IEEE 802.15.4g and LoRa Networks at 868 MHz band, PHY layer analysis, evaluation and coexistence issues

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ABSTRACT

Internet of Things (IoT) refers to a network of connected physical objects that can communicate. Thanks to cheap processors and wireless networks, it's possible to turn anything, from a lightbulb to a building, into part of the IoT. Therefore, the most important challenge is the development of wireless protocols that are characterized by low power and long range. Since the introduction of the IoT paradigm, many technologies have been developed in order to support this venture. However, the Low Power Wide Area Networks (LPWANs) appear to be the most promising solution.

In this work, we focus our interest on two of these protocols: the IEEE 802.15.4g and the Long Range (LoRa). The LoRa protocol is based on spread spectrum modulation and is characterized by low data rate. On the other hand, IEEE 802.15.4g is based mainly on Frequency Shift Keying (FSK) modulation and has higher data rate. Both protocols are operating at the same frequency band which leads to mutual interference.

The main objective of this work is to evaluate the Physical (PHY) layers of IEEE 802.15.4g and LoRa and to estimate the effect of the interference to the performance of these two protocols. Also, we suggest solutions and configurations to mitigate the interference and enhance the performance of each protocol. Moreover, extended experiments with real devices in multiple environments have been carried out in order to evaluate the real-world performance of the two protocols.