



Wireless Networking: Ready to unplug your Library?

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Agenda

- ◆ Introduction to Wireless Technologies
- ◆ Wireless Networking Overview
- ◆ Cost
- ◆ Q&A

Wireless: Are YOU Ready?

Why Deploy Wireless?

- ◆ Cost savings over wireline.
- ◆ Can not run wire to locations needed.
- ◆ To enable patrons to bring their own laptop, therefore reducing the cost of owning many PCs.
- ◆ To enable you to easily move PCs.
- ◆ To be on the leading edge.

Is Wireless for You?

wDoes your current network satisfy your needs?

wDo you have all the access you need?

wDo not abandon your current infrastructure for wireless if wireline currently serves all your needs.

wIf it serves some, but not all of your needs, Wireless may be a good supplement.

What is Wi-Fi

Wi-Fi is an abbreviation for Wireless Fidelity and a catch all phrase for the standards that comprise 802.11 wireless networking.

Wi-Fi is also the name of an alliance of companies committed to ensuring the interoperability of wireless products.

Wireless Networking Overview

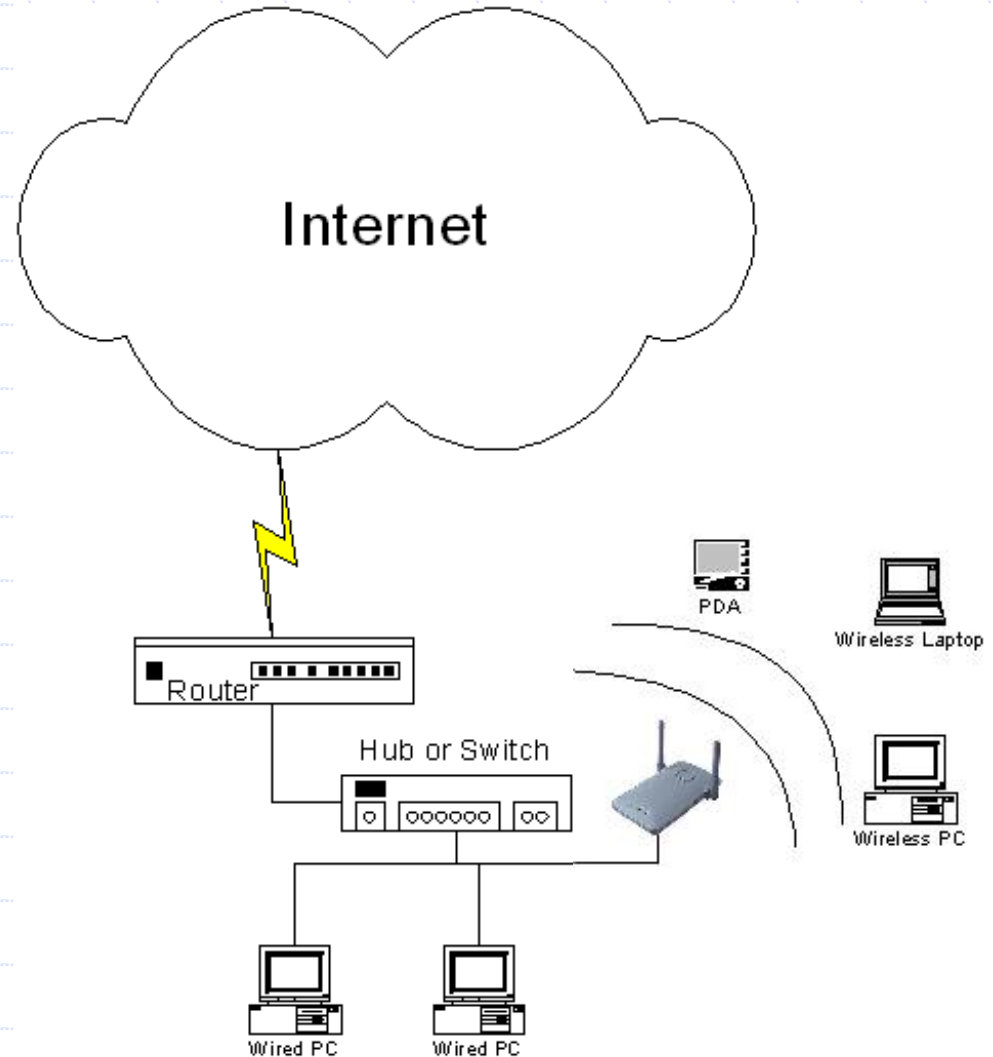
Wireless Network Components

- ◆ Access Points, Gateways, Routers, Firewalls
- ◆ NICs – Network Interface Cards
 - n PCMCIA: laptops, also built-into Centrino & others
 - n USB: external for desktops mostly
 - n PCI: internal to desktops
 - n CompactFlash: portable devices, such as PDAs
- ◆ Other Wireless Devices
 - n Print Servers

Wireless Networking Overview

Connecting To a Legacy Network

Access Points connect the wireless network to the legacy network.



Introduction to Wireless /802.11

Standards: B.A.G.

- ◆ IEEE 802.11**b** – 2.4GHz – 11Mbps (B)
- ◆ IEEE 802.11**a** – 5GHz – 54 Mbps (A)
- ◆ IEEE 802.11**g** – 2.4Ghz – 11/54Mbps (G)
(hybrid)

The “B” Standard

- ◆ Frequency: 2.4 GHz
- ◆ Speed: 11Mbps (w/perspective)
- ◆ Range: 100-150 ft.
- ◆ Relative Cost: Inexpensive
- ◆ Popularity: Very
- ◆ Compatibility: B & G

The “A” Standard

- ◆ Frequency: 5 GHz
- ◆ Speed: 54 Mbps
- ◆ Range: 25-75 ft.
- ◆ Relative Cost: More Expensive
- ◆ Popularity: Still new
- ◆ Compatibility: A only

The “G” Standard

- ◆ Frequency: 2.4 GHz
- ◆ Speed: 11-54 Mbps
- ◆ Range: 100-150 ft.
- ◆ Relative Cost: Semi-Inexpensive
- ◆ Popularity: Rapid Growth Expected
- ◆ Compatibility: B & G

The “B” Standard: Cons

- ◆ Frequency: 2.4 GHz
- ◆ Crowded by portable phones, radio devices, microwaves and more.
- ◆ Speed: 11Mbps comparison
- ◆ T1 = 1.54 Mbps
- ◆ DSL = .64 Mbps
- ◆ “B” = 11.00 Mbps (pretty fast, huh?)

The “A” Standard: Cons

- ◆ Frequency: 5 GHz: Less crowded
- ◆ Speed: 54 Mbps: Ridiculously fast
- ◆ Range: 25-75 ft.
- ◆ Relative Cost: Twice as Expensive
- ◆ Popularity: New, slow growth
- ◆ Compatibility: Severely Limited

The “Super G” Standard












- ◆ Frequency: 2.4 GHz -- Crowded
- ◆ Speed: 108 Mbps -- Insane
- ◆ Range: 5' = 50 Mbps; 300' = 5 Mbps
- ◆ Relative Cost: Semi-Inexpensive
- ◆ Popularity: Rapid Growth Expected
- ◆ Compatibility: B & G

The “A/G” Standard

- ◆ If money is no object...
- ◆ Frequency: 2.4 & 5 GHz
- ◆ Speed: 11-54 Mbps
- ◆ Range: 25-150 ft.
- ◆ Relative Cost: Expensive
- ◆ Popularity: Rapid Growth Expected
- ◆ Compatibility: A, B & G

Why Choose? A vs B vs G

Wireless Technology Comparison Chart

Wireless Standard	802.11b		802.11a		802.11g	
Popularity		Widely adopted. Readily available everywhere.		New technology.		New technology with rapid growth expected.
Speed	11 Mbps	Up to 11Mbps (note: cable modem service typically averages no more than 4 to 5Mbps).	54 Mbps	Up to 54Mbps (5X greater than 802.11b).	54 Mbps	Up to 54Mbps (5X greater than 802.11b).
Relative Cost		Inexpensive.		Relatively more expensive.		Relatively inexpensive.
Frequency	2.4 GHz	More crowded 2.4GHz band. Some conflict may occur with other 2.4GHz devices like cordless phones, microwave ovens, etc.	5 GHz	Uncrowded 5GHz band can coexist with 2.4 GHz networks without interference.	2.4 GHz	More crowded 2.4GHz band. Some conflict may occur with other 2.4GHz devices like cordless phones, microwave ovens, etc.
Range	 100-150	Good Range. Typically up to 100-150 feet indoors, depending on construction, building materials, room layout.	 25-75	Shorter range than 802.11b & 802.11g. Typically 25 to 75 feet indoors.	 100-150	Good Range. Typically up to 100-150 feet indoors, depending on construction, building materials, room layout.
Public Access		The number of public "hotspots" is growing rapidly, allowing wireless connectivity in many airports, hotels, college campuses, public areas, and restaurants.		None at this time.		Compatible with current 802.11b hotspots (at 11Mbps). Also, it is expected that most 802.11b hotspots will quickly convert to 802.11g.
Compatibility	OK 802.11b	Widest adoption.	OK 802.11b	Incompatible with 802.11b or 802.11g.	OK 802.11b 802.11g	Interoperates with 802.11b networks (at 11Mbps). Incompatible with 802.11a.

Limitations of Wireless

- ◆ 300 ft. effective range from access point
- ◆ Possible structural interference
- ◆ Interference from other devices such as cordless phones, microwaves.

Wireless Networking Overview

Security (Encryption, Service Filtering, Privacy, etc.)

Network Partitioning: Two separate networks

- ◆ A private network for day to day business
- ◆ A network for public access.
- ◆ Both can be wireless.
- ◆ They can talk to one another through a proxy server or firewall that will protect the private network from malicious attacks via the public network.

Wireless Networking Overview

Security (Encryption, Service Filtering, Privacy, etc.)

- ◆ Encryption can be used but creates more administrative overhead.
- ◆ Encryption keys would have to be changed regularly and anyone using their own laptop would have to be given the key.
- ◆ Encryption works best in a network that does not allow people to use their own laptops.
- ◆ Encryption increases privacy, but can be thwarted by software or by gaining access to a wireless PC and writing down the key.

Wireless Networking Overview

Security (Encryption, Service Filtering, Privacy, etc.)

- ◆ MAC Address Filtering: Many products offer MAC Address filtering. A MAC Address is a unique identifier assigned to every network interface card (NIC).
- ◆ Limit access by MAC address, however this requires someone to edit information in the Access Point to add or remove users, which adds overhead.

Wireless Networking Overview

Security (Encryption, Service Filtering, Privacy, etc.)

- ◆ Limit Access to Internet services to protect other machines from malicious use. Allowable Services could be HTTP (Port 80), Secure HTTP (Port 443), SMTP (Port 25), POP3 (Port 110), etc.
- ◆ Denied services: Back Orifice (Ports 31337 & 31338), Portal of Doom (Ports 9872-9875)

Wireless Networking Overview

Security (Encryption, Service Filtering, Privacy, etc.)

Viruses and Hackers

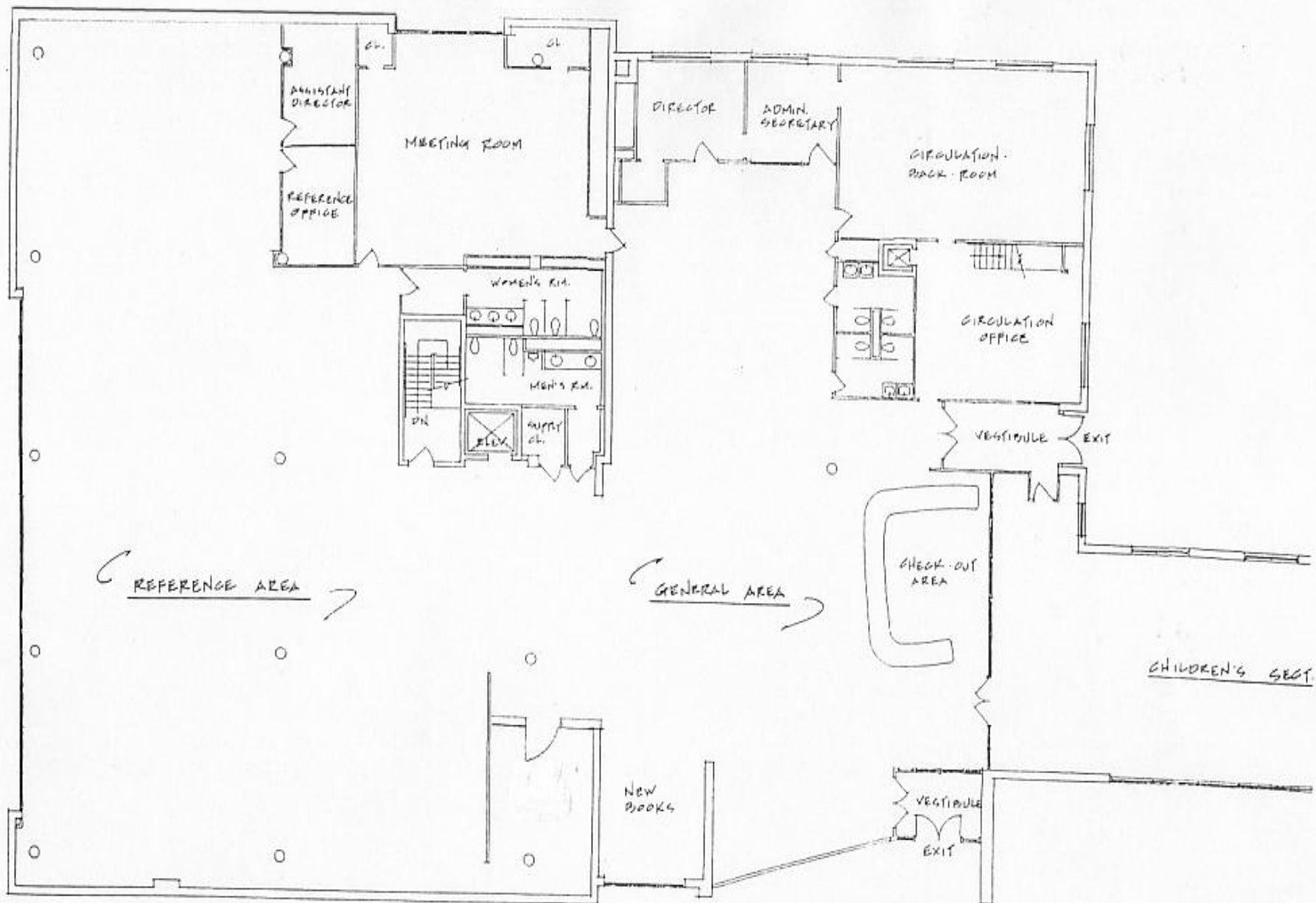
- n Wireless does not add any additional threat in the way of viruses.
- n Anyone can attack a network that is connected to the Internet.
- n Wireless does not increase that chance.
- n Firewalls, can reduce the risk.
- n Your wireless network is no more or less intrinsically safe than your wired network.

Wireless:

Environment Assessment

- ◆ Look at the structure of your building.
 - n Steel, Concrete, Stone, Glass
 - n Open w/ few walls or many separate rooms?

- ◆ Current technologies used
 - n Do you use a 2.4 GHz cordless phone?
Does it work throughout your environment?



FIRST FLOOR PLAN

Wireless:

Virtual Hours

- ◆ Your wireless network may not stop at your door. This means anyone can access your network after hours by sitting outside with a laptop.
- ◆ Best advice if you don't want people "parking lot surfing": Turn it off at night.

Assess Your Patrons

- ◆ Are they at a computer literacy level to help themselves?
- ◆ Can you make your wireless network simple enough that your patrons can set up their own computers?
- ◆ The less security, the easier it is to access.

Wireless:

Cost: Real examples

- ◆ 802.11b Wireless Access Points start around \$75.00 for basic connectivity and run up to \$600.00 for more management features.
- ◆ 802.11b Network Interface Cards (NICs) cost between \$30-\$80 and come in USB, PCI, PCMCIA and CompactFlash versions.

Wireless: How much will it cost?

Cost

- ◆ Access Points in \$200-\$400 range.
- ◆ Mid to high end models rich with management, security and reporting features.
- ◆ These allow for remote antennas, power level adjustments, multiple user authentication methods and MAC Address filtering.

Wireless: Cost

- ◆ Access Points – \$200 each
- ◆ Cabling – \$250 per 1000'
- ◆ Cable connections, cable track, and other odd and ends – \$100-\$200
- ◆ Labor: 20-40 hours to install and configure
- ◆ Cable Modem or xDSL – \$0-\$100/month
- ◆ Installation – Assume 20-40 billed hours for an average install.
- ◆ Wireless Cards – From \$30-\$80 each.