Dynamism Proficient Routing Protocol to Elude Suspension in Wireless Sensor Network-A Survey

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ABSTRACT **-** Wireless Sensor Networks (WSNs) are networks of small and tiny lightweight nodes that is capable of playacting some processing, gathering sensory information and communicating with other connected nodes in the network. Sensor nodes that are arbitrarily deployed in a large area where it is not manageable to monitor sensual parameters such as pressure, temperature and relative humidity etc. Strength consumption is the most important and critical issues for WSNs. This paper categorizes the routing protocols based on the basis of field and region. Further, a summary of different routing protocols are done with their comparison by considering the factors like energy, power consumption, latency, network life etc.

Keywords *-LEACH, PEGASIS, WSN*

INTRODUCTION

WSN mainly consists of number of sensor nodes that are randomly deployed in the area that is called as sensor fields or field of observation [1]. Sensor nodes have limited power supply and may have the problem of pleading when battery runs out. Therefore, the mechanism for efficient power consumption is necessary. Wireless sensor nodes perform three operations: event sensing, event processing and communicating with neighboring nodes. Among these, energy consumption is the major resource for communication. We have to keep in mind that routing Protocols must be energy efficient in order to increase the life of sensor node and the sensor network [11]. Routing

Protocols [12] are categorized into three categories viz data Centric protocols, hierarchical protocols and location based Protocols. The present paper deals with classification of routing protocols with their comparison as discussed in Section V. The balance of the paper is labeled as Section that contains various perspectives related to architecture and application of WSN and next it describes the routing protocol schemes and describes the classification of WSN protocols into two categories: (a) Classification based on WSN layers (b) Classification based on architecture and functionality of WSN and discussion of various (networking) routing algorithms in brief. Finally conclusion is given.

NETWORK CHARACTERISTICS AND DESIGN

As compared to the traditional wireless communication networks such as mobile ad hoc network (MANET) and cellular systems, wireless sensor networks have the following unique characteristics and constraints:

Dense sensor node deployment: Sensor nodes are usually densely deployed and can be several orders of magnitude higher than that in a MANET.

Battery-powered sensor nodes: Sensor nodes are usually powered by battery and are deployed in a harsh environment where it is very difficult to change or recharge the batteries.

Severe energy, computation, and storage constraints: Sensors nodes are having highly limited energy, computation, and storage capabilities.

Self-configurable: Sensor nodes are usually randomly deployed and autonomously configure themselves into a communication network.

Unreliable sensor nodes: Since sensor nodes are prone to physical damages or failures due to its Deployment in harsh or hostile environment.

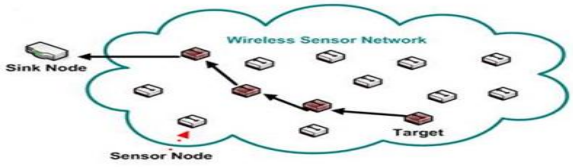

Figure 1: Dynamic Wireless Sensor networks

Data redundancy: In most sensor network application, sensor nodes are densely deployed in a region of interest and collaborate to accomplish a common sensing task. Thus, the data sensed by multiple sensor nodes typically.

ROUTING and TOPOLOGY

Distributed network is a centralized architecture is used in a sensor network and the central node fails, then the entire network will collapse, however the reliability of the sensor network can be increased by using distributed control architecture. Distributed control is used in WSNs for the following reasons: Sensor nodes are prone to failure, for better collection of data, To provide nodes with backup in case of failure of the central node. The routing methods can be fixed (i.e., pre-planned), flexible, centralized, distributed, transmitted, etc. Fixed routing schemes often use Routing Tables that dictate the next node to be routed to, given the current message location and the destination node. Routing tables can be very large for large networks, and cannot take into account real-time effects such as failed links, nodes with backed up queues, or congested links. Adaptive routing schemes depend on the current network status and can take

into account various performance measures, including cost of transmission over a given link, congestion of a given link, reliability of a path, and time of transmission. They can also account for link or node failures. The routing is closely associated with the optimal control problem, dynamic programming, and feedback control. The shortest path routing scheme is to find the shortest path from the specified node to the destination node. Instead, the cost of the link length, each link is connected to the case; these algorithms can calculate the least-cost path. These algorithms (or distributed) on all the nodes in the shortest path search for the specified node is the shortest path from the center of the specified node to all other nodes (search). There are different types of network topologies which are in use they are: star, ring, bus, tree, mesh. These act as both as open and closed type. The different topologies can be used based upon the need and also the availability of proper routing.

ROUTING ALGORITHMS

Wireless Sensor Network protocols have been proposed stood Ordering based on Layers: Physical Layer: It performs Data Encryption techniques, Modulation schemes, synchronization scheme and FEC. Data Link Layer: SMECN, Collaborative MAC called as CMAC, Event MAC (EMAC) and Network MAC based Protocols. Network Layer: Data Centric Protocols: Sensor Protocol for information via negotiation like SPIN, COUGAR, Active query forwarding in sensor networks also called ACQUIRE, Sequential assignment routing, Rumor routing, flooding, gossiping and constrained anisotropic diffused routing, directed diffusion, Gradient based routing. Hierarchical Protocols: Energy aware scheme, Power Efficient gathering for sensor information system called as PEGASIS, Threshold sensitive protocol for energy efficient Sensor network i.e. TEEN and APTEEN, LEACH called as Low energy adaptive clustering hierarchy.

Location Based Protocols: Minimum energy consumption network i.e. MECN, SMECN (Small MECN), Geographical and energy aware routing called as GEAR. Transport Layer: Reliable Multi Segment Transport i.e. RMST, Pump Slow Fetch Quickly i.e. PSFQ, ESR i.e. event to Sink Reliability. Application Layer: Sensor query and data dissemination Protocol called as SQDDP, Task assignment and data Advertisement protocol called as TADAP, and Sensor Management protocol i.e. SMP.

B. CLASSIFICATION BASED ON NETWORK ARCHITECTURE

I. LOW ENERGY ADAPTIVE CLUSTERING HIERARCHY (LEACH)

LEACH is a gradable protocol in which most nodes transmit to cluster heads, and the cluster heads aggregate and compress the data and forward it to the base station (sink). Each node uses a stochastic algorithm at each round to determine whether it will become a cluster head in this round. LEACH assumes that each node has broadcasting powerful enough to directly reach the base station or the nearest cluster head, but that using this radio at full power all the time would waste energy. Nodes that have been cluster heads cannot become cluster heads again for *P* rounds, where *P* is the desired percentage of cluster heads. Thereafter, each node has a 1/*P* probability of becoming a cluster head again. At the end of each round, each node that is not a cluster head selects the closest cluster head and joins that cluster. The cluster head then creates a schedule for each node in its cluster to transmit its data. All nodes that are not cluster heads only communicate with the cluster head in a TDMA manner, according to the schedule created by the cluster head. They do so using the minimum energy needed to reach the cluster head, and only need to keep their radios on during their time slot. LEACH also use CDMA manner so that each cluster uses a different set of CDMA codes, to minimize interference between

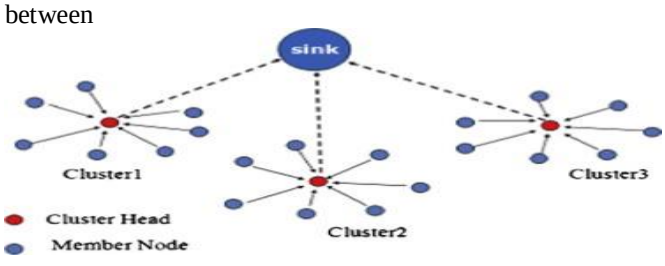

Figure 2: LEACH Protocol

II. PEGASIS (POWER-EFFICIENT GATHERING IN SENSOR INFORMATION SYSTEM)

Power-Efficient Gathering in Sensor Information Systems (PEGASIS) is the extreme favored concatenation based hierarchical protocol. The nodes are arranged in the form of a chain for the transportation and aggregation of the data. The creation of chain can be centralized based on the application. PEGASIS is based on the precondition that global knowledge of network is provided to all the nodes. The creation of chain starts from the last mentioned most nodes from sink and its nearest neighbor are selected as next node in the chain and so on. The last node must be the sink and the node before sink acts as a leader of the node. Processes like data-processing and aggregation are accomplished by leader node. PEGASIS is not so relevant for the networks with dynamic or time varying topology. As the size of network will be larger, the delay in transmission will be as long, because of that PEGASIS undergoes with scalability.

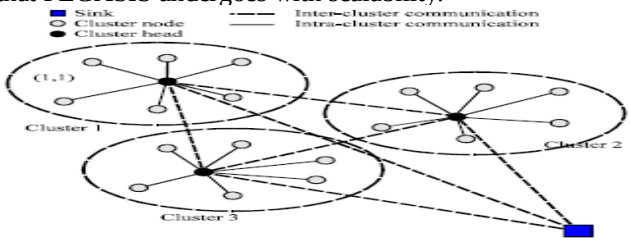

Figure 3: PEGASIS Protocol

COMPARISON IN LEACH AND PEGASIS PROTOCOLS

This section just explains a hypothetical based comparison of the leach and pegasis. Both protocols come under class-conscious class, it means that very few nodes are given priority over the others nodes. in leach protocol, local data processing obtain at specific nodes, which are called

cluster-heads and at last the aggregated data is send to the sink node. On the other part in Pegasis protocol, no aggregation of data occurs. Leach is cluster-based hierarchy, at the same time pegasis is a chain-based hierarchy. on the other side, about network lifetime, pegasis provides extended lifetime of the network because there is a balance in energy distribution. the no. of deaths of nodes in pegasis is less as compare to leach Directed Diffusion Algorithm: Directed diffusion is based on data-centric (DC), query driven and application-aware technique in the sense that all data generated by sensor nodes is named by two pairs i.e. attribute and value. Data centric routing select from multiple sources routes to a single destination that allows in-network consolidation of redundant data.

RULE OF PEGASIS PROTOCOL

The algorithm of PEGASIS is just based on the LEACH protocol. The main idea in PEGASIS is to construct a chain between all the sensor nodes so that every node can collect from and transfer to the closest neighbor. The Collected data moves from node to node, it get merged, and hereafter a designated node (i.e. cluster head) transmits it to the BS (base station). Nodes take turns send out to the BS so that the average energy consumed by every node per round is just reduced. The technique of building a chain to just reduce the total length is matching to the traveling salesman trouble, which is so difficult. Despite of that, with the radio-communication energy specification, simple chains created with a greedy approach do the job totally well. Thus, PEGASIS algorithm is having some asset as:-

Normal nodes only reach to their neighbor and every nodes will take data fusion in regulation. The distance of the connected nodes to each other have been minimized especially .Nodes take turns to become the cluster head, so it takes no energy.

Some of discriminate of PEGASIS algorithm as:-

Transmission of data results in time-delay. Since the limitation of greedy approach, the probability of long chain is max. The method of cluster head is not at all suitable for load balance.

PROJECTED METHOD

There are several periodical in the PEGASIS protocol. The main idea in PEGASIS is for each node to receive from and transmit to close neighbors and take turns being the leader for transmission to the BS. This formulation will distribute the energy load evenly among the sensor nodes in the network. We initially place the nodes randomly in the play field, and therefore, the i –th node is at a random location. The nodes will be organized to form a chain, which can either be accomplished by the sensor nodes themselves using a greedy algorithm starting from some node. We could have constructed a loop, however, to ensure that all nodes have close neighbors is difficult as this problem is similar to the traveling salesman problem. The greedy approach to constructing the chain works well and this is done before the first round of communication. To construct the chain, we start with the furthest node from the BS.By implementing this routing protocol at the end we were able to create energy efficient routing protocol for wireless sensor network.

Parameter	LEACH	PEGASIS
Type of protocol	Hierarchical	Hierarchical
Network Lifetime	High	Very high
Data Aggregation	Yes	No
Power Consumption	High	Maximum
Overhead	High	Low
Data Delivery Model	Cluster-based	Chain-based
QoS	No	No
Specified path	Yes	Yes
Scalable	Yes	Yes
Query Based	No	No

Table 1: Possessions of Leach and Pegasis Protocol

SIMULATION RESULTS

Our simulation results showed that if we introduce more number of sensor in network then we can increase the network efficiency by using pegasis routing protocol in a network the all sensor do not have to waste their valuable time and energy for electing the cluster head for each and every round of its working as like in LEACH routing protocol in our network we have introduced the sensor node and analyzed them to a certain period of rounds or cycles this increased the lifespan but there is a disadvantage also data which is present at that time on sensor nodes memory also dies so there may be a chance of data loss when we simulated the network. And the cluster-heads which are in sleep state may also get affected due to environmental conditions**.**

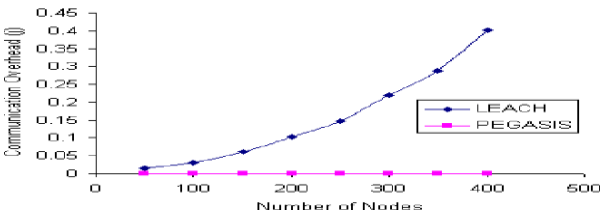

Figure 4: Graph Depiction and Comparison of LEACH and PEGASIS protocol

CONCLUSIONS

During this work we have observed the working of PEGASIS Routing protocol for wireless sensor networks from theory to our simulation. And we concluded that we can implement the algorithm in the network and our simulation had a good result we have introduced enormous sensor nodes and then created a chain using a greedy algorithm in network and had seen that network consumes less energy as they have only one specific task to perform in the network only sensing and transmitting the data.

REFERENCES

[1] S. Gobriel. "Energy-efficient design of ad-hoc and sensor networks",M.Sc University of Pittsburgh, 2008.

[2] T. Zia and A. Zomaya, "Security Issues in wireless sensor networks" in proceedings of the international conference of system and networks communication, 2006.

[3] A. al-yasiri and A. Sunley, "Data Aggregation in wireless sensor networks using SOAP protocol."Journal of physics conference series 76, 2007

[4] Ravi Kishore Kodali, Naveen kumar Aravapalli, "multilevel LEACH protocol model Using NS-3," IEEE international conference on advance computing, feb 2014.

[5] A. Ahmed, H. Shi and Y. Sang" a survey on network protocols for wireless sensor networks," in proceedings of information technology: research and education,aug 2003

[6] C.S.R. Murthy, B.S. Manoj "Adhoc Sensor Networks – Architecture and Protocols" 2nd Edition, PHI, 2004.

[7] C. Intanagonwiwat, R. Govindan, D. Estrin "Directed Diffusion:A scalable and robust communication paradigm for Sensor Networks" IEEE/ACM Transactions on Networking (TON)volume 11 issue 1, February 2003.

[8] D. Braginsky, D. Estrin, "Rumor Routing Algorithm for Sensor Networks" International Conference on Distributed Computing Systems (ICDCS), 2002.

[9] L. Li , J.Y. Halpern, "Minimum-Energy Mobile Wireless Networks Revisited" Proc. of IEEE Int. Conf. on Communications, 2001.

[10] Helsinki, Finland, S. Lindsey, C. Raghvendra "PEGASIS:Power-Efficient Gathering in Sensor Information System" International Conference on Communication, 2001.

[11] W. R. Heinzelman, J. Kulik, H. Balakishan, "Adaptive Protocol for information dissimination in Wireless Sensor Networks",Proceeding of ACM MOBICOM 1999, pp. 174-185, August-1999.

[12] K. Sohrabi, J. Gao, V. Ailawadhi, G. J. Pottie, "Protocols for selforganization for wireless sensor networks" IEEE Personal Communiations Magazine, vol. 7, no. 5, pp. 16-27, October 2000.

[13] F. Ye, A. Chen, S. Lu, L. Zhang, "A Scalable Solution to Minimum Cost Forwarding in Large Sensor Networks" Proceeding of IEEE ICCCN 2001, pp. 304-309, October 2001.

[14] D. Bragisky , D. Estrin, "Rumor Routing Algorithm for Sensor Networks", Proceeding of ACM Workshop on Wireless Sensor Networks and Applications 2002, pp. 2, September 2002.

[15] S. Lindsey, C. Raghvendra, K.M. Sivalingam, "Data Gathering Algorithm in Sensor Networks Using Energy Metrics" IEEE Transaction on Parallel and Distributed Systems, vol. 13, no. 9,pp. 924-935, September 2002.

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