Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X

IJCSMC, Vol. 3, Issue. 5, May 2014, pg.428 – 433

RESEARCH ARTICLE

Advancement in Dynamic Source Routing Protocol for MANETs

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***Abstract*— Mobile Ad-Hoc Networks are temporarily infrastructure less Network .There is not any centralized system in it and intermediate nodes only work as router for transmission. There are various routing protocols are present and Dynamic Source Routing Protocol is an on-demand or reactive routing protocol. In this protocol data transmission done in two phases one route discovery and second is route maintenance. During transferring of packets if network between nodes is lost then DSR starts again from route discovery phase. In this paper there is improvement in Dynamic Source Routing. Dynamic Source Routing while performing in case of network lost, number of packet lost is high and total process is time consuming. Here total receiving of packets are increased so that lost packets decreases causes upliftment in dynamic source routing protocol.**

***Keywords*— Dynamic Source Routing Protocol, MANETs, Route Discovery, Route Maintenance**

INTRODUCTION

In the mid-70s, wireless networks have become increasingly popular in the computing industry. This is particularly true within last decade which has view wireless networks being adapted to enable mobility. There are majorly two types of mobile wireless networks [1]. First one is known as infrastructured networks, Networks with fixed and wired gateways and second is the infrastructureless mobile network, commonly called as an ad-hoc network. In this networks have no fixed routers and all nodes are capable of movement i.e. mobile nodes and can be connected dynamically in an arbitrary manner. Nodes in these types of networks function as routers which discover and maintain routes to other nodes in the network. Under infrastructureless networks there are ad-hoc networks, which form spontaneously without an infrastructure or centralized controller. This type of

networks infers that each node, or user, in the network can act as a data endpoint or intermediate repeater[2]. Ad hoc networks with mobile nodes known as Mobile Ad hoc Networks (MANETs). Mobile ad hoc Network is a collection of many independent and movable nodes that can communicate to each other via radio waves or it is an infrastructureless [3] IP based network of mobile and wireless machine nodes connected with each other using radio. In operation, nodes of a MANET do not have a centralized administration mechanism and mobile nodes that are in radio range of each other can directly communicate. Normally network consists of nodes divided into three major categories source, destination and intermediate nodes. Others nodes need the aid of intermediate nodes to route their packet. In order to perform communication function within the network, a routing protocol is used to find routes between nodes. The important goal of such an ad-hoc network routing protocol is correct reliable and efficient route establishment between a pair of nodes so that messages may be delivered within a certain time. Route establishment should be done with a minimum of overhead and bandwidth consumption but high in functionality. For completing routing work there are many routing protocols. Routing protocols may generally be divided as: (a) table-driven and (b) source-initiated on-demand driven[4]. Proactive MANET's protocols are also known as table-driven protocols and will actively determine the layout of the network. Through a periodic exchange of network topology packets between the nodes of the network, at every single node an absolute picture of the network is maintained. Today's used most of thing also brings a significant issue of mobility and is a key issue in mobile ad-hoc networks. The mobility of the nodes causes the topology of the network to change regularly. Keeping track of topology in these networks is not an easy task, and too many resources may be consumed in signalling. Reactive routing protocols were mainly made for these types of environments. These are based on design that there is no point on trying to have an image of the entire network topology, since it will be constantly changing. Instead, whenever a node needs a route to a given target, it initiates a route discovery process on the fly, for discovering out a pathway. Reactive protocols starts process by set up routes only on-demand.

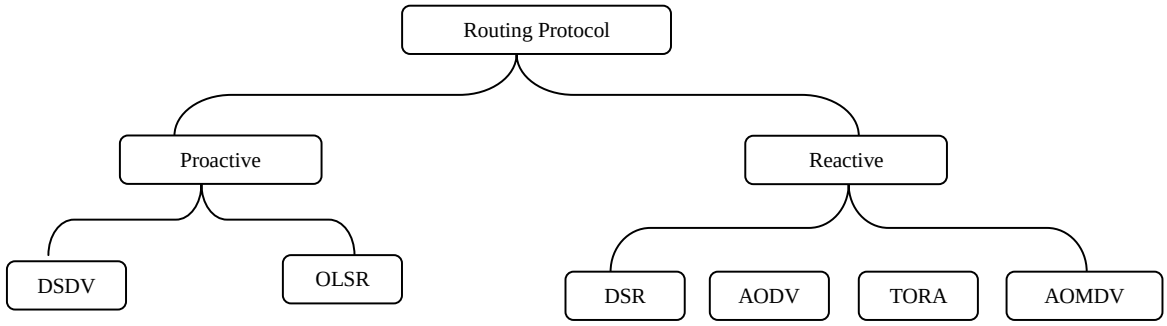

Fig 1 Categories of Routing Protocol

RELATED WORK

In 1996, D.B. Johnson et.al [5] gives dynamic Source routing algorithm which is different from backward protocol basis on its reactive approach. In respective paper authors explain working of Dynamic Source routing algorithm that how in Dynamic Source routing protocol actually works in all its phases. Venkatapathy Ragunath under University of Bonn [4] implements DSR in his own way but using DSR MANET draft in ns2 simulator in a paper. In 2009, Trib mukherjee et.al [7] describes how a proactive protocol works during phase of route maintenance. To measure three basic categories are formed one is data traffic intensity second is link dynamics and third one is target reliability and intensity. In 2010, V. Kanakaris et.al [8] gives a review of energy consumption in all Ad hoc routing protocols and for this used four protocols are TORA, DSDV, DSR, AODV.

In year 2013 D. Mahmood et.al [9]perform a detail search on reactive routing protocols in which working of all reactive routing protocols during its various phases as route request, route reply and route maintenance are modelled with respect to control overhead. In this paper they form a new model which calculates control overhead variation and then three protocols AODV, DSR, DYMO (Dynamic MANET on demand) performance are calculated. Above search gives a view that route maintenance phase of DSR have some drawbacks which can be solved to make it better than other protocol.

The Dynamic Source Routing (DSR) [10] algorithm is a new approach to routing in a MANET in which nodes communicate along paths stored in source routes carried by the data packets. It is known as one of the purest examples of an on-demand protocol. In DSR, mobile nodes must have to maintain route caches that contain the source routes of which mobile are aware. Entries in route cache are regularly updated as new routes are discovered. The protocol consists of two main phases: route discovery and route maintenance. When a mobile node has a packet to send to its destination, it first tries to find in its route cache to determine whether it already has a route to the destination. If it has an route to destination within time to live, it will use existing route to send the packet. On the other hand, if node does not have such existing route, it initiates a round of route discovery by broadcasting a route request packet to all other neighbour nodes. This route request packet consists of the address of the destination, along with sender node's address and having a unique identification number. Each node receiving packet checks whether it knows of a route to destination node. If it does not contain, it adds its own address to the route record of cache of packet and then forwards the packet along its outgoing links. To limit number of requests for route propagated on outgoing links of a node, a mobile node only forwards the route request if the request has not yet been seen by the mobile nodes and if the mobile node's address does not already appear in the route record of cache. Route reply is generated when the route request reaches either the target itself, or an intermediate node that contains in its route cache an unexpired route to the destination. By the time packet reaches either destination or such an intermediate node, it contains a route record yielding the sequence of hops taken. If the node generating route reply is destination, it places the route record contained in the route request into the route reply packet. If the responding node is an intermediate node, it appends its cached route to the route record and then sends the route reply. To return the route reply, responding node must have a route to the initiator. If it has a route to the initiator in its route cache, it may use that route. Otherwise, if symmetric links are supported, the node may reverse the route in the route record. If symmetric links are not supported, the node may initiate its own route discovery and piggyback the route reply on the new route request.

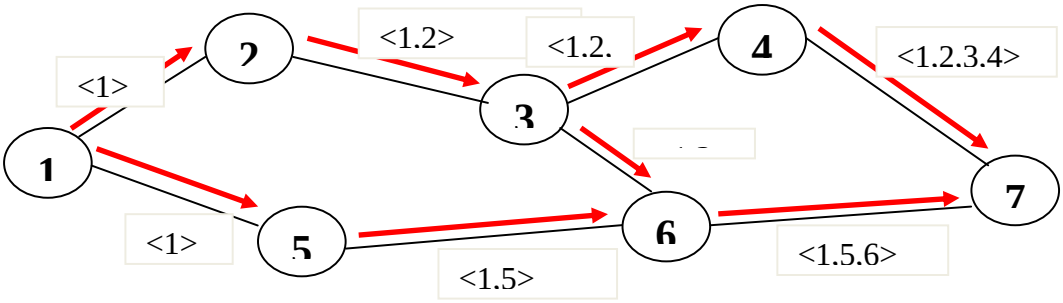

Fig 2 Route discovery

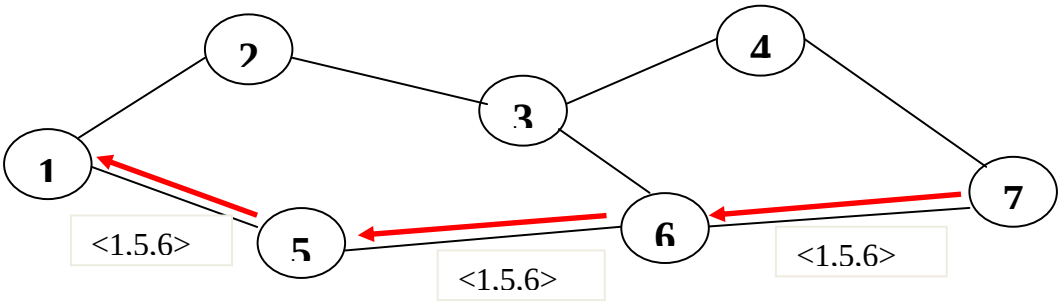

Fig 3 Route maintenance

Route maintenance is accomplished through the use of route error packets and acknowledgments after transmission failure. Route error packets are generated at a node when the data link layer of OSI architecture encounters a fatal transmission problem. When a route error packet is received, the fatal node in error is removed from the node's route cache and all routes containing the hop are ended up at that point. In addition to route error messages, acknowledgments are used to verify the correct operation of the route links. These include passive acknowledgments, where a mobile is able to hear next hop forwarding the packet along the route established.

As a contribution to this work in this paper a new approach of route maintenance during link failure is discussed.

PROPOSED WORK

Dynamic Source Routing protocol is a on demand routing protocol works on two phase process. During data transmission in dynamic source routing protocol if a established network between two nodes is lost then information regarding this breakage is first transmitted to all and then whole process is started from base that is route discovery whereas starting from route causes wastage of time that increases packet loss. High loss of packets causes receiving of packets is low. Even when number of breakages in a network is high then this problem becomes major issue. So to reduce respective problem in this paper, a concept of again starting from discovery phase is changed. If any link breaks during transmission then only local nodes work on it and can find new links to reach destination rather than involving source node. In proposed modified dynamic source routing protocol while link breakage happen then only nodes that include in breakage can find new path and no starting from route discovery by source node is there. Due to this concept total numbers of lost packets are less and so receiving of packets become high

SIMULATION RESULTS

For showing improvement in route maintenance we taking a scenario in which there are random movements of nodes and links are break regularly. In simulation scenario simulator used is NS2 2.35. Simulation area for our scenario is 1000*1000 then simulation time is 200 sec, selected traffic type CBR with UDP traffic agent that is used for connectionless links. Maximum number of packets that a queue can handle is 50 packets. Data payload is 512 Bytes/packet. We are taking three scenarios in which all parameters are same, only changes is number of nodes.

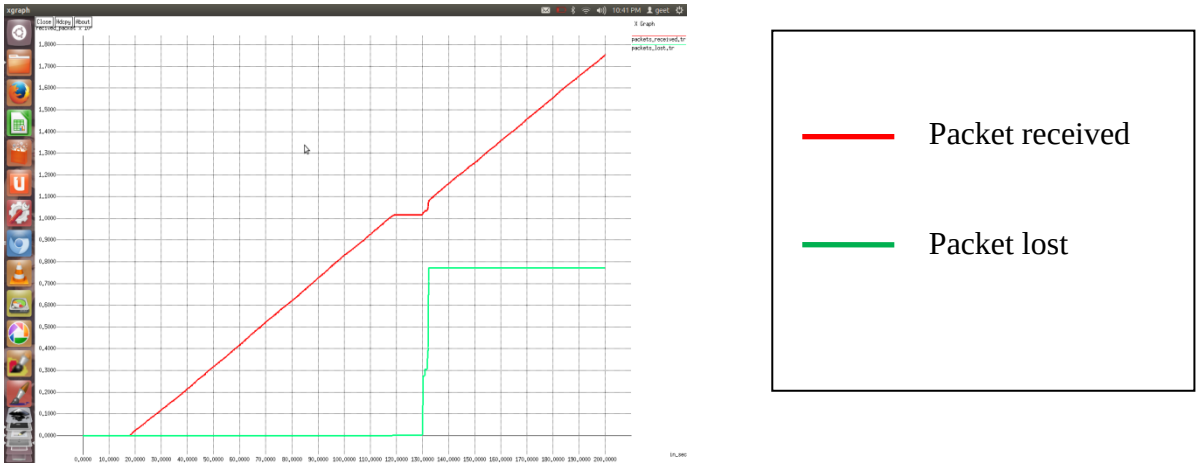

Fig 4 Packet loss and receiving with 8 numbers of nodes

Fig 4 represents the status of receiving number of packets and packet lost, before and after link breakage. As shown in figure that after starting packet transmission all packets are received till there is not any breakage but after it suddenly packets lost starts. It remains same till end of simulation. Packet lost value in normal cases remains same as with improved dynamic source routing protocol. This case is same because of as less number of nodes, due to which breakage between links are also low. Due to less breakages starting again route discovery and locally re-establish packet send error packets to all nodes remains less causes receiving and lost remains same. As number of nodes increase this scenario changes.

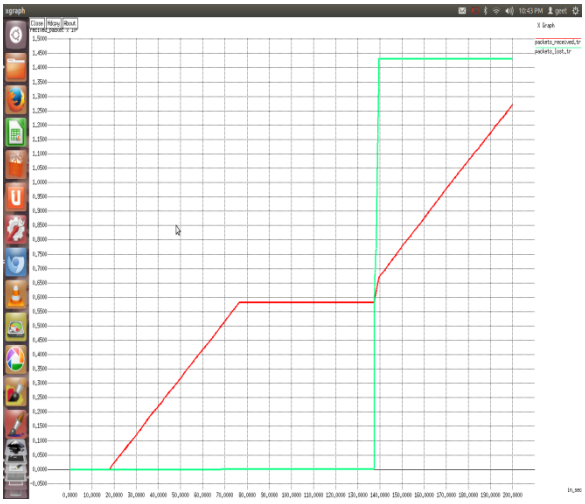

Fig 5 Packet loss and receiving with 16 numbers of nodes

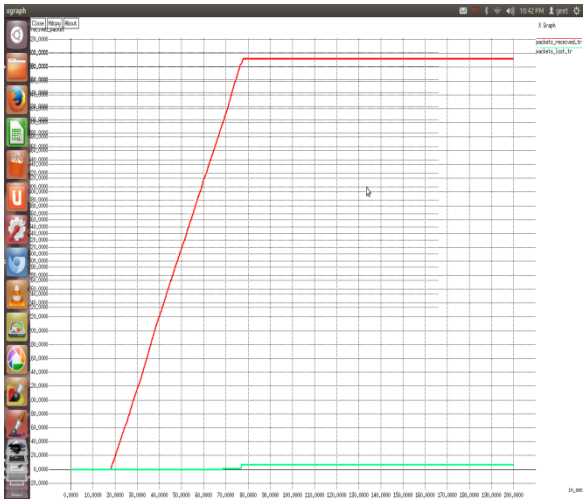

Fig 6 Packet loss and receiving with 24 numbers of nodes

Fig 5 also represents the status of receiving number of packets and packet lost but for 16 nodes. Here as link break due to link failure then up to sometime there is no loss of packets because of queue length. After this packet lost starts but receiving of packets is also there. Here receiving of packets more than the normal route maintenance in dynamic source routing protocol. It is because of locally usage of cache, re-establishment of route is easily performed. So number of packets received is high. Fig 6 shows that when as number of nodes increases number of link breakage also becomes more. In this case due to usage of cache, packet lost is very low. As packet lost is low receiving is high which means improved version is better than normal dynamic source routing protocol.

CONCLUSION AND FUTURE SCOPE

In this paper dynamic source routing protocol is described with its both phases and is concluded that dynamic source routing protocol is not perfect for high number of nodes. During more number of nodes, if link breakage is high then the usage of dynamic source routing protocol is not at all worthy. So to improve this new approach is defined in this paper. Using this new approach, number of packet received are high then the normal technique. To show increment in packet receives graphs are generated in NS2 simulator.

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