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ENHANCED PACKET COVERING AND STITCHING OVER MAN IN THE MIDDLE ATTACKS IN WIRELESS SENSOR NETWORK

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ABSTRACT

Wireless sensors networks are immediately forward its packets to organizer with seed node present in network. Seed node perform vital role in wireless sensor network, for each and every movement in communication is controlled by seed node but some attacks occurred for transmission attacker node gather the information from one node forward data packet to another node. It causes network depletion during packet transmission. In proposed Enhanced packet covering and stitching algorithm (EPCSA) method covers the data packet and stitched before packet transmission. Intruder present in the network not fetch the information during communication, so network lifetime is improved and end to end delay is minimized. Seed node collects all the information from cluster head and any other node present in network. Cluster head act as anchor node to organize data such node position and coverage and connectivity to neighbor that kind of information's are forwarded to seed node.

Keywords: enhanced packet covering, stitching, seed node, anchor node, man in the middle attack removal.

1. INTRODUCTION

Wireless Sensor Networks which contains a huge number of batteries with minimum cost, perform data transmission between nodes within the radio range of each node in sensor infrastructure, to analyze the error occurred area in network. The effectiveness of the sensor nodes are openly related with the time taken of the reliable focusing period of the field which must be achieved with enhanced energy organize of sensor nodes and the network organization. Consequently, the limited energy utilization nodes must be handling well [1]. In previous days, the focal point of study in WSN was enhancement of network output consider the base station in single node in smooth multi-hop wireless sensor nodes environment. Sensor environments containing of single stationary sink node, base station or sink node have more capability than normal sensor nodes and powered by infinite energy basis. Sink node process to collect the data created by sensors node sensed in the network through multi-hop intermediate nodes. Fixed single sink model but affects from two main issues, one is hotspot and another is end to end delay. Hotspot issue is also known single sink network area issue [2], anywhere the sensors within one-hop distance with sink node need to relay the data for the other sensors that cannot arrive at the sink straight. That single hop sensor uses the majority of its battery in node forwarding data and charge of their energy usage is higher than another sensor node in network. Output report, they reduce their energy, the network need to split and the base station will confused from relax of sensors yet if those sensors are with enough residual energy for each node. The end to end delay between forwarding data packet by sender node and received by a sink nodes frequent manner [3]. Whether the routes between the sources to sink node distance are long, end to end packet delay is to be high. All hops present in route to base station slot for each packet transmissions are organized. Sender node forward data packet to multi hop path have several nodes are visited that packet takes so much of time to reach the target point. Issues in transmission are not well because network quality goes to minimum level [4]. This kind of issues denotes the energy depletion, and multiple sink plans is to be broken and demonstrated in large to enhance the various network show including network lifetime [5] with minimum packet latency. Many sink nodes are fixed in the sensor network with each being used to collect sensed data of sensors node and positive count of hops from base station node that outputs in minimizing the network overload of all sensor, reduction in end to end delay. Base station node fixed to activate the network of homogeneous or heterogeneous design toper form its process very fast. Larger wireless sensor network, many-sink located in network is difficult problem and to optimize these issue to increase the performance of parameters. In a flat network topology, the issues are NP complete [6]. Tree network based architecture that some sensors are selected as cluster header nodes, creating a two tier topology; the difficulty based on the network Clustering and sinks locating methods [7] and NP complete method. While optimal sink locating in WSN has agreed to be NP-complete, different methods are present to identify sub-optimal reports. In present paper, to denotes the energy matching aware k-sink node fixed issues in large network WSN by splitting the entire network into k disjoint clusters and fix a sink for all group of cluster in an efficient way shortest distance routing path is identified to sink any cluster has to increase and decrease the node count [8].

Residual of the paper is planned as follows. Section II indicates a related works. In section III, we present the details of proposed Enhanced packet covering and stitching algorithm (EPCSA) provides localization based virtue node optimized routing path. Section IV provides simulation performance results analysis obtained under different parameters. Finally section V concludes the paper with future track.

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2. RELATED WORKS

Meng *et al.*, [10] proposes an the GA Genetic Algorithm is used to denote the issues of coverage range between sensor node and base station position of designed that target to minimize the cost of networks communication and the power usage for now meet particular coverage and capacity constraint satisfaction. Output reports show that the present method to minimize the energy usage and slim down the structure of the Base Stations BSs effectively, and then it can be applied to different kinds of network environment. Nodes position planning method to minimize the total power usage and BS count in cooperative networks arrangement model is presented. To focus the radio range, transmission rate and service provided for particular network are consider in present method, to manage the resource utilization of process. Though, the intermediate nodes in networks are not measured and consider that the users distribute in the area constant manner.

Aziz *et al.*, [11] proposed maximum distances nodes perform transmission in a Wireless Sensor network affects the network lifetime and loss so much of energy for each transmission. Genetic algorithm tries to reduce the communication distance, it provides shortest distance communication path. In present system, launch latest method based on a genetic algorithm-GA and an agent cluster head to solution a WSN optimization difficulty. This scheme goal at discovery the best one and position of cluster heads instead with agent cluster head to control the distance between cluster head and sink node. GA to decide both the number and position of the cluster heads that reduces the message distance in a sensor environment. Totalling an agent cluster head to manage the energy usage of all cluster heads, and to certify that cluster head information's will reach to the sink node. Also extract indicates simulation report that present method process LEACH protocol in conditions of the average energy.

Pei, Bingnan *et al.*, [13] proposed the FA-firefly algorithm was used to accurate the location estimated by DV-Hop count; a firefly optimization localization algorithm based on DV-Hop was presented. Arithmetical scheme is designed with the minimum attacks for all of unidentified nodes, and the firefly algorithm applies to attain optimal output of the scheme lacking extra strategy and increasing the interchange level. Simulation output indicates that the standard localization attack of the FDV-Hop scheme is considerably enhanced compared with the normal schemes. FDV-Ho -DV-Hop algorithm for sensor infrastructure, well-known a numerical model of least the amount of position attack of all unidentified nodes and used firefly algorithm to get the best answer of the models to obtain efficient location of the unidentified nodes. Output of simulation indicates that the present scheme is efficient and the ALE of FDV-Hop scheme is minimum than DV-Hop scheme. Enhanced algorithm does not insert any extra hardware cost and overload. In every time, If necessary, efficient position correctness can be get while the present scheme is merged with different methods.

Krishnaprabha *et al.*, [14] present each sensor node collects data packet and provides the error report, it is vital to know the origin of data and events. In Present, nature-inspired inhabitants based optimization algorithm called GSO-Group Search Optimizer presented for positioning sensor nodes in random deployment of sensor infrastructure. Sensor position is identification issues and solve with GSO method. Process estimate of GSO based localization algorithm is taken out through simulator. A range-based WSN localization scheme using a nature-inspired, node density based heuristic optimization algorithm known as GSO algorithm. This scheme has not still used in the area of sensor environment. It is straightforward and easy to design. GSO algorithm gives more accurate outputs in localizing nodes distinguish with other network node based on optimization algorithm, PSO method. Efficiency of the present scheme is verified using simulation output as good with the data from a real WSN experiment.

Singh, Prince *et al.*, [15] paper method are relate to the same node localization issues to two before used imitation neural network schemes MLP-Multi Layer perceptron and RBF-Radial Basis Function sensor nodes. Following that a relative study between each selected algorithms has been completed. Output of simulation indicates the superiority of M5P and SMO against MLP and RBFN in high error conditions in expressions of root mean square mistake. Finally a comparative distinguish between the two latest proposed methods was made by varying the number of training nodes. Output indicates that startlingly the performance of SMO is efficient but there is no enhancement in its process with improving training sample output. Another method M5P's process should be best by train it with many count of sample. This scheme skilled with less count of samples SMOreg's process is better than M5P.In SMOreg's process not be much enhanced by increasing the count of training samples. Finally then decide it that when the accessibility of buffer space is in abundance at nodes; means the training with high amount of information is not as issue, the M5P is top chance for node localization in high error in network. However when the amount of memory available is incomplete; SMOreg is best option for node positioning in high error environment due to its reliability.

Dandekar, *et al.*, [16] presents the issue of optimal arrangement of m sink nodes in a wireless sensor network to reducing average hop distance between sensors and its next sink with increasing count of each sink node that answer the hot spot issue which is another dangerous issue of WSN implementation. A wireless sensor network anywhere the position of each sensor node is identified split the whole sensor network into m disjoints groups and fix sink nodes efficiently. Then present multi sink placement algorithm, based on Particle swarm extraction. Performance output indicates proposed optimization based algorithm perform efficient over algorithm without optimization. Addressed the multiple sink network design issue, anywhere the optimal position for the sink nodes is estimated to have higher standard sink node count and standard hop count in the resulting network. The implemented four outputs for this issues, and analyzed the effect of adding new base stations on count of sinks and the standard minimum hop count of nodes in the group. Performance output confirmed good result of multiple sink deployments using Particle Swarm Optimization method. It uses comprehensive search in scheming the position of sink nodes. Nevertheless, such thorough investigate, although ensuring to discover the optimal sink positions, become computationally too costly for even fairly sized sensor nodes.

Ozdemir *et al*., [17] present the growth of a newly multi-objective optimization algorithm also known as MOEA/D-multi-objective evolutionary algorithm depends on decomposition. It goals to the moving of mobile nodes in a sensor network with the plan of given that most sensing coverage range, and with the constraint of reducing the energy necessary for the reposition as calculated by total travel distance of the sensors from their early position to their last position. Output of simulation clearly indicates the non-dominated answer have trade off connecting the travelled expanse and coverage range. MOEA/D for repositioning mobile nodes of a MWSN direct to give the trade-off among coverage and nodes' moved location. Then the coverage and total distance are measured in the optimization. MOEA/D doesn't offer only one best answer, so we have answer set. After determining the objective functions, MOEA/D need to develop a group of early answers to a number of non-dominated answers, each has a bias toward one of the two strength purpose.

Kumar Anil *et al*., [18] present BBO has a latest inclusive energy depends on the skill of network and employ relocation worker to split data between various characteristics, of issue answers. Sensor network localization issue is formulating as an NP-Hard optimization issue because of its amount and difficulty. Present, an attack model is describe for view of optimal node position in a manner such that the position attack is reduced with HPSO and BBO schemes. Prsent HPSO and BBO algorithms are established to extract the sensors position and process efficiently as compared to the previous optimization algorithms such as Gas-Genetic Algorithms, and SAA-Simulated Annealing Algorithm. Qualified learn reveals that the HPSO yields enhanced process in terms of speed, developed, and correct localization as compared to gbest-global best PSO method. Wide simulation emphasize that as channel development, more nodes get developed and need minimum anchors to identify the coordinate of the target node in network. Additional, the alteration phase with attack control extra to enhance the performance, the present may be designed for centralized localization and for multi-hop localization and distinguish with energy usage. The hybrid stochastic algorithm present to attains extra exactness.

Alam *et al*., [19] present multi-model sensor nodes for identify various kinds of attack in a single sensor network and mobile nodes for on-demand attendance of attacks. While a multi-model WSN is fixed to check attacks of varied main concern, major difficulties defamation to assign resources and activate mobile nodes in an optimized way to improve detection routine. Launch the idea of varied main concern and cost of not identified of attacks, and suggest a identification method for many concurrent attacks in a merged sensor environment. All mobile nodes are move through formulation of optimization issues that improves the prioritized exactnessaslatency identification is reduced. Academic and simulation reports show that our scheme considerably performance other method that consider all attacks equally. The plan of attack priority for various kinds of attacks, and obtainable a novel method to allocate mobile nodes to attacks depending on their main concern to improve the quality of identification. Output confirmed that present scheme performance previous method in overall attack detection exactness and latency.

Akl, Robert *et al.,* [20] Proposed to analyse work to launch the ideal position to place anchor nodes was on the border of the sensor environment. It not consider in passive localization, because the process of anchor nodes now is dissimilar than the anchor nodes used in other localization scheme. Different simulations are executed in high density nodes and sparse networks for proper position of anchor nodes. Output indicates that, for effective passive localization, the optimal situation of the anchor nodes is at the centre of the network in such a way that no three anchor nodes share its output. In output more non-linearity betters the localization scheme. It is used to network construction and proves improved when we place anchor nodes to form right coverage. Additionally, the localization seems to be greatest when the anchor nodes are fixed to form a right position. Different location of nodes operates on both sparse and dense networks environment.

3. OVERVIEW OF PROPOSED SCHEME

Sensor nodes in network that detect and remove man in the middle attack, with its cluster member communication between one node to another neighbor node. Location of each node is not varied, constantly maintained because of wireless sensor network.

Packets are unsafe for transmission that causes packet loss; attacker nodes are easy to fetch the data packets. In normal network there is any energy loss or any other data drops. In present Enhanced packet covering and stitching algorithm launch stitched formats of packet so intruder not affects that kind of data packets. So this network increases its lifetime and packet latency. Every time coverage and connectivity of each node is checked if it coverage is good then seed node or sink node ready to organize different types of packets in cluster head or anchor node.

Anchor node is mainly focus for localization; it gives the extract position of sensor nodes fixed in network and analyze neighbor node possibility to provide communication, each transmission taken by help of anchor node information's. Anchor node also captures behavior of each node, node behavior attacker nodes are easy to track from entire network environment.

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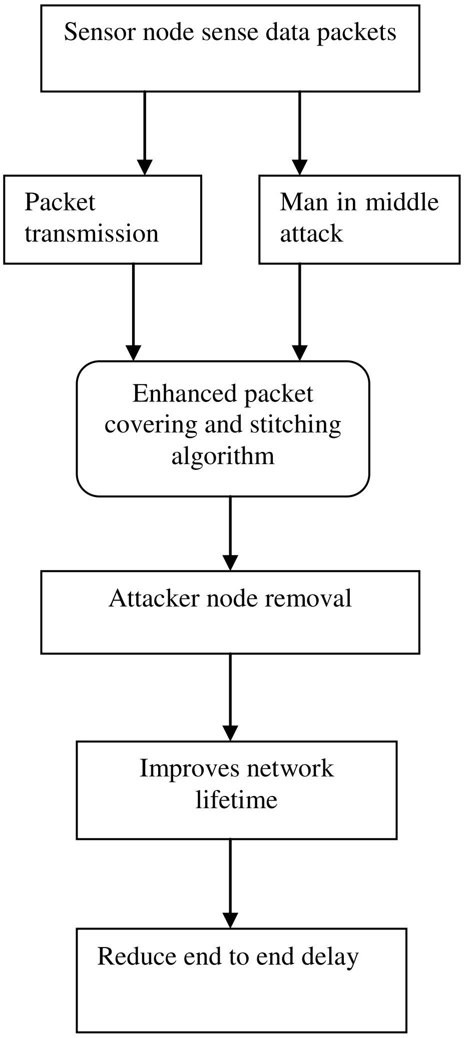

Figure-1. Block diagram of enhanced packet covering and stitching over attack.

Figure-1 shows Enhanced packet covering and stitching over attack with anchor and seed node data packet organization. Sensor nodes in real time environment sense information from network, and forward data packets to neighbor node in network. During communication period attacker node need to gather data packets, so packets are covered and stitched using enhanced packet covering and stitching algorithm, removes the attacker node to increase network lifetime and minimize end to end delay.

3.1 Anchor node monitoring behavior of cluster members

Anchor node is vital role for clustering method to reduce the packet drops. Anchor node also a cluster head, it needs to organize the data packets from different area in cluster. Cluster head watch closely all node position at every time and node behavior that denotes the resource utilization and packet transmission speed for every moment. Node if any actions are identified same frequency match at particular instances of nodes. Distance between two nodes is considered it is same frequency they are node and coverage connection checking time depends on packet transmission speed.

All sensor node are not maintain same energy level they are varied because node transmit minimum size of packet another node transmit maximum size of packet, it cause network depletion to maintain constantly anchor nodes are higher possibility node to discover efficient transmission. Anchor node protects the network from error packet. Initially node status is minutely watched by anchor node that information's are uploaded to seed node. Seed node controls the attacker node performance it acts as root node for overall network environment.

Positive and negative feedback of each node are analyzed by anchor node. It handle the attacker node error data, they are collected and cancelled by anchor node available in sensor network. Nodes in network not possible to add or remove from network, if it adds. The joined node is attacker node that goes to network in dangerous condition. It only estimates the attack free paths to attain efficient transmission between cluster member, anchor node, and seed node in network environment.

Normal cluster head control the process but not consider the position of each node and resource utilization for particular transmission between sender nodes to relay nodes in network. Seed node verify the collected packets are injured that node rejects the packet. So much of energy used to sense and forwarding the data packets to seed node is waste. It increase the energy consumption, it gives another option called anchor node it startlingly analyze the node performance and based on its report forward the original data packet to seed node.

Seed node controls the anchor nodes, there are many anchor nodes are available based on its distance and node density of network environment. Sensor sense real time data packets its size is fixed to overcome the fake data packets use anchor to organize only the true data packets but not fake, it is remove from packet transmission.

3.2 Anchor node based detection of man in the middle attack

Anchor node need to split the network is good or bad node, if bad node data packets are not captured by anchor, but attacker node creates in between link to neighbor node, gives some request packet, neighbor node response that request packet takes more energy, but anchor filter out that data packet, data packets are fake and removed from the cluster they are absolutely monitored by anchor nodes.

Man in-the-middle attack is also known as MiM attack. Packets exchanging between intermediate nodes attacker gathers that packet and to transfer secret for unwanted nodes or other parties. Unwanted nodes use this data packet to misbehave itself, in which data are misused to affect the effective communication between sensor nodes. Anchor node have different capacity to collect the data packet and filter out based on fake node behavior, node id , position of node available in network infrastructure. Where $Pki1$ location of first node, $Pki1$ is computed as:

$$Pki1 = tan(\phi kip) - \quad (1)$$

$$Pkij = cosin(\phi ki(j-1)) + 1tan(\phi kip) - \quad (2)$$

$$Pkin = cosin(\phi ki(j-1)) - \quad (3)$$

Where p is path, i node axis, $Pkij$ highest priority node, $indicates$ degree.If packet loss goes to retransmission make more energy consumption and difficult to achieve best communication. Analyze the behavior and arise the queries of its fake data available in network. Highest priority node is true node and it have minimum number of queries for each transmission, lowest priority node is fake node and it have maximum number of queries to overcome these situation network select only higher priority nodes for packet transmission to anchor node available in network.

Sensor nodes are not maintain its energy level constantly it varied belong its transmission rate. Transmission rate of nodes focus the priority, node have higher transmission rate its priority is high else node has minimum transmission rate its priority is low. Low priority nodes are detected and removed from entire network process.

$$Pk = (Pkij/Pkin) - \quad (4)$$

$$Pk = ((cosin(\phi ki(j-1)) + 1tan(\phi kip)/cosin(\phi ki(j-1))) - \quad (5)$$

Where $Pkin$ highest priority of nth node, it is selected for packets transmission. Nodes are targeted to obtain higher priority nodes for packet exchange. Only true packets are sensed and forwarded to neighbor node then organized by anchor nodes. It checks data packets and reject the injuries, that time injuries count is reduced.S_g is computed as:

$$Pk = (cosin(\phi ki(j-1)) - \quad (6)$$

ThePk node count hasmaximum priority, in which to obtain communication for particular sensor network. Seed node organizes all data packets from anchor node.

$$Ah = n * Pk - \quad (7)$$

$$Ah = n * (cosin(\phi ki(j-1)) - \quad (8)$$

Where Ah denotes anchor node, seed node organizes all data packets from anchor nodes available in sensor network. But not sure some packets are faked, due its packet size not detected. Nodes behavior only identifies the sender or intermediate node is fake or true. Removal of these attack increase the network lifetime and reduce packet latency for every communication.

Anchor node based detection of man in the middle attack algorithm:

Step 1: If $Pkij = high$ checks the priority high goto step2
Step 2: Node search its neighbor node with maximum priority
Step 3: $Pkin$ check up to reaches the nth node highest priority
Step 4: sender node starts to forward packets through the neighbor node.
Step 5: else.
Step 6: $Pkij = low$ checks priority is low goto step7
Step 7: Reject that node for packet transmission.
Step 8: end if
Step 9: $Pk = (cosin(\phi ki(j-1))$ high priority nodes are selected
Step 10: $Ah = n * (cosin(\phi ki(j-1))$
Anchor node organizes all data packets to filter out error packet.

3.3 Enhanced packet covering and stitching

Cluster member node packet transmission takes place in network, normal data packets cause the attack, and data's in packet misuse or changed by man in middle attack to overcome by this kind of attack. To present the EPCSA scheme sensor node sense action in real time environment and create data packets are covered and stitched completely before packet transmission. All data packets are followed in same manner to improve the communication process. Where Sn seed node,$Sn$is computed:

$$Sn = n + (Ah) - \quad (9)$$

$$Sn = n + (n * (cosin(\phi ki(j-1))) - \quad (10)$$

Intruder nodes in sensor network tries to compromise and gather data packets exchange between two neighbor nodes in network. If the packet is fully covered and stitched efficiently there is no possibility to collect and change information in data packets, man in the middle attacker node try to collect data at its final it goes there is no data gather from true neighbor nodes.

Packets are securely covered whether attacker node tries to open the covered packet is very difficult, they are heavily stitched. When it open means that kind of packets are not forwarded, they are rejected by true sensor node, but there is minimum priority to open the covered and stitched packets in sensor infrastructure, easy to monitor and output is analyzed to enhance the network lifetime with minimum energy consumption for every communication.

Enhanced Packet covering and stitching algorithm:

Step 1: For each the packet generation of nodes.
Step 2: If $Sn = Ah$ starts to packet collection
Step 2: increment of $n++$
Step 3: $Sn = n + Ah$
Step 4: continues until reaches end.
Step 5: else
Step 6: $Sn = !Ah$
Step 7: Not collects the data packet.
Step 8: end if.

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Step 9: end for.

Sensor nodes launch well-organized transmission between anchor nodes to seed node present in the network. It satisfies the covered and stitched packet protection, to improve overall network lifetime with minimum end to end packet delay.

Packet ID: Packet ID includes entire wireless sensor node data's Also it has current location and node characteristics are monitored.

Source ID	Destinati on ID	Cluster member behavior	Anchor node detect intruders	Enhanced Packet covering and stitching	Priority based performance
2	2	4	4	4	2

Figure-2. Proposed packet format.

In Figure-2: the present packet format is exposed. Now the source and destination node ID field takes 2 bytes. Third one is Cluster member behavior have 4 bytes. Simulator establishes the grouping of nodes depending on transmission speed. In fourth field occupies 4 bytes. Anchor node detect intruders analyze the node forward packet is good or otherwise fake packet. In fifth occupies 4 bytes, Enhanced Packet covering and stitching, fully covered the generated packet and stitched to avoid attackers. Final filed Priority based performance, node have higher priority means is selected for communication and accept the packet else low priority means reject the error packets occupies 2 bytes, to separate packets.

4. PERFORMANCE EVALUATION

A. Simulation model and parameters

The proposed EPCSA is simulated with Network Simulator tool (NS 2.34). In our simulation, 100 sensor nodes deployed in 1050 meter x 900 meter square region for 80 milliseconds simulation time. All sensor nodes deployed in random manner among the network. All nodes have the same transmission range of 250 meters. CBR Constant Bit Rate provides a constant speed of packet transmission in network to limit the traffic rate. DSR Dynamic source routing protocol is used to cover and stitch all packets before communication. Table-1 shows Simulation setup is judgment.

Table-1. Simulation setup.

No. of nodes	100
Area Size	1050 X 900
Mac	802.11
Radio Range	250m
Simulation Time	30ms
Traffic Source	CBR
Packet Size	150 bytes
Mobility Model	Random Way Point
Protocol	DSR

Simulation Output:

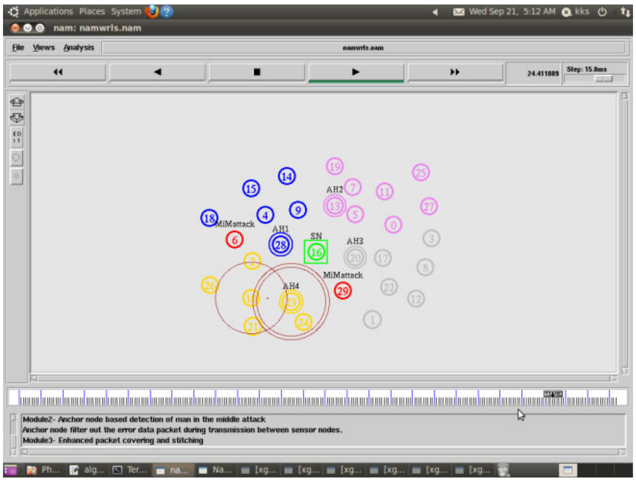

Figure-3. Proposed EPCSA result.

Simulation Result: Figure-3 show that the proposed EPCSA scheme organizes the information and identifies man in the middle attack with help of anchor node is best compared with existing RANN [9] and LADID [12]. Present EPCSA used to enhance the packet safety over attacker, before packet transmission to cover and stitch entire packet. Attacker node not gather he information from stitched and covered packet to improve the network lifetime and reduce end to end delay.

Performance analysis

In simulation to analyzing the following performance parameters are using X graph in ns2.34.

End to End Delay: Figure-4 shows end to end delay is calculated by quantity of time used for packet transmission from sender node to seed node, node behavior are analyzed by anchor node. In proposed EPCSA scheme end to end delay is minimized compared to Existing method NARP, LORP, RANN, and LADID.

$$\text{End to End Delay} = \text{EndTime} - \text{StartTime}$$

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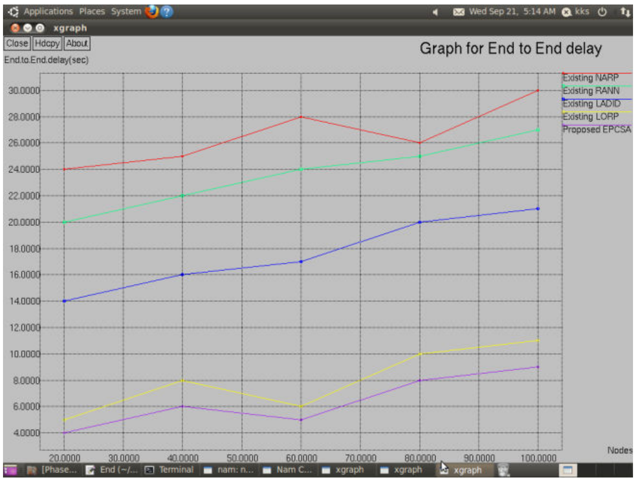

Figure-4. Graph for nodes vs. end to end delay.

Communication overhead: Figure-5 shows communication overhead is reduced that sender needs to forward packet to anchor node to filter out error data packets, all packets are covered and stitched efficiently. In proposed EPCSA scheme communication overhead is reduced compared to Existing method NARP, LORP, RANN, and LADID.

$$\text{ommunicationoverhead} = (\text{NumberofPacketLosses}/\text{Received}) * 100$$

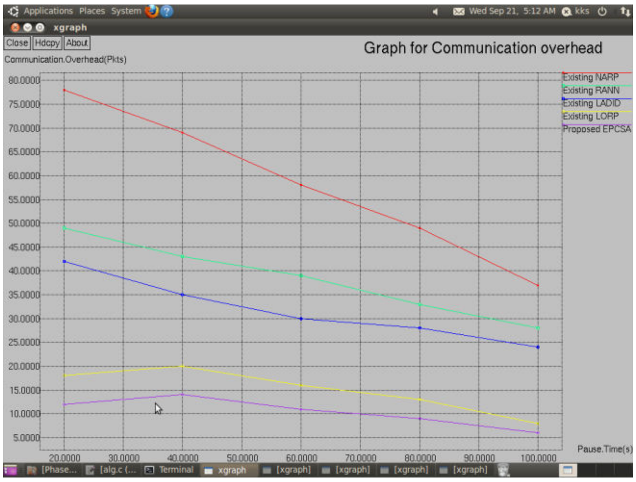

Figure-5. Graph for Pause Time Vs. Communication overhead.

Packet Delivery Ratio: Figure-6 shows Packet delivery ratio is calculated by packet received degree from packet sent degree in certain speed. Normally node speed is fixed in sensor network; simulation rate is set to 100, heavily covered and stitched packets only allowed for transmission. In proposed EPCSA scheme Packet delivery ratio is increased compared to existing method NARP, LORP, RANN, and LADID.

$$\text{PacketDeliveryRatio} = (\text{Numberofpacketreceived}/\text{Sent}) * \text{speed}$$

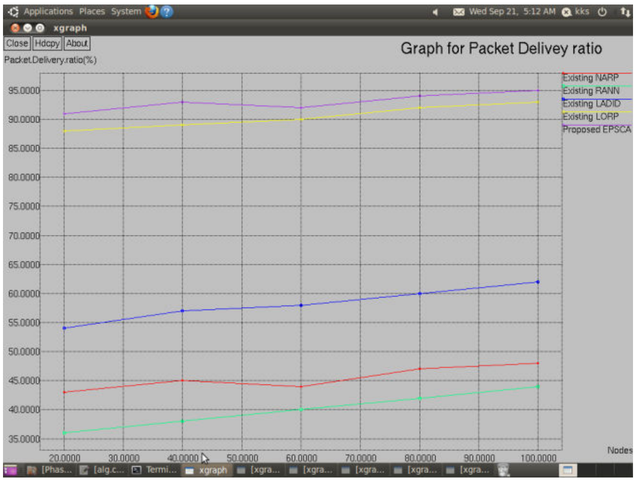

Figure-6. Graph for nodes vs. packet delivery ratio.

Network lifetime: Figure-9 show that Lifetime of the network is estimated by entire process of network, resource utilized to done communication successfully. The covered packets only collected by seed node. In proposed EPCSA scheme Network Lifetime is improved compared to Existing method NARP, LORP, RANN, and LADID.

$$\text{NetworkLifetime} = \text{lengthofenergyusage}/\text{overallenergy}$$

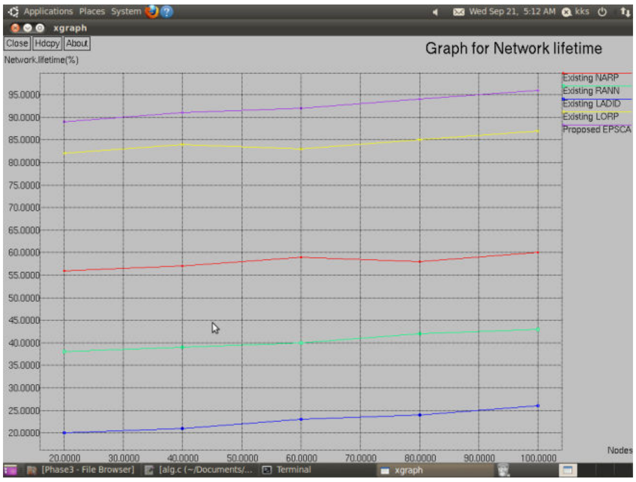

Figure-7. Graph for Nodes Vs. Network Lifetime.

Energy Consumption: Figure-8 shows energy consumption; identified total energy used for starting node to ending node. In proposed EPCSA scheme have enhanced packet covering so true nodes only forward true packets in network, energy consumption is reduced compared to Existing method NARP, LORP, RANN, and LADID.

$$\text{Energy Consumption} = \text{InitialEnergy} - \text{FinalEnergy}$$

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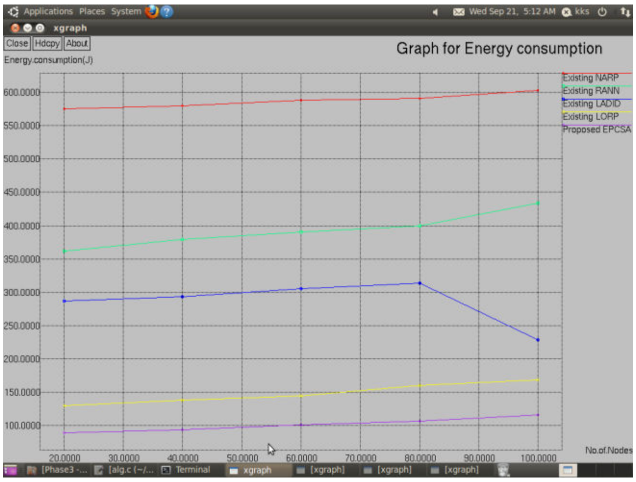

Figure-8. Graph for no. of nodes vs. energy consumption.

Packet drop rate: Figure-9 show that Packet drop of all packets are minimum because they are entirely covered before every transmission to chose trust node to obtain efficient communication. In Proposed EPCSA scheme Packet drop rate is reduced compared to Existing method NARP, LORP, RANN, and LADID.

$$\text{Packetdrop rate} = \left(\text{Numberofpacket}\frac{\text{dropped}}{\text{Sent}}\right) * 100$$

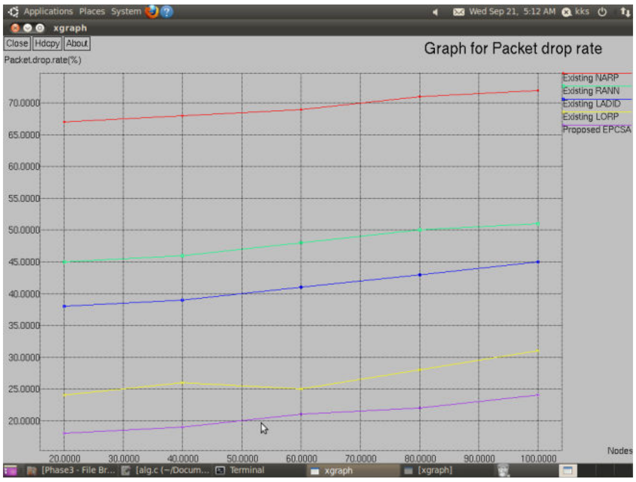

Figure-9. Graph for Node vs. Packet drop rate.

5. CONCLUSIONS

Sensor network nodes grouped into create clusters; each group is varied for its node energy and transmission rate. Cluster head act as anchor node to collect the data from all cluster member nodes. Intruder node gathers the information from two neighbor node data packet exchanging. In proposed EPCSA scheme have seed node that controls all anchor node available in network environment. Normally anchor node filter outs the attacked packet during packet collection period, only higher priority nodes is used for communication low priority nodes are rejected. Man in the middle attacks not affect the packet because enhanced packet covering and stitching method, initially covered and stitched the generated packet. It improves the network lifetime and minimizes the end to end delay. In future proposed an updated location of each sensor node to obtain efficient communication, to improve the path stability.

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