Enhancement in AOMDV Protocol to Reduce Chances of Link Failure in Mobile Adhoc Network

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***Abstract*—Mobile Ad Hoc Networks(MANETs) are the networks formed by mobile radio nodes where the topology of the network is constantly changing. During data transmission in MANET, there is a problem of link failure which degrades the performance of the network. The nodes are deployed in the network and path is established according to EAOMDV (Enhanced Ad-Hoc on Demand Multipath Distance Vector) protocolfrom source to destination. Due to different mobility of nodes link failure problem occurs in case of AOMDV. This link failure problem is responsible for performance degradation and low reliability of the network. In this paper, a novel technique is proposed to overcome link failure problem in EAOMDV. We use NS-2 software to implement EAOMDV protocol and the evaluation results shows better performance as comparison to AOMDV..**

***Index Terms*— AODV, AOMDV, EAOMDV, MANET, Link Failure**

I. INTRODUCTION

Wireless network enables people to exchange information, to access various application without the use of any wire[1]. Wireless networks have many properties such as mobility, simplicity, affordable and cost saving installation. Wireless networks can be classified into two types:

1. Infrastructure Network
2. Infrastructure less Network

Infrastructure networks has central controller that is Access Point. All the wireless devices communicate with each other through Access point and Access point is responsible for data routing [2]. These networks have a fixed base station and all wireless devices that are communicating to each other are connected to access point. If the node moves out of the range of one base station then it will come in contact with other base station. It is also known as Ad hoc Network.

Infrastructure-less networks has no central controller means no Access point. Ad hoc networks are decentralized type of wireless networks [3]. In ad hoc network, each node act as a router in it and forwarding data to other nodes. So the determination of the nodes forward data is made dynamically based on the network connectivity.

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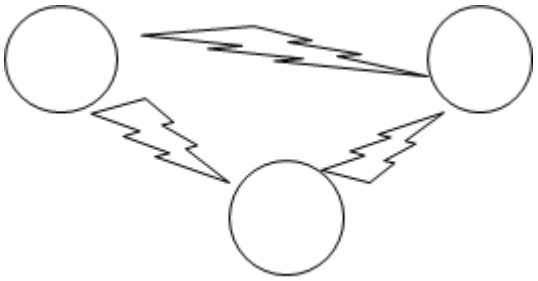

Fig 1.2: Infrastructure less Network

1.1 Types of Adhoc Network: There different types of adhoc network available. These are as following:

1.1.1 MANET:MANET is a mobile adhoc network. It is self-configuring network which is infrastructure less in nature. In MANET each node act as a router as well as host and MANET dynamically establish routing among nodes to form a network [2, 3].

***1.1.2. Wireless Sensor Network*:** A wireless sensor network is collections of sensing device that can be wirelessly communicate with each other. It is centralized system. A wireless sensor network provides platform to various protocols that drastically reduce node size, cost, and power consumption for their target application. s inexpensive to install and no wiring is required for data transfer [4].

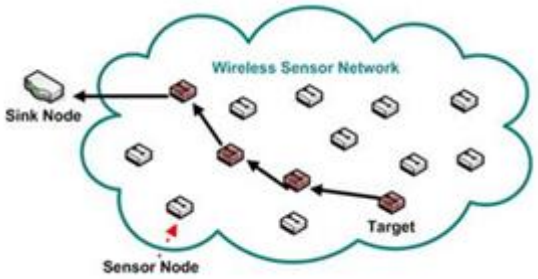

Fig 1.1.2 wireless sensor network [13]

1.2 Routing Protocol in MANET: One of the most important and a difficult mechanism to maintain in ad hoc networking is the routing mechanism. Due to mobility of nodes there is no fixed topology, interference and path loss are there. So we need some dynamic routing protocol for these function to work properly.[7].Routing protocols in MANETs are classified as:

1. Reactive Routing Protocol: It is also called the On Demand routing protocol. When there is no communication, they don't maintain any routing information or routing activity at the network nodes. It means that it creates its route only when it is needed by the source node. E.g. AODV, DSR,TORA.

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2. Proactive Routing Protocol: It maintains the routing information even before it is needed. They attempt to maintain up to date information from each node to every other node in the network [8]. Routes information is generally kept in the routing tables and is periodically updated as the network topology changes.Proactive routing protocols are table driven routing protocols. E.g. DSDV, WRP

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II. LITERATURE SURVEY

In this paper [5], they introduced about congestion control is a key problem in mobile ad-hoc networks. Congestion has a severe impact on the throughput, routing and performance. Identifying the occurrence of congestion in a Mobile Ad-hoc Network (MANET) is a challenging task. The congestion control techniques provided by Transmission Control Protocol (TCP) that is specially designed for wired networks. There are several approaches designed over TCP for detecting and overcoming the congestion. This paper considers design of Link-Layer congestion control for ad hoc wireless networks, where the bandwidth and delay measured at each node along the path. Based on the cumulated values, the receiver calculates the new window size and transmits this information to the sender as feedback. The sender behavior is altered appropriately. The proposed technique is also compatible with standard TCP. In this paper [6], they implemented a new distributed routing protocol i.e., Temporally-Ordered Routing Algorithm for mobile, multi hop, wireless networks. TORA can be used for highly dynamic mobile ad hoc networks. The protocol's reaction is structured as a temporally-ordered sequence of diffusing computations; each computation consisting of a sequence of directed link reversals. The protocol is highly adaptive, efficient and scalable; being best -suited for use in large, dense, mobile networks. The protocol is designed to minimize reaction to topological changes. A key concept in its design is that it decouples the generation of potentially far-reaching control message propagation from the rate of topological changes. It guarantees all routes are loop-free, and typically provides multiple routes for any source/destination pair which requires a route. In this paper they proposed [7],an enhanced AODV protocol is used. The techniques will follow only the path which has the highest signal strength. Header part is added in RREQ message which helps to find out the destination. Destination nodes check the vicinity of the adjacent nodes and those nodes further checks the vicinity of their adjacent nodes. After that source find out the average of the path, the path which has the maximum average value is selected as the final path. This work will help to reduce the problem of link failure and packet lost problem. In this paper they explained [8] the routing in Mobile Ad hoc Network (MANET) is a critical task due to dynamic topology. Many routing protocols were proposed which are categorized as proactive and reactive routing protocols. Route maintenance is a great challenge in MANET due to frequent link failure which causes high data loss and delay. To counter such problems, lots of link repair mechanisms were proposed, but all these have their own limitations. This paper proposes a novel routing algorithm for route maintenance based on link failure localization called DSR-LFL. DSR-LFL takes decision on the basis of location of failure link in source route. Proposed algorithm may improve the packet salvaging, delivery ratio and performance of DSR.

III. LINK FAILURE IN MANET

Link failure is a main problem in AOMDV which is responsible for the degradation of the network and packet lost. There are number of nodes in the network where source is host node from where data is send and destination node is the final node [10]. An active node is responsible for updating the table entry. When source node move, new route discovery initiated. If intermediate nodes or the destination node moves then following conditions are possible:

a) The next hop links break resulting in link failures.

b) Routing tables are updated when link failure occurs.

c) All active neighbors are informed by Route Error message.

During link failure, the source node is informed about the failure in the network so that either it may slow down the packet transmission rate or find an alternate route which may not necessarily be an optimal route. It must be pointed out that all the congestion control methods are able to inform the source node about the congestion problem because they use Transmission Control Protocol. To maintain and allocate network resources effectively and fairly is a major issue. The resources shared typically are the bandwidth and the queues of the routers or switches. Packets are queued in these queues awaiting for transmission [11]. When too many packets are challenging for the similar link, the queue overflows and packets have to be dropped. When such drops become common events, the network is said to be congested and link failure problem occurs. In MANET, there is no fixed infrastructure and hence the mobile nodes themselves act as the routers.

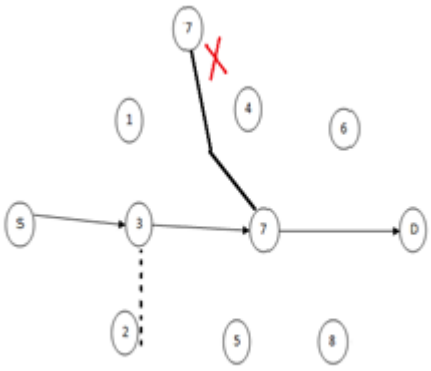

Fig. 1.3 Link Failure in MANET

In fig. 1.3, Network is deployed having finite numbers of nodes. After that, Path is established between source and destination. In this case node 7, which is an intermediate node moves from its position. So packet loss occurs at node 3.

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IV. PROPOSED METHODOLOGY

The main problem occurs during transfer of data from source to destination node is of congestion problem in AODV protocol. In case of MANET the number of nodes are can move freely in the area because there is no central controller in the MANET. So moves are free to move easily. It is self-configuring system. So when the data is send from source to destination congestion control problem occur easily due to free or easily movements of the nodes. To overcome the problem of congestion in the network various techniques of load balancing had been proposed in the previous times. Among all the proposed techniques multipath routing is the most efficient and advanced technique for load balancing in energy efficient mobile adhoc networks. In the proposed technique dynamic queues are defined on the basic of threshold values for load balancing in MANET. As discussed earlier, MANET is the self-configuring network in such network it is very difficult to define threshold values. In this work, we will enhance the proposed AOMDV protocol for load balancing in MANETs. The enhancement will be based on the actual values of the networks. The most advanced and energy efficient technique is multipath routing which is based on dynamic queue threshold values. In this work, enhancement in the proposed technique will be done to increase its efficiency in terms of energy, throughput and delay.

ALGORITHM

Set M Mobile Node's
Set S sender and R receiver
Node Routing = AOMDV
Set Route
{ If (route from S to R found)
{ Check number of route;
If (route => 1) //means alternative route exist in network
{
Find (energy of each route && energy > 20)
Select only 3 routes as a best route //shortest path
Send route acknowledge through all exist path }
}
Else {route unreachable} } {
Source send (Ping message, adjacent nodes)
{
Adjacent nodes revert back to source which can recover path
Check(Node which has higher energy is path recover node)
{
Increment-Q;
Store incoming data;
} Receiver receives data from I
node;
Send ACK to sender S; } } }

V. EXPERIMENTAL RESULTS

In proposed work, a new technique has been proposed to increase efficiency of the network which is implemented at NS2 Simulator.

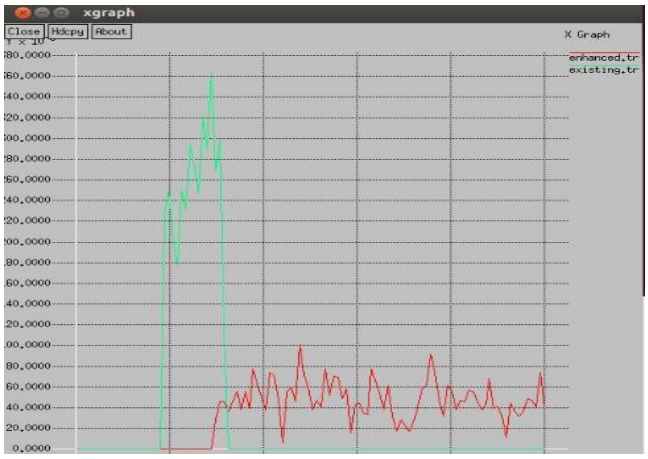

Fig.1.4 Packet Delivery Ratio

As shown in figure 1.4, PDR is shown in graph of both existing and proposed work. The graph is plotted between number of packets dropped verses time. In existing work showing with green line PDR varies with time and at the end it becomes zero. In the proposed technique showing with red line, PDR is constant. It is concluded that proposed technique is better than existing technique.

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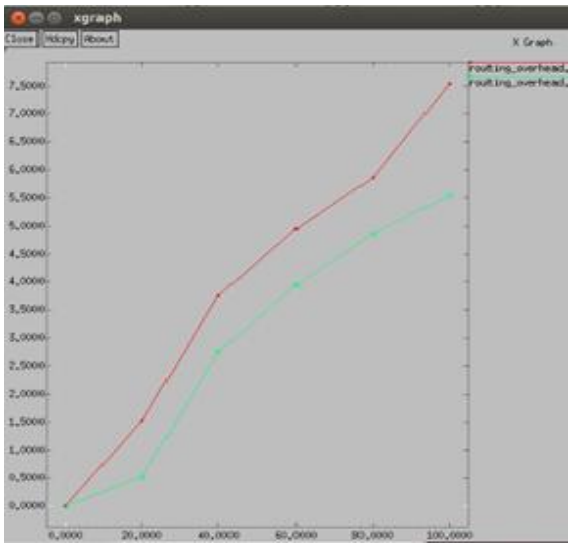

Fig.1.5 routing overhead

Routing overhead is defined as number of routing packets delivered in a network to establish connection with receiver. As shown in figure 1.5, green line shows routing overhead of the system which is less than existing technique. Red line shows routing overhead of existing protocol. The higher routing overhead represents unnecessary flooding of packets which causes wastage of energy. It is concluded that proposed technique is better than existing technique.

VI. CONCLUSION

As MANET is the self-configuring type of network, the problem of load unbalancing generally exists. During data transmission there is a problem of link failure in MANET which decreases network performance and reliability. In the previous year various techniques had been proposed for load balancing. The most advanced and energy efficient technique

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is multipath routing which is based on dynamic queue threshold values. In this work enhancement in the proposed technique will be done to increase its efficiency in terms of packet delivery ratio and routing overhead.

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