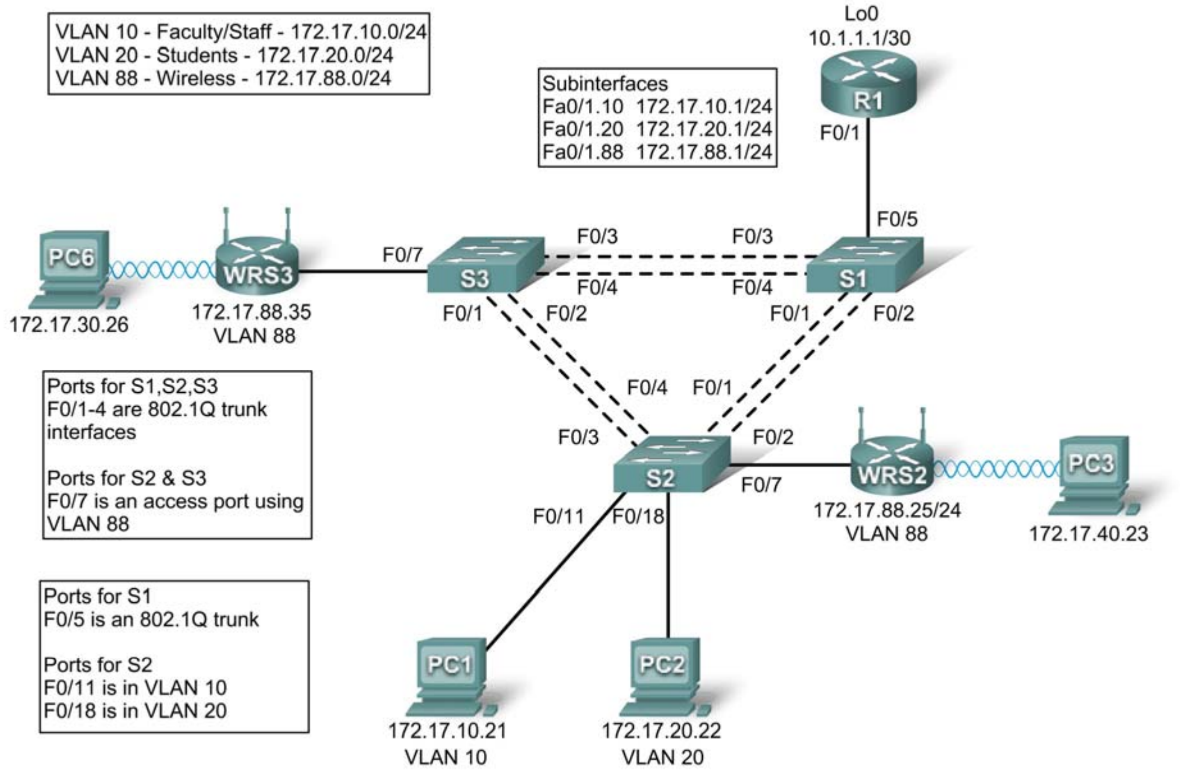
Lab 7.5.2: Challenge Wireless Configuration

Topology Diagram



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/1.10	172.17.10.1	255.255.255.0	N/A
	Fa0/1.20	172.17.20.1	255.255.255.0	N/A
	Fa0/1.88	172.17.88.1	255.255.255.0	N/A
	Lo0	10.1.1.1	255.255.255.252	N/A
WRS2	WAN	172.17.88.25	255.255.255.0	172.17.88.1
	LAN/Wireless	172.17.40.1	255.255.255.0	N/A
WRS3	WAN	172.17.88.35	255.255.255.0	172.17.88.1
	LAN/Wireless	172.17.30.1	255.255.255.0	N/A
PC1	NIC	172.17.10.21	255.255.255.0	172.17.10.1

PC2	**NIC**	172.17.20.22	255.255.255.0	172.17.20.1

Learning Objectives

Upon completion of this lab, you will be able to:

- Configure switch port VLAN information and port security
- Hard reset a Linksys WRT300N router
- Connect and verify connectivity to a wireless router
- Navigate to a Linksys WRT300N's web utility page
- Configure the IP settings of a Linksys WRT300N
- Configure DHCP on a Linksys WRT300N
- Configure static routes on both standard Cisco routers and on a WRT300N
- Change the network mode and corresponding network channel on a WRT300N
- Learn how to enable WEP encryption and disable SSID broadcast
- Enable a wireless MAC filter
- Configure access restrictions on a WRT300N
- Configure router management password on a WRT300N
- Enable logging on a WRT300N
- Upgrade WRT300N firmware
- Learn diagnosis, backup, restore, and confirmation mechanisms on a WRT300N

Scenario

In this lab, you will configure a Linksys WRT300N, port security on a Cisco switch, and static routes on multiple devices. Make note of the procedures involved in connecting to a wireless network because some changes involve disconnecting clients, which may then have to reconnect after making changes to the configuration.

Task 1: Perform Basic Router Configurations

Configure R1 according to the following guidelines:

- Router hostname
- Disable DNS lookup
- EXEC mode password
- Fast Ethernet 0/1 and Fast Ethernet 0/0 and its subinterfaces
- Loopback0
- Synchronous logging, exec-timeout, and a login of **cisco** on the console port

Task 2: Configure Switch Interfaces

Set the switches to transparent, clear the VLAN information, and create VLANs 10, 20, and 88.

<For all three switches>

```
!
vtp mode transparent
no vlan 2-1001
```

```
vlan 10,20,88
!
```

Step 1: Configure switch port interfaces on S1, S2, and S3.

Configure the interfaces on the S1, S2, and S3 switches with the connections from topology diagram.

On connections between two switches configure trunks.

On connections to a wireless router configure them as access mode for vlan 88.

Configure S2’s connection to PC1 in vlan 10 and PC2’s connection in vlan 20.

Configure S1’s connection to R1 as a trunk.

Allow all VLANS across trunking interfaces.

```
S1
!
interface FastEthernet 0/1
 switchport trunk encapsulation dot1q
 switchport mode trunk
 no shutdown
!
interface FastEthernet 0/2
 switchport trunk encapsulation dot1q
 switchport mode trunk
 no shutdown
!
interface FastEthernet 0/3
 switchport trunk encapsulation dot1q
 switchport mode trunk
 no shutdown
!
interface FastEthernet 0/4
 switchport trunk encapsulation dot1q
 switchport mode trunk
 no shutdown
!
interface FastEthernet0/5
 switchport trunk encapsulation dot1q
 switchport mode trunk
 no shutdown
!


S2
!
interface FastEthernet 0/1
 switchport trunk encapsulation dot1q
 switchport mode trunk
 no shutdown
!
interface FastEthernet 0/2
 switchport trunk encapsulation dot1q
 switchport mode trunk
 no shutdown
!
interface FastEthernet 0/3
```

```
 switchport trunk encapsulation dot1q
 switchport mode trunk
 no shutdown
!
interface FastEthernet 0/4
 switchport trunk encapsulation dot1q
 switchport mode trunk
 no shutdown
!
interface FastEthernet0/7
 switchport mode access
 switchport access vlan 88
 no shutdown
!
```

S3

```
!
interface FastEthernet 0/1
 switchport trunk encapsulation dot1q
 switchport mode trunk
 no shutdown
!
interface FastEthernet 0/2
 switchport trunk encapsulation dot1q
 switchport mode trunk
 no shutdown
!
interface FastEthernet 0/3
 switchport trunk encapsulation dot1q
 switchport mode trunk
 no shutdown
!
interface FastEthernet 0/4
 switchport trunk encapsulation dot1q
 switchport mode trunk
 no shutdwn
!
interface FastEthernet 0/7
 switchport mode access
 switchport access vlan 88
 no shutdown
!
interface FastEthernet 0/11
 switchport mode access
 switchport access vlan 11
 no shutdown
!
interface FastEthernet 0/18
 switchport mode access
 switchport access vlan 20
 no shutdown
!
```

Step 2: Verify VLANs and trunking.

Use the **show ip interface trunk** command on S1 and the **show vlan command** on S2 to verify that the switches are trunking correctly and the proper VLANs exist.

```
S1#show interface trunk

Port        Mode         Encapsulation  Status        Native vlan
Fa0/1       on           802.1q         trunking      1
Fa0/2       on           802.1q         trunking      1
Fa0/3       on           802.1q         trunking      1
Fa0/4       on           802.1q         trunking      1
Fa0/5       on           802.1q         trunking      1

Port      Vlans allowed on trunk
Fa0/1       1-4094
Fa0/2       1-4094
Fa0/3       1-4094
Fa0/4       1-4094
Fa0/5       1-4094

Port        Vlans allowed and active in management domain
Fa0/1       1,10,20,88
Fa0/2       1,10,20,88
Fa0/3       1,10,20,88
Fa0/4       1,10,20,88
Fa0/5       1,10,20,88

Port        Vlans in spanning tree forwarding state and not pruned

Port        Vlans in spanning tree forwarding state and not pruned
Fa0/1       1,10,20,88
Fa0/2       none         ←-- blocked due to spanning tree
Fa0/3       1,10,20,88
Fa0/4       1,10,20,88
Fa0/5       1,10,20,88>
```

```
S2#show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -----------------------------
1    default                          active    Fa0/5, Fa0/6, Fa0/8, Fa0/9
                                                Fa0/10, Fa0/12, Fa0/13,Fa0/14
                                                Fa0/15, Fa0/16, Fa0/17,Fa0/19
                                                Fa0/20, Fa0/21, Fa0/22,Fa0/23
                                                Fa0/24, Gi0/1, Gi0/2
10   VLAN0010                         active    Fa0/11
20   VLAN0020                         active    Fa0/18
88   VLAN0088                         active    Fa0/7
1002 fddi-default                     act/unsup
1003 token-ring-default               act/unsup
1004 fddinet-default                  act/unsup
1005 trnet-default                    act/unsup
```

When you have finished, be sure to save the running configuration to the NVRAM of the router and switches.

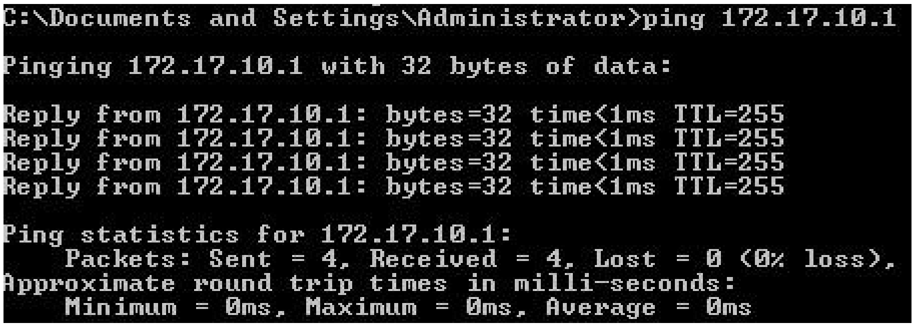
Step 3: Configure the Ethernet interfaces of PC1 and PC2.

Configure the Ethernet interfaces of PC1 and PC2 with the IP addresses and default gateways according to the addressing table at the beginning of the lab.

Step 4: Test the PC configuration.

Ping the default gateway from the PC: 172.17.10.1 for PC1, and 172.17.20.1 from PC2.

Go to Start->Run->cmd and type ping 172.17.x.x



```
C:\Documents and Settings\Administrator>ping 172.17.10.1

Pinging 172.17.10.1 with 32 bytes of data:

Reply from 172.17.10.1: bytes=32 time<1ms TTL=255
Reply from 172.17.10.1: bytes=32 time<1ms TTL=255
Reply from 172.17.10.1: bytes=32 time<1ms TTL=255
Reply from 172.17.10.1: bytes=32 time<1ms TTL=255

Ping statistics for 172.17.10.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

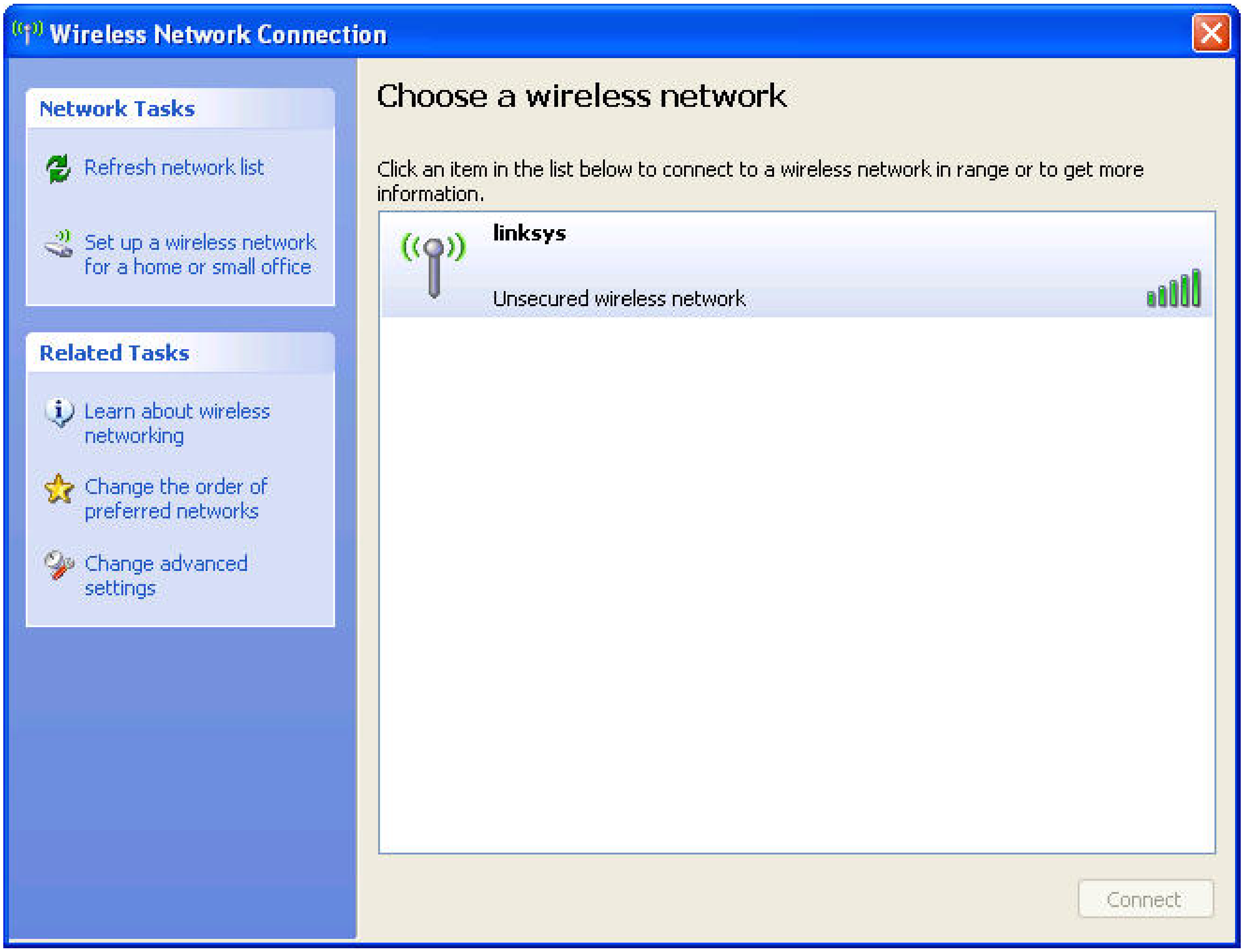
Task 3: Connect to the Linksys WRT300N Router

Check with your instructor that the wireless router has its factory default settings. If it does not, you must hard reset the router. To do so, find the reset button on the back of the router. Using a pen or other thin instrument, hold down the reset button for 5 seconds. The router should now be restored to its factory default settings.

Step 1: Use Windows XP to connect to the wireless router.

Locate the Wireless Network Connection icon in your taskbar, or go to **Start > Control Panel > Network Connections**. Right-click the icon and select View Available Wireless Networks.

You are prompted with the following display. Note that the factory default SSID of the router is simply “Linksys.”



Wireless Network Connection

Choose a wireless network

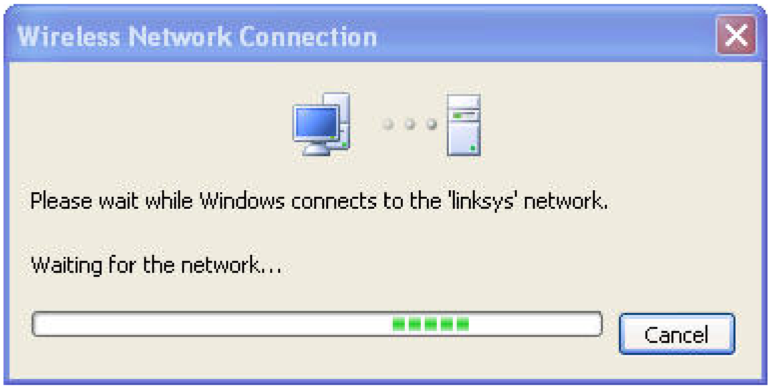
Click an item in the list below to connect to a wireless network in range or to get more information.

linksys

Unsecured wireless network

Network Tasks
Refresh network list
Set up a wireless network for a home or small office
Related Tasks
Learn about wireless networking
Change the order of preferred networks
Change advanced settings
Connect

Select **Linksys** and click **Connect**.

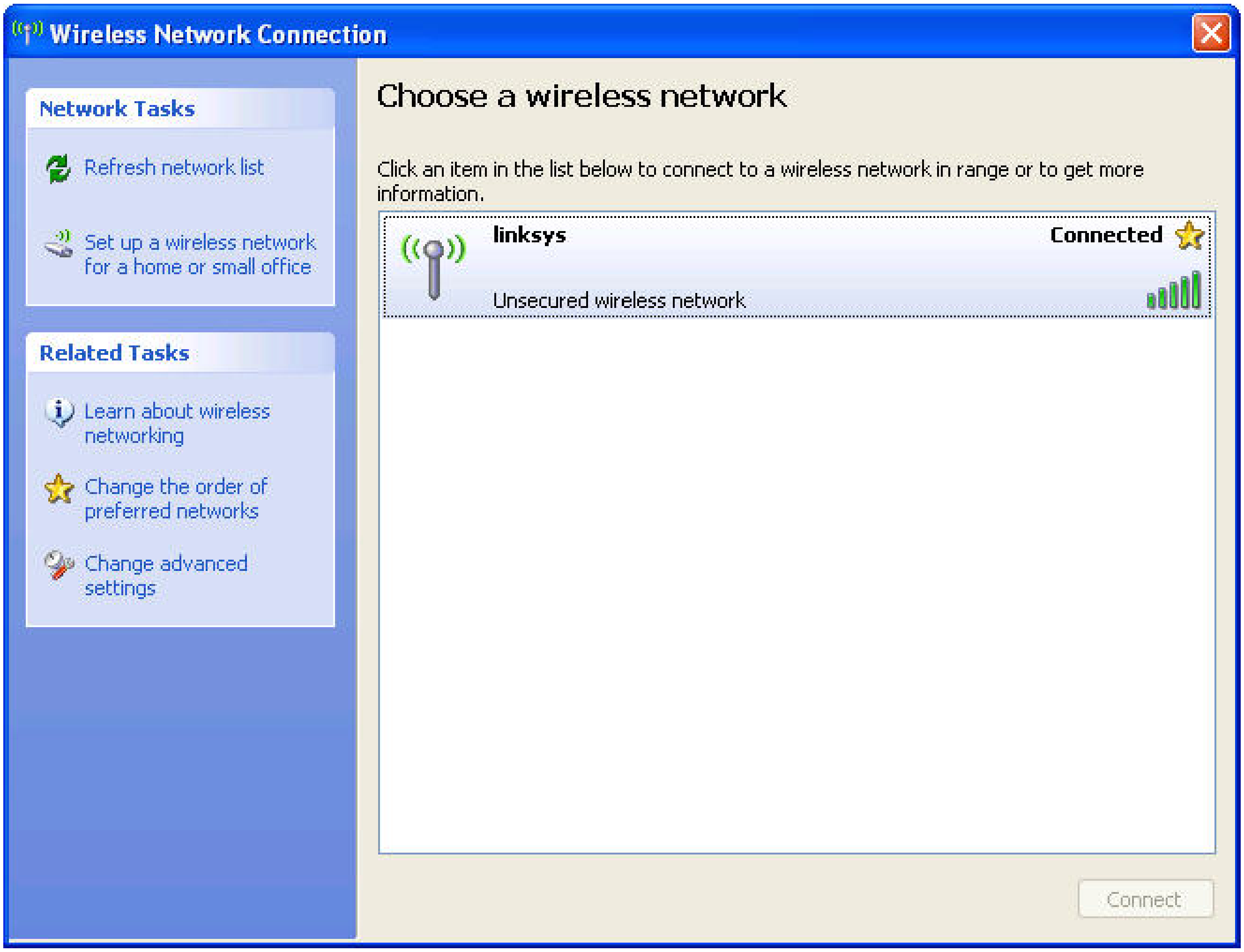


Wireless Network Connection

Please wait while Windows connects to the 'linksys' network.

Waiting for the network...

After a period of time you will be connected.


Wireless Network Connection
Network Tasks
Refresh network list
Set up a wireless network for a home or small office
Related Tasks
Learn about wireless networking
Change the order of preferred networks
Change advanced settings
Connect

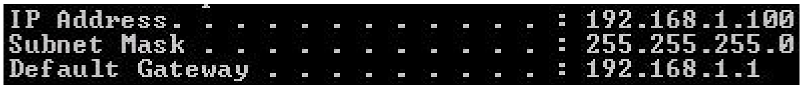
Choose a wireless network

Click an item in the list below to connect to a wireless network in range or to get more information.

linksys Connected
Unsecured wireless network

Step 2: Verify connectivity settings.

Verify the connectivity settings by going to **Start > Run** and typing **cmd**. At the command prompt, type the command **ipconfig** to view your network device information. Notice which IP address is the default gateway. This is the default IP address of a Linksys WRT300N.

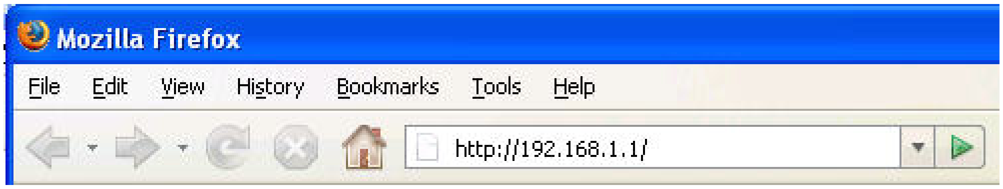


```
IP Address. . . . . . . . . . . . : 192.168.1.100
Subnet Mask . . . . . . . . . . . : 255.255.255.0
Default Gateway . . . . . . . . . : 192.168.1.1
```

Task 4: Configure the WRT300N Using the Web Utility

Step 1: Go to the default URL.

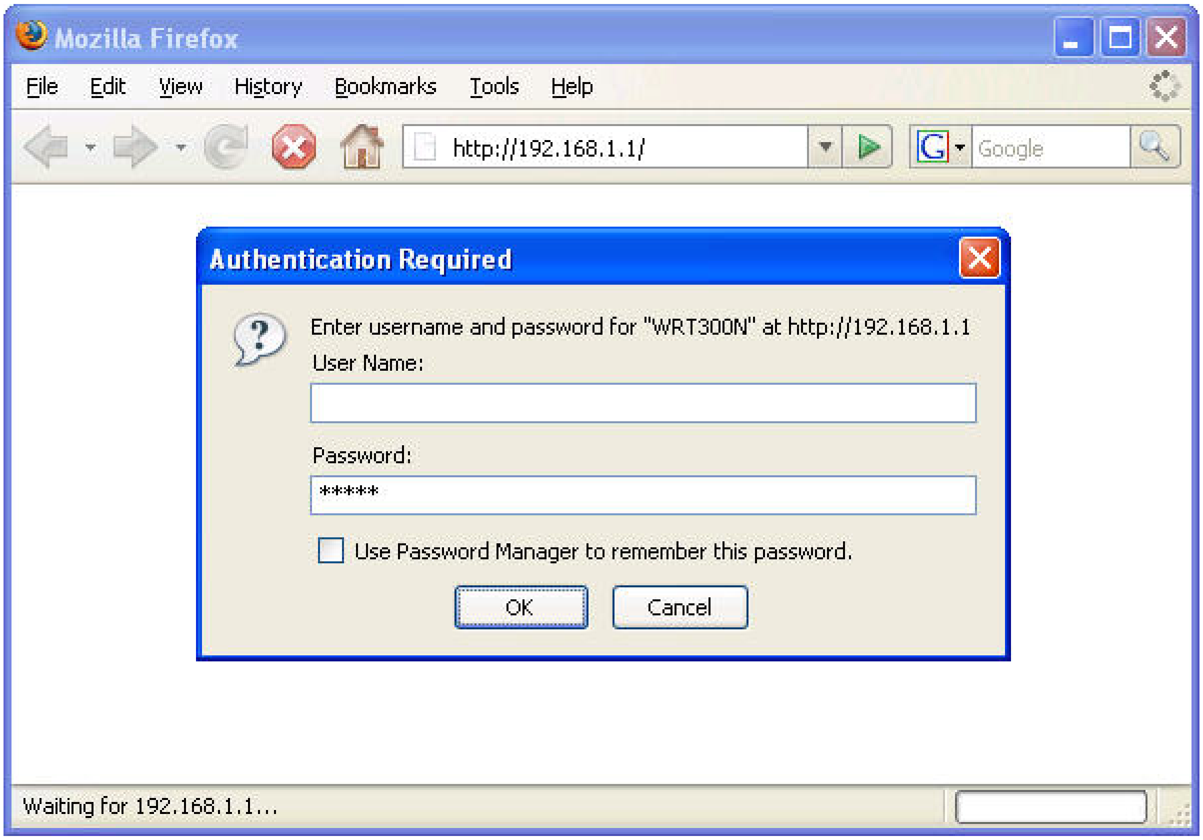
In your favorite web browse, navigate to http://192.168.1.1 which is the default URL for the WRT300N.



http://192.168.1.1/

Step 2: Enter authentication information.

You are prompted for a username and password. Enter the WRT300N factory default password of **admin** and leave the username field blank.



Enter username and password for "WRT300N" at http://192.168.1.1

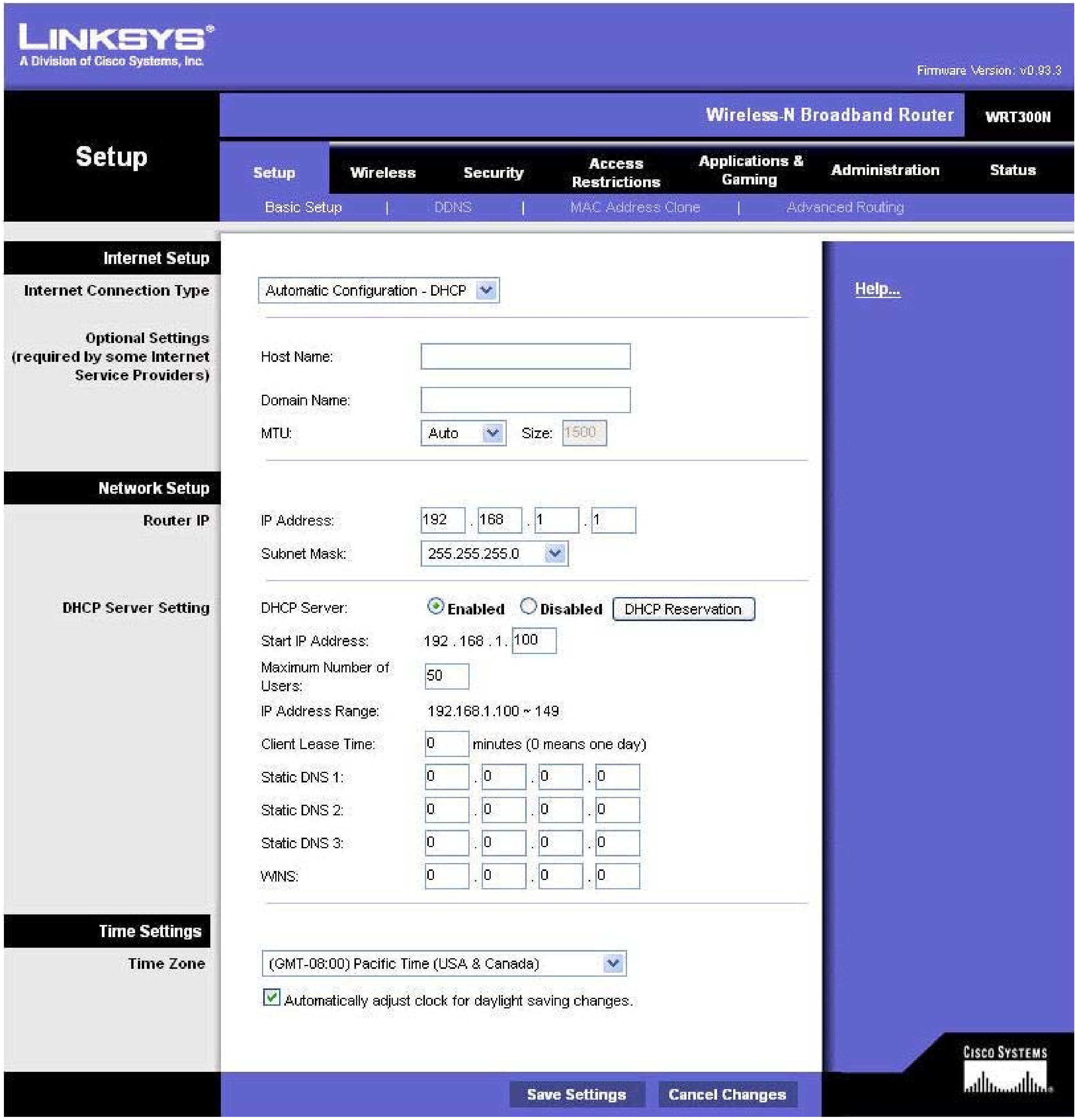
User Name:

Password: *****

□ Use Password Manager to remember this password.

Waiting for 192.168.1.1...

You should now be viewing the default page of the Linksys WRT300N web utility.



Internet Setup

Internet Connection Type: Automatic Configuration - DHCP

Optional Settings (required by some Internet Service Providers)

Host Name:

Domain Name:

MTU: Auto Size: 1500

Network Setup

Router IP

IP Address: 192 . 168 . 1 . 1

Subnet Mask: 255.255.255.0

DHCP Server Setting

DHCP Server: ● Enabled ○ Disabled DHCP Reservation

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

Static DNS 2: 0 . 0 . 0 . 0

Static DNS 3: 0 . 0 . 0 . 0

WINS: 0 . 0 . 0 . 0

Time Settings

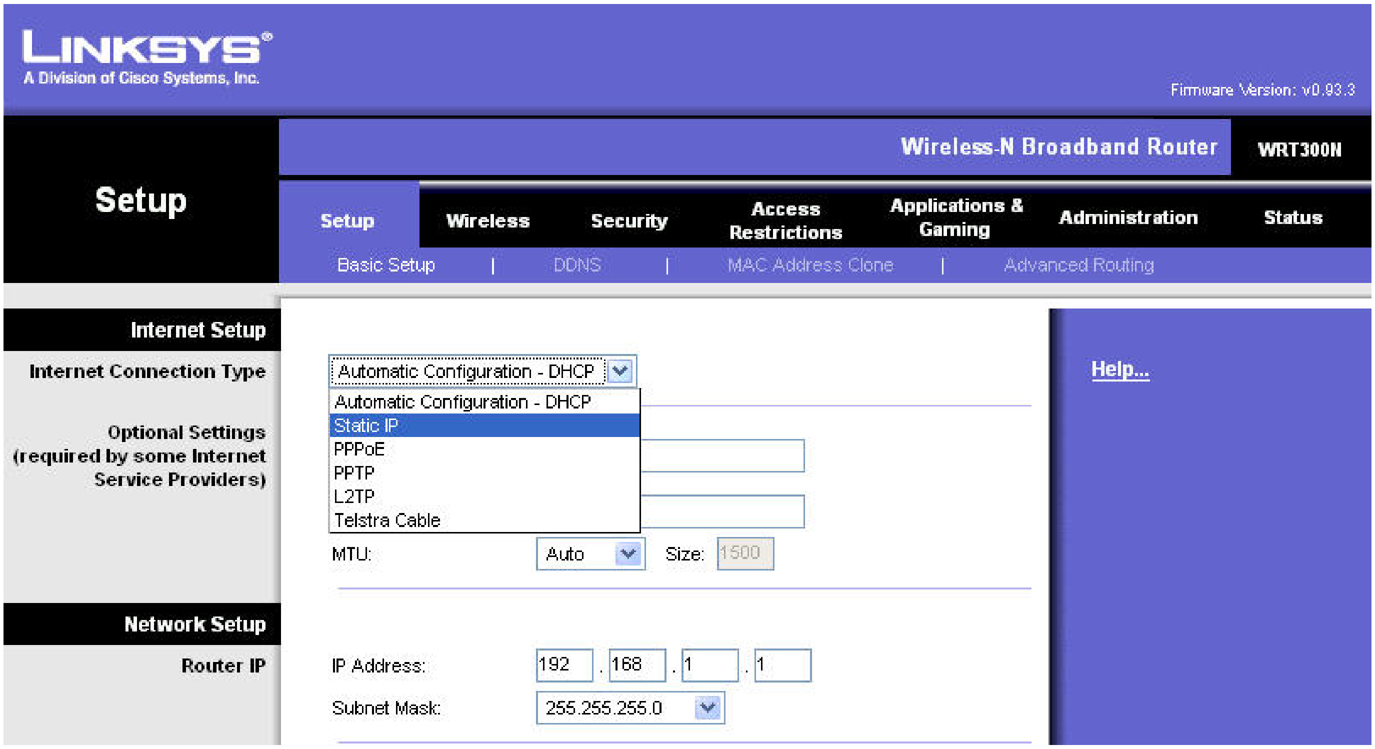
Time Zone: (GMT-08:00) Pacific Time (USA & Canada)

☑ Automatically adjust clock for daylight saving changes.

Task 5: Configure IP Settings for the Linksys WRT300N

The best way to understand the following settings is to think of the WRT300N as being similar to a Cisco IOS-based router with two separate interfaces. One of the interfaces, the one configured under Internet Setup, acts as the connection to the switches and the interior of the network. The other interface, configured under Network Setup, acts as the interface connecting to the wireless clients, PC6 and PC3.

Step 1: Set the Internet connection type to static IP.


LINKSYS®
A Division of Cisco Systems, Inc.
Firmware Version: v0.93.3
Setup
Wireless-N Broadband Router
WRT300N
Setup
Wireless
Security
Access Restrictions
Applications & Gaming
Administration
Status
Basic Setup | DDNS | MAC Address Clone | Advanced Routing
Help...

Internet Setup

Internet Connection Type: Automatic Configuration - DHCP

- Automatic Configuration - DHCP
- Static IP
- PPPoE
- PPTP
- L2TP
- Telstra Cable

Optional Settings (required by some Internet Service Providers)

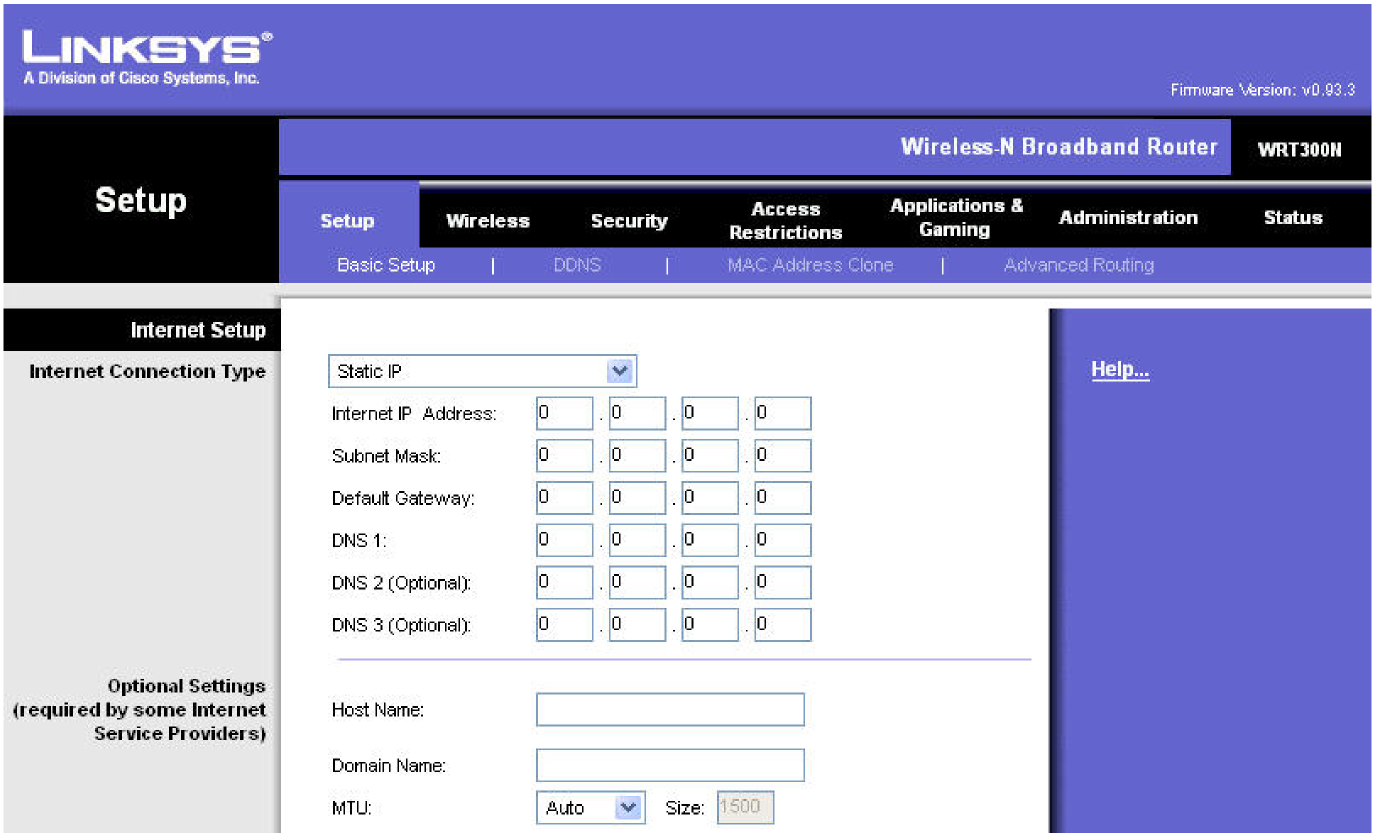
MTU: Auto Size: 1500

Network Setup

Router IP

IP Address: 192 . 168 . 1 . 1

Subnet Mask: 255.255.255.0


LINKSYS®
A Division of Cisco Systems, Inc.
Firmware Version: v0.93.3
Setup
Wireless-N Broadband Router
WRT300N
Setup
Wireless
Security
Access Restrictions
Applications & Gaming
Administration
Status
Basic Setup | DDNS | MAC Address Clone | Advanced Routing
Help...

Internet Setup

Internet Connection Type: Static IP

Internet IP Address: 0 . 0 . 0 . 0

Subnet Mask: 0 . 0 . 0 . 0

Default Gateway: 0 . 0 . 0 . 0

DNS 1: 0 . 0 . 0 . 0

DNS 2 (Optional): 0 . 0 . 0 . 0

DNS 3 (Optional): 0 . 0 . 0 . 0

Optional Settings (required by some Internet Service Providers)

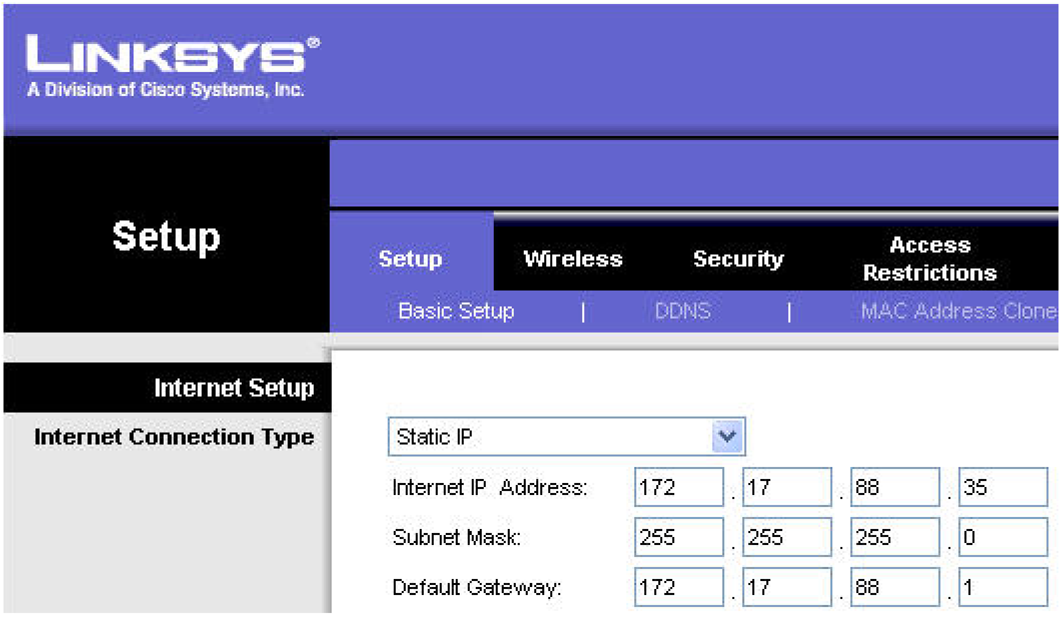
Host Name:

Domain Name:

MTU: Auto Size: 1500

Step 2: Set the IP address settings for Internet Setup.

- Set the Internet IP address to 172.17.88.35.
- Set the subnet mask to 255.255.255.0.
- Set the default gateway to the Fa 0/1 VLAN 88 IP address of R1, 172.17.88.1.


LINKSYS®
A Division of Cisco Systems, Inc.
Setup
Setup
Wireless
Security
Access Restrictions
Basic Setup | DDNS | MAC Address Clone

Internet Setup

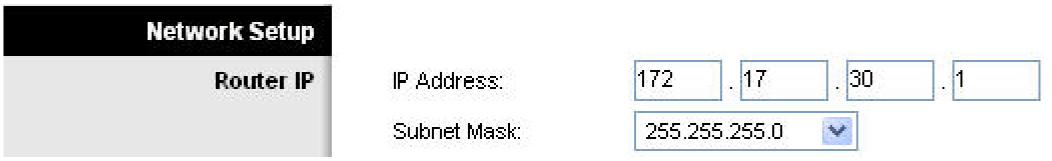
Internet Connection Type: Static IP

Internet IP Address: 172 . 17 . 88 . 35

Subnet Mask: 255 . 255 . 255 . 0

Default Gateway: 172 . 17 . 88 . 1

Step 3: Configure the Network Setup IP address to 172.17.30.1.



Network Setup

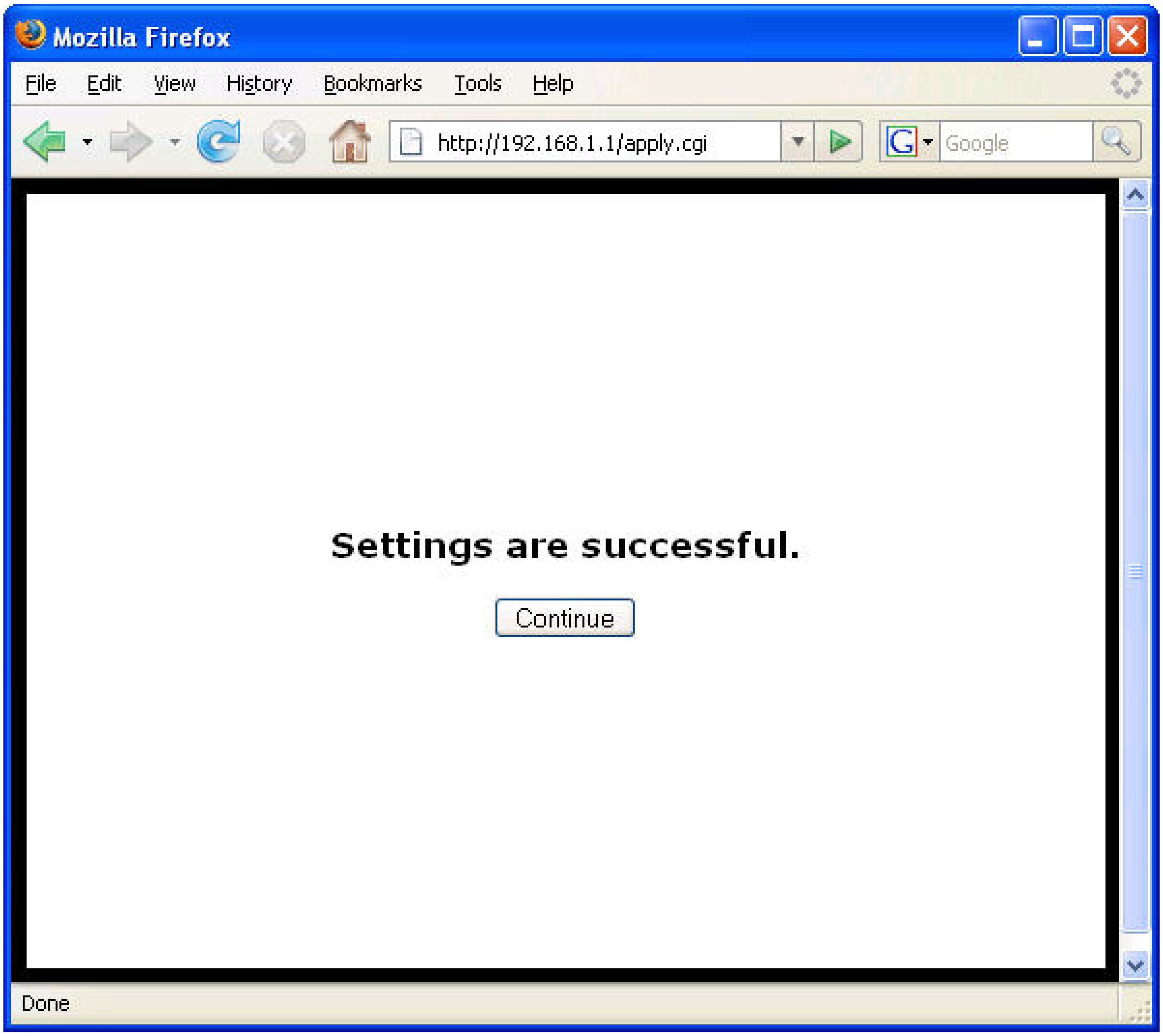
Router IP

IP Address: 172 . 17 . 30 . 1

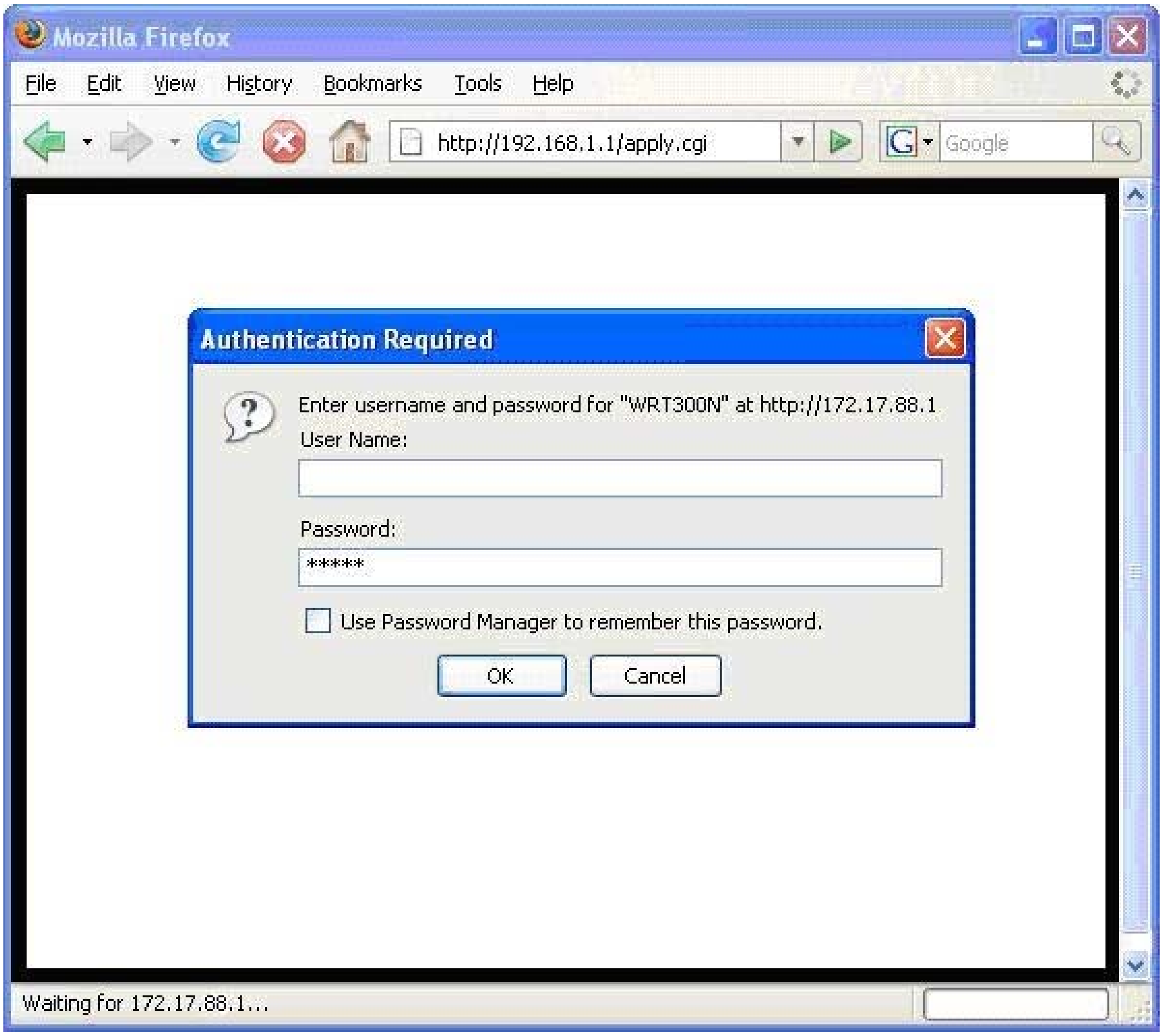
Subnet Mask: 255.255.255.0

Step 4: Save the settings.

Click **Save Settings**. You are prompted with the following window. Click **Continue**. If you are not redirected to the new URL of the web utility (**http://172.17.30.1**), navigate your browser there as you did in Task 4, Step 1.


Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://192.168.1.1/apply.cgi
Google

Settings are successful.


Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://192.168.1.1/apply.cgi
Google
Authentication Required

Enter username and password for "WRT300N" at http://172.17.88.1

User Name:

Password: *****

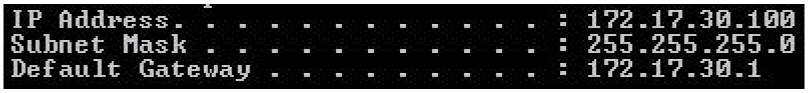
□ Use Password Manager to remember this password.

OK Cancel

Waiting for 172.17.88.1...

Step 5: Verify IP address changes.

Go back to the command prompt and notice the new IP addresses. Use the command **ipconfig**.

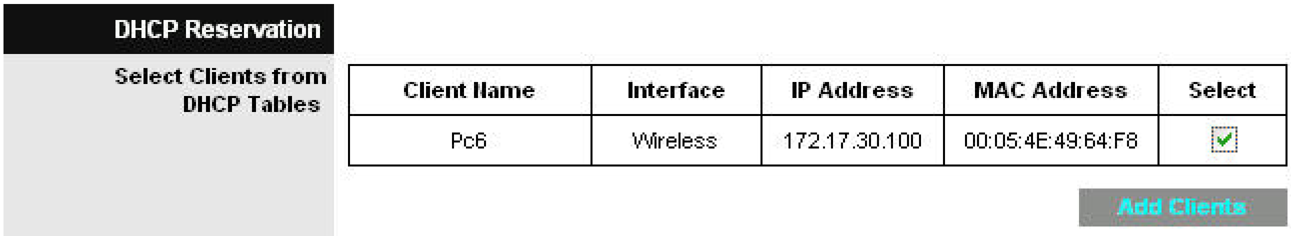


```
IP Address. . . . . . . . . . . . : 172.17.30.100
Subnet Mask . . . . . . . . . . . : 255.255.255.0
Default Gateway . . . . . . . . . : 172.17.30.1
```

Task 6: Configure DHCP Settings and Router Time Zone Settings

Step 1: Give Pc6 a static DHCP binding.

Click **DHCP Reservations** and find Pc6 in the list of current DHCP clients. Click **Add Clients**.

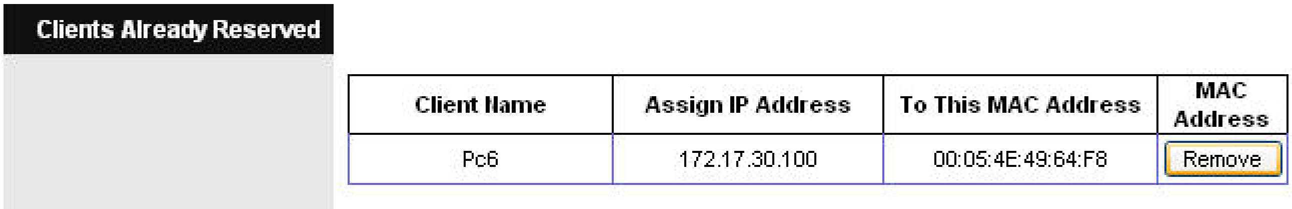


DHCP Reservation

Select Clients from DHCP Tables

Client Name	Interface	IP Address	MAC Address	Select
Pc6	Wireless	172.17.30.100	00:05:4E:49:64:F8	☑

This gives Pc6, the computer with a MAC address of 00:05:4E:49:64:F8, the same IP address, 172.17.30.100, whenever it requests an address through DHCP. This is only an example of a quick way to permanently bind a client to its current DHCP-given IP address. Now, you will assign Pc6 the IP address in the topology diagram, not the one it received initially. Click **Remove** to assign a new address.

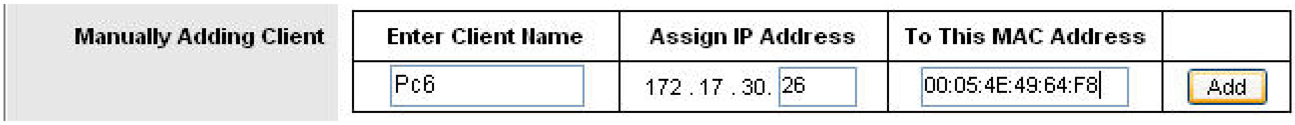


Clients Already Reserved

Client Name	Assign IP Address	To This MAC Address	MAC Address
Pc6	172.17.30.100	00:05:4E:49:64:F8	Remove

Step 2: Assign Pc6 the 172.17.30.26 address.

By entering the Pc6 address under Manually Adding Client, whenever Pc6 connects to the wireless router, it receives the IP address 172.17.30.26 via DHCP. Save your changes.



Manually Adding Client

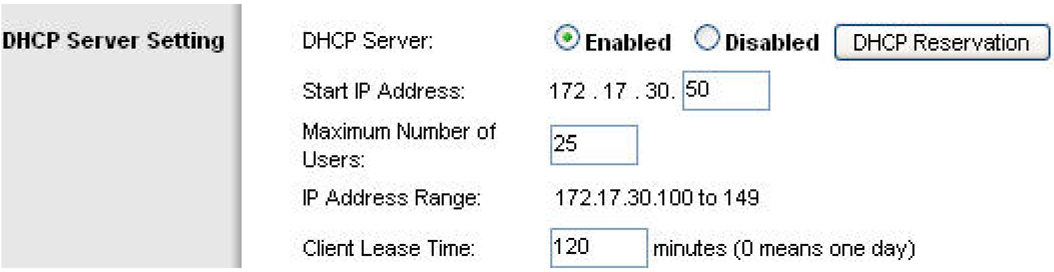
Enter Client Name	Assign IP Address	To This MAC Address	
Pc6	172 . 17 . 30. 26	00:05:4E:49:64:F8	Add

Step 3: Verify the static IP address change.

Since we already have an IP address from DHCP we are not going to get the new address, 172.17.30.26, until we reconnect. We will wait and notice that later in Task 6, Step 5 and verify that this change has taken place.

Step 4: Configure the DHCP server.

Set the start address to 50, the maximum number of users to 25, and the lease time to 2 hours (or 120 minutes).



DHCP Server Setting

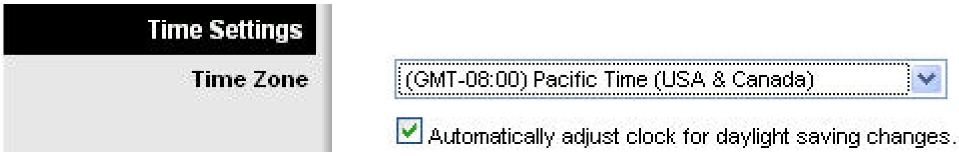
DHCP Server:	● Enabled ○ Disabled DHCP Reservation
Start IP Address:	172 . 17 . 30. 50
Maximum Number of Users:	25
IP Address Range:	172.17.30.100 to 149
Client Lease Time:	120 minutes (0 means one day)

These settings give any PC that connects to this router wirelessly requesting an IP address through DHCP, an address between 172.17.30.50–74. Only 25 clients at a time are able to get an IP address and can only have the IP address for two hours, after which time they must request a new one.

Note: IP Address Range does not update until you click **Save Settings**.

Step 5: Configure the router for the appropriate time zone.

At the bottom of the Basic Setup page, change the time zone of the router to reflect your location.



Time Settings

Time Zone: (GMT-08:00) Pacific Time (USA & Canada)

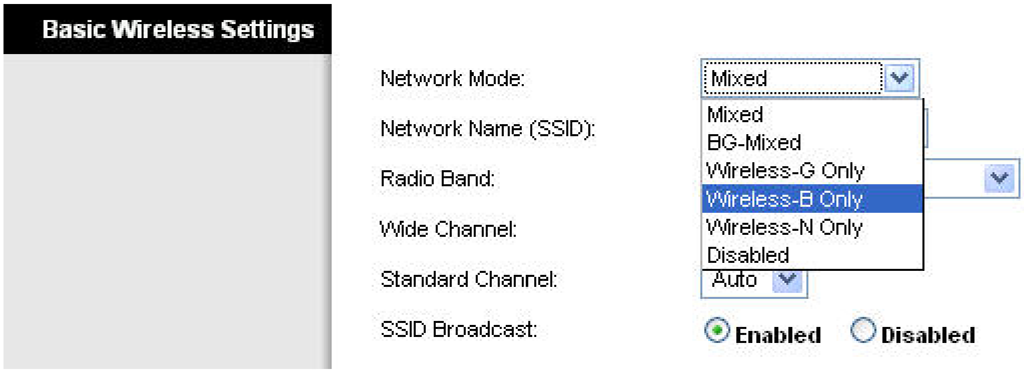
☑ Automatically adjust clock for daylight saving changes.

Step 6: Save your settings!

Task 7: Basic Wireless Settings

Step 1: Set the network mode.

The Linksys WRT300N allows you to choose in which network mode to operate. Currently, the most used network mode for clients is Wireless-G and for routers is BG-Mixed. When a router is operating in BG-Mixed, it can accept both B and G clients. However, if a B client connects, the router must scale down to the slower level of B. For this lab, we are assuming all clients are running B only, so choose Wireless-B Only.



Basic Wireless Settings

Network Mode: Mixed

Network Name (SSID):

Radio Band:

Wide Channel:

Standard Channel: Auto

SSID Broadcast: ● Enabled ○ Disabled

Step 2: Configure other settings.

Change the Network Name SSID to WRS3, Standard Channel to 6 – 2.437GHZ, and disable SSID Broadcast.

Why is it good to change the wireless channel to be different from the default channel?

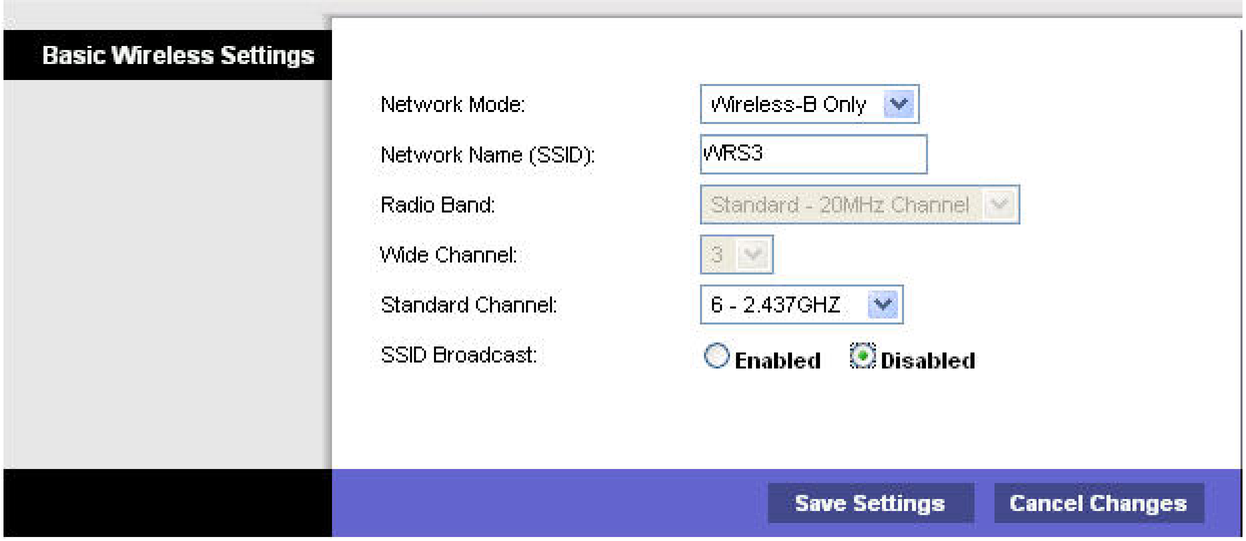
____

____

Why is it recommended to disable SSID broadcast?

____

____



Network Mode: Wireless-B Only

Network Name (SSID): WRS3

Radio Band: Standard - 20MHz Channel

Wide Channel: 3

Standard Channel: 6 - 2.437GHZ

SSID Broadcast: ○ Enabled ● Disabled

Step 3: Click Save Settings.

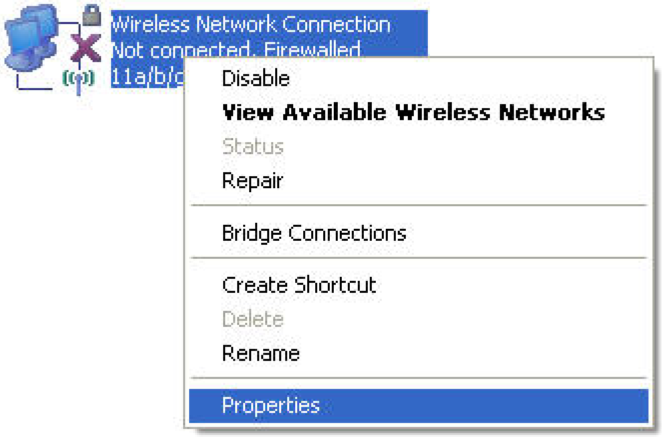
Step 4: Verify that the SSID of the router is no longer being broadcast.

Scan for wireless networks, as done in Task 3, Step 1. Does the SSID of the wireless router appear?

____

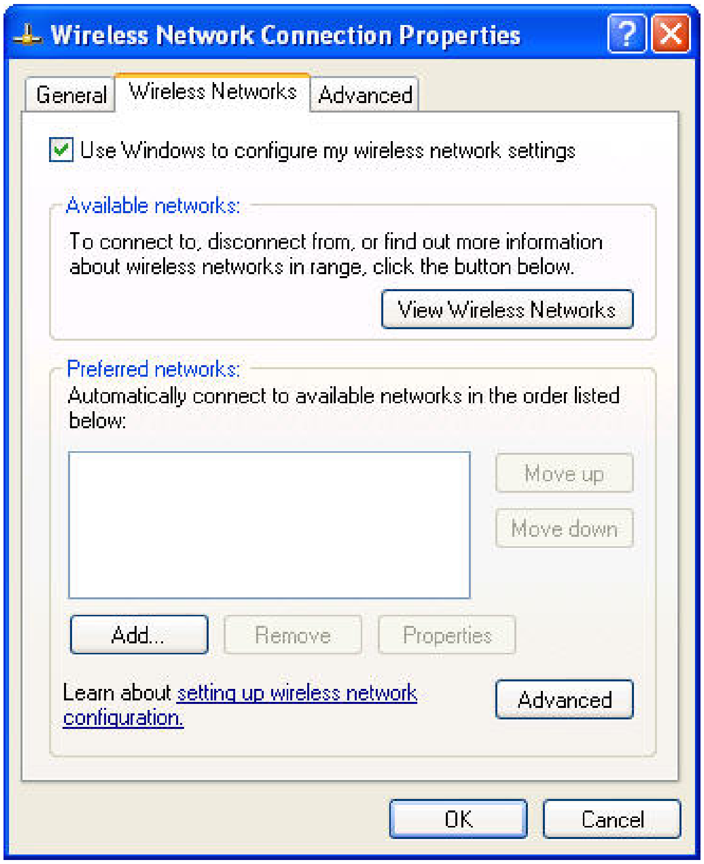
Step 5: Reconnect to the wireless network.

Navigate to **Start > Control Panel > Network Connections**, right-click the Wireless Network Connection icon, and select Properties.



Wireless Network Connection
Not connected, Firewalled
11a/b/g
Disable
View Available Wireless Networks
Status
Repair
Bridge Connections
Create Shortcut
Delete
Rename
Properties

In the Wireless Networks tab, select **Add**.



Wireless Network Connection Properties

General | Wireless Networks | Advanced

☑ Use Windows to configure my wireless network settings

Available networks:

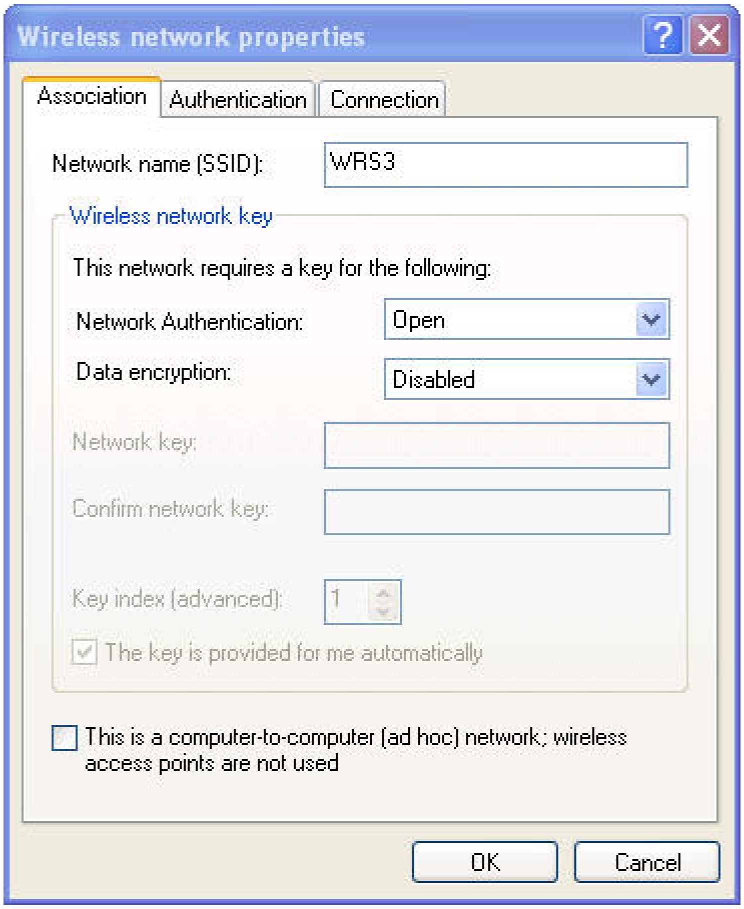
To connect to, disconnect from, or find out more information about wireless networks in range, click the button below.

Preferred networks:

Automatically connect to available networks in the order listed below:

Learn about setting up wireless network configuration.

In the Association Tab, enter WR33 as the SSID, and set the Data Encryption to Disabled. Select OK, and then select OK again. Windows should now try to reconnect to the wireless router.



Network name (SSID): WRS3

This network requires a key for the following:

Network Authentication: Open

Data encryption: Disabled

Network key:

Confirm network key:

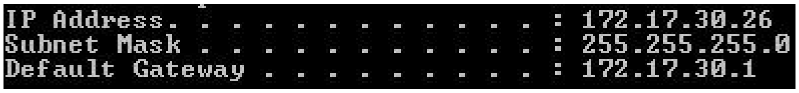
Key index (advanced): 1

☑ The key is provided for me automatically

□ This is a computer-to-computer (ad hoc) network; wireless access points are not used

Step 6: Verify the settings.

Now that you have reconnected to the network, you have the new DHCP settings that you configured in Task 5, Step 3. Verify this at the command prompt with the **ipconfig** command.



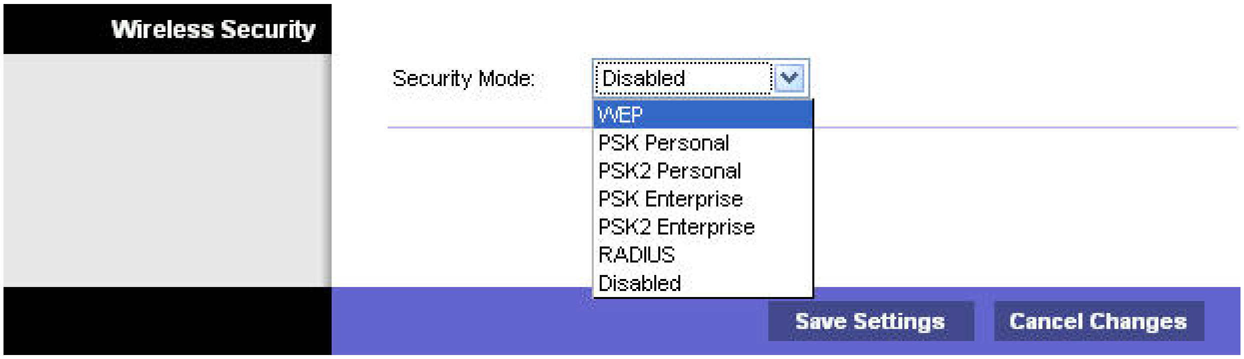
```
IP Address. . . . . . . . . . . . : 172.17.30.26
Subnet Mask . . . . . . . . . . . : 255.255.255.0
Default Gateway . . . . . . . . . : 172.17.30.1
```

Task 8: Enable Wireless Security

Step 1: Reconnect to the router setup page (http://172.17.30.1).

Step 2: Navigate to the Wireless page and then select the Wireless Security tab.

Step 3: Under Security Mode, select WEP.

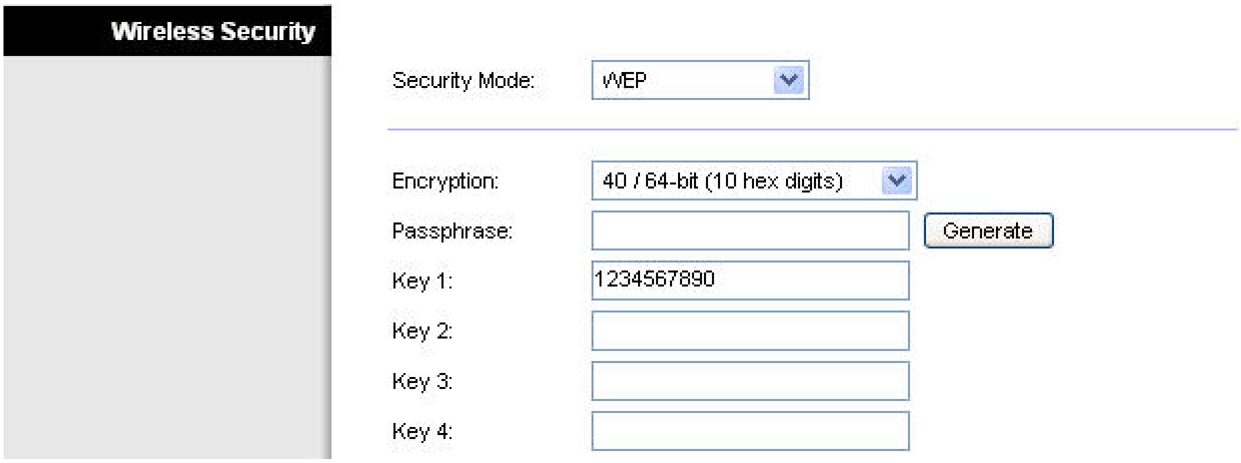


Step 4: Enter a WEP key.

A network is only as secure as its weakest point, and a wireless router is a very convenient place to start if someone wants to damage your network. By not broadcasting the SSID and requiring a WEP key to connect to the router, you are adding a few levels of security.

Unfortunately, there are tools that can discover networks that are not even broadcasting their SSID, and there are even tools that can crack WEP key encryption. A more robust form of wireless security is WPA and WPA-2, which are currently not supported on this router. Wireless MAC filters is more secure but sometimes impractical means of securing your network. It is discussed in the next task.

Add the WEP key 1234567890.



Security Mode: WEP

Encryption: 40 / 64-bit (10 hex digits)

Passphrase:

Key 1: 1234567890

Key 2:

Key 3:

Key 4:

Step 5: Save your settings.

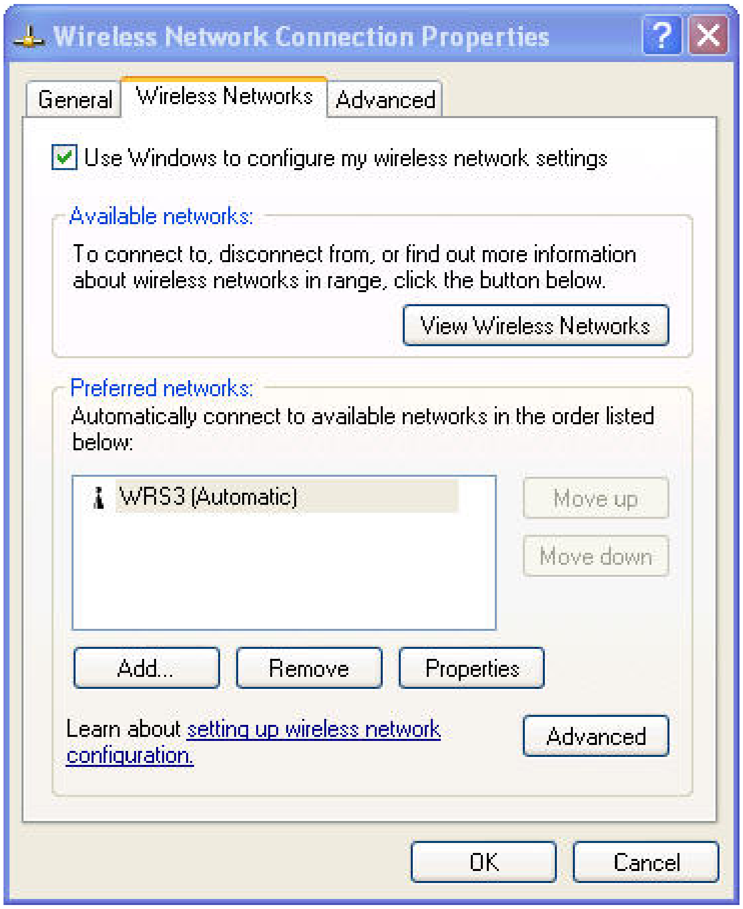
You will become disconnected from the network.

Step 6: Configure Windows to use WEP authentication.

Navigate to the Network Connections page again and right-click the **Wireless Network Connection** icon. In the Wireless Networks tab, locate the WRS3 network, and click **Properties**.

- Set Data Encryption to WEP.
- Uncheck This Key Is Provided For Me.
- Enter the network key of 1234567890, as configured before on the router.
- Click OK and OK.

Windows should now reconnect to the network.



Wireless Network Connection Properties

General | Wireless Networks | Advanced

☑ Use Windows to configure my wireless network settings

Available networks:

To connect to, disconnect from, or find out more information about wireless networks in range, click the button below.

Preferred networks:

Automatically connect to available networks in the order listed below:

WRS3 (Automatic)

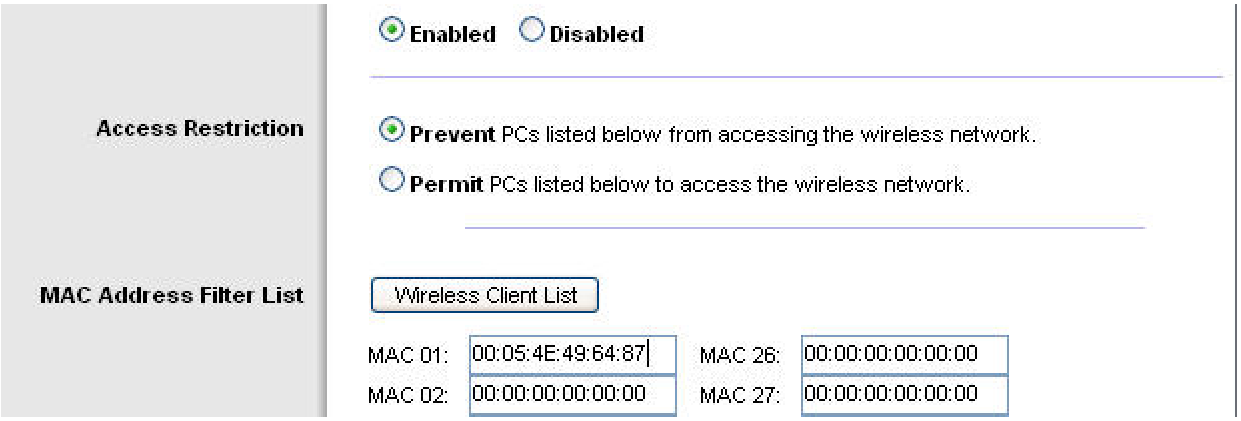
Learn about setting up wireless network configuration.

Task 9: Configure a Wireless MAC Filter

Step 1: Add a Mac filter.

- Navigate back to the web utility page of the router (http://172.17.30.1).
- Navigate to the Wireless section and then to the Wireless MAC Filter tab.
- Check Enabled.
- Select **Prevent PCs listed below from accessing the wireless network**.
- Enter the MAC address 00:05:4E:49:64:87.

This prevents any client with the MAC address 00:05:4E:49:64:87 from accessing the wireless network.



● 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:	00:05:4E:49:64:87	MAC 26:	00:00:00:00:00:00
MAC 02:	00:00:00:00:00:00	MAC 27:	00:00:00:00:00:00

Step 2: Click Wireless Client List.

The **Wireless Client List** shows anyone currently connected to the router via a wireless connection. Also take note of the option **Save to MAC filter list**. Checking this option automatically adds the MAC address of that client to the list of MAC addresses to prevent or permit access to the wireless network.

What is an extremely robust way of only allowing clients of your choosing to connect to the wireless network?

____

____

Why does this become not feasible in large networks?

____

____

What is a convenient way of adding MAC addresses if everyone to whom you wanted to allow access was already connected to the wireless network?

____

____

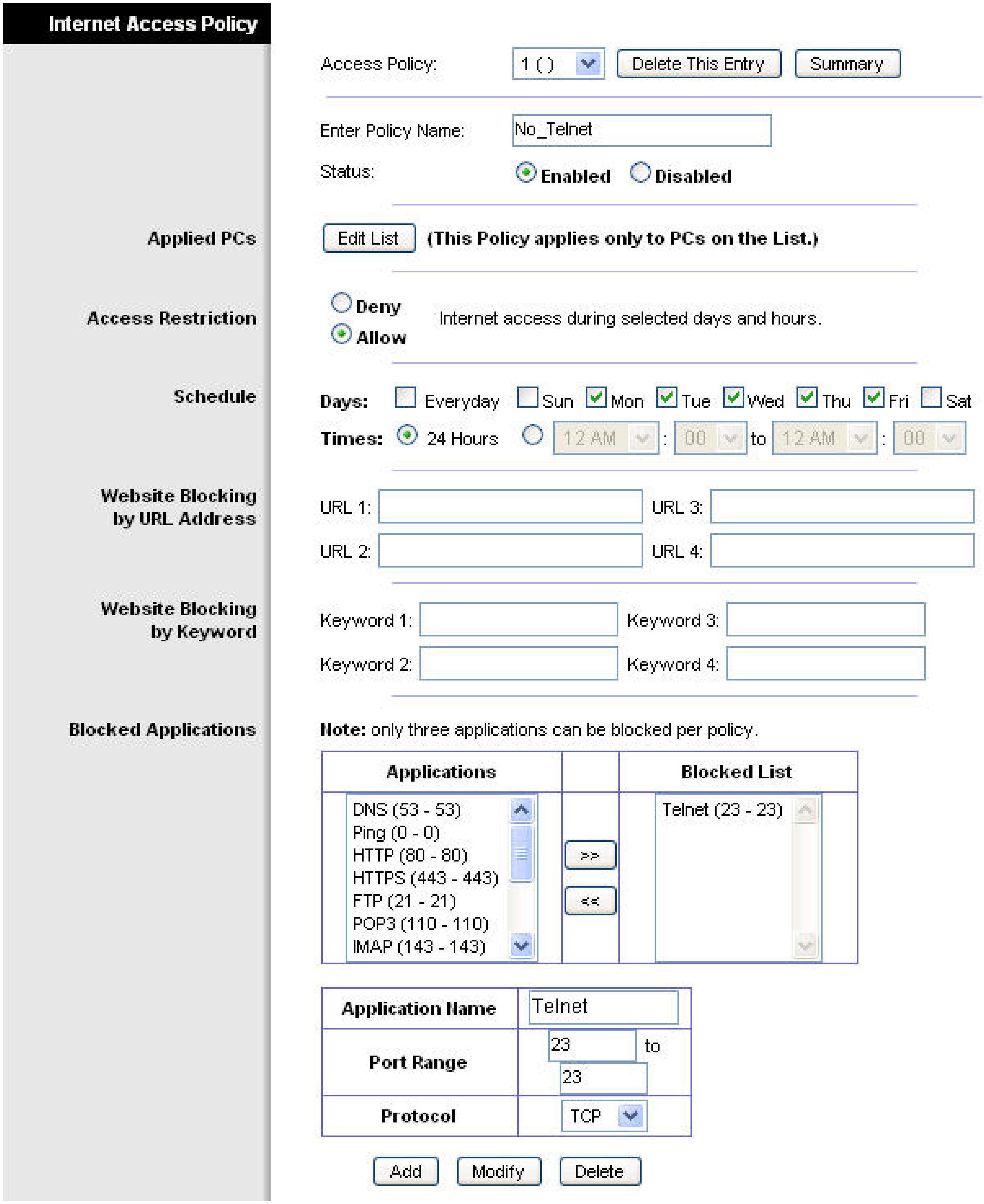
Task 10: Setting Access Restrictions

Configure an access restriction that prevents Telnet access Monday through Friday to users getting a DHCP address from the preset pool (172.17.30.50 – 74).

Step 1: Navigate to the Access Restrictions tab.

In the Access Restrictions tab, set the following:

- Policy Name – No_Telnet
- Status – Enabled
- Internet access – Allow
- Days – Check Monday through Friday
- Blocked List – Add Telnet



Internet Access Policy

Access Policy: 1 ( ) [Delete This Entry] [Summary]

Enter Policy Name: No_Telnet

Status: ● Enabled ○ Disabled

Applied PCs: [Edit List] **(This Policy applies only to PCs on the List.)**

Access Restriction: ○ **Deny** ● **Allow** Internet access during selected days and hours.

Schedule

Days: □ Everyday □ Sun ☑ Mon ☑ Tue ☑ Wed ☑ Thu ☑ Fri □ Sat

Times: ● 24 Hours ○ 12 AM : 00 to 12 AM : 00

Website Blocking by URL Address

URL 1:
URL 2:
URL 3:
URL 4:

Website Blocking by Keyword

Keyword 1:
Keyword 2:
Keyword 3:
Keyword 4:

Blocked Applications

Note: only three applications can be blocked per policy.

Applications		**Blocked List**
DNS (53 - 53) Ping (0 - 0) HTTP (80 - 80) HTTPS (443 - 443) FTP (21 - 21) POP3 (110 - 110) IMAP (143 - 143)	>> <<	Telnet (23 - 23)

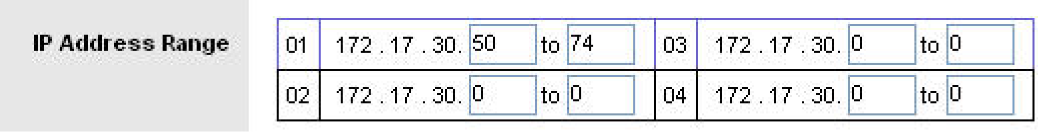
Application Name	Telnet
Port Range	23 to 23
Protocol	TCP

[Add] [Modify] [Delete]

Step 2: Set the IP address range.

Apply this configuration to anyone that is using a default DHCP address in the range of 172.17.30.50 – 74.

Click the **Edit List** button at the top of the window and enter the IP address range. Save the settings.



IP Address Range

01	172 . 17 . 30. 50	to 74	03	172 . 17 . 30. 0	to 0
02	172 . 17 . 30. 0	to 0	04	172 . 17 . 30. 0	to 0

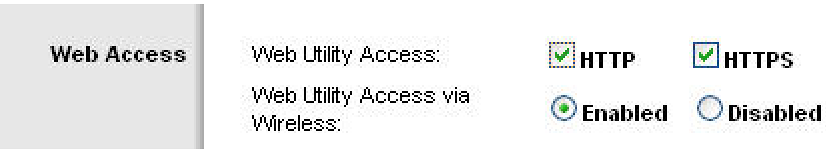
Save the access restriction settings

Task 11: Managing and Securing the Web Utility of the Router

Step 1: Configure web access.

Navigate to the **Administration** section. Change the router password to **cisco**.

For **Web Utility Access**, select both HTTP and HTTPS. Selecting HTTPS access allows a network administrator to manage the router via https://172.17.30.1 with SSL, a more secure form of HTTP. If you choose to do this in the lab, you may have to accept certificates.



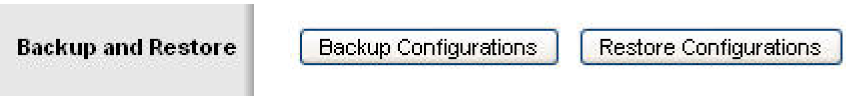
Web Access

Web Utility Access: ☑ HTTP ☑ HTTPS

Web Utility Access via Wireless: ● Enabled ○ Disabled

For **Web Utility Access via Wireless,** select Enabled. If you disabled this option, the Web Utility would not be available to clients connected wirelessly. Disabling access is another form of security, because it requires the user to be directly connected to the router before changing settings. However, in this lab scenario, you are configuring the router via wireless access, so disabling access would not be a good idea!

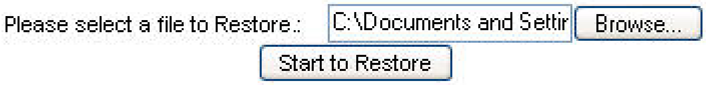
Now back up your configuration by clicking the **Backup Configurations** button. When prompted, save the file to your desktop.



Step 2: Restore your configuration.

If your settings are accidentally or intentionally changed or erased, you can restore them from a working configuration using the **Restore Configurations** option located in the Backup and Restore section.

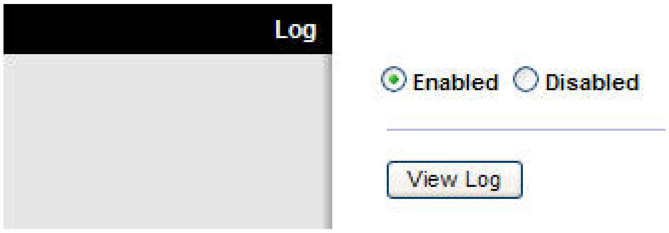
Click the **Restore Configuration** button now. In the Restore Configurations window, browse to the previously saved configuration file. Click the **Start to Restore** button. Your previous settings should be successfully restored.



Please select a file to Restore.: C:\Documents and Settir

Step 3: Enable logging.

Navigate to the **Log** tab and enable logging. You are now able to view the log of the router.



Log

● Enabled ○ Disabled

Step 4: Save your settings and end your wireless connection to the router.

Step 5: Plug an Ethernet cable into one of the wireless router's LAN ports and connect to it

Step 6: Navigate to the router's Web GUI.

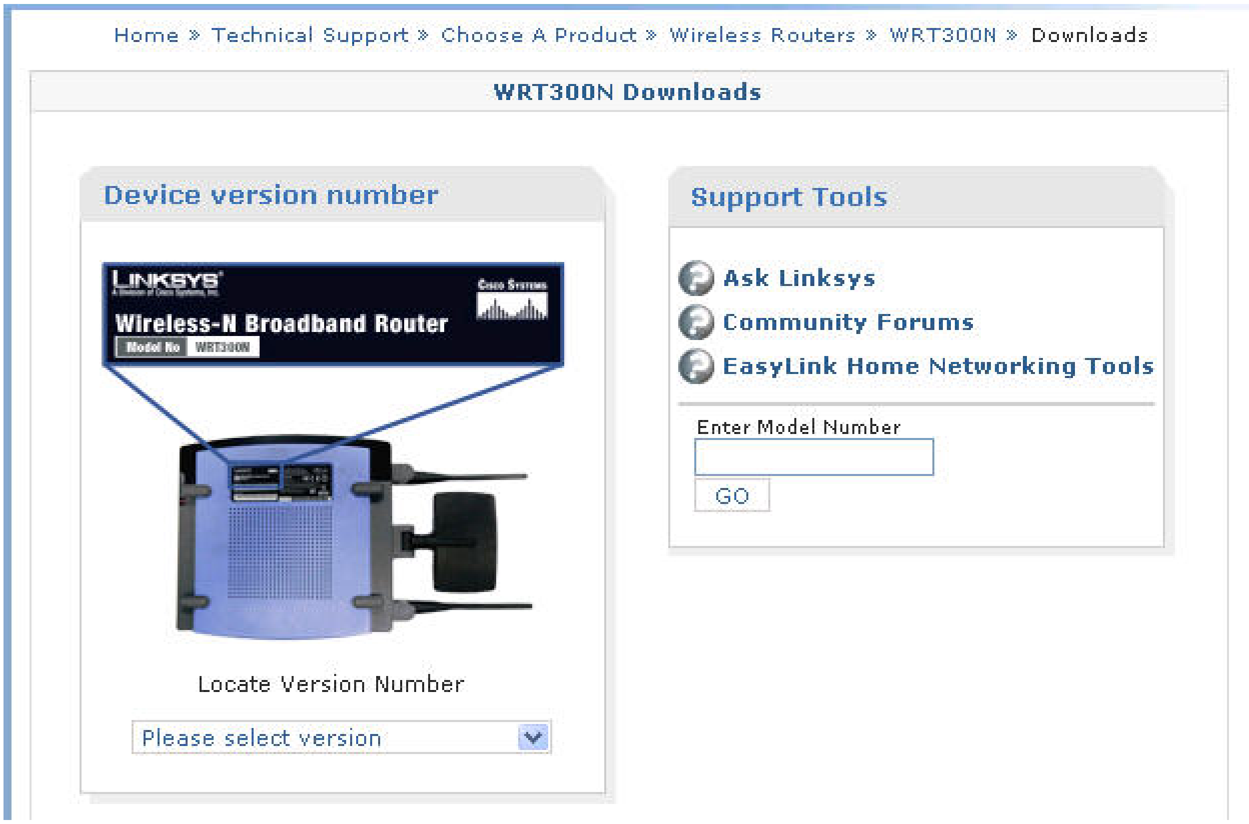
Step 7: Navigate to the Administration section

Step 8: Upgrade the firmware.

Go to

http://www.linksys.com/servlet/Satellite?c=L_CASupport_C2&childpagename=US%2FLayout&cid=1166859841746&pagename=Linksys%2FCommon%2FVisitorWrapper&lid=4174637314B274&displaypage=download

Select your router version. Instructions for identifying the version are located on the Linksys website.



Home » Technical Support » Choose A Product » Wireless Routers » WRT300N » Downloads

WRT300N Downloads

Device version number

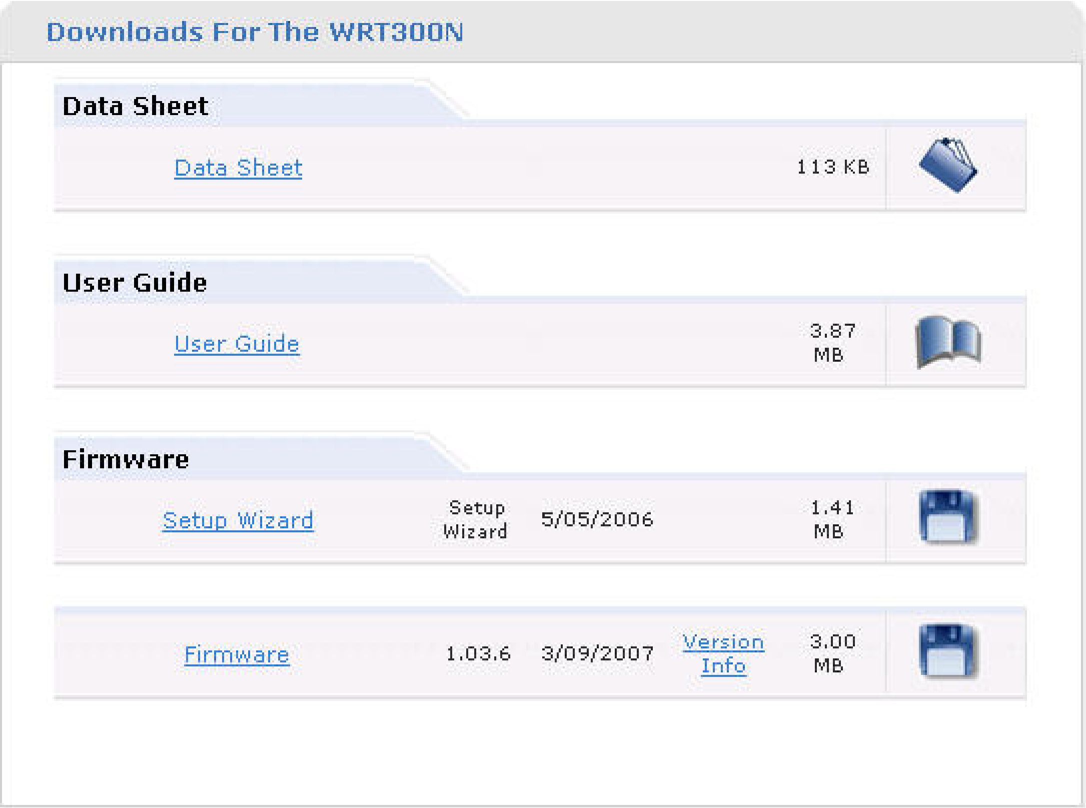
Locate Version Number

Please select version

Support Tools

Enter Model Number

Either click **Firmware** or the save icon. If prompted, save the file to the disk.



Downloads For The WRT300N

Data Sheet

Data Sheet				113 KB	

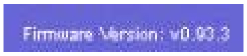
User Guide

User Guide				3.87 MB	

Firmware

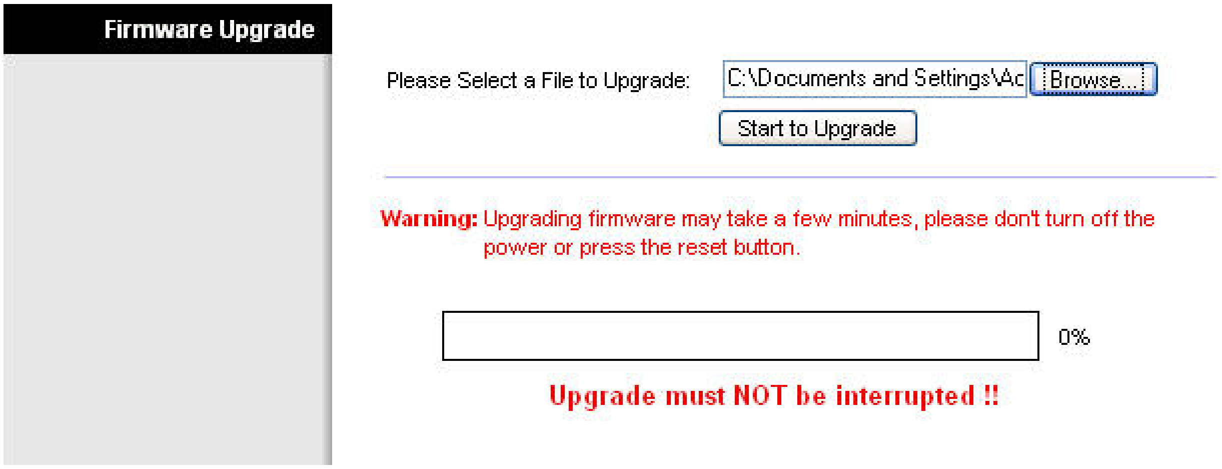
Setup Wizard	Setup Wizard	5/05/2006		1.41 MB	
Firmware	1.03.6	3/09/2007	Version Info	3.00 MB	

Before upgrading, notice the current firmware version in the upper right corner.



Firmware Version: v0.93.3

Navigate to the **Administration** section. Click **Upgrade Firmware**. Browse to the file you just downloaded. Click **Start to Upgrade**. The upgrade should not be interrupted, so make sure to not power off the device.



Firmware Upgrade

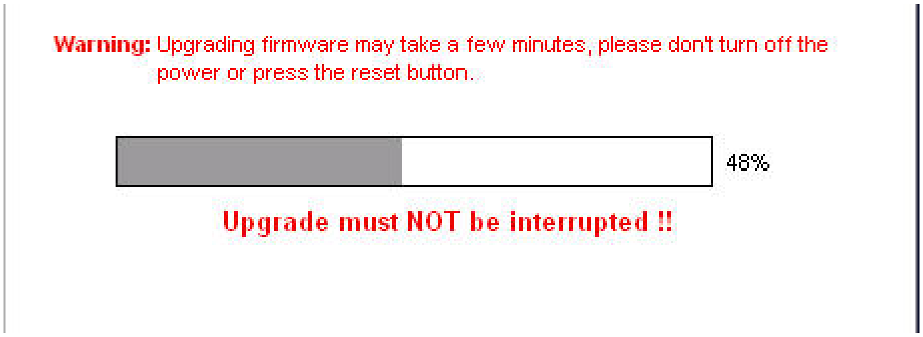
Please Select a File to Upgrade: C:\Documents and Settings\Ac [Browse...]

[Start to Upgrade]

Warning: Upgrading firmware may take a few minutes, please don't turn off the power or press the reset button.

0%

Upgrade must NOT be interrupted !!

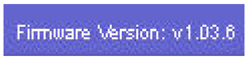


Warning: Upgrading firmware may take a few minutes, please don't turn off the power or press the reset button.

48%

Upgrade must NOT be interrupted !!

When completed, check the new version of firmware on your device.

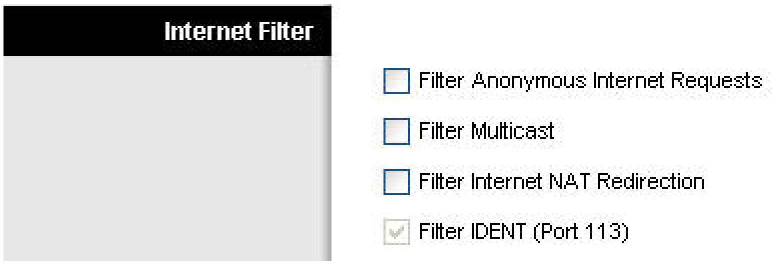


Firmware Version: v1.03.6

Task 12: Creating and Verifying Full Connectivity

Step 1: Filter anonymous Internet requests.

In the **Security** section, uncheck **Filter Anonymous Internet Requests**. Disabling this option allows you to ping the WRS3 internal LAN/wireless IP address, 172.17.30.1, from places connected to its WAN port.



Internet Filter

□ Filter Anonymous Internet Requests

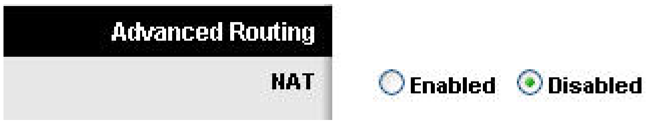
□ Filter Multicast

□ Filter Internet NAT Redirection

☑ Filter IDENT (Port 113)

Step 2: Disable NAT.

In the **Setup** section, click the **Advanced Routing** tab. Disable NAT.



Advanced Routing

NAT ○ Enabled ● Disabled

Step 3: Connect to WRS2.

Set the IP address settings for Internet Setup.

- Set the Internet IP address to 172.17.88.25.
- Set the subnet mask to 255.255.255.0.

Set the default gateway to the Fa 0/1 VLAN 88 IP address of R1, 172.17.88.1

Configure the Network Setup IP address to 172.17.30.1

Statically bind the MAC address of PC3 to the DHCP address 172.17.40.23 (hint: Task 6, Step 2).

Change the wireless SSID to WRS2 (hint: Task 7, Step 2).

Step 4: Give R1 static routes to the 172.17.30.0 and 172.17.40.0 networks.

```
   R1config)#ip route 172.17.30.0 255.255.255.0 172.17.88.35
   R1(config)#ip route 172.17.40.0 255.255.255.0 172.17.88.25
```

Step 5: Repeat steps 1 and 2 above for WRS2.

Step 6: Verify connectivity.

Verify that R1 has routes to PC3 and PC6 and that it can successfully ping them.

```
R1#sh ip route
<output deleted>

Gateway of last resort is not set

     172.17.0.0/24 is subnetted, 5 subnets
S       172.17.40.0 [1/0] via 172.17.88.25
S       172.17.30.0 [1/0] via 172.17.88.35
C       172.17.20.0 is directly connected, FastEthernet0/1.20
C       172.17.10.0 is directly connected, FastEthernet0/1.10
C       172.17.88.0 is directly connected, FastEthernet0/1.88
     10.0.0.0/24 is subnetted, 1 subnets
C       10.1.1.0 is directly connected, Loopback0
```

```
R1#ping 172.17.30.26

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.17.30.26, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
```

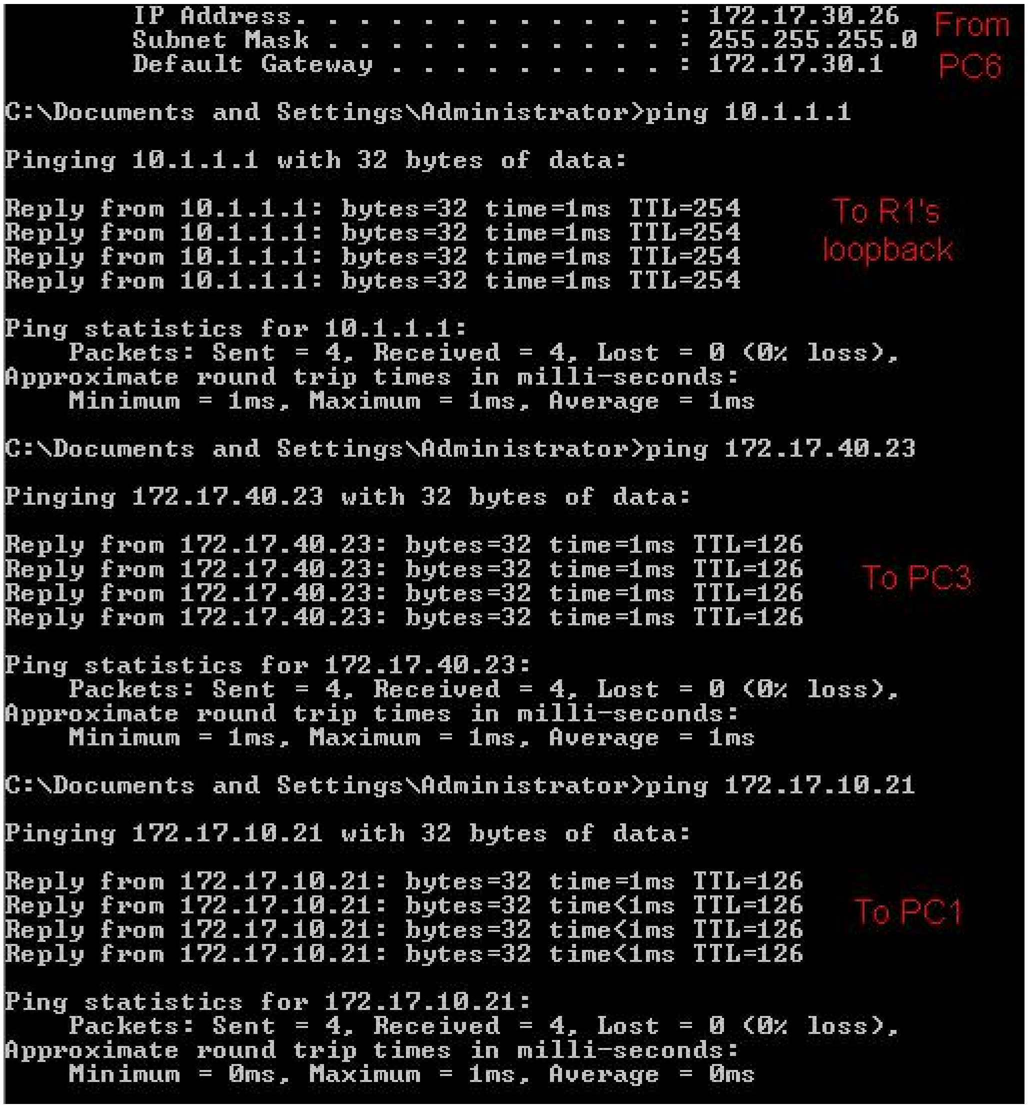
```
R1#ping 172.17.40.23

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.17.40.23, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
```

Verify that PC3 and PC6 can ping the loopback of R1.

Verify that PC3 and PC6 can ping each other.

Verify that PC3 and PC6 can ping PC1 and PC2.



```
        IP Address. . . . . . . . . . . . : 172.17.30.26
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . . : 172.17.30.1

C:\Documents and Settings\Administrator>ping 10.1.1.1

Pinging 10.1.1.1 with 32 bytes of data:

Reply from 10.1.1.1: bytes=32 time=1ms TTL=254
Reply from 10.1.1.1: bytes=32 time=1ms TTL=254
Reply from 10.1.1.1: bytes=32 time=1ms TTL=254
Reply from 10.1.1.1: bytes=32 time=1ms TTL=254

Ping statistics for 10.1.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\Documents and Settings\Administrator>ping 172.17.40.23

Pinging 172.17.40.23 with 32 bytes of data:

Reply from 172.17.40.23: bytes=32 time=1ms TTL=126
Reply from 172.17.40.23: bytes=32 time=1ms TTL=126
Reply from 172.17.40.23: bytes=32 time=1ms TTL=126
Reply from 172.17.40.23: bytes=32 time=1ms TTL=126

Ping statistics for 172.17.40.23:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\Documents and Settings\Administrator>ping 172.17.10.21

Pinging 172.17.10.21 with 32 bytes of data:

Reply from 172.17.10.21: bytes=32 time=1ms TTL=126
Reply from 172.17.10.21: bytes=32 time<1ms TTL=126
Reply from 172.17.10.21: bytes=32 time<1ms TTL=126
Reply from 172.17.10.21: bytes=32 time<1ms TTL=126

Ping statistics for 172.17.10.21:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

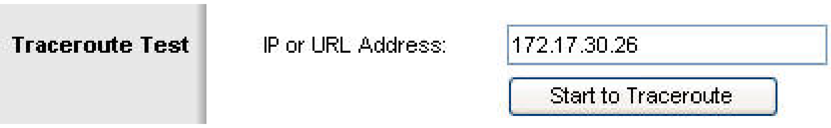
Task 13: Configuring Routing Efficiency

Step 1: Use Traceroute to view the network connection.

Because R1 is the default gateway, the Linksys router goes to R1 to get to a network it does not know how to get to, including the clients of the other Linksys routers.

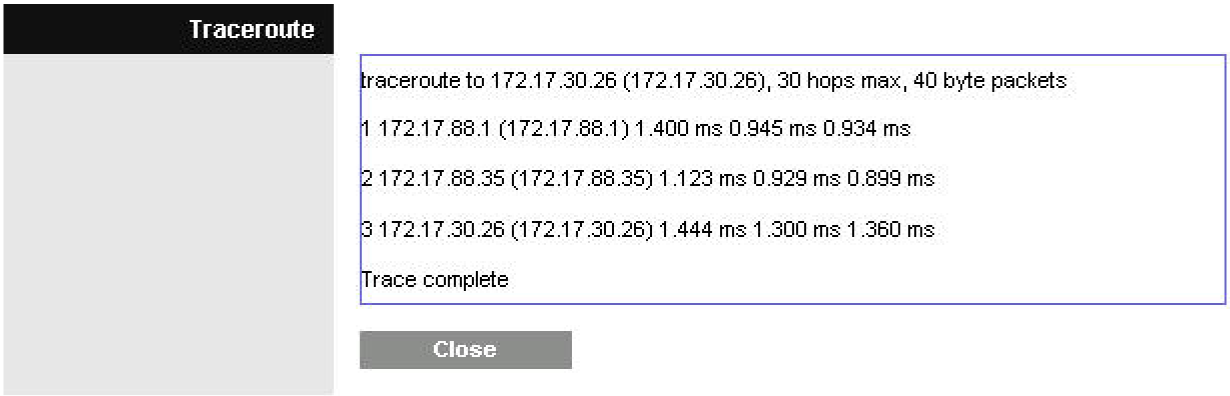
A packet from PC3 to PC6 first reaches its default gateway of 172.17.40.1, then it is sent out the WRS2 WAN interface of 172.17.88.25 toward the WRS2 default gateway (172.17.88.1). From there, R1 send the packet to the WRS3 WAN interface, 172.17.88.35, where WRS3 handles it.

You can verify this in the **Diagnostics** tab in the Administration section. In the Traceroute Test field, enter the IP address of PC6 to PC6, 172.17.30.26



IP or URL Address: 172.17.30.26

Now click Start to Traceroute, a pop-up will appear.



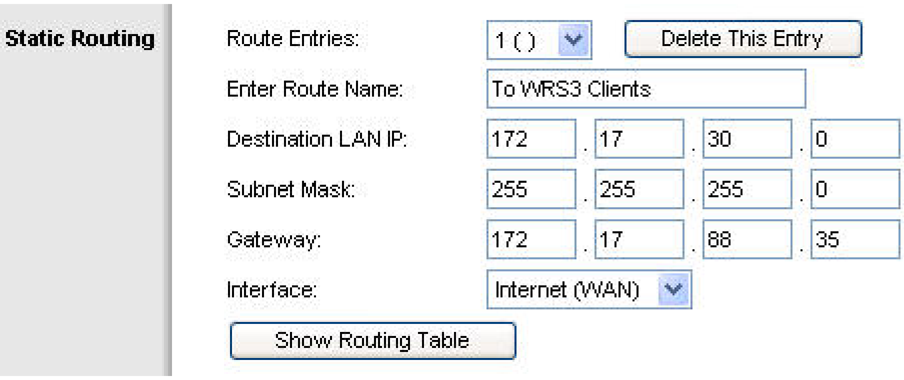
```
traceroute to 172.17.30.26 (172.17.30.26), 30 hops max, 40 byte packets
1 172.17.88.1 (172.17.88.1) 1.400 ms 0.945 ms 0.934 ms
2 172.17.88.35 (172.17.88.35) 1.123 ms 0.929 ms 0.899 ms
3 172.17.30.26 (172.17.30.26) 1.444 ms 1.300 ms 1.360 ms
Trace complete
```

If WRS2 knew that it could get to the 172.17.30.0 network from 172.17.88.35 it would just directly send it to that IP address. So lets tell it!

Step 2: Configure a new route.

In the **Setup** section, click the **Advanced Routing** tab. For Static Routing, enter the following settings:

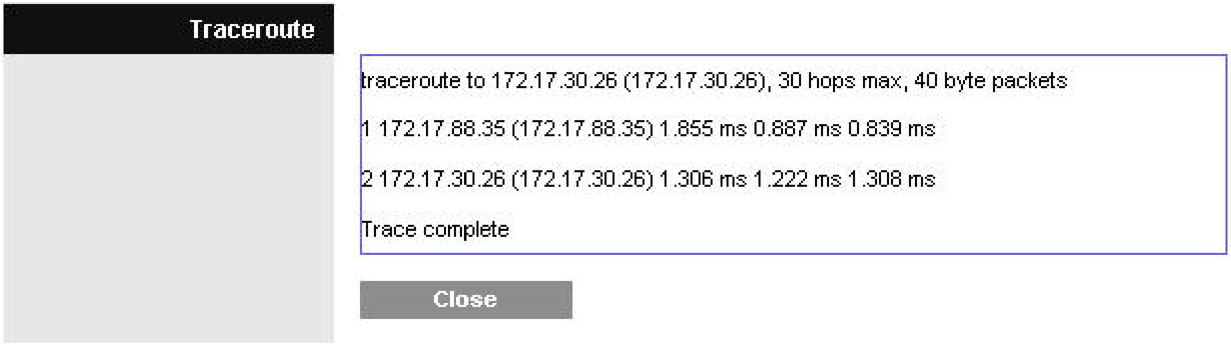
- In the **Route Name** field, enter **To WRS2 Clients**.
- For **Destination LAN IP**, enter the network behind WRS2: 172.17.40.0
- Enter a subnet mask of /24
- Enter a gateway of 172.17.88.35
- Set the interface to Internet (WAN)



Route Entries: 1 ( )
Enter Route Name: To WRS3 Clients
Destination LAN IP: 172 . 17 . 30 . 0
Subnet Mask: 255 . 255 . 255 . 0
Gateway: 172 . 17 . 88 . 35
Interface: Internet (WAN)

Step 3: Verify the new route.

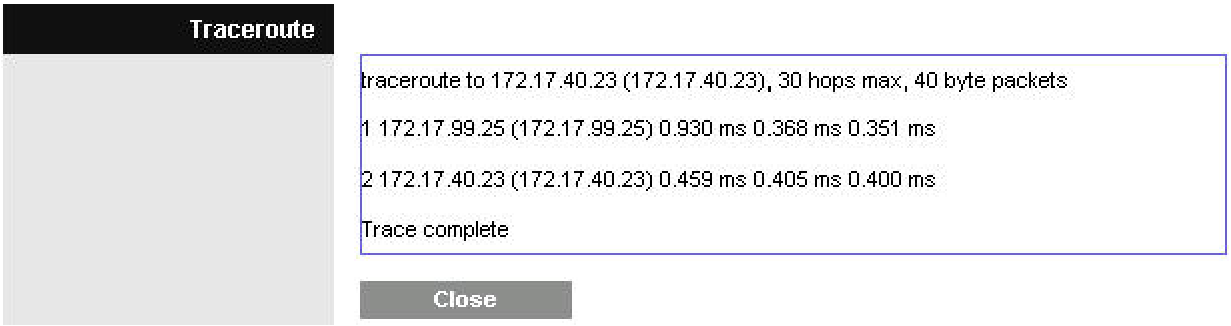
In the **Diagnostics** tab in the Administration section, re-enter the IP address of PC3 in the Traceroute Test field. Click **Start to Traceroute** to see the route.



```
traceroute to 172.17.30.26 (172.17.30.26), 30 hops max, 40 byte packets
1 172.17.88.35 (172.17.88.35) 1.855 ms 0.887 ms 0.839 ms
2 172.17.30.26 (172.17.30.26) 1.306 ms 1.222 ms 1.308 ms
Trace complete
```

Notice WRS2 goes straight to WRS3 and saves us the extra hop to R1!

Do the same thing on WRS3 for the 172.17.40.0/24 network, pointing towards WRS2's WAN interface, 172.17.88.25.



```
traceroute to 172.17.40.23 (172.17.40.23), 30 hops max, 40 byte packets
1 172.17.99.25 (172.17.99.25) 0.930 ms 0.368 ms 0.351 ms
2 172.17.40.23 (172.17.40.23) 0.459 ms 0.405 ms 0.400 ms
Trace complete
```

Task 14: Configuring Port Security

Step 1: Configure PC1 port security.

Log on to switch S2. Configure the PC1 switch port 11, enable port security, and enable dynamic sticky MAC addresses.

Step 2: Configure PC2 port security.

Repeat Step 1 for switch port 18.

S2

```
!
interface FastEthernet 0/11
 switchport mode access
 switchport access vlan 10
 switchport port-security
 switchport port-security mac-address sticky
 no shutdown
!
!
interface FastEthernet 0/18
 switchport mode access
 switchport access vlan 20
 switchport port-security
 switchport port-security mac-address sticky
 no shutdown
!
```

Step 3: Generate traffic across the ports by pinging PC2 from PC1.

Step 4: Verify port security.

```
S1#show port-security address
          Secure Mac Address Table
------------------------------------------------------------------------
Vlan    Mac Address       Type                       Ports   Remaining Age
                                                                (mins)
----    -----------       ----                       -----   -------------
  10    0006.5b1e.33fa    SecureSticky               Fa0/11       -
  20    0001.4ac2.22ca    SecureSticky               Fa0/18       -
------------------------------------------------------------------------
Total Addresses in System (excluding one mac per port)     : 0
Max Addresses limit in System (excluding one mac per port) : 6272

S1#sh port-security int fa 0/11
Port Security              : Enabled
Port Status                : Secure-up
Violation Mode             : Shutdown
Aging Time                 : 0 mins
Aging Type                 : Absolute
SecureStatic Address Aging : Disabled
Maximum MAC Addresses      : 1
Total MAC Addresses        : 1
Configured MAC Addresses   : 0
Sticky MAC Addresses       : 1
Last Source Address:Vlan   : 0006.5b1e.33fa:10
Security Violation Count   : 0
```

Appendix

Configurations

Hostname R1

```
!
enable secret class
!
no ip domain lookup
!
interface Loopback0
 ip address 10.1.1.1 255.255.255.0
!
interface FastEthernet0/1
 no shutdown
!
interface FastEthernet0/1.10
 encapsulation dot1Q 10
 ip address 172.17.10.1 255.255.255.0
!
interface FastEthernet0/1.20
 encapsulation dot1Q 20
 ip address 172.17.20.1 255.255.255.0
```

```
!
interface FastEthernet0/1.88
 encapsulation dot1Q 88
 ip address 172.17.88.1 255.255.255.0
!
!
ip route 172.17.30.0 255.255.255.0 172.17.88.35
ip route 172.17.40.0 255.255.255.0 172.17.88.25
!
!
!
!
line con 0
 exec-timeout 0 0
 logging synchronous
 password cisco
line aux 0
line vty 0 4
!
!
end
```

Hostname S1

```
!
!
vtp mode transparent
!
!
vlan 10,20,88
!
!
interface FastEthernet0/1
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface FastEthernet0/2
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface FastEthernet0/3
 switchport trunk encapsulation dot1q
switchport mode trunk
!
interface FastEthernet0/4
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface FastEthernet0/5
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
line con 0
 exec-timeout 0 0
 logging synchronous
```

```
!
end
```

Hostname S2

```
!
!
vtp mode transparent
!
vlan 10,20,88
!
!
interface FastEthernet0/1
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface FastEthernet0/2
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface FastEthernet0/3
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface FastEthernet0/4
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface FastEthernet0/7
 switchport mode access
 switchport access vlan 88
!
!
! PC1 and PC2’s MAC address will appear after ‘sticky’ on ports 11
! and 18 respectively, after traffic traverses them
!
!

interface FastEthernet0/11
 switchport access vlan 10
 switchport mode access
 switchport port-security
 switchport port-security mac-address sticky
 switchport port-security mac-address sticky ffff.ffff.ffff
!
interface FastEthernet0/18
 switchport access vlan 20
 switchport mode access
 switchport port-security
 switchport port-security mac-address sticky
 switchport port-security mac-address sticky ffff.ffff.ffff
!
line con 0
 exec-timeout 0 0
 logging synchronous
```

```
!
end
```

Hostname S3

```
!
vtp mode transparent
!
vlan 10,20,88
!
interface FastEthernet0/1
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface FastEthernet0/2
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface FastEthernet0/3
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface FastEthernet0/4
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface FastEthernet0/7
 switchport mode access
 switchport access vlan 88
!
!
line con 0
 exec-timeout 0 0
 logging synchronous
!
!
end
```