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IMPLEMENTATION OF AN ENERGY-EFFICIENT ALGORITHM TO IMPROVE THE ENERGY OF LOW ENERGY NODES IN WSN

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ABSTRACT

A wireless sensor network consists of a number of sensors which are interlinked for performing the same function collectively or cooperatively for checking and balancing the environmental factors. Due to their small size, they have a number of limitations. The energy constraint sensor nodes in sensors networks operate on limited power resources, so it is very important to improve energy efficiency and reduce power consumption. There are many routing protocols that have been proposed to achieve this. The adaptive routing protocols are very attractive because the routing overhead is low in their case. As a result, the routes tend to have the shortest hop count and contain weak links. They degrade the performance and are susceptible to breaks. Here, an energy efficient algorithm that is intended to provide a reliable transmission environment with low energy consumption is proposed. This algorithm efficiently utilizes the energy that is available and the received signal strength of the nodes to identify the best possible route to the destination. Simulation results are used to show that the energy efficient algorithm achieves much higher performance than the classical routing.

Keywords: wireless sensor network, power consumption, energy-efficient algorithm.

INTRODUCTION

A sensor network is a deployment of massive numbers of small, inexpensive, self-powered devices that can sense, compute, and communicate with other devices for the purpose of gathering local information to make global decisions about a physical environment" [1]. Every sensor node is equipped with a transducer, microcomputer, transceiver and power source. The transducer generates electrical signals based on sensed physical effects and phenomena. The microcomputer processes and stores the sensor output. The transceiver, which can be hard-wired or wireless, receives commands from a central computer and transmits data to that computer. The power for each sensor node is derived from the electric utility or from a battery[2]. WSNs [3] may consist of many different types of sensors such as seismic, magnetic, thermal, visual, infrared, acoustic and radar, capable to monitor a wide variety of ambient conditions.

A WSN is different from other popular wireless networks like cellular network, wireless local area network (WLAN) and Bluetooth in many ways. Compared to other wireless networks, a WSN has much more nodes in a network, distance between the neighbouring nodes is much shorter and application data rate is much lower also. To keep the cost of the entire sensor network down, cost of each sensor needs to be reduced. It is also important to use tiny sensor nodes. A smaller size makes it easier for a sensor to be embedded in the environment it is in. WSNs may also have a lot of redundant data since multiple sensors can sense similar information. The sensed data therefore need to be aggregated to decrease the number of transmissions in the network, reducing bandwidth usage and eliminating unnecessary energy consumption in both transmission and reception. WSNs have some unique characteristics.

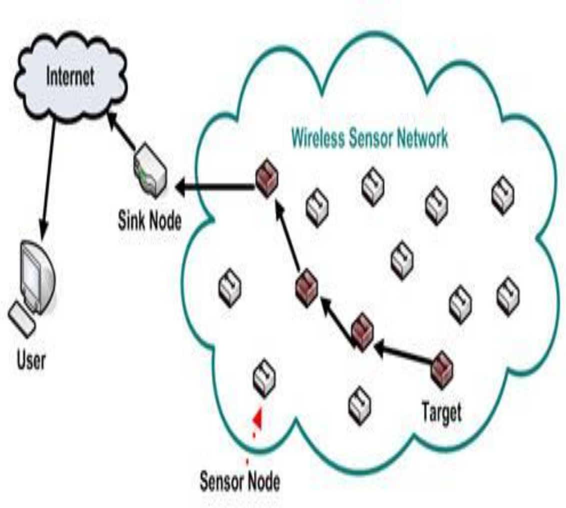

Figure 1. Network Model Of Wireless Sensor Network

I. EXISTING WORK

The key challenge in sensor networks is to maximize the lifetime of sensor nodes due to the fact that it is not feasible to replace the batteries of thousands of sensor nodes. that's why, computational operations of nodes and communication protocols must be made as energy efficient as possible. Among these protocols data transmission protocols have much more importance in terms of energy, Since the energy required for data transmission takes 70 % of the total energy consumption of a wireless sensor network[4]. Area coverage and data aggregation [5] techniques can greatly help conserve the scarce energy resources by eliminating data redundancy and minimizing the number of data transmissions. In this paper, we are going to discuss an energy efficient algorithm for node replacement.

```
{
1.   Find all the nodes that occur in path between source and the destination.
     These nodes are represented by Node List (1 to N).
2.   for i=1 to N
3.   {
4.   If ( Packet Loss Node List (i) ) > MAX_THRESHOLD_VALUE )
5.   {
6.   then Packet Loss Node = low energy node.
7.   }
}}
```

Existing Algorithm

II. SIMULATION OF EXISTING WORK

Simulation is done using NS2 (Network Simulator). Simulation of existing work is performed over 50 nodes. Nodes in the network are in random position. In this scenario there is a source node that will broadcast the data and all the neighbouring nodes will do the same after receiving it. When a particular node receives a fixed amount of data, it changes its color to show the energy loss. Some nodes became red due to receiving more broadcast and so more energy loss. Many nodes are in the critical situation. As the energy of the nodes decreases, packet dropping starts.

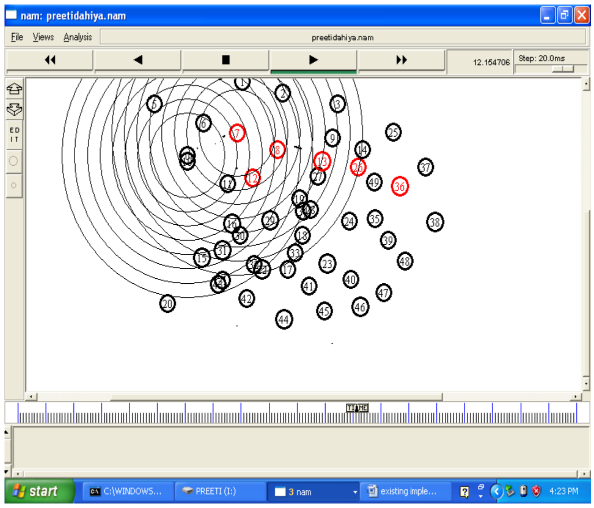

Figure 2. Low energy nodes showing packet loss

Figure 3. Number of packets lost over time

III. PROPOSED ALGORITHM

The proposed work is divided in the following phases:

- Locating the Low Energy Node.
- Defining it in the list of Block Nodes/Critical Nodes.
- Find alternate node such that efficiency of system should not degrade and transfer the packets of low energy node through this node.

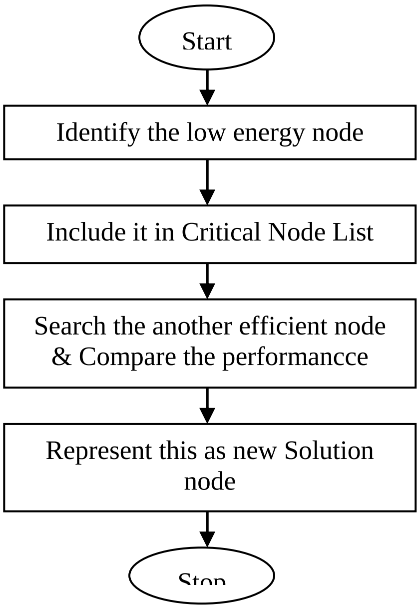

Figure 4. Flow chart of proposed algorithm

Main Algorithm(S,D)

/*S is the source node and D is the destination node, the network defined is dynamic*/

{

1. Find all the nodes that occur in path between source and the destination. These nodes are representing by NodeList(1 to N).
2. for i=1 to N
3. {
4. if(PacketLoss(NodeList(i))> MAX_THRESHOLD_VALUE)
5. {
6. find the list of compromising nodes for Node NodeList(i). This list is represented by Compromising(1 to K)
7. Select any of the compromising node from this list and use it in place of node dropping the data packet NodeList(i)=Rand(Compromising,1,k)
8. if K= 0 /* if there is no compromising node*/
9. {
10. NodeList(i)=Include New Node
11. }}}

}

Proposed Algorithm

IV. SIMULATION OF PROPOSED ALGORITHM

When the energy of a node becomes less than the threshold energy, it changes its color. The low energy node is added in critical node list and another node with high energy is searched. The low energy nodes are replaced with high energy nodes in the network.

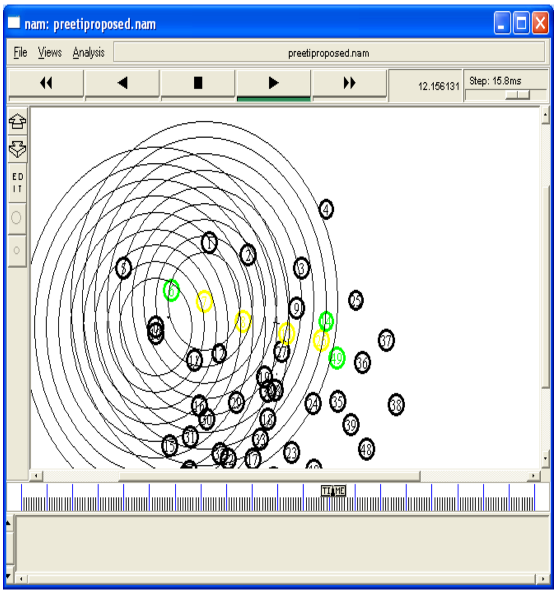

Figure 5. Low energy nodes are replaced with high energy nodes

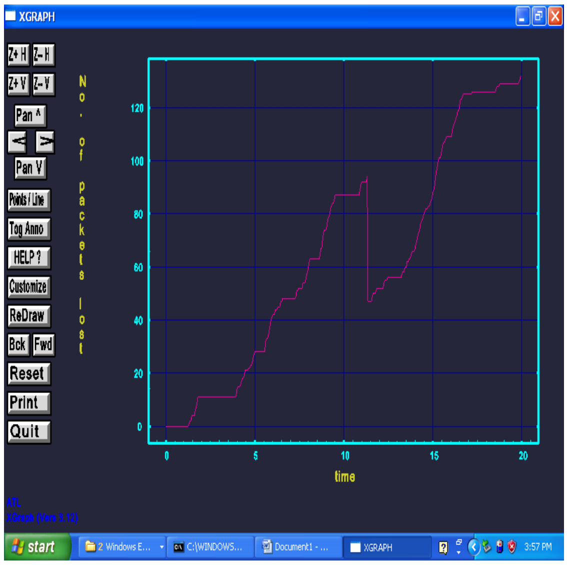

Figure 6. Number of packets lost over time

REFERENCES

[1] Stephan Olariu, “Information assurance in wireless sensor networks”, Sensor network research group, Old Dominion University.
[2] Akramul Azim1 and Mohammad Mahfuzul Islam (2009)**, “**Hybrid LEACH: A Relay Node Based Low Energy Adaptive Clustering Hierarchy for Wireless Sensor Networks,” Proceedings of the 2009 IEEE 9th Malaysia International Conference.
[3] S. Megerian and M. Potkonjak (2003) “Wireless Sensor Networks”, Wiley Encyclopedia of Telecommunications. Wiley-Interscience, New York, January 2003
[4] Kumar.S.P. Chee-Yee Chong. Sensor networks: Evolution, opportunities, and challenges. *Proc IEEE*, August 2003.
[5] D. Agrawal N. Shrivastava, C. Buragohain and S. Suri.Medians and beyond: new aggregation techniques for sensor networks. Proceedings of the 2nd inter-national conference on Embedded networked sensor systems, pages 239{249, 2004. ACM Press.