

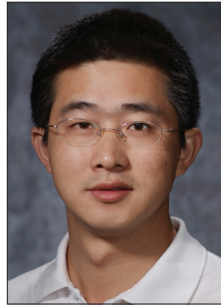
SECURITY IN WIRELESS MULTIMEDIA COMMUNICATIONS



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With the proliferation of mobile devices and the popularity of mobile multimedia applications, systematic research of the overall aspects of security in mobile multimedia communications is crucial. The emerging mobile wireless multimedia communications can be used for various pervasive and ubiquitous applications in consumers, businesses, and government agencies. Besides the consumer cellular systems and residential homes, mobile devices are being rapidly integrated into enterprises with the increase in bring-your-own-device (BYOD) in many organizations. As mobile multimedia communications become more popular in both the consumer and business markets, the need for tighter security is inevitable.

The topic of secure mobile wireless multimedia communications has attracted much attention from scholars and engineers all over the world. Despite the large amount of research work proposed in recent years, there are still many issues and open problems in secure mobile multimedia communications. Due to the unique characteristics of multimedia content and the mobile environment, the problems that mobile multimedia security needs to address are different from traditional wireless scenarios. First, mobile multimedia security methods are highly services-dependent. For example, different services require different methods for content transmission, distribution, and interaction. Second, secure transmissions are becoming increasingly difficult to obtain in mobile and distributed environments due to the broadcast nature of wireless channels. To solve this problem, many studies have been devoted to physical layer security, which exploits the physical characteristics of the wireless channel to transmit messages securely. Third, because mobile devices hold valuable and sensitive content, they face a similar or higher level of the malicious attacks that have existed in traditional communication networks for years. Security solutions for mobile devices

must defend against these attacks through the deployment of a wide array of mobile applications. Fourth, the recent growth of wireless multimedia networks has increased the demand for protection of digital media in terms of intellectual property rights. Copyright protection mainly addresses two issues: the authentication of image ownership and the identification of illegal copies of an image. Placing images or video sequences on a public network puts them at risk of theft and alteration, without the techniques of preventing copying, forgery, and unauthorized distribution.

The objective of this Feature Topic is to cover the most recent research and development on the enabling technologies for security in mobile wireless multimedia communications and stimulate discussions on state-of-the-art and innovative aspects in the field. The responses to our Call for Papers for this Feature Topic were good. During the review process, each paper was assigned to and reviewed by at least three experts in the relevant area, with a rigorous two-round review process. This Feature Topic accommodates four excellent articles covering various security aspects of mobile wireless multimedia communications involving mobile social networks, wireless multimedia delivery, the mobile media cloud, and a camera-based attack on mobile phones.

The first article, "Exploiting Multimedia Services in Mobile Social Networks from Security and Privacy Perspectives" by Zhang *et al.*, investigates security and privacy of the newly emerging multimedia-oriented mobile social network (MMSN). The article introduces the MMSN architecture and identifies the security and privacy challenges. It also presents three MMSN applications, and addresses the security and privacy issues in these applications. At the end of the article, the authors present future research directions for privacy and anonymity in multimedia.

In the second article, “Joint Physical-Application Layer Security for Wireless Multimedia Delivery,” Zhou *et al.* propose a joint framework involving both the physical layer and application layer security technologies for wireless multimedia systems. The authors show that by exploiting the security capacity and signal processing technologies at the physical layer, and the authentication and watermarking strategies at the application layer, the available network resources can be efficiently utilized.

The third article, “Security Protection between Users and the Mobile Media Cloud” by Wang *et al.*, proposes using both secure sharing and watermarking schemes to protect user data in the media cloud. The secure sharing scheme allows users to upload multiple data pieces to different clouds, making it impossible to derive the complete information from any one cloud. The authors show that the proposed scalable watermarking algorithm can be used for authentications between personal mobile users and the media cloud. They also introduce a new solution to overcome multimedia transmission errors through a joint design of watermarking technique and Reed-Solomon codes.

Wu *et al.* present the fourth article, “Security Threats to Mobile Multimedia Applications: Camera-Based Attacks on Mobile Phones.” In this article, the authors study security issues related to mobile phone cameras. They discuss several new attacks that are based on the use of phone cameras. They implement the attacks on real phones, and demonstrate the feasibility and effectiveness of the attacks. At the end, they propose a lightweight defense scheme that can effectively detect these attacks.

In closing, we would like to thank all the authors for their excellent contributions. We also thank the reviewers for their dedication in reviewing the papers, and providing valuable comments and suggestions for refining the quality of the articles. We appreciate the advice and support of former and current Editors-in-Chief of the previous and current Editors-in-Chief of *IEEE Communications Magazine*, Dr. Steve Gorshe and Dr. Sean Moore, and Joseph Milizzo, Jennifer Porcello, and Cathy Kemelmacher for their tremendous help in the publication process. Finally, we hope that the readership will find this Feature Topic interesting and informative. We also hope that the readership will stay tuned for new developments in this research area.

BIOGRAPHIES

ROSE QINGYANG HU [S'95, M'98, SM'06] (rosehu@ieee.org) received her B.S. degree in electrical engineering from the University of Science and Technology of China, her M.S. degree in mechanical engineering from the Polytechnic Institute of New York University, and her Ph.D. degree in electrical engineering from the University of Kansas. She has more than 10 years of R&D experience in the telecommunications industry as a technical manager, senior wireless system architect, and senior research scientist. From January 2002 to June 2004 she was an assistant professor with the Department of Electrical and Computer Engineering at Mississippi State University. Currently she is an associate professor with the Department of Electrical and Computer Engineering at Utah State University. Her research interests include

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