TEXT BOOK:
Wireless Communications and Networks
by
William Stallings

REFERENCE BOOK:
Modern Wireless Communications
By
Simon Haykin & Michael Moher
Introduction

Chapter 1
Wireless Comes of Age

- Guglielmo Marconi invented the wireless telegraph in 1896
  - Communication by encoding alphanumeric characters in analog signal
  - In 1901, sent telegraphic signals across the Atlantic Ocean (1800 miles)
- Communications satellites launched in 1960s
- Advances in wireless technology have led to
  - Radio, television, mobile telephone, communication satellites
The Cellular Revolution

- The first-generation mobile (cellular) phone used analog technology (1980 ~ 1990)- AMPS
- The second-generation mobile phone used digital technology (1990 ~ 2002)- GSM
- The third-generation mobile phone used new communication technology to support high bandwidth (up to 2 Mbps)- IMT 2000
Broadband Wireless Technology

- Higher data rates obtainable with broadband wireless technology
  - WLAN: 2 Mbps ~ 100 Mbps
  - HomeRF: 1 Mbps ~ 10 Mbps
  - 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
Limitations and Difficulties of Wireless Technologies

- Wireless is convenient and less expensive
- Limitations and political and technical difficulties inhibit wireless technologies
- Lack of an industry-wide standard
- Device limitations
  - E.g., small LCD on a mobile telephone can only displaying a few lines of text
  - E.g., browsers of most mobile wireless devices use wireless markup language (WML) instead of HTML
Part One: Background

- Provides preview and context for rest of book
- Covers basic topics
  - Data Communications
  - TCP/IP
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
Part Two: Wireless Communication Technology

- Underlying technology of wireless transmission
- Encoding of analog and digital data for wireless transmission
Chapter 5: Antennas and Propagation

- Principles of radio and microwave
  - Antenna performance
  - Wireless transmission modes
  - Fading
Chapter 6: Signal Encoding Techniques

- Wireless transmission
  - Analog and digital data
  - Analog and digital signals
Chapter 7: Spread Spectrum

- Frequency hopping
- Direct sequence spread spectrum
- Code division multiple access (CDMA)
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
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)
Chapter 12: Mobile IP and Wireless Access Protocol

- Modifications to IP protocol to accommodate wireless access to Internet
- Wireless Application Protocol (WAP)
  - Provides mobile users access to telephony and information services including Internet and Web
  - Includes wireless phones, pagers and personal digital assistants (PDAs)
Part Four: Wireless Local Area Networks

- Examines underlying wireless LAN technology
- Examines standardized approaches to local wireless networking
Chapter 13: Wireless LAN Technology

- Overview of LANs and wireless LAN technology and applications
- Transmission techniques of wireless LANs
  - Spread spectrum
  - Narrowband microwave
  - Infrared
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
Internet and Web Resources

- Web page for this book
  - Useful web sites, errata sheet, figures, tables, slides, internet mailing list, wireless courses

- Computer Science Student Support Site
  - WilliamStallings.com/StudentSupport.html

- Newsgroups
  - comp.std.wireless
  - comp.dcom.*
Wireless networks are convenient ways that modern technology uses to create networks with low costs as there are almost no wires involved. Wireless access points (WAP) allow devices to connect to such networks. The network can continue to run as a normal network. There are two types of wireless network methods that AQA have said you need to be aware of: Wi-Fi and Bluetooth. These are both radio-based protocols that are used to create networks that users can transfer data over.