NAGRA KUDELSKI GROUP

HAUTE ÉCOLE D'INGÉNIERIE ET DE GESTION DU CANTON DE VAUD
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Scope statement for RF fingerprinting on NFC devices (Bachelor Thesis)

Project purpose: Develop a tool to identify NFC devices by analysing the RF spectrum of their transmitted signals

Duration: 450 hours (ends 24th july 2020 at 12h00)

Detailed description

RF fingerprinting is a technique that allows the identification of radio transmitters (such as IoT devices) by analysing the spectrum of their transmissions. This analysis can typically be performed using machine learning algorithms.

NFC technology is often used in access control and payment applications but many implementations are vulnerable to relay attacks with research and tools that facilitate such attacks being publicly available.

The goal of this project is to determine if RF fingerprinting could be used as an authentication technique against relay attacks.

The main steps of this project are the following:

- Build a simple lab setup with Software-Defined Radio (SDR) equipment to acquire signals between an NFC device and its reader
- Acquire RF spectrum data of various NFC devices
- Analyse the signals
- Classify the signals of the devices by using supervised machine learning classification techniques in order to differentiate trusted devices from attacker / relay devices
- Determine if this identification technique could be used as an authentication feature against relay attacks

As the receiving equipment (SDR) has an influence on the recorded signals, for this project we consider a single receiver to record the RF samples. Similarly, the lab setup should be built to provide an ideal low-noise & low-interference environment to simplify the analysis phase.

The expected deliverables are the following:

- A tool able to identify NFC devices by analysing the RF spectrum of their signals, at least in an ideal environment and with a small number of devices
- A detailed account of the steps taken and the setup used (as part of the report)
- An analysis of the results (as part of the report)

Collaboration with other researchers in this field is wished (EPFL, ElectroSense).

	Date	***Name and signature***
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