A Comparative Study of LoRa and IEEE 802.15.4-based IoT Deployments inside School Buildings

IoT deployments for smart cities and smart buildings have been multiplying exponentially in recent years, benefiting from a steady rise in the number of new technologies that deal with the underlying networking and application challenges in indoor and outdoor spaces. Due to the overlap in their specifications, we are still trying to figure out which of these technologies fits better to certain application domains, such as building monitoring. In this work, we provide a comparative study between IEEE 802.15.4 and LoRa, based on our experiences from using both wireless networking technologies in the context of indoor deployments aimed at IoT-enabled school buildings in Europe. We provide an apples-to-apples comparison between the two technologies, comparing them in some cases in the same building and application context. Although these two technologies initially might not seem to be competing in the same application space, in practice we found out that both have strengths and weaknesses in the specific application domain we have been using them. Moreover, our LoRa-based networking implementation, on top of Arduino-based hardware, appears to be an option that allows for a robust, reliable and lower overall cost IoT deployment, especially in cases with multi-floor building installations and low bandwidth requirements. We also present a network-level dataset produced from our installations and upon which we based our findings and discussion. We provide data collected from 6 different school buildings, 8 networks and 49 devices, to compare the performance and cost-effectiveness of competing IoT technologies. In that effect, with LoRa we can achieve similar or better link quality to IEEE 802.15.4, with higher data rate and lower costs.

Domain: (Domains / IOT)
Technology: Embedded