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LTE Cellular Narrowband Internet of Things (NB-IoT) - Hossam Fattah 2021-04-28
NB-IoT is the Internet of Things (IoT) technology used for cellular communication. NB-IoT devices deliver much better capability and performance, such as: increased area coverage of up to one kilometer; a massive number of devices—up to 200,000—per a single base-station area; longer battery lifetime of ten years; and better indoor and outdoor coverage for areas with weak signal, such as underground garages. The cellular NB-IoT technology is a challenging technology to use and understand. With more than 30 projects presented in this book, covering many use cases and scenarios, this book provides hands-on and practical experience of how to use the cellular NB-IoT for smart applications using ArduinoTM, Amazon Cloud, Google Maps, and charts. The book starts by explaining AT commands used to configure the NB-IoT modem; data serialization and deserialization; how to set up the cloud for connecting NB-IoT devices; setting up rules, policy, security certificates, and a NoSQL database on the cloud; how to store and read data in the cloud; how to use Google Maps to visualize NB-IoT device geo-location; and how to use charts to visualize sensor datasets. Projects for Arduino are presented in four parts. The first part explains how to connect the device to the mobile operator and cellular network; perform communication using different network protocols, such as TCP, HTTP, SSL, or MQTT; how to use GPS for geo-location applications; and how to upgrade NB-IoT modem firmware over the air. The second part explains the microcontroller unit and how to build and run projects, such as a 7-segment display or a real-time clock. The third part explains how NB-IoT can be used with sensor devices, such as ultrasonic and environmental sensors. Finally, the fourth part explains how NB-IoT can be used to control actuators, such as stepper motors and relays. This book is a unique resource for understanding practical uses of the NB-IoT technology and serves as a handbook for technical and non-technical readers who are looking for practicing and exercising the cellular NB-IoT technology. The book can be used by engineers, students, researchers, system integrators, mobile operators' technical staff, and electronics enthusiasts. To download the software which can be used with the book, go to: https://github.com/5ghub/NB-IoT About the Author: Hossam Fattah is a technology expert in 4G/5G wireless systems and networking. He received his Ph.D. in Electrical and Computer Engineering from University of British Columbia, Vancouver, Canada in 2003. He received his Master of Applied Science in Electrical and Computer Engineering from University of Victoria, Victoria, Canada in 2000. He completed his B.Sc. degree in Computers and Systems Engineering from Al-Azhar

University, Cairo, Egypt in 1995. Between 2003 and 2011, he was in academia and industry, including Texas A&M University. Between 2011 and 2013, he was with Spirent Communications, NJ, USA. Since 2013, he has been with Microsoft, USA. He is also an affiliate associate professor at University of Washington, Tacoma, WA, USA, teaching graduate courses on IoT and distributed systems and collaborating on 5G research and innovations. He has had many patents and technical publications in conferences and journals. He is a registered professional Engineer with the Association of Professional Engineers, British Columbia, Canada. He is the author of the recent book 5G LTE Narrowband Internet of Things (NB-IoT). His research interest is in wireless communications and radio networks and protocols, cellular quality of service, radio resource management, traffic and packet scheduling, network analytics, and mobility.

The IoT Architect's Guide to Attainable Security and Privacy - Damilare D. Fagbemi 2019-10-08
This book describes how to architect and design Internet of Things (loT) solutions that provide end-to-end security and privacy at scale. It is unique in its detailed coverage of threat analysis, protocol analysis, secure design principles, intelligent loT's impact on privacy, and the effect of usability on security. The book also unveils the impact of digital currency and the dark web on the loT-security economy. It's both informative and entertaining. "Filled with practical and relevant examples based on years of experience ... with lively discussions and storytelling related to loT security design flaws and architectural issues."— Dr. James F. Ransome, Senior Director of Security Development Lifecycle (SOL) Engineering, Intel 'There is an absolute treasure trove of information within this book that will benefit anyone, not just the engineering community. This book has earned a permanent spot on my office bookshelf."— Erv Comer, Fellow of Engineering, Office of Chief Architect Zebra Technologies 'The importance of this work goes well beyond the engineer and architect. The IoT Architect's Guide to Attainable Security & Privacy is a crucial resource for every executive who delivers connected products to the market or uses connected products to run their business."— Kurt Lee, VP Sales and Strategic Alliances at PWNIE Express "If we collectively fail to follow the advice described here regarding loT security and Privacy, we will continue to add to our mounting pile of exploitable computing devices. The attackers are having a field day. Read this book, now."— Brook S.E. Schoenfield, Director of Advisory Services at IOActive, previously Master Security Architect at McAfee, and author of Securing Systems

Wireless and Satellite Systems - Min Jia 2019-05-06
This two-volume set LNICST 280-281 constitutes the post-conference proceedings of the 10th EAI International Conference on Wireless and Satellite Services, WiSATS 2019, held in Harbin, China, in January 2019. The conference was formerly known as the International Conference on Personal Satellite Services (PSATS) mainly covering topics in the satellite domain. The 137 full papers were carefully reviewed and selected from 289 submissions. The papers are organized in topical sections on machine learning for satellite-terrestrial networks, human-machine interactive sensing, monitoring, and communications, integrated space and onboard networks, intelligent signal processing, wireless communications and networks, vehicular communications and networks, intelligent 5G communication and digital image processing technology, security, reliability and resilience in internet of things, advances in communications and computing for internet of things.

Logistics 4.0 - Turan Paksoy 2020-12-18
Industrial revolutions have impacted both, manufacturing and service. From the steam engine to digital automated production, the industrial revolutions have conduced significant changes in operations and supply chain management (SCM) processes. Swift changes in manufacturing and service systems have led to phenomenal improvements in productivity. The fast-paced environment brings new challenges and opportunities for the companies that are associated with the adaptation to the new concepts such as Internet of Things (IoT) and Cyber Physical Systems, artificial intelligence (AI), robotics, cyber security, data analytics, block chain and cloud technology. These emerging technologies facilitated and expedited the birth of Logistics 4.0.

Industrial Revolution 4.0 initiatives in SCM has attracted stakeholders' attentions due to it is ability to empower using a set of technologies together that helps to execute more efficient production and distribution systems. This initiative has been called Logistics 4.0 of the fourth Industrial Revolution in SCM due to its high potential. Connecting entities, machines, physical items and enterprise resources to each other by using sensors, devices and the internet along the supply chains are the main attributes of Logistics 4.0. IoT enables customers to make more suitable and valuable decisions due to the data-driven structure of the Industry 4.0 paradigm. Besides that, the system's ability of gathering and analyzing information about the environment at any given time and adapting itself to the rapid changes add significant value to the SCM processes. In this peer-reviewed book, experts from all over the world, in the field present a conceptual framework for Logistics 4.0 and provide examples for usage of Industry 4.0 tools in SCM. This book is a work that will be beneficial for both practitioners and students and academicians, as it covers the theoretical framework, on the one hand, and includes examples of practice and real world.

Internet of Things - Bharat Bhusan 2022-04-29
Today, Internet of Things (IoT) is ubiquitous as it is applied in practice in everything from Industrial Control Systems (ICS) to e-Health, e-commerce, Cyber Physical Systems (CPS), smart cities, smart parking, healthcare, supply chain management and many more. Numerous industries, academics, alliances and standardization organizations make an effort on IoT standardization, innovation and development. But there is still a need for a comprehensive framework with integrated standards under one IoT vision. Furthermore, the existing IoT systems are vulnerable to huge range of malicious attacks owing to the massive numbers of deployed IoT systems, inadequate data security standards and the resource-constrained nature. Existing security solutions are insufficient and therefore it is necessary to enable the IoT devices to dynamically counter the threats and save the system. Apart from illustrating the diversified IoT applications, this book also addresses the issue of data safekeeping along with the development of new security-enhancing schemes such as blockchain, as well as a range of other advances in IoT. The reader will discover that the IoT facilitates a multidisciplinary approach dedicated to create novel applications and develop integrated solutions to build a sustainable society. The innovative and fresh advances that demonstrate IoT and computational intelligence in practice are discussed in this book, which will be helpful and informative for scientists, research scholars, academicians, policymakers, industry professionals, government organizations and others. This book is intended for a broad target audience, including scholars of various generations and disciplines, recognized scholars (lecturers and professors) and young researchers (postgraduate and undergraduates) who study the legal and socio-economic consequences of the emergence and dissemination of digital technologies such as IoT. Furthermore, the book is intended for researchers, developers and operators working in the field of IoT and eager to comprehend the vulnerability of the IoT paradigm. The book will serve as a comprehensive guide for the advanced-level students in computer science who are interested in understanding the severity and implications of the accompanied security issues in IoT. Dr. Bharat Bhushan is an Assistant Professor of Department of Computer Science and Engineering (CSE) at School of Engineering and Technology, Sharda University, Greater Noida, India. Prof. (Dr.) Sudhir Kumar Sharma is currently a Professor and Head of the Department of Computer Science, Institute of Information Technology & Management affiliated to GGSIPU, New Delhi, India. Prof. (Dr.) Bhuvan Unhelkar (BE, MDBA, MSc, PhD; FACS; PSM-I, CBAP®) is an accomplished IT professional and Professor of IT at the University of South Florida, Sarasota-Manatee (Lead Faculty). Dr. Muhammad Fazal Ijaz is working as an Assistant Professor in Department of Intelligent Mechatronics Engineering, Sejong University, Seoul, Korea. Prof. (Dr.) Lamia Karim is a professor of computer science at the National School of Applied Sciences Berrechid (ENSAB), Hassan 1st University.

The Internet of Things - Pethuru Raj 2017-02-24
As more and more devices become interconnected through the Internet

of Things (IoT), there is an even greater need for this book, which explains the technology, the internetworking, and applications that are making IoT an everyday reality. The book begins with a discussion of IoT "ecosystems" and the technology that enables them, which includes: Wireless Infrastructure and Service Discovery Protocols Integration Technologies and Tools Application and Analytics Enablement Platforms A chapter on next-generation cloud infrastructure explains hosting IoT platforms and applications. A chapter on data analytics throws light on IoT data collection, storage, translation, real-time processing, mining, and analysis, all of which can yield actionable insights from the data collected by IoT applications. There is also a chapter on edge/fog computing. The second half of the book presents various IoT ecosystem use cases. One chapter discusses smart airports and highlights the role of IoT integration. It explains how mobile devices, mobile technology, wearables, RFID sensors, and beacons work together as the core technologies of a smart airport. Integrating these components into the airport ecosystem is examined in detail, and use cases and real-life examples illustrate this IoT ecosystem in operation. Another in-depth look is on envisioning smart healthcare systems in a connected world. This chapter focuses on the requirements, promising applications, and roles of cloud computing and data analytics. The book also examines smart homes, smart cities, and smart governments. The book concludes with a chapter on IoT security and privacy. This chapter examines the emerging security and privacy requirements of IoT environments. The security issues and an assortment of surmounting techniques and best practices are also discussed in this chapter.

Inventing the Cloud Century - Marcus Oppitz 2017-08-03
This book combines the three dimensions of technology, society and economy to explore the advent of today's cloud ecosystems as successors to older service ecosystems based on networks. Further, it describes the shifting of services to the cloud as a long-term trend that is still progressing rapidly. The book adopts a comprehensive perspective on the key success factors for the technology – compelling business models and ecosystems including private, public and national organizations. The authors explore the evolution of service ecosystems, describe the similarities and differences, and analyze the way they have created and changed industries. Lastly, based on the current status of cloud computing and related technologies like virtualization, the internet of things, fog computing, big data and analytics, cognitive computing and blockchain, the authors provide a revealing outlook on the possibilities of future technologies, the future of the internet, and the potential impacts on business and society.

Research Anthology on Developing and Optimizing 5G Networks and the Impact on Society - Management Association, Information Resources 2020-11-27
As technology advances, the emergence of 5G has become an essential discussion moving forward as its applications and benefits are expected to enhance many areas of life. The introduction of 5G technology to society will improve communication speed, the efficiency of information transfer, and end-user experience to name only a few of many future improvements. These new opportunities offered by 5G networks will spread across industry, government, business, and personal user experiences leading to widespread innovation and technological advancement. What stands at the very core of 5G becoming an integral part of society is the very fact that it is expected to enrich society in a multifaceted way, enhancing connectivity and efficiency in just about every sector including healthcare, agriculture, business, and more. Therefore, it has been a critical topic of research to explore the implications of this technology, how it functions, what industries it will impact, and the challenges and solutions of its implementation into modern society. Research Anthology on Developing and Optimizing 5G Networks and the Impact on Society is a critical reference source that analyzes the use of 5G technology from the standpoint of its design and technological development to its applications in a multitude of industries. This overall view of the aspects of 5G networks creates a comprehensive book for all stages of the implementation of 5G, from early conception to application in various sectors. Topics highlighted include smart cities, wireless and mobile networks, radio access technology, internet of

things, and more. This all-encompassing book is ideal for network experts, IT specialists, technologists, academicians, researchers, and students.

eIoT - Steffi O. Muhanji 2019-02-20
This open access book explores the collision between the sustainable energy transition and the Internet of Things (IoT). In that regard, this book's arrival is timely. Not only is the Internet of Things for energy applications, herein called the energy Internet of Things (eIoT), rapidly developing but also the transition towards sustainable energy to abate global climate is very much at the forefront of public discourse. It is within the context of these two dynamic thrusts, digitization and global climate change, that the energy industry sees itself undergoing significant change in how it is operated and managed. This book recognizes that they impose five fundamental energy management change drivers: 1.) the growing demand for electricity, 2.) the emergence of renewable energy resources, 3.) the emergence of electrified transportation, 4.) the deregulation of electric power markets, 5.) and innovations in smart grid technology. Together, they challenge many of the assumptions upon which the electric grid was first built. The goal of this book is to provide a single integrated picture of how eIoT can come to transform our energy infrastructure. This book links the energy management change drivers mentioned above to the need for a technical energy management solution. It, then, describes how eIoT meets many of the criteria required for such a technical solution. In that regard, the book stresses the ability of eIoT to add sensing, decision-making, and actuation capabilities to millions or perhaps even billions of interacting "smart" devices. With such a large scale transformation composed of so many independent actions, the book also organizes the discussion into a single multi-layer energy management control loop structure. Consequently, much attention is given to not just network-enabled physical devices but also communication networks, distributed control & decision making, and finally technical architectures and standards. Having gone into the detail of these many simultaneously developing technologies, the book returns to how these technologies when integrated form new applications for transactive energy. In that regard, it highlights several eIoT-enabled energy management use cases that fundamentally change the relationship between end users, utilities, and grid operators. Consequently, the book discusses some of the emerging applications for utilities, industry, commerce, and residences. The book concludes that these eIoT applications will transform today's grid into one that is much more responsive, dynamic, adaptive and flexible. It also concludes that this transformation will bring about new challenges and opportunities for the cyber-physical-economic performance of the grid and the business models of its increasingly growing number of participants and stakeholders.

Internet of Things (IoT) Applications for Enterprise Productivity - Koç, Erdinç 2020-03-13
Development in information and communication technologies has led to the advancement of business and enabled enterprises to produce on a global scale. Productivity is a key function in maintaining a competitive advantage in today's market. The internet of things has rapidly become prevalent in the productivity efforts of businesses. Understanding these technologies and how to implement them into current business practices is vital for researchers and practitioners. Internet of Things (IoT) Applications for Enterprise Productivity is a collection of innovative research on the advancing methods productivity efforts of business through the implementation of the internet of things. While highlighting topics including employee motivation, enterprise productivity, and supply chain tracking, this book is ideally designed for manufacturing professionals, industrialists, engineers, managers, practitioners, academicians, and students seeking current research on enterprise production systems and its transformation using internet of things technologies.

5G-Enabled Internet of Things - Yulei Wu 2019-05-29
How the enabling technologies in 5G as an integral or as a part can seamlessly fuel the IoT revolution is still very challenging. This book presents the state-of-the-art solutions to the theoretical and practical challenges stemming from the integration of 5G enabling technologies

into IoTs in support of a smart 5G-enabled IoT paradigm, in terms of network design, operation, management, optimization, privacy and security, and applications. In particular, the technical focus covers a comprehensive understanding of 5G-enabled IoT architectures, converged access networks, privacy and security, and emerging applications of 5G-eabled IoT.

NB-IoT Use Cases and Devices - Kersten Heins 2021
This book presents the cellular wireless network standard NB-IoT (Narrow Band-Internet of Things), which addresses many key requirements of the IoT. NB-IoT is a topic that is inspiring the industry to create new business cases and associated products. The author first introduces the technology and typical IoT use cases. He then explains NB-IoT extended network coverage and outstanding power saving features which are enabling the design of IoT devices (e.g. sensors) to work everywhere and for more than 10 years, in a maintenance-free way. The book explains to industrial users how to utilize NB-IoT features for their own IoT projects. Other system ingredients (e.g. IoT cloud services) and embedded security aspects are covered as well. The author takes an in-depth look at NB-IoT from an application engineering point of view, focusing on IoT device design. The target audience is technical-minded IoT project owners and system design engineers who are planning to develop an IoT application.

Orchestrating and Automating Security for the Internet of Things
- Anthony Sabella 2018-06-04
Master powerful techniques and approaches for securing IoT systems of all kinds–current and emerging Internet of Things (IoT) technology adoption is accelerating, but IoT presents complex new security challenges. Fortunately, IoT standards and standardized architectures are emerging to help technical professionals systematically harden their IoT environments. In Orchestrating and Automating Security for the Internet of Things, three Cisco experts show how to safeguard current and future IoT systems by delivering security through new NFV and SDN architectures and related IoT security standards. The authors first review the current state of IoT networks and architectures, identifying key security risks associated with nonstandardized early deployments and showing how early adopters have attempted to respond. Next, they introduce more mature architectures built around NFV and SDN. You'll discover why these lend themselves well to IoT and IoT security, and master advanced approaches for protecting them. Finally, the authors preview future approaches to improving IoT security and present real-world use case examples. This is an indispensable resource for all technical and security professionals, business security and risk managers, and consultants who are responsible for systems that incorporate or utilize IoT devices, or expect to be responsible for them. · Understand the challenges involved in securing current IoT networks and architectures · Master IoT security fundamentals, standards, and modern best practices · Systematically plan for IoT security · Leverage Software-Defined Networking (SDN) and Network Function Virtualization (NFV) to harden IoT networks · Deploy the advanced IoT platform, and use MANO to manage and orchestrate virtualized network functions · Implement platform security services including identity, authentication, authorization, and accounting · Detect threats and protect data in IoT environments · Secure IoT in the context of remote access and VPNs · Safeguard the IoT platform itself · Explore use cases ranging from smart cities and advanced energy systems to the connected car · Preview evolving concepts that will shape the future of IoT security

Telematics and Computing - Miguel Félix Mata-Rivera 2022-10-30
This book constitutes the proceedings of the 11th International Congress on Telematics and Computing, WITCOM 2022, held in Cancún, México, in November 2022. The 30 full papers presented in this volume were carefully reviewed and selected from 73 submissions. The papers are focused on the topics of artificial intelligence techniques, Data Science, Blockchain, environment Monitoring, Cybersecurity, Education, and software for communications protocols.

LPWAN Technologies for IoT and M2M Applications - Bharat S. Chaudhari 2020-03-17
Low power wide area network (LPWAN) is a promising solution for long range and low power Internet of Things (IoT) and machine to machine

(M2M) communication applications. The LPWANs are resource-constrained networks and have critical requirements for long battery life, extended coverage, high scalability, and low device and deployment costs. There are several design and deployment challenges such as media access control, spectrum management, link optimization and adaptability, energy harvesting, duty cycle restrictions, coexistence and interference, interoperability and heterogeneity, security and privacy, and others. LPWAN Technologies for IoT and M2M Applications is intended to provide a one-stop solution for study of LPWAN technologies as it covers a broad range of topics and multidisciplinary aspects of LPWAN and IoT. Primarily, the book focuses on design requirements and constraints, channel access, spectrum management, coexistence and interference issues, energy efficiency, technology candidates, use cases of different applications in smart city, healthcare, and transportation systems, security issues, hardware/software platforms, challenges, and future directions. One stop guide to the technical details of various low power long range technologies such as LoRaWAN, Sigfox, NB-IoT, LTE-M and others Describes the design aspects, network architectures, security issues and challenges Discusses the performance, interference, coexistence issues and energy optimization techniques Includes LPWAN based intelligent applications in diverse areas such as smart city, traffic management, health and others Presents the different hardware and software platforms for LPWANs Provides guidance on selecting the right technology for an application

LTE Security - Günther Horn 2011-06-09
Addressing the security solutions for LTE, a cellular technology from Third Generation Partnership Project (3GPP), this book shows how LTE security substantially extends GSM and 3G security. It also encompasses the architectural aspects, known as SAE, to give a comprehensive resource on the topic. Although the security for SAE/LTE evolved from the security for GSM and 3G, due to different architectural and business requirements of fourth generation systems the SAE/LTE security architecture is substantially different from its predecessors. This book presents in detail the security mechanisms employed to meet these requirements. Whilst the industry standards inform how to implement systems, they do not provide readers with the underlying principles behind security specifications. LTE Security fills this gap by providing first hand information from 3GPP insiders who explain the rationale for design decisions. Key features: Provides a concise guide to the 3GPP/LTE Security Standardization specifications Authors are leading experts who participated in decisively shaping SAE/LTE security in the relevant standardization body, 3GPP Shows how GSM and 3G security was enhanced and extended to meet the requirements of fourth generation systems Gives the rationale behind the standards specifications enabling readers to have a broader understanding of the context of these specifications Explains why LTE security solutions are designed as they are and how theoretical security mechanisms can be put to practical use

Harnessing the Internet of Everything (IoE) for Accelerated Innovation Opportunities - Cardoso, Pedro J.S. 2019-02-15
As innovators continue to explore and create new developments within the fields of artificial intelligence and computer science, subfields such as machine learning and the internet of things (IoT) have emerged. Now, the internet of everything (IoE), foreseen as a cohesive and intelligent connection of people, processes, data, and things, is theorized to make internet connections more valuable by converting information into wise actions that create unprecedented capabilities, richer experiences, and economic opportunities to all players in the market. Harnessing the Internet of Everything (IoE) for Accelerated Innovation Opportunities discusses the theoretical, design, evaluation, implementation, and use of innovative technologies within the fields of IoE, machine learning, and IoT. Featuring research on topics such as low-power electronics, mobile technology, and artificial intelligence, this book is ideally designed for computer engineers, software developers, investigators, advanced-level students, professors, and professionals seeking coverage on the various contemporary theories, technologies, and tools in IoE engineering.

Principles and Applications of Narrowband Internet of Things (NBIoT) - Routray, Sudhir K. 2021-01-08
The internet of things (IoT) has emerged as a trending technology that is

continually being implemented into various practices within the field of engineering and science due to its versatility and various benefits. Despite the levels of innovation that IoT provides, researchers continue to search for networks that maintain levels of sustainability and require fewer resources. A network that measures up to these expectations is Narrowband IoT (NBIoT), which is a low power wide area version of IoT networks and is suitable for larger projects. Engineers and other industry professionals are in need of in-depth knowledge on this growing technology and its various applications. Principles and Applications of Narrowband Internet of Things (NBIoT) is an essential reference source that provides an in-depth understanding on the recent advancements of NBIoT as well as the crucial roles of emerging low power IoT networks in various regions of the world. Featuring research on topics such as security monitoring, sustainability, and cloud infrastructure, this book is ideally designed for developers, engineers, practitioners, researchers, students, managers, and policymakers seeking coverage on the large-scale deployment and modern applications of NBIoT.

Cognitive Hyperconnected Digital Transformation - Ovidiu Vermesan 2017-06-23
Cognitive Hyperconnected Digital Transformation provides an overview of the current Internet of Things (IoT) landscape, ranging from research, innovation and development priorities to enabling technologies in a global context. It is intended as a standalone book in a series that covers the Internet of Things activities of the IERC-Internet of Things European Research Cluster, including both research and technological innovation, validation and deployment. The book builds on the ideas put forward by the European Research Cluster, the IoT European Platform Initiative (IoT-EPI) and the IoT European Large-Scale Pilots Programme, presenting global views and state-of-the-art results regarding the challenges facing IoT research, innovation, development and deployment in the next years. Hyperconnected environments integrating industrial/business/consumer IoT technologies and applications require new IoT open systems architectures integrated with network architecture (a knowledge-centric network for IoT), IoT system design

and open, horizontal and interoperable platforms managing things that are digital, automated and connected and that function in real-time with remote access and control based on Internet-enabled tools. The IoT is bridging the physical world with the virtual world by combining augmented reality (AR), virtual reality (VR), machine learning and artificial intelligence (AI) to support the physical-digital integrations in the Internet of mobile things based on sensors/actuators, communication, analytics technologies, cyber-physical systems, software, cognitive systems and IoT platforms with multiple functionalities. These IoT systems have the potential to understand, learn, predict, adapt and operate autonomously. They can change future behaviour, while the combination of extensive parallel processing power, advanced algorithms and data sets feed the cognitive algorithms that allow the IoT systems to develop new services and propose new solutions. IoT technologies are moving into the industrial space and enhancing traditional industrial platforms with solutions that break free of device-, operating system- and protocol-dependency. Secure edge computing solutions replace local networks, web services replace software, and devices with networked programmable logic controllers (NPLCs) based on Internet protocols replace devices that use proprietary protocols. Information captured by edge devices on the factory floor is secure and accessible from any location in real time, opening the communication gateway both vertically (connecting machines across the factory and enabling the instant availability of data to stakeholders within operational silos) and horizontally (with one framework for the entire supply chain, across departments, business units, global factory locations and other markets). End-to-end security and privacy solutions in IoT space require agile, context-aware and scalable components with mechanisms that are both fluid and adaptive. The convergence of IT (information technology) and OT (operational technology) makes security and privacy by default a new important element where security is addressed at the architecture level, across applications and domains, using multi-layered distributed security measures. Blockchain is transforming industry operating models by adding trust to untrusted environments, providing distributed security

mechanisms and transparent access to the information in the chain. Digital technology platforms are evolving, with IoT platforms integrating complex info

Internet of Things (IoT) in 5G Mobile Technologies - Constandinos X. Mavromoustakis 2016-04-20
This book reports on the latest advances in the modeling, analysis and efficient management of information in Internet of Things (IoT) applications in the context of 5G access technologies. It presents cutting-edge applications made possible by the implementation of femtocell networks and millimeter wave communications solutions, examining them from the perspective of the universally and constantly connected IoT. Moreover, it describes novel architectural approaches to the IoT and presents the new framework possibilities offered by 5G mobile networks, including middleware requirements, node-centrality and the location of extensive functionalities at the edge. By providing researchers and professionals with a timely snapshot of emerging mobile communication systems, and highlighting the main pitfalls and potential solutions, the book fills an important gap in the literature and will foster the further developments of 5G hosting IoT devices.

5G for the Connected World - Devaki Chandramouli 2019-04-29
Comprehensive Handbook Demystifies 5G for Technical and Business Professionals in Mobile Telecommunication Fields Much is being said regarding the possibilities and capabilities of the emerging 5G technology, as the evolution towards 5G promises to transform entire industries and many aspects of our society. 5G for the Connected World offers a comprehensive technical overview that telecommunication professionals need to understand and take advantage of these developments. The book offers a wide-ranging coverage of the technical aspects of 5G (with special consideration of the 3GPP Release 15 content), how it enables new services and how it differs from LTE. This includes information on potential use cases, aspects of radio and core networks, spectrum considerations and the services primarily driving 5G development and deployment. The text also looks at 5G in relation to the Internet of Things, machine to machine communication and technical enablers such as LTE-M, NB-IoT and EC-GSM. Additional chapters discuss new business models for telecommunication service providers and vertical industries as a result of introducing 5G and strategies for staying ahead of the curve. Other topics include: Key features of the new 5G radio such as descriptions of new waveforms, massive MIMO and beamforming technologies as well as spectrum considerations for 5G radio regarding all possible bands Drivers, motivations and overview of the new 5G system – especially RAN architecture and technology enablers (e.g. service-based architecture, compute-storage split and network exposure) for native cloud deployments Mobile edge computing, Non-3GPP access, Fixed-Mobile Convergence Detailed overview of mobility management, session management and Quality of Service frameworks 5G security vision and architecture Ultra-low latency and high reliability use cases and enablers, challenges and requirements (e.g. remote control, industrial automation, public safety and V2X communication) An outline of the requirements and challenges imposed by massive numbers of devices connected to cellular networks While some familiarity with the basics of 3GPP networks is helpful, 5G for the Connected World is intended for a variety of readers. It will prove a useful guide for telecommunication professionals, standardization experts, network operators, application developers and business analysts (or students working in these fields) as well as infrastructure and device vendors looking to develop and integrate 5G into their products, and to deploy 5G radio and core networks.

Smart Grid Telecommunications - Alberto Sendin 2021-09-08
SMART GRID TELECOMMUNICATIONS Discover the foundations and main applications of telecommunications to smart grids In Smart Grid Telecommunications, renowned researchers and authors Drs. Alberto Sendin, Javier Matanza, and Ramon Ferrús deliver a focused treatment of the fundamentals and main applications of telecommunication technologies in smart grids. Aimed at engineers and professionals who work with power systems, the book explains what smart grids are and where telecommunications are needed to solve their various challenges. Power engineers will benefit from explanations of the main concepts of

telecommunications and how they are applied to the different domains of a smart grid. Telecommunication engineers will gain an understanding of smart grid applications and services and will learn from the explanations of how telecommunications need to be adapted to work with them. The authors offer a simplified vision of smart grids with rigorous coverage of the latest advances in the field, while avoiding some of the technical complexities that can hinder understanding in this area. The book offers: Discussions of why telecommunications are necessary in smart grids and the various telecommunication services and systems relevant for them An exploration of foundational telecommunication concepts ranging from system-level aspects, such as network topologies, multi-layer architectures and protocol stacks, to communications channel transmission- and reception-level aspects Examinations of telecommunication-related smart grid services and systems, including SCADA, protection and teleprotection, smart metering, substation and distribution automation, synchrophasors, distributed energy resources, electric vehicles, and microgrids A treatment of wireline and wireless telecommunication technologies, like DWDM, Ethernet, IP, MPLS, PONs, PLC, BPL, 3GPP cellular 4G and 5G technologies, Zigbee, Wi-SUN, LoRaWAN, and Sigfox, addressing their architectures, characteristics, and limitations Ideal for engineers working in power systems or telecommunications as network architects, operations managers, planners, or in regulation-related activities, Smart Grid Telecommunications is also an invaluable resource for telecommunication network and smart grid architects.

LTE Advanced Pro - Frédéric Launay 2019-06-03
This book presents LTE evolution towards 5G mobile communication and the emergence of new requirements for MBB, MTC and LLC services. As LTE technologies evolve, LTE Advanced Pro dramatically increases cell capacity and user data rates for the MBB unicast service. Such requirements are obtained using full-dimension MIMO, carrier aggregation (on either licensed or unlicensed frequency bands) and dual connectivity. To improve the efficiency of same-content delivery to multiple users, 3GPP proposes a group communications service over LTE

and defines mission critical push-to-talk (MCPTT) for dedicated public safety services. Complementary low-cost and low-power modems with enhanced coverage and massive connectivity are emerging. Thus, this book also discusses the need for LTE to support low-rate transmission and high-latency communication for MTC services.

Механизмы и модели регулирования цифровых технологий. Монография - Под ред. Минбалеева А.В. 2021-11-11
Монография посвящена исследованию механизмов и моделей регулирования цифровых технологий. Законодательство приведено по состоянию на 1 сентября 2020 г. Работа адресована законодательным органам, субъектам правоприменительной деятельности, представителям научного правового сообщества, преподавателям, аспирантам, студентам, а также широкому кругу лиц, интересующихся проблемами правового обеспечения информационной безопасности.

Self-Driving Vehicles and Enabling Technologies - 2021-09-22
This book examines the development and technical progress of self-driving vehicles in the context of the Vision Zero project from the European Union, which aims to eliminate highway system fatalities and serious accidents by 2050. It presents the concept of Autonomous Driving (AD) and discusses its applications in transportation, logistics, space, agriculture, and industrial and home automation.

Smart Environment for Smart Cities - T.M. Vinod Kumar 2019-04-04
This book discusses the design and practice of environmental resources management for smart cities. Presenting numerous city case studies, it focuses on one specific environmental resource in each city. Environmental resources are commonly owned properties that require active inputs from the government and the people, and in any smart city their management calls for a synchronous combination of e-democracy, e-governance and IOT (Internet of Things) systems in a 24/7 framework. Smart environmental resources management uses information and communication technologies, the Internet of Things, internet of governance (e-governance) and internet of people (e-democracy) along with conventional resource management tools to achieve coordinated,

effective and efficient management, development, and conservation that equitably improves ecological and economic welfare, without compromising the sustainability of development ecosystems and stakeholders.

The 5G Myth - William Webb 2018-12-03

The 5G Myth explains why the vision of 5G, the next generation in mobile telephony, heralded as a huge advance in global connectivity, is flawed and sets out a better vision for a connected future. It explains why insufficient technological advances and inadequate profitability will be problems in the widespread implementation of 5G. The book advocates a focus on consistent connectivity everywhere rather than fast speeds in city centers. William Webb looks back at the transitions through previous generations of mobile telephony and shows what simple extrapolations of trends would predict for 5G. He discusses whether the increases in speed and capacity promised by 5G are needed; if the required technology is available; whether a sound business case can be made for the deployment; and asks why, given this, the industry appears so supportive of 5G. He then puts forth the argument in favor of consistent connectivity of around 10Mbits/s everywhere as a more compelling vision and shows how it can be delivered via a mix of 4G and Wi-Fi. Subscribers to The Economist can access an article featuring this book at https: //www.economist.com/business/2019/08/24/vodafones-search-for-the-g-sp ot

5G System Design - Wan Lei 2019-09-09

This book presents a detailed pedagogical description of the 5G commercial wireless communication system design, from an end to end perspective. It compares and contrasts NR with LTE, and gives a concise and highly accessible description of the key technologies in the 5G physical layer, radio access network layer protocols and procedures. This book also illustrates how the 5G core and EPC is integrated into the radio access network, how virtualization and edge computer fundamentally change the way users interact with the network, as well as 5G spectrum issues. This book is structured into six chapters. The first chapter reviews the use cases, requirements, and standardization organization and activities for 5G. These are 5G requirements and not NR specifically, as technology that meets the requirements, may be submitted to the ITU as 5G technology. This includes a set of Radio Access Technologies (RATs), consisting of NR and LTE; with each RAT meeting different aspects of the requirements. The second chapter describes the air interface of NR and LTE side by side. The basic aspects of LTE that NR builds upon are first described, followed by sections on the NR specific technologies, such as carrier/channel, spectrum/duplexing (including SUL), LTE/NR co-existence and new physical layer technologies (including waveform, Polar/LDPC codes, MIMO, and URLLC/mMTC). In all cases the enhancements made relative to LTE are made apparent. The third chapter contains descriptions of NR procedures (IAM/Beam Management/Power control/HARQ), protocols (CP/UP/mobility, including grant-free), and RAN architecture. The fourth chapter includes a detailed discussion related to end-to-end system architecture, and the 5G Core (5GC), network slicing, service continuity, relation to EPC, network virtualization, and edge computing. The fifth and major chapter describes the ITU submission and how NR and LTE meet the 5G requirements in significant detail, from the rapporteur responsible for leading the preparation and evaluation, as well as some field trial results. Engineers, computer scientists and professionals with a passing knowledge of 4G LTE and a comprehensive understanding of the end to end 5G commercial wireless system will find this book to be a valuable asset. Advanced-level students and researchers studying and working in communication engineering, who want to gain an understanding of the 5G system (as well as methodologies to evaluate features and technologies intended to supplement 5G) will also find this book to be a valuable resource.

Practical Guide to LTE-A, VoLTE and IoT - Ayman Elnashar 2018-06-19

Essential reference providing best practice of LTE-A, VoLTE, and IoT Design/deployment/Performance and evolution towards 5G This book is a practical guide to the design, deployment, and performance of LTE-A, VoLTE/IMS and IoT. A comprehensive practical performance analysis for

VoLTE is conducted based on field measurement results from live LTE networks. Also, it provides a comprehensive introduction to IoT and 5G evolutions. Practical aspects and best practice of LTE-A/IMS/VoLTE/IoT are presented. Practical aspects of LTE-Advanced features are presented. In addition, LTE/LTE-A network capacity dimensioning and analysis are demonstrated based on live LTE/LTE-A networks KPIs. A comprehensive foundation for 5G technologies is provided including massive MIMO, eMBB, URLLC, mMTC, NGCN and network slicing, cloudification, virtualization and SDN. Practical Guide to LTE-A, VoLTE and IoT: Paving the Way Towards 5G can be used as a practical comprehensive guide for best practices in LTE/LTE-A/VoLTE/IoT design, deployment, performance analysis and network architecture and dimensioning. It offers tutorial introduction on LTE-A/IoT/5G networks, enabling the reader to use this advanced book without the need to refer to more introductory texts. Offers a complete overview of LTE and LTE-A, IMS, VoLTE and IoT and 5G Introduces readers to IP Multimedia Subsystems (IMS)Performs a comprehensive evaluation of VoLTE/CSFB Provides LTE/LTE-A network capacity and dimensioning Examines IoT and 5G evolutions towards a super connected world Introduce 3GPP NB-IoT evolution for low power wide area (LPWA) network Provide a comprehensive introduction for 5G evolution including eMBB, URLLC, mMTC, network slicing, cloudification, virtualization, SDN and orchestration Practical Guide to LTE-A, VoLTE and IoT will appeal to all deployment and service engineers, network designers, and planning and optimization engineers working in mobile communications. Also, it is a practical guide for R&D and standardization experts to evolve the LTE/LTE-A, VoLTE and IoT towards 5G evolution.

Fundamentals of 5G Mobile Networks - Jonathan Rodriguez 2015-06-22
Fundamentals of 5G Mobile Networks provides an overview of the key features of the 5th Generation (5G) mobile networks, discussing the motivation for 5G and the main challenges in developing this new technology. This book provides an insight into the key areas of research that will define this new system technology paving the path towards future research and development. The book is multi-disciplinary in nature, and aims to cover a whole host of intertwined subjects that will predominantly influence the 5G landscape, including the future Internet, cloud computing, small cells and self-organizing networks (SONs), cooperative communications, dynamic spectrum management and cognitive radio, Broadcast-Broadband convergence , 5G security challenge, and green RF. This book aims to be the first of its kind towards painting a holistic perspective on 5G Mobile, allowing 5G stakeholders to capture key technology trends on different layering domains and to identify potential inter-disciplinary design aspects that need to be solved in order to deliver a 5G Mobile system that operates seamlessly.

Tech Trends in Practice - Bernard Marr 2020-04-09
Discover how 25 powerful technology trends are transforming 21st century businesses How will the latest technologies transform your business? Future Tech Trends in Practice will give you the knowledge of today's most important technology trends, and how to take full advantage of them to grow your business. The book presents 25 real-world technology trends along with their potential contributions to organisational success. You'll learn how to integrate existing advancements and plan for those that are on the way. In this book, best-selling author, strategic business advisor, and respected futurist Bernard Marr explains the role of technology in providing innovative businesses solutions for companies of varying sizes and across different industries. He covers wide-ranging trends and provides an overview of how companies are using these new and emerging technologies in practice. You, too, can prepare your company for the potential and power of trending technology by examining these and other areas of innovation described in Future Tech Trends in Practice: Artificial intelligence, including machine and deep learning The Internet of Things and the rise of smart devices Self-driving cars and autonomous drones 3D printing and additive manufacturing Blockchain technology Genomics and gene editing Augmented, virtual and mixed reality When you understand the technology trends that are driving success, now and into the future, you'll be better positioned to address and solve problems within your

organisation.

5G LTE Narrowband Internet of Things (NB-IoT) - Hossam Fattah 2018-09-03
This book explains the 3GPP technical specifications for the upcoming 5G Internet of Things (IoT) technology based on latest release which is Release 15. It details the LTE protocol stack of an IoT device, architecture and framework, how they are functioning and communicate with cellular infrastructure, and supported features and capability. NB-IoT is designed to connect a large number of devices in a wide range of application domains forming so-called Internet of Things (IoT). Connected devices are to communicate through cellular infrastructure. This technology is new within the 3GPP specifications and is part of upcoming new wireless technology known as 5G. Table of Contents Preface. Acknowledgments. Author. List of Abbreviations. 1. Internet of Things. 2. 4G and 5G Systems. 3. Radio Resource Control Sublayer. 4. Packet Data Convergence Protocol Sublayer. 5. Radio Link Control Sublayer. 6. Medium Access Control Sublayer. 7. Physical Sublayer. 8. Quality of Service Architecture. 9. Use Cases and Deployment. References. Index.

Mobile Policy Handbook - 2016

IoT Security - Madhusanka Liyanage 2019-12-02
An up-to-date guide to an overview of authentication in the Internet of Things (IoT) The Internet of things (IoT) is the network of the countless physical devices that have the possibility to connect and exchange data. Among the various security requirements, authentication to the IoT is the first step to prevent the impact of attackers. IoT Security offers an important guide into the development of the many authentication mechanisms that provide IoT authentication at various levels such as user level, device level and network level. The book covers a wide range of topics including an overview of IoT and addresses in detail the security challenges at every layer by considering both the technologies and the architecture used. The authors—noted experts on the topic—provide solutions for remediation of compromised security, as well as methods for risk mitigation, and offer suggestions for prevention and improvement. In addition, IoT Security offers a variety of illustrative use cases. This important book: Offers an authoritative reference designed for use by all IoT stakeholders Includes information for securing devices at the user, device, and network levels Contains a classification of existing vulnerabilities Written by an international group of experts on the topic Provides a guide to the most current information available on IoT security Written for network operators, cloud operators, IoT device manufacturers, IoT device users, wireless users, IoT standardization organizations, and security solution developers, IoT Security is an essential guide that contains information on security features, including underlying networks, architectures, and security requirements.

The Impact of Digital Infrastructure on the Sustainable Development Goals - Antonio García Zaballos 2019-05-06
This publication identifies the role of digital infrastructure in achieving the Sustainable Development Goals (SDGs)--including education, employment, agricultural sustainability, food security, and spatial inequality--in 12 countries in Latin America and the Caribbean. It identifies a gap between the outcomes achieved for each SDG in the countries studied and those achieved in OECD countries. Moreover, the region still has a long way to go to achieve the SDG targets set in the 2030 Agenda for Sustainable Development. The authors explain how investment in digital infrastructure can help close the gaps between the region and these two benchmarks (OECD countries and SDG targets). They also quantify the investment in telecom in the region between 2008 and 2017 and estimate what amount is still needed to help close these gaps.

IoT Fundamentals - David Hanes 2017-05-30
Today, billions of devices are Internet-connected, IoT standards and protocols are stabilizing, and technical professionals must increasingly solve real problems with IoT technologies. Now, five leading Cisco IoT experts present the first comprehensive, practical reference for making IoT work. IoT Fundamentals brings together knowledge previously available only in white papers, standards documents, and other hard-to-

find sources—or nowhere at all. The authors begin with a high-level overview of IoT and introduce key concepts needed to successfully design IoT solutions. Next, they walk through each key technology, protocol, and technical building block that combine into complete IoT solutions. Building on these essentials, they present several detailed use cases, including manufacturing, energy, utilities, smart+connected cities, transportation, mining, and public safety. Whatever your role or existing infrastructure, you'll gain deep insight what IoT applications can do, and what it takes to deliver them. Fully covers the principles and components of next-generation wireless networks built with Cisco IOT solutions such as IEEE 802.11 (Wi-Fi), IEEE 802.15.4-2015 (Mesh), and LoRaWAN Brings together real-world tips, insights, and best practices for designing and implementing next-generation wireless networks Presents start-to-finish configuration examples for common deployment scenarios Reflects the extensive first-hand experience of Cisco experts
Internet of Things for Sustainable Community Development - Abdul Salam 2019-12-28
This book covers how Internet of Things (IoT) has a role in shaping the future of our communities. The author shows how the research and education ecosystem promoting impactful solutions-oriented science can help citizenry, government, industry, and other stakeholders to work collaboratively in order to make informed, socially-responsible, science-based decisions. Accordingly, he shows how communities can address complex, interconnected socio-environmental challenges. This book addresses the key inter-related challenges in areas such as the environment, climate change, mining, energy, agro-economic, water, and forestry that are limiting the development of a sustainable and resilient society -- each of these challenges are tied back to IoT based solutions. Presents research into sustainable IoT with respect to wireless communications, sensing, and systems Provides coverage of IoT technologies in sustainability, health, agriculture, climate change, mining, energy, water management, and forestry Relevant for academics, researchers, policy makers, city planners and managers, technicians, and industry professionals in IoT and sustainability

Cellular Internet of Things - Olof Liberg 2019-11-28
Cellular Internet of Things: From Massive Deployments to Critical 5G Applications, Second Edition, gives insights into the recent and rapid work performed by the 3rd Generation Partnership Project (3GPP) and the Multefire Alliance (MFA) to develop systems for the Cellular IoT. Beyond the technologies, readers will learn what the mMTC and cMTC market segments look like, deployment options and expected performance in terms of system capacity, expected battery lifetime, data throughput, access delay time and device cost, regulations for operation in unlicensed frequency bands, and how they impact system design and performance. This new edition contains updated content on the latest EC-GSM IoT, LTE-M and NB-IoT features in 3GPP Release 15, critical communication, i.e. URLLC, specified in 3GPP Release 15 for both LTE and NR, LTE-M and NB-IoT for unlicensed frequency bands specified in the Multefire Alliance (MFA), and an updated outlook of what the future holds in Industrial IoT and drone communications, amongst other topics. Provides ubiquitous wireless connectivity for a diverse range of services and applications, describing their performance and how their specifications were developed to meet the most demanding requirements Describes licensed and unlicensed technologies based on 2G, 4G and 5G technologies and how they have evolved towards the Cellular IoT Presents the Narrowband Internet of Things technology and how GSM, LTE and NR have been designed to provide Cellular Internet of Things services Provides use cases that cover ultra-low complex systems connecting billions of devices (massive MTC, mMTC), critical MTC and cMTC based on Ultra-Reliable and Low Latency Communications (URLLC) to meet strict latency and reliability requirements
5G Explained - Jyrki T. J. Penttinen 2019-04-29
Practical Guide Provides Students and Industry Professionals with Latest Information on 5G Mobile Networks Continuing the tradition established in his previous publications, Jyrki Penttinen offers 5G Explained as a thorough yet concise introduction to recent advancements and growing trends in mobile telecommunications. In this case, Penttinen focuses on the development and employment of 5G mobile networks and, more

specifically, the challenges inherent in adjusting to new global standardization requirements and in maintaining a high level of security even as mobile technology expands to new horizons. The text discusses, for example, the Internet of Things (IoT) and how to keep networks reliable and secure when they are constantly accessed by many different devices with varying levels of user involvement and competence. 5G Explained is primarily designed for specialists who need rapid acclimation to the possibilities and concerns presented by 5G adoption. Therefore, it assumes some prior knowledge of mobile communications. However, earlier chapters are structured so that even relative newcomers will gain useful information. Other notable features include: Three modules each consisting of three chapters: Introduction, Technical Network Description and Planning of Security and Deployment Comprehensive coverage of topics such as technical requirements for 5G, network architecture, radio and core networks and services/applications Discussion of specific security techniques in addition to common-sense guidelines for planning, deploying, managing and optimizing 5G networks 5G Explained offers crucial updates for anyone involved in designing, deploying or working with 5G networks. It should prove a valuable guide for operators, equipment manufacturers and other professionals in mobile equipment engineering and security, network planning and optimization, and mobile application development, or anyone looking to break into these fields.

Drones in Smart-Cities - Fadi Al-Turjman 2020-06-04
Drones in Smart-Cities: Security and Performance is the first book dedicated to drones in smart cities, helping address the many research challenges in bringing UAVs into practice. The book incorporates insights from the latest research in Internet of Things, big data, and cloud computing, 5G, and other communication technologies. It examines the design and implementation of UAV, focusing on data delivery, performability, and security. Intended for researchers, engineers, and practitioners, Drones in Smart-Cities: Security and Performance combines the technical aspects with academic theory to help implement the smart city vision around the globe. Addresses UAV and IoT for smart cities applications Examines topics as UAV safety, challenges, localization methods. QoS, simulation tools, and more Collect the relevant knowledge in one resource, saving research time and effort