A NETWORK LIFETIME ENHANCEMENT METHOD FOR SINK RELOCATION AND ITS ANALYSIS IN WIRELESS SENSOR NETWORKS

¹K.Rajkumar, ²S.A.Mohammed Uveise

¹PG Scholar, Department of Computer Science and Engineering, Mohamed Sathak Engineering College, Ramanathapuram, India.
²Assistant professor, Department of Computer Science and Engineering, Mohamed Sathak Engineering College, Ramanathapuram,India
¹rajkumark08@gmail.com

Abstract: In Wireless Sensor Networks to conserve the limited power resources of sensors to extend the network lifetime of the WSN is important. For increasing the network lifetime, the EGPSR for mobile sinks in WSNs is used. This Work proposes a sink relocating scheme to guide the sink when and where to move to. The main objective of this concept is to increase the network life time and also reduce the energy consumption of this network. A WSN consists of small-sized sensor devices, which are equipped with limited battery power and are capable of wireless communications. This EGPSR energy based routing algorithm finds out the forwarder node and relay node which have the high energy. For finding the sink node to done the process of Energy based path selection is used and also it reduces the network lifetime. The general process of EGPSR is based on energy based closest node selection. This

Keywords-WSN, EGPSR, MANET

1. INTRODUCTION

A network is a group of two or more computer systems linked together. In information technology, a network is a series of points or nodes interconnected by communication paths. Networks can also interconnect with other networks and contain sub networks. The most common topology or general configurations of networks include the star,bus, token ring, and mesh topologies. Networks also be characterized in terms of spatial distance as local area networks (LANs), metropolitan area networks (MANs), and wide area networks (WANs).

kind of node selection process is used to find the sink node in the MANET.

A given network can also be characterized by the type of data transmission technology in use on it whether it carries voice, data, or both signal by who can use the network (public or private); by the usual nature of its connections; and by the types of physical links as optical fiber, coaxial cable. Large telephone networks using their infrastructure such as the Internet have sharing and exchange arrangements with other companies so that larger networks are created.

One of the earliest examples of a computer network was a network of communicating computers that functioned as part of the U.S. military's SAGE radar system. In 1969, the University of California the Stanford Research Institute and the University of Utah were connected as part of the Advanced Research Projects Agency Network (ARPANET) project. A computer network is a group of computer systems and other computing hardware devices that are linked together through communication channels to facilitate communication and resource-sharing among a wide range of users. Networks are categorized based on their characteristics. Wireless sensor network (WSN) refers to a dedicated sensors for monitoring and recording the physical conditions of the environment and organizing the collected data at a central location. WSNs are used to measure environmental conditions like temperature, pollution levels, humidity, wind speed and pressure, direction etc.

2. THE BACKGROUND AND RELATED WORKS FOR THE SINK RELOCATION

The EASR scheme mainly focuses on when the sink will be triggered to perform the relocation process and where to move to. Besides the sink relocation scheme, the entire operation of the WSNs for environment monitoring also needs to incorporate the routing method for reporting the sensed data from the source to the sink, as well as the energy consumption model. In this section, we will firstly briefly describe the energy consumption model for message relaying. Then, the energy-aware routing method (the MCP [11]) that is adopted in the EASR method will be illustrated using a numerical example. At the end of this section, some related research works for sink relocation will also be addressed.

2.1. The Existing Energy-Aware Sink Relocation (Easr) Method

In the EASR method, we incorporate the technique of energy-aware transmission range adjusting to tune the transmission range of each sensor node according to its residual battery energy. In the case of the residual battery energy getting low after performing rounds of message relaying and environment sensing tasks, then its transmission range will betuned to be small for energy saving. Moreover, the relocating decision made by the sink will take the MCP [11] routing protocol, (which has been described in the previous section) as the underlying message routing in order to gain the merit of prolonging network lifetime. Note that the underlying message routing method may affect the performance of the entireoperating scheme (the sink relocating and the message routing) significantly as the parameters of the routing algorithm vary. Although the EASR method can be incorporated with any existing routing method, we chose the MCP as the underlying routing method to limit the above influence since the only parameter of the MCP is the same as the decision parameter of the proposed EASR method; that is the residual battery energy of the sensor nodes. The existing EASR consists of two components, the energy-aware transmission range adjusting and the sink relocation mechanism that are described as follows.

2.2. Energy-Aware Transmission Range Adjusting

In general, a larger transmission range set for a sensor node will increase the number of neighbors and consequently enhance the quality of the energy-aware routing; however, it also bring the drawback of longer distance message relaying, which will consume more battery energy of a sensor node. On the contrary, for a shorter range of communication, although it does not help too much for routing, it can conserve the usage of the residual battery energy. In the existing method, the transmission range adjusting will depend on the residual battery energy of a sensor node. We classify sensor nodes into three types by the 'healthy' state of their battery and adjust their transmission range accordingly. Let B be the battery energy value when the battery energy is full in the beginning and r (u) denotes the current residual battery energy of a sensor node $u \in V$. In the case of $0 \le r$ (u) < B/3(and B/3 $\le r$ (u) < B/2), then sensor node u belongs to type I (and II) sensor node and we set its transmission range to $\gamma/4$ (and $\gamma/2$), respectively, where γ denotes the initial transmission range of a sensor node. For the case of B/2 $\le r$ (u) \le B, the sensor node u is very healthy for its battery energy (type III node) and we set its transmission range to γ . Intuitively, a 'healthy' sensor node can adapt a larger transmission range to shorten the routing path, while a sensor node with only a little residual battery energy can tune the transmission range to be small to conserve its residual energy. Thus an adaptable transmission range adjusting mechanism can enlarge the lifetime of a sensor node and the network lifetime

2.3. The Sink Relocation Mechanism

This mechanism consists of two parts. The first is to determine whether to trigger the sink relocation by determining whether a relocation condition is met or not. The second part is to determine which direction the sink is heading in and the relocation distance as well. For the relocation condition, the sink will periodically collect the residual battery energy of each sensor node in the WSN. After the collecting process is completed, the sink will use the MCP routing protocol to compute the maximum capacity path P* us with respect to each sensor neighbor of sink s. For each maximum capacity path P* us, we denote the maximum capacity value with respect to P* uses c (P* us). Let the collection of the sensor neighbors of s be N. Then the relocation condition will be met when one of the following conditions occurs: (1) when one of the capacity values c(P* us) with respect to the sensor neighbor in N drops below B/2; or (2) the average residual battery energy of the neighbor set drops below B/2. That is, when either the

∃ u ∈ N, such that :c(P* us) < B/2 or

 (3)
 2. _u∈ N r (u)/|N| < B/2 (4)

Condition occurs, which Means the residual energy of the nearby Sensor nodes of the Sink become small or the residual energy bottleneck of some routing paths falls below a given threshold (B/2). Then the sink relocation mechanisms will be performed to relocate the sink to a new position, which can enlarge the network lifetime

3. THE PROPOSED ENERGY BASED GREEDYPERIMETER STATELESS ROUTING ALGORITHM

In proposed system EGPSR algorithm issued. This concept uses the EGPSR algorithm to find the closet node in the network. For transmitting a packet in the network first we have to find the closet nodes which mean that source node, destination node and then the forwarded node. With the help of the forwarded node we send the packet to the destination in secure manner. After that we start the packet transmission.

In our proposed concept use the EGPSR routing algorithm to find the best path in our network. The node between the source and destination is known as a relay node. The relay node is the forwarding node that forwards the original packet to the destination node and then transmits the dummy packets to the remaining nodes in the network. The principle for this routing depends on the information about the geographic position. Greedy forwarding helps to bring the message nearer to the destination in each step using only local information.

The algorithm consists of two methods for forwarding packets. Greedy forwarding, which is used wherever possible, and perimeter forwarding, which is used in the regions greedy forwarding cannot be done.

Under GPSR, packets are marked by their originator with their destinations' locations. As a result, a forwarding node can make a locally optimal, greedy choice in choosing a packet's next hop. Specifically, if a node knows its radio neighbors' positions, the locally optimal choice of next hop is the neighbor geographically closest to the packet's destination. Forwarding in this regime follows successively closer geographic hops, until the destination is reached.

3.1. Greedy Forwarding



Figure 1: Greedy forwarding example .Y is X's closest neighbour to D.

In greedy forwarding mode, a node x forwards a packet to the neighbor that is closer to the packet's destination.

The GREEDY-FORWARD algorithm looks at the Euclidean distances from each of its neighbors to the packet destination p. D and picks the one with smallest distance. It then compares the distance of the closer neighbor with the one from it top. D, if so happens that the neighbor is closer; it forwards the packet to that network. But, if none of its neighbors are closer to p.D than it, then the algorithm returns failure (see Figure 2).



Figure 2: Greedy Forwarding failure: x wants to send a packet to D, but none of its neighbors are closer to D than x [1].

3.2. Perimeter Forwarding



Figure 3: Example for Perimeter Forwarding

The idea behind perimeter forwarding is to forward the packets using the right hand rule across the faces in the planar graph that intercept the line L D p (see Figure 3).

Maping perimeters by sending packets on tours of them, using the right-hand rule. The state accumulated in these packets is cached by nodes, which recover from local maxima in greedy forwarding by routing to a node on a cached perimeter closer to the destination. This approach requires a heuristic, the no-crossing heuristic, to force the right-hand rule to find perimeters that enclose voids in regions where edges of the graph cross. While the no-crossing heuristic empirically finds the vast majority of routes in randomly generated networks, it is unacceptable for a routing algorithm persistently to fail to find route to a reachable node in a static, unchanging network topology



Figure 4: Shows the data flow diagram of routing process from source node to the destination node through the random forwarded node using GPSR protocol.

First in MANET the routing process takes place from the source node to the destination node via the intermediate nodes, the main consideration in data transmission is that secure data transmission and data validation. The routing process is takes place from the source node to the designation node through the intermediate random forwarder; the random forwarder uses GPSR protocol to forward the packet or data in secured manner, and chooses the closest path of the routing process by using the protocol. The destination node receives the packet from source to destination in effective way and secured manner.

4. SIMULATION RESULTS

Simulation model is carried out using Network simulator -2 and the Protocol GPSR is implemented. In simulation model the main process is node creation, zone partition, Relay node selection and closest path routing. The network animator results show all those process by using NS-2 simulation software. The mobile nodes are created for the transmission and the reception process, mobile nodes are capable of transmit and receive the packets.

4.1. Node Formation

The simulation to find out the result. For creation purpose of the wireless sensor network first step is that the node formation. We use the node to form the wireless sensor network. In sensor network the nature of the node is that mobile nodes. In our proposed concept we create the 50 nodes. Each of which are mobile nodes. After node formation next step is to find the source and destination node in the network in order to make the packet transmission.

First the node formed to transmit and also receive the packets. Here, set more number of nodes for clustering and sending and receiving the packets from sender to receiver. Then 200 nodes are formed for processing. The node formation is the first step of our process in which nodes are added in to the network. The nodes are in mobile nature and are free to move.



Figure 5: output showing node formation

4.2. Topology Creation

After selection of source and destination topology formation is constructed. Topology formation means that the each node will send their information to the neighbor nodes. The information's are creation time, expiry time, position and also the other details. In this stage we predict the location of each node.

Then create the mobile node for the purpose of packet transmission. In this project we need 25 mobile nodes so we form the 25 mobile nodes. Nodes are used to send the packet and make communication. After node formation then we select source and destination to make packet transmission. Then after we construct topology to knows the neighbor information. Each node sends the message to its neighbor to know node details. This topology formation mainly used to find the node location for packet transmission.



Figure 6: output showing topology creation

4.3 Packet Transmission

Final stage is that the packet transmission. We transmit the packet between the source and destination node in order to achieve the proper communication. After packet transmission the graph will be generated. We generate the graph for the energy of network.

A node can be a computer or some other device, such as a printer. Every node has a unique network address, sometimes called a Data Link Control (DLC) address or Media Access Control (MAC) address. In a network, a node is a connection point, either a redistribution point or an end point for data transmissions. In general, a node has programmed or engineered capability to recognize and process for forward transmissions to other nodes. Transmission of standardized packets of data over transmission lines rapidly by networks of high-speed switching computers that have the message packets stored in fast-access core memory. Data-transmission for a small bundle of data sent across a network (such as LAN or Internet).



Figure 7: output showing packet transmission

4.4 Construct Energy Performance Graph

This X graph compares the delay time for nodes and packets. This graph shows that the time delay for packets is reduced compared to the EGPSR scheme



Figure 8: output showing energy graph

5. CONCLUSION

In mobile ad hoc networks the data's or packets are transferred between the source and destination nodes. In order to provide security and then overcome the problems presented in existing system, we introduce new concept called EASR (An Energy Aware Sink Relocation Protocol).In our proposed concept first selects the node for packet transmission. This means, we select the source node, destination node and forwarded node. After that we select the random forwarded node for packet transmission. In order to provide the security we introduce the GPRS routing protocol to find the best path in our network for packet transmission. The GPSR select the relay for packet transmission. The source first send the data to the random forwarded node, that node sends the packet to the relay in destination zone. This relay node sends the original packet to the destination node and sends the dummy node to the remaining node in the network. This process is continuous until the packet receives the destination node. Finally we construct a graph from the received data and then compared with the theoretical values. This system provides the efficiency and requires low cost for hide the initiator/ receiver identities.

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