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NOVEL DELAY OPTIMIZATION TECHNIQUE BY PREVENTING LINK FAILURE PROBLEM IN MANET

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ABSTRACT: *MANET is a wireless communication system. It contains the many mobile nodes. It is comes under ad-hoc network. In case of MANET, no centralized access point is required, i.e. it comes under infra-structure less category. The MANET uses a carrier sense protocol for synchronization purpose. This protocol is similar to the Ethernet standard. In this paper, we are going to discuss the idea to solve link failure problem and time delay in MANET. It can be solve by integrating ACO, i.e. ant colony optimization with Beacon frames. In the wireless network the ACO is basically used to optimize the communication process. This approach is used in the nodes to find the optimize path over the network. Ant places the pheromones on the located path so all other nodes can follow these pheromones to communicate on this optimized path. Mainly these ant communicate and indentify the pheromones location and to place them at appropriate location. The purpose of beacon frames is to advertise the presence of an AP in an area, its capabilities, and some configuration and security information to the client devices.*

Keywords: *MANET, ACO, Link Failure, Vicinity, Beacon Frame.*

1. INTRODUCTION

A wireless ad hoc network is the collection of mobile nodes without the requirement of any centralized access point. There are the many applications for the ad hoc networks, as ad hoc networks are used for many security operations. The term wireless network is technically used for the any type of network that is wireless in nature. This term is mostly used to refer the telecommunication networks, which show the interconnection between the various nodes that is implemented without use of any wires. The main examples of this are the computer network, which is the type of the telecommunication network. MANET stands for mobile ad-hoc networks. It is the type of infra-structure less network. [2]

It is an infrastructure less IP based network of mobile and wireless machine nodes connected with radio. In operation, the nodes of a MANET do not have a centralized administration mechanism. It is known for its route table network properties where each node act as a "router" to forward the traffic to other specified node in the network.

Types of MANET

There are different types of MANETs including:

- Vehicular Ad Hoc Networks (VANETs) are used for communication among vehicles and between vehicles and roadside equipment.
- Intelligent vehicular ad hoc networks (In VANETs) [1] are a kind of artificial intelligence that helps vehicles to behave in intelligent manners during vehicle-to-vehicle collisions, accidents, drunken driving etc.
- Internet Based Mobile Ad-hoc Networks (iMANET) are ad-hoc networks that link mobile nodes and fixed Internet-gateway nodes. In such type of networks normal ad-hoc routing algorithms don't apply directly.

In the MANET wireless communication system need for the rapid deployment of independent mobile users. It is very significant example include establishing survivable, efficient, dynamic communication in case of emergency operations, disaster relief efforts and military networks. In the network scenarios cannot rely on centralized and organized connectivity. In the mobile ad-hoc network is autonomous collection of mobile users that communicate over relatively bandwidth constrained wireless links. Mobile network topology may change rapidly and unpredictably over time. . The network decentralized where all network activity including discovering the topology and delivering messages must be executed by the nodes themselves. In the application of mobile ad hoc network constrained by power sources, to large-scale, mobility, high dynamic networks. The design of network protocol for this network is complex issue. In the MANETs has used different distributed algorithms to determine the network, link scheduling and routing. In the mobile ad hoc network find the shortest path between the source and destination in the static network is usually the optimal route. In the mobile ad-hoc network is set of mobile nodes which communicate over radio and need not any infrastructure. This type of network is very flexible and suitable for several situations and applications. Due to the limited transmission range of wireless interface the communication traffic has to relay over several intermediate nodes to enable the communication between the two nodes. This kind of network complete the

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functionality of hosts but each node also be router to forwarding packets for other nodes.

Types of MANET routing protocols:
Routing table can be classified into two categories: reactive and proactive and hybrid [3].

Reactive protocols:
The reactive protocol also Known as the demand routing protocol. In the reactive protocol, topology data is given only when needed.

DSR (Dynamic source routing): DSR is on demand routing protocol that is based on the concept of source routing. Mobile nodes are required to maintain the route caches that contain the source routes of which the mobile is aware.

AODV (Ad hoc on-demand distance vector routing): It is distance vector protocol. In this process source nodes send message to some destinations it initiates a path discovery process to locate the other node. It broadcast a route request (RREQ) packet to its neighbor which then forwards the request to their neighbors and so on until either the destination with fresh nodes route to the destination is located. AODV uses destination sequence numbers to ensure all routes are loop free contain the most recent route information. Each node maintains its own sequence number as well as broadcast ID. Afterward RREP message is unicast by the destination to the originator of the RREQ.RERR, and other message of RERR (route error) message are used to notify nodes about link breaks.

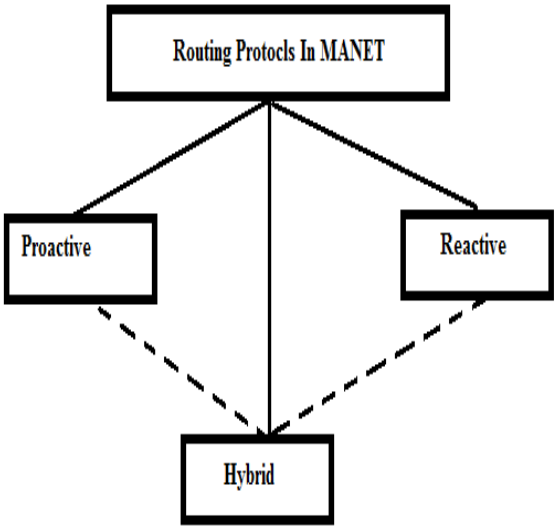

Fig 1: Routing Protocols

Proactive protocol: In the case of proactive protocols are characterized by periodic exchange of topology control messages. Nodes periodically update their routing tables and control traffic is more dense but constant and routes are instantly available [3].

ACO (Ant Colony Optimization): Ant communication is accomplished primarily through chemical called pheromones. Ants communicate to one another by laying down pheromones along with their tail. Other ants receive the presence of pheromone and tend to follow path where the pheromones concentration is higher. Pheromone trail starts to evaporate, then reducing its attractive strength. The more time the pheromones have to evaporate. Ant follows that path which are shorter and the pheromone density remain high as it lay on the path as fast as it can evaporate

2. LITERATURE SURVEY

D. Rupérez Cañas (2013) represents a paper **"Hybrid ACO Routing Protocol for Mobile Ad Hoc Networks"**. in this paper author discuss about the ACO protocol that is used in MANET. The mobile ad-hoc networks are constituted by wireless mobile nodes. These nodes are distributed without any need of predefined infrastructure. In the MANET, each node is free to act as client or server. These nodes are mobile in nature, hence these nodes may join or depart the network at any time. Ant Colony Optimization is a particular type of algorithms. It takes inspiration from the behavior of ants at the time of obtaining the food. ACO is a meta-heuristic approach. CO takes into account the behavior of ants at the time of obtaining the food. This behavior is based on Swarm Intelligence. In this paper author proposed a new algorithm, called hybrid ant colony optimization. This algorithm is used to solve the different problems. The hybrid ACO routing protocol is a combination of proactive and reactive protocols. HACOR proposes several enhancements and additional functionalities in comparison to previous ACO-based algorithms. In this paper the experimentation results show that HACOR has a better performance than AODV according to analyzed metrics.

Praveen Biradar, and Sowmya K.S (2012) represents a paper **"ROUTING IN MANETS USING ACO WITH MOBILITY ASSISTANCE":** in this paper, author discuss about the routing of mobile ad-hoc network by using the ant colony optimization. Mobile ad-hoc network is a collection of various mobile nodes. These mobile nodes are communicates through wireless links. MANET is a dynamic topology. Hence the connectivity between the nodes may vary with the movements of nodes and the with time node departures. MANET pose the many challenges like mobility of node, route discovery, link failure, packet loss and so on. In this paper author focuses on the packet loss, throughput, route discovery using ACO. Ant Colony Optimization algorithm inspired from

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the behavior of ant. The ability to find the shortest path and most successful algorithm technique based on ant behavior. ACO algorithms as the potentiality of using artificial pheromone and artificial ants to drive the search of always better solutions for complex optimization problems. ACO mechanism is more effective since it avoids long convergence time by directly concentrate the search in a neighborhood of the best tour found up to the current iteration of the algorithm.

Bhanu Pratap Singh, Sohan Garg (2013) represents a paper **"A Characteristics Study of Ant Colony Optimization Algorithms for Routing Problems".** In this paper author discuss about the various ant colony optimization algorithms. The Routing algorithms are difficult to formalize into mathematic. These routing algorithms are tested using extensive simulation. The mobile ad hoc networks depend on applying the traditional approaches of routing in wired networks. A large amount of work has also been done in the area of energy efficient routing. This approach attempts to maximize network lifetime by routing through paths, which use the least amount of energy relative to each node. In this research paper author will study all ant based optimized routing algorithms to solve routing problems.

S.B.Wankhade, M.S.Ali (2011) represents a paper **"Route Failure Management Technique for Ant Based Routing in MANET"** In this paper, author discuss about the ant colony optimization techniques. These techniques are used for route failure management. MANET is a collection of mobile nodes using as transmission medium radio waves. It is able to communicate with each other using multi-hops links without the need of any infrastructure. Any mobile node communicates directly using the radio waves with nodes in its transmission range, and uses intermediate nodes to communicate with other nodes which are out of its transmission range. In an ad hoc network, a routing protocol is required for transmission of packets through number of nodes. Proactive routing protocols*:* on exchanging topological information among the network nodes, the proactive protocols continuously learn the topology of the network. Reactive routing protocols: Query-reply dialog are the basis of the reactive routing protocols and it establishes routes to the destination only when there is a need. Hybrid routing protocols: A combination of reactive or proactive feature will give a better solution when compared to a particular routing protocol. In this paper, author describes route failure management technique for ant based routing in Mobile Ad Hoc Network (MANET), inspired by Ant colony Optimization.

3. PURPOSED WORK

MANET stands for Mobile ad-hoc network. MANET is a network with large number of nodes. In this network AODV is used. The source node sends the information to its neighboring node and this node sends the packets to next node. A link is established in between these nodes. The communication takes place in the network from its source node to the destination node. Hence the packet transfer is occurs. In the network, MANET is open for all nodes over the network. The main problem is packet loss due to the link failure. In the MANET, the nodes are moveable. When the nodes move from their position, the nodes may be out of range from its neighboring node. Hence the problem of link failure is occurred. When a node is out of range packet loss is occur. Hence the source node leaves that path and chooses the new path by using the ant colony optimization. Just like the ant, it chooses the safe path. To choose safe path using ACO, it will take some time and it will not provides the surety that it will prevent from link failure problem in future. So, in process of rebuilding paths time will consume, which cause for delay in communication.

Methodology: To solve link failure problem in MANET and to reduce delay, Here we are going to integrate the concept of Beacon frame range with ACO under AODV routing protocol.

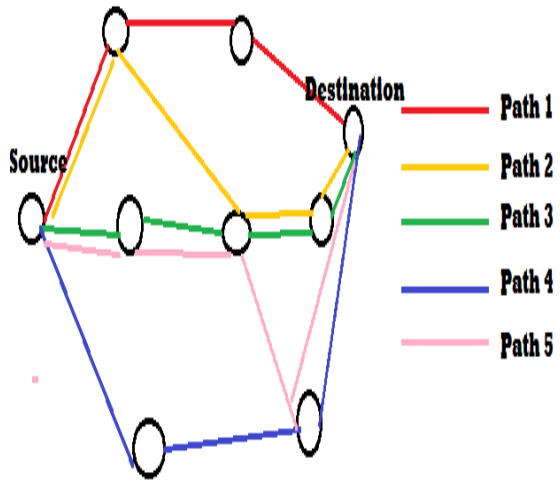

Fig 2: Ant Colony Optimization

Ant colony Optimization is used to find the maximum number of paths between source and destination. In the above diagram MANET is shown, it contains many nodes. According to ACO, there are several paths between source and destination.

Beacon Frame: According to the IEEE 802.11 standard, every compliant Access Point (AP) periodically sends out management frames called beacon frames. The purpose of beacon frames is to advertise the presence of an AP in an area, its capabilities, and some configuration and security information to the client devices.

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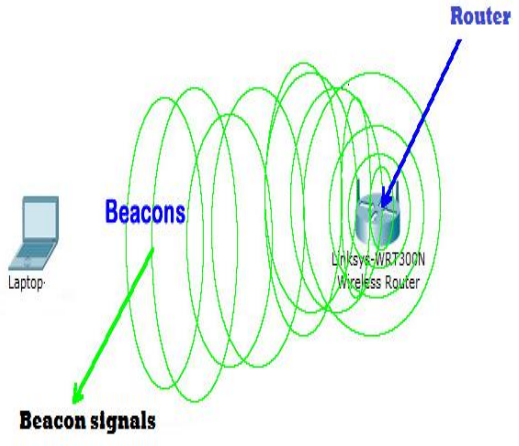

Fig 3: Beacon Frame

The time interval between two consecutive beacon frames is called the beacon interval. The beacon interval is measured in Time Units (TUs), where each TU equals 1024 microseconds, so the default period between beacons is approximately 100 milliseconds. Beacon interval is a configurable parameter on Cisco APs, but changing this value is not recommended without careful consideration. A mis-configured beacon can cause a client to not associate with the AP.

Beacon Frame range:

The range of beacon frames lies, where the signal of router can reach. It means the distance between router and range of its signal at maximum far location is known as beacon frame range.

In the figure 4, the concept of Beacon Frame is shown. It checks the range of different nodes. According to Beacon Frame, it chooses the node with high range density. There are three nodes are comes under Beacon Frame, the range of these nodes are 60%, 70% and 5% respectively. Hence Beacon Frame chooses the node with high range density. According to it, the path is chosen having the high density of beacon frame. Hence the link failure problem can be reduces.

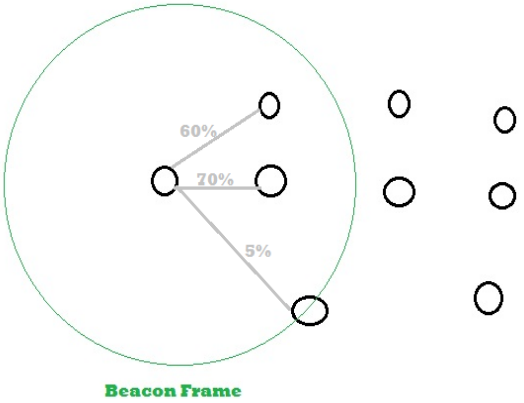

Fig 4: ACO and Beacon node selection Process

4. RESULTS AND DISCUSSIONS

Simulation is done using NS-2 and the results are given below

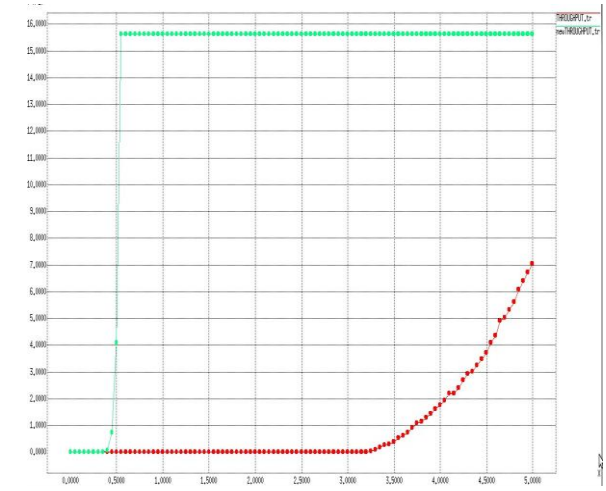

Fig 5: Throughput Graph

The throughput of the new proposed technique and previous technique is shown. Green line shows the throughput of proposed technique and red line shows the throughput of the previous technique. The path loss is reduced in the new technique which will enhance the throughput of the network.

Fig 6: Delay graph

The delay in the network is shown in this graph. The red line shows the delay of previous technique and green line shows the delay in new proposed technique. The packet loss is deceased in the new technique will reduce the end to end delay in the network.

5. CONCLUSION AND FUTURE SCOPE

In this paper, we have developed a network of the high vicinity. In this network, the source node chooses the

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node which is in its vicinity with higher signal strength. Suppose if a node has the 45 percent vicinity, and the path that chooses by the source having the 50 percent vicinity. As the node of vicinity 50 moves from its position then its vicinity will also reduces. In that case the source node will shift the route to the node having the vicinity 45. Hence the link failure can be controlled by applying this method. The packet loss can also reduce.

We have generated a path in which no node with low vicinity will be included. It will give a secure and efficient approach for data transmission in ad hoc network. The proposed algorithm intends to provide a network having the secure and reliable data transmission.

The proposed algorithm presented in this paper considers the high vicinity between the nodes. These nodes are uses for the data transmission. The path that is chosen by the source node may be consists large no. of nodes. Hence the path of network becomes large, so the future work can also be done to choose the lesser number of nodes with high vicinity.

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