

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

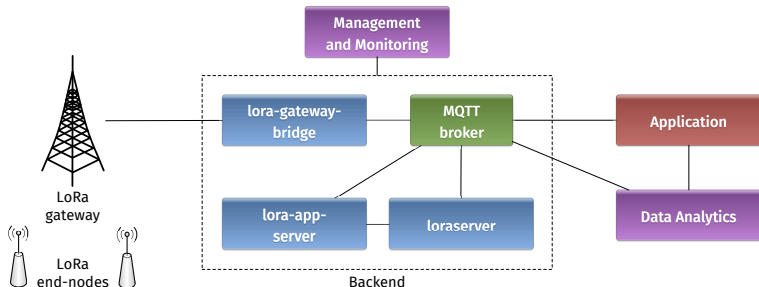
1 Experimentation



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
- Participation in the PoC with Libatel for OGERO
 - Deployment at Château Kefraya

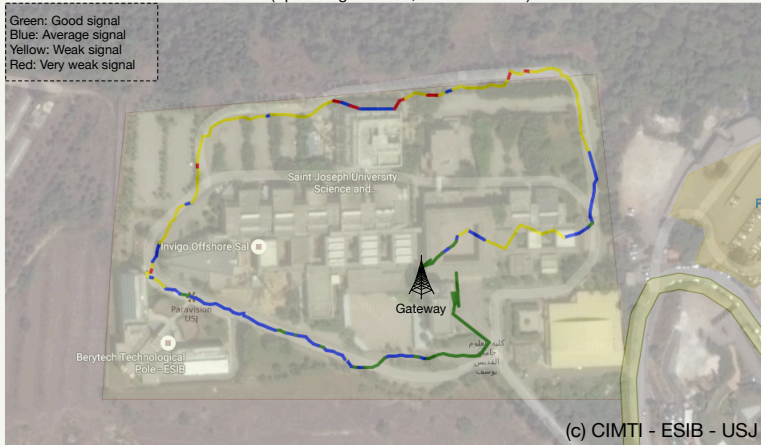
First LoRaWAN Pilot in Lebanon at ESIB



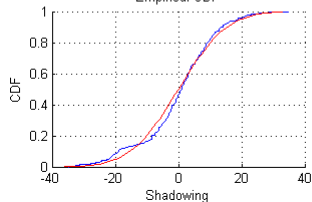
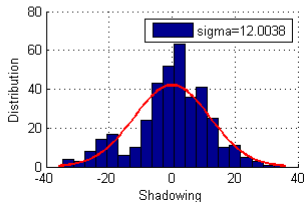
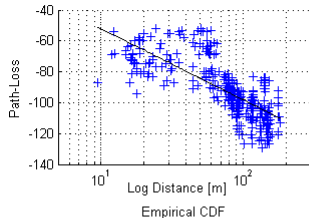
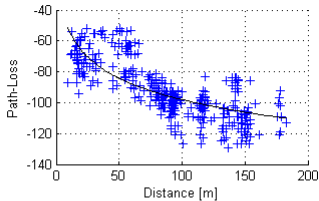
- Diversity of devices: Arduino + Dragino (HopeRF) LoRa shield, Sodaq autonomo with (Microchip) LoRabee, Pycom LoPy, Raspberry Pi based DIY gateway, Kerlink Wirnet gateway
- Diversity of usage: Course on IoT technologies, student projects, research studies

LoRa Campus Coverage (1/2)

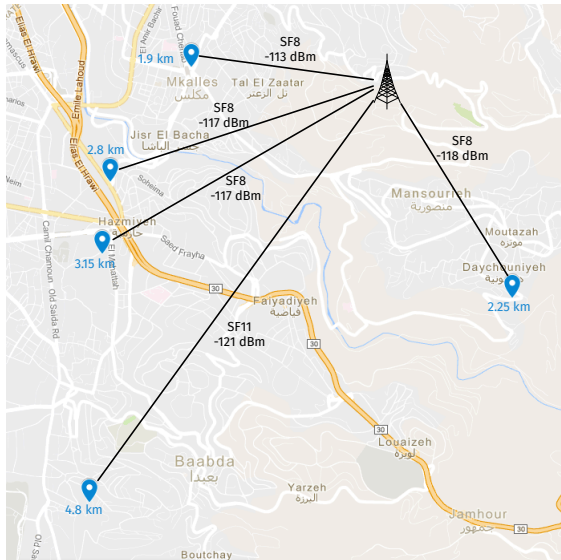
LoRa Coverage Test
(Spreading Factor 7, Power 13 dBm)



LoRa Campus Coverage (2/2)



LoRa Drive Test



LoRa Cool Services

- View the live dashboard
 - <https://goo.gl/jksaJW>
- 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

