An Experimental Analysis of Routing Protocol with Mobile Sink

Savneet Kaur, Deepali Virmani

Abstract: In this exploration, we have looked at tree conventions in detail as they increase energy competence and reduce inertia due to their network capacity. Despite the disadvantage of the previous tree conventions, which is the high portability of the execution cost, the versatility of the cost of the card depends on the region influences by the versatility of the heat sink. To solve this problem, we have proposed a tree convention. The structure of the tree is based on nodes rather than the versatile heat sink. In static sink condition, sensor focuses close sink reliably go about as the hand-askew focuses. Hand-askew guides pass on the data toward the sink and like this, exhaust greater imperativeness when separated from different focuses that are far from the sink, like this, amazing. Such, circumstance is designated "swarmed focus effect" or "essentialness opening/issue zone issue". Sink accommodation draws out the system lifetime by lessening the issue area issue. The proposed protocol (TEDD) makes the tree in the framework. There are two classes of the center points in the tree: one is the transfer center point (RN), and the other is the non-hand-off center point (non-RN). The hand-off center point is dependable to hand over the data from the center points to its next hand-off center.

Index Terms: Routing Protocol, Mobile Sink, Network Model, Wireless Networks.

I. INTRODUCTION

Wireless Sensor Network (WSN) ordinarily includes a large number of sensor hubs thickly passed on in a region of interest, and somewhere around one data sinks or base stations that are found close or inside the detecting area, as showed up in the figure 1. The sink(s) sends questions or directions to the sensor hubs in the detecting zone while the sensor hubs team up to accomplish the detecting task and send the detected data to the sink(s). Meanwhile, the sink(s) moreover fills in as a passage to outside networks, for example, (Lewis 2004) the Internet. It gathers data from the sensor hubs, performs clear getting ready on the collected data, and subsequently sends excess data (or the dealt with data) by methods for the Internet to the customers who requested it or use the data [1-4].

Sensor nodes are ordinarily thickly conveyed in a field of intrigue. The sensor nodes are powered by battery. It isn’t conceivable to revive or change the batteries. The sensor nodes are randomly conveyed without watchful arranging and engineering. The system topology changes often because of hub disappointment, harm, energy exhaustion, or channel blurring. The data sensed by multiple sensor nodes regularly have a specific level of relationship or repetition. Sensor nodes are very restricted in energy, calculation and capacity limitations. The application for WSN is shifted, normally including sense sort of observing, following, or controlling. Applications incorporate natural surroundings checking, protest observing, atomic reactor control, fire detection and observing, ecological checking, calamity checking, wellbeing observing, water level observing, vehicle detection and activity checking [5]. The sink occasionally transmits a little reference point to make the association buzzing with the passage hub. In the event that the sink moves out from the scope of the present entryway hub, at that point it chooses another hub as the passage hub. The turn of the portal hub can defeat the issue of the energy gap [6]. Mobile sink intermittently communicates the little flag called reference point to inform the neighbor sensor nodes. The nodes that get the reference point send their reaction to wind up the entryway hub dependent on their lingering energy [7-8].

The sink collects one and articulates it as the central point of the entrance. Among the responses received from the sink, it leans towards the central exchange point like the entrance. The center of the section sends the RREQ packet to the transfer nodes to make the route to the central point of the data transmission passage. The dispersion of the data starts while advancing as shown in Figure 1. The proposed tradition contains various phases, such as the disclosure of a neighbor, the progress of the trees, the guarantee of the central transfer point and the distribution of data. Remote sensor networks (WSNs) consist of many sensor-controlled battery nodes with remote matching capabilities. They detect natural data, such as humidity, temperature, sound, light and development and extraordinary nodes where accumulated nodes accumulate the identified data to convey the performance of the accommodation exams.

![Figure 1. Wireless Networks](image)
The execution of a WSN is limited by the control of the battery, the low point of interruption of the registration, the short execution of the remote transmission and the hostile conditions. In this way, I am directing projects for WSN that must be carefully planned to guarantee a long battery life, low energy consumption, low control costs and valuable operations. In MANET, the address is created for each original pair to be addressed with the ultimate goal that any internal point in a MANET can be a corresponding target as a provisioning setup point.

II. OBJECTIVES

1. To explore the Tree Based Routing Protocol Use in Mobile Sink techniques
2. To explore the management strategy mobile sink
3. To analysis the clustered tree-based routing protocol
4. To analysis the simulation results of tree-based routing protocol

III. TREE BASED ROUTING PROTOCOL USE IN MOBILE SINK

The hand-off center point is dependable to hand over the data from the center points to its next hand-off center. The non-hand-off center points can pass on through a transfer center. Like this, it is a unidirectional correspondence.

The section center point might be a transfer center or a non-hand-off center point. The sink picks the door center point reliant on the criteria. The sink intermittently transmits a little reference point to make the affiliation bursting at the seams with the portal hub. If the sink moves out of the scope of the present door hub, at that point, it chooses another hub as the entryway hub. The turn of the passage hub can vanish the issue of the energy gap. The proposed protocol includes distinctive stages, for instance, neighbor disclosure, tree improvement, and relay hub choice, and data transmission.

![Tree construction and development](image-url)

Algorithm 4.1 Neighbor Discovery

<table>
<thead>
<tr>
<th>Node x receives following packets from node y:</th>
</tr>
</thead>
<tbody>
<tr>
<td>HNLCp: (HNLCp, id, HNLc)</td>
</tr>
<tr>
<td>if (y ∈ N(x)) then</td>
</tr>
<tr>
<td>(HNLCp, id, HNLc) ∈</td>
</tr>
<tr>
<td>(HNLCp, id, HNLc) ∈</td>
</tr>
<tr>
<td>else</td>
</tr>
<tr>
<td>(HNLCp, id, HNLc) = null</td>
</tr>
<tr>
<td>end if</td>
</tr>
<tr>
<td>(HNLCp, id, HNLc) = null</td>
</tr>
</tbody>
</table>

Figure 2: Tree development in (a) and (b)

Algorithm 4.2 Tree Construction and Relay node Selection

Data Structure for any sensor node x:

<table>
<thead>
<tr>
<th>Children(x)</th>
<th>Parent(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children(x) = set of neighbors of node x, initialized to Ø.</td>
<td></td>
</tr>
<tr>
<td>Parent(x) = parent of node x, initialized to Ø.</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2: Tree construction in (a) and (b)
IV. TREE DEVELOPMENT (RELAY NODE SELECTION)

As a result of getting the list of neighbors, each center has neighbor’s data, for example, id and availability to close the delivery center. The progress of the tree and the decision of the transfer center started using the neighbor’s data. The central point begins with the packages in the middle of the tree improvement and the transfer center guarantees organize:

If you have not selected any parent and the parent has a seat with a quick overview of the hand-held RN nodes for that time, select the sender's focus as a parent.

If the sender's main focus identifier is comparative as the recipient's identifier, combine the sender's identifier the recipients into the alternative N nodes.

T ERRS: the waiting time is exhausted inside when the time for the organization of the progress of the tree is shifted. Any midpoint and check its main focal point on the possibility that it does not exist, then an internal one gives an error message to ERR about the approach approaches of the neighbor. The focal point of the collector makes the following improvement:

![Algorithm 4.3 Data Transmission](image)

**Data Transmission**

DATA: Each hub in recognizes the earth, and it makes the data and transmits towards the going with hand-off hub with the affiliation < DATA, idy, sec noy >. Here idy is the id of sender hub y and sec noy is the data movement number of the hub y. Any hub that gets the DATA group performs following activities:

(a) Process of reversal

(b) Sink mobility management.

![Figure 3: Connectivity Reversal and Sink Mobility Management](image)

**Algorithm 4.3 Data Transmission**

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TBRP USED IN MOBILE SINK

The sink conservativeness the board in a directing protocol with controlled or evident versatility is astoundingly less requesting than the abstract transportability. As needs are, the sensor center point can't anticipate the running with the situation of the sink in self-self-assured adaptability.
V. MANAGEMENT STRATEGY MOBILE SINK

Select the sender’s transmission node as a pass and send a Gateway package. The pass package contains the identification of the receiver and has chosen the identification of the entry node. Exactly when they chose the item, the node obtains the package, chooses the next node as the sink ID. The ACK frame includes the identification of the sender and the identification of the port node. The receiving node of the relay reproduces the exercises that accompany it:

- Checks on off chance that the ACK parcel isn’t for the past entryway node
- Selects the portal node as of late chosen entryway node and chooses the accompanying node as sender node id.

Load Balancing of Tree Reconstruction

In this analysis, to reduce tree-reproduction overhead, another transfer node is recognized which concerns only two bounce neighbors. This stage is essential for extending the useful life of the network and decreasing energy use.

VI. CLUSTERED TREE BASED ROUTING PROTOCOL

The beginning in the protocols based on proposed trees, TEDD and DTRP, concerns the flexibility of the heat sink. In DTRP, the standard path length is smaller when separated from TEDD. In any case, under large-scale WSN conditions, the two protocols suffer the destructive effects of data transmission on wealth. In TEDD and DTRP, the exchange node pushes data from other sensor nodes. It is necessary to have the reward in attractive esteem, to promote centrality. The entire data scale is a structure in which each exchange node can view data, process it and transmit a replacement social opportunity.

The Proposed Protocol

In the protocol, the entire framework is based on problems divided into networks that are evaluated as indistinguishable and the meetings are surrounded by each system. The strategic system of the package combines the choice of the head of the cluster and the process of union between the head of the social event and refers to the individuals of the group. After the improvement of the social event, the heads of the meetings are treated as vertexes for the strategy of the tree. To change the weight, a group leader is re-elected just when the head of the social occasion influences his vitality as much as possible in terms of respect. The proposed protocol includes five phases, for example: development of the structure, progress of the storage, development of the tree and the administrator, data transmission and weight change.

Cluster Formation

Gathering improvement stage is started after the framework development stage in which bundles is molded.

VII. RESULTS OF THE SIMULATION

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The implementation of the proposed protocol was weighted and isolated the result and the current tree protocols. For an acute examination, the parameters of concern are related to current contracts. We see the effect of the discretionary adaptability of the reference point in its importance. The arrangement of good faith of the recreation is carried out using the Castalia test structure (v3.2) and is based on the parameters recorded in Table 1.

Table 1: Simulation Parameters

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network area</td>
<td>$500 \times 500 \text{ meter}^2$</td>
</tr>
<tr>
<td>Number of sensor nodes</td>
<td>200</td>
</tr>
<tr>
<td>Data packet size</td>
<td>512 bytes</td>
</tr>
<tr>
<td>Control packet size</td>
<td>32 bytes</td>
</tr>
<tr>
<td>Initial energy</td>
<td>1 J</td>
</tr>
<tr>
<td>$\delta$</td>
<td>5 sec</td>
</tr>
<tr>
<td>Sink speed</td>
<td>(5, 10, 15, 20, 25, 30) m/sec</td>
</tr>
<tr>
<td>Mobility Model</td>
<td>Random Waypoint</td>
</tr>
<tr>
<td>$E_{\text{elec}}$</td>
<td>50 nJ/bit</td>
</tr>
<tr>
<td>$\epsilon_{\text{JS}}$</td>
<td>10 pJ/bit/\text{m}^2</td>
</tr>
<tr>
<td>$\epsilon_{\text{MPI}}$</td>
<td>0.0013 pJ/\text{bit/\text{m}^4}</td>
</tr>
<tr>
<td>$d_0$</td>
<td>87 meters</td>
</tr>
<tr>
<td>$E_{\text{low}}$</td>
<td>0.2 nJ/sec</td>
</tr>
<tr>
<td>Simulation time</td>
<td>400 sec</td>
</tr>
<tr>
<td>MAC protocol</td>
<td>TMAC</td>
</tr>
</tbody>
</table>

Figure 7: Control Packet

We are verifying that the node is transmitting the data. Instead of ignition protocols, and the SUPPLET does not depend on the improvement of the well. Therefore, overloading the control package is the result of tree progress and confirmation of node confirmation. In this case, in the proposed protocol (TEDD), and the new activities of the sink must be known only by the neighbors of a single bounce, which causes a lower overloading of the control package.

Average Energy Consumption

However, the use of the standard vitality in each node for this information and the control regulation appears in the figure, the ordinary partition between the source and the sink is proportional to ART and SN-MPR in any case due to a lower overload of the control package; The recommended protocol (TEDD) exceeds current contracts. The execution of the mill divisions between the source and the safety nodes is n / 2.

Figure 8: Energy Consumption

Average Latency

The inactivity depends on the term to find an extended path between the source and the sink. Figure 9 shows the operation of the mill from the beginning to the end of the inactivity used at different speeds of descent using the versatility of the reference point of the flight. The time required to copy the tree based on the new position of the sink causes the return to ART and SN-MPR. In SN-MPR, the affected area is not as much as the ART. ART makes more inaction than SN-MPR. The test nodes are tightened so that the useful sink tilts towards the position. It makes the final inertia more than the previous protocols, while the proposed contract (TEDD) reserves less expenses and the possibility to manage the transportability of the well.

Packet Delivery Ratio

SUPPLE worked well because the partition in the center of the sink and the safety of a knot are a leap. The result of SN-MPR is relatively surprising given the less affected position and able to restore the system. The anticipated extension for ART decreases with increasing sink speed. And the greater speed of sinking joins the reorganization of the association’s disappointment. In any case, the proposed protocol is solid; means that the association has remained incessantly in the middle of the source and the sink. From now on and in the near future, the extent of data movement is:
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Figure 9: Average Latency

Figure 10: Packet Delivery Ratio

Figure 11: Network Lifetime

VIII. CONCLUSION

In the application, the sensor approach focuses on making the tree self-directed from the sinking position. The tree fuses two types of central fire; swap the point of focus and the point not manipulated by hand. A hand-twisted point is the focal point of the sensor chosen from another point twisted by hand.

The focus of the exchange stores and advances the data obtained from another sensor focus. After the revelation of the neighbor, the focal point of the initiator begins to build the tree by selecting the crooked hand. Each non-transferable center selects the main exchange focal point for sending data. The connection between the two exchange approaches is bidirectional. In any case, the non-hand point next to the hand is unidirectional as shown in the figure. Just when the sink needs to add data, select a section focus in its area from the set of exchange focus points.

The proposed protocol combines some phases, for example the disclosure of the neighbor; tree improvement and exchange focal point affirmation, adaptable experts, data transmission, weight variation and tree reparation.

The sink is moving inside the system. It was considered the abstract landmark that appears for the size of the sink. It has been found that the advantageous heat sink reduces the effect of the imperative in the whole matter.

Quick and dirty description of the adaptive sink described to the authorities in the algorithm. Just when the versatile sink adapts to the new area, it guarantees a series of reference parameters. The Beacon group joins the sink identification. The transfer node that gets the flag must respond to the sink with the Beacon Relay package. The Beacon Reply aggregate joins its id and the receiver id.

The proposed strategy does not require from the prior learning of all network nodes, does not use multi-ricochet controlling, or any part of looking for after the sink. The versatile sink is permitted to search for after any course while gathering the data. Our suggestion grants are decoupling the data dissipating the administrators from the versatile sink's bearing.

REFERENCES

AUTHORS PROFILE

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