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An Efficient Sink Scheduling for Mobile Sink (MS) based Wireless Sensor Networks

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Abstract: ***In wireless sensor network (WSN), the major issue is the limited memory, bandwidth and power of sensors. So that this limited resources are not suitable for long running WSN since it will not perform as we expect from it. As we know the mobility of sink has very efficient and strongly appeared as far as the potential solution to it. So that for solving these problem a Mobile Based (MS) method and algorithm are invented, for better utilization and enhance the performance of every sensor. In current scenario the most of the sensor lost the data for waiting only for mobile sink because of sensor low data generation rate, So that the sensor networks mobile sink will not be able to take all the data from node in efficient time. Therefore lots of sensors may not be able to transmit the data to mobile sink because of their limited power consumption. In our work, we propose a sensor Data Generation Rate (DGR) based algorithm for efficiently rendezvous point (RP) selection and after that scheduling the path for the mobile sink. We simulate the propose algorithm and compare the results with existing algorithm to measure its efficiency.***

Keywords: ***Wireless sensor networks, Data generation rate, mobile sink, Rendezvous point.***

I. INTRODUCTION

The ascent in the need of sensing in remote, unfriendly or dangerous ranges like cautioning framework, warning system ,smart transportation, environment monitoring , and so on Remote Sensor Networks (WSN) is a standout amongst the most talked about and investigated theme in remote innovation. It is essentially utilized for detecting an extensive variety of physical wonders like light, commotion, mugginess, gasses, temperature and numerous more [1]. WSN generally involves sensor Hubs (SNs) which are either self- assert travel or physically sent in the objective range.

Thusly, the analysts have proposed the idea of meeting focuses [4] [5] to moderate this issue. Here, rather than gathering information from every sensor hub (SN), the portable sink visits an arrangement of plausible indicate RPs gather the information from the SNs. In this paper, we build up a calculation of each and every sensor data generation rate and finding the shortest path. In these scenarios a long time, numerous algorithm [14] [2] [6] for the path scheduling for portable sink had been proposed. Be that as it may, our proposed data

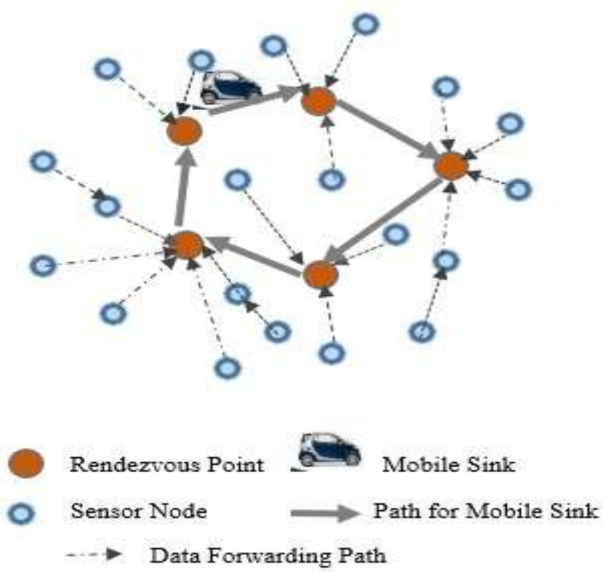

Fig 1:-. MS (Mobile sink) based sensor data collection in a WSN

generation rate based algorithm is a novel approach as in it deals with covering the entire target territory as it partitions It into hexagonal cells like cell system for the reason to calendar entire system and versatile sink with no covering. By covering the entire target range, we need to imply that SNs can speak with the portable sink at some RPs by single-bounce or multi jump correspondence. The calculation is reproduced broadly to gauge its execution as far as different parameters, for example, vitality utilization, organize lifetime, jump checks and standard deviation of residual vitality. The outcomes are likewise contrasted and the current calculation [6] the results are likewise contrasted with the current calculation [16] with demonstrate its adequacy.

II. LITERATURE RIVEW

A present state in WSN is to misuse the mobility of sink for adjusting the energy exhaustion among the SNs. The many authors in [15] sorted WSNs into stationary and re-Locatable few work have been expert for sink development technique [8] [9]. [10] Arranged sinks adaptability from the sensors viewpoint into sporadic, obvious and controlled. The authors of [11] [12] have proposed characteristic computations in light of flexible sink. In [16], it is suggested that flexible sink can manage the small and isolated frameworks better than anything the static sink, along these lines improving the accessibility of the framework. The coordinating traditions of compact sink [13] can fulfill better accessibility with almost lesser effort than the directing traditions for static sink.

In any case, this estimation takes O(n^5) time for the particular n SNs. this scenario may be seen that our proposed figuring requires O(m^4) time here m is amount of the potential positions and m << n<<0. In [3][7] authors proposed a procedure for updating the framework lifetime through the sink development. The information (sensor data) regarding the extra battery of Sensor Networks are used to change the whole transmission extent of the Sensor Networks. convenient sink may known in prior time so that the MS can be enacted to play out its development. In this research paper, we choose to discover the RPs which is having the most noteworthy information Generations rate and making a way by taking after algorithm.

III. SYSTEM MODEL

A. Network model

Consider a homogeneous WSN comprising of static, SNs with a MS. Suppose n is a total number of SNs sent arbitrarily over a two-dimensional target zone which is thought to be assumed inside a rectangle. A SN can talk with whatever other center if it exists in its correspondence go . it is proposed to find a plan of the potential RPs, which is additionally restricted constraining objectives over certain framework parameters The correspondence delay between the portable sink is furthermore thought to be irrelevant

B. One Hop Neighbor discovery

A SNs with the graph G(y)= (V(y),e(y)), and this node sets V(y) speaks to set on SNs dynamic at the time k and edge set e(y) comprises of sets of hubs (u,v) to such an extent that hubs u and v can specifically trade message between each other at time k. By a dynamic hub we mean a hub that has not bombed for all time. All diagrams considered to be undirected, i.e., (i, j) =(j,i). The quantity of neighbors which is i, is called it′s degree, which is meant by di(k). A way from i to j is an arrangement of edges associating i and j. A diagram is called associated if there is a way between each combine of hubs. From source hub to goal hub, neighbors of a source hub are taken and every conceivable way are made.

C. Data generation rate

Data generation rate is the parameter, which we consider for rendezvous point (RP) selection. In real world, every sensor nodes detects data and send with some data rate, some location may have high data generation, due to availability of data.

D. Rendezvous point (RP) selection

Rendezvous point can be selected from available set of sensor nodes, which is selected based on node, which is having high data generation rate. If a node has high data generation rate, first it is chosen as RP1, then the node itself and its neighbors are omitted from list of nodes, then we search for next node, which has high data generation rate and it is selected as RP2, this process repeats till we get no nodes in set.

E. Travelling salesmen problem

Near the sink location, RP is selected and it first collects data from that RP, next sink will choose the RP, which is near to that location and go to that RP, after completing it, it goes to next nearest one, this process repeats till no RPs are found to collect data

Energy Model

The sensor nodes energy model is worked by the radio model [17] (paper) my is (15). .what's more, here every Sensor Network (SN) creates sensor information with the n bits every second and the vitalityE_{Trans}

$$E_{Trans}(n,d) = n^*(E_{Elec} + \varepsilon_{Fmp} * d^2), For\ d<d_0$$

$$E_{Trans}(n,d) = n^*(E_{Elec} + \varepsilon_{Amp} * d^4), For\ d \geq d_0$$

$$E_{Rec} = n^* E_{elec}$$

Notation and Description

Notation	Description
n	Total number of sensor nodes
d	distance between the sending node and the receiving node
d_0	
E_{Trans}	the data transmit energy consumption
E_{Elec}	the WS is circuit energy consumption
ε_{Fmp}	amplifier circuit power coefficient for free-space model
ε_{Amp}	amplifier circuit power coefficient for multi-path fading model

IV. PRAPOSED WORK

In WSN (wireless sensor networks) main challenge in is to increase throughput of SN (sensor node) and decrease energy consumption to improve the lifetime of SNs. The steering conventions have incredible effect on to the lifetime of sensors system. The steering system that connected in such systems ought to affirm that the vitality utilization will diminish and consequently the lifetime of such system will be expanded [19].. The end-to-end postpone was limited however vitality utilization was expanded continuously application. Yet, in this proposed paper altered the expanded [18].. The end-to-end postpone was limited however vitality utilization was expanded continuously application. Yet, in this research paper altered convention, which we execute the three pass calculation in need line based calculation. So the vitality utilization is diminished and throughput is expanded. The two pass calculation is as taken after In Wireless Sensor Network, the multi trust based any WSN we will plan the information utilizing DATA ENERATION RATE based sink planning
.every hub has its own particular limit of information era rate and in addition control utilization rate in this way.

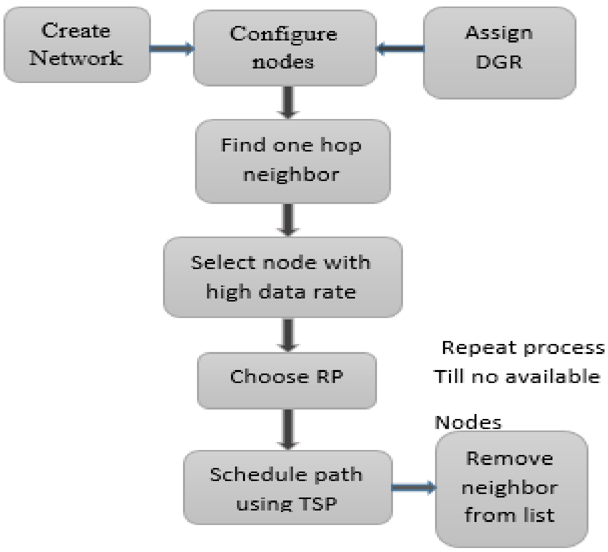

Figure 2: *- System Architecture*

A About Algorithm

The idea of this algorithm is to take the node that have highest data generation rate in given area and than go to second highest next data generating node that are present in particular wireless sensor network. And making a path by following these decreasing order of data generating node using priority queue algorithm. After that we are calculating the node density and making a shortest path according to this node density. So this technique may take less time complexity compare to *In degree and K means* proposed algorithm.

Selection of RP

We will assume that di (V = 1 to !D!) from D, sorted in the descending order of DGR(data generation rate) and keeping on addition in into set of RPs and making most priority queue based path until the generation rate of sensor data will not be minimum either become zero.

Lemma : The proposed algorithms (DGR) takes time in order of $O(m3)$ and m<<n<<0, here n=|s| , s in set of sensor nodes.k.

Proof: The TC (time complexity) of DGR algorithms totally depended on the how many times it appears the MPQ (Most Priority Queue) to evaluate the and compute and cover the all sensor data.Basiclayy it works with highest data generation rate .in our algorithm we first deploy the certain n mummers of sensors randomly And second finding the neighbors of all the sensor nodes. Then in 3rd step the we are assign the data generation rate D to all the randomly .so finding the highest the data generation rate these are taking the 0 2. Another step involve to finding the node which have maximum dgr data generation rate that take some linear time.morover the step 2 and step 3 takes as a constant slices say p, its complexity is 0(xn2)*0(x)3+0(xn), ie 0 (n3) is worst case which is all Sensor Nods might be designated as RPs The proposed algorithms is replicated with the k −means for selection of RPs.

Priority Queue Algorithm

A priority queue which is an abstract data type (ADT) which is like a regular queue or stack data structure, but where additionally each sensor data has it's own "priority "associated with it. In a PQ, an element (Senor Data) with highest priority is served before an (Senor Data) element with low priority elements. If there are two elements have the same priority, so that elements are served according to their queue order

.

Algorithm 2: k-means Based Approach

Input: Set of sensor nodes S= {SI, sz… ,sn}, r and number of RPs generated through proposed algorithm say q.

Output: Set of q positions as RPs and path for mobile sink.

Step 1: Call k-means (S,q) /*returns k positions as k-means RPs*/

Step 2: Call TSp (k-means RPs) /* Path Formulation*/

Step 3: Stop

k - Means algorithm for path scheduling

V. SIMULATION RESULTS

We had performed simulation of the proposed Data Generation Rate (DGR) algorithm using network simulator 2 (NS2) on the system with an Intel Pentium CPU 3220M with the speed of 2.60 GHz, 4 GB RAM and Linux OS.

Simulation setup: The sensor hub are accepted to have the underlying energy of 2J and it will dead on the off chance that it ranges to 0J. Conversely, The Senor Network is thought to be dead when its most first Sensor hub will passes on. The MS (Mobile sink) is not compelled to vitality and it can go with speed of 2 t0 2.5 m/s [13]. In this part, the point of this usage and reenactment study is to dissect the execution of proposed steering convention and contrasted and the current directing convention

A. The packet delivery of the sensor node's (SNs):- we deployed is that totally depends on the sensor data generation rate (DGR) and as will as priorities of the . sensor DGR and as will as priorities of the sensor data rate queue. If the sensors data generation rate is high the MS will collect the data according to the data consumption. The path scheduling is here that follow the DGR based policy here is the figure

B. Analysis of network lifetime: Performance:

Simulation will supported out of the DGR algorithm shows satisfactory results for the sensor network pure lifetime. The algorithm which is proposed by us outstrips the WRP regarding system lifetime when plotted against various SNs thickness in Fig 6.1 and correspondence extend in Fig 6.2 while keeping alternate parameters is to be steady.

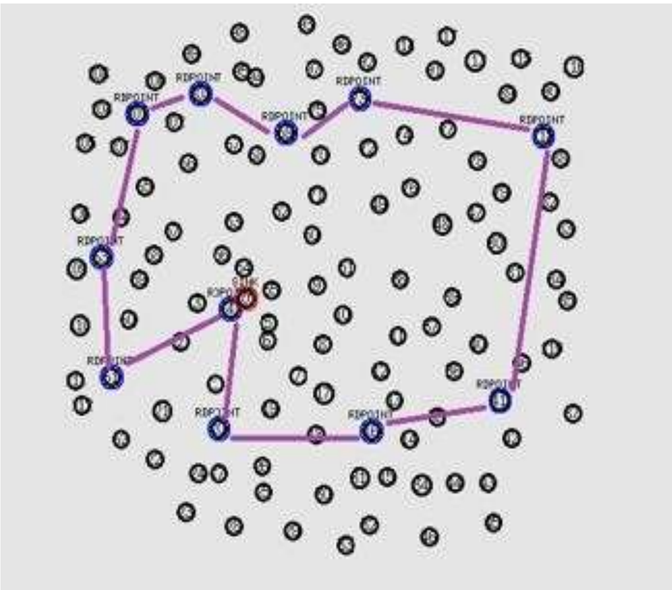

***Figure 3:** -Path Scheduling*

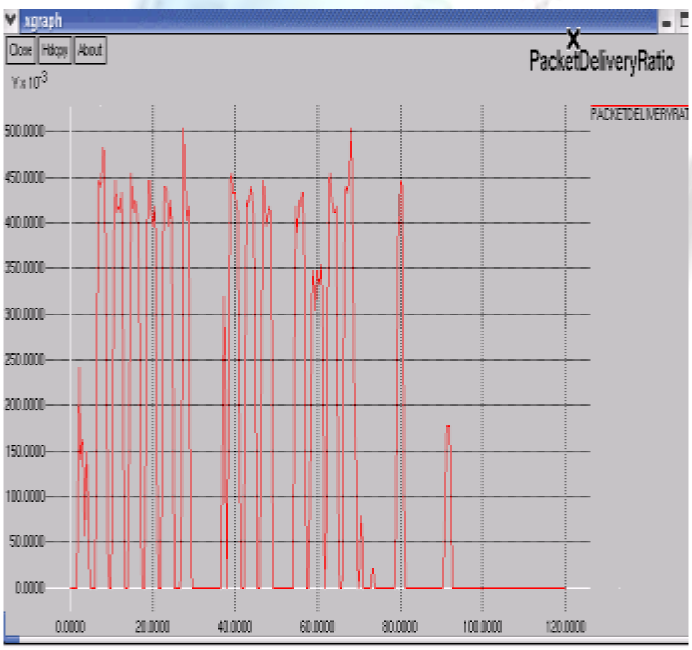

Fig A. Packet Delivery Ratio

Algorithm 1 Data Generation Based Approach

Input: S = {Sl, S2... Sn} **be the set of SNs**

Output: RP = {rp1, rp2,... rpd} be the set of rendezvous points that the mobile sink visits in its tour.

Step 1: **Initialize** 'n' sensor nodes in network

Step 2: **Find** one hop neighbor for all sensor nodes

Step 3: Assign **data generate rate** 'D' to all nodes using random generated value

Step 4: **sort** nodes using data rate, high data rate nodes are first

Step 5: **for** {

List ai [nn], where nn- number of nodes

Select node with high data rate generation, RPi

Remove RPi and its neighbor from List ai }

Step 5: **repeat** till List ai=0;

Step 6: Sink scheduling of path for selected RPs.

Step 7: **Call** TSp (RPs) Path Formulation

Step 8: Each SN communicates with the nearest RP and **move** to next location.

Proposed Data Generation Based Algorithm

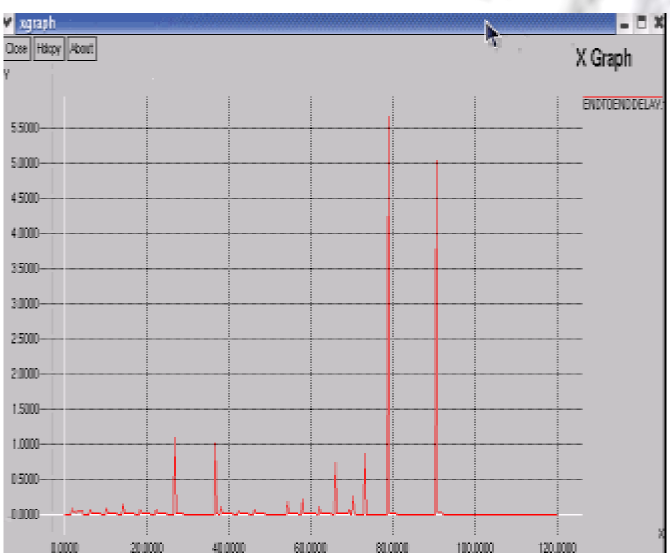

Fig B. End to end delay

C. Energy consumption and Standard Deviation Analysis –

The algorithm as far as energy consumption & SD of remaining sensor energy . For calculating SD of remaining sensors energy of SNs by plotting it against the quantity of rounds in conveyed zones. We can see from Fig 6.1 and 6.3 that both of the energy consumption of SNs and the SD of their outstanding vitality gives better outcomes for the DGR calculation in opposition to k-Means based calculation because of the inferred cost work.

Measurement of Performance

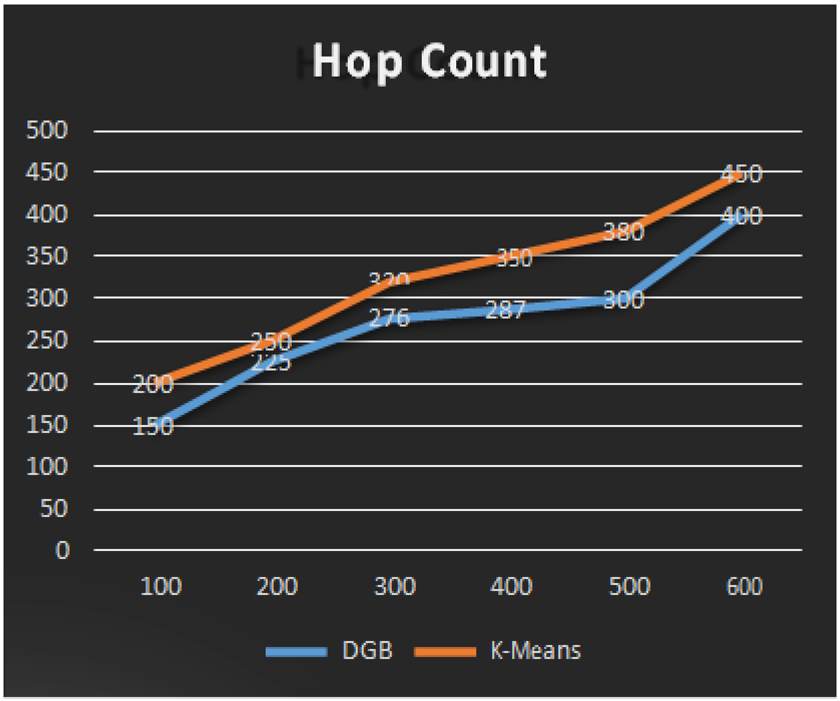

Fig C. Hop Count-K-means v/s Proposed Algorithm

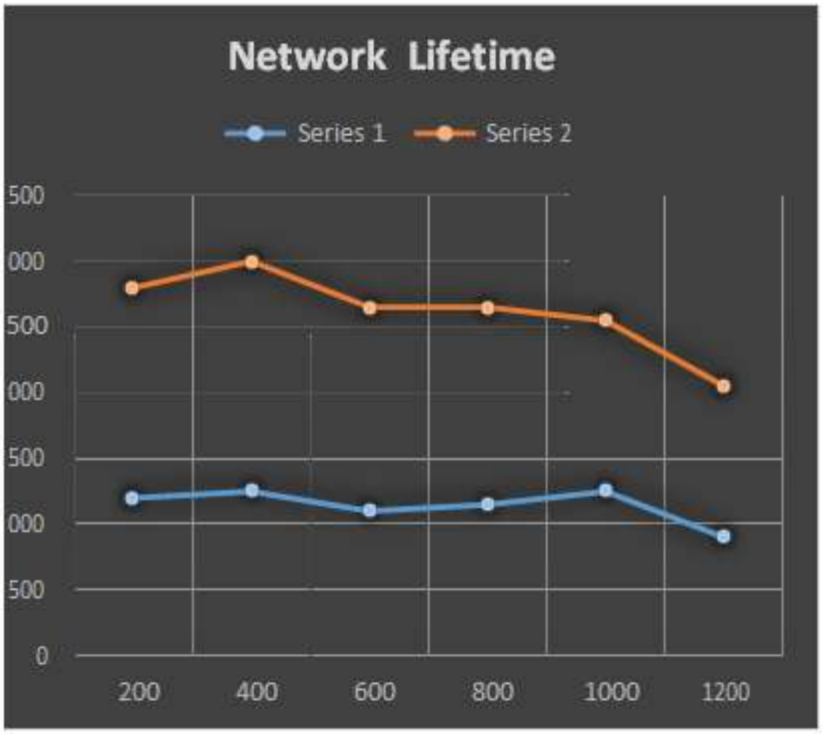

Fig D. Network Lifetime – K-means v/s Proposed Algorithm

As we can see from C ,D,E and Athe Hop Count Lifetime of Network and Energy Consumption is better that K means based approach. Probably all the parameters we measured and get the better outputs comparative k – means algorithm.

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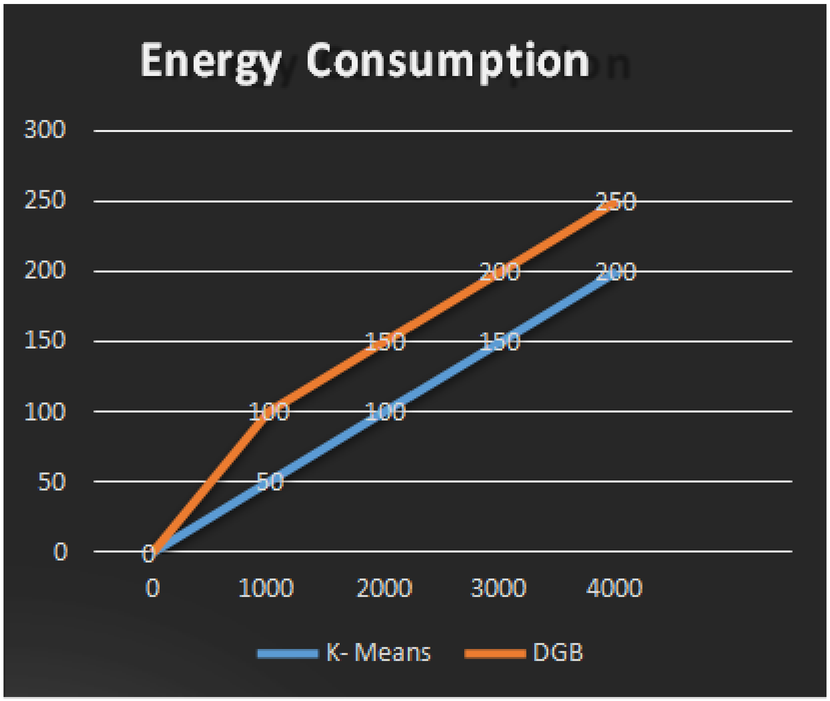

Fig E. Energy Consumption of Sensor Network

VI. CONCLUSION

In This Research paper, The proposed algorithm for scheduling the efficient path for MS in data generation rate in WSNs (Wireless sensor network).We had also confirmed that selected Rendezvous points are very efficient to cover whole sensor deployed area i e , the MS can combined to the sensed sensor data which is deployed in the sensor network while visiting these Rendezvous points in this tour. We exhibited the DGR based algorithm performed as well as superior to anything other proposed algorithm as far as hop count and network system lifetime well as execution. In any case, the time complexity of our algorithm is in the of ��(�3) here n is total number of potential positions in the objective territory, which we might want to decrease in our future research work.

REFERENCES

[1] Akyildiz, I. E, Su, w., Sankarasubramaniam, Y, and ayirci, E. (2002).”Wireless sensor networks: a survey. Computer networks”, 38(4), 393-422.

[2] Li, Jian, and Prasant Mohapatra. "An analytical model for the energy hole problem in many-to-one sensor networks." IEEE vehicular technology conference. Vol. 62. No. 4. IEEE; 1999, 2005..

[3] S. Jain, R.C. Shah, G. Borriello, W. Brunette, S. Roy, “Exploiting mobilityfor energy efficient data collection in sensor networks”, in: Proc. Of2nd IEEE/ACM Workshop on Modeling and Optimization in Mobile,Ad Hoc and Wireless Networks (WiOpt), Cambridge, UK, 2004.

[4] Nitesh, Kumar, Md Azharuddin, and Prasanta K. Jana. "A novel approach for designing delay efficient path for mobile sink in wireless sensor networks." Wireless Networks: 1-20

[5] S.R. Gandham, M. Dawande, R. Prakash, S. Venkatesan, “Energyefficient schemes for wireless sensor networks with multiplemobile base stations”, in: Proceeding of IEEE GLOBECOM 2003.

[6] Nitesh, Kumar, Md Azharuddin, and Prasanta Jana. "Minimum spanning tree–based delay-aware mobile sink traversal in wireless sensor networks." International Journal of communication Systems (2017).

[7] Z.M. Wang, S. Basagni, E. Melachrinoudis, C. Petrioli, “Exploiting sinkmobility for maximizing sensor networks lifetime”, in: Proc. of 38thHawaii International Conference on System Sciences, Big Island,Hawaii, USA, 2005

[8] S. Basagni, A. Carosi, E. Melachrinoudis, C. Petrioli Z.M. Wang,”Controlled sink mobility for prolonging wireless sensor networks lifetime”, ACM/Springer Wireless Networks 14 (2007) 831–858..

[9] Azharuddin M., Jana P.K. (2015) "A PSO Based Fault Tolerant Routing Algorithm for Wireless Sensor Networks" in Springer.

[10] L. Li, J.Y. Halpern, P. Bahl, Y.-M. Wang, andR. Wattenhofer. “Analysis of a cone-based distributedtopology control algorithm for wireless multihopnetworks”. In Proceedings of the ACM Symposium onPrinciples of Distributed Computing (PODC),(Newport, RI, Aug. 2001), pages 264–273, 2001 .

[11] Azharuddin M., Jana P.K. (2013/8/22) "A distributed fault- tolerant clustering algorithm for wireless sensor networks" in IEEE.

[12]Azharuddin, Md, and Prasanta K. Jana. "Particle swarm optimization for maximizing lifetime of wireless sensor networks." Computers & Electrical Engineering 51 (2016): 26- 42

[13] R. Wattenhofer and A. Zollinger. Xtc: “A Practical topology control algorithm for ad-hoc networks.Technical R port 407, Department of Computer Science ”, ETH Xurich, 2003.

[14] "A distributed algorithm for energy efficient and fault – tolerant routing in wireless sensor networks." Wireless Networks 21.1 (2015): 251-267

[15] I.F. Akyildiz, W. Su*, Y. Sankarasubramaniam, E. Cayirci “Wireless sensor networks: a survey”, IEEE Communication Magazine, pp. 393–422, 2002.

[16] Nikolaos A. Pantazis, Dimitrios D. Vergados, “A Survey on Power Control Issues in Wireless Sensor Networks,” IEEE Communications Surveys, vol. 9, pp. 86-107, 2007.

[17] Baiping Li; Xiaoqin Zhang , “Research of development in wireless sensor network routing protocols based on NS2” , International Conference on Electronic and Mechanical Engineering and Information Technology (EMEIT), vol. 4, pp. 1913-1916 , 2011.

[18]Azharuddin, Md, Pratyay Kuila, and Prasanta K. Jana. "A distributed fault-tolerant clustering algorithm for wireless sensor networks." Advances in Computing, Communications and Informatics (ICACCI), 2013 International Conference on. IEEE, 2013.
[19] Azharuddin, Md, Pratyay Kuila, and Prasanta K. Jana. "Energy efficient fault tolerant clustering and routing algorithms for wireless sensor networks." Computers & Electrical Engineering 41 (2015): 177-190.