Bayesian Estimation Model for Trust dependent Greedy Antivoid Routing (TGAR) in Wireless Sensor Networks (WSNs)

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Wireless Sensor Networks consist of tiny battery operated sensor nodes and which are connected in a network for communication. Energy, lifetime and reliable data delivery are the major issues in Wireless Sensor Networks (WSNs). The objective of any routing algorithm in WSN is successful data delivery. The existing Greedy Antivoid Routing (GAR) uses the Rolling ball Un-directed Traversal, to guarantee the packet delivery from source to destination. In the case of sparse network, when it experiences either an obstacle or void in the route, then it fails to deliver the data. To address these issues, we propose Trust dependent Greedy Antivoid Routing (TGAR) algorithm to find reliable path from the source to the sink. We use Bayesian estimation model to calculate the trust value for each path. Based on the trust value path is selected for the transmission of data. Simulation results show that TGAR achieves successful data delivery, higher throughput and lifetime with minimum energy consumption than the existing Greedy Antivoid Routing (GAR) Algorithm.

Keywords: Greedy Antivoid Routing, Sparse Network, Unit Distance Graph, Void and Wireless Sensor Networks

1. INTRODUCTION

Sensor nodes are battery operated and have limited energy in WSNs. Replacement or recharging of battery is difficult. Therefore, it is desirable to design an energy efficient routing protocol for WSNs. There are three types of routing techniques i.e., flat, hierarchical and location based routing. In flat routing, nodes are collaborated together to sense an event. There is no unique id for all nodes since they are deployed in large numbers and it is not feasible to give identification for each node. In hierarchical approach, high energy node can be used to process and send the information, low energy nodes are used only for sensing. In location based routing, sensor nodes are identified by their locations. The distance between the nodes are calculated based on the incoming signal strength. Coordinates of the neighboring nodes are obtained from the neighbor’s list. Node’s location is communicated through satellite or Global Positioning System (GPS) are equipped with the nodes. Energy consumption is reduced by keeping nodes in sleep mode when there is no demand for the node.

Geographic Energy Aware Routing (GEAR) selects the node from Geographically informed neighbor list to forward a packet to the destination. GEAR conserves more energy than directed diffusion algorithm since it avoids sending query to whole network and transmits a packet to a certain range. The Greedy Antivoid Routing (GAR) forwards the packets to the destination by finding an alternative path when there is a hole in the network. GAR guar-
value. If the probability of priori distributed function value is one i.e., trust value is good then that path is selected for routing. The proposed TGAR algorithm overcomes the void and obstacle problem encountered in GAR that results in lower delay and consumption of energy. Simulation result shows that the proposed TGAR algorithm saves 12% energy and 33% faster than the existing GAR algorithm. Thus, energy conservation is increased with each iteration with higher throughput and increased lifetime of the network. Delay can be reduced further with the mobile sink instead of static sink.

REFERENCES


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