

Instant Broadband™ Series

EtherFast® Wireless AP + Cable/DSL Router with PrintServer



Use this guide to install: BEFW11P1

User Guide

 **LINKSYS®**

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FCC STATEMENT

This Instant Broadband EtherFast Wireless AP + Cable/DSL Router with PrintServer has been tested and complies with the specifications 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 according to 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 is found 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 or device
- Connect the equipment to an outlet other than the receiver's
- Consult a dealer or an experienced radio/TV technician for assistance

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Introduction

The Linksys EtherFast Wireless AP + Cable/DSL Router with PrintServer

The EtherFast Wireless AP + Cable/DSL Router with PrintServer provides the ideal solution for connecting your wireless network to a high-speed broadband Internet connection and a 10/100 Fast Ethernet backbone. Configurable as a DHCP server for your existing network, the EtherFast Wireless AP + Cable/DSL Router with PrintServer acts as the only externally recognized Internet gateway on your local area network (LAN) and serves as an Internet firewall against unwanted outside intruders. The Router can also be configured to filter internal users' access to the Internet.

The EtherFast Wireless AP + Cable/DSL Routers provide an operating range of up to 500 meters (1640 feet), providing seamless roaming throughout your wireless LAN infrastructure, and its advanced user authentication feature ensures a high level of network security. The EtherFast Wireless AP + Cable/DSL Router's easy to install and easy to use-Windows-based diagnostics and statistic tools put you in control of your network.

Features

- Fully Compatible with IEEE 802.11b Standard and Supports a High Data Rate Up to 11 Mbps
- Build a Wireless Broadband Network in Your Home or Small Office with Just One IP Address
- Create a Natural Firewall to Protect Your PCs From Outside Intruders
- Auto Fallback Data Rate for Long-Distance Communication and Noisy Environments
- Provides Roaming, Best Access Point Selection, Load Balancing, and Network Traffic Filtering
- Long Operating Range Supports 150m (Indoors) and 500m (Outdoors)
- Capable of up to 128-Bit WEP Encryption
- Supports IPsec Pass-Thru and PPTP
- Acts as a DHCP Server and a Print Server for Your Existing Network
- Administrators Can Block Specific Internal Users' Internet Access with Filtering
- Free Technical Support—24 Hours a Day, 7 Days a Week for North America Only
- 1-Year Limited Warranty



Package Contents

- One EtherFast Wireless AP + Cable/DSL Router with PrintServer
- One Instant Wireless™ Network PC Card
- One Setup CD-ROM (for PrintServer Setup)
- One AC Power Adapter
- One User Guide and Registration Card

System Requirements

- One RJ-45 Broadband Internet connection, with a cable or DSL modem
- One PC with an installed 10Mbps, 100Mbps, or 10/100 Mbps Ethernet card (optional)
- TCP/IP network adapter protocol for each PC
- UTP network cable with RJ-45 connector
- Microsoft Internet Explorer 4.0 or later, or Netscape Navigator 4.0 or later. (5.0 and 4.7, respectively, are strongly recommended.)
- Windows 95, 98, Millennium, NT 4.0, or 2000

Getting to Know the EtherFast Wireless AP + Cable/DSL Router

The Wireless AP + Cable/DSL Router's Rear Panel

The rear panel of the Wireless AP + Cable/DSL Router is where all of the connections are made.



The Wireless AP + Cable/DSL Router's Ports

- WAN** The WAN (Wide Area Network) Port is where you will connect your cable or DSL modem.
- PC/Uplink** The PC and Uplink ports are shared, which means that if one is used the other cannot be used. The PC port is used for connecting the Wireless AP + Cable/DSL Router to a single PC. The Uplink port is used for connecting the Wireless AP + Cable/DSL Router to a network device and will automatically determine the speed of that device.
- PCMCIA** The Instant Wireless™ Network PC Card is inserted into the PCMCIA slot to enable the wireless features of the Wireless AP + Cable/DSL Router. This slot is not hot swappable.
- Printer** Connect a printer to the Printer port to use the Wireless AP + Cable/DSL Router's PrintServer function.
- Power** The Power Port is where you will connect the included AC Power adapter.



The Reset Button

Briefly pressing the Reset Button will refresh the Wireless AP + Cable/DSL Router's connections, potentially clearing any jammed links.

To Reset the Wireless AP + Cable/DSL Router's factory default settings, power off the Router and then press the Reset button. Then, power on the Router and press the Reset button again. This should be done only if you are experiencing heavy routing problems, and only after you have exhausted all of the other troubleshooting options. By resetting the Wireless AP + Cable/DSL Router, you run the risk of creating conflicts between your PCs' actual IP Addresses and what the Wireless AP + Cable/DSL Router thinks their IP Addresses should be. You may be forced to reboot the entire system(s).

If the Wireless AP + Cable/DSL Router locks up, simply power it down for 3 to 5 seconds by removing the power cable from the Wireless AP + Cable/DSL Router's Power Port. Leaving the power off for too long could result in the loss of network connections.

The Wireless AP + Cable/DSL Router's Front Panel LEDs



The LAN Indicators

- Power** *Green.* The Power LED illuminates when the Router is powered on.
- Diag** *Red.* The Diag LED illuminates when the Router goes through its self-diagnosis mode during boot-up. It will turn off upon successful completion of the diagnosis. If this LED stays on for an abnormally long period of time, refer to the Troubleshooting section.

WAN	<i>Green.</i> This LED illuminates when a successful connection is made between the Router and your Broadband device (such as a modem) or network.
LAN (10/100)	<i>Green.</i> The Uplink or PC port will automatically determine your network's speed and run accordingly. The 10 and 100 LEDs display the connection speed determined by either port.
WLAN	<i>Green.</i> This LED illuminates when a successful connection to a wireless network is made.
Printer/Err	<i>Red.</i> The Error LED illuminates when there is an error with the PrintServer. To correct this, clear your print queue. If that does not work, reset your printer. If that does not work, power off the Wireless AP + Cable/DSL Router.
Printer/Act	<i>Green.</i> The Act LED flickers when the PrintServer is sending or receiving data.

Planning Your Wireless Network

Network Topology

A wireless LAN is a group of computers, each equipped with one Instant Wireless™ Network PC Card. Computers in a wireless LAN must be configured to share the same radio channel.

Wireless LAN configurations are appropriate for branch level departments or SOHO operations.

The Instant Wireless™ Network PC Card provides access to a wired LAN for wireless workstations. An integrated wireless and wired LAN is called an Infrastructure configuration. A group of Instant Wireless™ Network PC Card users and a Wireless AP + Cable/DSL Router compose a Basic Service Set (BSS). Each PC utilizing an Instant Wireless™ Network PC Card in a BSS can talk to any computer in a wired LAN infrastructure via the Wireless AP + Cable/DSL Router.

An infrastructure configuration extends the accessibility of an Instant Wireless™ Network PC Card PC to a wired LAN, and doubles the effective wireless transmission range for two Instant Wireless™ Network PC Card PCs. Since the Wireless AP + Cable/DSL Router is able to forward data within its BSS, the effective transmission range in an infrastructure LAN is doubled.

The use of a unique ID in a BSS is essential. All PCs using an Instant Wireless™ Network PC Card configured without roaming options in an independent BSS must be configured with a BSS ID used in the BSS.

The Wireless LAN Infrastructure configuration is appropriate for enterprise-scale wireless access to a central database, or as a wireless application for mobile users.

Roaming

Infrastructure mode also supports roaming capabilities for mobile users. More than one BSS can be configured as an Extended Service Set (ESS). This continuous network allows users to roam freely within an ESS. All PCs using an Instant Wireless™ Network PC Card within one ESS must be configured with the same ESS ID and use the same radio channel.

Before enabling an ESS with roaming capability, choosing a feasible radio channel and optimum position of the Wireless AP + Cable/DSL Routers is recommended. Proper Wireless AP + Cable/DSL Router positioning combined with a clear radio signal will greatly enhance performance.



Connecting the EtherFast Wireless AP + Cable/DSL Router to Your Network

Overview

Unlike a simple hub or switch, the setup of the Wireless AP + Cable/DSL Router consists of more than simply plugging everything together. Because the Router acts as a DHCP server for your Network, you will have to set some values within the Router, and also configure your networked PCs to accept the IP Addresses the Router chooses to assign them.

You will need the following values from your ISP in order to install the Wireless AP + Cable/DSL Router:

- Your broadband-configured PC's fixed Internet IP Address (if applicable) } *Only if applicable*
- Your broadband-configured PC's Computer Name and Workgroup Name
- Your Subnet Mask
- Your Default Gateway
- Your Primary DNS IP address

Whoever installed your broadband access should have left this information with you. If not, call your ISP and they will be able to supply you with it.

About Static & Dynamic IP Addresses

Static IP Addresses A Static IP address is an IP address permanently assigned to a computer in a TCP/IP network. Static IP addresses are usually assigned to networked devices, which are consistently accessed by multiple users, such as Server PCs, or printers. If you are using the Router to share your cable or DSL Internet connection, contact your ISP to see if they have assigned your home or business a Static IP address. You will need that address during the Router's configuration.

Dynamic IP Addresses A dynamic IP address is an IP address that is automatically assigned to a client station (computer, printer, etc.) in a TCP/IP network. Dynamic IP addresses are typically assigned by a DHCP server on your Network, which can be a computer on the network or another piece of hardware, such as the Router. A dynamic IP address may change every time your computer connects to the network.

DHCP (Dynamic Host Configuration Protocol) DHCP automatically assigns IP addresses to client stations logging onto a TCP/IP network. DHCP eliminates having to manually assign permanent IP addresses to every device on your network. DHCP typically runs in servers and is also found in network devices such as Routers.



Note: Some ISPs—most notably some cable providers—configure their networks so that you do not have to enter a full Internet address into your web browser or e-mail application to reach your home page or receive your e-mail. If your Internet home page address is something very simple, such as “www”, rather than “www.linksys.com”, or your e-mail server’s address is something similar to “e-mail” or “pop3”, rather than “pop.mail.linksys.com”, you **won’t** be able to properly configure the Wireless AP + Cable/DSL Router until you determine the actual Internet addresses of your Web and e-mail connections.

You **must** obtain this information prior to connecting the Wireless AP + Cable/DSL Router to your network. You can obtain this information by contacting your ISP, or turn to the Appendix to learn how to ping for an IP address.

Connecting the Wireless AP + Cable/DSL Router & Booting Up

- 1. Locate an optimum location for the Wireless AP + Cable/DSL Router.** The best place for your Wireless AP + Cable/DSL Router is usually at the center of your wireless network, with line of sight to all of your mobile stations.
- 2. Insert the Instant Wireless™ Network PC Card into the slot.** With the Network PC Card’s 68-pin connector facing the slot in the rear and the “Network PC Card” label facing up, slide the Network PC Card completely into the Wireless AP + Cable/DSL Router.

- 3. Connect an RJ-45 (network) cable to the Wireless AP + Cable/DSL Router in either the PC or Uplink port.** The PC port is used when connecting the Wireless AP + Cable/DSL Router to a single PC and the Uplink port is used when connecting to a 10/100 Network. Then, connect the other end of the Ethernet cable to either a PC or a network device. The Wireless AP + Cable/DSL Router will then be connected to your 10/100 Network.
- 4. Connect another RJ-45 (network) cable to the Wireless AP + Cable/DSL Router in the WAN port.** The other end of the cable is used to connect the Wireless AP + Cable/DSL Router to your Cable/DSL modem. Connect to your Cable/DSL modem at this time.
- 5. Connect the AC Power Adapter to the Wireless AP + Cable/DSL Router’s Power Socket.** Only use the power adapter supplied with the Wireless AP + Cable/DSL Router. Use of a different adapter may result in product damage.
- 6. Verify that the LEDs are functioning.** The Power LED should remain on, while the Diag LED will flash and turn off right away. If the Diag LED remains on, there is a hardware error. Refer to the Troubleshooting section for resolution.

The Hardware Installation is complete.

For directions on connecting your printer to the Wireless AP + Cable/DSL Router’s PrintServer, see the EtherFast Wireless AP + Cable/DSL Router section in this user guide.

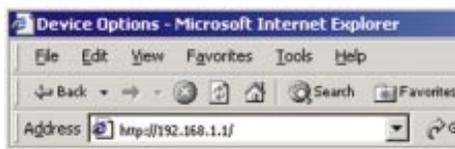
The EtherFast Wireless AP + Cable/DSL Router's Web-based Utility

Setting Up

To establish a connection from your PC to the Wireless AP + Cable/DSL Router:

1. After installing the Wireless AP + Cable/DSL Router to your network, start your PC. If your PC is already running, restart it.
2. Make sure that the TCP/IP protocol has been installed. See the Installing the TCP/IP Protocol section in the Appendix if you have any questions on how to do this.
3. Start your WEB browser.
4. In the Address box, enter "HTTP://" and the Wireless AP + Cable/DSL Router's IP Address, as in the following example, which uses the default IP Address: HTTP://192.168.1.1.

The PC accessing the Wireless AP + Cable/DSL Router must have its IP address set within the range applicable for the Wireless AP + Cable/DSL Router (192.168.1.2 through 192.168.1.51) and be set at the same Subnet Mask (255.255.255.0).



5. This will then bring up the Basic Setup screen.

Basic Setup

This is the first screen that will appear when you start up the Wireless AP + Cable/DSL Router's web-based utility. You can return to this screen at any time by clicking the **Setup** button.

Router

This is general information used to identify the Wireless AP + Cable/DSL Router.

Device Name. This name identifies the Wireless AP + Cable/DSL Router to your ISP. This is also called the "Hostname". Some ISPs require that you use the "Hostname" they provide. If so, enter the "Hostname" provided by your ISP.

Hardware (MAC) Address. That address which specifically identifies the Wireless AP + Cable/DSL Router on the WAN port. Some ISPs may require you to register this address with them.

LAN Port

For most users, the default values for these fields should be satisfactory and won't require changing.

- **Device IP Address.** This is the Wireless AP + Cable/DSL Router's IP Address in your Network. Use the default value unless that address is already used by your Network or your Network is using a different IP Address range. If the IP Address is already in use, change this value to reflect an unused address. If your Network is using a different IP Address range, change this value to fit within the range utilized.

- **Network Mask.** The default value is set for standard, small networks. For other networks, use the Network Mask for the segment to which the Wireless AP + Cable/DSL Router is attached, i.e. the same value as the PCs on that segment.

WAN Port

- **IP Address from ISP - Dynamic IP Address.** Leave this enabled if your ISP allocates an IP Address to the Wireless AP + Cable/DSL Router upon connecting to the Internet.

- **IP Address from ISP - Fixed IP Address.** Select this if using a fixed (Static) IP Address. If this option is selected, the following data must be entered:

IP Address. If connecting to an ISP, this is the address allocated by the ISP. If connecting to another Network, this must be a valid address on that Network.

Network Mask. This must be compatible with the IP address, as above.

Gateway IP Address. If you are configuring the Wireless AP + Cable/DSL Router for another network, this would be the default gateway for the other network. However, if you are configuring the Wireless AP + Cable/DSL Router to share Internet access, this is your ISP's IP Address as provided by your ISP.

DNS IP Address. This is the Wireless AP + Cable/DSL Router's Domain Name System address.

• **PPPoE (PPP Over Ethernet)**

Only enable this checkbox if your ISP uses PPPoE. If your ISP's data does not mention PPPoE, do NOT enable this checkbox.

Account/User Name. This is the name of the Internet account provided by your ISP.

Password. Enter the password for the ISP account. Re-enter this password in the **Verify** field.

Connect On Demand. Normally, this should be Enabled. If disabled, you must use the Reconnect button on the **Status** screen to connect to your ISP.

Disconnect after Idle. After a connection if inactive for longer than the time period put in this field, the connection will be terminated. If set at zero, the connection will never be terminated.

When you are ready to save any changes you have made, click the **Save** button. To undo any changes before saving, click the **Cancel** button.

If you have any questions about anything on this screen, click the **Help** button to bring up the Help window for this screen.

DHCP Server

You can access this screen at any time by clicking the **DHCP** button.

A DHCP (Dynamic Host Configuration Protocol) Server allocates a valid IP Address to the DHCP Clients that it serves, when the client device boots. The DHCP Server also provides the Gateway and DNS addresses to the client.

The screenshot shows the DHCP Server configuration screen. At the top, there are tabs for Setup, DHCP, Options, Wireless, Status, and Advanced. The DHCP Server section is active. It contains a description: "The DHCP Server allocates IP Addresses to PCs and other devices on request. A requesting device (e.g. default Windows 9x PC) is called a 'DHCP Client'." Below this, there are three main sections:

- Operation:** A text box says "Disable if you wish to use another DHCP Server or fixed IP Addresses." There are two radio buttons: "Enable DHCP Server (default)" (selected) and "Disable DHCP Server".
- IP Address Range:** A text box says "The DHCP Server will allocate IP Addresses from the following address range. Any fixed IP Addresses used on your LAN must NOT be in this range." Below this are two input fields: "Start IP Address: 192. 168. 1. 2" and "Finish IP Address: 192. 168. 1. 51".
- Allocated:** A text box says "IP Addresses currently allocated by the DHCP Server." Below this is a table with three columns: "IP. Address", "Physical Address", and "Status". One row is shown: "192.168.1.2", "00-20-78-0d-a0-bc", and "leased".

At the bottom right, there are buttons for "Save", "Cancel", and "Help".

Operation

The DHCP Server function is enabled by default. Select Disable DHCP Server to disable this function.

You will want to disable the DHCP Server when your Network is already using another DHCP Server. You can only use one DHCP Server.

IP Address Range

This range represents the range of IP addresses available in the DHCP pool that can be assigned to the PCs on your Network.

Allocated

This field will show the IP Addresses presently allocated to the other clients on your Network.

When you are ready to save any changes you have made, click the **Save** button. To undo any changes, click the **Cancel** button.

If you have any questions about anything on this screen, click the **Help** button to bring up the Help window for this screen.

Device Options

You can access this screen at any time by clicking the **Options** button.

Password

Once a password is entered, it is required in order to change the device configuration. Passwords are case sensitive and can be up to eight alphanumeric characters in length.

To create or change a password, enter the password in both the New password and Verify password fields.



NOTE: When prompted for the password, leave the "User Name" field blank.

Additional DNS

The fields for secondary and tertiary DNS IP Addresses are optional and should only be completed if provided by your ISP.

NAT

NAT (Network Address Translation) allows PCs on your Network to share a single external (Internet) IP Address. This IP Address is supplied by your ISP. Use the following to determine if you need NAT:

- For Internet access, NAT **must be enabled** unless all of the PCs on your Network have valid external (or public) IP Addresses.
- If the Wireless AP + Cable/DSL Router is not being used to provide shared Internet access, NAT is not normally necessary. With NAT disabled, the Wireless AP + Cable/DSL Router will act as a static router.
- If NAT is disabled, the Firewall protection provided by the Wireless AP + Cable/DSL Router is lost and the Advanced Features (Special Applications, Access Control, Virtual Servers, DMZ, and Routing) are no longer available.

When you are ready to save any changes you have made, click the **Save** button. To undo any changes before saving, click the **Cancel** button.

If you have any questions about anything on this screen, click the **Help** button to bring up the Help window for this screen.

Wireless

You can access this screen at any time by clicking the **Wireless** button.

Any changes made to the Wireless settings must match those of the other wireless devices in your Network.

Configuration

• **Regulatory Domain.** It is illegal to use this device in any location outside of the Regulatory Domain.

• **Station Name.** This is the same as the Device Name that was set on the Basic Setup screen.

• **SSID (Service Set Identifier).** All Wireless devices in your Network must use the same SSID. Make sure that this field reflects the correct SSID for your network.

• **Channel No:** All Wireless devices in your Network must use the same SSID. Make sure that this field reflects the correct channel for your network. Should you experience any interference, you may need to experiment with different channels to establish a better connection.

WEP Data Privacy

WEP is Wired Equivalent Privacy, a data privacy mechanism based on a 64-bit or 128-bit shared key algorithm, as described in the IEEE 802.11b standard. Using a 128-bit shared key algorithm will increase network security. However, you may experience decreased network performance when using a 128-bit shared key algorithm.

• **Off - no data encryption.** When WEP is turned off, data will not be encrypted before being transmitted, compromising security.

• **64 Bit Encryption using this key table.** For your wireless Network to utilize WEP encryption, an encryption key must be entered in each field. All wireless devices on your Network must utilize the same encryption key and all keys must be set identically.

• **Default Key.** Select the algorithm key to be used in your 64-bit WEP-enabled wireless Network.

• **128 Bit Encryption using this key.** For your wireless Network to utilize WEP encryption, an encryption key must be entered in each field. All wireless devices on your Network must utilize the same encryption key and all keys must be set identically.

The WEP keys (1 - 4) are five two-digit numerals in length and can be any numeric combination. However, these keys must be used identically for each point on your wireless Network.

Wireless Stations

• Access Permission.

When **Allow everyone access**, the default selection, is utilized, no check is performed on the station's address before allowing it to use the Wireless AP + Cable/DSL Router.

If you chose **Only allow access if on this list**, then a station must have an address that appears on the address list.

• **Existing Stations.** This lists the IP Addresses of those wireless stations in your Network with access to the Wireless AP + Cable/DSL Router.

• **New Station.** To add a new station to the list above, enter its address here and click the **Add** button.

When you are ready to save any changes you have made, click the **Save** button. To undo any changes, click the **Cancel** button.

If you have any questions about anything on this page, click the **Help** button to bring up the Help window for this screen.

Status

You can access this screen at any time by clicking the **Status** button.

The Status screen will display current data on your Wireless Access Point Router. This screen will change if you do not enable PPPoE.

The screenshot shows the Linksys Status page with the following information:

Hardware	Firmware Version: Version 1.0 Release 08 Hardware ID: 00da00955c11 NAT (Network Address Translation): Enable
LAN Port	Physical Address: 00-c0-02-00-00-7d IP Address: 192.168.1.1 Network Mask: 255.255.255.0 DHCP Server: Enable
WAN Port	Physical Address: 00-c0-02-00-00-7e IP Address: 0.0.0.0 Network Mask: 0.0.0.0 PPPoE Link Status: OFF

Below the table is a 'Connection Log' section with a text area and a 'Clear log' button. At the bottom of the page are buttons for 'Connect', 'Disconnect', 'Refresh', and 'Help'.

Hardware

- **Firmware Version.** Displays the current program code installed on the hardware.
- **Hardware ID.** This is utilized by Linksys to identify this device.
- **NAT (Network Address Translation).** This will display your current NAT selection.

LAN Port

- **Physical Address.** This is the physical address (Hardware MAC Address) of the LAN Port to which an IP address has been allocated.
- **IP Address.** This is the Wireless AP + Cable/DSL Router's IP Address, as seen by the other devices on your Network.
- **Network Mask.** This is the Network Mask for the above IP Address.
- **DHCP Server.** This is the status of the DHCP Server function, as selected on the **DHCP Server** screen.

WAN Port

- **Physical Address.** This is the physical address that identifies the Wireless AP + Cable/DSL Router to your ISP and should be used if your ISP requires you to register this with them.
- **IP Address.** This is the Wireless AP + Cable/DSL Router's IP Address, as seen by the other devices outside your Network.
- **Network Mask.** This is the Network Mask for the above IP Address.
- **PPPoE Link Status.** This shows the status of the PPPoE link, as specified on the Basic Setup screen. (If PPPoE has not been enabled, this selection will not appear.)
- **Connection Log.** This log will only be enabled when **PPPoE (PPP Over Ethernet)** is selected on the Basic Setup Screen and will display your connection activity. (If PPPoE has not been enabled, this selection will not appear.)

Click the **Connect** button to connect your PPPoE link.

Click the **Disconnect** button to disconnect your PPPoE link.

To reload your Connection Log data, click the **Clear Log** button.

If you have any questions about anything on this screen, click the **Help** button to bring up the Help window for this screen.

Advanced Options

The Advanced Options screens gives you the opportunity for further customization of the Wireless AP + Cable/DSL Router. While the previous screens allowed you to setup the Wireless AP + Cable/DSL Router to use, the Advanced Options screens are optional and should not be modified without consulting either your Network Administrator or reading this user guide. Help buttons are provided on each screen. If you make a mistake, return to one of the previous screens and click the Cancel button.

Special Applications

You can access this screen at any time by clicking the **Advanced** button and then clicking the **Special Apps** button.

This feature is only required if you wish to use Internet applications that require 2-way communication, multiple connections, or combined TCP/UDP connections. Some examples of such applications are Internet Video-conferencing, IP Telephony, Games Servers, and other special-purpose Servers.

The screenshot shows the 'Special Applications' configuration interface. At the top, there are navigation buttons for 'Special Apps', 'Access Control', 'Virtual Servers', 'DMZ', 'Routing', and 'Main'. The main title is 'Special Applications' with a description: 'This feature allows you to use 2-way communication, Games Servers, and other Internet applications with special requirements.' Below this is a 'Selected Entry' table with one entry: 'Special Application: disabled'. To the right of the table are 'Get Data' and 'Clear Form' buttons. Below the table is a 'Properties' section with the following fields: 'Name' (disabled), 'Enable' (checkbox), 'Outgoing Control' (Protocol: UDP, Port Range: 100-1201), and 'Incoming Data' (Protocol: UDP, Port Range: Start 1200, Finish 1201). At the bottom are 'Create', 'Delete', and 'Update' buttons, and 'List All' and 'Help' buttons in the bottom right corner.

To Add a New Application

Click the **Clear Form** button and enter the Application's details in the fields provided. (This information is available in your application's documentation.) Select either a UDP or TCP protocol from the drop-down box as shown. Click the **Create** button when completed. Ignore the drop-down menu next to **Special Application**.

To Delete an Existing Application

Selected the Application from the drop-down menu next to **Selected Entry**. Click the **Get Data** button to view the information, if it is not brought up automatically, and confirm that this is the correct Application. Then, click the **Delete** button.

To Change an Existing Application's Details

Select the Application from the drop-down menu next to **Selected Entry**. Click the **Get Data** button if the information on that particular Application is not brought up automatically. Make any necessary changes and click the **Update** button when completed.

To List All of the Special Applications

Click the **List All** button to generate a list of all applications.

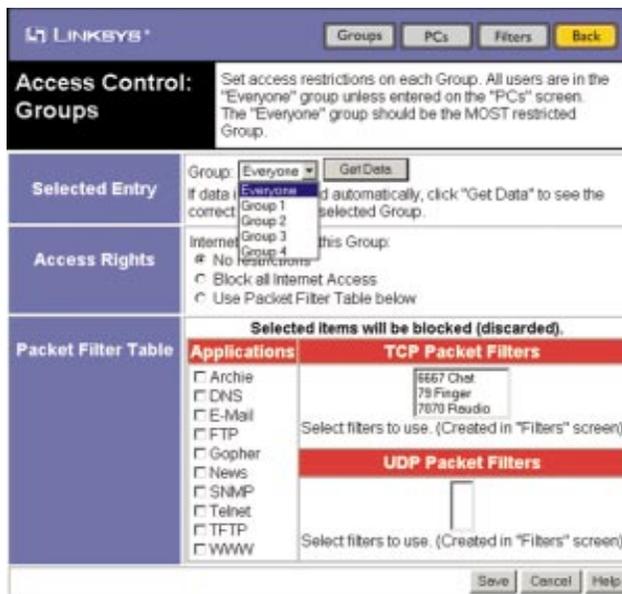
Special Applications							
Name	Enabled	Outgoing Protocol	Outgoing Start Port	Outgoing Finish Port	Incoming Protocol	Incoming Start Port	Incoming Finish Port
dalpad	No	UDP	51200	51201	UDP	51200	51201
palispd	No	UDP	2090	2091	UDP	2090	2091
quicktime	No	TCP	554	554	UDP	6970	6999
starcraft	No	TCP	6112	6112	UDP	6112	6112

If you have any questions about anything on this screen, click the **Help** button to bring up the Help window for this screen.

Access Control: Groups

You can access this screen at any time by clicking the **Advanced** button, followed by the **Access Control** button, and then the **Groups** button.

The Access Control feature allows administrators to restrict Internet access through the Wireless AP + Cable/DSL Router's by individual PCs on the network. The feature utilizes Packet Filtering to block or discard data packets.



Selected Entry

- **Group.** By default, this pull-down menu will always be set to Everyone, which means that all the Access Right for all PCs in the Network will be restricted uniformly according to the settings under Access Rights (below).

To choose another Selected Entry, simply select the Group from the pull-down menu. Then, click the **Get Data** button to bring up the information specific to that Selected Entry, if it does not come up automatically.

Access Rights

Changing the option in these fields will affect the group selected under Selected Entry. Access Rights may be modified as follows:

- **No restrictions.** No packets are blocked. Use this to create an “Unlimited Access” Group, or to temporarily remove restrictions from a group.
- **Block all Internet Access.** Group members cannot access the Internet at all. Use this to create the most restrictive group.
- **Use Packet Filter Table below.** Use this to define intermediate levels of access. Using the Packet Filter table gives you fine control over Internet access.

Packet Filter Table

Simply select the items you wish to block. You can choose from the pre-defined filters in the Applications column or use your own pre-defined filters (as shown in the Access Control:Filters section) in the TCP Packet Filters and UDP Packet Filters fields.

- **Applications.** Any items checked will be blocked. Users will not be able to use the application.
- **TCP Packet Filters.** This lists any TCP filters you have defined at the Access Control:Filters screen. If no filters have been defined, this will appear empty. Multiple filters can be selected (or deselected) by holding down the **Ctrl** key while selecting filters. Any filters selected will not be accessible by members of this group.
- **UDP Packet Filters.** This lists any UDP filters you have defined at the Access Control:Filters screen. If no filters have been defined, this will appear empty. Multiple filters can be selected (or deselected) by holding down the **Ctrl** key while selecting filters. Any filters selected will not be accessible by members of this group.

When you are ready to save any changes you have made, click the **Save** button. To undo any changes before saving, click the **Cancel** button.

If you have any questions about anything on this screen, click the **Help** button to bring up the Help window for this screen.

Access Control: PCs

You can access this screen at any time by clicking the **Advanced** button, followed by the **Access Control** button, and then the **PCs** button.

Selected Entry

- **Existing PCs.** When this pull-down menu is active, it will show the names of the PCs currently connected to the Wireless AP + Cable/DSL Router.

To choose another Selected Entry, simply select the PC from the pull-down menu. Then, click the **Get Data** button to bring up the information specific to that Selected Entry, if it is not brought up automatically.

Properties

- **Workstation Name.** Use this field to identify the PC within the Network.
- **Hardware (MAC) Address.** Enter the Hardware Address of the PC into this field. This is also called the "Physical Address" or "Network Adapter Address". For information on how to determine your PC's MAC address, refer to the "How to Determine Your PC's MAC Address" section in the Appendix.

- **Reserve entry in DHCP Table.** Check this if you wish to reserve an IP Address for this PC. This is useful if you have to provide the IP Address for other programs or users. If this is left unchecked, the **Reserve IP Address** field will not be active.

- **Reserved IP Address.** When the **Reserve entry in DHCP Table** box is checked, this field will be active. Enter the reserve address here. This must be within the range used by the DHCP server.

- **Security Group.** Use this field to identify the security group for this PC. The security group selected will be one of the Groups that was set on the **Access Control:Groups** screen.

To Add a New Workstation

Click the **Clear Form** button and enter the Workstation details in the fields provided. Click the **Create** button when completed. Ignore the drop-down menu next to **Existing PCs**.

To Delete an Existing Workstation

Select the Workstation from the drop-down menu next to **Existing PCs**. Click the **Get Data** button to view the information, if it is not brought up automatically, and confirm that this is the correct Workstation. Then, click the **Delete** button.

To Change an Existing Workstation's Details

Select the Workstation from the drop-down menu next to **Existing PCs**. Click the **Get Data** button, which will call up the information on that particular Workstation if it is not brought up automatically. Make any necessary changes and click the **Update** button when completed.

To List All of the Workstations

Click the **List All** button to generate a list of all workstations.

PC Database			
Name	Network Adapter Address	Reserved IP Address	Security Group
manny	00-20-78-04-a0-bc	192.168.1.2*	Group 1

If you have any questions about anything on this screen, click the **Help** button to bring up the Help window for this screen.

Access Control: Filters

You can access this screen at any time by clicking the **Advanced** button, followed by the **Access Control** button, and then the **Filters** button.

The Access Control:Filters screen allows you to define packet filters for use on the Access Control:Groups screen. When you define security groups on the Access Control:Groups screen, you can select from any filters defined here, along with those pre-set filters.

TCP Packets

- **Name.** Enter a name describing this filter.
- **Port No.** Enter an integer representing the Port Number for this type of packet. This information can normally be provided by the service provider. Otherwise, refer to the documentation for the application you are looking to filter, to find the specified port

UDP Packets

- **Name.** Enter a name describing this filter.

• **Port No.** Enter an integer representing the Port Number for this type of packet. This information can normally be provided by the service provider. Otherwise a Network Analyzer or Packet Sniffer can be used to determine the correct port number.

When you are ready to save any changes you have made, click the **Save** button. To undo any changes before saving, click the **Cancel** button.

If you have any questions about anything on this screen, click the **Help** button to bring up the Help window for this screen.

Virtual Servers

You can access this screen at any time by clicking the **Advanced** button and then clicking the **Virtual Servers** button.

Type of Server	Enable	LAN IP Address
DNS	<input type="checkbox"/>	0 0 0 0
Finger	<input type="checkbox"/>	0 0 0 0
FTP	<input type="checkbox"/>	0 0 0 0
Gopher	<input type="checkbox"/>	0 0 0 0
Mail (SMTP)	<input type="checkbox"/>	0 0 0 0
Mail (POP3)	<input type="checkbox"/>	0 0 0 0
News	<input type="checkbox"/>	0 0 0 0
Telnet	<input type="checkbox"/>	0 0 0 0
Web	<input type="checkbox"/>	0 0 0 0
Whois	<input type="checkbox"/>	0 0 0 0

The Virtual Servers screen allows you to create virtual servers within your Network. In this way, you can make various resources accessible via your web browser and other applications.

The Virtual Servers feature allows access to Servers on your network from the Internet. Without this feature, such access would be blocked by the Firewall.

All of your Virtual Servers have the IP Address allocated by your ISP. This IP Address is shown on the Status screen. It is preferable to have your ISP allocate you a Fixed IP Address if you wish to use the Virtual Servers feature. Otherwise, this Address will change often, making it difficult to connect to your Servers. This option should **not** be used if your ISP provides you with a Dynamic IP Address.

When configuring the Virtual Servers screen, the PCs entered in the "LAN IP Address" field must be running the appropriate Server software. Again, it is preferable for the "Server" PCs to use a fixed IP Address. If acting as DHCP clients, their IP Address could change, making this entry invalid.

Only one PC can use each Special Application at any time.

To create a virtual server, select the type of server desired from the list provided. Click the **Enable** box to set-up the server. Then, type in the LAN IP Address of the device on your Network being used as the Virtual Server.

When you are ready to save any changes you have made, click the **Save** button. To undo any changes before saving, click the **Cancel** button.

If you have any questions about anything on this screen, click the **Help** button to bring up the Help window for this screen.

DMZ

You can access this screen at any time by clicking the **Advanced** button and then clicking the **DMZ** button.

The DMZ feature, when enabled, drops firewall protection from a device on your Network, allow in one computer on your Network to be exposed to the Internet. This enables unrestricted 2-way communication between the "DMZ" and other Internet users or servers. Without this feature, such access would be blocked by the Firewall. Any Internet user who knows the DMZ computer's IP Address can connect to the DMZ.

This allows connection to special-purpose servers that require proprietary client software as well as two-way user connections such as Video-conferencing, which requires both users to run special software.



NOTE: Only one PC can be setup to utilize the DMZ feature.

Using the DMZ feature allows unrestricted access and disables the firewall to the DMZ device, creating a security risk.

You should only use this feature if the **Special Applications** feature is insufficient to allow an application to function correctly.

This feature should be turned **ON** only when necessary and turned **OFF** the remainder of the time.

The DMZ computer should have the IP Address allocated by your Router. This IP Address is shown on the Status screen. It is preferable to have your ISP allocate you a Fixed IP Address if you wish to use the DMZ feature. Otherwise, this Address will change often, making it difficult to make 2-way connections.

When configuring the DMZ screen, the PC entered in the "LAN IP Address" field must be running the appropriate software. Again, it is preferable for the DMZ PCs to use a fixed IP Address. If acting as DHCP client, its IP Address could change, making this entry invalid.

When using the DMZ feature, the Special Application feature should not be used.

To use this feature, check the box next to **Enable DMZ feature**. Then, type in the appropriate LAN IP Address for the chosen device in the empty IP Address fields. Click the **Save** button to use this feature. To undo any selections before saving, click the **Cancel** button.

If you have any questions about anything on this screen, click the **Help** button to bring up the Help window for this screen.

USING DMZ:

Since DMZ enables 2-way communication through the Wireless AP + Cable/DSL Router, you can utilize the DMZ function for:

- (1) Playing games over the Internet
- (2) Video-conferencing
- (3) IP Telephony
- (4) or whenever the software you are trying to run over the Internet is burdened by the Wireless AP + Cable/DSL Router's natural firewall.

Routing

You can access this screen at any time by clicking the **Advanced** button and then clicking the **Routing** button.

If you have a router already attached to your network and are connecting the Wireless AP + Cable/DSL Router, you will need to utilize the Routing feature to prevent conflicts.

Any existing entries are listed. To view and edit the details of an existing entry, select it from the "Routing Table" drop-down menu and click the **Get Data** button. After making any changes in the "Properties" fields, click the **Update** button to save your changes.

Selected Entry

• **Routing Table.** This pull-down menu will show the Destination IP Addresses created on this screen.

To add a new entry, click the **Clear Form** button, enter your data in the "Properties" fields and click the **Create** button to save your new entry.

Properties

- **Destination IP Address.** The Destination LAN IP is the Address of the remote network or host to which you want to assign a static route. Enter the IP address of the host for which you wish to create a static route here. If you are building a route to an entire network, be sure that the network portion of the IP address is set to zero.
- **Network Mask.** The Network Mask (also known as the Subnet Mask) determines which portion of an IP address is the network portion, and which portion is the host portion. For class "C" networks, the standard Network Mask is 255.255.255.0
- **Gateway IP Address.** This IP address should be the IP address of the router on the Network segment to which this device is attached.
- **Interface.** Select the appropriate interface - LAN (internal Network) or WAN (external Network) - from the drop-down menu.
- **Metric.** This is the number of routers which must be traversed to reach the remote LAN segment. The default Metric value is 1.

To List All of the Routing Tables

Click the **List All** button to generate a list of all routing tables.

Routing Table Entries				
Destination	Mask	Gateway	Interface	Metric
192.168.1.1	255.255.255.255	192.168.1.1	LAN	0
192.168.0.0	255.255.255.0	192.168.1.1	LAN	0

If you have any questions about anything on this screen, click the **Help** button to bring up the Help window for this screen.



NOTE: Linksys does not provide technical support for the Routing feature

WAN Port MAC Address

You can access this screen at any time by entering the following IP Address into your web browser: http://192.168.1.1/MAC_addr.htm

You should see the following screen displayed within your browser:

The MAC address specifically identifies the Wireless AP + Cable/DSL Router on the WAN port. Some ISPs may require you to register this address with them. When necessary, you can set the MAC Address from this screen and click the **Save** button to set the address. To restore the default address, click the **Retrieve Defaults** button. To exit without saving, click the **Cancel** button.

If you have any questions about anything on this screen, click the **Help** button to bring up the Help window for this screen. For further help, enter the following IP Address into your web browser: http://192.168.1.1/MAC_hlp.htm

The EtherFast Wireless AP + Cable/DSL Router's PrintServer

Connecting the PrintServer to Your Network

Connecting the Power

The Wireless AP + Cable/DSL Router's PrintServer does not have an ON/OFF power switch. Whenever its AC power adapter is plugged into a power supply, the PrintServer's power is on. Make sure that the power adapter is plugged into the Wireless AP + Cable/DSL Router's Power Port (on the back panel) and that the power adapter is plugged into an electrical outlet. The Wireless AP + Cable/DSL Router's **Power** LED should light up green.

Follow the directions for Connecting Everything Together and Booting Up in the "Connecting the EtherFast Wireless AP + Cable/DSL Router to Your Network" section.

Connecting the Printer

1. Connect your printer to the Printer port with your printer cable. Some printers, especially bidirectional models, may require special shielded cabling. Consult your printer's user guide for cabling specifications.
2. Power on your printer.

You are now ready to install the PrintServer software.

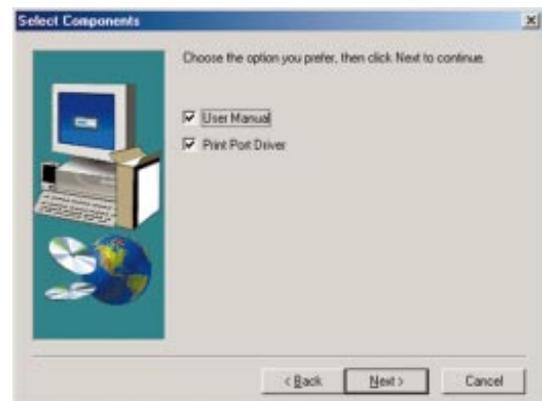
Installing the PrintServer's Drivers

To install the PrintServer drivers, put the Setup CD in your CD-ROM drive. A window will come up asking you to make sure that your printer and the Wireless AP + Cable/DSL Router are both connected and powered on.

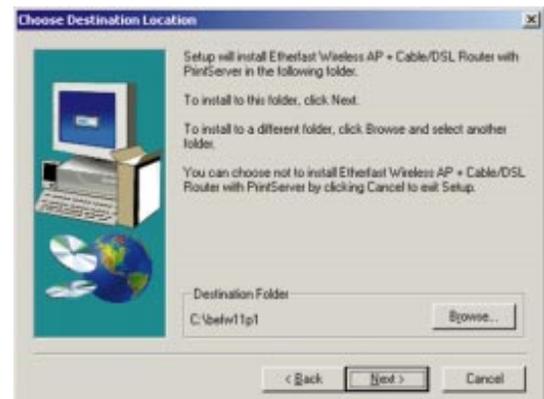


Verify that this has been done and click the **OK** button. This will begin the installation process.

1. When you see the Welcome screen, click the **Next** button to continue. This will bring up the Select Components screen. "User Manual" and "Print Port Driver" will be selected by default. If either of these is deselected, the PrintServer drivers will not be installed completely. Click the **Next** button to continue.



2. The next screen will ask you to choose a destination location. A default installation path will appear but you may click the **Browse** button to choose a different location. Then, click the **Next** button to continue.



3. You will now be asked to select a Program Folder from which you can run the PrintServer software. The PrintServer Program Folder will be created after the PrintServer software has been installed. If you wish to keep the default folder, click the **Next** button to continue. Otherwise, select or type in a Program Folder and click the **Next** button to continue.



4. Driver installation is now ready to begin. The “Run Print Port Setup now” selection will be selected by default. This will assign your printer to the Wireless AP+ Cable/DSL Router’s printer port. Click the **Finish** button to Add your Printer.



NOTE: If you are using Windows NT or 2000, you must **NOT** select “Run Print Port Setup now”. Make sure the box next to this selection is **NOT** selected before clicking the **Finish** button.

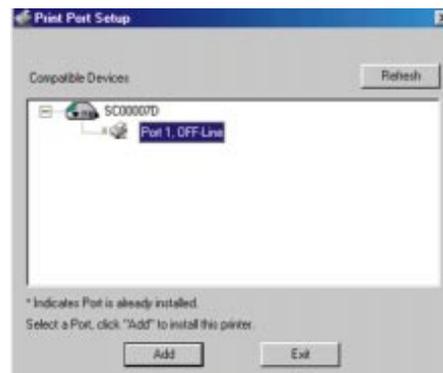
Adding a Printer under Windows 95, 98, and Millennium

Adding a printer under Windows 95, 98, or Millennium is done in two parts. First, you’ll identify the printer for the PrintServer and then the printer will be configured. In the example given below, our printer may vary from yours and it is assumed that no printer has yet been added. Screens, therefore, will vary depending on the printer you add and if a printer was previously added.

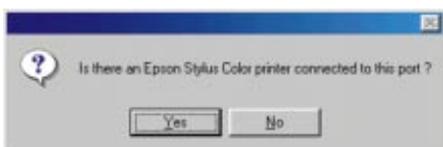
1. After you finish installing your PrintServer drivers, the following screen will appear, asking for you to verify that the Wireless AP + Cable/DSL Router and the printer that connects to it are both connected properly and powered on. Make sure you have done this and click the **OK** button.



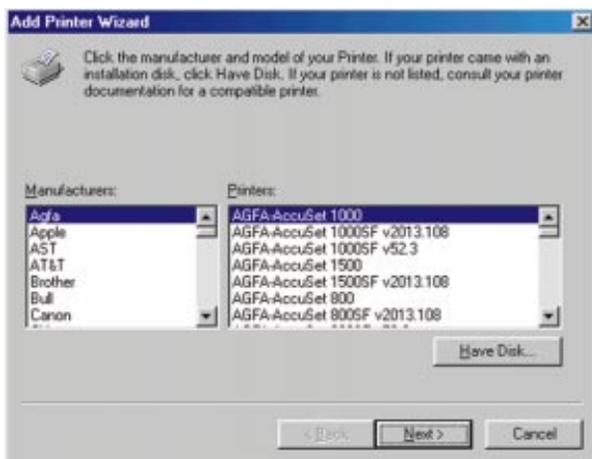
2. The Wireless AP + Cable/DSL Router will now scan the printer port for your printer. As no printer has previously been added, the Print Port Setup screen will show the printer port (Port 1) **OFF-Line**. This port should be selected. If it is not, click on it to select it. Then, click the **Add** button to begin adding the printer.



- Is the printer connected to the Wireless AP + Cable/DSL Router's printer port? Verify that it is connect and powered on and click the **Yes** button to continue.



- When you reach the "Add Printer Wizard" screen, you **must** click the **Cancel** button. The remainder of the process for adding a printer under Windows 95, 98, and Millennium will be performed through Windows.



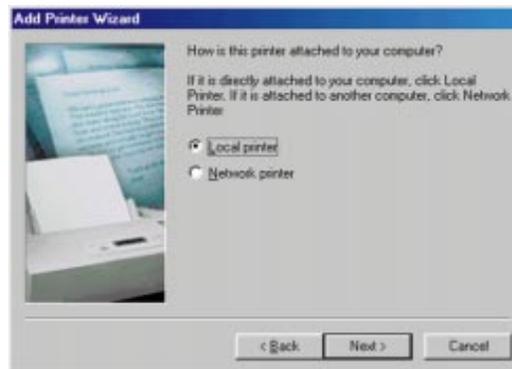
For the next part, you will need to configure your printer to function through the Wireless AP + Cable/DSL Router's Printer port.

- Go to "Add Printer" by clicking the **Start** button, selecting **Settings**, and clicking **Printers**.



Then, to begin the configuration process, click the **Next** button.

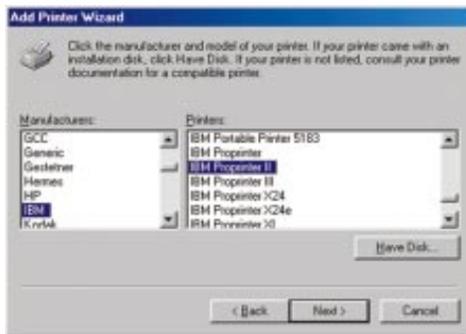
- The next screen will ask how your printer is attached to your computer. Since your printer is being connected to a network, rather than a single computer, you will still want to select **Local Printer**. Do not select **Network Printer**, even though your printer is being connected to a Network, since it is being connected directly to the Wireless AP + Cable/DSL Router. Make sure **Local Printer** is selected, as in the screen below, and click the **Next** button to continue.



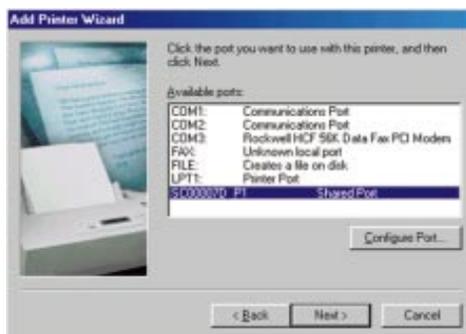
3. You will now be asked to select your printer's manufacturer and model name in order to install the appropriate driver.

If you have a driver disk that came with your printer, click the **Have Disk** button and select the driver's correct location.

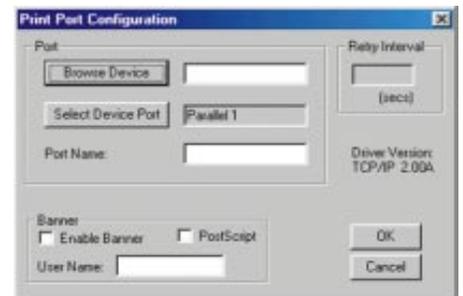
Once the correct printer has been selected or the driver's location has been specified on your driver disk, click the **Next** button.



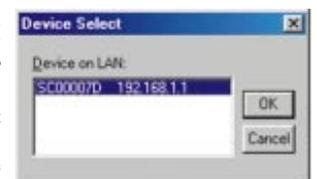
4. The next screen shows all of the Wireless AP + Cable/DSL Router's available ports. The port you will want to configure is the printer port, shown in this screen as "SC00007D P1 Shared Port". (Your port number may be different.) Make sure this port is selected and click the **Configure Port** button to continue.



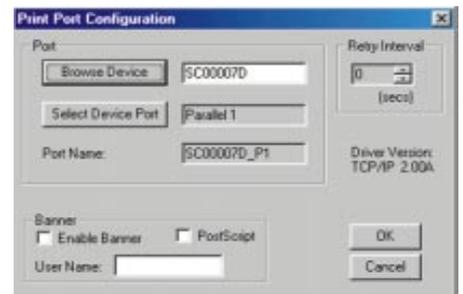
5. The "Print Port Configuration" screen will now assign the printer drivers that you installed to the printer connected to the Wireless AP + Cable/DSL Router. Click the **Browse Device** button to select the driver.



6. The driver for the device that you selected in **step 4** will automatically appear with the device number and IP Address, as shown in this screen as "SC00007D 192.168.0.1". (Your port number may be different.) Make sure the device is selected and click the **OK** button to continue.

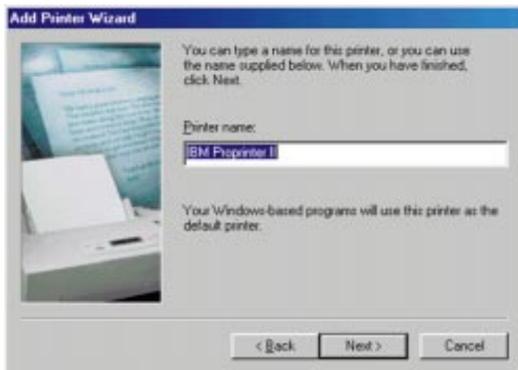


7. The "Print Port Configuration" screen will now appear with the printer selected. Click the **OK** button to continue.

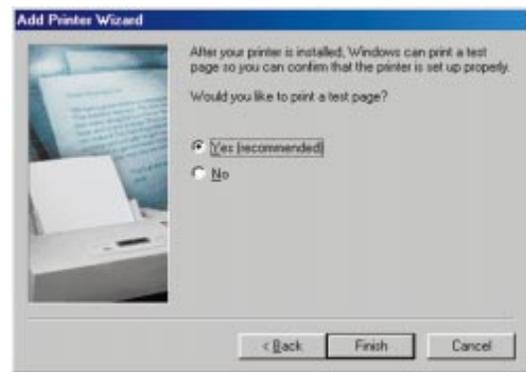


- The next screen will ask for your printer name. For best performance, make sure your printer name is less than 31 characters long. Enter this name in the blank field under "Printer Name". Then, click the **Next** button to continue.

Windows 95 will automatically use this printer as the default printer. Windows 98 and Millennium will ask if you want to use this printer as the default printer. Make the appropriate selection before clicking the **Next** button.



- Your printer has now been added. To verify that it is functioning properly through the Wireless AP + Cable/DSL Router, you will want to print a test page. Click the button beside "Yes (recommended)" to print the test page and then click the **Finish** button to complete adding your printer.



If you opt to print a test page, a window will appear asking if the test page printed correctly. If it did, click the **Yes** button to close the window. If it did not print correctly, click the **No** button and you will be given Windows Troubleshooting for your printer.

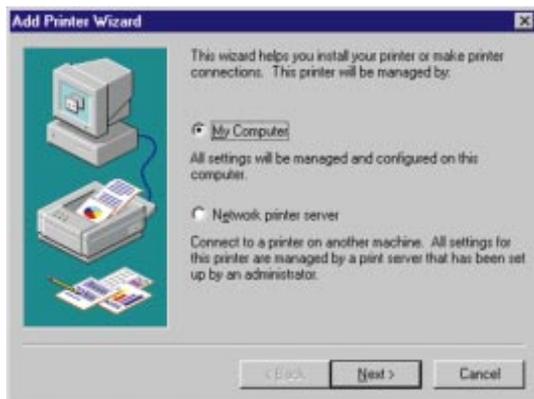
Adding a Printer under Windows NT

When adding a printer under Windows NT, make sure that the final window in the **Installing the PrintServer's Drivers** section does **NOT** have the "Run Print Port Setup now" box checked. Selecting this box will lead to an error in the installation process. Make sure that this box is **NOT** selected before continuing to this section.

1. Go to "Add Printer" by clicking the **Start** button, selecting **Settings**, and clicking **Printers**.

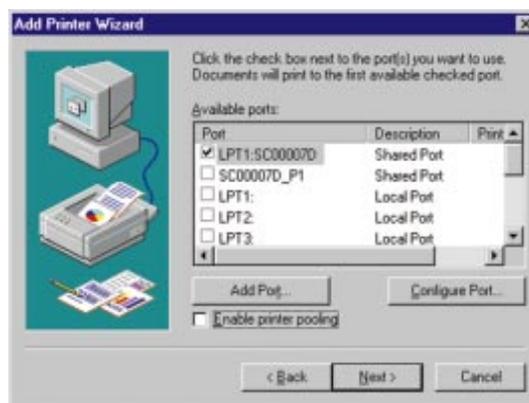


2. The next screen will ask you how you want to manage your printer. Windows NT will not manage the printer as through a Network printer server so you will need to click the button next to the **My Computer** selection. Then, click the **Next** button to continue.

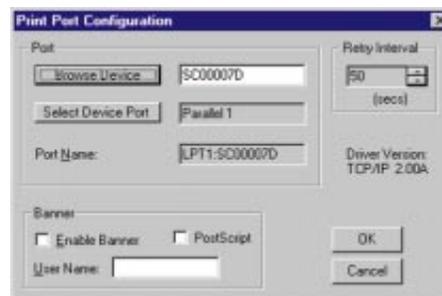


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3. The next screen shows all of the Wireless AP + Cable/DSL Router's available ports. The port you will want to configure is the printer port, shown in this screen as "LPT1:SC00007D Shared Port". (Your port number may be different.) Make sure this port is selected and click the **Configure Port** button to continue.

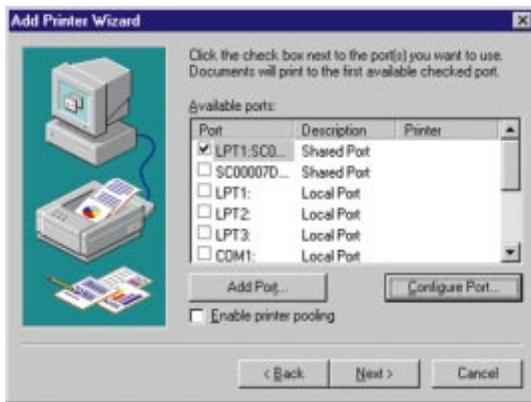


4. The "Print Port Configuration" screen will now assign the printer drivers that you installed to the printer connected to the Wireless AP + Cable/DSL Router. Click the **OK** button to continue.



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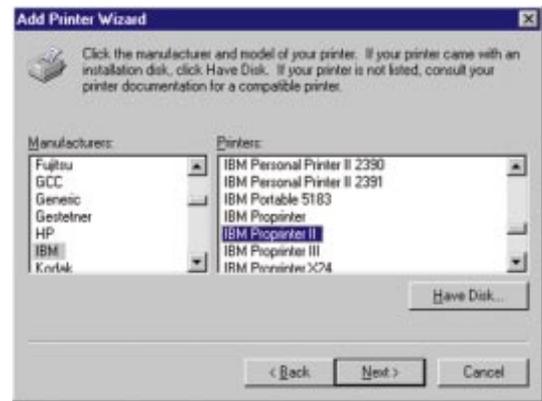
5. Now that the port has been configured, click the **Next** button to continue.



6. The “Add Printer Wizard” will ask you to select the Printer’s Manufacturer and Model Name in order to select the appropriate driver.

If you have a driver disk that came with your printer, click the **Have Disk** button and select the driver’s correct location.

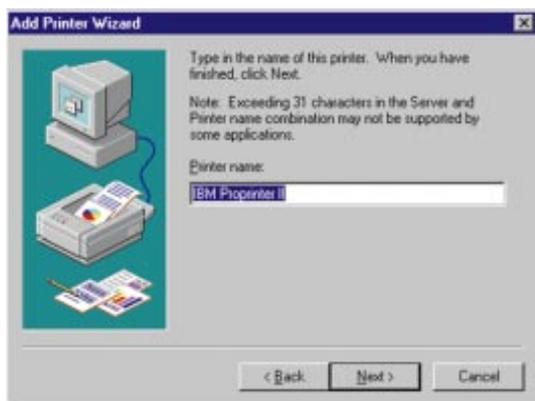
- Once the correct printer has been selected or the driver’s location has been specified on your driver disk, click the **Next** button.



7. At this stage, Windows NT will notify you that a driver has already been installed for this printer. This is due to an idiosyncrasy in Windows NT. Though you have not already installed printer drivers, you will want to select **Keep Existing Driver (recommended)**. **DO NOT** choose **Replace existing driver**. Click the **Next** button to continue.



- The Add Printer Wizard will now ask you to enter a "Printer Name". For best performance, make sure your printer name is less than 31 characters long. Enter this name in the blank field under "Printer Name". Then, click the **Next** button to continue.



- Will this printer be shared over the network? If so, select **Shared** on the following screen and enter a "Shared Name" for the printer. Then, select the operating systems under which this printer will be shared. In the example below, the printer is being shared. If you choose not to share this over the network, select **Not shared**. Then, click the **Next** button to continue.



- Your printer has now been added. To verify that it is functioning properly through the Wireless AP + Cable/DSL Router, you will want to print a test page. Click the button beside "Yes (recommended)" to print the test page and then click the **Finish** button to complete adding your printer.



If you opt to print a test page, a window will appear asking if the test page printed correctly. If it did, click the **Yes** button to close the window. If it did not print correctly, click the **No** button and you will be given Windows Troubleshooting for your printer.

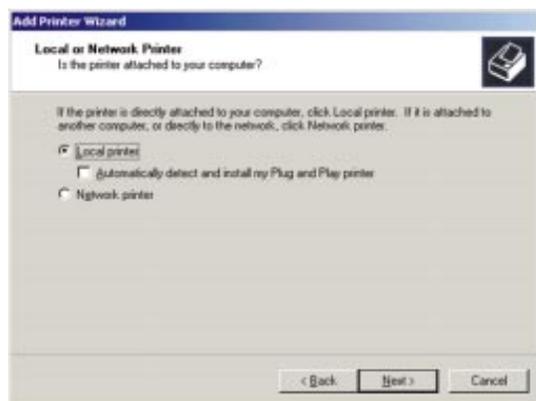
Adding a Printer under Windows 2000

When adding a printer under Windows 2000, make sure that the final window in the **Installing the PrintServer's Drivers** section does **NOT** have the "Run Print Port Setup now" box checked. Selecting this box will lead to an error in the installation process. Make sure that this box is **NOT** selected before continuing to this section.

1. Go to "Add Printer" by clicking the **Start** button, selecting **Settings**, and clicking **Printers**.

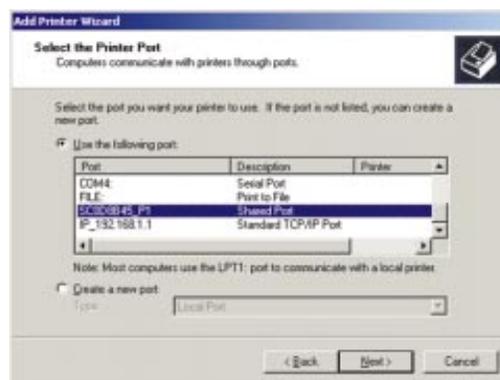
Then, to begin the configuration process, click the **Next** button.

2. The next screen will ask how your printer is attached to your computer. Since your printer is being connected to a network, rather than a single computer, you will still want to select **Local Printer**. Do not select **Network Printer**, even though your printer is being connected to a Network, since it is being connected directly to the Wireless AP + Cable/DSL Router. Nor should you select Automatically Detect and Install; this is only done when the printer is connected to the PC. Make sure **Local Printer** is selected, as in the screen below, and click the **Next** button to continue.

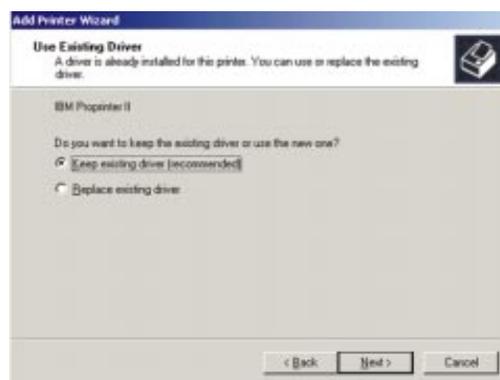


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3. The next screen shows all of the Wireless AP + Cable/DSL Router's available ports. The port you will want to configure is the printer port, shown in this screen as "SC0D8B45_P1 Shared Port". (Your port number may be different.) Make sure this port is selected and click the **Next** button to continue.

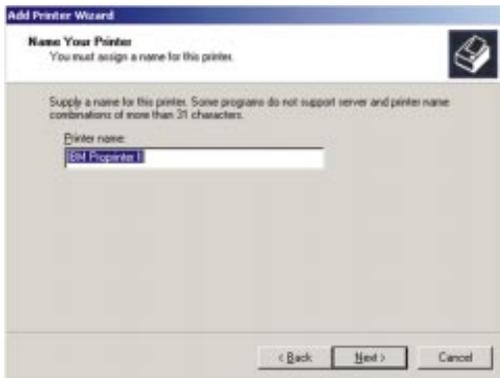


4. At this stage, Windows 2000 will notify you that a driver has already been installed for this printer. This is due to an idiosyncrasy in Windows 2000. Though you have not already installed printer drivers, you will want to select **Keep Existing Driver (recommended)**. **DO NOT** choose **Replace existing driver**. Click the **Next** button to continue.



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- The Add Printer Wizard will now ask you to enter a “Printer Name”. For best performance, make sure your printer name is less than 31 characters long. Enter this name in the blank field under “Printer Name”. Then, click the **Next** button to continue.



- To verify that it is functioning properly through the Wireless AP + Cable/DSL Router, you will want to print a test page. Click the button beside **Yes** to print the text page and then click the **Finish** button to complete adding your printer.



- Your printer has now been added. To print the test page, click the **Finish** button. This will complete adding your printer.



If you opt to print a test page, a window will appear asking if the test page printed correctly. If it did, click the **OK** button to close the window. If it did not print correctly, click the **Troubleshoot** button and you will be given Windows Troubleshooting for your printer.

Troubleshooting

Common Problems and Solutions

This section provides possible solutions to problems regarding the installation and operation of the Cable/DSL Router. Read the description below to solve your problems. If you can't find an answer here, check the Frequently Asked Questions section or the Linksys website at www.linksys.com.

1. I can't connect to the Wireless AP + Cable/DSL Router.

- Verify that the Wireless AP + Cable/DSL Router is properly installed, LAN connections are OK, and it is powered ON.
- Make sure that your PC and the Wireless AP + Cable/DSL Router are on the same network segment. If you are not sure, initiate the DHCP function and let the PC get the IP address automatically.
- Make sure that your PC is using an IP address within the default range of 192.168.1.2 to 192.168.1.254 and thus compatible with the Wireless AP + Cable/DSL Router's default IP Address of 192.168.1.1.
- The Network Mask should be set to 255.255.255.0 to match the Wireless AP + Cable/DSL Router. In the Wireless AP + Cable/DSL Router, you can check these settings by going to the Basic Setup screen.

2. The Diag LED stays lit when it shouldn't.

- The Diag LED lights up when the device is first powered up. Meantime, the system will boot up itself and check for proper operation. After finishing the checking procedure, the LED turns off to show the system is working fine. If the LED remains lit after this time, the device is not working properly. First, try restoring the Wireless AP + Cable/DSL Router' to its default settings by holding down the Reset button for more than five seconds. If the LED remains on after restoring the default settings, try to re-flash the firmware by assigning a static IP address to the computer, then upgrade the firmware again. If that doesn't help, contact your dealer for further information.

3. I can't browse through the Wireless AP + Cable/DSL Router.

- Make sure that both ends of the network cable and power adapter are properly connected and that the status LEDs on the front panel are functioning properly.
- If using Windows 95 or 98, check the TCP/IP setup on the client side. Run "**wiipcfg**" by clicking on the **Start** button, then selecting **Run**. The PC should have an IP address of 192.168.1.xxx ("xxx" is from 2 to 254.) Network Mask is 255.255.255.0, the default gateway IP should be the Router's IP Address.

- Make sure that the same values are in the Basic Setup screen of the Wireless AP + Cable/DSL Router web-based utility.

4. When I enter a URL or IP address, I get a time out error.

- Make sure that the other PCs work. If they do, ensure that your workstations IP settings are correct (IP address, Network Mask, Gateway and DNS).
- If the PCs are configured correctly, but still not working, check the Wireless AP + Cable/DSL Router to make sure that it is connected and ON. Once this is the case, check its settings. (If you cannot connect to the Wireless AP + Cable/DSL Router, check the LAN and power connections.)
- If the Wireless AP + Cable/DSL Router is configured correctly, check your Internet connection (the Cable/DSL modem) to see that it is working correctly.

5. I can't obtain an IP address from my cable or DSL modem.

- Make sure that all of your cabling is properly connected and that all of the Wireless AP + Cable/DSL Router's LEDs are correctly illuminated.
- Power down your cable or DSL modem for a few seconds. Turn it back on. After the modem goes through its self-test, check to see that you now have an IP address.
- Make sure that your cable or DSL modem is DHCP-capable.
- You may have to enter the Wireless AP + Cable/DSL Router or Device Name in the Basic Setup page of the Wireless AP + Cable/DSL Router's web-based utility.
- Your ISP may require Mac Addresses. Check with your ISP. This address can be obtained in the Basic Setup screen of the Wireless AP + Cable/DSL Router's Web-based Utility.

Frequently Asked Questions

Can I use firmware for other routers with my Wireless AP + Cable/DSL Router? No. If you attempt to use other router's firmware, you could damage your router. Only use firmware specifically written for the Wireless AP + Cable/DSL Router as posted on the Linksys web site: www.linksys.com.

What is the maximum number of IP addresses and users supported by the Wireless AP + Cable/DSL Router? The Wireless AP + Cable/DSL Router supports up to 253 IP addresses and users.

Where is the Wireless AP + Cable/DSL Router installed on the network? In a typical environment, the Wireless AP + Cable/DSL Router is installed between the Cable/DSL Modem and the LAN. Plug the Wireless AP + Cable/DSL Router into the Cable/DSL Modem's Ethernet port.

Does the Wireless AP + Cable/DSL Router support IPX or AppleTalk? No. TCP/IP is the only protocol standard for the Internet and has become the global standard for communications. IPX, a NetWare communications protocol used only to route messages from one node to another, and AppleTalk, a communications protocol used on Apple and Macintosh networks, can be used from LAN to LAN connections, but those protocols cannot connect from WAN to LAN.

Does the WAN connection of the Wireless AP + Cable/DSL Router support 100Mb Ethernet? Because of the speed limitations of broadband Internet connections, the Wireless AP + Cable/DSL Router's current hardware design supports 10Mb Ethernet on its WAN port. It does, of course, support 100Mbps over in the auto-sensing Fast Ethernet 10/100 switch on the LAN side of the Wireless AP + Cable/DSL Router.

What is Network Address Translation and what is it used for? Network Address Translation (NAT) translates multiple IP addresses on the private LAN to one public address that is sent out to the Internet. This adds a level of security since the address of a PC connected to the private LAN is never transmitted on the Internet. Furthermore, NAT allows the Wireless AP + Cable/DSL Router to be used with low cost Internet accounts, such as cable or DSL modems, where only one TCP/IP address is provided by the ISP. The user may have many private addresses behind this single address provided by the ISP.

Does the Wireless AP + Cable/DSL Router support any operating system other than Windows 95, 98, Millennium, NT, or 2000? The Wireless AP + Cable/DSL Router's Web Utility is configured via the Internet web browser on your Linux system. The PrintServer, though, is configured through Windows and will not function under Linux. Linksys does not, at this time, provide technical support for setup, configuration or troubleshooting of any non-Windows operating systems.

Does the Wireless AP + Cable/DSL Router support ICQ send file? Yes, with the following fix: ICQ menu-> preference -> connections tab-> check "I am behind a firewall or proxy", and set the firewall time-out to 80 seconds in firewall setting. The Internet user can then send a file to a user behind the Wireless AP + Cable/DSL Router.

I setup an Unreal Tournament Server, but others on the LAN cannot join. What do I need to do? If you have a dedicated Unreal Tournament server running, you need to create a static IP for each of the LAN computers and forward ports 7777, 7778, 7779, 7780, 7781, and 27900 to the IP address of the server. If you want to use the UT Server Admin, forward another port (8080 usually works well), then in the [UWeb.WebServer] section of the server.ini file, set the ListenPort to 8080 (to match the mapped port above) and ServerName to the IP assigned to the Router from your ISP.

How do I get Half-Life: Team Fortress to Work with the Wireless AP + Cable/DSL Router? The default client port for Half-Life is 27005. The computers on your LAN need to have "+clientport 2700x" to the HL shortcut command line; the x would be 6, 7, 8, and on up. This lets multiple computers connect to the same server. *One problem:* version 1.0.1.6 won't let multiple computers with the same CD key connect at the same time, even if on the same LAN (not a problem with 1.0.1.3). As far as hosting games, the HL server does not need to be in the DMZ. Just forward port 27015 or 27016 to the local IP of the server computer. There remains, however, a problem with people being booted after a few minutes with an "illegible server message."

Can multiple gamers on the LAN get on one game server and play simultaneously with just one public IP address? It depends on which network game or what kind of game server you are using. For example, Unreal Tournament supports multi-login with one public IP.

How can I receive uncorrupted FTP downloads? If you are experiencing corrupted files when you download a file with your FTP client, try using another FTP program.

Web page hangs, corrupt downloads, or nothing but junk characters are being displayed on the screen. What do I need to do? Force your NIC to 10Mbps or half duplex mode, and turn off the "Auto-negotiate" feature of your NIC as a temporary measure. (Please look at the Network Control Panel, in your Ethernet Adapter's Advanced Properties tab.). Check our website at www.linksys.com for more information.

If all else fails in the installation, what can I do? Reset the Wireless AP + Cable/DSL Router by holding down the reset button for at least three seconds and reset your cable or DSL modem by powering the unit off and then on. Obtain and flash the latest firmware release that is readily available on Linksys website, www.linksys.com.

How can I find upgrades to the Wireless AP + Cable/DSL Router's firmware? All Linksys firmware upgrades are posted on the Linksys website at www.linksys.com, where they can be downloaded for free. The Wireless AP + Cable/DSL Router's firmware can be upgraded with TFTP programs.

Will the Wireless AP + Cable/DSL Router function in a Macintosh environment? Yes, but the Wireless AP + Cable/DSL Router's web-based utility is accessible only through Internet Explorer or Netscape Navigator, versions 4.0 or higher for Macintosh. (Linksys does not provide technical support for the Macintosh platform.)

With which type of firewall is the Wireless AP + Cable/DSL Router equipped? The Wireless AP + Cable/DSL Router uses NAT and TCP/IP port inspections.

Does the Wireless AP + Cable/DSL Router do stateful packet inspection? No

I am not able to get the web configuration screen for the Wireless AP + Cable/DSL Router. What can I do? You may have to remove the proxy settings on your Internet browser, e.g., Netscape Navigator or Internet Explorer. You may also need to remove any Firewall software you may be running or remove the dial-up settings on your browser. Check with your browser documentation.

What is DMZ? Demilitarized Zone (DMZ) allows one IP Address (computer) to be exposed to the Internet. Some applications require multiple TCP/IP ports to be open. It is recommended that you set your computer with a static IP if you want to use DMZ.

If DMZ is used, does the exposed user share the public IP with the Wireless AP + Cable/DSL Router? No.

Does the Wireless AP + Cable/DSL Router pass PPTP packets or actively route PPTP sessions? The Wireless AP + Cable/DSL Router allows PPTP packets to pass through.

Is the Wireless AP + Cable/DSL Router cross-platform compatible? Any platform that supports Ethernet and TCP/IP is compatible with the Wireless AP + Cable/DSL Router.

Will the Wireless AP + Cable/DSL Router allow me to use my own public IPs and Domain, or do I have to use the IPs provided by the Wireless AP + Cable/DSL Router? The router mode allows for customization of your public IPs and Domain.

Does the Wireless AP + Cable/DSL Router replace a modem? Is there a cable or DSL modem in the Wireless AP + Cable/DSL Router? No, this version of the Wireless AP + Cable/DSL Router must work in conjunction with a cable or DSL modem.

Which modems are compatible with the Wireless AP + Cable/DSL Router? The Wireless AP + Cable/DSL Router is compatible with virtually any cable or DSL modem that supports Ethernet.

What are the advanced features of the Wireless AP + Cable/DSL Router? The Wireless AP + Cable/DSL Router's advanced features include Filters, Forwarding, Dynamic Routing, Static Routing, and DMZ host.

Does Linksys provided syslog support? No, Linksys does not currently provide syslog support.

How can I check whether I have static or DHCP IP Addresses? Consult your ISP to confirm the information.

How do I get mIRC to work with the Wireless AP + Cable/DSL Router? Set port forwarding to 113 for the computer on which you are using mIRC.

Can I run an application from a remote computer over the wireless network? This will depend on whether or not the application is designed to be used over a network. Consult the application's user guide to determine if it supports operation over a network.

Can I play computer games with other members of the cordless network? Yes, as long as the game supports multiple players over a LAN (local area network). Refer to the game's user guide for more information.

What is the IEEE 802.11b standard? The IEEE 802.11b Wireless LAN standards subcommittee, which is formulating a standard for the industry. The objective is to enable wireless LAN hardware from different manufacturers to communicate.

What IEEE 802.11 features are supported? The Wireless AP + Cable/DSL Router supports the following IEEE 802.11 functions:

- CSMA/CA plus Acknowledge protocol
- Multi-Channel Roaming
- Automatic Rate Selection
- RTS/CTS feature
- Fragmentation
- Power Management

What is Ad-hoc? An Ad-hoc wireless LAN is a group of computers, each with a WLAN adapter, connected as an independent wireless LAN. Ad-hoc wireless LAN is applicable at a departmental scale for a branch or SOHO operation.

What is Infrastructure? An integrated wireless and wired LAN is called an Infrastructure configuration. Infrastructure is applicable to enterprise scale for wireless access to central database, or wireless application for mobile workers.

What is Roaming? Roaming is the ability of a portable computer user to communicate continuously while moving freely throughout an area greater than that covered by a single Wireless Network Access Point. Before using the roaming function, the PC must make sure that it is the same channel number with the Wireless AP + Cable/DSL Router of dedicated coverage area.

To achieve true seamless connectivity, the wireless LAN must incorporate a number of different functions. Each node and Wireless AP + Cable/DSL Router, for example, must always acknowledge receipt of each message. Each node must maintain contact with the wireless network even when not actually transmitting data. Achieving these functions simultaneously requires a dynamic RF networking technology that links Wireless AP + Cable/DSL Routers and nodes. In such a system, the user's end node undertakes a search for the best possible access to the system. First, it evaluates such factors as signal strength and quality, as well as the message load currently being carried by each Wireless AP + Cable/DSL Router and the distance of each Wireless AP + Cable/DSL Router to the wired backbone. Based on that information, the node next selects the right Wireless AP + Cable/DSL Router and registers its address. Communications between end node and host computer can then be transmitted up and down the backbone.

As the user moves on, the end nodes RF transmitter regularly checks the system to determine whether it is in touch with the original Wireless AP + Cable/DSL Router or whether it should seek a new one. When a node no longer receives acknowledgment from its original Wireless AP + Cable/DSL Router, it undertakes a new search. Upon finding a new Wireless AP + Cable/DSL Router, it then re-registers, and the communication process continues.

What is BSS ID? A specific Ad hoc LAN is called a Basic Service Set (BSS). Computers in a BSS must be configured with the same BSS ID.

What is ESS ID? An Infrastructure configuration could also support roaming capability for mobile workers. More than one BSS can be configured as an Extended Service Set (ESS). Users within an ESS could roam freely between BSSs while served as a continuous connection to the network wireless stations and Wireless AP + Cable/DSL Routers within an ESS must be configured with the same ESS ID and the same radio channel.

What is ISM band? The FCC and their counterparts outside of the U.S. have set aside bandwidth for unlicensed use in the ISM (Industrial, Scientific and Medical) band. Spectrum in the vicinity of 2.4 GHz, in particular, is being made available worldwide. This presents a truly revolutionary opportunity to place convenient high-speed wireless capabilities in the hands of users around the globe.

What is Spread Spectrum? Spread Spectrum technology is a wideband radio frequency technique developed by the military for use in reliable, secure, mission-critical communications systems. It is designed to trade off bandwidth

efficiency for reliability, integrity, and security. In other words, more bandwidth is consumed than in the case of narrowband transmission, but the trade off produces a signal that is, in effect, louder and thus easier to detect, provided that the receiver knows the parameters of the spread-spectrum signal being broadcast. If a receiver is not tuned to the right frequency, a spread-spectrum signal looks like background noise. There are two main alternatives, Direct Sequence Spread Spectrum (DSSS) and Frequency Hopping Spread Spectrum (FHSS).

What is DSSS? What is FHSS? And what are their differences? Frequency-hopping spread-spectrum (FHSS) uses a narrowband carrier that changes frequency in a pattern that is known to both transmitter and receiver. Properly synchronized, the net effect is to maintain a single logical channel. To an unintended receiver, FHSS appears to be short-duration impulse noise. Direct-sequence spread-spectrum (DSSS) generates a redundant bit pattern for each bit to be transmitted. This bit pattern is called a chip (or chipping code). The longer the chip, the greater the probability that the original data can be recovered. Even if one or more bits in the chip are damaged during transmission, statistical techniques embedded in the radio can recover the original data without the need for retransmission. To an unintended receiver, DSSS appears as low power wideband noise and is rejected (ignored) by most narrowband receivers.

Would the information be intercepted while transmitting on air? WLAN features two-fold protection in security. On the hardware side, as with Direct Sequence Spread Spectrum technology, it has the inherent security feature of scrambling. On the software side, WLAN series offer the encryption function (WEP) to enhance security and Access Control. Users can set it up depending upon their needs.

What is WEP? WEP is Wired Equivalent Privacy; a data privacy mechanism based on a 40 bit shared key algorithm, as described in the IEEE 802.11 standard.

Appendix

How to Ping Your ISP's E-mail & Web Addresses

Virtually all Internet addresses are configured with words or characters (i.e., www.linksys.com, www.yahoo.com, etc.) In actuality, however, these Internet addresses are assigned to IP addresses, which are the true addresses on the Internet.

IP and web addresses, however, can sometimes be long and hard to remember. Because of this, certain ISPs will shorten their server addresses to single words or codes on their users' web browser or e-mail configurations. If your ISP's E-mail and Web server addresses are configured with single words ("www", "e-mail", "home", "pop3", etc.) rather than whole Internet Addresses or IP Addresses, the Router may have problems sending or receiving mail and accessing the Internet. This happens because the Router has not been configured by your ISP to accept their abbreviated server addresses.

The solution is to determine the true web addresses behind your ISP's code words. You can determine the IP and web addresses of your ISP's servers by "pinging" them.



NOTE: If you don't have your ISP's web and e-mail IP Addresses, you *must* either get them from your ISP or follow these steps *prior* to connecting the Cable/DSL Router to your network.

Step One: Pinging for an IP Address

The first step to determining your ISP's web and e-mail server address is to ping its IP Address.

1. **Power on the computer and the cable or DSL modem**, and restore the network configuration set by your ISP if you have since changed it.
2. **Click Start**, then **Run**, and type "command". This will bring up the DOS Window.

3. **At the DOS command prompt**, type "ping mail" (assuming that the location for which you're trying to find an IP address is configured as "mail"). Press **Enter**. Information such as the following data, taken from a ping of Microsoft Network's e-mail server, will be displayed. (Please note that the screen displayed below is only an example and may appear differently on your system.)

```
C:\>ping mail

Pinging mail [24.53.32.4] with 32 bytes of data:

Reply from 24.53.32.4: bytes=32 time<10ms TTL=128

Ping statistics for 24.53.32.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0%
    loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

4. **Write down the IP address returned by the ping command.** (In the example above: 24.53.32.4.) This IP address is the actual IP address of the server "mail", or any other word or value you have pinged.

Step Two: Pinging for a Web Address

While the IP address returned above would work as your e-mail server address, it may not be permanent. IP Addresses change all the time. Web addresses, however, usually don't. Because of this, you're likely to have less problems by configuring your system with web addresses rather than IP addresses. Follow the instructions below to find the web address assigned to the IP address you just pinged.

1. **At the DOS command prompt**, type "ping -a 24.53.32.4", where 24.53.32.4 is the IP address you just pinged. Information such as the following data will be displayed. (Please note that the screen displayed below is only an example and may appear differently on your system.)

```
C:\>ping -a 24.53.32.4

Pinging mail.msnv3.occa.home.com [24.53.32.4] with 32
bytes of data:

Reply from 24.53.32.4: bytes=32 time<10ms TTL=127

Ping statistics for 24.53.32.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0%
    loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

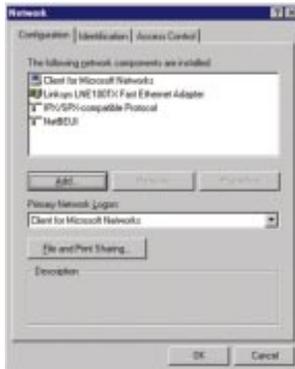
2. **Write down the web address returned by the ping command.** (In the example above: mail.msnv3.occa.home.com.) This web address is the web address assigned to the IP address you just pinged. While the IP address of "mail" could conceivably change, it is likely that this web address will not.
3. **Replace your ISP's abbreviated server address** with this extended web address in the corresponding Internet application (web browser, e-mail application, etc.).

Once you have replaced the brief server address with the true server address, the Router should have no problem accessing the Internet through that Internet application.

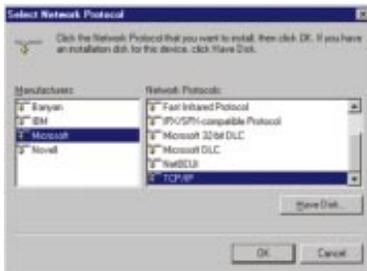
Installing the TCP/IP Protocol

Follow these instructions to install the TCP/IP Protocol on one of your PCs *only* after a network card has been successfully installed inside the PC. These instructions are for Windows 95, 98, and Millennium. For TCP/IP setup under Windows NT or 2000, please refer to your Windows manual.

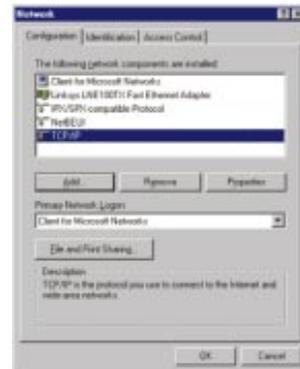
1. Click the **Start** button. Choose **Settings**, then **Control Panel**.
2. Double-click the **Network** icon. Your Network window should pop up. Select the **Configuration** tab.



3. Click the **Add** button.
4. Double-click **Protocol**.
5. Highlight **Microsoft** under the list of manufacturers.
6. Find and double-click **TCP/IP** in the list to the right (below).



7. After a few seconds you will be brought back to the main Network window. The TCP/IP Protocol should now be listed.



8. Click the **OK** button. Windows may ask for original Windows installation files. Supply them as needed (i.e.: D:\win98, D:\win95, c:\windows\options\cabs.)
9. Windows will ask you to restart the PC. Click the **Yes** button to restart.

The TCP/IP Installation is complete.

How to Determine Your PC's MAC Address

In Windows 95, 98, and Millennium, you can use the **Winipcfg** program to determine the MAC Address:

1. Open the "Run" dialog by clicking the **Start** button and selecting **Run**.
2. Type in "winipcfg" and click the **OK** button.
3. In Winipcfg, select your network adapter from the drop-down list. The hardware address will be shown on screen.

In Windows NT or 2000, you can use the **cmd** program to determine the MAC Address:

1. Open the "Run" dialog by clicking the **Start** button and selecting **Run**.
2. Type in "cmd" and click the **OK** button.
3. In the cmd window, type "ipconfig /all". Your MAC Address will be displayed as the "Physical Address".

Twisted-Pair Cabling

There are different grades, or categories, of twisted-pair cabling. Category 5 is the most reliable and is highly recommended. Category 3 is a good second choice. Straight-through cables are used for connecting computers to a hub. Crossover cables are used for connecting a hub to another hub (there is an exception: some hubs have a built-in uplink port that is crossed internally, which allows you to link or connect hubs together with a straight-through cable instead).

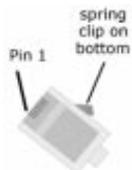
RJ-45 Color Chart

- Wire 1** → White with an Orange Stripe
- Wire 2** → Orange
- Wire 3** → White with a Green Stripe
- Wire 4** → Blue
- Wire 5** → White with a Blue Stripe
- Wire 6** → Green
- Wire 7** → White with a Brown Stripe
- Wire 8** → Brown

You can buy pre-made Category 5 cabling, or cut and crimp your own. Category 5 cables can be purchased or crimped as either straight-through or crossover. Inside a Category 5 cable are 8 thin, color-coded wires inside that run from one end of the cable to the other. All 8 wires are used. In a straight-through cable, wires 1, 2, 3, and 6 at one end of the cable are also wires 1, 2, 3, and 6 at the other end. In a crossover cable, the order of the wires change from one end to the other: wire 1 becomes 3, and 2 becomes 6. See the diagrams on the next page for more detailed information on straight-through and crossover cabling.

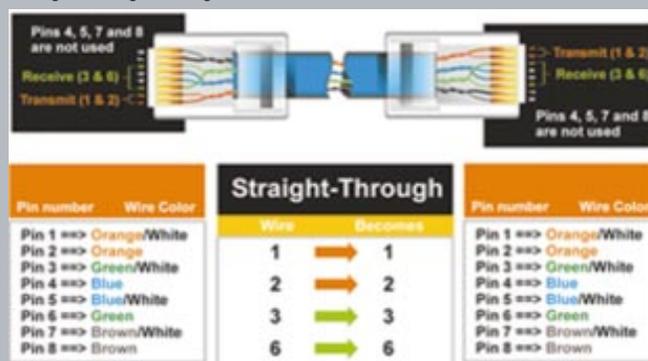
straight-through cable		crossover cable	
Wire	Becomes	Wire	Becomes
1	1	1	3
2	2	2	6
3	3	3	1
6	6	6	2

To determine which wire is wire number 1, hold the cable so that the end of the plastic RJ-45 tip (the part that goes into a wall jack first) is facing away from you. Face the clip down so that the copper side faces up (the springy clip will now be parallel to the floor). When looking down on the copper side, wire 1 will be on the far left.

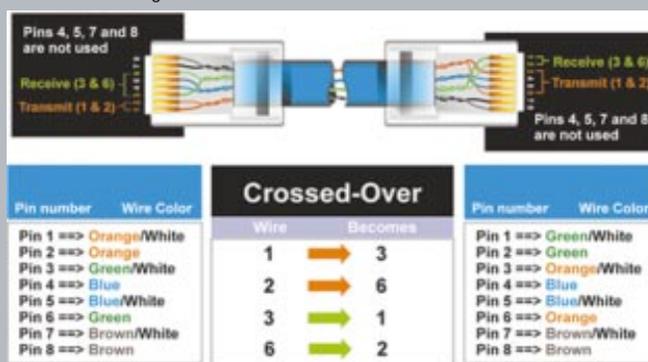


Crimping Your Own Network Cables

• Straight-Through Cabling



• Cross-Over Cabling



Glossary

Ad-hoc Network - An ad-hoc network is a wireless network or other small network in which some of the network devices are part of the network only for the duration of a communications session while in some close proximity to the rest of the network.

BSS (Basic Service Set) - A group of Instant Wireless™ Network PC Card users and a Wireless AP + Cable/DSL Router.

Default Gateway - The router used to forward all traffic that is not addressed to a station within the local subnet.

DHCP (Dynamic Host Configuration Protocol) - A protocol that lets network administrators manage centrally and automate the assignment of Internet Protocol (IP) addresses in an organization's network. Using the Internet's set of protocol (TCP/IP), each machine that can connect to the Internet needs a unique IP address. When an organization sets up its computer users with a connection to the Internet, an IP address must be assigned to each machine. Without DHCP, the IP address must be entered manually at each computer and, if computers move to another location in another part of the network, a new IP address must be entered. DHCP lets a network administrator supervise and distribute IP addresses from a central point and automatically sends a new IP address when a computer is plugged into a different place in the network.

DHCP uses the concept of a "lease" or amount of time that a given IP address will be valid for a computer. The lease time can vary depending on how long a user is likely to require the Internet connection at a particular location. It's especially useful in education and other environments where users change frequently. Using very short leases, DHCP can dynamically reconfigure networks in which there are more computers than there are available IP addresses.

DHCP supports static addresses for computers containing Web servers that need a permanent IP address.

DMZ - A DMZ (demilitarized zone) is a computer host or small network inserted as a "neutral zone" between a company's private network and the outside public network. It prevents outside users from getting direct access to a server that has company data.

DNS - The domain name system (DNS) is the way that Internet domain names are located and translated into Internet Protocol (IP) addresses. A domain name is a meaningful and easy-to-remember "handle" for an Internet address.

DSSS - Also known as "Direct Sequence Spread Spectrum", this is a variety of radio transmission methods that continuously change frequencies or signal patterns. Direct sequence spread spectrum (DSSS), which is used in CDMA, multiplies the data bits by a very fast pseudo-random bit pattern (PN sequence) that "spreads" the data into a large coded stream that takes the full bandwidth of the channel.

Dynamic IP Address - An IP address that is automatically assigned to a client station in a TCP/IP network, typically by a DHCP server. Network devices that serve multiple users, such as servers and printers, are usually assigned static IP addresses.

ESS - More than one BSS in a network.

FHSS - Also known as "Frequency Hopping Spread Spectrum". Frequency hopping spread spectrum (FHSS) continuously changes the center frequency of a conventional carrier several times per second according to a pseudo-random set of channels, while chirp spread spectrum changes the carrier frequency. Because a fixed frequency is not used, illegal monitoring of spread spectrum signals is extremely difficult, if not downright impossible depending on the particular method.

Firewall - A firewall is a set of related programs, located at a network gateway server, that protects the resources of a network from users from other networks. (The term also implies the security policy that is used with the programs.) An enterprise with an intranet that allows its workers access to the wider Internet installs a firewall to prevent outsiders from accessing its own private data resources and for controlling what outside resources to which its own users have access.

Basically, a firewall, working closely with a router program, examines each network packet to determine whether to forward it toward its destination.

Firmware - Programming that is inserted into programmable read-only memory (programmable read-only memory), thus becoming a permanent part of a computing device.

IEEE - The Institute of Electrical and Electronics Engineers. The IEEE describes itself as "the world's largest technical professional society -- promoting the development and application of electrotechnology and allied sciences for the benefit of humanity, the advancement of the profession, and the well-being of our members."

The IEEE fosters the development of standards that often become national and international standards. The organization publishes a number of journals, has many local chapters, and several large societies in special areas, such as the IEEE Computer Society.

Infrastructure - An infrastructure network is a wireless network or other small network in which the wireless network devices are made a part of the network through the Access Point which connects them to the rest of the network.

IP Address - In the most widely installed level of the Internet Protocol (Internet Protocol) today, an IP address is a 32-binary digit number that identifies each sender or receiver of information that is sent in packet across the Internet. When you request an HTML page or send e-mail, the Internet Protocol part of TCP/IP includes your IP address in the message (actually, in each of the packets if more than one is required) and sends it to the IP address that is obtained by looking up the domain name in the Uniform Resource Locator you requested or in the e-mail address you're sending a note to. At the other end, the recipient can see the IP address of the Web page requestor or the e-mail sender and can respond by sending another message using the IP address it received.

IPCONFIG - A utility that provides for querying, defining and managing IP addresses within a network. A commonly used utility, under Windows NT and 2000, for configuring networks with static IP addresses.

IPSec - IPSec (Internet Protocol Security) is a developing standard for security at the network or packet processing layer of network communication. A big advantage of IPSec is that security arrangements can be handled without requiring changes to individual user computers.

ISP - An ISP (Internet service provider) is a company that provides individuals and companies access to the Internet and other related services such as Web site building and virtual hosting.

LAN - A local area network (LAN) is a group of computers and associated devices that share a common communications line and typically share the resources of a single processor or server within a small geographic area (for example, within an office building).

MAC Address - The MAC (Media Access Control) address is your computer's unique hardware number.

mIRC - mIRC runs under Windows and provides a graphical interface for logging onto IRC servers and listing, joining and leaving channels.

NAT - NAT (Network Address Translation) is the translation of an Internet Protocol address (IP address) used within one network to a different IP address known within another network. One network is designated the inside network and the other is the outside.

Network Mask - also known as the "Subnet Mask".

Packet Filtering - Discarding unwanted network traffic based on its originating address or range of addresses or its type (e-mail, file transfer, etc.).

PCMCIA - The PCMCIA (Personal Computer Memory Card International Association) is an industry group organized in 1989 to promote standards for a credit card-size memory or I/O device that would fit into a personal computer, usually a notebook or laptop computer.

Ping - (Packet INternet Groper) An Internet utility used to determine whether a particular IP address is online. It is used to test and debug a network by sending out a packet and waiting for a response.

PPPoE (Point to Point Protocol over Ethernet) - A method used mostly by DSL providers for connecting personal computers to a broadband modem for Internet access. It is similar to how a dial-up connection works but at higher speeds and quicker access.

PPTP (Point-to-Point Tunneling Protocol) - A protocol (set of communication rules) that allows corporations to extend their own corporate network through private "tunnels" over the public Internet. Effectively, a corporation uses a wide-area network as a single large local area network. A company no longer needs to lease its own lines for wide-area communication but can securely use the public networks. This kind of interconnection is known as a virtual private network.

PrintServer - A hardware device that enables a printer to be located anywhere in the network.

RJ-45 - A connector similar to a telephone connector that holds up to eight wires, used for connecting Ethernet devices.

Roaming - The ability to use a wireless device and be able to move from one access point's range to another without losing the connection.

Static IP Address - A permanent IP address that is assigned to a node in a TCP/IP network.

Subnet Mask - The method used for splitting IP networks into a series of sub-groups, or subnets. The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets.

TCP (Transmission Control Protocol) - A method (protocol) used along with the Internet Protocol (Internet Protocol) to send data in the form of message units between computers over the Internet. While IP takes care of handling the actual delivery of the data, TCP takes care of keeping track of the individual units of data (called packet) that a message is divided into for efficient routing through the Internet.

TCP/IP - Transmission Control Protocol/Internet Protocol (TCP/IP) is the basic communication language or protocol of the Internet. It can also be used as a communications protocol in a private network (either an intranet or an extranet). When you are set up with direct access to the Internet, your computer is provided with a copy of the TCP/IP program just as every other computer that you may send messages to or get information from also has a copy of TCP/IP.

UDP (User Datagram Protocol) - A communications method (protocol) that offers a limited amount of service when messages are exchanged between computers in a network that uses the Internet Protocol (IP). UDP is an alternative to the Transmission Control Protocol (TCP) and, together with IP, is sometimes referred to as UDP/IP. Like the Transmission Control Protocol, UDP uses the Internet Protocol to actually get a data unit (called a datagram) from one computer to another. Unlike TCP, however, UDP does not provide the service of dividing a message into packets (datagrams) and reassembling it at the other end. Specifically, UDP doesn't provide sequencing of the packets that the data arrives in. This means that the application program that uses UDP must be able to make sure that the entire message has arrived and is in the right order.

Network applications that want to save processing time because they have very small data units to exchange (and therefore very little message reassembling to do) may prefer UDP to TCP.

UTP - Unshielded twisted pair is the most common kind of copper telephone wiring. Twisted pair is the ordinary copper wire that connects home and many business computers to the telephone company. To reduce crosstalk or electromagnetic induction between pairs of wires, two insulated copper wires are twisted around each other. Each signal on twisted pair requires both wires. Since some telephone sets or desktop locations require multiple connections, twisted pair is sometimes installed in two or more pairs, all within a single cable.

Virtual Server - Multiple servers that appear as one server, or one system image, to the operating system or for network administration

WAN - A communications network that covers a wide geographic area, such as state or country.

WEP (Wired Equivalent Privacy) - A data privacy mechanism based on a 64-bit shared key algorithm, as described in the IEEE 802.11 standard.

WINIPCFG - Configuration utility based on the Win32 API for querying, defining and managing IP addresses within a network. A commonly used utility, under Windows 95, 98, and Millennium, for configuring networks with static IP addresses.

Specifications

Standards:	IEEE 802.3 (10BaseT), IEEE 802.3u (100BaseTX), IEEE 802.11b (Wireless), IEEE1284
Protocol:	CSMA/CD
Ports:	<p>WAN: One 10Base-T RJ-45 Port for Cable/DSL Modem</p> <p>LAN: One Shared Uplink Port</p> <p>Wireless: PCMCIA slot</p> <p>Printer: One DMA-Equipped, Bi-Directional Parallel Port</p>
Cabling Type:	<p>10BaseT: UTP Category 3 or better</p> <p>100BaseTX: UTP Category 5 or better</p> <p>Printer: Standard Printer Cable</p>
Speed (Mbps):	<p>WAN: Up to 10</p> <p>LAN: 10/100 (Half or Full Duplex)</p> <p>Wireless: Up to 11</p>
Operating Range (Wireless):	<p>Indoor: up to 60M (205ft.) @ up to 11 Mbps up to 80M (275 ft.) @ up to 5.5 Mbps up to 130M (425ft.) @ up to 2 Mbps up to 150M (492 ft.) @ up to 1 Mbps</p> <p>Outdoor: up to 250M (820 ft.) up to @ 11 Mbps up to 350M (1148 ft.) up to @ 5.5 Mbps up to 400M (1312 ft.) up to @ 2 Mbps up to 500M (1640 ft.) up to @ 1 Mbps</p>
LEDs:	<p>Power, Diag, WAN, WLAN</p> <p>LAN: 10, 100</p> <p>Printer: Err, Act</p>

Environmental

Dimensions:	7.44" x 6.16" X 2.64" (186mm x 154mm x 48mm)
Unit Weight:	17.5 oz. (0.5 Kg)
Power:	External, 5V DC, 3A
Certifications:	FCC Class B Part 15, CE Mark Commercial
Operating Temp:	0°C to 40°C (32°F to 104°F)
Storage Temp:	-20°C to 70°C (-4°F to 158°F)
Operating Humidity:	10% to 85%, Non-Condensing
Storage Humidity:	5% to 90%, Non-Condensing

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