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A Framework for Enhancing the Performance of Internet of Things Applications Based on RFID and WSNs

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Abstract

Internet of Things (IoT) has emerged as a new paradigm that allows different objects interconnection to create new smart services and applications. In this sense, key features such as traceability, unique identification, energy efficiency, heterogeneity of devices, scalability and ubiquity, are necessary at the network structure for efficient performance of IoT applications. As a single technology, it is not capable to provide all these features, then, the integration of Wireless Sensor Networks (WSNs) and Radio Frequency Identification (RFID) arises as an important approach for these solutions. In this paper, a framework aiming to provide the network features required for IoT applications is proposed, considering the challenges that comes from the integration of these two technologies. In this framework, two components are considered, the Fuzzy Q-Algorithm and the Fuzzy System-Based Route Classifier. The former comprises a fuzzy system to enhance an anti-collision protocol for RFID, and the latter is a fuzzy system that classifies routes and assists routing protocols in applications that use WSNs and RFID. Experiments show that framework provides the following benefits: improves the performance of RFID tags identification, lowers packet loss rates, decreases the nodes energy consumption, and shows improvements in network load balancing. Moreover, these benefits provide greater energy efficiency and quality of service for IoT applications.

Keywords: Fuzzy System; Internet of Things; Performance; Radio Frequency

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