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An Energy Conservation Measures Consume Less Power While Delivering Traffic

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Abstract

Many applications require high degree of sensor node to identify their locations in wireless sensor network. Location information is gathered from manual setting or GPS device. Since manual setting requires huge cost of human time, and GPS requires expensive device cost. Both approaches are not applicable for large scale WSN. The mobile anchor node is used to finding the position of unknown location node. The optimal path planning mechanism is evaluated to minimize the time for determining the localization and should increase the accuracy.

In proposed system the circle based path planning mechanism can be implemented, because it covers four corners of the sensing field by increasing the diameter of the concentric circles. The sensor node is located at the center of this circle, a single mobile anchor node moves randomly through the sensing field to determine the localization and also detecting the hacker node in WSN. The Performance of the proposed system can be evaluated through a series of simulation with NS-2 environment.

Keywords: *Wireless Sensor Network (WSN), localization, mobile anchor node, circle based path planning mechanism.*

INTRODUCTION

Wireless Sensor Network (WSN) is a multi-hop wireless network consisting of a large number of small, low-cost, low-power sensor nodes to perform intended monitoring functions in the target area. The sensor node is used to sense the data and forward that data over a wireless medium to a remote data collection device. Localization is a critical requirement for determining where a given node is physically located. It is necessary for data correlation. Location information is gathered from manual setting or GPS device. Since manual setting requires huge cost of human time, and GPS requires expensive device cost, it does not work indoor environment and underwater. Both approaches are not applicable for large scale WSN.

The localization method can be classified according to the type of information. First method is range based localization where the locations are calculated from node to node distance estimation or inter node angles. Second method is range free localization method in which the locations are determined by radio connectivity constraints. Both methods are more complex and more expensive because they require infrared, X-ray or ultrasound techniques to calculate the distance.

In this paper we propose a circle based path planning mechanism to determine the localization of each node because it covers four corners of the sensing field by increasing the diameter of the concentric circles and also determine the hacker node in the group of wireless sensor networks.

LITERATURE SURVEY

A predefined trajectory algorithm [1] proposed to determine the accurate and low cost sensor localization and also minimize the localization error of the sensor node using a single mobile anchor node and the obstacle resistant trajectory is also developed to detect obstacle in the sensing field.

Route planning mechanism for MANET [2] developed using a single mobile anchor node to determine the locations of sensor node and also determine the block-hole attack such as denial of service attack (DOS) by improving the security in each and it drops the incoming packet between source and destination. In this algorithm they mainly focus on determining and improving the security of routing protocol Ad-hoc on Demand Distance Vector (AODV).This paper presents better results for end to end delay, packet delivery ratio and throughput. But in this approach each

node requires the behaviour of broadcasting node for trusting the receiving nodes.

Particles Swarm Optimization (PSO) [3] uses a single mobile anchor node to determine the location of individual sensor node and it is a population based stochastic technique. The PSO algorithm shares many similarities with evolutionary computation called Genetic Algorithm (GA) but it has no evolution operators such as crossover and mutation. It has the potential solution called particles. The PSO consist of each time step changing the velocity of each particle toward its best locations. They analyse a simulation result using PSO algorithm based on three matrices such as localization error, percentage of localized error and chord length.

However, the accuracy of the localization results is depends on the length of the chord. Scan algorithm [4] is for determine the location of sensor node using beacon points with more than two mobile anchor nodes to increase the percentage of localized sensor and also minimize the localization error. The scan method is a static path planning scheme.

The unknown node uses Omni-directional antenna and mobile anchor node uses directional antennas to receive feedback message from unknown nodes to calculate the virtual force to determine the location of sensor node. Superior path planning mechanism [5] for mobile beacon assisted localization based on Z-curve method localization. They use a mobile beacon points to decrease the time required for localization, increase the accuracy of the position and also increase the coverage.

The Z-curve mechanism is used to find the shortest path it will be selected by mobile beacons to broadcast their beacon messages to unknown sensor node. The obstacle resistant trajectory is also proposed to handle the obstacles in the sensing field.

An Energy efficient localization strategy using particle swarm optimization (PSO) [6] to determine the location of each and every sensor. The static sensors are deployed in the geographical area for data gathering process and also try to estimate the position of mobile sink which is relocating to improve the performance of overall network area. The mobile sink estimates its position with respect to neighbouring nodes. Few sensors with known position are deployed in the geographical area and using their

information mobile will try to determine the location unknown node by using PSO. This energy efficient location method increase the implementation cost and also reduce the error accumulation.

Localization algorithm [7] using mobile anchor node based on regular hexagon in two dimensional WSN to determine the location unknown node. The location unknown node determined by using trilateration method and it can achieve high localization ratio and accuracy location when the communication range is not smaller than trajectory resolution. The performance this localization algorithm depends upon communication range, broadcast interval, movement trajectory and path length. In this method they propose several mobile anchor nodes to reduce the localization time and also improve the localization accuracy.

Path planning mechanism [8] to determine the location of sensor node and minimize the location error. The obstacle resistant trajectory is also developed to determine the obstacles in the sensing field. If any obstacle in the sensing field can obstruct the radio connectivity between anchor node and sensor node they develop a single mobile anchor because the multiple anchor node cause the beacon collision in the sensing field.

Fuzzy logic based localization [9] for multiple mobile anchors uses fuzzy grid prediction scheme for simulate the result and hardware result can be implemented in i -Robot mobile host. They formulate mobile node localization, fuzzy multilateration and fuzzy grid prediction scheme for node localization in noisy environments. By using this algorithm the distance between mobile node and anchor nodes are fuzzified to obtain the fuzzy location.

An optimization algorithm [10]developed to solve flip ambiguity problem in localization and also localize the blind nodes in WSN. The optimization algorithms are simulated annealing, particle swarm optimization and genetic algorithm used to solve the problem of flip ambiguity to increase accurate and unique localization and also save the energy consumption. They propose GA is used to localize blind nodes and SA is used to find localization then PSO is used to solve flip ambiguity problem.

Node localization [11] implemented in environmental applications such as disaster relief, forest fire tracking and target tracking. This paper develops the

node localization to report the origin of events, assist group querying of sensors, routing and to answer questions on the network coverage. The node localization depends upon the following factors such as anchor density, node density, computation and communication cost, accuracy of the localization.

A novel iterative multilateral localization algorithm [12] discussed based on the use of time round mechanism and anchor node triangle to reduce the error accumulation also reduce location error to prevent abnormal phenomena caused by trilateration problem in localization through limiting the number of neighbouring beacon points used in time rounds. This paper proposes high accuracy localization even if in large range errors, it can produce good result and it is applicable to RSSI range based technique. This algorithm uses two events such as periodic timer trigger event and receiving location data packet event.

Mobile Anchor Positioning (MAP) [13] made for WSN to determine the location by using Global Positioning System (GPS). It is a range free localization method which uses the beacon points of mobile anchor and location packets of neighbouring nodes to determine the locations of node. In this the anchor node is equipped with global positioning system, to broadcasts its coordinates to the sensor nodes as it moves through the network and the sensor nodes collect enough beacons to calculate the locations . By increasing the number of mobile anchor nodes which increase the percentage of localized nodes with increase the execution time of localization.

Three novel subspace approaches [14] analysed for cooperative location for node localization in fully connected to reduce the biases and mean square error of the sensor node and also position estimation. The full set and minimum set subspace algorithms are used for centralized processing. The distributed subspace algorithm which takes available distance information to produce the solution with no iteration. The drawback of this proposed algorithm is its work only connectivity information because which can only find shortest path distance all pair of nodes but the theoretical performance is unavailable.

Distributed node localization algorithm [15] made survey on location implementation called mobile beacon improved optical fibre (MB-IPF). In this each mobile anchor node is equipped with

GPS which moves around the sensing field based on Gauss-Markov mobility model. The unknown node estimates its position in a fully connected mode based on received mobile beacons in GPS. It consist of three phase to find position of node such as information sampling, initial point estimation and self localization. The literature survey involves few recent papers on path planning mechanism.

LOCALIZATION TECHNIQUES

Localization is an essential need to determine where the sensor node is physically located in many WSN applications such as forest fire tracking, target tracking, military surveillance etc.

System architecture:

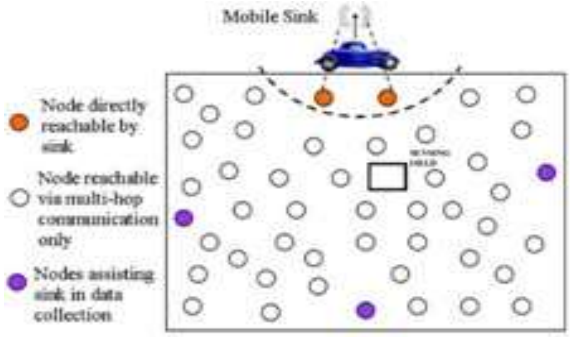


Fig 1 System Architecture

The system architecture consists of mobile sink differentiated by different colors. Mobile sink is used to collect the data from sensing field. The localization method classified into two types such as 1) Range based localization 2) Range free localization. The range based algorithm is used to find the point-to-point distance calculation and angle estimation to calculate the position of sensor node. It consist of different parameters they are Received Signal Strength Indicator (RSSI), Time of Arrival (TOA), Time Difference Of Arrival (TDOA) and Angle Of Arrival (AOA).The range free localization further classified into two types they are Local technique and Hop based technique. In local technique each mobile anchor node equipped with GPS to determine the location unknown node. In hop based technique the Distance vector (DV) routing is used to find the position of landmark announcement. The localization method consists of following different factors.

Accuracy:

In many WSN applications accuracy is very essential to determine the locations. For example in military application sensor network is deployed for intrusion detection.

Power:

Power is important for computation. Each sensor network has limited power which is

supplied by battery.

Cost:

Cost is very critical requirement in the localization. Many of the localization algorithms give low cost in the development of localization.

Static Nodes:

The static nodes are deployed in environment which has the ability to compute and sensing capability to sense and forward the data from source to destination.

Mobile Nodes:

The mobile anchor node is also deployed in wireless environment and it is equipped with Global Positioning System (GPS) to determine the position of sensor node. It consumes more power compared to static node. The mobile anchor node is one of the reference node to determine the location of unknown node. See figure 2.

In localization method sensor node fixed at the centre of the circle, a single mobile anchor moves through the sensing field, it broadcast its beacon messages and a sensor node select appropriate position on anchor node which is called beacon point to construct a chord of its communication circle.

However it requires three beacon points to construct a communication circle. The accuracy of localization depends upon the chord length. In this the location unknown node can be determined by using mobile anchor node.

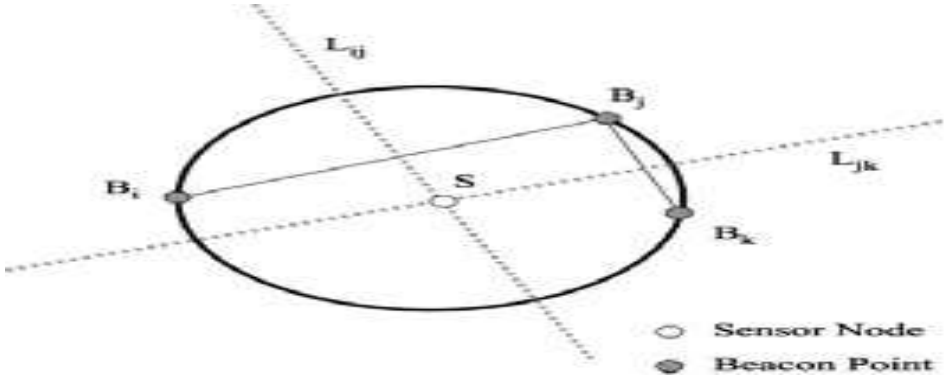


Fig 2 Localization Concept

PATH PLANNING ALGORITHM

Path planning can be classified into static or dynamic. Static path planning method is used to design movement trajectory before initial execution. Dynamic path planning scheme is proposed for real time distribution of unknown node in given ROI. It consists of Breadth-First (BRF) algorithm and a Backtracking Greedy (BTG) algorithm. Static path planning can be SCAN, HILBERT and S-CURVE method. As the scan method is a straight line method it cannot give guarantee to length of each chord which exceeds a certain threshold. Hilbert method is a curve method which cannot give guarantee that sensor node to obtain three or more beacon to form a communication circle and the s-curve method is difficult to obtain each sensor node can form a valid chords. The proposed CIRCLE method gives guarantee that four corners of the sensing field by increasing the diameter of the communication circle.

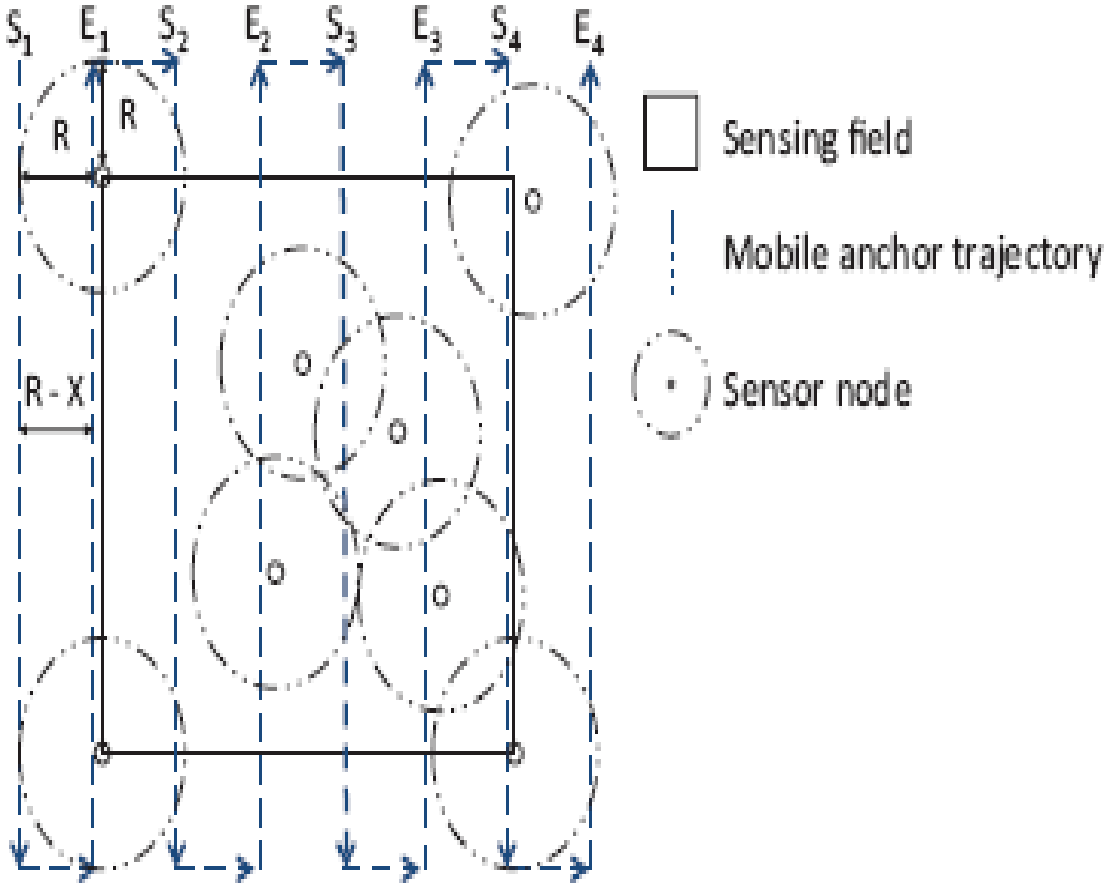


Fig 3 Circle Based Path Planning

In circle method the total path length obtained from

$$D = (L+2R)\times\left(\left\lceil\frac{L+2R}{R-X}\right\rceil+1\right)+(R-X)\times\left\lceil\frac{L+2R}{R-X}\right\rceil$$

L=>Total length in the sensing field

R-X=> The distance between two vertical segments of mobile anchor trajectory

R=> Radius of the mobile anchor.

X=> set in the range $0 < X \leq R$.

A. DATA FLOW DIAGRAM

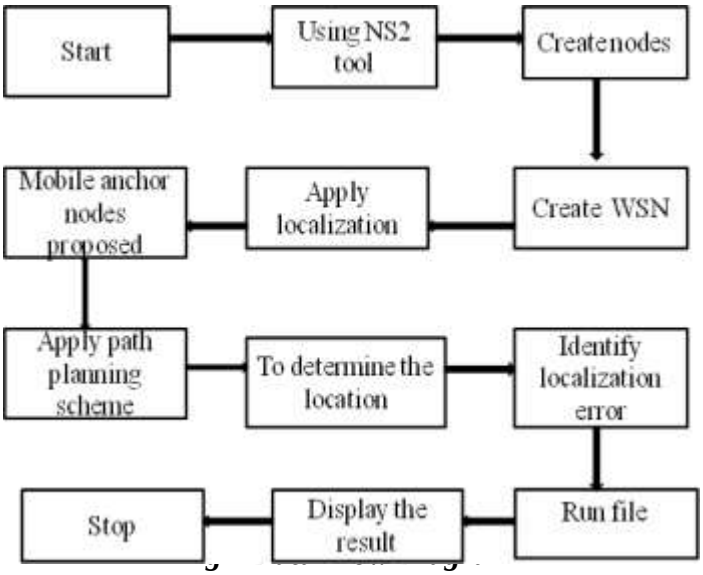


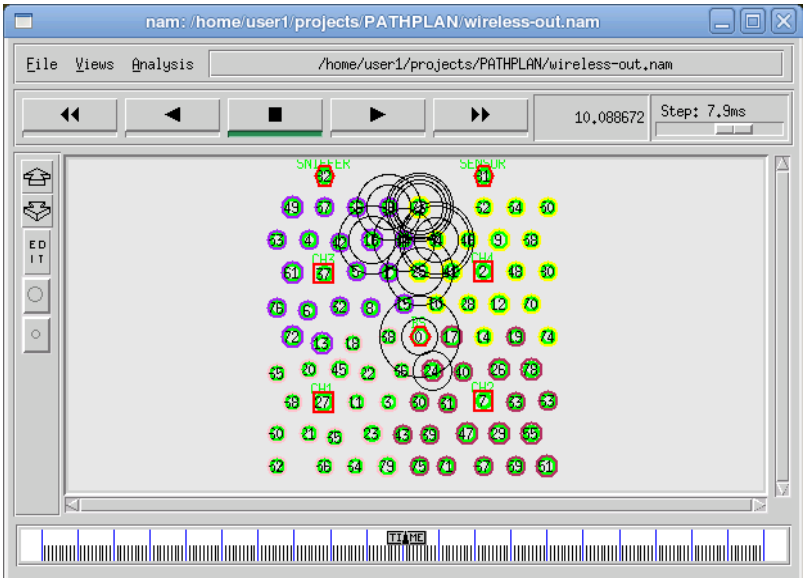
Table 1

Parameters	Value
Topology size	700M x 700 m
No of sensor nodes	82
No of anchor nodes	1
MAC layer	IEEE 802.11
Routing protocol	Ad hoc On-Demand Distance Vector (AODV)
Simulation time	20 Sec
Initial Energy	50 Joules
Transmission power	0.50175 W
Received Power	0.60175 W
Packet Size	512 Bytes

The data flow diagram shows steps to determine the localization using path planning mechanism.

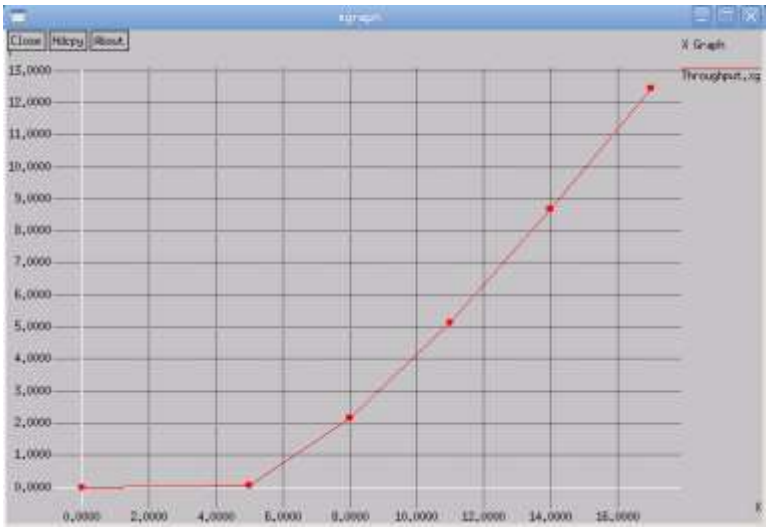
SIMULATION RESULT

The simulation result implemented in NS2 platform and IEEE 802.11 used as the MAC layer in our simulation experiments. The simulation result consists of different parameters and its value shown in table 1.

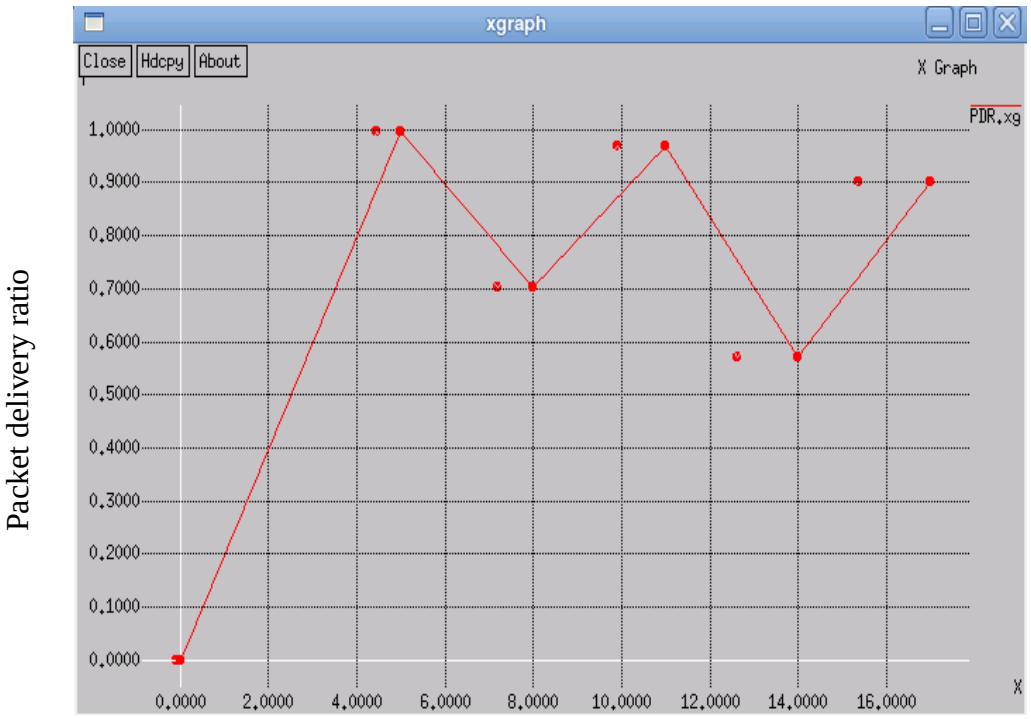


Throughput Graph:

No of nodes

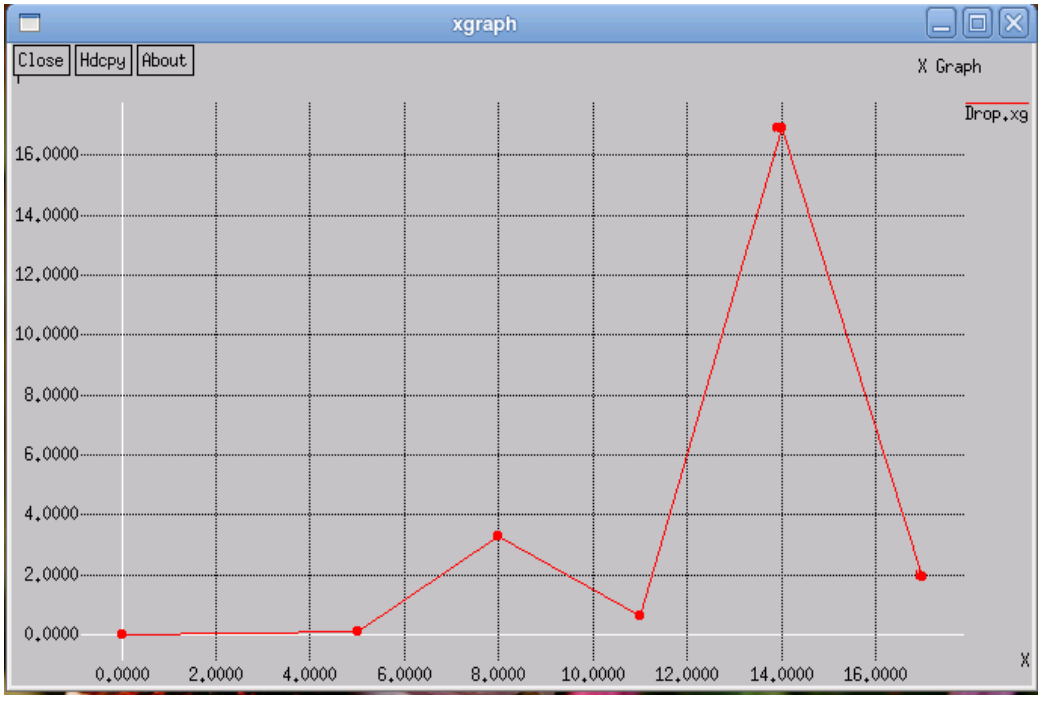


PDR Graph:



Packet delivery ratio

Packet drop graph:



Packet drop

No of nodes

CONCLUSION

In this paper propose a circle based path planning algorithm to determine the location of every sensor and to minimize the time to localization of every sensor node. The sensor node is located at the center of this circle, a single mobile anchor node moves randomly through the sensing field to determine the localization. The simulation result shows better results for Drop, Packet delivery ratio (PDR) and Throughput. The proposed algorithm used in many of the WSN applications such as flood detection, forest fire detection and military surveillance etc and the sniffer is used to detect the hacker node.

The future scope is to reduce the localization error due to the obstacle in the sensing field.

REFERENCES

[1] S. Divya and P.Purusothaman,''Predefined Trajrctory Algorithm for Mobile Anchor Based Localization in Wireless Sensor Network" International Journal of Computer Science and Network Security,2015, Vol 1,pp.71-76.

[2] Prof. Shubhangini Ugale, Ms. Poonam B.Kshirsagar,Mr.Ashwin W. Motikar," Route Planning Algorithm for Localization in Wireless Sensor Network" International Journal of Advanced Research in Computer and Communication Engineering,2015,Vol 4, Issue 6,pp.526-528.

[3] P. Sangeetha and B. Srinivasan,"Mobile Anchor Based Localization Using PSO and Path Planning Algorithm In Wireless Sensor Networks"International Journal of Innovative Research and Advanced Studies,2015, Vol 2,Issue 2,pp.5-10.

[4] Anupnam Kumar."Localization Using Beacon Points In Wireless Sensor Network"IJSEC,2015,pp.1259-1261.

[5] Javad Rezazadeh, Marjan Moradi, Abdul Samad Ismail, Eryk Dutkiewicz,"Superior Path Planning Mechanism for Mobile-Beacon Assisted Localization in Wireless Sensor Network"IEEE Sensors Journal,2014,pp.1-13.

[6] Ms. Prerana Shrivastava, Dr. S.B Pokle, Dr.S.S.Dorle,"An Energy Efficient Localization Strategy Using Particle Swarm Optimization in Wireless Sensor Network, International Journal of Advanced

Engineering and Global Technology,2014,Vol 02,Issue 19,pp.17-22.

[7] Guangjie Han, Chenyu Zhang, Jaime Lloret, Joel J. P. C. Rodrigues,"A mobile Beacon Assisted Localization Algorithm Based on Regular Hexagon in Wireless Sensor Network, The Scientific World Journal,2014,pp 1-12.

[8] Chia-Ho Ou, Wei-Lun He,"Path Planning Algorithm for Mobile Anchor Based Localization in Wireless Sensor Network, IEEE sensors Journal,2013,Vol 13, No 02,pp.466-475.

[9] Harsha Chenji,, Radu Stoleru,"Toward Accurate Mobile Sensor Network Localization"IEEE Transaction on Mobile Computing,2013,Vol12,No .6,pp.1094-1106.

[10] Mansoor-ul-haque, Farrukh Aslam Khan, Mohsin Iftikhar,"Optimized Energy-efficiet Iterative Distributed Localization"IEEEInternational Conference on Systems, Man, and Cybernetics,2013,PP.1407-1512.

[11] P.K Singh, Bharat Tripathi, Narendra Pal Singh,"Node Localization in Wireless Sensor Network" International Journal of Computer Science and Information Technologies,2011,Vol.2(6),pp.2568-2572.

[12] Zhang Shaoping, Li Guohui, Wei Wei, Yang Bing,"A Novel Iterative Multilateral Localization Algorithm for Wireless Sensor Nerwork" Journal Of Networks,2010,Vol. 5,No.1,pp.112-119.

[13] W.-H. Liao, Y.-C. Lee, S.P. Kedia,"Mobile Anchor Positioning for Wireless Sensor Network"The Institute of Engineering and Technology,2010,Vol.5,Issue.7,pp.914-921.

[14] Frankie K. W. Chan, H. C. So, W.-K. Ma,"A Novel Subspace Approach for Cooperative Localization in Wireless Sensor Network Using Range Measurments"IEEE Transactions On Signal Processing,2009,Vol.57,No.1,pp.260-269