Prof. Dr. Lothar Thiele

Master Thesis:

Truth be told: Benchmarking BLE and 15.4

The Internet of Things (IoT) refers to the proliferation of objects embedding both computing and communication capabilities. Some recent IoT platforms are featuring multiple radios, or radio modules that are compatible with multiple standard communication technologies, such as Bluetooth Low-Energy and IEEE 802.15.4 – also known as BLE and ZigBee respectively. An example such radio is the nRF52840 SoC. While both technologies are well-known and commercially used, there is still a lack of head-to-head performance comparison between the two approaches. This project aims to contribute to fill this gap by thoroughly benchmarking and comparing the performance of BLE and ZigBee, as two different levels

PHY layer – How do BLE and ZigBee compare on the simplest setting possible; that is, single-hop communication between two nodes?

LINK layer – The so-called Synchronous Transmissions (ST) technique is very popular on ZigBee, and was recently shown feasible on BLE [1]. How do BLE and ZigBee compare when using ST?

Project goal

The main goal of the project is to perform a thorough benchmarking and comparison of the performance trade-offs enabled by the BLE and ZigBee PHY layers using a state-of-the-art System-on-Chip: the nRF52840 SoC.

A particular attention must be paid to perform *repeatable experiments*: The lack of repeatability in low-power wireless experimental evaluation is known to be a challenge. Ongoing work [2] is attempting to address this issue; this project will serve as a perfect case study. Going further, the project can be stirred into two different directions:

- Developing support tools for streamlining the benchmarking of low-power wireless communication protocols;

- Leveraging the knowledge from the BLE vs ZigBee comparison to design and implement performant network stacks using Synchronous Transmissions.

References

[1] Concurrent Transmissions for Multi-Hop Bluetooth 5, B. Al Nahas et al., EWSN 2019

[2] Towards a Methodology for Experimental Evaluation in Low-Power Wireless Networking, R. Jacob et al., CPS-IoTBench 2019

Interested? Contact us for more details!

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