THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Department of Computing
電子計算學系

RESEARCH SEMINAR

Security-Enhanced Radio Access Networks for 5G OpenRAN

Prof. Zhiqiang LIN

Distinguished Professor of Engineering

Department of Computer Science and Engineering

The Ohio State University

USA

Date : 11 Nov 2024 (Mon)
Time : 5:00 pm - 6:00 pm
Venue : Y305

Abstract

In recent years, the mobile security landscape has been challenged by a range of sophisticated exploits targeting link and session-establishment protocols. These exploits, often deployed via software-defined radios (SDRs), can disrupt, spoof, or flood layer-3 (L3) messages, posing significant risks to the security and privacy of even the most advanced 5G networks. However, the shift from closed, proprietary infrastructures to the open, intelligent architecture of 5G OpenRAN (O-RAN) presents a transformative opportunity for the cybersecurity community. By embracing a software-defined, fully interoperable mobile architecture, we can fundamentally enhance the security posture of mobile networks.

In this talk, Prof. Lin will describe his recent collaborative Security-Enhanced Radio Access Network (SE-RAN) project, which aims to address emerging cellular network threats through innovative security services on the O-RAN control plane. First, he will present 5G-Spector, the first comprehensive framework for detecting the wide spectrum of L3 protocol exploits on O-RAN. This framework features a novel security audit stream called MobiFlow that transfers fine-grained cellular network telemetry, and a programmable control-plane xApp called MobieXpert. Next, he will also outline a forward-looking vision for the convergence of AI and cellular security, exploring how these technologies can unlock unprecedented capabilities in threat detection and mitigation. Finally, he will introduce 5G-XSec, a preliminary framework that leverages deep learning and large language models to automatically monitor, analyze, and explain anomalies and threats at the cellular network edge.

About the Speaker

Prof. Zhiqiang LIN is a Distinguished Professor of Engineering and the Director of the Institute for Cybersecurity and Digital Trust (ICDT) at The Ohio State University. His research focuses on systems and software security, emphasizing automated binary analysis techniques for vulnerability discovery and malware analysis, as well as software hardening through binary code rewriting, virtualization, and trusted execution environments, and the applications of these techniques in mobile, IoT, and cellular (e.g., 5G/6G) networks. He has published over 150 papers, many of which have appeared in the top venues in cybersecurity. He is an IEEE Fellow and an ACM Distinguished Member. He is a recipient of the Harrison Faculty Award for Excellence in Engineering Education, an NSF CAREER Award, an AFOSR Young Investigator Award, the Outstanding Faculty Teaching Award, and Distinguished Paper Award from IEEE S&P. He earned his PhD in Computer Science from Purdue University.