

# Design and implementation of Self Organized Tree Based Energy Routing Protocol in WSN

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**ABSTRACT:** Wireless sensing element Networks (WSNs) may be a promising structure accustomed assist the stipulation of the many military and industrial services. They need many alternative constraints, like machine power, storage capacity, energy offer and etc. area unit the vital issue is their energy constraint. Several problems wait and see the effectiveness of WSNs to support completely different applications, like the resource orbit of sensing element devices and the finite battery power. To beat this downside and to enhance the performance needn't solely to minimize total energy consumption however additionally to balance WSN load. During this analysis, a completely unique tree primarily based routing protocol is planned that builds a routing tree employing a method wherever, for every spherical, SB assigns a root node and broadcasts this choice to all or any sensing element nodes. Later, every node selects its parent by considering solely itself and its neighbors' info, so creating a dynamic protocol. The simulation results shows that the planned approach performs higher that alternative existing approaches.

**KEYWORDS:** Energy Balance, Routing Protocol, Self-organized, Wireless Sensor Networks.

## I. INTRODUCTION

A wireless device network composed of little sensing devices that typically perform on battery power. Device nodes area unit closely organized in the region of interest [1]. Every device has sensing and wireless communication capabilities, which facilitate it to sense and collect data from the environment and so send the information to other nodes within the device network. Earlier days, it's been received terrific concentration from each academe and business area.[2] A WSN normally consists of an outsized range of affordable, less-power, and multifunctional wireless device nodes, with sensing, wireless communications and calculation capabilities [3]. These device nodes communicate over short distance through a wireless medium and work together to realize a general task like setting monitoring, military observation and industrial process management [4]. The essential factor in WSNs is, the capability of every individual device node is restricted, and also the combination power of the full network is enough for the desired task. In spite of the many applications of WSNs, these networks have varied restrictions, e.g., limited energy offer, restricted computing power, and restricted information measure of the wireless links connecting device nodes. The most aim of WSNs is to perform digital communication whereas making an attempt to extend the life of the network and avoid connectivity degradation by exploitation aggressive energy management approaches. The look of routing protocols in WSNs are subjective by several risky factors. These risk factors is conquer before economical communication is earned in WSNs. Considering the restricted energy capabilities of associate degree individual device, a device node will sense to terribly small area, thus a wireless device network features a giant number of device nodes organize in terribly high density that reasons for rigorous issues such as quantifiability, redundancy. Reducing the number of communication by eliminating redundant detected data and by means that of the energy-saving link would save great deal of energy, so the life Of the WSNs gets redoubled [5].

In general, WSN could turn out quite substantial amount of information, thus if information fusion may well be used, the throughput may well be reduced [6]. As a result of device nodes area unit deployed densely, WSN would possibly generate redundant information from multiple nodes, and the redundant information is combined to scale back transmission. Most of the protocols implement information fusion, however around all of them take into account that the length of the message transmitted by every relay node be purported to be constant [7]. PEGASIS [8], PEDAP [9]

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and TBC [10] are representative protocols supported this thought and perform far better than LEACH [6] and HEED [11] during this case. Hence, many advanced techniques that eliminate energy inefficiencies that may condense the period of time of the network are extremely essential. Such constraints combined with a typical deployment of enormous variety of sensing element nodes cause many challenges to the planning and management of WSNs and necessitate energy-awareness in any respect layers of the networking protocol stack. In this research work, AN economical routing protocol proposed to beat the aforesaid problems in previous studies.

## II. LITERATURE SURVEY

In [12] the author planned a hybrid protocol called HECTOR protocol supported 2 sets of virtual coordinates. One set is corresponding to frozen tree coordinates, and also the different one is predicated on hop distances on the thanks to some landmarks. In HECTOR, the node presently holding the packet forwards it to its neighbor that optimizes magnitude relation of power value in way over distance progress with landmark coordinates, alongside nodes that reduce landmark coordinates and don't increase distance in tree coordinates. The experimental results theoretically shows that the packet delivery performance and propose an extension supported the use of multiple trees. The author given a unique routing protocol that considers sensors power limitation and increase the network's lifespan by eliminating extra messages between nodes [13]. This protocol is based on Tree Routing (TR). It routes the info over the shortest path via parent kid links in convoy with neighbors' links. Additionally, it solves the difficulty of node's failure. The planned protocol is examined and evaluated with different tree-based routing protocols. A new stratified energy economical routing protocol for detector networks is planned by the author that looks upon congestion management [14]. Routing protocol separate the network into several clusters exploitation Dijkstra rule builds a routing tree for every cluster. In routing tree, most number of youngsters for cluster nodes is decided. The protocols pay attention of congestion by routing tree, node's neighbors average queue length and residual energy of nodes as parameters. A new tree primarily based routing protocol (TBRP) is introduced for improve network lifespan of the sensor nodes. TBRP accomplish with a more robust performance in lifespan by equalization the energy load with relation to all the nodes [15]. TBRP presents a brand new bunch issue for cluster head election, which may economical to handle the heterogeneous energy capacities. It conjointly introduces a fuzzy spanning tree for causation aggregate knowledge to the bottom station. The author planned AN improved Dynamic Cluster-based WSN that build possible AN economical routing protocol [16]. Simulation results shows that the planned routing protocol finds a best route with less length and less machine time. In [17] a best routing protocol is planned based on Tree on DAG (ToD), a semi structured strategy that uses Dynamic Forwarding on A totally created structure encompass multiple shortest path trees to take care of network measurability. The key commonplace at the rear of ToD is adjacent nodes in a very graph can have low down stretch in one of these trees in ToD, so succeeding in early aggregation of packets. A configurable top-down cluster and cluster-tree formation rule, a cluster-tree self-optimization phase, a stratified cluster addressing theme, and a routing theme is planned in [18]. Options of clusters, that higher density of packets is at the high levels of the tree and alike for topologies that have equal density of packets across the network or higher density of packets at low levels of the tree. Cluster tree and routing area unit utilized to show the potency of the schemes over existing techniques. The author given a programming rule based on congestion rate of detector nodes. In congestion-based programming rule, coloring the given network is skilful correspond to scheduling is comparable to node-based programming [18]. The performance of this rule is predicated on the distribution of the packets at numerous levels of the routing tree. The congestion-based programming results in the level-based programming and in evaluation to node-based programming is healthier for topologies.

## III. NETWORK AND RADIO MODEL

In our work, we tend to assume that the system model has the following properties:

1. Detector nodes square measure randomly distributed within the sq. field and there is only one BS deployed far away from the area.
2. Detector nodes square measure stationary and energy forced. Once deployed, they are going to keep in operation till their energy is exhausted.
3. Base Station is stationary, however base station is not energy forced.

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4. All detector nodes have power management capabilities, every node will modification the ability level and communicate with BS directly.
5. Detector nodes square measure location-aware. A detector no- First State will get its location data through different mechanisms like GPS or position algorithms.
6. Every node has its distinctive symbol (ID).

## IV. GENERALISED TREE BASE ALGORITHM

Calculation of cluster heads

```

Create node =node id;
Set routing = AODV;
Set Channel = 802.11;
Set Initial Energy = $initial energy;
Set Residual Energy=$residual energy;
Set radio range=default;
If ((node in radio range) && (next hop! =Null)
{
Capture data load (node all);
Create node Configure (rreq, rrep, tsend, trecv, tdrop, initial energy, residual energy);
{
Pktype;
Time;
Tsend, trecv, tdrop, rrep, rreq;
}
}
For (i=0; i<nn; i++)
Consume energy[i] = initial energy[i]-final energy[i]//computer consume energy

Total energy[i] = consume energy[i]

if(max energy[i] <consume energy[i])
{
Max energy = consume energy[i]
node_id=i;
}
If (dist<300 &&max energy [node_id] >energy neighbor [node_id])
{
Max energy node is cluster head;

```

## V. ENERGY BALANCE ROUTING PROTOCOL

Initially, each node broadcasts a beacon message to notify its presence to the neighbors. A beacon message contains the state of the node. Each node builds its neighbor list based on the beacon messages received and distance from them. The cluster-heads Election is based on the Energy values of the nodes and the node having the Highest Energy is chosen as CH. Each node computes its weight value based on the following algorithm:

**Step 1:** The coefficients used in Energy calculation are assumed the following values Energy Based on the Energy levels that are set.

**Step 2:** Compute the difference between measuring distance and configure the node Capture data load (node all);  
Create node\_Configure (rreq, rrep, tsend, trecv, tdrop, initial energy, residual energy); {

```

    pkt_type;
    Time;
    Tsend, trecv, tdrop, rrep, rreq;
}

```

**Step 3:** For every node the sum of the distances,  $D_v$ , with all its neighbors is calculated.

$D_v = \sum_{dist < 300 \ \&\& \ max \ energy \ [node \ id] > \ energy \ neighbor \ [node \ id]}$

**Step 4:** Calculate the average speed for every node until the current time  $T$ . This gives the measure of the mobility  $M_v$  based on the X co-ordinate and Y co-ordinate ie. Position of the node  $v$  at all previous time instance  $t$ .

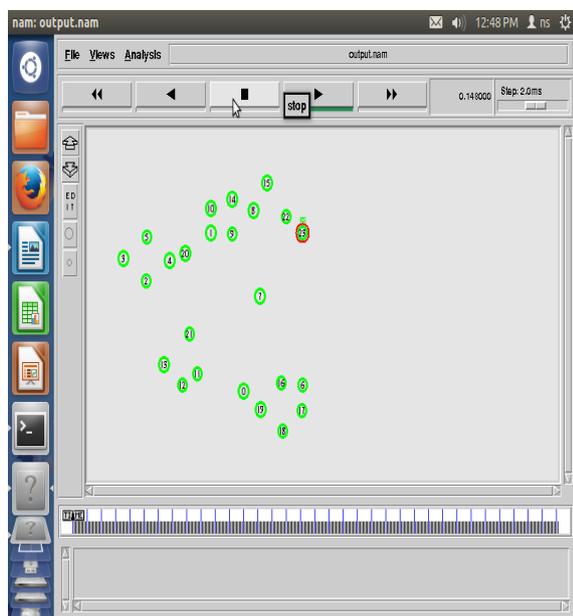
**Step 5:** Determine how much battery power has been consumed as  $P_v$ . This is assumed to be more for a Cluster-Head when compared to an ordinary node Because Cluster-Head has taken care of all the members of the cluster by continuously sending the signal.

**Step 6:** The weight  $W_v$  for each node is calculated based on neighbors,  $m_v$  is the mobility of the node, and power consumed is represented by,  $P_v$

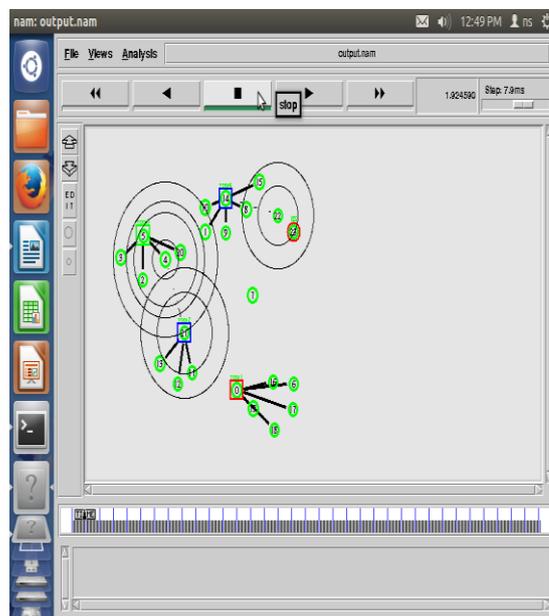
**Step 7:** The node with the smallest  $W_v$  is elected as a cluster-head. All the neighbors of the chosen cluster-head are no more allowed to participate in the election procedure.

**Step 8:** All the above steps are repeated for remaining nodes which is not yet elected as a cluster-head or assigned to a cluster.

## VI. RESULT AND ANYALISIS



**Figure1: Initial Phase tree construction**



**Figure2: Routing tree**

## VII. CONCLUSION AND FUTURE WORKS

In Wireless device Networks (WSNs) have intrinsic and distinctive options instead of ancient networks. They need many various constraints, like procedure power, storage capacity; energy provide and etc. are the necessary issue is their energy constraint. Energy aware routing protocol plays a major half within the wireless device network, however it considers solely energy provider of the system. As a result of this the protocol is not additional economical. As a result considering different parameters adjacent to energy potency is crucial for protocols potency. During this paper, GSTEM protocol is increased victimization the cluster tree topology and introducing the load equalization theme in GSTEM. Routing protocol separates network into additional variety of clusters, then by means that of distance, protocol

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is projected to constructs a routing tree for every cluster. In routing tree, most variety of kids for cluster nodes is set. Projected protocol manages load equalization, victimization routing tree, node's neighbors average queue length and residual energy of nodes as parameters. The effectiveness of the protocol is valid by simulation. Simulation results show that our protocol achieved its goals.

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