



NETGEAR™

802.11a Wireless Access Point

Model HE102

User's Guide

Rev 1.2.11

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FCC REGULATORY STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

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

RF Exposure Requirements

WARNING!!

To ensure compliance with FCC RF exposure requirements, the antenna used for this device must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or radio transmitter. Installers and end-users must follow the installation instructions provided in this user guide.

Radio Frequency Interference Requirements

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

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1 Introduction

1.1 Scope

The intent of this document is to familiarize you with the NETGEAR Model HE102 Access Point (AP), its physical characteristics, setup, configuration, and usage.

1.2 Features

The Model HE102 Access Point is an IEEE 802.11a AP supporting up to 60 IEEE 802.11a station associations including the AP itself. Rates of 6 to 54 Mbps are supported in standard IEEE 802.11a mode, and 12 to 72 Mbps in turbo mode. All transmission rates are supported across the lower and middle bands of the 5 GHz spectrum(5.15 to 5.35 GHz).

2 Getting to Know the Model HE102 Access Point

2.1 Front View

The Model HE102 Access Point (AP) has 3 LED's, and a pair of side-mounted antennas that rotate 180° for alternative reception positioning and compact packaging.

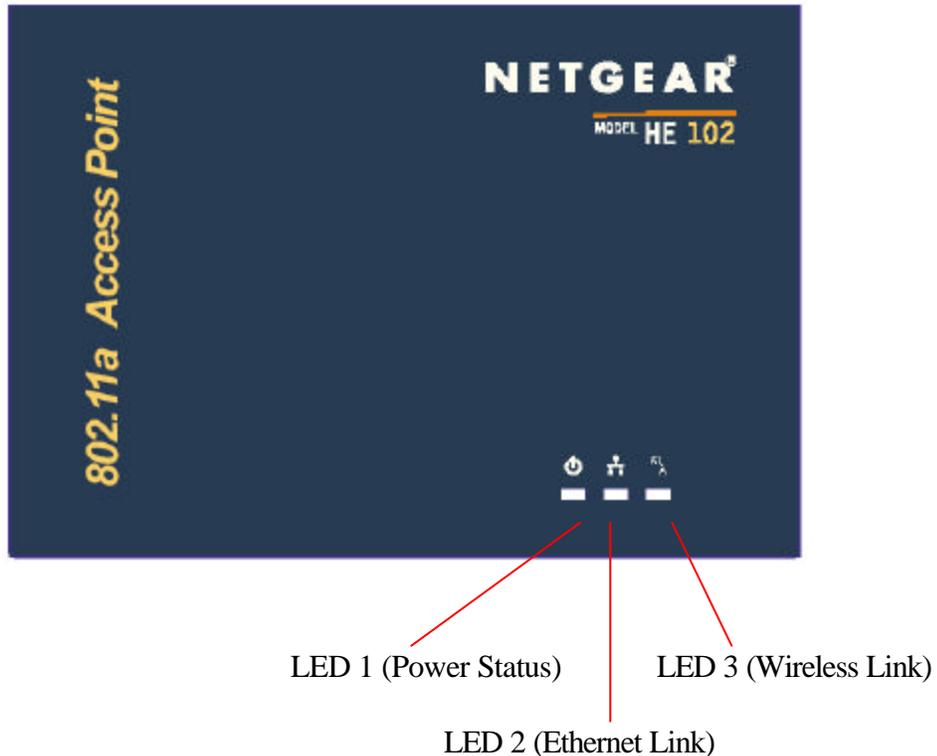


Table 1 – LED Functionality

LED 1	Description
Off	No Power
On	Power On and Ready for Operation
Blink	Power On but Not Ready for Operation – at initial power on or reset, this indicates self-test or software loading; at other times, this indicates a system fault

LED 2	Description
Off	No Ethernet Link Detected
Green On	100 Mbps Link Detected but No Activity
Green Blink	100 Mbps Link Activity – blink rate is proportional to activity
Amber On	10 Mbps Link Detected but No Activity
Amber Blink	10 Mbps Link Activity – blink rate is proportional to activity

LED 3	Description
Off	Wireless Link Disabled
Very Slow Blink	Looking for Network Association
Slow Blink	Associated with Network but No Activity
Fast Blink	Associated with Network – blink rate is proportional to activity

2.2 Rear View

The rear panel of the AP has a console interface, a RJ-45 Ethernet jack, a restore-to-default button, and a power supply connector,



- The console connector is only used for system configuration during manufacturing process and should not be connected.
- The RJ-45 Ethernet jack is provided for 10/100 Mbps connectivity to a wired Ethernet LAN. The Ethernet jack is wired for direct connection to a Ethernet hub or switch.
- The restore to default push button is to allow the Access Point to be reset back to the factory default condition in the event that the Access Point is no longer accessible or controllable through its web-based interface.
- A 3.3 V power supply is provided and is plugged into the power supply connector of the AP.

3 AP Network Attachment and Configuration

3.1 AP Network Configuration and Network Boot

Figure 1 shows an example connection of the AP to a Host PC (HPC). Follow these steps to establish the physical connections:

1. Connect the AP Ethernet port to the HPC Ethernet card through the Ethernet hub/switch or an Ethernet crossover cable. An Ethernet switch/hub or crossover cable is not included.
2. Plug in the 3.3 V power supply adapter (provided by NETGEAR) to the AP power supply connector.

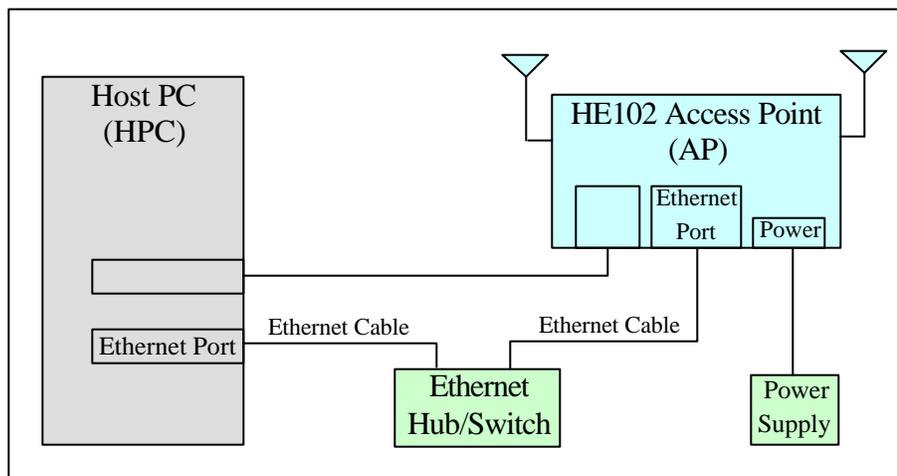
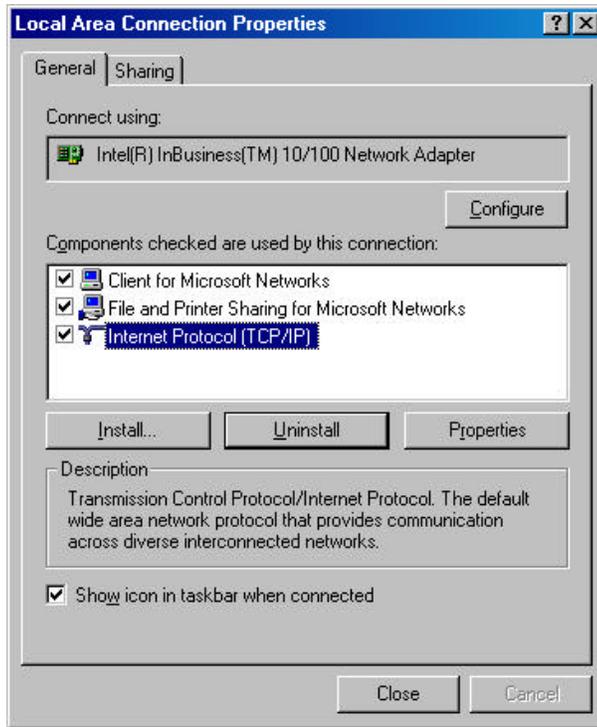


Figure 1 – Connection Between AP and Host PC

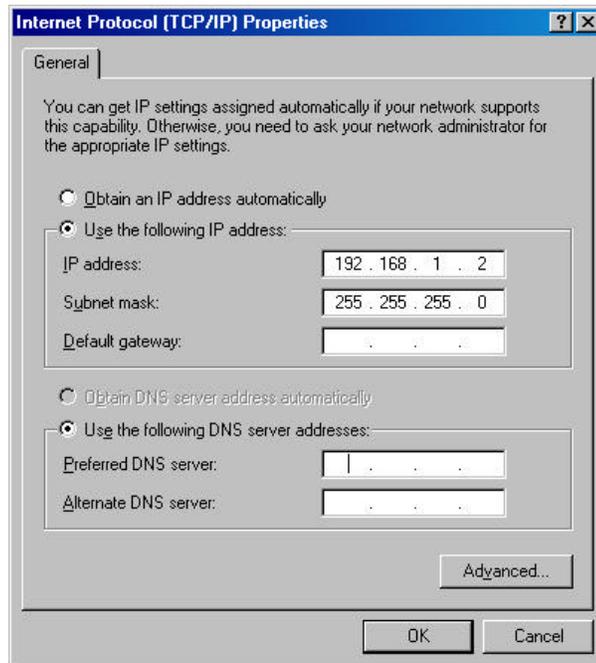
At this point, the Windows-based HPC needs the following configuration steps in order to control the AP:

1. From the Start menu, choose Settings and open the Network and Dial-up Connections window.
2. Right-click on the Local Area Network icon in the window, which belongs to the Ethernet controller that is connected to the AP and select Properties.

3. Within the Local Area Connection Properties window, choose Internet Protocol (TCP/IP) and click Properties.



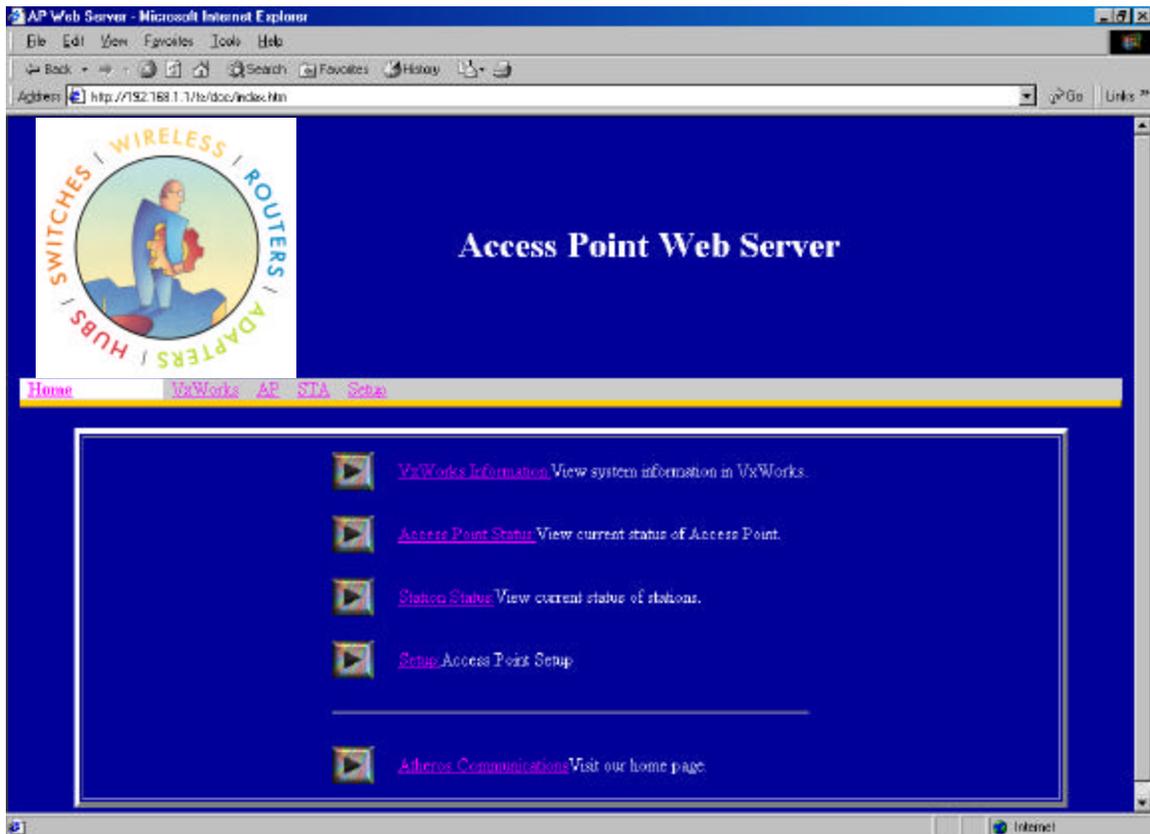
4. Configure the IP address for the Ethernet connection in the Internet Protocol (TCP/IP) Properties window. Click OK to continue, and close Local Area Connection Properties. Note that this IP address is used by the HPC to access the AP through the web-based interface via the Ethernet connection.



3.2 Configuring the AP through Web Browser

The following procedures show the steps to configure the channel frequency and SSID using a web browser:

1. Launch a web browser (Netscape Navigator or Internet Explorer are examples of commonly used web browsers) from the Host PC or other PC on the same IP subnet as the AP, and enter the IP address that is assigned to the AP as the URL. This is the “inet on ethernet (e)” value specified during the configuration step in Section 3.1.1 or Section 3.1.2. The Access Point Web Server page appears.



2. Click Setup. A dialog box appears that requests login authorization. When prompted, enter the following information to log in:

Log in: Admin
Password: 5up

Click OK to complete the login process.

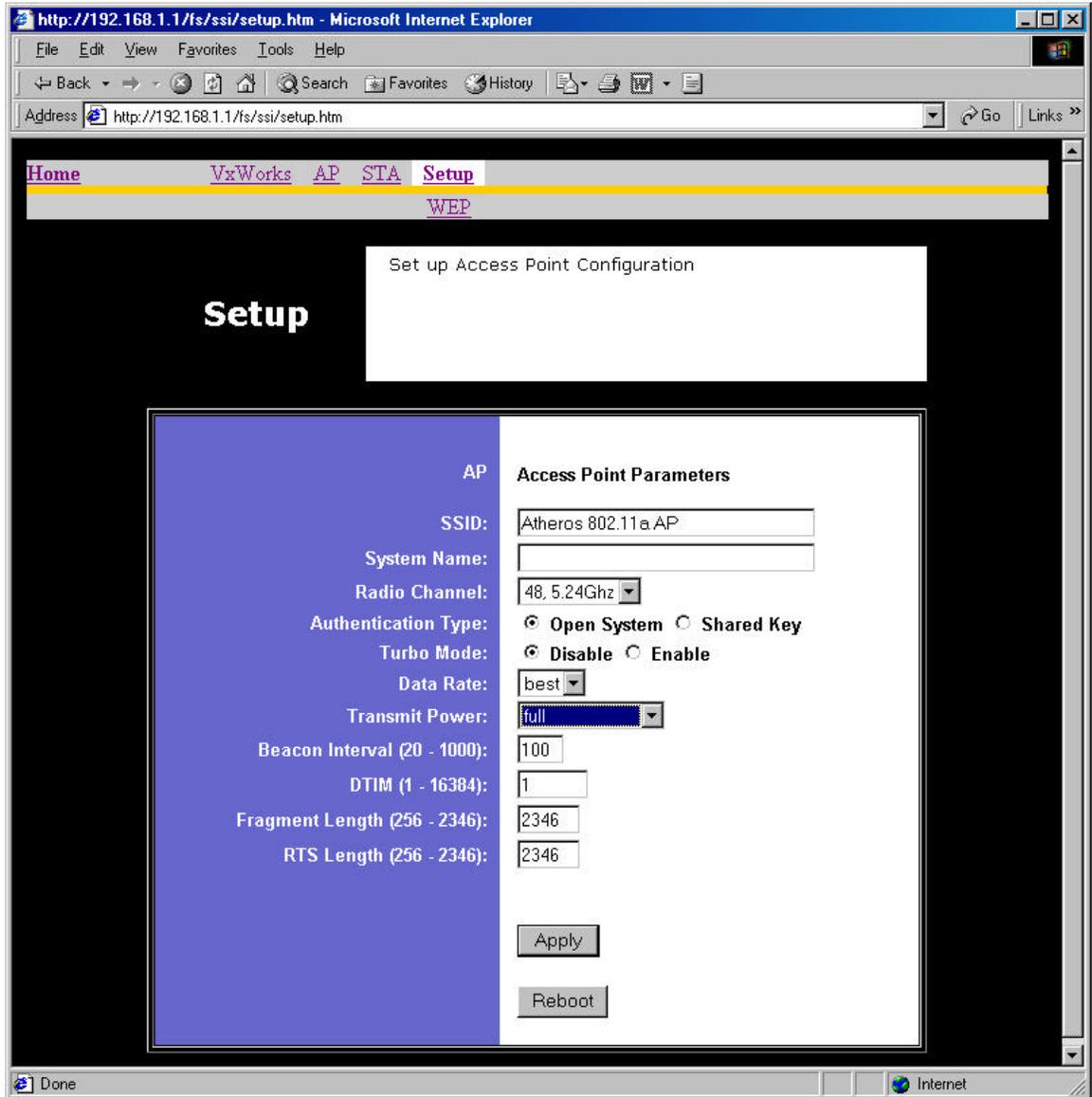


3. After the Setup menu loads, enter the SSID and IEEE Radio Channel that the stations (STAs) are associating in Infrastructure mode. Click Apply to commit the changes. At this time you can also change other settings. Refer to Appendix A for detailed information about each configuration option.

Note that the radio channel is specified using the IEEE 802.11a standard. For example, channel 48 is the equivalent of 5.240 GHz. The formula below shows how the channel number is derived:

$$\text{Channel Number} = \frac{\text{Channel Frequency (in MHz)} - 5000 \text{ MHz}}{5 \text{ MHz}}$$

Another new feature added to the AP firmware is the ability to control Transmit Power parameter. This feature can be used to decrease the transmit power, and therefore, reduce the range of the radio. In this operation mode, more than one AP with the same channel frequency can exist in the same location (as long as the ranges of these APs can cover are not overlapped each other).



- Optionally, you can also set up Wired Equivalent Privacy (WEP) for security purposes. To set up WEP, click WEP and the configuration screen appears. Refer to Appendix A for a detailed explanation of the WEP configuration options. Click Apply to save the settings.

Note that the Un-Encrypted Frames filter option (previously available in release 1.0) is now removed.

AP Wired Equivalent Privacy
For 40-bit encryption, enter 10 hexadecimal digits.
For 104-bit encryption, enter 26 hexadecimal digits.
For 128-bit encryption, enter 32 hexadecimal digits.

WEP: Disable Enable

Default Shared Key: 1 2 3 4

Shared Key	Encryption Key	Key Size
Shared Key 1:	<input type="text"/>	128
Shared Key 2:	<input type="text"/>	128
Shared Key 3:	<input type="text"/>	128
Shared Key 4:	<input type="text"/>	128

Unique Key **Encryption Key** **Key Size** 128

Read Write Delete

ACL: Disable Enable Strict

ACL Id:	MAC Address	Key Map	Permission
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/> Deny <input type="radio"/> Allow

Read Write Delete

Apply

Appendix A—AP Web Server

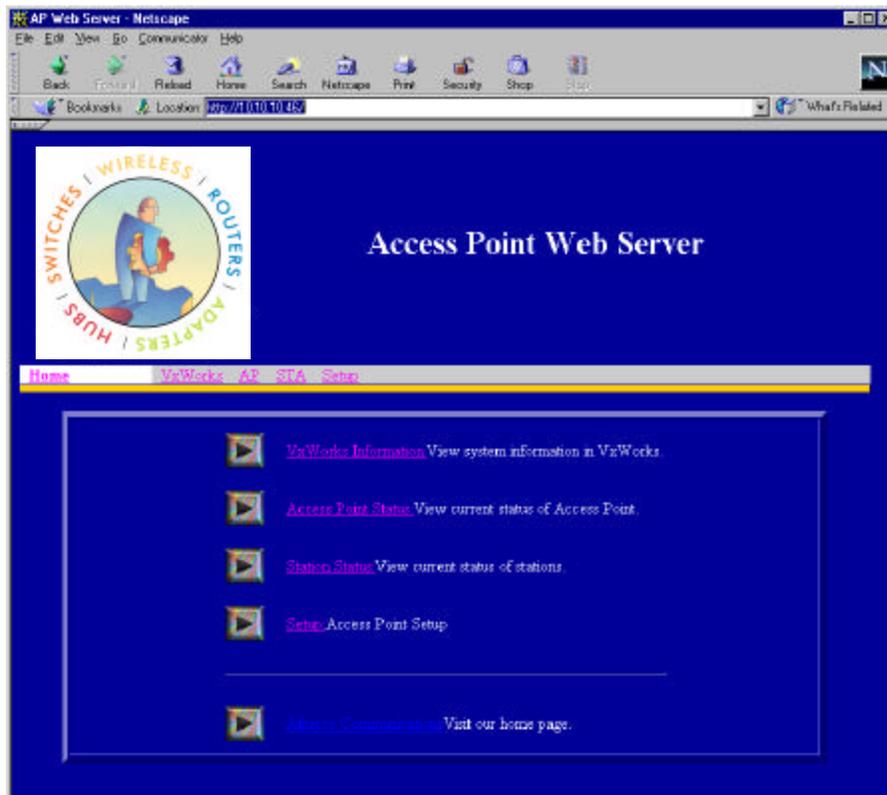
Introduction

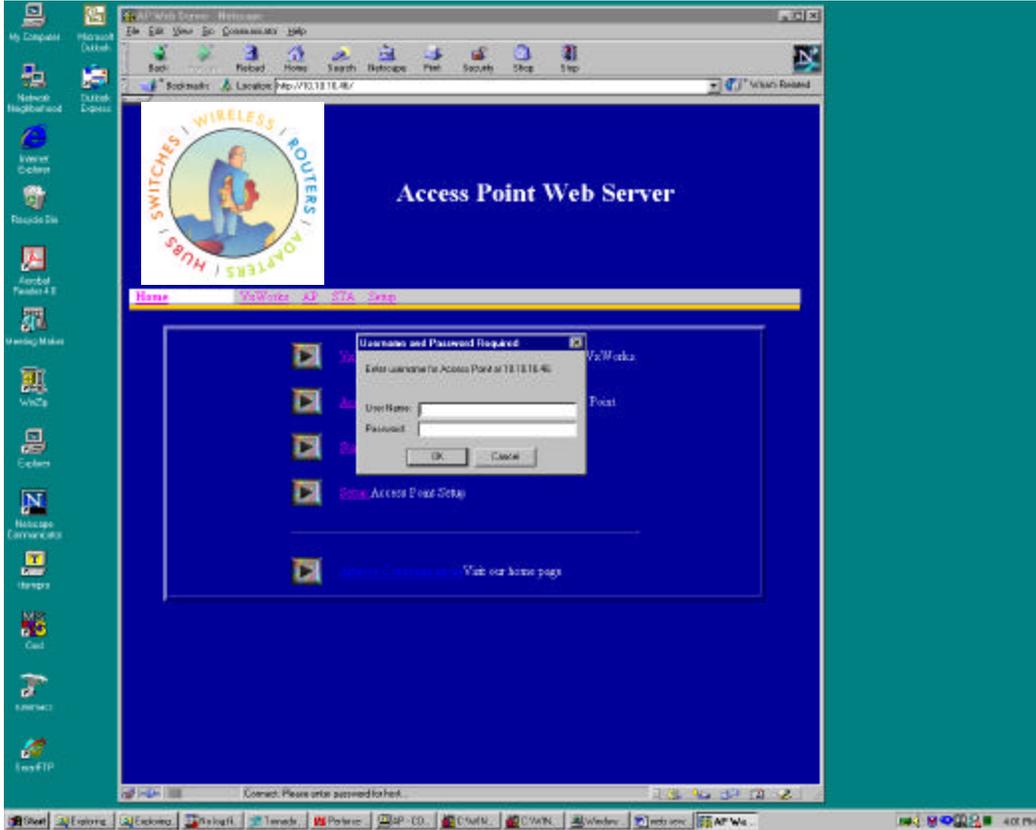
You can configure the AP through a web browser interface to the AP web server. The web server resides in the AP and is accessible from any STA that is connected to the AP Infrastructure network.

Accessing the AP Web Server

To access the AP web server, use the IP address of the AP as the URL address, for example **http://192.168.1.1**. The web server home page contains several hyperlinks that provide viewing of the system information, status of the AP and associated stations, and configuration parameters of the AP. On the initial entry into the AP web server (click on hyperlink) a popup window appears prompting for a username and password. Enter the username and password, and click “OK” to enter the AP web server.

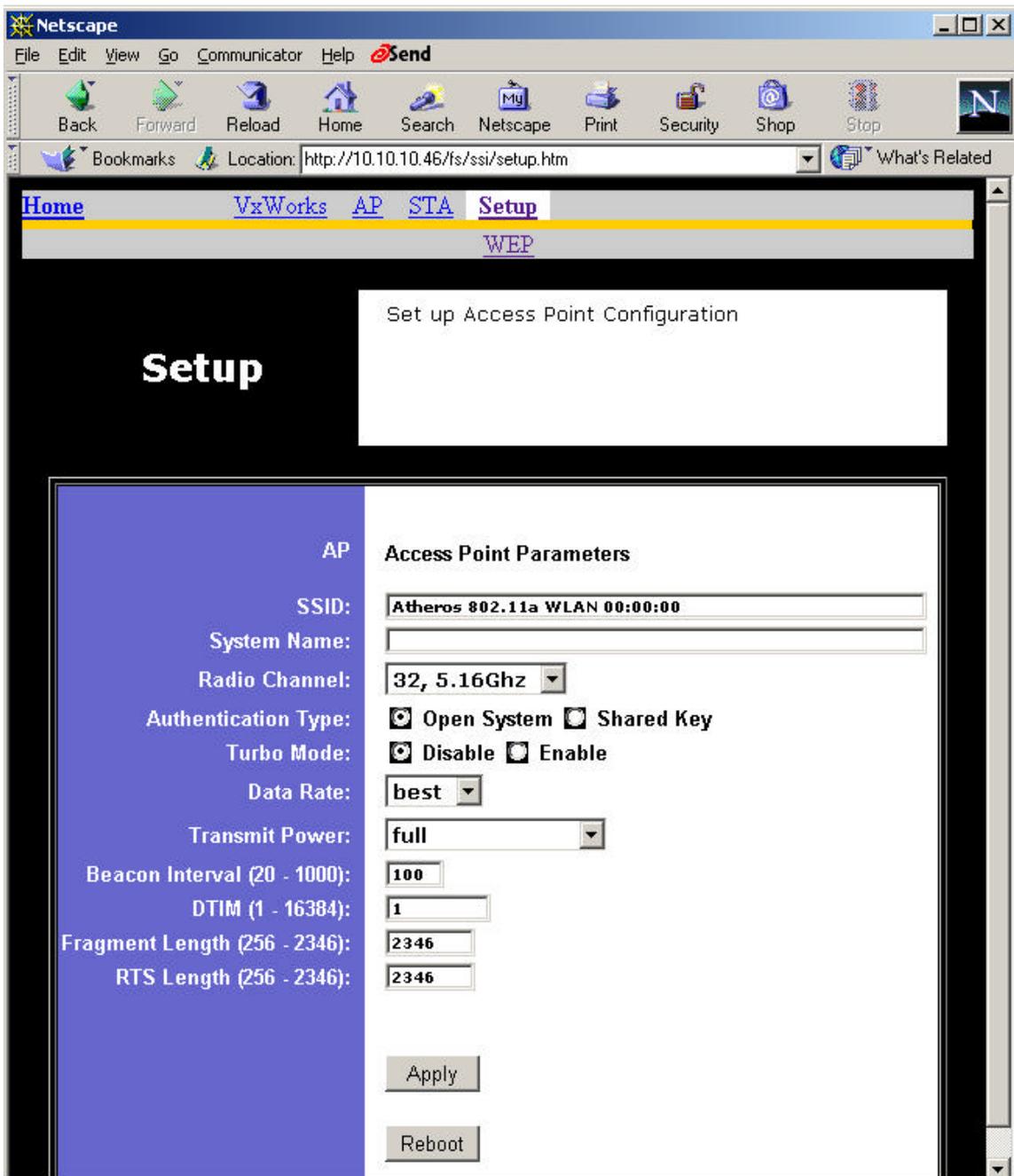
If you want to receive warning messages when configuring the AP, enable JavaScript on the web browser. Otherwise, no warnings are issued.





Setup

Click the Setup hyperlink from the AP Web Server home page to change AP configuration parameters. This page displays the current configuration of the AP. If you modify the configuration parameters, you must click Apply to save the changes. The new configuration is not in effect until you reboot the AP. Click Reboot to reboot the AP. The web browser loses connectivity with the AP web server as the AP reboots. To establish a network connection to the rebooted AP, wait until the AP has completed rebooting, and then navigate to the web server home page (by clicking the Home hyperlink) to resume communication with the AP web server.



WEP

Click the **WEP** hyperlink to configure the WEP keys.

The configurable options of the WEP page provide the ability to:

- Enable and disable WEP
- Select the default shared WEP key
- Specify the shared and unique WEP keys
- Enable, disable, restrict, and configure the ACL

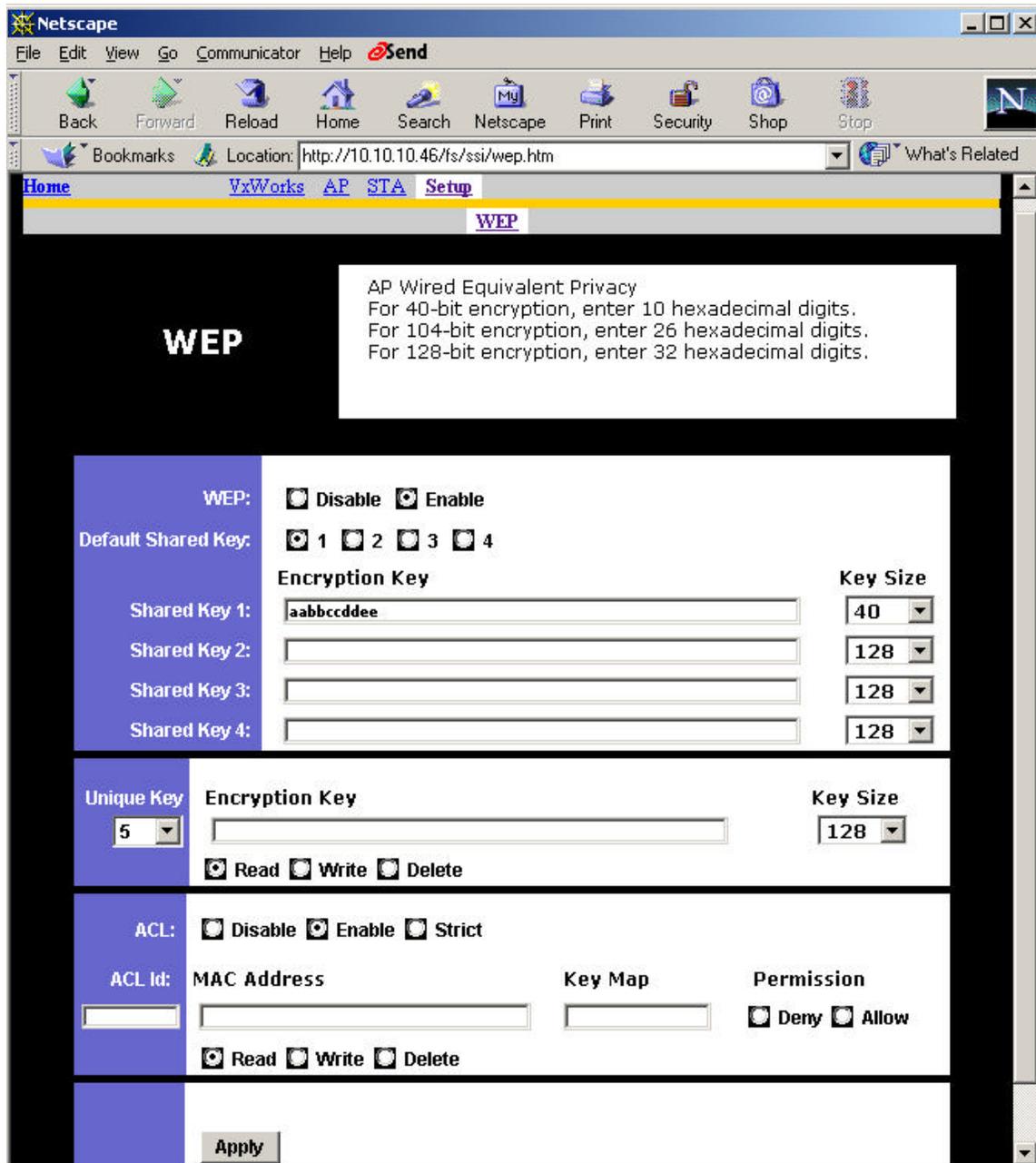
Refer to the following table for examples of WEP configurations on the AP and the STA.

WEP: Disable					WEP is disabled. Any STA can access to the network
WEP: Enable					
Shared Key	ACL				WEP
	ACL	MAC address	Key Map	Permission	
No	Disable	No	No	No	WEP is disabled. Any STA can access to the network
Yes	Disable	No	No	No	Only STA with matched shared key can access to the network
Yes	Enable	Yes	No	Allow	1. STA with matched MAC ID can access to the network 2. Any STAs with matched shared key are also allowed to access to the network
Yes	Enable	No	Unique key	Allow	1. STA with matched unique key can access to the network 2. Any STAs with matched shared key are also allowed to access to the network
Yes	Enable	Yes	Unique key	Allow	1. STA with matched MAC ID and matched unique key can access to the network 2. Any STAs with matched shared key are also allowed to access to the network
x	Enable	Yes	No	Deny	STA with the matched MAC ID is blocked from accessing the network
x	Enable	No	Unique key	Deny	STA with the matched unique key is blocked from accessing the network
x	Enable	Yes	Unique key	Deny	STA with the matched MAC ID and unique key is blocked from accessing the network

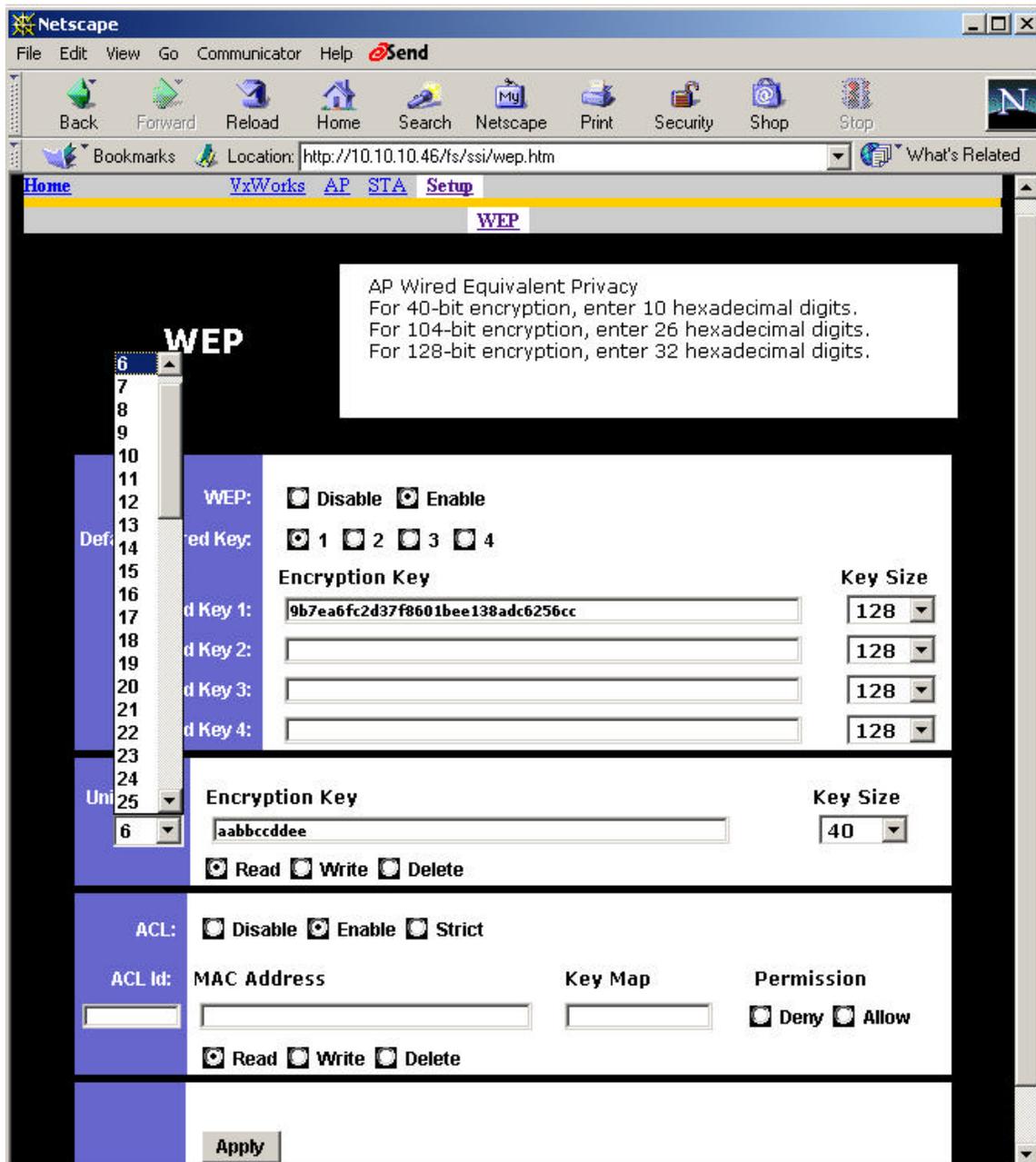
Preliminary

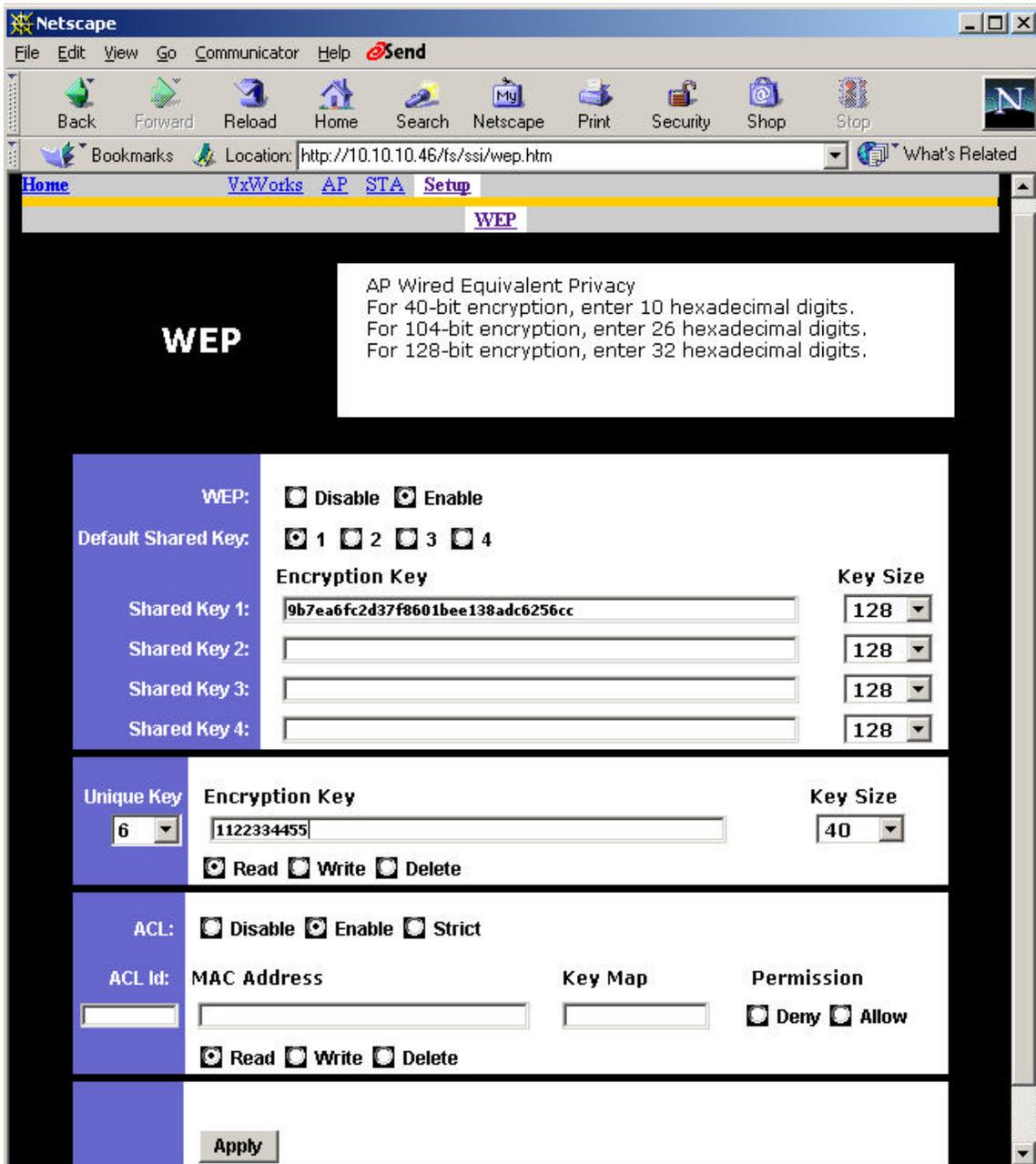
Yes	Strict	x	x	x	<ol style="list-style-type: none"> 1. Only STA with MAC ID and/or unique key matched to the setup in ACL can access to the network. 2. The STAs with only shared key are blocked from accessing the network.
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After entering or modifying the WEP configuration, you must click Apply to save the changes.



To view the configuration of a unique key, use the pull down menu to select the unique key ID, select Read inside the Unique Key frame, and then click Apply to view the unique key. In this example, unique key ID 6 is selected. The next example shows the results.





To make changes, select Write, enter the key changes, select the appropriate key size, select a unique key ID, and click Apply. Use the same procedure to add new unique keys. Note that the unique key ID starts from 5 and ends at 64. A total of 60 unique keys can be stored in the AP.

WEP

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 For 104-bit encryption, enter 26 hexadecimal digits.
 For 128-bit encryption, enter 32 hexadecimal digits.

WEP: Disable Enable

Default Shared Key: 1 2 3 4

Shared Key	Encryption Key	Key Size
Shared Key 1:	9b7ea6fc2d37f8601bee138adc6256cc	128
Shared Key 2:		128
Shared Key 3:		128
Shared Key 4:		128

Unique Key	Encryption Key	Key Size
6	0f340afe8a085508485caa625f9ec3ba	128

Read Write Delete

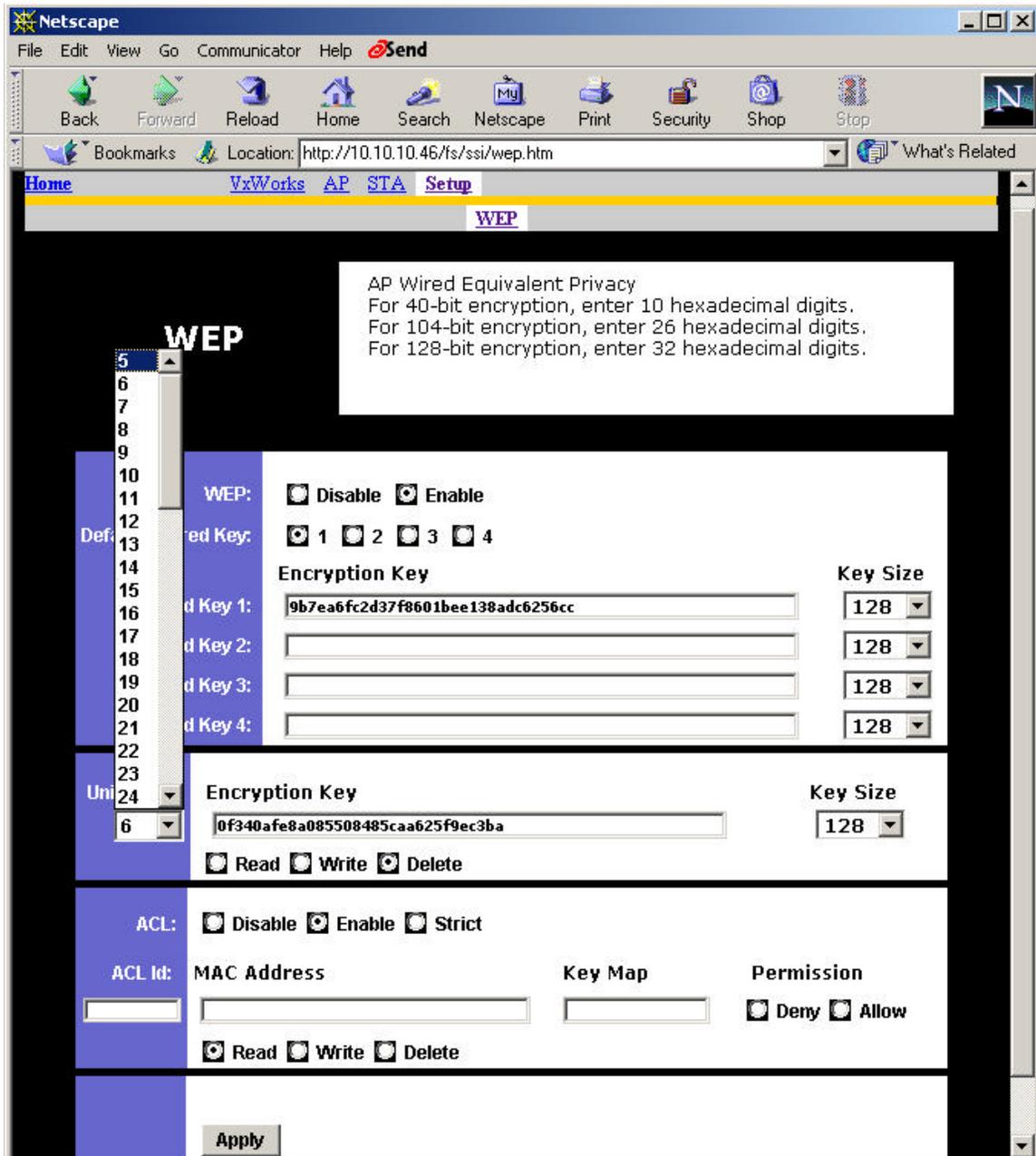
ACL: Disable Enable Strict

ACL Id:	MAC Address	Key Map	Permission
			<input checked="" type="checkbox"/> Deny <input type="checkbox"/> Allow

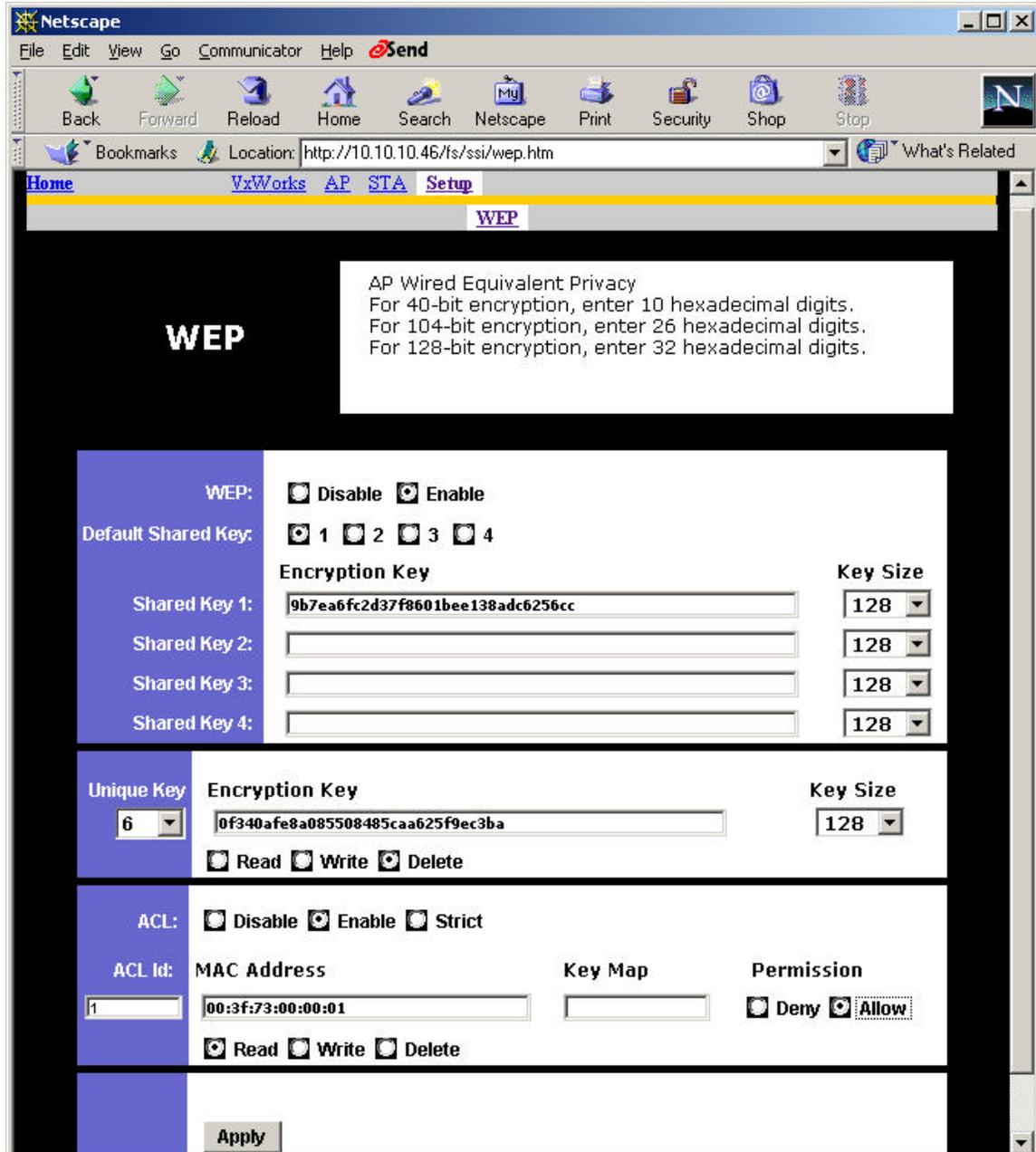
Read Write Delete

Apply

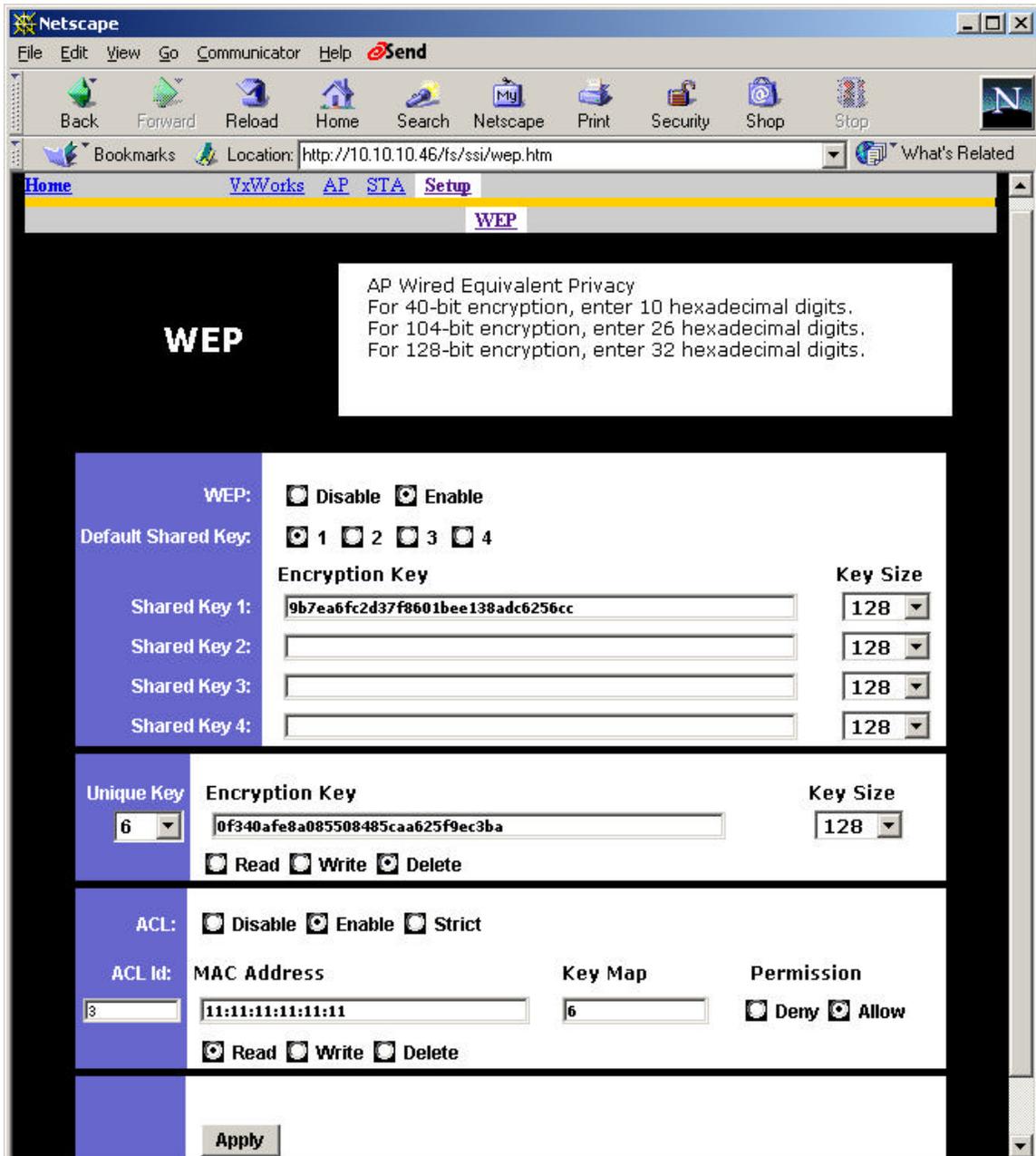
To delete a unique key, select Delete, use the pull down menu to select the unique key ID that contains the unique key you want to delete, and click Apply.



To view the ACL list, select Read inside the ACL frame, enter the ACL ID to be viewed, and click Apply. In this example, ACL ID 1 is selected and displayed, and specifies that MAC address 00:3f:73:00:00:01 is allowed access.



In this example, ACL ID 3 is selected and displayed, and specifies that MAC address 11:11:11:11:11:11 is allowed access with unique key 6.



To add a new ACL entry, select Write, enter the new MAC address, enter key ID (if needed), select either Deny or Allow, and click Apply to save the changes. In this example, the new ACL entry has the MAC address 08:00:20:ac:37:51 using shared key 1 to allow access. The next example shows that the changes are accepted and ACL ID 4 (the next available ACL ID) is automatically assigned.

WEP

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 For 104-bit encryption, enter 26 hexadecimal digits.
 For 128-bit encryption, enter 32 hexadecimal digits.

WEP: Disable Enable

Default Shared Key: 1 2 3 4

Shared Key	Encryption Key	Key Size
Shared Key 1:	9b7ea6fc2d37f8601bee138adc6256cc	128
Shared Key 2:		128
Shared Key 3:		128
Shared Key 4:		128

Unique Key	Encryption Key	Key Size
6	0f340afe8a085508485caa625f9ec3ba	128

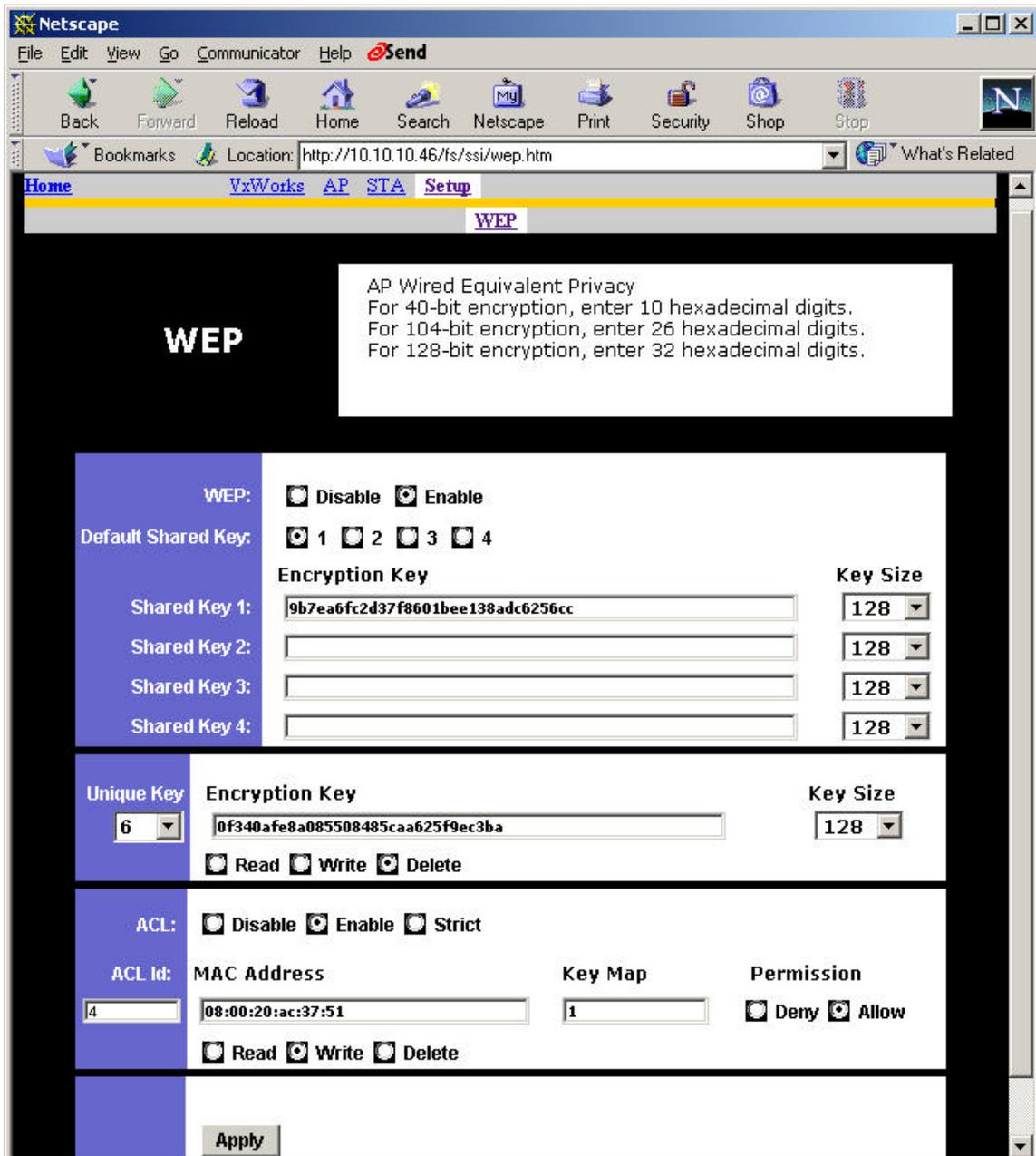
Read Write Delete

ACL: Disable Enable Strict

ACL Id:	MAC Address	Key Map	Permission
	08:00:20:ac:37:51	1	<input type="checkbox"/> Deny <input checked="" type="checkbox"/> Allow

Read Write Delete

Apply



To delete an ACL entry, select Delete, enter the ACL ID to be deleted, and click Apply. In this example, ACL ID 2 is deleted.

WEP

AP Wired Equivalent Privacy
 For 40-bit encryption, enter 10 hexadecimal digits.
 For 104-bit encryption, enter 26 hexadecimal digits.
 For 128-bit encryption, enter 32 hexadecimal digits.

WEP: Disable Enable

Default Shared Key: 1 2 3 4

Shared Key	Encryption Key	Key Size
Shared Key 1:	9b7ea6fc2d37f8601bee138adc6256cc	128
Shared Key 2:		128
Shared Key 3:		128
Shared Key 4:		128

Unique Key Read Write Delete

Unique Key	Encryption Key	Key Size
6	0f340afe8a085508485caa625f9ec3ba	128

ACL: Disable Enable Strict

ACL Id:	MAC Address	Key Map	Permission
2			<input type="checkbox"/> Deny <input checked="" type="checkbox"/> Allow

Read Write Delete