Cryptography And Network Security Lecture Notes

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The main objective of this book is to cater to the need of a quality textbook for education in the field of information security. The present third edition of the book covers the principles, design, and implementation of various algorithms in cryptography and information security domain. The book is a comprehensive work with a perfect balance and systematic presentation of the theoretical and practical aspects. The pre-requisite of the cryptography are the fundamentals of the mathematical background. The book covers all such relevant methods and theorems, which are helpful to the readers to get the necessary mathematical base for the understanding of the cryptographic algorithms. It provides a clear analysis of different algorithms and techniques. NEW TO THE THIRD EDITION • New chapters on o Cyber Laws o Vulnerabilities in TCP/IP Model • Revised sections on o Digital signature o Attacks against digital signature • Introduction to some open source tools like Nmap, Zenmap, port scanner, network scanner and wireshark • Revised section on block cipher modes of operation • Coverage of Simplified Data Encryption Standard (S-DES) and Simplified Advanced Encryption Standard (S-AES) with examples • Elaborated section on Linear Cryptanalysis and Differential Cryptanalysis • New solved problems and a topic “primitive roots” in number theory • Chapter on public key cryptosystems with various attacks against RSA algorithm • New topics on Ransomware, Darknet, and...
Darkweb as per the current academic requirement • Revised chapter on Digital Forensics The book is intended for the undergraduate and postgraduate students of computer science and engineering (B.Tech/M.Tech), undergraduate and postgraduate students of computer science (B.Sc. / M.Sc. Computer Science), and information technology (B.Sc. / M.Sc. IT) and the students of Master of Computer Applications (MCA). This book provides a comprehensive treatment of security in the widely adopted, Radio Frequency Identification (RFID) technology. The authors present the fundamental principles of RFID cryptography in a manner accessible to a broad range of readers, enabling them to improve their RFID security design. This book also offers the reader a range of interesting topics portraying the current state-of-the-art in RFID technology and how it can be integrated with today’s Internet of Things (IoT) vision. The authors describe a first-of-its-kind, lightweight symmetric authenticated encryption cipher called Redundant Bit Security (RBS), which enables significant, multi-faceted performance improvements compared to existing cryptosystems. This book is a must-read for anyone aiming to overcome the constraints of practical implementation in RFID security technologies. This book constitutes the refereed proceedings of the Third International Conference on Applied Cryptography and Network Security, ACNS 2005, held in New York, NY, USA in June 2005. The 35 revised full papers presented were carefully reviewed and selected from 158 submissions. Among the topics covered are authentication, key exchange protocols, network denial of service, digital signatures, public key cryptography, MACs, forensics, intrusion detection, secure channels, identity-based encryption, network security analysis, DES, key extraction, homomorphic encryption, and zero-knowledge arguments. This book presents a systematic and comprehensive overview for IoT security. It first introduces architecture approaches for IoT and IoT security, describing the security techniques for different layers in the IoT security architecture. It also provides an in-depth analysis on the difference between IoT security and traditional system and data security. It is commonly known that information security includes data confidentiality, data integrity, and availability, and that measures include non-repudiation and access control. However, in practical IoT system construction, many more security measures need to be carefully considered. As such, this book presents around 60 different security measures, mainly focusing on the sensor layer of IoT. These security measures can serve as a source of reference for IoT system construction, as well as IoT security standard making. The seventh international conference on Cryptology and Network Security (CANS 2008) was held at HKU Town Center, Hong Kong, China, during December 2–4, 2008. The conference was organized by the Department of Computer Science, the University of Hong Kong, and was fully supported by the Center for Information Security and Cryptography at the University of Hong Kong, the Cyberport Institute of Hong Kong at the University of Hong Kong and the Department of Computer Science at the City University of Hong Kong. The goal of CANS is to promote research on all aspects of network security, as well as to build a bridge between research on cryptography and network security. Previous CANS conferences have been held in Taipei, Taiwan (2001), San Francisco, USA (2002), Miami, USA (2003), Xiamen, China (2005), Suzhou, China (2006), and Singapore (2007). The conference proceedings of recent years were published by Springer in the Lecture Notes in Computer Science series. The Program Committee received 73 submissions, and accepted 27 papers for presentation. The final versions of the accepted papers, which the authors finalized on the basis of comments from
the reviewers, were included in the proceedings. The reviewing process took nine weeks; each paper was carefully evaluated by at least three members from the Program Committee. The individual reviewing phase was followed by a Web-based discussion. Based on the comments and scores given by reviewers, the final decisions on acceptance were made. We appreciate the hard work of the members of the Program Committee and the external referees who gave many hours of their valuable time. This book constitutes the refereed proceedings of the 14th International Conference on Applied Cryptography and Network Security, ACNS 2016, held in Guildford, UK, in June 2016. The 35 revised full papers included in this volume and presented together with 2 invited talks, were carefully reviewed and selected from 183 submissions. ACNS is an annual conference focusing on innovative research and current developments that advance the areas of applied cryptography, cyber security and privacy. This book constitutes the refereed proceedings of the 17th International Conference on Applied Cryptography and Network Security, ACNS 2019, held in Bogota, Colombia in June 2019. The 29 revised full papers presented were carefully reviewed and selected from 111 submissions. The papers were organized in topical sections named: integrity and cryptanalysis; digital signature and MAC; software and systems security; blockchain and cryptocurrency; post quantum cryptography; public key and commitment; theory of cryptographic implementations; and privacy preserving techniques. This book constitutes the refereed proceedings of the 5th International Conference on Applied Cryptography and Network Security, ACNS 2007, held in Zhuhai, China, June 2007. The 31 revised full papers cover signature schemes, computer and network security, cryptanalysis, group-oriented security, cryptographic protocols, anonymous authentication, identity-based cryptography, and security in wireless, ad-hoc, and peer-to-peer networks. This book constitutes the refereed proceedings of the 4th International Conference on Applied Cryptography and Network Security, ACNS 2006, held in Singapore in June 2006. The 33 revised full papers presented were carefully reviewed and selected from 218 submissions. The papers are organized in topical sections on intrusion detection and avoidance, cryptographic applications, DoS attacks and countermeasures, key management, cryptanalysis, security of limited devices, cryptography, authentication and Web security, ad-hoc and sensor network security, cryptographic constructions, and security and privacy. Analysis, assessment, and data management are core competencies for operation research analysts. This volume addresses a number of issues and developed methods for improving those skills. It is an outgrowth of a conference held in April 2013 at the Hellenic Military Academy, and brings together a broad variety of mathematical methods and theories with several applications. It discusses directions and pursuits of scientists that pertain to engineering sciences. It is also presents the theoretical background required for algorithms and techniques applied to a large variety of concrete problems. A number of open questions as well as new future areas are also highlighted. This book will appeal to operations research analysts, engineers, community decision makers, academics, the military community, practitioners sharing the current “state-of-the-art,” and analysts from coalition partners. Topics covered include Operations Research, Games and Control Theory, Computational Number Theory and Information Security, Scientific Computing and Applications, Statistical Modeling and Applications, Systems of Monitoring and Spatial Analysis. In an age of explosive worldwide growth of electronic data storage and communications, effective protection of
information has become a critical requirement. When used in coordination with other tools for ensuring information security, cryptography in all of its applications, including data confidentiality, data integrity, and user authentication, is a most powerful tool for protecting information. This book presents a collection of research work in the field of cryptography. It discusses some of the critical challenges that are being faced by the current computing world and also describes some mechanisms to defend against these challenges. It is a valuable source of knowledge for researchers, engineers, graduate and doctoral students working in the field of cryptography. It will also be useful for faculty members of graduate schools and universities.

Digital transformation is a revolutionary technology that will play a vital role in major industries, including global governments. These administrations are taking the initiative to incorporate digital programs with their objective being to provide digital infrastructure as a basic utility for every citizen, provide on demand services with superior governance, and empower their citizens digitally. However, security and privacy are major barriers in adopting these mechanisms, as organizations and individuals are concerned about their private and financial data. Impact of Digital Transformation on Security Policies and Standards is an essential research book that examines the policies, standards, and mechanisms for security in all types of digital applications and focuses on blockchain and its imminent impact on financial services in supporting smart government, along with bitcoin and the future of digital payments. Highlighting topics such as cryptography, privacy management, and e-government, this book is ideal for security analysts, data scientists, academicians, policymakers, security professionals, IT professionals, government officials, finance professionals, researchers, and students.

This book constitutes the refereed proceedings of the First International Conference on Applied Cryptography and Network Security, ACNS 2003, held in Kunming, China, in October 2003. The 32 revised full papers presented were carefully reviewed and selected from a total of 191 submissions. The papers are organized in topical sections on cryptographic applications, intrusion detection, cryptographic algorithms, digital signatures, security modeling, Web security, security protocols, cryptanalysis, key management, and efficient implementations.

The Third International Conference on Network Security and Applications (CNSA-2010) focused on all technical and practical aspects of security and its applications for wired and wireless networks. The goal of this conference is to bring together researchers and practitioners from academia and industry to focus on understanding modern security threats and countermeasures, and establishing new collaborations in these areas. Authors are invited to contribute to the conference by submitting articles that illustrate research results, projects, survey work and industrial experiences describing significant advances in the areas of security and its applications, including: Network and Wireless Network Security • Mobile, Ad Hoc and Sensor Network Security • Peer-to-Peer Network Security • Database and System Security • Intrusion Detection and Prevention • Internet Security, and Applications Security and Network Management • E-mail Security, Spam, Phishing, E-mail Fraud • Virus, Worms, Trojan Protection • Security Threats and Countermeasures (DDoS, MiM, Session Hijacking, Replay attack etc.) • Ubiquitous Computing Security • Web 2.0 Security • Cryptographic Protocols • Performance Evaluations of Protocols and Security Application There were 182 submissions to the conference and the Program Committee selected 63 papers for publication. The book is organized as a collection of papers from the First
International Workshop on Trust Management in P2P Systems (IWTMP2PS 2010), the First International Workshop on Database Management Systems (DMS-2010), and the First International Workshop on Mobile, Wireless and Networks Security (MWNS-2010). The 4th FTRA International Conference on Computer Science and its Applications (CSA-12) will be held in Jeju, Korea on November 22~25, 2012. CSA-12 will be the most comprehensive conference focused on the various aspects of advances in computer science and its applications. CSA-12 will provide an opportunity for academic and industry professionals to discuss the latest issues and progress in the area of CSA. In addition, the conference will publish high quality papers which are closely related to the various theories and practical applications in CSA. Furthermore, we expect that the conference and its publications will be a trigger for further related research and technology improvements in this important subject. CSA-12 is the next event in a series of highly successful International Conference on Computer Science and its Applications, previously held as CSA-11 (3rd Edition: Jeju, December, 2011), CSA-09 (2nd Edition: Jeju, December, 2009), and CSA-08 (1st Edition: Australia, October, 2008). The Handbook of Financial Cryptography and Security elucidates the theory and techniques of cryptography and illustrates how to establish and maintain security under the framework of financial cryptography. It applies various cryptographic techniques to auctions, electronic voting, micropayment systems, digital rights, financial portfolios, routing. This book constitutes the refereed proceedings of the 13th International Conference on Applied Cryptography and Network Security, ACNS 2015, held in New York, NY, USA, in June 2015. The 33 revised full papers included in this volume and presented together with 2 abstracts of invited talks, were carefully reviewed and selected from 157 submissions. They are organized in topical sections on secure computation: primitives and new models; public key cryptographic primitives; secure computation II: applications; anonymity and related applications; cryptanalysis and attacks (symmetric crypto); privacy and policy enforcement; authentication via eye tracking and proofs of proximity; malware analysis and side channel attacks; side channel countermeasures and tamper resistance/PUFs; and leakage resilience and pseudorandomness. This book constitutes the refereed proceedings of the 4th International Conference on Applied Cryptography and Network Security, ACNS 2006, held in Singapore in June 2006. Book presents 33 revised full papers, organized in topical sections on intrusion detection and avoidance, cryptographic applications, DoS attacks and countermeasures, key management, cryptanalysis, security of limited devices, cryptography, authentication and Web security, ad-hoc and sensor network security, cryptographic constructions, and security and privacy. Quantum computers will break today's most popular public-key cryptographic systems, including RSA, DSA, and ECDSA. This book introduces the reader to the next generation of cryptographic algorithms, the systems that resist quantum-computer attacks: in particular, post-quantum public-key encryption systems and post-quantum public-key signature systems. Leading experts have joined forces for the first time to explain the state of the art in quantum computing, hash-based cryptography, code-based cryptography, lattice-based cryptography, and multivariate cryptography. Mathematical foundations and implementation issues are included. This book is an essential resource for students and researchers who want to contribute to the field of post-quantum cryptography. This book constitutes the refereed proceedings of the 19th International Conference on Cryptology and
Network Security, CANS 2020, held in Vienna, Austria, in December 2020.* The 30 full papers were carefully reviewed and selected from 118 submissions. The papers focus on topics such as cybersecurity; credentials; elliptic curves; payment systems; privacy-enhancing tools; lightweight cryptography; and codes and lattices. *The conference was held virtually due to the COVID-19 pandemic. This book provides the basic theory, techniques, and algorithms of modern cryptography that are applicable to network and cyberspace security. It consists of the following nine main chapters: Chapter 1 provides the basic concepts and ideas of cyberspace and cyberspace security, Chapters 2 and 3 provide an introduction to mathematical and computational preliminaries, respectively. Chapters 4 discusses the basic ideas and system of secret-key cryptography, whereas Chapters 5, 6, and 7 discuss the basic ideas and systems of public-key cryptography based on integer factorization, discrete logarithms, and elliptic curves, respectively. Quantum-safe cryptography is presented in Chapter 8 and offensive cryptography, particularly cryptovirology, is covered in Chapter 9. This book can be used as a secondary text for final-year undergraduate students and first-year postgraduate students for courses in Computer, Network, and Cyberspace Security. Researchers and practitioners working in cyberspace security and network security will also find this book useful as a reference. Here are the refereed proceedings of the 5th International Conference on Security and Cryptology for Networks, SCN 2006. The book offers 24 revised full papers presented together with the abstract of an invited talk. The papers are organized in topical sections on distributed systems security, signature schemes variants, block cipher analysis, anonymity and e-commerce, public key encryption and key exchange, secret sharing, symmetric key cryptanalysis and randomness, applied authentication, and more. This book constitutes the refereed proceedings of the 9th International Conference on Information Security, ISC 2006, held on Samos Island, Greece in August/September 2006. The 38 revised full papers presented were carefully reviewed and selected from 188 submissions. The papers are organized in topical sections. This book focuses on three emerging research topics in mobile social networks (MSNs): privacy-preserving profile matching (PPM) protocols, privacy-preserving cooperative data forwarding (PDF) protocols, and trustworthy service evaluation (TSE) systems. The PPM helps two users compare their personal profiles without disclosing the profiles. The PDF helps users forward data to their friends via multiple cooperative relay peers while preserving their identity and location privacy. The TSE enables users to locally share service reviews on the vendors such that users receive more valuable information about the services not only from vendors but also from their trusted social friends. The authors address both theoretic and practical aspects of these topics by introducing the system model, reviewing the related works, and presenting the solutions. Security and Privacy for Mobile Social Networks further provides the security analysis and the performance evaluation based on real-trace simulations. It also summarizes the future research directions for this rapidly growing area of research. The book will be valuable for researchers and practitioners who work with mobile social networks, communication platforms, wireless communication techniques, and internet applications. "Suitable for any type of reader as an introduction to the topic The chapters are well motivated and presented It is recommended for researchers." - ACM Computing Reviews, 21 July 2014 This edited book provides an optimal portrayal of the principles and applications related to network security. The book is thematically divided into five segments: Part A
describes the introductory issues related to network security with some concepts of cutting-edge technologies; Part B builds from there and exposes the readers to the digital, cloud and IoT forensics; Part C presents readers with blockchain and cryptography techniques; Part D deals with the role of AI and machine learning in the context of network security. And lastly, Part E is written on different security networking methodologies. This is a great book on network security, which has lucid and well-planned chapters. All the latest security technologies are thoroughly explained with upcoming research issues. Details on Internet architecture, security needs, encryption, cryptography along with the usages of machine learning and artificial intelligence for network security are presented in a single cover. The broad-ranging text/reference comprehensively surveys network security concepts, methods, and practices and covers network security policies and goals in an integrated manner. It is an essential security resource for practitioners in networks and professionals who develop and maintain secure computer networks. This book constitutes the refereed proceedings of the 14th International Conference on Cryptology and Network Security, CANS 2015, held in Marrakesh, Morocco, in December 2015. The 12 full papers presented together with 6 short papers were carefully reviewed and selected from numerous submissions. The papers cover topics of interest such as internet of things and privacy; password-based authentication; attacks and malicious code; security modeling and verification; secure multi-party computation; and cryptography and VPNs. This book constitutes the proceedings of the satellite workshops held around the 18th International Conference on Applied Cryptography and Network Security, ACNS 2020, in Rome, Italy, in October 2020. The 31 papers presented in this volume were carefully reviewed and selected from 65 submissions. They stem from the following workshops: AIBlock 2020: Second International Workshop on Application Intelligence and Blockchain Security AIHWS 2020: First International Workshop on Artificial Intelligence in Hardware Security AIoTS 2020: Second International Workshop on Artificial Intelligence and Industrial Internet-of-Things Security Cloud S&P 2020: Second International Workshop on Cloud Security and Privacy SCI 2020: First International Workshop on Secure Cryptographic Implementation SecMT 2020: First International Workshop on Security in Mobile Technologies SiMLA 2020: Second International Workshop on Security in Machine Learning and its Applications. This book introduces readers to the tools needed to protect IT resources and communicate with security specialists when there is a security problem. The book covers a wide range of security topics including Cryptographic Technologies, Network Security, Security Management, Information Assurance, Security Applications, Computer Security, Hardware Security, and Biometrics and Forensics. It introduces the concepts, techniques, methods, approaches, and trends needed by security specialists to improve their security skills and capabilities. Further, it provides a glimpse into future directions where security techniques, policies, applications, and theories are headed. The book represents a collection of carefully selected and reviewed chapters written by diverse security experts in the listed fields and edited by prominent security researchers. Complementary slides are available for download on the book’s website at Springer.com. Cryptography will continue to play important roles in developing of new security solutions which will be in great demand with the advent of high-speed next-generation communication systems and networks. This book discusses some of the critical security challenges faced by today's computing world and provides insights to possible
mechanisms to defend against these attacks. The book contains sixteen chapters which deal with security and privacy issues in computing and communication networks, quantum cryptography and the evolutionary concepts of cryptography and their applications like chaos-based cryptography and DNA cryptography. It will be useful for researchers, engineers, graduate and doctoral students working in cryptography and security related areas. It will also be useful for faculty members of graduate schools and universities. This book presents a holistic view on compiler assisted practical secure multi-party computation (MPC) over Boolean circuits. It discusses that two or more parties jointly evaluate a function over their inputs in such a way that each party keeps its input unknown to the other parties in MPC. MPC provides a generic way to construct Privacy-Enhancing Technologies, which protect sensitive data during processing steps in untrusted environments. A major obstacle in the past was to generate MPC applications by hand. Recently, special compilers have been developed to build all kinds of applications. This book also explains in detail how efficient MPC applications can be created automatically from ANSI-C, thus, bridging the areas of cryptography, compilation and hardware synthesis. It also gives an insight into the requirements for creating efficient applications for MPC and is hence of interest to not only researchers in the area of MPC but also developers realizing practical applications with MPC. For a better understanding of the complete compile chain from ANSI-C to circuits, which is the ‘machine code’ of MPC, the authors first give the necessary background information on MPC protocols, Boolean logic, and logic synthesis. Then the authors describe the various compilation steps required to translate any code into an adequate circuit description. Afterwards, the authors introduce a variety of optimization techniques for two classes of MPC protocols, namely techniques that improve the runtime of applications in constant- and multi-round MPC protocols. The authors also illustrate how efficient parallelization of MPC protocols can be achieved using the assistance of compilers. It presents the effectiveness of the proposed techniques by giving a detailed evaluation on benchmarking applications. Most of the aforementioned techniques are implemented in our open source compiler that is accompanying this book and allows to study compilation for MPC in practice. Researchers who are interested in practical secure multi-party computation (MPC), and developers who are interested in realizing MPC applications in practice will find this book useful as a reference, as well as advanced-level students in computer science. As the use of wireless devices becomes widespread, so does the need for strong and secure transport protocols. Even with this intensified need for securing systems, using cryptography does not seem to be a viable solution due to difficulties in implementation. The security layers of many wireless protocols use outdated encryption algorithms, which have proven unsuitable for hardware usage, particularly with handheld devices. Summarizing key issues involved in achieving desirable performance in security implementations, Wireless Security and Cryptography: Specifications and Implementations focuses on alternative integration approaches for wireless communication security. It gives an overview of the current security layer of wireless protocols and presents the performance characteristics of implementations in both software and hardware. This resource also presents efficient and novel methods to execute security schemes in wireless protocols with high performance. It provides the state of the art research trends in implementations of wireless protocol security for current and future wireless communications. Unique in its coverage of specification and implementation
concerns that include hardware design techniques. Wireless Security and Cryptography: Specifications and Implementations provides thorough coverage of wireless network security and recent research directions in the field. This book constitutes the refereed proceedings of the 5th International Conference on Cryptology and Network Security, CANS 2006, held in Suzhou, China, December 2006. The 26 revised full papers and 2 invited papers cover encryption, authentication and signatures, proxy signatures, cryptanalysis, implementation, steganalysis and watermarking, boolean functions and stream ciphers, intrusion detection, and disponibility and reliability. Design and Implementation of service-oriented architectures imposes a huge number of research questions from the fields of software engineering, system analysis and modeling, adaptability, and application integration. Component orientation and web services are two approaches for design and realization of complex web-based system. Both approaches allow for dynamic application adaptation as well as integration of enterprise application. Commonly used technologies, such as J2EE and .NET, form de facto standards for the realization of complex distributed systems. Evolution of component systems has lead to web services and service-based architectures. This has been manifested in a multitude of industry standards and initiatives such as XML, WSDL UDDI, SOAP, etc. All these achievements lead to a new and promising paradigm in IT systems engineering which proposes to design complex software solutions as collaboration of contractually defined software services. Service-Oriented Systems Engineering represents a symbiosis of best practices in object-orientation, component-based development, distributed computing, and business process management. It provides integration of business and IT concerns. The annual Ph.D. Retreat of the Research School provides each member the opportunity to present his/her current state of their research and to give an outline of a prospective Ph.D. thesis. Due to the interdisciplinary structure of the Research Scholl, this technical report covers a wide range of research topics. These include but are not limited to: Self-Adaptive Service-Oriented Systems, Operating System Support for Service-Oriented Systems, Architecture and Modeling of Service-Oriented Systems, Adaptive Process Management, Services Composition and Workflow Planning, Security Engineering of Service-Based IT Systems, Quantitative Analysis and Optimization of Service-Oriented Systems, Service-Oriented Systems in 3D Computer Graphics sowie Service-Oriented Geoinformatics. The two-volume set LNCS 12726 + 12727 constitutes the proceedings of the 19th International Conference on Applied Cryptography and Network Security, ACNS 2021, which took place virtually during June 21-24, 2021. The 37 full papers presented in the proceedings were carefully reviewed and selected from a total of 186 submissions. They were organized in topical sections as follows: Part I: Cryptographic protocols; secure and fair protocols; cryptocurrency and smart contracts; digital signatures; embedded system security; lattice cryptography; Part II: Analysis of applied systems; secure computations; cryptanalysis; system security; and cryptography and its applications. This book has been written keeping in mind syllabi of all Indian universities and optimized the contents of the book accordingly. These students are the book’s primary audience. Cryptographic concepts are explained using diagrams to illustrate component relationships and data flows. At every step aim is to examine the relationship between the security measures and the vulnerabilities they address. This will guide readers in safely applying cryptographic techniques. This book is also intended for people who know very little about cryptography but need to make technical
decisions about cryptographic security. Many people face this situation when they need to transmit business data safely over the Internet. This often includes people responsible for the data, like business analysts and managers, as well as those who must install and maintain the protections, like information systems administrators and managers. This book requires no prior knowledge of cryptography or related mathematics. Descriptions of low-level crypto mechanisms focus on presenting the concepts instead of the details. This book is intended as a reference book for professional cryptographers, presenting the techniques and algorithms of greatest interest of the current practitioner, along with the supporting motivation and background material. It also provides a comprehensive source from which to learn cryptography, serving both students and instructors. In addition, the rigorous treatment, breadth, and extensive bibliographic material should make it an important reference for research professionals. While composing this book my intention was not to introduce a collection of new techniques and protocols, but rather to selectively present techniques from those currently available in the public domain. This book constitutes the proceedings of the 15th International Conference on Applied Cryptology and Network Security, ACNS 2017, held in Kanazawa, Japan, in July 2017. The 34 papers presented in this volume were carefully reviewed and selected from 149 submissions. The topics focus on innovative research and current developments that advance the areas of applied cryptography, security analysis, cyber security and privacy, data and server security. This book is the most comprehensive and integrated treatment of the protocols required for authentication and key establishment. In a clear, uniform presentation the authors classify most protocols in terms of their properties and resource requirements, and describe all the main attack types, so the reader can quickly evaluate protocols for particular applications. In this edition the authors introduced new chapters and updated the text throughout in response to new developments and updated standards. The first chapter, an introduction to authentication and key establishment, provides the necessary background on cryptography, attack scenarios, and protocol goals. A new chapter, computational security models, describes computational models for key exchange and authentication and will help readers understand what a computational proof provides and how to compare the different computational models in use. In the subsequent chapters the authors explain protocols that use shared key cryptography, authentication and key transport using public key cryptography, key agreement protocols, the Transport Layer Security protocol, identity-based key agreement, password-based protocols, and group key establishment. The book is a suitable graduate-level introduction, and a reference and overview for researchers and practitioners with 225 concrete protocols described. In the appendices the authors list and summarize the relevant standards, linking them to the main book text when appropriate, and they offer a short tutorial on how to build a key establishment protocol. The book also includes a list of protocols, a list of attacks, a summary of the notation used in the book, general and protocol indexes, and an extensive bibliography.

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