Lab 7.3.5 Configuring Wireless Security

Objectives

- Create a security plan for a home network.
- Configure the wireless access point (AP) portion of a multi-function device using security best practices.

Background / Preparation

A well-planned security implementation is critical to the safety of a wireless network. This lab goes over the steps that must be taken to ensure the safety of the network using the following scenario.

You have just purchased a Linksys WRT300N wireless router, and you want to set up a small network in your home. You selected this router because the IEEE 802.11n specification claims that it has 12 times the speed of an 802.11g and 4 times the range. Because the 802.11n uses 2.4 GHz, it is backward compatible with both the 802.11b and 802.11g and uses MIMO (multiple-in, multiple-out) technology.

You should enable security mechanisms *before* connecting your multi-function device to the Internet or any wired network. You should also change the default values provided, because they are well-known values that are easily obtainable on the Internet.

The following resources are required:

- Windows-based computer
- Linksys WRT300N
- Straight-through Ethernet cable

Step 1: Plan the security for your home network

a. List at least six security best practices that you should implement to secure your multi-function device and wireless network.

1) ____

2) ____

3) ____

4) ____

5) ____

6) ____

b. Describe what the security risk is for each item.

1) ____

2) ____

3) ____

4) ____

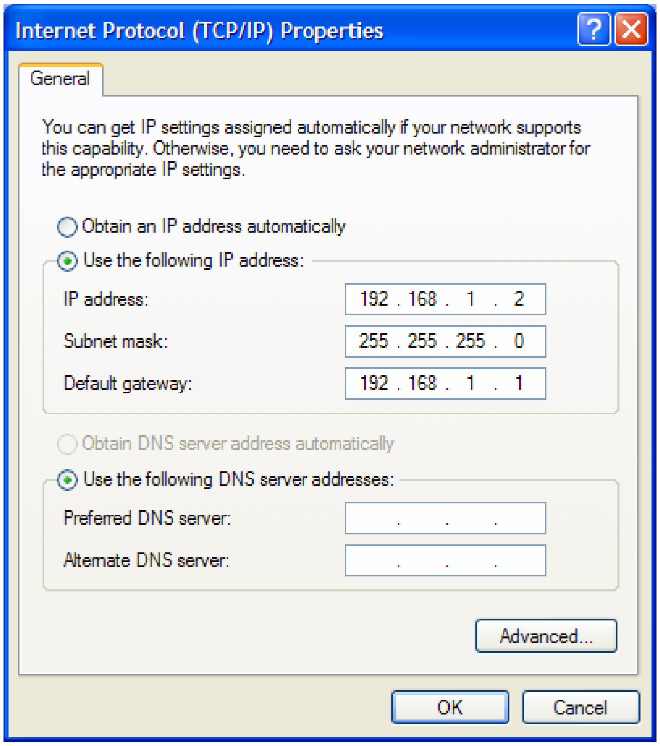
5) ____

6) ____

Step 2: Connect a computer to the multi-function device and log in to the web-based utility

a. Connect your computer (Ethernet NIC) to the multi-function device (port 1 on the Linksys WRT300N) by using a straight-through cable.

b. The default IP address of the Linksys WRT300N is 192.168.1.1, and the default subnet mask is 255.255.255.0. The computer and Linksys device must be on the same network to communicate with each other. Change the IP address of the computer to 192.168.1.2, and verify that the subnet mask is 255.255.255.0. Enter the internal address of the Linksys device (192.168.1.1) as the default gateway. Do this by clicking, **Start > Control Panel > Network Connections**. Right click on the wireless connection and choose **Properties**. Select the Internet Protocol (TCP/IP) and enter the addresses as shown below.



You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically

● Use the following IP address:

IP address: 192 . 168 . 1 . 2

Subnet mask: 255 . 255 . 255 . 0

Default gateway: 192 . 168 . 1 . 1

○ Obtain DNS server address automatically

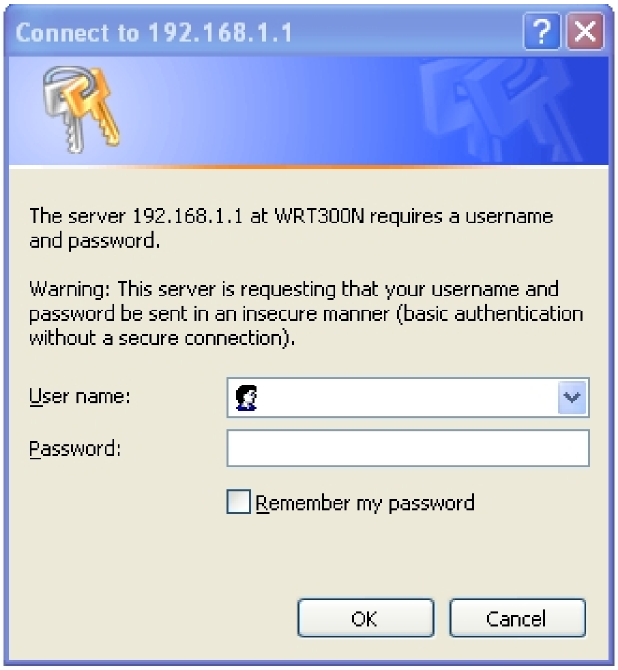
● Use the following DNS server addresses:

Preferred DNS server: . . .

Alternate DNS server: . . .

c. Open a web browser, such as Internet Explorer, Netscape, or Firefox and enter the default IP address of the Linksys device (192.168.1.1) into the address field and press **Enter**.

d. A screen appears, requesting your user name and password.



The server 192.168.1.1 at WRT300N requires a username and password.

Warning: This server is requesting that your username and password be sent in an insecure manner (basic authentication without a secure connection).

User name:

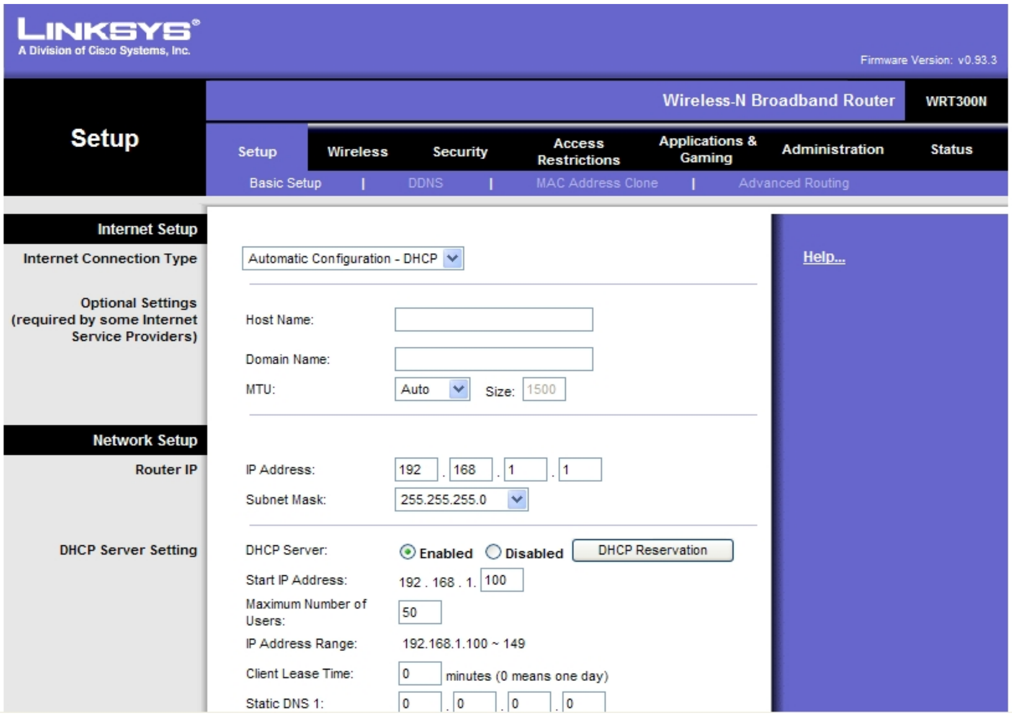
Password:

b. Leave the User name field blank and enter **admin** for the password. It is the default password on the Linksys device. Click **OK.** Remember that passwords are case-sensitive.

c. As you make the necessary changes on the Linksys device, click **Save Settings** on each screen to save the changes or click **Cancel Changes** to keep the default settings.

Step 4: Change the Linksys device password

a. The initial screen displayed is the **Setup > Basic Setup** screen.



Internet Connection Type: Automatic Configuration - DHCP

Optional Settings (required by some Internet Service Providers)

Host Name:

Domain Name:

MTU: Auto Size: 1500

Router IP

IP Address: 192 . 168 . 1 . 1

Subnet Mask: 255.255.255.0

DHCP Server Setting

DHCP Server: ● Enabled ○ Disabled

Start IP Address: 192 . 168 . 1. 100

Maximum Number of Users: 50

IP Address Range: 192.168.1.100 ~ 149

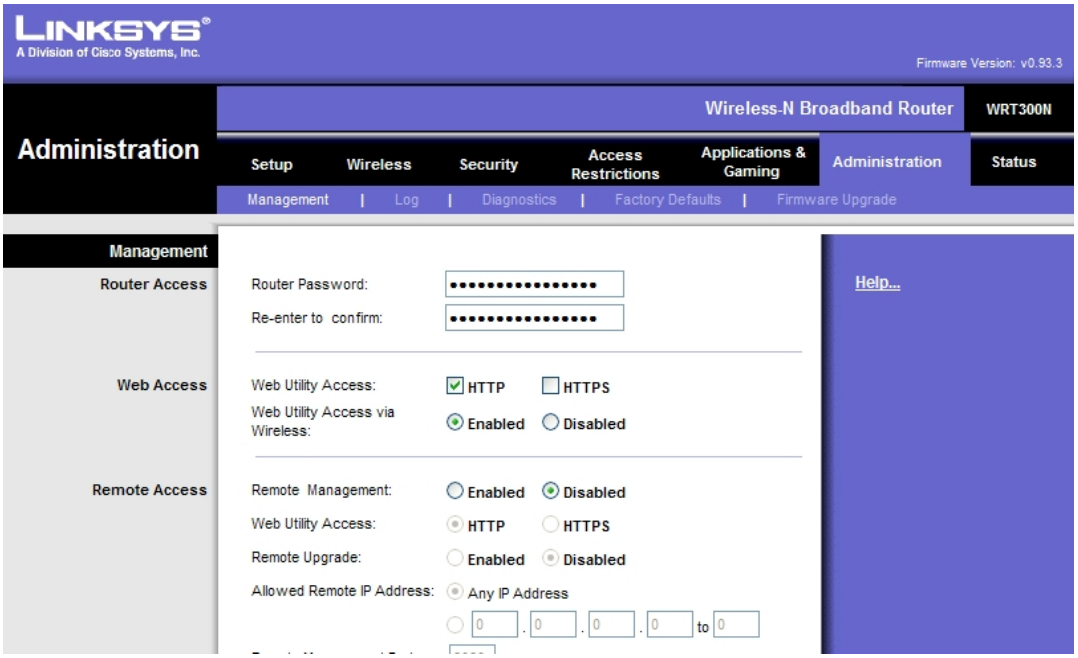
Client Lease Time: 0 minutes (0 means one day)

Static DNS 1: 0 . 0 . 0 . 0

b. Click the **Administration** tab. The **Management** tab is selected by default.

c. Type in a new password for the Linksys device, and then confirm the password. The new password must not be more than 32 characters and must not include any spaces. The password is required to access the Linksys device web-based utility and Setup Wizard.

d. The Web Utility Access via Wireless option is enabled by default. You may want to disable this feature to further increase security.


LINKSYS®
A Division of Cisco Systems, Inc.
Firmware Version: v0.93.3
Administration
Wireless-N Broadband Router
WRT300N
Setup
Wireless
Security
Access Restrictions
Applications & Gaming
Administration
Status
Management | Log | Diagnostics | Factory Defaults | Firmware Upgrade
Management
Help...

Router Access

Router Password: ••••••••••••••••

Re-enter to confirm: ••••••••••••••••

Web Access

Web Utility Access: ☑ HTTP □ HTTPS

Web Utility Access via Wireless: ● Enabled ○ Disabled

Remote Access

Remote Management: ○ Enabled ● Disabled

Web Utility Access: ● HTTP ○ HTTPS

Remote Upgrade: ○ Enabled ● Disabled

Allowed Remote IP Address: ● Any IP Address

○ 0 . 0 . 0 . 0 to 0

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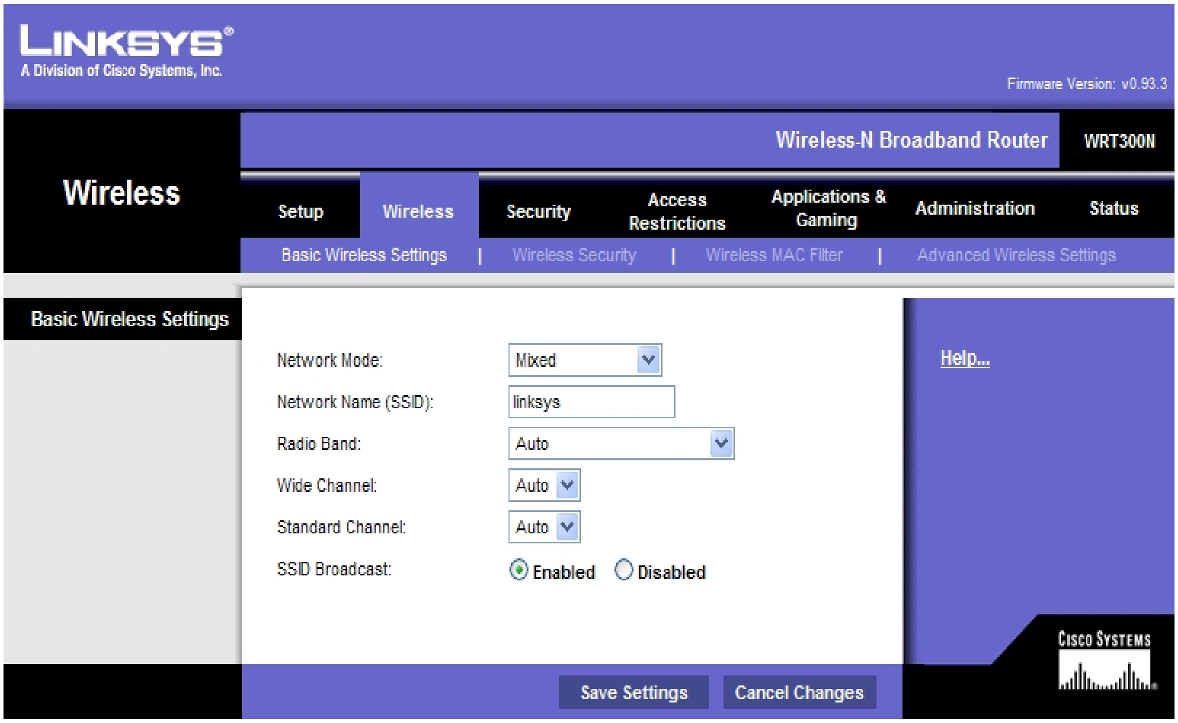
e. Click the **Save Settings** button to save the information.

NOTE: If you forget your password, you can reset the Linksys device to the factory defaults by pressing the RESET button for 5 seconds and then releasing it. The default password is **admin**.

Step 5: Configure the wireless security settings

a. Click the **Wireless** tab. The **Basic Wireless Settings** tab is selected by default. The **Network Name** is the SSID shared among all devices on your network. It must be identical for all devices in the wireless network. It is case-sensitive and must not be more than 32 characters.


LINKSYS®
A Division of Cisco Systems, Inc.
Firmware Version: v0.93.3
Wireless-N Broadband Router
WRT300N
Wireless
Setup
Wireless
Security
Access Restrictions
Applications & Gaming
Administration
Status
Basic Wireless Settings | Wireless Security | Wireless MAC Filter | Advanced Wireless Settings
Basic Wireless Settings
Help...
Cisco Systems
Save Settings
Cancel Changes

Network Mode: Mixed

Network Name (SSID): linksys

Radio Band: Auto

Wide Channel: Auto

Standard Channel: Auto

SSID Broadcast: ● Enabled ○ Disabled

b. Change the SSID from the default of **linksys** to a unique name. Record the name you have chosen:

____

c. Leave the Radio Band set to **Auto**. This allows your network to use all 802.11n, g, and b devices.

d. For SSID Broadcast, select the Disabled button to disable the SSID broadcast. Wireless clients survey the area for networks to associate with and will detect the SSID broadcast sent by the Linksys device. For added security, do not broadcast the SSID.

e. Save your settings before going to the next screen.

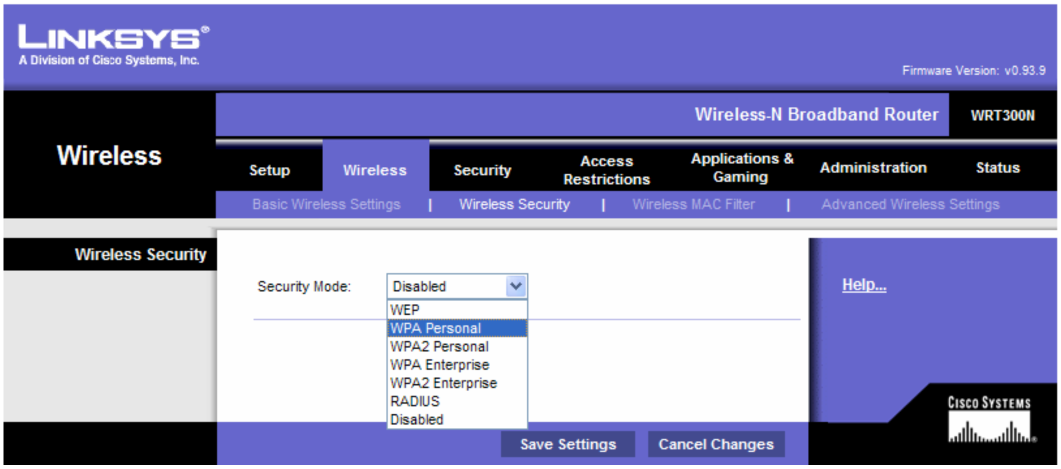
Step 6: Configure encryption and authentication

a. Choose the **Wireless Security** tab on the **Wireless** screen.

b. This router supports four types of security mode settings:

- WEP (Wired Equivalent Privacy)
- WPA (Wi-Fi Protected Access) Personal, which uses a pre-shared key (PSK)
- WPA Enterprise, which uses Remote Access Dial In User Service (RADIUS)
- RADIUS

c. Select WPA Personal Security Mode.



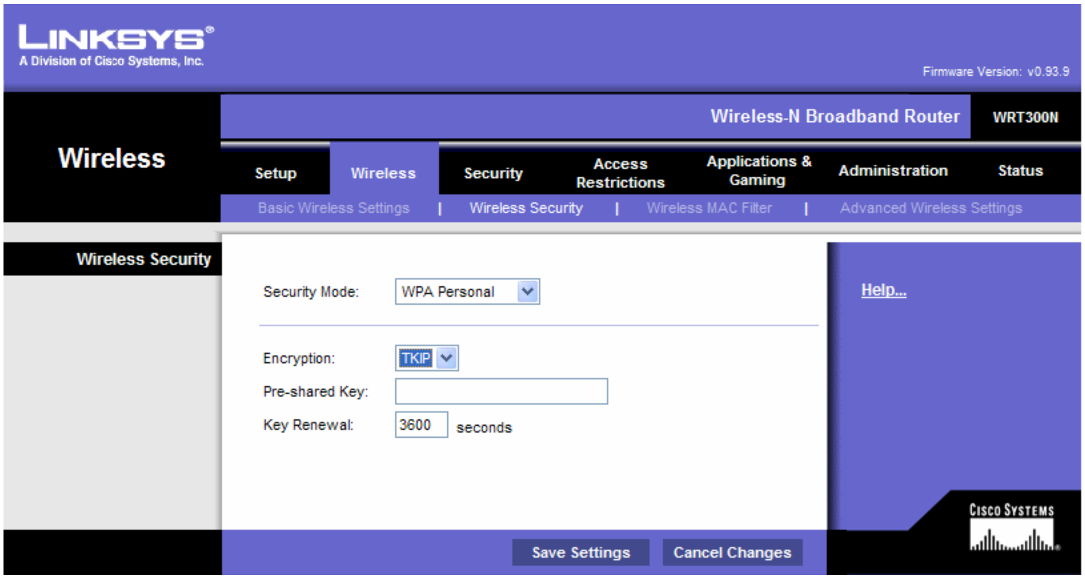
Security Mode: Disabled

d. On the next screen, choose an Encryption algorithm.

To secure a network, use the highest level of encryption possible within the Selected Security mode. The following Security Modes and Encryption levels are listed from least secure (WEP) to most secure (WPA2 with AES)

- WEP
- WPA
  - TKIP (Temporal Key Integrity Protocol)
  - AES (Advanced Encryption System)
- WPA2
  - TKIP
  - AES

AES is only supported by newer devices that contain a co-processor. To ensure compatibility with all devices, select TKIP.


LINKSYS®
A Division of Cisco Systems, Inc.
Firmware Version: v0.93.9
Wireless
Wireless-N Broadband Router
WRT300N
Setup
Wireless
Security
Access Restrictions
Applications & Gaming
Administration
Status
Basic Wireless Settings | Wireless Security | Wireless MAC Filter | Advanced Wireless Settings
Wireless Security
Help...
Save Settings
Cancel Changes
Cisco Systems

Security Mode: WPA Personal

Encryption: TKIP

Pre-shared Key:

Key Renewal: 3600 seconds

e. For authentication, enter a pre-shared key between 8 and 63 characters. This key is shared by the Linksys device and all connected devices.

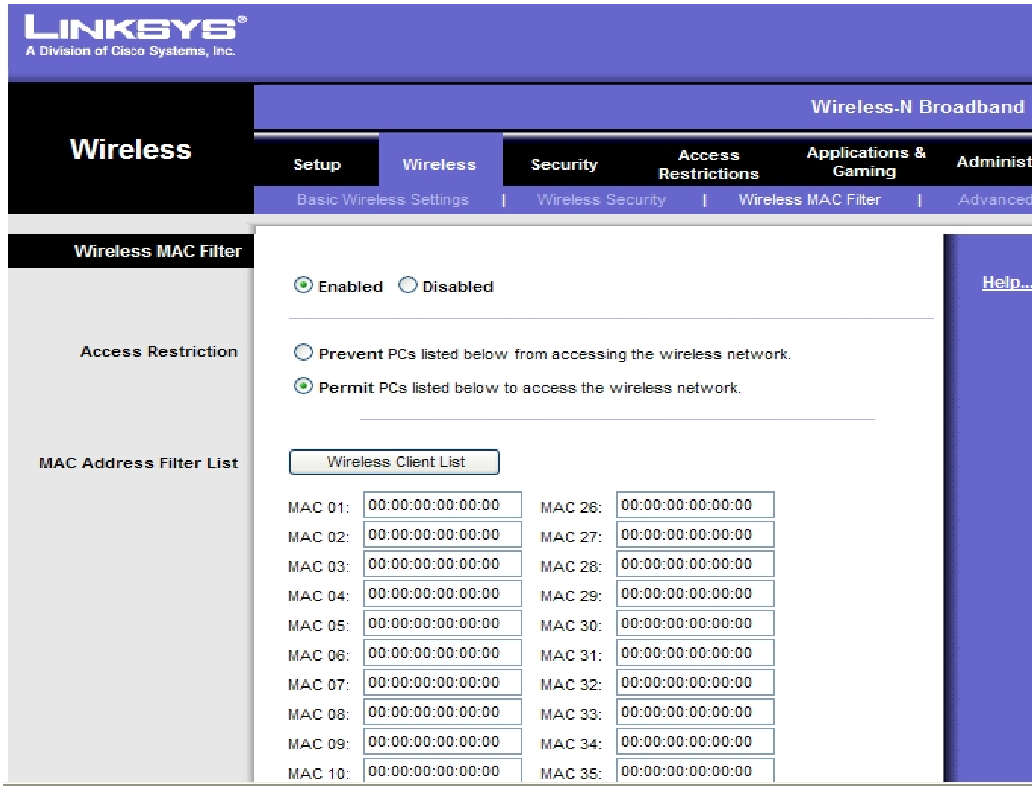
f. Choose a key renewal period between 600 and 7200 seconds. The renewal period is how often the Linksys device changes the encryption key.

g. Save your settings before exiting the screen.

Step 7: Configure MAC address filtering

a. Choose the **Wireless MAC Filter** tab on the **Wireless** screen.

b. MAC address filtering allows only selected wireless client MAC addresses to have access to your network. Select the radio button to **Permit PCs listed below to access the wireless network**. Click the **Wireless Client List** button to display a list of all wireless client computers on your network.



Wireless MAC Filter ● Enabled ○ Disabled

Access Restriction

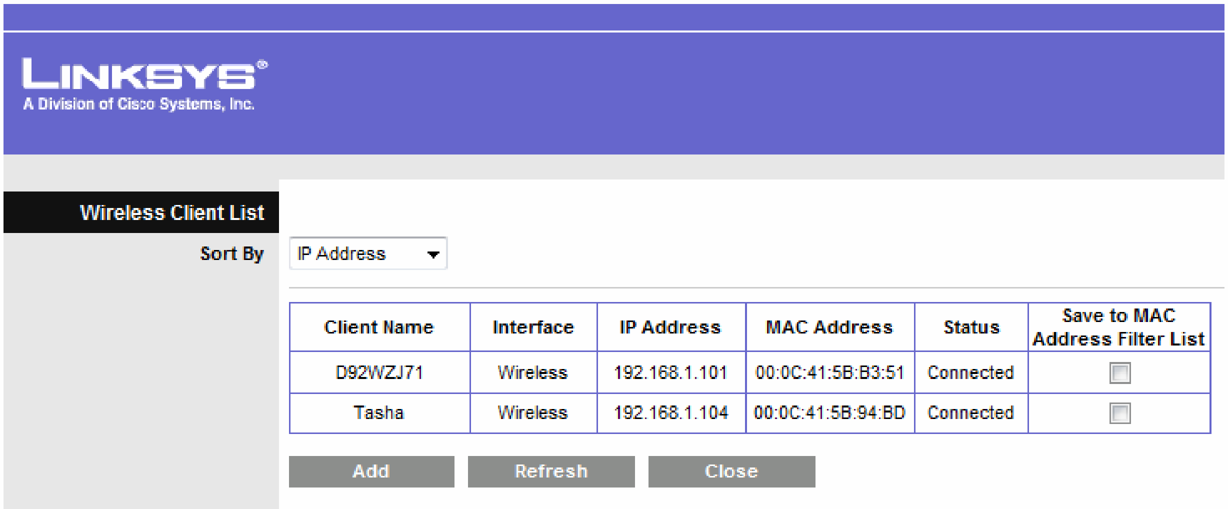
○ **Prevent** PCs listed below from accessing the wireless network.

● **Permit** PCs listed below to access the wireless network.

MAC Address Filter List

MAC 01:	00:00:00:00:00:00	MAC 26:	00:00:00:00:00:00
MAC 02:	00:00:00:00:00:00	MAC 27:	00:00:00:00:00:00
MAC 03:	00:00:00:00:00:00	MAC 28:	00:00:00:00:00:00
MAC 04:	00:00:00:00:00:00	MAC 29:	00:00:00:00:00:00
MAC 05:	00:00:00:00:00:00	MAC 30:	00:00:00:00:00:00
MAC 06:	00:00:00:00:00:00	MAC 31:	00:00:00:00:00:00
MAC 07:	00:00:00:00:00:00	MAC 32:	00:00:00:00:00:00
MAC 08:	00:00:00:00:00:00	MAC 33:	00:00:00:00:00:00
MAC 09:	00:00:00:00:00:00	MAC 34:	00:00:00:00:00:00
MAC 10:	00:00:00:00:00:00	MAC 35:	00:00:00:00:00:00

c. The next screen allows you to identify which MAC addresses can have access to the wireless network. Click the **Save to MAC Address Filter List** check box for any client device you want to add, and then click the **Add** button. Any wireless clients, other than those in the list will be prevented from accessing your wireless network. Save your settings before exiting the screen.



Sort By: IP Address

Client Name	Interface	IP Address	MAC Address	Status	Save to MAC Address Filter List
D92WZJ71	Wireless	192.168.1.101	00:0C:41:5B:B3:51	Connected	□
Tasha	Wireless	192.168.1.104	00:0C:41:5B:94:BD	Connected	□

Step 8: Reflection

a. Which feature that you configured on the Linksys WRT300N makes you feel the most secure and why?

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b. Make a list of other items that could be done to make your network even more secure.

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