



Powerline Communications:

Channel Characterization and Modem Design

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Communication Channels Characterization

Bernard Goldberg, Herbert S. Bennett



Communication Channels Characterization:

Communications Channels Bernard Goldberg, Herbert S. Bennett, 1976 **Communications Channels** Bernard Goldberg, Herbert S. Bennett, 1976 Propagation Channel Characterization, Parameter Estimation, and Modeling for Wireless Communications Xuefeng Yin, Xiang Cheng, 2016-09-13 A comprehensive reference giving a thorough explanation of propagation mechanisms channel characteristics results measurement approaches and the modelling of channels Thoroughly covering channel characteristics and parameters this book provides the knowledge needed to design various wireless systems such as cellular communication systems RFID and ad hoc wireless communication systems It gives a detailed introduction to aspects of channels before presenting the novel estimation and modelling techniques which can be used to achieve accurate models To systematically guide readers through the topic the book is organised in three distinct parts The first part covers the fundamentals of the characterization of propagation channels including the conventional single input single output SISO propagation channel characterization as well as its extension to multiple input multiple output MIMO cases Part two focuses on channel measurements and channel data post processing Wideband channel measurements are introduced including the equipment technology and advantages and disadvantages of different data acquisition schemes The channel parameter estimation methods are then presented which include conventional spectral based estimation the specular path model based high resolution method and the newly derived power spectrum estimation methods Measurement results are used to compare the performance of the different estimation methods The third part gives a complete introduction to different modelling approaches Among them both scattering theoretical channel modelling and measurement based channel modelling approaches are detailed This part also approaches how to utilize these two modelling approaches to investigate wireless channels for conventional cellular systems and some new emerging communication systems This three part approach means the book caters for the requirements of the audiences at different levels including readers needing introductory knowledge engineers who are looking for more advanced understanding and expert researchers in wireless system design as a reference Presents technical explanations illustrated with examples of the theory in practice Discusses results applied to 4G communication systems and other emerging communication systems such as relay CoMP and vehicle to vehicle rapid time variant channels Can be used as comprehensive tutorial for students or a complete reference for engineers in industry Includes selected illustrations in color Program downloads available for readers Companion website with program downloads for readers and presentation slides and solution manual for instructors Essential reading for Graduate students and researchers interested in the characteristics of propagation channel or who work in areas related to physical layer architectures air interfaces navigation and wireless sensing Channel Characterization and Modeling for Vehicular Communications Xiang Cheng, Ziwei Huang, Lu Bai, 2023-12-04 This book presents and develops comprehensive knowledge of vehicular channel characteristics and proper vehicular channel models The studied topics contain the propagation

characteristics of vehicular communications such as a time frequency non stationary single input single output SISO vehicle to vehicle V2V non geometry stochastic model NGSM a space time non stationary massive multiple input multiple output MIMO V2V regular shaped geometry based stochastic model RS GBSM and a space time non stationary massive MIMO V2V irregular shaped geometry based stochastic model IS GBSM Each is introduced with characteristics then discussed in detail Finally this book discusses future research directions to inspire further investigation in the field of vehicular channels from three different perspectives

Modeling and Characterization of Land Mobile Communication Channels Abdulkader Sadek Akki,1977 *Channel Characterization and System Design in Wireless Communications* Do-Sik Yoo,2002 We introduce parameters called normalized mean square covariance NMSV normalized mean square correlation NMSR re centered normalized mean square correlation RC NMSR and stochastic degree of freedom SDF to efficiently characterize the correlation properties of L2 stochastic processes We show that these parameters are very useful to characterize wireless communication channels In particular we show that there are very close relationships between the parameters and the performance of various wireless communication systems Due to such close relationship the parameters are very useful to evaluate the quality of wireless communication channels We show that the parameters are very effective in wireless communication system design In particular we can obtain direct relations between the quality of channel and the performance of various wireless communication systems Due to the fundamental nature of the parameters we believe that they will be very helpful in other branches of science and engineering in which stochastic modeling is useful

Power Line Communications Lutz Lampe,Andrea M. Tonello,Theo G. Swart,2016-04-27 This second edition of Power Line Communications will show some adjustments in content including new material on PLC for home and industry PLC for multimedia PLC for smart grid and PLC for vehicles Additional chapters include coverage of Channel Characterization Electromagnetic Compatibility Coupling and Digital Transmission Techniques This book will provide the reader with a wide coverage of the major developments within the field With contributions from some of the most active researchers on PLC the book brings together a wealth of international experts on specific PLC topics

Propagation Channel Characterization, Parameter Estimation, and Modeling for Wireless Communications Xuefeng Yin,Xiang Cheng,2016-10-24 A comprehensive reference giving a thorough explanation of propagation mechanisms channel characteristics results measurement approaches and the modelling of channels Thoroughly covering channel characteristics and parameters this book provides the knowledge needed to design various wireless systems such as cellular communication systems RFID and ad hoc wireless communication systems It gives a detailed introduction to aspects of channels before presenting the novel estimation and modelling techniques which can be used to achieve accurate models To systematically guide readers through the topic the book is organised in three distinct parts The first part covers the fundamentals of the characterization of propagation channels including the conventional single input single output SISO propagation channel characterization as well as its

extension to multiple input multiple output MIMO cases Part two focuses on channel measurements and channel data post processing Wideband channel measurements are introduced including the equipment technology and advantages and disadvantages of different data acquisition schemes The channel parameter estimation methods are then presented which include conventional spectral based estimation the specular path model based high resolution method and the newly derived power spectrum estimation methods Measurement results are used to compare the performance of the different estimation methods The third part gives a complete introduction to different modelling approaches Among them both scattering theoretical channel modelling and measurement based channel modelling approaches are detailed This part also approaches how to utilize these two modelling approaches to investigate wireless channels for conventional cellular systems and some new emerging communication systems This three part approach means the book caters for the requirements of the audiences at different levels including readers needing introductory knowledge engineers who are looking for more advanced understanding and expert researchers in wireless system design as a reference Presents technical explanations illustrated with examples of the theory in practice Discusses results applied to 4G communication systems and other emerging communication systems such as relay CoMP and vehicle to vehicle rapid time variant channels Can be used as comprehensive tutorial for students or a complete reference for engineers in industry Includes selected illustrations in color Program downloads available for readers Companion website with program downloads for readers and presentation slides and solution manual for instructors Essential reading for Graduate students and researchers interested in the characteristics of propagation channel or who work in areas related to physical layer architectures air interfaces navigation and wireless sensing

Characterization and Modeling of Real Communication Channels Jean-Pierre A. Adoul, Bruce D. Fritchman, Laveen N. Kanal, LEHIGH UNIV BETHLEHEM PA DEPT OF ELECTRICAL ENGINEERING., 1970 The paper presents new descriptive and generative models for the error cluster and error gap patterns which occur in the binary discrete time stochastic processes observed as outputs of digital communication channels having memory The slope of the error gap distribution is used to uncover relationships between various channel models One characterizes the memory μ of a process of error density P_e by its relative deviation in average conditional entropy from the discrete memoryless channel $D_{M/C}$ which one proves has maximum entropy for the class of finite and infinite memory length processes of density P_e One obtains an upper bound for μ for real channels derive μ for the general discrete renewal process from the error gap probability mass function EGPMF and prove that it is a lower bound for any processes having the same EGPMF One demonstrates some limitations of finite error free state models by showing that their EGPMF is bounded from above by a geometric series To estimate the counting distribution with flexibility we introduce conditional gap distributions and multigap statistics one uses these in implementing a denumerable Markov Chain model which free from finite state model limitations and more general than renewal processes allows the derivation of all classical statistics including entropy Author

Intra-body Communication Channel Characterization and Modeling Hongjie Zhu, 2011 *Characterization and Propagation of Sources and Backgrounds* Wendell R. Watkins, Dieter Clement, 1994 Antenna Design and Channels Characterization for Body Centric Communication Zhen Hua Sampson Hu, 2007 **Channel Characterization for Indoor Wireless Communication** Kwok Wai Cheung, 1997 *Bibliography on Ground Vehicle Communication and Control: a KWIC Index. Annual Report. Volume II.* W. I. Thompson (III.), 1971 **Ultra-wide Bandwidth Spread-spectrum Techniques for Wireless Multiple-access Communications** Moe Z. Win, 1998 Characterization of Audiences in Water Quality Information and Education Programs Susan Smetzer Anderson, 1997 *Performance Characterization of Communication Channels Through Asymptotic and Partial Ordering Analysis* Yuan Zhang, 2013

Asymptotic comparisons of ergodic channel capacity at high and low signal to noise ratios SNRs are provided for several adaptive transmission schemes over fading channels with general distributions including optimal power and rate adaptation rate adaptation only channel inversion and its variants Analysis of the high SNR pre log constants of the ergodic capacity reveals the existence of constant capacity difference gaps among the schemes with a pre log constant of 1 Closed form expressions for these high SNR capacity difference gaps are derived which are proportional to the SNR loss between these schemes in dB scale The largest one of these gaps is found to be between the optimal power and rate adaptation scheme and the channel inversion scheme Based on these expressions it is shown that the presence of space diversity or multi user diversity makes channel inversion arbitrarily close to achieving optimal capacity at high SNR with sufficiently large number of antennas or users A low SNR analysis also reveals that the presence of fading provably always improves capacity at sufficiently low SNR compared to the additive white Gaussian noise AWGN case Numerical results are shown to corroborate our analytical results This dissertation derives high SNR asymptotic average error rates over fading channels by relating them to the outage probability under mild assumptions The analysis is based on the Tauberian theorem for Laplace Stieltjes transforms which is grounded on the notion of regular variation and applies to a wider range of channel distributions than existing approaches The theory of regular variation is argued to be the proper mathematical framework for finding sufficient and necessary conditions for outage events to dominate high SNR error rate performance It is proved that the diversity order being d and the cumulative distribution function CDF of the channel power gain having variation exponent d at 0 imply each other provided that the instantaneous error rate is upper bounded by an exponential function of the instantaneous SNR High SNR asymptotic average error rates are derived for specific instantaneous error rates Compared to existing approaches in the literature the asymptotic expressions are related to the channel distribution in a much simpler manner herein and related with outage more intuitively The high SNR asymptotic error rate is also characterized under diversity combining schemes with the channel power gain of each branch having a regularly varying CDF Numerical results are shown to corroborate our theoretical analysis This dissertation studies several problems concerning channel inclusion which is a partial ordering

between discrete memoryless channels DMCs proposed by Shannon Specifically majorization based conditions are derived for channel inclusion between certain DMCs Furthermore under general conditions channel equivalence defined through Shannon ordering is shown to be the same as permutation of input and output symbols The determination of channel inclusion is considered as a convex optimization problem and the sparsity of the weights related to the representation of the worse DMC in terms of the better one is revealed when channel inclusion holds between two DMCs For the exploitation of this sparsity an effective iterative algorithm is established based on modifying the orthogonal matching pursuit algorithm The extension of channel inclusion to continuous channels and its application in ordering phase noises are briefly addressed

BTL Talks and Papers Bell Telephone Laboratories, inc. Technical Information Libraries, 1971 **Advanced Trends in**

Wireless Communications Mutamed Khatib, 2011-02-17 Physical limitations on wireless communication channels impose huge challenges to reliable communication Bandwidth limitations propagation loss noise and interference make the wireless channel a narrow pipe that does not readily accommodate rapid flow of data Thus researches aim to design systems that are suitable to operate in such channels in order to have high performance quality of service Also the mobility of the communication systems requires further investigations to reduce the complexity and the power consumption of the receiver This book aims to provide highlights of the current research in the field of wireless communications The subjects discussed are very valuable to communication researchers rather than researchers in the wireless related areas The book chapters cover a wide range of wireless communication topics 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

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