

Nb Iot Enabling New Business Opportunities Huawei

NB-IoT Use Cases and Devices Design Guide Springer

This book constitutes the refereed proceedings of the 14th International Joint Conference on E-Business and Telecommunications, ICETE 2017, held in Madrid, Spain, in July 2017. ICETE is a joint international conference integrating four major areas of knowledge that are divided into six corresponding conferences: International Conference on Data Communication Networking, DCNET; International Conference on E-Business, ICE-B; International Conference on Optical Communication Systems, OPTICS; International Conference on Security and Cryptography, SECRIPT; International Conference on Signal Processing and Multimedia, SIGMAP; International Conference on Wireless Information Systems, WINSYS. The 17 full papers presented were carefully reviewed and selected from 195 submissions. The papers cover the following key areas of information and communication technologies, including data communication and networking, e-business and telecommunications: data communication networking; e-business; optical communication systems; security and cryptography; signal processing and multimedia applications; wireless networks and mobile systems.

This book first provides a comprehensive review of state-of-the-art IoT technologies and applications in different industrial sectors and public services. The authors give in-depth analyses of fog computing architecture and key technologies that fulfill the challenging requirements of enabling computing services anywhere along the cloud-to-thing continuum. Further, in order to make IoT systems more intelligent and more efficient, a fog-enabled service architecture is proposed to address the latency requirements, bandwidth limitations, and computing power issues in realistic cross-domain application scenarios with limited priori domain knowledge, i.e. physical laws, system statuses, operation principles and execution rules. Based on this fog-enabled architecture, a series of data-driven self-learning applications in different industrial sectors and public services are investigated and discussed, such as robot SLAM and formation control, wireless network self-optimization, intelligent transportation system, smart home and user behavior recognition. Finally, the advantages and future directions of fog-enabled intelligent IoT systems are summarized. Provides a comprehensive review of state-of-the-art IoT technologies and applications in different industrial sectors and public services Presents a fog-enabled service architecture with detailed technical approaches for realistic cross-domain application scenarios with limited prior domain knowledge Outlines a series of data-driven self-learning applications (with new algorithms) in different industrial sectors and public services

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.

Cellular Internet of Things: Technologies, Standards and Performance gives insight into the recent work performed by the 3rd Generation Partnership Project (3GPP) to develop systems for the Cellular Internet of Things. It presents both the design of the new Narrowband Internet of Things (NB-IoT) technology and how GSM and LTE have evolved to provide Cellular Internet of Things services. The criteria used for the design and objectives of the standardization work are explained, and the technical details and performance of each technology is presented. This book discusses the overall competitive landscape for providing wireless connectivity, also introducing the most promising technologies in the market. Users will learn how cellular systems work and how they can be designed to cater to challenging new requirements that are emerging in the telecom industry, what the physical layers and procedures in idle and connected mode look like in EC-GSM-IoT, LTE-M, and NB-IoT, and what the expected performance of these new systems is in terms of expected coverage, battery lifetime, data throughput, access delay time and device cost. Provides a detailed introduction to the EC-GSM-IoT, LTE-M and NB-IoT technologies Presents network performance of the 3GPP cellular technologies, along with an analysis of the performance of non-cellular alternatives operating in unlicensed spectrum Includes prediction of true performance levels using state-of-the-art simulation models developed in the 3GPP standardization process

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 (NB-IoT), 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 (NB-IoT) is an essential reference source that provides an in-depth understanding on the recent advancements of NB-IoT 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 NB-IoT.

Recent advancements in data collection will affect all aspects of businesses, improving and bringing complexity to management and demanding integration of all resources, principles, and processes. The interpretation of these new technologies is essential to the advancement of management and business. The Handbook of Research on Expanding Business Opportunities With Information Systems and Analytics is a vital scholarly publication that examines technological advancements in data collection that will influence major change in many aspects of business through a multidisciplinary approach. Featuring coverage on a variety of topics such as market intelligence, knowledge management, and brand management, this book explores new complexities to management and other aspects of business. This publication is designed for entrepreneurs, business managers and executives, researchers, business professionals, data analysts, academicians, and graduate-level students seeking relevant research on data collection advancements.

This book presents the cellular network standard NB-IoT (Narrow Band-Internet of Things), which addresses the requirements of the IoT. The author first explains NB-IoT, a topic that is inspiring the industry to create new business cases and associated products. He then covers how NB-IoT enables the design of IoT devices (e.g. sensors) to work everywhere, for extended periods of time, in a maintenance-free

way. The book explains NB-IoT key features to industrial users and how to utilize them for their own IoT projects. The author then takes an in-depth look at NB-IoT from an application engineering point of view, focus on IoT device design. The target audience is technical-minded IoT project owners and system design engineers who are planning to address a specific IoT application.

Business models are regarded as a main emerging topic in the management area for opportune science-driven practical conceptions and applications. They represent how organizations are proposed and planned, as well as how they establish a market and social relations, manage strategic resources, and make decisions. However, companies must produce new solutions for strategic sustainability, performance measurement, and overall managerial conditions for these business models to be implemented effectively. The Handbook of Research on Business Models in Modern Competitive Scenarios depicts how business models contribute to strategic competition in this new era of technological and social changes as well as how they are conceptualized, studied, designed, implemented, and in the end, how they can be improved. Featuring research on topics such as creating shared value, global scenarios, and organizational intelligence, this book provides pivotal information for scientific researchers, business decision makers, strategic planners, consultants, managers, and academicians.

This book has a two-fold mission: to explain and facilitate digital transition in business organizations using information and communications technology and to address the associated growing threat of cyber crime and the challenge of creating and maintaining effective cyber protection. The book begins with a section on Digital Business Transformation, which includes chapters on tools for integrated marketing communications, human resource workplace digitalization, the integration of the Internet of Things in the workplace, Big Data, and more. The technologies discussed aim to help businesses and entrepreneurs transform themselves to align with today's modern digital climate. The Evolution of Business in the Cyber Age: Digital Transformation, Threats, and Security provides a wealth of information for those involved in the development and management of conducting business online as well as for those responsible for cyber protection and security. Faculty and students, researchers, and industry professionals will find much of value in this volume.

This book provides a comprehensive and consistent introduction to the Internet of Things. Hot topics, including the European privacy legislation GDPR, and homomorphic encryption are explained. For each topic, the reader gets a theoretical introduction and an overview, backed by programming examples. For demonstration, the authors use the IoT platform VICINITY, which is open-source, free, and offers leading standards for privacy. Presents readers with a coherent single-source introduction into the IoT; Introduces selected, hot-topics of IoT, including GDPR (European legislation on data protection), and homomorphic encryption; Provides coding examples for most topics that allow the reader to kick-start his own IoT applications, smart services, etc.

Leverage the full potential of IoT with the combination of Raspberry Pi 3 and Python and architect a complete IoT system that is the best fit for your organization Key Features Build complex Python-based applications with IoT Explore different concepts, technologies, and tradeoffs in the IoT architectural stack Delve deep into each element of the IoT design—from sensors to the cloud Book Description The Internet of Things (IoT) is the fastest growing technology market. Industries are embracing IoT technologies to improve operational expenses, product life, and people's well-being. We'll begin our journey with an introduction to Raspberry Pi and quickly jump right into Python programming. We'll learn all concepts through multiple projects, and then reinforce our learnings by creating an IoT robot car. We'll examine modern sensor systems and focus on what their power and functionality can bring to our system. We'll also gain insight into cloud and fog architectures, including the OpenFog standards. The Learning Path will conclude by discussing three forms of prevalent attacks and ways to improve the security of our IoT infrastructure. By the end of this Learning Path, we will have traversed the entire spectrum of technologies needed to build a successful IoT system, and will have the confidence to build, secure, and monitor our IoT infrastructure. This Learning Path includes content from the following Packt products: Internet of Things Programming Projects by Colin Dow Internet of Things for Architects by Perry Lea What you will learn Build a home security dashboard using an infrared motion detector Receive data and display it with an actuator connected to the Raspberry Pi Build an IoT robot car that is controlled via the Internet Use IP-based communication to easily and quickly scale your system Explore cloud protocols, such as Message Queue Telemetry Transport (MQTT) and CoAP Secure communication with encryption forms, such as symmetric key Who this book is for This Learning Path is designed for developers, architects, and system designers who are interested in building exciting projects with Python by understanding the IoT ecosystem, various technologies, and tradeoffs. Technologists and technology managers who want to develop a broad view of IoT architecture, will also find this Learning Path useful. Prior programming knowledge of Python is a must.

The book covers a variety of topics in Information and Communications Technology (ICT) and their impact on innovation and business. The authors discuss various innovations, business and industrial motivations, and impact on humans and the interplay between those factors in terms of finance, demand, and competition. Topics discussed include the convergence of Machine to Machine (M2M), Internet of Things (IoT), Social, and Big Data. They also discuss AI and its integration into technologies from machine learning, predictive analytics, security software, to intelligent agents, and many more. Contributions come from academics and professionals around the world. Covers the most recent practices in ICT related topics pertaining to technological growth, innovation, and business; Presents a survey on the most recent technological areas revolutionizing how humans communicate and interact; Features four sections: IoT, Wireless Ad Hoc & Sensor Networks, Fog Computing, and Big Data Analytics.

Discover how the Internet of Things will change the information and communication technology industry in the next decade The Intelligent Internet of Things explores a unique type of Internet of Things (IoT) architecture, for example, the Web of Things (WoT) with its open character that breaks the barriers among various IoT vertical applications. The authors—noted experts on the topic—examine and compare key technologies from physical to platform level, especially the Narrow Band Internet of Things (NB-IoT) technology. They discuss applications with different data transmission requirements that are typical to IoT. The text also describes the requirements of WoT applications on 5G and includes detailed information on WoT technologies. The Intelligent Internet of Things examines three typical WoT applications: the monitoring application of south-to-north water diversion projects; smart driving applications; and network optimization applications. In addition, the text explores testing and authentication of IoT key technologies, with the required equipment, platform, and outdoor environment development. This important book: Provides information on what IoT/WoT is, when to use it, how to provide IoT services with certain technologies, and more Discusses restful architecture, main protocols (ZigBee, 6lowpan, CoAP, HTML5) Explores key technologies on different layers (sensing, gathering, application) Examines how IoT will change the information and communication technology industry

Written for professionals working in IoT development, management and big data analytics, Intelligent Internet of Things offers an overview of IoT architecture, key technology, current applications and future development of the technology.

Advances in machine learning techniques and ever-increasing computing power has helped create a new generation of hardware and software technologies with practical applications for nearly every industry. As the progress has, in turn, excited the interest of venture investors, technology firms, and a growing number of clients, implementing intelligent automation in both physical and information systems has become a must in business. Handbook of Research on Smart Technology Models for Business and Industry is an essential reference source that discusses relevant abstract frameworks and the latest experimental research findings in theory, mathematical models, software applications, and prototypes in the area of smart technologies. Featuring research on topics such as digital security, renewable energy, and intelligence management, this book is ideally designed for machine learning specialists, industrial experts, data scientists, researchers, academicians, students, and business professionals seeking coverage on current smart technology models.

Industry 4.0 is based on the cyber-physical transformation of processes, systems and methods applied in the manufacturing sector, and on its autonomous and decentralized operation. Industry 4.0 reflects that the industrial world is at the beginning of the so-called Fourth Industrial Revolution, characterized by a massive interconnection of assets and the integration of human operators with the manufacturing environment. In this regard, data analytics and, specifically, the artificial intelligence is the vehicular technology towards the next generation of smart factories. Chapters in this book cover a diversity of current and new developments in the use of artificial intelligence on the industrial sector seen from the fourth industrial revolution point of view, namely, cyber-physical applications, artificial intelligence technologies and tools, Industrial Internet of Things and data analytics. This book contains high-quality chapters containing original research results and literature review of exceptional merit. Thus, it is in the aim of the book to contribute to the literature of the topic in this regard and let the readers know current and new trends in the use of artificial intelligence for the Industry 4.0.

This book introduces the students, researchers and practitioners into the subject and enabling technologies and applications pertaining to of technology, entrepreneurship and business development through research articles, case studies etc. It is primarily intended for academic purposes for learners of computer Science, management, accounting and information systems disciplines, economics,- entrepreneurship. Publishing chapters in the book is new innovative idea to spread the book in the Middle East and Arab countries and make the book achieve more sales. As many students in all levels, graduates and undergraduates in addition to research, professionals are not able to get sufficient resources because of the language concern.

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.

This document brings together a set of latest data points and publicly available information relevant for Hybrid Cloud Infrastructure. We are very excited to share this content and believe that readers will benefit immensely from this periodic publication immensely.

The three-volume set of LNCS 11921, 11922, and 11923 constitutes the refereed proceedings of the 25th International Conference on the Theory and Applications of Cryptology and Information Security, ASIACRYPT 2019, held in Kobe, Japan, in December 2019. The 71 revised full papers presented were carefully reviewed and selected from 307 submissions. They are organized in topical sections on Lattices; Symmetric Cryptography; Isogenies; Obfuscation; Multiparty Computation; Quantum; E-cash and Blockchain; Codes; Authenticated Encryption; Multilinear Maps; Homomorphic Encryption; Combinatorial Cryptography; Signatures; Public Key Encryption; Side Channels; Functional Encryption; Zero Knowledge.

This book discusses Internet of Things (IoT) as it relates to enterprise applications, systems, and infrastructures. The authors discuss IoT and how it's disrupting industries such as enterprise manufacturing, enterprise transportation, enterprise smart market, enterprise utilities, and enterprise healthcare. They cover how IoT in the enterprise will have a major impact on the lives of consumers and professionals around the world and how it will change the way we think about professional and consumer networks. The book's topics include IoT enterprise system architecture, IoT enabling enterprise technologies, and IoT enterprise services and applications. Examples include enterprise on demand, market impacts, and implications on smart technologies, big data enterprise management, and future enterprise Internet design for various IoT use cases, such as share markets, healthcare, smart cities, smart environments, smart communications and smart homes.

Break down the misconceptions of the Internet of Things by examining the different security building blocks available in Intel Architecture (IA) based IoT platforms. This open access book reviews the threat pyramid, secure boot, chain of trust, and the SW stack leading up to defense-in-depth. The IoT presents unique challenges in implementing security and Intel has both CPU and Isolated Security Engine capabilities to simplify it. This book explores the challenges to secure these devices to make them immune to different threats originating from within and outside

the network. The requirements and robustness rules to protect the assets vary greatly and there is no single blanket solution approach to implement security. Demystifying Internet of Things Security provides clarity to industry professionals and provides an overview of different security solutions What You'll Learn Secure devices, immunizing them against different threats originating from inside and outside the network Gather an overview of the different security building blocks available in Intel Architecture (IA) based IoT platforms Understand the threat pyramid, secure boot, chain of trust, and the software stack leading up to defense-in-depth Who This Book Is For Strategists, developers, architects, and managers in the embedded and Internet of Things (IoT) space trying to understand and implement the security in the IoT devices/platforms.

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.

A comprehensive overview of the 5G landscape covering technology options, most likely use cases and potential system architectures.

The Internet of Things (IoT) should be able to react with minimal human intervention and contribute to the Artificial Intelligence (AI) era requiring real-time and scalable operation under heterogeneous network infrastructures. This thesis investigates how cooperation and allocation of resources can contribute to the evolution of future wireless networks supporting the IoT. First, we examine how to allocate resources to IoT services which run on devices equipped with multiple network interfaces. The resources are heterogeneous and not interchangeable, and their allocation to a service can be split among different interfaces. We formulate an optimization model for this allocation problem, prove its complexity, and derive two heuristic algorithms to approximate the solution in large instances of the problem. The concept of virtualization is promising towards addressing the heterogeneity of IoT resources by providing an abstraction layer between software and hardware. Network function virtualization (NFV) decouples traditional network operations such as routing from proprietary hardware platforms and implements them as software entities known as virtualized network functions (VNFs). In the second paper, we study how VNF demands can be allocated to Virtual Machines (VMs) by considering the completion-time tolerance of the VNFs. We prove that the problem is NP-complete and devise a subgradient optimization algorithm to provide near-optimal solutions. Our numerical results demonstrate the effectiveness of our algorithm compared to two benchmark algorithms. Furthermore, we explore the potential of using intermediate nodes, the so-called relays, in IoT networks. In the third paper, we study a multi-user random-access network with a relay node assisting users in transmitting their packets to a destination node. We provide analytical expressions for the performance of the relay's queue and the system throughput. We optimize the relay's operation parameters to maximize the network-wide throughput while maintaining the relay's queue stability. A stable queue at relay guarantees finite delay for the packets. Furthermore, we study the effect of the wireless links' signal-to-interference-plus-noise ratio (SINR) threshold and the self-interference (SI) cancellation on the per-user and network-wide throughput. Additionally, caching at the network edge has recently emerged as an encouraging solution to offload cellular traffic and improve several performance metrics of the network such as throughput, delay and energy efficiency. In the fourth paper, we study a wireless network that serves two types of traffic: cacheable and non-cacheable traffic. In the considered system, a wireless user with cache storage requests cacheable content from a data center connected with a wireless base station. The user can be assisted by a pair of wireless helpers that exchange non-cacheable content as well. We devise the system throughput and the delay experienced by the user and provide numerical results that demonstrate how they are affected by the non-cacheable packet arrivals, the availability of caching helpers, the parameters of the caches, and the request rate of the user. Finally, in the last paper, we consider a time-slotted wireless system that serves both cacheable and non-cacheable traffic with the assistance of a relay node. The latter has storage capabilities to serve both types of traffic. We investigate how allocating the storage capacity to cacheable and non-cacheable traffic affects the system throughput. Our numerical results provide useful insights into the system throughput e.g., that it is not necessarily beneficial to increase the storage capacity for the non-cacheable traffic to realize better throughput at the non-cacheable destination node.

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.

5G NR: Architecture, Technology, Implementation, and Operation of 3GPP New Radio Standards is an in-depth, systematic, technical reference on 3GPP's New Radio standards (Release 15 and beyond), covering the underlying theory, functional descriptions, practical considerations and implementation of the 5G new radio access technology. The book describes the design and operation of individual components and shows how they are integrated into the overall system and operate from a systems perspective. Uniquely, this book gives detailed information on RAN protocol layers, transport, network architecture and services, as well as practical implementation and deployment issues, making it suitable for researchers and engineers who are designing and developing 5G systems. Reflecting on the

author's 30 plus years of experience in signal processing, microelectronics and wireless communication system design, this book is ideal for professional engineers, researchers and graduate students working and researching in cellular communication systems and protocols as well as mobile broadband wireless standards. Strong focus on practical considerations, implementation and deployment issues Takes a top-down approach to explain system operation and functional interconnection Covers all functional components, features, and interfaces based on clear protocol structure and block diagrams Describes RF and transceiver design considerations in sub-6 GHz and mmWave bands Covers network slicing, SDN/NFV/MEC networks and cloud and virtualized RAN architectures Comprehensive coverage of NR multi-antenna techniques and beamformed operation A consistent and integrated coverage reflecting the author's decades of experience in developing 3G, 4G and 5G technologies and writing two successful books in these areas

Sustainable Food Supply Chains: Planning, Design, and Control through Interdisciplinary Methodologies provides integrated and practicable solutions that aid planners and entrepreneurs in the design and optimization of food production-distribution systems and operations and drives change toward sustainable food ecosystems. With synthesized coverage of the academic literature, this book integrates the quantitative models and tools that address each step of food supply chain operations to provide readers with easy access to support-decision quantitative and practicable methods. Broken into three parts, the book begins with an introduction and problem statement. The second part presents quantitative models and tools as an integrated framework for the food supply chain system and operations design. The book concludes with the presentation of case studies and applications focused on specific food chains. Sustainable Food Supply Chains: Planning, Design, and Control through Interdisciplinary Methodologies will be an indispensable resource for food scientists, practitioners and graduate students studying food systems and other related disciplines. Contains quantitative models and tools that address the interconnected areas of the food supply chain Synthesizes academic literature related to sustainable food supply chains Deals with interdisciplinary fields of research (Industrial Systems Engineering, Food Science, Packaging Science, Decision Science, Logistics and Facility Management, Supply Chain Management, Agriculture and Land-use Planning) that dominate food supply chain systems and operations Includes case studies and applications

With the rise of mobile and wireless technologies, more sustainable networks are necessary to support such communications. These next generation networks can now be utilized to strengthen the growing era of the Internet of Things. Powering the Internet of Things With 5G Networks is a comprehensive reference source for the latest scholarly research on the progression and design of fifth generation networks and their role in supporting the Internet of Things. Including a range of perspectives on topics such as privacy and security, large scale monitoring, and scalable architectures, this book is ideally designed for technology developers, academics, researchers, and practitioners interested in the convergence of the Internet of Things and 5G networks.

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.

This book addresses one of the most overlooked practical, methodological, and moral questions in the journey to secure and handle the massive amount of data being generated from smart devices interactions: the integration of Blockchain with 5G-enabled IoT. After an overview, this book discusses open issues and challenges, which may hinder the growth of Blockchain technology. Then, this book presents a variety of perspectives on the most pressing questions in the field, such as: how IoT can connect billions of objects together; how the access control mechanisms in 5G-enabled industrial environment works; how to address the real-time and quality-of-service requirements for industrial applications; and how to ensure scalability and computing efficiency. Also, it includes a detailed discussions on the complexity of adoption of Blockchain for 5G-Enabled IoT and presents comparative case studies with respect to various performance evaluation metrics such as scalability, data management, standardization, interoperability and regulations, accessibility, human-factors engineering and interfaces, reliability, heterogeneity, and QoS requirements. This book acts as a professional guide for the practitioners in information security and related topics. Presents a professional guide to the interaction and promise of Blockchain, 5G, and IoT; Includes discussion of applications such as-Smart city, Smart home, Healthcare 4.0, Smart agriculture, Autonomous vehicles, and Supply chain management; Features a host of case studies to demonstrate the adoption of Blockchain for 5G-enabled IoT.

LPWAN Technologies for IoT and M2M Applications provides insight into LPWAN technologies, also presenting a wide range of applications and a discussion on security issues and future challenges and research directions. This book is a beneficial and insightful resource for university researchers, graduate students and R&D engineers who are designing networks and implementing IoT applications. To support new requirements for this emerging industry, a new paradigm of Low Power Wide Area Networks (LPWAN) has recently evolved, including LoRa, Sigfox and NB-IoT, hence this book presents the latest updates.

This book constitutes the proceedings of the Third International Conference on Computational Intelligence, Cyber Security, and Computational Models, ICC3 2017, which was held in Coimbatore, India, in December 2017. The 15 papers presented in this volume were carefully reviewed and selected from 63 submissions. They were organized in topical sections named: computational intelligence; cyber security; and computational models.

This six volume set LNCS 11063 – 11068 constitutes the thoroughly refereed conference proceedings of the 4th International Conference on Cloud Computing and Security, ICCCS 2018, held in Haikou, China, in June 2018. The 386 full papers of these six volumes were carefully reviewed and selected from 1743 submissions. The papers cover

ideas and achievements in the theory and practice of all areas of inventive systems which includes control, artificial intelligence, automation systems, computing systems, electrical and informative systems. The six volumes are arranged according to the subject areas as follows: cloud computing, cloud security, encryption, information hiding, IoT security, multimedia forensics

The Cloud in IoT-enabled Spaces addresses major issues and challenges in IoT-based solutions proposed for the Cloud. It paves the way for IoT-enabled spaces in the next generation cloud computing paradigm and opens the door for further innovative ideas. Topics include Cloud-based optimization in the IoT era, scheduling and routing, medium access, data caching, secure access, uncertainty, home automation, machine learning in wearable devices, energy monitoring, and plant phenotyping in farming. Smart spaces are solutions where Internet of Things (IoT)-enabling technologies have been employed towards further advances in the lifestyle. It tightly integrates with the existing Cloud infrastructure to impact several fields in academia and industry. The Cloud in IoT-enabled Spaces provides an overview of the issues around small spaces and proposes the most up-to-date alternatives and solutions. The objective is to pave the way for IoT-enabled spaces in the next-generation Cloud computing and open the door for further innovative ideas.

This book offers the first comprehensive view on integrated circuit and system design for the Internet of Things (IoT), and in particular for the tiny nodes at its edge. The authors provide a fresh perspective on how the IoT will evolve based on recent and foreseeable trends in the semiconductor industry, highlighting the key challenges, as well as the opportunities for circuit and system innovation to address them. This book describes what the IoT really means from the design point of view, and how the constraints imposed by applications translate into integrated circuit requirements and design guidelines. Chapter contributions equally come from industry and academia. After providing a system perspective on IoT nodes, this book focuses on state-of-the-art design techniques for IoT applications, encompassing the fundamental sub-systems encountered in Systems on Chip for IoT: ultra-low power digital architectures and circuits low- and zero-leakage memories (including emerging technologies) circuits for hardware security and authentication System on Chip design methodologies on-chip power management and energy harvesting ultra-low power analog interfaces and analog-digital conversion short-range radios miniaturized battery technologies packaging and assembly of IoT integrated systems (on silicon and non-silicon substrates). As a common thread, all chapters conclude with a prospective view on the foreseeable evolution of the related technologies for IoT. The concepts developed throughout the book are exemplified by two IoT node system demonstrations from industry. The unique balance between breadth and depth of this book: enables expert readers quickly to develop an understanding of the specific challenges and state-of-the-art solutions for IoT, as well as their evolution in the foreseeable future provides non-experts with a comprehensive introduction to integrated circuit design for IoT, and serves as an excellent starting point for further learning, thanks to the broad coverage of topics and selected references makes it very well suited for practicing engineers and scientists working in the hardware and chip design for IoT, and as textbook for senior undergraduate, graduate and postgraduate students (familiar with analog and digital circuits).

Hospitality managers are at a critical inflection point. Digital technology advancements are ramping up guest expectations and introducing nontraditional competitors that are beginning to disrupt the whole industry. The hospitality managers whose organizations are to thrive need to get their organizations into a position where they can effectively leverage digital technologies to simultaneously deliver breakthroughs in efficiency, agility, and guest experience. Hospitality Management and Digital Transformation is a much-needed guidebook to digital disruption and transformation for current and prospective hospitality and leisure managers. The book: • Explains digital technology advancements, how they cause disruption, and the implications of this disruption for hospitality and leisure organizations. • Explains the digital business and digital transformation imperative for hospitality and leisure organizations. • Discusses the different digital capabilities required to effectively compete as a digital business. • Discusses the new and/or enhanced roles hospitality and leisure managers need to play in effecting the different digital capabilities, as well as the competencies required to play these roles. • Discusses how hospitality and leisure managers can keep up with digital technology advancements. • Unpacks more than 36 key digital technology advancements, discussing what they are, how they work, and how they can be implemented across the hospitality and leisure industry. This book will be useful for advanced undergraduate and postgraduate students studying strategic management, IT, information systems, or digital business–related courses as part of degrees in hospitality and leisure management; as well as practitioners studying for professional qualifications.

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

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-enabled IoT.

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