

Evaluating the LoRaWAN protocol using a permanent outdoor testbed

Abu-Mahfouz, Adnan M
Council for Scientific and Industrial Research
Pretoria, 0001, South Africa
Email: AAbuMahfouz@csir.co.za

Abstract

Low-power wide-area network (LPWAN) protocols, such as a long range wide area network (LoRaWAN), are key to ensuring scalable wireless communication for Internet of Things devices. In this paper, an analysis of this protocol through a performance evaluation of a permanent outdoor LoRaWAN tested is presented. To ensure accurate results, tests lasted at least 17 h and required 1000 packets per node. The evaluation focused on the impact that the adaptive data rate (ADR) scheme, payload length, link checks, and acknowledgements had on the packet delivery ratio (PDR) of the testbed. The collected data showed that enabling the ADR scheme reduced the PDR. The ADR scheme had six data rates, which consist of a spreading factor and bandwidth combination, to choose from. Analysis revealed that the scheme primarily assigning either the fastest data rate (SF7BW250) or the slowest (SF12BW125) to nodes, regardless of distance. Furthermore, the scheme's assignments show the signs of oscillation, with nodes being instructed to abruptly change between SFs. The impact of payload length and link checks on the PDR was not pronounced, but enabling acknowledgements did show significant improvements.