EFFICIENT DATA COLLECTION FOR LARGE-SCALE MOBILE MONITORING APPLICATIONS

Radio frequency identification (RFID) and wireless sensor networks (WSNs) have been popular in the industrial field, and both have undergone dramatic development. RFID and WSNs are well known for their abilities in identity identification and data transmission, respectively, and hence widely used in applications for environmental and health monitoring. Though the integration of a sensor and an RFID tag was proposed to gather both RFID tag and sensed information, few previous research efforts explore the integration of data transmission modes in the RFID and WSN systems to enhance the performance of the applications. In this paper, we propose a hybrid RFID and WSN system (HRW) that synergistically integrates the traditional RFID system and WSN system for efficient data collection. HRW has hybrid smart nodes that combine the function of RFID tags, the reduced function of RFID readers, and wireless sensors. Therefore, nodes can read each other's sensed data in tags, and all data can be quickly transmitted to an RFID reader through the node that first reaches it. The RFID readers transmit the collected data to the back-end servers for data processing and management. We also propose methods to improve data transmission efficiency and to protect data privacy and avoid malicious data selective forwarding in data transmission. Comprehensive simulation and trace-driven experimental results show the high performance of HRW in terms of the cost of deployment, transmission delay and capability, and tag capacity requirement.