

Physical Principles of Wireless Communications

Second Edition



Victor L. Granatstein



CRC Press
Taylor & Francis Group

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TD Snyder



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Physical Principles of Wireless Communications, Second Edition Victor L. Granatstein, 2012-03-26 Updated and expanded Physical Principles of Wireless Communications Second Edition illustrates the relationship between scientific discoveries and their application to the invention and engineering of wireless communication systems The second edition of this popular textbook starts with a review of the relevant physical laws including Planck's Law of Blackbody Radiation Maxwell's equations and the laws of Special and General Relativity It describes sources of electromagnetic noise operation of antennas and antenna arrays propagation losses and satellite operation in sufficient detail to allow students to perform their own system designs and engineering calculations Illustrating the operation of the physical layer of wireless communication systems including cell phones communication satellites and wireless local area networks the text covers the basic equations of electromagnetism the principles of probability theory and the operation of antennas It explores the propagation of electromagnetic waves and describes the losses and interference effects that waves encounter as they propagate through cities inside buildings and to and from satellites orbiting the earth Important natural phenomena are also described including Cosmic Microwave Background Radiation ionospheric reflection and tropospheric refraction New in the Second Edition Descriptions of 3G and 4G cell phone systems Discussions on the relation between the basic laws of quantum and relativistic physics and the engineering of modern wireless communication systems A new section on Planck's Law of Blackbody Radiation Expanded discussions on general relativity and special relativity and their relevance to GPS system design An expanded chapter on antennas that includes wire loop antennas Expanded discussion of shadowing correlations and their effect on cell phone system design The text covers the physics of Geostationary Earth Orbiting satellites Medium Earth Orbiting satellites and Low Earth Orbiting satellites enabling students to evaluate and make first order designs of SATCOM systems It also reviews the principles of probability theory to help them accurately determine the margins that must be allowed to account for statistical variation in path loss The included problem sets and sample solutions provide students with the understanding of contemporary wireless systems needed to participate in the development of future systems Physical Principles of Wireless Communications Victor L. Granatstein, 2012-03-26 Updated and expanded Physical Principles of Wireless Communications Second Edition illustrates the relationship between scientific discoveries and their application to the invention and engineering of wireless communication systems The second edition of this popular textbook starts with a review of the relevant physical laws including Physical Principles of Wireless Communications, 2nd Edition Victor Granatstein, 2012 Updated and expanded Physical Principles of Wireless Communications Second Edition illustrates the relationship between scientific discoveries and their application to the invention and engineering of wireless communication systems The second edition of this popular textbook starts with a review of the relevant physical laws including *Physical Principles of Wireless Communications* Granatstein Victor L Staff, 2008-02-11 **Physical Principles of Wireless**

Communications Victor L. Granatstein, 2007-10-29 Wireless communications are based on the launching propagation and detection of electromagnetic waves emitted primarily at radio or microwave frequencies Their history can be traced back to the mid 19th century when James Clerk Maxwell formulated the basic laws of electromagnetism and Heinrich Hertz demonstrated the propagation of radio waves across his laboratory Recent engineering breakthroughs have led to wireless communication systems that have not only revolutionized modern lifestyles but have also launched new industries Based on the author's course in the physics of wireless communications Physical Principles of Wireless Communications provides students with a solid foundation in modern wireless communication systems It offers rigorous analyses of the devices and physical mechanisms that constitute the physical layers of these systems Starting with a review of Maxwell's equations the textbook details the operation of antennas and antenna arrays teaching students how to perform the necessary design calculations It also explores the propagation of electromagnetic waves leading to important descriptions of mean path loss The text also reviews the principles of probability theory enabling students to calculate the margins that must be allowed to account for statistical variation in path loss In addition it covers the physics of Geostationary Earth Orbiting GEO satellites and Low Earth Orbiting LEO satellites so students may evaluate and make first order designs of satellite communications SATCOM systems

Media Networks Hassnaa Moustafa, Sherali Zeadally, 2016-04-19 A rapidly growing number of services and applications along with a dramatic shift in users consumption models have made media networks an area of increasing importance Do you know all that you need to know Supplying you with a clear understanding of the technical and deployment challenges Media Networks Architectures Applications and Standard Wireless Communication Electronics Robert Sobot, 2012-02-21 This book is intended for senior undergraduate and graduate students as well as practicing engineers who are involved in design and analysis of radio frequency RF circuits Detailed tutorials are included on all major topics required to understand fundamental principles behind both the main sub circuits required to design an RF transceiver and the whole communication system Starting with review of fundamental principles in electromagnetic EM transmission and signal propagation through detailed practical analysis of RF amplifier mixer modulator demodulator and oscillator circuit topologies all the way to the system communication theory behind the RF transceiver operation this book systematically covers all relevant aspects in a way that is suitable for a single semester university level course The Physics and Mathematics of Electromagnetic Wave Propagation in Cellular Wireless Communication Tapan K. Sarkar, Magdalena Salazar Palma, Mohammad Najib Abdallah, 2018-05-31 An important resource that examines the physical aspects of wireless communications based on mathematical and physical evidence The Physics and Mathematics of Electromagnetic Wave Propagation in Cellular Wireless Communication describes the electromagnetic principles for designing a cellular wireless system and includes the subtle electromagnetic principles that are often overlooked in designing such a system This important text explores both the physics and mathematical concepts used in deploying antennas for transmission and

reception of electromagnetic signals and examines how to select the proper methodology from a wide range of scenarios In this much needed guide the authors noted experts in the field explore the principle of electromagnetics as developed through the Maxwellian principles and describe the properties of an antenna in the frequency domain The text also includes a review of the characterization of propagation path loss in a cellular wireless environment and examines ultrawideband antennas and the mechanisms of broadband transmission of both power and information This important resource Includes a discussion of the shortcomings of a MIMO system from both theoretical and practical aspects Demonstrates how to deploy base station antennas with better efficiency Validates the principle and the theoretical analysis of electromagnetic propagation in cellular wireless communication Contains results of experiments that are solidly grounded in mathematics and physics Written for engineers researchers and educators who are or plan to work in the field The Physics and Mathematics of Electromagnetic Wave Propagation in Cellular Wireless Communication offers an essential resource for understanding the principles underpinning wireless communications Military Communications in the Future Battlefield Marko Suojanen, 2018-07-31 Taking an applications oriented view this unique volume delivers a forward looking roadmap to military communications This hands on reference offers military and security technology practitioners insights into the key issues related to long term development within the battlefield communications area The book presents the technological alternatives for communication in the battlefield in unexpected situations and environments This authoritative resource discusses unstructured formations of actors using a holistic approach that considers key capability requirements Professionals and officers learn how to prepare for the unexpected and start building agile adaptive and cognitive systems that are needed in future operating environments From scenario based capability planning to situational and context awareness to unmanned ground and aerial platforms this easy to understand book covers the critical topics that practitioners need to master to achieve top performance in the battlefield Reducing Process Costs with Lean, Six Sigma, and Value Engineering Techniques Kim H. Pries, Jon M. Quigley, 2012-12-13 A company with effective cost reduction activities in place will be better positioned to adapt to shifting economic conditions In fact it can make the difference between organizations that thrive and those that simply survive during times of economic uncertainty Reducing Process Costs with Lean Six Sigma and Value Engineering Techniques covers

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