

Digital Communication over Fading Channels

Second Edition

Marvin K. Simon and Mohamed-Slim Alouini

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Digital Communication Over Fading Channels

K. Deergha Rao



Digital Communication Over Fading Channels:

Digital Communication over Fading Channels Marvin K. Simon, Mohamed-Slim Alouini, 2004-12-06 The four short years since Digital Communication over Fading Channels became an instant classic have seen a virtual explosion of significant new work on the subject both by the authors and by numerous researchers around the world Foremost among these is a great deal of progress in the area of transmit diversity and space time coding and the associated multiple input multiple output MIMO channel This new edition gathers these and other results previously scattered throughout numerous publications into a single convenient and informative volume Like its predecessor this Second Edition discusses in detail coherent and noncoherent communication systems as well as a large variety of fading channel models typical of communication links found in the real world Coverage includes single and multichannel reception and in the case of the latter a large variety of diversity types The moment generating function MGF based approach for performance analysis introduced by the authors in the first edition and referred to in literally hundreds of publications still represents the backbone of the book's presentation Important features of this new edition include An all new comprehensive chapter on transmit diversity space time coding and the MIMO channel focusing on performance evaluation Coverage of new and improved diversity schemes Performance analyses of previously known schemes in new and different fading scenarios A new chapter on the outage probability of cellular mobile radio systems A new chapter on the capacity of fading channels And much more Digital Communication over Fading Channels Second Edition is an indispensable resource for graduate students researchers investigating these systems and practicing engineers responsible for evaluating their performance **Digital Communications Over Fading Channels** R. Clark Robertson, Nathan E. Beltz, Naval Postgraduate School (U.S.), 2004-11-01 In this report the probabilities of bit error for the most commonly used digital modulation techniques are analyzed Analytic solutions are developed for the probability of bit error when the signal is affected by the most commonly encountered impairment to system performance for a wireless channel the transmission of the signal over a fading channel In this report the effect of a slow flat Ricean fading channel on communications systems performance is examined Since channel fading significantly degrades the performance of a communication system the performance of digital communication systems that also use forward error correction channel coding is analyzed for hard decision decoding and where appropriate for soft decision decoding Diversity another technique to mitigate the effect of fading channels on digital communication systems performance is also discussed Also included is a discussion of the effect of narrowband noise interference both continuous and pulsed on digital communication systems We then discuss the analysis of the probability of bit error for the combination of error correction coding and diversity Following this we briefly discuss spread spectrum systems Next we examine the link budget analysis and various models for channel loss Finally we examine in detail the second generation digital wireless standard Global System for Mobile GSM Digital Communication Over Fading Channels Marvin K. Simon, Mohamed-Slim

Alouini,2000-08-14 A unified presentation broad coverage single volume convenience This timesaving reference provides a unified approach to the performance analysis of digital communication systems over generalized fading channels Employing alternative forms of such classical mathematical functions as the Gaussian Q function the Marcum Q function and the incomplete Gamma function the book expresses communication system error probability performance in terms of the moment generation function MGF of the fading process This MGF based approach provides the unifying backbone of the book Digital Communication over Fading Channels discusses in detail coherent differentially coherent and noncoherent communication systems as well as a large variety of fading channel models typical of communication links found in the real world Coverage also includes single and multichannel reception and in the case of the latter a large variety of diversity types For each combination of communication type channel fading model and diversity type the average bit error rate and or symbol error rate is expressed in an easy to evaluate form Special features include Important results previously scattered over many publications now in a single volume Simplified results heretofore available only in complex forms Extremely broad coverage of topics Explores practical applications including the problem of optimum combining in the presence of co channel interference

Digital Communication over Fading Channels Marvin K. Simon, Mohamed-Slim Alouini, 2005-01-28 The four short years since Digital Communication over Fading Channels became an instant classic have seen a virtual explosion of significant new work on the subject both by the authors and by numerous researchers around the world Foremost among these is a great deal of progress in the area of transmit diversity and space time coding and the associated multiple input multiple output MIMO channel This new edition gathers these and other results previously scattered throughout numerous publications into a single convenient and informative volume Like its predecessor this Second Edition discusses in detail coherent and noncoherent communication systems as well as a large variety of fading channel models typical of communication links found in the real world Coverage includes single and multichannel reception and in the case of the latter a large variety of diversity types The moment generating function MGF based approach for performance analysis introduced by the authors in the first edition and referred to in literally hundreds of publications still represents the backbone of the book's presentation Important features of this new edition include An all new comprehensive chapter on transmit diversity space time coding and the MIMO channel focusing on performance evaluation Coverage of new and improved diversity schemes Performance analyses of previously known schemes in new and different fading scenarios A new chapter on the outage probability of cellular mobile radio systems A new chapter on the capacity of fading channels And much more Digital Communication over Fading Channels Second Edition is an indispensable resource for graduate students researchers investigating these systems and practicing engineers responsible for evaluating their performance

Channel Measurement for Wideband Digital Communication Over Fading Channels Kaveh Pahlavan, 1979

MIMO Wireless Communications over Generalized Fading Channels Brijesh Kumbhani, Rakshesh Singh Kshetrimayum, 2017-07-12 MIMO

systems have been known to better the quality of service for wireless communication systems This book discusses emerging techniques in MIMO systems to reduce complexities and keep benefits unaffected at the same time It discusses about benefits and shortcomings of various MIMO technologies like spatial multiplexing space time coding spatial modulation transmit antenna selection and various power allocation schemes to optimize the performance Crux of the book is focus on MIMO communication over generalized fading channels as they can model the propagation of signals in a non homogeneous environment Relevant MATLAB codes are also included in the appendices Book is aimed at graduate students and researchers in electronics and wireless engineering specifically interested in electromagnetic theory antennas and propagation future wireless systems signal processing

Channel Coding Techniques for Wireless Communications K. Deergha Rao, 2015-03-26 The book discusses modern channel coding techniques for wireless communications such as turbo codes low parity check codes LDPC space time coding Reed Solomon RS codes and convolutional codes Many illustrative examples are included in each chapter for easy understanding of the coding techniques The text is integrated with MATLAB based programs to enhance the understanding of the subject s underlying theories It includes current topics of increasing importance such as turbo codes LDPC codes LT codes Raptor codes and space time coding in detail in addition to the traditional codes such as cyclic codes BCH and RS codes and convolutional codes MIMO communications is a multiple antenna technology which is an effective method for high speed or high reliability wireless communications PC based MATLAB m files for the illustrative examples are included and also provided on the accompanying CD which will help students and researchers involved in advanced and current concepts in coding theory Channel coding the core of digital communication and data storage has undergone a major revolution as a result of the rapid growth of mobile and wireless communications The book is divided into 11 chapters Assuming no prior knowledge in the field of channel coding the opening chapters 1 2 begin with basic theory and discuss how to improve the performance of wireless communication channels using channel coding Chapters 3 and 4 introduce Galois fields and present detailed coverage of BCH codes and Reed Solomon codes Chapters 5 7 introduce the family of convolutional codes hard and soft decision Viterbi algorithms turbo codes BCJR algorithm for turbo decoding and studies trellis coded modulation TCM turbo trellis coded modulation TTCM bit interleaved coded modulation BICM as well as iterative BICM BICM ID and compares them under various channel conditions Chapters 8 and 9 focus on low density parity check LDPC codes LT codes and Raptor codes Chapters 10 and 11 discuss MIMO systems and space time ST coding

Multicarrier Communications Lie-Liang Yang, 2009-01-21 Benefiting from both time domain and frequency domain signal processing techniques multicarrier systems have the potential for achieving high spectral efficiency high flexibility and low complexity wireless communications Multicarrier techniques therefore constitute the promising techniques for implementation of future generations of wideband broadband and ultra wideband systems Multicarrier Communications offers comprehensive and in depth evaluation of numerous topics in the area covering the

fundamental principles of spread spectrum and multicarrier CDMA as well as more advanced topics such as multiuser detection MUD multiuser transmitter preprocessing MUP MIMO and space time processing It examines OFDM and various multicarrier CDMA within an unified framework and provides analytical approaches and formulas for error performance evaluation of numerous multicarrier systems Examines MUD and MUP in parallel to illustrate the strong duality between receiver optimization and transmitter optimization Comprehensively establishes the theory of noncoherent MUD and noncoherent interference suppression Details the body of knowledge on MIMO theory and space time multicarrier communications Contains tables diagrams and figures to illustrate the performance results Practicing electrical engineers and researchers in wireless communications will find Multicarrier Communications an invaluable guide It will also be of interest to senior undergraduate and graduate students on wireless communications courses Digital Communication Systems and Techniques Mr. Rohit Manglik, 2024-04-06 EduGorilla Publication is a trusted name in the education sector committed to empowering learners with high quality study materials and resources Specializing in competitive exams and academic support EduGorilla provides comprehensive and well structured content tailored to meet the needs of students across various streams and levels **Advances in Communication, Devices and Networking** Rabindranath Bera, Subir Kumar Sarkar, Om Prakash Singh, Hemanta Saikia, 2019-02-15 The book covers recent trends in the field of devices wireless communication and networking It presents the outcomes of the International Conference in Communication Devices and Networking ICCDN 2018 which was organized by the Department of Electronics and Communication Engineering Sikkim Manipal Institute of Technology Sikkim India on 2 3 June 2018 Gathering cutting edge research papers prepared by researchers engineers and industry professionals it will help young and experienced scientists and developers alike to explore new perspectives and offer them inspirations on addressing real world problems in the field of electronics communication devices and networking

This book delves into Digital Communication Over Fading Channels. Digital Communication Over Fading Channels is a vital topic that needs to be grasped by everyone, ranging from students and scholars to the general public. This book will furnish comprehensive and in-depth insights into Digital Communication Over Fading Channels, encompassing both the fundamentals and more intricate discussions.

1. This book is structured into several chapters, namely:
 - Chapter 1: Introduction to Digital Communication Over Fading Channels
 - Chapter 2: Essential Elements of Digital Communication Over Fading Channels
 - Chapter 3: Digital Communication Over Fading Channels in Everyday Life
 - Chapter 4: Digital Communication Over Fading Channels in Specific Contexts
 - Chapter 5: Conclusion
 2. In chapter 1, the author will provide an overview of Digital Communication Over Fading Channels. This chapter will explore what Digital Communication Over Fading Channels is, why Digital Communication Over Fading Channels is vital, and how to effectively learn about Digital Communication Over Fading Channels.
 3. In chapter 2, this book will delve into the foundational concepts of Digital Communication Over Fading Channels. This chapter will elucidate the essential principles that need to be understood to grasp Digital Communication Over Fading Channels in its entirety.
 4. In chapter 3, the author will examine the practical applications of Digital Communication Over Fading Channels in daily life. The third chapter will showcase real-world examples of how Digital Communication Over Fading Channels can be effectively utilized in everyday scenarios.
 5. In chapter 4, this book will scrutinize the relevance of Digital Communication Over Fading Channels in specific contexts. This chapter will explore how Digital Communication Over Fading Channels is applied in specialized fields, such as education, business, and technology.
 6. In chapter 5, the author will draw a conclusion about Digital Communication Over Fading Channels. The final chapter will summarize the key points that have been discussed throughout the book.
- The book is crafted in an easy-to-understand language and is complemented by engaging illustrations. This book is highly recommended for anyone seeking to gain a comprehensive understanding of Digital Communication Over Fading Channels.

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