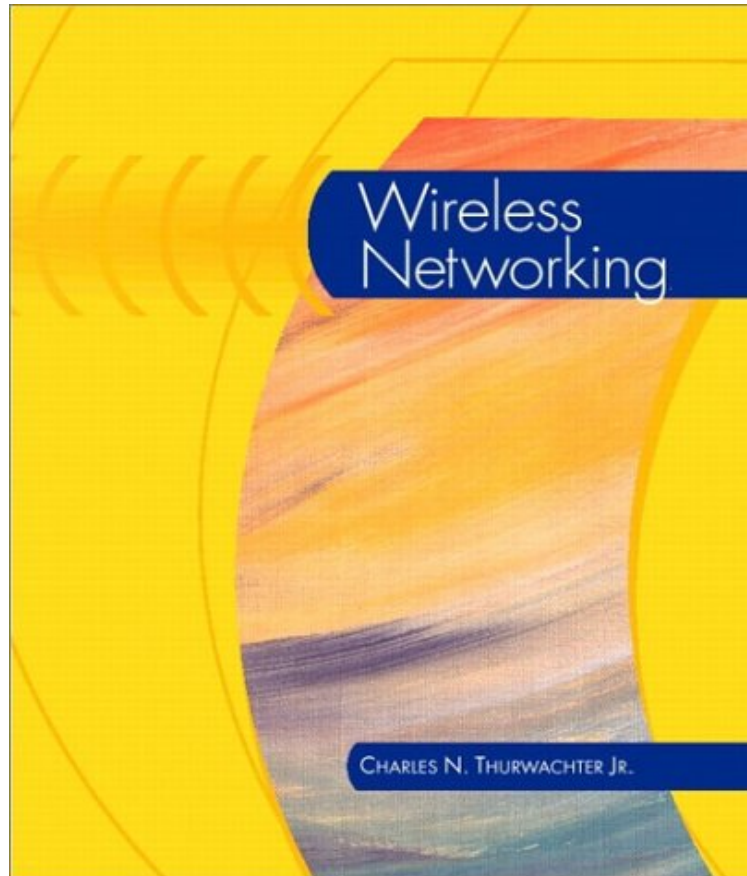


[Download ebook] Wireless Networking

Wireless Networking

Charles Thurwachter

*ePub | *DOC | audiobook | ebooks | Download PDF*



DOWNLOAD



+

READ ONLINE

#5678054 in Books 2002-02-11Original language:EnglishPDF # 1 9.21 x 1.37 x 7.49l, 2.63 #File Name: 0130883662629 pages | File size: 56.Mb

Charles Thurwachter : Wireless Networking before purchasing it in order to gage whether or not it would be worth my time, and all praised Wireless Networking:

Integrating many different wireless technologies into a single resource, this comprehensive volume provides an overview of the entire area of wireless networkingfrom fundamentals and traditional wireless technologies to cellular technologies and emerging standards and specifications. The book focuses on actual systems and techniques to explore the technology beyond wireless communication and into wireless networking. The emphasis on protocol analysis ties the many different technologies together. This one volume reference details wireless technology fundamentals, the wireless physical layer, cellular systems and protocol perspectives and emerging systems. For Network Technicians/Engineers and System Engineers.

From the Back Cover Wireless communications has recently created thousands of new jobs, many of them currently unfilled. Today, almost any electronic communications device (fax machines, hand-held computers, PDAs, and more)

can be wireless. Wireless Networking has already been hailed as a classic. It covers aspects of wireless networking from both an engineering and end-to-end application perspective. Thus, it addresses topics as diverse as antennas, coding, multiplexing, satellite technology, cellular technology, wireless protocols, and wireless LAN technology in depth. The text is broken into four logical parts: Part 1: Fundamentals of Wireless Networking summarizes wireless fundamentals. Part 2: The Wireless Physical Layer covers the engineering of wireless components and the characteristics of the channel to the extent they will be explored. Part 3: Cellular Systems and Protocol Perspectives focuses on the specific air interface schemes and protocol elements used to address the problems of a communications system that makes use of wireless networking elements. Part 4: Emerging Systems examines four emerging trends in the rapidly changing field of Wireless Networking. Instructors may wish to obtain a copy of the Instructor's Manual (0-13-092885-2). Excerpt. Reprinted by permission. All rights reserved. The subject of wireless communications is very broad and can be approached from many different perspectives. In most cases, an entire textbook could be devoted to each section of this text. The information provided in this textbook is useful for an overview course on the subject of wireless networking. This coverage allows the instructor to choose specific areas on which to focus the course. It also makes this textbook a good reference for the nonspecialist practitioner who does not have shelf space for several more specialized references. Several unique chapters bring together information that is often hard to locate. Examples include chapters dedicated to wireless layer 2 protocols; data protocols used in wireless networks; special considerations when using TCP/IP with an underlying wireless network; and WAP, 3G cellular networks, and Bluetooth three emerging standards. Wireless communications systems have an air interface rather than a wireline interface. Wireless characteristics have a profound impact on layers 1, 2, 3, and 4 protocols and services. Both LAN and WAN wireless systems are explored in detail. Wireless WAN and LAN techniques are widely available to consumers and businesses for the first time, thus wireless networking is emerging as its own specialized area of study. Traditional wireless WAN technologies, terrestrial broadband, and satellites are introduced. Whenever possible, actual systems are used to illustrate how the technology works. Cellular technology (the emerging wireless WAN technology) is introduced, summarized, and further explained in several chapters focusing on each group of cellular systems. A chapter on the rapidly expanding LAN technology for wireless networks, 802.11, is provided. Thus, both traditional and modern wireless systems and networks are examined. Several chapters provide a fundamental description of the wireless WAN and LAN infrastructure. Once these topics are covered, specialized data communications protocols used primarily in the cellular environment, are discussed in detail. The implications of the mobility of wireless devices on IP and the specific effects on TCP flow control are defined and explored. Existing solutions to these problems are summarized and compared. Chapters on wireless networking focus on each of the lower four layers of the protocol architecture and each discuss their relative strengths and weaknesses. This coverage is unique and allows the reader to set any one particular area of interest in context with the other layer protocols with which it interacts. Students must understand that, to achieve peak performance in a wireless network, each layer has special characteristics that need to be addressed. Part Four consists of three chapters that provide an introduction to the emerging standards and specifications important to wireless networking. The content of these chapters is not intended to be comprehensive. Instead, they offer an overview of operation and a perspective on how these emerging standards and specifications might fit into an evolving communications architecture.

PART 1: FUNDAMENTALS OF WIRELESS NETWORKING Part 1 is not intended to be read in its entirety by every reader. Depending on each reader's focus, some chapters may be skipped entirely while others will need to be carefully considered. The intent of Part 1 is to group together several disparate but central concepts and allow the reader to choose the chapters of most interest and applicability. Chapter 1, Technology Fundamentals, discusses several basic wireless concepts. It introduces the concepts of wavelength, frequency set in an electromagnetic spectrum, frequency bands, gain and attenuation, and power radiation. This chapter also summarizes the use of decibel and logarithmic techniques. Bandwidth, information capacity, Shannon's limit, licensed and unlicensed bands of operation, the importance of the ISM bands, FCC rule part 15, and propagation modes are covered. Chapter 2, Multiple-Access Methods, summarizes multiple access methods, which are the air interfaces of wireless systems. After a general introduction to wireless topologies and duplexing, the rest of the chapter is devoted to air interfaces. All major air interface methods are discussed, including FDMA, TDMA, FDM/TDMA, and CDMA. Additionally, the spread spectrum process is examined and compared to CDMA, and both FHSS and DSSS techniques are illustrated. Chapter 3, Protocol Architectures, examines the three protocol models referred to throughout the text. The chapter begins with a summary of basic protocol concepts and terminology. After this introduction, the OSI, TCP/IP, and SS7 protocol models are described. Where appropriate, layer protocol specifics are used to illustrate the concepts needed in later chapters. Chapter 4, Wireless Layer Protocols, is a survey and examination of protocols that are important for wireless network communications. Knowledge of this material is assumed in later parts of the text, especially Part 3. Because many wireless systems will be transitioning to IP as a layer 3 protocol, the chapter closes with a closer examination of the protocol than was provided in Chapter 3.

PART 2: THE WIRELESS PHYSICAL LAYER Part 2 is primarily of interest to readers who want to learn more about engineering and implementation techniques. Part 2 is written from an engineering or engineering technology viewpoint, and goes into some detail on the actual implementation practices

used in wireless devices. Thus, it addresses issues such as modulation, coding, and antenna design. In other words, wireless systems are discussed from a physical layer perspective. These concepts are fundamental to any wireless system. Part 2 is divided into two groups of chapters. The first group, Chapters 5, 6, and 7, explores the digital and pulse modulation techniques used by wireless communications systems. This discussion is followed by a chapter that introduces the error-correction codes used in wireless systems. This group of chapters is about technology, not systems. The second group of chapters in this part; Chapters 8, 9, and 10, discusses traditional wireless systems from a technological perspective. The second group is a three-chapter examination of wireless systems with a common theme of link analysis. The first chapter in this group explores antenna technology and gives a brief introduction to link analysis. The next chapter focuses on broadband, terrestrial, line-of-sight, microwave wireless links. This chapter includes a somewhat more complex link analysis. Part 2 closes with a chapter on satellite communications systems. It explores not only the communication applications of satellites but also the basics of satellite technology and orbital mechanics. Finally, a link analysis, which ties together common concepts in these related fields, is performed. Chapter 5, Digital Modulation, covers digital modulation. The chapter begins with an introduction to the central concepts of bandwidth efficiency, symbol rate, and M-ary encoding. To form a basis for comparison as well as to illustrate basic relationships between information bandwidth and transmission bandwidth, traditional DSB-AM is examined. An emphasis on transmission bandwidth is used throughout the chapter as a comparison of different techniques. The chapter then shifts to digital techniques, beginning with ASK, to build a bridge from the previous AM discussion. FSK is then discussed. Both coherent and noncoherent FSK are examined; the close relationship between coherent FSK and MSK is shown; the problem of wide transmission bandwidth of MSK is identified; and the solution used by many wireless systems, GMSK, is introduced. PSK at representative levels of modulation density is explored next, and the equivalence of QPSK and QAM is shown. Constellation diagrams are introduced, as are enhancements to traditional PSK methods important to wireless systems such as DQPSK and $1/4$ DQPSK. The chapter then moves to a discussion of error distance and higher modulation density techniques, and closes with an overview of BER graphs and how to use them. Chapter 6, Pulse Modulation, explores pulse modulation, focusing on PAM and PCM. Specific wireless examples are given. The chapter begins with an introduction to sampling theory, aliasing, and the effects of variation on sample interval and sample resolution. PAM is then presented as the basis of most pulse modulation techniques. The way in which it naturally flows into PCM is then demonstrated. Many important aspects of PCM are discussed, including quantization error, nonuniform quantization techniques, the use of code rather than binary to represent the sample value, quantization noise, dynamic range, and power utilization. The chapter closes with a brief overview of related pulse modulation techniques, including DPCM, ADPCM, and the various forms of delta modulation. Chapter 7, Error-Correcting Codes, contains material not often found in many wireless textbooks. If and when this material is discussed, the treatment of coding is often buried in complex mathematics. This important subject, which has links to modulation and bandwidth efficiency, is critical for understanding how wireless systems work and is discussed in a simplified way. Chapter 7 sets error-correcting coding methods in a general channel coding context. After a brief introduction to modulo 2 arithmetic, the chapter defines block codes and immediately introduces parity and Hamming codes. Specific examples are worked out and a step-by-step method is provided. Parity techniques, first through Hamming enhancements and then later in application to the Viterbi algorithm, link the concepts together. The interleaving technique and cyclic codes are then introduced, along with a brief introduction to the polynomial notation used. CRC codes are also explored. Again, specific examples are worked out and a step-by-step method is provided. The chapter then briefly ma...