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Smart Grid Security-Sanjay Goel 2015-04-28 This book on smart grid security is meant for a broad audience from managers to technical experts. It highlights security challenges that are faced in the smart grid as we widely deploy it across the landscape. It starts with a brief overview of the smart grid and then discusses some of the reported attacks on the grid. It covers network threats, cyber physical threats, smart metering threats, as well as privacy issues in the smart grid. Along with the threats the book discusses the means to improve smart grid security and the standards that are emerging in the field. The second part of the book discusses the legal issues in smart grid implementations, particularly from a privacy (EU data protection) point of view.

Security and Privacy in Smart Grid-Asmaa Abdallah 2018-07-26 This SpringerBrief addresses the main security concerns for smart grid, e.g., the privacy of electricity consumers, the exchanged messages integrity and confidentiality, the authenticity of participated parties, and the false data injection attacks. Moreover, the authors demonstrate in detail the various proposed techniques to secure the smart grid’s different communication networks and preserve the privacy of the involved. Over many years, power grid has generated electricity from central generators and distributed it in one direction from the generation stations to end-users; also, information is one directional so that the grid’s control center doesn’t get enough information about customers’ requirements and consequently can’t prevent electricity losses. So, the electricity grid is merged with information and communication technology to form smart grid. The main target of this incorporation is to connect different parties of power grid to exchange information about grid conditions and customers’ requirements, and consequently, improve the reliability and efficiency of electricity generation and distribution. That upgrade of the power grid exposes it to the cyber security threats that the communication networks suffer from, such as malicious attacks to forge the electricity consumption readings or price, extract personal information for residential consumers, such as daily habits and life style, or attack some grid’s resources and equipment availability using denial-of-service attacks. Also, novel threats are introduced in smart grid due to the power grid nature, such as false data injection attack, in which the adversary compromises several measurement units and injects false information about the grid conditions that mislead the grid’s control center to make wrong decisions for the grid and consequently impact on its stability and efficiency.

Enabling Secure and Privacy Preserving Communications in Smart Grids-Hongwei Li 2014-03-25 This brief focuses on the current research on security and privacy preservation in smart grids. Along with a review of the existing works, this brief includes fundamental system models, possible frameworks, useful performance, and future research directions. It explores privacy preservation demand response with adaptive key evolution, secure and efficient Merkle tree based authentication, and fine-grained keywords comparison in the smart grid auction market. By examining the current and potential security and privacy threats, the author equips readers to understand the developing issues in smart grids. The brief is designed for researchers and professionals working with computer communication networks and smart grids. Graduate students interested in networks and communication engineering will also find the brief an essential resource.

Solutions for Sustainability-Rafael Leal-Arcas 2019-08-26 This book explores links and synergies between international trade and two of the most urgent challenges of the 21st century: achieving sustainable energy (i.e., energy that is affordable, secure, and clean) and mitigating climate change. It takes the unique approach of not only examining how international trade can help achieve energy and climate goals, but also the impact of emerging tools and technologies such as smart grids and demand response, and the potential role and impact of citizens and prosumers. The book analyzes energy- and trade-related regulations in a range of jurisdictions to assess how conducive the regulation is towards achieving sustainable energy, and identifies gaps and overlaps in the existing legal framework.

Evolution of Smart Grids-Zubair Md. Fadlullah 2015-11-13 This SpringerBrief explores the opportunities and challenges posed by the smart grid. The evolution of the smart grid should allow consumers to directly communicate with their utility provider. However, complex issues such as architecture with legacy support, varying demand response and load management, varying price of power, and so forth can lead to various decision making challenges. It is essential to identify the scope and challenges of the smart grid in a comprehensive manner so as to ensure efficient delivery of sustainable, economic, and secure electricity supplies. This book provides an overview of the smart grid and its key advances in architecture, distribution management, demand-side response and load balancing, smart automation, electric storage, power loss minimization and security. Readers interested in a basic knowledge of electric grid and communication networks will find Evolution of Smart Grids useful. Readers who want more insight on smart grid research will also find this book a valuable resource.

Wireless Communications Networks for the Smart Grid-Quang-Dung Ho 2014-09-19 This brief presents a comprehensive review of the network architecture and communication technologies of the smart grid communication network (SGCN). It then studies the strengths, weaknesses and applications of two promising wireless mesh routing protocols that could be used to implement the SGCN. Packet transmission reliability, latency and robustness of these two protocols are evaluated and compared by simulations in various practical SGCN scenarios. Finally, technical challenges and open research opportunities of the SGCN are addressed. Wireless Communications Networks for Smart Grid provides communication network architects and engineers with valuable proven suggestions to successfully implement the SGCN. Advanced-level students studying computer science or electrical engineering will also find the content helpful.

Querying over Encrypted Data in Smart Grids-Mi Wen 2014-05-09 This SpringerBrief presents the concept of the smart grid architecture and investigates the security issues of the smart grid and the existing encrypted data query techniques. Unique characteristics of smart grid impose distinguished challenges on this investigation, such as multidimensional attributes in metering data and finer grained query on each dimension. Three kinds of queries are introduced, namely, equality query, conjunctive query and range query. For the equality query over encrypted metering data, an efficient searchable encryption scheme is introduced and can be applied for auction in emerging smart grid marketing. Later chapters examine the conjunctive query and range query over encrypted data. Different techniques are used, including the Public key Encryption with Keyword Search (PEKS) and Hidden Vector Encryption (HVE), to construct the comparison predicate and range query predicate. Their correctness is demonstrated in the book. Concise and practical, Encrypted Data Querying in Smart Grids is valuable for professionals and researchers involved in data privacy or encryption. It is also useful for graduate students interested in smart grid and related technologies.

Internet of Things for Smart Cities-Waleed Ejaz 2018-10-12 This book introduces the concept of smart city as the potential solution to the challenges created by urbanization. The Internet of Things (IoT) offers novel features with minimum human intervention in smart cities. This book describes different components of Internet of Things (IoT) for smart cities including sensor technologies, communication technologies, big data analytics and security.

Dynamic Spectrum Access for Wireless Networks-Danda B. Rawat 2015-03-09 This SpringerBrief presents adaptive resource allocation schemes for secondary users for dynamic spectrum access (DSA) in cognitive radio networks (CRNs) by considering Quality-of-Service requirements, admission control, power/rate control, interference constraints, and the impact of spectrum sensing or primary user interruptions. It presents the challenges, motivations, and applications of the different schemes. The authors discuss cloud-assisted geolocation-aware adaptive resource allocation in CRNs by outsourcing computationally intensive processing to the cloud. Game theoretic approaches are presented to solve resource allocation problems in CRNs. Numerical results are presented to evaluate the performance of the proposed methods. Adaptive Resource Allocation in Cognitive Radio Networks is designed for professionals and researchers working in the area of wireless networks. Advanced-level students in electrical engineering and computer science, especially those focused on wireless networks, will find this information helpful.

Security Challenges and Approaches in Internet of Things-Sridipta Misra 2016-09-03 This book provides a comprehensive survey of the security and privacy research advancements in Internet of Things (IoT). The book lays the context for the discussion by introducing a system model for IoT. Since IoT is very varied and has been introduced in many different contexts, the system model introduced plays a crucial role in integrating the concepts into a coherent framework. After the system model, the book introduces the vulnerable features of the IoT. By providing a comprehensive discussion of the vulnerable features, the book highlights the problem areas of IoT that should be studied concerning security and privacy. Using the vulnerable features as a motivation, the book presents a vast survey of existing security and privacy approaches for IoT. The survey is a good way for the reader to pick up interesting directions of research that have already been explored and also hints at directions that could take additional investigation. Finally, the book presents four case studies that provide a detailed view of how some of the security and privacy concerns are addressed in specific problem areas.

Information Security of Highly Critical Wireless Networks-Maurizio Martellini 2017-03-10 This SpringerBrief explores features of digital protocol wireless communications systems, and features of the emerging electrical smart grid. Both low power and high power wireless systems are described. The work also examines the cybersecurity vulnerabilities, threats and current levels of risks to critical infrastructures that rely on digital wireless technologies. Specific topics include areas of application for high criticality wireless networks (HCWN), modeling risks and vulnerabilities, governance and management frameworks, systemic mitigation, reliable operation, assessing effectiveness and efficiency, resilience testing, and accountability of HCWN. Designed for researchers and professionals, this SpringerBrief provides essential information for avoiding malevolent uses of wireless networks. The content is also valuable for advanced-level students interested in security studies or wireless networks.

Privacy-Enhancing Fog Computing and Its Applications-Xiaodong Lin 2018-11-12 This SpringerBrief covers the security and privacy challenges in fog computing, and proposes a new secure and privacy-preserving mechanisms to resolve these challenges for securing fog-assisted IoT applications. Chapter 1 introduces the architecture of fog-assisted IoT applications and the security and privacy challenges in fog computing. Chapter 2 reviews several promising privacy-enhancing techniques and illustrates examples on how to leverage these techniques to enhance the privacy of users in fog computing. Specifically, the authors divide the existing privacy-enhancing techniques into three categories: identity-hidden techniques, location privacy protection and data privacy enhancing techniques. The research is of great importance since security and privacy problems faced by fog computing impede the healthy development of its enabled IoT applications. With the advanced privacy-enhancing techniques, the authors propose three secure and privacy-preserving protocols for fog computing applications, including smart parking navigation, mobile crowdsensing and smart grid. Chapter 3 introduces identity privacy leakage in smart parking navigation systems, and proposes a privacy-preserving smart parking navigation system to prevent identity privacy exposure and support efficient parking guidance retrieval through road-side units (fogs) with high retrieving probability and security guarantees. Chapter 4 presents the location privacy leakage, during task allocation in mobile crowdsensing, and propose a strong privacy-preserving task allocation scheme that enables location-based task allocation and reputation-based report selection without exposing knowledge about the location and reputation for participators in mobile crowdsensing. Chapter 5 introduces the data privacy leakage in smart grid, and proposes an efficient and privacy-preserving smart metering protocol to allow collectors (fogs) to achieve real-time measurement collection with privacy-enhanced data aggregation. Finally, conclusions and future research directions are given in Chapter 6. This brief validates the significant feature extension and efficiency improvement of IoT devices without sacrificing the security and privacy of users against dishonest fog nodes. It also provides valuable insights on the security and privacy protection for fog-enabled IoT applications. Researchers and professionals who carry out research on security and privacy in wireless communication will want to purchase this SpringerBrief. Also, advanced level students, whose main research area is mobile network security will also be interested in this SpringerBrief.

Secure and Privacy-Preserving Data Communication in Internet of Things-Liehuang Zhu 2017-02-22 This book mainly concentrates on protecting data security and privacy when participants communicate with each other in the Internet of Things (IoT). Technically, this book categorizes and introduces a collection of secure and privacy-preserving data communication schemes/protocols in three traditional scenarios of IoT: wireless sensor networks, smart grid and vehicular ad-hoc networks recently. This book presents three advantages which will appeal to readers. Firstly, it broadens reader’s horizon in IoT by touching on three interesting and complementary topics: data aggregation, privacy protection, and key agreement and management. Secondly, various cryptographic schemes/protocols used to protect data confidentiality and integrity is presented. Finally, this book will illustrate how to design practical systems to implement the algorithms in the context of IoT communication. In summary, readers can simply learn and directly apply the new technologies to communicate data in IoT after reading this book.

The Electricity Grid in Indonesia-K. Kunaifi 2020-02-05 In 2017, nearly 60 million households in Indonesia were connected to the national power grid. Accordingly, we believe that their ‘voice’ is important to maintain democratic and participatory values in planning electricity services. However, what is actually the voice of electricity users in Indonesia? Also, what can we learn from it when looking at the fitness of the electricity supply in Indonesia in the context of costs, reliability, and environmental aspects? This book presents the real experience of households, some of the grid users in Indonesia. Through a series of surveys in 2017, households in three cities in Western, Central, and Eastern Indonesia shared their experiences and preferences regarding their electricity supply. They offered their opinions about the stability and reliability of electricity supply, how they coped with blackouts, and what impacts power interruptions had on their daily lives. Because of the frequent power outages, the users started to think about the importance of having a back-up power generator at home. Given that Indonesia has high solar irradiance the whole year through, we also observed the users’ attitudes toward solar photovoltaic (PV) systems. The book starts with a brief introduction about Indonesia followed by the status and challenges of power supply in the country. Then, in the middle section, the users’ voices are presented. Finally, the potential of PV systems, as a promising solution to increasing electricity access and improving the reliability of electricity supply in this tropical country, is presented. We believe that this book provides useful information for the transition to the use of solar energy in energy systems in Indonesia, which is meant for academia, electric utility companies, PV system actors, policymakers, and of course, households in Indonesia.

Communication Challenges and Solutions in the Smart Grid-Fayçal Bouhafs 2014-10-31 This SpringerBrief discusses the rise of the smart grid from the perspective of computing and communications. It explains how current and next-generation network technology and methodologies help recognize the potential that the smart grid initiative promises. Chapters provide context on the smart grid before exploring specific challenges related to communication control and energy management. Topics include control in heterogeneous power supply, solutions for backhaul and wide area networks, home energy management systems, and technologies for smart energy management systems. Designed for researchers and professionals working on the smart grid, Communication Challenges and Solutions in the Smart Grid offers context and applications for the common issues of this developing technology. Advanced-level students interested in networking and communications engineering will also find the brief valuable.

Social Network Forensics, Cyber Security, and Machine Learning-P. Venkata Krishna 2018-12-29 This book discusses the issues and challenges in Online Social Networks (OSNs). It highlights various aspects of OSNs consisting of novel social network strategies and the development of services using different computing models. Moreover, the book investigates how OSNs are impacted by cutting-edge innovations.

Internet of Things-Fatima Hussain 2017-05-03 This book describes the building blocks and introductory business models for Internet of Things (IoT). The author provide an overview of the entire IoT architecture and constituent layers, followed by detail description of each block . Various inter-connecting technologies and sensors are discussed in context of IoT networks. In addition to this, concepts of Big Data and Fog Computing are presented and characterized as per data generated by versatile IoT applications . Smart parking system and context aware services are presented as an hybrid model of cloud and Fog Afterwards, various IoT applications and respective business models are discussed. Finally, author summarizes the IoT building blocks and identify research issues in each, and suggest potential research projects worthy of pursuing.

Smart Metering Design and Applications-K.S.K Weranga 2013-10-04 Taking into account the present day trends and the requirements, this Brief focuses on smart metering of electricity for next generation energy efficiency and conservation. The contents include discussions on the smart metering concepts and existing technologies and systems as well as design and implementation of smart metering schemes together with detailed examples.

Power-to-Gas: Technology and Business Models-Markus Lehner 2014-07-18 Increased production of energy from renewable sources leads to a need for both new and enhanced capacities for energy transmission and intermediate storage. The book first compares different available storage options and then introduces the power-to-gas concept in a comprehensive overview of the technology. The state of the art, advancements, and future requirements for both water electrolysis and methanation are described. The integration of renewable hydrogen and methane into the gas grid is discussed in terms of the necessary technological measures to be taken. Because the power-to-gas system is very flexible, providing numerous specific applications for different targets within the energy sector, possible business models are presented on the basis of various process chains taking into account different plant scales and operating scenarios. The influence of the scale and the type of the integration of the technology into the

existing energy network is highlighted with an emphasis on economic consequences. Finally, legal aspects of the operation and integration of the power-to-gas system are discussed.

Cyber-Risk Management-Atle Refsdal 2015-10-01 This book provides a brief and general introduction to cybersecurity and cyber-risk assessment. Not limited to a specific approach or technique, its focus is highly pragmatic and is based on established international standards (including ISO 31000) as well as industrial best practices. It explains how cyber-risk assessment should be conducted, which techniques should be used when, what the typical challenges and problems are, and how they should be addressed. The content is divided into three parts. First, part I provides a conceptual introduction to the topic of risk management in general and to cybersecurity and cyber-risk management in particular. Next, part II presents the main stages of cyber-risk assessment from context establishment to risk treatment and acceptance, each illustrated by a running example. Finally, part III details four important challenges and how to reasonably deal with them in practice: risk measurement, risk scales, uncertainty, and low-frequency risks with high consequence. The target audience is mainly practitioners and students who are interested in the fundamentals and basic principles and techniques of security risk assessment, as well as lecturers seeking teaching material. The book provides an overview of the cyber-risk assessment process, the tasks involved, and how to complete them in practice.

Big Data-Min Chen 2014-05-05 This Springer Brief provides a comprehensive overview of the background and recent developments of big data. The value chain of big data is divided into four phases: data generation, data acquisition, data storage and data analysis. For each phase, the book introduces the general background, discusses technical challenges and reviews the latest advances. Technologies under discussion include cloud computing, Internet of Things, data centers, Hadoop and more. The authors also explore several representative applications of big data such as enterprise management, online social networks, healthcare and medical applications, collective intelligence and smart grids. This book concludes with a thoughtful discussion of possible research directions and development trends in the field. Big Data: Related Technologies, Challenges and Future Prospects is a concise yet thorough examination of this exciting area. It is designed for researchers and professionals interested in big data or related research. Advanced-level students in computer science and electrical engineering will also find this book useful.

Homomorphic Signature Schemes-Giulia Traverso 2016-04-21 Homomorphic signature schemes are an important primitive for many applications and since their introduction numerous solutions have been presented. Thus, in this work we provide the first exhaustive, complete, and up-to-date survey about the state of the art of homomorphic signature schemes. First, the general framework where homomorphic signatures are defined is described and it is shown how the currently available types of homomorphic signatures can then be derived from such a framework. In addition, this work also presents a description of each of the schemes presented so far together with the properties it provides. Furthermore, three use cases, electronic voting, smart grids, and electronic health records, where homomorphic signature schemes can be employed are described. For each of these applications the requirements that a homomorphic signature scheme should fulfill are defined and the suitable schemes already available are listed. This also highlights the shortcomings of current solutions. Thus, this work concludes with several ideas for future research in the direction of homomorphic signature schemes.

Spain's Photovoltaic Revolution-Pedro A. Prieto 2013-01-04 The Energy Return on Energy Invested (EROI or EROEI) is the amount of energy acquired from a particular energy source divided by the energy expended, or invested, in obtaining that energy. EROI is an essential and seemingly simple measure of the usable energy or "energy profit" from the exploitation of an energy source, but it is not so easy to determine all of the energy expenditures that should be included in the calculation. Because EROI values are generally low for renewable energy sources, differences in these estimates can lead to sharply divergent conclusions about the viability of these energy technologies. This book presents the first complete energy analysis of a large-scale, real-world deployment of photovoltaic (PV) collection systems representing 3.5 GW of installed, grid-connected solar plants in Spain. The analysis includes all of the factors that limit and adjust the real electricity output through one full-year cycle, and all of the fossil fuel inputs required to achieve these results. The authors' comprehensive analysis of energy inputs, which assigns energy cost estimates to all financial expenditures, yields EROI values that are less than half of those claimed by other investigators and by the solar industry. Sensitivity analysis is used to test various assumptions in deriving these EROI estimates. The results imply that the EROI of current, large-scale PV systems may be too low to seamlessly support an energy and economic transition away from fossil fuels. Given the pervasiveness of fossil fuel subsidies in the modern economy, a key conclusion is that all components of the system that brings solar power to the consumer, from manufacturing to product maintenance and life cycle, must be improved in terms of energy efficiency. The materials science of solar conversion efficiency is only one such component. Sunny Spain represented an ideal case study as the country had the highest penetration of solar PV energy at 2.3 percent of total national demand as well as state-of-the-art expertise in solar power including grid management of intermittent, modern renewable systems. This book, written by a uniquely qualified author team consisting of the chief engineer for several major photovoltaic projects in Spain and the world's leading expert on the concept and application of EROI, provides a comprehensive understanding of the net energy available to society from energy sources in general and from functioning PV installations under real-world conditions in particular. The authors provide critical insight into the capacity of renewable energy sources to fill the foreseeable gap between world energy demand and depletion rates for fossil fuels. · Presents the first comprehensive study of the EROI of large-scale solar PV systems in a developed country · Uses real-world operational data rather than laboratory approximations and extrapolations · Describes the dependence of one alternative energy source on the goods and services of a fossil-fueled economy · Has global implications for the potential of renewable energy sources to replace dwindling reserves of fossil fuels · Written with the first-hand knowledge of the chief, on-site engineer for many solar installations in Spain together with the leader in the development and application of the concept of EROI

Location Privacy in Mobile Applications-Bo Liu 2018-08-30 This book provides a comprehensive study of the state of the art in location privacy for mobile applications. It presents an integrated five-part framework for location privacy research, which includes the analysis of location privacy definitions, attacks and adversaries, location privacy protection methods, location privacy metrics, and location-based mobile applications. In addition, it analyses the relationships between the various elements of location privacy, and elaborates on real-world attacks in a specific application. Furthermore, the book features case studies of three applications and shares valuable insights into future research directions. Shedding new light on key research issues in location privacy and promoting the advance and development of future location-based mobile applications, it will be of interest to a broad readership, from students to researchers and engineers in the field.

Content-Centric Networks-Syed Hassan Ahmed 2016-03-02 This book introduces Content-Centric Networking (CCN), a networking paradigm that provides a simple and effective solution to the challenging demands of future wired and wireless communications. It provides an overview of the recent developments in the area of future internet technologies, bringing together the advancements that have been made in Information-Centric Networking (ICN) in general, with a focus on CCN. It begins with an introduction to the basics of CCN is followed by an overview of the current internet paradigm and its challenges. Next, an application perspective has been included, where the authors encompass the selected applications for CCN with recent refereed research and developments. These applications include Internet of Things (IoT), Smart Grid, Vehicular Ad hoc Networks (VANETs), and Wireless Sensor Networks (WSNs). The book is a useful reference source for practising researchers, and can be used as supporting material for undergraduate and graduate level courses in computer science and electrical engineering.

Modeling and Evaluating Denial of Service Attacks for Wireless and Mobile Applications-Zhou Lu 2015-11-05 This SpringerBrief covers modeling and analysis of Denial-of-Service attacks in emerging wireless and mobile applications. It uses an application-specific methodology to model and evaluate denial-of-service attacks. Three emerging applications are explored: multi-modal CSMA/CA networks, time-critical networks for the smart grid, and smart phone applications. The authors define a new performance metric to quantify the benefits of backoff misbehavior and show the impacts of a wide range of backoff mishandling nodes on the network performance, and propose a scheme to minimize the delay of time-critical message delivery under jamming attacks in smart grid applications. An investigation on the resilience of mobile services against malware attacks is included to advance understanding of network vulnerabilities associated with emerging wireless networks and offers instrumental guidance into the security design for future wireless and mobile applications. This book is appropriate for students, faculty, engineers, and experts in the technical area of wireless communication, mobile networks and cyber security.

The Use Case and Smart Grid Architecture Model Approach-Marion Gottschalk 2017-01-10 This book introduces readers to the fundamentals of the IEC 62559 Use Case Methodology, explains how it is related to the Smart Grid Architecture Model (SGAM), and details how a holistic view for both architecture and requirements engineering can be achieved. It describes a standardized and holistic approach to requirements engineering for smart grid projects based on work conducted in the context of the EU M/490 standardization mandate. Over the last years, this method has been established in Europe as the basic building block of requirements engineering in the utilities sector. The authors present a canonical, structured approach that users can apply to the Use Case Methodology and the SGAM, as well as open tools for this purpose. The application in various domains outside the smart grid is also discussed, as it can be used for critical infrastructures or system-of-systems domains like Industrie 4.0 and Ambient Assisted Living. Accordingly, the book also presents various architecture models for different fields of application, like EMAM, SCIAM, RAMI 4.0, and MAF.

Fire Detection in Warehouse Facilities-Joshua Dinaburg 2013-08-19 Automatic sprinklers systems are the primary fire protection system in warehouse and storage facilities. The effectiveness of this strategy has come into question due to the challenges presented by modern warehouse facilities, including increased storage heights and areas, automated storage retrieval systems (ASRS), limitations on water supplies, and changes in firefighting strategies. The application of fire detection devices used to provide early warning and notification of incipient warehouse fire events is being considered as a component of modern warehouse fire protection. Fire Detection in Warehouse Facilities provides technical information to aid in the development of guidelines and standards for the use of fire detection technologies for modern warehouse fire protection. The authors share their thorough literature review, analyze characteristic fire hazards for modern warehouse facilities, and identify information gaps in the field. The book concludes with recommendations for the development of guidelines and standards for the use of detection technologies in warehouse fire protection design, including a research plan for implementation. This book is intended for practitioners seeking an understanding of the issues surrounding warehouse design and fire protection. The book will also prove valuable for fire hazard researchers and those involved with fire department response, applicable detection systems, and fire growth suppression.

Understanding the Bigger Energy Picture-Michael Düren 2017-05-10 This book is open access under a CC BY 4.0 license. This book focuses on the global cycles of energy, water and carbon, which are not only the essentials of our main energy carriers, the fossil fuels, but are also the building blocks of life. The book offers an overview of the basic scientific facts and relationships that are needed to understand today's energy generation and use, how they relate to global climate, the water cycle and other resources, and the complexities of energy policy. Building on the work of the Desertec project, it presents the main technological options that we will have in a world after the "Energiewende" and presents the possible future solutions for a sustainable world. The book is written in an engaging, descriptive style that can be understood by those without specific knowledge of science or economics and allows readers to form their own conclusions. Controversy rages over energy problems, climate change and their possible solutions. Expressions like "climate deniers", "renaissance of nuclear energy", "stop the war on coal", and "Energiewende now" represent a diversity of opinions that divide our society and political leaders. This book shows the reader the whole energy picture and how it is part of the wider global problems of overpopulation and uncontrolled economies in a world of limited resources.

Communication Networks for Smart Grids-Kenneth C. Budka 2014-02-06 This book presents an application-centric approach to the development of smart grid communication architecture. The coverage includes in-depth reviews of such cutting-edge applications as advanced metering infrastructure, distribution automation, demand response and synchrophasors. Features: examines a range of exciting utility applications made possible through smart grid evolution; describes the core-edge network architecture for smart grids, introducing the concept of WANs and FANs; explains how the network design paradigm for smart grids differs from that for more established data networks, and discusses network security in smart grids; provides an overview of communication network technologies for WANs and FANs, covering OPGW, PLC, and LTE and MPLS technology; investigates secure data-centric data management and data analytics for smart grids; discusses the transformation of a network from conventional modes of utility operation to an integrated network based on the smart grid architecture framework.

Failing States, Collapsing Systems-Nafeez Mosaddeq Ahmed 2016-11-26 This work executes a unique transdisciplinary methodology building on the author's previous book, A User's Guide to the Crisis of Civilization: And How to Save it (Pluto, 2010), which was the first peer-reviewed study to establish a social science framework for the integrated analysis of crises across climate, energy, food, economic, terror and the police state. Since the 2008 financial crash, the world has witnessed an unprecedented outbreak of social unrest in every major continent. Beginning with the birth of the Occupy movement and the Arab Spring, the eruption of civil disorder continues to wreak havoc unpredictably from Greece to Ukraine, from China to Thailand, from Brazil to Turkey, and beyond. Yet while policymakers and media observers have raced to keep up with events, they have largely missed the biophysical triggers of this new age of unrest - the end of the age of cheap fossil fuels, and its multiplying consequences for the Earth's climate, industrial food production, and economic growth. This book for the first time develops an empirically-ground theoretical model of the complex interaction between biophysical processes and geopolitical crises, demonstrated through the analysis of a wide range of detailed case studies of historic, concurrent and probable state failures in the Middle East, Northwest Africa, South and Southeast Asia, Europe and North America. Geopolitical crises across these regions, Ahmed argues, are being driven by the proliferation of climate, food and economic crises which have at their root the common denominator of a fundamental and permanent disruption in the energy basis of industrial civilization. This inevitable energy transition, which will be completed well before the close of this century, entails a paradigm shift in the organization of civilization. Yet for this shift to result in a viable new way of life will require a fundamental epistemological shift recognizing humanity's embeddedness in the natural world. For this to be achieved, the stranglehold of conventional models achieved through the hegemony of establishment media reporting - dominated by fossil fuel interests - must be broken. While geopolitics cannot be simplistically reduced to the biophysical, this book shows that international relations today can only be understood by recognizing the extent to which the political is embedded in the biophysical. Although the book offers a rigorous scientific analysis, it is written in a clean, journalistic style to ensure readability and accessibility to a general audience. It will contain a large number of graphical illustrations concerning oil production data, population issues, the food price index, economic growth and debt, and other related issues to demonstrate the interconnections and correlations across key sectors.

Cooperative Wireless Communications-Yan Zhang 2009-03-10 Cooperative devices and mechanisms are increasingly important to enhance the performance of wireless communications and networks, with their ability to decrease power consumption and packet loss rate and increase system capacity, computation, and network resilience. Considering the wide range of applications, strategies, and benefits associated with cooperative wireless communications, researchers and product developers need a succinct understanding of relevant theory, fundamentals, and techniques to navigate this challenging field. Cooperative Wireless Communications provides just that. Assesses Applications, Benefits, and Methods of Cooperative Strategies This comprehensive reference handbook contains useful background to develop and implement cooperative mechanisms for infrastructure-based wireless systems and self-organizing multi-hop wireless networks (e.g., ad hoc, mesh, peer-to-peer, and sensor networks). It introduces key cooperative strategies and details recent improvements to a variety of cooperative mechanisms and frameworks applicable in diverse scenarios. Addressing fundamentals and techniques, this invaluable reference: Offers comprehensive guidance on technical, practical, and deployment aspects of cooperative strategies and the latest IEEE standard specifications Explores key challenges and solutions in 3G, B3G, 4G WiMAX, and ad hoc, mesh, and sensor networks Covers cooperative diversity, virtual MIMO, cognitive radio networks, and resource and mobility management Discusses energy efficiency, relaying strategy, routing, MAC, topology control, and security Provides Guidance to Resolve Key Challenges A distinct introduction to different cooperative mechanisms, cooperation frameworks in diverse scenarios, and recent improvements to wireless network performance, this one-stop reference consolidates the essential information and guidance that readers will need to resolve key challenges in various protocol issues from a cooperation perspective.

Graph Theory Applications to Deregulated Power Systems-Ricardo Moreno Chuquen 2020-10-26 This book provides a detailed description of network science concepts applied to power systems and electricity markets, offering an appropriate blend of theoretical background and practical applications for operation and power system planning. It discusses an approach to understanding power systems from a network science perspective using the direct recognition of the interconnectivity provided by the transmission system. Further, it explores the network properties in detail and characterizes them as a tool for online and offline applications for power system operation. The book includes an in-depth explanation of electricity markets problems that can be addressed from a graph theory perspective. It is intended for advanced undergraduate and graduate students in the fields of electric energy systems, operations research, management science and economics. Practitioners in the electric energy sector also benefit from the concepts and techniques presented here.

Software Defined Systems-Deze Zeng 2019-11-25 This book introduces the software defined system concept, architecture, and its enabling technologies such as software defined sensor networks (SDSN), software defined radio, cloud/fog radio access networks (C/F-RAN), software defined networking (SDN), network function virtualization (NFV), software defined storage, virtualization and docker. The authors also discuss the resource allocation and task scheduling in software defined system, mainly focusing on sensing, communication, networking and computation. Related case studies on SDSN, C/F-RAN, SDN, NFV are included in this book, and the authors discuss how these technologies cooperate with each other to enable cross resource management and task scheduling in software defined system. Novel resource allocation and task scheduling algorithms are introduced and evaluated. This book targets researchers, computer scientists and engineers who are interested in the information system softwareization technologies, resource allocation and optimization algorithm design, performance evaluation and analysis, next-generation communication and networking technologies, edge computing, cloud computing and IoT. Advanced level students studying these topics will benefit from this book as well.

ITIL® 2011 At a Glance-John O. Long 2012-07-01 "ITIL® 2011 At a Glance" is an important update to the internationally-recognized ITIL® best practices for IT Service Management. "ITIL® 2011 At a Glance" provides graphical and textual memory joggers for the primary concepts of those best practices. IT organizations worldwide are implementing ITIL® as a vehicle for improving IT service quality and improve return on investment for IT services. This book is an update based on the ITIL 2011 Update. The desk reference's unique graphical approach will take otherwise complex textual descriptions and make the information accessible in a series of consistent, simple diagrams. "ITIL® 2011 At a Glance" will be of interest to organizations looking to train their staffs in a consistent and cost-effective way. Further, this book is ideal for anyone involved in planning consulting, implementing, or testing an ITIL® implementation.

Cybersecurity in France-Philippe Baumard 2017-05-02 This Brief presents the overarching framework in which each nation is developing its own cyber-security policy, and the unique position adopted by France. Modern informational crises have penetrated most societal arenas, from healthcare, politics, economics to the conduct of business and welfare. Witnessing a convergence between information warfare and the use of "fake news", info-destabilization, cognitive warfare and cyberwar, this book brings a unique perspective on modern cyberwarfare campaigns, escalation and de-escalation of cyber-conflicts. As organizations are more and more dependent on information for the

continuity and stability of their operations, they also become more vulnerable to cyber-destabilization, either genuine, or deliberate for the purpose of gaining geopolitical advantage, waging wars, conducting intellectual theft and a wide range of crimes. Subsequently, the regulation of cyberspace has grown into an international effort where public, private and sovereign interests often collide. By analyzing the particular case of France national strategy and capabilities, the authors investigate the difficulty of obtaining a global agreement on the regulation of cyber-warfare. A review of the motives for disagreement between parties suggests that the current regulation framework is not adapted to the current technological change in the cybersecurity domain. This book suggests a paradigm shift in handling and anchoring cyber-regulation into a new realm of behavioral and cognitive sciences, and their application to machine learning and cyber-defense.

Critical Information Infrastructures Security-Grigore Havarneanu 2017-11-21 This book constitutes the post-conference proceedings of the 11th International Conference on Critical Information Infrastructures Security, CRITIS 2016, held in Paris, France, in October 2016. The 22 full papers and 8 short papers presented were carefully reviewed and selected from 58 submissions. They present the most recent innovations, trends, results, experiences and concerns in selected perspectives of critical information infrastructure protection covering the range from small-scale cyber-physical systems security via information infrastructures and their interaction with national and international infrastructures.

Renewables for Energy Access and Sustainable Development in East Africa-Manfred Hafner 2019-01-01 This short open access book investigates the role of renewable energy in East Africa to provide policy-relevant inputs for the achievement of a cost-effective electrification process in the region. For each country, the authors review the current situation in the domestic power sector, adopt a GIS-based approach to plot renewable energy resources potential, and review currently planned projects and projects under development, as well as the key domestic renewables regulations. Based on such information, least-cost 100% electrification scenarios by 2030 are then modelled and comparative results over the required capacity additions and investment are reported and discussed. The authors also inquire into some of the key technological, economic, policy, cooperation, and financing challenges to the development of a portfolio of renewables to promote energy access in a sustainable way, including a discussion of the challenges and opportunities that might stem from the interaction between local RE potential and natural gas resources currently under development in the region. To conclude, policy recommendations based on the book's results and targeted at international cooperation and development institutions, local policymakers, and private stakeholders in the region are elaborated.

Big Data in Context-Thomas Hoeren 2017-10-17 This book is open access under a CC BY 4.0 license. This book sheds new light on a selection of big data scenarios from an interdisciplinary perspective. It features legal, sociological and economic approaches to fundamental big data topics such as privacy, data quality and the ECJ's Safe Harbor decision on the one hand, and practical applications such as smart cars, wearables and web tracking on the other. Addressing the interests of researchers and practitioners alike, it provides a comprehensive overview of and introduction to the emerging challenges regarding big data. All contributions are based on papers submitted in connection with ABIDA (Assessing Big Data), an interdisciplinary research project exploring the societal aspects of big data and funded by the German Federal Ministry of Education and Research. This volume was produced as a part of the ABIDA project (Assessing Big Data, 01IS15016A-F). ABIDA is a four-year collaborative project funded by the Federal Ministry of Education and Research. However the views and opinions expressed in this book reflect only the authors' point of view and not necessarily those of all members of the ABIDA project or the Federal Ministry of Education and Research.

EIoT-Steffi O. Muhanji 2019-01-01 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.

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