Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X

IJCSMC, Vol. 3, Issue. 7, July 2014, pg.310 – 317

RESEARCH ARTICLE

INCREASE THROUGHPUT OF A NETWORK THROUGH WIRELESS SENSOR NETWORK

Yatika, Vikram Nandal
M.Tech student, Department of CSE, R.N. College of Engineering & Management
Assistant Professor, Department of CSE, R.N. College of Engineering & Management
yatika987monga@gmail.com, vikramcse@live.com

Abstract- Sensors integrated into structures, machinery, and the environment, coupled with the efficient delivery of sensed information, could provide tremendous benefits to society. Potential benefits include: fewer catastrophic failures, conservation of natural resources, improved manufacturing productivity, improved emergency response, and enhanced homeland security However, barriers to the widespread use of sensors in structures and machines remain. Bundles of lead wires and fiber optic "tails" are subject to breakage and connector failures. Long wire bundles represent a significant installation and long term maintenance cost, limiting the number of sensors that may be deployed, and therefore reducing the overall quality of the data reported. Wireless sensing networks can eliminate these costs, easing installation and eliminating connectors. The ideal wireless sensor is networked and scalable, consumes very little power, is smart and software programmable, capable of fast data acquisition, reliable and accurate over the long term, costs little to purchase and install, and requires no real maintenance.

Keyword: WSN, Routing, Flooding, Sensors, IC, LEACH

I. INTRODUCTION

Wireless Sensor Networks (WSNs) are networks of light-weight sensors that are battery powered used majorly for monitoring purposes. The advances in micro-electromechanical technologies have made the improvising of such sensors a possibility. Recently, WSNs have been heavily researched by several organizations and by the military where we can find some of the applications in battle field surveillance and other security etiquettes. With the recent issues on climate change, WSNs can be utilized to track changes that affect the climate using a network of sensors to gather environmental variables such as temperature, humidity and pressure. One of the numerous advantages of these sensors is their ability to operate unattended which is ideal for inaccessible areas. However, while WSNs are increasingly equipped to handle some of these complex functions, in-network processing such as data aggregation, information fusion, computation and transmission activities requires these sensors to use their energy efficiently in order to extend their effective network life time. Sensor nodes are prone to energy drainage and failure, and their battery source might be irreplaceable, instead new sensors are deployed. . A WSN is characterized by the following features:

- The network relay on a collection of tiny sensors to observe and influence the real-world.
- The sensors have a modest and sometimes non-renewable power budget and do not necessarily need to be active at all times. So sensors can be dynamically added to or removed from the network.
- There is no infrastructure (wireless).
- It is a self-organized network.
- Multi-hop communication is used and the network topology changes dynamically.

Some of the applications of wireless sensor network in different fields are given below:

1. Forest fires detection

A network of Sensor Nodes can be installed in a forest to detect when a fire has started. The nodes can be equipped with sensors to measure temperature, humidity and gases which are produced by fires in the trees or vegetation. The early detection is crucial for a successful action of the firefighters; thanks to Wireless Sensor Networks, the fire brigade will be able to know when a fire is started and how it is spreading.

2. Greenhouse monitoring

Wireless sensor networks are also used to control the temperature and humidity levels inside commercial greenhouses. When the temperature and humidity drops below specific levels, the greenhouse manager must be notified via e-mail or cell phone text message, or host systems can trigger misting systems, open ventilators, turn on fans, or control a wide variety of system responses.

3. Landslide detection

A landslide detection system makes use of a wireless sensor network to detect the slight movements of soil and changes in various parameters that may occur before or during a landslide. And through the data gathered it may be possible to know the occurrence of landslides long before it actually happens.

4. Agriculture

Using wireless sensor networks within the agricultural industry is increasingly common; using a wireless network frees the farmer from the maintenance of wiring in a difficult environment. Gravity feed water systems can be monitored using pressure transmitters to monitor water tank levels, pumps can be controlled using wireless I/O devices and water use can be measured and wirelessly transmitted back to a central control center for billing. Irrigation automation enables more efficient water use and reduces waste.

5. Structural monitoring

Wireless sensors can be used to monitor the movement within buildings and infrastructure such as bridges, flyovers, embankments, tunnels etc... enabling Engineering practices to monitor assets remotely without the need for costly site visits, as well as having the advantage of daily data, whereas traditionally this data was collected weekly or monthly, using physical site visits, involving either road or rail closure in some cases. It is also far more accurate than any visual inspection that would be carried out.

The rest of this paper is organized as follows: section II summarizes related researches. Section III gives a brief introduction of wireless sensor network architecture. Section IV describes our classification.
Section V describes Simulation and Results. In Section VI, we draw conclusion and give future work.

II. RELATED WORK

A wireless sensor network is composed by hundreds or thousands of small compact devices, called sensor nodes, equipped with sensors (e.g. acoustic, seismic or image), that are densely deployed in a large geographical area.

Yingpeng Sang [40], In this paper Author survey these work and classify them into two cases: hop-by-hop encrypted data aggregation and end-to-end encrypted data aggregation. Author also proposes two general frameworks for the two cases respectively.

Jamal N. Al-Karaki Raza [39], In this paper, Author present solutions for the data gathering and routing problem with in-network aggregation in WSNs. Presented objective is to maximize the network lifetime by utilizing data aggregation and in-network processing techniques.

Bhaskar Krishnamachari [38], In this paper Author model data-centric routing and compare its performance with traditional end-to-end routing schemes. Author examines the impact of source destination placement and communication network density on the energy costs and delay associated with data aggregation.

Sokwoo Rhee [37], In this paper Author have devised several novel techniques for minimizing power consumption in wireless sensor networks. Based on these techniques, Author has developed a highly power-efficient sensor networking platform called the I-Bean Network. In this paper, Author describes these techniques in detail and the associated tradeoffs.

Mohamed Watfa [36], In this paper, Author give an energy efficient approach to query processing by implementing new optimization techniques applied to in-network aggregation. Author first discuss earlier approaches in sensors data management and highlight their disadvantages.

Ayad Salhieh et.al [35], In this paper, discussed the topology that best supports communication among these sensor nodes and propose a power-aware routing protocol and simulate the performance, showing that our routing protocol adapts routes to the available power. This leads to a reduction in the total power used as well as more even power usage across nodes.

V. Rodoplu et.al [34], MECN identifies a relay region for every node. The relay region consists of nodes in a surrounding area where transmitting through those nodes is more energy efficient than direct transmission. The main idea of MECN is to find a sub-network, which will have less number of nodes and require less power for transmission between any two particular nodes.

R. M. Sharma [33], use the performance of the two common MANET protocols, namely AODV and DSR has been shown .The Average end-to-end delay and the Packet Delivery Ratio have been considered as the two performance parameters.

W. Heinzelman [32], use an improved algorithm, LEACH-C protocol was described. LEACH-C is a centralized version of LEACH where only the advertisement phase differs. In LEACH-C, a centralized algorithm at the base station makes cluster formation.

W. Heinzelman et.al [31], use a hierarchical clustering algorithm for sensor networks, called Low Energy Adaptive Clustering Hierarchy (LEACH) was introduced. LEACH is a cluster-based protocol, which includes distributed cluster formation. LEACH randomly selects a few sensor nodes as cluster heads (CHs) and rotates this role to evenly distribute the energy load among the sensors in the network. Although LEACH is able to increase the network lifetime, there are still a number of issues about the assumptions used in this protocol. Main problem with LEACH protocol lies in the random selection of cluster heads.

III. WIRELESS SENSOR NETWORK ARCHITECTURE

Sensor nodes are normally scattered in a sensing field, every sensor has the capability of sensing, processing in form of aggregating and communicating the data to the sink or base station using various schemes. The underlying protocol scheme in the OSI model for WSNs includes the application layer, transport layer, network layer, data link layer and the physical layer. The protocol stack shown in Figure1.1, combines power and routing awareness, integrates data with networking protocols to communicates power efficiently through wireless medium, and promotes cooperative efforts of sensor nodes.

The application layer supports different application software depending on the task. The transport layer maintains the data flow, while the network layer does the routing of data from the transport layer. Depending on the deployment of the sensors, they can be either mobile or static, if the former then the data link layer, specifically the MAC protocol design must have power control mechanism, forwarding mechanism and should be able to perform communication confidentiality through encryption-decryption techniques. Finally, the task of the physical layer involves modulation and demodulation of radio carrier stream, forward error-correction (FEC) and performing efficient synchronization between the sender and receiver. The power, mobility, and task management planes were proposed to monitor the power, movement, and task distribution among the sensor nodes. Most often sensor network protocols are designed with two basic kinds of architectures; the layered and the clustering architectures; these architectures are discussed in the next sections.

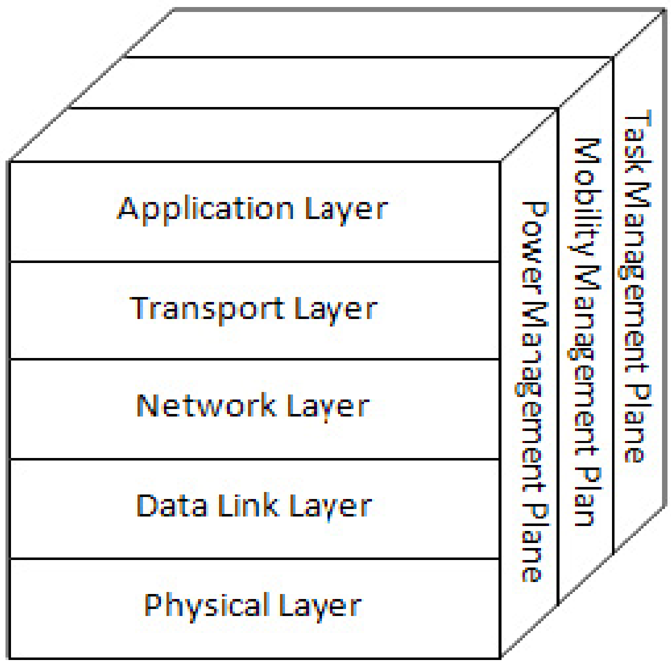

Figure 1: Protocol Stack Diagram

LAYERED ARCHITECTURE

The design of a layered architecture would normally consist of a base station and sensors scattered in the field. The layers of sensor nodes around the base station constitutes nodes that are in a single hop count to the base station, while nodes that are farther away can be multiple hop count to the BS depending on the size of the network, this is shown in Figure 1.6. One of the earliest protocols to complete the implementation of the layered architecture is the UNPF (Unified Network Protocol Framework), designed for a multi-hop infrastructure network architecture. The UNPF protocol is unified in the sense that it combines three different protocol structures: the network organization, medium access control (MAC) and the routing protocol to achieve the objectives of a robust protocol. These schemes are briefly described next.

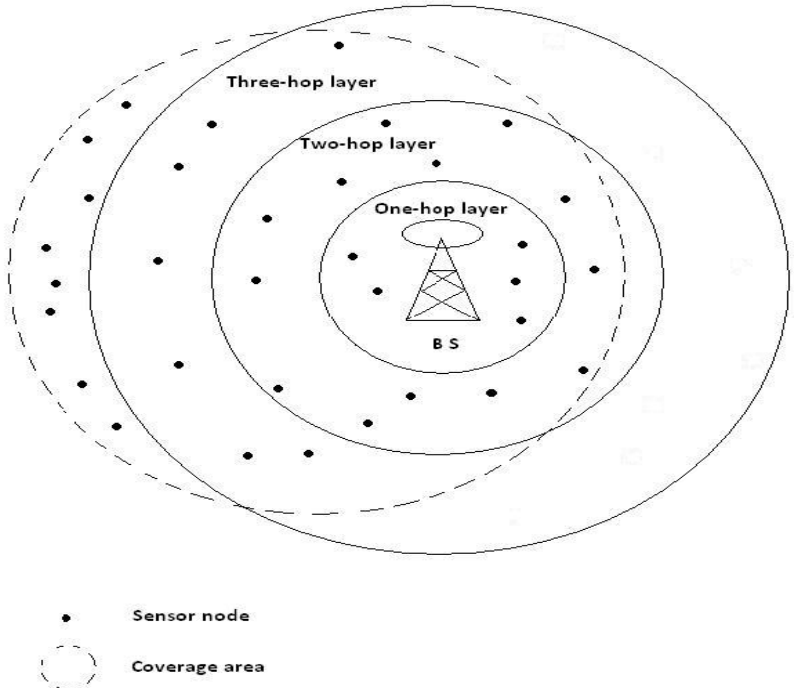

Figure 2: Layered Architecture

IV. CLASSIFICATION

A simple classification of Wireless sensor networks based on their mode of functioning and the type of target application is given below.

- **Proactive Networks**

The nodes in this sort of network periodically switch on their sensors and transmitters, sense the environment and transmit the data of interest. Hence, they collect the data for the relevant parameters at regular intervals. They are well suited for applications requiring periodic data monitoring. Some known instances or protocols of this kind are the LEACH (Low Energy Adaptive Clustering Hierarchy) protocol, some improvements on LEACH such as and PEGASIS (Power-efficient gathering in sensor information systems).

- **Reactive Networks**

The nodes of the networks according to this scheme react immediately to sudden and drastic changes in the value of a sensed attribute. They are well suited for time critical applications.

- **Hybrid Networks**

The nodes in such a network not only react to time-critical situations, but also give an overall picture of the network at periodic intervals in a very energy efficient manner. Such a network enables the user to request past, present and future data from the network in the form of historical, one-time and persistent queries respectively. Such kind of network takes advantages of Proactive and Reactive networks.

V. SIMULATION & RESULTS

In simulation we evaluated the performance of improved protocol in terms of network lifetime, number of dead nodes, and number of alive nodes in comparison with existing protocol. The results of modification we done in Spin Protocol and perform the comparison with existing spin protocol.

SIMULATION

Life time of network related to number of alive nodes, number of dead nodes, and rate of packet transmission and how long time cluster of nodes is formed in network. System which is proposed here gives good output in all four parameters.

Following are the assumptions we used for simulation:

```
n=      100
P=      0.1;
Eo=     0.5;
ETX=    50*0.000000001;
ERX=    50*0.000000001;
Efs=    10*0.000000000001;
Emp=    0.0013*0.000000000001;
EDA=    5*0.000000001;
EDA=    5*0.000000001;
a   =   1;
rmax=   5000;
do=     sqrt(Efs/Emp);
```

We have taken all these values and find that there are less dead nodes and more alive nodes in proposed system. Also rate of packet transmission is enhanced and due to more alive nodes cluster formation process is ensue for a long time which tends to increase life time of wireless sensor network.

Modified system output shows improvement in four areas.

- There is less number of dead nodes.
- Number of alive nodes is enhanced.
- Packet transmission to base station occurs frequently.
- Even in last round clustering process is going take place.

RESULTS

The result refers to the measurement of network life time. Figure shows the output of existing protocol, modified LEACH protocol and comparison between existing work and modified result.

Results of Scenario 1 (10 Nodes)

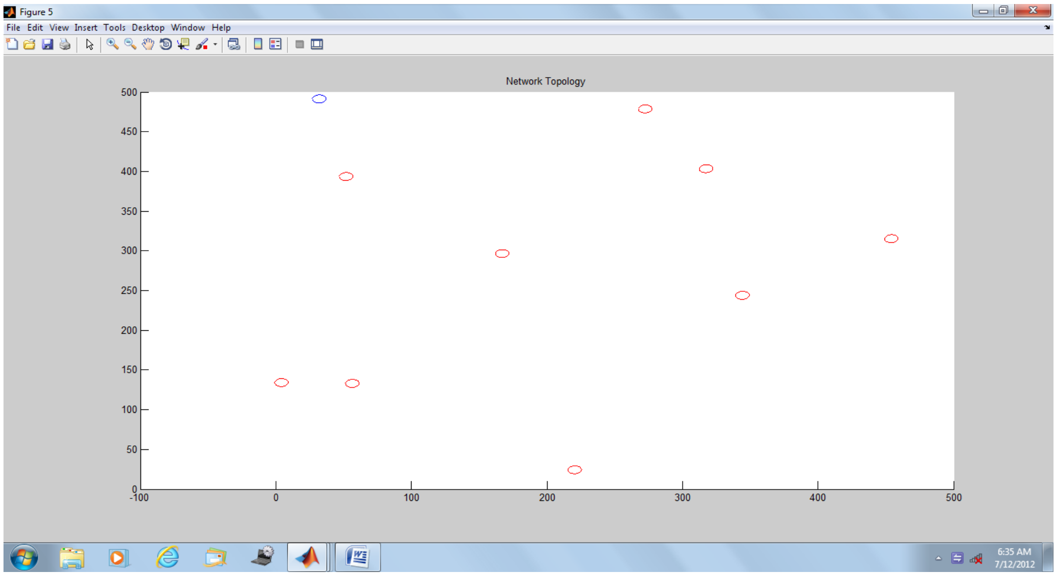

Figure5.1 Network Topology

Figure 5.1 shows a network with 100 nodes and coverage area of 500x500. Here red circles define the nodes and blue nodes represent the receiver nodes.

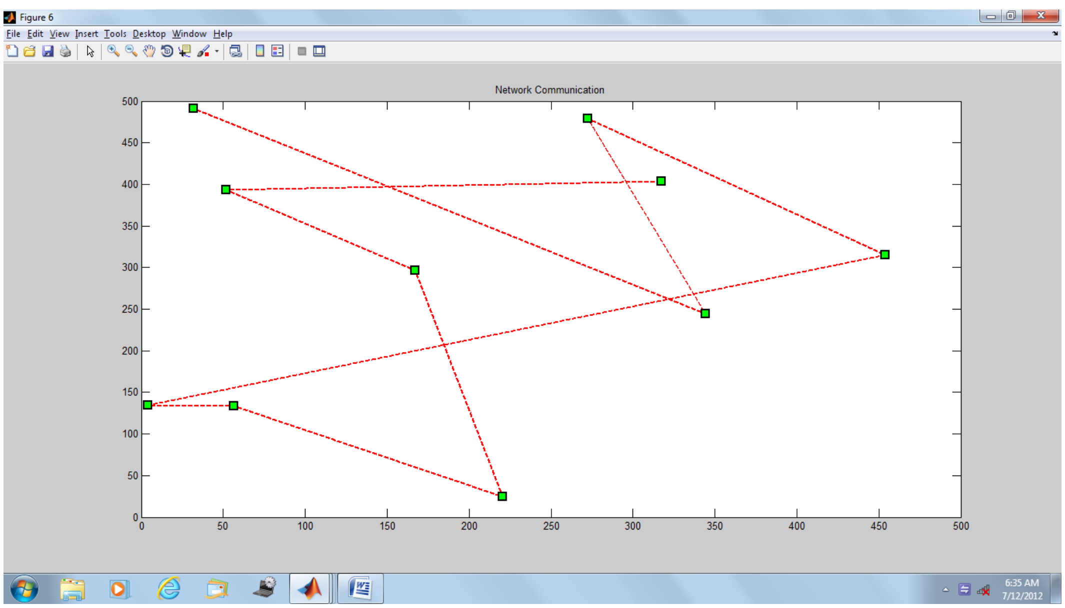

Figure 5.2: Network Communication

Figure 5.2 shows the communication over the network. The lines here represent the interconnection between nodes.

VI. CONCLUSION AND FUTURE WORK

CONCLUSION

The proposed work is implemented on Wireless Sensor network to improve the network life in case of clustered Network. The main problem with cluster network is to find the cluster head for each cluster. Here the improvement is done for Spin protocol. In this work we have include one parameter to select the cluster head and the vice cluster head. This parameter is represented by Ideal Time Analysis. The work has considered the concept of congestion parameter along with effective throughput for that instance. The node will be selected that is working with low congestion and better throughput over the network.

FUTURE SCOPE

In this work the improvement over the Spin is proposed that will increase the network lifetime and improve the communication over the network. This work is performed on homogenous network. The work can be extended to work on heterogamous network. The heterogeneity will be in terms of type of sensor nodes, environment and the node parameters.

REFERENCES

- Kun Zhang and Cong Wang , "A Secure Routing Protocol for Cluster-Based Wireless Sensor Networks Using Group Key Manag ement ," IEEE Xplore,vol.37, pp. 178-185, jan.-2008.
- Bolian Yin, Hongchi Shi, and Yi Shang ,"Analysis of Energy Consumption in Clustered Wireless Sensor Networks" IEEE Transactions on Mobile Computing, vol. 3, pp. 272–285, July 2007
- Zhao Yulan and Jiang Chunfeng,"Research about Improvement of LEACH Protocol", An Energy Efficient Protocol for Wireless Sensor Network". Application Research of Computers, No.2 pp: 209-211, Jan. 2005.
- Stephan Olariu and Qingwen Xu, I"nformation Assurance In Wireless Sensor Networks", IEEE Transactions on Mobile Computing, 3(4), pp. 317-331 , Dec.2004.
- Zenon Chaczko, Ryszard Klempous and Jan Nikodem," Methods of Sensors Localization in Wireless Sensor Network", IEEE Transactions On Mobile Computing, VOL. 3, pp. 3, Jul-Sep 2004.
- Adrian Perrig , John Stankovic and David Wagner," Security in wireless sensor network",. Vol. 47, pp.6-9 ,June 2004.
- Jan Steffan ,Ludger Fiege, Mariano Cilia and Alejandro Buchmann, "Scoping in Wireless Sensor Networks", IEEE Network, 18(1), pp.15–21, May 2004.
- Zhiwei Zhao, Xinming Zhang, Peng Sun and Pengxi Liu," A Transmission Power Control MAC Protocol for Wireless Sensor Networks", IEEE/ACM Tran. on Networking, , 12(3), pp.493-506,April 2004.

