

Privacy oriented analysis of UltraWideBand in connected devices

Keywords: Privacy, security, IoT, connected devices, wireless, UWB,

Ultra-Wide-Band (UWB) is an emerging wireless communication technologies that is currently deployed at a large scale in consumer devices (smartphones, tags, ...). In particular Apple and Samsung have been integrating UWB in their most recent devices where it joins and complement other wireless technologies such as Wi-Fi and Bluetooth. UWB is used for accurate ranging and transmission of information and is used to enable location services (Beacons), access control (Vehicle keys) and device to device communications (Airtags).

The fast and ubiquitous deployment of UWB may have an impact on users' privacy [1]. As it has been demonstrated with other wireless technologies (Wi-Fi, Bluetooth, BLE, ...) wireless communication can expose sensitive information about the users. Metadata exposed by wireless signal originating from connected devices can be leveraged to track users [2,3,4,5] or to infer all kind of personal data [3].

The objective of this internship is to perform a first assessment of the privacy risks associated with UWB. A first step is to study the technical tools available to interact (capture and injection) of UWB traffic. The second step will focus on the analysis of UWB traffic generated by commodity devices (smartphones, Airtags) in search of information that might threaten users' privacy. The envisioned work will be similar to the one conducted in [5] and [3] for Wi-Fi and BLE.

[1]A. Ahmed, "Privacy issues of mobile phone companies'™ usage of Ultra-Wideband (UWB) technology: Analysing the use of UWB in mobile phones from a multi-actor perspective, magnifying privacy concerns and formulating guidelines," 2021,

[2]N. Ludant, T. D. Vo-Huu, S. Narain, and G. Noubir, "Linking Bluetooth LE & Classic and Implications for Privacy-Preserving Bluetooth-Based Protocols," in 2021 IEEE Symposium on Security and Privacy (SP), San Francisco, CA, USA, May 2021, pp. 1318–1331. doi: 10.1109/SP40001.2021.00102.

[3]G. Celosia and M. Cunche, "Discontinued Privacy: Personal Data Leaks in Apple Bluetooth-Low-Energy Continuity Protocols," Proceedings on Privacy Enhancing Technologies, vol. 2020, no. 1, pp. 26–46, Jan. 2020, doi: 10.2478/popets-2020-0003.

[4]J. K. Becker, D. Li, and D. Starobinski, "Tracking Anonymized Bluetooth Devices," Proceedings on Privacy Enhancing Technologies, vol. 2019, no. 3, pp. 50–65, Jul. 2019, doi: 10.2478/popets-2019-0036.

[5]M. Vanhoef, C. Matte, M. Cunche, L. S. Cardoso, and F. Piessens, "Why MAC Address Randomization is Not Enough: An Analysis of Wi-Fi Network Discovery Mechanisms," in Proceedings of the 11th ACM on Asia Conference on Computer and Communications Security, New York, NY, USA, 2016, pp. 413–424. doi: 10.1145/2897845.2897883.

Profile

We are looking for a highly motivated M2 (or equivalent) student with a strong interest in privacy and security. The candidate should have strong technical and analytical skills, and have a good background in the following topics:

- Programming (Python, bash, ...)
- Networking and associated tools (Wireshark, ...)
- Wireless communications
- System administration (Linux)

Environment

This internship will take place in the Inria Privatics team hosted in the CITI-lab of INSA-Lyon.

The Privatics team is a research group affiliated to Inria and INSA-Lyon based in Grenoble and Lyon. Privatics follows a multidisciplinary approach in considering the scientific and technical issues, but also economic, legal and social aspects of privacy. The team has expertise in the identification of privacy issues, anonymization techniques and sanitization database and design of Privacy Enhancing Technologies (PETs). Privatics has a long history of contributing to Standards Developing Organisations (IETF and IEEE) and has strong links with the CNIL (the French Data Protection Authority).

The CITI-lab develops research activities bringing together computer science, networking, and digital communications to address the challenging issues related to the development of Internet. This world scale network offers a seamless communication path between heterogeneous nodes (persons, objects, sensors, phones,...) in an heterogeneous architecture including wireless access, offering mobility, ubiquity and adaptability. Cutting-edge technologies are expected in various fields to provide seamless, self-adaptive and secured solutions fitting with the specific constraints of many applicative frameworks. The full cross-layer expertise the CITI acquired during the past ten years makes it a very original, challenging and almost unique place in France.

Location

Campus La Doua Villeurbanne / Lyon

Contact

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Benefits and remuneration

- Partial reimbursement of public transport costs
- approx 600 euros / month