E2R2: ENERGY-EFFICIENT AND RELIABLE ROUTING FOR MOBILE WIRELESS SENSOR NETWORKS

Energy efficient and secure multi hop routing for wireless sensor networks

ABSTRACT

Wireless sensor networks (WSNs) are resource constrained. Energy is one of the most important resources in such networks. Therefore, optimal use of energy is necessary. A novel energy-efficient routing protocol is proposed for WSNs. The protocol is reliable in terms of data delivery at the base station (BS). Mobility in sensor nodes and in the BS is considered. The proposed protocol is hierarchical and cluster based. Each cluster consists of one cluster head (CH) node, two deputy CH nodes, and some ordinary sensor nodes. The re-clustering time and energy requirements have been minimized by introducing the concept of CH panel. At the initial stage of the protocol, the BS selects a set of probable CH nodes and forms the CH panel. Considering the reliability aspect of the protocol, it puts best effort to ensure a specified throughput level at the BS. Depending on the topology of the network, the data transmission from the CH node to the BS is carried out either directly or in multihop fashion. Moreover, alternate paths are used for data transmission between a CH node and the BS.
INTRODUCTION

Wireless Sensor Network (WSN) consists of several resource-constrained sensor nodes randomly deployed over a geographic region. These sensor nodes forward sensory data toward a resourceful base station (BS). Depending on the application type, the BS is located either far away from the sensor field or within the sensor field. Such networks have wide range of applications in military and civil domains. Some application areas of WSN are as follows: combat field surveillance, target tracking in battlefields, intrusion detection, post disaster rescue operations, smart home, monitoring and alarming systems for supermarkets, wildlife monitoring systems, and many safety and security related applications.

In the aforementioned applications, the sensor nodes generate sensory data from the environment of interest. The sensed data are finally forwarded toward the BS for further processing and decision making with regard to the control for meeting the objectives of the system in place. Depending on the application type, the sensor nodes and the BS can be static or mobile. In a typical WSN, the sensor nodes are highly resource constrained. The sensor nodes are inexpensive, disposable, and expected to last until their energy drains out. Therefore, energy is a very limited resource for a WSN system, and it needs to be managed in an optimal fashion. Reliable and successful data delivery at the BS is desired. Energy efficiency is an important aspect of any application of WSN.
PROBLEM DEFINITION

Routing of data in WSN is a critical task, and significant amount of energy can be saved if routing can be carried out tactfully. Routing is an issue linked to the network layer of the protocol stack of WSN. In multihop communication, the major issue may be the selection of the intermediate nodes in the route. The intermediate nodes are to be selected in such a way that the energy requirement is minimized. At the same time, the data are to be delivered at the BS reliably and successfully.

Existing protocols are not suitable, due to different features of WSN and the unique constraints WSN suffers from. Moreover, the WSN applications have different sets of requirements. Routing in a WSN setup in which both the sensor nodes and the BS are mobile is a challenging problem.
EXISTING SYSTEM

- Hierarchical routing is considered to be an energy-efficient and scalable approach. There are several hierarchical routing protocols proposed for WSN. All these protocols consider a WSN with static sensor nodes.

- Dynamic source routing (DSR), ad hoc on-demand distance vector (AODV) routing, destination-sequenced distance vector (DSDV) routing, temporally ordered routing algorithm (TORA), and zone routing protocol are some routing protocols that exist for mobile ad hoc networks.

- In a mobile WSN, the communication links may come up and fail very dynamically. Therefore, the routing protocol has to take care of the connectivity issue also in such a WSN setup. Data packets are to be routed taking this connectivity issue into consideration. Otherwise, there will be significant loss of data packets due to failed links apart from all other reasons such as frequent death of sensor nodes or noise of the wireless links.

Disadvantages

- Hierarchical routing protocols are not suitable to handle mobility of the sensor nodes and the BS.

- DSR, AODV, DSDV are not well suited for WSN setup.
PROPOSED SYSTEM

- A novel routing protocol, which is called Energy-Efficient and Reliable Routing protocol for mobile wireless sensor network (E2R2), is proposed.

- The proposed protocol is a hierarchical one.

- Major goal is to achieve energy efficiency and to provide connectivity to the nodes.

- The objective behind such routing is that the data packets need to move through suitable routes in spite of node mobility and in presence of subsequent link failures.

Advantages

- The mobility of the nodes is considered while routing decisions are made.

- Proposed protocol well suited for wireless sensor networks
HARDWARE REQUIREMENTS

Processor : Any Processor above 500 MHz.
Ram : 128Mb.
Hard Disk : 10 Gb.
Compact Disk : 650 Mb.
Input device : Standard Keyboard and Mouse.
Output device : VGA and High Resolution Monitor.

SOFTWARE SPECIFICATION

Operating System : Win2000/XP / Linux 9.0
Programming Package : TCL coding
Tools : VM ware Workstation