



Wireless Networks

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Introduction

Chapter 1



Wireless Comes of Age

- Guglielmo Marconi invented the wireless **telegraph** in 1896
 - Communication by encoding alphanumeric characters in analog signal
 - Sent telegraphic signals across the Atlantic Ocean
- Communications **satellites** launched in 1960s
- **Advances** in wireless technology
 - Radio, television, mobile telephone, communication satellites
- More **recently**
 - Wireless LAN networking, cellular technology, WSN, WPN, WMN

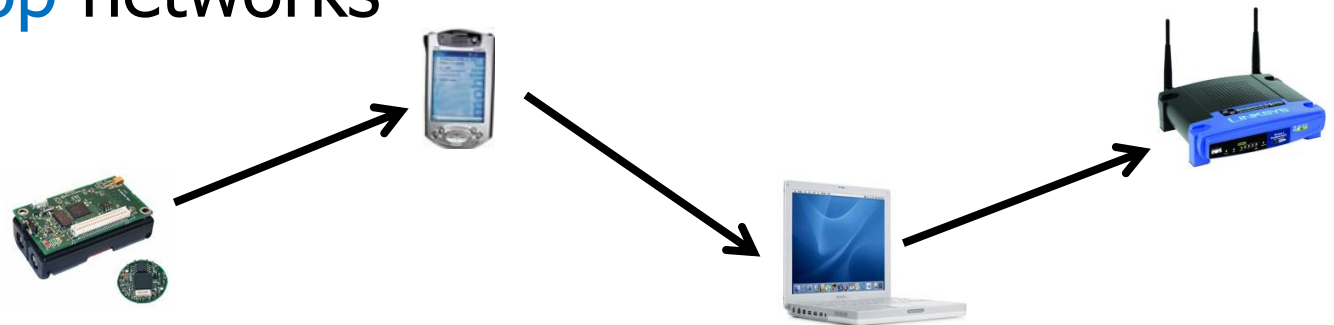
Shifting Trends

- The edge of the internet becoming wireless

- Single-hop networks



- Multi-hop networks





Broadband Wireless Technology

- Higher **data rates** obtainable with broadband wireless technology
 - Graphics, video, audio
- Shares same **advantages** of all wireless services: convenience and reduced cost
 - Service can be deployed **faster** than fixed service
 - No **cost** of cable plant
 - Service is **mobile**, deployed almost anywhere



Many Benefits due to Wireless

- Significantly lower cost
 - No cable, low labor cost, low maintenance
- Ease
 - Minimum infrastructure - scatter and play
- Unrestricted mobility
 - Unplugged from power outlet
- Ubiquity
 - Available like water/electricity

Challenges in the Wireless Technologies

- Inherently **broadcast** and shared
 - Users can impact other users, just by co-location or location vicinity
 - Limited capacity; no adding cables to add capacity
 - Licensing of spectrum, or ‘collisions’ in unlicensed
- **Unpredictable Medium**
 - Medium is dynamic, even without devices moving
 - Devices may be moving
 - Attenuation with distance, multi-paths, higher error rates, and unpredictable channel responses
- Device limitations: battery capacity or screen sizes
- Politics and Incompatible standards



Chapter 2: Transmission Fundamentals

- Basic overview of transmission topics
- Data communications concepts
 - Includes techniques of analog and digital data transmission
- Channel capacity
- Transmission media
- Multiplexing

Chapter 3: Communication Networks

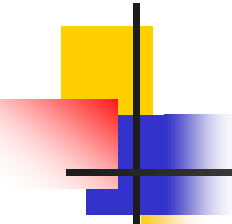


- Comparison of basic communication network technologies
 - Circuit switching
 - Packet switching
 - Frame relay
 - ATM



Chapter 4: Protocols and the TCP/IP Protocol Suite

- Protocol architecture
- Overview of TCP/IP
- Open systems interconnection (OSI) reference model
- Internetworking



Chapter 8: Coding and Error Control

- Forward error correction (FEC)
- Using redundancy for error detection
- Automatic repeat request (ARQ) techniques



Part Three: Wireless Networking

- Examines major types of networks
 - Satellite-based networks
 - Cellular networks
 - Cordless systems
 - Fixed wireless access schemes
- Use of mobile IP and Wireless Access Protocol (WAP) to provide Internet and Web access



Chapter 9: Satellite Communications

- Geostationary satellites (GEOS)
- Low-earth orbiting satellites (LEOS)
- Medium-earth orbiting satellites (MEOS)
- Capacity allocation

Chapter 10: Cellular Wireless Networks



- Cellular wireless network design issues
- First generation analog (traditional mobile telephony service)
- Second generation digital cellular networks
 - Time-division multiple access (TDMA)
 - Code-division multiple access (CDMA)
- Third generation networks
- Fourth generation networks



Chapter 11: Cordless Systems and Wireless Local Loop

- Cordless systems
- Wireless local loop (WLL)
 - Sometimes called radio in the loop (RITL) or fixed wireless access (FWA)



Part Four: Wireless Local Area Networks

- Examines underlying wireless LAN technology
- Examines standardized approaches to local wireless networking



Chapter 14: IEEE 802.11 Wireless LAN Standard

- Wireless LAN standards defined by IEEE 802.11 committee



Chapter 15: Bluetooth

- Bluetooth is an open specification for wireless communication and networking
 - Personal computers
 - Mobile phones
 - Other wireless devices