Installing and Configuring a Wireless Network

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Introduction

- Wireless networks are growing in popularity
- Instead of CAT5 network cables, wireless networks use radio waves to communicate with each other
- Most of today's wireless networks are based on the IEEE 802.11 standard

Wireless Network Types

- 802.11b
  - Limited to 11 Mbps @ 2.4 GHz
  - Most popular for hot-spots and home use.
- 802.11g
  - 54 Mbps or higher @ 2.4 GHz
  - Newer technology gaining popularity.
- 802.11a
  - 11 Mbps @ 5.8 GHz
  - Primarily secure sites. Less interference.

802.11 Standards

Table 23.3 Comparison of 802.11 Standards

Standard	802.11a	802.11b	802.11g
Max. Throughput	54 Mbps	11 Mbps	54 Mbps
Max. Range	150 feet	300 feet	300 feet
Frequency	5 GHz	2.4 GHz	2.4 GHz
Security	SSID, MAC filtering, Industry-standard WEP, WPA	SSID, MAC filtering, Industry-standard WEP, WPA	SSID, MAC filtering, Industry-standard WEP, WPA
Compatibility	802.11a	802.11b	802.11b, 802.11g
Spread-spectrum method	DSSS	DSSS	DSSS
Communication mode	Ad hoc or infrastructure	Ad hoc or infrastructure	Ad hoc or infrastructure
Description	Products that adhere to this standard are considered "Wi-Fi Certified." Eight available channels. Less prone to interference than 802.11b and 802.11g.	Products that adhere to this standard are considered "Wi-Fi Certified." Fourteen channels available in the 2.4-GHz band (only eleven of which can be used in the U.S. due to FCC regulations). Three non-overlapping channels.	Products that adhere to this standard are considered "Wi-Fi Certified." Improved security enhancements. Fourteen channels available in the 2.4-GHz band (only eleven of which can be used in the U.S. due to FCC regulations). Three non-overlapping channels.

Wireless Networking Components

- Connection components for wider access
  - PCI cards that accept wireless PC cards
  - External USB wireless NICs

Wireless Networking Components

LinkSys now owned by Cisco

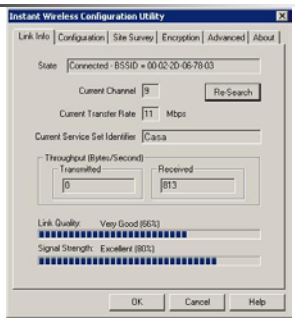
Wireless Access Point

- Wireless Access Point (WAP)
  - Acts like a hub to the wireless PCs

Wireless Networking Software

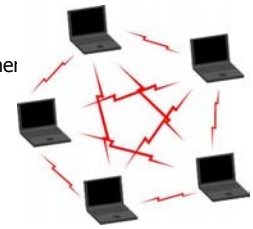
- Wireless devices use the same networking clients and protocol as wired networks (TCP/IP)
- Wired networks are always inherently more secure than wireless networks.
- Wireless network speeds are approaching wired network speeds of 100 Mbps.
- Wireless networking software utility usually provided with the wireless NIC to configure wireless settings.
- Windows XP has built-in zero configuration utility for wireless networks. (SP2 is much improved.)

Wireless Configuration Utility



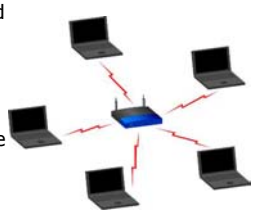
Wireless Network Modes

- Ad hoc Mode
  - Each wireless PC is in direct contact with other PCs in a decentralized free-for-all
  - Called peer-to-peer mode
  - Good for a few computers as a temporary network



Wireless Network Modes

- Infrastructure Mode
  - Use WAPs to connect wireless PCs to a wired network
  - A single WAP is called a Basic Service Set (BSS)
  - Additional WAPs create an Extended Basic Service Set (EBSS)



Configuring Wireless Networks

- Ad-hoc Mode
  - Does no require a Wireless Access Point (WAP)
  - Each wireless PC needs to be configured with the same network name (SSID)
  - May need to select a common channel
  - Configure unique host IP addresses (no DHCP)
  - Configure File and Printer Sharing (Workgroup)
- Infrastructure Mode
  - Requires a Wireless Access Point (WAP)
  - All nodes need to be configured the same
  - Configure the WAP and client PCs to match the chosen options

Wireless Networking Security

- Service Set Identifier (SSID)
  - Configure a unique SSID or network name
  - Each PC needs to use the WAP's SSID
  - Not secure without encryption.
- MAC Filtering
  - Filtering based on each host's MAC address (unique number burned into every NIC)
  - Creates a list of accepted or denied users.

Wireless Network Security

- Wired Equivalent Privacy (WEP)
  - Encrypts data using up to 128-bit encryption
  - Provides authentication based on MAC addresses but not users
- Wi-Fi Protected Access (WPA)
  - User authentication using the Extensible Authentication Protocol (EAP)
  - Uses encryption key integrity-checking
  - Regarded as a better choice than WEP.

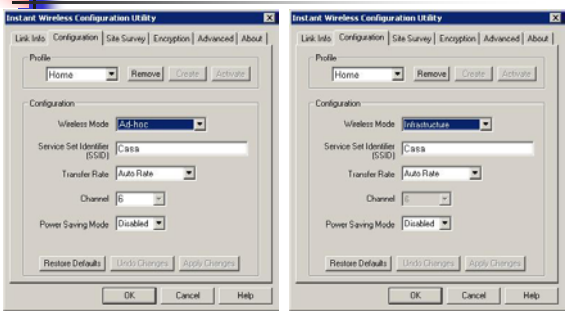
Wi-Fi Security

- New standards are in the works
- 802.11i is a new standard that will add Advanced Encryption Standard (AES) technology for improved security.
- 802.11e is a new standard aimed at home wireless media networks, and possibly voice-over-IP telephony.

Configuring Wireless Networks

- Physically installing a wireless NIC is the same as installing a wired NIC
- Install the wireless network configuration utility to configure additional parameters
  - Windows XP has configuration parameters built-in
- The more important issue is authentication and security

Configuring Wireless Networks



Configuring Wireless Networks

- Configuring a Wireless Access Point (WAP) is usually done through a web browser
  - Enter the WAP's default IP address in your browser (usually 192.168.1.1)
  - Enter the default administrative password (in your documentation) to log in
    - The next few slides show some screen shots of the configuration pages

Configuring Wireless Networks

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- Encryption screen on client wireless network adapter configuration utility

Configuring Wireless Networks

- WAP default settings are not secure.
- Change the default admin password.
- Change the default SSID.
- Turn on encryption (WEP or WPA).
- Turn off SSID broadcast (unless required).
- Change the default IP Address of the WAP.
- Optional: Utilize MAC Filtering to prevent unauthorized users.

Signal Strength Problems

- Signal strength depend on distance as well as possible obstructions.
- Walls, floors and other objects can easily obstruct a wireless signal.
- Cordless phones, microwave ovens and other electronic devices can also affect the signal quality.

What's Next in Wireless?

- Many new uses for wireless technology
  - Wireless Game Adapters
    - PlayStation, Xbox, Game Cube
  - Wireless Music Systems
    - Portable boom box-like
  - Wireless Video Cameras
    - Internet camera for live video
  - Wireless Media Adapter
    - Pictures and Music on TV or Stereo