Wireless Networks

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Security and Privacy for Next-Generation Wireless Networks

Springer

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Preface

Information technology and big data have made mobile Internet indispensable, leading to the development of a panoply of novel computing models and fueling the development of the next generation wireless networks. Breakthroughs in application technologies such as cloud computing, blockchains, and artificial intelligence have accelerated the integration of the human society and the physical world with the cyber world. The sophisticated connections between human individuals and physical devices are accurately and diversely reflected in the IoT space where the physical world and the cyber world are blended through a large-scale deployment of wireless sensor networks, the Internet of Things, and mobile crowdsourcing. Among them, new interpersonal interactions, social networks, and community collaborations, which were previously widely anticipated, have gained unprecedentedly great potentials for implementation and deployment.

In this process, on the one hand in terms of basic wireless network technologies and applications, its convenient deployment, low construction cost, strong scalability, high openness, and high flexibility bring multiple conveniences for the intelligentization, diversification and integration of our daily life; on the other hand, it is inherently open and participatory, making the control of data and communication security more complicated. Therefore, security and privacy have become a key issue as well as the primary concern for the growth of the next-generation wireless networks.

There have been an abundant number of books that introduce wireless networks which mainly make comprehensive reviews from the perspectives of technologies, principles and applications, such as wireless network security technologies, status quo and strategies of wireless network security, ZigBee wireless networks, wireless vehicle networks, wireless sensor networks, to name but a few. However, books that start from the point of view of security and privacy of wireless networks, and discuss the systems of the next-generation wireless networks and the basis of their algorithms from both the macro and micro perspectives are not so easy to find. Those books which further explore and discuss about the human-cyber-physical integration, namely, the integration of the human society, the physical

world and the cyber world, in the field of cyber security and privacy are scarcer. This book, fortunately, fills the vacant space in this research field in time. It starts at two levels, namely fundamental theories and system designs, and uses the human-cyber-physical interconnection as an entry point to explain in detail the process of integrating the human society, the physical world and the cyber world, and how to understand and solve security and privacy issues in the next-generation wireless networks.

The authors of this book are all active scholars in the field of cyber security and network systems. They have made more than significant contributions in their cutting edge research. In particular, Sheng Zhong is a leading member of the cyberspace security team of the State Key Laboratory of Novel Software Technology. He has successfully accumulated several excellent scientific research achievements in the aforementioned field, especially on the theoretical foundations. In this book, he reviews the challenges and opportunities of the next-generation wireless network security and privacy from a macro perspective, and thoroughly discusses the fundamentals of algorithm designs. Hong Zhong, Dean of the School of Computer Science and Technology at Anhui University, has always been at the forefront of network and information security research and teaching. Therefore, she has presented various innovative ideas in numerous investigative topics such as the security and privacy of self-organized vehicle networks. Xinyi Huang, Dean of the College of Mathematics and Informatics at Fujian Normal University, with a lot of experience in the research on network information security, studies security and privacy issues in mobile sensor networks in this book. Panlong Yang, from the University of Science and Technology of China, an expert of wireless networks and crowd sensing, is responsible for a chapter on security and privacy issues of mobile crowd sensing with detailed interpretations and discussions. Jin Shi, Director of the National Security Intelligence Research Group at Nanjing University, has been engaged in information security and big data analysis research for many years. He presents insights on security and privacy issues in cloud computing systems and embedded systems. Lei Xie, a promising young computer scientist from Nanjing University, writes a chapter on security and privacy issues in the integration of the cyber world and the physical world. Kun Wang from Nanjing University of Posts and Telecommunications has been engaged in extensive research on blockchain technology, energy Internet, and edge computing. In this book, he presents the latest research findings on security and privacy issues in mobile crowd computing.

The research topics covered in this book all belong to those currently hot ones. Each author has incorporated his opinions while writing the relevant chapters. This book has a nice and logical structure, uses concise language, and is fully accessible. It is a good textbook suitable for computer science, electrical engineering and other majors. It can also serve as a reference book for wireless network researchers and practitioners.

From a research point of view, all the chapters of this book are integrated into a whole; but if it is read separately, each chapter can be regarded as an independent part, and is convenient for undergraduate and graduate students interested in a particular topic to carry out targeted research and discussions. This book can

broaden readers' horizons, guide students and relevant researchers to see the development of next-generation wireless networks from a higher perspective, and explore the future trends of wireless network technology with a more acute insight in this era of rapid development. In this sense, this book is a must-read for wireless network security and privacy research. We believe that the publication of this book can play an active role in promoting the in-depth development of this research field. Hereby I recommend this book to all potential readers, and write a preface for it.

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