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Implementaion of Energy Efficient Protocol for Wireless Sensor Network

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Abstract — **this paper contains the algorithm, implementation and results of the emery efficient algorithm for routing in Wireless Sensor Network. The WSN nodes have limited power backup. Complex routing algorithms would drain the battery and it will decrease the overall efficiency of the network. The proposed algorithm saves the power for the efficient routing.**

Keywords: Sensor nodes, wireless network, energy efficient routing, WSN

I. INTRODUCTION

The emerging field of wireless sensor networks combines sensing, computation, and communication into a single tiny device. Through advanced mesh networking protocols, these devices form a sea of connectivity that extends the reach of cyberspace out into the physical world. As water flows to fill every room of a submerged ship, the mesh networking connectivity will seek out and exploit any possible communication path by hopping data from node to node in search of its destination. While the capabilities of any single device are minimal, the composition of hundreds of devices offers radical new technological possibilities.

The power of wireless sensor networks lies in the ability to deploy large numbers of tiny nodes that assemble and configure themselves. The most straightforward application of wireless sensor network technology is to monitor remote environments for low frequency data trends. For example, a chemical plant could be easily monitored for leaks by hundreds of sensors that automatically form a wireless interconnection network and immediately report the detection of any chemical leaks. Unlike traditional wired systems, deployment costs would be minimal. Instead of having to deploy thousands of feet of wire routed through protective conduit, installers simply have to place quarter-sized device, such as the one pictured [1]. The applications of wireless sensor networks are given below:

Fig 1: geographically deployed sensors

A) Intrusion detection
B) Avalanche prediction
C) Building Automation
D) Process control
E) Environmental data collection
F) Security monitoring
G) Node tracking

II. TOPOLOGY CONTROL

Topology control is the mechanism by which nodes are arrange in such a way based upon their transmission range to increase network capacity and reduce node energy consumption.
The main goal of topology control is:

1) Homogenous critical transmission range: every node has the same transmission range

2) Heterogeneous critical transmission range: every node has the different transmission range.

III. NON HOMOGENOUS TOPOLOGY

The non homogenous topology can be classified as:
a. Location based Topology control
  i. Range assignment and variant
  ii. Energy efficient communication
b. Direction based Topology control
c. Location free Topology control

A. **Location based approach** can be applied when the node location are known to compute the corresponding topology. This topology control scheme can be applied to both centralized and distributed network. In case of centralize schemes the information about node location is used by centralized authority to calculate set of transmitting range. And in case of distributed network information is transformed between various nodes to find out the optimal transmission range. In sensor network the nodes are equipped with low power GPS receiver to find out the appropriate position. As it is a new hardware attached to node it increases the cost factor which is a disadvantage in this scheme

B. **Direction based protocol** topology control schemes depend upon the ability of node to find the relative direction of their neighbours. It is actually less accurate information than location. If the direction is given then we can find out the location. IEEE antenna and propagation community proposed various mechanisms for estimation of direction in which the node transmit. This problem is known as Angle - of- arrival problem. This can be solved by equipping nodes with one directional antenna. Advantage of using Angle-of-arrival technique rather than location based techniques is that it can be use in case of indoors application.

C. **Location free topology control** knowledge about their neighbour by some message passing schemes. So that each and every node should know some minimal amount of information about their neighbour it. The information may be node id, location and order them according to certain criteria. Every node requires some minimum amount of information to build network topology it may be number of node or node id. If the node not able to find out information about the neighbour it is very difficult to built topology. [2]

IV. PROPOSED ALGORITHM

Input:
N: number of nodes in a wireless sensor network
G: maxpower graph
L(Xx, Yx): Location of each node x in the G
OUTPUT: transmit power level of each node P to form a connected topology.
Pmin: minimum required power to communicate through a distance d, it is a function of distance.
NC: number of cluster
C: number of possible nodes
R: sorted pair list
OUTPUT: Transmit power level of each node P to form a connected topology
{
  Begin
    1) Initialization
    D(x,y)-0
    Pmin= a*d(x,y)
    N=0
    Create cluster per node depending upon N
    C=0
    NC=0
    2) Enter number of nodes N
    3) Calculate the Euclidian distance d(x,y)
    4) Arrange the (x,y) on the basis of d(x,y) in ascending order and store in R and return C
    5) NC=N
    6) For i=1 to C
    a. Select_node_pair(C)
    7) If cluster of both node pair are different then

8) Assign P(x) and P(y) to the d(x,y)
9) Merge Both node pair cluster to form new cluster
10) NC=NC-1
11) If NC is equal to 1 then stop
12) Minimum_ power(G,pmin,P,k,R)
13) End

}

Procedure minimum_ power (G, p_{min}, P, k, R)
{

1. For i=N to 1
2. Select(node)
3. Create a set S of node pairs in which the selected node is the source or destination node.
4. Arrange the set S in descending order of d(x,y)
5. Calculate pmin for each node and compare with the power level of each node
6. If pmin(d)>P(u) then Remove that node pair from T
7. Search node pairs in T and check if P(u)=pmin(d) then the graph is not K connected stop
8. Else assign P(u) to pmin(d)

}[4]

V. IMPLEMENTATION

I created each node that is present in the (node.cs) file and specified the attribute of each node that is the node location in term of x-coordinate and y-coordinate, Node id, power associated with each node, receiver sensitivity and the Euclidian distance from node considered to the all other node. Each and every node has some region of communication that is known as node boundary. we here assign node boundary to each and every node. Location of each and every node are randomly assigned and the node location are checked with the boundary condition whether the node present inside the boundary or not. If it is present inside the boundary then considered otherwise discarded. Another node attribute is the node id of the destination node to which the current node can communicate. We first made cluster for each and every node by specifying the node boundary .In which the node can able to communicate. The cluster can be created by the help of generic collection class present in the System.

Syntax:

1. List<node> li=new List<node> ()
2. For n is greater than 0
3. li.Add(new node())

Here List is a collection which can contain object of type node. All the node property including the node id, power, boundry condition etc is encapsulate in the respective list object. List object are nothing but nodes. And every List object can be access by the help of indexer e.g. li[i] where i represent node no. After that from each location the Euclidian distance can be found out. And from this distance we can found out the power associated with each node by applying the following formula:

$P_{uv}= (D (u, v))^{\beta} *c$
Where C=path loss component
β=Distance power gradient
Here we consider the free space propagation model so for this model the value of β be 2 and c=1
So the generalized formula is:
$P_{uv}= (D (u, v))^2$

Initially all the calculated power assign to each node and all nodes transmit with this maximum power. Then by applying the above algorithm we can calculate per node minimal transmit power. Here I take k=1 that is for one – connectivity only. Here one thing I took pmin as constant multiple of x let say a and the value of 0≤a<1.With pmin we check the connectivity issue in the minimum power procedure. Here I write the program for 20 nodes. Then the average transmits power of the entire node for a particular number of nodes calculated. And a graph is plotted between the density and the average transmits power of node.

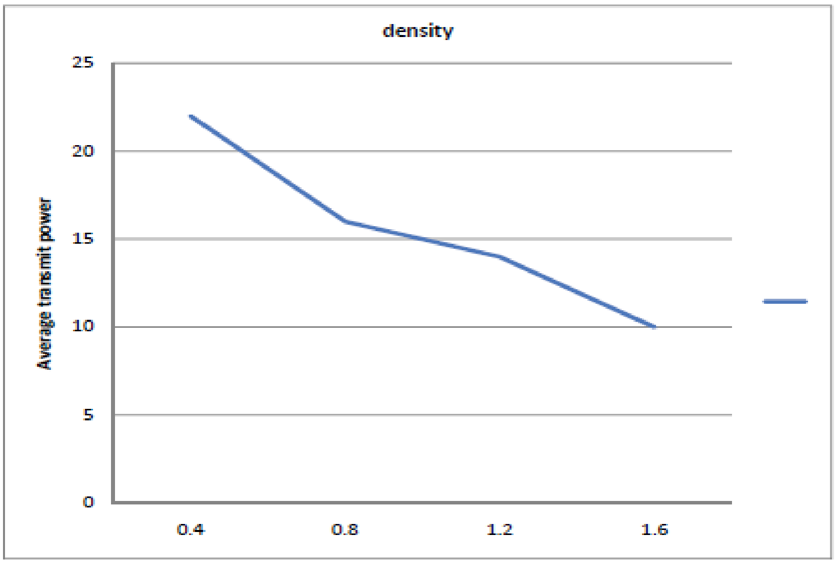

Fig 2: Graph of density and average energy of node

VI. CONCLUSIONS

Here we plot a graph between density and average energy of node in a wireless sensor network. From this result we found that with increase in density the average power decreases because suppose a area of radii 2 contain two nodes then the Euclidian distance between node are larger as comparison to ten nodes in the same area because their mutual distance decreases . As the power is calculated directly from distance and with increase in distance the power increases and vice-versa. Here the density plotted on x- axis and average power on y-axis.

VII. REFERENCES

[1] Carlos de Morais Cordeiro, Dharma Prakash Agrawal ,Ad-hoc and sensor networks theory and application,World Scientific publication,2006

[2] Paolo Santi, Topology control in wireless Ad-hoc and Sensor networks, Jhon Wiley and son’s publication, 2005.

[3]prasant mohapatra, srikanth Krishnamurthy, ad-hoc networks technologies and protocols, Springer Science + Business Media, 2005

[4]Ram Ramanathan, Regina Rosales-Hain, Topology Control of Multihop Wireless Networks using Transmit Power Adjustment, Internetwork research department, BBN Technologies Cambridge, Massachusetts, (IEEE Infocom 2000) 2000; 404-413.

[5] Jang –Ping Sheu, Shin – Chih Tu, Chi- Hung Hsu, and Location-free topology control protocol in wireless ad hoc networks, Computer Communication 31(2008) 3410-3419.

[6] Prasan kumar sahoo, jang- ping Sheu, Kun-Ying Hsieh, Power control based topology construction for the distributed wireless sensor networks, Computer Communication.