Packet Loss Reduction Routing Protocol for Mobile Ad-Hoc Network Using Node Density Method

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Abstract: Mobile Ad-hoc NETwork (MANET) is an anxious self-shaping, framework less system of mobile networks in a remote association. As there is a high climb in the utilization of cell phones and remote systems over past years, MANET has become one of the vital networks used for communication. A routing protocol is utilized for dispersing data that permits choosing routes between two nodes in a system. Packet loss is one of the significant issues that occur in the mobile ad- hoc networks while routing. A packet comprises the unit of information which is steered amongst source and destination in a system. Packet loss happens when at least one packet crosswise over systems in a network drop before achieving the destination node. A node density strategy is proposed in this paper to ease the packet loss issue to a degree. Because of system framework of MANET progressively changes, portable specially appointed system is exceptionally helpless against assaults. Concerning the security reason, we utilize RSA encryption calculation, the keys are sent to all hubs inside a system, the message is encoded and sent to the destination node.

IndexTerms **- MANET, routing protocol, neighbour node, node density strategy, packet loss**

I. INTRODUCTION

With late execution A Mobile Ad hoc Network (MANET) consists in a collection of wireless mobile nodes, which form a temporary network without relying on any existing infrastructure or centralized administration. Ad hoc network presents many specific problems which had influence on solution that assure QoS. The level of service that a user obtains from a network is known as the Quality of Service. The goal of QoS offered is to ensure a better delivery of information carried by the network, and a better utilization of the network's resources. The network provides a set of service guarantees such as minimum bandwidth, maximum delay, and maximum packet loss rate while transporting a packet stream from the source to the destination. Usage of mobile nodes these days has increased and the communication enhancement in its network becomes crucial. Ad hoc networks are generally used by military, rescue teams, personal electronic device networking, maritime communications etc. These users cannot rely on the centralized network [10]. The main factors affected in ad-hoc networks are routing and the characteristic of wireless communication. In ad hoc, a node can communicate only with nodes in its area and to communicate with other nodes uses a routing algorithm. [10]. Mobile Ad-hoc network (MANET) is a collection of mobile nodes that constitute a network with no central admin [1]. A MANET can change location and is a kind of ad-hoc network. MANET has its property that it can configure itself. The advantage of a decentralized network is that they are more robust than centralized networks due to its multi-hop pattern.

The distributed nature and dynamic topology of Wireless Sensor Networks (WSNs) introduces very special requirements in routing protocols that should be met. The most important feature of a routing protocol, in order to be efficient for WSNs, is the energy consumption and the extension of the network's lifetime. During the recent years, many energy efficient routing protocols have been proposed for WSNs

Packet loss in transmission is one of the major limitations in the mobile ad-hoc network. As one node moves away from the network, the connection gets lost and the packet drop may happen and also because of congestion packet loss happens. Congestion happens when many demand request gathers and when there is a shared medium [11]. To send packets to the Internet, a MANET node acquires information about an Internet Gateway and establishes appropriate routes to this gateway.

II. LITERATURE SURVEY

Vinay. P.Viradia, "Improved AODV Routing Protocol for MANET", January 2014[1]

Routing protocols in ad hoc networks vary depending on the type of the network. Typically, ad hoc network routing protocols are classified into three major categories based on the routing information updated mechanism. They are proactive (table driven routing Protocols), reactive (on-demand routing protocols) and hybrid routing protocols. In addition, protocols can also be classified according to the utilization of specific resources, such as power aware routing protocol and load aware routing protocols and so on.

Routes to all destinations are maintained by sending periodical control messages. There is unnecessary bandwidth wastage for sending control packets.

Proactive routing protocols are not suitable for larger networks, as it needs to maintain route Information every node's routing table. This causes more overhead leads to consumption of more bandwidth. Ex: DSDV.

Reactive Routing Protocols Routes are found when there is a need (on demand). Hence, it reduces the routing overhead. It does not need to search for and maintain the routes on which there is no route request.

Reactive routing protocols are very pleasing in the resource-limited environment. However the source node should wait until a route to the destination is discovered. This approach is best suitable when the network is static and traffic is very light. Ex: DSR, AODV.

Hybrid Routing The Ad Hoc network can use the hybrid routing protocols that have the advantage of both proactive and reactive routing protocols to balance the delay and control overhead (in terms of control packages). The difficulty of all hybrid routing protocols is the complexity of organizing the network according to network parameters. The common disadvantage of hybrid routing protocols is that the nodes that have high level topological information maintains more routing information, which leads to more memory and power consumption.
There are two approaches to evaluate routing protocols:
1. Network Environment Parameters like network size, connectivity, mobility, link capacity etc.
2. General Performance Metrics of Routing Protocols like message delivery ratio, control overhead, hop count, end to end delay, etc. [13,14] In this paper packet delivery ratio and average end to end delay performance parameters are considered.
AODV protocol allows mobile nodes to quickly obtain routes for new destinations, and it does not require nodes to maintain routes to destinations that are not in active communication. Also, AODV routing permits mobile nodes to respond link breakages and changes in network topology in a timely manner. The main objectives of the protocol is quickly and dynamically adapt to changes of conditions on the network links, for example, due to mobility of nodes the AODV protocol works as a pure on-demand route acquisition system. Control messages [8, 9] used in AODV are:
• Route Request Message (RREQ)
• Route Reply Message (RREP)
• Route Error Message (RERR)
• Route Reply Acknowledgment (RREP-ACK) Message
• HELLO Messages

Routing Table
---
destination
sequence _number
hop_count
next hop
expiration_timeout

Drawbacks of AODV:
1. A large number of control packets are generated when a link breakage occurs. These control packets increase the congestion in the active route.
2. AODV has high processing demand.
3. AODV consumes a large share of the bandwidth.
4. AODV takes long time to build the routing table.
5. It is possible that a valid route may expired and the determination of reasonable expiry time is difficult.
6. As the size od network grows, various performance matrix begins decreasing.

M. K. Marina and S. R. Das, "Ad hoc on-demand multipath distance vector routing," 2006.[2]

Route Discovery and Route Maintenance: In on-demand protocols, route discovery procedure is used by nodes to obtain routes on an 'as needed' basis. In AODV, route discovery works as follows. Whenever a traffic source needs a route to a destination, it initiates a route discovery by flooding a route request (RREQ) for the destination in the network and then waits for a route reply (RREP). When an intermediate node receives the first copy of a RREQ packet, it sets up a reverse path to the source using the previous hop of the RREQ as the next hop on the reverse path. In addition, if there is a valid route available for the destination, it unicasts a RREP back to the source via the reverse path; otherwise, it re-broadcasts the RREQ packet. Duplicate copies of the RREQ are immediately discarded upon reception at every node. The destination on receiving the first copy of a RREQ packet forms a reverse path in the same way as the intermediate nodes; it also unicasts a RREP back to the source along the reverse path. As the RREP proceeds towards the source, it establishes a forward path to the destination at each hop.
Route maintenance is done by means of route error (RERR) packets. When an intermediate node detects a link failure (via a link-layer feedback, e.g.), it generates a RERR packet. The RERR propagates towards all traffic sources having a route via the failed link, and erases all broken routes on the way. A source upon receiving the RERR initiates a new route discovery if it still needs the route. Apart from this route maintenance mechanism, AODV also has a timer-based mechanism to purge stale routes.
AOMDV shares several characteristics with AODV. It is based on the distance vector concept and uses hop-by-hop routing approach. Moreover, AOMDV also finds routes on demand using a route discovery procedure. The main difference lies in the number of routes found in each route discovery. In AOMDV, RREQ propagation from the source towards the destination establishes multiple reverse paths both at intermediate nodes as well as the destination. Multiple RREPs traverse these reverse paths back to form multiple forward paths to the destination at the source and intermediate nodes.
AOMDV relies as much as possible on the routing information already available in the underlying AODV protocol, thereby limiting the overhead incurred in discovering multiple paths. In particular, it does not employ any special control packets. In

fact, extra RREPs and RERRs for multipath discovery and maintenance along with a few extra fields in routing control packets (i.e., RREQs, RREPs, and RERRs) constitute the only additional overhead in AOMDV relative to AODV.

Routing Table
---
destination
sequence_number
advertised_hopcount
route_list, (next_hop1,hopcount1),(next_hoph2,hopcount2)...
expiration_timeout

An on-demand routing protocol, AOMDV has its roots in the ad hoc on-demand distance vector (AODV), a popular single-path routing protocol. AOMDV creates a more extensive AODV by discovering, at every route discovery process, a multipath (i.e. several other paths) between the source and the destination. The multipath has a guarantee for being loop-free and link-disjoint. AOMDV likewise offers two key services: route discovery and route maintenance. Since it greatly depends on the AODV route information, which is already available, AOMDV incurs less overhead than AODV through the discovery of multiple routes. Compared to AODV, AOMDV's only additional overhead is extra route requests (RREPs) and route errors (RERRs) intended for multipath discovery and maintenance, along with several extra fields to route control packets (i.e. RREQs, RERRs and route replies (RREPs)). Adding some fields and changing others modified the structure of the AOMDV's routing table. Figure 1 presents the routing table entries' structure for AODV and AOMDV. In AOMDV, advertised hopcount is used instead of the hopcount in AODV. A route list stood as a replacement for nexthop; this change essentially defining multiple nexthops with respective hopcounts. All nexthops, however, are still allotted the same destination sequence number. Every time the sequence number gets updated, the advertised hopcount is initialized.

Drawbacks of AOMDV: The disadvantage of using AOMDV is that it has more message overheads during route discovery due to increased flooding and since it is a multipath routing protocol, the destination replies to the multiple RREQs those results in longer overhead packets in response to single RREQ packet may lead to heavy control overhead.

S. Mueller, R. P. Tsang, and D. Ghosal, "Multipath routing in mobile ad hoc networks: Issues and challenges," 2004.[3]

Standard routing protocols in ad hoc wireless networks, such as AODV and DSR, are mainly intended to discover a single route between a source and destination node. Multipath routing consists of finding multiple routes between a source and destination node. These multiple paths between source and destination node pairs can be used to compensate for the dynamic and unpredictable nature of ad hoc networks.Multiple paths(fig 1) can provide load balancing, fault-tolerance, and higher aggregate bandwidth. Load balancing can be achieved by spreading the traffic along multiple routes. This can alleviate congestion and bottlenecks.

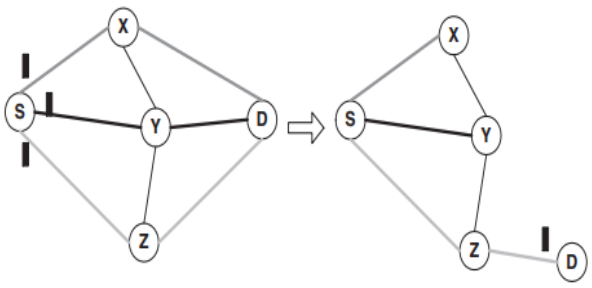


Fig 1: Multipath Routing

From a fault tolerance perspective, multipath routing can provide route resilience. To demonstrate this, consider fig, where node S has established three paths to node D.

If node S sends the same packet along all three paths, as long as at least one of the paths does not fail, node D will receive the packet. While routing redundant packets is not the only way to utilize multiple paths, it demonstrates how multipath routing can provide fault tolerance in the presence of route failures.

Drawback of the system: While link-disjoint routes have no common links, it may have nodes in common. Node-disjoint routes, which are also referred to as totally disjoint routes, do not have common nodes or links. Non- disjoint routes, on the other hand, can have both nodes and links that are in common. AOMDV's primary idea is in discovering multiple routes during the process of route discovery. The design of AOMDV is intended to serve highly dynamic ad-hoc networks that have frequent occurrences of link failure and route breaks.

Aqeel Taha, Raed Alsaqour, Mueen Uddin, Maha Abdelhaq, Tanzila Saba, "Energy Efficient Multipath Routing Protocol for Mobile Ad-Hoc Network Using the Fitness Function",June 27, 2017[4]

Multipath routing protocol in this system called the FF-AOMDV routing protocol, which is a combination of Fitness Function and the AOMDV's protocol. In a normal scenario, when a RREQ is broadcasted by a source node, more than one route to the destination will be found and the data packets will be forwarded through these routes without knowing the routes' quality. By implementing the proposed algorithm on the same scenario, the route selection will be totally different. When a RREQ is broadcast and received, the source node will have three (3) types of information in order to find the shortest and optimized route path with minimized energy consumption. This information includes:

1. Information about network's each node's energy level

2. The distance of every route
3. The energy consumed in the process of route discovery. The route, which consumes less energy, could possibly be

(a) The route that has the shortest distance;
(b) The route with the highest level of energy, or
(c) both.

The source node will then sends the data packets via the route with highest energy level, after which it will calculate its energy consumption. Alike to other multipath routing protocols, this protocol will also initiates new route discovery process when all routes to the destination are failed. In the event when the selected route fails, the source node will then selects an alternative route from its routing table, which represents the shortest route with minimum energy consumption.

Limitation of the system: The system mainly focuses on the energy efficient path discovey. Packet loss reduction method is not considered as a constraint.

Shalini Sharma, Hitesh Gupta, Pankaj Kawadkar, "Reducing Packet Loss in MANET", 2013.[5]

Routing concept: Routing is the act of moving information from source to a destination in an internet work. During this process, at least one intermediate node within the internetwork is encountered. The routing concept basically involves two activities: firstly, determining optimal paths and secondly, transferring the information groups (called packets) through an internetwork. The latter concept is called as packet switching, which is straight forward, and path determination is very complex. Routing protocol uses several matrices to calculate the best path for the routing the packet to its destination. These matrices are a standard measurement that could be number of hops, which is used by the routing algorithm to determine the optimal path for the packet to its destination. The process of path determination is that, routing algorithms initialize and maintain routing tables, which contain the total route information for packet. This route information varies form one routing algorithm to another. Routing tables are filled with a variety of information which is generated by routing algorithms. Most common entries in the routing table are ip-address prefix and the next hop. Routing tables Destination/next hop associations tell the router that a particular destination can be reached optimally by sending the packet to router representing the "next hop" on its way to final destination and ip-address prefix specifies a set of destinations for which the routing entry is valid for. In mobile ad-hoc network every node is having routing capability. Nodes are within the radio range (transmissionrange) are called its Neighbors. When the destination node is neighbor of source node, packets are transferred with single hop. When the destination node is neighbor of source node, packets are transferred with single hop. When the destination node is out of radio-range (not a neighbors of source node) then packet are transferred in multiple hops using intermediate nodes. These intermediate nodes (neighbors of source node) forward packets to their neighbors and so on till destination is reached.

In the existing ack-based scheme uses 2ack process for the node authentication process in attack scenario in adhoc network. These 2ack based scheme generate a huge amount of ack packet in the network and also give decision ambiguity for requested node and then effect quality of service. In this modified these scheme used finite state automata. Finite state automate provide a state of route ack, due to this node ack packet maintain state between node to request and respond node. In this process used some extra buffered memory for maintain a state of node that memory area maintain a path state due to given request and response. For maintaining a request packet acknowledgment and calculate the next hop with dsdv protocol concept. Path state maintains a sequence of ack packet.

Limitations of the system: As the system uses DSDV, it has few disadvantages. DSDV requires frequent updation of routing table which uses up battery power and small amount of band width.

Rezvi Shahariar and Abu Naser, "Reducing Packet Losses in Mobile Ad Hoc Network Using the Warning Message Generated from a Routing Node",2014 (July). [6]

In MANET node is communicating by using sending and receiving of packets. Each time a node sends or receives something it actually uses some energy from battery. In such way a node's battery energy will be finished and this node will die out soon. As a result one of the routing nodes will not find it to forward packets. So, route breakage will occur obviously and some packets will be lost because source will not know the off condition of this node and source node will continue sending packets using this broken route in DSR and in EDSR. This is a scenario of energy abuses and packets losses in MANETs. To get rid from this situation this paper gives an approach to save energy and at the same time reducing packet losses in MANETs.

A routing node will generate a Warning Message while its energy level reaches to a critical value and tries to forward all the packets to the next node on the same route using its remaining energy. Thus when a routing node's energy level reached to critical level it will send a Warning Message to the source node immediately and relays the received message on the next hop. This low energy node tries to relays all the packets to the next hop on the ongoing route by using its current energy level until its energy reduces to zero level. When the source node receives a Warning Message from a routing node it assumes that the routing node will not be functional long. In this way the source node gets information about the stopping condition of this routing node in our approach. Whenever a node will go in off mode there must be a route breakage event on the ongoing route and also there will be some packets which do not get a way to the destination. These packets losses can be minimized by not sending more packets on the current route because the source node gets information earlier from the low energy node using the Warning Message. The Warning Message is generated by a node when 10 percentage of total energy remains. On the other hand ROUTE ERROR message is generated when an error detecting node does not find the error node because its energy level is totally empty. Thus we can easily realize that Warning Message comes earlier than ROUTE ERROR message and source can stop sending packets on the current route and this way packet loss can be minimized more by using this approach than DSR and its extension.

Limitation of the system: As lot of warning message could confuse the system while transmitting packets from node to node.

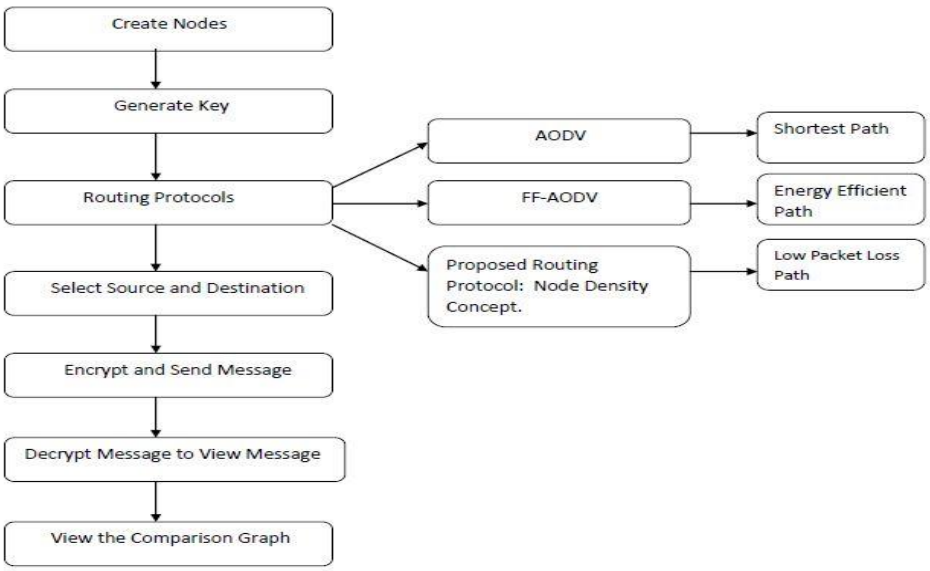
III. SCOPE OF PROPOSED SYSTEM

Packet loss in transmission is one of the major limitations in the mobile ad-hoc network. As one node moves away from the network, the connection gets lost and the packet drop may happen and also because of congestion packet loss happens. Congestion in a network occurs whenever the demands exceed the maximum capacity of a communication link especially when multiple hosts try to access a shared media simultaneously. To send packets to the Internet, a MANET node acquires information about an Internet Gateway and establishes appropriate routes to this gateway. So the proposed concept is based on the packet loss reduction method. Detecting and reacting to packet losses is an important component of any comprehensive security solution. To avoid false positives, before isolating malicious nodes from the path in trust-based security schemes, a thorough investigation and analysis are required to find the actual cause of the packet loss. Without such analysis, the performance of any underlying security solution may degrade, resulting in the punishment of innocent nodes and disconnection of portions of the network, while actual malicious nodes remain undetected. Therefore, current MANET trust-based schemes need to be extended with approaches able to perform a correct diagnosis of packet losses, considering run-time network conditions to detect truly misbehaving nodes. In MANETs, the limited battery capacity of a mobile node affects network survivability since links are disconnected when the battery is exhausted. Therefore, a routing protocol considering the mobile nodes energy is essential to guarantee network connectivity and prolong the network lifetime. Power-aware routing protocols deal with the techniques that reduce the energy consumption of the batteries of the mobile nodes. The routing strategies selection is an important issue for the efficient delivery of the packets to their destination. Moreover, in such networks, the applied routing strategy should ensure the minimum of the energy consumption and hence maximization of the lifetime of the network.

IV. METHODOLOGY

A mobile ad hoc network (MANET) is a wireless network that uses multi-hop peer to- peer routing instead of static network infrastructure to provide network connectivity. MANETs have applications in rapidly deployed and dynamic military and civilian systems. The network topology in a MANET usually changes with time. Therefore, there are new challenges for routing protocols in MANETs since traditional routing protocols may not be suitable for MANETs. For example, some assumptions used by these protocols are not valid in MANETs or some protocols cannot efficiently handle topology changes.

1) Node Module
2) Keys Module
3) Movement Module
4) Data Transmission Module



To start with, make a gathering of hubs that could shape a system. Every hub has given its highlights like the name of the hub, IP address, X point and Y point as a measurement, scope of the hub, neighbors inside the range, energy of the hub. The scope of the hub can be given appropriately. Move and stop the development of hubs if necessary, the speed of development can be changed. Development of a solitary hub should be possible. The key is created to every one of the hubs in the system so an assailant hub won't be permitted to take an interest in the message transmission. For this, RSA calculation can be utilized. A user of RSA creates and then publishes a public key based on two large prime numbers, along with an auxiliary value. The prime numbers must be kept secret. Anyone can use the public key to encrypt a message, but with currently published methods, and if the public key is large enough, only someone with knowledge of the prime numbers can decode the message feasibly. Breaking RSA encryption is known as the RSA problem. Whether it is as difficult as the factoring problem remains an open question. RSA is a relatively slow algorithm, and because of this, it is less commonly used to directly encrypt user data. More often, RSA passes encrypted shared keys for symmetric key cryptography which in turn can perform bulk encryption-decryption operations at much higher speed.

Routing protocols AODV is used to find the shortest path. The AODV protocol builds routes between nodes only if they are requested by source nodes. AODV is therefore considered an on-demand algorithm and does not create any extra traffic for communication along links. The routes are maintained as long as they are required by the sources. They also form trees to connect

multicast group members. AODV makes use of sequence numbers to ensure route freshness. They are self-starting and loop-free besides scaling to numerous mobile nodes. In AODV, networks are silent until connections are established. Network nodes that need connections broadcast a request for connection. The remaining AODV nodes forward the message and record the node that requested a connection. Thus, they create a series of temporary routes back to the requesting node.

A node that receives such messages and holds a route to a desired node sends a backward message through temporary routes to the requesting node. The node that initiated the request uses the route containing the least number of hops through other nodes. The entries that are not used in routing tables are recycled after some time. If a link fails, the routing error is passed back to the transmitting node and the process is repeated.

The FF-AOMDV protocol deals with the configuration of route which is having maximum power efficiency. An energy efficient multipath routing protocol called ad-hoc on demand multipath distance vector with the fitness function (FF-AOMDV). The FF-AOMDV uses the fitness function as an optimization method, in this optimization, we seek for two parameters in order to select the optimum route on of them is energy level of the route and the another one is the route distance in order to transfer the data to the destination more efficiently by consuming less energy and prolonging the network lifetime.

FF-AOMDV routing protocol, which is a combination of Fitness Function and the AOMDV's protocol. In a normal scenario, when a RREQ is broadcasted by a source node, more than one route to the destination will be found and the data packets will be forwarded through these routes without knowing the routes' quality. By implementing the

Proposed algorithm on the same scenario, the route selection will be totally different. When a RREQ is broadcast and received, the source node will have three (3) types of information in order to find the shortest and optimized route path with minimized energy consumption.

This information includes:

1. Information about network's each node's energy level
2. The distance of every route
3. The energy consumed in the process of route discovery.

The route, which consumes less energy, could possibly be (a) the route that has the shortest distance; (b) the route with the highest level of energy, or (c) both. The source node will then sends the data packets via the route with highest energy level, after which it will calculate its energy consumption. Alike to other multipath routing protocols, this protocol will also initiates new route discovery process when all routes to the destination are failed. In the event when the selected route fails, the source node will then selects an alternative route from its routing table, which represents the shortest route with minimum energy consumption.

A node density method proposed in the project can alleviate the packet loss problem to an extent. Packet loss can occur in ad hoc networks where compromised nodes are not present. This packet loss happens mainly because of the following factors.

A. Congestion in Network

In mobile ad hoc networks, congestion is the main factor for packet loss. As the traffic increases packets may not reach the destination and packet loss happens.

B. Path Change and Noise

In mobile ad-hoc networking, the path condition cannot be made unseen since it changes its path frequently. Presence of noise and fading of the transmitted signals are among the channel conditions that can lead to packet loss or bit errors in the transmitted signal. Because of these factors, packets can get dropped.

C. Energy Constraints

Nodes in mobile ad hoc networks have limited energy resource. As the power of nodes decreases, the low energy nodes can get disconnected which may lead to packet loss.

The mobile ad-hoc network is dynamic in nature the routing protocol will be preferred on the basis of administrative distance value allotted to each path in the network. As an enhancement to AODV protocol, the node density feature can be embedded. When a node is about to get disconnected, the packets must be transferred to the neighbour node which has a maximum number of neighbours. For configuration of routes, select the source and destination. The message to be send is encoded using RSA algorithm for the secure transmission. The security of RSA relies on the computational difficulty of factoring large integers. As computing power increases and more efficient factoring algorithms are discovered, the ability to factor larger and larger numbers also increases. Encryption strength is directly tied to key size, and doubling key length delivers an exponential increase in strength, although it does impair performance. The comparison graph can depicts the improvement in reduction in packet loss for the proposed protocol than AODV and FF-AODV.

4.1 NODE DENSITY ALGORITHM

Proposed (Node Density Route Method)

1. Select S and D
2. Create route request
3. Node S broadcast route request to neighbours
4. For each node n, Assign density=0 value

   Density= Density+ n.neighbor.size() */ Size of neighbour is found/*
5. Neighbor nodes with highest node density is chosen as the path to destination from source

Source and Destination within a network is chosen at first. Route request is created and the route request is send from source to neighbor nodes till it reaches the destination, the route request is broadcasted within the network. The route is selected according to the algorithm step, for each node, density is initialized as 0,

Density=Density+ n.neighbor.size().

The total neighbors within the range of nodes are saved in density parameter. Neighbor nodes with highest density are chosen as the path from source to destination.

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The green line is the proposed node density based routing protocol which produces better packet delivery ratio than the red and blue lines shown in the below graph fig 2:

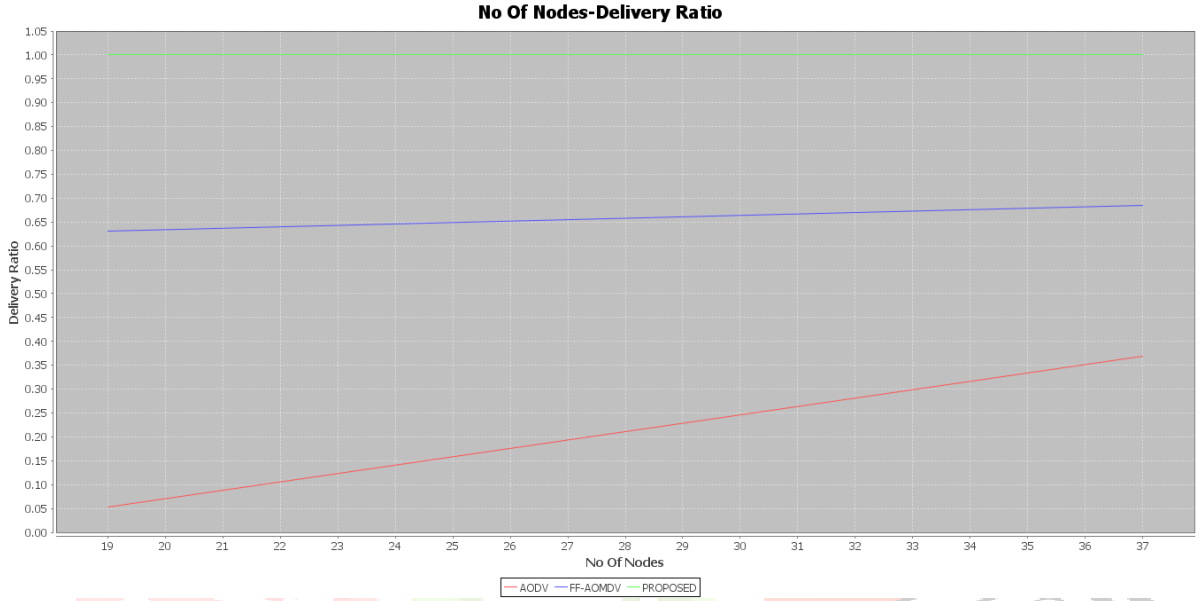

Fig 2: Node delivery ratio comparison graph

V. CONCLUSION

In this paper, proposed a method on packet loss reduction and node registration methods in AODV for MANET. Mobile ad-hoc network is a self-configuring, dynamic network of the mobile node in a wireless connection. AODV routing protocol is a distance vector routing protocol and uses destination sequence numbers to determine the freshness of routes. RSA algorithm is used to secure the system as a whole. Thus the attacker node will not be able to join the network. For routing, AODV protocol can be used which is already widely used a routing protocol. In order to reduce the packet loss in a network due to disconnectivity of nodes, the node density feature can be considered. In future, more on security and packet loss reduction methods will be concentrated.

Multipath routing protocols flood a route request to learn more than one path to the destination to forward packets through them. It is not necessary that the source will always find the optimum or the shortest path available. Since the power source of the mobile nodes is limited, the power consumption by these nodes should be controlled to increase the network lifetime. Multipath routing protocols have several issues. One of them is finding an optimum path from the sources to the destinations. The issue becomes more complicated with a large number of mobile nodes that are connected to each other for transferring the data. Subsequently, the more energy is wasted at data transfer.

Mobile ad-hoc network is a self-configuring, dynamic network of the mobile node in a wireless connection. AODV routing protocol is a distance vector routing protocol and uses destination sequence numbers to determine the freshness of routes. The graph depicting the variation of packet loss among three routing protocols is shown in the Graph(Fig 2).

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