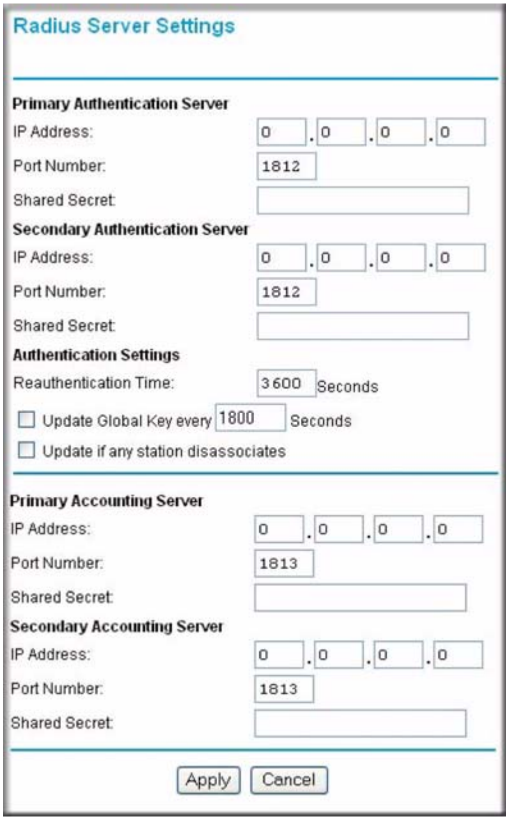
1. Connect to the WG302.

   In the address field of your Web browser, enter the default LAN address of **http://192.168.1.128**. Log in with the user name of **admin** and default password of **password**, or log in by using the LAN address and password that you configured.

2. In the Security menu, click Radius Server Settings.
3. Enter the settings, and click **Apply**.

The Radius Server Settings are explained below:

- **Authentication/Access Control Radius Server Configuration.** This configuration is required for authentication using Radius. IP Address, Port No. and Shared Secret is required for communication with Radius Server. A Secondary Radius Server can be configured which is used on failure on Primary Radius Server
- **IP Address.** The IP address of the Radius Server. The default is 0.0.0.0.



Radius Server Settings

Primary Authentication Server	
IP Address:	0 . 0 . 0 . 0
Port Number:	1812
Shared Secret:	
Secondary Authentication Server	
IP Address:	0 . 0 . 0 . 0
Port Number:	1812
Shared Secret:	
Authentication Settings	
Reauthentication Time:	3600 Seconds
□ Update Global Key every 1800 Seconds	
□ Update if any station disassociates	
Primary Accounting Server	
IP Address:	0 . 0 . 0 . 0
Port Number:	1813
Shared Secret:	
Secondary Accounting Server	
IP Address:	0 . 0 . 0 . 0
Port Number:	1813
Shared Secret:	

Figure 3-10

- **Port Number.** Port number of the Radius Server. The default is 1812.
- **Shared Secret.** This is shared between the Wireless Access Point and the Radius Server while authenticating the supplicant.
- **Re-authentication Time.** The time interval in seconds after which the supplicant will be authenticated again with the Radius Server. The default is 3600 seconds.
- **Global-key Re-Key Time.** Select this option to enable Re-keying of Global Key. The Global Key Re-Key can be done based on time interval in seconds or number of packets exchanged using the global key. The default is 3600 seconds.

- **Update if any station disassociates.** Select this option to refresh global key when any stations disassociated with wireless Access Point.
- **Accounting Radius Server Configuration.** This configuration is required for accounting using Radius Server. IP Address, Port Number and Shared Secret is required for communication with Radius Server. A Secondary Radius Server can be configured which is used on failure on Primary Radius Server.
- **IP Address.** The IP address of the Radius Server. The default is 0.0.0.0.
- **Port Number.** Port number of the Radius Server. The default is 1813.
- **Shared Secret.** This is shared between the Wireless Access Point and the Radius Server while authenticating the supplicant.

Configuring Network Authentication

Use the following steps to configure network authentication.

1. Connect to the WG302.

In the address field of your Web browser, enter the default LAN address of **http://192.168.1.128**. Log in with the user name of **admin** and default password of **password**, or log in by using the LAN address and password that you configured.

2. If you are using Radius Server Settings, set them up first, as described in "Configuring the Radius Server Settings" on page 3-19.

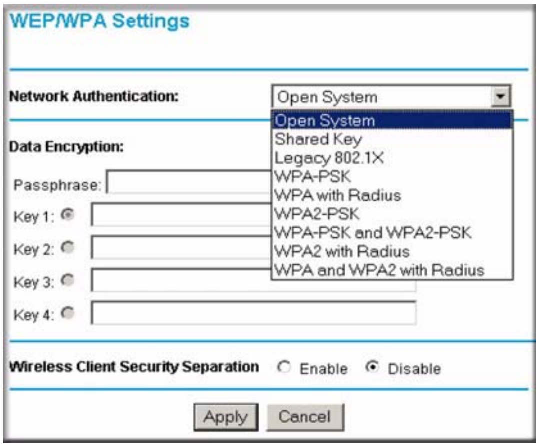
3. Set the Network Authentication that you want to use.

a. On the Security menu, click Security Profiles Settings.

b. Select the profile that you want.

c. Click Edit to view the Security Profiles Configuration menu.

d. Choose the type of Network Authentication that you want from the list.



WEP/WPA Settings

Network Authentication: Open System

Data Encryption:

Passphrase:

Key 1: ●

Key 2: ○

Key 3: ○

Key 4: ○

Wireless Client Security Separation ○ Enable ● Disable

Figure 3-11

➡	**Note:** You can use WEP with Open System or Shared Key. Choose the encryption strength, and then enter the Keys as explained in "Entering WEP Data Encryption Keys" on page 3-21

e. Click **Apply** to save your settings.

➡	**Note:** If you use a wireless computer to configure WEP settings, you will be disconnected when you click Apply. Reconfigure your wireless adapter to match the new settings or access the wireless access point from a wired computer to make any further changes.

Entering WEP Data Encryption Keys

You can manually or automatically program the four data encryption keys. These values must be identical on all PCs and Access Points in your network.

- Automatic: Enter a word or group of printable characters in the Passphrase box and click the Generate button. The four key boxes are automatically populated with key values.
- Manual: Enter ten hexadecimal digits (any combination of 0-9, a-f, or A-F).
  Select which of the four keys is the default.

See *http://documentation.netgear.com/reference/enu/wireless/index.htm* for a full explanation of each of these options, as defined by the IEEE 802.11 wireless communication standard.

Restricting Wireless Access by MAC Address

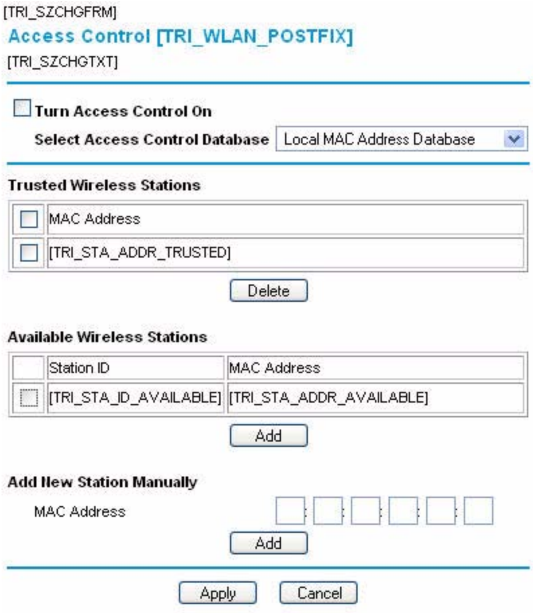
To restrict access based on MAC addresses, follow these steps:

1. Connect to the WG302.

In the address field of your Web browser, enter the default LAN address of **http://192.168.1.128**. Log in with the user name of **admin** and default password of **password**, or log in by using the LAN address and password that you configured.

Note: When configuring the WG302 from a wireless computer whose MAC address is not in the access control list, if you select Turn Access Control On, you will lose your wireless connection when you click Apply. You must then access the wireless access point from a wired computer or from a wireless computer which is on the access control list to make any further changes.

2. From the Security menu, click the Access Control link to display the Access Control List (ACL) menu shown below.



[TRI_SZCHGFRM]

Access Control [TRI_WLAN_POSTFIX]

[TRI_SZCHGTXT]

□ Turn Access Control On

Select Access Control Database: Local MAC Address Database

Trusted Wireless Stations

□	MAC Address
□	[TRI_STA_ADDR_TRUSTED]

Available Wireless Stations

	Station ID	MAC Address
□	[TRI_STA_ID_AVAILABLE]	[TRI_STA_ADDR_AVAILABLE]

Add New Station Manually

MAC Address: □ : □ : □ : □ : □ : □

Figure 3-12

3. Select the Turn Access Control On check box.

4. Choose to use the local MAC address database stored on the access point, or use the RADIUS MAC address database stored on a RADIUS server.

   - If you choose the RADIUS MAC Address Database, you must configure the RADIUS Server Settings first.

   - If you choose Local MAC Address Database, either select from the list of available wireless cards the WG302 has found in your area, or enter the MAC address and device name for a device you plan to use.

You can usually find the MAC address printed on the wireless adapter. Click Add to add the wireless device to the access list. Repeat these steps for each additional device you want to add to the list.

5. Be sure to click **Apply** to save your wireless access control list settings.

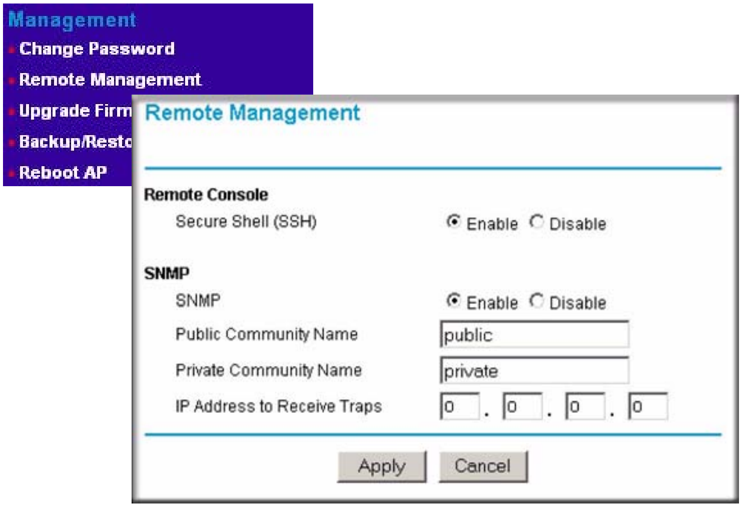
Now, only devices on the MAC ACL will be allowed to wirelessly connect to the WG302.

Chapter 4
Management

This chapter describes how to use the management features of your NETGEAR ProSafe 802.11g Wireless Access Point WG302. To get to these features, connect to the WG302 as described in "Logging in to the WG302 Using Its Default IP Address" on page 3-9.

Remote Management

Access the Remote Management screen by clicking Remote Management under Management on the main menu.



Remote Management

Remote Console

Secure Shell (SSH) ● Enable ○ Disable

SNMP

SNMP ● Enable ○ Disable

Public Community Name: public

Private Community Name: private

IP Address to Receive Traps: 0 . 0 . 0 . 0

Figure 4-1

Enter the Remote Management information.

- **Remote Console**, **Secure Shell (SSH)**: If set to Enable, the Wireless Access Point will only allow remote access via Secure Shell and Secure Telnet. The default is Enable.
- **SNMP**: Enable SNMP to allow the SNMP network management software, such as HP OpenView, to manage the wireless access point via SNMPv1/v2 protocol.

- **Public Community Name**: The community string to allow the SNMP manager to read the wireless access point's MIB objects. The default is public.
- **Private Community Name**: The community string to allow the SNMP manager to read and write the wireless access point's MIB objects. The default is private.
- **IP address to Receive Traps**: The IP address of the SNMP manager to receive traps sent from the wireless access point. The default is 0.0.0.0.

Using the Secure Telnet Interface

The WG302 includes a secure Telnet command line interface (CLI). You can access the CLI from a secure Telnet client over the Ethernet port or over the serial console port.

> **Note:** You must use a secure Telnet client such as Absolute Telnet. Also, when you configure the client, use the SSH1, 3DES option. If you use the Telnet client to connect over the Ethernet port, use the IP address of the WG302 as the host name.

How to Use the CLI via the Console Port

1. Using the null-modem cable, connect a VT100/ANSI terminal or a workstation to the port labeled Console.

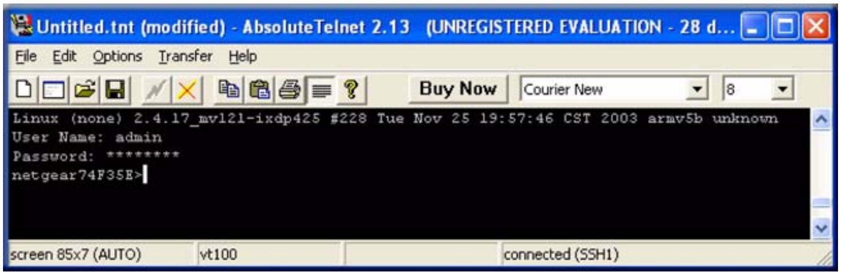
If you attached a PC, Apple Macintosh, or UNIX workstation, start a secure terminal-emulation program.

2. Configure the terminal-emulation program to use the following settings:

- Baud rate: 9600 bps
- Data bits: 8
- Parity: none
- Stop bit: 1
- Flow control: none

These settings appear below the connector on the back panel.

3. Press the return key, and the screen below should appear.


Untitled.tnt (modified) - AbsoluteTelnet 2.13 (UNREGISTERED EVALUATION - 28 d...
File Edit Options Transfer Help
Buy Now
Courier New
8

```
Linux (none) 2.4.17_mvl21-ixdp425 #228 Tue Nov 25 19:57:46 CST 2003 armv5b unknown
User Name: admin
Password: ********
netgear74F35E>
```

screen 85x7 (AUTO)
vt100
connected (SSH1)

Figure 4-2

The login name is **admin** and **password** is the default password.

After successful login, the screen should show the (*Access Point Name*)> prompt. In this example, the prompt is *netgear74F35E*.

Enter help to display the CLI command help.

CLI Commands

The CLI commands are listed in Appendix C, “Command Line Reference.”

SNMP Remote Management

Enable SNMP to allow SNMP network management software such as HP OpenView to manage the wireless access point via the SNMPv1/v2 protocol.

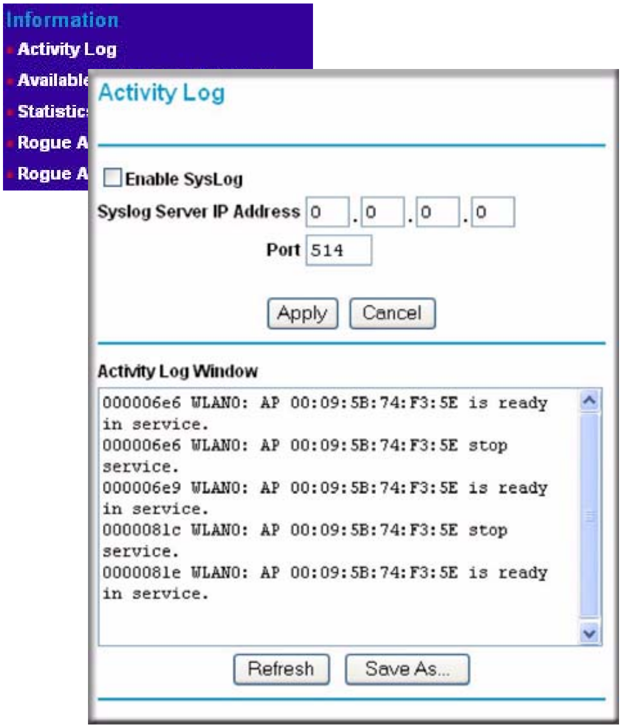
1. Click Enable to use the SNMP remote management feature.
2. Fill in the fields according to the requirements of your location.
   - **Public Community Name.** (Default: public) The community string to allow the SNMP manager to read the MIB objects of the WG302.
   - **Private Community Name.** (Default: private) The community string to allow the SNMP manager to read and write the MIB objects of the WG302.
   - **Manager IP address.** Enter the IP address of the SNMP manager. If this is set to 255.255.255.255, any SNMP manager is allowed.

- **IP address to Receive Traps.** Enter the IP address of the SNMP manager to receive traps sent from the wireless Access Point. If you don't want Traps to be sent, leave this at the default value of 0.0.0.0

3. Be sure to click **Apply** to save your changes.

Viewing the Activity Log

From the WG302 main menu, under the Information heading, click Activity Log.



□ Enable SysLog

Syslog Server IP Address 0 . 0 . 0 . 0

Port 514

```
000006e6 WLAN0: AP 00:09:5B:74:F3:5E is ready
in service.
000006e6 WLAN0: AP 00:09:5B:74:F3:5E stop
service.
000006e9 WLAN0: AP 00:09:5B:74:F3:5E is ready
in service.
0000081c WLAN0: AP 00:09:5B:74:F3:5E stop
service.
0000081e WLAN0: AP 00:09:5B:74:F3:5E is ready
in service.
```

Figure 4-3

You can use a SysLog server to view the Activity Log. If you have a SysLog server on your LAN, then enable the SysLog. If enabled, you must enter the IP address of your SysLog server and the port number that your SysLog server uses.

- SysLog Server IP address: The access point sends all the SysLog to the specified IP address if SysLog option is enabled. Default: 0.0.0.0

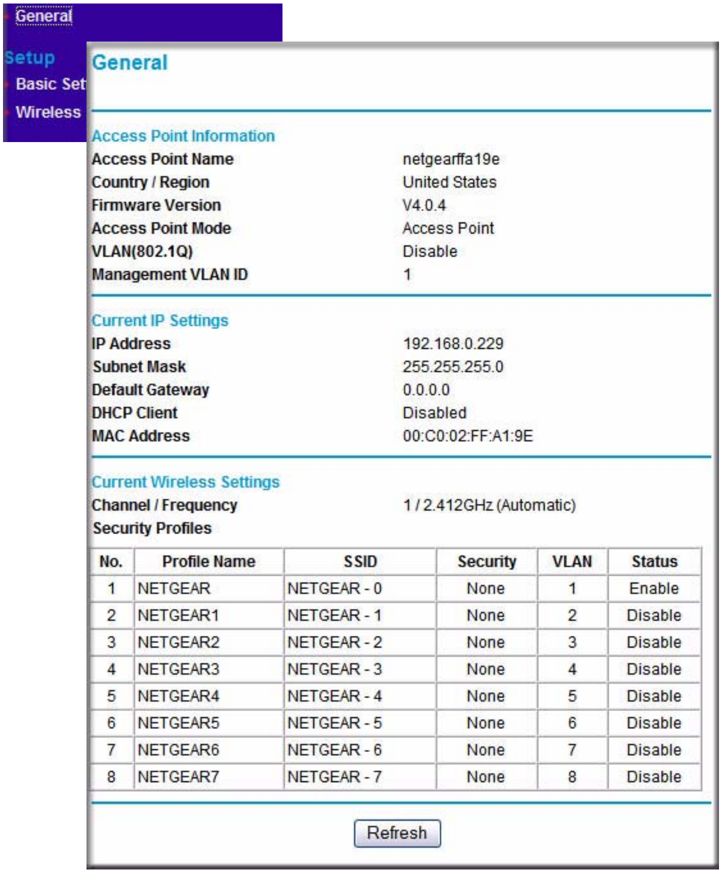
- Port: The port number configured in the SysLog server on your LAN. The default is 514

The Activity Log Window displays the Access Point system activity.

You can click Refresh to update the display. To save the log contents into a file on your PC, click Save As and save the file to a disk drive.

Viewing General Information

The General information is a summary of the WG302 configuration settings. From the WG302 main menu, click General to view the screen shown below.



General

Access Point Information

Access Point Name	netgearffa19e
Country / Region	United States
Firmware Version	V4.0.4
Access Point Mode	Access Point
VLAN(802.1Q)	Disable
Management VLAN ID	1

Current IP Settings

IP Address	192.168.0.229
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DHCP Client	Disabled
MAC Address	00:C0:02:FF:A1:9E

Current Wireless Settings

Channel / Frequency	1 / 2.412GHz (Automatic)
Security Profiles	

No.	Profile Name	SSID	Security	VLAN	Status
1	NETGEAR	NETGEAR - 0	None	1	Enable
2	NETGEAR1	NETGEAR - 1	None	2	Disable
3	NETGEAR2	NETGEAR - 2	None	3	Disable
4	NETGEAR3	NETGEAR - 3	None	4	Disable
5	NETGEAR4	NETGEAR - 4	None	5	Disable
6	NETGEAR5	NETGEAR - 5	None	6	Disable
7	NETGEAR6	NETGEAR - 6	None	7	Disable
8	NETGEAR7	NETGEAR - 7	None	8	Disable

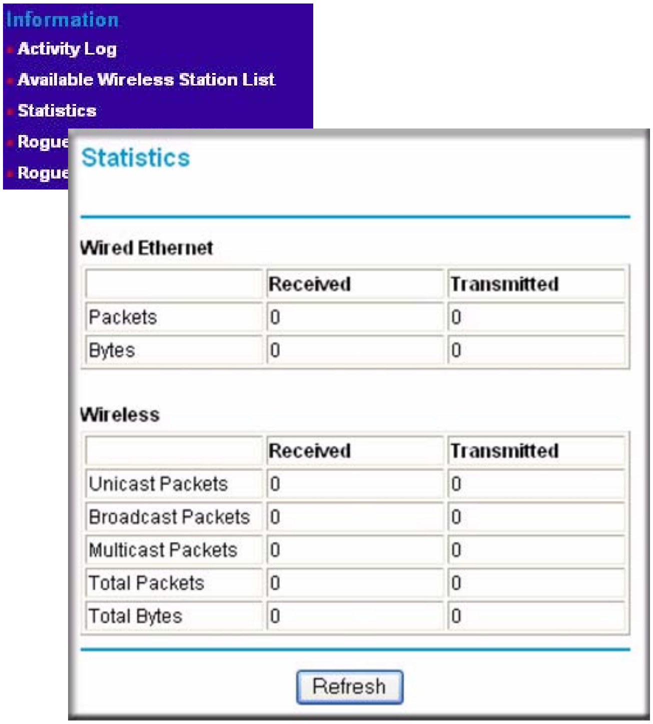
Figure 4-4

Table 4-1. General Information Fields

Field	Description
Access Point Information	
Access Point Name (NetBIOS name)	The name of the access point, which you can configure.
Country/Region	The domain or region for which the wireless access point is licensed for use. It may not be legal to operate this wireless access point in a region other than one of those identified in this field.
Firmware Version	The version of the firmware currently installed.
Access Point Mode	The operating mode of the WG302: Access Point, Point-to-point bridge, Multi-point bridge or Repeater.
VLAN (802.1Q)	Indicates if VLAN support is enabled. The default is disabled.
Management VLAN ID	Displays the VLAN ID.
Current IP Settings	
IP Address	The IP address of the wireless access point.
Subnet Mask	The subnet mask for the wireless access point.
Default Gateway	The default gateway for the wireless access point communication.
DHCP Client	If the DHCP Client is enabled, the current IP address was obtained from a DHCP server on your network. Disabled indicates a static IP configuration.
MAC Address	The Media Access Control address (MAC address) of the wireless access point's Ethernet port.
Current Wireless Settings	
Channel/Frequency	The channel the wireless port uses. The default channel setting is 11. For the frequencies used on each channel, see *http://documentation.netgear.com/reference/enu/wireless/index.htm*.
Security Profiles	For each Security Profile, the following information is displayed: Profile name, SSID, security option, VLAN ID, and enabled/disabled.

Viewing Statistics

The Statistics screen provides LAN and WLAN statistics. From the WG302 main menu, click Statistics under the Information heading to view the screen shown in Figure 4-5.



Wired Ethernet

	Received	Transmitted
Packets	0	0
Bytes	0	0

Wireless

	Received	Transmitted
Unicast Packets	0	0
Broadcast Packets	0	0
Multicast Packets	0	0
Total Packets	0	0
Total Bytes	0	0

Figure 4-5

Viewing the Available Wireless Station List

The Available Wireless Station List contains a table of all IP devices associated with the wireless access point for the Wired Network Name (SSID).

From the WG302 main menu, under the Information heading, click Available Wireless Station List to view the list. The fields in the list are explained below.

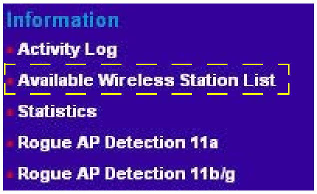


Figure 4-6

Table 4-2. Available Wireless Station List

Field	Description
Wired Ethernet	Received/Transmitted
Packets	The number of packets sent since the WG302 was restarted.
Bytes	The number of bytes sent since the WG302 was restarted.
For Each Wireless Security Profile	Received/Transmitted
Unicast Packets	The Unicast packets sent since the WG302 was restarted.
Broadcast Packets	The Broadcast packets sent since the WG302 was restarted.
Multicast Packets	The Multicast packets sent since the WG302 was restarted.
Total Packets	The Wireless packets sent since the WG302 was restarted.
Total Bytes	The Wireless bytes sent since the WG302 was restarted.
Refresh button	Click the Refresh button to update the statistics on this screen.

For each device, the table shows the Station ID, MAC address, IP Address, and Status (whether the device is allowed to communicate with the wireless access point or not).

Note that if the wireless access point is rebooted, the table data is lost until the wireless access point rediscovers the devices. To force the wireless access point to look for associated devices, click the Refresh button.

➡	**Note:** A wireless network can include multiple wireless access points that use the same network name (SSID). This extends the reach of the wireless network. Users can roam from one access point to another, providing seamless network connectivity. If this is the case, only the stations associated with this access point are shown in the Available Station List.

Upgrading the Wireless Access Point Firmware

⚠	**Warning:** When uploading firmware to the WG302 Wireless Access Point, do not interrupt the Web browser by closing the window, clicking a link, or loading a new page. If the browser is interrupted, the upload may fail, corrupt the firmware, and render the WG302 completely inoperable

You cannot upgrade the firmware from a computer that is connected to the WG302 with a wireless link. You must use a computer that is connected to the WG302 with an Ethernet cable.

The WG302 Wireless Access Point firmware is stored in FLASH memory and can be upgraded as new firmware is released by NETGEAR. You can download the upgrade files from the NETGEAR Web site. If the upgrade file is compressed (.ZIP file), you must first extract the image (.IMG) file before you send it to the wireless access point. The upgrade file can be sent using your browser.

➡	**Note:** The Web browser used to upload new firmware into the WG302 must support HTTP uploads, such as Microsoft Internet Explorer 6.0 or above, or Netscape Navigator 4.78 or above.

Use the following steps to upgrade the firmware:

1. Download the file from NETGEAR, save it to your hard disk, and unzip it.
2. If you want to save your configuration settings, see “Backing up and Restoring the Configuration” on page 4-10.
3. From the main menu Management section, click the Upgrade Firmware link.
4. In the Upgrade Firmware menu, click the Browse button and browse to the location of the image (.IMG) upgrade file.

5. Click Upload.

   When the upload completes, your wireless access point automatically restarts. The upgrade process typically takes about one minute.

In some cases, you may need to reconfigure the wireless access point after upgrading.

Configuration File Management

The WG302 Wireless Access Point settings are stored in the wireless access point in a configuration file. This file can be saved (backed up) to a computer, retrieved (restored) from a computer, or cleared to factory default settings.

Click Backup/Restore Settings under the Management heading to go to the menu shown in Figure 4-7.

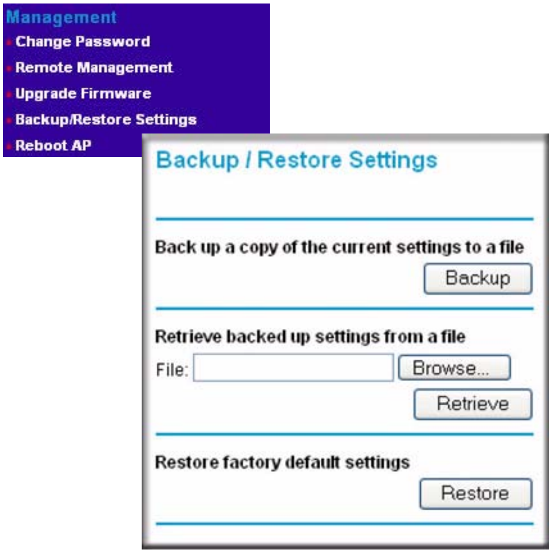

Management
Change Password
Remote Management
Upgrade Firmware
Backup/Restore Settings
Reboot AP
Backup / Restore Settings
Back up a copy of the current settings to a file
Backup
Retrieve backed up settings from a file
File:
Browse...
Retrieve
Restore factory default settings
Restore

Figure 4-7

The three options displayed are described in the following sections.

Backing up and Restoring the Configuration

To save your settings, click Backup. Your browser extracts the configuration file from the wireless access point and prompts you for a location on your computer to store the file. You can give the file a meaningful name at this time, such as `WG302.cfg`.

To restore your settings from a saved configuration file, enter the full path to the file on your computer or click the Browse button to locate the file. When you have located it, click the Restore button to upload the file. After completing the upload, the WG302 reboots automatically.

Erasing the Configuration

You can erase the wireless access point configurations and return to the factory default settings. After you erase the configurations, the wireless access point's password will be **password**, the SSID will be NETGEAR, the DHCP client will be disabled, the default LAN IP address will be 192.168.1.128, and the access point name is reset to the name printed on the label on the bottom of the unit.

Using the Reset Button to Restore Factory Default Settings

If you do not know the login password or IP address, you can still restore the factory default configuration settings with the Reset button. This button is on the rear panel of the wireless access point (see "Hardware Description" on page 2-7). The reset button has two functions:

- **Reboot.** When pressed and released, the Wireless Access Point reboots (restart).
- **Reset to Factory Defaults.** When pressed and held down, it clears all data and restores all settings to the factory default values.

To clear all data and restore the factory default values:

1. Hold the Reset Button until the LEDs blink twice, usually more than five seconds.

2. Release the Reset Button.

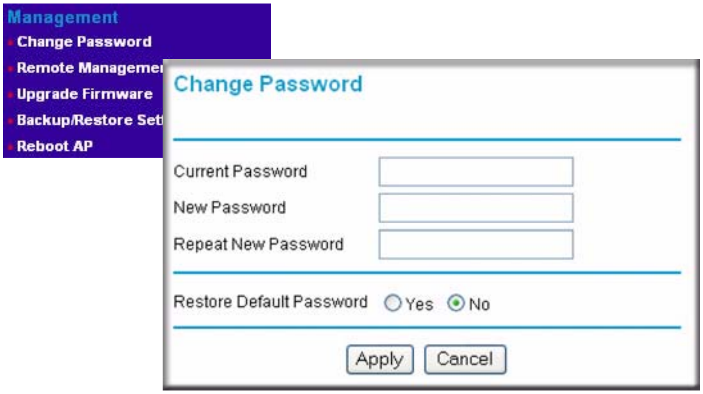
The factory default configuration has now been restored, and the WG302 is ready for use.

Changing the Administrator Password

The default password is **password**. NETGEAR recommends that you change this password to a more secure password. You cannot change the administrator login name.

From the WG302 main menu, click Change Password to go to the menu shown below.

To change the password, first enter the old password, and then enter the new password twice. Click **Apply** to save your change.



Change Password

Current Password □

New Password □

Repeat New Password □

Restore Default Password ○ Yes ● No

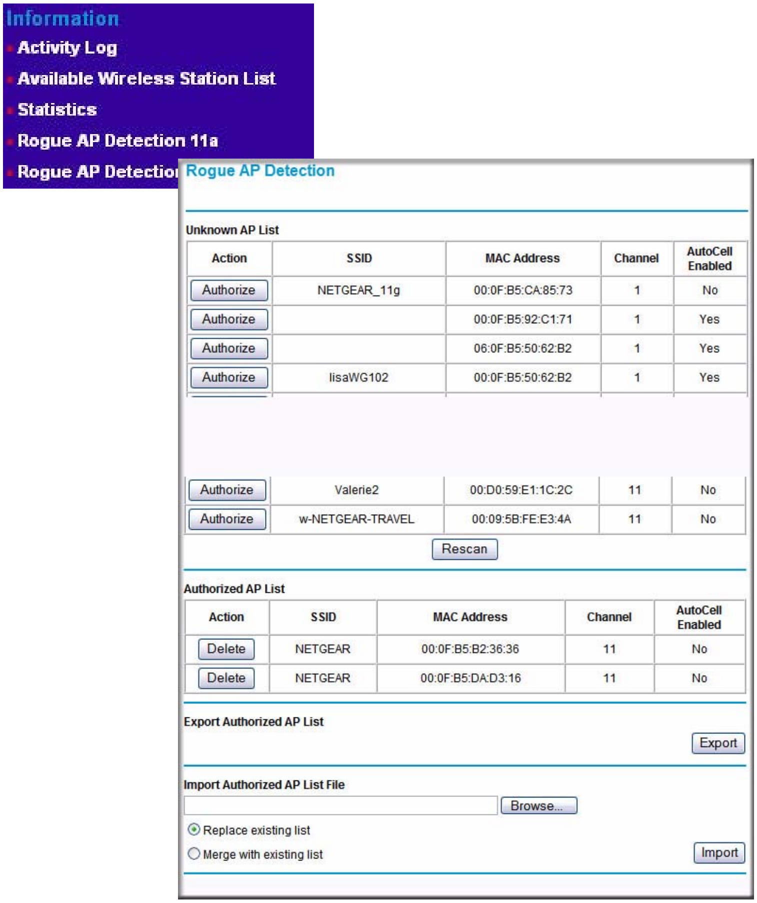
Figure 4-8

AutoCell Rogue AP Detection

The AutoCell feature provides added security. It can detect rogue APs and wireless stations and exclude them from connecting to the WG302 Wireless Access Point.

From the WG302 main menu, click Rogue AP Detection to view this menu.

- You can click Rescan to discover the APs.
- Click Authorize to add any AP to the Authorized AP List. Click Delete to remove an AP from the list.
- Optionally, you can export or import lists of authorized APs.



Rogue AP Detection

Unknown AP List

Action	SSID	MAC Address	Channel	AutoCell Enabled
Authorize	NETGEAR_11g	00:0F:B5:CA:85:73	1	No
Authorize		00:0F:B5:92:C1:71	1	Yes
Authorize		06:0F:B5:50:62:B2	1	Yes
Authorize	lisaWG102	00:0F:B5:50:62:B2	1	Yes
Authorize	Valerie2	00:D0:59:E1:1C:2C	11	No
Authorize	w-NETGEAR-TRAVEL	00:09:5B:FE:E3:4A	11	No

Rescan

Authorized AP List

Action	SSID	MAC Address	Channel	AutoCell Enabled
Delete	NETGEAR	00:0F:B5:B2:36:36	11	No
Delete	NETGEAR	00:0F:B5:DA:D3:16	11	No

Export Authorized AP List

Export

Import Authorized AP List File

Browse...

● Replace existing list

○ Merge with existing list

Import

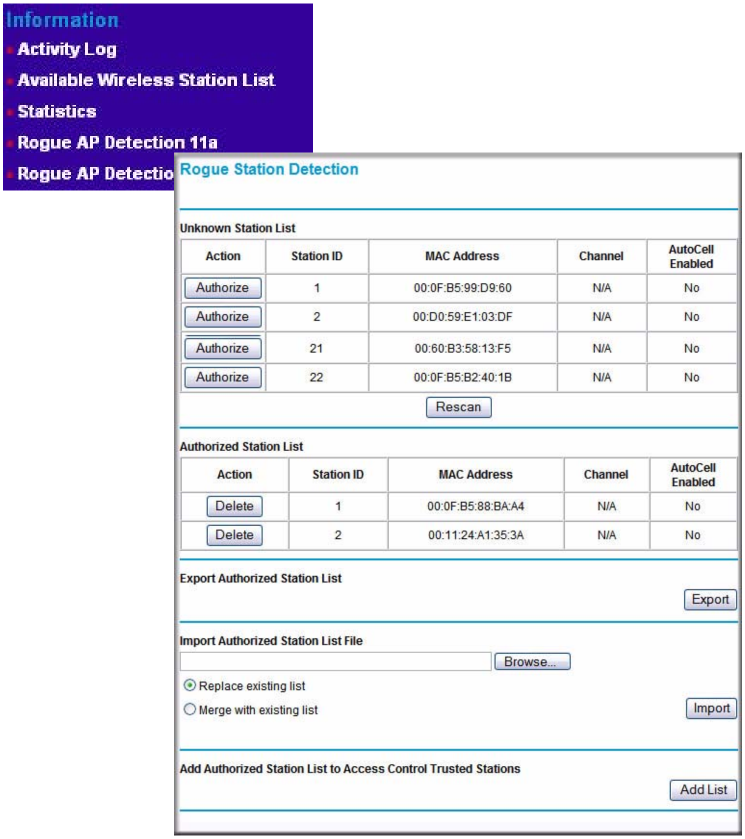
Figure 4-9

AutoCell Rogue Station Detection

The AutoCell feature provides added security. It can detect rogue APs and wireless stations and exclude them from connecting to the WG302 Wireless Access Point.

From the WG302 main menu, click Rogue Station Detection to view this menu.

- Click Rescan to discover the stations.
- Click Authorize to add any station to the Authorized Station List. Click Delete to remove an station from the list.
- Optionally, you can export or import lists of authorized stations.



Rogue Station Detection

Unknown Station List

Action	Station ID	MAC Address	Channel	AutoCell Enabled
Authorize	1	00:0F:B5:99:D9:60	N/A	No
Authorize	2	00:D0:59:E1:03:DF	N/A	No
Authorize	21	00:60:B3:58:13:F5	N/A	No
Authorize	22	00:0F:B5:B2:40:1B	N/A	No

Rescan

Authorized Station List

Action	Station ID	MAC Address	Channel	AutoCell Enabled
Delete	1	00:0F:B5:88:BA:A4	N/A	No
Delete	2	00:11:24:A1:35:3A	N/A	No

Export Authorized Station List

Export

Import Authorized Station List File

Browse...

● Replace existing list

○ Merge with existing list

Import

Add Authorized Station List to Access Control Trusted Stations

Add List

Figure 4-10

.

Chapter 5
Advanced Configuration

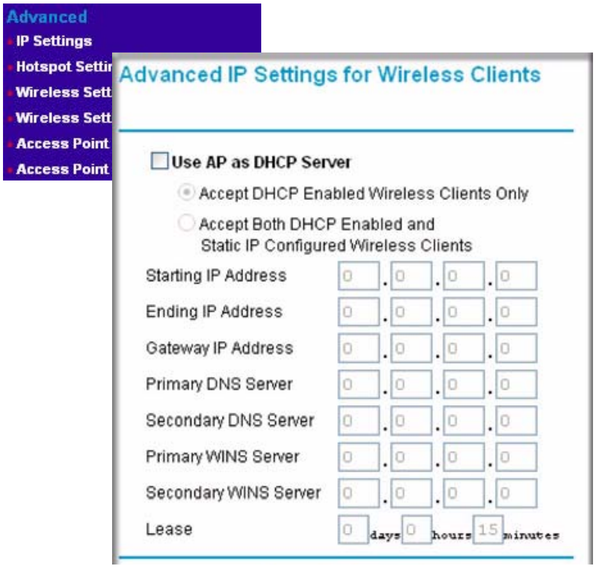
This chapter describes how to configure the advanced features of your NETGEAR ProSafe 802.11g Wireless Access Point WG302. The following list describes the advanced features:

- **IP Settings:** Use the AP as a DHCP server for wireless clients.
- **Wireless Settings:** Set up AutoCell and configure advanced wireless LAN parameters.
- **Access Point Settings:** Enable wireless bridging and repeating.
- **TBD:** New features under the Advanced heading, like NAT and Load Balancing.

You can find these features under the Advanced heading in the main menu.

Understanding Advanced IP Settings for Wireless Clients

If you want the AP to act as a DHCP server gateway for wireless clients, use this feature. The AP can accept both static and DHCP clients.



Advanced IP Settings for Wireless Clients

☐ Use AP as DHCP Server

● Accept DHCP Enabled Wireless Clients Only

○ Accept Both DHCP Enabled and Static IP Configured Wireless Clients

Starting IP Address	0 . 0 . 0 . 0
Ending IP Address	0 . 0 . 0 . 0
Gateway IP Address	0 . 0 . 0 . 0
Primary DNS Server	0 . 0 . 0 . 0
Secondary DNS Server	0 . 0 . 0 . 0
Primary WINS Server	0 . 0 . 0 . 0
Secondary WINS Server	0 . 0 . 0 . 0
Lease	0 days 0 hours 15 minutes

Figure 5-1

The following list provides information about how to configure DHCP settings.

- **Use AP as DHCP Server:** You may turn on this option and the Access Point will function as a DHCP Server for Wireless Clients only. The Access Point will provide the pre-configured TCP/IP configurations for all wireless stations connected to this Access Point.

  There are two options available for managing the wireless clients:

  - **Accept DHCP Enabled Wireless Clients Only:** The Access Point can only provide the TCP/IP configurations to those wireless clients with the DHCP enabled.
  - **Accept Both DHCP Enabled and Static IP Configured Wireless Clients:** The Access Point will support wireless clients with the DHCP enabled and the static IP configured.

If you use the AP as a DHCP server, you must configure the following TCP/IP configurations for using Access Point as a DHCP Server for Wireless Clients.

- **Starting IP Address:** Type the starting IP address can be assigned from the DHCP server on this Access Point.
- **Ending IP Address:** Type the Ending IP address can be assigned from the DHCP server on this Access Point
- **Subnet Mask:** The Access Point will assign the specified subnet mask to the connected wireless stations.
- **Gateway Address:** The Access Point will assign this IP address as the default gateway for any traffic beyond the local network.
- **Primary DNS Server:** The Access Point will assign this IP address as the primary Domain Name Server used by the connected wireless stations.
- **Secondary DNS Server:** The Access Point will assign this IP address as the secondary Domain Name Server used by the connected wireless stations.
- **Primary WINS Server:** The Access Point will assign this IP address as the primary WINS Server used by the connected wireless stations.
- **Secondary WINS Server:** The Access Point will assign this IP address as the secondary WINS Server used by the connected wireless stations.
- **Lease:** The lease time for the IP address assigned. The wireless client user is required to renew the IP address as soon as the lease is expired.

Configuring Advanced Wireless LAN Settings

This section describes the advanced wireless settings menu, which enables configuration of the following features:

- AutoCell RF management
- Wi-Fi multimedia (WMM) setup
- Hotspot settings
- Advanced wireless parameters

AutoCell Overview

AutoCell provides advanced RF wireless management features that improve performance and enhance security.

Table 5-1. What does AutoCell do?

Problem	AutoCell Settings
Erosion of privacy	You can enable these two settings: • Enhanced RF Security (Default: Disabled): Makes your Wi-Fi network nearly undetectable by neighbors and hackers. • Rogue Device Detection (Default: Disabled): Blocks rogue wireless devices from connecting to your network.
Diminishing performance from multiple APs installed in one area.	The Auto RF Management feature (Default: Enabled) manages APs and clients load-balance traffic across underutilized APs.
Complexity of installation	With the Auto RF Management feature (Default: Enabled), the APs can be put in any convenient location and in any density.
Increasing interference	The Auto RF Management feature (Default: Enabled) lets clients and APs avoid interference from neighbors and other unexpected sources.

AutoCell's self-organizing micro cells provide an additional level of privacy for enterprises. AutoCell clients are highly-recommended for Enhanced RF Security.

AutoCell AP/Client Interaction

AutoCell's self-organizing micro cells provide performance benefits and an additional level of privacy for enterprises.

- **Automatic Transmit Power Control.** An AP with AutoCell enabled coordinates the RF transmit power level of AutoCell-enabled clients. This creates client micro-cells and reduces co-channel interference with other clients and APs on the same frequency. It also improves overall throughput and performance.
- **Automatic Load-Balancing.** An AutoCell-enabled client seeks out and associates with the lightest loaded AutoCell-enabled AP available.
- **Rapid Roaming.** An AutoCell-enabled client quickly distinguishes movement from RF anomalies such as arbitrary and momentary changes in the surrounding RF domain. When it detects true movement, the client immediately seeks the best available AP at the highest data rate possible instead of waiting for the data rate to decline. This feature does not require AutoCell-enabled APs.)

Additional AutoCell View Management Options

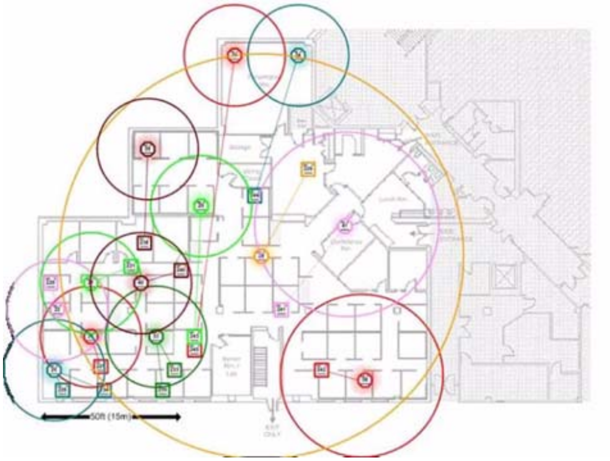


Figure 5-2

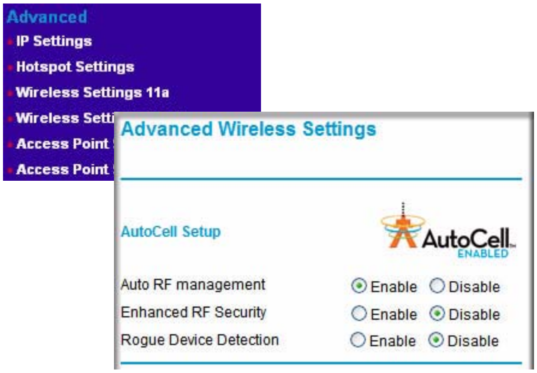
AutoCell View is a management tool that provides sophisticated views of your wireless network so that you can manage the wireless communications easily from a simple console.

AutoCell Configuration Options

There are three AutoCell configuration setting choices:

- Auto RF Management: Enabled by default.
- Enhanced RF Security: Disabled by default.
- Rogue Device Detection: Disabled by default.

These options are discussed below.



AutoCell Setup

Auto RF management ● Enable ○ Disable
Enhanced RF Security ○ Enable ● Disable
Rogue Device Detection ○ Enable ● Disable

Figure 5-3

Auto RF Management

Note: Channel selection and power management is automatically adjusted by the AutoCell Auto RF Management option. The Auto RF Management option is enabled by default.

In this mode, AutoCell APs and clients load-balance traffic across underutilized APs. This mode avoids interference from neighbors, clients, APs, and other unexpected sources.

Enhanced RF Security

Note: Broadcast Wireless Network Name (SSID) is automatically turned off when you select the AutoCell Enhanced RF Security option.

In this mode, AutoCell shrinks the size of coverage to the minimum to reach clients but also shrinks the size of the beacons that access points use to announce their presence. This mode makes an enterprise wireless LAN nearly invisible to users outside an office building.

Rogue Device Detection

The AutoCell Rogue Device Detection feature lets you identify and block wireless devices that should never be given access to the wireless network.

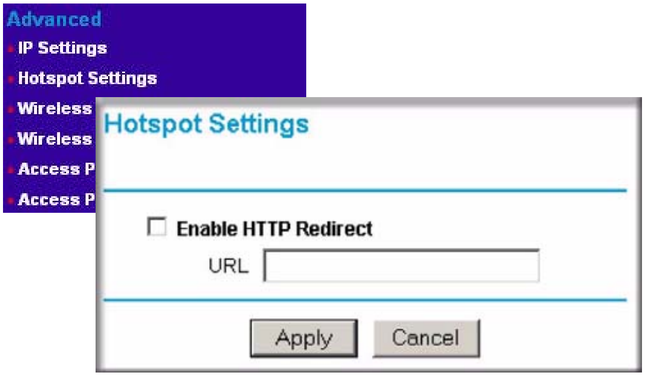
Wi-Fi Multimedia (WMM) Setup

WMM is a subset of the 802.11e standard. WMM allows wireless traffic to have a range of priorities, depending on the kind of data. Time-dependent information, such as video or audio, will have a higher priority than normal traffic. For WMM to function correctly, wireless clients must also support WMM.

WMM Support: Select Yes or No as required on the Advanced Wireless Settings menu. The default is No.

Hotspot Settings

If you want the access point (AP) to capture and redirect all HTTP (TCP, port 80) requests, use this feature. For example, a hotel might want all wireless connections to go to its server to start a billing transaction.



□ Enable HTTP Redirect

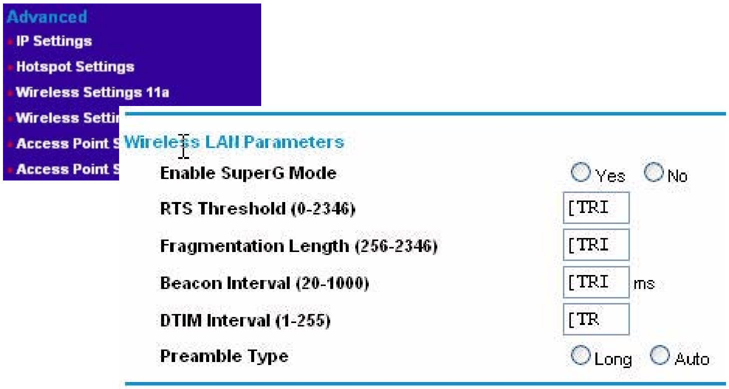
URL

Figure 5-4

Enter the URL of the Web server where you wish to redirect HTTP requests.

Configuring Wireless LAN Parameters

The default advanced wireless LAN parameter settings usually work well. If you want the AP to operate in Super-G mode, use this feature.



Wireless LAN Parameters

Enable SuperG Mode	○ Yes ○ No
RTS Threshold (0-2346)	[TRI
Fragmentation Length (256-2346)	[TRI
Beacon Interval (20-1000)	[TRI ms
DTIM Interval (1-255)	[TR
Preamble Type	○ Long ○ Auto

Figure 5-5

Table 5-1 describes the advanced wireless parameters.

Table 5-1. Advanced Wireless LAN Settings Fields

Field	Description
Enable SuperG Mode	Click Enable to enable SuperG Mode.
RTS Threshold	The packet size used to determine whether it should use the CSMA/CD (Carrier Sense Multiple Access with Collision Detection) or the CSMA/CA (Carrier Sense Multiple Access with Collision Avoidance) mechanism for packet transmission.
Fragmentation Length	This is the maximum packet size used for fragmentation. Packets larger than the size programmed in this field will be fragmented. The Fragment Threshold value must be larger than the RTS Threshold value.
Beacon Interval	Specifies the data beacon rate between 20 and 1004.
DTIM Interval	The Delivery Traffic Indication Message specifies the data beacon rate between 1 and 255.
Preamble Type	A long transmit preamble may provide a more reliable connection or slightly longer range. A short transmit preamble gives better performance. Long is the default
Antenna	Select the desired antenna for transmitting and receiving. Auto is the default.

Wireless Bridging and Repeating

The WG302 Wireless Access Point lets you build large bridged wireless networks.

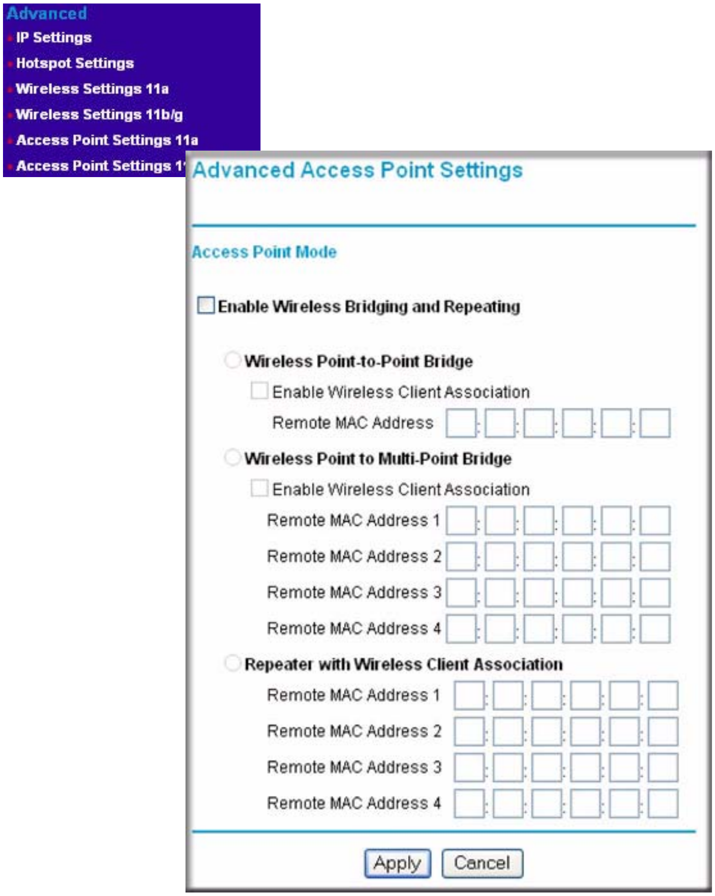
> **Note:** All bridge mode options are not available when AutoCell Auto RF Management is enabled (the default setting).

Examples of wireless bridged configurations are:

- Point-to-Point Bridge. The WG302 communicates with another bridge-mode wireless station. See "Point-to-Point Bridge Configuration" on page 5-10.
- Multi-Point Bridge. The WG102 is the "master" for a group of bridge-mode wireless stations. Then all traffic is sent to this "master," rather than to other access points. See "Multi-Point Bridge Configuration" on page 5-11.

- Repeater with Wireless Client Association. Sends all traffic to the remote AP. See "Repeater with Wireless Client Association" on page 5-12.

These configurations can be set up from the Advanced Access Point Settings menu, shown to the right.



Advanced Access Point Settings

Access Point Mode

□ Enable Wireless Bridging and Repeating

○ Wireless Point-to-Point Bridge

□ Enable Wireless Client Association

Remote MAC Address □:□:□:□:□:□

○ Wireless Point to Multi-Point Bridge

□ Enable Wireless Client Association

Remote MAC Address 1 □:□:□:□:□:□

Remote MAC Address 2 □:□:□:□:□:□

Remote MAC Address 3 □:□:□:□:□:□

Remote MAC Address 4 □:□:□:□:□:□

○ Repeater with Wireless Client Association

Remote MAC Address 1 □:□:□:□:□:□

Remote MAC Address 2 □:□:□:□:□:□

Remote MAC Address 3 □:□:□:□:□:□

Remote MAC Address 4 □:□:□:□:□:□

Figure 5-6

Point-to-Point Bridge Configuration

In Point-to-Point Bridge mode, the WG302 communicates with another bridge-mode wireless station. In addition, you can enable client associations with this WG302. You must enter the MAC address of the other bridge-mode wireless station in the field provided. Use WEP to protect this communication. The figure below shows an example of Point-to-Point Bridge mode.

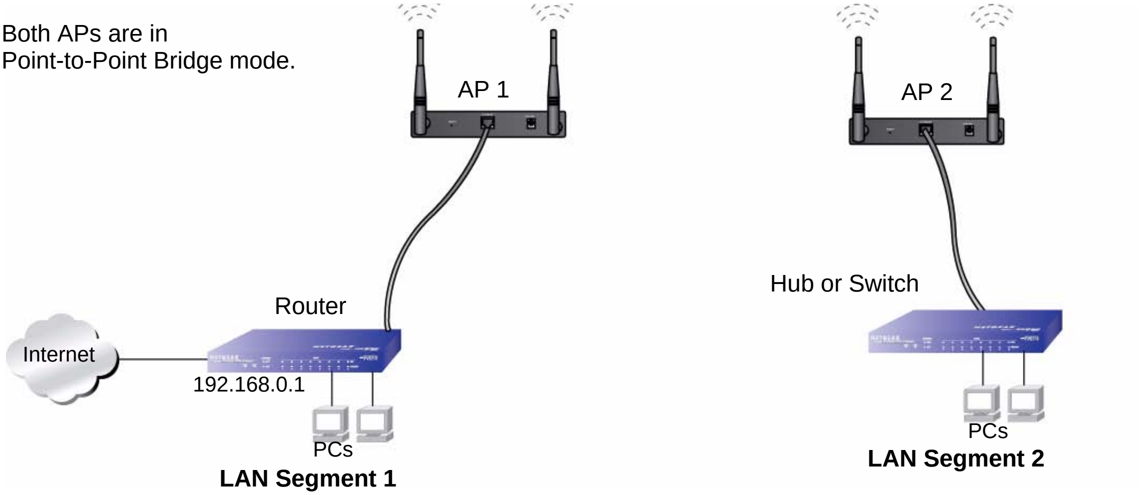


Figure 5-7

Follow the steps below to set up a Point-to-Point Bridge configuration.

1. Configure the WG302 (AP1) on LAN Segment 1 in Point-to-Point Bridge mode.
2. Configure the other access point (AP2) on LAN Segment 2 in Point-to-Point Bridge mode.

   AP 1 must have AP 2’s MAC address in its Remote MAC Address field and AP 2 must have AP 1’s MAC address in its Remote MAC Address field.
3. Configure and verify the following for both access points:
   - Verify the LAN network configuration of the access points. Both must be configured to operate in the same LAN network address range as the LAN devices
   - Both APs must use the same ESSID, Channel, authentication mode, if any, and security settings if security is in use.
4. Verify connectivity across the LAN 1 and LAN 2.

   A computer on either LAN segment should be able to connect to the Internet or share files and printers of any other PCs or servers connected to LAN Segment 1 or LAN Segment 2.

Multi-Point Bridge Configuration

Set up a Multi-Point Bridge only if this WG102 is the “master” for a group of bridge-mode wireless stations. Then all traffic is sent to this “master,” rather than to the other access points. In addition, you can enable client associations with this WG302.

- You must enter the MAC addresses of the other access points in the fields provided.
- The other bridge-mode wireless stations must be set to Point-to-Point Bridge mode, using the MAC address of this WG102 as the Remote MAC Address.
- Use WEP to protect this traffic.

The figure below shows an example of a Multi-Point Bridge mode configuration.

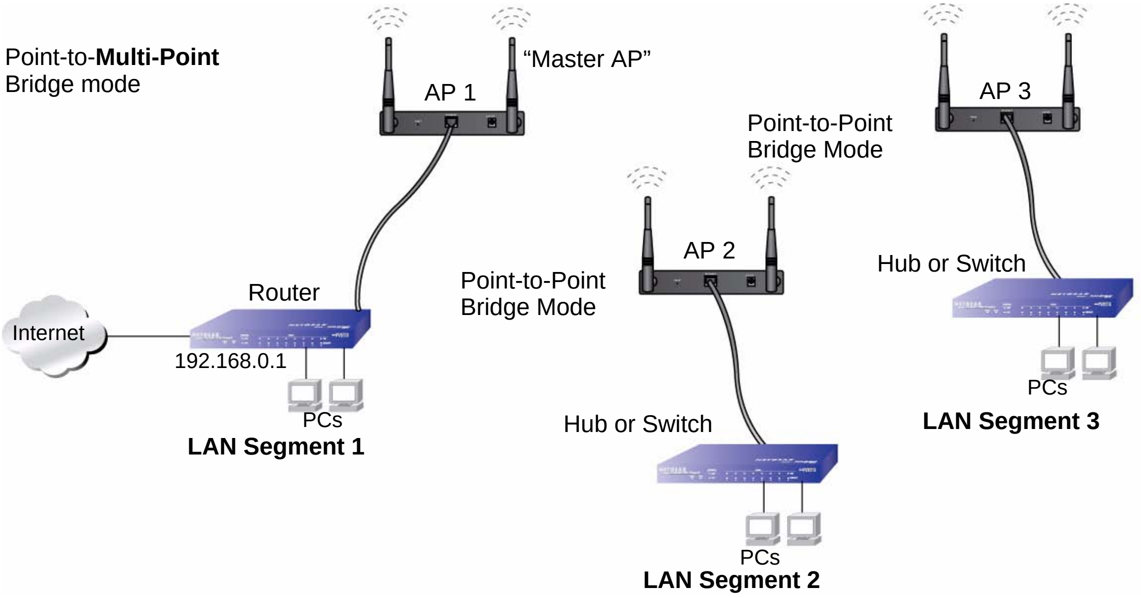


Figure 5-8

Follow the steps below to set up the Multi-Point Bridge configuration.

1. Configure the Operating Mode of the WG302 Wireless Access Points.
   - Because it is in the central location, configure WG302 (AP 1) on LAN Segment 1 in Point-to-Multi-Point Bridge mode. The MAC addresses of AP2 and AP3 are required in AP1.
   - Configure WG302 (AP 2) on LAN Segment 2 in Point-to-Point Bridge mode with the Remote MAC Address of AP1.

- Configure the WG302 (AP3) on LAN 3 in Point-to-Point Bridge mode with the Remote MAC Address of AP1.

2. Verify the following for all access points:

- The LAN network configuration of the WG302 Wireless Access Points are configured to operate in the same LAN network address range as the LAN devices
- Only one AP is configured in Point-to-Multi-Point Bridge mode, and all the others are in Point-to-Point Bridge mode.
- All APs must be on the same LAN. That is, all the APs LAN IP address must be in the same network.
- If using DHCP, all WG302 Wireless Access Points should be set to "Obtain an IP address automatically (DHCP Client)" in the IP Address Source portion of the Basic IP Settings menu.
- All WG302 Wireless Access Points use the same SSID, Channel, authentication mode, if any, and encryption in use.
- All Point-to-Point APs must have AP2's MAC address in its Remote AP MAC address field.

3. Verify connectivity across the LANs.

- A computer on any LAN segment should be able to connect to the Internet or share files and printers with any other PCs or servers connected to any of the three LAN segments.
- Wireless stations will not be able to connect to the WG302 Wireless Access Points in the illustration above. If you require wireless stations to access any LAN segment, you can use additional WG302 Wireless Access Points configured in Wireless Access Point mode to any LAN segment.

➡	**Note:** You can extend this multi-point bridging by adding additional WG302s configured in Point-to-Point mode for each additional LAN segment. Furthermore, you can extend the range of the wireless network with NETGEAR wireless antenna accessories.

Repeater with Wireless Client Association

In this mode, the WG302 Wireless Access Point sends all traffic to the remote AP. For repeater mode, you must enter the MAC address of the remote "parent" access point. You can also enter the address of the "child" access point. Note that the following restrictions apply:

- You *do not* have the option of disabling client associations with this WG302.

- You cannot configure a sequence of parent/child APs. You are limited to only one parent/child AP pair.

The figure below shows an example of a Repeater Mode configuration.

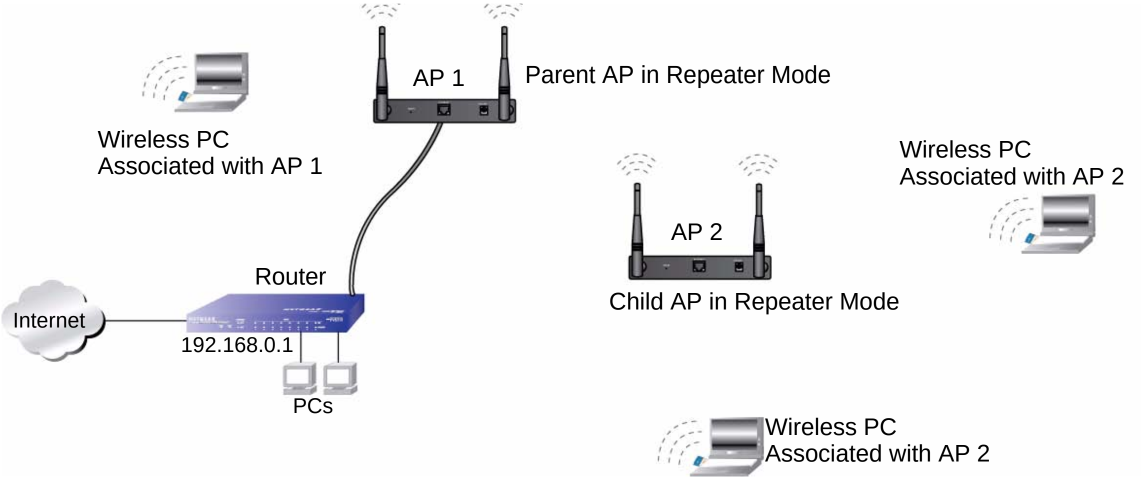


Figure 5-9

To set up a repeater with wireless client association, follow the steps below:

1. Configure the Operating Mode of the WG302 Wireless Access Points.
   - Configure AP 1 on LAN Segment 1 as the Parent in Repeater mode with the its own MAC address in the Parent AP MAC Address field, and the MAC Address of the ‘downstream’ AP (AP 2) in the Child AP MAC Address field.
   - Configure AP 2 in the Child Repeater mode with its MAC addresses as in the Child AP MAC Address field and the MAC address of the ‘upstream’ AP (AP 1) in the Parent MAC Address field.
2. Verify the following for all access points:
   - The LAN network configuration of the WG302 Wireless Access Points are configured to operate in the same LAN network address range as the LAN devices
   - All APs must be on the same LAN. That is, all the APs LAN IP address must be in the same network.
   - If using DHCP, all WG302 Wireless Access Points should be set to “Obtain an IP address automatically (DHCP Client)” in the IP Address Source portion of the Basic IP Settings menu.

- All WG302 Wireless Access Points use the same SSID, Channel, authentication mode, if any, and encryption in use.

3. Verify connectivity across the LANs.

A computer on any LAN segment should be able to connect to the Internet or share files and printers with any other PCs or servers connected to any of the three WLAN segments.

Note: You can extend this repeating by adding up to two more WG302s configured in repeater mode. However, since repeaters communicate in half-duplex mode, the bandwidth decreases as you add repeaters to the network. Also, you can extend the range of the wireless network with NETGEAR wireless antenna accessories.

Configuring NAT

TBD

Configuring QoS Queues

Configuring Quality of Service (QoS) on the WG302 Wireless Access Point consists of setting parameters on existing queues for different types of wireless traffic, and effectively specifying minimum and maximum wait times (via *Contention Windows*) for transmission. The settings described here apply to data transmission behavior on the access point only, not to that of the client stations.

Note: For the Guest interface, QoS queue settings apply to the access point load as a whole (both BSSes together). On a two-radio access point these settings apply to both radios but the traffic for each radio is queued independently. (The exception to this is guest traffic as noted below.) Internal and Guest network traffic is always queued together within each radio. This is the case on both one-radio and two-radio APs.

QoS on the access point leverages existing information in the IP packet header related to Type of Service (ToS). The access point examines the ToS field in the headers of all packets that pass through the AP. Based on the value in a packet's ToS field, the AP prioritizes the packet for transmission by assigning it to one of the queues. A different type of data is associated with each queue. You can configure parameters that determine how each queue is treated when it is sent by the access point.

Setting up Guest Access

Out-of-the-box *Guest Interface* features allow you to configure the WG302 Wireless Access Point for controlled guest access to an isolated network. You can configure the same access point to broadcast and function as two different wireless networks: a secure "Internal" LAN and a public "Guest" network.

Guest clients can access the guest network without a username or password. When guests log in, they see a guest Welcome screen (also known as a *captive portal*).

You can define unique parameters for *guest* connectivity and isolate guest clients from other more sensitive areas of the network. No security is provided on the guest network; only plain-text security mode is allowed.

Simultaneously, you can configure a secure *internal* network (using the same access point as your guest interface) that provides full access to protected information behind a firewall and requires secure login or certificates for access.

Chapter 6
Troubleshooting

This chapter provides information about troubleshooting your NETGEAR ProSafe 802.11g Wireless Access Point WG302. After each problem description, instructions are given to help you diagnose and solve the problem. For the common problems listed, go to the section indicated.

- Is the WG302 on?
- Have I connected the wireless access point correctly?

  Go to“Installing the WG302 Wireless Access Point” on page 3-5.
- I cannot remember the wireless access point’s configuration password.

  Go to “Changing the Administrator Password” on page 4-12.

If you have trouble setting up your WG302, check the tips below.

No lights are lit on the access point.

It takes a few seconds for the power indicator to light up. Wait a minute and check the power light status on the access point.

If the access point has no power.

- Make sure the power cord is connected to the access point.
- Make sure the power adapter is connected to a functioning power outlet. If it is in a power strip, make sure the power strip is turned on. If it is plugged directly into the wall, verify that it is not a switched outlet.
- Make sure you are using the correct NETGEAR power adapter supplied with your access point.

The Wireless LAN activity light does not light up.

The access point’s antennae are not working.

- If the Wireless LAN activity light stays off, disconnect the adapter from its power source and then plug it in again.
- Make sure the antennas are tightly connected to the WG302.
- Contact NETGEAR technical support if the Wireless LAN activity light remains off.

The LAN light is not lit.

There is a hardware connection problem. Check these items:

- Make sure the cable connectors are securely plugged in at the access point and the network device (hub, switch, or router). A switch, hub, or router must be installed between the access point and the Ethernet LAN or broadband modem.
- Make sure the connected device is turned on.
- Be sure the correct cable is used. Use a standard Category 5 Ethernet patch cable. If the network device has Auto Uplink™ (MDI/MDIX) ports, you can use either a crossover cable or a normal patch cable.

I cannot access the Internet or the LAN with a wireless capable computer.

There is a configuration problem. Check these items:

- You may not have restarted the computer with the wireless adapter to have TCP/IP changes take effect. Restart the computer.
- The computer with the wireless adapter may not have the correct TCP/IP settings to communicate with the network. Restart the computer and check that TCP/IP is set up properly for that network. The usual setting for Windows the Network Properties is set to “Obtain an IP address automatically.”
- The access point’s default values may not work with your network. Check the access point default configuration against the configuration of other devices in your network.

I cannot connect to the WG302 to configure it.

Check these items:

- The WG302 is properly installed, LAN connections are OK, and it is powered on. Check that the LAN port LED is on (amber indicating a 10 Mbps Ethernet connection or green indicating a 100 Mbps Ethernet connection) to verify that the Ethernet connection is OK.
- The default configuration of the WG302 is for a static IP address of 192.168.1.128 and a Mask of 255.255.255.0 with DHCP disabled. Make sure your network configuration settings are correct.
- If you are using the NetBIOS name of the WG302 to connect, ensure that your computer and the WG302 are on the same network segment or that there is a WINS server on your network.
- If your computer is set to “Obtain an IP Address automatically” (DHCP client), restart it.
- If your computer uses a Fixed (Static) IP address, ensure that it is using an IP Address in the range of the WG302. The WG302 default IP Address is 192.168.1.128 and the default Subnet Mask is 255.255.255.0.

When I enter a URL or IP address I get a timeout error.

A number of things could be causing this. Try the following troubleshooting steps.

- Check whether other PCs work. If they do, ensure that your PCs TCP/IP settings are correct. If using a Fixed (Static) IP Address, check the Subnet Mask, Default Gateway, DNS, and IP Addresses.
- If the PCs are configured correctly, but still not working, ensure that the WG302 is connected and turned on. Connect to it and check its settings. If you cannot connect to it, check the LAN and power connections.
- If the WG302 is configured correctly, check your Internet connection (DSL/Cable modem etc.) to make sure that it is working correctly.
- Try again.

Using the Reset Button to Restore Factory Default Settings

The Reset button (see “Rear Panel” on page 2-8) has two functions:

- *Reboot*. When pressed and released quickly, the WG302 will reboot (restart).
- *Reset to Factory Defaults*. This button can also be used to clear ALL data and restore ALL settings to the factory default values.

To clear all data and restore the factory default values:

1. Power off the WG302 and power it back on.
2. Use something with a small point, such as a pen, to press the Reset button in and hold it in for at least 5 seconds.
3. Release the Reset button.

The factory default configuration has now been restored, and the WG302 is ready for use.

Appendix A
Specifications

Parameter	**NETGEAR ProSafe 802.11g Wireless Access Point WG302**
Network Management	Web-based configuration and status monitoring
Maximum Clients	Limited by the amount of wireless network traffic generated by each node; typically 30 to 70 nodes.
Status LEDs	Power/Ethernet LAN/Wireless LAN/Test
Power Adapter	12V DC, 1 A
Electromagnetic Compliance	FCC Part 15 Class B and Class E
Environmental Specifications	Operating temperature: 0 to 50° C Operating humidity: 5-95%, non-condensing
Data Encoding:	802.11b: 1 and 2 Mbps, Direct Sequence Spread Spectrum (DSSS) 802.11b: 5.5 and 11 Mbps, Complementary Code Keying (CCK) 802.11g: All rates, Orthogonal Frequency Division Multiplexing (OFDM)
Maximum Computers Per Wireless Network:	Limited by the amount of wireless network traffic generated by each node. Typically 30-70 nodes.
802.11b and g Radio Data Rate	1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, 54, and 108 Mbps (Auto-rate capable)
802.11b and g Operating Frequencies	2.412 ~ 2.462 GHz (US) 2.412 ~ 2.484 GHz (Japan) 2.412 ~ 2.472 GHz (Europe ETSI)
802.11g Encryption	40-bits (also called 64-bits), 128- and 152-bits WEP data encryption
Antenna:	Please refer to page iv

Appendix B
Wireless Networking Basics

This chapter provides an overview of Wireless networking.

Wireless Networking Overview

The WG302 Wireless Access Point conforms to the Institute of Electrical and Electronics Engineers (IEEE) 802.11b and 802.11g standards for wireless LANs (WLANs).

On an 802.11b or g 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 802.11b 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 802.11g auto rate sensing rates are 1, 2, 5.5, 6, 9, 12, 18, 24, 36, 48, and 54 Mbps.

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

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.

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.

Network Name: 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 ESSID is used, but may still be referred to as SSID.

An SSID is a thirty-two character (maximum) alphanumeric key identifying the name of 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.

The ESSID is usually broadcast in the air from an access point. The wireless station sometimes can be configured with the ESSID **ANY.** This means the wireless station will try to associate with whichever access point has the stronger radio frequency (RF) signal, providing that both the access point and wireless station use Open System authentication.

Authentication and WEP Data Encryption

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

- **Open System**. With Open System authentication, a wireless computer can join any network and receive any messages that are not encrypted.
- **Shared Key**. 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 an Open System network.

Wired Equivalent Privacy (WEP) data encryption is used when the wireless devices are configured to operate in Shared Key authentication mode.

802.11 Authentication

The 802.11 standard defines several services that govern how two 802.11 devices communicate. The following events must occur before an 802.11 Station can communicate with an Ethernet network through an access point, such as the one built in to the WG302:

1. Turn on the wireless station.
2. The station listens for messages from any access points that are in range.
3. The station finds a message from an access point that has a matching SSID.
4. The station sends an authentication request to the access point.
5. The access point authenticates the station.
6. The station sends an association request to the access point.
7. The access point associates with the station.
8. The station can now communicate with the Ethernet network through the access point.

An access point must authenticate a station before the station can associate with the access point or communicate with the network. The IEEE 802.11 standard defines two types of authentication: Open System and Shared Key.

- Open System Authentication allows any device to join the network, assuming that the device SSID matches the access point SSID. Alternatively, the device can use the “ANY” SSID option to associate with any available Access Point within range, regardless of its SSID.
- Shared Key Authentication requires that the station and the access point have the same WEP Key to authenticate. These two authentication procedures are described below.

Open System Authentication

The following steps occur when two devices use Open System Authentication:

1. The station sends an authentication request to the access point.
2. The access point authenticates the station.
3. The station associates with the access point and joins the network.

This process is illustrated below.

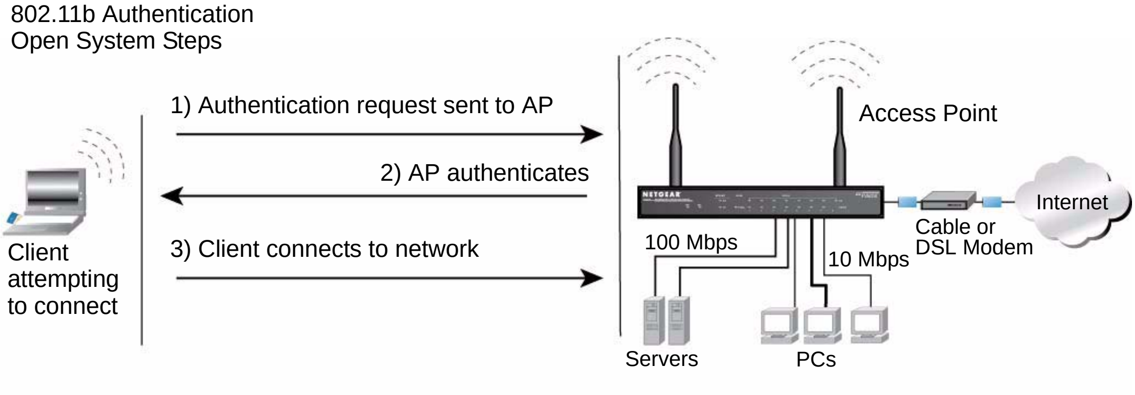


Figure 6-1

Shared Key Authentication

The following steps occur when two devices use Shared Key Authentication:

1. The station sends an authentication request to the access point.
2. The access point sends challenge text to the station.
3. The station uses its configured 64-bit or 128-bit default key to encrypt the challenge text, and sends the encrypted text to the access point.
4. The access point decrypts the encrypted text using its configured WEP Key that corresponds to the station’s default key. The access point compares the decrypted text with the original challenge text. If the decrypted text matches the original challenge text, then the access point and the station share the same WEP Key and the access point authenticates the station.
5. The station connects to the network.

If the decrypted text does not match the original challenge text (the access point and station do not share the same WEP Key), then the access point will refuse to authenticate the station and the station will be unable to communicate with either the 802.11 network or Ethernet network.

This process is illustrated below.

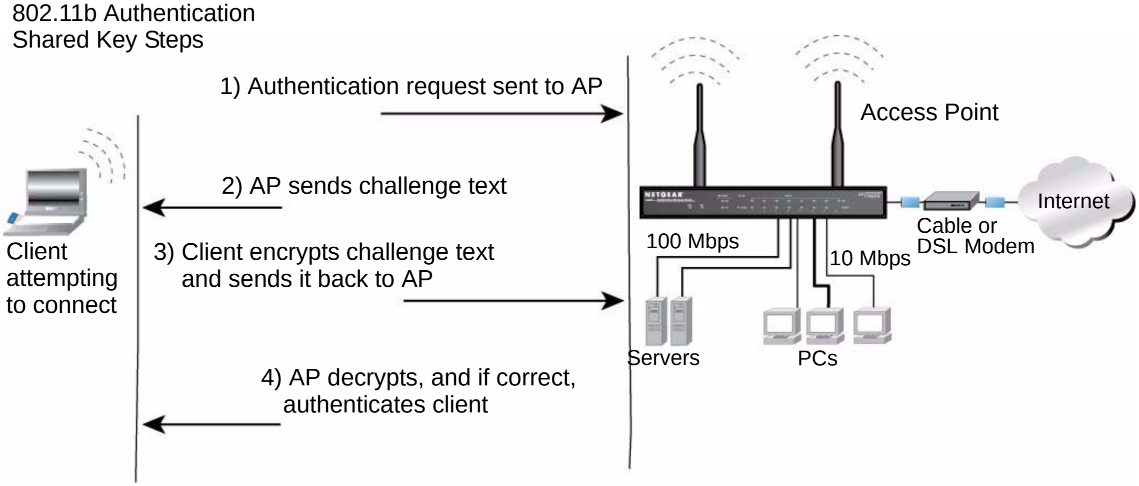

802.11b Authentication
Shared Key Steps
1) Authentication request sent to AP
2) AP sends challenge text
3) Client encrypts challenge text and sends it back to AP
4) AP decrypts, and if correct, authenticates client
Client attempting to connect
Access Point
Internet
Cable or DSL Modem
100 Mbps
10 Mbps
Servers
PCs

Figure 6-2

Overview of WEP Parameters

Before enabling WEP on an 802.11 network, you must first consider what type of encryption you require and the key size you want to use. Typically, there are three WEP Encryption options available for 802.11 products:

1. **Do Not Use WEP:** The 802.11 network does not encrypt data. For authentication purposes, the network uses Open System Authentication.

2. **Use WEP for Encryption:** A transmitting 802.11 device encrypts the data portion of every packet it sends using a configured WEP Key. The receiving device decrypts the data using the same WEP Key. For authentication purposes, the network uses Open System Authentication.

3. **Use WEP for Authentication and Encryption:** A transmitting 802.11 device encrypts the data portion of every packet it sends using a configured WEP Key. The receiving device decrypts the data using the same WEP Key. For authentication purposes, the wireless network uses Shared Key Authentication.

Note: Some 802.11 access points also support **Use WEP for Authentication Only** (Shared Key Authentication without data encryption).

Key Size

The IEEE 802.11 standard supports two types of WEP encryption: 40-bit and 128-bit.

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.

128-bit encryption is stronger than 40-bit encryption, but 128-bit encryption may not be available outside of the United States due to U.S. export regulations.

When configured for 40-bit encryption, 802.11 products typically support up to four WEP Keys. Each 40-bit WEP Key is expressed as 5 sets of two hexadecimal digits (0-9 and A-F). For example, “12 34 56 78 90” is a 40-bit WEP Key.

When configured for 128-bit encryption, 802.11 products typically support four WEP Keys but some manufacturers support only one 128-bit key. The 128-bit WEP Key is expressed as 13 sets of two hexadecimal digits (0-9 and A-F). For example, “12 34 56 78 90 AB CD EF 12 34 56 78 90” is a 128-bit WEP Key.

Table 8-1: Encryption Key Sizes

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

Note: Typically, 802.11 access points can store up to four 128-bit WEP Keys but some 802.11 client adapters can only store one. Therefore, make sure that your 802.11 access and client adapters’ configurations match.

WEP Configuration Options

The WEP settings must match on all 802.11 devices that are within the same wireless network as identified by the SSID. In general, if your mobile clients will roam between access points, then all of the 802.11 access points and all of the 802.11 client adapters on the network must have the same WEP settings.

Note: Whatever keys you enter for an AP, you must also enter the same keys for the client adapter in the same order. In other words, WEP key 1 on the AP must match WEP key 1 on the client adapter, WEP key 2 on the AP must match WEP key 2 on the client adapter, and so on.

Note: The AP and the client adapters can have different default WEP Keys as long as the keys are in the same order. In other words, the AP can use WEP key 2 as its default key to transmit while a client adapter can use WEP key 3 as its default key to transmit. The two devices will communicate as long as the AP's WEP key 2 is the same as the client's WEP key 2 and the AP's WEP key 3 is the same as the client's WEP key 3.

Wireless Channels

This section discusses the wireless frequencies the 802.11b/g networks use.

IEEE 802.11b/g wireless nodes communicate with each other by using radio frequency signals in the ISM (Industrial, Scientific, and Medical) band between 2.4 GHz and 2.5 GHz. Neighboring channels are 5 MHz apart. However, due to spread spectrum effect of the signals, a node sending signals using a particular channel utilizes frequency spectrum 12.5 MHz 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 interfere with each other. Applying two channels that allow the maximum channel separation decreases the amount of channel cross-talk and provides a noticeable performance increase over networks with minimal channel separation.

Table 8-2 lists the radio frequency channels the 802.11b/g networks use.

Table 8-2. 802.11b/g Radio Frequency Channels

Channel	Center Frequency	Frequency Spread
1	2412 MHz	2399.5 MHz - 2424.5 MHz
2	2417 MHz	2404.5 MHz - 2429.5 MHz
3	2422 MHz	2409.5 MHz - 2434.5 MHz
4	2427 MHz	2414.5 MHz - 2439.5 MHz
5	2432 MHz	2419.5 MHz - 2444.5 MHz
6	2437 MHz	2424.5 MHz - 2449.5 MHz
7	2442 MHz	2429.5 MHz - 2454.5 MHz
8	2447 MHz	2434.5 MHz - 2459.5 MHz
9	2452 MHz	2439.5 MHz - 2464.5 MHz

Table 8-2. 802.11b/g Radio Frequency Channels

Channel	Center Frequency	Frequency Spread
10	2457 MHz	2444.5 MHz - 2469.5 MHz
11	2462 MHz	2449.5 MHz - 2474.5 MHz
12	2467 MHz	2454.5 MHz - 2479.5 MHz
13	2472 MHz	2459.5 MHz - 2484.5 MHz

➡ **Note:** The available channels supported by the wireless products in various countries are different. For example, Channels 1 to 11 are supported in the U.S. and Canada, and Channels 1 to 13 are supported in Europe and Australia.

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.

WPA and WPA2 Wireless Security

Wi-Fi Protected Access (WPA and WPA2) is a specification of standards-based, interoperable security enhancements that increase the level of data protection and access control for existing and future wireless LAN systems.

The IEEE introduced the WEP as an optional security measure to secure 802.11b (Wi-Fi) WLANs, but inherent weaknesses in the standard soon became obvious. In response to this situation, the Wi-Fi Alliance announced a new security architecture in October 2002 that remedies the shortcomings of WEP. This standard, formerly known as Safe Secure Network (SSN), is designed to work with existing 802.11 products and offers forward compatibility with 802.11i, the new wireless security architecture that has been defined by the IEEE.

WPA and WPA2 offer the following benefits:

- Enhanced data privacy
- Robust key management
- Data origin authentication
- Data integrity protection

The Wi-Fi Alliance is now performing interoperability certification testing on Wi-Fi Protected Access products. Starting August of 2003, all new Wi-Fi certified products have to support WPA. NETGEAR is implementing WPA and WPA2 on client and access point products. The 802.11i standard was ratified in 2004.

How Does WPA Compare to WEP?

WEP is a data encryption method and is not intended as a user authentication mechanism. WPA user authentication is implemented using 802.1x and the Extensible Authentication Protocol (EAP). Support for 802.1x authentication is required in WPA. In the 802.11 standard, 802.1x authentication was optional. For details on EAP specifically, refer to IETF RFC 2284.

With 802.11 WEP, all access points and client wireless adapters on a particular wireless LAN must use the same encryption key. A major problem with the 802.11 standard is that the keys are cumbersome to change. If you do not update the WEP keys often, an unauthorized person with a sniffing tool can monitor your network for less than a day and decode the encrypted messages. Products based on the 802.11 standard alone offer system administrators no effective method to update the keys.

For 802.11, WEP encryption is optional. For WPA, encryption using Temporal Key Integrity Protocol (TKIP) is required. TKIP replaces WEP with a new encryption algorithm that is stronger than the WEP algorithm, but that uses the calculation facilities present on existing wireless devices to perform encryption operations. TKIP provides important data encryption enhancements including a per-packet key mixing function, a message integrity check (MIC) named Michael, an extended initialization vector (IV) with sequencing rules, and a re-keying mechanism. Through these enhancements, TKIP addresses all of known WEP vulnerabilities.

How Does WPA Compare to WPA2 (IEEE 802.11i)?

WPA is forward compatible with the WPA2 security specification. WPA is a subset of WPA2 and used certain pieces of the early 802.11i draft, such as 802.1x and TKIP. The main pieces of WPA2 that are not included in WPA are secure IBSS (Ad-Hoc mode), secure fast handoff (for specialized 802.11 VoIP phones), as well as enhanced encryption protocols, such as AES-CCMP. These features were either not yet ready for market or required hardware upgrades to implement.

What are the Key Features of WPA and WPA2 Security?

The following security features are included in the WPA and WPA2 standard:

- WPA and WPA2 Authentication
- WPA and WPA2 Encryption Key Management
  - Temporal Key Integrity Protocol (TKIP)

  - Michael message integrity code (MIC)
  - AES support (WPA2, requires hardware support)
- Support for a mixture of WPA, WPA2, and WEP wireless clients to allow a migration strategy, but mixing WEP and WPA/WPA2 is discouraged

These features are discussed below.

WPA/WPA2 addresses most of the known WEP vulnerabilities and is primarily intended for wireless infrastructure networks as found in the enterprise. This infrastructure includes stations, access points, and authentication servers (typically RADIUS servers). The RADIUS server holds (or has access to) user credentials (for example, user names and passwords) and authenticates wireless users before they gain access to the network.

The strength of WPA/WPA2 comes from an integrated sequence of operations that encompass 802.1X/EAP authentication and sophisticated key management and encryption techniques. Its major operations include:

- Network security capability determination. This occurs at the 802.11 level and is communicated through WPA information elements in Beacon, Probe Response, and (Re) Association Requests. Information in these elements includes the authentication method (802.1X or Pre-shared key) and the preferred cipher suite (WEP, TKIP, or AES).

  The primary information conveyed in the Beacon frames is the authentication method and the cipher suite. Possible authentication methods include 802.1X and Pre-shared key. Pre-shared key is an authentication method that uses a statically configured pass phrase on both the stations and the access point. This obviates the need for an authentication server, which in many home and small office environments will not be available nor desirable. Possible cipher suites include: WEP, TKIP, and AES (Advanced Encryption Standard). We talk more about TKIP and AES when addressing data privacy below.

- Authentication. EAP over 802.1X is used for authentication. Mutual authentication is gained by choosing an EAP type supporting this feature and is required by WPA. 802.1X port access control prevents full access to the network until authentication completes. 802.1X EAPOL-Key packets are used by WPA to distribute per-session keys to those stations successfully authenticated.

  The supplicant in the station uses the authentication and cipher suite information contained in the information elements to decide which authentication method and cipher suite to use. For example, if the access point is using the pre-shared key method then the supplicant need not authenticate using full-blown 802.1X. Rather, the supplicant must simply prove to the access point that it is in possession of the pre-shared key. If the supplicant detects that the service set does not contain a WPA information element then it knows it must use pre-WPA 802.1X authentication and key management in order to access the network.

- Key management. WPA/WPA2 features a robust key generation/management system that integrates the authentication and data privacy functions. Keys are generated after successful authentication and through a subsequent 4-way handshake between the station and Access Point (AP).
- Data Privacy (Encryption). Temporal Key Integrity Protocol (TKIP) is used to wrap WEP in sophisticated cryptographic and security techniques to overcome most of its weaknesses.
- Data integrity. TKIP includes a message integrity code (MIC) at the end of each plaintext message to ensure messages are not being spoofed.

WPA/WPA2 Authentication: Enterprise-level User Authentication via 802.1x/EAP and RADIUS

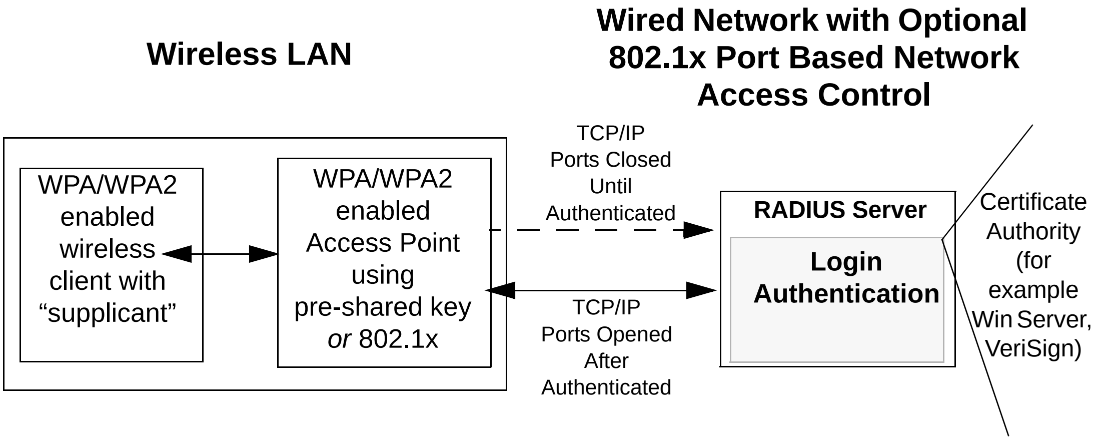

Wireless LAN
Wired Network with Optional 802.1x Port Based Network Access Control
WPA/WPA2 enabled wireless client with “supplicant”
WPA/WPA2 enabled Access Point using pre-shared key *or* 802.1x
TCP/IP Ports Closed Until Authenticated
TCP/IP Ports Opened After Authenticated
RADIUS Server
Login Authentication
Certificate Authority (for example Win Server, VeriSign)

Figure 8-3

IEEE 802.1x offers an effective framework for authenticating and controlling user traffic to a protected network, as well as providing a vehicle for dynamically varying data encryption keys via EAP from a RADIUS server, for example. This framework enables using a central authentication server, which employs mutual authentication so that a rogue wireless user does not join the network.

It is important to note that 802.1x does not provide the actual authentication mechanisms. When using 802.1x, the EAP type, such as Transport Layer Security (EAP-TLS), or EAP Tunneled Transport Layer Security (EAP-TTLS), defines how the authentication takes place.

Note: For environments with a Remote Authentication Dial-In User Service (RADIUS) infrastructure, WPA supports Extensible Authentication Protocol (EAP). For environments without a RADIUS infrastructure, WPA supports the use of a pre-shared key.

Together, these technologies provide a framework for strong user authentication.

Windows XP implements 802.1x natively, and several NETGEAR switch and wireless access point products support 802.1x.

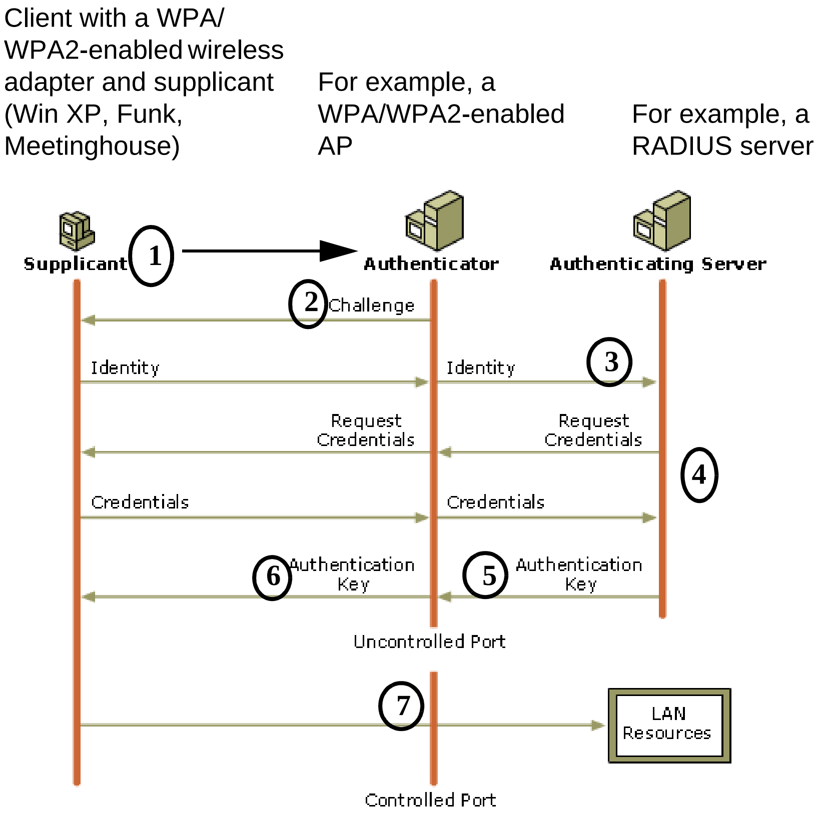


Figure 8-4

The AP sends Beacon Frames with WPA/WPA2 information element to the stations in the service set. Information elements include the required authentication method (802.1x or Pre-shared key) and the preferred cipher suite (WEP, TKIP, or AES). Probe Responses (AP to station) and Association Requests (station to AP) also contain WPA information elements.

1. Initial 802.1x communications begin with an unauthenticated supplicant (client device) attempting to connect with an authenticator (802.11 access point). The client sends an EAP-start message. This begins a series of message exchanges to authenticate the client.
2. The access point replies with an EAP-request identity message.
3. The client sends an EAP-response packet containing the identity to the authentication server. The access point responds by enabling a port for passing only EAP packets from the client to an authentication server located on the wired side of the access point. The access point blocks all other traffic, such as HTTP, DHCP, and POP3 packets, until the access point can verify the client's identity using an authentication server (for example, RADIUS).
4. The authentication server uses a specific authentication algorithm to verify the client's identity. This could be through the use of digital certificates or some other EAP authentication type.
5. The authentication server will either send an accept or reject message to the access point.
6. The access point sends an EAP-success packet (or reject packet) to the client.
7. If the authentication server accepts the client, then the access point will transition the client's port to an authorized state and forward additional traffic.

The important part to know at this point is that the software supporting the specific EAP type resides on the authentication server and within the operating system or application “supplicant” software on the client devices. The access point acts as a “pass through” for 802.1x messages, which means that you can specify any EAP type without needing to upgrade an 802.1x-compliant access point. As a result, you can update the EAP authentication type to such devices as token cards (Smart Cards), Kerberos, one-time passwords, certificates, and public key authentication, or as newer types become available and your requirements for security change.

WPA/WPA2 Data Encryption Key Management

With 802.1x, the rekeying of unicast encryption keys is optional. Additionally, 802.11 and 802.1x provide no mechanism to change the global encryption key used for multicast and broadcast traffic. With WPA/WPA2, rekeying of both unicast and global encryption keys is required.

For the unicast encryption key, the Temporal Key Integrity Protocol (TKIP) changes the key for every frame, and the change is synchronized between the wireless client and the wireless access point (AP). For the global encryption key, WPA includes a facility (the Information Element) for the wireless AP to advertise the changed key to the connected wireless clients.

If configured to implement dynamic key exchange, the 802.1x authentication server can return session keys to the access point along with the accept message. The access point uses the session keys to build, sign and encrypt an EAP key message that is sent to the client immediately after sending the success message. The client can then use contents of the key message to define applicable encryption keys. In typical 802.1x implementations, the client can automatically change encryption keys as often as necessary to minimize the possibility of eavesdroppers having enough time to crack the key in current use.

Temporal Key Integrity Protocol (TKIP). WPA uses TKIP to provide important data encryption enhancements including a per-packet key mixing function, a message integrity check (MIC) named Michael, an extended initialization vector (IV) with sequencing rules, and a re-keying mechanism. TKIP also provides for the following:

- The verification of the security configuration after the encryption keys are determined.
- The synchronized changing of the unicast encryption key for each frame.
- The determination of a unique starting unicast encryption key for each preshared key authentication.

Michael. With 802.11 and WEP, data integrity is provided by a 32-bit *integrity check value* (ICV) that is appended to the 802.11 payload and encrypted with WEP. Although the ICV is encrypted, you can use cryptanalysis to change bits in the encrypted payload and update the encrypted ICV without being detected by the receiver.

With WPA, a method known as *Michael* specifies a new algorithm that calculates an 8-byte message integrity check (MIC) using the calculation facilities available on existing wireless devices. The MIC is placed between the data portion of the IEEE 802.11 frame and the 4-byte ICV. The MIC field is encrypted together with the frame data and the ICV.

Michael also provides replay protection. A new frame counter in the IEEE 802.11 frame is used to prevent replay attacks.

AES Support for WPA2. One of the encryption methods supported by WPA2 is the advanced encryption standard (AES), although AES support will not be required initially for Wi-Fi certification. This is viewed as the optimal choice for security conscience organizations, but the problem with AES is that it requires a fundamental redesign of the NIC hardware in both the station and the access point. TKIP is a pragmatic compromise that allows organizations to deploy better security while AES capable equipment is being designed, manufactured, and incrementally deployed.

Is WPA/WPA2 Perfect?

WPA/WPA2 is not without its vulnerabilities. Specifically, it is susceptible to denial of service (DoS) attacks. If the access point receives two data packets that fail the message integrity code (MIC) within 60 seconds of each other, then the network is under an active attack, and as a result, the access point employs counter measures, which include disassociating each station using the access point. This prevents an attacker from gleaning information about the encryption key and alerts administrators, but it also causes users to lose network connectivity for 60 seconds. More than anything else, this may just prove that no single security tactic is completely invulnerable. WPA/WPA2 is a definite step forward in WLAN security over WEP and has to be thought of as a single part of an end-to-end network security strategy.

Product Support for WPA/WPA2

Starting in August, 2003, NETGEAR, Inc. wireless Wi-Fi certified products will support the WPA standard. NETGEAR, Inc. wireless products that had their Wi-Fi certification approved before August, 2003 will have one year to add WPA so as to maintain their Wi-Fi certification.

WPA/WPA2 requires software changes to the following:

- Wireless access points
- Wireless network adapters
- Wireless client programs

Supporting a Mixture of WPA, WPA2, and WEP Wireless Clients is Discouraged

To support the gradual transition of WEP-based wireless networks to WPA/WPA2, a wireless AP can support both WEP and WPA/WPA2 clients at the same time. During the association, the wireless AP determines which clients use WEP and which clients use WPA/WPA2. The disadvantage to supporting a mixture of WEP and WPA/WPA2 clients is that the global encryption key is not dynamic. This is because WEP-based clients cannot support it. All other benefits to the WPA clients, such as integrity, are maintained.

However, a mixed mode supporting WPA/WPA2 and non-WPA/WPA2 clients would offer network security that is no better than that obtained with a non-WPA/WPA2 network, and thus this mode of operation is discouraged.

Changes to Wireless Access Points

Wireless access points must have their firmware updated to support the following:

- **The new WPA/WPA2 information element**
  To advertise their support of WPA/WPA2, wireless APs send the beacon frame with a new 802.11 WPA/WPA2 information element that contains the wireless AP's security configuration (encryption algorithms and wireless security configuration information).
- **The WPA/WPA2 two-phase authentication**
  Open system, then 802.1x (EAP with RADIUS or preshared key).
- **TKIP**
- **Michael**
- **AES** (WPA2)

To upgrade your wireless access points to support WPA/WPA2, obtain a WPA/WPA2 firmware update from your wireless AP vendor and upload it to your wireless AP.

Changes to Wireless Network Adapters

Wireless networking software in the adapter, and possibly in the OS or client application, must be updated to support the following:

- **The new WPA/WPA2 information element**
  Wireless clients must be able to process the WPA/WPA2 information element and respond with a specific security configuration.
- **The WPA/WPA2 two-phase authentication**
  Open system, then 802.1x supplicant (EAP or preshared key).
- **TKIP**
- **Michael**
- **AES** (WPA2)

To upgrade your wireless network adapters to support WPA/WPA2, obtain a WPA/WPA2 update from your wireless network adapter vendor and update the wireless network adapter driver.

For Windows wireless clients, you must obtain an updated network adapter driver that supports WPA. For wireless network adapter drivers that are compatible with Windows XP (Service Pack 1) and Windows Server 2003, the updated network adapter driver must be able to pass the adapter's WPA capabilities and security configuration to the Wireless Zero Configuration service.

Microsoft has worked with many wireless vendors to embed the WPA driver update in the wireless adapter driver. So, to update your Microsoft Windows wireless client, all you have to do is obtain the new WPA/WPA2-compatible driver and install the driver.

Changes to Wireless Client Programs

Wireless client programs must be updated to permit the configuration of WPA/WPA2 authentication (and preshared key) and the new WPA/WPA2 encryption algorithms (TKIP and AES).

To obtain the Microsoft WPA client program, visit the Microsoft Web site.

Note: The Microsoft WPA2 client is still in beta.

Appendix C
Command Line Reference

In addition to the Web based user interface, the NETGEAR ProSafe 802.11g Wireless Access Point WG302 includes a command line interface (CLI) for administering the access point. The CLI lets you view and modify status and configuration information.

The following topics provide an introduction to the class structure upon which the CLI is based, CLI commands, and examples of using the CLI to get or set configuration information on an access point or cluster of APs:

- "Configurable CLI and Web UI Settings Comparison"
- "Quick View of Commands and How to Get Help"
- "Keyboard Shortcuts and Tab Completion Help"

Configurable CLI and Web UI Settings Comparison

The command line interface (CLI) and the Web user interface (UI) to the WG302 Wireless Access Point are designed to suit the preferences and requirements for different types of users or scenarios. Most administrators will probably use both UIs in different contexts. Some features (such as Clustering) can only be configured from the Web UI and, conversely, some details and more complex configurations are only available through the CLI.

The CLI is particularly useful in that it provides an interface to which you can write programmatic scripts for AP configurations. Also, the CLI can be made available through a serial port, so it can be used even if the network connection is not functioning. Finally, the CLI may be less resource-intensive than a Web interface.

The following table shows a feature-by-feature comparison of which settings can be configured through the CLI or the Web UI, and which are configurable with either.

Table 8-1.

Feature or Setting	Configurable from CLI	Configurable from Web UI
Basic Settings • Getting/changing Administrator Password • Getting/changing AP name and location Viewing information like MAC, IP address, and Firmware version	yes	yes
User Accounts	yes	yes
User Database Backup and Restore	You cannot backup or restore a user database from the CLI.	yes
Sessions	The CLI does not provide session monitoring information. Use the Web UI to view client sessions.	yes
Channel Management	You cannot configure Channel Management from the CLI. .	yes
Status	yes	yes
Ethernet (Wired) Interface	yes	yes
Wireless Interface	yes	yes
Security	yes	yes
Set Up Guest Access	yes	yes
Enable/Configure Guest Login Welcome Page	yes	
Configuring Multiple BSSIDs on Virtual Wireless Networks	yes	yes
Radio Settings	yes	yes
MAC Filtering	yes	yes
Load Balancing	yes	yes
Quality of Service	yes	yes
Wireless Distribution System	yes	yes
Time Protocol	yes	yes

Table 8-1.

Feature or Setting	Configurable from CLI	Configurable from Web UI
Reboot the AP	yes	
Reset the AP to Factory Defaults	yes	yes
Upgrade the Firmware	You cannot upgrade the firmware from the CLI. Please use the Web UI to configure this feature.	yes
Backup and Restore	You cannot backup or restore an AP configuration from the CLI.	yes

Quick View of Commands and How to Get Help

This section describes the commands, command syntax, and how to get help on commands at the CLI

Warning: Settings updated from the CLI (with `get`, `set`, `add`, and `remove` commands) will not be saved to the startup configuration unless you explicitly save them by issuing the `save-running` command.

Commands and Syntax

The CLI for the WG302 Wireless Access Point provides the following commands for manipulating objects..

Note: *`named_class`* is a class of an object from the configuration whose instances are individually named. Named classes have two types: unique-named and group-named. All the instances of a unique named class must be assigned unique names. In a group named class, instances that have the same name form a group. *`instance`* is a name of an instance of class.

Note: Property values cannot contain spaces unless the value is in quotes.

get	The “get” command allows you to get the property values of existing instances of a class. Classes can be “named” or “unnamed”. The command syntax is: **get** *unnamed-class* [*property*... | **detail**] **get** *named-class* [*instance* | **all** [*property*... | *name* | **detail**]] The rest of the command line is optional. If provided, it is either a list of one or more *`properties`*, or the keyword **detail**. An example of using the “get” command on an unnamed class with a single instance is: **`get log`** (There is only one log on the AP. This command returns information on the log file.) An example of using the “get” command on an unnamed class with multiple instances is: **`get log-entry`** (There are multiple log entries but they are not named. This command returns all log entries.) An example of using the “get” command on a named class with multiple instances is: **`get bss wlan0bssInternal`** (There are multiple bss’s and they are named. This command returns information on the BSS named “wlan0bssInternal”.) An example of using the “get” command on a named class to get all instances: **`get radius-user all name`** **`get radius-user all`** **Note:** “`wlan0bssInternal`” is the name of the basic service set (BSS) on the internal network (`wlan0` interface).

set	The “set” command allows you to set the property values of existing instances of a class. **set** *unnamed-class* [**with** *qualifier-property qualifier-value*... **to**] *property value...* The first argument is an unnamed class in the configuration. After this is an optional qualifier that restricts the set to only some instances. For singleton classes (with only one instance) no qualifier is needed. If there is a qualifier, it starts with the keyword **with**, then has a sequence of one or more *qualifier-property qualifier-value* pairs, and ends with the keyword **to**. If these are included, then only instances whose present value of *qualifier-property* is *qualifier-value* will be set. The *qualifier-value* arguments cannot contain spaces. Therefore, you cannot select instances whose desired *qualifier-value* has a space in it. The rest of the command line contains *property-value* pairs. **set** *named-class instance* | **all** [with *qualifier-property qualifier-value...* **to**] *property value...* The first argument is either a named class in the configuration. The next argument is either the name of the *instance* to set, or the keyword **all**, which indicates that all instances should be set. Classes with multiple instances can be set consecutively in the same command line as shown in Example 4 below. The *qualifier-value* arguments cannot contain spaces. Here are some examples. (Bold text indicates class names, property names or keywords; the unbold text are values to which the properties are being set.) 1. **`set interface wlan0 ssid`** `“Vicky's AP”` 2. **`set radio all beacon-interval`** `200` 3. **`set tx-queue wlan0 with queue data0 to aifs`** `3` 4. **`set tx-queue wlan0 with queue data0 to aifs`** 7 **`cwmin`** 15 **`cwmax`** 1024 **`burst`** 0 5. **`set bridge-port br0 with interface eth0 to path-cost`** 200
add	The “add” command allows you to add a new instance or group of instances of a class. **add** *unique-named-class instance* [*property value...*] **add** *group-named-class instance* [*property value...*] **add** *anonymous-class* [*property value...*] For example: add radius-user wally **Note:** If you’re adding an instance to a unique-named class, you must assign the instance a name not already in use by any other instance of that class. If you add instances to group-named classes, you can form groups by creating instances and assigning them identical names. All instances of a group-named class that have the same name form a group of instances.

remove	The “remove” command allows you to remove an existing instance of a class. **remove** *unnamed-class* [*property value*...] **remove** *named-class instance* | **all** [*property value*...] For example: `remove radius-user wally`

The CLI also includes the following commands for maintenance tasks:

save-running	The `save-running` command saves the running configuration as the startup configuration.
reboot	The `reboot` command restarts the access point (a “soft” reboot).
factory-reset	The `factory-reset` command resets the AP to factory defaults and reboots.

Getting Help on Commands at the CLI

Help on commands can be requested at the command line interface (CLI) by using the TAB key. This is a quick way to see all valid completions for a class.

Hitting TAB once will attempt to complete the current command.

If multiple completions exist, a beep will sound and no results will be displayed. Enter TAB again to display all available completions.

Example 1: At a blank command line, hit TAB twice to get a list of all commands.

```
NETGEAR-AP#
add             Add an instance to the running configuration
factory-reset   Reset the system to factory defaults
get             Get property values of the running configuration
reboot          Reboot the system
remove          Remove instances in the running configuration
save-running    Save the running configuration
set             Set property values of the running configuration
```

Example 2: Type “`get`” <TAB><TAB> (including a space after `get`) to see a list of all property options for the `get` command.

```
NETGEAR-AP# get

association     Associated station
basic-rate      Basic rates of radios
bridge-port     Bridge ports of bridge interfaces
bss             Basic Service Set of radios
```

```
config           Configuration settings
detected-ap      Detected access point
dhcp-client      DHCP client settings
dot11            IEEE 802.11 (all radios)
host             Internet host settings
interface        Network interface
ip-route         IP route entry
log              Log settings
log-entry        Log entry
mac-acl          MAC address access list item
ntp              Network Time Protocol client
portal           Guest captive portal
radio            Radio
radius-user      RADIUS user
serial           Serial access to the command line interface
snmp             SNMP (Simple Network Management Protocol)
ssh              SSH access to the command line interface
static-ip-route
supported-rate   Supported rates of radios
system           System settings
telnet           Telnet access to the command line interface
traphost         Destination host for SNMP traps
tx-queue         Transmission queue parameters
wme-queue        Transmission queue parameters for stations
```

Example 3: Type `get system v` TAB. This results in completion with the only matching property, `get system version`. Press ENTER to display the output results of the command.

Keyboard Shortcuts and Tab Completion Help

The CLI provides keyboard shortcuts to help you navigate the command line and build valid commands, along with “tab completion” hints on available commands that match what you have typed so far.

Table 8-2.describes the keyboard shortcuts available from the CLI.

Table 8-2. Keyboard Shortcuts

Keyboard Shortcut	Action on CLI
Ctrl-a Home	Move cursor to the beginning of the current line
Ctrl-e End	Move cursor to the end of the current line
Ctrl-b Left Arrow key	Move cursor back on the current line, one character at a time
Ctrl-f Right Arrow Key	Move the cursor forward on the current line, one character at a time
Ctrl-c	Start over at a blank command prompt (abandons the input on the current line)
Ctrl-h	Remove one character on the current line.
Ctrl-W	Remove the last word in the current command. (Clears one word at a time from the current command line, always starting with the last word on the line.)
Ctrl-k	Remove characters starting from cursor location to end of the current line. (Clears the current line from the cursor forward.)
Ctrl-U	Remove all characters before the cursor. (Clears the current line from the cursor back to the CLI prompt.)
Ctrl-l	Clear screen but keep current CLI prompt and input in place.
Ctrl-p Up Arrow key	Display previous command in history. (Ctrl-p and Ctrl-n let you cycle through a history of all executed commands like Up and Down arrow keys typically do. Up/Down arrow keys also work for this.)
Ctrl-n Down Arrow key	Display next command in history. (Ctrl-p and Ctrl-n let you cycle through a history of all executed commands like Up and Down arrow keys typically do. Up/Down arrow keys also work for this.)
Ctrl-d	Exit the CLI. (At a blank command prompt, typing Ctrl-d closes the CLI.) (Typing Ctrl-d within command text also removes characters, one at a time, at cursor location like Ctrl-h.)

CLI Command Sets

This section lists the CLI commands available from the WG302 Wireless Access Point command line.

TBD