International Journal of Recent Technology and Engineering (IJRTE)
ISSN: 2277-3878 (Online), Volume-8, Issue-1, May 2019

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 influenced 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 appropriate 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.

Revised Manuscript Received on 30 May 2019.
***** Correspondence Author
Savneet Kaur*, Ph.D Department of Wireless Sensor Network , Shri Venkateshwara University,
Dr. Deepali Virmani, Ph.D Department of Wireless Sensor Network from Delhi University

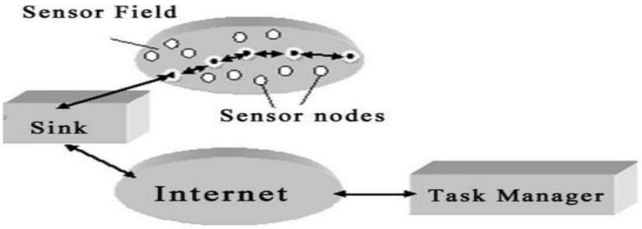


Figure 1. Wireless Networks

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 vanquish 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.

Algorithm 4.1 Neighbor Discovery

Data Structure for any sensor node x :

$Nbr(x)$: neighbor set of node x, initialized to ϕ.

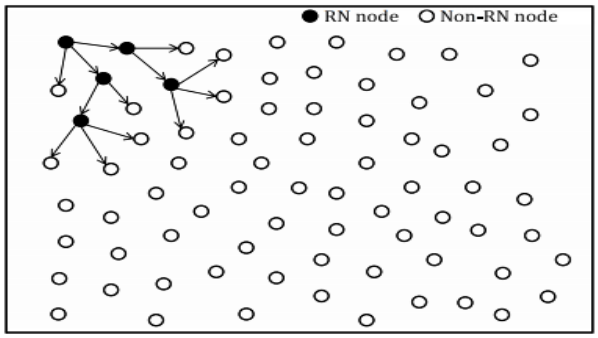
$CRN(x)$: the set of neighbors of node x, which are willing to be the relay node, initialized to ϕ.

$WILL_x$: either **true** or **false** depends on the willingness of node x to become a relay node.

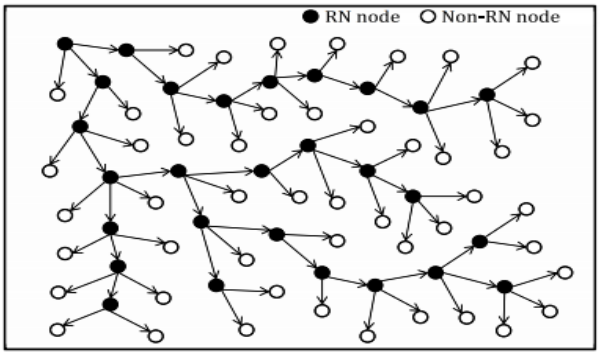
$NbrDETSent_x$: set to **true** when the sensor node x sends NBR_DET packet, initialized to **false**.

node x receives following packet from node y:

```
NBR_DET : < NBR_DET, id_y, WILL_y >
if (y ∉ Nbr(x)) then
    Nbr(x) ← Nbr(x) ∪ {y};
    if (WILL_y == true) then
        CRN(x) ← CRN(x) ∪ {y};
    end if
    if (NbrDETSent_x == false) then
        NbrDETSent_x ← true;
        l_rb(NBR_DET, id_x, WILL_x);          ▷ Broadcast NBR_DET packet
    else
        Drop the packet;
    end if
else
    Drop the packet;
end if
```



‡ (a) there is tree construction



‡ (b) tree development

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

Algorithm 4.2 Tree Construction and Relay node Selection

Data Structure for any sensor node x :

$Children(x)$: children set of node x, initialized to ϕ.
$Parent(x)$: parent of node x, initialized to ϕ.
RN_{nodes} : set of relay nodes in the network.
$Parent\_Selected_x$: set to **true** once the sensor node x selects its parent, initialized to **false**.
$T\_MSGSent_x$: set to **true** once the sensor node x sends T_MSG packet, initialized to **false**.
$CRN(x)$: the set of neighbors of node x, which are willing to be the relay node, initialized to ϕ.

node x receives following packets from node $y \in Nbr(x)$:

T_MSG : < T_MSG, id_y, $Parent(y)$ >
if ($id_x \in Parent(y)$) then
  $Children(x) \leftarrow Children(x) \cup \{id_y\}$;
  $RN_{nodes} \leftarrow RN_{nodes} \cup \{x\}$; ▷ node x declare itself as a relay node
  Drop the packet;
else if ($Parent\_Selected_x == false$ && $y \in CRN(x)$) then
  $Parent(x) \leftarrow y$;
  $Parent\_Selected_x \leftarrow true$;
  if (($T\_MSGSent_x == false$)) then
    $T\_MSGSent_x \leftarrow true$;
    $bcast$(T_MSG, id_x, $Parent(x)$); ▷ Broadcast T_MSG packet
  else
    Drop the packet;
  end if
else
  Drop the packet;
end if

▷ Timeout occur to the node y when the time duration expire for the tree construction phase and $TIMEOUT_y$ become $true$.
if ($TIMEOUT_y == true$) then
  if ($Parent\_Selected_y == false$) then
    $bcast$(T_ERR, id_y); ▷ Broadcast T_ERR packet
  end if
end if

T_ERR : < T_ERR, id_y >
if ($Parent\_Selected_x == true$) then
  $T\_MSGSent_x \leftarrow true$;
  $bcast$(T_MSG, id_x, $Parent(x)$); ▷ Broadcast T_MSG packet
else
  Drop the packet;
end if

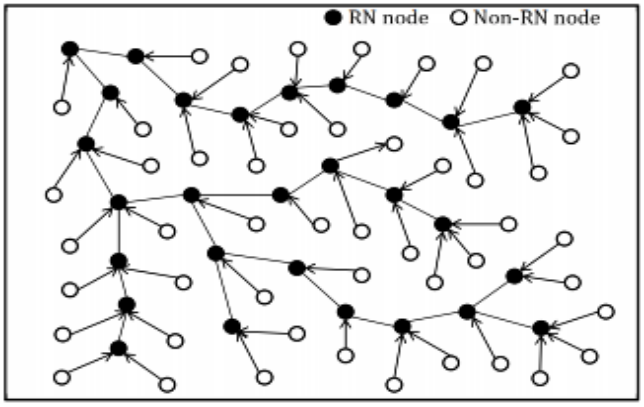
IV. TREE DEVELOPMENT (RELAY NODE SELECTION)

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:

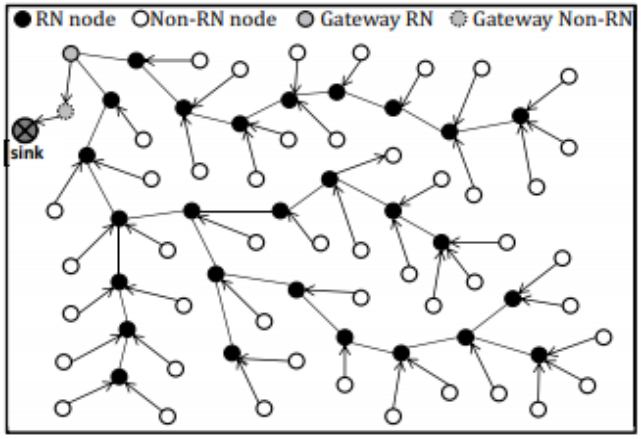
If you have not selected any parent and the parent has a seat with a quick overview of the hand-held RN nodes for that time, select the sender's focus as a parent.

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:



(a) Process of reversal



(b) Sink mobility management.

Figure 3: Connectivity Reversal and Sink Mobility Management

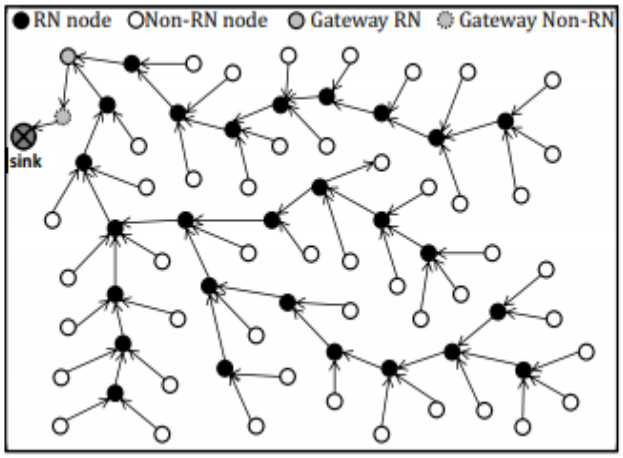


Figure 4: Path development for gateway node

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:

Algorithm 4.3 Data Transmission

Data Structure for any sensor node x :

$Send\_Data(x)$: node x add the pair of id and sec_no after receiving the DATA packet, initialized to ϕ.

$Gateway$: node selected by the sink for data reception.

node x will receive following packet from node $y \in Nbr(x)$:

DATA : $< \text{DATA}, id_y, sec\_no_y >$
if $(x \in RN_{node})$ then
  if $(< id_y, seq\_no_y > \notin Send\_Date(x))$ then
    if $(x == Gateway)$ then
      $Send\_Data(x) \leftarrow Send\_Data(x) \cup \{y, sec\_no_y\}$;
      Forward DATA packet towards the sink;
    else
      $Send\_Data(x) \leftarrow Send\_Data(x) \cup \{y, sec\_no_y\}$;
      Forward DATA packet to its neighbor relay node towards gateway
    end if
  else
    Drop the packet;
  end if
else
  Drop the packet;
end if

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

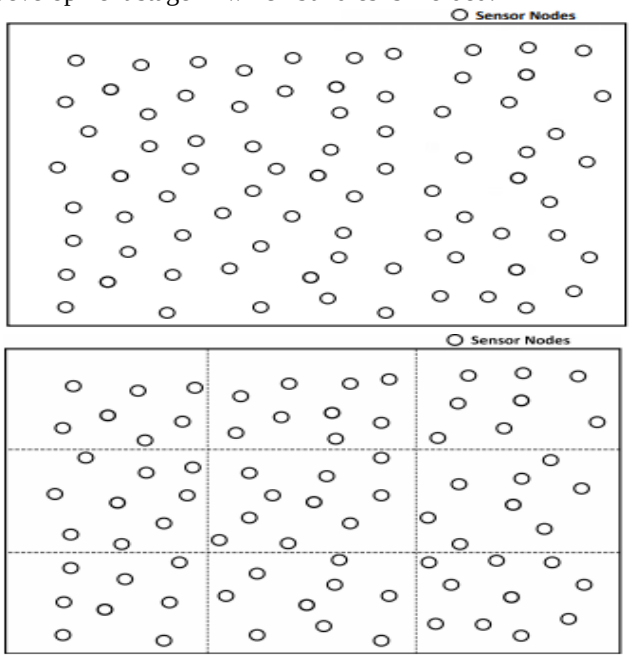
The beginning in the protocols based on proposed trees, TEDD and DTRP, concerns the flexibility of the heat sink. In DTRP, the standard path length is smaller when separated from TEDD. In any case, under large-scale WSN conditions, the two protocols suffer the destructive effects of data transmission 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.

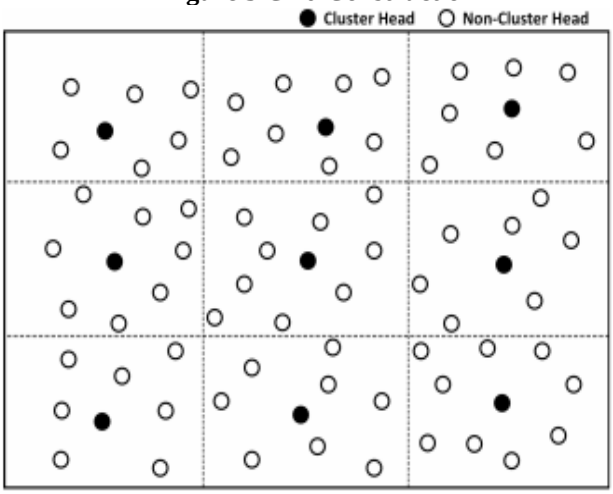
Cluster Formation

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



(a) Initial network. (b) Final grid construction

Figure 5 Grid Construction



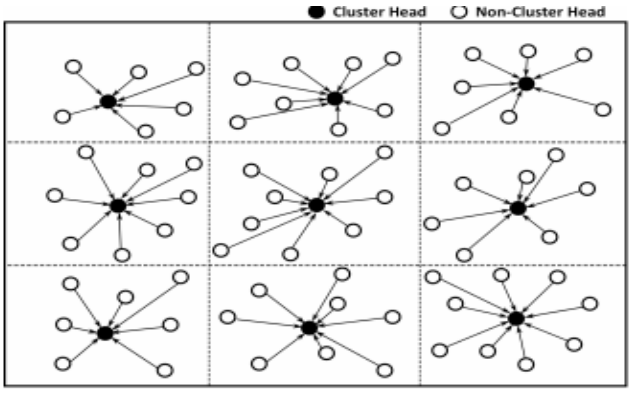


Figure 6: Cluster Head selection and Cluster formation

VII. RESULTS OF THE SIMULATION

The submitting author is responsible for obtaining agreement of all coauthors and any consent required from sponsors before submitting a paper. It is the obligation of the authors to cite relevant prior work.

Authors of rejected papers may revise and resubmit them to the journal again.

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.

Parameter Name	Value
Network area	$500 \times 500\ meter^2$
Number of sensor nodes	200
Data packet size	512 *bytes*
Control packet size	32 *bytes*
Initial energy	$1J$
δ	5 *sec*
Sink speed	(5, 10, 15, 20, 25, 30) m/sec
Mobility Model	Random Waypoint
E_{elec}	$50\ nJ/bit$
ε_{fs}	$10\ pJ/bit/m^2$
ε_{mp4}	$0.0013\ pJ/bit/m^4$
d_0	87 *meters*
E_{low}	$0.2\ nJ/sec$
Simulation time	400 *sec*
MAC protocol	TMAC

Table 1: Simulation Parameters

Control Packet

The figure that the proliferation of trees and the cost of the official sink are limited in the proposed protocol when it is shown separately on different protocols. In ART, the entire structure must know the current position of the sink.

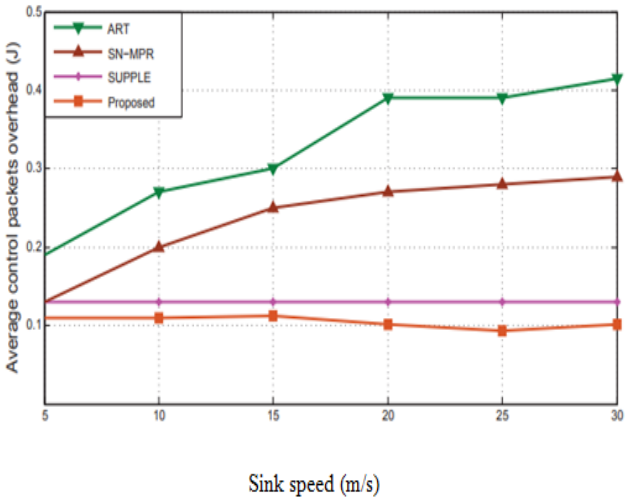


Figure 7: Control Packet

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.

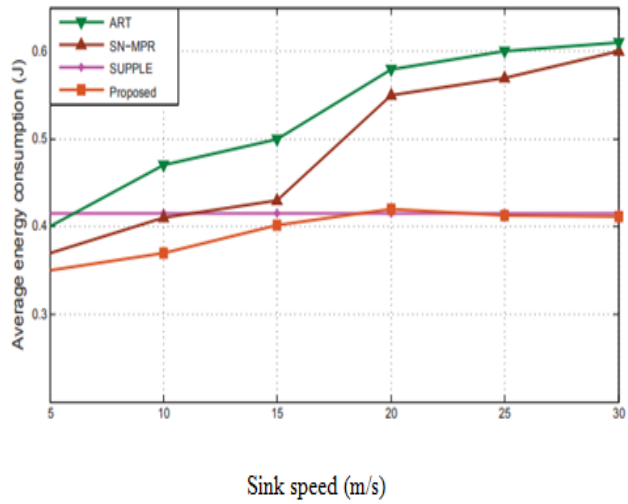


Figure 8: Energy Consumption

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:

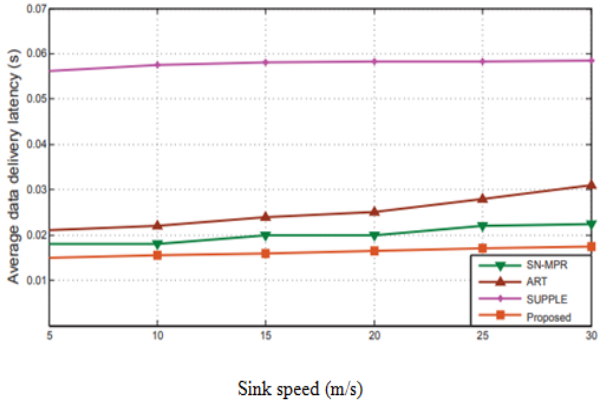


Figure 9: Average Latency

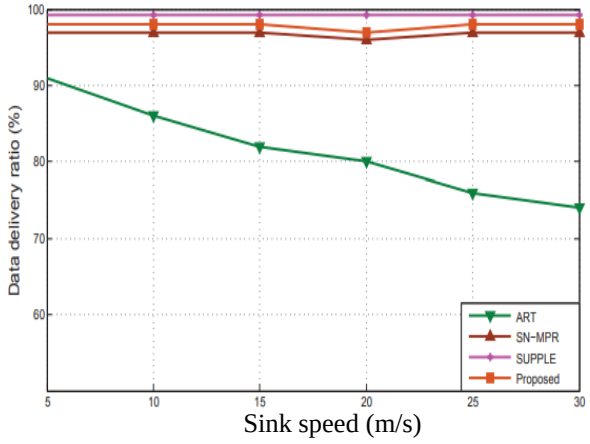


Figure 10: Packet Delivery Ratio

Network Lifetime

Control packages are exchanged for near support, relay node decision, tree development, course creation and maintenance. It's called routing overhead and direct effects on frame life of the proposed plan framework (TEDD) is greater than ART and SN-MPR and probably higher than SUPPLE. The aim is to devour a couple of control packages and adjust the store between the sensor nodes.

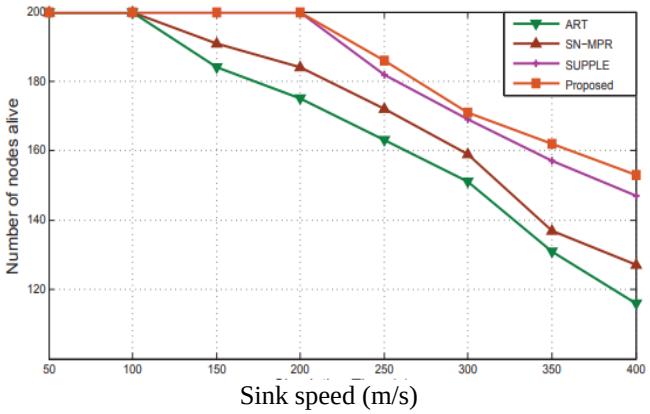


Figure 11: Network Lifetime

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 focus 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 reprobation.

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

1. A. Chehri, P. Fortier, & P.M. Tardif, “UWB-Based Sensor Networks for Localization in Mining Environments”, *Ad Hoc Networks*, vol.7, 2009, pp.987-1000.

2. D. Tacconi, D. Miorandi, I. Carreras, F. Chiti, & R. Fantacci, "Using Wireless Sensor Networks to Support Intelligent Transportation Systems", *Ad Hoc Networks*, vol.8, 2010, pp. 462-473.
3. M.E. Kantarci, & H.T. Mouftah, "Wireless Multimedia Sensor and Actor Networks for the Next Generation Power Grid", Ad Hoc Networks, vol.9, 2011, pp.542-551.
4. M.V. Ramesh, "Design, Development, and Deployment of a Wireless Sensor Network for Detection of Landslides" *Ad Hoc Networks*, vol.13, 2014, pp.2-18.
5. S. Vural, & E. Ekici, "On Multihop Distances in Wireless Sensor Networks with Random Node Locations", *IEEE Transactions on Mobile Computing*, vol.9, no.4, 2010, pp.540-552.
6. R. Cui, Z. Qu, & S. Yin, "Energy-efficient routing protocol for energy harvesting wireless sensor network', In Communication Technology ICCT 15th IEEE, International Conference on IEEE, 2013, pp. 500-504.
7. J, Gnanambigai, N. Rengarajan, & R.J. Prarthana, "An Analytical Approach For Quadrant-Based Leach: An Energy Efficient Routing Protocol For WSNs", In Devices, Circuits and Systems (ICDCS), 2014, 2nd International Conference on IEEE, 2014, pp.1-6.
8. E. Akhtarkavan, & M.T.M. Shalmani, "Energy Adaptive ClusterHead Selection for Wireless Sensor Networks, Using Center of Energy Mass", *In Advances in Computer Science and Engineering, Springer Berlin Heidelberg*, 2009, pp. 130-137.

AUTHORS PROFILE

Savneet Kaur has done, B. Tech, Computer Science from APJ, Sohna in 2002, M. Tech in Information Technology in 2005, from IASE Deemed University and pursuing Ph.D in Wireless Sensor Network from Shri Venkateshwara University, U.P.. She has a teaching experience of 15 years.

Dr. Deepali Virmani has done, B. Tech , Computer Science from MDU, Rohtak in 2001, M. Tech in Information Technology in 2005, from GGSIPU and Ph.D Wireless Sensor Network from Delhi University in 2013. She has a teaching experience of 17 years. She is actively engaged in teaching and research in areas of Computer Science since 2001. She has published more than 73 research papers in International journals / National journals / International conferences of repute. Her research interests are in the areas of Sensor Networks, Data Mining and Security. She has guided more than 45 B.Tech projects. Presently she is guiding 5 Ph.D scholars registered with reputed universities like GGSIPU, UPTU. She is branch counselor BPIT -IEEE student chapter and BPIT-CSI student branch. She is on the reviewer panel / editorial board of many International Journals. She has organized many professional activities like FDPs, Workshops, expert lectures. She has been the session chair in National / International conferences.