

IoT Firmware Management: Over the Air Firmware Management for Constrained Devices using IPv6 over BLE

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Abstract

The next wave driving the Internet expansion will come from Internet of Things. Bluetooth Low Energy (BLE) is considered to be a prime candidate to connect and let the device communicate with each other. Furthermore, with the advent of LoWPAN technology, it is possible to designate the IPv6 address to every “thing” in the Internet of things paradigm. As IoT is gaining traction, a number of associated challenges have surfaced. One of which is the management of the fleet of IoT devices.

Manual management of resource constrained IoT devices is not feasible. The network of wireless sensors should be controlled by a remote management framework which should take care of device control and firmware upgrade. The firmware upgrade is required to push bug fixes, security, vulnerabilities fixes and new features into the IoT devices. In the current state of the art, there exist no end to end firmware upgrade framework to remotely manage the device control and firmware upgrade on BLE devices. This dissertation establishes state of the art in IoT protocol stack and firmware upgrade mechanism. Further, we investigate the gaps in current firmware upgrade mechanism and implements an approach which adheres the specifications of remote management standard (LwM2M) and uses CoAP block transfer for transporting the firmware image to BLE based IoT device via IPv6 over BLE channel.