Laboratory for Advanced Research into Telecommunication Systems

Challenges and solutions for 5G proximity-based information exchange protocols

Special topics:

Securing Network-Assisted Direct Communication: The Case of Unreliable Cellular Connectivity

Human Centered Studies – Collaborative Video Challenges: A Playful Concept of Proximity-Based Social Interaction

Guest Seminar

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With this talk, we address the emerging concept of network-assisted proximity-based services and applications envisioned to augment future fifth-generation (5G) wireless systems. Proximal connectivity is commonly believed to alleviate congestion on current cellular networks, create flexible and efficient on-demand network infrastructures, and enable novel ways of interaction for nearby human users. Inspired by recent technology progress in this area, we rigorously review the underlying security challenges and threats, as well as offer comprehensive cryptographic solutions to mitigate these alongside the following main directions.

Special topic 1:

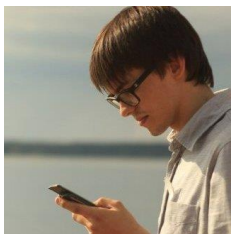
– Consider novel security challenges resulting from connectivity between unfamiliar users/devices. How cellular network assistance can help establish trust? What happens if (for some users) cellular connection is disrupted or a new untrusted peer comes into proximity? To what extent the trust is transitive (e.g., trust to a friend of a friend)?

– Consider a secure enclave (i.e., a distributed mobile cloud), when users arrive and depart, but those still in proximity can collectively share some (multimedia) data. What are the key privacy issues and associated solutions? For instance, how do we

account for data access privileges (e.g., do we allow access to shared data after a user leaves the system)?
– Consider serendipity and user experience aspects of proximity services. How the device can learn about user habits/priorities and use this knowledge to aid the user daily? What is the extent such services can be helpful and what are the related threats?

Special topic 2:
– How the device-to-device operation may bring the new way of human interaction to our everyday lives? The discussion would be about the general concept of collaborative video sharing application, its development and usability challenges. Also the topic of the trial concept establishment from the beginning of the project would be discussed. The general information regarding Human Centered Design techniques and tools used for the implementation and its improvement of quality of experience are also touched. The role of user experience and its benefits in software development process would be stated.

Short biographies:



Aleksandr Ometov is a research assistant at the Department of Electronics and Communications Engineering of Tampere University of Technology (TUT), Finland. He received the Information Security Specialist degree from the St. Petersburg State University of Aerospace Instrumentation, St. Petersburg, Russia, in 2013. His major research interests are in wireless communications, information security, heterogeneous networks, cooperative communications, and M2M applications.

Ekaterina Olshannikova is a project researcher at the Department of Pervasive Computing of Tampere University of Technology (TUT), Finland. She received the Art Critic Specialist degree in History and Theory of Fine Art at St. Petersburg State University of Technology and Design, St. Petersburg, Russian Federation, in 2013. Her major research interests are in human-computer interaction, augmented and virtual reality and user interface design.