

LoRAWAN network coverage testing design using open-source low-cost hardware

Abstract

The Internet of Things (IoT) is considered to be one of the most radical technological advances of the century. The increasing amount of applications and devices, requires the deployment of a large network infrastructure to provide with reliable communication. However, existing communication technologies could be energy demanding and not suitable for applications where a constant energy supply is not available (e.g. battery-powered sensors). Low-Power Wide Area Network (LPWAN) communication technologies appear to fill in this gap, with LoRaWAN as one of the most popular ones, given its low cost of implementation, reliability and coverage. Operating on the frequency band below 1GHz, it is possible to cover larger areas than more mature technologies, such as the IEEE802.11x (Wifi) standard. The aim of this work is to present a low-cost open-source based technical solution and measurement procedure for determining the network coverage of a LoRaWAN network, in dense urban environments. By measuring connection link quality parameters, it was possible to establish a testing methodology to determining the operational coverage of the network implemented. Obtained results show an average coverage between 7 and 10 km per gateway and that the most outstanding combination of spreading factor and coding rate was SF10-CR4. This study offers great insights for proper planning and validation of LoRaWAN based IoT networks.