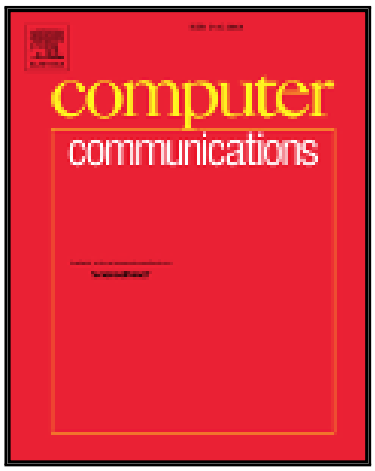

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Trail-based Routing Algorithms for WSNs with Uncontrolled Sink Mobility

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Abstract

In some applications of wireless sensor networks, the moving path of the mobile sink is unpredictable. When sensors detect an event of interest (i.e. source sensors), they have to find the location of the mobile sink first before they can report the data. In this paper, we will discuss how source sensors can locate the constantly moving mobile sinks and send data packets through a smaller number of forwarding hop counts. Two algorithms will be proposed, including Trail-based Algorithm with virtual Guide line (TAG) and enhanced Trail-based Algorithm with virtual Guide line (*e*TAG). TAG is an algorithm that builds vertical virtual guide lines to help source sensors find the location of the mobile sink. *e*TAG is an enhanced algorithm designed to further reduce the average number of forwarding hop counts of data packets. The main difference between TAG and *e*TAG is that *e*TAG builds not only vertical virtual guide lines but also horizontal virtual guide lines. The effectiveness of the proposed algorithms is verified through a comparison with other data gathering via uncontrolled mobile sink algorithms. Our experimental results confirm that the proposed algorithms can ensure that all source sensors find one of the mobile sinks and can reduce the average forwarding hop counts of data packets.

Keywords: *wireless sensor networks, static sensor, data gathering, uncontrolled sink mobility*

1. Introduction

A Wireless Sensor Network (WSN) is a network system composed of numerous wireless sensors and a few sinks which transmit data wirelessly [20][25]. The wireless sensors are equipped with different sensing devices depending on applications. For example, common sensing devices include temperature sensor, humidity sensor, infrared sensor, acoustic sensor, ultrasonic sensor, triaxial accelerometer, and etc. WSNs are commonly applied in areas including military [2][29], agriculture [6][28], traffic [8][23], human activity monitoring [10][26] and safety monitoring [9][30]. In all these applications, sensors gather environmental information and then report the sensing data to the sink(s) wirelessly. This makes data gathering an important issue in WSNs [12][17].