DESIGN AND IMPLEMENTATION TO INCREASE THE EFFICIENT ROUTING SCHEMES BY DISTRIBUTE LIFETIME IN WSN

R TEJAS, MANJULA DEVI T.H
[#1] PG Student, DCN, [#2] Associate Professor
Dept. of Telecommunication Engineering, Dayananda Sagar College of Engineering, Bangalore, India
rtejas1992@gmail.com, thm0303@gmail.com

ABSTRACT: The major concern is on energy-efficient routing in wireless sensor networks. Existing routing schemes assigns energy-related costs and obtain the shortest paths. Maximum achievable lifetime and optimal link cost are low in the existing routing schemes. The best performance is achieved by obtaining the shortest path in distributed routing algorithm. The present distributed shortest path routing network provides best link cost and have maximum lifetime. Heuristic algorithm is developed with low complexity to obtain best performance to provide route selection framework and a bench mark in evaluating the existing routing algorithm energy efficiency.

Keywords: Optimal link cost, distributed shortest path routing, heuristic algorithm.

1. INTRODUCTION

Wireless sensor network systems has been attracting much attention on areas such as in engineering and science in an emerging research area. A sensor networks application includes management of home energy, environmental monitoring Phenomena and traffic control. Sensor networks are utilized in data gathering applications which deal in several types of performance in network, efficiency in lifetime and capacity. The optimization performance is adopting a suitable materials managing strategic of stand-alone battery powered equipments in sensors. Optimizing in lifetime is fulfilled by energy consumption of a sensors and giving the network lifetime significantly. Network lifetime is time taken for the first node to run off battery. The capacity maximizing and lifetime of the network are two major goals. The increase in network capacity requires in increasing of the transmission of data rates at the nodes which in turn increases the energy consumption by reduces the network lifetime.

The application gathers the data required to measuring of environmental values and by transmitting of the data to the base station without interruption in sensors. Proper routing scheme is

required in establishment of routes from any node to sink node in the network. This information is transmitted by each node which includes its own data stream and traffic received in the network from different nodes. The network performance is measured by depending highly on the strategic routing. Optimizing in lifetime of routing are the network layer protocols is aiming to balance the load in traffic of effective paths from the source to the sink nodes. To have better achievement in lifetime performance, many strategies have been introduced, is involving combining selection of routes and resource allocation schemes. Utilizing mobility topology control.

Network layer strategies: algorithm inside this class uses effective selection in routing in improving the lifetime of network sensors. This can be classified as based in optimization method. These both classes classify energy-related metrics in the optimization procedure. Main difference between these lies in implementation and underlying assumption. Optimizing based methods, usually in routing being simplified as network diagram flow, and assuming that data is being transmitted from any definite node can be divided randomly in the routes chosen in the base stations between nodes.

Topology Control: This approach uses many mechanisms such as controlling power and to control clusters in the topology of a network sensor and optimization in its lifetime. Optimizing scheme in lifetime is uniformly presenting deployment in a network sensors by creating coronas on the base station and energy consumption balancing techniques are provided in every corona. The routing that is proposed here is hybrid combining the multi hop flat routing and multi hop hierarchy routing.

2. DETAILS EXPERIMENTAL

2.1. Existing routing approach

The existing approach namely Flood, all the possible paths for about 2 neighbor set levels are discovered by using the process of flooding and forwarding. For each of the possible paths the routing metrics especially end to end delay is computed which is directly proportional to bandwidth. Finally the path is chosen to send the packets which has the lowest set of end to end delay. Drawbacks in flood algorithm as follows complexity is very high because of discovery of huge number of routes and also for each of the routes lot of control packets are wasted.

The energy consumed is very high due to fact that the energy required for transmission and Euclidean distance are directly proportional to energy consumed hence as the number of links are high the energy consumed is high.

Proposed routing approach

Distributed Lifetime-Efficient Routing algorithm computes the link cost based on energy as one metrics and hop count. After the measure it picks the forward node based on the cost metric of the link. The process followed proves to be more efficient than the existing flood algorithm approach with respect to various parameters namely end to end delay, total number of hops, energy consumed, and total number of alive node, number of dead nodes and residual energy of the network. In distributed lifetimes efficient routing the source node finds its neighbors and checks whether the neighbor list has destination. Compute the link cost for each nodes in the network and picking the node which has lowest link cost.

Calculate LINK COST: The link cost is given by

$$Link_{cost} = \frac{1}{hopcount} + \frac{E_{consumed}}{TotalEnergy} + \frac{1}{data\ rate}$$

Where,

$E_{consumed}$ = Energy consumed on link

The energy consumed again is given by

$$E_c = 2\,E_{tx} + E_{amp}\,d^{\gamma}$$

E_{tx} = energy required for data transmission

E_{amp} = energy required for data generation

d = distance between two intermediate nodes

γ = environment factor

$0.1 \leq \gamma \leq 1$

Data Flow diagram shows how the data flows in a sequence of processing steps. The Node Deployment algorithm which is used to place the nodes in the network across a given area. Each of the router topology is based on randomized placement of nodes using node deployment algorithm. The routing table formation algorithm helps in route discovery process from the perspective of neighbor discovery.

The routing table formation process can be divided into following phases

1) Global Routing Table flowchart
2) Individual Routing Table flowchart

Global Routing Table flowchart:

The Global Routing Table flowchart is responsible for generation of routing tables for all the nodes in the network.

Individual Routing Table flowchart:

The individual routing table flowchart is responsible for generating the routing table for the specific node in the network.

Flood algorithm, floods all the possible paths for about 2 neighbor set that are discovered by using the process of flooding and forwarding. Flood algorithms drawbacks are such as complexity and very high energy consumption. Distributed Lifetime-Efficient Routing algorithm computes the link cost based on energy as one metrics and hop count. It Computes the link cost for every nodes in the network and picking the node which has lowest link cost.

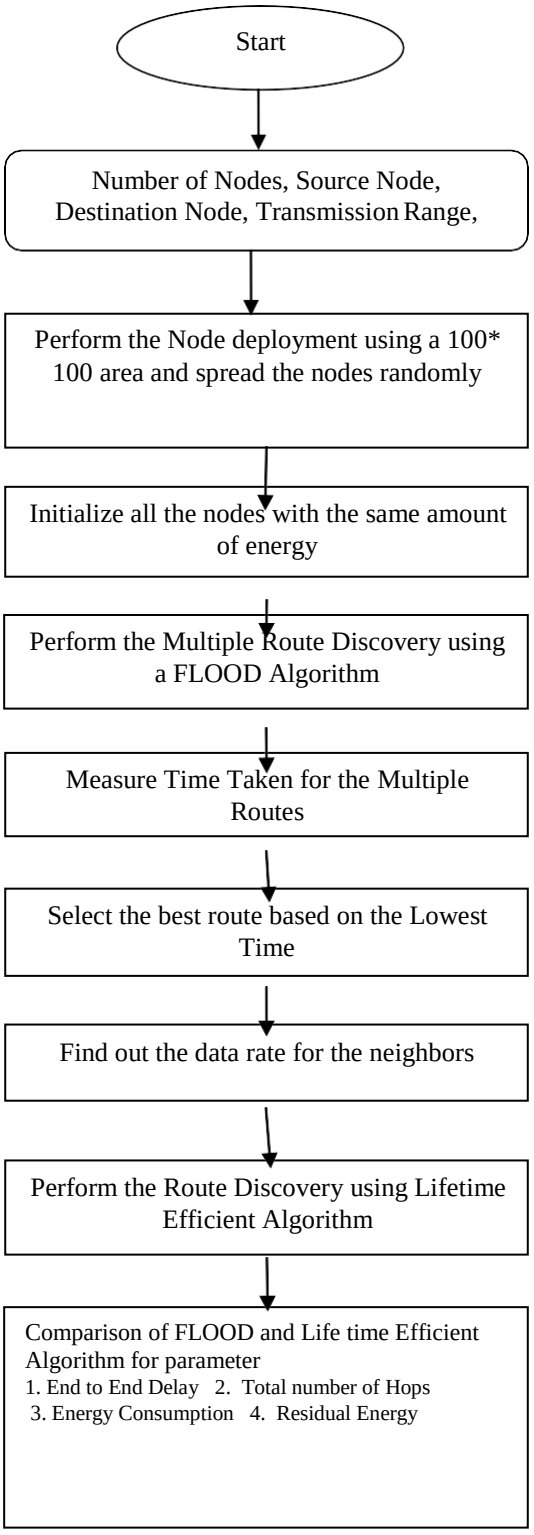

Fig 2.1. Flowchart in detail

3. RESULTS AND DISCUSSION

Efficient lifetime routing algorithm actively adjusts the values of the link cost and obtains the less path costs in operating network. Figure 3.1 node id and battery power for each nodes.

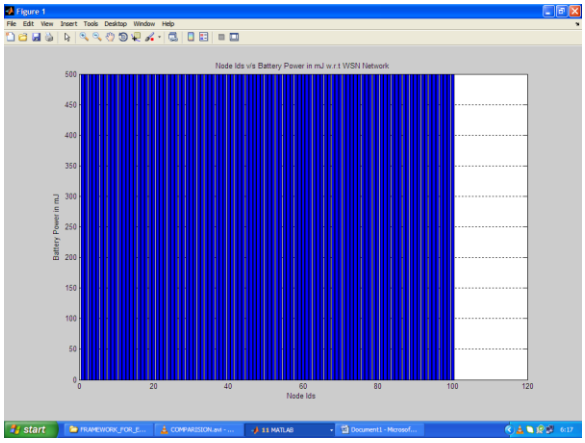

Fig 3.1 shows Node ids vs battery power in Mj

Figure 3.2, 3.3 and 3.4 shows the comparison between the flood and lifetime efficient routing algorithm, fig.3.2 shows end to end delay red and blue line represents flood and lifetime efficient routing respectively. Number of hops from source to destination is shown in the fig. 3.3. Energy consumed by each node is shown in the fig 3.4. Hence, it is proved that lifetime efficient routing gives best performance.

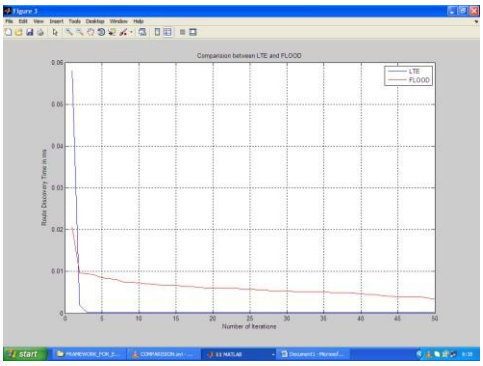

Fig 3.2. shows end to end delay, comparing LTE and flood

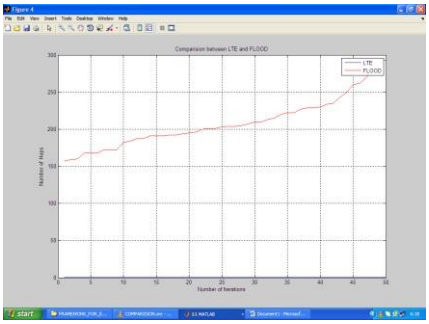

Fig 3.3 shows number of hops, comparing LTE and flood

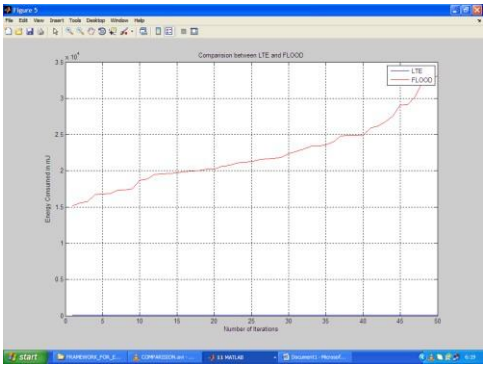

Fig 3.4 shows energy consumed in mJ, comparing LTE and flood

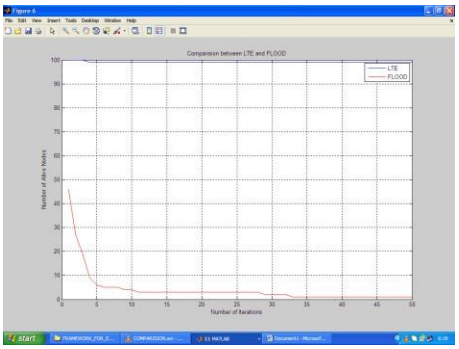

Fig 3.5 shows number of alive nodes

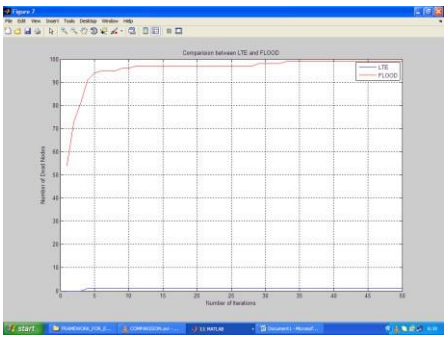

Fig 3.6 shows number of dead nodes

CONCLUSION

Best solution for distributing minimum cost problem in routing is presented in network sensors. The analytical solution is utilized to determining of the collision of link cost values and the sub graph results on the consuming of the energy and network lifetime. The pattern of consumption of energy is developed for the nodes in the networks. The same pattern is used in a general optimization of the lifetime frameworks. The highest lifetime achievable of network with the varying link cost assignment is being obtained below any shortest path routing approach. In the aim to find a subset of modes operating with an complex level of arbitrary of the network the heuristic algorithm is proposed. Values of link cost optimization is being developed in a distributed fashion,

resulting in the best performance. Future scope is that the Algorithms can make use of Centralized Server and Security mechanisms to reduce the overhead.

REFERENCES

1. M. Noori and M. Ardakani, ―Lifetime analysis of random event-driven clustered wireless sensor networks,‖ IEEE Trans. Mobile Computing, vol. 10, no. 10, pp. 1448–1458, Oct. 2011.

2. S. Lee and H. S. Lee, ―Analysis of network lifetime in cluster-based sensor networks,‖ IEEE Commun. Lett., vol. 14, no. 10, pp. 900–902, Oct. 2010.

3. M. R. Senouci, A. Mellouk, H. Senouci, and A. Aissani, ―Performance evaluation of network lifetime spatial-temporal distribution for WSN routing protocols,‖ J. Netw. Comput. Appl., vol. 35, no. 4, pp. 1317–1328, Jul. 2012.

4. J. Luo and J.-P. Hubaux, ―Joint sink mobility and routing to maximize the lifetime of wireless sensor networks: The case of constrained mobility,‖ IEEE/ACM Trans. Netw., vol. 18, no. 3, pp. 871–884, Jun. 2010.

5. Y. Yun, Y. Xia, B. Behdani, and J. C. Smith, ―Distributed algorithm for lifetime maximization in a delay-tolerant wireless sensor network with a mobile sink,‖ IEEE Trans. Mobile Comput., vol. 12, no. 10, pp. 1920–1930, Oct. 2013.

6. H. Lee, A. Keshavarzian, and H. Aghajan, ―Near-lifetime-optimal data collection in wireless sensor networks via spatio-temporal load balancing,‖ ACM Trans. Sensor Netw., vol. 6, no. 3, p. 26, Jun. 2010.

7. J. Kim, X. Lin, N. B. Shroff, and P. Sinha, ―Minimizing delay and maximizing lifetime for wireless sensor networks with anycast,‖ IEEE/ACM Trans. Netw., vol. 18, no. 2, pp. 515–528, Apr. 2010.

8. F. Liu, C. Tsui, and Y. Zhang, ―Joint routing and sleep scheduling for lifetime maximization of wireless sensor networks,‖ IEEE Trans. Wireless Commun., vol. 9, no. 7, pp. 2258–2267, Jul. 2010.

9. D. Kumar, ―Performance analysis of energy efficient clustering protocol sfor maximising lifetime of wireless sensor networks,‖ IETWireless Sensor Syst., vol. 4, no. 1, pp. 9–16, Mar. 2014.

10. A. E. Abdulla, H. Nishiyama, and N. Kato, ―Extending the lifetime of wireless sensor networks: A hybrid routing algorithm,‖ Comput. Commun., vol. 35, no. 9, pp. 1056–1063, May 2012.