Implementation of enhanced REAC-IN protocol

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***Abstract*— A lot of energy-efficient delivering schemes appear to be devising for WSNs, just like. Clustering is very a good selection for delivering on the basis sensor sites that want scalability to be able to hundreds possibly a large number of nodes. A group composed of at least a group go (CH) along with group customers. But cluster head selection increases the overhead of CH selection and assignment. This paper proposes a energy efficient clustering scheme for prolonging the lifetime of WSN with isolated nodes that is ENHANCED REAC-IN.**

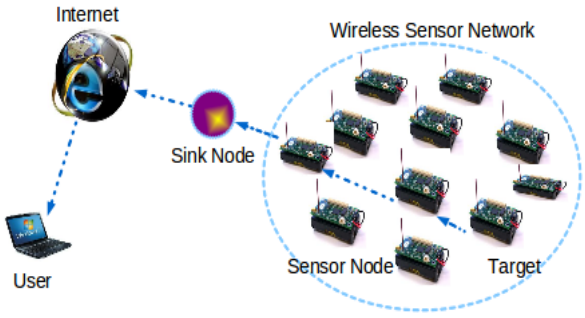
For selecting the CH nodes EM algorithm finds out the maximum likelihood of nodes to become a cluster head. A bad design of CH selection algorithm may lead to node isolation. Such as nodes can send their data to the server or to the cluster head.

Index terms: energy efficient clustering, EM algorithm, isolated nodes, probabilistic approach

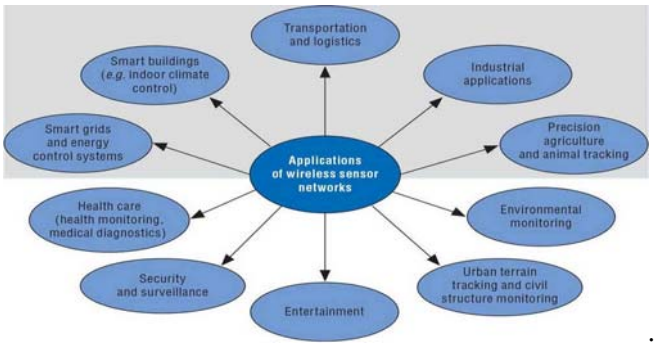
I. INTRODUCTION

Wireless sensor network WSN are made of sensor nodes. Which further consists of :

- Sensors
- Communicators
- Data processors



Applications of Wireless sensor networks are:



A lot of energy-efficient delivering schemes appear to be devising for WSNs, just like. Clustering is very a good selection for delivering on the basis sensor sites that want scalability to be able to hundreds possibly a large number of nodes. A group composed of at least a group go (CH) along with group customers. CHs are duty for managing your nodes in their group and also occasionally send aggregated facts into a remote onlooker (sink). In the course of regular re-clustering, nodes along with great residual energy may serve since CHs. System life span will be continuous making use of effectiveness facts aggregation, involving pairing the data through resource nodes right modest number of significant details, and also make facts indication to get far more energy enough.

Wireless Sensor Network supervise the physical and environmental conditions alike temperature, sound, pressure etc and passing the data over the network to the main location. A sensor network comprised of various detection stations called sensor nodes, each of which is small, lightweight and portable. Each wireless network composed of hundreds of nodes which combined with current wired measurement and control system. Node employ more energy for transmission purpose, with this network lifetime of WSN will be reduced. So the nodes are dies promptly in the network.

In this paper a new CH selection scheme is proposed for cluster head selection called enhanced regional energy aware clustering with isolated nodes(enhanced REAC-IN) based on the concept of REAC-IN which rotates the CH role among all nodes so that each node consume uniform amount of energy and also the lifetime of the network increases.

II. LITERATURE SURVEY

Jenq-Shiou Leu, et al. In this paper they explained the Energy Efficient Clustering strategy which enhance the lifetime of a Wireless Sensor Network by using the concept of Isolated Nodes. An appropriate algorithm used to select the cluster head can enhance the energy efficiency of the network.. Hence, cluster head selection needs additional overhead. This paper proposes a new regional energy aware cluster head selection technique with the use of isolated nodes for WSNs, called Regional Energy Aware Clustering with Isolated Nodes (REAC-IN). In REAC-IN, CHs are selected based weight and regional average energy.

Qureshi. N. et al. In this paper a new technique is presented which is more stable, multi level and energy efficient as compared to the previous techniques.previous techniques assumes that evry node consume same amount of energy but that is not true. Hence they can't take full advantage of heterogeneity among nodes.the protocol presented in this paper consider heterogeneity and consider that every node consume different amount of energy. And after comparasion with different protocols it shows better results.

Vidya K S Arun Anoop et al. in this paper author presents a new technique to location authentication in WSNs.it uses a location substaintial algorithm which uses probabilistic

Approach to find out the no of hopes a packet pass through to reach the destination. The most likely value is between no 0 and 1. This numerical value is used to find out the most likely location claimed.

M. Aslam et al. In this paper they discussed some energy adequate hierarchal routing protocols, established from conventional LEACH routing protocol. Their main motive is to find out how these protocols behave with increase in the life time and how quality routing protocol is enhanced for the WSNs. Furthermore, they highlighted some of the issues faced by LEACH and also discussed how these problems are handled by enlarged versions of LEACH. Author compare the characteristics and completion issues of every hierarchal routing protocol.

Kemal Akkaya and Mohamed Younis et al. Author evaluates recent routing protocols for sensor networks and commenced an analysis for the distinct approaches to continued. The prime characteristics of this paper are:

- data-centric
- hierarchical
- location-based

Each routing protocol is analyzed and discussed under the better category. In addition, the suggestion has also been done on protocols using contemporary techniques alike network flow and QoS modeling. The paper ends with open research problems.

I.F. Akyildiz et al: In this paper they make a survey of design problems and methods for sensor networks explaining the constraints on sensor nodes and the protocols perspective in all layers of network stack. This paper work is examined to be a good introduction for readers interested in this area. Their paper is the first work to make a analysis of routing protocols in sensor networks. Furthermore, their work reflects the current state of art in routing research by involving an extensive list of recently proposed routing protocols.

S. Tilak et al: In this paper anatomy of the distinct architectural attributes of sensor networks is advanced in. This work gives a high-level explanation of what is examined a typical sensor network architecture. Their work is a devoted study of the network layer, specifying and identifying the various perspectives for data routing.

Moreover they outline several architectural design problems that may influence the attainment of routing protocols.

K. Sohrabi et al: Author presents a collection of algorithm for self-organization of wireless sensor networks, in which there is a extensively large number of static nodes with great constrained energy resources. The protocols further reinforcement slow flexibility by a subset of the nodes, energy-efficient routing, and pattern of ad hoc sub networks for implement cooperative signal processing functions between a set of the nodes. They have established considerably various algorithms for setting up sub-networks to observe cooperative signal processing functions, with the effort included and the scalability build upon quite strongly on the signal processing function.

III. PROBLEM DEFINITION

In the previous work cluster head is defined on energy and distance which increase the no of dead nodes in the network and also the predictions of cluster is not depend on the previous performance of nodes in cluster. In the previous research the stability of the network is reduced because the network life time is very less. Also the dead isolated nodes are not identified by the previous CH selection method which tends to increase in number of isolated nodes in the network. Isolated nodes tend to consume more energy as compared to other nodes of the network to send its data to the sink.

In this paper a new scheme is proposed for enhancing the lifetime of wireless sensor network. That is enhanced REAC-IN protocol which will Reduce the energy and reduce the dead nodes in cluster with the help of probablistic approach for wireless sensor network.

A. probablisitic approach

Probabilistic approach is a way to find out or evaluate the variation and uncertain behavior of the given set of values. Mainly by using distributed data rather than fixed values.it find out the maximum likely value to be occur in the given range of values. In probabilistic approach first of all a CH is selected and then assign a random value to it. Then apply expectation maximization algorithm to this CH. And calculates the results or compute the probability estimates for the CH.

B. Cluster head selection based on expectation minimization algorithm

Expectation maximization algorithm produces maximum likelihood estimates of the parameters when values of the variables are unknown. EM algorithm works in two phases:

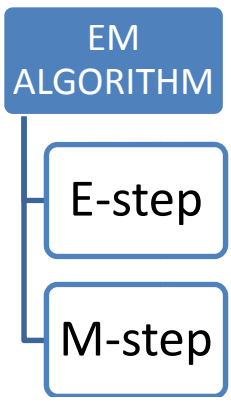
1. Expectation phase
2. Maximization phase

In the expectation phase the values for the variable are computed for the current estimates of the parameters and conditions upon the observations. In maximization phase the estimates of the parameters are produced. Till now EM algorithm had been employed to various areas by the different researchers like genetics, sociology, economical and clinical. In this paper a new use of EM algorithm is presented that is in the field of cluster head selection. In this first of all a node is selected and a random value is assigned to that node. And then apply the EM algorithm to estimate the maximum likelihood of the parameters. And repeat this procedure for all the nodes in the network. Based upon the probability of these parameters the node with maximum likelihood is selected as cluster head.

C. EM algorithm

EM algorithm is an efficient iterative model to compute the maximum likelihood. EM is used where the data is missing or hidden.

EM algorithm consist of two parts:



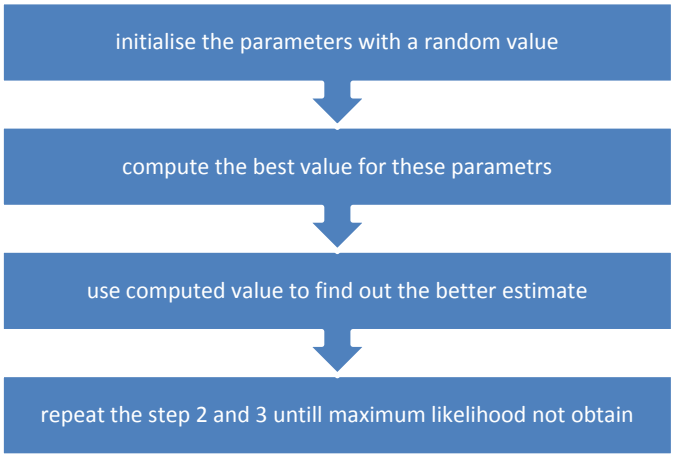
Expectation step (E step): In this step the expected value of log function is calculated with respect to given condition:

$$Q(\theta|\theta^{(t)}) = E_{Z|X,\theta^{(t)}}[\log L(\theta; X, Z)]$$

Maximization step (M step): In this part the parameters were found to maximize the quantity.

$$\theta^{(t+1)} = \arg max\, Q(\theta|\theta^{(t)})$$

The various steps to perform the calculation in EM algorithm are given below:



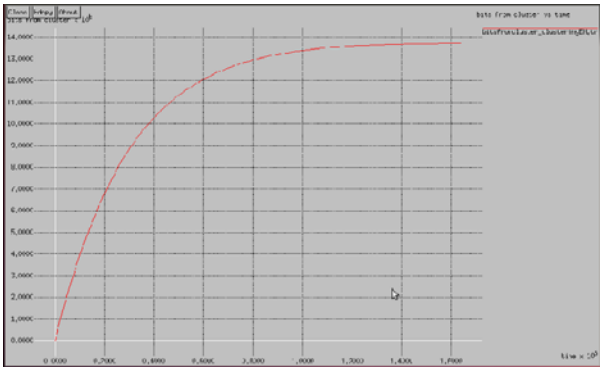
IV. SIMULATION RESULTS

In this simulation section the performance of Enhanced REAC- IN protocol is evaluated using network simulator 2(NS2). Main configurable parameters used in our simulations referred from the study in [1]. The center of the network is base station so that generalization of the network will not lost. After evaluating the performance of the enhanced REACH-IN protocol in ns2 simulator, it will be compared with the REAC-in protocol. The study of probabilistic approach shows that it produces better results for cluster head selection as compared to REAC-IN protocol which work on prediction based approach. Enhanced REAC-IN protocols exhibit less delay in frame transfer between nodes as compared to the previous REAC-IN protocol which take long delays to transfer the data between nodes which causes more energy consumption and loss of frames during the communication. In this work the two protocols are compared based on three parameters which are:

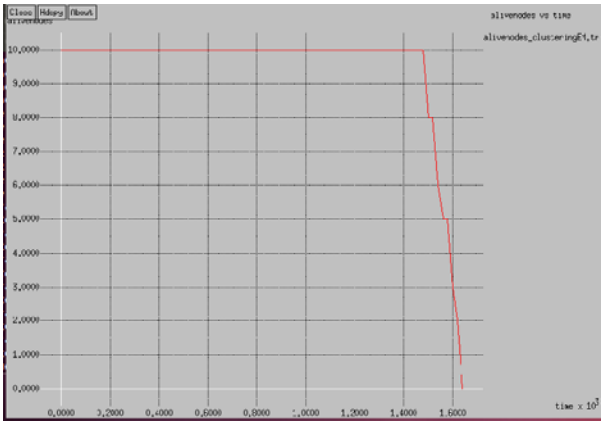
- bits from cluster
- alive nodes vs time
- frames vs round number

The graphs for these three parameters are shown below for both the protocols:

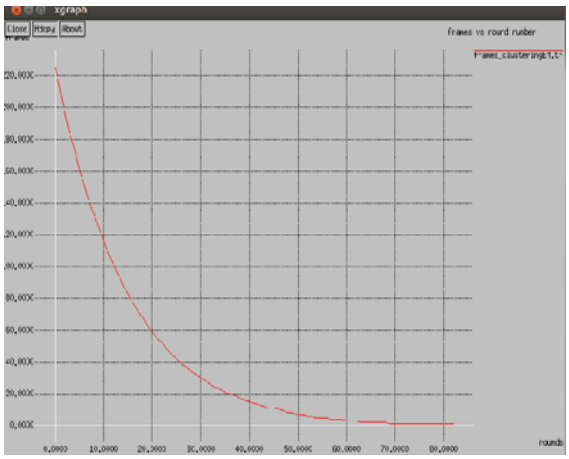
Results of Enhanced REAC-IN protocol:



Bits from cluster vs time

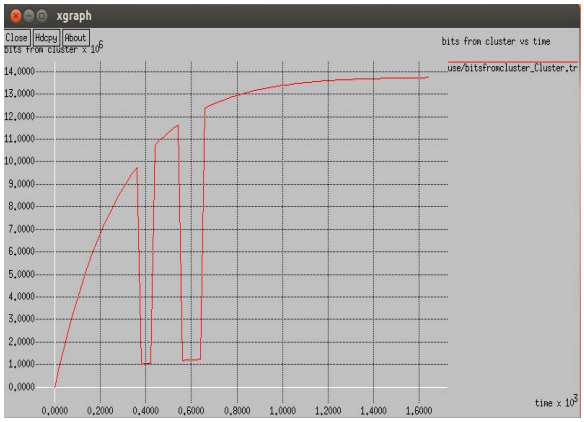


Alive nodes vs time



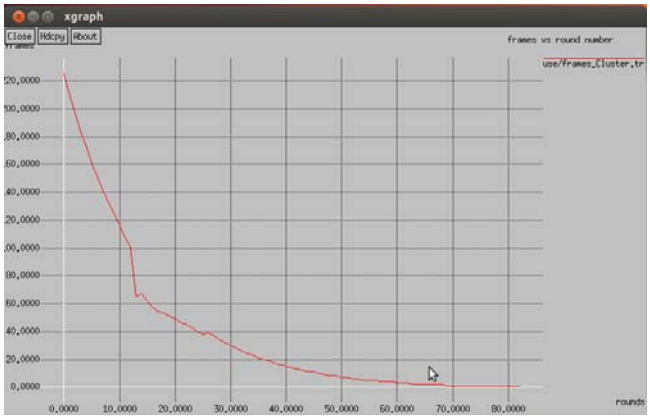
Frames vs round number

Results for REAC-IN protocol:



Bits from cluster vs time

Alive nodes vs time



Frames vs round number

V. CONCLUSION

In both the protocols same no of nodes are used to compare the results. Same no of bits are transferred between the nodes and same no of rounds are used in the same time. The only difference is the used method to produce the resuls.when the results of these two methods are compared the its found that enhanced REAC-IN gives better results as compared to REAC-IN.it shows that with the same values Enhanced REAC-IN gives smooth network with less delay.and the nodes remain alive for long time as compared to REAC-IN.Also nodes send same no of bits in same time but with less delay nd loss.This shows that Enhanced REAC-IN protocol presented here gives better performance of the WSN network. The probabilistic approach used in this paper performs better CH selection as compared to the algorithm used in previous work.

References

[1] Jenq-Shiou Leu, Member, IEEE, Tung-Hung Chiang, Min-Chieh Yu, and Kuan-Wu Su, “Energy Efficient, Clustering Scheme for Prolonging the Lifetime of Wireless Sensor Network With Isolated Nodes” ISSN:1089-7798 volume 19 issue 2, 06 feb, 2015

[2] Qureshi, T. N. "BEENISH: Balanced Energy Efficient Network Integrated Super Heterogeneous Protocol for Wireless Sensor Networks." Procedia Computer Science 19 (2013): 920-925.

[3] Vidya K S Arun Anoop “Lifetime Enhanced Cluster Based Routing in Wireless Sensor Networks Computer Science”, International Journal of Engineering Science Invention, ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726 www.ijesi.org Volume 2 Issue 7 June. 2013 PP.69-72.

[4] M. Aslam “Review Paper on Routing Protocol Centralized Energy Efficient Clustering (CEEC) for Wireless Sensor Networks”,international journal for research in emerging science and technology, volume-1, issue-5, October-2014.

[5] Abbasi, Ameer Ahmed, and Mohamed Younis, "A survey on clustering algorithms for wireless sensor networks." Computer communications 30.14(2007): 2826-2841.

[6] I.F. Akyildiz, “Wireless sensor networks: a survey”, Broadband and Wireless Networking Laboratory, School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA 30332, USA, Computer Networks 38 (2002) 393–422.

[7] Sameer Tilak* and Nael B. Abu-Ghazaleh,” Collaborative storage management in sensor Networks”, Int. J. Ad Hoc and Ubiquitous Computing, Vol. 1, Nos. 1/2, 2005

[8] K. Shorabi ,“ protocols for self organization of wireless sensor networks”, IEEE personal communication “ISSN: 2277 128X volume 3 issue 1 january 2013