

Introduction to Wireless Networking

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<http://www.accc.uic.edu/itl>

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Wireless Ethernet LANs

- Wireless (mobile) applications
- Technology overview
- Recommended products for home
- ACCC Wireless: a secure wireless campus network
- Recommended products for campus use
- <http://www.accc.uic.edu/workshops/wireless>

Wireless networking in a nutshell

Wireless at home

- DSL or cable modem Internet connection
- Inexpensive Wireless Access Point
- Computer with wireless network device (e.g. Intel Centrino, many others)
- **Recommendation:** Get a wireless network device that is compatible with ACCC Wireless

Wireless on campus

- Ethernet connection
- ACCC Wireless-compliant Access Point
- Computer with ACCC-compliant wireless network device (e.g. Intel Centrino, a few others, like Cisco, Agere, 3Com and Linksys cards)
- Odyssey client for Windows or Pocket PC, or Mac running OS X 10.3.x (aka Panther)

Wireless applications

- Ubiquitous computing
- Being connected everywhere and at all times
- Share DSL/cable modem connection at home without laying out network wiring
- Classroom and healthcare applications
- Just-in-time collaboration
- Your backpack and the Internet in your pocket
- **Comfortable computing arrives**

Technology overview

802.11b and 802.11g aka Wi-Fi

- Wireless Ethernet (LAN, aka WLAN) standards
- Backward-compatible standards, operating at 2.4GHz
- **802.11b** – 11Mbps (~6Mbps, real) shared Ethernet max speed, original Wi-Fi standard (2001)
- **802.11g** – 54Mbps (~30Mbps, real) shared Ethernet max speed, newer Wi-Fi standard (2003+)
- 802.11a – 54Mbps but not backwards compatible with 802.11b or 802.11g (not recommended)



**The Standard for
Wireless Fidelity.**

Technology overview

How does it work?

- Access Points — stationary transceivers
- APs act as broadcast-and-receive base stations for wireless network traffic
- APs can offer some encryption, security and other services, including access
- Radio frequency signal coverage typically ranges from 100 to 300 feet

Technology overview

How does it work?

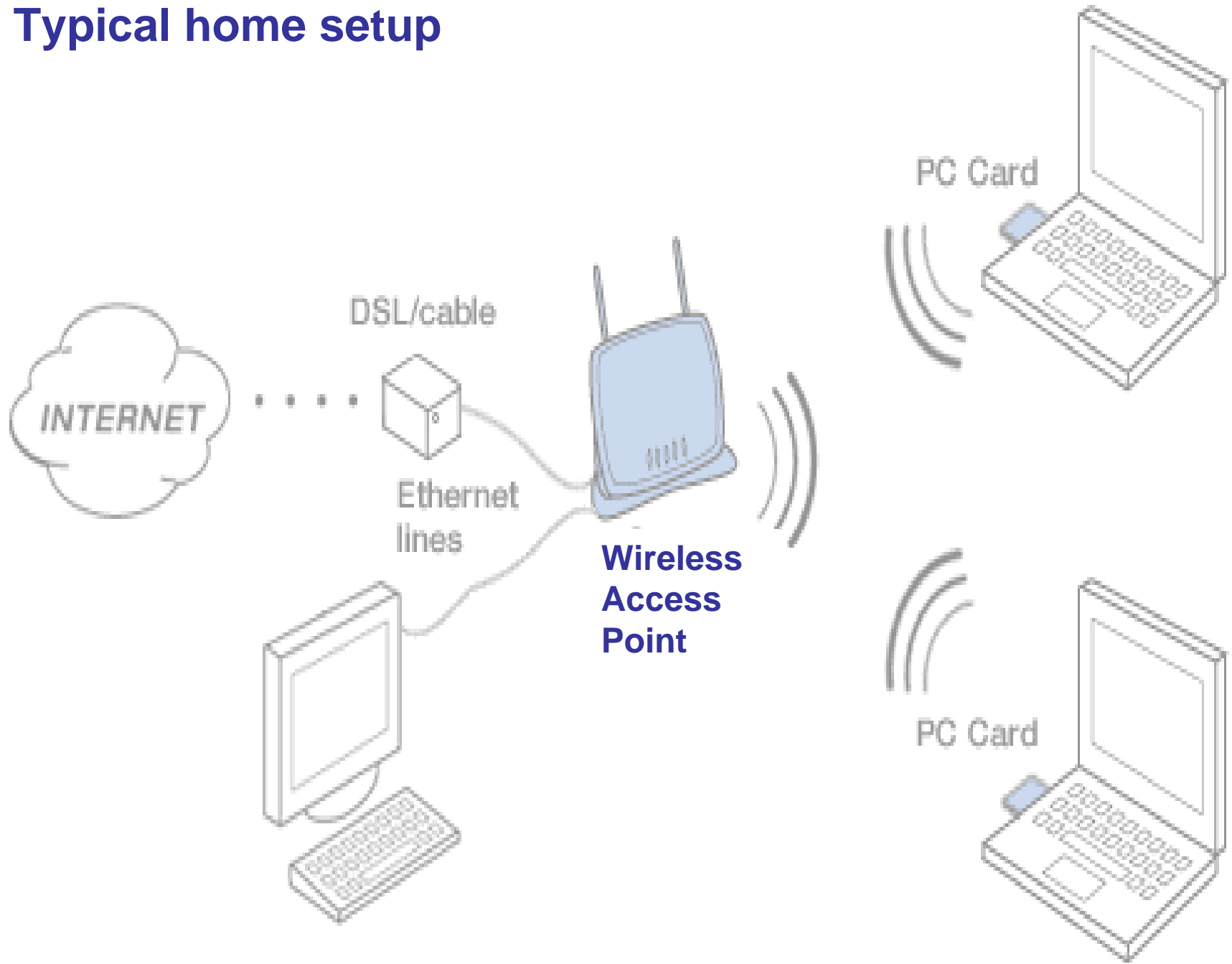
- APs are connected to a wired Ethernet network (bridge, switch, hub, or router) or to a cable modem or DSL connection
- Once you have an Access Point in operation, wireless networking is enabled in its vicinity

Technology overview

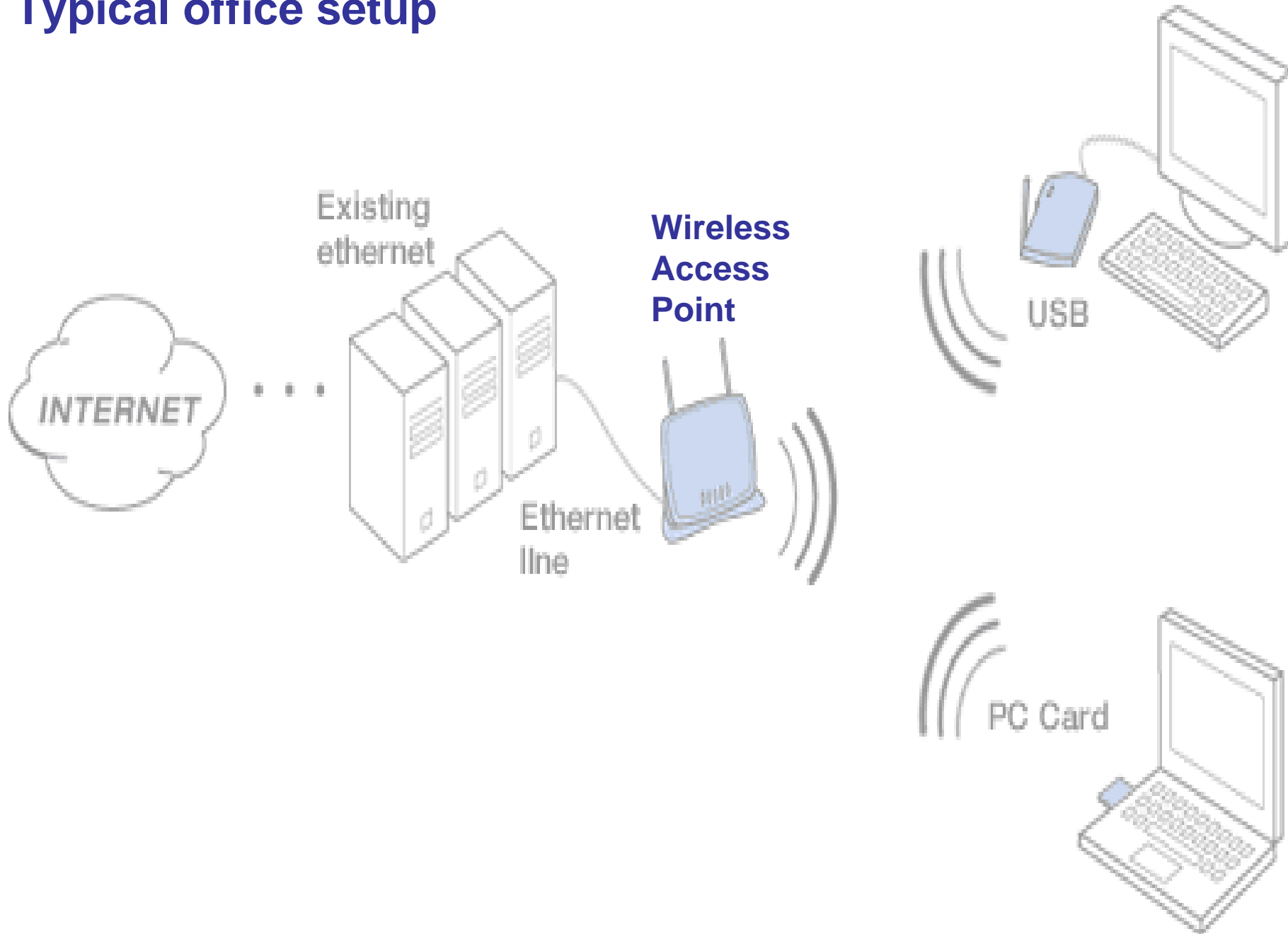
How does it work?

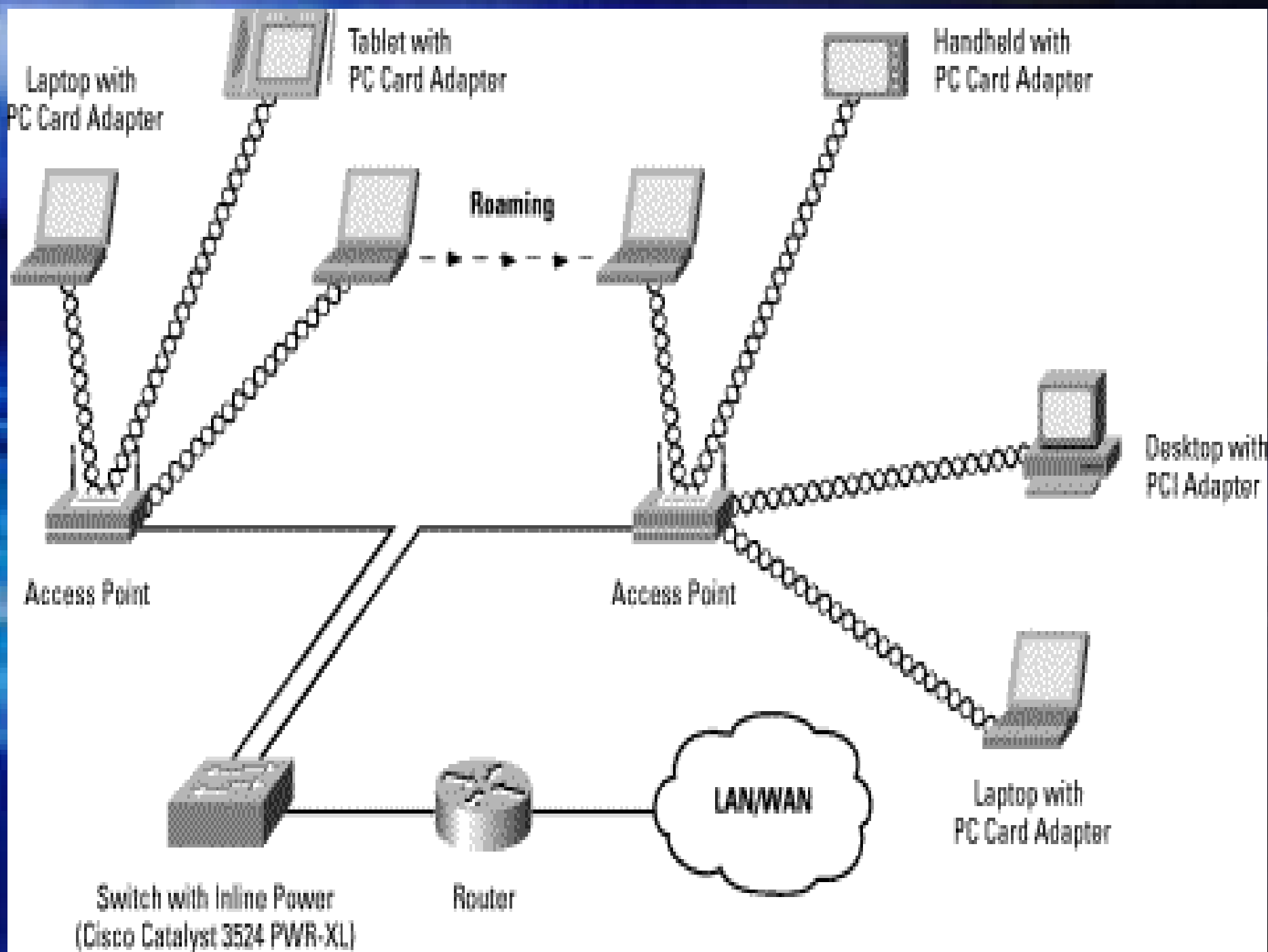
- A wireless device or adapter is needed to access the wireless LAN with a notebook computer, PDA, Tablet PC, wireless printer, wireless Webcam, or other Wi-Fi-compliant peripheral
- **Types of Wi-Fi devices:** PC (PCMCIA) cards, Compact Flash and Secure Digital (SD) IO cards, PCI NICs, USB Wi-Fi adapters, or built-in (e.g. Intel Centrino)

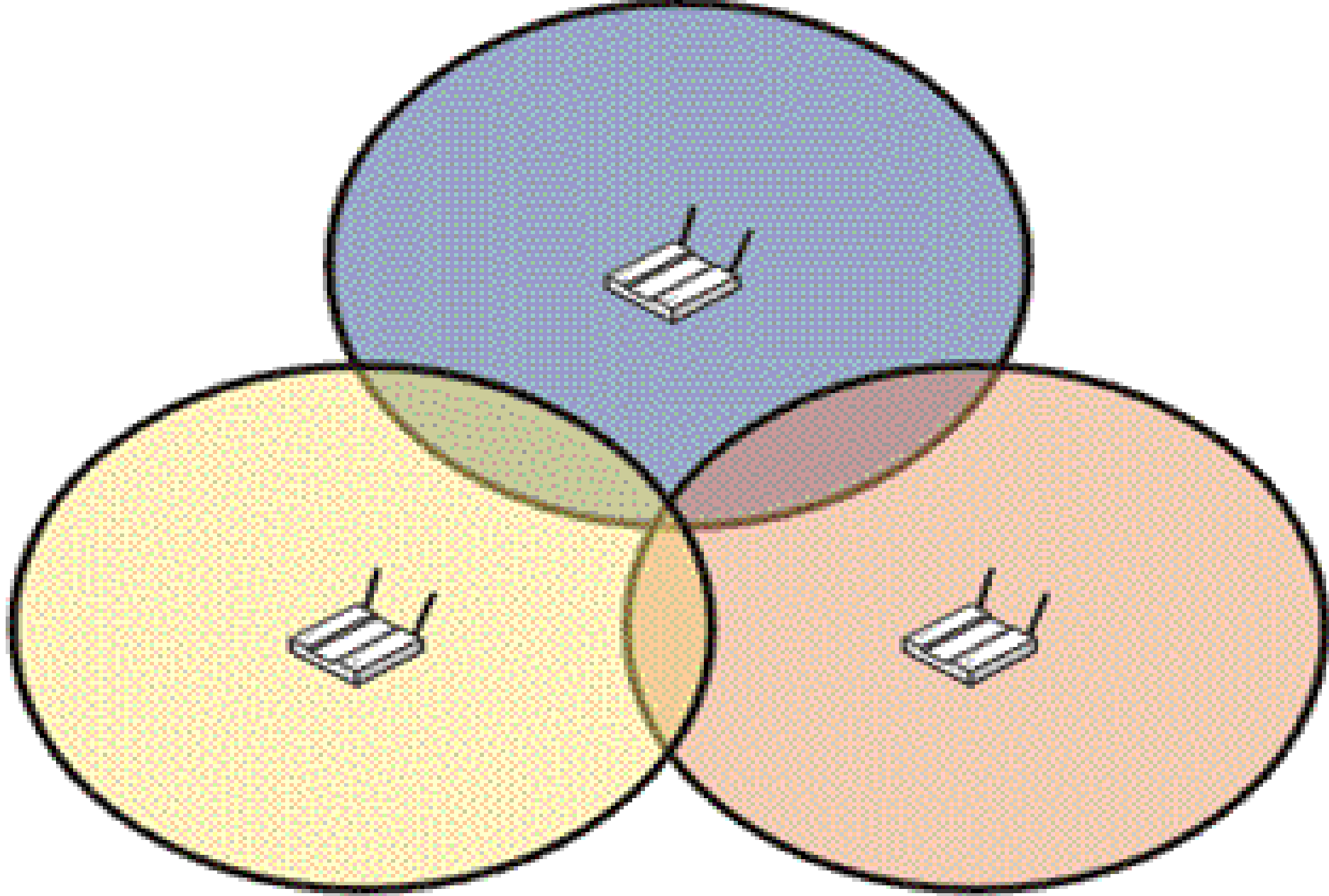
Typical home setup



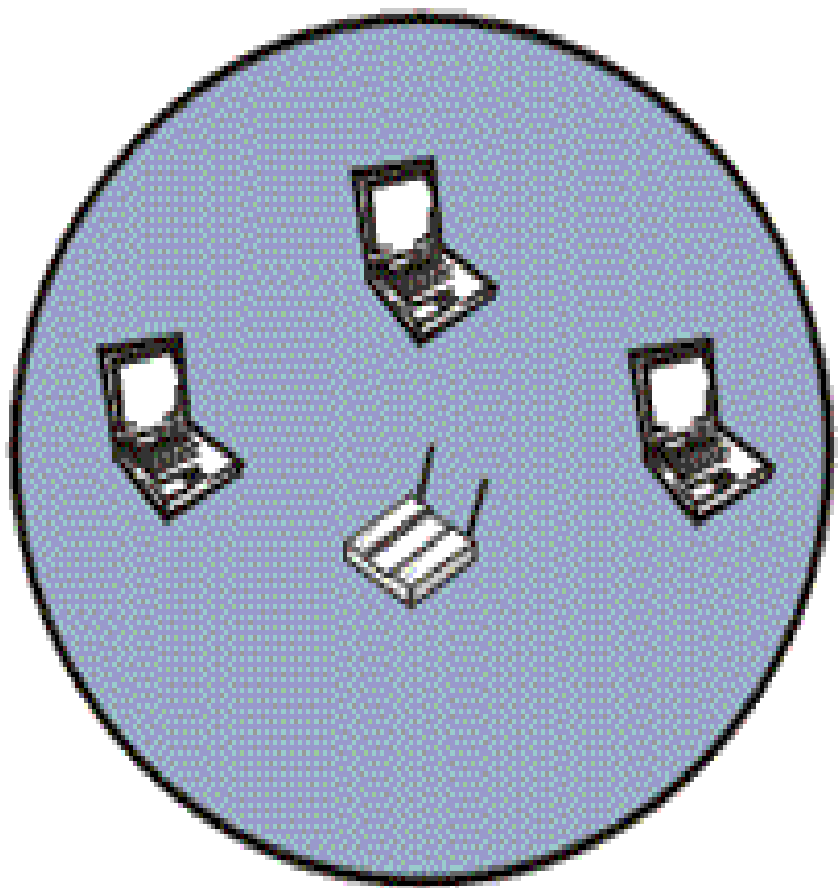
Typical office setup



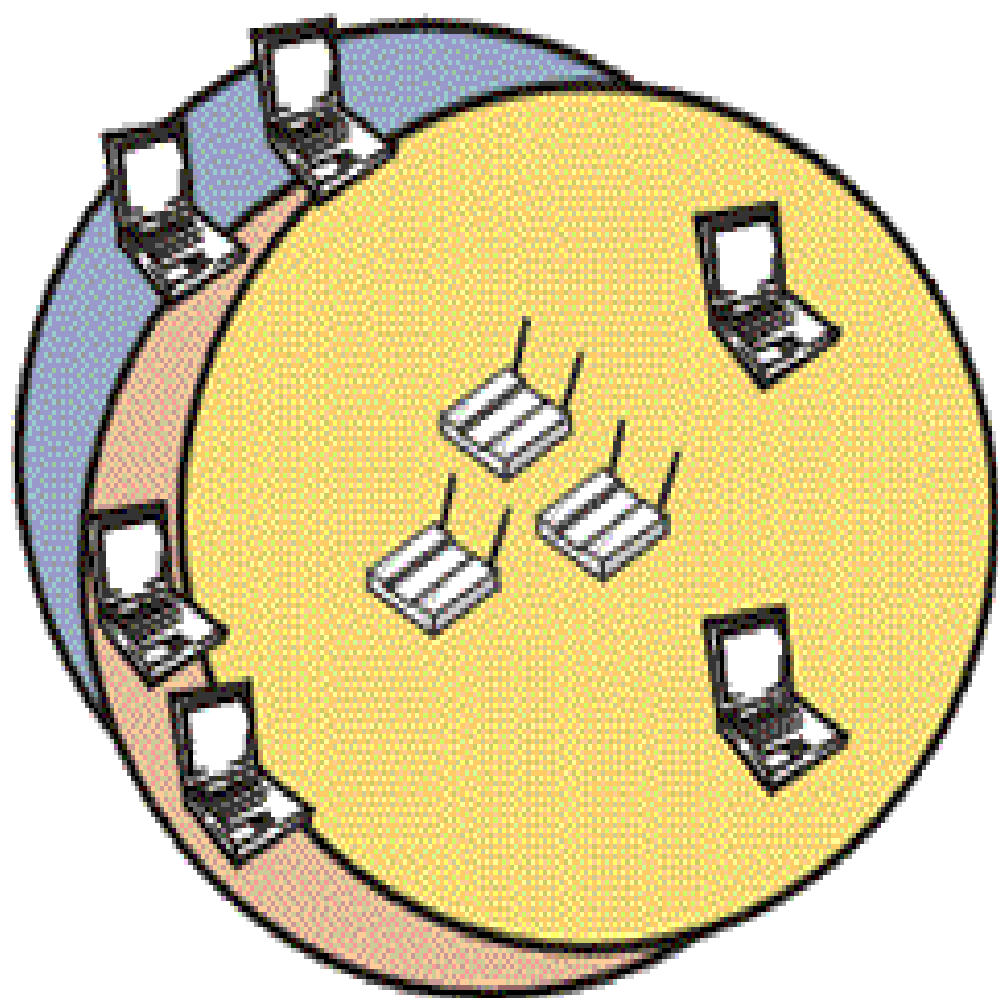




Overlapping Wireless Access Points

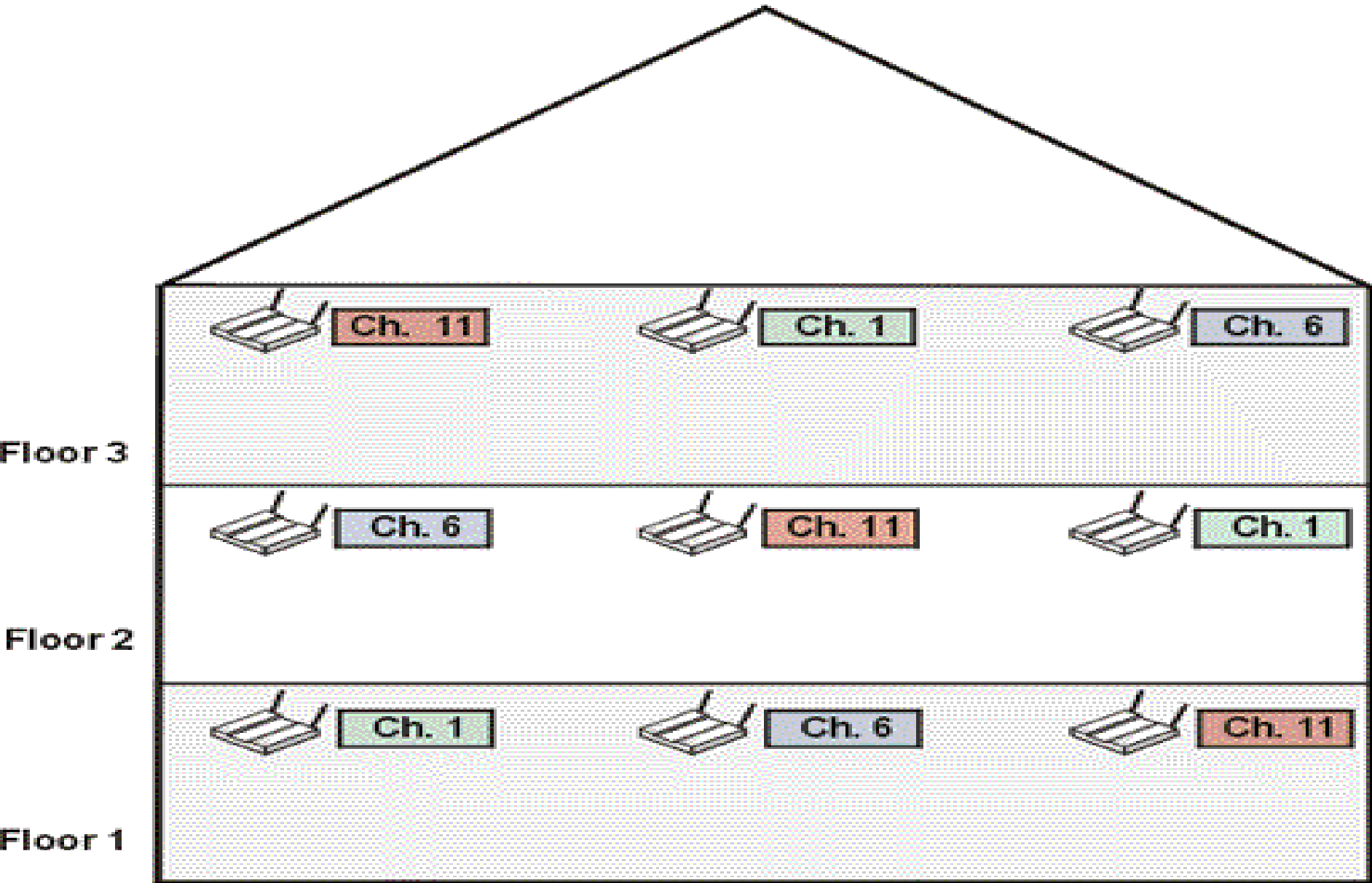


11-Mbps aggregate bandwidth



33-Mbps aggregate bandwidth

Scaling and aggregating 802.11b AP bandwidth



Multiple Wireless Access Points on multiple floors

A close-up photograph of a student's hand using a stylus to interact with a tablet PC. The screen displays a complex diagram with various colored boxes and lines. The student's face is partially visible in the background, looking at the device. The overall scene is brightly lit, suggesting a classroom or study environment.

Mobile Learning Solutions

for Higher Education

All Tablet PCs have built-in wireless capabilities

Recommended Wi-Fi products

Access Points

- Cisco Aironet 350 Access Points (\$800)
 - ACCC familiarity
 - Very good range coverage
 - Wall mountable, power-outlet friendly and support for external antennas
 - Cisco lead in 802.1x security
- Linksys Wireless-G or Wireless-B EtherFast Wireless AP + Cable-DSL Router with 4-Port Switch (~\$70)
 - Good for home use (not on campus)

Recommended Wi-Fi products

Wireless network devices

- Cisco Aironet 350 Wireless LAN (WLAN) PC cards and PCI NICs (\$100)
- Agere (Orinoco), 3Com, NetGear and Linksys PC cards, Symbol or Socket Compact Flash cards (\$50 to \$120)
- **Intel Centrino (built-in wireless)**
Intel Pro Wireless 2100 (802.11b)
and 2200b/g (802.11b & 802.11g)



Security for wireless home LANs

- SSID — service set identifier
 - Name of your wireless network
 - **Change your SSID regularly**
- Consider using (enabling) Media Access Control (MAC) address filtering
- **WEP — Wired Equivalent Privacy**
 - **Use (turn on) 128-bit WEP encryption**
 - WEP may be fine for home use

ACCC Wireless campus network

- Cisco Aironet 350 Series Access Points
 - A reliable wireless access point
 - 802.1x, EAP-TTLS security standards
 - 802.11b and 802.11g Wi-Fi compliant
- 802.11b and 802.11g Wi-Fi compliant and 802.1x and EAP-TTLS-compliant wireless cards
 - Not all Wi-Fi cards support 802.1x and EAP-TTLS
- For a list of compatible wireless network adapters and access points visit the ACCC Wireless Support Page at <http://wireless.uic.edu>

ACCC Wireless campus network

■ Odyssey client program

- Distributed freely by ACCC (CSO, Web)
- Allows UIC authentication and Dynamic WEP encryption (HIPAA-compliant)
- Windows Me/98/2000/XP (WinXP recommended)
- Pocket PC
- Macintosh — requires Mac OS X 10.3 (Panther)
- Minimal Odyssey client software configuration
- Need to specify your UIC netid and password to gain access to ACCC Wireless access points
- See <http://wireless.uic.edu>

ACCC Wireless campus network

- **Odyssey Radius authentication server**
 - Run by ACCC
 - 802.1x and EAP-TTLS protocol standards
 - EAP – Extensible Authentication Protocol
 - TTLS – Tunneled Transport Layer Security
 - ACCC signs are being posted to indicate locations (hot spots) where ACCC Wireless is available

Current ACCC Wireless locations

- CIU: 2nd & 3rd floors
- CIU student lounge
- Health Sciences Lib.
- CMW: student lounge, lecture halls 221 and 423
- BGRC: 1st floor
- Main Library
- BSB: 1st floor cafeterias
- CCC: 1st and 2nd floors, Montgomery Ward lounge, room 401, InnerCircle and the Pier Room
- Lincoln Hall: 1st floor
- SEL: 2nd floor study carrels by 2267 SEL
- SES 2nd floor lounge



ACCC Wireless

wireless.uic.edu

Signs posted where ACCC Wireless is available

ACCC Wireless campus network

- ACCC Wireless at departments
 - Departments must use 802.1x and EAP-TTLS compliant Access Points
See <http://wireless.uic.edu>
 - Everyone must use Dynamic WEP
 - Departmental wireless networks tie into existing wired infrastructure

ACCC Wireless campus network

- ACCC Wireless at departments
 - Departments must allocate/donate subnet IP addresses for their departmental wireless networks
 - Departments buy the APs and wireless cards meeting ACCC Wireless specs
 - For more information, interested departments should contact the ACCC Networking group — network@uic.edu

Related links

- ACCC Wireless Support Page - wireless.uic.edu
- Acceptable Use Policy
www.accc.uic.edu/policies/netpol.html
- CDW-G Wireless Reference Guide
www.cdwg.com/wirelessguide
- Intel Centrino - www.intel.com/centrino
- Dell White Paper: Deploying 802.11b (Wi-Fi) in the Enterprise Network
www1.us.dell.com/content/topics/global.aspx/vectors/en/2001_wireless_deployment?c=us&l=en&s=gen
- Apple Airport - www.apple.com/airport

Contacting the ITL

- ITL home page:
<http://www.accc.uic.edu/itl>
- Email: itl@uic.edu
- Phone: (312) 996-9824

ACCC home page:

<http://www.accc.uic.edu>

ITL-East

- **ITL-East — Room 401 CCC**
(all the way in the back of computer lab)
- **Open Hours**
 - Tuesdays and Wednesdays, from 1-5pm
 - Can stop without an appointment
- **By appointment**
 - Visit ITL home page and click on “making reservations”

ITL-West

- **ITL-West — Room 181 BGRC**
 - (behind the CSO consultant's desk)
- **Open Hours**
 - Mondays and Thursdays, from 1-5pm
 - Can stop without an appointment
- **By appointment**
 - Visit ITL home page and click on “making reservations”