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HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

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APPENDIX/ANNEXURE

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- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

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INCREASING NETWORK LIFETIME WITH ANGLED-LEACH PROTOCOL IN WSNs

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ABSTRACT

Increasing scalability, network lifetime and load balancing are important factors for wireless sensor networks. Clustering is a useful technique through which we can affect these factors. In this paper, we propose a new method of clustering (Angled-LEACH) which prolongs network lifetime. Links between nodes in sensor networks are vulnerable to breakage because of the dynamic nature of the networks. Angled-LEACH is based on the direction of the adjacent mobile nodes of the networks. Each pair of nodes that are taking part in the transmission should ideally be moving in the same or similar direction. This helps in reducing the traffic and delay in the network. It also helps in having less number of collisions between the nodes and hence helps in energy efficiency and increases network lifetime. Simulation results demonstrate that using the proposed method offers significant improvement in network lifetime in comparison with the LEACH and SEP methods.

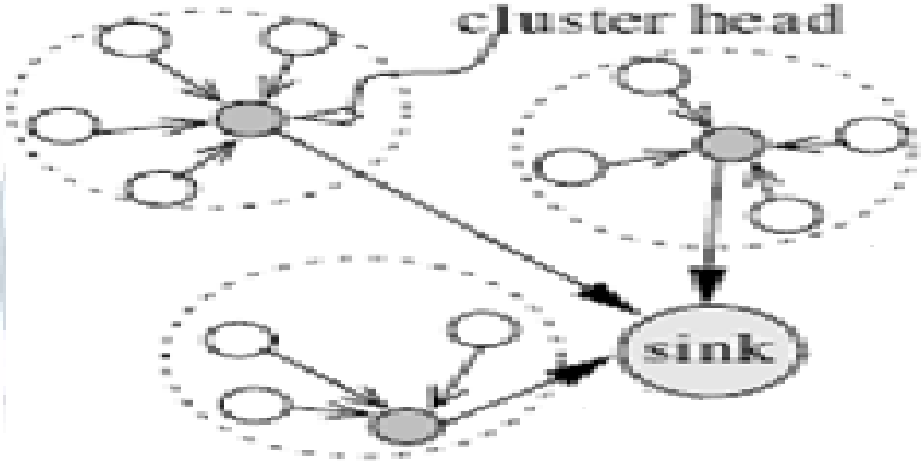
KEYWORDS

WSN, Network Protocols, Clustering, Energy Efficiency, Delay, Traffic, LEACH, SEP.

INTRODUCTION

Wireless sensor networks are being used all over the world in many applications including traffic monitoring, military surveillance, habitat monitoring, combat field reconnaissance, object tracking, etc. This has been made practically feasible by significant advances in micro electro-mechanical systems (MEMS) technology, radio communications and digital electronics. Sensors are tiny devices that are deployed in an ad-hoc manner in the area of interest to monitor events and gather data about the environment. The WSNs consist of hundreds or thousands of inexpensive sensor nodes. They have the ability of sensing, data processing and communicating with each other. Basic features of sensor networks are self-organizing capabilities, mobility of nodes, dynamic network topology, multi-hop routing, limited computational and communication power, node failures, short-range broadcast communication and large scale of deployment. The WSNs have features of flexibility and scalability. Multi-hopping in the networks can cause a sensor node to communicate with a node with is far away from it. In WSNs, each of the sensor nodes collects and route data either to an external base station (BS) or to other sensors. Therefore, each node plays the dual role of data originator and data router in a multi-hop sensor network. A sensor node is a microelectronic device which can only be equipped with a limited power source. The sensor nodes communicate either among each other or directly to an external base station. A base station may be a fixed or mobile node which helps in communications among the sensor nodes. The sensor nodes are self organizing in nature. A large number of sensor nodes are distributed over large geographic regions. They collaborate with each other to accomplish the task. Networking together thousands of sensor nodes allows users to accurately monitor a remote environment by combining the data from the individual nodes. The following figure represents a WSN where sensor nodes send the data to their respective cluster heads and they further send the data to the sink node.

FIGURE 1: A WIRELESS SENSOR NETWORK

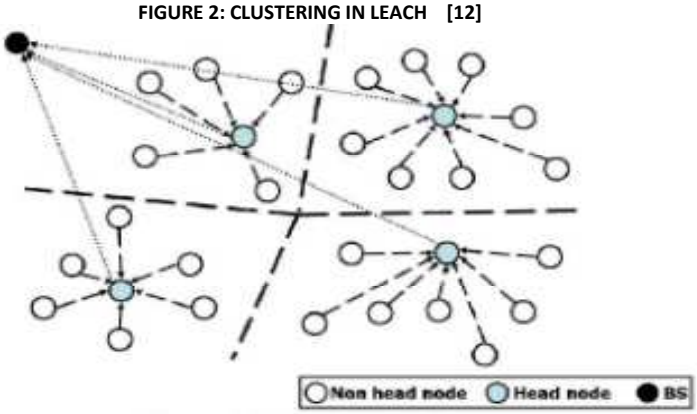


The key limitations of WSNs are the storage, data processing and efficient energy consumption. Due to dense deployment nature of WSNs, the node batteries of these sensor nodes are difficult to recharge. Also it is not feasible to replace the batteries of thousands of nodes. Hence, energy awareness and maximizing the lifetime of the sensors are essential design issues in WSNs. The WSN protocols can be classified into two types, planar routing protocol and hierarchical routing protocol. Hierarchical routing based clustering not only advance network scalability and reduces delay, but also it supports data aggregation [15] to prolong the network lifetime. In WSNs, it is seen from the literature, 70% of the total energy is consumed for data transmission. Hence the methods used for data collection and transmission can greatly help in achieving energy efficiency. Since long transmissions consume much more energy, we can minimize long transmissions with clustering and reduce data redundancy in the transmissions to conserve the scarce energy resources. The sleep-awake cycles, clustering etc techniques have been proposed for reducing the energy consumption.

RELATED WORK

LEACH: LEACH (Low Power Adaptive Clustering Hierarchy) is a hierarchical clustering method in WSNs. In this algorithm, a node randomly elects itself to become cluster head and then broadcasts an advertisement message to all of the remaining nodes.

FIGURE 2: CLUSTERING IN LEACH [12]



The nodes receiving the message join the nearest cluster head. Once the cluster heads are formed, the sensor nodes send information to the base station through the corresponding cluster head. This time along with the time required for formation of a cluster is known as a round time. The clustering process repeats after each round. Another set of nodes become the cluster head in other rounds. The CH node creates a TDMA schedule [16] and assigns each child node a time slot when it can transmit. This schedule is broadcast to all the nodes in the cluster. In this approach, there is a formula in which every node has probability to be cluster head in every round. At the beginning of every round, every node chooses a random number between 0 and 1. There is a threshold number T (n) which varies in every round. The node can be a cluster head in the current round if the random number chosen by it is less than T (n). The LEACH probability formula is:

$T(n) = p(n)/(1-p(n) * (r \bmod(1/p(n)))) \vee n \varepsilon G$. [12]

Where *n* is the number of network nodes, *r* is the number of the round, G is the set of nodes that haven't been cluster head in the last 1/p rounds and p is the desired percentage of cluster heads which equals to 0.05. LEACH algorithm has a drawback that it doesn't consider node's residual energy in selecting the CHs. Hence CHs chosen in every round are not always suitable for the network.

THE PROPOSED ANGLED-LEACH

The main motivation of the proposed Angled-LEACH is to reduce the number of collisions between the nodes, the breakage of the links between nodes and the traffic in the network, resulting in a new robust clustering technique, called Angled-LEACH. The model and algorithm of the proposed scheme are given below.

ANGLED-LEACH SCHEME

The Angled-LEACH assumes that the sensor nodes are placed randomly within a WSN and some of the nodes introduce themselves to be the cluster heads by broadcasting advertisement messages to the other nodes. All the nodes would be collecting the data at their respective cluster heads and the cluster heads would be transferring the data to the sink node. This causes links breakage between the nodes and traffic in the network and affects load balancing and hence energy efficiency too. Angled-LEACH scheme calculates the angles between the adjacent nodes. The nodes would be transferring the data to the cluster heads which would be reachable to it and lies in the direction of the destination. This reduces the overall traffic and delay in the network and gives efficient energy utilization.

METHOD OF ANGLED-LEACH

CHECK FOR REACHABILITY OF THE NODES

The reachability of the nodes to the other nearby nodes can be calculated by the distance formula where the distances between the nodes, distances between the nodes and the cluster heads and the distances between the cluster heads and sink node can be calculated.

CALCULATING THE ANGLES BETWEEN THE NODES

The angles of the nodes to their respective cluster heads and the sink node is calculated by the dot product of the position of the nodes, cluster heads and the sink. If the angle calculated lies between 0° and 45° (in the direction of the destination), then the energy utilization is less else the energy utilization is more.

CALCULATING THE TOTAL TIME FOR WHICH THE NETWORK WORKS

The time taken by the algorithm in Matlab can be calculated by tic and toc formulae. The trace of tic and toc can be traced by loading its trace file and then displaying both with the display formula. The more the value of the difference of tic and toc, the more is the efficiency of the algorithm.

PERFORMANCE EVALUATION

The performance analysis of routing protocols is evaluated with the MATLAB simulator. Then our proposed protocol is compared to the LEACH and SEP (Stable Election Protocol) algorithms in terms of the network lifetime.

SIMULATION ENVIRONMENT

In this simulation, our experiment model performed on 100 nodes which were randomly deployed and distributed in a 100×100 square meter area. We assume that all nodes are mobile in nature and can move within the specified area. Our simulation model uses the parameters as shown in table 1.

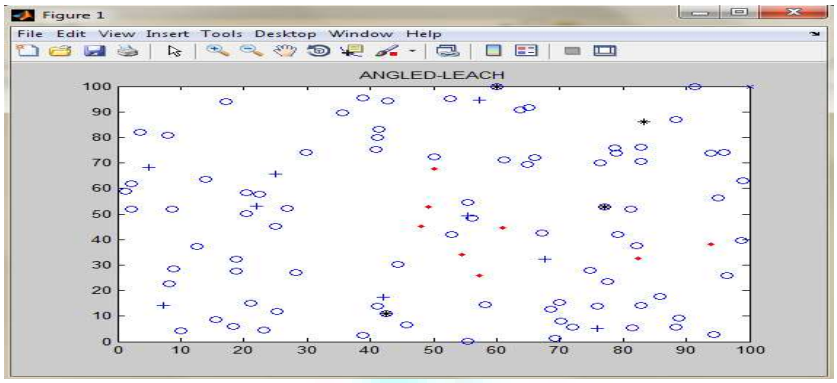
TABLE 1: SIMULATION PARAMETERS

Parameters	Values
Network size	100m * 100m
Location of the sink node	[100,100]
Number of nodes	100
Number of clusters	10
Initial energy of each node	0.5J
Maximum number of rounds	7000
Percentage of CH nodes	0.05
Fraction of advanced nodes	0.1
Additional energy factor between advanced and normal nodes	1

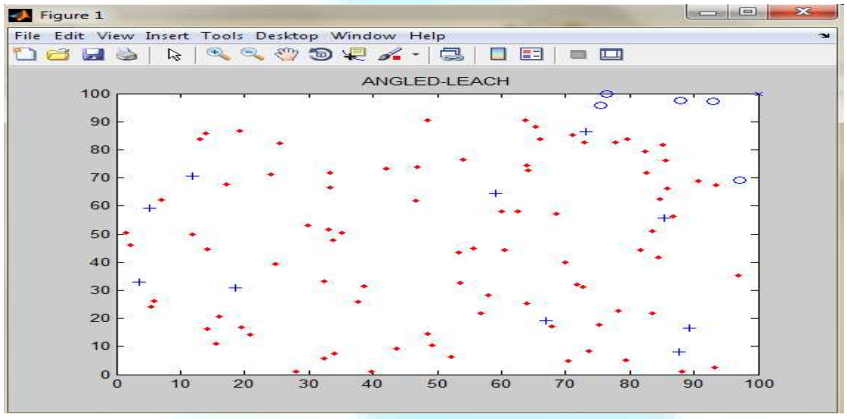
SIMULATION RESULTS

To compare the network lifetime of the algorithms, following results have been observed.

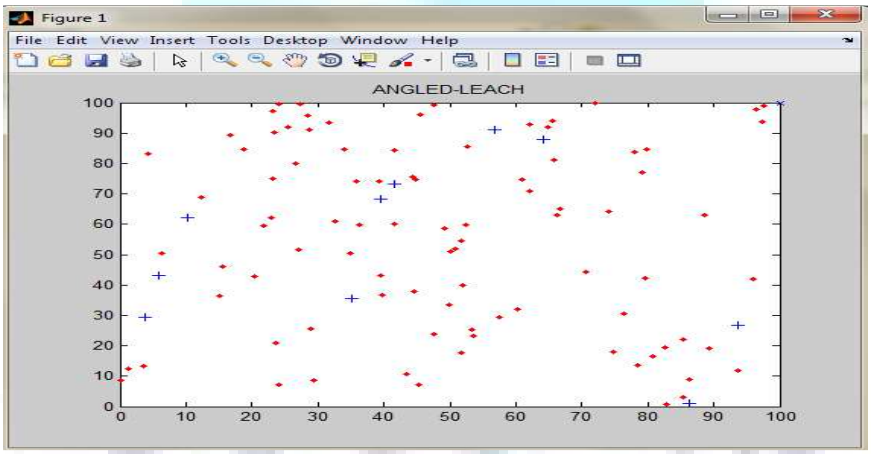
A SNAPSHOT OF THE ANGLED-LEACH NETWORK AFTER 1000 ROUNDS



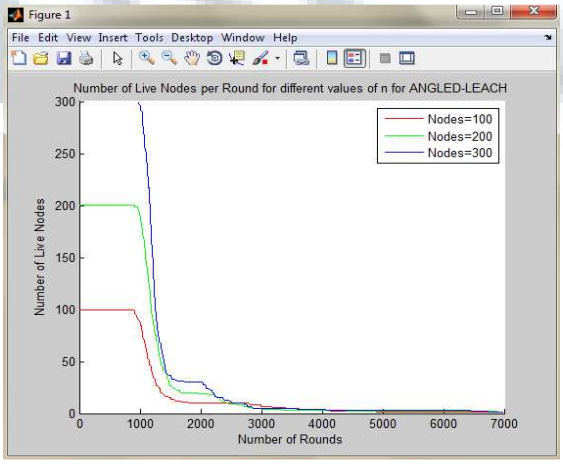
A SNAPSHOT OF THE ANGLED-LEACH NETWORK AFTER 1500 ROUNDS



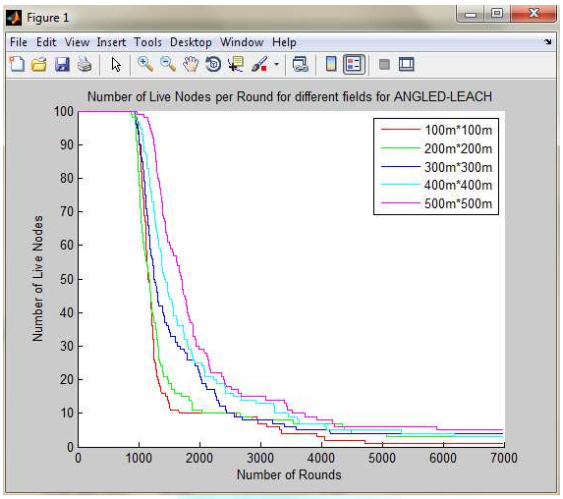
A SNAPSHOT OF THE ANGLED-LEACH NETWORK AFTER 2500 ROUNDS



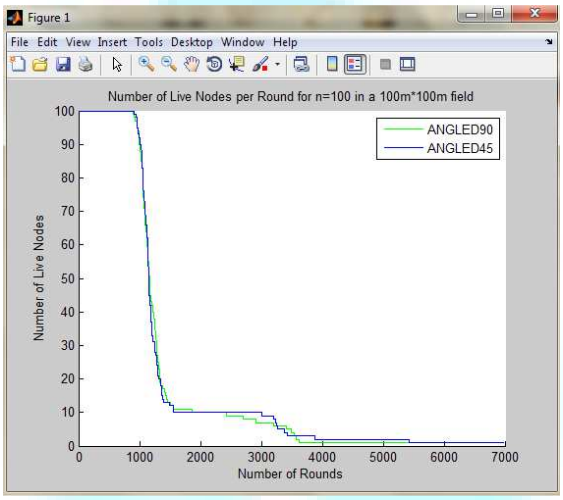
PLOT FOR NUMBER OF LIVE NODES PER ROUND OF ANGLED-LEACH PROTOCOL FOR DIFFERENT NUMBER OF NODES 'n'



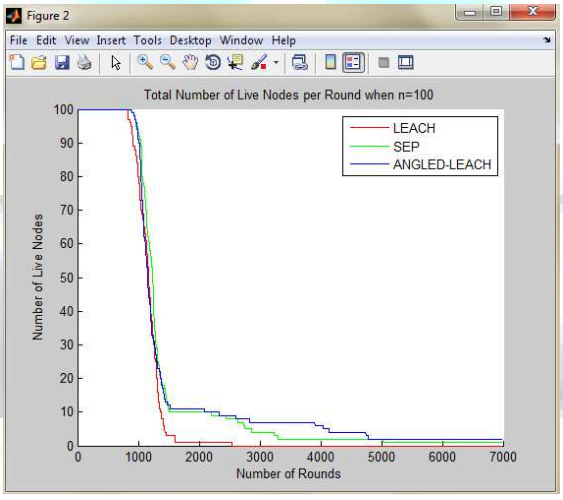
PLOT FOR NUMBER OF LIVE NODES PER ROUND OF ANGLED-LEACH PROTOCOL VARYING THE NETWORK FIELD



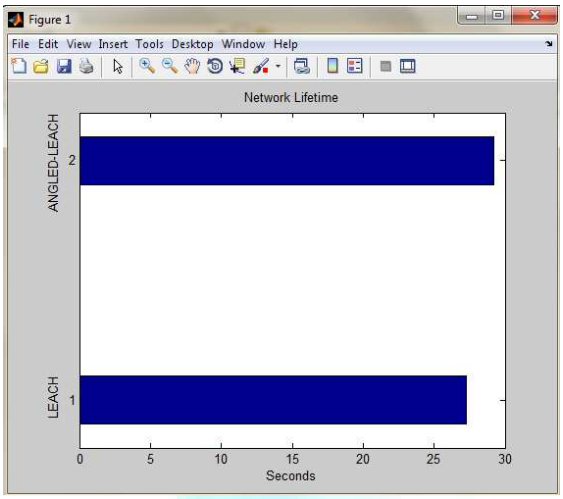
PLOT FOR NUMBER OF LIVE NODES PER ROUND FOR N=100 IN A 100M * 100M FIELD OF ANGLED-LEACH PROTOCOL FOR DIFFERENT ANGLES



PLOT FOR TOTAL NUMBER OF LIVE NODES PER ROUND FOR LEACH, SEP AND ANGLED-LEACH PROTOCOLS WHEN n=100



PLOT BETWEEN NETWORK LIFETIME FOR LEACH AND ANGLED-LEACH PROTOCOLS



CONCLUSIONS

Hierarchical clustering has proven to be an effective approach for efficient energy and bandwidth utilization. We have classified a comprehensive survey of LEACH protocol in WSNs. The clustering algorithms aim to maximize the lifetime of the networks while not compromising data delivery and accuracy. It is seen from the literature that about 70% of the total energy is consumed in data transmission. Hence the methods used for data collection and transmission can greatly help in reducing energy consumption in the networks. Traffic induces delays and most of the nodes may get die due to collisions. Many of the links break due to collisions between the nodes. We can reduce the traffic by having communications between the nodes such that the source and the destinations must lie in the same or similar directions. This will reduce the number of collisions between the sensor nodes, traffic and delay and helps in achieving energy efficiency in the wireless networks. The above simulation results show that Angled-LEACH protocol enhances the network lifetime in comparison with LEACH and SEP.

REFERENCES

1. Jamal N. Al-Karaki and Ahmed E. Kamal, (2004) "Routing Techniques in Wireless Sensor Networks: A Survey",The Hashemite University and The Iowa State University.
2. Ossama Younis, Marwan Krunz, and Srinivasan Ramasubramanian,(2006) "Node Clustering in Wireless Sensor Networks: Recent Developments and Deployment Challenges", University of Arizona.
3. Femi A. Aderohunmu, Jeremiah D. Deng, and Martin K. Purvis,(2009) "Enhancing Clustering in Wireless Sensor Networks with Energy Heterogeneity", Department of Information Science, University of Otago, New Zealand.
4. Kemal Akkaya, and Mohamed Younis, (2003) "A survey on Routing Protocols for Wireless Sensor Networks", Department of Computer Science and Electrical Engineering, University of Maryland, Baltimore Country, Baltimore, MD 21250, USA.
5. Ameer Ahmed Abbasia and Mohamed Younis, (2007) "A Survey on Clustering Algorithms for Wireless Sensor Networks",Baltimore County, Baltimore, MD 21250, USA.
6. Vivek Mhatre, Catherine Rosenberg,(2003) "Design guidelines for wireless sensor networks: communication, clustering and aggregation", School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN 47907-1285, USA.
7. Mohammad Mehrani, Jamshid Shanbehzadeh, Abdolhossein Sarrafzadeh, Seyed Javad Mirabedini, and Chris Manford, (2010) "FEED: Fault Tolerant, Energy Efficient, Distributed Clustering for WSN", Auckland, New Zealand.
8. Peyman Neamatollahi, Hoda Taheri, Mahmoud Naghibzadeh, and Mohammad-Hossein Yaghmaee, (2011) "A Hybrid Clustering Approach for Prolonging Lifetime in Wireless Sensor Networks", Iran.
9. Saeed Rasouli Heikalabad, Naeim Rahmani, and Ahmad Habibizad Navin, (2010) "REACH: The New Routing Algorithm based on Energy Aware Clustering Hierarchical for Lifetime Increasing in Wireless Sensor Networks", Iran, Vol 2.
10. V. Loscri, G. Morabito and S. Marano, (2005) "A Two-Level Hierarchy for Low-Energy Adaptive Clustering Hierarchy", Proceedings of Vehicular Technology Conference, vol 3, 1809-1813.
11. Rahmanian, H. Omranpour, M. Akbari, K. Raahemifar, (2011) "A Novel Genetic Algorithm in LEACH-C Routing Protocol for Sensor Networks", IEEE CCECE.
12. Heinzelman W R, Chandrakasan A, Balakrishnan H.,(2000) "Energy efficient communication protocol for wireless microsensor networks", The 33rd Hawaii International Conference on System Sciences, Hawaii.
13. Akramul Azim and Mohammad Mahfuzul Islam, (2009) "Hybrid LEACH: A Relay Node Based Low Energy Adaptive Clustering Hierarchy for Wireless Sensor Networks", Proceedings of the 2009 IEEE 9th Malaysia International Conference on Communications.
14. Neetesh Purohit, Himanshu Agrawal, Ankit Jain, (2011) "A New Scheme for Cooperative Communication in LEACH based Wireless Sensor Network", IEEE, CICN.
15. Peng Ren, Jiansheng Qian, Leida Li, Zhikai Zhao, Xiaobin Li, (2010) "Unequal Clustering Scheme Based LEACH for Wireless Sensor Networks", IEEE, ICGEC.
16. Rupesh Mehta, Abhishek Pandey& Pratik Kapadia, (2012)" Reforming Clusters Using C-LEACH in Wireless Sensor Networks", IEEE, International Conference on Computer Communication and Informatics (*ICCCI* -2012), Jan. 10 – 12, 2012, Coimbatore, INDIA.
17. Yuhua Liu, Yongfeng Zhao, Jingju Gao, (2009) "A New Clustering Mechanism Based On LEACH Protocol", IEEE International Joint Conference on Artificial Intelligence.
18. Guofeng Hou, K. Wendy Tang, (2006) "Evaluation of LEACH Protocol Subject to Different Traffic Models", The 1st International Conference on Next Generation Network, Korea.
19. Ji Peng, Wu Chengdong, Zhang Yunzhou, Chen Fei,(2011) "A Low-Energy Adaptive Clustering Routing Protocol of Wireless Sensor Networks", National Nature Science Foundation under Grant, IEEE.
20. Haosong Gou and Younghwan Yoo, (2010)"An Energy Balancing LEACH Algorithm for Wireless Sensor Networks", Seventh International Conference on Information Technology, IEEE.
21. Peyman Neamatollahi, Hoda Taheri, Mahmoud Naghibzadeh and Mohammad-Hossein Yaghmaee, (2011)"A Hybrid Clustering Approach for Prolonging Lifetime in Wireless Sensor Networks", International Symposium on Computer Networks and Distributed Systems (CNDS), IEEE.
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