Towards Replay-resilient RFID Authentication

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Abstract
We provide the first solution to an important question, “how a physical-layer authentication method can defend against signal replay attacks”. It was believed that if an attacker can replay the exact same reply signal of a legitimate authentication object (such as an RFID tag), any physical-layer authentication method will fail. This paper presents Hu-Fu, the first physical layer RFID authentication protocol that is resilient to the major attacks including tag counterfeiting, signal replay, signal compensation, and brute-force feature reply. Hu-Fu is built on two fundamental ideas, namely inductive coupling of two tags and signal randomization. Hu-Fu does not require any hardware or protocol modification on COTS passive tags and can be implemented with COTS devices. We implement a prototype of Hu-Fu and demonstrate that it is accurate and robust to device diversity and environmental changes, including locations, distance, and temperature. Hu-Fu provides a new direction of battery-free/low-power device authentication that enables numerous IoT applications.

About the Speaker
Chen Qian is an Assistant Professor in Department of Computer Engineering at University of California Santa Cruz. He got his PhD degree in 2013 from The University of Texas at Austin, where he worked with Simon Lam. His research interests include computer networking and distributed systems, Internet of Things, network security, and cloud computing. He has published more than 60 papers, most of which appeared in top journals and conferences. He received the NSF CAREER Award in 2018.

All are welcome!

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