ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 3, March 2018

Mobile Sinks Scheduling for Data Collection in Wireless Sensor Networks

Zohra Begum[1], Dr. Rajkumar L.Biradar[2]

M.Tech., Wireless and Mobile Communications, Department of ETM, G.Narayanamma Institute of Technology and Science(GNITS), Ambedkar Nagar, Shaikpet, Hyderabad, Telangana, India

Professor, Department of ETM, G.Narayanamma Institute of Technology and Science (GNITS), Ambedkar Nagar, Shaikpet, Hyderabad, Telangana, India.

ABSTRACT: In wireless sensor networks, sensors typically aim to transmit their own readings to the sink node. Constructing an efficient data collection tree is very important since it can determine the lifetime of the given WSNs. In literature, may studies have investigated this issue and proposed algorithms for mobile sink to visit each sensor such that the readings of the sensors can be directly transmit to the WSN. However, visiting each sensor is time consuming which results in long path for mobile sink to pass through each sensor. Consequently, the time period between the consecutive two visits to the same sensor is long, leading to the situation of sensor buffer overflow. This paper aims to propose an efficient data collection mechanism which chooses a set of sensors to play the role of the rendezvous points (RPs) which would be visited by the mobile sink. The proposed mechanism will select important sensors as the RPs and construct an efficient path for mobile sink to collect data. Those sensors that are not visited by the mobile sink will forward their readings to the nearest RP and then the RP can relay their information to the mobile sink when it is visited. Performance results show that the proposed mechanism is better than the existing studies and significantly reduce the time period between two consecutive visits.

KEYWORDS: Mobile Sink based Networks, Data Collection, WSN, Scheduling Process.

I. INTRODUCTION

The main objective of the project is to improve network lifespan by minimizing the data collection delay in wireless sensor network because energy consumption has become a critical collection in wireless sensor network so we describe the methods used in collecting the data regarding the information gathering from each senor nodes and the time period required to complete the process from source to sink by calculating the packet delivery time and path length covered in the process.

Mobile sink is allowed to explore any part of the location in wireless sensor network and help in identifying the maximum tour coverage in the field. Wireless Sensor Network [WSN] is the complex arrangement in the field that contain bulky quantity of sensor nodes and each node is skilled of collecting, developing and transmitting the information over the mobile sink.

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 3, March 2018

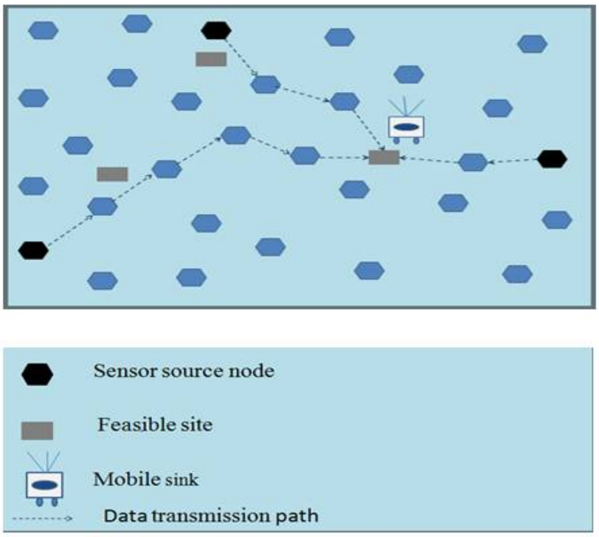

Fig.1 Collection of Information by using Mobile Sink

Therefore it acts as transceiver that can collect the information and also transmit the information in multi-hop method. The sensor nodes are used in many real time applications like smart discovering, gathering of information, following the object, detect the nearby node, calculating and managing the location of node, successful routing between Base Station [BS] and node. Other applications of sensor nodes are military application, location checking, cultivation, house mechanization, shipping and fitness.

Sensor nodes contain battery that is having less power in it as the sensor nodes are widen around the field the battery replacement is next to impossible. So for overcoming this disadvantage many researches is been conducted to provide a useful methods or protocols for energy efficient system. In multi-hop communication the information is transmitted from one sub system to another sub system until it reach ultimate target. So the node that is near to the sink is overcrowded as they are responsible for transmitting the data to the nodes that are distant in the network.

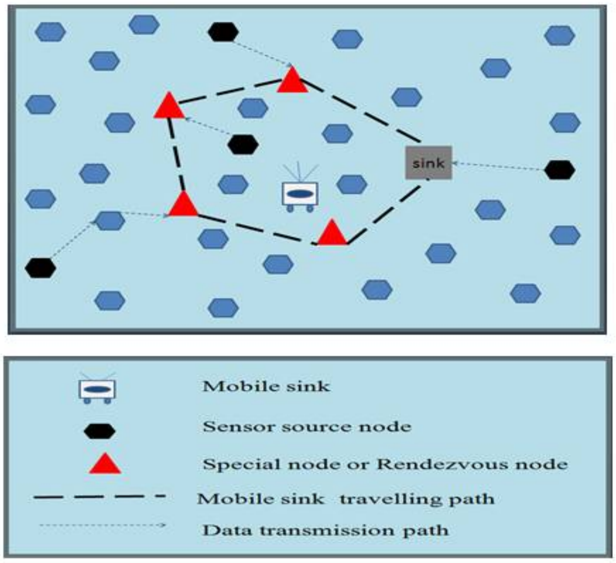

Fig.2 Mobile Sink Travelling Path

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 3, March 2018

Therefore the battery consumption is as follows the more near the node to the sink the faster the battery depleted. If the data is transmitted to far away node then the energy consumption will be less compare to nearby node and will maintain maximum original energy of the node.

This transmission give rise to varying reduction of energy in network and lead to network separation due to arrangement of energy holes. In this situation network sink is detached from other nodes in the network and thereby weakening the wireless sensor network. To overcome the problem of formation of energy holes in the network the necessity of balancing the energy consumption in the sensor nodes has become very important. The usage of one or more mobile sink is used to reduce the consumption of energy in the network by collecting the information and data from each sensor node, this process reduce the delay in the transporting the information from source sensor node to destination sensor node. If the data from source node to destination node is passed from each and every upcoming node then this mechanism leads wastage of time and also increases the energy consumption due to multi-hop communication.

II. LITERATURE SURVEY

In the year of 2010, the authors "Y. Yun and Y. Xia" proposed a system titled "Maximizing the lifetime of wireless sensor networks with mobile sink in delay-tolerant applications", in that they described such as: a framework to maximize the lifetime of the wireless sensor networks (WSNs) by using a mobile sink when the underlying applications tolerate delayed information delivery to the sink. Within a prescribed delay tolerance level, each node does not need to send the data immediately as it becomes available. Instead, the node can store the data temporarily and transmit it when the mobile sink is at the most favorable location for achieving the longest WSN lifetime. To find the best solution within the proposed framework, we formulate optimization problems that maximize the lifetime of the WSN subject to the delay bound constraints, node energy constraints, and flow conservation constraints. We conduct extensive computational experiments on the optimization problems and find that the lifetime can be increased significantly as compared to not only the stationary sink model but also more traditional mobile sink models. We also show that the delay tolerance level does not affect the maximum lifetime of the WSN.

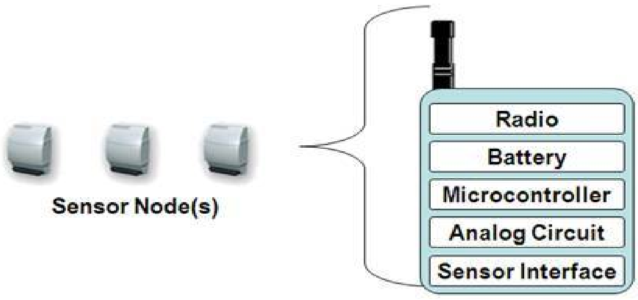

Fig.3 Sensor Node

In the year of 2011, the authors "S. Gao, H. Zhang, and S. Das" proposed a system titled "Efficient data collection in wireless sensor networks with path-constrained mobile sinks", in that they described such as: recent work has shown that sink mobility along a constrained path can improve the energy efficiency in wireless sensor networks. However, due to the path constraint, a mobile sink with constant speed has limited communication time to collect data from the sensor nodes deployed randomly. This poses significant challenges in jointly improving the amount of data collected and reducing the energy consumption. To address this issue, we propose a novel data collection scheme, called the Maximum Amount Shortest Path (MASP) that increases network throughput as well as conserves energy by optimizing the assignment of sensor nodes. MASP is formulated as an integer linear programming problem and then solved with the help of a genetic algorithm. In addition, the impact of different overlapping time partition methods is studied. The proposed algorithms and protocols are validated through simulation experiments using OMNET++.

In the year of 2012, the authors "H. Salarian, K.-W. Chin, and F. Naghdy" proposed a system titled "Coordination in wireless sensor actuator networks: A survey", in that they described such as: Wireless Sensor–

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 3, March 2018

Actuator Networks (WSANs) have a myriad of applications, ranging from pacifying bulls to controlling light intensity in homes automatically. An important aspect of WSANs is coordination. Unlike conventional Wireless Sensor Networks (WSNs), sensor and actuator nodes must work hand-in-hand to collect and forward data, and act on any sensed data collaboratively, promptly and reliably. More specifically, we review techniques in the following areas: (i) sensor–actuator coordination, (ii) routing protocols, (iii) transport protocols, and (iv) actuator-to-actuator coordination protocols. We provide an extensive qualitative comparison of their key features, advantages and disadvantages. Finally, we present unresolved problems and future research directions.

III. PROPOSED SYSTEM- A SUMMARY

The disadvantages in the existing method is described as missing of mobile sink tracking device in the data collection model. So in the proposed method the necessity of mobile sink is obtained by placing the sink node tracking in the model.

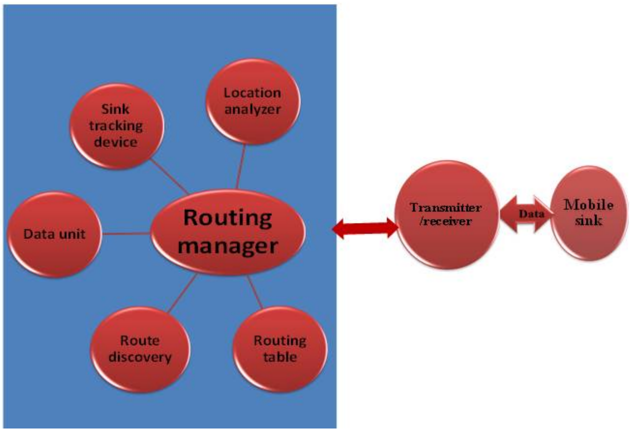

Fig.4 Sensor Network Model using Sink Node Tracking Device

As previously mentioned that the mobile sink is free to move anywhere in the wireless sensor network so the senor nodes has to be updated of the position of the mobile sink in the network so that they can be ready to obtain all the information needed to be transfer to the destination point and also to inform the other nearby nodes to transfer the data which is urgent to be transferred. This act as plus point in the energy efficient model to demonstrate the movement of the mobile sink in the sensing field and there are many advantage in the proposed method. They are as follows:

- ✓ Proficient data transmission
- ✓ Life span of the network is boosted
- ✓ Delay in the data is trim down
- ✓ Data rate is increased

The mobile sink is to travel all over the network to collect the information from the set of rendezvous nodes without any delay and energy wastage so the proposed method describe the idea of using more than one mobile sink to cover up the whole network before the deadline and also the energy consumption is minimized. The demonstration of the simulation is seen in the paper compared to existing methods in terms of packet delivery factor, network lifetime, energy efficiency and also number of nodes active in the network till the transmission is completed between the source sensor node and destination sensor node.

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 3, March 2018

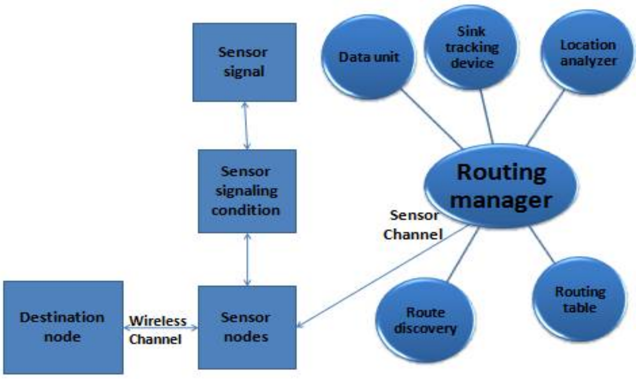

Fig.5 Clear View of Usage of Sink Node Tracking Model

Weighted Rendezvous Planning (WRP)

Weighted rendezvous planning (WRP) applies the principle of rendezvous method which implies the Steiner minimum tree (SMT) in branching out the network in the sensing field. Using Steiner minimum tree the network lifetime can be increased and therefore the collection of rendezvous planning (RP) nodes are assigned by looking after all the sensor nodes in the wireless sensor network and selecting the sensor nodes with highest weight as RP node. The sensor node weight can be calculated by multiplying the number of data packet transferred by the sensor node 'a' and hop distance of a node 'a' from the nearby rendezvous planning node from collection of RP's denoted by N. the weight of sensor node can be expressed by this notation

$$W_a = NDT(a) \times H(a,N) \quad \ldots\ldots 4.1$$

Where, W_a=weight of sensor node

NDT(a)= no of data packet transferred by node 'a'

H(a,N)=hop distance of node 'a' from the nearby RP in N

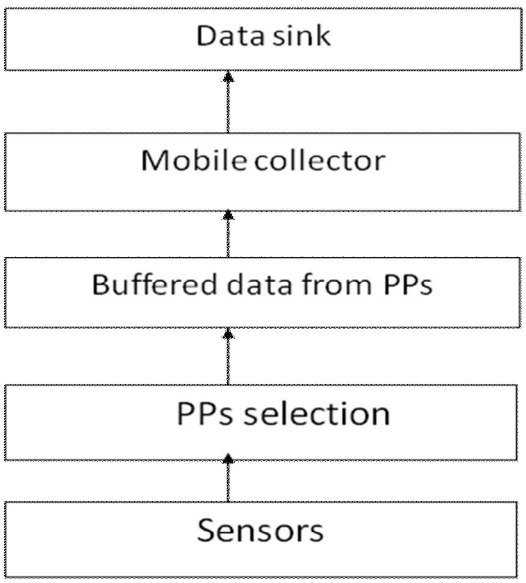

Fig 6 Procedures in Weighted Rendezvous Planning

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 3, March 2018

Considering an example the number of packet transferred by the node 'a' is 30 and the hop distance of node 'a' from RP is 3 then the weight of node 'a' is 90 .if the node 'x' contain less packet and the hop distance is one or minimum then the node weight will be less .the maximum hop distance and the maximum no of packets transferred from node 'x' is allotted with highest weight in the sensing field. Hence from the above explanation it can be concluded that weight is proportional to hop distance and no of data packet transferred. Using the highest weighted sensor node energy consumption can be reduced and network lifetime as it uses multihop communication for transferring the data.WRP is can be used in crowded region and reduced energy holes occurring due to more number of sensor nodes in wireless sensor network.

Segments in Weighted Rendezvous Planning (WRP)

The basic terminology behind weighted rendezvous planning (WRP) is to reduce energy consumption and improvise network life time of the wireless sensor network. These are the following segments in WRP

- Specifying the total hops to be fewer
  Selection of sensor node as rendezvous planning (RP) node
- Identifying the RP node and gathering the data from it
- Releasing the data to the sink node.

The major target is to minimize the energy wastage on the tour path so to avoid the problems in multihop communication the total hop for transmission is specified less.

Algorithm

Weighted rendezvous planning algorithm consider two factors to construct the framework that is single hop data aggregation and manageable mobile sink. In below figure, the algorithm the working process of weighted rendezvous planning is described by processing the intake of algorithm as the entire plot of wireless sensor network and the highest acceptable tour path.

Algorithm 1: Weighted Rendezvous Planning (WRP) algorithm.

```
Input: G(V, E), l_max
Output: M = (m_0, m_1, m_2, ..., m_n, m_0) =
        NULL, where m_i ∈ V ∪ Sink
begin
  int T_n = 0;
  int W_max = 0, flag = 0, RP = −1;
  float cost = 0;
  Boolean
  mark = [false, false, false, ...], removed =
  [false, false, false, ...];
  M = M ∪ Sink; T_n + +;
  while T_n ≤ |V| do
    W_max = 0; flag = 0;;
    for i ← 0 to |V| do
      NFD(i) = C(T_mi) + 1;
    end
    for i ← 0 to |V| do
      if not mark(i) and
      (NFD(i) × H(i, M) > W_max) then
        RP = i;
        W_max = NFD(i) × H(i, M);
        flag = 1;
      end
    end
    if !flag then
      break
    end
    mark(RP) = true; M = M ∪ RP;
    T_n + +;
    cost = TSP(M);
    if cost ≤ l_max then
      for i ← 0 to |V| do
        if i ∉ M then
          mark(i) = false;
        end
        if C(T_mi) == 0 and
        mark(i) == true and
        removed[i] == false and i ≠ RP
        then
          removed[i] = true; mark(i) =
          false;
          M = M − i; T_n − −;
        end
      end
    end
    if cost > l_max then
      M = M − RP; T_n − −;
      W_max = 0; flag = 0;;
      Go to line 12;
    end
  end
end
```

Fig 7 Algorithm for Weighted Rendezvous Planning (WRP)

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 3, March 2018

The outtake of the whole process is collection of rendezvous planning (RP) nodes. The above figure is slotted with lines from 1 to 39, so this line indicate as follows

Line (1-4)-initiates the values for all parameters

Line (6) -Adds the static destination nodes as first RP

Line (9-17) –identify the highest weighted sensor node and then declare it as highest weighted node.

Line (21)-defines the functionality of TSP solver that is able to estimate overall cost of the transmission.

Line (22-32)-this applies the condition if the tour path extend more than highest acceptable tour path then the highest weighted sensor node that was the first RP will be still the first RP and that node will be excluded from tour path.

Line (33-37) - according to the above condition in Line (22-32) that sensor node will be excluded that extend the highest acceptable tour path.

Line (27-30) it implies that if the RP is selected, then all the unwanted sensor nodes are remove from the tour path it means that they won't provide the necessary data and not create overhead for mobile sink.

It may include some other sensor nodes that has data packet to be transferred to the destination node and removing of the node is done only once and if that node has the data packet to be transferred then it is added to the tour path. This node cannot be removed from the tour path once more. The entire sensor node in the sensing field will be added into tour path such a way that the total tour path will be less than the highest acceptable tour path.

Calculation of Energy Consumption

Composite timing of weighted rendezvous planning is basically depend on the calling the travelling salesman path(TSP) for calculating the cost of the tour of mobile sink to collection of RP's in the sensing field. For every round of mobile sink it adds up the suitable sensor node as RP and if all the sensor nodes are selected as RP's then TSP has to solve the cost of the tour path. Therefore it also mean that the algorithm selected the RP first and then unmarked all the nearby senor nodes and prepare for next round. The TSP solver is used for almost n^2times and here n means from collection of B [23].

The WRP always work only if the wireless sensor network contains at least one optimum tour path if not it cannot be applied to the application as the algorithm has the capability of adding up the suitable sensor nodes in the tour in order to reduce the energy consumption. This capability and unique feature lies only in the WRP and other algorithm like cluster based (CB) and rendezvous design for variable track cannot deal in these circumstances. In case of cluster based (CB) algorithm the tour cannot be obtain if it contain more than two sensor nodes from the matching cluster and in RD-VT the tour is not obtained due to tour path exceeding more than highest acceptable tour path.

The energy consumption can be reduced if it visited the highest weighted sensor node instead of other sensor nodes with less weight. Consider L is a sensor node with weight W_L and O as Sensor node with weight W_O this will help in determine which sensor node will consume more energy. The node P transmitted NDT (P) data packet to the nearby rendezvous planning (RP).the energy consumption by the node including the node L will be expressed by

$$E_L - (E_T + E_R) \times (NDT(L) \times H(L,N)) \text{........4.2}$$

If the Node O transmit the NDT (O) data packets to the nearby RP and the energy consumption in this node is expressed as

$$E_O = (E_T + E_R) \times (NDT(O) \times H(O,N)) \text{........4.3}$$

And if the node L becomes RP then the value for $E_L$will be zero, the weight of the sensor node is $W_L = NDT(L) \times H(L,N)$ and the weight of senor node O is $W_O = NDT(O) \times H(O,N)$ so then the energy consumption for node Land O will be now expressed as

For node L; $E_L = (E_T + E_R) \times (W_L)$............4.4

For node O; $E_0 = (E_T + E_R) \times (W_0)$..................4.5

From 4.4 and 4.5 we can conclude that

$$W_L > W_O$$
$$E_L > E_0$$

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 3, March 2018

Therefore if select the node L as RP then the network lifetime will be increased and energy consumption will be less compare to selecting the node O with less weight. If assume there are 'n' no of nodes in the sensing field and tour 'D 'contains the sensor nodes that mutually (L_D)will be less than the highest acceptable tour path (p_h).

So tour D = {n_0, $n_1, n_2, n_3, n_4 \dots \dots . . n_k$} ; where n_0 is destination sink node

The tour path of D is expressed by

$$L_D = \sum_0^{n-1} d_{n_a n_{a+1}} + d_{n_k n_0} \text{.................4.6}$$

For obtaining best possible path, the sink is selected as first RP then the next RP is the one with highest weight in the network ahead of the calculation of cost by TSP solver. The cost will be less than the highest acceptable tour length for D (L_D) and so on the process continue till a=*k*. the optimal tour using weighted rendezvous planning (WRP) will include only a set of RP's but the optimal solution visits all the sensor nodes including the sensor nodes that has no data to be transfer.

Consider if the mobile sink visit only sensor node 'L' then the energy consumption by the sensing field is denoted by $E_{Network(L)}$

$$E_{Network(L)} = (E_T + E_R \times ((|s_n|-1) \times U)) + (E_R \times ((|s_n|-1) \times U))$$

………. 4.7

And the energy consumed by all the sensor nodes except sensor node L is denoted by

$$E_{Network((|s_n|-1))} - (E_T \times ((|s_n|-1)) + E_R) \text{......4.8}$$

The difference between the two is if the data packets are send directly to the mobile sink then it will consume$E_{Network((|s_n|-1))}$ and if it sends the data packets to the rendezvous planning (RP) node the energy consume is $E_{Network(L)}$.

From 4.7 and 4.8 the proportion of energy consume by weighted rendezvous planning (WRP) and energy consume by optimal solution framework is

$$\frac{2 \times U \times (|s_n|-1)+1}{(|s_n|+2)} \text{................................4.9}$$

The weighted rendezvous planning (WRP) work with routing technique called Steiner minimum tree (SMT) where the tree branched out from the sink node to other nodes in order to obtain a feasible path containing rendezvous planning (RP) nodes. As mentioned previously there are two types of Steiner points that are real and virtual points.

In other algorithm that follows Steiner minimum tree (SMT) will change the sensor nodes that is not part of the sensing field into real senor nodes but weighted rendezvous planning (WRP) consider virtual RP as virtual RP only instead it allow the mobile sink to visits them and collect the urgent information and dumped into the destination sink node.

Management of the Network by means of Two Mobile Sinks

If consider there are 10 nodes then mobile sink is capable to collect the information from the network in the given period, assume the maximum time period to be 'n'. The numbers of nodes are increased 10 times than before scenario it means number of nodes are 100.then If consider there are 10 nodes then mobile sink is capable to collect the information from the network in the given period, assume the maximum time period to be 'n'. The numbers of nodes are increased 10 times than before scenario it means n.then the necessity of transmitting and receiving the data packet before the time is more complex than before.

If only one mobile sink is present than it will need to cover x time span to collect the information from the rendezvous planning (RP's) in the network of 100 nodes.

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 3, March 2018

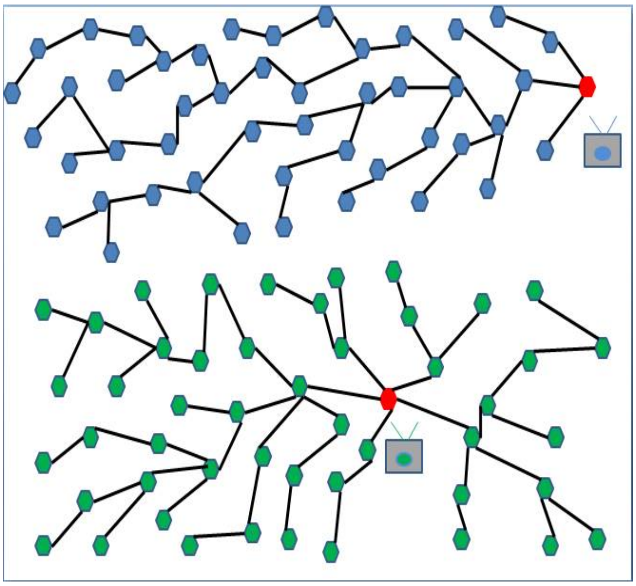

Fig 8 Using Multiple Mobile Sink in WRP Algorithm

So to reduce the overhead on the mobile sink the transmission process is shared with another mobile sink this limit down the energy wastage .hence as it took 'x' Time period to cover then tour path containing 100 nodes using only one mobile sink then it would probably complete the transmission of data from source to destination using to two mobile sink in half of 'x' time period. The procedure of transmission of data will remain same as in weighted rendezvous planning (WRP) algorithm with one mobile sink.

In the figure 8 Weighted rendezvous planning uses to mobile sink to collect the information from the sensing field therefore the blue hexagon represent the nodes are operated by mobile sink 1 and green hexagon represent the sensor nodes that comes under the operation of mobile sink 2.

Assume there are 100 nodes in the sensing field and two mobile sinks, here the mobile sink are allotted with N no of nodes to look after suppose 50 nodes are looked after by mobile sink 1 and other 50 nodes are operated under mobile sink 2.

$$M_1 = \{n_0, n_1, n_2, n_3, n_4, n_5, \ldots \ldots \ldots \ldots, n_{49}\}$$

$$M_2 = \{n_{50}, n_{51}, n_{52}, n_{53}, n_{54}, \ldots \ldots \ldots \ldots, n_{99}\}$$

It can be concluded that no of nodes in mobile sink are denoted by

$$M_y = \sum_0^k n_{k-1} \quad \ldots\ldots 5.0$$

Here,
'y'= no of mobile sinks
'k' = the no of nodes in the particular mobile sink

Therefore procedure remain same firstly the sink node is selected from the sensing field both the mobile sink is assigned to check there respective highest weighted sensor node as rendezvous planning (RP) node and the cost is calculated by TSP solver if it less the highest acceptable tour path then it remain in the tour path if not removed from the tour path and so on till the total tour path is obtained and the information is transmitted to the sink node.

By using multiple mobile sink the sensing field can be divided into small zones and for each zone one mobile sink is allotted to collect the information these can be helpful in reducing energy consumption and improving network lifetime.

The advantages as mentioned above can stimulate the process efficiently and delay of transmission of data from source sensor node to the destination sensor node is completed before the deadline of application. Hence there are disadvantages in the usage of multiple mobile sink that are interference in transmission of data in the network field and

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 3, March 2018

the coordination of mobile sink is most important. For that reason the sensing field is been distributes among the mobile sink so there will be no confusion of which nodes come under which mobile sink.

IV. EXPERIMENTAL RESULTS

The following figure illustrates the algorithm comparisons of the proposed system.

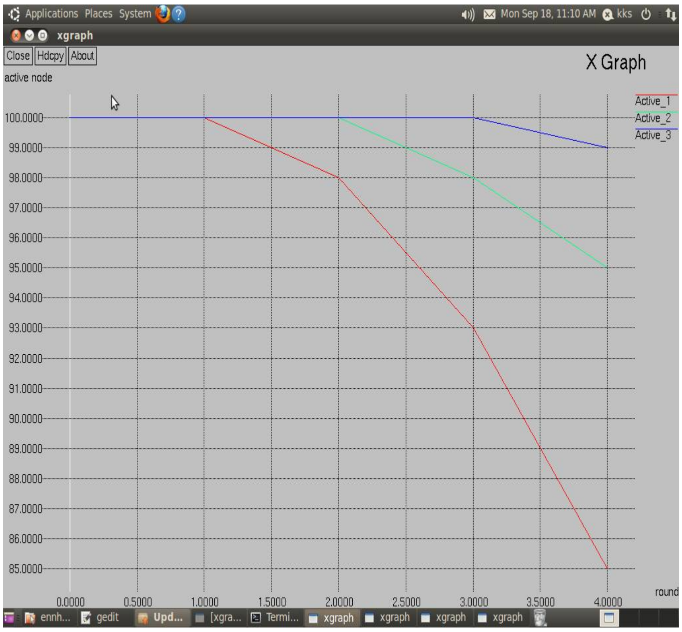

Fig.9 Algorithm Comparisons

The following figure illustrates the Packet Delivery Factor of the proposed system.

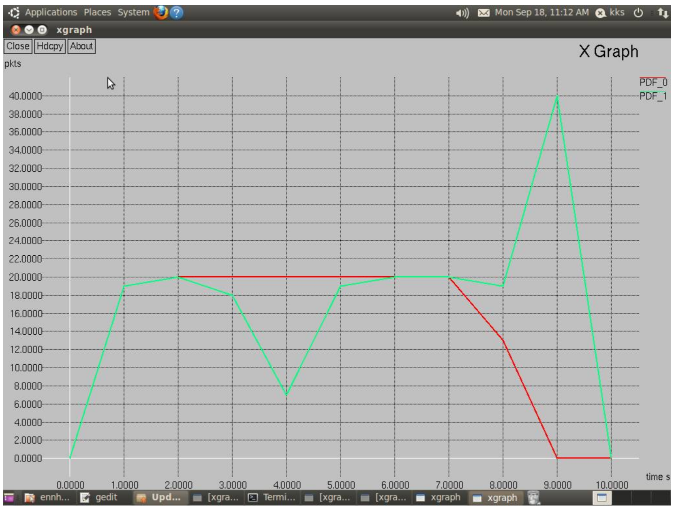

Fig.10 Packet Delivery Factor

The following figure illustrates the Network Lifetime Model of the proposed system.

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 3, March 2018

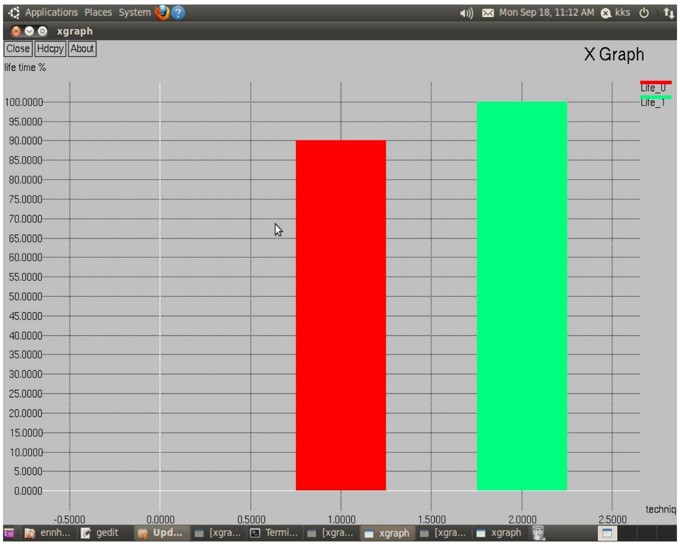

Fig.11 Network Lifetime

The following figure illustrates the Energy Consumption ratio of the proposed system.

Fig.12 Energy Consumption Analysis

V. CONCLUSION AND FUTURE SCOPE

The proposed approach illustrates the weighted rendezvous planning (WRP) algorithm to transmit the urgent information from the sensor node to the sink node. The transmission of data is not the criteria but the data should be received without any delay. The energy consumed by the network should be reduced and network lifetime of the network should be available for other application. Hence weighted rendezvous planning algorithm (WRP) uses SMT to root out the branches into the network and select the highest weighted rendezvous planning (RP) node and collect the

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 3, March 2018

information from RP using Mobile sink. The mobile sink aggregate the information from RP and this increase the network lifetime as RP consume less energy compare to other normal senor node .if instead of using one mobile sink we uses two mobile sink in the large sensing field holding lot of sensor nodes, hence the network will be distributed among two mobile sink if not the problems like intrusion and coordination of mobile ink will be difficult. Using WRP with multiple mobile sink increase the network lifetime and energy consumption will be decreased. Simulation results shows the network lifetime is increased by using multiple mobile sink and energy consumption is reduced .it also present packet delivery factor and comparison of WRP with one mobile sink , WRP with two mobile sink and direct transmission.

In further, we prepare to present the scenario in which the network is busy in completing the task but another application wants to access the network and it's urgent to complete the process so we may use grade of service (GOS) concept to solve the problems.

REFERENCES

[1] I. F. Akyildiz, W. Su, Y. Sankarasubramaniam, and E. Cayirci, "Wireless sensor networks: A survey," Comput. Netw., vol. 38, no. 4, pp. 393-422, Mar. 2002.
[2] S. Diamond and M. Ceruti, "Application of wireless sensor network to military information integration," in Proc. 5th IEEE Int. Conf. Ind. Inform., Vienna, Austria, Jun. 2007, vol. 1, pp. 317–322.
[3] I. Bekmezci and F. Alagz, "Energy efficient, delay sensitive, fault tolerant wireless sensor network for military monitoring," Int. J. Distrib. Sens. Netw., vol. 5, no. 6, pp. 729–747, 2009.
[4] A. Mainwaring, D. Culler, J. Polastre, R. Szewczyk, and J. Anderson, "Wireless sensor networks for habitat monitoring," in Proc. 1st ACM Int. Workshop Wireless Sens. Netw. Appl., New York, NY, USA, Sep. 2002, pp. 88–97.
[5] J. Zhang, W. Li, Z. Yin, S. Liu, and X. Guo, "Forest fire detection system based on wireless sensor network," in Proc. 4th IEEE Conf. Ind. Electron. Appl., Xi'an, China, May 2009, pp. 520–523.
[6] L. Ruiz-Garcia, L. Lunadei, P. Barreiro, and I. Robla, "A review of wireless sensor technologies and applications in agriculture and food industry: State of the art and current trends," Sensors, vol. 9, no. 6, pp. 4728-4750, Jun. 2009.
[7] N. Wang, N. Zhang, and M. Wang, "Wireless sensors in agriculture and food industry–recent development and future perspective," Comput. Electron. Agriculture, vol. 50, no. 1, pp. 1–14, Jan. 2006.
[8] A. Wheeler, "Commercial applications of wireless sensor networks using zigbee," IEEE Commun. Mag., vol. 45, no. 4, pp. 70–77, Apr. 2007.
[9] W. Chen, L. Chen, Z. Chen, and S. Tu, "Wits: A wireless sensor network for intelligent transportation system," in Proc. 1st Int. Multi-Symp. Comput. Comput. Sci., Hangzhou, China, Jun. 2006, vol. 2, pp. 635–641.
[10] B. Hull, V. Bychkovsky, Y. Zhang, K. Chen, M. Goraczko, A. Miu, E. Shih, H. Balakrishnan, and S. Madden, "Cartel: A distributed mobile sensor computing system," in Proc. 4th Int. Conf. Embedded Netw. Sens. Syst., New York, NY, 2006.
[11] L. Yu, N. Wang, and X. Meng, "Real-time forest fire detection with wireless sensor networks," in Proc. Int. Conf. Wireless Commun., Netw. Mobile Comput., Wuhan, China, Sep. 2005, vol. 2, pp. 1214–1217.
[12] I. Akyildiz, W. Su, Y. Sankarasubramaniam, and E. Cayirci, "A survey on sensor networks," IEEE Commun. Mag., vol. 40, no. 8, pp. 102–114, Aug. 2002.
[13] J. Lian, K. Naik, and G. B. Agnew, "Data capacity improvement of wireless sensor networks using non-uniform sensor distribution," Int. J. Distrib. Sens. Network, Jun. 2006.
[14] J. Li and P. Mohapatra, "An analytical model for the energy hole problem in many-to-one sensor networks," in Proc. 62nd IEEE Veh. Technol. Conf., Dallas, TX, USA, Sep. 2005, vol. 4, pp. 2721–2725.
[15] J. Luo and J.-P. Hubaux, "Joint mobility and routing for lifetime elongation in wireless sensor networks," in Proc. IEEE INFOCOM, Miami, FL, USA, Mar. 2005, vol. 3, pp. 1735–1746.