Building a Test Bed for Simulation Analysis for the Internet of Things

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Abstract

The current Internet of Things (IoT) solutions require support at different network layers, from higher level applications to lower level media-based support. The dissertation presents some of the main application requirements for IoT, characterizing architecture, Quality of Service (QoS) features, security mechanisms, discovery service resources and web integration options and the protocols that can be used to provide them (e.g. CoAP, XMPP, DDS, MQTT-SN, AMQP). As examples of lower-level requirements and protocols, several wireless network characteristics (e.g. ZigBee, Z-Wave, BLE, LoRaWAN, SigFox, IEEE 802.11af, NB-IoT) are presented.

The variety of possible applications scenarios and the heterogeneity of enabling technologies combined with a large number of sensors and devices, suggests the need for simulation and modeling tactics to describe how the previous requirements can be met.

As a potential solution, the creation of simulation models and the usage of the OMNET++ simulation tool to enable meaningful IoT simulation is discussed. The analysis of the behavior of IoT applications is proposed for two use cases: Wireless Sensor Networks (WSN) for home and industrial automation, and Low Power Wide Area (LPWA) networks for smart meters, smart buildings, and smart cities.