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RESEARCH ARTICLE

A NOVEL APPROACH OF IMPROVED STABLE ELECTION PROTOCOL (I-SEP) IN WSN

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ABSTRACT

In this paper with emergence of Wireless sensor networks (WSN) are progressivelyprepared to control more challengingpurposes, in-network handlingmay possiblyinvolve theThreshold powerdevices to carefullyusagein controlled energy to extend the actual network lifespan time exclusively in a heterogeneous backgrounds. Assembled (cluster)methods need energetic to enhance energy consumption in this energy controlled wireless sensor networks. This Research intends an Improved-SEP clustering process in a multi-hop node state to extend the operative network lifespan time and average energy consumption with saturated round of nodes. Experimental analysisdisplays that the I-SEP (Improve stable election protocol) getsimproved performance in this respect, associated to formerpresent clustering systems in individually heterogeneous and homogenous settings. Show of this protocol has beenestimated in MATLAB and graphical outcomes have beenshown in Result. The concert of I-SEP is enhanced than SEP inform of main node expires in everyroundandwhole number of packetsdistributed with constant gain energy consumption. In our concept dynamic source distance based parameter routing protocol we have evaluate which minimize average energy consumption and improve network lifetime.

Keywords: WSN, Multi-Hop, I-SEP, Base Station.

I.INTRODUCTION

WSN has developed an interesting field of research. The device or sensor nodescontain homogeneous or heterogeneous. Homogeneous sensors hardly exist. This paper reports the heterogeneous wireless sensor networks (HWSN) for amplified reliability of the network. The key of clustering method to increase the network lifetime, energy consumption decrease and increase the scalability of the sensor network. An accessible sensor network is gained by resources of clusters. A cluster head (CH) can be selected or pre-assigned. Severalclustering algorithms must be consideredthat is LEACH [11], PEGASIS [12], TEEN [13], APTEEN [14]. Energy efficient routing is possible by means of cluster based routing.

Advantages of clustering

a) Decreases the size of the routing table by restricting the route setup within the cluster) Conserves communication bandwidth
b) Protracted battery life of individual sensor
c) No topology preservation overhead.
d) Reduce rate of energy consumption

In HWSN, inexpensive nodes achieve sensing and cluster heads perform data filtering, transport and fusion. Real time deployments of sensors employ HWSN.

SEP (Stable election protocol)

SEP [7] protocol is anenhancement and improvement of LEACH [6] protocol which uses clustering based routing approach based on the node heterogeneity of the sensor node in the networks. In this protocol and method, some of the sensor nodes have high energy they are mentioned to as the progressive nodes and the probability of the advanced nodes to become CHs is more as associated to the normal nodes and the normal nodes have lower energy as compared to the advanced nodes in the network. SEP strategy uses a dispersedtechniqueto select a CH in WSNs. It is heterogeneity-aware protocol and CH selection probabilities of nodes are weighted by initial energy of each node associated to the other nodes in WSN. So essentially, SEP protocol is based on two levels of node heterogeneity as normal nodes and advanced nodes.

- Let, miss the fraction of total number of nodes n, which areorganized with α times more energy than the others nodes.
- These controlling nodes are as advanced nodes.
- The remaining (1 − m) × n nodes are as normal nodes.
- Probability of normal nodes to become CHs is calculatedas

$$\text{Pnor} = \frac{Popt}{1 + m.\propto}$$

- Probability of progressive nodes to become CHs is calculated as

$$\text{Padv} = \frac{Popt}{1+m.\propto}(1+\alpha)\text{.....................}1$$

Poptis the optimal probability of each node to become CH in the network. In SEP [7][8]approach, selection of CH is done arbitrarily on probability basis for each node. Sensor nodes unceasingly sense data and communicate it to their associated CH and CH transmit that data it to the sink or base station (BS). This scheme can be more improved by increasing the value of mor Padv. Due to advance nodes with two level of node heterogeneity, SEP [7] strategy results in high stable time period, high network lifetime and high throughput.

Multi-hop Heterogeneous

With the development of micro-sensor and wireless technology, wireless sensor networks are organized in various applications. In a continuous observing application, sensors collect information and transmit the sensed data to base station in anepisodic manner. In each data assembly round, a node produces a data packet and transmits the packet to base station, or any other node; the data packets established from bordering nodes can be combined. The lifetime of such sensor scheme is the time until base station receives data from all sensors in the network. We propose an improvement stable election protocol algorithm (I-SEP) based multi-hop routing for a heterogeneous network to exploit the network lifetime. Assumed the location of the sensor nodes and base station, our algorithm generates a sequence of routing paths that maximizes the system lifetime

II.LITRATURE REVIEW

Improvement in the network life has been obtained because of the cluster head has not dead ever. As a cluster have head has been died it has been replaced by its vice Cluster head. Babaie et al. [2] have proposed a novel method to select a cluster Head. LEACH protocol has set threshold value to 0 for next 1/p rounds when a node has been selected as a cluster head. This technique optimized LEACH method, by adjusting threshold considering some factors. Proposed algorithm has settled the threshold of each node correspondingly to the number of live and dead nodes in each round, so the probability for more nodes has been established to become clusterhead. Energy factor has taken into consideration in this technique, During Cluster Head selection phase and no-cluster-head selecting node as its cluster head, although data communicating procedure is the same as LEACH. This algorithm measured the number of alive and dead nodes in each round to control the threshold value. Probability of choose the cluster-head has been increasing after rounds. Consideration of number of live and dead nodes in each round has been to analyze the Threshold. It decided that the proposed method can reduce the low energy level sensor nodes to be designated as cluster heads, and set up the energy Balance of network load. Furthermore, Results have been achieved better network lifetime in WSN. Consequently, the method to change the threshold might be an actual way to determination the problem of network energy consumption as this methodclarified.

Ahlawat et al. [1] has proposed a new technique in which concept of Vice Cluster head has been taken out to improve the network lifetime. Vice Cluster head has been selected as alternate head that has worked when the cluster head has fallen down. Criteria for the selection of vice cluster head have set up on the basis of three factors i.e. Minimum distance, maximum residual energy, and minimum energy. Bakr et al. [3] have made focus mainly on extending the WSN lifetime. Lifetime has been extended by making WSNs redundant by adding spare nodes. The passive (switched off) spares has been made available to become active (be switched on) whenever any active WSN node energy exhausted. A new proposed LEACH-SM (LEACH Spare Management) has modified the prominent LEACH protocol by enhancing it with an efficient management of spares. Addition of the spare selection phase has been done in LEACH; this functionality has been named as spare management features in LEACH-SM. During Spare Selection phase, each node has been decided in parallel whether it would be become an active primary node, or a passive spare node. The nodes decided spares go asleep, while the WSN as the whole has been maintained the required above-threshold target coverage. (The spares have awakened when the probability that any primary node exhausted its energy reaches a predefined value.) Identification of spares alone has been increased energy efficiency for WSNs as proved, Decentralized Energy-efficient Spare Selection Technique has been used in spare selection phase by spare manger. Reduction in the duration of the active interval for cluster heads has been observed, considered as a side effect. Reduction energy consumption by cluster heads has been observed mainly. Beiranavand et al. [4] have proposed a enhancement in LEACH named I-LEACH, An Improvement has been done by considering basically three factors; Residual Energy in nodes, Distance from base station and number of neighboring nodes. A node has been considered as head node if it has optimum value for discussed three factors i.e. have more residual energy as compare to average energy of network, more neighbors than average neighbors for a node calculated in network and node having less distance from base station as comparison to node's average distance from BS in network. Reduction in energy consumption and prolongation in network life time has been observed.

III.PROBLEM DEFINITION

Popular SEP protocol the robust nodes (which have the extra energy) become cluster head more commonly than the normal nodes. Due to this, the network lifetime increases. The stability period also growths and the cluster is balanced when the first node dies as well as large amount of sensor nodes are dead. One of the problems in the TSEP (Threshold SEP) protocol is that the clusterhead which are far away to the base station will consume more energy and are dying very often. While cluster-heads which are near to the base station takes operation until end, that will cause network instability and the network lifetime is greatly affected. We will try to enhance the lifetime of the network by avoiding direct broadcastmethod;in its place we have used the multi-hop transmission method. By this technique we can enhance the lifetime of sensor network. The parameters for the developments of results for simulation are described below:

• Stability period: - It is define as the time intermission between initial of the operation of the network and to the demise of the first node. It is also called “stable region.”

• Instability period: - It is defined as the time interval between the demises of first sensor node to the expiry of last node.

• Cluster head per round: - It is the quantity of nodes that sends data to the sink directly after collecting the data.

• Network lifetime: - It is defined as the watching of the network operation to the decease of the last node.

• Throughput: - It is defined as the rate of data sent over network, it contains both the data transfer i.e., from node to cluster head and cluster head to sink. From the overhead definition, we can say that the best network is having largest stable region and lowermostunbalanced region but there is a compromise between lifetime and reliability of sensor network, because till the demise of last sensor node we are having some data but it is not reliable.

IV. SYSTEM MODEL

We mark the following basic norms for WSNs in this paper:

1. All sensor nodes are fixed after deployment;

2. Every sensor node has a unique ID;

3. Links are symmetric;

4. There are no problem objects between communication pair;

5. Sensor nodes are location-aware and can adjust their transmission power based on distance.

As can be seen from the conventions above, the network is not expected to be homogenous. It can be heterogeneous with various types of sensors and sink nodes (static or mobile ones).

Heterogeneous Network Model

This segmentdefines the heterogeneous wireless sensor network model used in the paper. Network model consists of N sensors which are randomly deployed in a 100 X 100 square meters region. Some of the expectations made about the network model and sensors are as follows:

- Base station is located in the middle of the sensor field.
- Base station and nodes are stationary after deployment.
- Nodes endlessly sense the region and they continuously have the data to send to the base station.
- Nodes do not have any information about their location i.e. they are location uninformed.

- Some percentage of the nodes has high energy then the other nodes.
- Due to the exacting environment condition it is not possible to recharge the batteries of the nodes.

V. PROPOSED IMPLEMENTATION

Now this segment we define our new protocol I-SEP (Improved- Stable Election Protocol) which has two mainfeatures: "It is reactive routing protocol "which follow multi dimensionally packet routes configure on the basis of distance coefficient would cover higher energy node cluster then we have to apply 4 times distance coefficient directionallyproportional to minimum packet transmission cluster areas which improve and get constant average energy consumption and minimize dead node occurrence , as broadcastconsumes more energy than identifying and it is done onlywhen a specific threshold is reached and "Three levels ofheterogeneity". To define whole protocol obviously we particularly deliberateabout energy model and how optimal number of clusters canbe calculated. For three levels of heterogeneity, nodes withdifferent energy levels are:
1) Normal Nodes
2) Intermediate Nodes (Transmission Helper)
3) Advance Nodes

Advance nodes having energy better than all other nodes,middle nodes with energy in between normal and advancenodes while residual nodes are normal nodes. Middlenodes can be chosen by using b, a fraction of nodeswhich are intermediate nodes and using the relation that energyof normal nodes is μ times more than that of normal nodes.
In SEP energy for normal nodes is Eo, for advance nodes itis EADV = Eo(1+α) and energy for middle nodes canbe computed as…
EINT = Eo(1 + μ), where $\mu = \alpha/2$.
So, total energy of normal nodes, advance nodes and forintermediate nodes will be,
n.b(1 + α), nEo.(1 − m − bn),and n.m.Eo.(1 + α) respectively.

So, the total Energy of all the nodes will be,

$$nEo.(1-m-bn*bn) + n.m.Eo.(2 + \alpha) + n.b.(1 + \mu) = n.Eo(1 + m\alpha + b\mu).$$

$$nEo.(1-m-bn*bn*bn) + n.m.Eo.(2 + \alpha) + n.b.(1 + \mu) = n.Eo(1 + m\alpha + b\mu).$$

Where, n is number of nodes m is percentage of advancednodes to total number of nodes n with energy more than restof nodes and b is percentage of intermediate nodes.
The best probability of nodes, which are separated on thebasis of energy, to be elected as a CH can be intended byusing following formulas:

$$Pnrm=popt/(1+.\alpha)+b.\mu \ldots\ldots 2$$

$$Pint=popt.(1+\mu)/(1+ m.\alpha) + b.\mu \ldots\ldots 3$$

ISEP_Pint=Pint/(1+ m.α) + b.μ………………4

Padv=popt.(1+α)/(1 + m.α) + b.μ……………..5

ISEP_Padv=Padv/(1 + m.α) + b.μ……………..6

At the present to ensure that CH selection is done in the same wayas we have assumed, we have taken another parameter intodeliberation, which is threshold level. Each node generatesrandomly a number comprehensive of 0 and 1, if generated valueis less than threshold then this node becomes CH [2], [12].For all these type of nodes we have different formulas forthe calculation of threshold depending on their probabilities,which are given below:

M-nrm={pnrm/1−pnrm[r.mod1/pnrm] ……….7

If No of Gain'

otherwise

M-int={pint/1−pint[r.mod1Pint

ifnintϙG" otherwise…………………………..…8

M-adv(multihop-advnc) ={ padj/1−padv[r.mod 1padv]

if nadvϙG"' otherwise………………………….9

G′, G" and G"' are the set of normal nodes, intermediatenodes and set of advanced nodes that has not become CHs inthe past respectively, so ensuring that the equations (2), (3)besides (4) are working.

Average total number of CHs per round will be:

n.(1−m−b).pnrm + n.b.pint + n.m.padj = n.popt…………………………….……………..10

Although, average number of CHs is same as that of LEACH,SEP and ISEP. However, here a good aspect of MSEP is energydissipation is reduced due to energy heterogeneity.At the start of each round, here takes place the phenomenonof cluster change. In case of MSEP, at cluster change time,the CH transmissions the following parameters.

VI.RESULT

A network consisting of 100 nodes, placed randomly in a region of MxM and a BS located in the center is considered.

The Instability of period between first dead node and last dead node.
3) Number of alive nodes per round.
4) Number of dead nodes per round.
5) Throughput, number of packets sent from cluster heads to base station.
We performed simulations for different values of α and m while keeping b constant that is 0.3. For the first case α = 1, m= 0. 1, for second case α = 3 and m = 0. 2.
This is done to observe change in network's stability, life and throughput relative to increase in number of advance nodes and their energies. Since popt= 0. 1, is the optimal probability of CHs, by using equations (2), (3) and (4) we obtained different probabilities for each type of nodes in accordance with different values of α and m. Other parameters used in simulations are shown in Table 1.

Parameter	Values
Simulation Round	**100**
Sink Location	**0.000005**
Network Size	**100*100**
Initial Energy	**Eo (0.5)**
Initial energy of advance nodes	**3 j**
Distance threshold	**2 mm**
Multi root dist from higher e.ad	**10 mm**
Energy for data aggregation EDA	5 nJ/bit/signal
Transmitting and receiving energy *Eelec*	5 nJ/bit
Amplification energy for short distance Efs	111 Pj/bit/m2
Amplification energy for long distance Eamp	0.014*pJ/bit/m4*
Probability Popt	0.3

Comparing all these protocols, SEP and I-SEP being heterogeneous, probability based protocolsresult in approximately equal stability period and network life.
By performing simulations in MATLAB, it is observed that:

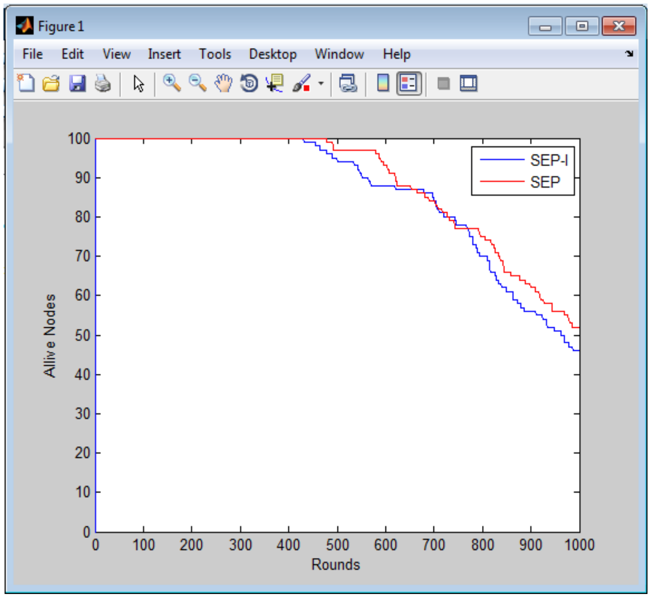

Figure 1: Alive nodes in initial stage for 1000 rounds

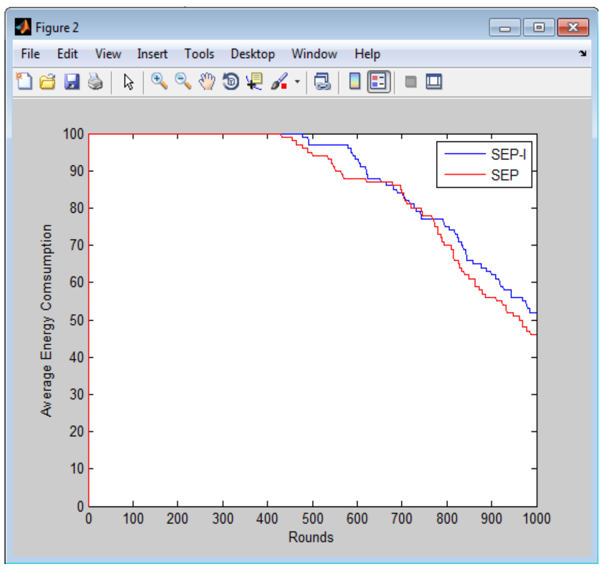

Figure 2:Average energy consumption I 1000 rounds

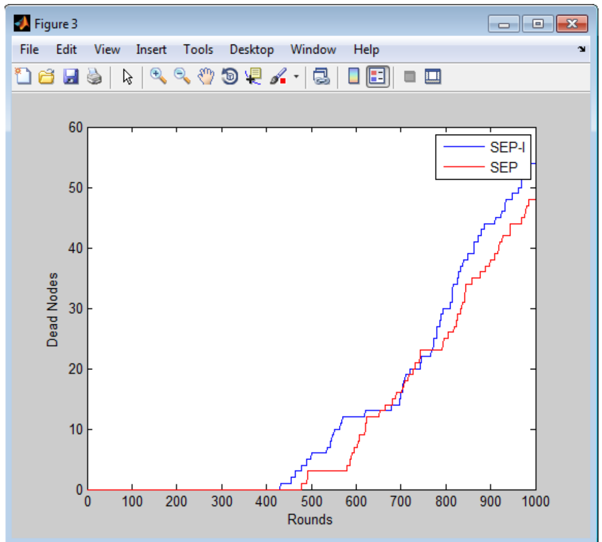

Figure 3:Dead nodes in 1000 rounds

SEP has enhanced stability period than all other protocols. The network life for TSEP was increased as compared to others.Increase and decrease in number of alive and dead nodes respectively.

VII.CONCLUSION

In this paper, we proposed I-SEP as a reactive networkrouting protocol with three different levels of node heterogeneity. The I-SEP syndicates the best features of I-SEP and energy level estimation method. Due to the concept of energy level based cluster head selection, hard and softthreshold value, three levels of node heterogeneity and beingreactive routing network protocol I-SEP produces increase in energy efficiency, enhanced lifetime of network and maximum throughput as shown in the simulation result. In comparison with SEP it can be concluded that our protocol I-SEP will perform well in small as well as large geographical networks and best suited for time critical applications.

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