Low Power Wide Area Networks for the Internet of Things

Framework, Performance Evaluation, and Challenges of LoRaWAN and NB-IoT

Samer Lahoud   Melhem El Helou

ESIB, Saint Joseph University of Beirut, Lebanon

Mar Roukos, June 2018

Tutorial Outcomes

- How do LPWAN complement traditional cellular and short-range wireless technologies?
- What are the fundamental mechanisms that enable to meet the LPWAN requirements?
- What are the major design choices made in the LoRaWAN and NB-IoT specifications?
- How do we evaluate the performance of a LoRaWAN deployment in terms of coverage and capacity?

Outline

LISA: Long-range IoT for Smart Agriculture

- Project launched at ESIB-USJ in Sept. 2016
- Scientific objectives cover networking and agriculture topics
    - Deploy and test LoRa for agriculture
    - Automate measurement process of microclimates under vines
    - Test and assess different pruning lengths
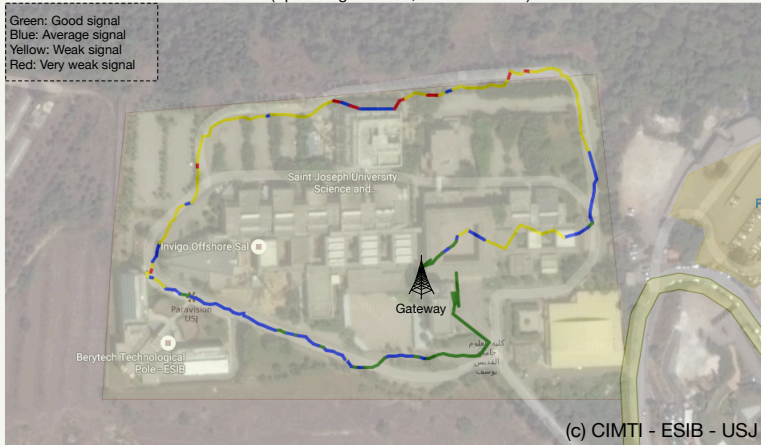- LISA will deploy a LoRa based IoT network in Bekaa in 2018
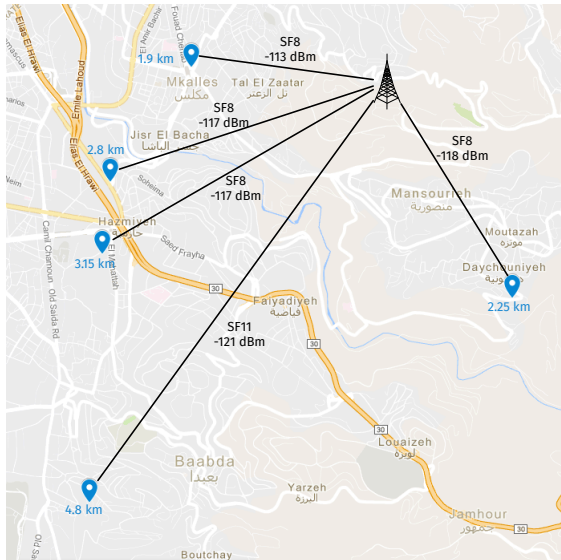
First LoRaWAN Pilot in Lebanon at ESIB
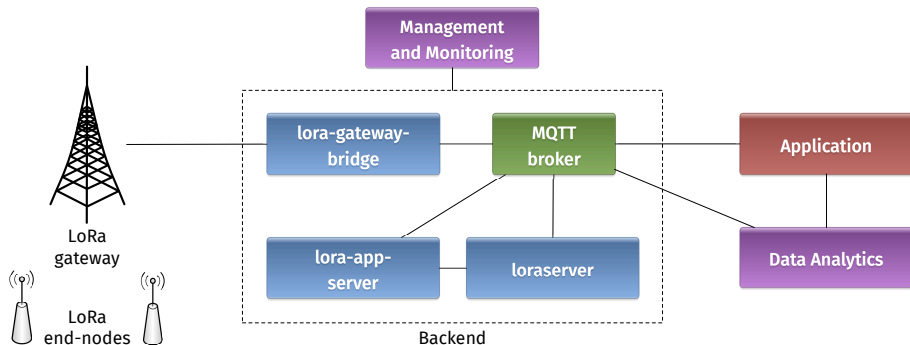
- Lab prototype: Arduino + Dragino (HopeRF) LoRa shield, Raspberry Pi based DIY gateway
- Deployment: Sodaq autonomo with (Microchip) LoRabee devices, Kerlink Wirnet gateway

LoRa Campus Coverage

LoRa Coverage Test
(Spreading Factor 7, Power 13 dBm)

Green: Good signal
Blue: Average signal
Yellow: Weak signal
Red: Very weak signal

Gateway

(c) CIMTI - ESIB - USJ

LoRa Drive Test

LoRa Cool Services

- View the live dashboard
  - https://emoncms.org/dashboard/view&id=42658

- Play with MQTT and receive LoRa messages
  - Install a MQTT app (MQTT Dashboard on Android)
  - Connect to 212.98.137.194 port 1883
  - Subscribe to topic #

- Connect with our plants
  - Twitter: @allo_laplante
  - Hangout: rt.laplante@gmail.com and type `/bot eguz`