Data Aggregation Tree Approach in AODV Protocol to Select Dynamic Route for Sensor Network

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ABSTRACT

Design an energy efficient data aggregation tree approaches sensor network using localized power efficient data aggregation protocols. Using LMST and RNG topologies approximate minimum spanning tree and calculate position and distance information of one hop neighbors. A new node is added or fails route maintenance procedure is executed. The shortest weighted path – based approaches, can achieve 90 percent of the upper bound on lifetime. AODV proposed algorithm to assess the node lifetime and link lifetime utilizing the dynamic nature of energy drain rate and relative mobility estimation rate of nodes. Using node lifetime and link lifetime algorithm select least dynamic route with the longest lifetime. On prediction AODV protocol is a loop – free routing and has self – starting in network behavior as node mobility, link fail and packet losses.

Keywords

Local Minimum Spanning Tree, Relative neighborhood graph, sensor network, node lifetime, AODV protocol (Ad hoc On-Demand distance vector), link lifetime.

1. INTRODUCTION

With the introduction of Wireless sensor networks depends on the application requirements. The main constraint of sensor nodes is their very low finite battery energy, which limits the lifetime and the quality of the network. For that sensor, the protocols running on sensor networks must consume the resources of the node a efficiently in order to achieve a longer network lifetime Finding an energy efficient routing scheme for gathering all data at the sink periodically so that the lifetime of the network is prolonged as much as possible[1].

The algorithm should be distributed since it is extremely energy consuming to calculate the optimum path in a dynamic network and inform others about the computed path in a centralized manner.

2. EXISTING SYSTEM

Each sensor node has to know it is all one-hop neighbors and their locations, the neighbors on the computed topology, the parent node that it will send the data to in order to reach the sink, and the child nodes that it will receive the data from before it sends the fused or aggregated packet to its parent node.

The Existing solution consists of three parts:

- Route Computation
- Data Gathering
- Route Maintenance

To find a sparse topology and set up the routes over it, which means determining the children and parent nodes for each node. At the end of this phase, a data aggregation tree rooted at sink is constructed the nodes and the sink are not aware about the environment [1]. In the setup phase, all nodes and the sink broadcast HELLO messages, which include their location and remaining energy, using their maximum allowed transmit power. The remaining energy level is advertised only when dynamic (power-aware) protocols are used.

After receiving HELLO messages, all nodes are informed about their one-hop neighbors and their locations and energy levels. Each node can then locally compute its neighbors in the desired sparse topology (static and dynamic versions of RNG and LMST). After finding its neighbors in the sparse topology, a node can join the distributed route computation process in order to find its parent and children on the aggregation tree .The route computation is done via a broadcasting process which starts at the sink node. The sink initiates a ROUTE-DISCOVERY packet in order to find and set up the routes from all sensor nodes toward itself.

2.1 Existing Techniques

To test two different sparse topologies in a distributed manner, namely,

- **Local Minimum Spanning Tree (LMST)**
- **Relative Neighborhood Graph (RNG)**

These structures are supersets of MST and can be efficiently computed in a localized manner. For the second phase we propose three different methods and provide performance results of them. All of the methods are based on flooding a special packet using only the edges of the computed structure. According to the decisions made during this flooding process, the tree is yielded [3]. These three methods that can be executed at a node for choosing the parent node toward the sink are to choose:

- The first node from which the special packet is received
- The node that minimizes the number of hops to the sink
- The node that minimizes the total energy consumed over the path to the sink

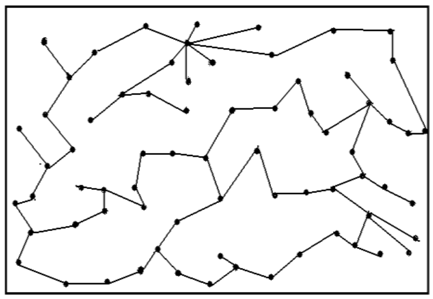

Fig 1: Local Minimum Spanning Tree (LMST)

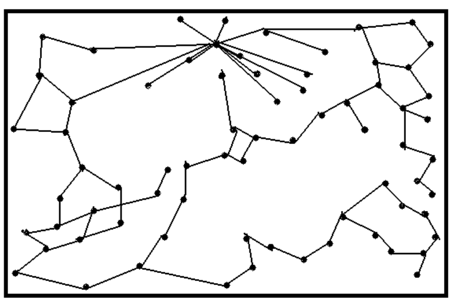

Fig 2: Relative Neighborhood Graph (RNG)

2.2 Existing Methodology

To investigate the efficiency of two different methods:

- **First parent path method (FP)**
- **Nearest minimum hop path method (MH)**
- **Shortest weighted path (i.e., least cost) method (SWP)**

- The FP method is the simplest among the three. A node will set its parent as the first neighboring node (among neighbors in selected sparse structure) from which the special route discovery packet was received.
- In the MH method, the node chooses its nearest neighbor among those with minimum hops to reach to the sink. So, the node updates its parent only if the sender node has a smaller hop count or has the same hop count as the current parent, but it is closer than the current parent (among neighbors in selected sparse structure). Otherwise, the packet is ignored.
- The SWP method tries to yield a tree that minimizes the cost of reaching the sink for each node.

- New energy-efficient routing approach that combines the desired properties of minimum spanning tree and shortest path tree-based routing schemes [2].

3. PROPOSED SYSTEM

The proposed system is consists of the following three subdivisions.

- Routing protocols
- Lifetime prediction routing
- Route lifetime in AODV
    - i) Node lifetime prediction algorithm
    - ii) Link lifetime prediction algorithm

3.1 Routing Protocols

Routing protocols find a route for packet delivery and deliver the packet to the correct destination.

3.2 Lifetime Prediction Routing

In this lifetime prediction routing algorithm, each node attempt to estimate it is battery lifetime based on it is residual energy and it is past activity. It maximizes the network lifetime by finding routing solution that minimizes the variance of the remaining energies of the nodes in the network. The above algorithm used-well defined metrics to evaluate the lifetime of nodes.

3.3 Route Lifetime in AODV

The phases involved in improving route lifetime and link lifetime are,

- Node lifetime prediction
- Link lifetime prediction

3.3.1 *Node Lifetime Prediction Algorithm*

Two nodes that have the same residual energy level, an active node that is used in many data-forwarding paths consumes energy more quickly, and thus, it has a shorter lifetime than the remaining inactive node. The node lifetime that is based on its current residual energy and its past activity solution [4] that does not need to calculate the predicted node lifetime from each data packet.

3.3.2 *Link Lifetime Prediction Algorithm*

Concerned the minimum node lifetime or the connection lifetime in a route from two nodes of a stable connection are within the communication range of each other, the connection lifetime may last longer, and they are not a bottleneck from the route to which they belong. It is easier to model the mobility of nodes in a short period during which unstable connections last.

Reasonably and simply that the nodes move at a constant speed towards the same direction in such a short period. Easy to measure the distance between nodes N_i and N_{i-1} when we use Global- Positioning- System- based location information. Senders transmit packets with the same power level a receiver can measure the received signal power strength when receiving a packet and then calculates the distance by directly applying the radio propagation model.

If the received signal power strength is lower than a threshold value, then this link as an unstable state and then calculate the connection time. LLT (Link Lifetime) prediction algorithm requires only two sample packets, and implement piggyback information on route-request (RREQ) and route-reply (RREP) packets during a route-discovery procedure with no other control message overhead, and thus, it does not increase time complexity.

4. CONCLUSION AND FUTUREWORK

In this paper one of the main design in sensor network is that they are power constrained. Since every node to perform the functions of a routes, if some node die early due to lack of energy. It will not be possible for other nodes to communicate with each other. Hence, the network will get disconnected and the network lifetime will be adversely affected. The proposed presents a lifetime prediction routing protocol for sensor networks, to evaluate the node lifetime and the link lifetime utilizing the dynamic nature to select the least dynamic route with the longest lifetime. In future work, to maximize the network lifetime by finding routing solution that minimize the variance of the remaining energies of the nodes and show that it improves the network lifetime.

5. RESULT AND DISCUSSION

The local minimum spanning tree for finding the shortest weighted path consists of the cost and range. By using LMST topology data loss and time consumption is high. So AODV protocol is used based on node lifetime and link. lifetime prediction algorithm used to improve the lifetime of the node

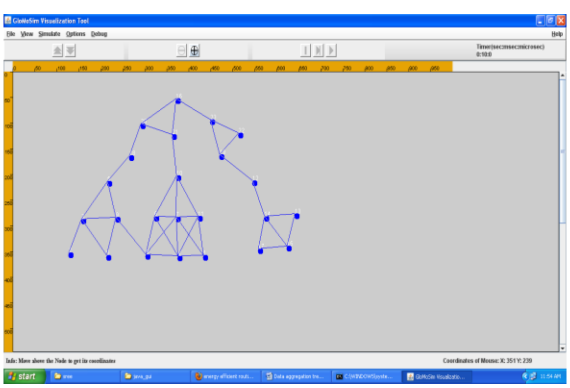

Fig 3: Shortest Weighted Path Tree

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