Open Thesis / Project

Extending ContikiBLE: An Open-Source IPv6 over BLE Stack for Contiki

Motivation
Bluetooth Low Energy (BLE) has gained increasing popularity over the past years because of its energy efficiency, reliability under interference, and wide adoption in consumer devices such as smartphones, tablets, and wearables. In 2015, the IETF formalized the RFC 7668 standard that defines how BLE connections can be used to exchange IPv6 packets, practically allowing any BLE device to seamlessly connect to the Internet of Things.

At our Institute we created ContikiBLE, an open-source IPv6 over BLE communication stack for the Contiki operating system. We plan to enrich this stack with further functionality such as BLE mesh networking, to support multiple platforms (e.g., based on nRF52 transceivers), as well as to connect IoT devices using ContikiBLE to Android-powered smartphones and tablets.

Goal and Tasks

- **Topic 1.** Extend the current Android BLE stack to support raw L2CAP communication (especially credit-based flow control channels) and enable IPv6 over BLE messages to be sent on Android devices. The current BLE stack of Android only supports GATT/ATT communication and the underlying L2CAP connections used by GATT/ATT are hidden from the Android system even on rooted devices.
- **Topic 2.** Extend ContikiBLE to support mesh networking. Mesh networking is currently not supported in the official BLE standard, but is soon expected to be a killer feature for IoT applications based on BLE.
- **Topic 3.** Extend ContikiBLE’s support to other hardware platforms, e.g., based on nRF52 transceivers.

Required Prior Knowledge
- Good C/C++ programming skills;
- Prior experience with Contiki is desirable.

Used Tools & Equipment
- TI CC2650 SensorTags/Launchpads;
- nRF52 Development Kit;
- Contiki operating system (C language).

Contact Person
- Michael Spörk
  michael.spoerk@tugraz.at
- Dr. Carlo Alberto Boano
  cboano@tugraz.at

Target Group
Students in ICE/Telematics and Comp. Science.

Thesis Type
Master Project / Master Thesis.