

TEXT BOOK:
Wireless Communications and Networks
by
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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
 - <http://WilliamStallings.com/Wireless1e.html>
 - 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.*

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