

Comparison of SPIN and LEACH Routing Protocol

Nisha Prajapati

Mtech (Digital Communication), Acropolis Institute of Technology and Research, Indore

Abstract - Wireless sensor networks has emerged as a technology that are being quickly adopted due to their flexibility and use in a variety of environments. However, they consist of small, inexpensive devices or nodes that have severe constraints such as limited bandwidth, limited processing power, short battery life, small storage capability and are physically prone to external threats. WSN is becoming famous because of its use in different areas such as environment, Medical, Defense, House, Media and Education. Now, we will discuss the comparison spin and leach routing protocol. SPIN is a data centric protocol. In SPIN, sensor node communicate about the data they already have and they still need to obtain. In leach, these protocols uses cluster node for the purpose of transmission of information between the nodes. This paper analysis performance of the routing protocol.

Keywords - Wireless sensor networks SPIN and LEACH routing protocols, network structure, and energy efficiency.

I. INTRODUCTION

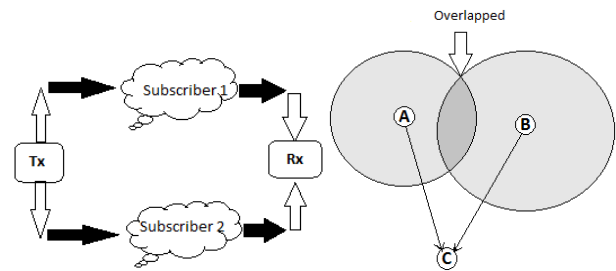
Data centric Routing protocols used to control the redundancy of data and it happen because sensor Node does not have global identification number which specify them uniquely so data is transmitted to each node with significant redundancy. In data centric routing, the sink request for data by sending the query so the nearest sensor node transmits the data selected understand from the query.

Flooding and Gossiping

Flooding: sensor node transmits the data to its entire neighbors till the packet reach the destination. Its advantage is easy to implement.

- Implosion: It is caused by duplicated message send to same neighbor.
- Overlap problem: the same event may be sensed by more than one node due to overlapping regions coverage.

Gossiping: In Gossiping packet is send to the randomly selected neighbor which select another random neighbor to forward the data and so on.



(a) Implosion Problem (b) Overlapping Problem

Routing protocols in WSNs might differ depending on the application and network architecture. A sensor network (WSN) are highly distributed networks of small, lightweight wireless nodes, deployed in large numbers to monitor the environment or system by the measurement of physical parameters such as temperature, pressure humidity, sound, vibration, pollutants and collectively relay their sensed data to the sink node. Each node in the network connected to each other.

Each sensor node in the network consists of three subsystems:

- 1) The sensor subsystem which is used to sense the environment.
- 2) The processing subsystem which performs the local computations on the sensed data.
- 3) The communication subsystem which is responsible for sharing the sensed data with the neighboring sensor nodes.

II. Routing Protocols in WSN

SPIN PROTOCOL

SPIN is a family of protocols used to efficiently disseminate information in a wireless sensor network. Conventional data dissemination approaches like flooding and gossiping waste valuable communication and energy resources sending redundant information throughout the network. In addition, these protocols are not resource-aware or resource-adaptive. SPIN solves these shortcomings of conventional approaches using data negotiation and resource-adaptive algorithms. Nodes running SPIN assign a high-level name to their data, called *meta-data*, and perform meta-data negotiations

before any data is transmitted. This assures that there is no redundant data sent throughout the network. In addition, SPIN has access to the current energy level of the node and adapts the protocol it is running based on how much energy is remaining. Simulation results show that SPIN is more energy-efficient than flooding or gossiping while distributing data at the same rate or faster than either of these protocols.

Here Three Types of messages are used:-

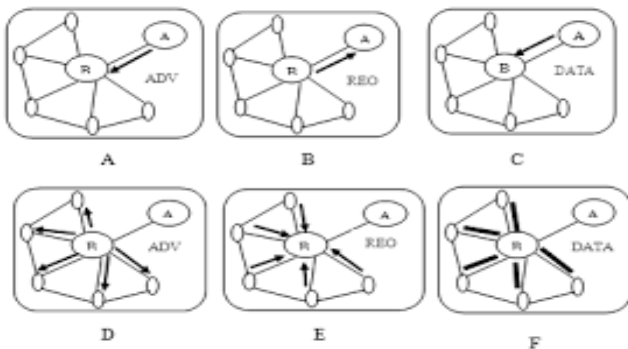
ADV Message: - This allow sensor node to advertise particular Meta Data.

REQ Message: - Request specific data.

DATA Message: - carry actual data.

The SPIN family of protocols is designed based on two basic ideas:

1) Sensor nodes operate more efficiently and conserve energy by sending data that describe the sensor data instead of sending all the data; for example, image and sensor nodes must monitor the changes in their energy resources.



2) Conventional protocols like flooding or gossiping-based routing protocols waste energy and bandwidth when sending extra and unnecessary copies of data by sensors covering overlapping areas.

LEACH PROTOCOL

LEACH (Low Energy Adaptive Clustering Hierarchy) is designed for sensor networks where an end-user wants to remotely monitor the environment. In such a situation, the data from the individual nodes must be sent to a central base station, often located far from the sensor network, through which the end-user can access the data.

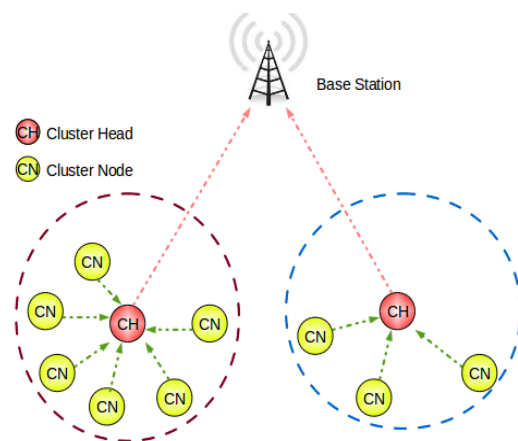
LEACH is a TDMA based MAC protocol which is integrated with clustering and a simple routing protocol in WSN. The goal of leach is to lower the energy consumption required to create and maintain cluster in order to improve the life time of WSN. LEACH also used

CDMA so that each cluster uses a different set of CDMA nodes, to minimize interference between clusters.

We will select the cluster head node is not fixed it's depend on possibility of nodes, so it give high energy. Formation of cluster head is based on TDMA schedule for data transmission. TDMA used as this schedule mechanism make it down to long delays when applied to large sensor network. TDMA Schedule prevents data collision, among message and preserve energy among non-cluster nodes.

Difference between SPIN and LEACH Routing Protocol

	SPIN PROTOCOL	LEACH PROTOCOL
Classification	Flat	Hierarchical
Mobility	Poss.	Fixed BS
Position Awareness	No	No
Power usage	Ltd	Max
Negotiation Based	Yes	No
Data Aggregation	Yes	Yes
Localization	No	Yes
Query Based	Yes	No
State Complexity	Low	CHs
Scalability	Ltd	Good
Multipath	Yes	No



The establishment of cluster head is as follows: Each node generates a random number between 0 and 1 and compares it with the threshold value $P(n)$. If the number is less than the threshold value, it becomes the cluster head node. If it has been selected cluster head node in each round of cycle, the node's $P(n)$ is set to 0 so that the node will not be re-selected as cluster head. Otherwise, the node is non-cluster head node in the current round. After the selection of cluster head, the head broadcast its own presence to all other nodes. After broadcasting the information, then all

other nodes send the information to the cluster head. Together, these features allow LEACH to achieve the desired properties in the networks. $P(n) = p / 1 - p(r \bmod 1/p)$

There are several desirable properties for protocol on these networks:

- Use 100's - 1000's of nodes
- Maximize the lifetime of system
- Maximize network coverage
- Use uniform battery-operated nodes

III. WORK UNTIL NOW

Various data centric routing algorithm and protocols had been proposed in wireless sensor network. When selecting a WSN routing protocol some other standard also need to be consider such as complexity, energy usage and quality of service feature.

Every protocol have its pros and cons, so were in previous researches.

IV. CONCLUSION

The concluded algorithm shows that, this routing algorithm can support multiple path to a destination with low overhead, it could help in balancing the network load. Now we compare the SPIN and LEACH protocol.

SPIN protocol is based on negotiation and its dead nodes are very less because data transmission is based on metadata negotiation of the nodes and LEACH protocol has very large dead nodes because of cluster head rotation. Mobility in the SPIN protocol is possible for multiple transmission but In LEACH protocol we will select the cluster head node is not fixed it depends on possibility of nodes, so it gives high energy. LEACH has limited energy and it has more energy consumption in comparison to SPIN protocol.

Main purpose of this research is to find most efficient result by comparing spin and leach protocol.

V. FUTURE SCOPE

There might be some limitation, those are because of time only. There is a lot of scope for further enhancement of the paper.

VI. REFERENCE

[1] V.Vasanthi, "A Perspective analysis of routing protocol in wireless sensor network" (IJCSSE) International Journal on Computer Science and Engineering Vol. 02.No. 08,2010,2511-2518.

[2] D. Braginsky, D. Estrin, Rumor routing algorithm for sensor networks, in: Proceedings of the First Workshop on

[3] Sensor Networks and Applications (WSNA), Atlanta, GA, October 2002.

[4] C. Schurgers, M.B. Srivastava, Energy efficient routing in wireless sensor networks, in: The MILCOM

[5] Proceedings on Communications for Network-Centric Operations: Creating the Information Force, McLean, VA,

[6] 2001.

[7] M. Chu, H. Haussecker, F. Zhao, Scalable information driven sensor querying and routing for ad hoc heterogeneous

[8] sensor networks, The International Journal of High Performance Computing Applications 16 (3) (2002) 293–313.

[9] R. Shah, J. Rabaey, Energy aware routing for low energy ad hoc sensor networks, in: Proceedings of the IEEE.

[10] Wireless Communications and Networking Conference (WCNC), Orlando, FL, March 2002.

[11] N. Sadagopan et al., The ACQUIRE mechanism for efficient querying in sensor networks, in: Proceedings of the

[12] First International Workshop on Sensor Network Protocol and Applications, Anchorage, AK, May 2003. M. BaniYassein, "Improvement on LEACH Protocol of Wireless Sensor Network (VLEACH) "doi: 10.4156/jdcta.vol3.issue2.yassein.

[13] Amir SepasiZahmati et. al, "An Energy-Efficient Protocol with static Cluster based Routing in Wireless Sensor Networks World Academy of Science, Engineering and Technology 28 2007.

[14] Mahmood Ali" Real Time Support and Energy Efficiency in Wireless Sensor Networks"