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Performance of SEP with Three Level of Heterogeneity over LEACH and SEP of WSN

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Abstract - Wireless Sensor Network plays a important role in our daily life. In real life applications we have to send data from one location to another location via mobile nodes and sensor nodes. In wireless sensor network one base station is required and one controlling station is required which controls sink node for transferring data from base station to destination station. In this paper, three protocols are used for transferring data from base station to destination station which are given: LEACH (Low energy adaptive clustering Protocol), SEP(Stable Election Protocol and SEP with three level of heterogeneity ie. three types of nodes are used which are normal nodes, advanced nodes and intermediate nodes. Energy is totally distributed equally in nodes.

In this paper we have to increase energy and increase number of advanced nodes and intermediate nodes then more stable protocol is achieved ie. SEP with three level of heterogeneity. We have changed the energy factor α = 4 and μ = 2 and μ= α/2. In future, the level of heterogeneity is increased and changing the value of α and μ, more stable protocol is developed.

1. INTRODUCTION

Wireless Sensor networks(WSN) have emerged as a promising tool for monitoring (and possibly actuating) the physical world, utilizing self-organizing networks of battery powered wireless sensors that can sense, process and communicate. A WSN typically consists of a large number of low-cost, low power, and multifunctional wireless sensor nodes, with sensing, wireless communications and computation capabilities. These small sensing devices are called nodes and consist of CPU (for data processing), memory (for data storage), battery (for energy) and transceiver (for receiving and sending signals or data from one node to another)

Characteristics of Wireless Sensor Networks

- A WSN typically consists of a large number of low-cost, low power, and multifunctional nodes
- Wireless sensor nodes, with sensing, wireless communications and computation capabilities.
- The nodes have very limited resources such as memory, computational power, communication range and most importantly battery power
- Sensor nodes are usually randomly deployed and autonomously configure themselves into a communication network.
- The deployment of sensor nodes is totally distributive in nature. The node density is thus varying at different places. Due to this reason one can find dense as well as sparse region in the same topology.
- Sensor nodes are prone to physical damages or failures due to its deployment in harsh or hostile environment.
- In most sensor network application, sensor nodes are densely deployed in a region of interest and collaborate to accomplish a common sensing task. Thus, the data sensed by multiple sensor nodes typically have a certain level of correlation or redundancy.
- A sensor network is usually designed and deployed for a specific application. The design requirements of a sensor network change with its application.
- The primary component of the network is the sensor, essential for monitoring real world physical conditions such as sound, temperature, humidity, intensity, vibration, pressure, motion, pollutants etc. at different locations.
- There is a Bounded Directed Stream (from /to Sink).
- The nodes are disposable and inexpensive.

Application of WSN

- Military applications
- Health applications
- Home Applications.
- Environment applications.

2. Related work

Previously SEP with three level of heterogeneity is developed with 10% advanced nodes and 15% intermediate nodes and energy level $\alpha = 4$ and $\mu = \alpha / 2$ i.e. $\mu = 2$ in MATLAB.

In previous research LEACH, SEP and SEP with three level of heterogeneity are performed and the result of previous research is given by

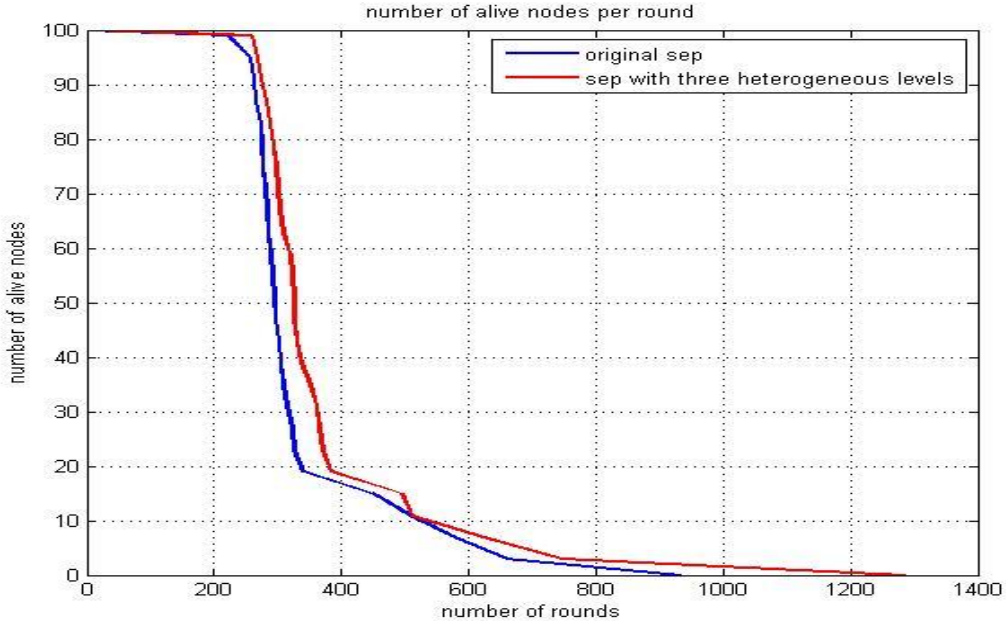

Figure 1 Comparison graph between SEP and SEP with three level of heterogeneity.

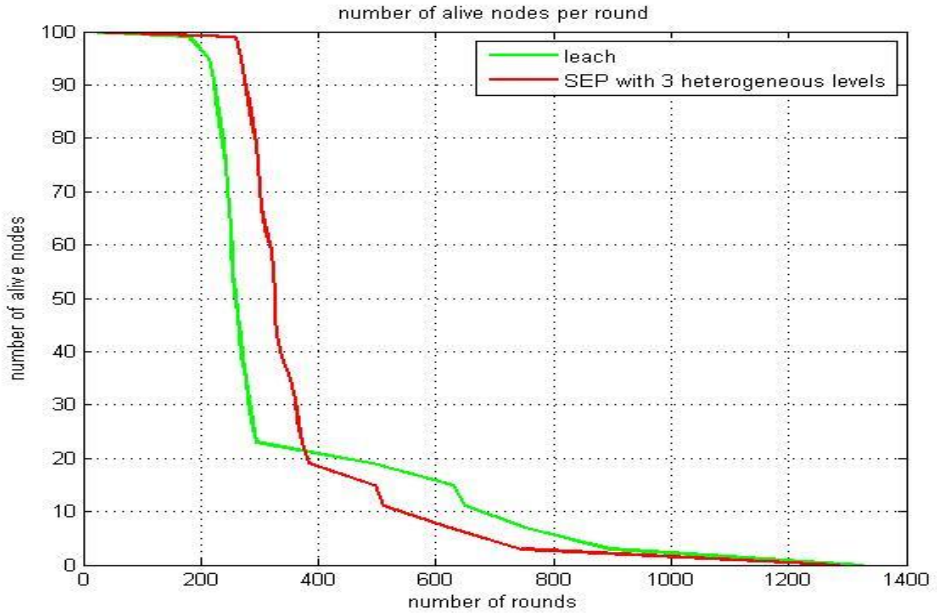

Figure 2 Comparison graph between SEP with three level of heterogeneity and LEACH

3. Objectives

A stable and reliable routing protocol, it can increase the lifetime of the network by minimizing the energy consumption of each sensor nodes resource constraints, including storage, computation and communication's. The first routing protocol is based on sending and receiving message to the nodes. The solution is:

1. Comparison of LEACH, SEP and SEP with three level of heterogeneity over WSN.
2. Propose stable and energy efficient Routing protocol SEP with three level of heterogeneity over WSN.
3. Implementation of SEP with three level of heterogeneity over WSN.
4. Evaluate the result.

4. Proposed Work

SEP (Stable Election Protocol) works with three tier of heterogeneity such as three nodes which are given below: Normal Node, Advanced Node and Intermediate Nodes. The intermediate node is kept between normal node and advanced node at equal distance having extra energy. The cluster is formed with these nodes. The cluster head is chosen on the probabilistic method of

energy having nodes. The cluster head changed with respect to time and energy. The cluster head is kept on and intermediate nodes are kept on and other nodes are kept off. So energy is saved for future use. The process takes place into rounds.

For ″SEP with three levels of heterogeneity″ also, we are using a 100 × 100 network of 100 sensor nodes for simulation using MATLAB. Let 20% nodes be the advanced nodes with additional energy level $\alpha = 4$ and 30% nodes be the intermediate nodes with additional energy level $\mu = \alpha/2$ i.e. $\mu = 2$.

5. Results

For ″SEP with three levels of heterogeneity″ also, we are using a 100 × 100 network of 100 sensor nodes for simulation using MATLAB. Let 20% nodes be the advanced nodes with additional energy level $\alpha = 4$ and 30% nodes be the intermediate nodes with additional energy level $\mu = \alpha/2$ i.e. $\mu = 2$.

Let Popt = 0.1, this means that on an average, 10 nodes will become cluster heads per round.
Initial energy Eo = 0.5J

The initial position of the node in the 100 X 100 network is given below:

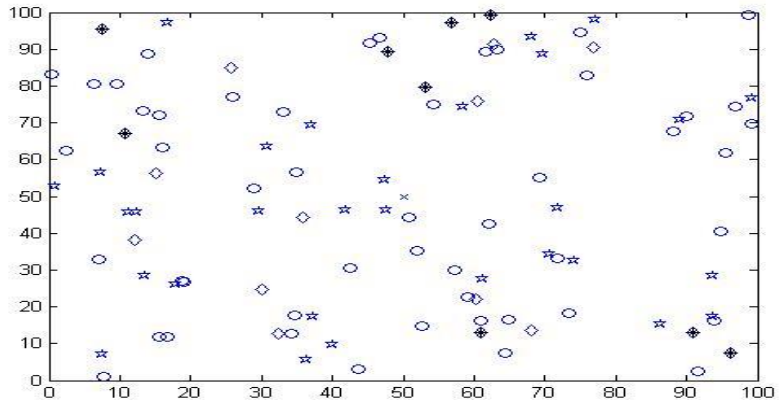

Figure 3 Initial State of Sensor Nodes

◊ represents advanced nodes

O represents normal node

Star represents intermediate nodes.

After successful completion of 1850 rounds of iteration of sensor network, first node is dissipated 50%energy and turns color white to yellow which is shown in fig.

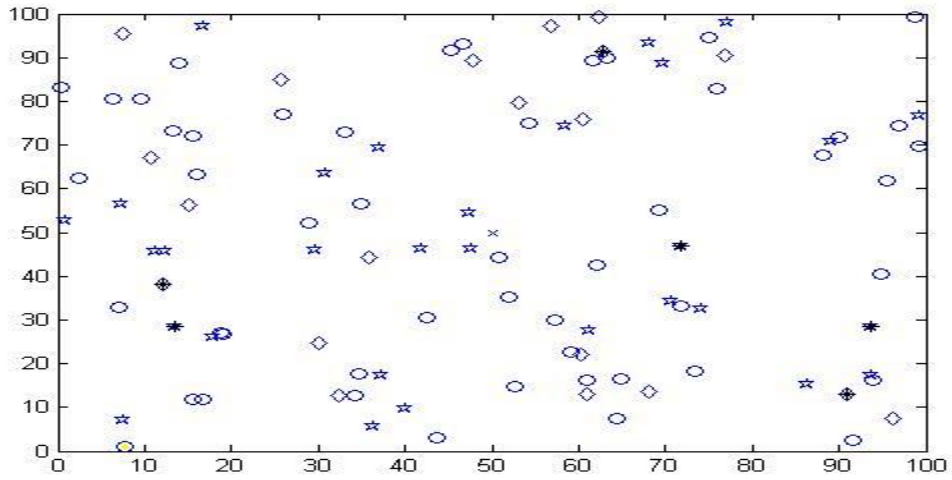

Figure 4 First Node 50% energy dissipated

After successful completion of 1200 rounds of sensor network, all normal nodes are dissipated 50% energy and color of nodes are yellow given in the fig,

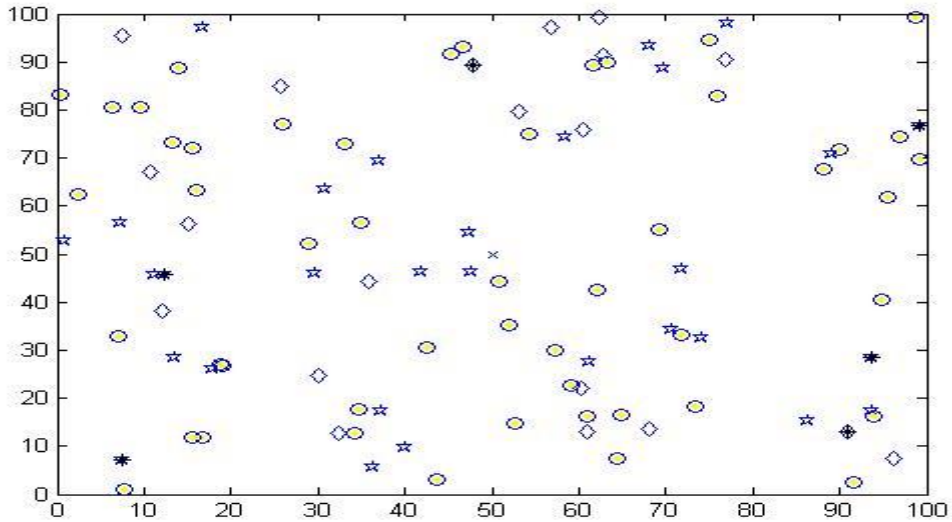

Figure 5 Nodes are dissipated energy

After successful completion of 1842 rounds, first node is died which is given below in the fig.

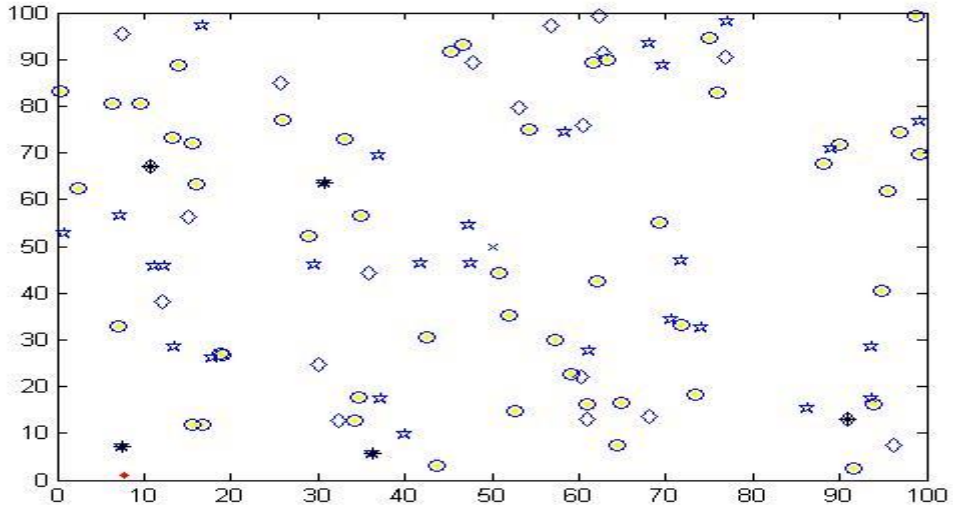

Figure 6 First Node is died

After completion of 3500 rounds all nodes are died and network becomes unstable which is shown in fig.

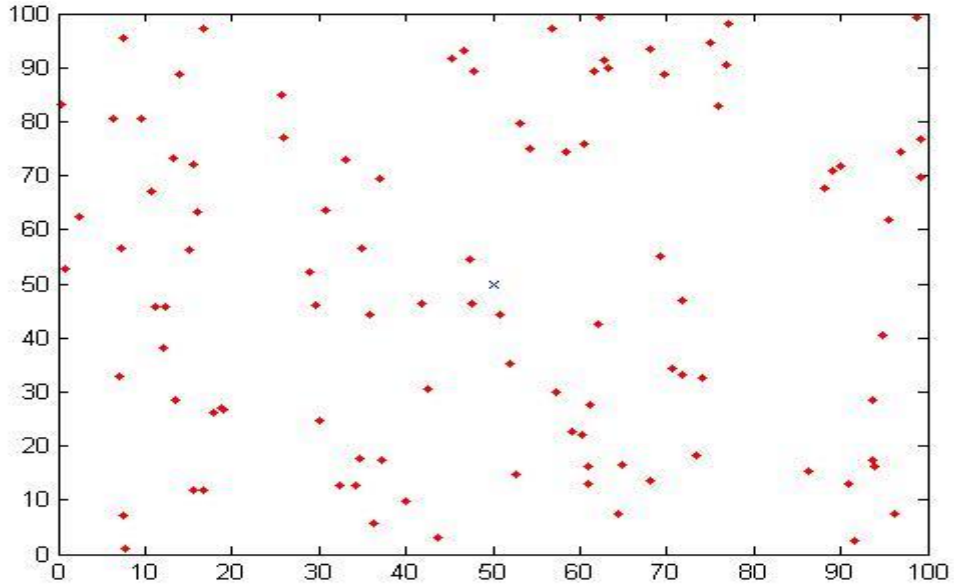

Figure 7 All nodes are died with α = 4 and μ = 2

6. Conclusion

In the previous research, 10% nodes are advanced nodes and 15% are intermediate nodes, energy level $\alpha = 2$ and $\mu = 1$. First node is started to dissipate energy after completing 911 rounds and all nodes are dissipating energy after completing 944 rounds. After completing 1400 rounds all nodes is dissipated energy. The sensor network becomes unstable.

So in my research, 20% nodes are advanced nodes and 30% are intermediate nodes, energy level

$\alpha = 4$ and $\mu = 2$. After completing 850 rounds, first node is dissipated energy and after completing 1842 rounds, first node is died and after completing 3500 rounds, all nodes are died.

Hence SEP with three level of heterogeneity and 20% nodes are advanced nodes and 30% intermediate nodes with energy level $\alpha = 4$ and $\mu = 2$ is more stable than previous research.

7. Future Scope

If the ratio of normal node, advanced node and intermediate nodes are changed then the protocol is expected to be more stable and more energy efficient. The selection ratio of cluster head randomly is kept same then less nodes are died after many number of rounds and many number of nodes are alive then the sensor network perform its sensing property well in wireless sensor network.

The sensor network is used in many aspects of daily life, if the sensing life of an sensor is good then it is used in our daily life. In future, if the energy of nodes is increased then the networks become more stable and energy efficient. If the number of tier is increased with heterogeneity level then also energy level is also increased and network becomes stable.

References

[1] Ameer Ahmed Abbasi, "A survey on clustering algorithms for wireless sensor networks", Science Direct, 2008.
[2] Hu Junping, Jin Yuhui, Dou Liang, A Time Based Cluster-Head Selection Algorithm for LEACH, 2008 IEEE.
[3] Jiun-Jian Liaw, Lin-Huang Chang and Hung-Chi Chu, "Improving lifetime in Heterogeneous Wireless Sensor Networks with the Energy Efficient Grouping Protocol". International Journal of Innovative Computing, Information and control. *Volume 8, Number 9, September 2011*.
[4] Tripti Sharma, "Performance comparison of LEACH, SEP and DEEC Protocol in Wireless Sensor Network", Research Gate, 2012.

[5]. M.M.ISLAM, "Extended Stable Election Protocol (SEP) for three-level hierarchical clustered heterogeneous WSN", 2012.
[6]. Satish Chand, Samayveer Singh and Bijendra Kumar,*"3-Level Heterogeneity Model for Wireless Sensor Network"*, I.J.Computer Network and Information Security, 2013.
[7]. Meena Malik, "Analysis of LEACH protocol in wireless sensor network", 2013.
[8].Yogesh Mishra, Rashmi Pandey, "Energy Level Based Stable Election Protocol in Wireless Sensor Network", 2014.
[9].Sunil Tiwari, "Performance Analysis of SEP and LEACH for Heterogeneous Wireless Sensor Networks", 2014.
[10]. Shobti Saini, "Performance Evaluation of Variants of Stable Election Based WSN protocols", 2015.
[11] Rajat Kandpal, "Comparative Study of Hierarchical Routing Protocols in Wireless Sensor Networks", 2015.
[12] Prerna, "A Modified LEACH Protocol for Network Lifetime Enhancement in Wireless Sensor Networks", 2015.

