Background

In order to make our life easy, we are intended to automate every possible device around us. Internet of Things (IoT) communication gives an enormous opportunity to make it possible. Though, there are lots of challenges in integrating the real world with the cyber world of Information communication technology.

Thanks to the ever increasing advances in microelectronics, sensors have become so small and inexpensive that could be embedded not only in electrical devices, cars, household appliances, toys, and tools but also in such things like pencils, clothes, and the human body to collect data from the environment. The current trend is to develop tinier and cheaper integrated circuits able to communicable wirelessly with the network. Eventually, these objects will automatically, with a reduced (or even no) human intervention, communicate with each other in order to realize a networked society. According to a market research, it is anticipated that the number of connected devices will be more than 20 billion by 2025 [1]. Taking the ever increasing number of IoT devices and inefficiency of existing wireless infrastructure for handling such traffic, evolutionary and revolutionary IoT access technologies have been investigated in recent years. Numerous IoT technologies are available in the market to handle outdoor and indoor IoT connectivity, including LTE category 1 and M, low power wide area network (LPWAN), IEEE 802.15.4, WiFi, and Bluetooth Low Energy BLE. The best connectivity solution depends on many factors, including wireless medium, number of IoT devices, and the target quality-of-service levels. Despite its significant societal and economic impacts, how to find the best connectivity solution for IoT is a largely open problem.

This thesis aims at addressing this important gap by proving a comprehensive simulator where IoT developers can implement their IoT scenario, evaluate the performance of different connectivity solutions, and pick the best one.

Objective

To ensure a cost effective rollout of services, it is always wise to compare the performance of different connectivity options to select the best suited technology for a service. Our main objective is to develop a user-friendly simulator environment based on NS-3 simulator. We would like to study and compile most prominent use cases with most promising connectivity option to demonstrate the technologies pros and cons for a specific service case.

Projects

- LoRa, LR-WAN and NB-IoT Module in NS-3 simulator and observe the performance of these technologies in selected use cases in smart city context.
- Integrate BLE, WiFi and 6LoWPAN module in NS-3 simulator and observe the performance of these technologies in selected use cases in Industry 4.0 context.
- Develop a user friendly GUI interface based on Java or C++ where a user can easily select different use cases and run it on NS-3 to simulate graphical results.

References: