**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. 5, May 2014, pg.961 – 965*

**RESEARCH ARTICLE**

# Investigation of Flooding / Gossiping Of Messages by a Node inside Hop Using Spanning Tree

**Ramandeep Kaur[1], Vikramjit Singh[2]**
[1]Assistant Professor, RBIENT, Hoshiarpur, Punjab
[2]Assistant Professor, DAV University, Jalandhar, Punjab

***Abstract:***
***Wireless sensor networks are widely deployed for wide range of applications for assembly information about the required appliance. In general, sensor nodes intellect their environment, assemble sensed data and pass on it to the base station or to other nodes in the cluster. During this broadcast of sensed data from node to sink or to other nosed in the cluster, there is a lot of energy get lessen. In-order to overcome this problem, some of the researchers used Gossiping approach to send the data to the other nodes in the cluster. In gossiping nodes do not broadcast but send the incoming packets to a arbitrarily selected neighbour. A sensor node arbitrarily selects one of its neighbours to send the data. Once the neighbour node receives the data, it selects arbitrarily another sensor node. In this paper, we have implemented energy efficient mechanism for transmit data from one node to another node inside a cluster using spanning tree. Using this mechanism congestion reduced and time to propagate the message to all sensor nodes in gossiping also reduced.***

***Keywords: Wireless Sensor Nodes, Gossiping, Broadcasting, Leach Protocol***

## 1. Wireless Sensor Networks

The recent technological advancements in the field of micro electrical mechanical systems have made the manufacturing and use of small, low powered and moderate cost micro-sensors[1] both technically and economically feasible. A Wireless Sensor Network (WSN)
[2] consists of hundreds to thousands of low-power multi-functioning sensor nodes, operating in an unattended environment, having capabilities of sensing, computation and communications.

 

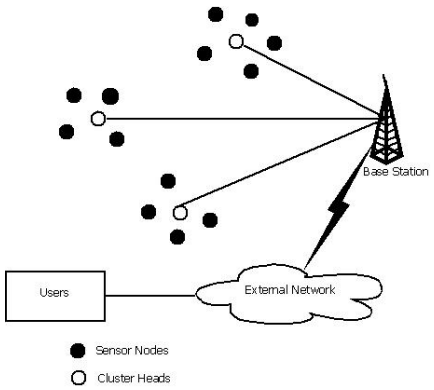

Figure 1: Wireless sensor network [4]

Wireless Sensor Networks are used for monitoring and collecting information from an unattended environment and for reporting events to the user. They monitor physical or environmental conditions such as temperature, humidity, pressure, sound, vibration etc. Since a sensor node is limited in terms of sensing and computation capacities, communication performance and power - a large number of sensor nodes can be distributed over an area of interest for collecting information. [3]The decrease in size and cost of the sensor nodes has made it possible to have a network of large number of sensor nodes, thereby increasing the reliability and accuracy of data as well as the area of coverage. Due to the low-cost deployment, the nodes are generally deployed with greater degree of connectivity. Such redundancy also increases the network fault tolerance as the failure of a single node has negligible impact on the entire network operation. [4]
LEACH assumes a simple model for the radio hardware energy dissipation where the transmitter dissipates energy to run the radio electronics and the power amplifier, and the receiver dissipates energy to run the radio electronics. For the experiments described here, both the free space and the multipath fading channel models were used, depending on the distance between the transmitter and receiver [6].

**PHASES IN LEACH**

**Set-up Phase**

(1) Advertisement Phase
(2) Cluster Set-up Phase

**Steady Phase**

(1) Schedule Creation
(2) Data Transmission

**Setup Phase**

Each node decides independent of other nodes if it will become a CH or not. This decision takes into account when the node served as a CH for the last time[7]
In the following advertisement phase, the CHs inform their neighborhood with an advertisement packet that they become CHs. Non-CH nodes pick the advertisement packet with the strongest received signal strength.
In the next cluster setup phase, the member nodes inform the CH that they become a member to that cluster with "join packet" contains their IDs using CSMA. After the cluster-setup sub phase, the CH knows the number of member nodes and their IDs. Based on all messages received within the cluster, the CH creates a TDMA schedule, pick a CSMA code randomly, and broadcast the TDMA table to cluster members. After that steady-state phase begins.

**Steady-state phase:**

Data transmission begins; Nodes send their data during their allocated TDMA slot to the CH[7]. This transmission uses a minimal amount of energy.. The radio of each non-CH node can be turned off until the nodes allocated TDMA slot, thus minimizing energy dissipation in these nodes. When all the data has been received, the CH aggregate these data and send it to the BS. LEACH is able to perform local aggregation of data in each cluster to decrease the amount of data that transmitted to the base station.
Although LEACH protocol acts in a good manner, it suffers from many drawbacks such like;
• CH selection is randomly, that does not take into account energy consumption.
• It can't cover a large area.
• CHs are not uniformly distributed; where CHs can be located at the edges of the cluster.

 

## 2. Design Space

### 2.1 Deployment

The deployment of sensor nodes in the physical environment may take several forms. Nodes may be deployed at random or installed at deliberately chosen spots. Deployment may be a one-time activity, where the installation and use of a sensor
network are strictly separate activities[12]. However, deployment may also be a continuous process, with more nodes being deployed at any time during the use of the network.

### 2.2 Mobility

Sensor nodes may change their location after initial deployment. Mobility can result from environmental influences such as wind or water, sensor nodes may be attached to or carried by mobile entities, and sensor nodes may possess automotive capabilities[12]. In other words, mobility may be either an incidental side effect, or it may be a desired property of the system, in which case mobility may be either active or passive.

### 2.3 Communication Modality

For wireless communication among sensor nodes, a number of communication modalities can be used such as radio, diffuse light, laser, inductive and capacitive coupling, or even sound. Perhaps the most common modality is radio waves, since these do not require a free line of sight, and communication over medium ranges can be implemented with relatively low power consumption and relatively small antennas frequency. Using light beams for communication requires a free line of sight and may interfere with ambient light and daylight, but allows for much smaller and more energy efficient transceivers compared to radio communication. Smart Dust [7], for example, uses laser beams for communication. Inductive and capacitive coupling only works over small distances, but may be used to power a sensor node.

### 2.4 Network Topology

One important property of a sensor network is its diameter, that is, the maximum number of hops between any two nodes in the network[12]. In its simplest form, a sensor network forms a single-hop network, with every sensor node being able to directly communicate with every other node. An infrastructure-based network with a single base station forms a star network with a diameter of two. A multi-hop network may form an arbitrary graph, but often an overlay network with a simpler structure is constructed such as a tree or a set of connected stars. The topology affects many network characteristics such as latency, robustness, and capacity. The complexity of data routing and processing also depends on the topology.

## 3. Broadcasting and Gossiping

Broadcasting is the process in which a source node sends a message to all other nodes in the network[7]. Figure 2 shows the classifications of broadcasting methods.

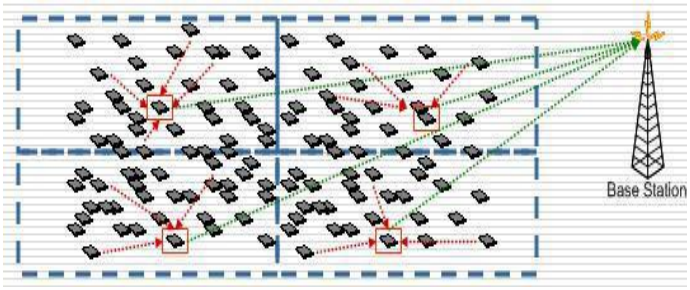


Fig 2: Broadcasting

In Gossiping nodes do not broadcast but send the incoming packets to a randomly selected neighbour. A sensor node randomly selects one of its neighbours to send the data. Once the neighbour node receives the data, it selects randomly another sensor node. It takes long time to propagate the message to all sensor nodes.

## 4. Problem Definition

Nodes inside clusters/ hops use Flooding/ Broadcasting mechanism to communicate with other nodes inside same hop. using flooding, Node which wants to communicate with other nodes, sends data to all the nodes in the hop. The scenario is depicted in following figure 3.[8]

Use flooding for communicates with other nodes inside same hop, increased inside hop. So, there is also possibility of Congestion.

 

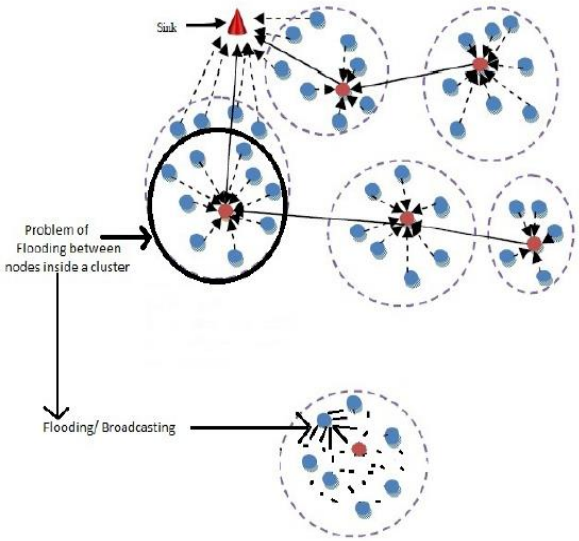


Figure 3: Broadcasting/ Flooding inside a hop

To overcome this Gossiping mechanism is used. In gossiping nodes do not broadcast but send the incoming packets to a randomly selected neighbour. A sensor node randomly selects one of its neighbours to send the data. Once the neighbour node receives the data, it selects randomly another sensor node. It takes long time to propagate the message to all sensor nodes.

## 5. Objectives

To fulfill our require experimentation we will have following objectives

- To find the power efficient scheme for communication.
- To find the scheme with minimum intermediate nodes.

## 6. Proposed Work

Our research will start with study of sensor network implementation and will proceed with saving energy for sensors.
Broadcasting degrades the system performance because in broadcasting traffic is more. In Gossiping a sensor node randomly selects one of its neighbours to send the data. Once the neighbour node receives the data, it selects randomly another sensor node. It takes long time to propagate the message to all sensor nodes. To overcome gossiping problem spanning tree(prim) algorithm is used.

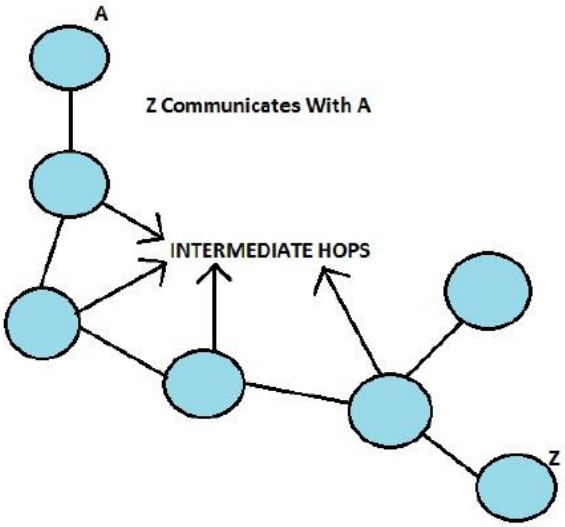


Fig 4: Spanning Tree

 

As in fig (4) A communicates with Z using Spanning Tree. It may also be possible multiple intermediate nodes. In proposed scheme we will intend to solve flooding / gossiping problem by using Spanning Tree( prim) algorithm.

Using spanning tree traffic will be decreased. So , there will be no any congestion. With the help of spanning tree energy of the nodes will be saved. Spanning tree removes the drawbacks of gossiping (taking long time to propagate the message to all sensor nodes).

## 7. Conclusion

This Research will prove to be a good solution for saving resources while finding the power saving and congestion avoidance mechanism. This is our continuous experimentation for providing a stable communication. In further experimentation we will implement the concept in Network Simulator to fetch the exact results of the concept.

## References

[1] I.F. Akyildiz, W. Su, Y. Sankara subramaniam, "A Survey on Sensor Networks", in IEEE Communications Magazine, 2002, Vol. 40, Issue. 8, pp.102-114.

[2] K. Sohrabi, J. Gao, V. Ailawadhi and G. Pottie, "Protocols for Self-organization of a Wireless Sensor Network", in IEEE Personal Communications, Vol. 7, Issue. 5, 2000, pp. 16-27.

[3] Chandrakasan, Amirtharajah, Cho, Goodman, Konduri, Kulik, Rabiner and Wang, "Design Considerations for Distributed Microsensor Systems", in IEEE Custom Integrated Circuits Conference (CICC), Vol. 9, Issue. 2, May 1999, pp. 279-286..

[4] Koushik Majumder, Sudhabindu Ray,'' A Novel Power Efficient Routing Scheme for Wireless Sensor Networks''. International Journal of Instrumentation, Control & Automation (IJICA), Vol. 1, Issue. 1, 2011, pp.23-29.

[5] I.F. Akyildiz, W. Su, Y. Sankarasubramaniam, E. Cayirci, "Wireless sensor networks: a survey", Broadband and Wireless Networking Laboratory, School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA 30332, USA ,Received 12 December 2001; accepted 20 December 2001

[6] Lu Tao1, Zhu Qing-Xin, Zhang Luqiao, "An Improvement for LEACH Algorithm in Wireless Sensor Network", IEEE Conference on Consumer Communications and Networking, Vol. 6, Issue. 4, June 2010, pp 593 – 598.

[7] M. Bani Yassein, A. Al-zou'bi, Y. Khamayseh, W. Mardini, " Improvement on LEACH Protocol of Wireless Sensor Network" , International Journal of Digital Content Technology and its Applications Volume 3, Number 2, June 2009.

[8] Raju Pal, Ajay K. Sharma, "MSEP-E: Enhanced Stable Election Protocol with Multihop Communication", IEEE Conference on Asia-Pacific Service Computing Conference, Vol. 2, Issue. 2, February 2011, pp 172- 178.

[9] K.Suganthi, Dr.B.Vinayaga Sundaram, K.S.Vishwa Kumar, J.Syed Ashim, S.Saravana Kumar, "Improving Energy Efficiency and Reliability using multiple mobile sinks and hierarchical clustering in Wireless Sensor Networks", IEEE-International Conference on Recent Trends in Information Technology, MIT, Anna University, Chennai, Vol.5, No.4, June 3-5, 2011.

[10] Z. Maria Wang, Stefano Basagni, Emanuel Melachrinoudis and Chiara Petriol, "Exploiting Sink Mobility for Maximizing Sensor Networks Lifetime" IEEE Proceedings of the 38th Hawaii International Conference on System Sciences, pp. 1–5, March 2005.

[11] Fahed Awad, Eyad Taqieddin, Asmaa Seyam, "Energy-Efficient and Coverage-Aware Clustering in Wireless Sensor Networks", Wireless Engineering and Technology, SciRes, Vol. 3, 2012, pp.142-151.

[12] Kay R¨omer and Friedemann Mattern, "The Design Space of Wireless Sensor Networks", IEEE Wireless Communications, pp.2 -4, dec 2004.

 