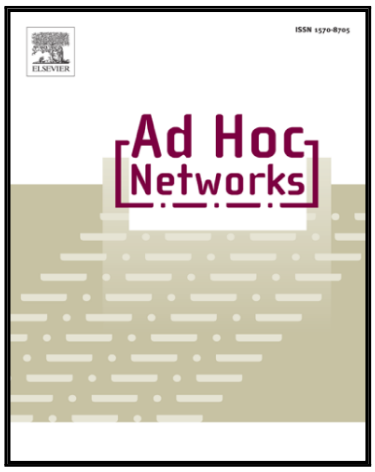

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PII: S1570-8705(17)30160-9
DOI: 10.1016/j.adhoc.2017.08.010
Reference: ADHOC 1581

To appear in: *Ad Hoc Networks*

Received date: 24 January 2017
Revised date: 12 August 2017
Accepted date: 29 August 2017

Please cite this article as: Moysés M. Lima, Horácio A.B.F. Oliveira, Daniel L. Guidoni, Antonio A.F. Loureiro, Geographic Routing and Hole Bypass using Long Range Sinks for Wireless Sensor Networks, *Ad Hoc Networks* (2017), doi: 10.1016/j.adhoc.2017.08.010

Geographic Routing and Hole Bypass using Long Range Sinks for Wireless Sensor Networks

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Abstract

Greedy Forward is a well-known technique used by most of the geographic routing algorithms to forward packets to the node that is geographically closer to the destination node. It is the simplest form of the proposed geographic routing algorithms and it is particularly attractive in sensor networks by bringing additional advantages such scalability, dynamism, and high delivery rates. However, in the presence of a hole (or voids), greedy forward techniques tend to fail. Thus, a hole bypass solution needs to be used in order to route packets to a node where greedy forwarding process can be resumed. In this work, we propose a new geographic routing algorithm called REACT that can bypass routing holes and create routing paths toward the sink node. Our solution takes advantage of the higher communication range of the sink node and the Received Signal Strength Indicator (RSSI) to enable the construction of routing paths by self-electing the next hop at each step while also performing data aggregation. No extra packets are required to configure the routing task. Our results clearly show an efficient data delivery achieved by the proposed algorithm in scenarios with routing holes with all the benefits of a greedy forwarding technique.

Keywords: hole bypass, geographic routing, local minima

1. Introduction

Wireless Sensor Networks (WSNs) are typically composed of a large number multifunction sensors that can communicate among them and sense the characteristics of their neighboring area. The large number of nodes in this type of network allows coverage and monitoring of large geographic regions, increasing the accuracy of the gathered data. Although the devices are of small size, they are most usually equipped with various types of sensors, microprocessors, wireless communication devices, and perform tasks that involve the processing and transmission of the gathered data [1, 2].

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