



Review Paper on Different Routing Protocol in Wireless Sensor Network

Shradha Yadav¹; Shalley Bakshi²

¹Department (Electronics and Communication), Chandigarh Engineering College, Landran, India

²Department (Electronics and Communication), Chandigarh Engineering College, Landran, India

¹ shradhay2019@gmail.com; ² shalley.3904@cgc.edu.in

Abstract— *Wireless sensor network is an important part of wireless communication. It is a group of a large number of sensor nodes that are placed in remote places. The sensors have capability to do a common task. So energy consumption plays an important role in maintaining a stable network. To increase the network lifetime, a various energy-efficient algorithm is required which increases the network lifetime and makes the network more energy efficient. For the maximizing, the lifetime of the network different routing technique has been used which help in increasing the lifetime of the network. This paper describes the various routing protocol which helps in energy-efficient routing in a wireless sensor network.*

Keywords— *WSN; LEACH; SEP; HEED; TEEN; PEGASIS*

I. INTRODUCTION

WSN consists of several sensors that are dispersed spatially and are used to monitor the sensation in the environment, for the calculation of the conditions happening in the environment related to temperature, pollution levels, and humidity. The sink or base station gets information when these sensors cooperate and link with each other and pass their information in the network. Over the last decade, there is rapid development in WSN because of its properties of having low power battery, wireless communication, and small size. They are widely used in many applications that are implemented in a real environment. The network is basely composed of several of sensors and group of sensor which are deployed close to able to perform the number of activities which include sensing, monitoring, processing and communication capabilities including the recording of data about the events which are happening in the environment. The basic element which is attached in the sensors is microprocessors, receivers, transmitter, processing unit. Some extra element eg mobilizer, power generator are also attached to it. Processing unit which is consists of analog-digital convertor and manages the procedure through which collaboration of one sensor node to another sensor node. Transceiver unit maintains the establishment of the node to the network. The microprocessor performs the function which includes the management and collection of information from sensors node, interfacing of physical radio layer to information which is sent by the user [1].

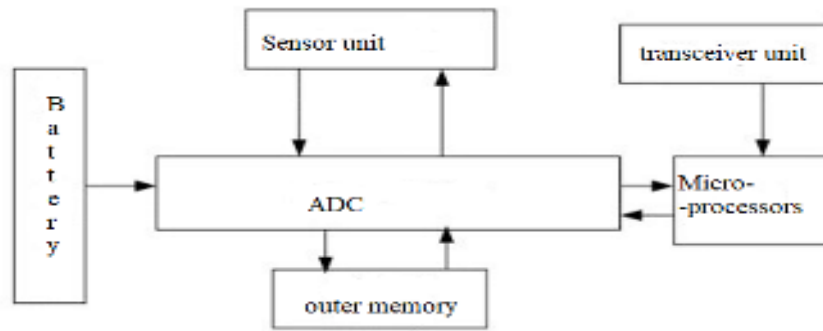


Fig.1 Component of wireless sensor

Power supply – Provide a continuous supply of energy to the nodes present in a wireless sensor network eg solar cell.

II. CHALLENGES IN WIRELESS SENSORS NETWORKS

Wireless sensors are deployed at remote places, to obtain the full capacity of sensors networks, some limitation of these networks which causes technical issues in the network has to be removed. Some challenges which obstruct the performance of the network are related to fault tolerance, communication, low latency, scalability, transmission media, and coverage problem. To solve the above problems different routing protocol is used. Different routing techniques are used for transmitting the data from the sensor node to the base station. Routing technique is quite different from normal IP network routing which consists of multiple unique characteristics in a way to unrealistic for a global addressing method for multiple numbers of sensor nodes, Requirement for a technique that can be applied to a system for proper linkage of a sensor node to a base station. For making the system to attain the optimal we required routing protocol. These protocols are classified into the following ways and to make the system (WSN) more energy-efficient some energy-efficient protocols are discussed in the next section.

III. ENERGY EFFICIENT PROTOCOL

Energy efficiency plays an important role in WSN. Nowadays the size, shape of the network is becoming larger. As a result of it, the large most amount of energy of a node is used which increases the early death of a node. As a result different efficient routing protocol is developed to increase the lifetime of the network. Following are some energy-efficient routing protocol.

A LEACH

(Low energy adaptive clustering hierarchy)

The working of LEACH is divided into 2 phase

1. Set up phase-Which divides the network into clusters, CH makes advertisement for a schedule of transmission.
2. The steady phase includes data aggregation, compression, and transmission to the sink.

The advantage of uses of LEACH is its direct communication by each cluster head for forwarding the data to sink. The usage of the cluster increases the lifetime of the network. It aggregates the original data which is sent by the sensed sensor into a smaller size for easy transmission of data. In LEACH protocol every node is given a chance to become a cluster head which helps to decrease the probability of dying the sensor nodes [2].

B SEP

(Stable electron protocol) for clustered heterogeneous WSN, which has several advantages over LEACH. The two-level of heterogeneity of sensor node is considered. They are classified into two types -

1. Normal node
2. Advanced node

Advanced nodes when compared with normal nodes they have more probability of becoming a cluster head when compared with other sensor nodes. In the sensor field, this protocol is quite scalable, because it does not need the position of nodes [3].

C *HEED*

(Hybrid energy-efficient distributed clustering) .This technique was proposed by Younis and Fahmy in 2004. The purpose of this technique was the formation of a cluster that is distributed and energy efficient [4]. In heed for the selection of cluster head, two parameters are considered.

1. The residual energy of each node
2. Node degree

For the selection of CH, the residual energy of the node along with some probability is taken consideration [5]. The process of formation of cluster head occurs in the case when all the other nodes which are present in the network found their CH to maintain less cost of communication advantage. The advantage of using HEED is help in maintaining long network lifetime, support scalable data aggregation.

D *TEEN*

Manjeshwar et al proposed (threshold sensitive energy-efficient sensor network protocol) especially made for reactive networks. The reactive network is the network that consists of those sensor nodes which adopt the changes in themselves according to the changes which occur in the environment. To increase energy efficiency, the transmission number is reduced in the network. There is a specific range of interest when data value falls, only then data transmission takes place [6]. Every cluster in the network has a cluster head that sets attributes. In the (hard and soft) threshold, these thresholds are of its member nodes. The transmission of data taken place when its value is more than soft threshold value along with the value of the difference between the older and new one, because of the above procedures, certain transmission (TEEN) are eliminated and that saves the energy of those sensors which are present in the network.

E *PEGASIS*

Lindsey proposed this routing algorithm PEGASIS (the power-efficient gathering in sensor information systems). This PEGASIS protocol was obtained after modification in LEACH was done. A chain-like structure of nodes is made and each node establishes communication only with its neighbour which is close in distance. The transmission of data takes place through one node to another node only with the help through one node which is designated can send data to the base station. The leader node is changed turn by turn during transmission of data. The base station determines whether it is chain formation or the chain form by the nodes themselves using an algorithm (greedy). It required global knowledge (network knowledge). When data is transfer each node gathers its data from its neighbouring node. At random locations, to make system robust sensor nodes die. This whole process is achieved by changing the transmission leader in every communication round. To solve above problem, nodes that are allowed, so they can form leaders, by making a threshold to a distance for neighbours.[7]The advantage of the PEGASIS is the transmission number is less which helps in less loss of energy by the sensor nodes.

F *TSC*

(Track sector clustering) based on the clustering algorithm in which every cluster one cluster head is selected. The whole network is divided into triangular sectors and concentric circular tracks. The division of network in this way helps in energy saving. The process of TSC for its execution is divided into phases. Track setup ,Sector setup, Cluster heads selection, chain construction, and data transmission. Sensor nodes energy is not wasted by the computation of tracks by the base station. Energy dissipation is also reduced by redundancy distance between a head node to the base station. The centre of these concentric circles is a base station. Random selection of head node at the first level. When the base station determines the location of the head node it calculates the transmission slope. In a particular cluster, the formation of the head node takes place when nodes that are at a higher level have a similar transmission slope. The approach used helps to reduce the redundancy level in the data which is transmitted by breaking the long chain of nodes into a smaller one. In a particular cluster, the formation of the head node takes place when nodes that are at a higher level have a similar transmission slope. The advantage of using TSC is to reduce the level of reducing in data for transmission in the network.

G *COMPARISON OF DIFFERENT ROUTING PROTOCOL IN WSN*

In this section several routing algorithm comparison is done. Table 1 shows the comparison of different routing algorithm in WSN with the parameters, power efficiency, network scalability, cluster head formation, network stability.

TABLE 1 shows the comparison of this energy-efficient routing protocol on parameters which are power efficiency, network scalability, cluster head formation, network stability.

energy-efficient routing protocol	Power efficiency	Network scalability	Cluster head formation	Network stability
LEACH	low	low	yes	moderate
HEED	moderate	moderate	yes	high
SEP	high	high	yes	high
TEEN	very high	low	yes	high
PEGASIS	low	Very low	no	low
TSC	moderate	moderate	yes	moderate

Conclusions

In this paper a brief review on routing protocol in WSN and their comparison is presented. From above comparison an observation is done that cluster based protocol are more energy efficient. WSN which have gain attention over the last few years are widely used in both civil and military purposes. There is multiple challenges task for effective design of these WSN. Routing protocol is great solution to tackle the challenges which occurs in WSN. Future scope can be extended on developing new routing protocol which deals with problem of node – mobility applications.

ACKNOWLEDGEMENT

This work was done with help of Chandigarh Engineering College, Landran which has guided. We like to thank you for their valuable comments.

REFERENCES

- [1] Moslem Afrashteh Mehr, “Design and Implementation a New Energy Efficient Clustering Algorithm using Genetic Algorithm for Wireless Sensor Networks” World Academy of Science, Engineering and Technology, 52 ,2011 Parminder Kaur, Mrs. Mamta Katiyar, “The Energy-Efficient Hierarchical Routing Protocols for WSN: A Review” (International Journal of advanced research in computer science), volume 2,issue 11,2012
- [2] Rabiner, W.; Kulik, J.; Balakrishnan, H. Adaptive Protocols for Information Dissemination in Wireless Sensor Networks. In *Proceedings of the Fifth Annual International Conference on Mobile Computing and Networking (MOBICOM)*, Seattle, WA, USA, August 1999; pp. 174–185.leach
- [3] W. R. Heinzelman. Application-Specific Protocol Architectures for Wireless Networks, Ph.D. thesis, Massachusetts Institute of Technology, 2000.
- [4] Ossama Younis and Sonia Fahmy, “Distributed Clustering in Ad-hoc Sensor Networks: A Hybrid, Energy-efficient Approach”, September 2002.
- [5] Ossama Younis and Sonia Fahmy” Heed: A hybrid, Energy-efficient, Distributed Clustering Approach for Ad-hoc Networks”, IEEE Transactions on Mobile Computing, vol. 3, no. 4, Oct.-Dec. 2004, pp. 366-369
- [6] A. Manjeshwar and D. P. Agrawal, “TEEN: A Protocol for Enhanced Efficiency in Wireless Sensor Networks”, in the Proceedings of the 1st International Workshop on Parallel and Distributed Computing Issues in Wireless Networks and Mobile Computing, San Francisco, CA, April 2001.
- [7] S. Lindsey and C.S. Raghavendra, “PEGASIS: Power-efficient Gathering in Sensor Information System”, Proceedings IEEE Aerospace Conference, vol. 3, Big Sky, MT, Mar. 2002, pp. 1125-1130.
- [8] X. Liu, 2012, “A Survey on Clustering Routing Protocols in Wireless Sensor Networks,” Sensors, vol. 12, pp. 11113–11153.