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Digital Communication over Fading Channels

A Unified Approach to Performance Analysis

Marvin K. Simon
Mohamed-Slim Alouini

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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 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 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,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 Communication Over Fading Dispersive Channels John Stephen Richters,1967 The transmission of digital

information over a fading dispersive channel is considered subject to a bandwidth constraint on the input signals A specific signaling scheme is proposed in which information is transmitted with signals formed by coding over a set of smaller basic signals all of which excite approximately independent and orthogonal outputs The problem is then modeled as one of block coding over successive independent uses of a diversity channel Upper and lower bounds to the minimum error probability attainable by such a scheme are derived These bounds are exponentially decreasing in terms of the time available for information transmission and agree asymptotically for a range of rates These bounds are used to interpret the significance of different signal and channel parameters and the interplay between them Some conclusions are drawn concerning the nature of good input signals the major one being that any basic signal should be transmitted at one of a small number of discrete voltage levels Several numerical examples are included to illustrate how these results may be applied in the estimation of performance levels for practical channels Author Bit Rate Adaptation in Digital Communication Over Fading Channels Roman E. Goot,2025-01-31 In this unique compendium the general principal of adaptation and its application in communications especially for bit rate adaptation are considered Two type of bit rate adaptation are treated signal duration and size constellation When a channel state is relatively good size constellation adaptation should be used With state degradation signal duration is used The optimal control algorithms maximizing bit rate are constructed and quantitative characteristics of efficiency are determined for both types separately as well as when they are used jointly The characteristics are separated into two classes potential and real ones The potential demonstrates the limiting possibilities for the system and real shows how much the efficiency decreases taking into account the influence of real factors **Digital Communication Over Fading and Dispersive Channels, with Emphasis on Mobile Radio Applications** Robert Anthony Ziegler,1991 **Analytical Evaluation of Wireless Digital Communication Performance Over Fading Channels** □□□,Chi-Ming Lo,2017-01-27 This dissertation Analytical Evaluation of Wireless Digital Communication Performance Over Fading Channels by Chi ming Lo was obtained from The University of Hong Kong Pokfulam Hong Kong and is being sold pursuant to Creative Commons Attribution 3 0 Hong Kong License The content of this dissertation has not been altered in any way We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation All rights not granted by the above license are retained by the author DOI 10 5353 th_b3124208 Subjects Mobile communication systems Digital communications Radio Transmitters and transmission Fading **Coherent Digital Communications for Rapidly Fading Channels with Applications to Underwater Acoustics** Milica Stojanović,1994 **On Signal Transmission and Detection Over Fading Channels** Fadel Fadel Abdel-Aziz Digham,2005 **Blind Equalization in Digital Communications Over Fading Channels** Robert A. Conn,1992 **Digital Communications Over Non-Fading and Fading Channels** ,2008 The objective of this thesis is to enhance the ability of the Improved Many on Many IMOM software package to analyze modern digital communication systems using available intelligence Currently

IMOM can only be used to analyze analog communication systems but modern systems are increasingly digital In this thesis the probability of bit error expressions for many common digital modulation techniques both binary and non binary are inverted to obtain expressions for the required signal to noise ratio as a function of probability of channel bit error Furthermore results are obtained not only for a non fading channel but for channels modeled as either Rayleigh or Ricean These equations can be implemented in IMOM to increase the accuracy of the link budget analysis when the specific modulation type being evaluated is known This thesis takes the approach of determining probability of channel bit error rather than information bit error which allows generic solutions independent of the specifics of the system under investigation as long as the particular modulation type is known When even greater accuracy is desired system specifics such as the type of error control coding must be taken into account As an example of this the Joint Tactical Information Distribution System JTIDS is considered *Wireless Communications Over MIMO Channels* Volker Kuhn,2006-08-25 Wireless Communications over MIMO Channels Applications to CDMA and Multiple Antenna Systems covers both state of the art channel coding concepts and CDMA and multiple antenna systems rarely found in other books on the subject Furthermore an information theoretical analysis of CDMA and SDMA systems illuminate ultimate limits and demonstrates the high potential of these concepts Besides spatial multiplexing the use of multiple transmit antennas in order to increase the link reliability by diversity concepts space time coding is described Another focus is the application of error control coding in mobile radio communications Accompanying appendices include basic derivations tables of frequently used channel models chain rules for entropy and information data processing theorem basics of linear algebra Householder reflection and Givens rotation and the LLL algorithm for lattice reduction **MSWiM '07** Carla-Fabiani Chiasserini,2007 **Cumulative Index to Entire IEEE Group Transactions/journals, 1951-1971: Subject** Nichigai Asoshiētsu,1973 **Dissertation Abstracts International** ,2008 *Worldwide Wireless Communications* Frank S. Barnes,1995 1996 IEEE AFRICON, 4th AFRICON Conference in Africa, 25-27 September 1996, Tutorials on 24 September 1996 ,1996 1993 International Symposium on Communications ,1993

Adopting the Song of Expression: An Emotional Symphony within **Digital Communication Over Fading Channels**

In a global taken by displays and the ceaseless chatter of instant communication, the melodic elegance and mental symphony created by the written word usually disappear into the background, eclipsed by the persistent noise and distractions that permeate our lives. However, set within the pages of **Digital Communication Over Fading Channels** a wonderful fictional treasure brimming with raw thoughts, lies an immersive symphony waiting to be embraced. Constructed by an outstanding musician of language, that charming masterpiece conducts viewers on a psychological journey, well unraveling the hidden melodies and profound influence resonating within each cautiously constructed phrase. Within the depths with this emotional assessment, we can explore the book is main harmonies, analyze its enthralling publishing style, and surrender ourselves to the profound resonance that echoes in the depths of readers souls.

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