SCALABLE ENERGY EFFICIENT SCHEME FOR DEPLOYMENT OF WIRELESS SENSOR NETWORKS

[1]*VIMMI NAGPAL*, [2]*PANKAJ KUMAR PATEL*

[1]Department of Electronics & Communication, DCRUST Murthal, IGI, Jhunndpur, Sonipat
[2]Assistant Professor Department of Electronics & Communication Engineering, IGI Jhundpur, Sonipat

[1]*vimmi.nagpal05@gmail.com* ,[2]*pankaj.patel85@gmail.com*

ABSTRACT **:** *When a wireless sensor network is defined the one of the major research question is the optimization of the network in the terms of coverage, energy efficiency and the connectivity. To optimize this, one of the architectural approach, is optimized localization of nodes in the networks as well as its structural representation. To optimize the communication over the network there are number of existing routing approaches available. These approaches are based on traffic analysis, it means no approach gives the optimized benefits always. As well as these approaches are based on the distance analysis between the nodes. It means if the distance between the two most frequently communicating nodes is larger then, It has to pay always higher communication cost in terms of distance and energy. To improve the network effectiveness from the base it is required to improve the network architecture instead of communication. If the architecture is improved then the communication itself will be improved. The paper work is focused on the same.*

KEYWORDS: *WSN, Communication range, sensing range, preferred location.*

1. INTRODUCTION

A wireless sensor network is composed by hundreds or thousands of small compact devices, called sensor nodes, equipped with sensors (example acoustic, seismic or image), that are densely deployed in a large geographical area. These sensors measures ambient conditions in environment surrounding them and then transform these data into electric signals which can be processed to reveal some characteristics about some phenomena located in the area around these sensors. Therefore, we can get information about the area which is far away. The applications may be environment control such as office building, robot control and guidance in automatic manufacturing environments, interactive toys, high security smart homes, and identification and personalization. Wireless sensor networks (WSNs) are the products which integrate the sensor techniques, embedded techniques and distributed information processing and communication techniques. The appearance of wireless sensor networks is a revolution in information sensing and detection. Although there have been significant improvements in processor design and computing, advances in battery technology still lag behind, making energy resource considerations the fundamental challenge in wireless sensor network. Consequently, there have been active research efforts on performance limits of wireless sensor networks. These performance limits include, among others, network capacity and network lifetime.

Network capacity typically refers to maximum amount of bit volume that can be successfully delivered to base station (”sink node”) by all nodes in the network.

Network lifetime refers to the maximum time limit that nodes in the network remain alive until one or more nodes drain up their energy. In this work, we consider an overarching problem that encompasses both performance metrics. In particular, we study the network capacity problem under a given lifetime requirement. Specifically, for a wireless sensor network where each node is provisioned with an initial energy, if all nodes are required to live up to a certain network lifetime criterion, what is the maximum amount of bit volume that can be generated by the entire network? At first glance, it appears desirable to maximize the sum of rates from all the nodes in the network, subject to condition that each node can meet the network lifetime requirement.

Mathematically, this problem can be formulated as a linear programming problem(LPP) within which the objective function is defined as the sum of rates over all the nodes in the network and the constraints are: 1) flow balance is preserved at each node and 2) the energy constraints at each node is met for the given network lifetime requirement. However, the solution to this problem shows that although the network capacity (i.e. the sum of bit rates over all nodes) is maximized, there exists a severe bias in rate allocation among the nodes. In particular, those nodes that consume the least amount of power on their data path toward the base station are allocated with much more bit rates than other nodes in the network. Consequently, the data collection behavior for the entire network only favors certain nodes that have the above property, while other nodes will be unfavorably penalized with much smaller bit rates.

2. PROBLEM FORMULATION

In this present work, effective network localization architecture is presented under different parameters. According to this architecture, complete network is divided in smaller hexagon shaped clusters. Each cluster will be controlled by cluster head. The cluster formation will be done based on distance, density and energy parameters. The work will also perform the analysis on the network clusters so that the identification of congested cluster as well as other problem over the cluster will be identified. Instead of performing the clustering over the network, the particular cluster will be identified where cluster reselection will be performed.

Design a cluster architecture with hexagon shaped clusters
Perform the cluster analysis under distance, density and energy parameters
Perform the cluster head selection and identify the cluster strength
Identify the requirement of cluster head re-selection
Optimize the network by performing the reselection of cluster head
Perform node mobility over the network and perform cluster analysis respectively
Analyze the network under distance and energy parameters

Cluster selection will be performed based on energy, distance and density vectors. The presented work architecture is shown in the form of a flow chart.

3. RESULTS

The proposed model is implemented in the MATLAB. We have designed a network of 100*100 cross-sectional area. The nodes taken are 100 in number and base station is located at the center of deployment area as shown in fig.3.1.

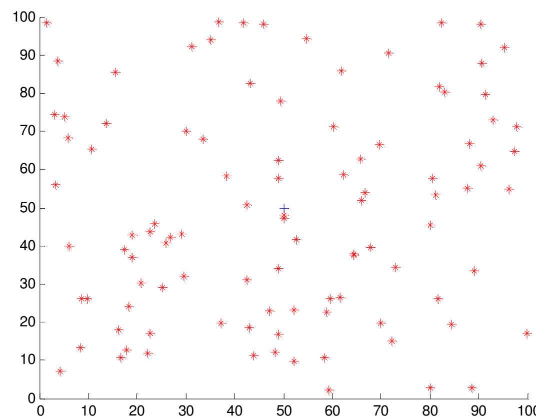

Fig.3.1 WSN Network Architecture

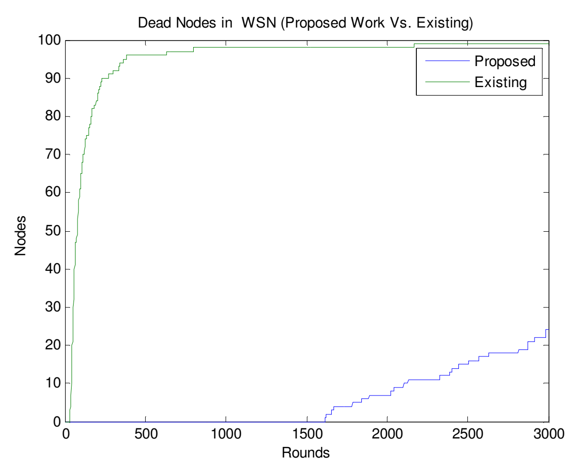

Fig.3.2 Dead Nodes in the WSN

In our proposed model when the network is analyzed for various rounds, then number of dead nodes in the network is increasing but with not at a high rate as increasing in previous approaches as shown in fig.3.2. Similarly, the number of alive nodes in the network are decreasing but not at a high rate as shown in fig.3.3.

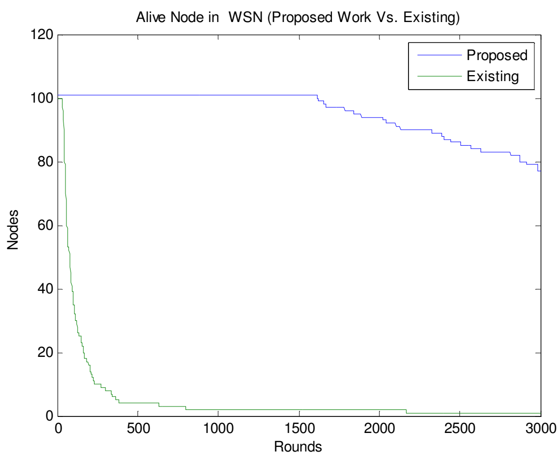

Fig.3.3 Alive Nodes in WSN

Depending upon the number of alive and dead nodes into the network, more packets are transmitted in our proposed scheme than the existing approaches as shown in fig.3.4.

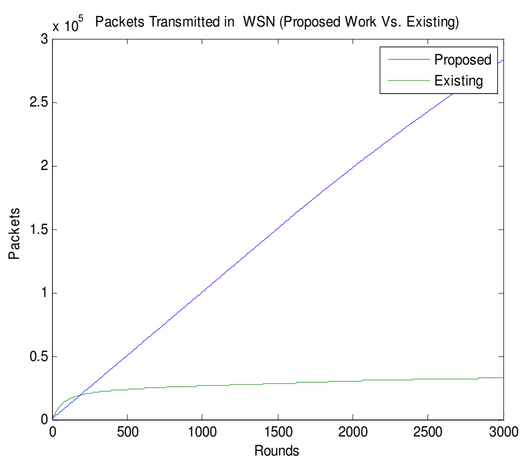

Fig.3.4 Packets Transmitted in WSN

4. CONCLUSION

This scheme achieves optimum coverage while maintaining connectivity. MSNs require less average movement to set themselves to the preferred locations so it is energy efficient. An effective network clustered architecture is defined. Also the lifetime of network and communication is improved. For future work, instead of taking square shape, one may the deployment area of any other shape.

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