Chapter 3
Strengthening Agriculture Through Energy-Efficient Routing in Wireless Sensor Networks Using Sink Mobility

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ABSTRACT

Wireless sensor networks (WSNs) can be used in agriculture to provide farmers with help monitoring the fields. Most of the people depend on agriculture. WSN plays a vital role in strengthening agriculture. In this chapter, the authors discuss energy-efficient routing with mobile sink protocols that are more suitable to strengthen the agriculture. They organize this chapter by classifying aforesaid protocols into three different categories (e.g., hierarchical-based, tree-based, and virtual structure-based routing).

DOI: 10.4018/978-1-5225-9004-0.ch003

INTRODUCTION

Agriculture exists since past many centuries and that has played vital role in human evolution. The quality of sedentary human civilization was greatly enhanced by farmers in farming agriculture. Since the nation's economic growth depends on Agriculture, there is an enormous need for improving crop yield production with innovative technologies (Mendez, Yunus & Mukhopadhyay, 2012). The technologies that support the farming procedures to enhance the ease of farming are surpassing day by day. Wireless Sensor Networks (WSNs) as an emerging technology can be used in farming to further enhance the ease of farming. WSNs can be used in farming to monitor environmental conditions such as humidity, temperature, moisture levels, atmospheric pressure, and soil water to maintain the health of plants. These nature parameters are necessary in growing, strengthening of plants. Besides, WSNs also useful in sensing the early disease of plants that will leap away from disasters. This technology will facilitate farmers to do farming with less time and efforts with more profits (Al, Braik & Bani-Ahmad, 2010; Deepika & Rajapirian, 2016).

In WSNs, all sensor nodes have limited energy to send data to gateways, also sometimes referred as sink nodes, and receive acknowledgments from sink nodes. So, decreasing energy consumption and increasing throughout of a network is needed. When sink node or base station is initiated to all other sensor nodes with a request for data. All the sensor nodes send data directly to sink node, it consumes a lot of energy. So, effective routing technique is required among sensor nodes and sink node. An enormous amount of sensor data evolved from the terrestrial nodes often have no longer used data from base station with exponentially creating leverage energy consumption. Effective routing is important for energy efficiency in network. Routing designs a path for sensor nodes, sends data to sink node or base station or gateway. To decrease energy consumption of sensor nodes, dynamic change of network routing is required (Vu, Nguyen & Nguyen, 2014). The overview of Wireless Sensor Network (WSN) is shown in Figure 1. In a WSN some numbers of wireless sensor nodes are deployed. Among these sensor nodes some of them are active and transmit data to the base station, through Internet or Wi-Fi and furthermore the base station forwards these data to user. The nodes that are with below threshold energy are called as exhausted sensor nodes. The standby nodes are the nodes with full energy and not involved in communication.