Linksys®

A Division of Cisco Systems, Inc.

USER GUIDE

Wireless-N Access Point with Power Over Ethernet

BUSINESS SERIES

Cisco Systems

Model No. WAP4410N

Wireless

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WARNING: This product contains chemicals, including lead, known to the State of California to cause cancer, and birth defects or other reproductive harm. ***Wash hands after handling.***

How to Use this User Guide

The user guide to the Wireless-G Exterior Access Point has been designed to make understanding networking with the Access Point easier than ever. Look for the following items when reading this User Guide:

This checkmark means there is a note of interest and is something you should pay special attention to while using the Access Point.

This exclamation point means there is a caution or warning and is something that could damage your property or the Access Point.

This question mark provides you with a reminder about something you might need to do while using the Access Point.

In addition to these symbols, there are definitions for technical terms that are presented like this:

word: *definition.*

Also, each figure (diagram, screenshot, or other image) is provided with a figure number and description, like this:

Figure 0-1: Sample Figure Description

Figure numbers and descriptions can also be found in the “List of Figures” section.

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Chapter 1: Introduction

Welcome

Thank you for choosing the Wireless-N Access Point with Power Over Ethernet. This Access Point will allow you to network wirelessly better than ever. An access point allows for greater range and mobility within your wireless network while also allowing you to connect the wireless network to a wired environment. The Wireless-N Access Point also offers the convenience of Power over Ethernet (PoE) capability (in addition to regular 12VDC power adaptor), so it can receive data and power over a single Ethernet network cable.

This Access Point supports the latest 802.11n draft Specification by IEEE early 2006. It also support 802.11g and 802.11b clients in a mixed environment. This Access Point currently can support an 11n data rate up to 300 Mbps. Besides the higher data rate, 802.11n technology also promises longer coverage by using multiple antennas to transmit and receive data streams in different directions. Users are encouraged to update their firmware through www.linksys.com when 802.11n specification is finalized by IEEE to ensure compatibility with all the wireless-N devices.

Networks are useful tools for sharing computer resources. You can access one printer from different computers and access data located on another computer's hard drive. Networks are even used for playing multiplayer video games. So, networks are not only useful in homes and offices, they can also be fun.

PCs on a wired network create a LAN, or Local Area Network. They are connected with Ethernet cables, which is why the network is called "wired".

PCs equipped with wireless client cards or adapters can communicate without cumbersome cables. By sharing the same wireless settings within their transmission radius, they form a wireless network. This is sometimes called a WLAN, or Wireless Local Area Network. The Access Point bridges wireless networks of 802.11n, 802.11g and 802.11b standards and wired networks.

Use the instructions in this Guide to help you connect the Access Point, set it up, and configure it to bridge your different networks. These instructions should be all you need to get the most out of the Access Point.

access point*: a device that allows wireless-equipped computers and other devices to communicate with each other and with devices on a wired network. Also used to expand the range of a wireless network.*

***network:** a series of computers or devices connected together.*

***lan** (local area network): the computers and networking devices that make up your local network.*

***poe** (power over ethernet): a technology enabling an Ethernet network cable to deliver both data and power.*

***ethernet:** network protocol defined in IEEE 802.3 standard that specifies how data is placed on and retrieved from a common transmission medium.*

***adapter:** a device that adds network functionality to your PC.*

***802.11n:** wireless networking draft standard that specifies a maximum data rate up to 600Mbps (300Mbps supported by this device), an operating frequency of 2.4GHz, and backward compatibility with 802.11b/g devices.*

***802.11g:** a wireless networking standard that specifies a maximum data transfer rate of 54Mbps, an operating frequency of 2.4GHz, and backward compatibility with 802.11b devices.*

***802.11b:** a wireless networking standard that specifies a maximum data transfer rate of 11Mbps and an operating frequency of 2.4GHz.*

What’s in this User Guide?

This user guide covers the steps for setting up and using the Wireless-N Access Point.

- Chapter 1: Introduction
  This chapter describes the Wireless-N Access Point’s applications and this User Guide.

- Chapter 2: Planning your Wireless Network
  This chapter describes the basics of wireless networking.

- Chapter 3: Getting to Know the Wireless-N Access Point
  This chapter describes the physical features of the Access Point.

- Chapter 4: Connecting the Wireless-N Access Point
  This chapter instructs you on how to connect your Access Point to your network and placement options.

- Chapter 5: Setting up the Wireless-N Access Point
  This chapter explains how to perform the most basic setting changes through the Web-based Utility.

- Chapter 6: Configuring the Wireless-G Exterior Access Point
  This chapter provides a reference for the available configuration through the Web-based Utility.

- Appendix A: Troubleshooting
  This appendix describes some frequently asked questions regarding installation and use of the Wireless-G Exterior Access Point.

- Appendix B: Wireless Security
  This appendix explains the risks of wireless networking and some solutions to reduce the risks.

- Appendix C: Upgrading Firmware
  This appendix instructs you on how to upgrade the Access Point’s firmware.

- Appendix D: Windows Help.
  This appendix describes some of the ways Windows can help you with wireless networking.

- Appendix E: Glossary
  This appendix gives a brief glossary of terms frequently used in networking.

- Appendix F: Specifications
  This appendix provides the Access Point’s technical specifications.

- Appendix G: Warranty Information
  This appendix supplies the Access Point’s warranty information.

- Appendix H: Regulatory Information
  This appendix supplies the Access Point’s regulatory information.

- Appendix I: Contact Information
  This appendix provides contact information for a variety of Linksys resources, including Technical Support.

Chapter 2: Planning Your Wireless Network

Network Topology

A wireless network is a group of computers, each equipped with one or more wireless adapters. Computers in a wireless network must be configured to share the same radio channel to talk to each other. Several PCs equipped with wireless cards or adapters can communicate with each other to form an ad-hoc network without the use of an access point.

Linksys also provides products to allow wireless adaptors to access wired network through a bridge such as the wireless access point, or wireless router. An integrated wireless and wired network is called an infrastructure network. Each wireless PC in an infrastructure network can talk to any computer in a wired or wireless network via the access point or wireless router.

An infrastructure configuration extends the accessibility of a wireless PC to a wired network, and may double the effective wireless transmission range for two wireless adapter PCs. Since an Access Point is able to forward data within a network, the effective transmission range in an infrastructure network may be more than doubled since Access Point can transmit signal at higher power to the wireless space.

ad-hoc*: a group of wireless devices communicating directly with each other (peer-to-peer) without the use of an access point.*

infrastructure*: a wireless network that is bridged to a wired network via an access point.*

Roaming

Infrastructure mode also supports roaming capabilities for mobile users. Roaming means that you can move your wireless PC within your network and the access points will pick up the wireless PC's signal, providing that they both share the same wireless network (SSID) and wireless security settings.

This Access Point has 802.11F Inter-Access Point Protocol (IAPP) to complete the roaming process in seconds. If your wireless networks share the same IP subnet, this will not disrupt your data connection while moving around.

Before you consider roaming, choose a feasible radio channel and optimum access point position. Proper access point positioning combined with a clear radio signal will greatly enhance performance.

roaming*: the ability to take a wireless device from one access point's range to another without losing the connection.*

ssid*: your wireless network's name*

Network Layout

The Wireless-N Access Point has been designed for use with 802.11n, 802.11g and 802.11b products. The Access Point is compatible with 802.11n, 802.11g and 802.11b adapters, such as the notebook adapters for your laptop computers, PCI adapters for your desktop PCs, and USB adapters for all PCs when you want to enjoy wireless connectivity. These wireless products can also communicate with a 802.11n, 802.11g or 802.11b wireless print server (if available).

To link your wired network with your wireless network, connect the Access Point's Ethernet network port to any switch or router with Power over Ethernet (PoE)—or a PoE injector, such as the Linksys WAPPOE or WAPPOE12. Note that the 12 VDC on the WAPPOE12 is for the splitter output. Both PoE Injectors provide 48 VDC power output.

With these, and many other, Linksys products, your networking options are limitless. Go to the Linksys website at *www.linksys.com* for more information about wireless products.

Example of a simple wireless network

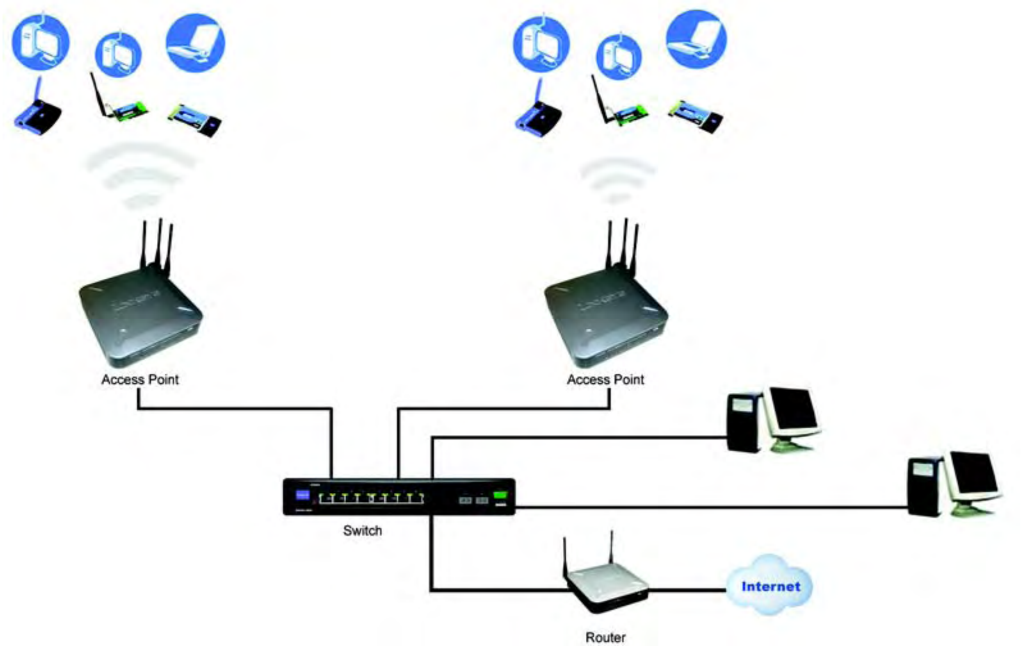


Figure 2-1: Example of a Simple Wireless Network

The above diagram shows a typical infrastructure wireless network setup. The wireless Access Points are connecting to a Linksys switch that provides power to the Access Points. Each Access Point can connect multiple wireless devices to the network. This network will provide connectivity among wireless network devices and PCs that have a wired connection to the switch.

The switch then can connect to a router that can connect to an ISP to reach global Internet.

Chapter 3: Getting to Know the Wireless-G Exterior Access Point

The LEDs

The Access Point's LEDs, where information about network activity is displayed, are located on the front panel.

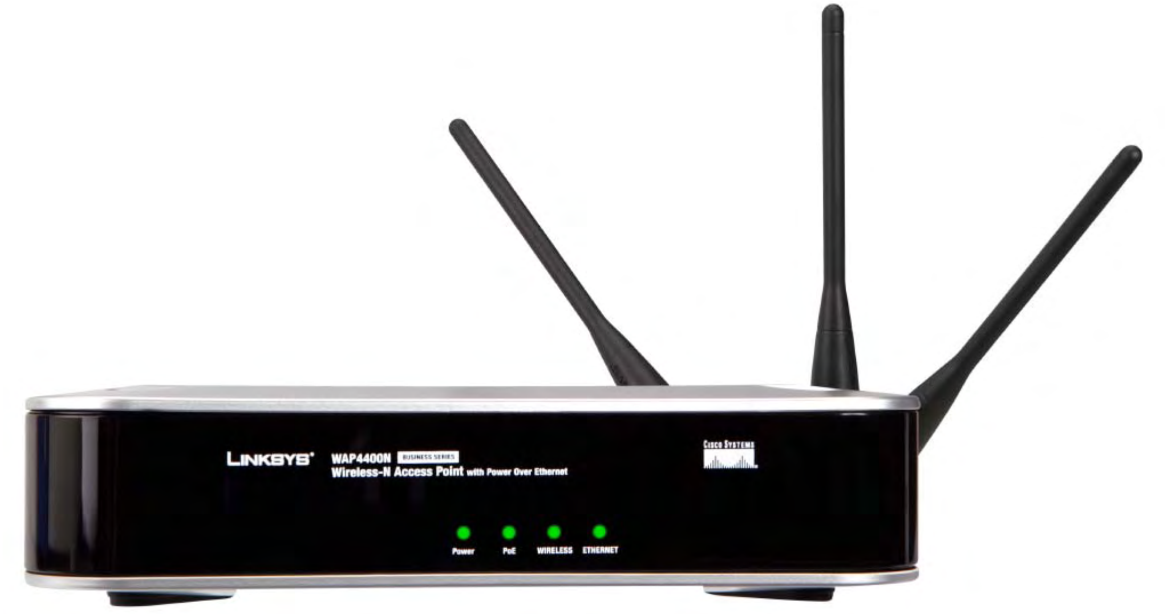


Figure 3-1: Front Panel

Power Green. The Power LED lights up when the Access Point is powered on.

PoE Green. The PoE LED lights up when the Access Point is powered through Ethernet cable.

WIRELESS Green. The WIRELESS LED lights up when the Access Point is successfully connected to a wireless device. If the Wireless LED is flashing, the Access Point is actively sending to or receiving data from a wireless device.

ETHERNET Green. The ETHERNET LED lights up when the Access Point is successfully connected to a device through the Ethernet network port. If the ETHERNET LED is flashing, the Access Point is actively sending to or receiving data from one of the devices over the Ethernet network port.

The Ports

The Access Point’s port are located on the back of the device.

port: *the connection point on a computer or networking device used for plugging in cables or adapters*

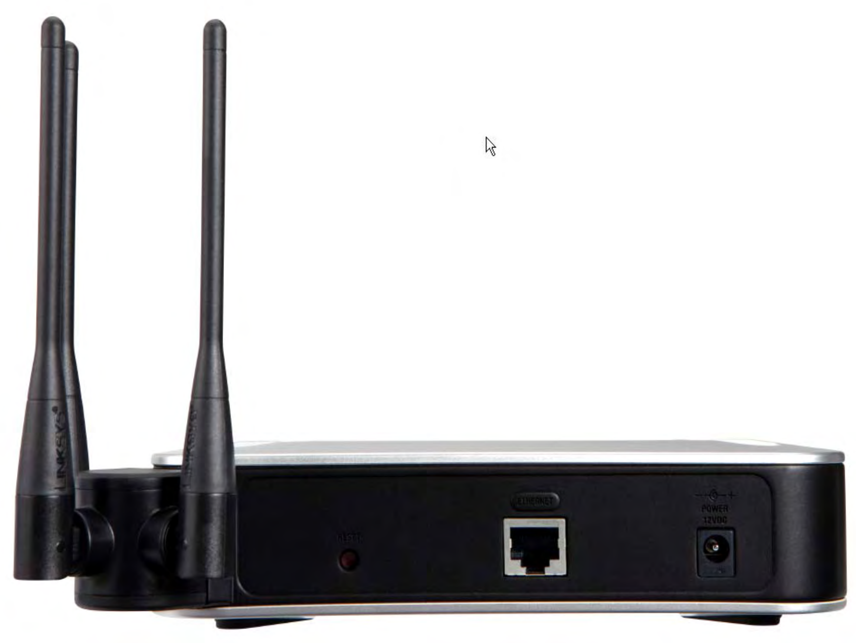


Figure 3-2: Back View

Power The Power port connects to the supplied 12VDC power adapter.

Ethernet The Ethernet network port connects to Ethernet network devices, such as a switch or router that may or may not support Power over Ethernet (PoE).

Reset Button There are two ways to reset the Access Point to the factory default configuration. Either press the **Reset** button, for approximately ten seconds, or restore the defaults using the Access Point's Web-based Utility.

IMPORTANT: Resetting the Access Point will erase all of your settings (including wireless security, IP address, and SSID) and replace them with the factory defaults. Do not reset the Access Point if you want to retain these settings.

Antennas and Positions

The Access Point’s port are located on the back of the device. The Access Point can be placed in three different positions. It can be either stackable, standalone, or wall-mount.

Antenna The Access Point has three non-detachable 2dBi omni-directional antennas. The three antennas have a base that can rotate 90 degrees when in the standing position. The three antennas will all be used to support 3X3 MIMO diversity in wireless-N mode.

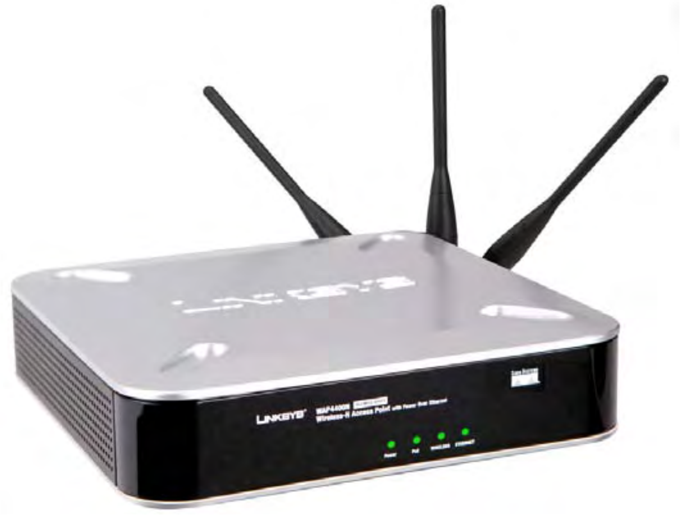


Figure 3-3: Stackable Position and its Antenna Setup

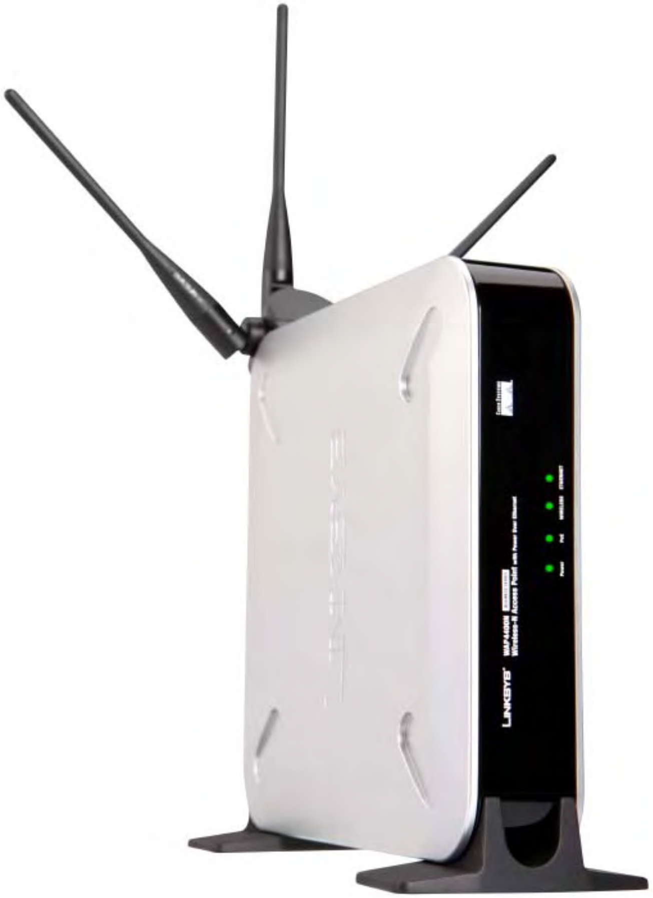


Figure 3-4: Standalone Position and its Antenna Setup

Chapter 4: Connecting the Wireless-N Access Point

Overview

This chapter explains how to place and connect the Access Point.

Depending on your application, you might want to set up the device first before mounting the device. Refer to "Chapter 5: Setting Up the Wireless-N Access Point".

***hardware:** the physical aspect of computers, telecommunications, and other information technology devices.*

Connection

1. Connect your Ethernet network cable to your network router or switch. Then connect the other end of the network cable to the Access Point's Ethernet port.
2. If you are using Power Over Ethernet (POE), proceed to the following section, "Placement Options."

   If you are not using POE, then connect the included power adapter to the Access Point's Power port. Then plug the power adapter into an electrical outlet. The LEDs on the front panel will light up as soon as the Access Point powers on.

Proceed to the following section, "Placement Options."

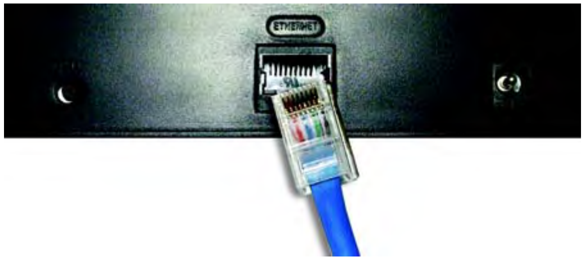


Figure 4-1: Connect the Ethernet Cable

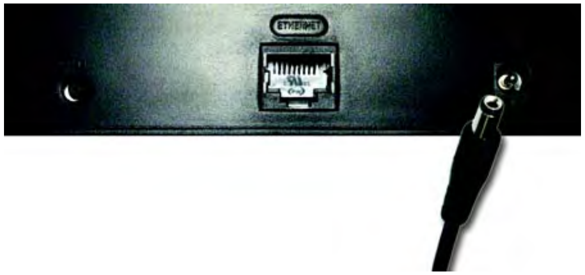


Figure 4-2: Connect the Power

Placement Options

There are three ways to place the Wireless-N Access Point. The first way is to place it horizontally on a surface, so it sits on its four rubber feet. The second way is to stand the Access Point vertically on a surface. The third way is to mount it on a wall. The stand and wall-mount options are explained in further detail below.

Stand Option

1. Locate the Access Point's left side panel.
2. The Access Point includes two stands. With the two large prongs facing outward, insert the short prongs into the little slots in the Access Point, and push the stand upward until it snaps into place.

   Repeat this step with the other stand.

Now that the hardware installation is complete, proceed to "Chapter 5: Setting up the Wireless-N Access Point," for directions on how to set up the Access Point."

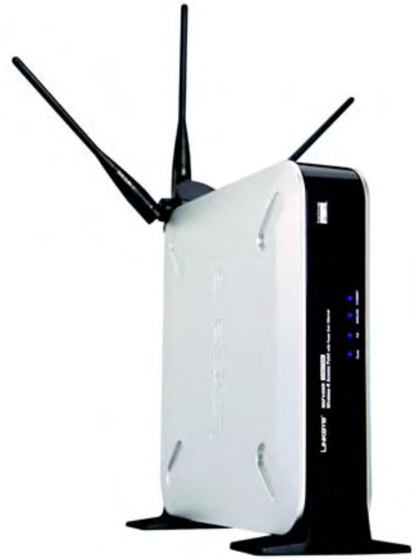


Figure 4-3: The Stand Option

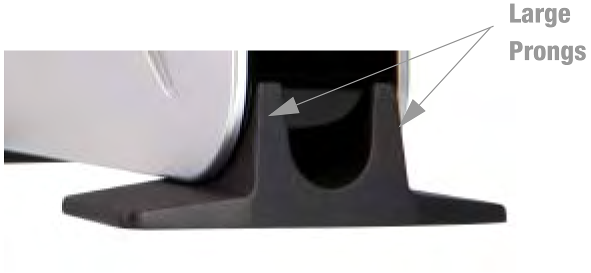


Figure 4-4: Stand

Wall-Mount Option

1. On the Access Point's back panel are two criss-cross wall-mount slots.
2. Determine where you want to mount the Access Point, and install two screws that are 2-15/16" apart.
3. Line up the Access Point so that the wall-mount slots line up with the two screws.
4. Place the wall-mount slots over the screws and slide the Access Point down until the screws fit snugly into the wall-mount slots.

Now that the hardware installation is complete, proceed to "Chapter 5: Setting up the Wireless-N Access Point," for directions on how to set up the Access Point."

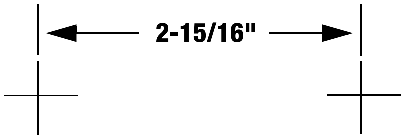


Figure 4-5: Mounting Dimensions

Chapter 5: Setting Up the Wireless-N Access Point

Overview

The Access Point has been designed to be functional right out of the box with the default settings. However, if you'd like to change these settings, the Access Point can be configured through your web browser with the Web-based Utility. This chapter explains how to use the Utility to perform the most basic settings.

The Utility can be accessed via web browsers, such as Microsoft Internet Explorer or Mozilla Firefox through the use of a computer that is networked with the Access Point.

For a basic network setup, most users only have to use the following screens of the Utility:

- Setup
  On the *Setup* screen, enter your basic network settings (IP address) here.

- Management
  Click the **Administration** tab and then select the **Management** screen. The Access Point's default password is **admin.** To secure the Access Point, change the AP Password from its default.

Most users will also customize their wireless settings:

- Wireless
  On the *Wireless* screen, change default SSID under the **Basic Wireless Settings** Tab. Select the level of security under the **Wireless Security** Tab and complete the options for the selected security mode.

HAVE YOU: Enabled TCP/IP on your PCs? PCs communicate over the network with this protocol. Refer to "Appendix D: Windows Help" for more information on TCP/IP.

tcp/ip: *a set of protocols PCs use to communicate over a network.*

browser: *an application that provides a way to look at and interact with all the information on the World Wide Web.*

Accessing the Utility

There are three ways to connect to your Access Point for the first time.

1. If you have a 48VDC Power Injector (e.g. Linksys WAPPOE), power up your Access Point first, then connect the Injector's cable to your PC. Configure your PC to have the static IP address on the same subnet as the Access Point's default IP address (192.168.1.245).

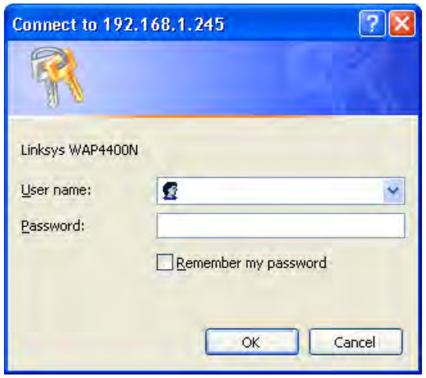
2. If you have a PoE switch (e.g. Linksys SRW224P), connect your Access Point and your PC to the same network. Configure your PC to have the static IP address on the same subnet as the Access Point's default IP address (192.168.1.245). Or if there is a DHCP server connected to the switch, configure it to assign the IP address in 192.168.1.0/24 subnet. Your PC will get an IP address in the subnet through the DHCP.

3. Although it is not recommended, you can connect your PC wirelessly to the Access Point when the DHCP server is connected on the LAN side. It is not recommended, because you can easily lose your connection through configuration changes.

Launch your web browser, such as Internet Explorer or Mozilla Firefox and enter the Access Point's default IP address, **192.168.1.245**, in the *Address* field. Press the **Enter** key.

Enter **admin** in the *User Name* field. The first time you open the Web-based Utility, use the default password, **admin**. (You can set a new password from the Administration - Management tab.) Then click the **OK** button.

After setting up the Access Point to use DHCP or manually configure a new IP address, move your Access Point to the desired network. You will have to use the new IP address the next time you access the Web-based Utility.



Connect to 192.168.1.245

Linksys WAP4400N

User name:

Password:

Figure 5-1: Login Screen

Navigating the Utility

The Web-based Utility consists of the following five main tabs: Setup, Wireless, Security Monitor, Administration, and Status. Additional screens (sub tabs) will be available from most of the main tabs.

The following briefly describes the main & sub tabs of the Utility.

Setup

Enter the Host Name, IP Address settings, and set the time on this screen.

- *Basic Setup*. Configure the host name and IP address settings for this Access Point.

- Time. Set the time on this Access Point.

Wireless

You will use the Wireless tabs to enter a variety of wireless settings for the Access Point.

- *Basic Wireless Settings*. Choose the wireless network mode (e.g. B/G/N-Mixed), SSID, and radio channel on this screen.

- *Wireless Security*. Use this screen to configure the Access Point's security settings.

- *Wireless Connection Control*. Use this screen to control the wireless connections from client devices to this Access Point.

- *Advanced Wireless Settings*. Use this screen to configure the Access Point's more advanced wireless settings (e.g. Tx Rate Limiting, Channel Bandwidth, etc.).

Security Monitor

Use this screen to configure the Access Point's security monitor capabilities. You will be able to monitor your wireless network through a client utility on administrator's PC. This feature works with WPC4400N and future Linksys client devices.

Administration

You will use the Administration tabs to manage the Access Point.

- *Management*. This screen allows you to customize the password and Simple Network Management Protocol (SNMP) settings.
- *Log*. Configure the Log settings for the Access Point on this screen.
- *Factory Default*. Use this screen to reset the Access Point to its factory default settings.
- *Firmware Upgrade*. Upgrade the Access Point's firmware on this screen.
- *Reboot*. Use this screen to reboot the Access Point.
- *Config Management*. You can save the configuration file for the Access Point to your PC, as well as restore the backup configuration file to the Access Point.

Status

You will be able to view status information for your local network, wireless networks, and network performance.

- *Local Network*. This screen displays system information, including software & hardware version, MAC address, and IP address on the LAN side of the Access Point.
- *Wireless*. This screen displays wireless network settings including SSID, network mode, and wireless channel.
- *System Performance*. This screen displays the current traffic statistics of this Access Point for both Wireless and LAN ports.

***snmp:** the standard network management protocol on the Internet.*

***firmware:** the software image that runs on a CPU inside a networking device.*

Chapter 6: Configuring the Wireless-N Access Point

This chapter is a detailed reference guide for the Web-based Utility. You do not need the Utility to start using your Access Point. The Access Point has been designed to be functional right out of the box with the default settings. Besides, you can follow the instructions in "Setting Up the Wireless-N Access Point" on page 13 to perform the most basic settings without reading through this chapter.

The Setup - Basic Setup Tab

The first screen that appears is the *Setup* screen. This allows you to change the Access Point's general settings.

Basic Setup

Enter names for the Access Point. The host name can be used to access the Web Utility through the network if DNS has been set up. The device name is for the benefit of identifying your Access Point after you log in.

Host Name. This is the host name assigned to the Access Point. This host name will be published to your DNS server if the Access Point is configured to acquire the IP address through DHCP. In that case, Linksys recommends to follow the company policy on the host name assignment. The default name is **Linksys.**

Device Name. You may assign any device name to the Access Point. This name is only used by the Access Point administrator for identification purposes. Unique, memorable names are helpful, especially if you are employing multiple access points on the same network. The default name is WAP4410N.

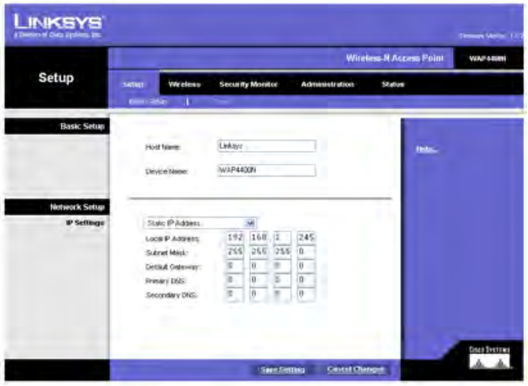
Network Setup

The selections under this heading allow you to configure the Access Point's IP address setting(s).

IP Settings

Select **Static IP Address** (default) if you want to assign a static or fixed IP address to the Access Point. Then complete the following:

- **IP Address.** The IP address must be unique to your network. The default IP address is **192.168.1.245.**



Host Name: Linksys

Device Name: WAP4400N

Static IP Address

Local IP Address: 192 . 168 . 1 . 245

Subnet Mask: 255 . 255 . 255 . 0

Default Gateway: 0 . 0 . 0 . 0

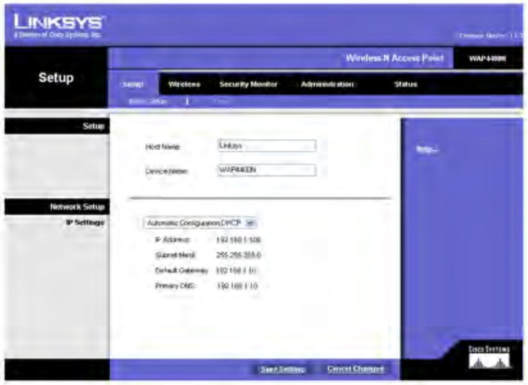
Primary DNS: 0 . 0 . 0 . 0

Secondary DNS: 0 . 0 . 0 . 0

Figure 6-1: Setup - Static IP Address

- **Subnet Mask.** The Subnet Mask must be the same as that set on the LAN that your Access Point is connected to. The default is **255.255.255.0.**

Select **Automatic Configuration - DHCP** if you have a DHCP server enabled on the LAN that can assign an IP address to the Access Point.



Host Name: Linksys
Device Name: WAP4400N
Automatic Configuration DHCP
IP Address: 192.168.1.105
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.1.10
Primary DNS: 192.168.1.10

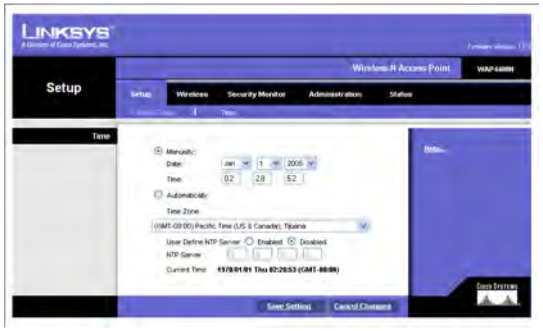
Figure 6-2: Setup - Automatic Configuration - DHCP

Change these settings as described here and click **Save Settings** to apply your changes, or click **Cancel Changes** to cancel your changes. Help information is displayed on the right-hand side of the screen.

The Setup - Time Tab

This allows you to change the Access Point's time settings. The correct time setting can help the administrator to search the system log to identify problems.

Time



● Manually:
Date: Jan 1 2005
Time: 02 28 52
○ Automatically:
Time Zone:
(GMT-08:00) Pacific Time (US & Canada); Tijuana
User Define NTP Server ○ Enabled ● Disabled
NTP Server :
Current Time 1970/01/01 Thu 02:28:53 (GMT-08:00)

Figure 6-3: Setup - Time

You can set the time either manually or automatically from a time server if the Access Point can access the public Internet.

Manually. Select this radio button to set the date and time manually. The default is to set the time manually.

Automatically. Select this option and time zone. The Access Point will contact the public time server to get the current time.

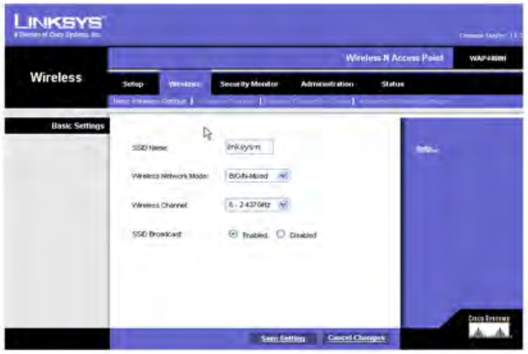
User Defined NTP Server. Enable this option if you have set up local NTP server. Default is **Disabled.**

NTP Server IP. Enter the IP address of user defined NTP Server.

Change these settings as described here and click **Save Settings** to apply your changes, or click **Cancel Changes** to cancel your changes. Help information is displayed on the right-hand side of the screen.

The Wireless - Basic Wireless Settings Tab

Change the basic wireless network settings on this screen.



SSID Name: linksys-n

Wireless Network Mode: B/G/N-Mixed

Wireless Channel: 6 - 2.437GHz

SSID Broadcast: ● Enabled ○ Disabled

Figure 6-4: Wireless - Basic Wireless Settings

Basic Settings

Configure the Wireless Network basic attributes for this Access Point.

SSID Name. The SSID is the unique name shared among all devices in a wireless network. It is case-sensitive, must not exceed 32 alphanumeric characters, and may be any keyboard character. Make sure this setting is the same for all devices in your wireless network. The default SSID name is **linksys-n.**

Wireless Network Mode. Select one of the following modes. The default is **B/G/N-Mixed**.

B-Only: All the wireless client devices can be connected to the Access Point at Wireless-B data rates with maximum speed at 11Mbps.

G-Only: Both Wireless-N and Wireless-G client devices can be connected at Wireless-G data rates with maximum speed at 54Mbps. Wireless-B clients cannot be connected in this mode.

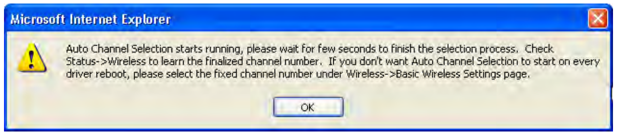
N-Only: Only Wireless-N client devices can be connected at Wireless-N data rates with maximum speed at 300Mbps.

B/G-Mixed: Both Wireless-B and Wireless-G client devices can be connected at their respective data rates. Wireless-N devices can be connected at Wireless-G data rates.

G/N-Mixed: Both Wireless-G and Wireless-N client devices can be connected at their respective data rates. Wireless-B clients cannot be connected in this mode.

B/G/N-Mixed: All the wireless client devices can be connected at their respective data rates in this mixed mode.

Disabled: To disable wireless connectivity completely. This might be useful during system maintenance.



Auto Channel Selection starts running, please wait for few seconds to finish the selection process. Check Status->Wireless to learn the finalized channel number. If you don't want Auto Channel Selection to start on every driver reboot, please select the fixed channel number under Wireless->Basic Wireless Settings page.

Figure 6-5: Pop-up message on Auto Channel Selection

Wireless Channel. Select the appropriate channel to be used among your Access Point and your client devices. The default is channel 6. You can also select **Auto** so that your Access Point will select the channel with the lowest amount of wireless interference while the system is powering up. Auto channel selection will start when you click **Save Settings** button, it will take several seconds to scan through all the channels to find the best channel. For the Wireless-N 40MHz channel option (see Wireless - Advanced Wireless Settings Tab), the Access Point will automatically select the adjacent 20MHz channel to combine them into a wider channel.

SSID Broadcast. This option allows the SSID to be broadcast on your network. You may want to enable this function while configuring your network, but make sure that you disable it when you are finished. With this enabled, someone could easily obtain the SSID information with site survey software or Windows XP and gain unauthorized access to your network. Click **Enabled** to broadcast the SSID to all wireless devices in range. Click **Disabled** to increase network security and prevent the SSID from being seen on networked PCs. The default is **Enabled** in order to help users configure their network before use.

Change these settings as described here and click **Save Settings** to apply your changes, or click **Cancel Changes** to cancel your changes. Help information is displayed on the right-hand side of the screen, and click **More** for additional details.

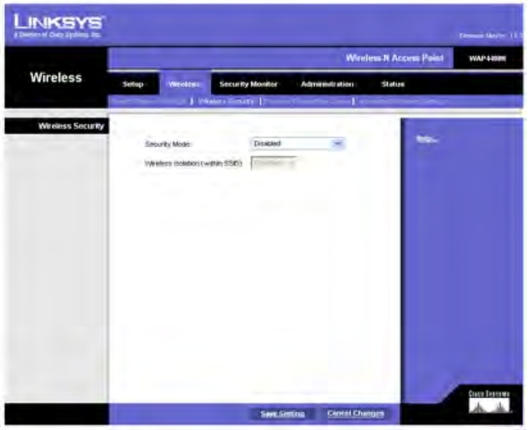
The Wireless - Wireless Security Tab

Change the Access Point’s wireless security settings on this screen.

Wireless Security

Security Mode. Select the wireless security mode you want to use, **WPA-Personal**, **WPA2-Personal**, **WPA2-Personal Mixed**, **WPA-Enterprise**, **WPA2-Enterprise, WPA2-Enterprise Mixed**, or **WEP.** (WPA stands for Wi-Fi Protected Access, which is a security standard stronger than WEP encryption and forward compatible with IEEE 802.11e. WEP stands for Wired Equivalent Privacy, Enterprise refers to using RADIUS server for authentication, while RADIUS stands for Remote Authentication Dial-In User Service.) Refer to the appropriate instructions below after you select the Authentication Type and SSID Interoperability settings. For detailed instructions on configuring wireless security for the Access Point, refer to “Appendix B: Wireless Security.” To disable wireless security completely, select **Disabled.** The default is **Disabled.**

Wireless Isolation (within SSID). When disabled, wireless PCs that are associated to the same network name (SSID), can see and transfer files between each other. By enabling this feature, Wireless PCs will not be able to see each other. This feature is very useful when setting up a wireless hotspot location. The default is **Disabled.**



Security Mode: Disabled
Wireless Isolation (within SSID):

Figure 6-6: Wireless - Wireless Security (Disabled)

Following section describes the detailed options for each Security Mode.

Disabled

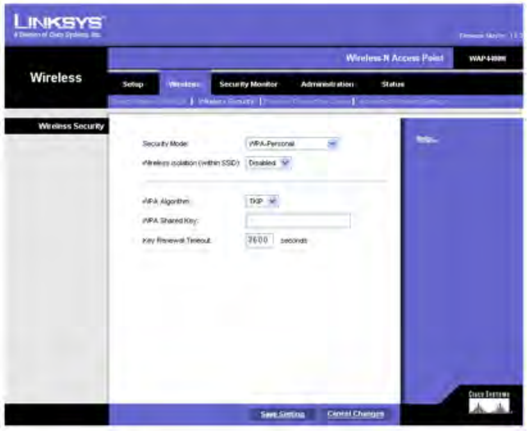
There is no option to be configured for this mode.

WPA-Personal (aka WPA-PSK)

WPA Algorithms. WPA offers you two encryption methods, TKIP and AES for data encryption. Select the type of algorithm you want to use, **TKIP** or **AES.** The default is **TKIP.**

WPA Shared Key. Enter a WPA Shared Key of 8-63 characters.

Key Renewal Timeout. Enter a Key Renewal Timeout period, which instructs the Access Point how often it should change the encryption keys. The default is **3600** seconds.



Security Mode: WPA-Personal
Wireless Isolation (within SSID): Disabled
WPA Algorithm: TKIP
WPA Shared Key:
Key Renewal Timeout: 3600 seconds

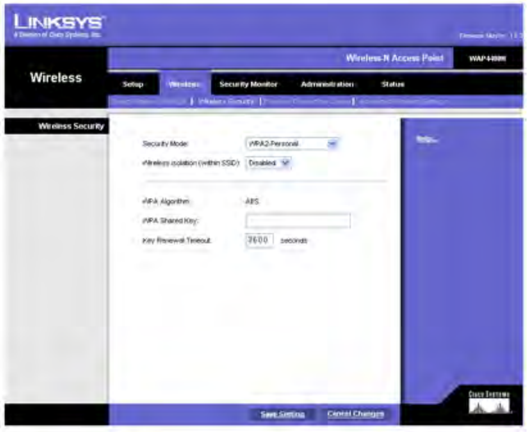
Figure 6-7: Wireless - Wireless Security (WPA-Personal)

WPA2-Personal

WPA Algorithms. WPA2 always uses AES for data encryption.

WPA Shared Key. Enter a WPA Shared Key of 8-63 characters.

Key Renewal Timeout. Enter a Key Renewal Timeout period, which instructs the Access Point how often it should change the encryption keys. The default is **3600** seconds.



Security Mode: WPA2-Personal
Wireless isolation (within SSID): Disabled
WPA Algorithm: AES
WPA Shared Key:
Key Renewal Timeout: 3600 seconds

Figure 6-8: Wireless - Wireless Security (WPA2-Personal)

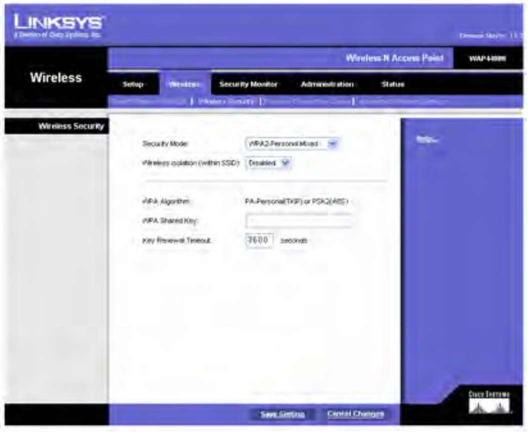
WPA2-Personal Mixed

This security mode supports the transition from WPA-Personal to WPA2-Personal. You can have client devices that use either WPA-Personal or WPA2-Personal. The Access Point will automatically choose the encryption algorithm used by each client device.

WPA Algorithms. Mixed Mode automatically chooses TKIP or AES for data encryption.

WPA Shared Key. Enter a WPA Shared Key of 8-63 characters.

Key Renewal Timeout. Enter a Key Renewal Timeout period, which instructs the Access Point how often it should change the encryption keys. The default is **3600** seconds.



Security Mode: WPA2-Personal Mixed
Wireless isolation (within SSID): Disabled
WPA Algorithm: PA-Personal(TKIP) or PSK2(AES)
WPA Shared Key:
Key Renewal Timeout: 3600 seconds

Figure 6-9: Wireless - Wireless Security (WPA2-Personal Mixed)

WPA-Enterprise

This option features WPA used in coordination with a RADIUS server for client authentication. (This should only be used when a RADIUS server is connected to the Access Point.)

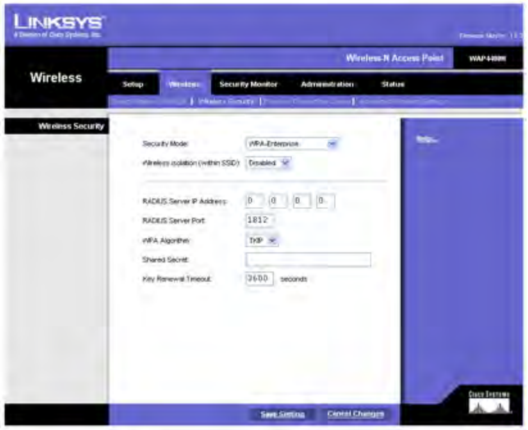
RADIUS Server IP Address. Enter the RADIUS server's IP address.

RADIUS Server Port. Enter the port number used by the RADIUS server. The default is 1812.

WPA Algorithms. WPA offers you two encryption methods, TKIP and AES for data encryption. Select the type of algorithm you want to use, **TKIP** or **AES.** The default is **TKIP.**

Shared Secret. Enter the Shared Secret key used by the Access Point and RADIUS server.

Key Renewal Timeout. Enter a Key Renewal Timeout period, which instructs the Access Point how often it should change the encryption keys. The default is **3600** seconds.



Security Mode: WPA-Enterprise
Wireless isolation (within SSID): Disabled
RADIUS Server IP Address: 0 . 0 . 0 . 0
RADIUS Server Port: 1812
WPA Algorithm: TKIP
Shared Secret:
Key Renewal Timeout: 3600 seconds

Figure 6-10: Wireless - Wireless Security (WPA-Enterprise)

WPA2-Enterprise

This option features WPA2 used in coordination with a RADIUS server for client authentication. (This should only be used when a RADIUS server is connected to the Access Point.)

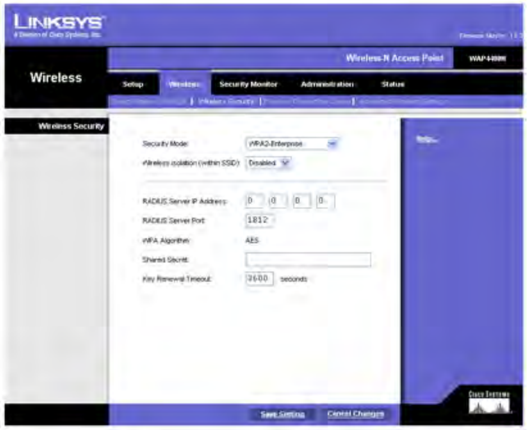
RADIUS Server IP Address. Enter the RADIUS server's IP address.

RADIUS Server Port. Enter the port number used by the RADIUS server. The default is 1812.

WPA Algorithms. WPA2 always uses AES for data encryption.

Shared Secret. Enter the Shared Secret key used by the Access Point and RADIUS server.

Key Renewal Timeout. Enter a Key Renewal Timeout period, which instructs the Access Point how often it should change the encryption keys. The default is **3600** seconds.



Security Mode: WPA2-Enterprise
Wireless isolation (within SSID): Disabled
RADIUS Server IP Address: 0 . 0 . 0 . 0
RADIUS Server Port: 1812
WPA Algorithm: AES
Shared Secret:
Key Renewal Timeout: 3600 seconds

Figure 6-11: Wireless - Wireless Security (WPA2-Enterprise)

WPA2-Enterprise Mixed

This security mode supports the transition from WPA-Enterprise to WPA2-Enterprise. You can have client devices that use either WPA-Enterprise or WPA2-Enterprise. The Access Point will automatically choose the encryption algorithm used by each client device.

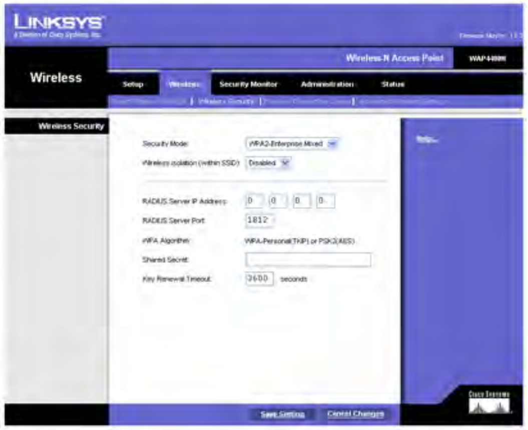
RADIUS Server IP Address. Enter the RADIUS server's IP address.

RADIUS Server Port. Enter the port number used by the RADIUS server. The default is 1812.

WPA Algorithms. Mixed Mode automatically chooses TKIP or AES for data encryption.

Shared Secret. Enter the Shared Secret key used by the Access Point and RADIUS server.

Key Renewal Timeout. Enter a Key Renewal Timeout period, which instructs the Access Point how often it should change the encryption keys. The default is **3600** seconds.



Security Mode: WPA2-Enterprise Mixed
Wireless isolation (within SSID): Disabled
RADIUS Server IP Address: 0 . 0 . 0 . 0
RADIUS Server Port: 1812
WPA Algorithm: WPA-Personal(TKIP) or PSK2(AES)
Shared Secret:
Key Renewal Timeout: 3600 seconds

Figure 6-12: Wireless - Wireless Security (WPA2 - Enterprise Mixed)

WEP

This security mode is defined in the original IEEE 802.11. This mode is not recommended now due to its weak security protection. Users are urged to migrate to WPA or WPA2.

Authentication Type. Choose the 802.11 authentication type as either **Open System** or **Shared Key.** The default is **Open System.**

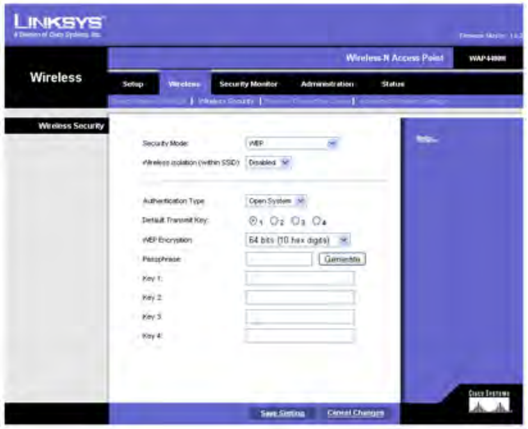
Default Transmit Key. Select the key to be used for data encryption.

WEP Encryption. Select a level of WEP encryption, **64 bits (10 hex digits)** or **128 bits (26 hex digits).**

Passphrase. If you want to generate WEP keys using a Passphrase, then enter the Passphrase in the field provided and click the **Generate** key. Those auto-generated keys are not as strong as manual WEP keys.

Key 1-4. If you want to manually enter WEP keys, then complete the fields provided. Each WEP key can consist of the letters "A" through "F" and the numbers "0" through "9". It should be 10 characters in length for 64-bit encryption or 26 characters in length for 128-bit encryption.

Change these settings as described here and click **Save Settings** to apply your changes, or click **Cancel Changes** to cancel your changes. Help information is displayed on the right-hand side of the screen, and click **More** for additional details.



Security Mode: WEP
Wireless isolation (within SSID): Disabled
Authentication Type: Open System
Default Transmit Key: ● 1 ○ 2 ○ 3 ○ 4
WEP Encryption: 64 bits (10 hex digits)
Passphrase:
Key 1:
Key 2:
Key 3:
Key 4:

Figure 6-13: Wireless Settings - WEP

The Wireless - Wireless Connection Control Tab

This screen allows you to configure the Connection Control List to either permit or block specific wireless client devices connecting to (associating with) the Access Point.

Wireless Connection Control

Enabled/Disabled. Enable or disable wireless connection control. The default is **disabled.**

Connection Control

There are two ways to control the connection (association) of wireless client devices. You can either **prevent** specific devices from connecting to the Access Point, or you can **allow** only specific client devices to connect to the Access Point. The client devices are specified by their MAC addresses. The default is to **allow** only specific client devices.

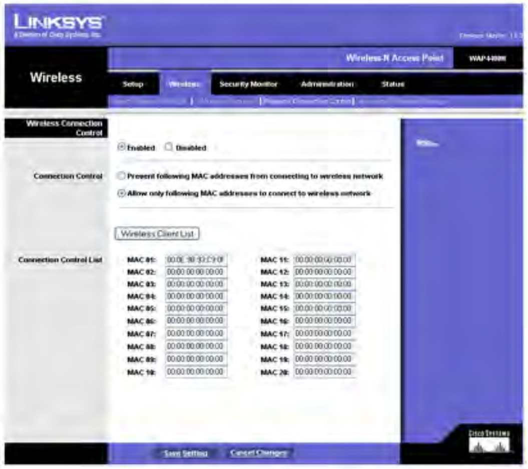
Wireless Client List

Instead of manually entering the MAC addresses of each client, the Access Point provides a convenient way to select a specific client device from the client association table. Click this button and a window appears to let you select a MAC address from the table. The selected MAC address will be entered into the Connection Control List.

Connection Control List

MAC 01-20. Enter the MAC addresses of the wireless client devices you want to control.

Change these settings as described here and click **Save Settings** to apply your changes, or click **Cancel Changes** to cancel your changes. Help information is displayed on the right-hand side of the screen.



Wireless Connection Control: ● Enabled ○ Disabled

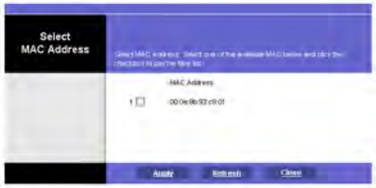
Connection Control: ○ Prevent following MAC addresses from connecting to wireless network ● Allow only following MAC addresses to connect to wireless network

Wireless Client List

Connection Control List

MAC 01:	00:0E:9B:93:C9:01	MAC 11:	00:00:00:00:00:00
MAC 02:	00:00:00:00:00:00	MAC 12:	00:00:00:00:00:00
MAC 03:	00:00:00:00:00:00	MAC 13:	00:00:00:00:00:00
MAC 04:	00:00:00:00:00:00	MAC 14:	00:00:00:00:00:00
MAC 05:	00:00:00:00:00:00	MAC 15:	00:00:00:00:00:00
MAC 06:	00:00:00:00:00:00	MAC 16:	00:00:00:00:00:00
MAC 07:	00:00:00:00:00:00	MAC 17:	00:00:00:00:00:00
MAC 08:	00:00:00:00:00:00	MAC 18:	00:00:00:00:00:00
MAC 09:	00:00:00:00:00:00	MAC 19:	00:00:00:00:00:00
MAC 10:	00:00:00:00:00:00	MAC 20:	00:00:00:00:00:00

Figure 6-14: Wireless - Wireless Connection Control

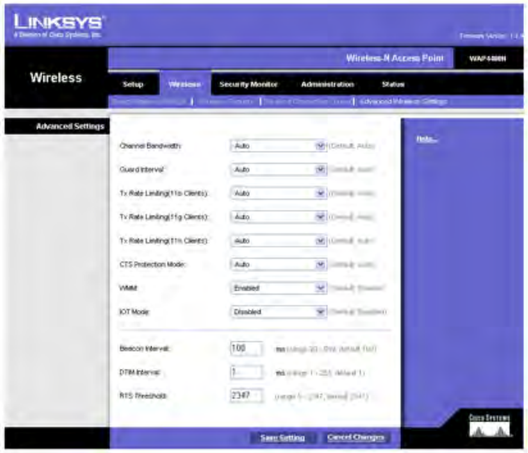


	MAC Address
1 □	00:0e:9b:93:c9:01

Figure 6-15: Select MAC Address from Wireless Client List

The Wireless - Advanced Wireless Settings Tab

This screen allows you to configure the advanced settings for the Access Point. The Wireless-N adopts several new parameters to adjust the channel bandwidth, and guard intervals to improve the data rate dynamically. Linksys recommends to let your Access Point automatically adjust the parameters for maximum data throughput.



Channel Bandwidth: Auto

Guard Interval: Auto

Tx Rate Limiting(11b Clients): Auto

Tx Rate Limiting(11g Clients): Auto

Tx Rate Limiting(11n Clients): Auto

CTS Protection Mode: Auto

WMM: Enabled

IOT Mode: Disabled

Beacon Interval: 100 ms

DTIM Interval: 1

RTS Threshold: 2347

Figure 6-16: Wireless - Advanced Wireless

Advanced Wireless

You can change the following advanced parameters (some only for Wireless-N) for this Access Point. Wireless-N data rates are classified into 16 **MCS** numbers (0-15). **MCS** stands for Modulation and Coding Scheme. For the same **MCS** number, the data rate changes according to the Channel Bandwidth and Guard Interval settings. You can see the change through the drop-down menu of **Tx Rate Limiting (11n clients)**.

Channel Bandwidth. You can select the channel bandwidth manually for Wireless-N connections. When it is set to 20MHz, only the 20MHz channel is used. When it is set to 40MHz, Wireless-N connections will use 40MHz channel but Wireless-B and Wireless-G will still use 20MHz channel. The default is **Auto.**

Guard Interval. You can select the guard interval manually for Wireless-N connections. The two options are **Short (400ns)** and **Long (800ns).** The default is **Auto.**

Tx Rate Limiting (**11b clients**). This option provides rate limiting on Wireless-B connections. Wireless-B clients can be limited to data rate specified by IEEE 802.11b. The default is **Auto.**

Tx Rate Limiting (**11g clients**). This option provides rate limiting on Wireless-G connections. Wireless-G clients can be limited to data rates specified by IEEE 802.11g and 802.11b. The default is **Auto.**

Tx Rate Limiting (**11n clients**). This option provides rate limiting on Wireless-N connections. Wireless-N clients can be limited to data rates specified by draft IEEE 802.11n, IEEE 802.11g, and 802.11b. The data rate associated with each **MCS** number (0-15) changes according to your selection on Channel Bandwidth and Guard Interval. The default is **Auto.**

CTS Protection Mode. CTS (Clear-To-Send) Protection Mode function boosts the Access Point's ability to catch all wireless transmissions, but will severely decrease performance. Keep the default setting, **Auto**, so the Access Point can use this feature as needed, when the Wireless-N/G products are not able to transmit to the Access Point in an environment with heavy 802.11b traffic. Select **Disabled** if you want to permanently disable this feature.

WMM. Wi-Fi Multimedia is a QoS feature defined by WiFi Alliance before IEEE 802.11e was finalized. Now it is part of IEEE 802.11e. When it is enabled, it provides four priority queues for different types of traffic. It automatically maps the incoming packets to the appropriate queues based on QoS settings (in IP or layer 2 header). WMM provides the capability to prioritize traffic in your environment. The default in **Enabled.** Select

High Performance (N-Only) if you want to achieve highest throughput on 11n connections. Note that 11b and 11g clients performance will be affected by setting to this mode.

IOT Mode. Interoperability Mode. Enabling this mode will help this AP to communicate with Linksys retail client cards (e.g. WPC300N) at 11n rates. This mode is a temporary measure to cope with implementation differences on 802.11n draft specification. This option will be removed eventually when IEEE802.11n is finalized. The default is **disabled**.

Beacon Interval. This value indicates the frequency interval of the beacon. A beacon is a packet broadcast by the Access Point to keep the network synchronized. A beacon includes the wireless networks service area, the Access Point address, the Broadcast destination addresses, a time stamp, Delivery Traffic Indicator Maps, and the Traffic Indicator Message (TIM). The default is **100** ms.

DTIM Interval. This value indicates how often the Access Point sends out a Delivery Traffic Indication Message (DTIM). Lower settings result in more efficient networking, while preventing your PC from dropping into power-saving sleep mode. Higher settings allow your PC to enter sleep mode, thus saving power, but interferes with wireless transmissions. The default is **1** ms.

RTS Threshold. This setting determines how large a packet can be before the Access Point coordinates transmission and reception to ensure efficient communication. This value should remain at its default setting of **2347**. If you encounter inconsistent data flow, only minor modifications are recommended.

Change these settings as described here and click **Save Settings** to apply your changes, or click **Cancel Changes** to cancel your changes. Help information is displayed on the right-hand side of the screen, and click **More** for additional details.

The Security Monitor Tab

On this screen you can enable or disable the security monitor feature of this Wireless Access Point. It also allows you to create user accounts for system administrators to use this advanced feature.

This feature works together with WPC4400N and future Linksys Business Series wireless client adapters. A client utility will be provided with the client card, which will allow you to download information from the Access Point. The current version will support wireless Access Points and wireless clients detection and classification. Please check Linksys.com for future updates on this powerful security feature.

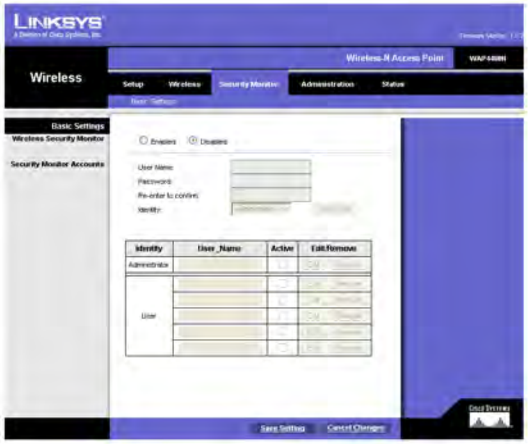


Figure 6-17: Security Monitor

Basic Settings

Wireless Security Monitor

Enabled/Disabled. You can enable or disable the security monitor feature here. When it is enabled, the Access Point will work with selected wireless PCs to monitor your wireless network. If you don’t plan to use the client utility to actively monitor your network, you can disable this feature to improve your wireless network performance. The default is **Disabled.**

Security Monitor Accounts

The section allows the system administrator to create accounts for the purpose of wireless security monitoring. You can create one account at a time. The administrator will be able to use his WPC4400N client utility to log in and get authenticated to the system after user accounts are created.

User Name. Enter the user name of this account.

Password. Enter the password of this account.

Re-enter to confirm. Enter the password a second time to re-confirm it.

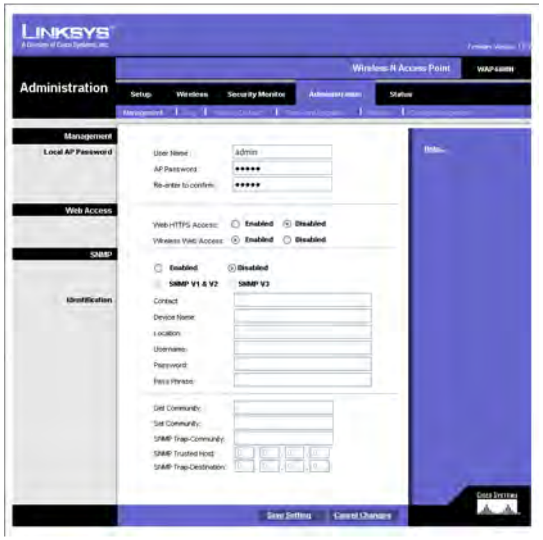
Identify. You can create either an Administrator or User account by making the selection here. You can create one Administrator account and five User accounts.

Click the **Add/Save** button to create an account. The accounts that are created will display in the table.

Change these settings as described here and click **Save Settings** to apply your changes, or click **Cancel Changes** to cancel your changes. Help information is displayed on the right-hand side of the screen, and click **More** for additional details.

The Administration - Management Tab

On this screen you can configure the password, Web Access, and SNMP settings.



Management

Local AP Password

User Name: admin

AP Password: •••••

Re-enter to confirm: •••••

Web Access

Web HTTPS Access: ○ Enabled ● Disabled

Wireless Web Access: ● Enabled ○ Disabled

SNMP

○ Enabled ● Disabled

○ SNMP V1 & V2 ○ SNMP V3

Identification

Contact:

Device Name:

Location:

Username:

Password:

Pass Phrase:

Get Community:

Set Community:

SNMP Trap-Community:

SNMP Trusted Host: 0 . 0 . 0 . 0

SNMP Trap-Destination: 0 . 0 . 0 . 0

Figure 6-18: Administration - Management

Management

You should change the username/password that controls access to the Access Point’s Web-based Utility to prevent unauthorized access.

Local AP Password

User Name. Modify the administrator user name. The default is **admin.**

AP Password. Modify the administrator password for the Access Point’s Web-based Utility. The default is **admin.**

Re-enter to confirm. To confirm the new password, enter it again in this field.

Web Access

To increase the security on accessing the Web-based Utility, you can enable HTTPS. Once enabled, users need to use *https://* when accessing the Web-based Utility.

Web HTTPS Access. The default is **Disabled.**

Wireless Web Access. Allow or deny wireless clients to access Web based Utility. The default is **Enabled.**

SNMP

SNMP is a popular network monitoring and management protocol. It provides network administrators with the ability to monitor the status of the Access Point and receive notification of any critical events as they occur on the Access Point.

To enable the SNMP support feature, select **Enabled.** Otherwise, select **Disabled.** The default is **Disabled.**

This Access Point supports SNMP version 1, 2, and 3. Select **SNMP V1 & V2** if you don't need the enhanced capability on V3 or your management software does not support V3. Otherwise, select **SNMP V3.**

Identification

Contact. Enter the name of the contact person, such as a network administrator, for the Access Point.

Device Name. Enter the name you wish to give to the Access Point.

Location. Enter the location of the Access Point.

User Name. SNMPv3 only. Create a administrator account to access and manage the SNMP MIB objects.

Password. SNMPv3 only. Enter the authentication password for administrator account (minimum length 8).

Passphrase. SNMPv3 only. Enter the passphrase for data encryption on administrator's management traffic.

Get Community. Enter the password that allows read-only access to the Access Point's SNMP information. The default is **public.**

Set Community. Enter the password that allows read/write access to the Access Point's SNMP information. The default is **private.**

SNMP Trap-Community. Enter the password required by the remote host computer that will receive trap messages or notices sent by the Access Point.

SNMP Trusted Host. You can restrict access to the Access Point's SNMP information by IP address. Enter the IP address in the field provided. If this field is left blank, then access is permitted from any IP address.

SNMP Trap-Destination. Enter the IP address of the remote host computer that will receive the trap messages.

Change these settings as described here and click **Save Settings** to apply your changes, or click **Cancel Changes** to cancel your changes. Help information is displayed on the right-hand side of the screen, and click **More** for additional details.