

IEEE ICC'15 Workshop on Wireless Physical Layer Security

Date: Monday 8 June

Room: Capital Suite 13 (check official ICC conference program for the final venues)

9:00 Opening Remarks (Eduard Jorswieck)

9:05 – 9:55 Keynote 1 (Chair – Eduard Jorswieck)

- **The Wireless Physical Layer: A Medium for Information Extraction and Exploitation**

Wade Trappe (Rutgers University)

Abstract: Wireless networks are becoming prolific, and the implication is that they create imprints on our environment-- new sources of information that can be examined to arrive at a variety of societal benefits and societal threats. The wireless medium allows for the creation of many new services, such location-based services as well as new forms of security services. On the other hand, it is now possible to examine the information traversing the wireless to infer information that might have previously been considered inaccessible. This talk will examine the broad implications associated with pervasive wireless connectivity, ranging from the new types of applications that can be created by tapping into the wireless fabric to new types of security and privacy threats unique to the wireless medium. After completing a high-level survey of such issues and opportunities, the talk will turn to a detailed examination of security solutions that may be devised at the physical layer. Such physical layer security activity has pulled from a broad variety of traditional research areas, ranging from traditional cryptographic security to information theoretic security, from theoretical efforts focused on understanding fundamental limits to systems efforts targeted at proving that the proposed theories can in fact be realized in real systems. The talk will examine how physical layer methods can be leveraged to develop authentication and confidentiality services. The talk will present some of the basic theories being used, as well as present systems-validation efforts that have been conducted. Lastly, we will comment on some of the potential weaknesses that exist in physical layer security and, by doing so, highlight directions for ongoing research.

9:55 – 10:30 Oral Session 1: Multi-Antenna Secure Transmissions (Chair – Eduard Jorswieck)

- **Unitary Modulation for Secrecy Enhancement in Multi-antenna Wireless Systems with Only CSIT**

Pang-Chang Lan (University of Southern California, USA); Yao-Win Peter Hong (National Tsing Hua University, Taiwan); Tze-Ping Low (MediaTek USA Inc., USA); C.-C. Jay Kuo (University of Southern California, USA)

- **Secure Beamforming and Artificial Noise Design in Interference Networks with Imperfect ECSI**

Jian Zhou, Ruohan Cao, Hui Gao, Cong Zhang and Tiejun Lv (Beijing University of Posts and Telecommunications, P.R. China)

10:30 – 11:00 Coffee Break

11:00 – 11:50 Keynote 2 (Chair – Stefano Tomasin)

- **Secure Communication under Channel Uncertainty and Adversarial Attacks**

Rafael Schaefer (Princeton University)

Abstract: Information theoretic approaches to security have been examined as a promising complement to current cryptographic techniques. Such information theoretic approaches establish reliable communication and data confidentiality directly at the physical layer of a communication network by taking the properties of the noisy channel into account leading to unconditional security regardless of the computational capabilities of eavesdroppers. The provision of accurate channel state information is a major challenge particularly in wireless communication systems, especially information about the channels to non-legitimate eavesdroppers. In addition, there might be malevolent adversaries who jam or influence the channel of the legitimate users. This talk surveys different models for secure communication under channel uncertainty and adversarial attacks and reviews the corresponding results.

11:50 – 1:00 Oral Session 2: Coding and Cooperation for Secrecy (Chair – Stefano Tomasin)

- **Key Generation with A Byzantine Helper**

Wenwen Tu and Lifeng Lai (Worcester Polytechnic Institute, USA)

- **Performance assessment and design of finite length LDPC codes for the Gaussian wiretap channel**

Marco Baldi, Giacomo Ricciutelli, Nicola Maturo and Franco Chiaraluce (Università Politecnica delle Marche, Italy)

- **On MMSE Properties of Codes for the Gaussian Broadcast Channel with Confidential Messages**

Ronit Bustin, Rafael F. Schaefer and H. Vincent Poor (Princeton University, USA); Shlomo (Shitz) Shamai (The Technion, Israel)

- **Can Bob Enhance the Security of the Multiple Antenna Wiretap Channel?**

Nabil Romero-Zurita (The University of Leeds, Cambridge Silicon Radio Ltd., United Kingdom); Mounir Ghogho (University of Leeds & International University of Rabat, United Kingdom); Desmond McLernon (The University of Leeds, United Kingdom); Ananthram Swami (Army Research Lab., USA)

1:00 – 2:30 Lunch Break

2:30 – 4:00 Panel Discussion (Chair – Eduard Jorswieck)

- **Wireless Physical Layer Security – Myth or Reality**

Panelists: Merouane Debbah (Supélec, Huawei, France), Andreas Mueller (Bosch, Germany), Francois Delaveau (Thales, France)

4:00 – 4:30 Coffee Break

4:30– 5:15 Interactive Poster Session 1: Performance Analysis and New Design of Secure Communications (Chair – Xiangyun Zhou)

Room: Capital Suite 3 (check official ICC conference program for the final venues)

- **Achievable Ergodic Secrecy Rate for MIMO SWIPT Wiretap Channels**
Jun Zhang and Chau Yuen (Singapore University of Technology and Design, Singapore); Chao-Kai Wen (National Sun Yat-sen University, Taiwan); Shi Jin (Southeast University, P.R. China); Kai Kit Wong (University College London, United Kingdom); Hongbo Zhu (Nanjing University of Posts and Telecommunications, P.R. China)
- **On Directional Modulation: An Analysis of Transmission Scheme with Multiple Directions**
Mohammed A. Hafez and Huseyin Arslan (University of South Florida, USA)
- **Fundamental Limits of Caching in D2D Networks With Secure Delivery**
Zohaib Awan (RUB, Germany); Aydin Sezgin (RUB & Digital Communication Systems, Germany)
- **Tomlinson-Harashima Precoding Design in MIMO Wiretap Channels Based on the MMSE Criterion**
Lei Zhang and Yunlong Cai (Zhejiang University, P.R. China); Benoit Champagne (McGill University, Canada); Minjian Zhao (Zhejiang University, P.R. China)
- **Multi-Phase Transmission for Secure Cognitive Radio Networks**
Pin-Hsun Lin (TU Dresden, Germany); Frederic Gabry and Ragnar Thobaben (KTH Royal Institute of Technology, Sweden); Eduard Jorswieck (TU Dresden, Germany); Mikael Skoglund (KTH Royal Institute of Technology, Sweden)

5:15– 6:00 Interactive Poster Session 2: Performance Analysis and New Design of Secure Communications (Chair – Xiangyun Zhou)

Room: Capital Suite 3 (check official ICC conference program for the final venues)

- **MIMO Wiretap Channels with Randomly Located Eavesdroppers: Large-System Analysis**
Maksym A. Girnyk and Frederic Gabry (KTH Royal Institute of Technology, Sweden); Mikko Vehkaperä (Aalto University, Finland); Lars K. Rasmussen and Mikael Skoglund (KTH Royal Institute of Technology, Sweden)
- **Construction of Best Equivocation Codes with Highest Minimum Distance for Syndrome Coding**
Salah Al-Hassan (Plymouth University, United Kingdom); Mohammed Ahmed and Martin Tomlinson (University of Plymouth, United Kingdom)
- **Feedback Based Two-Phase Transmission for Secure SIMO Communications**
Chaowen Liu, Wang Wenjie, Pengcheng Mu, Hui-Ming Wang and Weile Zhang (Xi'an Jiaotong University, P.R. China)

- **Secure Robust Resource Allocation using Full-Duplex Receivers**
Mohammadreza Abedi (Amirkabir University, Iran); Nader Mokari and Hamid Saeedi (Tarbiat Modares University, Iran); Halim Yanikomeroglu (Carleton University, Canada)
- **On the Individual Secrecy for Gaussian Broadcast Channels with Receiver Side Information**
Yanling Chen (Ruhr-University Bochum, Germany); Onur Ozan Koyluoglu (The University of Arizona, USA); Aydin Sezgin (RUB & Digital Communication Systems, Germany)

6:00 Closing Remarks (Xiangyun Zhou)