ProSafe Dual Band Wireless N Access Point WNDAP350 Reference Manual

NETGEAR®

NETGEAR, Inc.
350 East Plumeria Drive
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Technical Support

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This equipment is in the Class B category (information equipment to be used in a residential area or an adjacent area thereto) and conforms to the standards set by the Voluntary Control Council for Interference by Data Processing

Equipment and Electronic Office Machines aimed at preventing radio interference in such residential areas. When used near a radio or TV receiver, it may become the cause of radio interference. Read instructions for correct handling.

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This section includes user requirements for operating this product in accordance with National laws for usage of radio spectrum and operation of radio devices. Failure of the end-user to comply with the applicable requirements may result in unlawful operation and adverse action against the end-user by the applicable National regulatory authority.

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FCC Requirements for Operation in the United States

FCC Information to User

This product does not contain any user serviceable components and is to be used with approved antennas only. Any product changes or modifications will invalidate all applicable regulatory certifications and approvals

FCC Guidelines for Human Exposure

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 25 cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC Declaration Of Conformity

We NETGEAR, Inc.,350 east Plumeria Drive, San Jose, CA 95134, declare under our sole responsibility that the model ProSafe Dual Band Wireless N Access Point WNDAP350 complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:

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

FCC Radio Frequency Interference Warnings & Instructions

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 uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following methods:

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

Modifications made to the product, unless expressly approved by NETGEAR, Inc., could void the user's right to operate the equipment.

Canadian Department of Communications Radio Interference Regulations

This digital apparatus (ProSafe Dual Band Wireless N Access Point WNDAP350) does not exceed the Class B limits for radio-noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

IMPORTANT NOTE:

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. To maintain compliance with IC RF exposure compliance requirements, please follow operation instruction as documented in this manual.

Caution:

The device for the band 5150-5250 MHz is only for indoor usage to reduce potentail for harmful interference to co-channel mobile satellite systems.

High power radars are allocaed as primary users (meaning they have priority)of 5250-5350 MHz and 5650-5850 MHz and these radars could cause interference and/or damage to LE-LAN devices.

Canada ID: 4054A-09200110

Product and Publication Details

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Contents

About This Manual

The *ProSafe™ Dual Band Wireless N Access Point WNDAP350 Reference Manual* describes how to install, configure and troubleshoot the ProSafe Dual Band Wireless N Access Point WNDAP350 . The information in this manual is intended for readers with intermediate computer and Internet skills.

Conventions, Formats, and Scope

The conventions, formats, and scope of this manual are described in the following paragraphs:

- **Typographical Conventions**. This manual uses the following typographical conventions:

Italic	Emphasis, books, CDs, file and server names, extensions
Bold	User input, IP addresses, GUI screen text
`Fixed`	Command prompt, CLI text, code
italic	URL links

- **Formats**. This manual 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.

Danger: This is a safety warning. Failure to take heed of this notice may result in personal injury or death.

- **Scope**. This manual is written for the WNDAP350 wirelss access point according to these specifications:

Product Version	ProSafe Dual Band Wireless N Access Point WNDAP350
Manual Publication Date	April 2013

For more information about network, Internet, firewall, and VPN technologies, see the links to the NETGEAR website in Appendix B, "Related Documents."

Note: Product updates are available on the NETGEAR, Inc. website at *http://kbserver.netgear.com/products/WNDAP350.asp*.

How to Print This Manual

To print this manual, 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*.

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.

Revision History

Part Number	Version Number	Date	Description
202-10534-02	2.0	April 2013	Updates to compliance information
202-10534-01	1.0	September 2009	Product introduction

Chapter 1
Introduction

This chapter describes some of the key features of the ProSafe Dual Band Wireless N Access Point WNDAP350 . It also includes the minimum prerequisites for installation ("System Requirements" on page 1-5.), package contents ("What's In the Box?" on page 1-6) and a description of the front and back panels of the WNDAP350 ("Hardware Description" on page 1-6).

About the ProSafe Dual Band Wireless N Access Point WNDAP350

The ProSafe Dual Band Wireless N Access Point WNDAP350 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 WNDAP350 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 of about a 500 foot radius. Consequently, the ProSafe Dual Band Wireless N Access Point WNDAP350 can support a small group of users in a range of several hundred feet. Most access points can handle between 10 to 32 users simultaneously per radio.

The WNDAP350 wirelss access point acts as a bridge between the wired LAN and wireless clients. Connecting multiple WNDAP350s 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.

Key Features and Standards

The WNDAP350 wirelss access point is easy-to-use and provides solid wireless and networking support. It also offers a wide range of security options.

Supported Standards and Conventions

The following standards and conventions are supported:

- **Standards Compliance.** The Wireless Access Point complies with the IEEE 802.11 a/b/g/n standards for Wireless LANs.
- **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 preshared key authentication without the overhead of RADIUS servers but with all of the strong security of WPA.
- **Multiple BSSIDs.** Supports multiple BSSIDs. When a wireless access point is connected to a wired network and a set of wireless stations, it is called a Basic Service Set (BSS). The Basic Service Set Identifier (BSSID) is a unique identifier attached to the header of packets sent over a WLAN that differentiates one WLAN from another when a mobile device tries to connect to the network.

  The multiple BSSID feature allows you to configure up to 8 SSIDs per Radio mode on your access point and assign different configuration settings to each SSID. All the configured SSIDs are active and the network devices can connect to the access point by using any of these SSIDs.
- **DHCP Client Support.** DHCP provides a dynamic IP address to PCs and other devices upon request. The WNDAP350 can act as a client and obtain information from your DHCP server; it 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.
- **802.1Q VLAN (Virtual LAN) Support.** A network of computers that behave as if they are connected to the same network even though they actually may 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.

Key Features

The WNDAP350 provides solid functionality, including the following features:

- **Dual Band Concurrent.** The Wireless Access Point can operate in both the 2.4 GHz band and the 5 GHz band concurrently.

  The choice of band(s) is reflected in the protocol standard supported, as well as the administration screens displayed to you.

- Multiple operating modes:
  - **Wireless Access Point.** Operates as a standard 802.11a/an or 11b/bg/ng access point.
  - **Point-to-Point Bridge.** In this mode, the WNDAP350 only communicates with another bridge-mode wireless access point (with or without clients). Network authentication should be used to protect this communication.
  - **Point-to-Multi-Point Bridge.** Select this only if this WNDAP350 is the "Master" for a group of bridge-mode wireless access points. The other bridge-mode wireless access points send all traffic to this "Master", and do not communicate directly with each other. Network Authentication should be used to protect this traffic.
- **Hotspot Settings.** You can allow the first HTTP (TCP, port 80) request, on client association, to be captured and redirected 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. In addition to using Web browser to do so, command-line interface and SNMP can also be used.
- **Rogue AP detection**. The Rogue AP detection feature shows a list of unknown APs to the administrator.
- **Access Control.** The Access Control MAC address filtering feature can ensure that only trusted wireless stations can use the WNDAP350 to gain access to your LAN.
- **Security Profiles.** When using multiple BSSIDs, you can configure unique security settings (encryption, SSID, etc.) for each BSSID.
- **Hidden Mode.** The SSID is not broadcast, assuring only clients configured with the correct SSID can connect.
- **Secure Telnet Command Line Interface.** The secure Telnet command line interface enables direct secure access over the serial port and easy scripting of configuration of multiple WNDAP350s across an extensive network via the Ethernet interface. An SSH client is required.
- **Configuration Backup.** Configuration settings can be backed up to a file and restored.
- **Power over Ethernet.** Power can be supplied to the WNDAP350 over the Ethernet port from any 802.3af compliant mid-span or end-span source. Please refer to the Appendix for a list of compliant Netgear PoE switches.
- **Autosensing Ethernet Connection with Auto Uplink Interface.** Connects to 10/100/1000 Mbps IEEE 802.3 Ethernet networks.
- **LED Indicators.** Power/Test, LAN speed, LAN activity, and wireless activity for each radio mode are easily identified.

- **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.
- **WMM Power Save Support.** Power Save uses mechanisms from 802.11e and legacy 802.11 to save power (for battery powered equipment) and fine-tune power consumption**.**
- **VLAN Security Profiles.** Each Security Profile can be assigned a VLAN ID as each Security Profile is modified.

802.11a/b/g/n Standards-based Wireless Networking

The ProSafe Dual Band Wireless N Access Point WNDAP350 provides a bridge between Ethernet wired LANs and 802.11a/b/g/n compatible wireless LAN networks. It provides connectivity between Ethernet wired networks and radio-equipped wireless notebook systems, desktop systems, print servers, and other devices. Additionally, the WNDAP350 supports the following wireless features:

- Aggregation Support
- Reduced Inter Frame Spacing support
- Multiple Input, Multiple Output (MIMO) support
- Distributed coordinated function (CSMA/CA, Back off procedure, ACK procedure, retransmission of unacknowledged frames)
- RTS/CTS handshake
- Beacon generation
- Packet fragmentation and reassembly
- Auto or long preamble
- Roaming among access points on the same subnet

Autosensing Ethernet Connections with Auto Uplink

The WNDAP350 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 incorporates Auto Uplink™ technology. The Ethernet port will automatically sense 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 to the correct configuration. This feature also eliminates any concerns about crossover cables, as Auto Uplink will accommodate either type of cable to make the right connection.

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 WNDAP350 wirelss access point:

- FS108P - ProSafe 8 Port 10/100 Switch with 4 Port PoE
- FS116P ProSafe 16 Port 10/100 Desktop Switch with 8 Port PoE
- FS726TP - ProSafe 24 Port 10/100 Smart Switch with 2 Gigabit Ports and 12 Port PoE
- FS728TP - ProSafe 24+4 10/100 Smart Switch with full PoE
- FS752TPS - ProSafe 48 Port 10/100 Stackable Smart Switch with 4 Gigabit Ports and 24 Port PoE
- FSM7328PS - ProSafe 24-port 10/100 L3 Managed Stackable Switch with 24 PoE Ports
- FSM7352PS
- GS724TP
- GS748TP
- WNDA3100 - RangeMax Dual Band Wireless-N USB 2.0 Adapter
- WN121T RangeMax NEXT Wireless-N USB 2.0 Adapter
- WN111 - RangeMax Next Wireless-N USB Adapter
- WN511B RangeMax NEXT Wireless-N Notebook Adapter
- WN311B RangeMax NEXT Wireless-N PCI Adapter
- 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 USB Adapter
- WPN111 - RangeMax Wireless USB 2.0 Adapter

System Requirements

Before installing the WNDAP350, make sure your system meets these requirements:

- A 10/100/1000 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 5.0 or above, or Mozilla 3.0 or above
- At least one computer with the TCP/IP protocol installed
- 802.11a/n or 802.11b/g/n-compliant devices, such as the NETGEAR WG511 Wireless Adapter

What's In the Box?

The product package should contain the following items:

- ProSafe Dual Band Wireless N Access Point WNDAP350
- Power adapter and cord (12 V dc, 1.2 A)
- Straight through Category 5 Ethernet cable
- ProSafe Dual Band Wireless N Access Point WNDAP350 Installation Guide
- *Resource CD* which includes a link to this manual.

If any of the parts are incorrect, missing, or damaged, contact your NETGEAR dealer. Keep the carton, including the original packing materials, in case you need to return the firewall 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 front and rear hardware functions of the WNDAP350.

Front Panel

The WNDAP350 front hardware functions are described below.

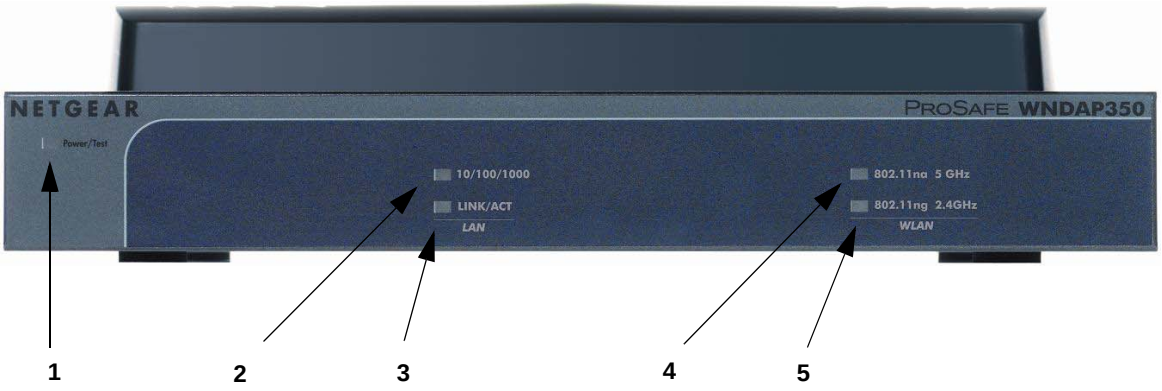


Figure 1-1

The following table explains the LED indicators:

Table 1-1. Front Panel LED Indicators

Item	LED		DESCRIPTION
1	**PWR/TEST**		Power Indicator
		Off	No power.
		On	Power is on.
		Blink	Indicates self test, loading software, or system fault (if continues). Note: This LED may blink for a minute before going off.
2	**100**		Ethernet LAN Speed Indicator
		Off	Indicates 10 Mbps or no link detected.
		Yellow	Indicates 100 Mbps link detected.
		Green	Indicates 1000 Mbps link detected.
3	**LINK/ACT LAN**		Ethernet LAN Link Activity Indicator
		Off	Indicates no Ethernet link detected.
		Blink (Green)	Indicates data traffic on the 1000Mbps Ethernet LAN.

Table 1-1. Front Panel LED Indicators (continued)

Item	LED		DESCRIPTION
4	**802.11na WLAN**		Wireless LAN Link Activity Indicator (5 GHz)
		Off	Indicates WLAN 802.11n/a (5GHz) mode is disabled.
		Blink (Green)	Indicates Wireless data traffic in 5GHz modes.
5	**802.11ng WLAN**		Wireless LAN Link Activity Indicator (5 GHz)
		Off	Indicates WLAN 802.11b/g (5GHz) mode is disabled.
		Blink (Green)	Indicates Wireless data traffic in 2.4GHz modes.

Rear Panel

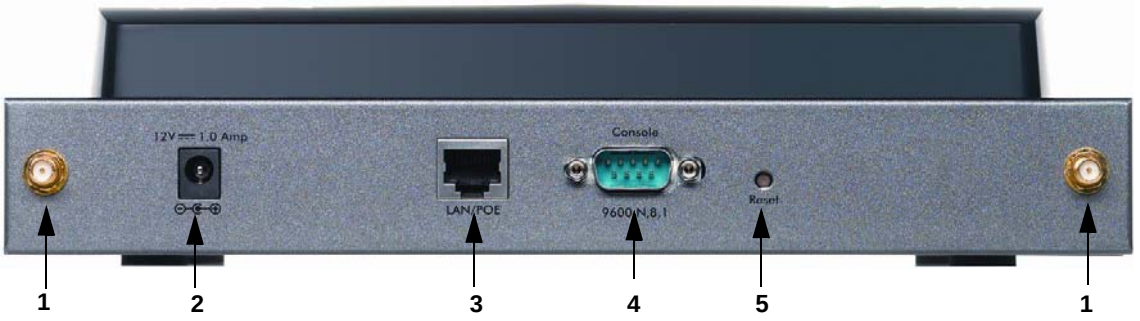


Figure 1-2

The WNDAP350 rear panel functions are described below:

1. Left and Right Detachable Antennas. The WNDAP350 provides two detachable dipole antennas.
2. Power Socket. This socket connects to the WNDAP350 12V 1.2A power adapter.
3. RJ-45 Ethernet Port. Use the WNDAP350 Ethernet RJ-45 port to connect to an Ethernet LAN through a device such as a hub, switch, router, or PoE switch.
4. Serial Console Port. Male DB-9 serial port for serial DTE connections.
5. Restore to Factory Defaults Button. The restore to default button restores the WNDAP350 to the factory default settings.

Chapter 2
Basic Installation and Configuration

This chapter describes how to set up your ProSafe Dual Band Wireless N Access Point WNDAP350 for wireless connectivity to your LAN. This basic configuration will enable computers with 802.11b/g/n or 802.11a/n 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 802.11b/bg/ng or 802.11a/na 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 WNDAP350 wirelss access point provides highly effective security features which are covered in detail in “Understanding Security Profiles” on page 2-23. Deploy the security features appropriate to your needs.

This chapter contains the following sections:

14. "Configuring WPA2 with RADIUS
15. "Configuring WPA and WPA2 with RADIUS
16. "Configuring WPA-PSK
17. "Configuring WPA2-PSK
18. "Configuring WPA-PSK and WPA2-PSK
19. "Restricting Wireless Access by MAC Address

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

- A location for the WNDAP350 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/g/n or 802.11a/n wireless adapters.

Wireless Equipment Placement and Range Guidelines

The operating distance or range of your wireless connection can vary significantly based on the physical placement 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 WNDAP350. For complete performance specifications, see Appendix A, "Default Settings and Technical Specifications."

For best results, place your wireless access point:

- Near the center of the area in which your PCs will 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.

The antenna provides better coverage above the access point. Place the access point so that it is either ceiling mounted or mounted on a wall facing the users.

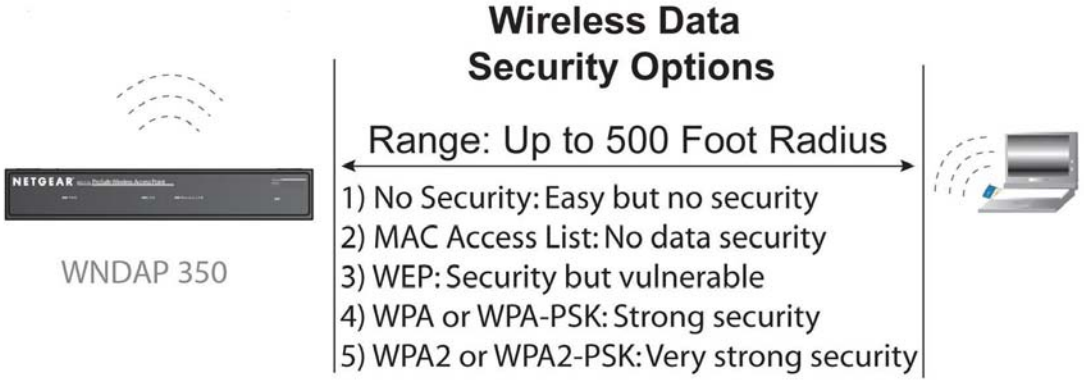
If you are using multiple access points for 11b/bg/ng, it is better if adjacent access points use different radio frequency channels to reduce interference. The recommended Channel spacing between adjacent access points is 5 Channels (for example, use Channels 1 and 6, or 6 and 11). For 11a/na, the 6 Channel spacing is not needed.

The time it takes to establish a wireless connection can vary depending on both your security settings and placement. Some types of security connections can take slightly longer to establish and can consume more battery power on a notebook computer.

Understanding WNDAP350 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 WNDAP350 wirelss access point provides highly effective security features which are covered in detail in this chapter. Deploy the security features appropriate to your needs.

Figure 2-1



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 WNDAP350. 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, Vista and Unix systems but the data is still fully exposed to a determined snoop using specialized test equipment like wireless sniffers.
- **Use WEP.** Wired Equivalent Privacy (WEP) data encryption provides data security. WEP open authentication and WEP data encryption will block all but the most determined eavesdropper.
- **Use WPA or WPA-PSK.** Wi-Fi Protected Access (WPA) 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.

	**Note:** WEP and TKIP provide only legacy rates of operation. So, AES is the recommended solution to use the 802.11n rates and speed.

Installing the WNDAP350 wirelss access point

Before installing the ProSafe Dual Band Wireless N Access Point WNDAP350 , you should make sure that your Ethernet network is up and working. You will be connecting the access point to the Ethernet network so that computers with 802.11b/g/n or 802.11a/n wireless adapters will be able to communicate with computers on the Ethernet network. In order for this to work correctly, verify that you have met all of the system requirements, shown on “System Requirements” on page 1-5.

Setting up the WNDAP350 wirelss access point

	**Tip:** Before mounting the WNDAP350 in a high location, first set up and test the WNDAP350 to verify wireless network connectivity.

To set up the WNDAP350 wirelss access point:

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

2. Configure the computer with a static IP address of 192.168.0.210 and 255.255.255.0 for the Subnet Mask.
3. Connect an Ethernet cable from the WNDAP350 to the computer.
4. Turn on your computer, connect the power adapter to the WNDAP350 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.
   - The WLAN LEDs should be blinking.

Configuring LAN and Wireless Access

To configure the WNDAP350 Ethernet port for LAN access:

1. Connect to the WNDAP350 by opening your browser and entering **http://192.168.0.237** in the address field. The WNDAP350 login screen appears (see Figure 2-2).
2. Enter **admin** for the user name and **password** for the password, both in lower case letters.

Figure 2-2 Login screen

3. Click **Login**. The main menu of the WNDAP350 displays as shown in Figure 2-3.
   - When the wireless access point is connected to the Internet, under the **Support** tab, select **Documentation** to view the documentation for the wireless access point.
   - On the top-right of the screen, select **Logout** to exit the WNDAP350 setup screens. (You will automatically be logged out of the wireless access point after 5 minutes of no activity.)

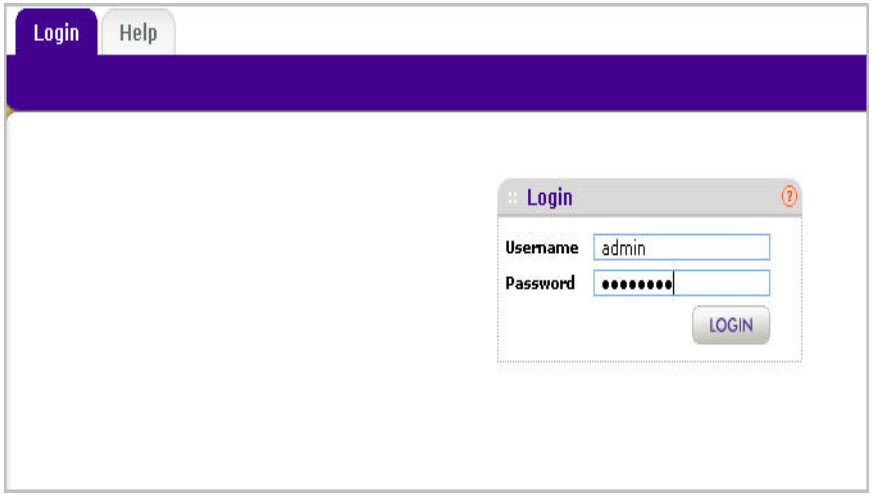


Figure 2-3 Access Point Name and Country / Region

4. **Access Point Name:** Enter the access point name of the WNDAP350.

   This unique name is the access point NetBIOS name. The default Access Point Name is located on the bottom label of WNDAP350. The default is netgearxxxxxx, where xxxxxx represents the last 6 digits of the WNDAP350 MAC address. You may modify the default name with a unique name up to 15 characters long.

5. From the **Country/Region** pull-down menu, select the region where the WNDAP350 can be used (the default Country/Region is the United States).

	Note: If your country or region is not listed, please check with Netgear Support.

6. **Spanning Tree Protocol.** Enable or disable spanning tree protocol. Spanning tree protocol enables network traffic optimization in settings with multiple WNDAP350 wirelss access points. The default is Disable.

7. **802.1Q VLAN.** This section allows each Security Profile to be associated with the default VLAN for WNDAP350. (Useful primarily if the hubs/switches on your LAN support the VLAN 802.1Q standard.)

– **Untagged VLAN.** Untagged VLANs do not cause the outbound traffic to be tagged with the VLAN ID. Also, there can be only one Untagged VLAN. The default is Enable and set to 1.

– **Management VLAN.** Management VLANs are used for managing traffic (Telnet, SNMP, and HTTP) to and from the Access Point. Management VLANs also cause outbound traffic to be tagged with this VLAN ID. However, if their VLAN ID is same as the Untagged VLAN ID, then the outbound traffic is not tagged. There can be only one Management VLAN.The default is 1.

8. Select **Time** from the left panel. The Time screen displays, as shown in Figure 2-4.

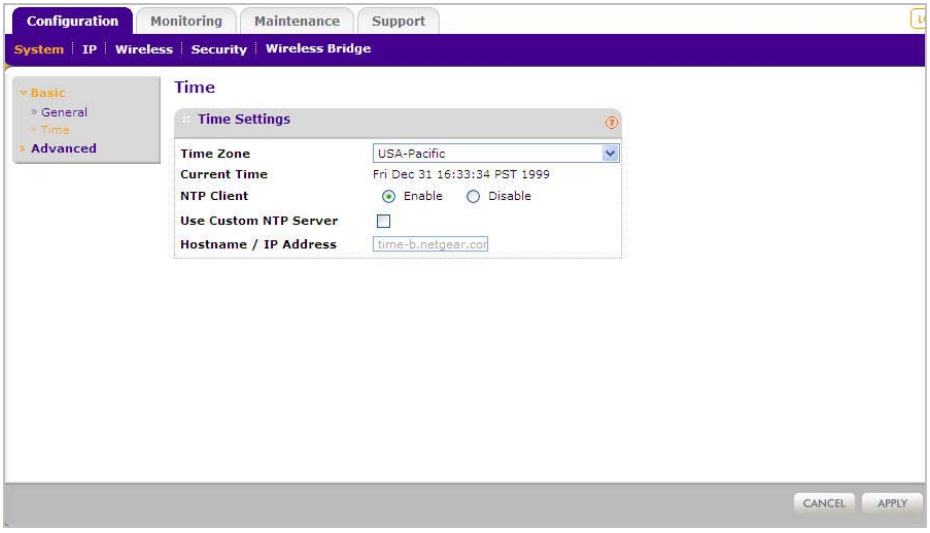


Figure 2-4 Time zone and system time related settings

9. Enter the Time Settings for your area. See the online help or “Configuring Time Settings” on page 2-8 for more information about how to configure the settings on this screen.

10. Select **IP** on the main menu. The IP Settings screen displays, as shown in Figure 2-5.

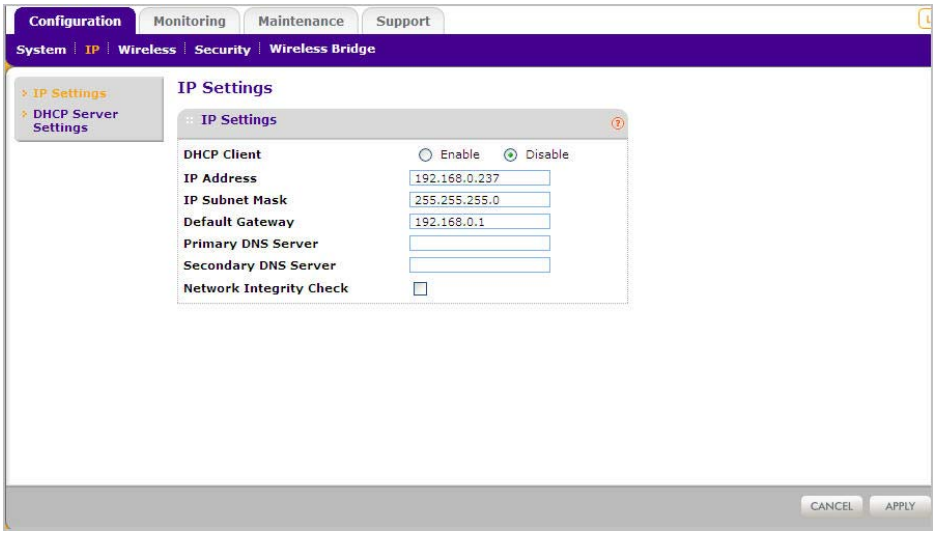


Figure 2-5 IP Settings

11. Configure the IP Address settings appropriate for your network. The default values are suitable for most users and situations. (See the online help or "Setting Basic IP Options" on page 2-13 for more information about how to configure the settings on this screen.

12. Click **Apply.**

Configuring Time Settings

To configure your time settings:

1. Under the **Configuration** tab, select **System** from the main menu, select **Basic**, and then select **Time**. The Time screen displays, as shown in Figure 2-6.

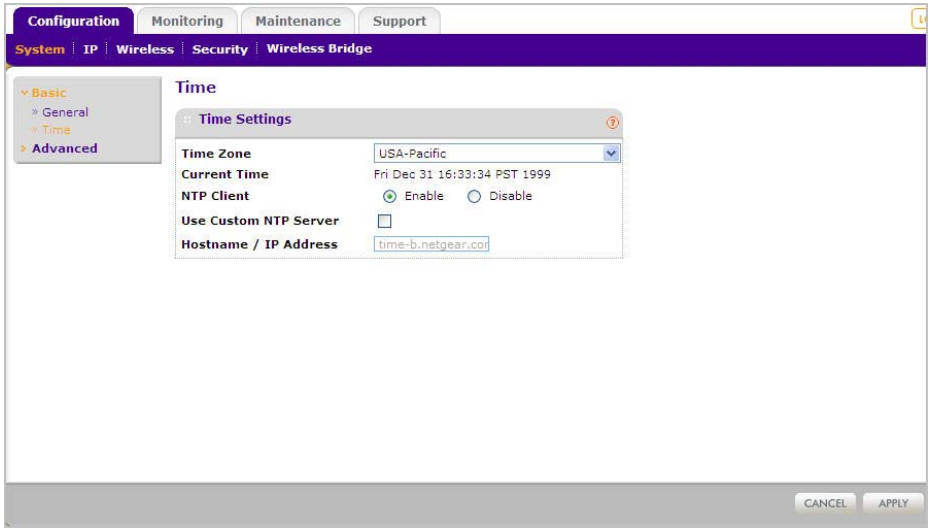


Figure 2-6 Time zone and system time related settings

2. Configure the following information:

   – **Time Zone.** From the pull-down menu, select the local time zone for your wireless access point from a list of all available time zones. The default is **USA-Pacific**.

   – **NTP Client.** Enable NTP Client to synchronize the time of the access point with an NTP Server. The Default is Enabled.

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

   – **Use Custom NTP Server.** Check the option if you have a custom NTP server. The default is Disabled.

   – **Hostname / IP Address.** Enter the host name or the IP address of the custom NTP server. The default is time-b.netgear.com.

3. Click **Apply.**

Configuring Wireless Access

To configure your wireless settings for 11b/bg/ng and 11a/na:

1. From the main menu under **Configuration**, select **Wireless**. The Wireless Settings screen displays, as shown in Figure 2-7.
2. Enter the wireless settings for your area. See the online help or "Wireless Settings" on page 2-14.
3. Click **Apply** to save your settings.

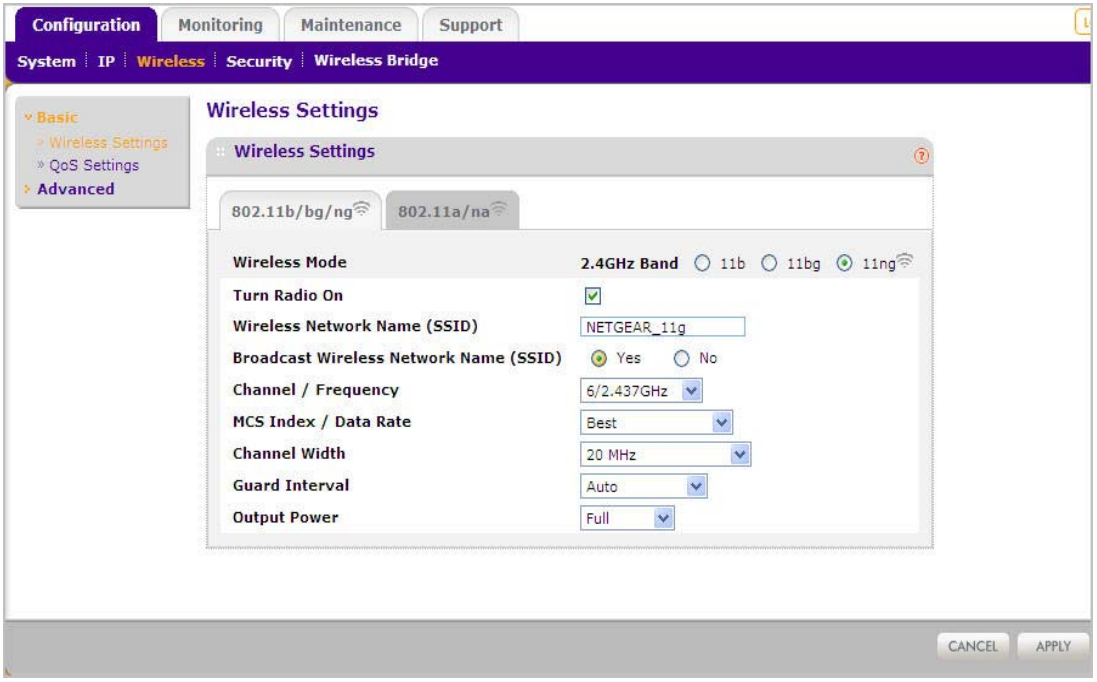


Figure 2-7 Basic Wireless Settings for 802.11b/bg/ng

When you have completed the setup steps, you can deploy the WNDAP350 in your network. If needed, you can now reconfigure the computer you used in step 1 (from the Static IP) back to its original TCP/IP settings.

Deploying the WNDAP350 wirelss access point

To deploy the WNDAP350 wirelss access point:

1. Disconnect the WNDAP350 and position it where it will be deployed. 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.
2. Lift the antennae on either side so that they are vertical.

	**Note:** Refer to the antenna positioning and wireless mode configuration information in the Advanced Configuration chapter of the Reference Manual.

3. Connect an Ethernet cable from your WNDAP350 wirelss access point to a LAN port on your router, switch, or hub.

	**Note:** By default, WNDAP350 is set with the DHCP client disabled. If your network uses dynamic IP addresses, you must change this setting. To connect to the WNDAP350 after the DHCP server on your network assigns it a new IP address, enter the wireless access point name into your Web browser. The default wireless access point name is netgearxxxxxx, where xxxxxx represents the last 6 bytes of the MAC address. The default name is printed on the bottom label of the WNDAP350.

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

Verifying Wireless Connectivity

Using a computer with an 802.11b/bg/ng or 802.11a/na wireless adapter with the correct wireless settings needed to connect to the WNDAP350 (SSID, WEP/WPA, MAC ACL, etc.), verify connectivity by using a browser such as Mozilla Firefox or Internet Explorer to browse the Internet, or check for file and printer access on your network.

The default SSID for the 802.11b/bg/ng wireless mode is NETGEAR_11g; the default SSID for the 802.11a/na mode is NETGEAR_11a. The SSID of any wireless access adapters must match the SSID configured in the ProSafe Dual Band Wireless N Access Point WNDAP350 . If they do not match, no wireless connection will be made.

	**Note:** If you are unable to connect, see Chapter 5, “Troubleshooting and Debugging.”

Logging In Using the Default IP Address

After you install the WNDAP350, log in to the wireless access point to configure the basic settings and the wireless settings. The WNDAP350 is set, by default, with the IP address of 192.168.0.237 with DHCP disabled.

	Note: The computer you are using to connect to the WNDAP350 should be configured with an IP address that starts with 192.168.0.x and a Subnet Mask of 255.255.255.0.

To log in using the default IP Address:

1. Open a Web browser such as Internet Explorer or Mozilla Firefox.
2. Connect to the WNDAP350 by entering its default address of **http://192.168.0.237** into your browser. The login screen displays. Enter **admin** for the user name and **password** for the password, both in lower case letters.

Figure 2-8 Connecting to the Access Point

3. Click **Login**.

   Your Web browser should automatically find the WNDAP350 wirelss access point and display the home screen.

Setting Basic IP Options

The basic IP settings for your wireless access point are entered on this screen. Most of the default settings will work in most cases. However, if your wireless access point is part of a more complex LAN network, then modify the settings to meet the requirements of your network based on the explanation of the various fields.

To configure the basic IP settings of your wireless access point:

1. Under **Configuration**, select **IP**, and then IP Settings. The IP Settings screen displays as shown in Figure 2-9 below.

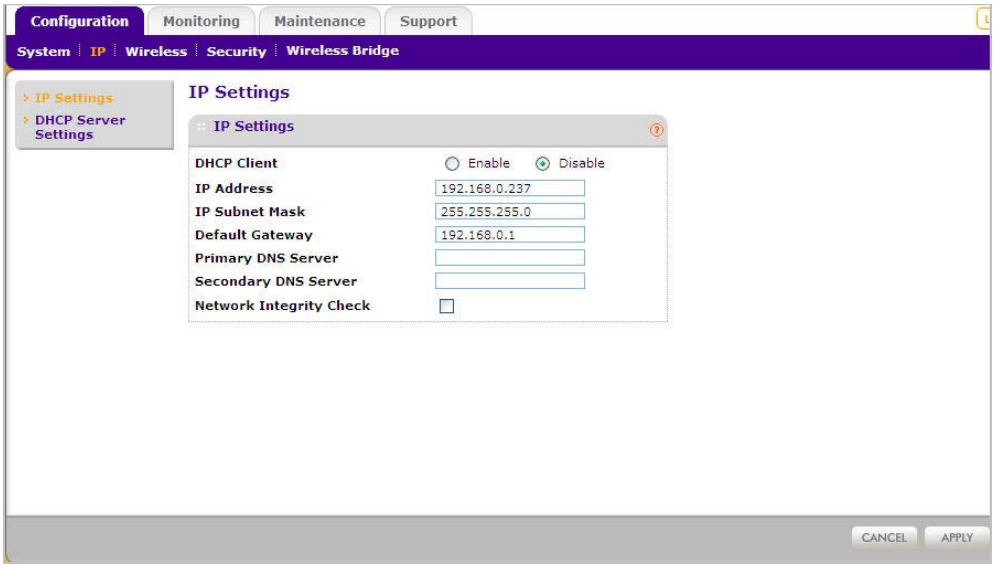


Figure 2-9 Basic IP options

2. Enter the IP Address fields of the WNDAP350.

   – **DHCP Client**. By default, the Dynamic Host Configuration Protocol (DHCP) client is disabled. If you have a DHCP server on your LAN and you enable DHCP, the wireless access point will get its IP address, subnet mask and default gateway settings automatically from the DHCP server on your network when you connect the WNDAP350 to your LAN.

   – **IP Address.** Enter the IP Address of your wireless access point.The default IP address is **192.168.0.237**. To change it, enter an unused IP address from the address range used on your LAN; or enable DHCP.

- **IP Subnet Mask**. The Access Point will automatically calculate the subnet mask based on the IP address that you assign. Otherwise, you can use 255.255.255.0 (the default) as the subnet mask.
- **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.
- **Primary DNS Servers.** The WNDAP350 will use this IP address as the primary Domain Name Server used by stations on your LAN.
- **Secondary DNS Servers.** The WNDAP350 will use this IP address as the secondary Domain Name Server used by stations on your LAN.
- **Network Integrity Check.** Check this box to enable the WNDAP350 to validate that the upstream link is active before allowing wirelessassociations.If you set this option you must ensure your default gateway is configured.

3. Click **Apply** to save your basic IP settings.

Wireless Settings

The following sections describe how to configure the wireless settings available in both the 802.11b/bg/ng and 802.11a/na modes.

Configuring 802.11b/bg/ng Wireless Settings

To configure the wireless settings of your 802.11 b/bg/ng wireless access point:

1. From main menu under **Configuration**, select **Wireless**. The Wireless Settings screen of your 802.11 b/bg/ng wireless access point displays, as shown in Figure 2-10 below.

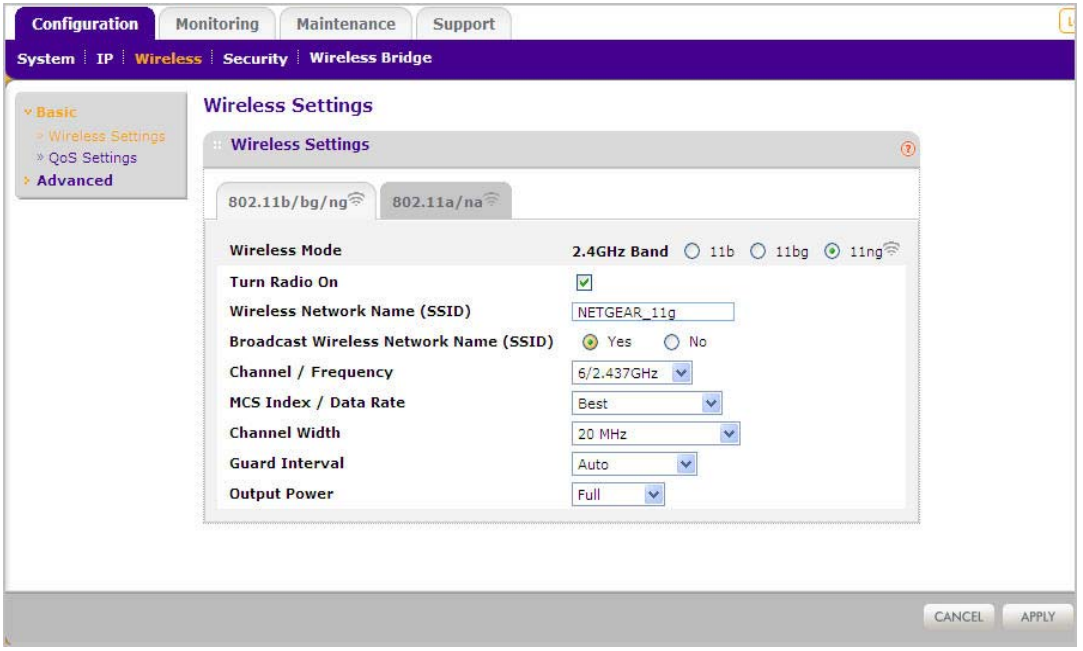


Figure 2-10 Configure wireless settings 802.11b/bg/ng

2. Configure the Wireless LAN settings based on the following field descriptions:

   - **Wireless Mode**. Select the desired wireless operating mode. The default is 11ng. The options are:
     - **11b** – All 802.11b wireless stations can be used. (The 802.11g wireless stations can still be used if they can operate in 802.11b mode.)
     - **11bg** – Both 802.11b and 802.11g wireless stations can be supported.

– **11ng** – All 11b, 11g, and 11ng wireless stations can be used. This is the default. If you select this option, then two additional options, Channel Width and Guard Interval, are displayed.

Note: If you select one of these option and if other settings on this screen are disabled, then you must select the Turn Radio On radio button to enable available options on this screen.

- **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.
- **Wireless Network Name (SSID).** This is the name of your wireless network. It is set to the default name of NETGEAR_11a for 802.11a/n and NETGEAR_11g for 802.11b/bg/ng.
- **Broadcast 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, Vista and Unix systems but the data is still fully exposed to a determined snoop using specialized test equipment like wireless sniffers. Default is enabled.
- **Channel/Frequency**. From the pull-down menu, select the channel you wish to use on your wireless LAN. The wireless channel in use will be between 1 to 11 for US and Canada, 1 to 13 for Europe and Australia. The default is channel Auto.

  It should not be necessary to change the wireless channel unless you experience interference (shown by lost connections and/or slow data transfers). Should this happen, you may need to experiment with different channels to see which is the best. Alternatively, you can select the Auto channel option for the AP to intelligently pick the channel with least interference. See the article on "Wireless Channels" available on the NETGEAR website. (A link to this article and other articles of interest can be found in Appendix B, "Related Documents."). When selecting or changing channels, some points to bear in mind:

  – Access points use a fixed channel. You can select the channel used. This allows you to choose a channel which provides the least interference and best performance. In the USA and Canada, 11 channels are available

  – If using 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 5 channels (for example, use channels 1 and 6, or 6 and 11).

  – 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 various access points are using the same SSID.

- **MCS Index/Data Rate**. From the pull-down menu, select the available transmit data rate of the wireless network. Also, depending on the band selected, the set of rates will vary. The possible data rates supported are:
  - **Data Rates for Channel Width=20MHz and Guard Interval=short (400ms):** Best, 7.2 Mbps, 14.4 Mbps, 21.7 Mbps, 28.9 Mbps, 43.3 Mbps, 57.8 Mbps, 65 Mbps, 72.2 Mbps, 14.44 Mbps, 28.88 Mbps, 43.33 Mbps, 57.77 Mbps, 86.66 Mbps, 115.56 Mbps, 130 Mbps, 144.44 Mbps
  - **Data Rates for Channel Width=20MHz and Guard Interval=long (800ms):** Best, 6.5 Mbps, 13 Mbps, 19.5 Mbps, 26 Mbps, 39 Mbps, 52 Mbps, 58.5 Mbps, 65 Mbps, 13 Mbps, 26 Mbps, 39 Mbps, 52 Mbps, 78 Mbps, 104 Mbps, 117 Mbps, 130 Mbps
  - **Data Rates for Channel Width=40MHz and Guard Interval=short:** Best, 15 Mbps, 30 Mbps, 45 Mbps, 60 Mbps, 90 Mbps, 120 Mbps, 135 Mbps, 150 Mbps, 30 Mbps, 60 Mbps, 90 Mbps, 120 Mbps, 180 Mbps, 240 Mbps, 270 Mbps, 300 Mbps
  - **Data Rates for Channel Width=40MHz and Guard Interval=long:** Best, 13.5 Mbps, 27 Mbps, 40.5 Mbps, 54 Mbps, 81 Mbps, 108Mbps, 121.5 Mbps, 135 Mbps, 27 Mbps, 54 Mbps, 81 Mbps, 108Mbps, 162 Mbps, 216 Mbps, 243 Mbps, 270 Mbps
- **Channel Width.** From the pull-down menu, select the desired channel width.
  - 20 MHz - This is the static, legacy mode. It gives the least throughput.
  - 40 MHz - This is the static, high-throughput mode. Legacy clients will not be able to connect in this mode.
  - 20/40 MHz - This is the dynamic, compatibility mode.
- **Guard Interval.** From the pull-down menu, select the desired guard interval. The guard interval protects from interference from other transmissions. The default is Auto.
- **Output Power**. From the pull-down menu, select the transmit power of the access point. The options are Full, Half, Quarter, Eighth, and Minimum. Decrease the transmit power if two or more APs are close together and use the same channel frequency. The default is Full. (The transmit power may vary depending on the local regulatory regulations.

3. Click **Apply** to save your 802.11b/bg/ng wireless settings.

Configuring 802.11a/na Wireless Settings

To configure the 802.11a/na wireless settings of your wireless access point:

1. From the main menu under **Configuration**, select **Wireless**, and then select the **802.11a/na** tab. The Wireless Settings screen for your 11a/na access point displays as shown in Figure 2-11 below.

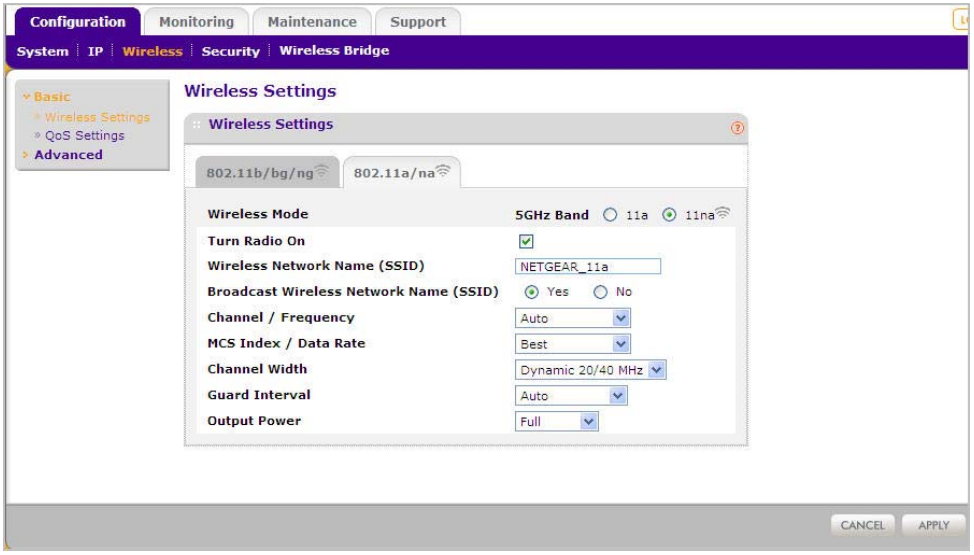


Figure 2-11 Basic Wireless Settings - 802.11a/na

2. Configure the Wireless LAN settings based on the following field descriptions:

- **Wireless Mode**. Select the desired wireless operating mode. Only 802.11a/na wireless modes can be selected from this menu. The default is 11na. The options are:
  - **11a** – All 802.11a wireless stations can be used.
  - **11na** – All 11a and 11na wireless stations can be used. This is the default.

	Note: If you select one of these options and if other settings on this screen are disabled, then you must select the Turn Radio On radio button to enable available options on this screen.

- **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.
- **Wireless Network Name (SSID).** This is the name of your wireless network. It is set to the default name of NETGEAR_11a for 802.11a/na and NETGEAR_11g for 802.11b/bg/ng modes.

- **Broadcast 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, Vista and Unix systems but the data is still fully exposed to a determined snoop using specialized test equipment like wireless sniffers. Default is enabled.
- **Channel/Frequency**. From the pull-down menu, select the channel you wish to use on your wireless LAN. The default is Auto. When you select Auto as the Channel Frequency, then the only available Channel Width is Dynamic: 20/40MHz.

  It should not be necessary to change the wireless channel unless you experience interference (shown by lost connections and/or slow data transfers). Should this happen, you may want to experiment with different channels to see which is the best. See the article on "Wireless Channels" available on the NETGEAR website. (A link to this article and other articles of interest can be found in Appendix B, "Related Documents."). When selecting or changing channels, some points to bear in mind:
  - Access points use a fixed channel. You can select the channel used. This allows you to choose a channel which provides the least interference and best performance. In the USA and Canada, 8 channels are available.
  - If using 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 8 channels (for example, use channels 36 and 44, or 44 and 52).
  - 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 occur when the various access points are using the same SSID.
- **MCS Index/Data Rate**. From the pull-down menu, select the transmit data rate of the wireless network. Also, depending on the band selected, the set of rates will vary. The default is Best.

	**Note:** Data rate is selected using MCS Index. The actual data rate is computed based on MCS Index, Channel Width, and Guard Interval. When Channel Width selected is Dynamic 20/40MHz or when Guard Interval is selected is Auto, then the data rate for a client depends on associated clients channel width and guard interval capabilities.

The possible data rates supported are:

- **Data Rates for Channel Width=20MHz and Guard Interval=short (400ms):** Best, 7.2 Mbps, 14.4 Mbps, 21.7 Mbps, 28.9 Mbps, 43.3 Mbps, 57.8 Mbps, 65 Mbps, 72.2 Mbps, 14.44 Mbps, 28.88 Mbps, 43.33 Mbps, 57.77 Mbps, 86.66 Mbps, 115.56 Mbps, 130 Mbps, 144.44 Mbps
- **Data Rates for Channel Width=20MHz and Guard Interval=long (800ms):** Best, 6.5 Mbps, 13 Mbps, 19.5 Mbps, 26 Mbps, 39 Mbps, 52 Mbps, 58.5 Mbps, 65 Mbps, 13 Mbps, 26 Mbps, 39 Mbps, 52 Mbps, 78 Mbps, 104 Mbps, 117 Mbps, 130 Mbps
- **Data Rates for Channel Width=40MHz and Guard Interval=short:** Best, 15 Mbps, 30 Mbps, 45 Mbps, 60 Mbps, 90 Mbps, 120 Mbps, 135 Mbps, 150 Mbps, 30 Mbps, 60 Mbps, 90 Mbps, 120 Mbps, 180 Mbps, 240 Mbps, 270 Mbps, 300 Mbps
- **Data Rates for Channel Width=40MHz and Guard Interval=long:** Best, 13.5 Mbps, 27 Mbps, 40.5 Mbps, 54 Mbps, 81 Mbps, 108Mbps, 121.5 Mbps, 135 Mbps, 27 Mbps, 54 Mbps, 81 Mbps, 108Mbps, 162 Mbps, 216 Mbps, 243 Mbps, 270 Mbps

- **Channel Width.** From the pull-down menu, select the desired channel width. To maximize performance, select high throughput channel width. The default is Dynamic 20/40 MHz.
- **Guard Interval.** From the pull-down menu, select the desired guard interval. The guard interval protects from interference from other transmissions. The default is Auto.

  The data rates for different Channel Width and Guard Interval combinations are given above:
- **Output Power**. From the pull-down menu, select the transmit power of the access point. The options are Full, Half, Quarter, Eighth, and Minimum. Decrease the transmit power if two or more APs are close together and use the same channel frequency. The default is Full. (The transmit power may vary depending on the local regulatory regulations.

3. Click **Apply** to save your 802.11a/n wireless settings.

Configuring Basic QoS Settings

Wi-Fi Multimedia Support (WMM). Wireless Multimedia (WMM) is a subset of the 802.11e standard. WMM allows wireless traffic to have a range of priorities, depending on the type of data.

Time-dependent information, such as video or audio, has a higher priority than normal traffic. For WMM to function correctly, Wireless clients must also support WMM.

To configure basic wireless QoS settings for 11b/bg/ng and 11a/na:

1. Under the **Configuration** tab, select **Wireless** from the main menu, select **Basic**, and then select **QoS Settings** from the left panel. The QoS Settings screen displays, as shown in Figure 2-12.

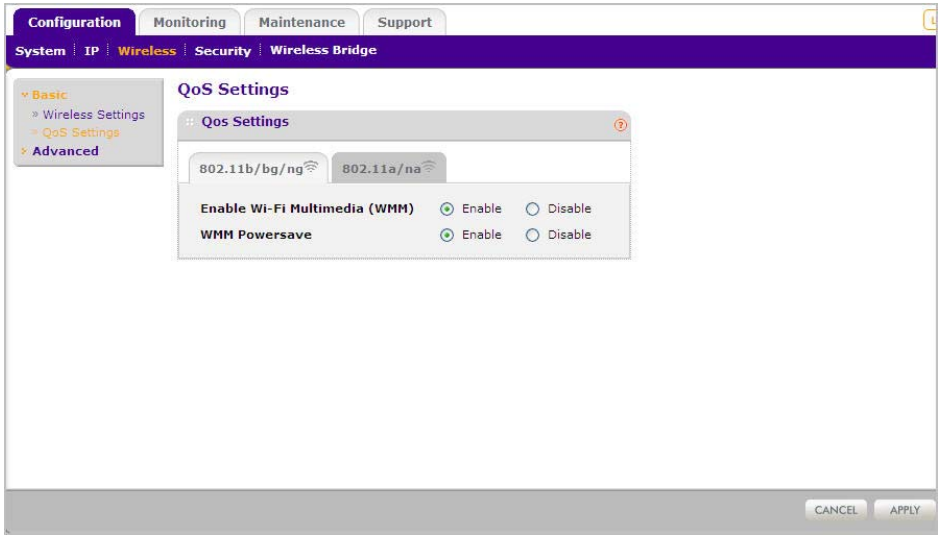


Figure 2-12Basic QoS settings screen

2. Wi-FI Multimedia (WMM) is enabled by default. Select the **Disable** radio button to disable WMM support.
3. WMM Power Save is enabled by default. Select the **Disable** radio button to disable WMM power save.
4. Click **Apply** to save your settings

Setting Up and Testing Basic Wireless Connectivity

Follow the instructions below to set up and test basic wireless connectivity. Once you have established basic wireless connectivity, you can enable security settings appropriate to your needs.

1. From your Web browser, log in to the WNDAP350 using its default address of **http://192.168.0.237**. Use the default user name of **admin** and default password of **password** or use a new LAN address and password if you have set them up.
2. From the main menu under **Configuration**, select **System**. Verify that the correct Country/ Region in which the wireless interface will operate has been selected.
3. Click **Apply** to save any changes.
4. Under the **Configuration** tab, select **Wireless** from the main menu, and then select your network, either the Wireless Settings 11b/bg/ng or Wireless Settings 11a/na. Ensure that the auto channel (default) feature is selected for your network. This feature selects a channel that has the least interference.

   It should not be necessary to change the wireless channel unless you notice interference problems or are near another wireless access point. Select a channel that is not being used by any other wireless networks within several hundred feet of your wireless access point.
5. Click **Apply** to save any changes.
6. Under the **Configuration** tab, select **Security** from the main menu, and then select your network Security Profile settings, either Security Profile settings 11b/bg/ng or Security Profile settings 11a/na. For initial configuration and testing, the Security Profile Settings for Profile 1 (the default profile) are set to Open System and the SSID for 11a/na set to NETGEAR_11a and the SSID for 11b/bg/ng set to NETGEAR_11g (see “Understanding Security Profiles” on page 2-23 to configure a profile).

   Note: The SSID of any station must match the SSID you configured in the WNDAP350 wirelss access point. If they do not match, you will not get a wireless connection to the WNDAP350.
7. Click **Apply** to save any changes.
8. Configure and test your PCs for wireless connectivity

Program the wireless adapter of your PCs to have the same SSID that you configured in the WNDAP350. Check that they have a wireless link and are able to obtain an IP address by DHCP from the WNDAP350.

Note: If you are configuring the WNDAP350 from a wireless computer and you change the SSID, channel, or Security Profile 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.

Once your PCs have basic wireless connectivity to the WNDAP350, you can configure the advanced wireless security functions.

Understanding Security Profiles

Security Profiles let you configure unique security settings for each SSID. You can configure up to eight unique 802.11b/bg/ng wireless security profiles or up to eight unique 802.11a/na wireless security profiles on the WNDAP350 (see Figure 2-13).

Note: If you are using a RADIUS Server, configure the RADIUS settings first, as described in the “Configuring WPA with RADIUS” on page 2-35.

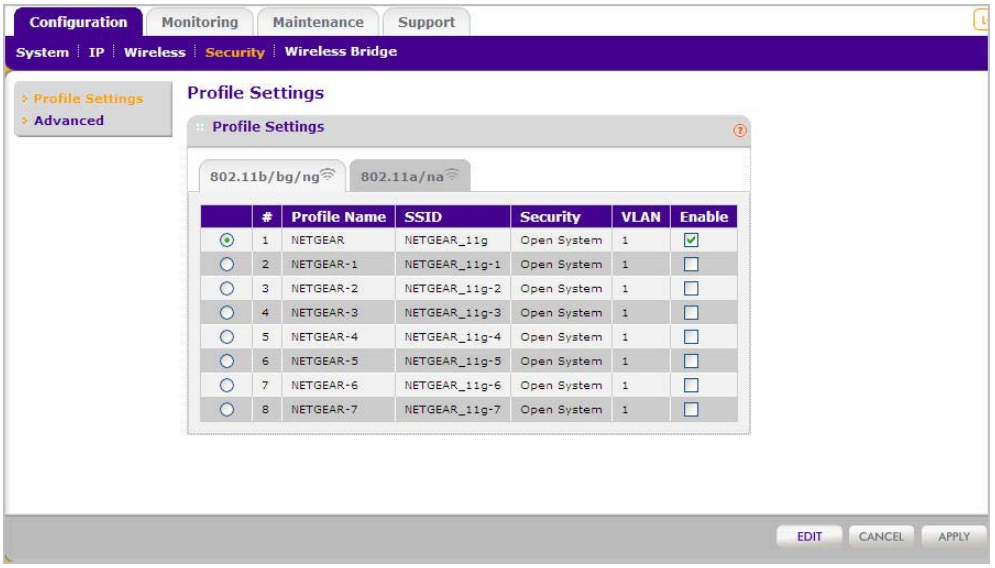


Figure 2-13 Security Profile Settings

An overview of the information that is required to set up a Security Profile follows, including a description of the Network Authentication choices that are available:

- **Profile Definition.** Configure the following settings:
  - **Security Profile Name**. Use a name that makes it easy to recognize the profile, and to tell profiles apart. (The default names are NETGEAR, NETGEAR-1, NETGEAR-2, and so on.) You can enter a value of up to 32 alphanumeric characters.

	Note: Only the first profile is enabled by default. The rest of the profiles are disabled and must be enabled if configured.

  - **Wireless Network Name (SSID).** This is the name of your wireless network. It is set to the default name of NETGEAR_11a for 802.11a/na and NETGEAR_11g for 802.11b/bg/ng.

- **Broadcast 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, Vista and Unix systems but the data is still fully exposed to a determined snoop using specialized test equipment like wireless sniffers. Default is enabled.

- **Authentication Settings.** Configure the following settings:

  - **Network Authentication**. The WNDAP350 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 bridge mode 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 WNDAP350 to use the types of network authentication shown in the table below.

Table 2-1. Network Authentication Types

Type[a]	Description
Open System	Can be used with WEP encryption or no encryption.
Shared Key	You must use WEP encryption and enter at least one shared key.
Legacy 802.1x	You must configure the RADIUS Server Settings to use this option.
WPA with RADIUS	You must configure the RADIUS Server Settings to use this option.
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.
WPA and WPA2 with RADIUS	This selection allows clients to use either WPA (with TKIP) or WPA2 (with AES). If selected, you must use TKIP + AES encryption and configure the RADIUS Server Settings.
WPA-PSK	You must use TKIP or TKIP + AES encryption and enter the WPA passphrase (Network key).

Table 2-1. Network Authentication Types

Type[a]	Description
WPA2-PSK (WPA2 is a later version of WPA)	Only select this if all clients support WPA2. If selected, you must use AES or TKIP + 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, you must use TKIP + AES encryption and enter the WPA passphrase (Network key).

a. All options are available if using Access Point mode. In bridge modes some options may be unavailable.

- **Data Encryption**. The available options depend on the Network Authentication setting selected (see Table 2-1 above); otherwise, the default is None. The Data Encryption settings are explained in the table below:

Table 2-2. Data Encryption Settings

Data Encryption Type	Description
None	No encryption is used.
Open WEP	Can be used with WEP encryption or no encryption.
64 bits WEP	Standard WEP encryption, using 40/64 bit encryption.
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 and WPA2.
AES	This is the standard encryption method for WPA2.
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.

  - Use of 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 Preshared Key Passphrase.** If using WPA-PSK or WPA2-PSK, enter the passphrase here. All wireless stations must use the same passphrase (network key). The network key must be from 8 to 64 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 intended for hotspots and other public access situations.) The default is Disabled.
- **VLAN ID**. If the hubs/switches on your LAN support the VLAN (802.1Q) standard and this feature has been enabled, the default VLAN ID for WNDAP350 will be associated with each profile. The default Profile VLAN ID must match the IDs used by other network devices.

SSID and WEP/WPA Settings Setup Form

802.11b/bg/ng Configuration

For a new wireless network, print or copy this form and fill in the configuration parameters. For an existing wireless network, the person who set up or is responsible for the network will be able to provide this information. Be sure to set the Regulatory Domain correctly as the first step.

- **SSID*:*** The Service Set Identification (SSID) identifies the wireless local area network. **NETGEAR_11g** is the default WNDAP350 SSID. However, you may customize it by using up to 32 alphanumeric characters. Write your customized SSID on the line below.

  _____

  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 as well and have the same keys in the same positions as those in the WNDAP350.

- **WEP Encryption Keys.**

  Circle one: 64, 128, or 152 bits. (Enter all four 802.11a/n keys for the Key Size chosen.)

  Key 1: _____

  Key 2: _____

Key 3: _____

Key 4: _____

- **WPA-PSK (Preshared Key)**

  Record the WPA-PSK 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: _____

802.11a/na Configuration

For a new wireless network, print or copy this form and fill in the configuration parameters. For an existing wireless network, the person who set up or is responsible for the network will be able to provide this information. Be sure to set the Regulatory Domain correctly as the first step.

- **SSID*:*** The Service Set Identification (SSID) identifies the wireless local area network. **NETGEAR_11a** is the default WNDAP350 SSID. However, you may customize it by using up to 32 alphanumeric characters. Write your customized SSID on the line below.

  _____

  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 as well and have the same keys in the same positions as those in the WNDAP350.

- **WEP Encryption Keys**

  Circle one: 64, 128, or 152 bits. (Enter all four 802.11b/bg/ng keys for the Key Size chosen.)

  Key 1: _____

  Key 2: _____

  Key 3: _____

  Key 4: _____

- **WPA-PSK (Preshared Key)**

  Record the WPA-PSK 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: _____

Use the procedures described in the following sections to configure the WNDAP350. Store this information in a safe place.

Configuring the RADIUS Server Settings

You can setup or modify the RADIUS Server settings to compliment Network Authentication security options. The RADIUS Server must be used with Legacy 802.1x, and can be used with WPA and WPA2 Network Authentication. When using a RADIUS Server, the RADIUS Server settings must be configured before completing the Network Authentication security profile (see "Configuring WPA with RADIUS" on page 2-35, "Configuring WPA2 with RADIUS" on page 2-37, or "Configuring WPA and WPA2 with RADIUS" on page 2-38 for specifics on implementing these security options).

Note: The RADIUS Server Settings apply to all profiles. They only need to be configured once per wireless access point.

To set up or modify the RADIUS Server Settings:

1. From your Web browser, log in to the WNDAP350 using the default LAN address of **http://192.168.0.237**, user name **admin** and password **password**, or use the LAN address and password that you set up.
2. Under the **Configuration** tab, select **Security** on the main menu, select **Advanced** from the left panel, and then select **RADIUS Server Settings**. The RADIUS Server Settings screen displays, as shown in Figure 2-14.

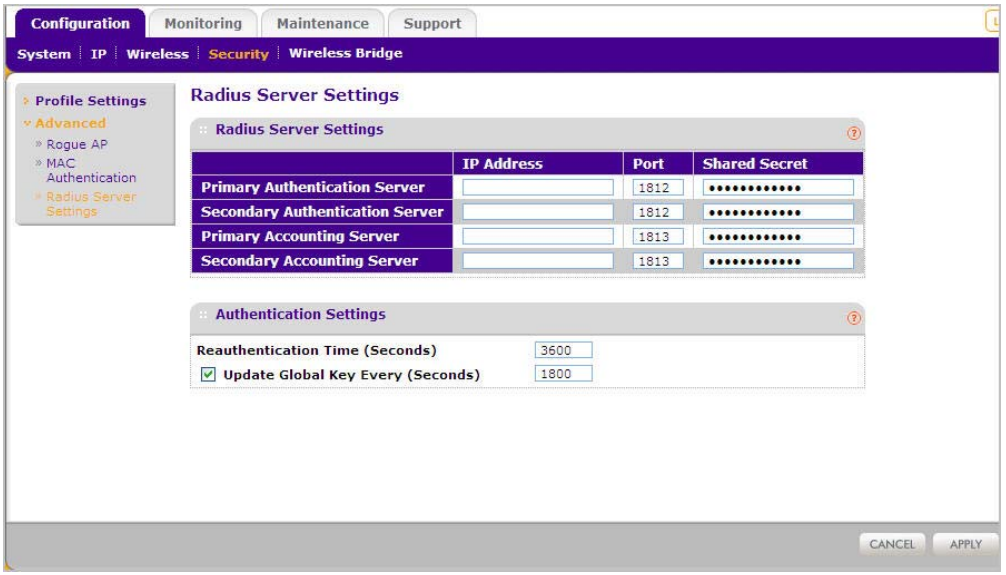


Figure 2-14 RADIUS server settings

3. Enter the following RADIUS Server settings:

- **Authentication Server.** This configuration is required for authentication using a RADIUS Server.The IP Address, Port Number, and Shared Secret are required for communication with the Primary RADIUS Server. You can also configure a Secondary RADIUS Server to use, if the Primary RADIUS Server fails.
  - **IP Address.** The IP address of the RADIUS Server.
  - **Port Number.** The 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 (wireless client).
- **Accounting Server**. This configuration is required for accounting using a RADIUS Server. The IP Address, Port Number, and Shared Secret are required for communication with the Primary RADIUS Server. You can also configure a Secondary RADIUS Server to use if the Primary RADIUS Server fails.
  - **IP Address.** The IP address of the RADIUS Server.
  - **Port Number.** Port number of the RADIUS Server. The default: 1813

– **Shared Secret.** This is shared between the Wireless Access Point and the RADIUS Server while authenticating the supplicant (wireless client).

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

Setting up a Security Profile

The WNDAP350 allows you to set up eight different security profiles for 802.11b/bg/ng and eight different profiles for 802.11a/na. Each profile can be configured with a different security option for network authentication.

Note: If you are using a RADIUS Server, configure the RADIUS settings first, as described in the "Configuring the RADIUS Server Settings" on page 2-29.

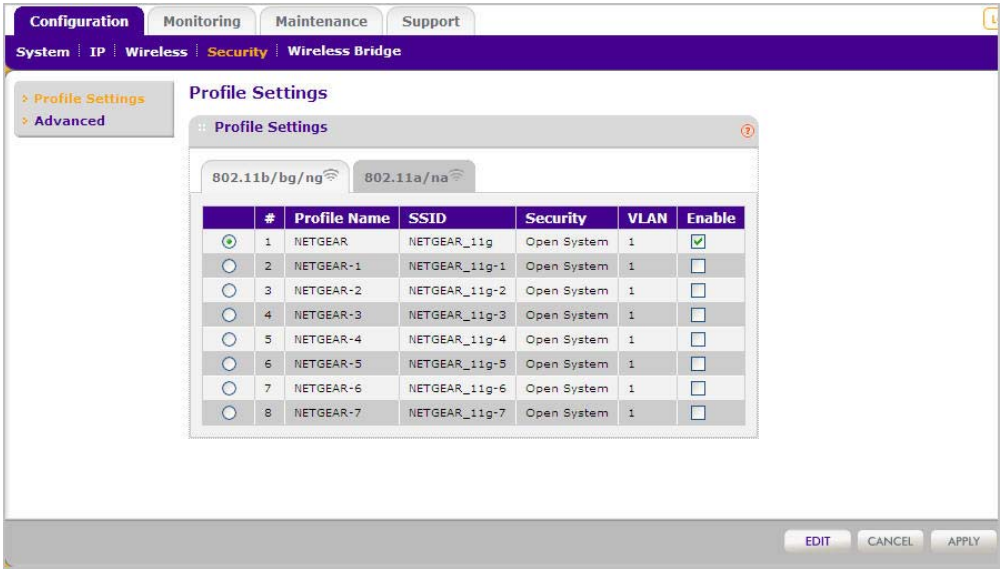


Figure 2-15 Security profile settings

To configure a Security Profile:

1. From your Web browser, log in to the WNDAP350 using the default LAN address of **http://192.168.0.237**, user name **admin** and password **password**, or use the LAN address and password that you set up.
2. Under the **Configuration** tab, select **Security** from the main menu, and then select either Security Profile Settings for 802.11b/bg/ng or 802.11a/na. The screen for the Profile Settings you selected displays as shown in Figure 2-15above.
3. Select the check box of the profile you want to modify and click **Edit.** The Security Profile Configuration screen for the selected profile displays (see Figure 2-16).

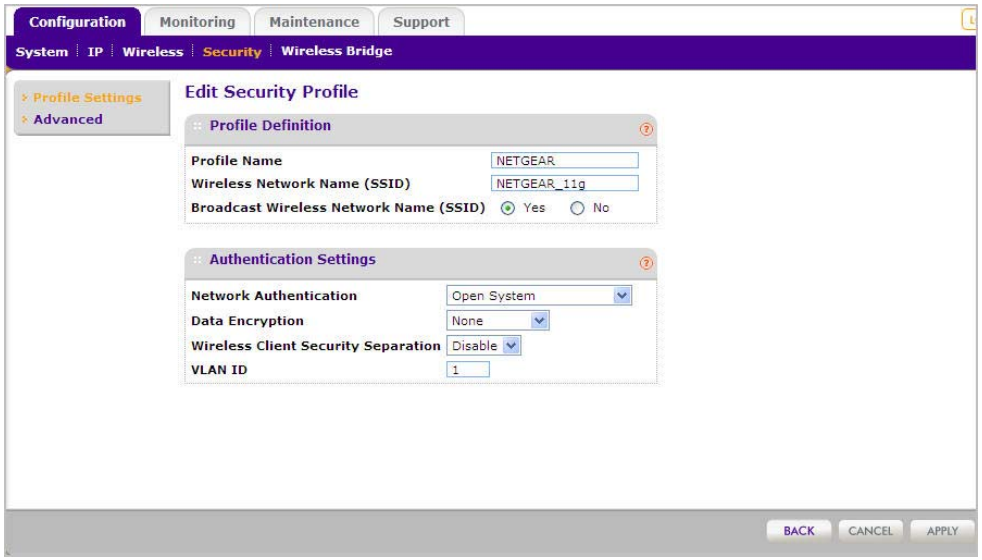


Figure 2-16 Edit a security profile

4. Give your profile a meaningful name so that you can remember it later.
5. The Wireless Network Name (SSID) is set by default to identify it as NETGEAR_11g.
6. Enable or disable the Broadcast Wireless Network Name (SSID). It is enabled by default. (If it is broadcast, it can be easily detected by other clients.)
7. From the **Network Authentication** pull-down menu, select the Network Authentication Type you want to use for this profile:
   - To configure WEP encryption for Open Systems or Shared Key, see “Configuring WEP” on page 2-33.

- To configure WPA with RADIUS, see “Configuring WPA with RADIUS” on page 2-35.
- To configure WPA2 with RADIUS, see “Configuring WPA2 with RADIUS” on page 2-37.
- To configure WPA and WPA2 with RADIUS, see “Configuring WPA and WPA2 with RADIUS” on page 2-38.
- To configure WPA-PSK, see “Configuring WPA-PSK” on page 2-40.
- To configure WPA2-PSK, see “Configuring WPA2-PSK” on page 2-41.
- To configure WPA-PSK and WPA2-PSK, see “Configuring WPA-PSK and WPA2-PSK” on page 2-42.

8. **Wireless Client Security Separation** is disabled by default. If enabled, the associated wireless clients will not be able to communicate with each other.
9. If the hubs/switches on your LAN support the VLAN (802.1Q) standard and this feature has been enabled, the default **VLAN ID** for WNDAP350 will be associated with each profile. The default Profile VLAN ID must match the IDs used by other network devices.
10. Click **Apply** to save your Security Profile settings.
11. Click **Back**. Your new settings will appear in the Security Profiles table identified by the Profile Name of the profile. A VLAN ID will also be assigned to your profile.

	**Note:** Security Profiles that share the same type of network authentication need not share the same passphrase or keys.

To enable your Security Profile:

1. Check the radio box in the **Enable** column next to your profile.
2. Click **Apply**. Your Security Profile will be enabled. If you enabled VLAN 802.1Q, your VLAN Profile will also be enabled. (See “Setting Basic IP Options” on page 2-13 to enable VLAN 802.1Q.)

Configuring WEP

To configure WEP data encryption:

1. From the **Network Authentication** drop-down menu, choose either **Open System** or **Shared Key** authentication.

2. From the Data Encryption drop-down menu, select encryption strength (64 bits, 128 bits, or 152 bits).

3. You manually or automatically program the four data encryption keys. These values must be identical on all PCs and wireless access points in your network. Choose either:

   - Automatic – Enter a word or group of printable characters in the Passphrase box and click the Generate button. The four key boxes will be automatically populated with key values.
   - Manual – Enter the number of hexadecimal digits appropriate to the encryption strength: 10 digits for 64-bit, 26 digits for 128-bit and 32 digits for 152-bit (any combination of 0-9, a-f, or A-F)

   Select which of the four keys will be the default.

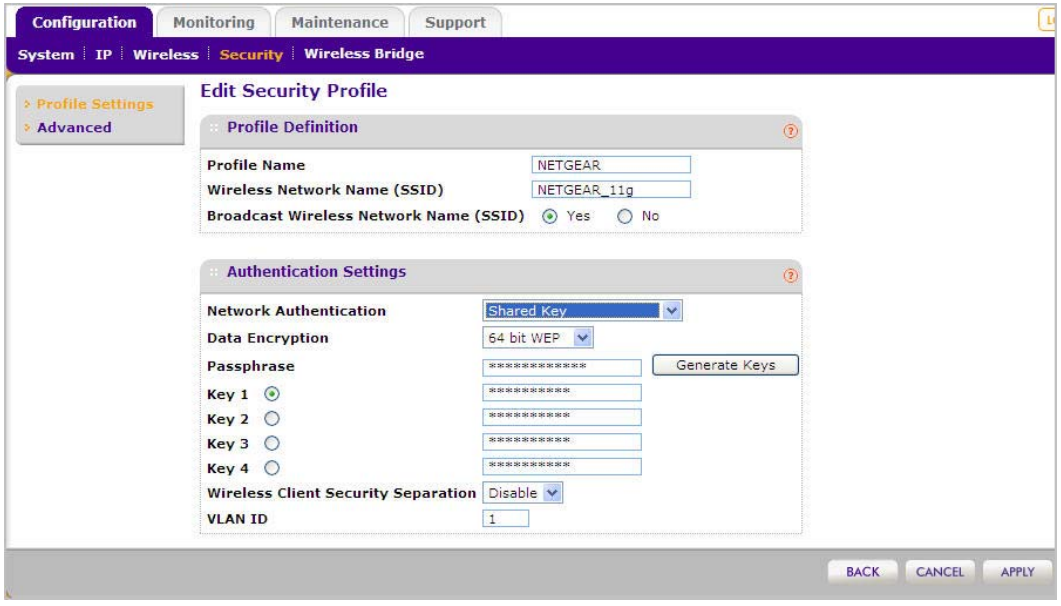


Figure 2-17 Configure WEP Shared Key

4. Select the key to be used as the default key by checking the radio box. (Data transmissions are always encrypted using the default key.)

   See the document “Wireless Communications” for a full explanation of each of these options, as defined by the IEEE 802.11 wireless communication standard. A link to this document on the NETGEAR website is in Appendix B, “Related Documents.”

5. **Wireless Client Security Separation** is disabled by default. If enabled, associated wireless clients will not be able to communicate with each other. (This feature is intended for hotspots and other public access situations.
6. 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.

Configuring WPA with RADIUS

Not all wireless adapters support WPA. Furthermore, client software is required on the client. Windows XP and Windows 2000 with Service Pack 3 or above do include the client software that supports WPA. Nevertheless, the wireless adapter hardware and driver must also support WPA. Consult the product document for your wireless adapter and WPA client software for instructions on configuring WPA settings.

To configure WPA, follow these steps:

1. Under the **Configuration** tab, select **Security** on the main menu, select **Advanced** from the left-hand menu, and then select **RADIUS Server Settings**. The RADIUS Server Settings screen displays.
2. Enter the RADIUS Server Settings as shown in “Configuring the RADIUS Server Settings” on page 2-29.
3. Click **Apply** to save your RADIUS Server settings.

4. Under the **Configuration** tab, select **Security** from the main menu, and then select either Security Profile Settings for 802.11b/bg/ng or 802.11a/na. The screen for the Profile Settings you selected displays. When the Security Profile screen displays, check the check box of the Security Profile you want to modify and click **Edit.**

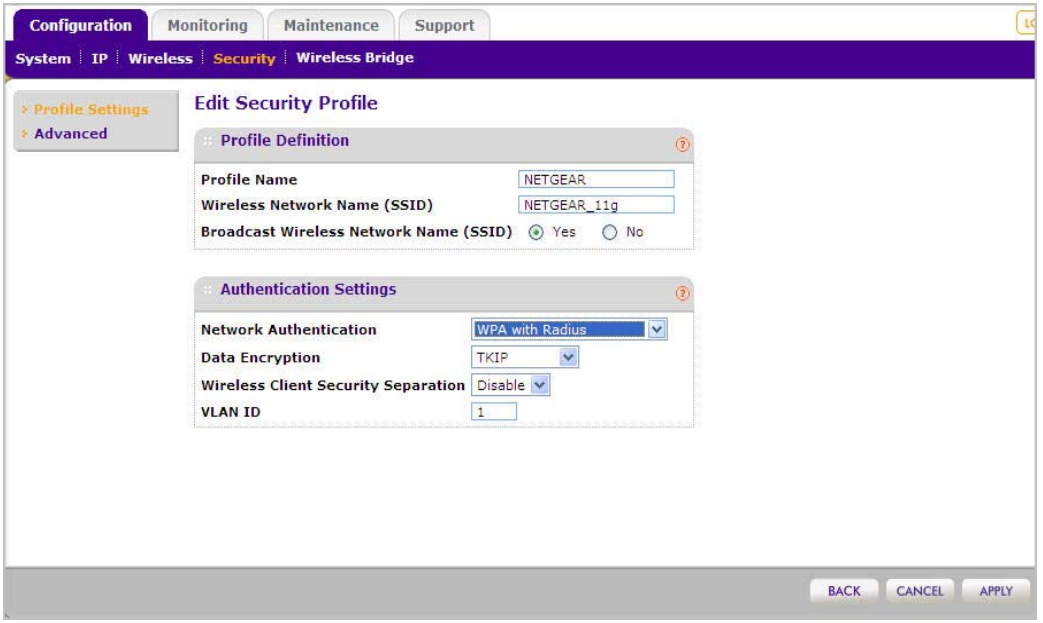


Figure 2-18 Configure WPA with RADIUS

5. Choose **WPA with RADIUS** from the from the Network Authentication drop-down menu. Data Encryption will be set to TKIP by default.
6. **Wireless Client Security Separation** is disabled by default. If enabled, associated wireless clients will not be able to communicate with each other. (This feature is intended for hotspots and other public access situations.
7. Click **Apply** to save your settings.

Configuring WPA2 with RADIUS

Not all wireless adapters support WPA2. Furthermore, client software is required on the client. Make sure your client card supports WPA2. Consult the product document for your wireless adapter and WPA2 client software for instructions on configuring WPA2 settings.

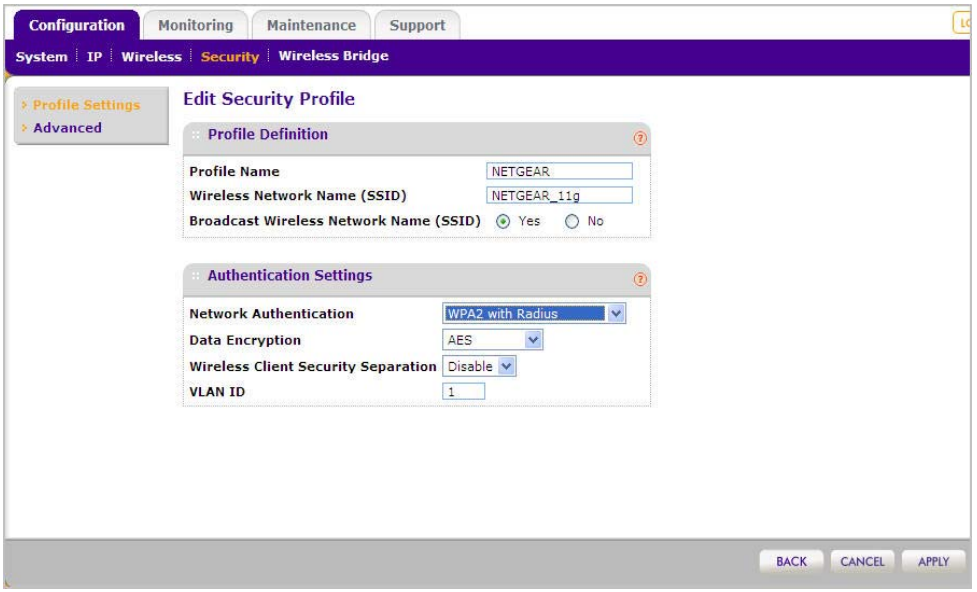


Figure 2-19 Configure WPA2 with RADIUS

To configure WPA2 with RADIUS:

1. Under the **Configuration** tab, select **Security** on the main menu, select **Advanced** from the left panel, and then select **RADIUS Server Settings**. The RADIUS Server Settings screen displays.
2. Enter the RADIUS settings as shown in ““Configuring the RADIUS Server Settings” on page 2-29.
3. Click **Apply** to save your RADIUS settings.
4. Under the **Configuration** tab, select **Security** from the main menu, and then select either Security Profile Settings for 802.11b/bg/ng or 802.11a/n.a The screen for the Profile Settings you selected displays. When the Security Profile screen displays, check the check bb ox of the Security Profile you want to modify and click **Edit.**

5. From the Network Authentication drop-down menu, select WPA2 with RADIUS from the list. By default, Data Encryption will be set to **AES**.
6. **Wireless Client Security Separation** is disabled by default. If enabled, associated wireless clients will not be able to communicate with each other. (This feature is intended for hotspots and other public access situations.
7. Click **Apply** to save your settings.

Configuring WPA and WPA2 with RADIUS

Not all wireless adapters support WPA and WPA2. Client software is required on the client:

- Windows XP and Windows 2000 with Service Pack 3, or above, do include the client software that supports WPA. The wireless adapter hardware and driver must also support WPA.
- Service Pack 3 does not include the client software that supports WPA2. Make sure your client card supports WPA2. The wireless adapter hardware and driver must also support WPA2.

Consult the product documentation for your wireless adapter; WPA client software for instructions on configuring WPA settings; and WPA2 client software for instructions on configuring WPA2 settings.

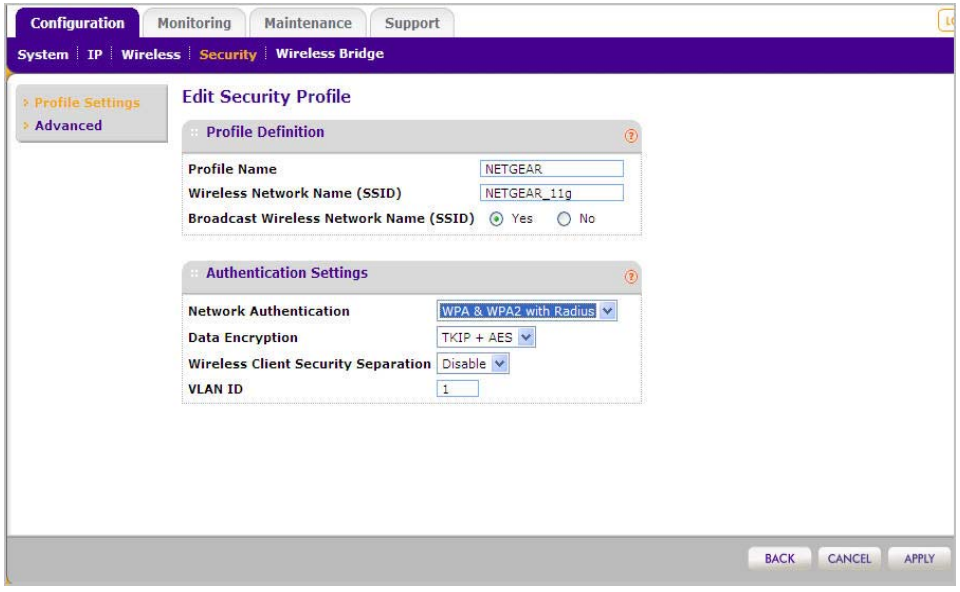


Figure 2-20 Configure WPA and WPA2 with RADIUS

To configure WPA and WPA2 with RADIUS:

1. Under the **Configuration** tab, select **Security** on the main menu, select **Advanced** from the left panel, and then select **RADIUS Server Settings**. The RADIUS Server Settings screen displays.
2. Enter the RADIUS settings as shown in ""Configuring the RADIUS Server Settings" on page 2-29.
3. Click **Apply** to save your RADIUS settings
4. Under the **Configuration** tab, select **Security** from the main menu, and then select either Security Profile Settings for 802.11b/bg/ng or 802.11a/na. The screen for the Profile Settings you selected displays. When the Security Profile screen displays, check the check box of the Security Profile you want to modify and click **Edit.**
5. From the **Network Authentication** drop-down menu, select **WPA & WPA2 with RADIUS** from the list. By default, **Data Encryption** will be set to **TKIP+AES**.
6. **Wireless Client Security Separation** is disabled by default. If enabled, associated wireless clients will not be able to communicate with each other. (This feature is intended for hotspots and other public access situations.
7. Click **Apply** to save your settings.

Configuring WPA-PSK

Not all wireless adapters support WPA. Furthermore, client software is required on the client. Windows XP and Windows 2000 with Service Pack 3 or above include the client software that supports WPA. Nevertheless, the wireless adapter hardware and driver must also support WPA. Consult the product document for your wireless adapter and WPA client software for instructions on configuring WPA settings.

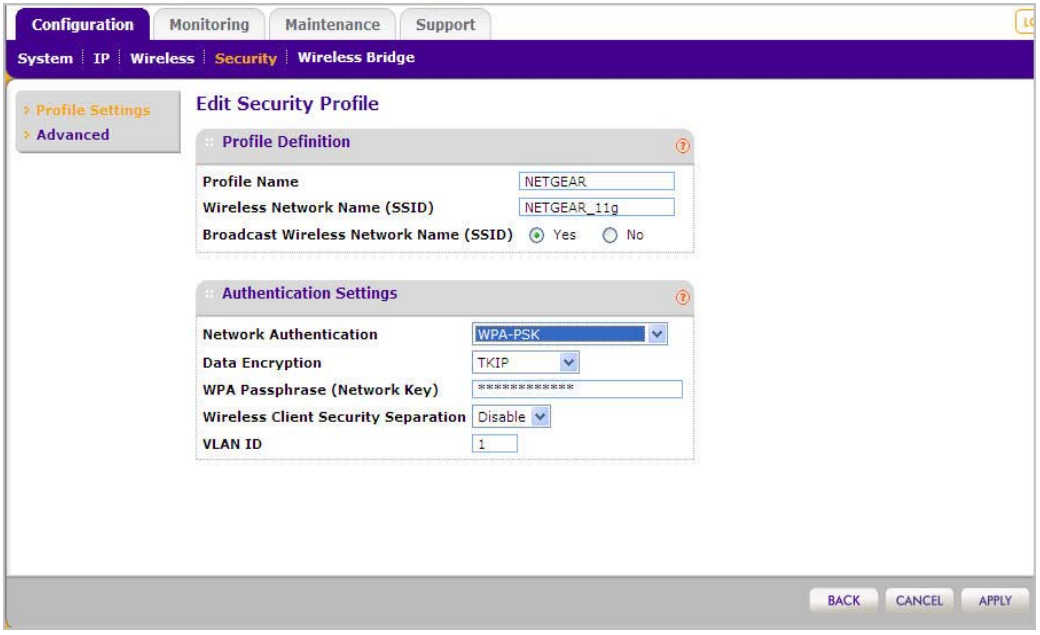


Figure 2-21 Configure WPA-PSK

To configure WPA-PSK:

1. From the **Network Authentication** drop-down menu, select **WPA-PSK**. By default, **Data Encryption** will be set to **TKIP**.
2. Enter the preshared key passphrase (Network Key).
3. **Wireless Client Security Separation** is disabled by default. If enabled, associated wireless clients will not be able to communicate with each other. (This feature is intended for hotspots and other public access situations.
4. Click **Apply** to save your settings.

Configuring WPA2-PSK

Not all wireless adapters support WPA2. Furthermore, client software is required on the client. Make sure your client card supports WPA2. Consult the product document for your wireless adapter and WPA2 client software for instructions on configuring WPA2 settings.

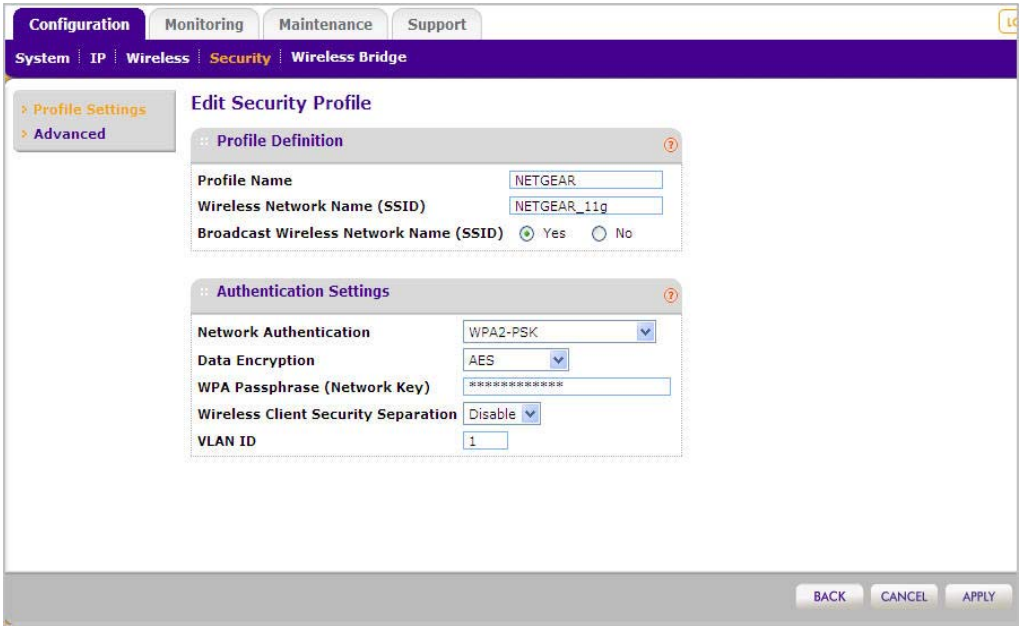


Figure 2-22 Configure WPA2-PSK

To configure WPA2-PSK:

1. From the **Network Authentication** drop-down menu, select **WPA2-PSK** from the list. By default, **Data Encryption** will be set to **AES**.
2. Enter the preshared key passphrase (Network Key).
3. **Wireless Client Security Separation** is disabled by default. If enabled, associated wireless clients will not be able to communicate with each other. (This feature is intended for hotspots and other public access situations.
4. Click **Apply** to save your settings.

Configuring WPA-PSK and WPA2-PSK

Not all wireless adapters support WPA and WPA2. Client software is required on the client:

- Windows XP and Windows 2000 with Service Pack 3 or above do include the client software that supports WPA. The wireless adapter hardware and driver must also support WPA.
- Service Pack 3 does not include the client software that supports WPA2. Make sure your client card supports WPA2. The wireless adapter hardware and driver must also support WPA2.

Consult the product documentation for your wireless adapter; WPA client software for instructions on configuring WPA settings; and WPA2 client software for instructions on configuring WPA2 settings

.

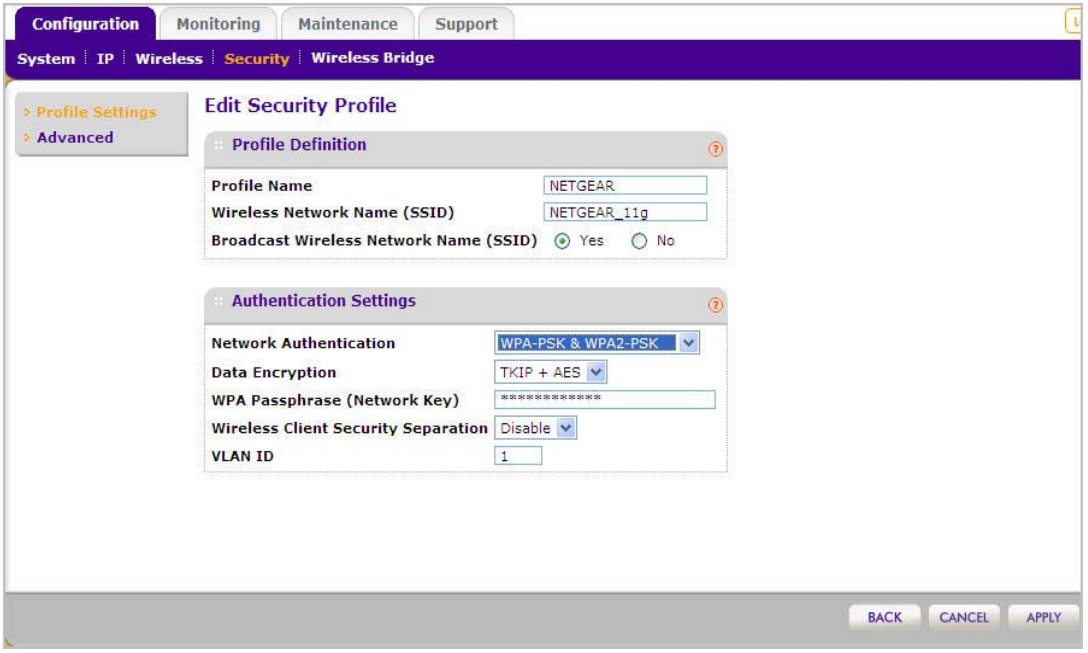


Figure 2-23 Configure WPA-PSK and WPA2-PSK

To configure WPA-PSK and WPA2-PSK:

1. From the **Network Authentication** drop-down menu, select **WPA-PSK & WPA2-PSK**. By default, **Data Encryption** will be set to **TKIP+AES**.
2. Enter the WPA Passphrase (Network Key).
3. **Wireless Client Security Separation** is disabled by default. If enabled, associated wireless clients will not be able to communicate with each other. (This feature is intended for hotspots and other public access situations.
4. Click **Apply** to save your settings.

Restricting Wireless Access by MAC Address

The optional Access Control window lets you block the network access privilege of any specified stations through the WNDAP350 wirelss access point. When you enable access control, the access point only accepts connections from clients on the selected access control list. This provides an additional layer of security.

Note: If configuring the WNDAP350 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 that is on the access control list to make any further changes.

To restrict access based on MAC addresses:

1. Log in to the WNDAP350 using the default address of **http://192.168.0.237,** user name of **admin** and default password of **password**, or whatever LAN address and password you have set up.
2. Under the **Configuration** tab, select **Security** on the main menu, select **Advanced** from the left panel, and then select **MAC Authentication**. The MAC Authentication screen displays.

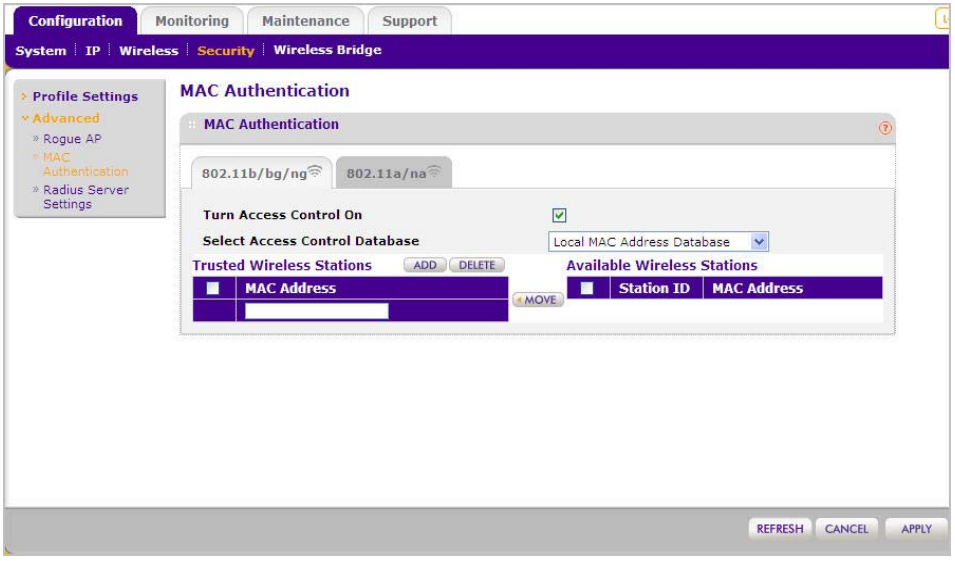


Figure 2-24 Configure MAC authentication

3. Check the **Turn Access Control On** radio box to enable Access Control feature.
4. Select the desired Access Control Database options. The options are:
   - **Local MAC Address Database** – The Access Point will use the local MAC address table for Access Control. This is the default.
   - **RADIUS MAC Address Database** – The Access Point will use the MAC address table located on the external RADIUS server on the LAN for Access Control. If you choose this database, you must configure the RADIUS Server Settings first (see "Configuring the RADIUS Server Settings" on page 2-29).
5. The **Trusted Wireless Stations** list shows any wireless stations you have entered. If you have not entered any wireless stations this list will be empty. To delete an existing entry, select it and then click **Delete**.
6. Click Refresh to refresh the **Available Wireless Stations** list found in your area.
7. Select the stations from the list of **Available Wireless Stations** found in your area, or enter the MAC address of a station to add a new station manually. (You can usually find the MAC address printed on the bottom of the wireless adapter.)

8. Click **Add** to add the wireless device to the **Trusted Wireless Stations** list. Repeat these steps for each additional device you want to add to the list.
9. Click **Apply** to save your wireless access control list settings.

Now, only devices on this list will be allowed to wirelessly connect to the WNDAP350.

Chapter 3
Management

This chapter describes how to use the management features of your ProSafe Dual Band Wireless N Access Point WNDAP350 . To access these features, connect to the WNDAP350 as described in “Logging In Using the Default IP Address” on page 2-12. Then select the category under either the **Monitoring** or **Maintenance** headings in the main menu of the browser interface.

This chapter contains the following sections:

Remote Management

Both the SNMP and Remote Console are enabled by default, which allows for remote management of the WNDAP350 from a client running SNMP management software, as well as from a secure Telnet console.

To set up an SNMP management interface:

1. Under the **Maintenance** tab, select **Remote Management**, and then select **SNMP** from the left sidebar. The SNMP screen displays, as shown in Figure 3-1 below:

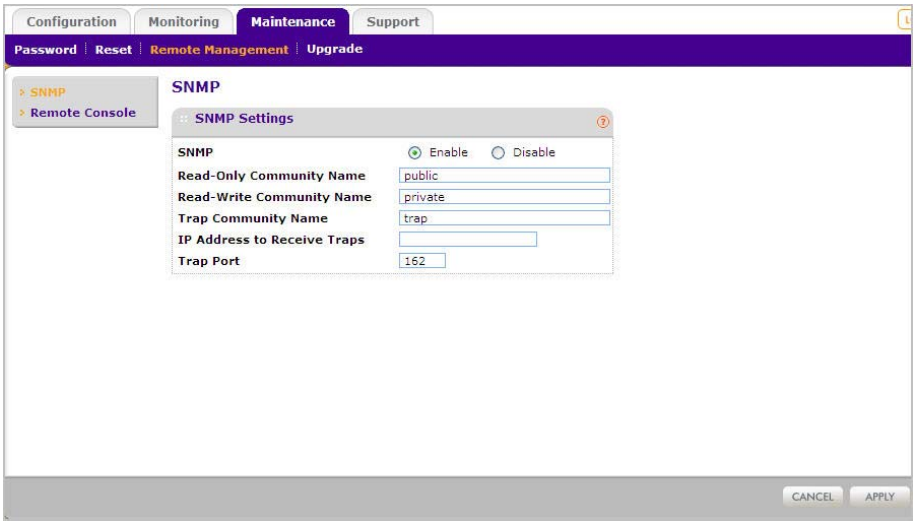


Figure 3-1 Configure SNMP settings

2. Enter the following information in the SNMP fields:

   - **SNMP:** Enable SNMP to allow the SNMP network management software, such as HP OpenView, to manage the wireless access point via SNMPv1/v2 protocol.
   - **Read-Only Community Name:** The community string to allow the SNMP manager to read the wireless access point's MIB objects. The default is Public.
   - **Read-Write 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.
   - **Trap Community Name:** The community string to allow the SNMP manager to send traps. The default is trap.
   - **IP address to Receive Traps:** The IP address of the SNMP manager to receive traps sent from the wireless access point.
   - **Trap Port**: The port number on which the SNMP Manager will receive traps. The default is 162/UDP.

Remote Console

The Remote Console configuration features are located under the **Maintenance** tab, **Remote Management**, and then under **Remote Console**. Enter the following information in the Remote Console screen, as shown in Figure 3-2:

- **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**.
- **Telnet**: If set to Enable, the Wireless Access Point will only allow remote access via Telnet. The default is **Disable**.

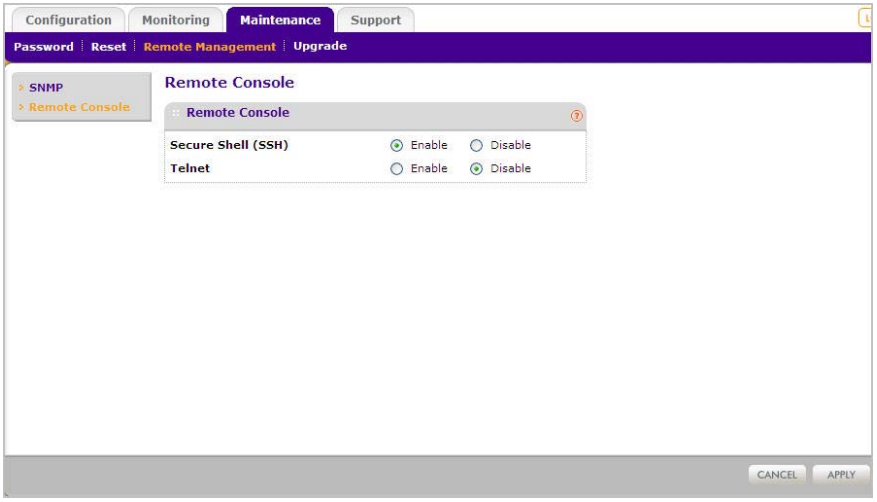


Figure 3-2 Configure Remote Console

Using the Secure Telnet Interface

The WNDAP350 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 WNDAP350 as the host name.

To use the CLI from a 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 **Enter**. The screen shown below in Figure 3-3 should appear.

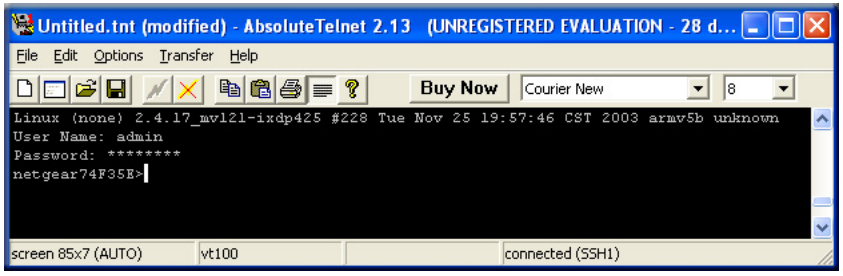


Figure 3-3

4. Enter the login name and password (**admin** and **password** are the defaults).

   After successful login, the <*Access Point Name*> prompt should appear. In this example, the prompt is *netgear74F35E*.

5. Enter `help` to display the CLI command help.

CLI Commands

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

Upgrading the Wireless Access Point Software

The software of the WNDAP350 wirelss access point is stored in FLASH memory, and can be upgraded as new software is released by NETGEAR. Upgrade files can be downloaded from Netgear's Web site. The upgrade file can be sent to the wireless access point using your browser.

Note: The Web browser used to upload new firmware into the WNDAP350 must support HTTP uploads, such as Microsoft Internet Explorer 6.0 or above or Mozilla 1.5 or above.

You cannot perform the software upgrade from a computer that is connected to the WNDAP350 wirelss access point with a wireless link. You must use a computer that is connected to the WNDAP350 wirelss access point with a Ethernet cable.

Warning: When uploading software to the WNDAP350 wirelss access point, it is important not to 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 software, and render the WNDAP350 completely inoperable.

The Web browser used to upload new firmware into the WNDAP350 must support HTTP uploads, such as Microsoft Internet Explorer 6.0 or above, or Firefox 1.5 or above.

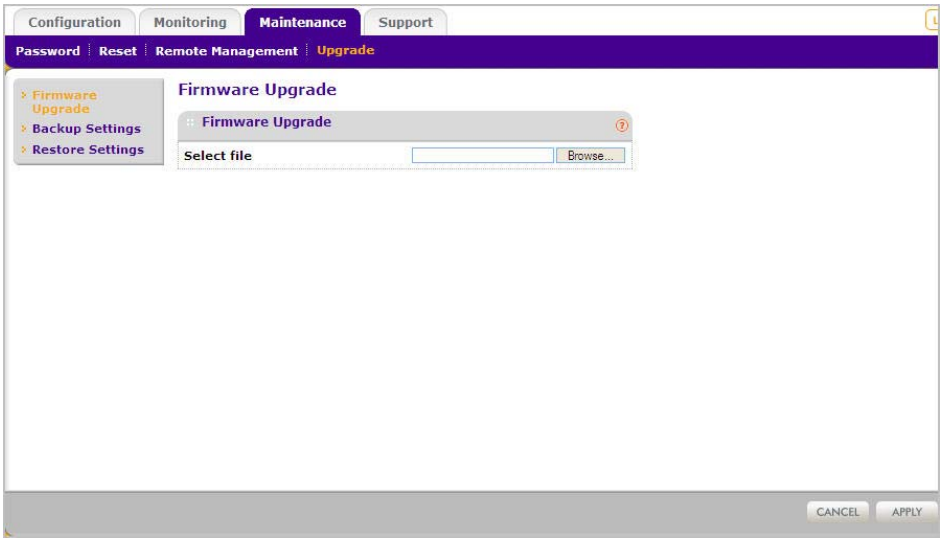


Figure 3-4 Firmware upgrade screen

To upgrade the WNDAP350 firmware:

1. Download the new software file from the NETGEAR website, save it to your hard disk.
2. Under the **Maintenance** tab, select **Upgrade** from the main menu, and then select **Firmware** Upgrade. The Firmware Upgrade screen displays as shown in Figure 3-4 above.
3. Click **Browse** and browse to the location of the upgrade file.
4. Click **Apply**.

   When the upload completes, your wireless access point will automatically restart. The upgrade process typically takes about 2 minutes.

Configuration File Management

The WNDAP350 wirelss access point settings are stored in the wireless access point in a configuration file. This file can be saved (backed up) to a user's computer, retrieved (restored) from the user's computer, or cleared to factory default settings.

Saving Your Configuration Settings

To backup your configuration settings:

Under the **Maintenance** tab on the main menu, select **Upgrade**, then select **Backup Settings** from the left sidebar to back up your current settings. The following screen displays:

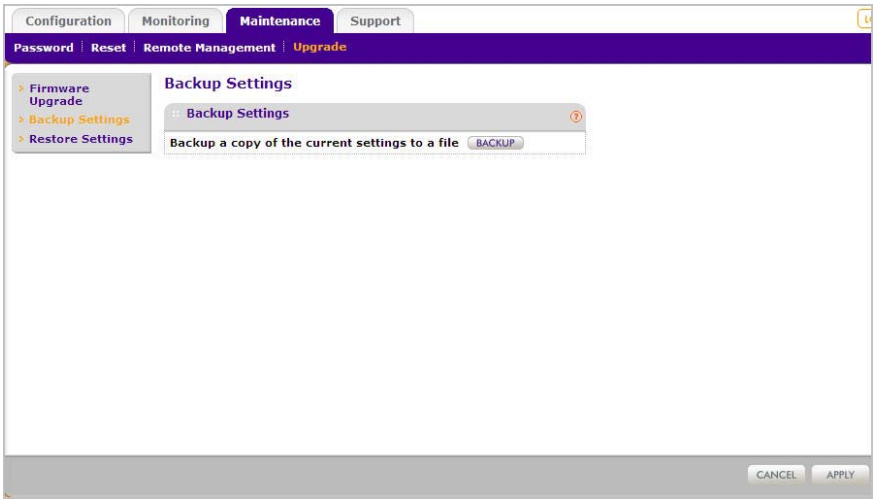


Figure 3-5 Backup configuration settings

1. Click **Backup**. Your browser will extract the configuration settings from the wireless access point and prompt you for a location on your computer to store the file.
2. Give the file a meaningful name, such as `WNDAP350.cfg`, and click **Save.**

Restoring Saved Settings

To restore your settings from a saved configuration file:

Under the **Maintenance** tab on the main menu, select **Upgrade**, then select **Restore Settings** from the sidebar to back up your current settings. The following screen displays:

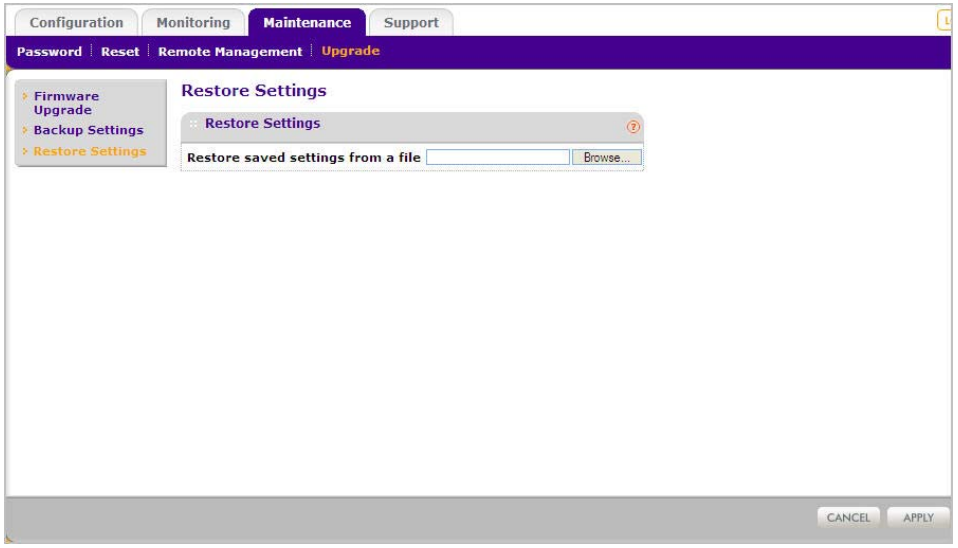


Figure 3-6 Restore Configuration settings from file

1. Enter the full path to the file on your computer or click the **Browse** button to locate the file.
2. When you have located the file, click **Restore** to upload the file. After completing the upload, the WNDAP350 will reboot automatically.

Restoring the WNDAP350 to the Factory Default Settings

It is sometimes desirable to restore the wireless access point to the factory default settings. This can be done by using the Restore Defaults option, which restores all factory settings.

To access this function:

1. Under the **Maintenance** tab on the main menu, select **Reset**, and then select **Restore Defaults** from the sidebar. The Restore Defaults screen displays, as shown in Figure 3-7 below.

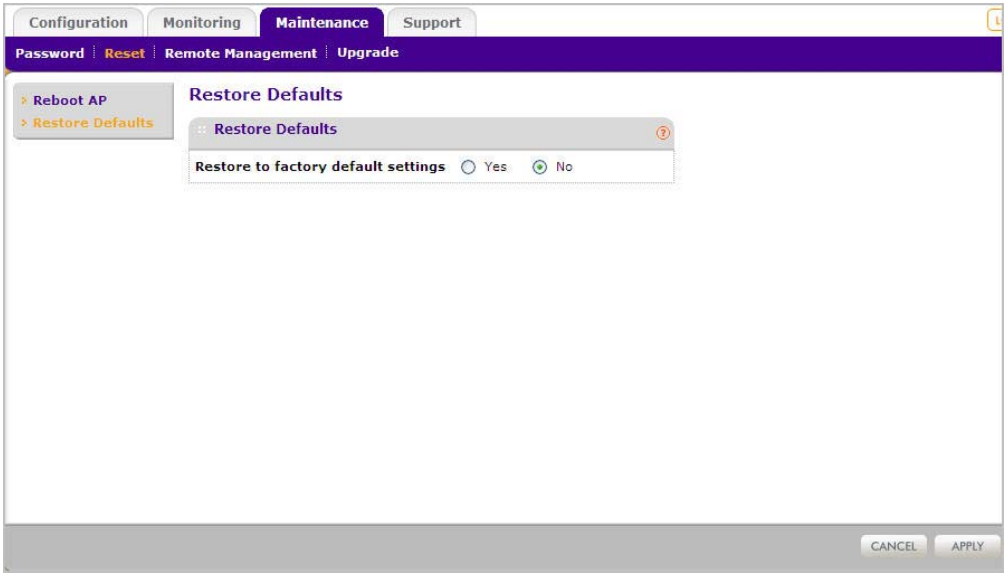


Figure 3-7 Restore to factory defaults

2. On the Restore Defaults screen, enable the **Restore to factory default settings** option by selecting the **Yes** radio button.
3. Click **Apply** to reset to the factory default settings.

After a restore, the wireless access point password will be **password**, the default LAN IP address will be **192.168.0.237**, and the access point name will reset to the name printed on the label on the bottom of the unit.

To restore the factory default configuration settings without knowing the login password or IP address, you must use the Default Reset button on the rear panel of the wireless access point (see Figure 1-1 on page 1-7). The reset button has two functions:

- **Reboot.** When pressed and released, the Wireless Access Point 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 WNDAP350.

2. Use something with a small point, such as a pen, hold the Reset button for 5 seconds while you Power On the WNDAP350.
3. Continue holding the Reset Button until the LEDs blink twice.
4. Release the Reset Button.

   The factory default configuration has now been restored and the WNDAP350 is ready for use.

Changing the Administrator Password

The default password is **password**. You should change this password to a more secure password, since you cannot change the administrator login name.

To change the Administrator password:

1. Under the **Maintenance** tab on the main menu, select **Password**, and then select **Change Password**. The Change Password screen displays as shown in Figure 3-8 below.

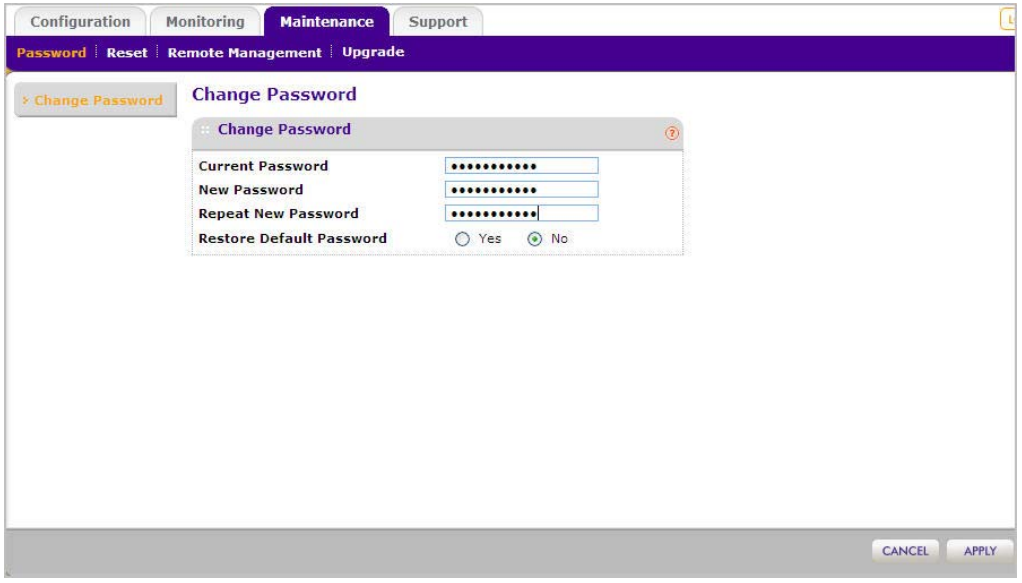


Figure 3-8 Change administrator password

2. First enter the old password in the **Current Password** field.

3. Then enter the new password twice, once in the **New Password** field and again in the **Repeat New Password** field.
4. Click **Apply** to save your change.

Enabling the SysLog Server

The SysLog screen allows you to enable the SysLog option if you have a SysLog server on your LAN.

To enable a SysLog server:

1. Under the **Configuration** tab on the main menu, select **System**, then select the **Advanced** option, and select **SysLog** to view the screen shown in Figure 3-9.

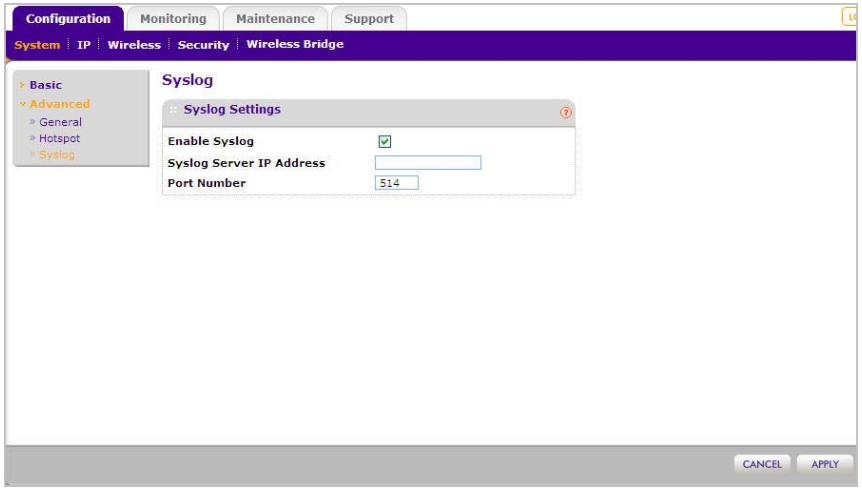


Figure 3-9 Enable SysLog server

2. **Enable SysLog –** Enable this option if you have a SysLog server on your LAN. If enabled, you must enter the IP address of your SysLog server and the port number your SysLog server is configured to use. The default is Disabled.
3. **SysLog Server IP Address –** The access point will send all the SysLog to the specified IP address if SysLog option is enabled.
4. **Port Number –** The port number configured in the SysLog server on your LAN. Default is 514.

5. Click **Apply** to save your SysLog settings.

Using Activity Log Information

The Activity Log screen displays the Access Point system activity.

To view the Activity Log, under the **Monitoring** tab on the main menu, click **Logs.** The Activity Logs screen displays as shown in Figure 3-10 below.

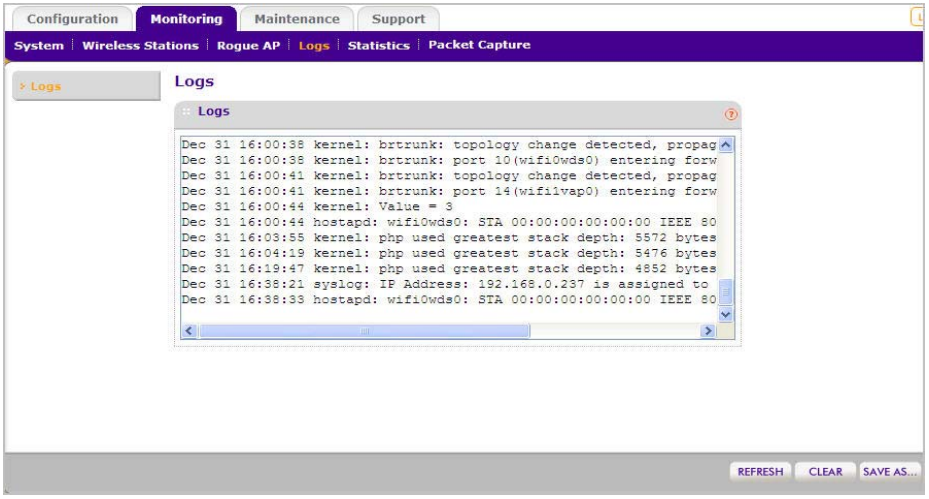


Figure 3-10 View activity logs

The Activity Log Window displays the Access Point system activity.

Click **Refresh** to update the display, click **Clear** to clear the log content, or click **Save As** to save the log contents into a file on a disk drive.

Viewing General Summary Information

The System screen, under the **Monitoring** tab provides a summary of the current WNDAP350 configuration settings, including current IP settings and current Wireless settings. This information is read only, so any changes must be made on other pages.

To access the System screen:

Under the **Monitoring** tab on the main menu, select **System** to view the System screen, shown in Figure 3-11 below. This screen shows the parameters listed in Table 3-1:

Table 3-1. System Information Fields

Field	Description
Access Point Information	
Access Point Name	Indicates the NetBIOS name. The default name may be changed, if desired.
Ethernet MAC Address	Displays the Media Access Control address (MAC address) of the wireless access point's Ethernet port.
Wireless MAC address for 2.4GHz	Displays the Media Access Control address (MAC address) of the wireless access point's wireless card when operating at 2.4GHz
Wireless MAC address for 5GHz	Displays the Media Access Control address (MAC address) of the wireless access point's wireless card when operating at 5GHz
Country/Region	Displays 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.
Current Time	Displays the current system time of the access point.
Current IP Settings	
IP Address	The IP address of the wireless access point.
Subnet Mask	The subnet mask for IP address of the wireless access point.
Default Gateway	The default gateway for the wireless access point communication.
DHCP Client	Enabled indicates that the current IP address of the AP was obtained from a DHCP server on your network. Disabled indicated a static IP configuration.
Current Wireless Settings for 802.11b/bg/ng	
Operating Mode	Identifies the 802.11 operating mode of the WNDAP350.
Channel/Frequency	Identifies the channel the wireless port is using. 'Auto' is the default channel setting. (Channel frequencies used on each channel can be found in "Wireless Communications"; a link to this article is in Appendix B, "Related Documents.).
Rogue AP Detection	Identifies whether the Rogue AP detection feature is enabled or disabled.
Current Wireless Settings for 802.11n/na	
Operating Mode	Identifies the 802.11 operating mode of the WNDAP350.

Table 3-1. System Information Fields (continued)

Field	Description
Channel/Frequency	Identifies the channel the wireless port is using. 11 is the default channel setting. (Channel frequencies used on each channel can be found in "Wireless Communications"; a link to this article is in Appendix B, "Related Documents.).
Rogue AP Detection	Identifies whether the Rogue AP detection feature is enabled or disabled.

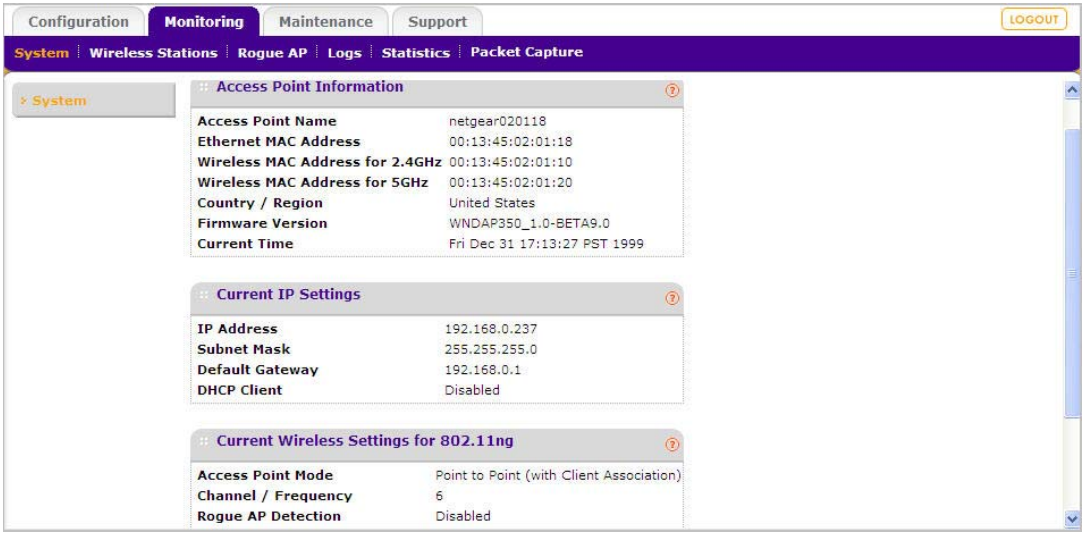


Figure 3-11 View system information

Viewing Network Traffic Statistics

The Statistics screen displays information for both wired (LAN) and wireless (WLAN) interface network traffic.

To access Statistics information:

1. Under the **Monitoring** tab on the main menu, select **Statistics**. The Statistics screen displays, as shown in Figure 3-12 below.

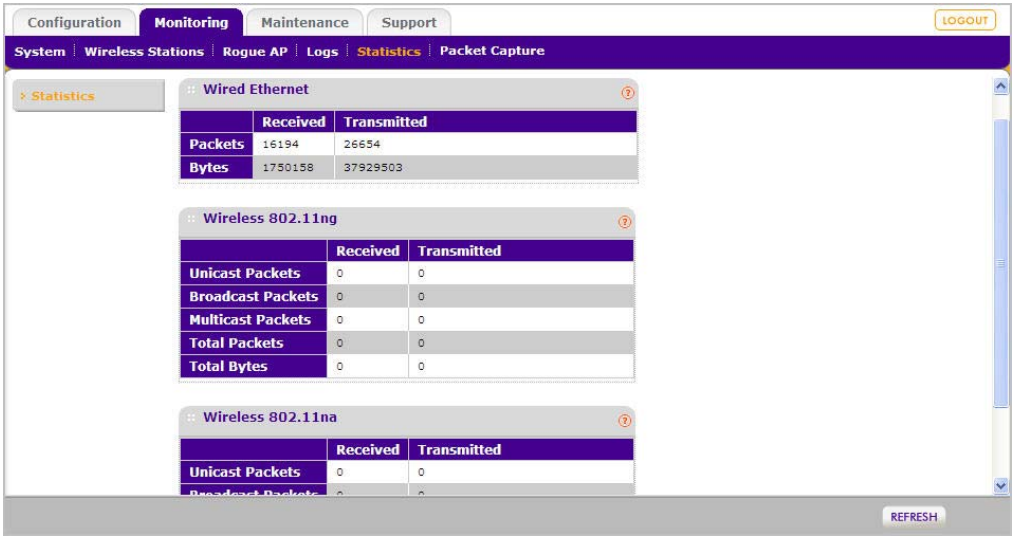


Figure 3-12 View network statistics

2. Click **Refresh** to update the Statistics information for each interface.

Table 3-2, shown below, describes the information fields detailed on the Statistics screen.

Table 3-2. Statistics Fields

Field	Description
Wired Ethernet	
Packets	The number of packets sent and received since the WNDAP350 was restarted.
Bytes	The number of bytes sent and received since the WNDAP350 was restarted.
Wireless 11b/bg/ng	
Unicast Packets	The Unicast packets sent and received in 802.11n/g mode since the WNDAP350 was restarted.
Broadcast Packets	The Broadcast packets sent and received in 802.11n/g mode since the WNDAP350 was restarted.

Table 3-2. Statistics Fields

Field	Description
Multicast Packets	The Multicast packets sent and received in 802.11n/g mode since the WNDAP350 was restarted.
Total Packets	The Wireless packets sent and received in 802.11n/g mode since the WNDAP350 was restarted.
Total Bytes	The Wireless bytes sent and received in 802.11n/g mode since the WNDAP350 was restarted.
Wireless 11n/na	
Unicast Packets	The Unicast packets sent and received in 802.11n/a mode since the WNDAP350 was restarted.
Broadcast Packets	The Broadcast packets sent and received in 802.11n/a mode since the WNDAP350 was restarted.
Multicast Packets	The Multicast packets sent and received in 802.11n/a mode since the WNDAP350 was restarted.
Total Packets	The Wireless packets sent and received in 802.11n/a mode since the WNDAP350 was restarted.
Total Bytes	The Wireless bytes sent and received in 802.11n/a mode since the WNDAP350 was restarted.

Viewing Available Wireless Station Statistics

The Available Wireless Stations List (AWSL) contains a table of all IP devices associated with this wireless access point in the wireless network defined by the Wireless Network Name (SSID). For each device, the table shows the MAC address, BSSID, SSID, Channel, Rate, State (whether the device is allowed to communicate with the wireless access point or not), Type, AID, Mode, and Status.

Note: A wireless network can include multiple wireless access points, all using the same network name (SSID). This enables extending the reach of the wireless network and allows users to roam from one access point to another, providing seamless network connectivity. Under these circumstances, be aware that only the stations associated with this access point will be presented in the Available Station List.

To view the Available Wireless Stations List:

1. Under the **Monitoring** tab, select **Wireless Stations** on the main menu. The Available Wireless Stations list displays, as shown in Figure 3-13.

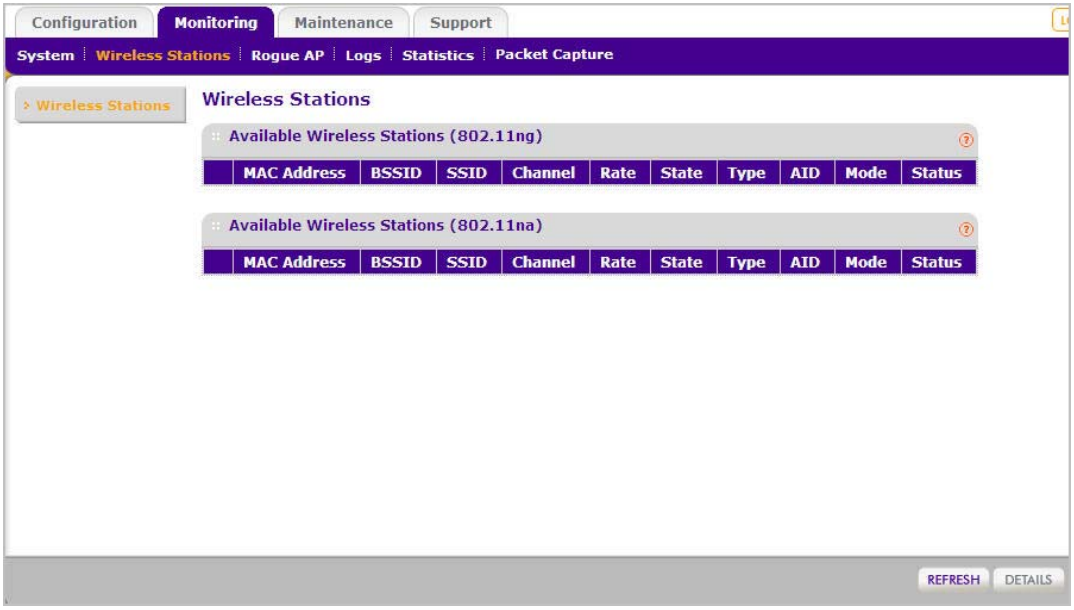


Figure 3-13 Available Wireless Stations list

2. Click **Refresh** to update the list.

Tip: 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.

Enabling Rogue AP Detection

The WNDAP350 can detect rogue APs and wireless stations and show their details to the administrator.

To enable Rogue AP Detection:

1. Under the **Configuration** tab on the main menu, select **Security**, select **Advanced** from the sidebar, and then select **Rogue AP**. The Rogue AP screen displays, as shown in Figure 3-8 below.

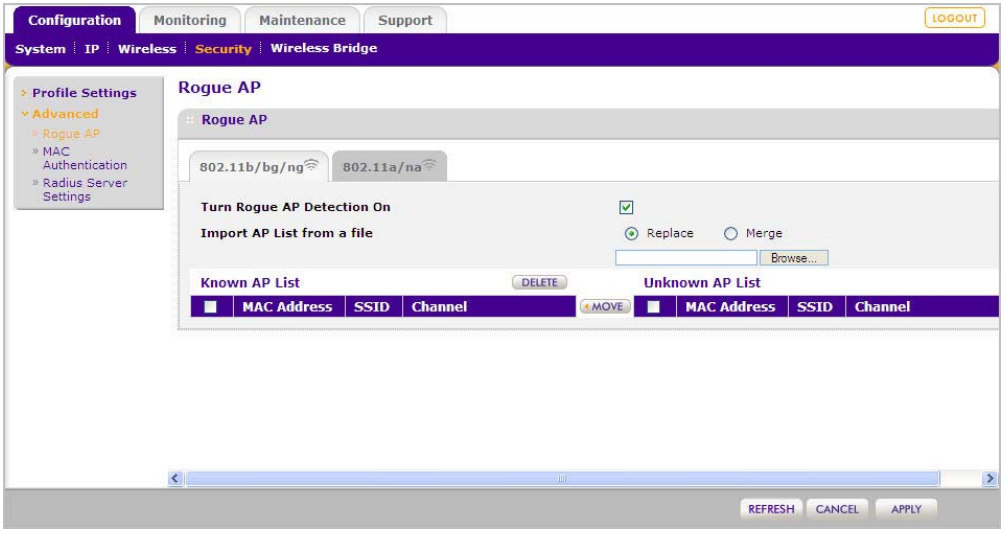


Figure 3-14 Enable Rogue AP detection

2. Check the **Turn Rogue AP Detection On** radio box to enable rogue AP detection and click **Apply.**

   If you enable Rogue AP Detection, the AP continuously scans the wireless network and collects information about all APs heard on its channel.

3. You can Import AP List from a File. See “Importing Rogue AP List from a File” on page 3-18 for more information.
4. Under the Unknown AP List, click **Refresh** to discover the APs.
5. Click **Move** to add any AP to the Known AP List.
6. Click **Delete** to remove an AP from the Known AP List.
7. Click **Apply** to save your change.

Importing Rogue AP List from a File

To replace the existing AP list:

1. Create a text file that contains the MAC address of each known AP, separated by a space. The following example shows a list of six known APs that an administrator might upload to the AP:

   ```
   00:0c:41:d7:ee:a5 00:0f:b5:92:cd:49 00:12:17:70:85:3d
   00:14:bf:ae:b1:e4 00:40:f4:f8:47:03 00:0c:41:d7:ee:b4
   ```

2. Select **Replace** to replace the existing list of known APs, or select **Merge** to add the new MAC addresses to the existing list.
3. Click **Browse** and navigate to the location where you saved the text file.
4. Select the file and click **Open.**
5. Click **Import** to upload the list to the AP.

To import the list from an existing file:

1. Click **Browse** and navigate to the location where you saved the text file.
2. Select the file and click **Open.**
3. Click **Import** to upload the list to the AP.

Viewing Rogue AP Statistics

The WNDAP350 can detect rogue APs and wireless stations and show a complete list of unknown or known APs to the administrator.

To view the Rogue AP list:

1. Under the **Monitoring** tab on the main menu, select **Rogue AP**. Select **Unknown AP List**.The following screen displays with a list of unknown APs:

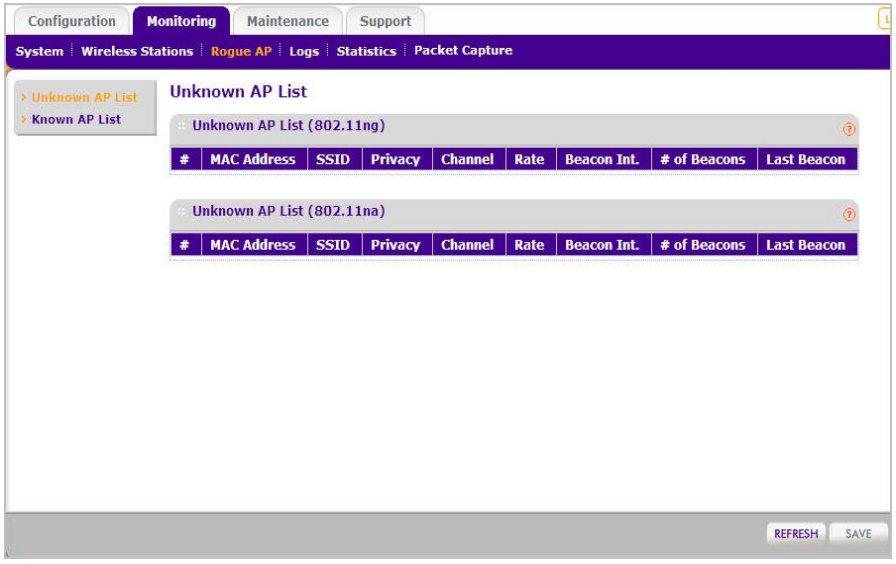


Figure 3-15 Unknown APs list

2. Click **Refresh** to refresh the list.
3. Click **Save** to export the list of unknown APs to a file. A window opens so you can browse to the location where you want to save the file.

To view the list of known APs:

1. Under the **Monitoring** tab on the main menu, select **Rogue AP**. Select **Known AP List**.The following screen displays with a list of known APs:

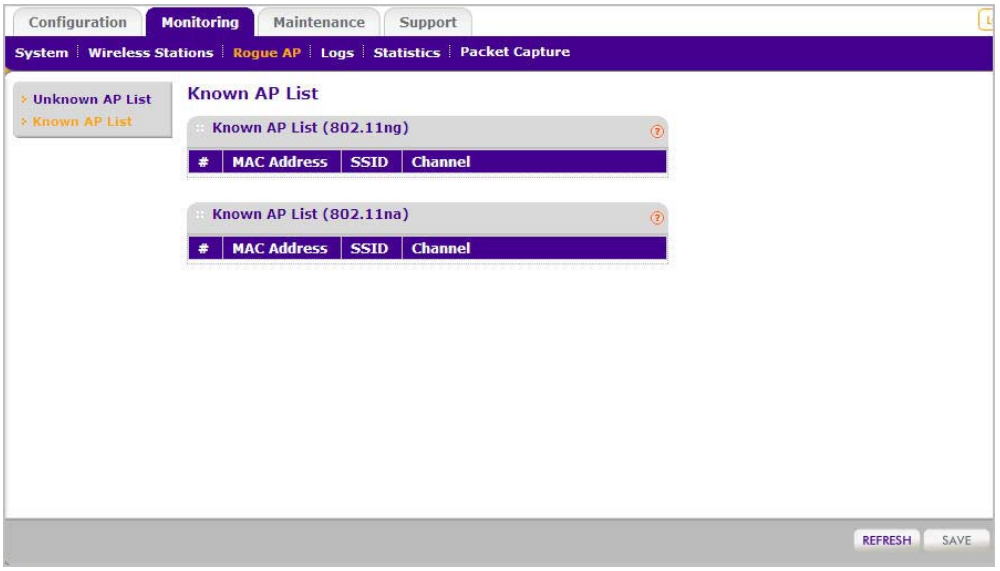


Figure 3-16 Known APs list

2. Click **Refresh** to refresh the list.
3. Click **Save** to export the list of known APs to a file. A window opens so you can browse to the location where you want to save the file.

Packet Capture

The packet capture option is available under the **Monitoring** > **Packet Capture** tab. Use this option for troubleshooting association problems. You can capture all packets transmitted and received by the AP and save them in `pcap` format for analysis by any standard sniffer tool such as *WireShark* or *OmniPeek*.

The packet capture screen is shown below:

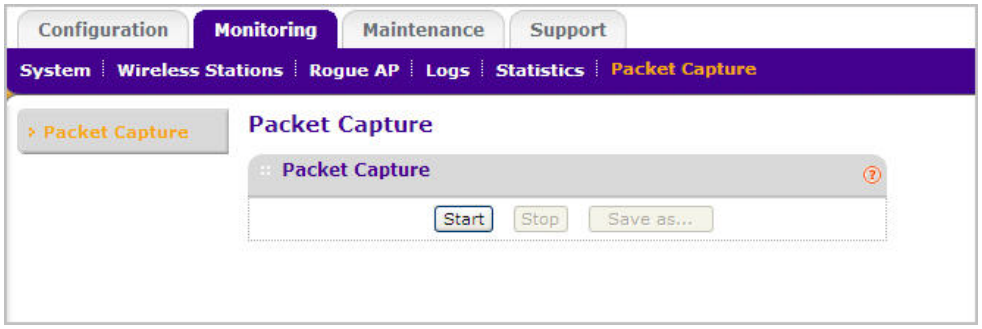


Figure 3-17 Packet capture screen

Chapter 4
Advanced Configuration

This chapter describes how to configure the advanced features of your ProSafe Dual Band Wireless N Access Point WNDAP350 . The advanced configuration features are located under various sub-menus under **Configuration** and provide the following functions:

- **IP Settings**. Using the wireless access point as a DHCP server for wireless clients (“IP Settings for Wireless Clients).
- **Hotspot settings.** Enabling HTTP redirect (“Hotspot Settings).
- **Wireless Settings**: Configuring advanced wireless LAN parameters (“Configuring Advanced Wireless Settings).
- **Advanced QoS Settings**: Configuring advanced QoS settings (“Configuring Advanced QoS Settings)
- **Access Point Settings**: Enabling wireless bridge modes (“Enabling Wireless Bridging).

IP Settings for Wireless Clients

You can turn the WNDAP350 into a DHCP Server for wireless clients for both DHCP-enabled wireless clients. The default advanced IP wireless settings usually work well. This feature is intended for use by a systems administrator. By default, this feature is not enabled.

To use this wireless access point as a DHCP server:

1. From the main menu under **Configuration**, select **IP**, and then select **DHCP Server Settings**. The DHCP Server Settings screen displays (see Figure 4-1).
2. DHCP Server is disabled by default. Select the **Enable** radio button to enable this wireless access point as a DHCP server.

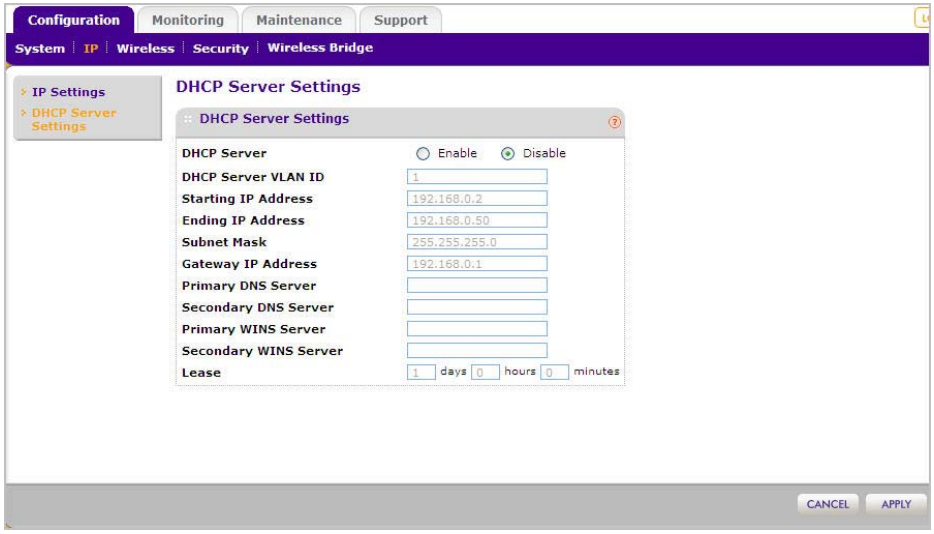


Figure 4-1 DHCP server settings

3. Configure the following TCP/IP configurations for using the WNDAP350 as a DHCP Server for wireless clients.

   - **DHCP Server:** By default, the Dynamic Host Configuration Protocol (DHCP) server on the AP is disabled. If you enable it, all the wireless clients associated with the AP will get their IP addresses, subnet mask and default gateway settings automatically from the AP.
   - **DHCP Server VLAN ID:** All the stations that are part of the configured VLAN ID will get their IP addresses only from the AP.
   - **Starting IP Address**: Enter the starting IP address that can be assigned from the DHCP server on this Access Point.
   - **Ending IP Address**: Enter the Ending IP address that 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.

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

Hotspot Settings

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

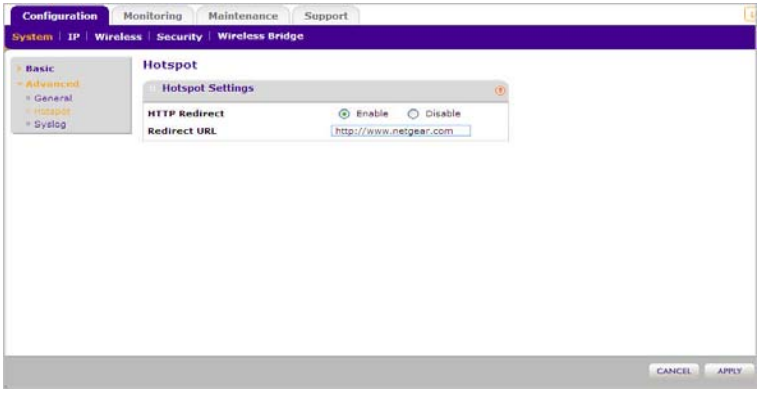


Figure 4-2 Hotspot settings

To set up a Hotspot server:

1. From the main menu under **Configuration**, select **System**, then select **Advanced**.
2. From the sidebar, select **Hotspot**. The Hotspot screen displays, as shown in Figure 4-2., with the following fields:
   - **HTTP Redirect:** Enable HTTP Redirect**.**

- **Redirect URL**: Enter the URL of the Web server where you wish to redirect HTTP (port 80) requests.

3. Click **Apply**. All port 80 requests will now be redirected to the specified URL.

Configuring Advanced Wireless Settings

The **Advanced** option of the Wireless Settings menu is used to configure and enable various wireless LAN parameters for both the 11a/na and 11b/bg/ng modes. The default wireless LAN parameters usually work well. However, you can use these settings to fine tune the overall performance of your wireless access point for your environment.

The Wireless Settings option of the Advanced menu is used to configure the Wireless LAN parameters. The default advanced wireless LAN parameter settings usually work well.

Configuring 802.11b/bg/ng Advanced Wireless Settings

To configure advanced Wireless Settings:

1. Under the **Configuration** tab, select **Wireless**.
2. From the sidebar, select **Advanced**, and then select **Wireless Settings**.

3. Select the **802.11b/bg/ng** tab. The Advanced Wireless Settings screen you selected displays, as shown in Figure 4-3.,

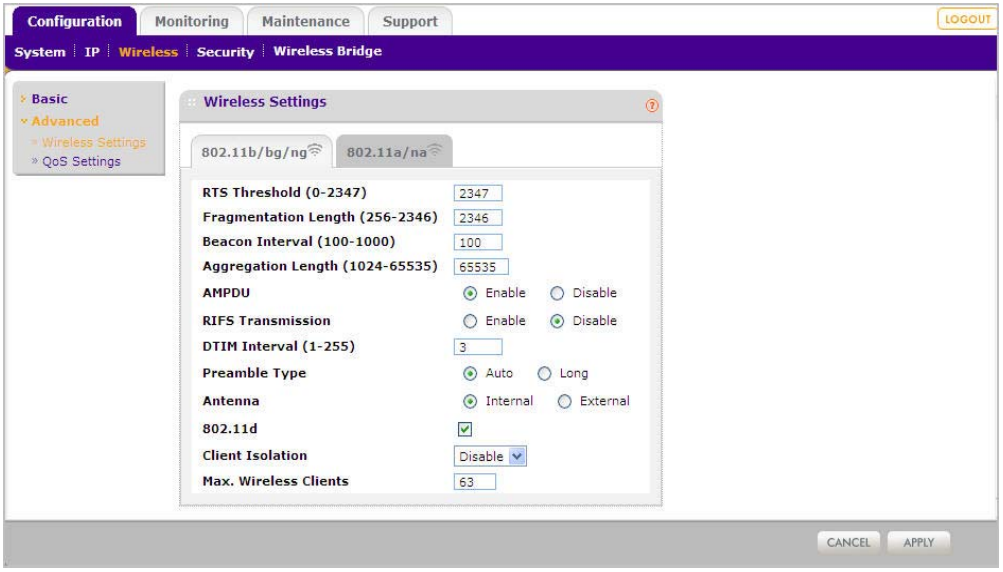


Figure 4-3 Advanced Wireless Settings - 802.11b/bg/ng

4. Enter the appropriate information in the fields described below:

- **RTS Threshold (0 - 2347)**: Request to Send Threshold. The packet size that is used to determine if it should use the CSMA/CD (Carrier Sense Multiple Access with Collision Detection) mechanism or the CSMA/CA mechanism for packet transmission. With the CSMA/CD transmission mechanism, the transmitting station sends out the actual packet as soon as it has waited for the silence period. With the CSMA/CA transmission mechanism, the transmitting station sends out an RTS packet to the receiving station, and waits for the receiving station to send back a CTS (Clear to Send) packet before sending the actual packet data. The default is 2347.
- **Fragmentation Length (256 - 2346)**: This is the maximum packet size used for fragmentation. Packets larger than the size programmed in this field will be fragmented. The Fragmentation threshold value must be larger than the RTS threshold value. The default is 2346.
- **Beacon Interval (100 - 1000)**: The Beacon Interval. Specifies the interval time between 100ms and 1000ms for each beacon transmission, which allows the access point to synchronize the wireless network. The default is 100.

- **Aggregation Length (1024-65535) (11ng)**: The aggregation length defines the size of aggregated packets. Larger aggregation lengths may sometimes lead to better network performance. The default is 65535.
- **A-MPDU (11ng)**: Aggregated MAC Protocol Data Unit. Aggregates several MAC frames into a single large frame to achieve higher throughput. The default is enabled.
- **RIFS Transmission (11ng):** Reduced Interframe Space. RIFS transmissions are shorter than other interframe spaces, and if enabled allow transmission of successive frames at different transmit powers. The default is disabled.
- **DTIM Interval**: The Delivery Traffic Indication Message. Specifies the data beacon rate between 1 and 255. The default is 3.
- **Preamble Type (11b/bg only):** A long transmit preamble may provide a more reliable connection or a slightly longer range. A short transmit preamble gives better performance. The Auto settings automatically handles both long and short preambles. The default is Auto.
- **Antenna:** Enable the internal or external antenna. The internal antenna is enabled by default.
- **802.11d:** Enable this option to include support for "additional regulatory domains" that are not in the current standard.
- **Client Isolation:** This option, when enabled, blocks communication between wireless clients that are associated to different VAPs. The default is Disable**.**
- **Max Wireless Clients:** The number of wireless clients that can associate with the AP at one time. The default is 63.

5. Click **Apply** to enable the Wireless Settings.

Configuring 802.11a/na Advanced Wireless Settings

To configure advanced Wireless Settings:

1. Under the **Configuration** tab, select **Wireless**.

2. From the sidebar, select **Advanced**, and then select **Wireless Settings**.

3. Select the **802.11a/na** tab. The Advanced Wireless Settings screen you selected displays, as shown in Figure 4-3.,

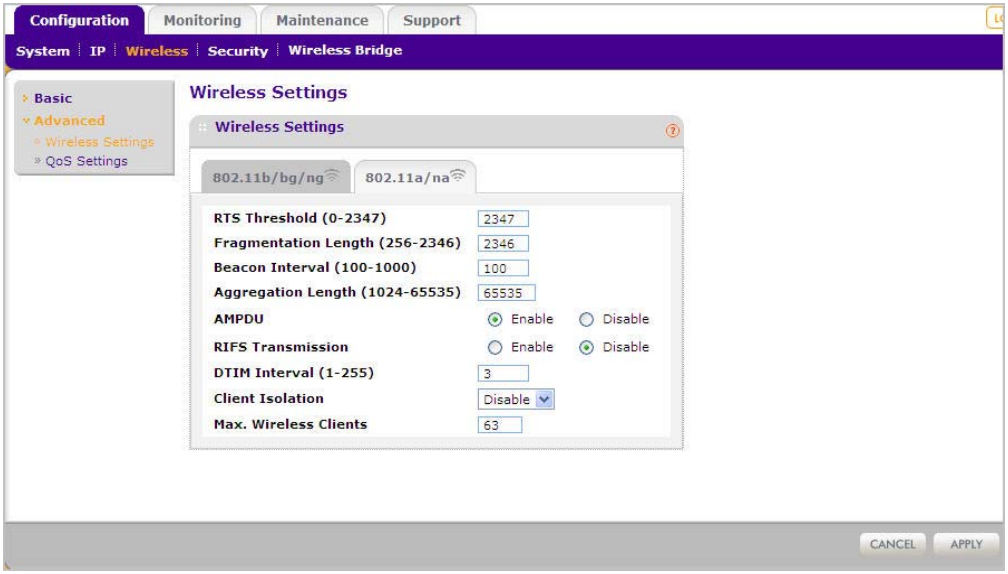


Figure 4-4 Advanced Wireless Settings - 802.11n/na

4. Enter the appropriate information in the fields described below:

- **RTS Threshold (0 - 2347)**: Request to Send Threshold. The packet size that is used to determine if it should use the CSMA/CD (Carrier Sense Multiple Access with Collision Detection) mechanism or the CSMA/CA mechanism for packet transmission. With the CSMA/CD transmission mechanism, the transmitting station sends out the actual packet as soon as it has waited for the silence period. With the CSMA/CA transmission mechanism, the transmitting station sends out an RTS packet to the receiving station, and waits for the receiving station to send back a CTS (Clear to Send) packet before sending the actual packet data. The default is 2347.
- **Fragmentation Length (256 - 2346)**: This is the maximum packet size used for fragmentation. Packets larger than the size programmed in this field will be fragmented. The fragmentation threshold value must be larger than the RTS Threshold value. The default is 2346.
- **Beacon Interval (100 - 1000)**: The Beacon Interval. Specifies the interval time between 100ms and 1000ms for each beacon transmission, which allows the access point to synchronize the wireless network. The default is 100.

- **Aggregation Length (1024-65535) (11na only)**: The aggregation length defines the size of aggregated packets. Larger aggregation lengths may sometimes lead to better network performance. The default is 65535.
- **A-MPDU (11na only)**: Aggregated MAC Protocol Data Unit. Aggregates several MAC frames into a single large frame to achieve higher throughput. The default is enabled.
- **RIFS Transmission (11na only):** Reduced Interframe Space. RIFS transmissions are shorter than other interframe spaces, and if enabled allow transmission of successive frames at different transmit powers. The default is disabled. The default is disabled.
- **DTIM Interval**: The Delivery Traffic Indication Message. Specifies the data beacon rate between 1 and 255. The default is 3.
- **Client Isolation:** This option, when enabled, blocks communication between wireless clients that are associated to different VAPs. The default is Disable**.**
- **Max Wireless Clients:** The number of wireless clients that can associate with the AP at one time. The default is 63.

5. Click **Apply** to enable the Wireless Settings.

Configuring Advanced QoS Settings

Wireless Multimedia Extension (WME) or Wi-Fi Multimedia (WMM) is a subset of the 802.11e standard. WME allows wireless traffic to have a range of priorities, depending on the type of data. Time-dependent information, such as video or audio, has a higher priority than normal traffic. For WME to function correctly, Wireless clients must also support WME.

Figure 4-5 shows the Quality of Service (QoS) screen. For most networks, the default QoS queue parameter settings work well.Quality of Service provides you with the ability to specify parameters on multiple queues for increased throughput and better performance of differentiated wireless traffic, like Voice-over-IP (VoIP), other types of audio, video, and streaming media, as well as traditional IP data.

To configure advanced QoS settings, on the **Configuration** tab select **Wireless**, select **Advanced**, and then select **QoS Settings**. The QoS Settings screen dis pa lys:

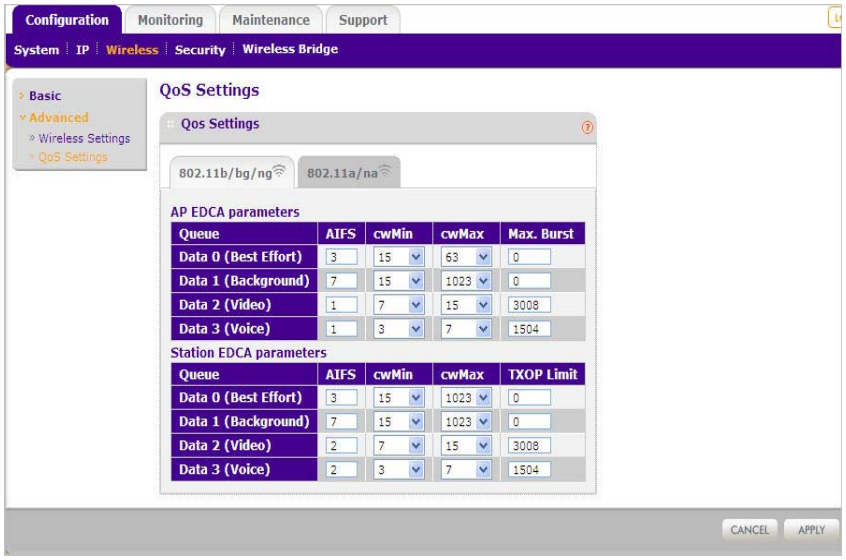


Figure 4-5 Advanced QoS settings

The QoS options on the WNDAP350 are as follows:

- **AP EDCA Parameters.** Specify the AP EDCA (Enhanced Distributed Channel Access) parameters for different types of data transmitted from the WNDAP350 wirelss access point to the wireless client.
- **Station EDCA Parameters.** Specify the Station EDCA parameters for different types of data transmitted from the wireless client to the WNDAP350 wirelss access point. If WMM is disabled, you cannot configure Station EDCA parameters.

Table 4-1 describes the settings for QoS Queues.

Table 4-1. QoS Queues and Parameters

QoS Queue	Description
Data 0 (Voice)	High priority queue, minimum delay. Time-sensitive data such as VoIP and streaming media are automatically sent to this queue.
Data 1(Video)	High priority queue, minimum delay. Time-sensitive video data is automatically sent to this queue.
Data 2 (Best Effort)	Medium priority queue, medium throughput and delay. Most traditional IP data is sent to this queue.

Table 4-1. QoS Queues and Parameters

QoS Queue	Description
Data 3 (Background)	Lowest priority queue, high throughput. Bulk data that requires maximum throughput and is not time-sensitive is sent to this queue (FTP data, for example).
AIFS (Arbitration Inter-Frame Space)	Specifies a wait time (in milliseconds) for data frames. Valid values for AIFS are 1 through 255.
cwMin (Minimum Contention Window)	Upper limit (in milliseconds) of a range from which the initial random backoff wait time is determined. Valid values for the “cwmin” are 1, 3, 7, 15, 31, 63, 127, 255, 511, or 1024. The value for cwMin must be lower than the value for cwMax.
cwMax (Maximum Contention Window)	Upper limit (in milliseconds) for the doubling of the random backoff value. Valid values for the “cwmax” are 1, 3, 7, 15, 31, 63, 127, 255, 511, or 1024. The value for cwMax must be higher than the value for cwMin.
Max. Burst Length	Specifies (in milliseconds) the Maximum Burst Length allowed for packet bursts on the wireless network. A packet burst is a collection of multiple frames transmitted without header information. Valid values for maximum burst length are 0.0 through 999.9.

Enabling Wireless Bridging

The ProSafe Dual Band Wireless N Access Point WNDAP350 lets you build large bridged wireless networks. Select the desired wireless access point mode for your environment:

- **Wireless Point-to-Point Bridge**. In this mode, the WNDAP350 can communicate with another bridge mode wireless access point. Select the **Enable Wireless Client Association** option to enable wireless clients to associate with this access point.

  When you click the **Edit** button, you must enter the Profile Name and the MAC address (physical address) of the other Bridge mode wireless access point in the fields provided. WEP, WPA-PSK, or WPA2-PSK are supported. WPA2-PSK can (and should) be used to protect this communication.

- **Wireless Point-to-Multi-Point Bridge**. Select this only if this WNDAP350 is the “Master” for a group of bridge-mode wireless access points. Select the **Enable Wireless Client Association** option to enable wireless clients to associate with this access point.

  The other bridge-mode wireless access points must be set to point-to-point bridge mode, using the MAC address of this WNDAP350. They then send all traffic to this “Master”, rather than communicate directly with each other.

When you click the **Edit** button, you must enter the profile name and the MAC address (physical address) of the other bridge mode wireless station in the fields provided. WEP, WPA-PSK, or WPA2-PSK are supported. WPA2-PSK can (and should) be used to protect this communication.

The screens used to configure these options are located by selecting **Wireless Bridge** under the **Configuration** tab (see Figure 4-6 below).

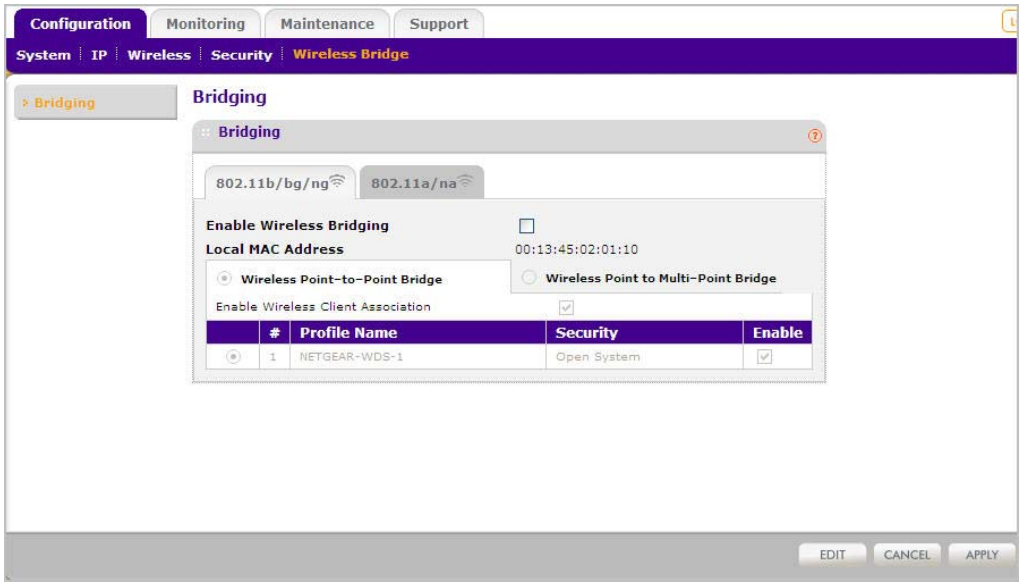


Figure 4-6 Enable Wireless Point-to-Point Bridge

To configure bridge settings on the Bridging page shown in Figure 4-6 above, follow these steps:

1. Select the **Enable Wireless Bridging** option.
2. Select one of the bridge mode options, **Wireless Point to Point Bridge**, or **Wireless Point to Multi-Point Bridge**.
3. Select **Enable Wireless Client Association**, if you wish.
4. Click **Edit** to edit the security profile of the wireless bridge settings, as shown in Figure 4-7 below.

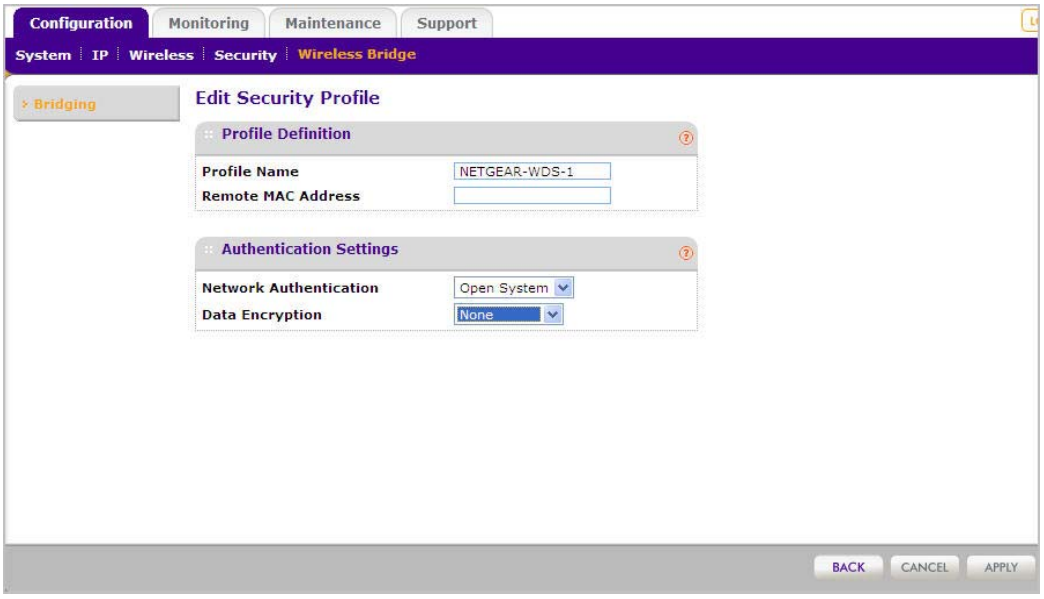


Figure 4-7 Bridging - Edit WDS Security Profile

Configuring a WNDAP350 as a Point-to-Point Bridge

To configure a point-to-point bridge as shown in Figure 4-8:

1. Under the **Configuration** tab, select **Wireless Bridge**. Then, select **Bridging**. The Bridging screen displays (see Figure 4-6).
2. Configure the WNDAP350 (AP1) on LAN Segment 1 in Point-to-Point Bridge mode.

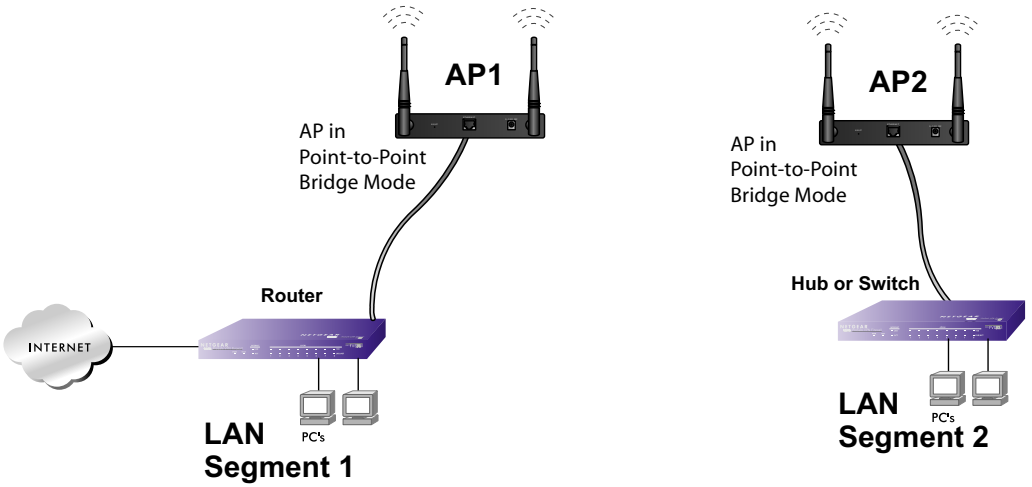


Figure 4-8 Wireless point-to-point bridge setup

3. Configure the WNDAP350 (AP2) on LAN Segment 2 in Point-to-Point Bridge mode.

   AP1 must have AP2's MAC address in its Remote MAC Address field and AP2 must have AP1's MAC address in its Remote MAC Address field.

4. Configure and verify the following parameters for both access points:

   - Verify that the LAN network configuration of the WNDAP350 wirelss access points both are configured to operate in the same LAN network address range as the LAN devices
   - Both use the same ESSID, Channel, authentication mode, if any, and security settings if security is in use.

5. 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.

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

Configuring a Point-to-Multi-Point Wireless Bridge

To configure a point-to-multi-point wireless bridge as shown in Figure 4-9:

1. Under the **Configuration** tab, select **Wireless Bridge**. Then, select **Bridging**. The Bridging screen displays.

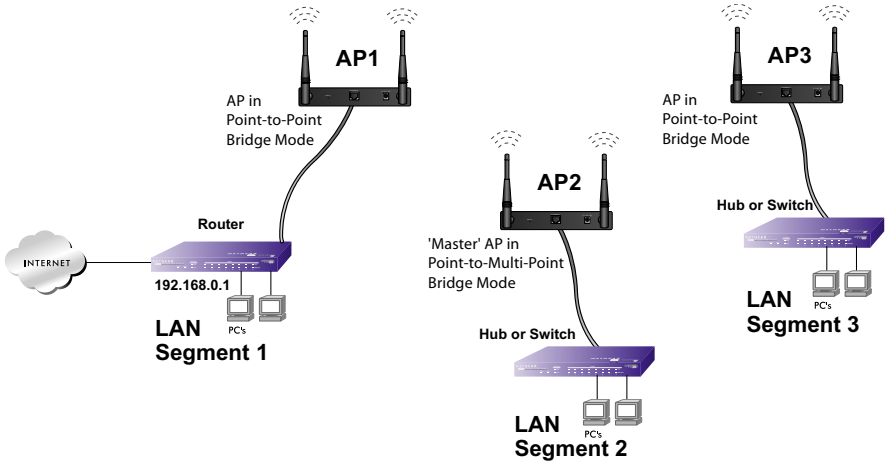


Figure 4-9 Wireless point-to-multipoint bridge setup

2. Configure the Operating Mode of the WNDAP350 wirelss access points.
   - WNDAP350 (AP1) on LAN Segment 1 in Point-to-Point Bridge mode with the Remote MAC Address of AP2.
   - Because it is in the central location, configure WNDAP350 (AP2) on LAN Segment 2 in Point-to-Multi-Point Bridge mode. The MAC addresses of the adjacent APs are required in AP2.
   - Configure the WNDAP350 (AP3) on LAN 3 in Point-to-Point Bridge mode with the Remote MAC Address of AP2.
3. Verify the following parameters for all access points:
   - Verify that the LAN network configuration the WNDAP350 wirelss access points are configured to operate in the same LAN network address range as the LAN devices
   - Only one access point is configured in Point-to-Multi-Point Bridge mode, and all the others are in Point-to-Point Bridge mode.
   - All access points must be on the same LAN. That is, all the APs LAN IP address must be in the same network.

- If using DHCP, all WNDAP350 wirelss 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 WNDAP350 wirelss access points use the same SSID, Channel, authentication mode, if any, and encryption in use.
- All Point-to-Point Access Points must have the AP2 MAC address in its Remote AP MAC address field.

4. 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 be able to connect to the WNDAP350 wirelss access points in the illustration above. If you require wireless stations to access any LAN segment, you can add additional WNDAP350 wirelss access points configured in Wireless Access Point mode to any LAN segment.

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

	**Note:** You can extend this multi-point bridging by adding additional WNDAP350s 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.

Chapter 5
Troubleshooting and Debugging

This chapter provides information about troubleshooting your ProSafe Dual Band Wireless N Access Point WNDAP350 . 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 WNDAP350 on?

  Go to "Installing the WNDAP350 wirelss access point" on page 2-4

- Have I connected the wireless access point correctly?

  Go to "Installing the WNDAP350 wirelss access point" on page 2-4.

- I cannot remember the wireless access point's configuration password.

  Go to "Changing the Administrator Password" on page 3-10.

Note: For up-to-date WNDAP350 installation details and troubleshooting guidance visit *http://kbserver.netgear.com/products/WG302.asp*.

If you have trouble setting up your WNDAP350, check the tips below.

No lights are lit on the wireless 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 antennas 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 WNDAP350.
- 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.
- LAN light does not light up if it is a 10 Mbps link. In such cases, the Lan activity light will still blink if there is activity.
- 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 WNDAP350 to configure it.

Check these items:

- The WNDAP350 is properly installed, LAN connections are OK, and it is powered on. Check that the LAN port LED is green to verify that the Ethernet connection is OK.
- The default configuration of the WNDAP350 is for a static IP address of 192.168.0.237 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 WNDAP350 to connect, ensure that your computer and the WNDAP350 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 WNDAP350. The WNDAP350 default IP Address is 192.168.0.237 and the default Subnet Mask is 255.255.255.0. If you are not sure about these settings, follow the instructions for "Installing the WNDAP350 wirelss access point" on page 2-4.

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 WNDAP350 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 WNDAP350 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 1-8) has two functions:

- **Reboot.** When pressed and released quickly, the WNDAP350 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 WNDAP350 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 WNDAP350 is ready for use.

Appendix A
Default Settings and Technical Specifications

This appendix provides the factory default settings and technical specifications for the ProSafe Dual Band Wireless N Access Point WNDAP350 .

Factory Default Settings

You can use the reset button located on the front of your device to reset all settings to their factory defaults. This is called a hard reset.

- To perform a hard reset, push and hold the reset button for approximately 5 seconds (until the TEST LED blinks rapidly). Your device will return to the factory configuration settings shown in Table A-1 below.
- Pressing the reset button for a shorter period of time will simply cause your device to reboot.

Table A-1. Access Point Default Configuration Settings

Feature		Description
AP Login		
	User Login URL	192.168.0.237
	User Name (case sensitive)	admin
	Login Password (case sensitive)	password
Ethernet Connection		
	Static IP Address	192.168.0.210
	Ethernet MAC Address	See bottom label.
	Port Speed	10/100/1000
Local Network (LAN)		
	Lan IP	192.168.1.1
	Subnet Mask	255.255.255.0
	Gateway Address	0.0.0.0
	DHCP Server	Disabled

Table A-1. Access Point Default Configuration Settings

Feature		Description
	DHCP Client	Disabled
	Time Zone	USA-Pacific
	Time Zone Adjusted for Daylight Saving Time	Disabled
	SNMP	Enabled, but Trap forwarding disabled
	Spanning Tree Protocol	Disabled
	Secure Telnet	Enabled
Wireless		
	Operating Mode	Access Point
	Access Point Name	netgearxxxxxx where xxxxxx are the last 6 digits of the wireless access point MAC address.
	Wireless Communication	Enabled
	11a/na Wireless Network Name (SSID)	NETGEAR_11a
	11 b/bg/ng Wireless Network Name (SSID)	NETGEAR_11g
	Broadcast Network Name SSID	Enabled
	Security	Disabled
	Transmission Speed	Best[a]
	Country/Region	Varies by region
	80211.a Radio Frequency Channel	Auto
	80211.g Radio Frequency Channel	Auto
	Output Power	Full
	Wireless Card Access List	All wireless stations allowed
	WMM Support	Enabled

a. Maximum Wireless signal rate derived from IEEE Standard 802.11 specifications. Actual throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead, lower actual data throughput rate.

Technical Specifications

Table A-2. WNDAP350 Technical Specifications

Parameter	ProSafe Dual Band Wireless N Access Point WNDAP350
802.11a Data Rates	6, 9, 12, 18, 24, 36, 48, 54, and 108 Mbps (Auto-rate capable)
802.11na Data Rates	Data Rates for Channel Width=20MHz and Guard Interval=short (400ms): Best, 7.2 Mbps, 14.4 Mbps, 21.7 Mbps, 28.9 Mbps, 43.3 Mbps, 57.8 Mbps, 65 Mbps, 72.2 Mbps, 14.44 Mbps, 28.88 Mbps, 43.33 Mbps, 57.77 Mbps, 86.66 Mbps, 115.56 Mbps, 130 Mbps, 144.44 Mbps
	Data Rates for Channel Width=20MHz and Guard Interval=long (800ms): Best, 6.5 Mbps, 13 Mbps, 19.5 Mbps, 26 Mbps, 39 Mbps, 52 Mbps, 58.5 Mbps, 65 Mbps, 13 Mbps, 26 Mbps, 39 Mbps, 52 Mbps, 78 Mbps, 104 Mbps, 117 Mbps, 130 Mbps
	Data Rates for Channel Width=40MHz and Guard Interval=short: Best, 15 Mbps, 30 Mbps, 45 Mbps, 60 Mbps, 90 Mbps, 120 Mbps, 135 Mbps, 150 Mbps, 30 Mbps, 60 Mbps, 90 Mbps, 120 Mbps, 180 Mbps, 240 Mbps, 270 Mbps, 300 Mbps
	Data Rates for Channel Width=40MHz and Guard Interval=long: Best, 13.5 Mbps, 27 Mbps, 40.5 Mbps, 54 Mbps, 81 Mbps, 121.5 Mbps, 135 Mbps, 27 Mbps, 54 Mbps, 81 Mbps, 162 Mbps, 216 Mbps, 243 Mbps, 270 Mbps
802.11a/na Operating Frequencies FCC operating Frequencies CE(EU) operating frequencies	 5150MHz ~ 5250MHz 5725MHz ~ 5825MHz 5150MHz ~ 5250MHz 5250MHz ~ 5350Mz 5470MHz ~ 5725MHz
802.11a/na Encryption	64-bits, 128- and 152-bits WEP, AES, TKIP data encryption
802.11g Data Rates	1, 2, 5.5, 11, 12, 18, 24, 36, 38, 54, & 108 Mbps (Auto-rate capable)

Table A-2. WNDAP350 Technical Specifications

Parameter	ProSafe Dual Band Wireless N Access Point WNDAP350
802.11ng Data Rates	Data Rates for Channel Width=20MHz and Guard Interval=short (400ms): Best, 7.2 Mbps, 14.4 Mbps, 21.7 Mbps, 28.9 Mbps, 43.3 Mbps, 57.8 Mbps, 65 Mbps, 72.2 Mbps, 14.44 Mbps, 28.88 Mbps, 43.33 Mbps, 57.77 Mbps, 86.66 Mbps, 115.56 Mbps, 130 Mbps, 144.44 Mbps
	Data Rates for Channel Width=20MHz and Guard Interval=long (800ms): Best, 6.5 Mbps, 13 Mbps, 19.5 Mbps, 26 Mbps, 39 Mbps, 52 Mbps, 58.5 Mbps, 65 Mbps, 13 Mbps, 26 Mbps, 39 Mbps, 52 Mbps, 78 Mbps, 104 Mbps, 117 Mbps, 130 Mbps
	Data Rates for Channel Width=40MHz and Guard Interval=short: Best, 15 Mbps, 30 Mbps, 45 Mbps, 60 Mbps, 90 Mbps, 120 Mbps, 135 Mbps, 150 Mbps, 30 Mbps, 60 Mbps, 90 Mbps, 120 Mbps, 180 Mbps, 240 Mbps, 270 Mbps, 300 Mbps
	Data Rates for Channel Width=40MHz and Guard Interval=long: Best, 13.5 Mbps, 27 Mbps, 40.5 Mbps, 54 Mbps, 81 Mbps, 121.5 Mbps, 135 Mbps, 27 Mbps, 54 Mbps, 81 Mbps, 162 Mbps, 216 Mbps, 243 Mbps, 270 Mbps
802.11b/bg/ng Operating Frequencies	2.412 ~ 2.462 GHz (US) 2.412 ~ 2.484 GHz (Japan) 2.412 ~ 2.472 GHz (Europe ETSI) 2.457 ~ 2.462 GHz (Spain) 2.457 ~ 2.472 GHz (France)
802.11 b/bg/ng Encryption	64-bits, 128- and 152-bits WEP, AES, TKIP data encryption
Network Management	Web-based configuration and status monitoring
Maximum Clients	Limited by the amount of wireless network traffic generated by each node; maximum 64 supported.
Status LEDs	Power/Ethernet LAN/Wireless LAN/Test
Power Adapter	12V DC, 1.5 A
Electromagnetic Compliance	FCC Part 15 Class B and Class E, CE, and C-TICK
Environmental Specifications	Operating temperature: 0 to 50° C Operating humidity: 5-95%, non-condensing

Appendix B
Related Documents

This appendix provides links to reference documents you can use to gain a more complete understanding of the technologies used in your NETGEAR product.

Document	Link
Windows XP and Vista Wireless Configuration Utilities	*http://documentation.netgear.com/reference/enu/winzerocfg/index.htm*
Internet Networking and TCP/IP Addressing	*http://documentation.netgear.com/reference/enu/tcpip/index.htm*
Wireless Communications	*http://documentation.netgear.com/reference/enu/wireless/index.htm*
Preparing a Computer for Network Access	*http://documentation.netgear.com/reference/enu/wsdhcp/index.htm*
Virtual Private Networking (VPN)	*http://documentation.netgear.com/reference/enu/vpn/index.htm*
Glossary	*http://documentation.netgear.com/reference/enu/glossary/index.htm*

Appendix C 2.0
Command Line Reference

The ProSafe Dual Band Wireless N Access Point WNDAP350 can be configured either through the command line interface (CLI), a Web browser, or an MIB browser. The CLI allows viewing and modification of the configuration from a terminal or PC through a telnet connection.

Command Sets

```
keyword                                  Description
---------------------------------------- ----------------------
|-backup-configuration                   --backup configuration
|-config>                                --configuration setting
| |-apname                               --access point name
| |-country                              --country/region
| |-dhcp>                                --DHCP server
| | |-dns-server                         --DNS server
| | |-gateway                            --default gateway
| | |-ip-address                         --IP range
| | |-lease-time                         --lease time
| | |-status                             --status
| | |-subnet-mask                        --subnet mask
| | |-wins-server                        --WINS server
| |
| |-http-redirect                        --enable HTTP redirection
| |-http-redirect-url                    --HTTP redirection URL
| |-interface>                           --select wireless lan interface
| | |-wlan>                              --wireless LAN interface setting
| | | |-2.4GHz>                          --2.4 GHz wireless LAN interface setting
| | | | |-aggregation-length             --aggregated packet size
| | | | |-ampdu                          --aggregated MAC Protocol Data Unit
| | | | |-beacon-interval                --wireless beacon period in TU(1024 us)
| | | | |-channel                        --wireless channel (depends on country
and wireless mode)
| | | | |-channelwidth                   --wireless channel width
| | | | |-dtim-interval                  --wireless DTIM period in beacon interval
| | | | |-extension-protection-spacing   --wireless extension protection spacing
| | | | |-fragmentation-length           --wireless fragmentation threshold(even
only)
| | | | |-guardinterval                  --interval (from interference from other
```

```
transmissions)
| | | | |-knownap-add                    --add known access point
| | | | |-knownap-del              --delete known access point
| | | | |-macacl-add                     --add wireless access control (ACL)
| | | | |-macacl-database                --delete wireless access control (ACL)
database
| | | | |-macacl-del                     --delete wireless access control (ACL)
| | | | |-mcsrate                        --transmit data rate
| | | | |-mode                           --enable wireless access control (ACL)
| | | | |-operation-mode                 --wireless operation mode
| | | | |-power                        --wireless transmit power
| | | | |-preamble                       --wireless preamble (only effect on
802.11b rates)
| | | | |-radio                          --enable wireless radio
| | | | |-rate                           --wireless transmission date rate
| | | | |-rifs-transmission             --enable successive frame transmission at
different transmit powers
| | | | |-rogue-ap-detection             --enable rogue access point detection
| | | | |-rts-threshold                  --wireless RTS/CTS threshold
| | | | |-security-profile>         --create security profile
| | | | | |-1>                           --1st security profile
| | | | | | |-authentication             --authentication type
| | | | | | |-encryption                 --data encryption
| | | | | | |-hide-network-name          --hide network name
| | | | | | |-key1                       --wireless wep key 1
| | | | | | |-key2                       --wireless wep key 2
| | | | | | |-key3                       --wireless wep key 3
| | | | | | |-key4                       --wireless wep key 4
| | | | | | |-keyno                      --key number
| | | | | | |-name                       --profile name
| | | | | | |-presharedkey               --pre-shared key
| | | | | | |-security-separation        --disable associated wireless client
communication
| | | | | | |-ssid                       --network name (1-32 chars)
| | | | | | |-status                     --profile status
| | | | | | |-vlan-id                    --VLAN id
| | | | | | |-wep-pass-phrase            --wireless wep passphrase key
| | | | | | |-wepkeytype              --wireless wep key type
| | | | | | |
| | | | | |-2>                      --2nd security profile
| | | | | | |-authentication        --authentication type
| | | | | | |-encryption            --data encryption
| | | | | | |-hide-network-name  --hide network name
| | | | | | |-key1           --wireless wep key 1
| | | | | | |-key2           --wireless wep key 2
| | | | | | |-key3           --wireless wep key 3
| | | | | | |-key4           --wireless wep key 4
| | | | | | | |-keyno                --key number
```

```
| | | | | | |-name                --profile name
| | | | | | |-presharedkey        --pre-shared key
| | | | | | |-security-separation --disable associated wireless client
communication
| | | | | | |-ssid                --network name (1-32 chars)
| | | | | | |-status         --profile status
| | | | | | |-vlan-id             --VLAN id
| | | | | | |-wep-pass-phrase     --wireless wep passphrase key
| | | | | | |-wepkeytype         --wireless wep key type
| | | | | | |
| | | | | | |-3>                  --3rd security profile
| | | | | | |-authentication     --authentication type
| | | | | | |-encryption          --data encryption
| | | | | | |-hide-network-name   --hide network name
| | | | | | |-key1               --wireless wep key 1
| | | | | | |-key2               --wireless wep key 2
| | | | | | |-key3               --wireless wep key 3
| | | | | | |-key4               --wireless wep key 4
| | | | | | |-keyno               --key number
| | | | | | |-name                --profile name
| | | | | | |-presharedkey        --pre-shared key
| | | | | | |-security-separation --disable associated wireless client
communication
| | | | | | |-ssid                --network name (1-32 chars)
| | | | | | |-status         --profile status
| | | | | | |-vlan-id             --VLAN id
| | | | | | |-wep-pass-phrase     --wireless wep passphrase key
| | | | | | |-wepkeytype         --wireless wep key type
| | | | | | |
| | | | | | |-4>                  --4th security profile
| | | | | | |-authentication     --authentication type
| | | | | | |-encryption          --data encryption
| | | | | | |-hide-network-name   --hide network name
| | | | | | |-key1               --wireless wep key 1
| | | | | | |-key2               --wireless wep key 2
| | | | | | |-key3               --wireless wep key 3
| | | | | | |-key4               --wireless wep key 4
| | | | | | |-keyno               --key number
| | | | | | |-name                --profile name
| | | | | | |-presharedkey        --pre-shared key
| | | | | | |-security-separation --disable associated wireless client
communication
| | | | | | |-ssid                --network name (1-32 chars)
| | | | | | |-status             --profile status
| | | | | | |-vlan-id             --VLAN id
| | | | | | |-wep-pass-phrase     --wireless wep passphrase key
| | | | | | |-wepkeytype         --wireless wep key type
| | | | | | |
```

```
| | | | | |-5>                    --5th security profile
| | | | | | |-authentication     --authentication type
| | | | | | |-encryption          --data encryption
| | | | | | |-hide-network-name   --hide network name
| | | | | | |-key1               --wireless wep key 1
| | | | | | |-key2               --wireless wep key 2
| | | | | | |-key3               --wireless wep key 3
| | | | | | |-key4               --wireless wep key 4
| | | | | | |-keyno               --key number
| | | | | | |-name                --profile name
| | | | | | |-presharedkey        --pre-shared key
| | | | | | |-security-separation --disable associated wireless client
communication
| | | | | | |-ssid                --network name (1-32 chars)
| | | | | | |-status             --profile status
| | | | | | |-vlan-id             --VLAN id
| | | | | | |-wep-pass-phrase     --wireless wep passphrase key
| | | | | | |-wepkeytype         --wireless wep key type
| | | | | | |
| | | | | |-6>                    --6th security profile
| | | | | | |-authentication     --authentication type
| | | | | | |-encryption          --data encryption
| | | | | | |-hide-network-name   --hide network name
| | | | | | |-key1               --wireless wep key 1
| | | | | | |-key2               --wireless wep key 2
| | | | | | |-key3               --wireless wep key 3
| | | | | | |-key4               --wireless wep key 4
| | | | | | |-keyno               --key number
| | | | | | |-name                --profile name
| | | | | | |-presharedkey        --pre-shared key
| | | | | | |-security-separation --disable associated wireless client
communication
| | | | | | |-ssid                --network name (1-32 chars)
| | | | | | |-status             --profile status
| | | | | | |-vlan-id             --VLAN id
| | | | | | |-wep-pass-phrase     --wireless wep passphrase key
| | | | | | |-wepkeytype         --wireless wep key type
| | | | | | |
| | | | | |-7>                    --7th security profile
| | | | | | |-authentication     --authentication type
| | | | | | |-encryption          --data encryption
| | | | | | |-hide-network-name   --hide network name
| | | | | | |-key1               --wireless wep key 1
| | | | | | |-key2               --wireless wep key 2
| | | | | | |-key3               --wireless wep key 3
| | | | | | |-key4               --wireless wep key 4
| | | | | | |-keyno               --key number
| | | | | | |-name                --profile name
```

```
| | | | | | |-presharedkey        --pre-shared key
| | | | | | |-security-separation --disable associated wireless client
communication
| | | | | | |-ssid                --network name (1-32 chars)
| | | | | | |-status             --profile status
| | | | | | |-vlan-id             --VLAN id
| | | | | | |-wep-pass-phrase     --wireless wep passphrase key
| | | | | | |-wepkeytype          --wireless wep key type
| | | | | | |
| | | | | |-8>                    --8th security profile
| | | | | | |-authentication      --authentication type
| | | | | | |-encryption          --data encryption
| | | | | | |-hide-network-name   --hide network name
| | | | | | |-key1               --wireless wep key 1
| | | | | | |-key2               --wireless wep key 2
| | | | | | |-key3               --wireless wep key 3
| | | | | | |-key4               --wireless wep key 4
| | | | | | |-keyno               --key number
| | | | | | |-name                --profile name
| | | | | | |-presharedkey        --pre-shared key
| | | | | | |-security-separation --disable associated wireless client
communication
| | | | | | |-ssid                --network name (1-32 chars)
| | | | | | |-status             --profile status
| | | | | | |-vlan-id             --VLAN id
| | | | | | |-wep-pass-phrase     --wireless wep passphrase key
| | | | | | |-wepkeytype          --wireless wep key type
| | | | | | |
| | | | | |
| | | | |-wireless-bridge>            --wireless bridge setting
| | | | | |-security-profile>       --create security profile
| | | | | | |-1>                    --1st security profile
| | | | | | | |-authentication  --authentication type
| | | | | | | |-encryption      --data encryption
| | | | | | | |-name            --profile name
| | | | | | | |-presharedkey    --preshared key
| | | | | | | |-remote-mac      --remote MAC
| | | | | | | |-status          --profile status
| | | | | | | |-wep-pass-phrase --wireless wep passphrase key
| | | | | | | |-wepkey          --wireless wep key
| | | | | | | |-wepkeytype      --wireless wep key type
| | | | | | | |
| | | | | | |-2>                    --2nd security profile
| | | | | | | |-authentication  --authentication type
| | | | | | | |-encryption      --data encryption
| | | | | | | |-name            --profile name
| | | | | | | |-presharedkey    --preshared key
| | | | | | | |-remote-mac      --remote MAC
```

```
| | | | | | | |-status          --profile status
| | | | | | | |-wep-pass-phrase --wireless wep passphrase key
| | | | | | | |-wepkey          --wireless wep key
| | | | | | | |-wepkeytype      --wireless wep key type
| | | | | | | |
| | | | | | |-3>                  --3rd security profile
| | | | | | | |-authentication  --authentication type
| | | | | | | |-encryption      --data encryption
| | | | | | | |-name            --profile name
| | | | | | | |-presharedkey    --preshared key
| | | | | | | |-remote-mac      --remote MAC
| | | | | | | |-status          --profile status
| | | | | | | |-wep-pass-phrase --wireless wep passphrase key
| | | | | | | |-wepkey          --wireless wep key
| | | | | | | |-wepkeytype      --wireless wep key type
| | | | | | | |
| | | | | | |-4>                  --4th security profile
| | | | | | | |-authentication  --authentication type
| | | | | | | |-encryption      --data encryption
| | | | | | | |-name            --profile name
| | | | | | | |-presharedkey    --preshared key
| | | | | | | |-remote-mac      --remote MAC
| | | | | | | |-status          --profile status
| | | | | | | |-wep-pass-phrase --wireless wep passphrase key
| | | | | | | |-wepkey          --wireless wep key
| | | | | | | |-wepkeytype      --wireless wep key type
| | | | | | | |
| | | | | | |
| | | | | |
| | | | | |-wmm>                      --wmm settings
| | | | | | |-ap-data0-best-effort    --access point best effort voice data
| | | | | | |-ap-data1-background     --access point low-priority data
| | | | | | |-ap-data2-video          --access point video data
| | | | | | |-ap-data3-voice          --access point voice data
| | | | | | |-station-data0-best-effort --station best effort voice data
| | | | | | |-station-data1-background  --station low-priority data
| | | | | | |-station-data2-video     --station video data
| | | | | | |-station-data3-voice     --station voice data
| | | | | | |-support                 --support
| | | | | |
| | | | |
| | | |-5GHz>                  --5 GHz wireless LAN interface setting
| | | | |-aggregation-length        --aggregated packet size
| | | | |-ampdu                     --aggregated MAC Protocol Data Unit
| | | | |-beacon-interval           --wireless beacon period in TU(1024 us)
| | | | |-channel                   --wireless channel (depends on country and
wireless mode)
| | | | |-channelwidth              --wireless channel width
```

```
| | | | |-dtim-interval             --wireless DTIM period in beacon interval
| | | | |-extension-protection-spacing   --wireless extension protection spacing
| | | | |-fragmentation-length      --wireless fragmentation threshold(even
only)
| | | | |-guardinterval             --interval (from interference from other
transmissions)
| | | | |-knownap-add               --add known access point
| | | | |-knownap-del           --delete known access point
| | | | |-macacl>                   --modify wireless access control (ACL)
| | | | | |-add                      --add wireless access control (ACL)
| | | | | |-del                     --delete wireless access control (ACL)
| | | | |
| | | | |-macacl-add              --add wireless access control (ACL)
| | | | |-macacl-database           --delete wireless access control (ACL)
database
| | | | |-macacl-del                --delete wireless access control (ACL)
| | | | |-mcsrate                   --transmit data rate
| | | | |-mode                      --enable wireless access control (ACL)
| | | | |-operation-mode            --wireless operation mode
| | | | |-power                    --wireless transmit power
| | | | |-radio              --enable wireless radio
| | | | |-rate                      --wireless transmission date rate
| | | | |-rifs-transmission         --enable successive frame transmission at
different transmit powers
| | | | |-rogue-ap-detection        --enable rogue access point detection
| | | | |-rts-threshold             --wireless RTS/CTS threshold
| | | | |-security-profile>     --create security profile
| | | | | |-1>                    --1st security profile
| | | | | | |-authentication        --authentication type
| | | | | | |-encryption            --data encryption
| | | | | | |-hide-network-name     --hide network name
| | | | | | |-key1                  --wireless wep key 1
| | | | | | |-key2                  --wireless wep key 2
| | | | | | |-key3                  --wireless wep key 3
| | | | | | |-key4                  --wireless wep key 4
| | | | | | |-keyno                 --key number
| | | | | | |-name                  --profile name
| | | | | | |-presharedkey          --pre-shared key
| | | | | | |-security-separation   --disable associated wireless client
communication
| | | | | | |-ssid                  --network name (1-32 chars)
| | | | | | |-status                --profile status
| | | | | | |-vlan-id               --VLAN id
| | | | | | |-wep-pass-phrase       --wireless wep passphrase key
| | | | | | |-wepkeytype          --wireless wep key type
| | | | | |
| | | | | |-2>                    --2nd security profile
| | | | | | |-authentication        --authentication type
```

```
| | | | | | |-encryption            --data encryption
| | | | | | |-hide-network-name     --hide network name
| | | | | | |-key1                 --wireless wep key 1
| | | | | | |-key2                 --wireless wep key 2
| | | | | | |-key3                 --wireless wep key 3
| | | | | | |-key4                 --wireless wep key 4
| | | | | | | |-keyno                --key number
| | | | | | | |-name                 --profile name
| | | | | | | |-presharedkey         --pre-shared key
| | | | | | | |-security-separation  --disable associated wireless client
communication
| | | | | | |-ssid                   --network name (1-32 chars)
| | | | | | |-status               --profile status
| | | | | | |-vlan-id                --VLAN id
| | | | | | |-wep-pass-phrase        --wireless wep passphrase key
| | | | | | |-wepkeytype           --wireless wep key type
| | | | | | |
| | | | | |-3>                     --3rd security profile
| | | | | | |-authentication       --authentication type
| | | | | | |-encryption             --data encryption
| | | | | | |-hide-network-name     --hide network name
| | | | | | |-key1                 --wireless wep key 1
| | | | | | |-key2                 --wireless wep key 2
| | | | | | |-key3                 --wireless wep key 3
| | | | | | |-key4                 --wireless wep key 4
| | | | | | | |-keyno                --key number
| | | | | | | |-name                 --profile name
| | | | | | | |-presharedkey         --pre-shared key
| | | | | | | |-security-separation  --disable associated wireless client
communication
| | | | | | |-ssid                   --network name (1-32 chars)
| | | | | | |-status               --profile status
| | | | | | |-vlan-id                --VLAN id
| | | | | | |-wep-pass-phrase        --wireless wep passphrase key
| | | | | | |-wepkeytype           --wireless wep key type
| | | | | | |
| | | | | |-4>                     --4th security profile
| | | | | | |-authentication       --authentication type
| | | | | | |-encryption             --data encryption
| | | | | | |-hide-network-name     --hide network name
| | | | | | |-key1                 --wireless wep key 1
| | | | | | |-key2                 --wireless wep key 2
| | | | | | |-key3                 --wireless wep key 3
| | | | | | |-key4                 --wireless wep key 4
| | | | | | | |-keyno                --key number
| | | | | | | |-name                 --profile name
| | | | | | | |-presharedkey         --pre-shared key
```

```
| | | | | | |-security-separation   --disable associated wireless client
communication
| | | | | | |-ssid                  --network name (1-32 chars)
| | | | | | |-status               --profile status
| | | | | | |-vlan-id               --VLAN id
| | | | | | |-wep-pass-phrase       --wireless wep passphrase key
| | | | | | |-wepkeytype           --wireless wep key type
| | | | | | |
| | | | | |-5>                    --5th security profile
| | | | | | |-authentication       --authentication type
| | | | | | |-encryption            --data encryption
| | | | | | |-hide-network-name     --hide network name
| | | | | | |-key1                 --wireless wep key 1
| | | | | | |-key2                 --wireless wep key 2
| | | | | | |-key3                 --wireless wep key 3
| | | | | | |-key4                 --wireless wep key 4
| | | | | | |-keyno                 --key number
| | | | | | |-name                  --profile name
| | | | | | |-presharedkey          --pre-shared key
| | | | | | |-security-separation   --disable associated wireless client
communication
| | | | | | |-ssid                  --network name (1-32 chars)
| | | | | | |-status               --profile status
| | | | | | |-vlan-id               --VLAN id
| | | | | | |-wep-pass-phrase       --wireless wep passphrase key
| | | | | | |-wepkeytype           --wireless wep key type
| | | | | | |
| | | | | |-6>                    --6th security profile
| | | | | | |-authentication       --authentication type
| | | | | | |-encryption            --data encryption
| | | | | | |-hide-network-name     --hide network name
| | | | | | |-key1                 --wireless wep key 1
| | | | | | |-key2                 --wireless wep key 2
| | | | | | |-key3                 --wireless wep key 3
| | | | | | |-key4                 --wireless wep key 4
| | | | | | |-keyno                 --key number
| | | | | | |-name                  --profile name
| | | | | | |-presharedkey          --pre-shared key
| | | | | | |-security-separation   --disable associated wireless client
communication
| | | | | | |-ssid                  --network name (1-32 chars)
| | | | | | |-status               --profile status
| | | | | | |-vlan-id               --VLAN id
| | | | | | |-wep-pass-phrase       --wireless wep passphrase key
| | | | | | |-wepkeytype           --wireless wep key type
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| | | | | |-7>                    --7th security profile
| | | | | | |-authentication       --authentication type
```

```
| | | | | | |-encryption            --data encryption
| | | | | | |-hide-network-name     --hide network name
| | | | | | |-key1                 --wireless wep key 1
| | | | | | |-key2                 --wireless wep key 2
| | | | | | |-key3                 --wireless wep key 3
| | | | | | |-key4                 --wireless wep key 4
| | | | | | |-keyno                  --key number
| | | | | | |-name                   --profile name
| | | | | | |-presharedkey           --pre-shared key
| | | | | | |-security-separation    --disable associated wireless client
communication
| | | | | | |-ssid                   --network name (1-32 chars)
| | | | | | |-status               --profile status
| | | | | | |-vlan-id                --VLAN id
| | | | | | |-wep-pass-phrase        --wireless wep passphrase key
| | | | | | |-wepkeytype           --wireless wep key type
| | | | | | |
| | | | | |-8>                    --8th security profile
| | | | | | |-authentication       --authentication type
| | | | | | |-encryption            --data encryption
| | | | | | |-hide-network-name     --hide network name
| | | | | | |-key1                 --wireless wep key 1
| | | | | | |-key2                 --wireless wep key 2
| | | | | | |-key3                 --wireless wep key 3
| | | | | | |-key4                 --wireless wep key 4
| | | | | | |-keyno                  --key number
| | | | | | |-name                   --profile name
| | | | | | |-presharedkey           --pre-shared key
| | | | | | |-security-separation    --disable associated wireless client
communication
| | | | | | |-ssid                   --network name (1-32 chars)
| | | | | | |-status               --profile status
| | | | | | |-vlan-id                --VLAN id
| | | | | | |-wep-pass-phrase        --wireless wep passphrase key
| | | | | | |-wepkeytype           --wireless wep key type
| | | | | | |
| | | | | |
| | | | |-wireless-bridge>          --wireless bridge setting
| | | | | |-security-profile>       --create security profile
| | | | | | |-1>                    --1st security profile
| | | | | | | |-authentication      --authentication type
| | | | | | | |-encryption          --data encryption
| | | | | | | |-name                --profile name
| | | | | | | |-presharedkey        --preshared key
| | | | | | | |-remote-mac          --remote MAC
| | | | | | | |-status              --profile status
| | | | | | | |-wep-pass-phrase     --wireless wep passphrase key
| | | | | | | |-wepkey              --wireless wep key
```

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| | | | | | | |-wepkeytype          --wireless wep key type
| | | | | | | |
| | | | | | |-2>                    --2nd security profile
| | | | | | | |-authentication      --authentication type
| | | | | | | |-encryption          --data encryption
| | | | | | | |-name                --profile name
| | | | | | | |-presharedkey        --preshared key
| | | | | | | |-remote-mac          --remote MAC
| | | | | | | |-status              --profile status
| | | | | | | |-wep-pass-phrase     --wireless wep passphrase key
| | | | | | | |-wepkey              --wireless wep key
| | | | | | | |-wepkeytype          --wireless wep key type
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| | | | | | |-3>                    --3rd security profile
| | | | | | | |-authentication      --authentication type
| | | | | | | |-encryption          --data encryption
| | | | | | | |-name                --profile name
| | | | | | | |-presharedkey        --preshared key
| | | | | | | |-remote-mac          --remote MAC
| | | | | | | |-status              --profile status
| | | | | | | |-wep-pass-phrase     --wireless wep passphrase key
| | | | | | | |-wepkey              --wireless wep key
| | | | | | | |-wepkeytype          --wireless wep key type
| | | | | | | |
| | | | | | |-4>                    --4th security profile
| | | | | | | |-authentication      --authentication type
| | | | | | | |-encryption          --data encryption
| | | | | | | |-name                --profile name
| | | | | | | |-presharedkey        --preshared key
| | | | | | | |-remote-mac          --remote MAC
| | | | | | | |-status              --profile status
| | | | | | | |-wep-pass-phrase     --wireless wep passphrase key
| | | | | | | |-wepkey              --wireless wep key
| | | | | | | |-wepkeytype          --wireless wep key type
| | | | | | | |
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| | | | | | |-station-data2-video         --station video data
| | | | | | |-station-data3-voice         --station voice data
| | | | | | |-support                     --???
| | | | | |
```

```
| | | |
| | |
| |
| |-ip>                                  --set host IP
| | |-address                            --host IP address
| | |-default-gateway                    --IP address of default gateway
| | |-dhcp-client                        --enable dhcp client
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| |
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| | |-syslog-server-ip                   --syslog server IP address
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| |
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| | |-accounting-server-primary-sharedsecret  --primary accounting server shared
secret
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| | |-accounting-server-secondary-sharedsecret    --secondary accounting server
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| | |-authentication-server-primary            --primary authentication server
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| | |-authentication-server-primary-sharedsecret  --primary authentication
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server shared secret
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```

```
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| | |-custom-ntp-server                  --custom NTP server host name
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| | | | |-stationlist                    --station list
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| | | |
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| | | | |-knownaplist                    --known access point list
| | | | |-stationlist                    --station list
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| | | | |-trusted-stationlist            --trusted station list
| | | | |-unknownaplist                  --unknown access point list
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| |
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