

Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

Become an expert in implementing advanced, network-related tasks with Python. About This Book
the skills to perform all networking tasks using Python with ease Use Python for network device
automation, DevOps, and software-defined networking Get practical guidance to networking with
Python Who This Book Is For If you are a network engineer or a programmer who wants to use Python
for networking, then this book is for you. A basic familiarity with networking-related concepts such as
TCP/IP and a familiarity with Python programming will be useful. What You Will Learn Review the
fundamentals of Python and the TCP/IP suite Use Python to execute commands when the device does not
support the API or programmatic interaction with the device Implement automation techniques for
integrating Python with Cisco, Juniper, and Arista eAPI Integrate Ansible using Python to control
Cisco, Juniper, and Arista networks Achieve network security with Python Build Flask-based web
service APIs with Python Construct a Python-based migration plan from a legacy to scalable SDN
based network. In Detail This book begins with a review of the TCP/IP protocol suite and a review of
the core elements of the Python language. Next, you will start using Python and supported libraries to
automate network tasks from the current major network vendors. We will look at automating network
devices based on the command-line interface, as well as newer devices with API support. Finally,
hands-on labs. We will then learn the concepts and practical use cases of the Ansible framework.

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

order to achieve your network goals. We will then move on to using Python for DevOps, starting with using open source tools to test, secure, and analyze your network. Then, we will focus on network monitoring and visualization. We will learn how to retrieve network information using a polling mechanism, flow-based monitoring, and visualizing the data programmatically. Next, we will learn how to use the Python framework to build your own customized network web services. In the last part, we will use Python for SDN, where you will use a Python-based controller with OpenFlow in a hands-on lab to learn its concepts and applications. We will compare and contrast OpenFlow, OpenStack, OpenDaylight, and NFV. Finally, you will use everything you've learned in the book to construct a migration plan to go from a legacy to a scalable SDN-based network. Style and approach An easy-to-follow guide packed with hands-on examples of using Python for network device automation, network security, and SDN.

This book highlights the importance of security in the design, development and deployment of networks based on Software-Defined Networking (SDN) and Network Functions Virtualization (NFV), together referred to as SDNFV. Presenting a comprehensive guide to the application of security mechanisms in the context of SDNFV, the content spans fundamental theory, practical solutions, and potential applications in future networks. Topics and features: introduces the key security challenges of SDN/NFV and Cloud Computing, providing a detailed tutorial on NFV security; discusses the issue of security in SDN/NFV environments, covering roots of trust services, and proposing a technique to evaluate security by exploiting remote attestation; reviews a range of specific SDNFV security solutions, including a security detection and remediation framework, and a security policy transition framework for SDN; describes the implementation of a virtual home gateway, and a project that combines dynamic security with big-data analytics to detect network-wide threats; examines the security implications of

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

evolving and future networks, from network-based threats to Industry 4.0 machines, to the requirements for 5G; investigates security in the Observe, Orient, Decide and Act (OODA) paradigm and proposes a monitoring solution for a Named Data Networking (NDN) architecture; includes questions in each chapter, to test the reader's understanding of each of the key concepts described. This informative and practical volume is an essential resource for researchers interested in the SDNFV systems to address a broad range of network security challenges. The work will also benefit to practitioners wishing to design secure next-generation communication networks, or new security-related mechanisms for SDNFV systems.

This open access book was prepared as a Final Publication of the COST Action IC1304 "Autonomous Control for a Reliable Internet of Services (ACROSS)". The book contains 14 chapters and consists of a show-case of the main outcome of the Action in line with its scientific goals. It will serve as a reference for undergraduate and post-graduate students, educators, faculty members, researchers, engineers, and research strategists working in this field. The explosive growth of the Internet fundamentally changed the global society. The emergence of concepts like SOA, SaaS, PaaS, IaaS, NaaS, and Cloud Computing in general has catalyzed the migration from the information-oriented Internet into an Internet of Services (IoS). This has opened up virtually unbounded possibilities for the creation of new and innovative services that facilitate business processes and improve the quality of services. However, this also calls for new approaches to ensuring the quality and reliability of these services. The objective of this book is, by applying a systematic approach, to assess the state-of-the-art and consolidate the main research results achieved in this area.

Design your networks to successfully manage their growing complexity Network professionals have often been told that today's modern control planes would simplify their networks. The opposi-

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

happened: Technologies like SDN and NFV, although immensely valuable, are exacerbating complexity instead of solving it. Navigating Network Complexity is the first comprehensive guide to managing complexity in both deployment and day-to-day operations. Russ White and Jeff Tantsura introduce modern complexity theory from the standpoint of the working network engineer, helping you solve the practical problems you face every day. Avoiding complex mathematical models, they show how to characterize network complexity, so you can understand it and control it. The authors examine techniques and technologies associated with network control planes, including SDNs, fast reroute, segment routing, service chaining, and cloud computing. They reveal how each of these affects network design and complexity and help you anticipate causes of failure in highly complex systems. Next, they turn to modern control planes, examining the fundamental operating principles of SDNs, such as OpenFlow and I2RS, network and other service function virtualization, content distribution networks, Layer 2 fabrics, and service chaining solutions. You'll learn how each of these might both reduce and increase complexity in network design and operations and what you can do about it. Coverage includes:

- Defining complexity, understanding its components, and measuring it
- Mastering a straightforward "state, speed, and surface" model for analyzing complexity
- Controlling complexity in design, deployment, operations, protocols, and programmable networks
- Understanding how complex networks begin to fail and how to prevent failure
- Recognizing complexity tradeoffs in service function virtualization and service chaining
- Managing new challenges of complexity in virtualized and cloud environments
- Learning why constructs such as hierarchical design, aggregation, and protocol distribution work and when they work best
- Choosing the right models to contain complexity as your network changes

From start to finish, Navigating Network Complexity helps you assess the true impact of new network technologies, so they can capture more value with fewer problems.

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

Virtualized Software-Defined Networks and Services

Security in Network Functions Virtualization

Auditor's Guide to Information Systems Auditing

Orchestrating and Automating Security for the Internet of Things

Network Functions Virtualization (NFV) with a Touch of SDN

Architecture and Applications

17th EAI International Conference, SecureComm 2021, Virtual Event, September 6–9, 2021, Proceedings, Part II

This comprehensive new resource presents the latest developments in key Software-Defined Network (SDN) technologies including SDN controllers, network control and management applications, southbound protocols, and northbound interfaces. NFV technologies are reviewed, including network function virtualization infrastructure, virtualized network functions, virtual network management and orchestration.

Professionals find comprehensive discussions on the relationship between SDN and NFV and how they may integrate into unified future network architecture. Virtualization network services including, cloud, carrier Ethernet services, and IP VPN services are also covered.

This book reports on the latest advances from both industry and academia on ubiquitous intelligence and how it is enabled by 5G/6G communication technologies. The authors cover network protocol and architecture design, machine learning and artificial

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

intelligence, coordinated control and digital twins technologies, and security and privacy enhancement for ubiquitous intelligence. The authors include recent studies of performance analysis and enhancement of the Internet of Things, cyber-physical systems, edge computing, and cyber twins, all of which provide importance guidance and theoretical tools for developing future ubiquitous intelligence. The content of the book will be of interest to students, educators, and researchers in academia, industry, and research laboratories. Provides comprehensive coverage of enabling communications, computing, and control technologies for ubiquitous intelligence; Presents a novel paradigm of ubiquitous intelligence powered by broadband communications, computing, and control; Includes a review of 5G/6G communication technologies, network protocol and architecture design, and ubiquitous computing.

Explore the emerging definitions, protocols, and standards for SDN—software-defined, software-driven, programmable networks—with this comprehensive guide. Two senior network engineers show you what's required for building networks that use software for bi-directional communication between applications and the underlying network infrastructure. This vendor-agnostic book also presents several SDN use cases, including bandwidth scheduling and manipulation, input traffic and triggered actions, as well as some interesting use cases around big data, data center overlays, and network-function virtualization. Discover how enterprises and service providers alike are pursuing SDN as

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

it continues to evolve. Explore the current state of the OpenFlow model and centralized network control Delve into distributed and central control, including data plane generation Examine the structure and capabilities of commercial and open source controllers Survey the available technologies for network programmability Trace the modern data center from desktop-centric to highly distributed models Discover new ways to connect instances of network-function virtualization and service chaining Get detailed information on constructing and maintaining an SDN network topology Examine an idealized SDN framework for controllers, applications, and ecosystems

Telecommunication networks are continually evolving and are deeply impacted by new technologies such as Software Defined Networking (SDN), Software Defined Wireless Networking (SDWN) and Network Functions Virtualization (NFV) paradigms. Research and solutions that explore new concepts, however, need to be tested in controlled environments, provide reliable results, and preferably have portability to physical network infrastructures. Thus, seeking to fill an important gap about experimenting with projects and research on wireless networks, the Mininet-WiFi emulator was developed. Also capable of emulating the wired medium, Mininet-WiFi can be used as a tool in the process of teaching computer networks for various levels of education and addressing multiple case studies including mobility, mesh and ad hoc networks, load balancing, security, quality. of Service (QoS), MultiPath TCP (MP-TCP), vehicular networks, IoT,

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

P4, among others. This book takes an approach to the world of wireless networking with an emphasis on experimentation and case studies, which are separated at different levels of complexity, but always following a didactic step-by-step approach, with access to source code for reproducing activities. proposed practices and supplemented with additional readings and demonstrative videos.

IBM Software Defined Environment

Software Defined Mobile Networks (SDMN)

Concepts and Applications

Building the Network of the Future

Guide to Security in SDN and NFV

Network Programmability with YANG

Software-Defined Networking for Future Internet Technology

This IBM® Redbooks® publication introduces the IBM Software Defined Environment (SDE) solution, which helps to optimize the entire computing infrastructure--compute, storage, and network resources--so that it can adapt to the type of work required. In today's environment, resources are assigned manually to workloads, but that happens automatically in a SDE. In an SDE, workloads are dynamically assigned to IT resources based on application characteristics, best-available resources, and service level policies so that they deliver continuous, dynamic optimization and reconfiguration to address

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

infrastructure issues. Underlying all of this are policy-based compliance checks and updates in a centrally managed environment. Readers get a broad introduction to the new architecture. Think integration, automation, and optimization. Those are enablers of cloud delivery and analytics. SDE can accelerate business success by matching workloads and resources so that you have a responsive, adaptive environment. With the IBM Software Defined Environment, infrastructure is fully programmable to rapidly deploy workloads on optimal resources and to instantly respond to changing business demands. This information is intended for IBM sales representatives, IBM software architects, IBM Systems Technology Group brand specialists, distributors, resellers, and anyone who is developing or implementing SDE.

This book constitutes the proceedings of the 16th International Conference on Detection of Intrusions and Malware, and Vulnerability Assessment, DIMVA 2019, held in Gothenburg, Sweden, in June 2019. The 23 full papers presented in this volume were carefully reviewed and selected from 80 submissions. The contributions were organized in topical sections named: wild wild web; cyber-physical systems; malware; software security and binary analysis; network security; and attack mitigation.

Fundamentals of Information Systems Security, Fourth Edition provides a comprehensive overview of the essential concepts readers must know as they pursue careers in information systems security.

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

This book brings together a group of visionaries and technical experts from academia to industry to discuss the applications and technologies that will comprise the next set of cellular advancements (5G). In particular, the authors explore usages for future 5G communications, key metrics for these usages with their target requirements, and network architectures and enabling technologies to meet 5G requirements. The objective is to provide a comprehensive guide on the emerging trends in mobile applications, and the challenges of supporting such applications with 4G technologies.

Delivering Advanced Security Capabilities from Edge to Cloud for IoT

Software-Defined Networking and Security

An Authoritative Review of Network Programmability Technologies

Getting Smarter, Faster, and More Flexible with a Software Centric Approach

Mastering Python Networking

A Comprehensive Approach

MPLS in the SDN Era

Software Defined Networks: A Comprehensive Approach, Second Edition provides in-depth coverage of the technologies collectively known as Software Defined Networking (SDN). The book shows how to explain to business decision-makers the benefits and risks in shifting parts of a network to the SDN model, when to integrate SDN

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

technologies in a network, and how to develop or acquire SDN applications. In addition, the book emphasizes the parts of the technology that encourage opening up the network, providing treatment for alternative approaches to SDN that expand the definition of SDN as networking vendors adopt traits of SDN to their existing solutions. Since the first edition was published, the SDN market has matured, and is being gradually integrated and morphed into something more compatible with mainstream networking vendors. This book reflects these changes, with coverage of the OpenDaylight controller and its support for multiple southbound protocols, the Inclusion of NETCONF in discussions on controllers and devices, expanded coverage of NFV, and updated coverage of the latest approved version (1.5.1) of the OpenFlow specification. Contains expanded coverage of controllers Includes a new chapter on NETCONF and SDN Presents expanded coverage of SDN in optical networks Provides support materials for use in computer networking courses A Visual Guide to Understanding Software Defined Networks and Network Function Virtualization The simple, visual, at-a-glance guide to SDN and NFV: Core concepts, business drivers, key technologies, and

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

more! SDN (Software Defined Networks) and NFV (Network Function Virtualization) are today's hottest areas of networking. Many executives, investors, sales professionals, and marketers need a solid working understanding of these technologies, but most books on the subject are written specifically for network engineers and other technical experts. SDN and NFV Simplified fills that gap, offering highly visual, "at-a-glance" explanations of SDN, NFV, and their underlying virtualizations. Built around an illustrated, story-telling approach, this answers the questions: Why does this technology matter? How does it work? Where is it used? What problems does it solve? Through easy, whiteboard-style infographics, you'll learn: how virtualization enables SDN and NFV; how datacenters are virtualized through clouds; how networks can also be virtualized; and how to maximize security, visibility, and Quality of Experience in tomorrow's fully-virtualized environments. Step by step, you'll discover why SDN and NFV technologies are completely redefining both enterprise and carrier networks, and driving the most dramatic technology migration since IP networking. That's not all: You'll learn all you need to help lead this transformation. Learn how virtualization establishes the foundation for

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

SDN and NFV Review the benefits of VMs, the role of hypervisors, and the management of virtual resources Discover how cloud technologies enable datacenter virtualization Understand the roles of networking gear in virtualized datacenters See VMWare VMotion and VXLAN at work in the virtualized datacenter Understand multitenancy and the challenges of “communal living” Learn how core network functions and appliances can be virtualized Ensure performance and scalability in virtualized networks Compare modern approaches to network virtualization, including OpenFlow, VMWare Nicera, Cisco Insieme, and OpenStack Walk through the business case for SDN, NFV, and the Cloud Discover how the Software Defined Network (SDN) solves problems previously left unaddressed Understand SDN controllers—and who’s fighting to control your network Use SDN and NFV to improve integration and say goodbye to “truck rolls” Enforce security, avoid data leakage, and protect assets through encryption Provide for effective monitoring and consistent Quality of Experience (QoE) Learn how SDN and NFV will affect you—and what’s next Great CIOs consistently exceed key stakeholders' expectations and maximize the business value delivered through their company's

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

technology. What's their secret? Sure, IT professionals need technological smarts, plus an understanding of their company's goals and the competitive landscape. But the best of them possess a far more potent ability: they forge good working relationships with everyone involved in an IT-enabled project, whether it's introducing new hardware or implementing a major business transformation. In The CIO Edge, the authors draw on Korn/Ferry International's extensive empirical data on leadership competencies as well as Gartner's research on IT trends and the CIO role. They prove that, for IT leaders, mastering seven essential skills yields big results. This new book lays out the people-to-people leadership competencies that the highest-performing CIOs have in common—including the ability to inspire others, connect with a diverse array of stakeholders, value others' ideas, and manifest caring in their relationships. The authors then explain how to cultivate each defining competency. Learn these skills, and you'll get more work done through others' enabling you to successfully execute more IT projects, generate better results for your company, and concentrate your efforts where they'll exert the most impact. The payoff? As the authors show, you'll work smarter, not

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

harder—and get promoted far faster than your peers.

Praise for Auditor's Guide to Information Systems Auditing "Auditor's Guide to Information Systems Auditing is the most comprehensive book about auditing that I have ever seen. There is something in this book for everyone. New auditors will find this book to be their bible—reading it will enable them to learn what the role of auditors really is and will convey to them what they must know, understand, and look for when performing audits. For experienced auditors, this book will serve as a reality check to determine whether they are examining the right issues and whether they are being sufficiently comprehensive in their focus. Richard Cascarino has done a superb job." —E. Eugene Schultz, PhD, CISSP, CISM Chief Technology Officer and Chief Information Security Officer, High Tower Software

A step-by-step guide to successful implementation and control of information systems

More and more, auditors are being called upon to assess the risks and evaluate the controls over computer information systems in all types of organizations. However, many auditors are unfamiliar with the techniques they need to know to efficiently and effectively determine whether information systems are adequately protected. Auditor's

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

Guide to Information Systems Auditing presents an easy, practical guide for auditors that can be applied to all computing environments. As networks and enterprise resource planning systems bring resources together, and as increasing privacy violations threaten more organization, information systems integrity becomes more important than ever. With a complimentary student's version of the IDEA Data Analysis Software CD, Auditor's Guide to Information Systems Auditing empowers auditors to effectively gauge the adequacy and effectiveness of information systems controls.

Network Programmability and Automation

Network Function Virtualization

Skills for the Next-Generation Network Engineer

Methods, Models, Approaches, Techniques, Algorithms, and Tools

Netw Fun Vir (NFV ePub_1

Software Defined Networks

Interoperable Scenarios to Make Networks Scale to New Services

In the ever-evolving telecommunication industry, smart mobile computing devices have become increasingly affordable and powerful, leading to significant growth in the number of advanced mobile users and their bandwidth demands. Due to this increasing

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

need, the next generation of wireless networks needs to enable solutions to bring together broadband, broadcast, and cellular technologies for global consumers. Paving the Way for 5G Through the Convergence of Wireless Systems provides innovative insights into wireless networks and cellular coexisting solutions that aim at paving the way towards 5G. Through examining data offloading, cellular technologies, and multi-edge computing, it addresses coexistence problems at different levels (i.e., physical characteristics, open access, technology-neutrality, economic characteristics, healthcare, education, energy, etc.), influencing networks to provide solutions for next generation wireless networks. Bridging research and practical solutions, this comprehensive reference source is ideally designed for graduate-level students, IT professionals and technicians, engineers, academicians, and researchers.

This SpringerBrief provides state-of-the-art technical reviews on self-organizing and optimization in 5G systems. It covers the latest research results from physical-layer channel modeling to software defined network (SDN) architecture. This book focuses on the cutting-edge wireless technologies such as heterogeneous networks (HetNets), self-organizing network (SON), smart low power node (LPN), 3D-MIMO, and more. It will help researchers from both the academic and industrial worlds to better understand the technical momentum of 5G key technologies.

From the Foreword: "This book lays out much of what we've learned at AT&T about SDN and NFV. Some of the smartest network experts in the industry have drawn a map

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

to help you navigate this journey. Their goal isn't to predict the future but to help you design and build a network that will be ready for whatever that future holds. Because if there's one thing the last decade has taught us, it's that network demand will always exceed expectations. This book will help you get ready." —Randall Stephenson, Chairman, CEO, and President of AT&T "Software is changing the world, and networks too. In this in-depth book, AT&T's top networking experts discuss how they're moving software-defined networking from concept to practice, and why it's a business imperative to do this rapidly." —Urs Hölzle, SVP Cloud Infrastructure, Google "Telecom operators face a continuous challenge for more agility to serve their customers with a better customer experience and a lower cost. This book is a very inspiring and vivid testimony of the huge transformation this means, not only for the networks but for the entire companies, and how AT&T is leading it. It provides a lot of very deep insights about the technical challenges telecom engineers are facing today. Beyond AT&T, I'm sure this book will be extremely helpful to the whole industry." —Alain Maloberti, Group Chief Network Officer, Orange Labs Networks "This new book should be read by any organization faced with a future driven by a "shift to software." It is a holistic view of how AT&T has transformed its core infrastructure from hardware based to largely software based to lower costs and speed innovation. To do so, AT&T had to redefine their technology supply chain, retrain their workforce, and move toward open source user-driven innovation; all while managing one of the biggest networks in the world. It is

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

an amazing feat that will put AT&T in a leading position for years to come." —Jim Zemlin, Executive Director, The Linux Foundation This book is based on the lessons learned from AT&T's software transformation journey starting in 2012 when rampant traffic growth necessitated a change in network architecture and design. Using new technologies such as NFV, SDN, Cloud, and Big Data, AT&T's engineers outlined and implemented a radical network transformation program that dramatically reduced capital and operating expenditures. This book describes the transformation in substantial detail. The subject matter is of great interest to telecom professionals worldwide, as well as academic researchers looking to apply the latest techniques in computer science to solving telecom's big problems around scalability, resilience, and survivability.

Network softwarization is an emerging research area that is envisioned to revolutionize the way network infrastructure is designed, operated, and managed today.

Contemporary telecommunication networks are going through a major transformation, and softwarization is recognized as a crucial enabler of this transformation by both academia and industry. Softwarization promises to overcome the current ossified state of Internet network architecture and evolve towards a more open, agile, flexible, and programmable networking paradigm that will reduce both capital and operational expenditures, cut-down time-to-market of new services, and create new revenue streams. Software-Defined Networking (SDN) and Network Function Virtualization

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

(NFV) are two complementary networking technologies that have established themselves as the cornerstones of network softwarization. SDN decouples the control and data planes to provide enhanced programmability and faster innovation of networking technologies. It facilitates simplified network control, scalability, availability, flexibility, security, cost-reduction, autonomic management, and fine-grained control of network traffic. NFV utilizes virtualization technology to reduce dependency on underlying hardware by moving packet processing activities from proprietary hardware middleboxes to virtualized entities that can run on commodity hardware. Together SDN and NFV simplify network infrastructure by utilizing standardized and commodity hardware for both compute and networking; bringing the benefits of agility, economies of scale, and flexibility of data centers to networks. Network softwarization provides the tools required to re-architect the current network infrastructure of the Internet. However, the effective application of these tools requires efficient utilization of networking resources in the softwarized environment. Innovative techniques and mechanisms are required for all aspects of network management and control. The overarching goal of this thesis is to address several key resource orchestration challenges in softwarized networks. The resource allocation and orchestration techniques presented in this thesis utilize the functionality provided by softwarization to reduce operational cost, improve resource utilization, ensure scalability, dynamically scale resource pools according to demand, and optimize energy utilization.

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

Testbeds and Research Infrastructure: Development of Networks and Communities
Paving the Way for 5G Through the Convergence of Wireless Systems
Beyond LTE Network Architecture

The Structure of Network Automation with YANG, NETCONF, RESTCONF, and gNMI
Applications, Requirements and Candidate Technologies

Wireless Network Emulation with Mininet-WiFi

Security and Privacy in Communication Networks

This book describes the concept of a Software Defined Mobile Network (SDMN), which will impact the network architecture of current LTE (3GPP) networks. SDN will also open up new opportunities for traffic, resource and mobility management, as well as impose new challenges on network security. Therefore, the book addresses the main affected areas such as traffic, resource and mobility management, virtualized traffics transportation, network management, network security and techno economic concepts. Moreover, a complete introduction to SDN and SDMN concepts. Furthermore, the reader will be introduced to cutting-edge knowledge in areas such as network virtualization, as well as SDN concepts relevant to next generation mobile networks. Finally, by the end of the book the reader will be familiar with the feasibility and opportunities of SDMN concepts, and will be able to evaluate the limits of performance and scalability of these new technologies while applying them to mobile broadband networks.

SOFTWARE DEFINED NETWORKS Software defined networking suggests an alternative worldview, one that comes with a new software stack to which this book is organized, with the goal of presenting a top-to-bottom tour of SDN without leaving any significant gaps that the reader might suspect can only be

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

filled with magic or proprietary code. Software defined networking (SDN) is an architecture designed to make a network more flexible and easier to manage. SDN has been widely adopted across data centers, WANs, and access networks and serves as a foundational element of a comprehensive intent-based networking (IBN) architecture. Although SDN has so far been limited to automated provisioning and configuration, IBN now adds “translation” and “assurance” so that the complete network cycle can be automated, continuously aligning the network to business needs. In 14 chapters, this book provides a comprehensive understanding of an SDN-based network as a scalable distributed system running on commodity hardware. The reader will have a one-stop reference looking into the applications, architectures, functionalities, virtualization, security, and privacy challenges connected to SDN. Audience Researchers in software, IT, and electronic engineering as well as industry engineers and technologists working in areas such as network virtualization, Python network programming, CISCO ACI, software defined network, and cloud computing.

Network Functions Virtualization (NFV) will drive dramatic cost reductions while also accelerating service delivery. Using NFV with SDN, network owners can provision new functions rapidly on demand, improve scalability, and leverage microservices. Benefits like these will make NFV indispensable for service providers, mobile operators, telcos, and enterprises alike. Network Functions Virtualization (NFV) with a Touch of SDN is the first practical introduction to NFV’s fundamental concepts, techniques, and use cases. Written for wide audiences of network engineers, architects, planners, and operators, it assumes no previous knowledge of NFV architecture, deployment, or management. The authors first explain how virtualization, VMs, containers, and related technologies establish the foundation for the NFV transformation. Next, they show how these concepts and technologies can be applied to virtualize network functions in the cloud, data centers, routing, security, and the mobile packet

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

core. You'll discover new tools and techniques for managing and orchestrating virtualized network devices, and gain new clarity on how SDN and NFV interact and interrelate. By the time you're done, you'll be ready to assess vendor claims, evaluate architectures, and plan NFV's role in your own networks. Understand NFV's key benefits and market drivers Review how virtualization makes NFV possible Consider key issues associated with NFV network design and deployment Integrate NFV into existing network designs Orchestrate, build, and deploy NFV networks and cloud services Maximize operational efficiency by building more programmable, automated networks Understand how NFV and SDN work together Address security, programmability, performance, and service function chaining Preview evolving concepts that will shape NFV's future

Foundations of Modern Networking is a comprehensive, unified survey of modern networking technology and applications for today's professionals, managers, and students. Dr. William Stallings offers clear and well-organized coverage of five key technologies that are transforming networks: Software-Defined Networks (SDN), Network Functions Virtualization (NFV), Quality of Experience (QoE), the Internet of Things (IoT), and cloudbased services. Dr. Stallings reviews current network ecosystems and the challenges they face—from Big Data and mobility to security and complexity. Next, he offers complete, self-contained coverage of each new set of technologies: how they work, how they are architected, and how they can be applied to solve real problems. Dr. Stallings presents a chapter-length analysis of emerging security issues in modern networks. He concludes with an up-to date discussion of networking careers, including important recent changes in roles and skill requirements. Coverage: Elements of the modern networking ecosystem: technologies, architecture, services, and applications Evolving requirements of current network environments SDN: concepts, rationale, applications, and standards across data, control, and application planes OpenFlow, OpenDaylight, and other key SDN

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

technologies Network functions virtualization: concepts, technology, applications, and software defined infrastructure Ensuring customer Quality of Experience (QoE) with interactive video and multimedia network traffic Cloud networking: services, deployment models, architecture, and linkages to SDN and NFV IoT and fog computing in depth: key components of IoT-enabled devices, model architectures, and example implementations Securing SDN, NFV, cloud, and IoT environments Career preparation and ongoing education for tomorrow's networking careers Key Features: Strong coverage of unifying principles and practical techniques More than a hundred figures that clarify key concepts Web support at williamstallings.com/Network/ QR codes throughout, linking to the website and other resources Keyword/acronym lists, recommended readings, and glossary Margin note definitions of key words throughout the text

Broadband Communications, Computing, and Control for Ubiquitous Intelligence

Software Defined-WAN for the Digital Age

Fundamentals of Information Systems Security

Exploring Expect

Foundations of Modern Networking

Innovations in Software-Defined Networking and Network Functions Virtualization

SDN, NFV, QoE, IoT, and Cloud

This book offers readers an idea of what embedded Linux software and hardware architecture looks like, cross-compiling, and also presents information about the bootloader and how it can be built for a specific board. This book will go through Linux kernel features

and source code, present information on how to build a kernel source, modules, and the Linux root filesystem. You'll be given an overview of the available Yocto Project components, how to set up Yocto Project Eclipse IDE, and how to use tools such as Wic and Swabber that are still under development. It will present the meta-realtime layer and the newly created meta-cgl layer, its purpose, and how it can add value to poky.

Network infrastructures are growing rapidly to meet the needs of business, but the required repolicing and reconfiguration provide challenges that need to be addressed. The software-defined network (SDN) is the future generation of Internet technology that can help meet these challenges of network management. This book includes quantitative research, case studies, conceptual papers, model papers, review papers, and theoretical backing on SDN. This book investigates areas where SDN can help other emerging technologies deliver more efficient services, such as IoT, industrial IoT, NFV, big data, blockchain, cloud computing, and edge computing. The book demonstrates the many benefits of SDNs, such as reduced costs, ease of deployment and management, better scalability, availability, flexibility and fine-grained control of traffic, and security. The book

demonstrates the many benefits of SDN, such as reduced costs, ease of deployment and management, better scalability, availability, flexibility and fine-grained control of traffic, and security. Chapters in the volume address: Design considerations for security issues and detection methods State-of-the-art approaches for mitigating DDos attacks using SDN Big data using Apache Hadoop for processing and analyzing large amounts of data Different tools used for attack simulation Network policies and policy management approaches that are widely used in the context of SDN Dynamic flow tables, or static flow table management A new four-tiered architecture that includes cloud, SDN-controller, and fog computing Architecture for keeping computing resources available near the industrial IoT network through edge computing The impact of SDN as an innovative approach for smart city development More. The book will be a valuable resource for SDN researchers as well as academicians, research scholars, and students in the related areas.

This book provides readers insights into cyber maneuvering or adaptive and intelligent cyber defense. It describes the required models and security supporting functions that enable the analysis of potential threats, detection of attacks, and implementation of

countermeasures while expending attacker resources and preserving user experience. This book not only presents significant education-oriented content, but uses advanced content to reveal a blueprint for helping network security professionals design and implement a secure Software-Defined Infrastructure (SDI) for cloud networking environments. These solutions are a less intrusive alternative to security countermeasures taken at the host level and offer centralized control of the distributed network. The concepts, techniques, and strategies discussed in this book are ideal for students, educators, and security practitioners looking for a clear and concise text to avant-garde cyber security installations or simply to use as a reference. Hand-on labs and lecture slides are located at <http://virtualnetworksecurity.thothlab.com/>. Features Discusses virtual network security concepts Considers proactive security using moving target defense Reviews attack representation models based on attack graphs and attack trees Examines service function chaining in virtual networks with security considerations Recognizes machine learning and AI in network security Network Function Virtualization provides an architectural, vendor-neutral level overview of the issues surrounding the large levels of

data storage and transmission requirements needed for today's companies, also enumerating the benefits of NFV for the enterprise. Drawing upon years of practical experience, and using numerous examples and an easy-to-understand framework, authors Tom Nadeau and Ken Gary discuss the relevancy of NFV and how it can be effectively used to create and deploy new services. Readers will learn how to determine if network function virtualization is right for their enterprise network, be able to use hands-on, step-by-step guides to design, deploy, and manage NFV in an enterprise, and learn how to evaluate all relevant NFV standards, including ETSI, IETF, Openstack, and Open Daylight. Provides a comprehensive overview of Network Function Virtualization (NFV) Discusses how to determine if network function virtualization is right for an enterprise network Presents an ideal reference for those interested in NFV Network Service Chaining, NSC network address translation (NAT), firewalling, intrusion detection, domain name service (DNS), caching, and software defined networks Includes hands-on, step-by-step guides for designing, deploying, and managing NFV in the enterprise Explains, and contrasts, all relevant NFV standards, including ETSI, IETF, Openstack, and Open Daylight

***Mobile Networks and Management
Self-organizing and Optimization
Detection of Intrusions and Malware, and Vulnerability Assessment
A Bold Transition to Next Generation Networking
5th International Conference, MONAMI 2013, Cork, Ireland,
September 23-25, 2013, Revised Selected Papers
Autonomous Control for a Reliable Internet of Services
Towards 5G***

This book constitutes the proceedings of the 9th International Conference on Testbeds and Research Infrastructures for the Development of Networks and Communities, TridentCom 2014, held in Guangzhou, China, in May 2014. The 49 revised full papers presented were carefully selected out of 149 submissions. The conference consisted of 6 symposia covering topics such as testbed virtualization, Internet of Things, vehicular networks, SDN, NDN, large-scale testbed federation, mobile networks, wireless networks.

This book constitutes the post-proceedings of the 5th International ICST Conference on Mobile Networks and Management, MONAMI 2013, held in Cork, Ireland, in September 2013. The 18 revised full papers presented were carefully reviewed and selected from numerous submissions. The volume is organized thematically in five parts, covering: TCP, multi-path and coding and content-centric networking; mobile networks; wireless sensor and vehicular networks; wireless communications and traffic; future research directions, including cloud connectivity,

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

orchestration and SDN.

This book explores the challenges and opportunities in exploiting cloud technologies for 5G, ranging from radio access network (RAN) to the evolved packet core (EPC). With a specific focus on cloud RAN and EPC, the text carefully explains the influence of recent network technologies such as software defined networking (SDN), visualization, and cloud technologies in the evolution of architecture for future mobile networks. The book discusses the causes, benefits and challenges of cloud RAN and its interplay with other evolving technologies for future mobile networks. Researchers and professionals involved in mobile technology or cloud computing will find this book a valuable resource. The text is also suitable for advanced-level students studying all types of networking.

The advancement of technology is a standard of modern daily life, whether it be the release of a new cellphone, computer, or a self-driving car. Due to this constant advancement, the networks on which these technologies operate must advance as well. Innovations in Software-Defined Networking and Network Functions Virtualization is a critical scholarly publication that observes the advances made in network infrastructure through achieving cost efficacy while maintaining maximum flexibility for the formation and operation of these networks. Featuring coverage on a broad selection of topics, such as software-defined storage, openflow controller, and storage virtualization, this publication is geared toward professionals, computer engineers, academicians, students, and researchers seeking current and relevant research on the advancements made to network infrastructures.

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

SDN and NFV Simplified

Resource Orchestration in Softwarized Networks

9th International ICST Conference, TridentCom 2014, Guangzhou, China, May 5-7, 2014,

Revised Selected Papers

A Tcl-based Toolkit for Automating Interactive Programs

16th International Conference, DIMVA 2019, Gothenburg, Sweden, June 19-20, 2019,

Proceedings

The CIO Edge

Navigating Network Complexity

This two-volume set LNICST 398 and 399 constitutes the post-conference proceedings of the 17th International Conference on Security and Privacy in Communication Networks, SecureComm 2021, held in September 2021. Due to COVID-19 pandemic the conference was held virtually. The 56 full papers were carefully reviewed and selected from 143 submissions. The papers focus on the latest scientific research results in security and privacy in wired, mobile, hybrid and ad hoc networks, in IoT technologies, in cyber-physical systems, in next-generation communication systems in web and systems security and in pervasive and ubiquitous computing.

Expect is quickly becoming a part of every UNIX user's toolbox. It allows you to automate Telnet, FTP, passwd, rlogin, and hundreds of other applications that normally require human interaction. Using Expect to automate these applications will allow you to speed up tasks and, in many cases, solve new problems that you never would have even considered

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

before. For example, you can use Expect to test interactive programs with no changes to their interfaces. Or wrap interactive programs with Motif-like front-ends to control applications by buttons, scrollbars, and other graphic elements with no recompilation of the original programs. You don't even need the source code! Expect works with remote applications, too. Use it to tie together Internet applications including Telnet, Archie, FTP, Gopher, and Mosaic. Don Libes is the creator of Expect as well as the author of this book. In Exploring Expect, he provides a comprehensive tutorial on all of Expect's features, allowing you to put it immediately to work on your problems. In a down-to-earth and humorous style, he provides numerous examples of challenging real-world applications and how they can be automated using Expect to save you time and money. Expect is the first of a new breed of programs based on Tcl, the Tool Command Language that is rocking the computer science community. This book provides an introduction to Tcl and describes how Expect applies Tcl's power to the new field of interaction automation. Whether your interest is in Expect or interaction automation or you simply want to learn about Tcl and see how it has been used in real software, you will find Exploring Expect a treasure trove of easy-to-understand and valuable information.

SD-WAN is an advanced networking approach that creates hybrid networks to integrate broadband or other network services into the corporate WAN, not only just handling general business workloads and traffic, but also being capable of maintaining the performance and security of real-time and sensitive applications. This book posits that Software Defined (SD) WAN is the answer to questions such as what changes can be made to the networking sector? What innovations can make WAN, which plays a vital integrated part of the cloud

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

ecosystem, more cost effective, performance robust, provisioning efficient, and operation intelligent?

*Master powerful techniques and approaches for securing IoT systems of all kinds—current and emerging Internet of Things (IoT) technology adoption is accelerating, but IoT presents complex new security challenges. Fortunately, IoT standards and standardized architectures are emerging to help technical professionals systematically harden their IoT environments. In *Orchestrating and Automating Security for the Internet of Things*, three Cisco experts show how to safeguard current and future IoT systems by delivering security through new NFV and SDN architectures and related IoT security standards. The authors first review the current state of IoT networks and architectures, identifying key security risks associated with nonstandardized early deployments and showing how early adopters have attempted to respond. Next, they introduce more mature architectures built around NFV and SDN. You'll discover why these lend themselves well to IoT and IoT security, and master advanced approaches for protecting them. Finally, the authors preview future approaches to improving IoT security and present real-world use case examples. This is an indispensable resource for all technical and security professionals, business security and risk managers, and consultants who are responsible for systems that incorporate or utilize IoT devices, or expect to be responsible for them.*

- Understand the challenges involved in securing current IoT networks and architectures*
- Master IoT security fundamentals, standards, and modern best practices*
- Systematically plan for IoT security*
- Leverage Software-Defined Networking (SDN) and Network Function Virtualization (NFV) to harden IoT networks*
- Deploy the advanced IoT platform, and use MANO to manage and orchestrate virtualized network*

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

functions · Implement platform security services including identity, authentication, authorization, and accounting · Detect threats and protect data in IoT environments · Secure IoT in the context of remote access and VPNs · Safeguard the IoT platform itself · Explore use cases ranging from smart cities and advanced energy systems to the connected car · Preview evolving concepts that will shape the future of IoT security

Seven Leadership Skills You Need to Drive Results

Next-Generation Routing with Sdn, Service Virtualization, and Service Chaining

From Theory to Practice

SDN: Software Defined Networks

Learning Embedded Linux Using the Yocto Project

A Visual Guide to Understanding Software Defined Networks and Network Function Virtualization

How can you make multivendor services work smoothly on today's complex networks? This practical book shows you how to deploy a large portfolio of multivendor Multiprotocol Label Switching (MPLS) services on networks, down to the configuration level. You'll learn where Juniper Network's Junos, Cisco's IOS XR, and OpenContrail, interoperate and where they don't. Two network and cloud professionals from Juniper describe how MPLS technologies and applications have rapidly evolved through services and architectures such as Ethernet VPNs, Network Function Virtualization, Seamless MPLS, Egress Protection, External Path Computation, and more. This book contains no vendor bias or corporate messages,

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

just solid information on how to get a multivendor network to function optimally. Topics include: Introduction to MPLS and Software-Defined Networking (SDN) The four MPLS Builders (LDP, RSVP-TE, IGP SPRING, and BGP) Layer 3 unicast and multicast MPLS services, Layer 2 VPN, VPLS, and Ethernet VPN Inter-domain MPLS Services Underlay and overlay architectures: data centers, NVO, and NFV Centralized Traffic Engineering and TE bandwidth reservations Scaling MPLS transport and services Transit fast restoration based on the IGP and RSVP-TE FIB optimization and egress service for fast restoration

Today, networks must evolve and scale faster than ever. You can't manage everything by hand anymore: You need to automate relentlessly. YANG, along with the NETCONF, RESTCONF, or gRPC/gNMI protocols, is the most practical solution, but most implementers have had to learn by trial and error. Now, Network Programmability with YANG gives you complete and reliable guidance for unlocking the full power of network automation using model-driven APIs and protocols. Authored by three YANG pioneers, this plain-spoken book guides you through successfully applying software practices based on YANG data models. The authors focus on the network operations layer, emphasizing model-driven APIs, and underlying transports. Whether you're a network operator, DevOps engineer, software developer, orchestration engineer, NMS/OSS architect, service engineer, or manager, this guide can help you dramatically improve value, agility, and manageability throughout your network. Discover the value of implementing YANG and Data Model-Driven Management in your network Explore the layers and

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

components of a complete working solution Build a business case where value increases as your solution grows Drill down into transport protocols: NETCONF, RESTCONF, and gNMI/gRPC See how telemetry can establish a valuable automated feedback loop Find data models you can build on, and evaluate models with similar functionality Understand models, metadata, and tools from several viewpoints: architect, operator, module author, and application developer Walk through a complete automation journey: business case, service model, service implementation, device integration, and operation Leverage the authors' experience to design successful YANG models and avoid pitfalls Like sysadmins before them, network engineers are finding that they cannot do their work manually anymore. As the field faces new protocols, technologies, delivery models, and a pressing need for businesses to be more agile and flexible, network automation is becoming essential. This practical guide shows network engineers how to use a range of technologies and tools—including Linux, Python, JSON, and XML—to automate their systems through code. Network programming and automation will help you simplify tasks involved in configuring, managing, and operating network equipment, topologies, services, and connectivity. Through the course of the book, you'll learn the basic skills and tools you need to make this critical transition. This book covers: Python programming basics: data types, conditionals, loops, functions, classes, and modules Linux fundamentals to provide the foundation you need on your network automation journey Data formats and models: JSON, XML, YAML, and YANG for networking Jinja templating and its

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

applicability for creating network device configurations The role of application programming interfaces (APIs) in network automation Source control with Git to manage code changes during the automation process How Ansible, Salt, and StackStorm open source automation tools can be used to automate network devices Key tools and technologies required for a Continuous Integration (CI) pipeline in network operations

The software and networking industry is experiencing a rapid development and deployment of Network Functions Virtualization (NFV) technology, in both enterprise and cloud data center networks. One of the primary reasons for this technological trend is that NFV has the capability to reduce CAPEX and OPEX, whilst increasing networking service efficiency, performance, agility, scalability, and resource utilization. Despite such well-recognized benefits, security remains a major concern of network service providers and seriously impedes the further expansion of NFV. This book is therefore dedicated to investigating and exploring the potential security issues of NFV. It contains three major elements: a thorough overview of the NFV framework and architecture, a comprehensive threat analysis aiming to establish a layer-specific threat taxonomy for NFV enabled networking services, and a series of comparative studies of security best practices in traditional networking scenarios and in NFV, ultimately leading to a set of recommendations on security countermeasures in NFV. This book is primarily intended for engineers, engineering students and researchers and those with an interest in the field of networks and telecommunications (architectures, protocols,

Online Library Sdn And Nfv Simplified A Visual Guide To Understanding Software Defined Networks And Network Function Virtualization

services) in general, and particularly software-defined network (SDN) and network functions virtualization (NFV)-based security services. Extensively studies security issues in NFV Presents a basis or guideline for both academia researchers and industry practitioners to work together to achieve secure and dependable lifecycle management of NFV based network services

Cloud Mobile Networks

5G Heterogeneous Networks

Challenges, Opportunities, and Applications

From RAN to EPC