**A COMPARATIVE STUDY BETWEEN LEACH AND PEGASIS- A REVIEW**

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***Abstract – Wireless sensor network is a collection of nodes organized in a cooperative network. It can relay information between a computer and other devices by transmitting radio signals through the air. Wireless sensor networks composed of number of sensor nodes to from a large network. Theses sensor nodes have limited energy, storage capacity and computing power. This paper presents a review of the routing protocols proposed by wireless sensor network. There are no. of routing protocols in a wireless sensor network. This paper also includes difference between two routing protocols. Routing protocols can maintain and discover the routes in the network. In this paper we have compared various protocols in hierarchical routing.***

***Keywords – Wireless sensor network, Routing protocols.***

I. INTRODUCTION

A wireless sensor network is a collection of nodes organized in to a cooperative network. Each node consist of processing capability one or more microcontroller CPU and flash memories, program data have a power sources example batteries and solar cells. It is composed of environmental conditions like temperature, sounds, pressure, direction etc. All these condition are measured by wireless sensor network. Sensor nodes sense the environmental and communicate with each other or an external base station of these sensor nodes size and weight are very small. Sensor nodes have a limited transmission range, processing and storage capacity and energy resources are very limited. Wireless sensor network provides a bridge between the real, physical and virtual worlds. It is widely used as a industry, science, transportation, civil infrastructure, and security, military, entertainment, homeland defense, smart space and medical. Wireless sensor network is also used as MAC

II.MAC

Most commonly used solution for Medium Access Control are contention based, which means that it can transmit the message to send the Channel. The channel is busy then it cannot send and if therefore then waits and tries again later. If two nodes can send at the same time then collision is occurred. It is optimized for the arbitrary communication patterns and workloads.

III. ISSUES IN WSN

* RANGE AND CONNECTIVITY**-** It cans occupy the Smaller, less power, smaller bandwidth.
* LOCALIZATION AND SYNCHRONIZATION**-** Node’s location is important to get knowledge about the node that let us know which are active and which are sleep.
* POWER MANAGEMENT**-** Maximizes the life time of nodes as well as for network.

IV. ROUTING PROTOCOLS IN WIRELESS SENSOR NETWORK

*A. ROUTING*

Routing is a method for finding out the path between the source node and destination node. It can also help the message or packet to be sent or moved from one node to another node. It can be classified on the basis of route from source to destination.

PROACTIVE

REACTIVE

HYBRID ROUTING

* PROACTIVE-Before there is a demand for routing traffic, it can set a routing path. Even there is no traffic flow paths are maintained.
* REACTIVE: It can set path up demand basis.
* HYBRID ROUTING: It is a combination of both the proactive and Reactive

*TYPES OF ROUTING PROTOCOLS*

A. Location Based Routing

B. Flat Based Routings

C. Hierarchal Based Routing

HIERARCHICAL BASED ROUTING PROTOCOL: It is also called as cluster based routing protocol. It can minimize the energy consumption of sensor nodes. In this higher energy node can be used to process and send the information while the low energy nodes can be used to perform sensing task.

Types of Hierarchical Routing Protocol

*1. Leach*

Leach (Low Energy Adaptive Clustering Hierarchy).it is the first and the most popular energy efficient hierarchal protocol. This protocol can be performed in two phases. These phases are

SETUP PHASE: It can select as a cluster head.

STEADY STATE PHASE- It can transmit data to base station. And minimize the overhead duration of the steady state phase. The duration of set up phase is more than steady phase

LEACH is also called as a hierarchical based or cluster based protocol. LEACH is completely distributed and requires no global knowledge of network. It can easily reduce the energy consumption by turning off. It can use a single loop routing. The performance of LEACH is based on round. LEACH randomly selects a few sensor nodes as cluster heads and rotates it to distribute the energy among the sensor in the network. The power usage of LEACH is very high while Scalability is very limited and network life time is very good. LEACH is only suitable for homogeneous type of wireless sensor network.

*2. Pegasis*

Pegasis(Power Efficient Gathering in Sensing Information System): It is a hierarchical based or chain based protocol. PEGASIS has the ability to increase the life time of the network twice as a much the life time of the network under LEACH protocol. The main idea of the protocol is to increase the network lifetime, nodes can only communicate with their closest neighbors and then turns in communicating with the base station.

MAIN OBJECTIVES OF THE PEGASIS

1. Data aggregation is not required in PEGASIS

2. It can use collaborative technique to increase the lifetime of the each node, thus the network rise and time will be also increased.

3. PEGASIS can deliver as a data in a chain based.  
4. The death of nodes in PEGASIS is lesser as compare to the LEACH.

5. It can also reduce the bandwidth by allowing the coordination between the local nodes.

6. It also helps to avoid the cluster formation and uses only one node to transmit data to the base station

7. It can assume that all nodes maintain a complete database about the location of the other nodes in the network.

Table I. COMPARATIVE TABLE BETWEEN LEACH AND PEGASIS

|  | Routing Protocol | | |
| --- | --- | --- | --- |
| Parameter | Leach | Pegasis |
| 1. | Classifications | Hierarchical based | Hierarchical based |
| 2. | Power usages | High | High |
| 3. | Scalability | Limited | No |
| 4. | Multipath | No | No |
| 5. | Network life time | Very good | Very good |
| 6. | Number of packets transmit | Less | More |
| 7. | Energy consumption | More | Less |
| 8. | Query based | No | No |
| 9. | Data delivery model | Cluster head | Chain based |
| 10. | Over head | High | Low |
| 11. | Maximum no. of alive nodes | Same | Same |
| 12. | Data aggregation | Yes | No |

VI.COMPARISION BETWEEN LEACH AND PAGASIS

LEACH is a cluster based and PEGASIS is a chain based. PEGASIS is an extension of an LEACH protocol. Both are hierarchical based protocols. Data aggregation is available in LEACH protocol but not in PEGASIS. The energy efficiency of the LEACH is mainly due to data fusion but in the PEGASIS data fusion is not expected to end node and only one message is passed at every node.

LOCATION BASED ROUTING PROTOCOL: It can provide a location to the sensor node. It can calculate the distance between the two particular nodes so that energy consumption can be easily estimated. Example, GPS Position of nodes can be estimated and distance between the two nodes in the network is determined with the help of signal strength.

TYPES OF LOCATION BASED ROUTING PROTOCOL.

*1. Gaf*

GAF (Geographic Adaptive Fidelity): It is an energy aware routing protocol. And it is proposed as a MANET. It is based on an energy model and also be applicable to the sensor network. It can also use WSN. In GAF, the whole network is divided into virtual Grid.

*2. Gear*

GEAR (Geographic and energy aware routing): It is an energy efficient routing protocol. It is proposed by a Routing Queries to target regions in the sensor field. It basically uses energy aware and geographically informed neighbor.

3. *Mecn*

MECN (Minimum energy communication network): It find as an optimal link on the enclosure graph and it is set up to maintain a minimum energy network by utilizing a low power GPS for wireless network graph.

*4. Smecn*

SMECN (Small minimum energy communication network): It is an extension of the MECN. It is the self configuring protocol that maintains network connectivity.

FLAT BASED ROUTING PROTOCOL: In flat based routing every node plays the same role and collaborates together to perform sensing task due to presence of large number of nodes. It is not feasible to assign global identifier to every node.

Types of flat based routing protocol

1. Data centric routing: It can execute the queries to the sender and the data is transmitted to the receiver node.

*2. Spin*

SPIN (Sensor Protocol for Information via Negotiation) - This protocol distribute information to all nodes when user does not require to exchange data between nodes. And each node has similar data with the neighboring node. Two types of spin are used. SPIN 1 is used to diminish the consumption of the sensor. And SPIN 2 it is an extension of the SPIN 1. It is used as a resources aware mechanism for energy saving.

Advantages of WSN

* It avoids a lot of wiring.
* It can contain new devices at any time.
* It is flexible to go via physical partitions.
* It can be accessed through a centralized monitor

Disadvantages of WSN

* Relatively low speed of communication Stations
* It is easy for hackers to have it as we can’t control propagation of waves.
* Gets diverted by various Elements like Bluetooth.
* Still costly

VII.APPLICATION OF WSN

* Physical security for military operation.
* Security protocol for sensor network.
* Industrial automation.
* Bio medical application.
* Health and wellness monitoring.
* Inventory location awareness.
* Tracking a chemical cloud.
* Habitats monitoring.
* Indoor / outdoor environmental monitoring.
* Future consumer application.

VIII.CONCLUSION

Overall if we compare LEACH with PEGASIS on the basis of different parameters as shown in above table. We have found that PEGASIS routing protocol outperforms much better than the LEACH protocol. And over all the PEGASIS on the basis of various parameters like data aggregation, reliability, Network lifetime etc performs better than that of LEACH protocol.

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