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A Survey on Beenish Protocol of Wireless Sensor Networks

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Abstract: Wireless sensor networks are the networks that help in communication between devices without any specific infrastructure present to do so. The basic idea behind wireless sensor network is spontaneous formation of network without any need of prior infrastructure, and when the nodes (users) within the sensor networks are allowed to move freely then that network is basically known as wireless sensor networks. The main work is to improve the network lifetime of network. So clustering is the most useful technique to improve the network lifetime and make it energy efficient. Here, in this paper we work on beenish to make it so advance by making it more energy efficient using clustering algorithm.

Keywords: wireless sensor networks, clustering, network lifetime, energy efficiency.

I. INTRODUCTION

Wireless communication technologies have seen extreme growth in wide area, leading to provide opportunities for networking and services. WSNs are the products which incorporate the sensing techniques, the embedded techniques, as well as the communication techniques. [8]

A wireless sensor networks comprises of hundreds to several nodes, doing work in an unattended environment and having properties like sensing computation and communication in between nodes and communication capabilities. It managed to establish the connection between the physical world, the computing world and society of humans. The major issues of wsn are the development of more energy efficient routing protocol. In terms and after study of protocols we assume that clustering is the affective way to improve the energy efficiency. Heterogeneous protocols consider two or three levels of nodes in which data can be processed in easy or a simple way. In this the cluster heads are elected on the bases of residual energy levels of nodes or protocols with clustering algorithm achieves more longer stability, lifetime and more effective message than other existing protocols.

In homogeneous WSN, all sensor nodes are of some initial energy whereas heterogeneous WSN has sensor nodes of different energy. As compared to homogeneous WSNs, heterogeneous WSNs consist of different types of sensor nodes with different abilities in terms of sensing, energy, computation and communication. These are basically four common types of heterogeneity in HWSNs as summarized below: [6]

I. The sensing heterogeneity, which includes different sensing ranges and varied sized of data packets.
II. The computational heterogeneity, which includes different data storage capacities and different data compression techniques.
III. The communication heterogeneity, which includes different transmission rates and different communication ranges.
IV. Energy heterogeneity, which includes different energy levels for different sensor nodes. [1]

Since their evolution in 1970's, wireless networks have become increasingly popular in the communication industry. These networks provide mobile users with high computing capability and information access regardless of the user location. The network characteristics of WSN are as follows:

- **Dense deployment of nodes:** The sensor nodes are densely deployed in area or field of interest. Thus, the number of sensor nodes in a sensor network can be several orders of magnitude higher than that in a BEENISH.
- **Battery powered sensor node:** The sensor node are usually powered by battery source. In most of the application scenarios, these nodes are deployed in a harsh or hostile environment where it is very hard or even impossible to change or recharge the batteries.
- **Limited energy, consumption and storage constraints:** The sensor nodes are highly limited in energy, storage and computation capabilities.
- **Self configurable:** The sensor nodes are usually randomly deployed without careful planning and engineering. Once deployed, sensor nodes have to self configured themselves in to a communication network as there is in a central administration.
- **Application specific:** The sensor networks are application specific and usually designed and deployed for a specific application. So, the design requirement of a network changes with its application.
- **Frequently changing topology:** Network topology changes frequently due to node addition, damage, failure, energy depletion and channel fading.
- **No global identification:** Due to large number of sensor nodes, it is usually impossible to build a global addressing scheme for a sensor network because it

would introduce a high overhead for the maintenance identification.

- **Many to one traffic pattern:** The information sensed by sensor nodes flow from multiple sources sensor nodes to a particular sink which possess a many to one traffic pattern.
- **Data redundancy:** In most sensor network applications, the sensor nodes are densely deployed in a region of interest and collaborate to perform a common sensing task. Hence, the information sensed by multiple sensor nodes typically has a certain level of redundancy.

II. RELATED WORK

T.N. Qureshi, N. Javaid, A.H. Khan, A. Iqbal, E. Akhtar and M. Ishfaq [1] the main work in this paper is on energy efficiency. Basically, the major issue of wireless sensor network is development of energy efficient routing protocols. Clustering plays an important role to increase the energy efficiency. Mainly, heterogeneous protocols consider two or three energy levels of nodes. Heterogeneous protocols contain large number of energy levels. By analyzing communication energy consumption of the clusters and large number of energy levels in heterogeneous wireless sensor networks we purpose BEENISH (Balanced Energy Efficient Network Integrated Super Heterogeneous Protocol) protocol. Wireless sensor networks consist of four energy level nodes. In simulation results shows that its performance is better than existing clustering protocols in heterogeneous WSNs. BEENISH achieves longer stability, lifetime and more effective results than DEEC (Distributed energy efficient clustering), Devoloped DEEC, and Enhanced DEEC.

Binkal S Ahir, Rohan Parmar and Bintu Kadhiwala [2]in this paper the main focus is on data aggregation. Data aggregation is an effective technique to save energy and to enhance the lifetime for the sensor networks. In various approaches, hierarchical cluster based data aggregation protocols are widely used due to high reliability and flexibility. But there is a problem of unbalanced energy dissipation in cluster based sensor networks.

So, the main problem addresses in this paper is unbalanced energy dissipation in cluster heads that transmit data to the base station via multihop communication. It proposes an energy efficient clustering algorithm for data aggregation (EECAD) in heterogeneous. The algorithm adopts some measures to increase stability period of network and to save the energy.

In simulation results EECAD exhibit better performance than LEACH and WB-TEEN in terms of energy consumption network, lifetime and balance energy dissipation.

Abhijit Singh and Shashi B Rana [3]in this paper states that routing in WSN has been one of major challenge as it has great impact on network lifetime and stability in the network; homogeneous and heterogeneous, the later has proven to be much more difficult to enhancing the network lifetime and making the network much more energy balanced with appropriate probabilistic cluster head selection.

In this paper E-BEENISH (Enhanced Balanced Energy Efficient Network Integrated Super Heterogeneous Protocol) is produced with much more approx 35% more stability period than the BEENISH and enhanced network lifetime upto approx 7200 rounds.

III. BACKGROUND STUDY

a) Introduction to BEENISH

BEENISH (Balanced energy efficient network integrated super heterogeneous protocol for wireless sensor networks). Beensih works to implement the same concept as in DEEC (Distributed energy efficient clustering). In terms of selecting cluster head which is based on residual energy level of nodes with respect to average energy of network.

In Beenish average energy of round can be obtained as follows:-

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$$E(r) = 1/N*Etotal\ (1-r/R) \qquad [7]$$

Where R is showing total rounds.

Where R=E (total) / E (round)) [9]

In BEENISH, the concept of four levels heterogeneous nodes are used that are: [2]

$$Pi = \begin{cases} \dfrac{poptEi(r)}{(1+m(a+m0(-a+b+m1(-b+u))))E(t)} & Si \text{ is the norm node} \\ \dfrac{Popt(1+a)Ei(r)}{(1+m(a+m0(-a+b+m1(-b+u))))E(t)} & Si \text{ is the adv node} \\ \dfrac{Popt(1+b)Ei(r)}{(1+m(a+m0(-a+b+m1(-b+u))))E(t)} & Si \text{ is the sup node} \\ \dfrac{Popt(1+u)Ei(r)}{(1+m(a+m0(-a+b+m1(-b+u))))E(t)} & Si \text{ is the ult node} \end{cases}$$

Fig: Taken from reference [5]

b) Introduction to **Data aggregation**:

Data coming from multiple sensor nodes are aggregated if they are about the same attribute of the phenomenon when they reach the same routing node on the way back to the sink.

- Solve the overlap problem
- Energy efficient

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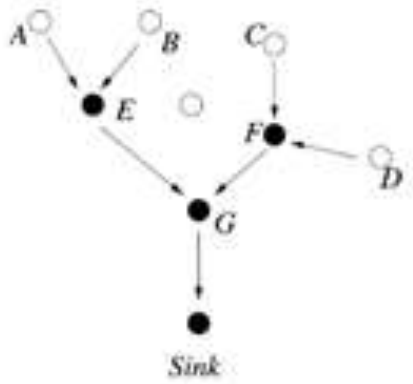

There are four types of data aggregation [3]

A. Chain based data aggregation

The data is sent to the closest neighboring sensor node. Each node knows the addresses and location of other nodes and determines the distance to its neighbour sensors.Then the process of adjusting the signal strength to place the communication of data only with the closest neighbours is done. In this basically aggregation data is sent only to the closest neighbor and then the selected node transmit data to the base station node. [4]

B. Greed based data aggregation

The data is forwarding into three steps: first, the cluster grid construction process. Second, query forward and last data forwarding. The sensor nodes with in a grid do not communicate with each other and any sensor with in a grid can assume the role of a data aggregation in terms of specified periods until all nodes dies. [4]

C. Tree based data aggregation

The path is computed centrally using base station or done by computing shortest path (SP) algorithm at particular node. The path information is broadcasted to the network. In collection phases, all the leaf nodes forward data to its parent and then it roots towards the base station. If any failure persist in root than it blocks the data.[4]

D. Cluster based data aggregation

In this sensor nodes are sub divided into number of clusters. Cluster heads are elected in order to aggregate data locally and transmit this data to the base station. This technique solves the problem of transmission delay and loss if data caused due to node failure in root to the base station. [4]

c) Introduction to EBEENSIH

E-BEENISH aims to achieve high throughput and much improved network lifetime. [1]

A. Network Model**:** In this it assume that sensor node deployment is randomly uniform in a square area. Assumption is a made that all nodes in the network has the following properties.

- All nodes are determined to be static which mean there is no movement of nodes once they are deployed.
- All the nodes are same and have the same initial energy at the beginning.
- Each node is having the ability to merge the redundant data.
- Nodes do not posses any GPS equipment and their relative distances are calculated on the basis of received signal strength.

B. Cluster formulation and cluster head selection**:** In this we deal four level of heterogeneity like in BEENISH consisting of normal nodes, advance nodes, super nodes and ultra nodes. This is the first time any protocol used four levels of heterogeneity in the network. P (i) is the probability of the node to become the cluster head and is expressed differently by the different protocols like DEEC, EDEEC and DDEEC etc. The concept of threshold is being applied in the EDDEEC for the three levels of energy heterogeneity but never been done the same in the four level.

$$P(i) = \begin{cases} \dfrac{Popt * Ei}{1+m(a+m0(-a+b+m1(-b+u))) * Ea} & \text{norm nodes if } Ei>Tab \\ \dfrac{Popt * Ei * (1+a)}{1+m(a+m0(-a+b+m1(-b+u))) * Ea} & \text{adv nodes if } Ei>Tab \\ \dfrac{Popt * Ei * (1+u)}{1+m(a+m0(-a+b+m1(-b+u))) * Ea} & \text{sup nodes if } Ei>Tab \\ \dfrac{Popt * Ei * (1}{1+m(a+m0(-a+b+m1(-b+u))) * Ea} & \text{ult nodes if } Ei>Tab \\ \dfrac{C * popt * Ei * (1+u)}{1+m(a+m0(-a+b+m1(-b+u))) * Ea} & \text{all nodes if } Ei>Tab \end{cases}$$

Fig: Taken from reference [1]

IV. CONCLUSION

It is clear that BEENISH is energy efficient protocol than other protocols like DEEC, DDEEC and EDEEC. But the main focus of my work is to improve it from E-BEENISH by making my protocol more energy efficient. So that I am going to apply k means clustering algorithm in between beenish to enhance it from EBEENISH.

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REFERENCES

[1]. Abhijit Singh, Shashi B. Rana,"Enhanced Balanced Energy Efficientt Network Integrated Super Heterogeneous Protocol for Wireless Sensor Networks", IJEEE, Vol.2, June 2015.

[2]. T.N. Qureshi, N. Javaid, A.H. Khan, A. IQBAL, E. Akhtar, M. Ishfaq, " Balanced Energy Efficient Network Integrated Super Heterogeneous Protocol for Wireless Sensor Networks", International workshop on body area sensor networks. (2013)

 ISSN: 2320-7868 (Online)

[3]. Binkal S Ahir, Rohan Parmar, Bintu Kadhiwala," Energy efficient clustering algorithm for data aggregation in wireless sensor network". (2015)

[4]. R. Rajagopalan, P.K. Varshney," Data aggregation techniques in sensor networks a survey", Communication surveys & tutorials, IEEE, vol.8, no.4, pp.48-63, fourth quarter 2006.

[5]. B. Macdonald, T. Znati, " design and performance of a distributed dynamic clustering algorithm for ad-hoc networks", in proceedings of the annual simulation symposium, 2001.

[6]. M. Yarvis, N. Kushalnagar, H. Singh," Exploiting heterogeneity in sensor networks", proceeding of 24th annual joint conference of the IEEE computer and communication societies (INFOCOM), Miami, FL, United States, pp. 878-890, 2005.

[7]. Aslam. M, Shah. T, Javaid. N, Rahim. A, Rahman. Z, Khan. Z. A," CEEC: Centralized energy efficient clustering a new routing protocol for WSNs", Poster session of 9th annual IEEE communications society conference on sensor, Mesh and Ad hoc communications and networks (SECON2012), Seoul, Korea, 2012

[8]. I.F. Akyilidiz, W. Su, Y. Sankarasubramaniam and E Cayirci," A survey on sensor networks", IEEE communications magazine, vol.40, no.8, pp.102-114, 2002.

[9]. Latif. K, Jaffar. M, Javaid. N, Saqib. M. N, Qasim. U, Khan. Z. A," Performance analysis of hierarchical routing protocols in wireless sensor networks", 5th international workshop on next generation of wireless and mobile networks (NGWMN 2012) in conjunction with 7th IEEE international conference on broadband and wireless computing, communication and application (BWCCA 2012), victoria, canada, 2012.

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Jitesh student of M. Tech computer science and engineering branch at CT Institute of Engineering & Management. My main thesis topic is to work on wireless sensor network. In this I am working on WSN protocol and clustering algorithm to make protocol more energy efficient than before.

Ms. Varsha assistant professor at CT Institute of Engineering and Management. She is my guide during my research and helps me to know more about wireless sensor networks and its protocols. She helps me also to know about clustering algorithms.