A REVIEW FOR ENERGY EFFICIENT ROUTING USING HIERARCHICAL WIRELESS SENSOR NETWORK

Amandeep Singh[1], Davinder Rana[2]

[1] *Assistant Prof., CSE, I. J. Gujral Punjab Technical University, Punjab, India*
[2] *Student, CSE, I. J. Gujral Punjab Technical University, Punjab, India*

ABSTRACT

In recent few years WSNs form place in wide number of applications such as security, monitoring, surveillance, habitant monitoring, disaster management,, structural health of buildings and health care. WSN's are limited by energy constraints which is on availability to participating sensor nodes and most of the time these nodes have the structural constraints such that it becomes impossible to change or replenish battery of a node as sensor nodes that may be potentially deployed in harsh environmental conditions is unmanageable. Efficiency in various working parameters like routing of data can help in overcoming the major challenge of sustaining a long life for these sensor nodes which are part of WSNs and form hierarchical routing protocols. In such type of protocols the patriating sensor nodes as a part of the network may be gathered into possibly non overlapping clusters. These clusters have some unique node or on the basis of some conditions some node may be designated as cluster heads which may implement the choosing of cluster head at various time intervals or in different time frames. Clusters have cluster heads that can be used for data agglomeration and route data to desired sink. In this paper a taxonomy of hierarchical routing protocols is provided to envision an energy efficient hierarchical routing protocol that may embeds characteristics of intelligent routing protocols.

Keyword: - *WSN, Energy Efficient, Hierarchical, LEACH, Cluster, Cluster Head, Routing etc….*

1. INTRODUCTION

Wireless Sensor Networks (WSNs) consist of a large number of nodes which are capable of communication and computation. These nodes communicate among each other while making the desired computation. These nodes find applications in various fields like deployment in remote areas to perform the specific task for sensing and collecting the information. They have the constraint in limiting power supply which further limits there computational power. The necessity of wireless sensor network (WSN) has increased because of increasing field of application and expansion to new fields like medical to industrial domain. Now a days, WSN has its applications which ranges to agriculture to benefit to the mankind. Sensor nodes not only do the task of transmitting and receiving information but also perform routing process within the network.

The WSN is mainly comprised of interconnected small-sized batteries (nodes) that can be used to limit their lifetime, extend their lifespan and indispensability is the objective of the energy efficient protocol. Thus, the low energy consumption requirement by the sensor nodes is one of the most important issues to consider in order to extend the network life, which is only possible when it is possible to effectively use the sensor nodes and save as much as possible. WSNs are a key factor in network life and ultimately, most researchers are focused on the preparation of protocols and algorithms to effectively use power. Energy efficient data transmission can eliminate all the unnecessary data and reduce the energy consumption by collecting information to the CH and collect smaller no of CHs, the clustering protocols. In a WSN clustering protocol, the cluster node may change from time to time and these variables may depend on various factors such as mobility, node density, node energy, and distance between intersections and this energy-efficient communication protocol comes under the MAC Layer protocols.

The majority of the cluster-based protocol consists of two phases: ie phase and phase constant. It organizes a linking at both stages and new groups are organized at each stage. WSNs have various energy saving solutions, including radio optimization, data reduction, sleep/wake mechanisms, energy saving directive, battery supplement, and wireless charging. In this article, system architecture (Hierarchical) based routing protocols and problems are analyzed for a deeper understanding and solution for a more Energy Efficient hierarchical wireless sensor network(WSN) is thought to design.

2. LITERATURE SURVEY

A one-level network architecture can cause network nodes to load and cause inappropriate monitoring of events. This can also cause a delay in communication. The presence of a large number of sensing nodes in a WSN may be great, so special attention should be paid to the measurements because sensors do not allow the data to be transmitted over long distances, and thus a single-level network has no scalability. Sensors with a wider range of suspicion are suspicious. Thus, WSN is a useful protocol of network clustering for a non-degraded service without downloading on a single-level network. The purpose of cluster routing is to achieve energy efficiency by communicating with multichannel communications in multiple and common/storage information to minimize sensors working period. , the signal is transferred to the node. Cluster formation is based on a number of parameters, such as the residual energy of the sensors or the distance from the sink node. There are a number of hierarchical routing protocols such as Sensor Information Systems (PEGASIS), Low Energy Adaptive Clustering Hierarchy (LEACH), Hierarchical PEGASIS, Energy Guide Orientation for cluster-based sensor networks, and Power Efficient Adaptive Clustering Hierarchy (PEACH), Threshold Sensitive Energy Efficient Sensor Network Protocol (TEEN), Adaptive TEEN(APTEEN), ERA, EADC, CPEQ and EEPA.

2.1 LEACH:

Low Energy Adaptive Clustering Hierarchy routing protocol is the most significant clustering based routing protocol in the present scenario. Once placed in the desired region, the circuits themselves include the period of the Cluster Head (CH). While the LEACH protocol provides less energy consumption for data transmission than other protocols, such as MTE, there are some limitations that directly affect communication and static clustering. For the LEACH operation, homogeneous energy nodes must be counted at all times and that all CHs have uniform energy disturbance should not be deformed in practice.

2.2 SOP:

Self-Organizing Protocol is made up of four stages namely: Discovery, Organization, Maintenance and Self re-organizing Phase. The Discovery Phase is a neighbor of the entire sensor node. At the organizational state, clusters are compiled hierarchically and that each node is assigned an address depending on the node location in that hierarchy. Broadcast trees are prepared after the O (Log N) size table is created. The maintenance phase, which includes the routing and power levels of the support nodes, is updated and transmitted to the neighboring nodes of the sensor nodes. Broadcast trees are protected by Local Markov Cycles. The rebuilding of the group during the reorganization phase occurs when there are no intersections or junctions.

2.3 PEGASIS:

PEGASIS and Hierarchical PEGASIS include Power Efficient Gathering in Sensor information Systems is the chain centered algorithm that forms chain of sensors as per greedy algorithm. Each of the nodes in the chain sends and receives only information that is neighboring node and only one of the chain nodes is connected to the chain node. Sensed data is merged with each node. This protocol is 100% to 300% better than LEACH for different network sizes and topologies. The key benefit of PEGASIS is to eliminate the burden associated with the selection of clustered heads. The problem with PEGASIS causes too much delay in nodes away from the chain. A cluster head who communicates with the sink can cause a downturn. Thus, there is a need for dynamic topology regulation, which is the main reason for the PEGASIS approach, which is the most commonly used network.

2.4 TEEN:

Threshold sensitive Energy Efficient sensor Network protocol, this protocol is intended to respond to abrupt variations in attributes detected by sensing devices and is more useful for time critical applications. A hierarchical network structure that uses a knowledge-based approach that creates clusters of intersections closest to each other is monitored. After the cluster is formed, the CH node publishes rigid and soft threshold values for detected features. The harder threshold will reduce the amount of data transfer by allowing the sensor to set only when the specified value is at the required value and the lowest value of a feature that causes the sensor to transmit sensitive features to CH. After detecting a value for an attribute that is outside the threshold or harder threshold value, the sensor sends this information to CH if the value of the attribute is equal to or less than the threshold value, which further reduces the number of transmission. TEEN does not apply to applications requiring periodic data transmission, as the user can not access the information when the thresholds are not reached.

2.5 ATEEN:

Adaptive TEEN is basically an extension of TEEN i.e. Threshold sensitive Energy Efficient sensor Network, which tries to overcome limitation of non-handling of periodic collection and transmission of data and still maintains responsiveness to critical events and support for data aggregation. The protocol permits three types of queries: a date that gives you a snapshot of a time system that historically allows you to analyze pervious values of sensitive features and eliminate TEEN deficiencies by providing short-term monitoring events While TEEN performs better the APTEEN protocol is better than LEACH's energy efficiency. The disadvantage is that it participates in multi-level cluster formulation and application of functions based on eve.

2.6 PEACH:

Power Efficient Adaptive Clustering Hierarchy (PEACH) performs clustering at multiple levels. This protocol can also be applied to WSNs as well as connects to WSNs with nodes that are unaware of thir location. This protocol was assessed on various aspects, such as the complexity of algorithms, the distance between the live sensor nodes, the remaining energy of the sensor nodes and the intersections within the cluster, and the connection between the clusters. In terms of energy efficiency, PEACH has performed far superior to other hierarchical routing protocols, such as LEACH, PEGASIS.

2.7 CPEQ:

Cluster based Periodic Event driven and Query bae (CPEQ) is a protocol that is an extension of PEQ protocol that applies clustering based approach to PEQ. Protocol is a low tolerance and tolerance algorithm. The authors offered a protocol for warning environments in the context and are more suitable for physically challenging environments like firing, toxic gases, and coal mines. The protocol uses a broadcast / subscription mechanism to streamline network requests across different nodes and minimize data delays when traffic is high.

Table -1: Comparison of Hierarchical or clustering based routing protocols

Routing Protocol	Energy Efficiency	Data Aggregation	Scalability	Route Selection	Query Based	Overhead
LEACH	Strong	Yes	Good	Proactive	No	High
SOP	Weak	No	Good	Proactive	No	High
PEGASIS	Strong	Yes	Good	Hybrid	No	Low
TEEN	Strong	Yes	Good	Reactive	No	High
APTEEN	Strong	Yes	Good	Hybrid	No	High
PEACH	Strong	Yes	Good	Proactive	Yes	Low
CPEQ	Moderate	Yes	Good	Proactive	Yes	High

3. CONCLUSIONS

WSNs in different areas are useful, and when other networks are established, these networks apply to facilitate the survival of the individual so that they can experience different physical parameters of a person's body, from monitoring of the structure to the health monitoring. The main concern with WSN is energy savings because the devices used in this sensor cannot be replaced and the battery cannot be changed or renewed due to harsh environmental conditions. The overall scalability of all of these protocols is seen to be enhanced by network expansion. Route selection is mostly proactive for most routing protocols. Despite the overlapping cluster heads, the CHs option hierarchical routing protocols extends the energy efficiency aspects and lifecycle for the network.

4. REFERENCES

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