GUEST EDITORIAL PREFACE

Special Issue on Physical Layer Security Techniques and Applications in Wireless Networks

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The continued proliferation of cheap wireless Radio Frequency (RF) devices provides worldwide communication connectivity for many millions of individuals. However, transmissions in wireless systems are constantly vulnerable to eavesdroppers that may intercept the information exchange among the nodes and get confidential messages. In conventional wireless networks, security issues are primarily considered to be above the physical layer and are usually based on cryptographic methods, in which the cryptographic protocols are used mainly to provide security. The aim of the cryptographic algorithms are to make it computationally prohibitive for the malicious user to decrypt the information. This relies on the assumption that malicious user has limited computational power. However, with advances of hardware technologies and parallel computing, achieving secure communication with bit-level algorithm is insufficient.

Physical layer security is a new paradigm that provides an extra layer of security to wireless devices. Over the last few years, the wireless communications community has devoted a considerable attention to physical layer security, which exploits the uncorrelated nature of the wireless medium to enhance the security of wireless systems. Geographical information, channel response and transmitter radiometric information is different instances of physical layer security that are used to establish the identity of a wireless device and make communication more secure. This special issue of IJMCMC aims to highlight the current research related to Physical Layer Security in wireless networks and the latest research finding in the area.

The first article in this special issue provides an overview and challenges associated with three main aspects of practical deployment of Radiometric fingerprinting: 1) the practical limits of low-cost receivers for RF fingerprinting, 2) the effect of Signal-to-Noise Ratio (SNR) on the classification performance of RF fingerprinting using low-cost receivers, and 3) the portability of RF fingerprint across low-end and high-end devices. Physical layer secret key generation (PHY-SKG) techniques that exploit reciprocity of wireless channels have attracted considerable interest among researchers in the field of wireless communication. However, a key drawback of PHY-SKG techniques are low Secret Key Generation Rate (SKGR), a critical performance metric. The second paper explores the role of advanced network technologies (e.g., Multiple Input Multiple Output (MIMO) and cooperative MIMO) to enhance SKGR.

The next generation wireless networks strive to seamlessly integrate existing multiple heterogeneous networks. In an IP Multimedia Subsystem (IMS) based heterogeneous internetworking environment various security schemes are proposed to provide secure handover when a Mobile Node (MN) moves between different access networks. However, these schemes degrades the Quality of Service (QoS). Third paper provides a Secure Context Transfer Model (SCTM) for secure and efficient handover in an IMS based Worldwide Interoperability for Microwave access (WiMAX)/ Long Term Evolution (LTE) integrated networks.

The importance of information that resides on storage systems exceeds all other IT systems in an organization. The fourth paper provides an overview of the security of file storage system of an organization. Different kinds of security threats and a number of security techniques used to protect information is examined and an assessment plan for evaluating cyber security of local storage systems is proposed. The proposed assessment model is implemented for two important organizations in the Kingdom of Bahrain.

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