

Satellite Communications Principles Applications Principles And Applications

The field of fibre optics communications has exploded over the past two decades. Fibre is an integral part of modern day communication infrastructure and can be found along roads, in buildings, hospitals and machinery. Fibre optic communication has revolutionised the telecommunications industry. It has also made its presence widely felt within the data networking community as well. Using fibre optic cable, optical communications have enabled telecommunications links to be made over much greater distances and with much lower levels of loss in the transmission medium and possibly most important of all, fiber optical communications has enabled much higher data rates to be accommodated. Optical fibers can be used to transmit light and thus information over long distances. Fiber-based systems have largely replaced radio transmitter systems for long-haul optical data transmission. They are widely used for telephony, but also for Internet traffic, long high-speed local area networks (LANs), cable TV (CATV), and increasingly also for shorter distances within buildings. In most cases, silica fibers are used, except for very short distances, where plastic optical fibers can be advantageous. The basic components are light signal transmitter, the optical fiber, and the photo detecting receiver. The additional elements such as fiber and cable splicers and connectors, regenerators, beam splitters, and optical amplifiers are employed to improve the performance of the communication system. The book offers a completely up-to-date, accessible, and in-depth introduction to the principles and applications of optical fiber communications. It describes the recent developments in optical fiber communication materials, devices, components, and systems.

This book presents the principal structure of space systems, functionality, media and applications for modern remote sensing, transmission systems, meteorological antennas, propagation meteorological observation and transferring weather data from satellite to the ground infrastructures and users. The book starts with a short background to the development of Radio and Space systems including overview, concepts and applications of satellite communications in function of transfer meteorological observation data and images. It goes on to discuss the fundamental principles of the space platforms and orbital parameters, laws of satellite motions, new types of launching systems, satellite orbits and geometric relations, spacecraft configuration, payload structure, type of onboard antenna systems, satellite orbits and components of satellite bus. The author also provides comprehensive coverage of baseband and transmission systems, fundamentals of atmospheric electromagnetic radiation, satellite meteorological parameters and instruments, and research and applications in antenna systems and propagation. This is a companion book of Global Satellite Meteorological Observation Applications (Springer).

Satellites are increasingly used for global communications, as well as for radio and television transmissions. With the growth of mobile communications, and of digital technology, the use of satellite systems is set to expand substantially and already all students of electronics or communications engineering must study the subject. This book steers a middle path between offering a basic understanding of the process of communication by satellite and the methodology used; and the extensive mathematical analysis normally adopted in similar texts. It presents the basic concepts, using as much mathematical content as is necessary to make the process understandable. The principles introduced are backed up by examples of actual applications showing how professional systems engineers have achieved the required system performance capabilities. The practical systems chosen are representative of modern day applications and comprise an international communications system, an international maritime system and a regional system.

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Mobile Communications Library.

This is the first book to cover the Global Marine Distress and Safety System (GDMSS) in a comprehensive and readable way. GDMSS is now being developed to provide a new global communications and locating network to alert search and rescue services, and all students of navigation or maritime technology, and practising navigation officers, will need to be trained in its use. This accessible reference textbook provides students and new radio operators with all the knowledge necessary for a complete understanding of GMDSS and its related systems.

For those seeking a thorough grounding in modern communication engineering principles delivered with unrivaled clarity using an engineering-first approach *Communication Engineering Principles: 2nd Edition* provides readers with comprehensive background information and instruction in the rapidly expanding and growing field of communication engineering. This book is well-suited as a textbook in any of the following courses of study: Telecommunication Mobile Communication Satellite Communication Optical Communication Electronics Computer Systems Primarily designed as a textbook for undergraduate programs, *Communication Engineering Principles: 2nd Edition* can also be highly valuable in a variety of MSc programs. *Communication Engineering Principles* grounds its readers in the core concepts and theory required for an in-depth understanding of the subject. It also covers many of the modern, practical techniques used in the field. Along with an overview of communication systems, the book covers topics like time and frequency domains analysis of signals and systems, transmission media, noise in communication systems, analogue and digital modulation, pulse shaping and detection, and many others. This book provides a concise but lucid explanation of the fundamentals of spread-spectrum systems with an emphasis on theoretical principles. Throughout the book, learning is facilitated by many new or streamlined derivations of the classical theory. Problems at the end of each chapter are intended to assist readers in consolidating their knowledge and to provide practice in analytical techniques. The choice of specific topics is tempered by the author's judgment of their practical significance and interest to both researchers and system designers. The evolution of spread spectrum communication systems and the prominence of new mathematical methods in their design provided the motivation to undertake this new edition of the book. This edition is intended to enable readers to understand the current state-of-the-art in this field. More than 20 percent of the material in this edition is new, including a chapter on systems with iterative channel estimation, and the remainder of the material has been thoroughly revised.

Fully updated edition of the comprehensive, single-source reference on satellite technology and its applications Covering both the technology and its applications, *Satellite Technology* is a concise reference on satellites for commercial, scientific and military purposes. The book explains satellite technology fully, beginning by offering an introduction to the fundamentals, before covering orbits and trajectories, launch and in-orbit operations, hardware, communication techniques, multiple access techniques, and link design fundamentals. This new edition also includes comprehensive chapters on *Satellite Networks* and *Satellite Technology – Emerging Trends*. Providing a complete survey of applications, from remote sensing and military uses, to navigational and scientific applications, the authors also present an inclusive compendium on satellites and satellite launch vehicles. Filled with diagrams and illustrations, this book serves as an ideal introduction for those new to the topic, as well as a reference point for professionals. Fully updated edition of the comprehensive, single-source reference on satellite technology and its applications - remote sensing, weather, navigation, scientific, and military - including new chapters on *Satellite Networks* and *Satellite Technology – Emerging Trends* Covers the full range of satellite applications in remote sensing, meteorology, the military, navigation and science, and communications, including satellite-to-under sea communication, satellite cell-phones, and global

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Xpress system of INMARSAT The cross-disciplinary coverage makes the book an essential reference book for professionals, R&D scientists and students at post graduate level Companion website provides a complete compendium on satellites and satellite launch vehicles An ideal introduction for Professionals and R&D scientists in the field. Engineering Students. Cross disciplinary information for engineers and technical managers.

Spread spectrum and CDMA are cutting-edge technologies widely used in operational radar, navigation and telecommunication systems and play a pivotal role in the development of the forthcoming generations of systems and networks. This comprehensive resource presents the spread spectrum concept as a product of the advancements in wireless IT, shows how and when the classical problems of signal transmission/processing stimulate the application of spread spectrum, and clarifies the advantages of spread spectrum philosophy. Detailed coverage is provided of the tools and instruments for designing spread spectrum and CDMA signals answering why a designer will prefer one solution over another. The approach adopted is wide-ranging, covering issues that apply to both data transmission and data collection systems such as telecommunications, radar, and navigation. Presents a theory-based analysis complemented by practical examples and real world case studies resulting in a self-sufficient treatment of the subject Contains detailed discussions of new trends in spread spectrum technology such as multi-user reception, multicarrier modulation, OFDM, MIMO and space-time coding Provides advice on designing discrete spread spectrum signals and signal sets for time-frequency measuring, synchronization and multi-user communications Features numerous Matlab-based problems and other exercises to encourage the reader to initiate independent investigations and simulations This valuable text provides timely guidance on the current status and future potential of spread spectrum and CDMA and is an invaluable resource for senior undergraduates and postgraduate students, lecturers and practising engineers and researchers involved in the deployment and development of spread spectrum and CDMA technology. Supported by a Companion website on which instructors and lecturers can find a solutions manual for the problems and Matlab programming, electronic versions of some of the figures and other useful resources such as a list of abbreviations.

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.

Offering readers a concise and yet comprehensive reference, Satellite Technology provides a unique coverage of both the principles and applications in this wide field. This book covers the technological and application aspects of satellites in one volume, ensuring not only extensive coverage of communications-related applications of satellites, but also other important applications such as remote sensing, weather forecasting, navigation, scientific and military. The essentials of satellite technology are explained, by giving an introduction to the fundamental topics such as orbits and trajectories, launch and in-orbit operations before going on to describe satellite hardware, communication techniques, multiple access techniques and link design. Topics range from the history and evolution of satellites, and the laws governing motion of artificial satellites around earth, to multiplexing techniques, satellite subsystems and link design fundamentals. Amply illustrated with a large number of figures and photographs, as well as relevant mathematics and design examples Contains a large number of problems with solutions, which would particularly benefit students at undergraduate and graduate levels Companion website provides a

complete compendium on features and facilities of satellites and satellite launch vehicles from past, present and planned futuristic satellite missions for various applications. The coverage of satellite technology together with its applications make the book an essential reference book for professionals, R&D scientists and engineers and students at undergraduate and postgraduate level.

Satellite Communications and Navigation Systems publishes the proceedings of the 2006 Tyrrhenian International Workshop on Digital Communications. The book focuses on the integration of communication and navigation systems in satellites.

A comprehensive, single-source reference on satellite technology and its applications, *Satellite Technology: Principles and Applications, Second Edition* includes the latest developments on the topic. Covering the features and facilities of satellites and satellite launch vehicles, with an emphasis on the fundamental principles and concepts, the authors provide readers with a complete understanding of the technology. This book explains the past, present and future satellite missions, as well as non-communication related applications. Coverage ranges from remote sensing and navigational uses to meteorological and military areas. This second edition contains an additional chapter on earth station design and gives extensive focus to space based weapon systems, satellite interference and future trends in satellite technology. Extra information has also been provided on all of the first edition's topics to enhance the existing coverage. Fully updated new edition with latest technological developments. Covers the full range of important applications such as remote sensing, weather forecasting, navigational, scientific and military applications. Amply illustrated with figures and photographs, this book also contains problems with solutions, which is of benefit to students at undergraduate and graduate levels. An indispensable book for professionals and students in the field of satellite technology. Companion website provides a complete and updated compendium on satellites and satellite launch vehicles.

This book discusses current theory regarding global mobile satellite communications (GMSC) for maritime, land (road and rail), and aeronautical applications. It covers how these can enable connections between moving objects such as ships, road and rail vehicles and aircrafts on one hand, and on the other ground telecommunications subscribers through the medium of communications satellites, ground earth stations, Terrestrial Telecommunication Networks (TTN), Internet Service Providers (ISP) and other wireless and landline telecommunications providers. This new edition covers new developments and initiatives that have resulted in land and aeronautical applications and the introduction of new satellite constellations in non-geostationary orbits and projects of new hybrid satellite constellations. The book presents current GMSC trends, mobile system concepts and network architecture using a simple mode of style with understandable technical information, characteristics, graphics, illustrations and mathematics equations. The first edition of *Global Mobile Satellite Communications* (Springer, 2005) was split into two books for the second edition—one on applications and one on theory. This book presents global mobile satellite communications theory.

Optical and wireless technologies are being introduced into the global communications infrastructure at an astonishing pace. Both are revolutionizing the industry and will undoubtedly dominate its future, yet in the crowded curricula in most electrical engineering programs, there is no room in typical data communications courses for proper coverage of these "next generation" technologies. *Optical and Wireless Communications: Next Generation Networks* covers both types of networks in a unique presentation designed for a one-semester course for senior undergraduate or graduate engineering students. Part I: *Optical Networks* covers optical fibers, transmitters, receivers, multiplexers, amplifiers, and specific

networks, including FDDI, SONET, fiber channel, and wavelength-routed networks. Part II: Wireless Networks examines fundamental concepts and specific wireless networks, such as LAN, ATM, wireless local loop, and wireless PBXs. This section also explores cellular technologies and satellite communications. Eventually, next generation networks will be as ubiquitous as traditional telephone networks, and today's engineering students must be prepared to meet the challenges of optical and wireless systems development and deployment. Filled with illustrations, examples, and end-of-chapter problems, *Optical and Wireless Communications: Next Generation Networks* provides a brief but comprehensive introduction to these technologies that will help future engineers build the foundation they need for success.

A quantitative yet accessible introduction to remote sensing techniques, this new edition covers a broad spectrum of Earth science applications.

This book provides up to date coverage of the basics of ATM and internet protocols, and characteristics of satellite networks and internetworking between satellite and terrestrial networks *Satellite Networking: Principles and Protocols, Second Edition* provides up to date information of the original topics in satellite networking and protocols focusing on Internet Protocols (IP) over satellites, broadband over satellites, next generation IP (IPv6) over satellites, new generation of DVB-S/S2 and DVB-RCS next generations and new services and applications. It also includes some analytical techniques for evaluation of end to end IP performance and QoS over satellite, reflecting the recent convergence of telecommunication, Internet, broadcasting and mobile networks. Topics new to this edition: Internetworking with MANET, DVB-S/S2 and DVB-RCS/RCS2 (including TCP/IP over DVB-S/RCS), recent developments in broadband satellite systems, convergence of services and network technologies (including Internet, telecom, mobile, TV, etc.), radio resource management, PEP, I-PEP, SCPS, traffic modelling and engineering with analysis and examples, and future developments of satellite networking. Provides up to date coverage of the basics of ATM and internet protocols, and characteristics of satellite networks and internetworking between satellite and terrestrial networks (e.g. mobile ad hoc networks), including coverage of new services and applications (e.g. Internet, telecom, mobile and TV) Discusses the real-time protocols including RTP, RTCP and SIP for real-time applications such as VoIP and MMC, and explains TCP/IP over satellite and evolution of IPv6 over satellite and beyond

The important and fascinating topics of radar enjoy an extensive audience in industry and government but deserve more attention in undergraduate education to better prepare graduating engineers to meet the demands of modern mankind. Radar is not only one of the major applications of electronics and electromagnetic communications, but it is also a mature scientific discipline with significant theoretical and mathematical foundations that warrant an intellectual and educational challenge. *Fundamental Principles of Radar* is a textbook providing a first exposure to radar principles. It provides a

broad concept underlying the basic principle of operations of most existing radar systems and maintains a good balance of mathematical rigor to convince readers without losing interest. The book provides an extensive exposition of the techniques currently being used for radar system design, analysis, and evaluation. It presents a comprehensive set of radar principles, including all features of modern radar applications, with their underlying derivations using simple mathematics. Coverage is limited to the main concepts of radar in order to present them in a systematic and organized fashion. Topics are treated not as abstruse and esoteric to the point of incomprehensibility, but the very complex and rich technology of radar is distilled into its fundamentals. The author's emphasis is on clarity without sacrificing rigor and completeness, thus making the book broad enough to satisfy a variety of backgrounds and interests. Thorough documentation provides an unusual degree of completeness for a textbook at this level, with interesting and sometimes thought-provoking content to make the subject even more appealing. Key Features: Covers a wide range of topics in radar systems Includes examples and exercises to reinforce the concepts presented and explain their applications Provides self-contained chapters useful for readers seeking selective topics Provides broad concepts underlying the basic principles of operations of most types of radars in use today Includes documentation to lead to further reading of interesting concepts and applications

Contains a compendium of the most frequently used data in day-to-day telecommunications engineering work: tables, graphs, figures, formulae, nomograms, performance curves, standards highlights, constants and statistics. Designed for easy and rapid access. Comprehensive reference for designing, building, purchasing, using or maintaining all kinds of telecommunications systems. Central source of information on transmission, switching, traffic engineering, numbering, signaling, noise, modulation and forward error correction.

Originally adopted in military networks as a means of ensuring secure communication when confronted with the threats of jamming and interception, spread-spectrum systems are now the core of commercial applications such as mobile cellular and satellite communication. This book provides a concise but lucid explanation and derivation of the fundamentals of spread-spectrum communication systems. The level of presentation is suitable for graduate students with a prior graduate-level course in digital communication and for practicing engineers with a solid background in the theory of digital communication. As the title indicates, the author focuses on principles rather than specific current or planned systems. Although the exposition emphasizes theoretical principles, the choice of specific topics is tempered by their practical significance and interest to both researchers and system designers. Throughout the book, learning is facilitated by many new or streamlined derivations of the classical theory. Problems at the end of each chapter are intended to assist readers in consolidating their knowledge and to provide practice in analytical techniques. Principles of Spread-

Spectrum Communication Systems is largely self-contained mathematically because of the four appendices, which give detailed derivations of mathematical results used in the main text.

This reader-friendly resource covers the broad spectrum of satellite principles and their associated technologies. While other books limit their coverage to specialized services or to satellite payloads such as communication satellites, Satellite Systems focuses upon the methodology of launching satellites, keeping them there, the environments under which they operate, and other facets particular to their operation. Pattan's detailed, elaborate approach does not assume that the reader is versed in esoteric mathematics. Satellite Systems is specific enough to be a valuable working-tool to scientists and engineers in related fields, yet general enough to be accessible to students and interested lay people. Pattan thoroughly explores the concepts and technologies of satellite systems in simple, direct terms. Satellite Systems includes precise coverage of: *various orbits and the services they provide *international launch of vehicles and launch sites *phased array antennas for satellite network applications *mobile satellite services from land vehicles, aircraft, and ships *low orbit satellites for telecommunication and position determination applications *international frequency allocations for satellite control, payload management, and status *geometric relationships between satellite and Earth stations used in interference analysis, orbit determination, and location *the hostile environments in which satellites operate and cope *and much more Satellite Systems is a self-contained, extensive introduction that offers professionals and advanced undergraduate and graduate students of satellite systems the tools they need for in-depth understanding of the complexities of the subject. It is ideal as both a reference and a training text for engineers, technicians, communication lawyers, weather professionals, telecommunications experts, students, and anyone interested insatellites and satellite technology.

Antennas represent a critical technology in any of these wireless systems. Not only do they directly affect the received power of the system, they are also typically the largest and most visible part. Recently, the need for low-cost, low-profile, and lightweight antenna in the frequency range of the microwave/millimeter wave/THz band has regained momentum. "Basic Principles of Fresnel Antenna Arrays" provides us with the basics of the various Fresnel Antenna approaches, in order to achieve low-cost, low-profile, and lightweight antenna in the microwave/millimeter wave band. A potential solution of the antenna problem lies in using lens technology in an array. The Fresnel zone plate lens (FZPL) antenna is in particular an interesting candidate for the array element. The limiting focusing properties of FZPL including subwave length focus are described in detail. The book further presents a novel hexagonal FZPL antenna which can be more effectively packed in an array due to its shape. Before considering the hexagonal FZPL antenna in an array, the authors investigate two ideas, described as methods to potentially improve the radiation characteristics. The first idea is to change the reference phase of the Fresnel zone radii - a novel free parameter in the

usual design of zone plate's lenses and antennas. To further improve the radiation characteristics of the hexagonal FZPL antenna, a technique involving Fresnel zone rotation is investigated. The book is of interest for designers of optical systems because, taking scaling effects into account, the characteristics of diffractive quasi-optical elements are valid for diffractive focusing elements of integrated optics.

The book covers all the fundamentals of satellites, ground control systems, and earth stations, considering the design and operation of each major segment. You gain a practical understanding of the basic construction and usage of commercial satellite networks. How parts of a satellite system function, how various components interact, which role each component plays, and which factors are the most critical to success."

Sections on important areas such as spread spectrum, cellular communications, and orthogonal frequency-division multiplexing are provided. * Computational examples are included, illustrating how to use the computer as a simulation tool, thereby allowing waveforms, spectra, and performance curves to be generated. * Overviews of the necessary background in signal, system, probability, and random process theory required for the analog and digital communications topics covered in the book.

Provides a systematic overview of a hot research area, examining the principles and theories of energy harvesting communications. This book provides a detailed and advanced level introduction to the fundamentals of energy harvesting techniques and their use in state-of-the-art communications systems. It fills the gap in the market by covering both basic techniques in energy harvesting and advanced topics in wireless communications. More importantly, it discusses the application of energy harvesting in communications systems to give readers at different levels a full understanding of these most recent advances in communications technologies. The first half of *Energy Harvesting Communications: Principles and Theories* focuses on the challenges brought by energy harvesting in communications. The second part of the book looks at different communications applications enhanced by energy harvesting. It offers in-depth chapters that: discuss different energy sources harvested for communications; examine the energy harvesters used for widely used sources; study the physical layer and upper layer of the energy harvesting communications device; and investigate wireless powered communications, energy harvesting cognitive radios, and energy harvesting relaying as applications. Methodically examines the state-of-the-art of energy harvesting techniques. Provides comprehensive coverage from basic energy harvesting sources and devices to the end users of these sources and devices. Looks at the fundamental principles of energy harvesting communications, and biomedical application and intra-body communications. Written in a linear order so that beginners can learn the subject and experienced users can attain a broader view. Written by a renowned expert in the field, *Energy Harvesting Communications: Principles and Theories* is an excellent resource for students, researchers, and others interested in the subject.

Satellite Communications Principles and Applications Butterworth-Heinemann

The first four chapters of the text describe different types of signals, modulation and demodulation of these signals, various transmission channels and noise encountered by the signals during propagation from sender to receiver end. Apart from this, this

part of the book also deals with different forms of line communication systems. A brief introduction of information theory is also given at the end of the text so that the students become familiar with this aspect of communication systems.

The renowned communications theorist Robert Gallager brings his lucid writing style to the study of the fundamental system aspects of digital communication for a one-semester course for graduate students. With the clarity and insight that have characterized his teaching and earlier textbooks, he develops a simple framework and then combines this with careful proofs to help the reader understand modern systems and simplified models in an intuitive yet precise way. A strong narrative and links between theory and practice reinforce this concise, practical presentation. The book begins with data compression for arbitrary sources. Gallager then describes how to modulate the resulting binary data for transmission over wires, cables, optical fibers, and wireless channels. Analysis and intuitive interpretations are developed for channel noise models, followed by coverage of the principles of detection, coding, and decoding. The various concepts covered are brought together in a description of wireless communication, using CDMA as a case study.

Seminar paper from the year 2006 in the subject Engineering - Communication Technology, grade: 2,0, Reutlingen University, 12 entries in the bibliography, language: English, abstract: Without satellites our life would be considerably different. Thus, the goal of this paper is to present this great invention of XX age, which enabled the society to speed - up the communication even more than before and opened the door to many new discoveries. The main focus is going to be concentrated on communication satellites and their main working principles as they are a part of nowadays used means of advanced communication. Firstly, the basic facts of satellites, including history, definition, types of satellites, their orbits and advantages as well as disadvantages, will be presented. Afterwards, the main functioning principles of communication satellites will be described in order to introduce the most important aspects, how the messages are transmitted. Finally, the application spheres of communication satellites will be listed and described more in detail.

This book is intended for the undergraduate students of electrical and electronics engineering, electronics and communication engineering, and electronics and instrumentation engineering of various universities and state boards of technical education. In the entire book the approach in explaining a concept has been to take the reader from known to unknown and from simple to complex. Care has been taken to make the presentation student-friendly by showing step-by-step procedures wherever necessary to hold the reader's attention throughout the book. The book has been developed on the basis of author's long experience of teaching technical students as well as training technical professionals. Both the students, and the teachers will find this book useful and interesting to read. Key features

- Exclusive coverage of the syllabus prescribed for the undergraduate students of engineering.
- In-depth presentation of all key topics.
- Sufficient worked-out examples to support and reinforce concepts.
- Pedagogical features such as chapter wise key points to recall concepts and exercises as well as numerical problems with answers for practice.

"This book provides relevant theoretical frameworks covering the latest empirical research findings in the area of grid computing, with a critical perspective bridging the gap between academia and the latest achievements of the computer industry"--Provided by

publisher.

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.

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