THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Department of Computing
電子計算學系

RESEARCH SEMINAR

AI/ML-Based IDS as 5G Core Network Function for 3GPP Cellular IoT Traffic

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Date : 13 August 2025 (Wed)
Time : 10:30 am – 11:30 am
Venue : PQ304

Abstract

In this talk, we will present an Intrusion Detection System (IDS) within the 5G core network, which is capable of inspecting both IP and non-IP data flows. By leveraging the Access and Mobility Management Function (AMF) Network Function (NF) communication service, our IDS can analyze all Cellular Internet of Things (CIoT) data traffic flowing across both the User and Control Planes (UP and CP), enabling the detection of malicious activities originating from or targeting IoT networks. Our proposal is aligned with the 3GPP Release 17 standard and makes use of predefined functionalities to ensure compliance. Our proposal is non-intrusive and does not interfere with the core network's usual processes based on existing Service Based Interfaces (SBI). Additionally, we demonstrate that the classification of a data packet as malicious or benign is context-dependent using AI/ML Transformer Encoder architectures. We implement and integrate our proposed 5G-CIoT IDS as a Network Function inside the 5G Amarisoft platform for extensive experimentation. To evaluate the models' performance, we train our models with different categories of safe and malicious generated traffic and apply them to an emulated realistic scenario.

About the Speaker

Prof. Nadjib Aitsaadi is a full professor at UVSQ Paris-Saclay University, where he leads the Next Generation Networks (NGN) Team in the DAVID Laboratory. Before his tenure at UVSQ Paris-Saclay, he held several positions: full professor of computer science at ESIEE Paris, part of Gustave Eiffel University (UGE); associate professor of computer science at the University of Paris-Est Creteil (UPEC); and research fellow at INRIA.

Prof. Aitsaadi earned his HDR (habilitation diploma) in computer science from University Paris Est (UPE) in 2016. He received both his PhD and master's degrees in computer science from Sorbonne University (UPMC/Paris 6), in 2010 and 2006, respectively.

His primary research focuses on the security and QoS/QoE optimization of networks in the RAN, Core, and Edge/Cloud segments. He addresses various challenges, including resource allocation and routing, V2X, D2D, supervision/observability, misbehavior detection, SIEM, NFV/SFC service chaining, among others.