Analysis of Link Prediction Method for Link Recovery in Mobile Ad-hoc Network

Palvi1, Jatinder Kaur2, Danvir Mandal3, Dr. Rajneesh Talwar4
M.Tech. Research Scholar1, Assistant Professor2, Head of Department3, Principal4
1, 2, 3, 4 Department of ECE, CGCTC, Jhanjeri, Mohali, Punjab, India

DOI: 10.23956/ijarcse/V7I6/0103

Abstract: The mobile ad-hoc network is the decentralized type of network in which mobile nodes can join or leave the network when they want. Due to decentralized nature of the network routing, quality of services and security are the three major issues of mobile ad-hoc network. In this paper, problem of link failure is addressed which reduce efficiency of ad-hoc routing. The improvement in the AODV routing protocol is done which lets to recover the path from source to destination in case of link failure. The proposed technique is implemented in NS2 and it is been analyzed that network throughput is increased, delay and packet loss is reduced in the network.

Keywords: IGP, RDP, LLFR, QRP, AODV

I. INTRODUCTION

The networks which do not require any wires for providing communication between devices and utilize radio and microwaves are known as the wireless sensor networks. The network that involves a central controller known as access point within it is known as the infrastructure network. The type of network which does not involve any central controller is known as the infrastructure-less network [1]. The network in which mobile nodes communicate with each other without the involvement of any fixed infrastructure is known as a wireless ad hoc network. For providing communication, no base station is present within this type of network. The nodes themselves act as routers for transmitting and receiving the packets from the other routers present within the network [2].

The network which involves mobile devices that are connected through wireless medium is known as a mobile ad hoc network. The mobility of devices can be in any direction and the links are changed to the various devices to which the communication is required. The agreeable control of routing packets among each other is done with the help of ad hoc routing protocol [3]. As there is no knowledge regarding the topology of the network, the routes are discovered by the nodes within the ad hoc network. There are three categories of the routing protocols within the mobile ad hoc network as per the functionality of the protocols. The on demand routing protocols are known to be the reactive routing protocols which do not have any record of the routing information related to the communications are not held. Only in cases where source node requires any communication, the routes are to be generated. When any communication is required between any two nodes, the reactive routing protocol finds the route as per the demand. For the communication, the connection is generated here [4]. Instead of depending on the routing table of each intermediate node, the dynamic routing protocol which is a reactive routing type of protocol utilizes source routing. Within the header of the request, the complete routing information of the path that is to be followed from source to destination is present. A very simple, effective as well as efficient type of reactive routing protocol which does not have any fixed topology is the ad hoc on demand protocol [5]. Another type of routing protocols is the proactive routing protocols which maintain the information even when there is no need. The detailed routing information of each node present within the network is maintained by these types of protocols. Within the routing tables, the information is stored and updated after certain durations as per the changes of the topology and thus they are named table driven routing protocols. A proactive routing protocol that requires each mobile station within the network to advertise its routing table to the neighbors is known as the destination sequenced distance vector protocol. The gathering of link state data and calculating the best route is done by the optimized link state routing protocol which is a dynamic type of protocol [6]. The complete information of the routing table is forwarded to all the active interfaces after certain duration of time through the routing information protocol. The best way to remote a network is selected by the hop counting method within the RIP. For the purpose of routing traffic within the global internet also, this protocol is utilized. This protocol performs routing within a single autonomous system and is thus known as the interior gateway protocol (IGP). All the routing protocols are thus utilized as per the requirements within various applications.

II. LINK FAILURE IN MANET

There are various types of routes established from source to destination within the multipath routing method. A different route is selected from source to destination to provide communication once there is a link failure in MANETs.
The transmission of data fails when the route disconnections occur [7]. The multicasting within the mobile ad hoc networks is minimized here. With the help of other available routing paths, the route is maintained and the duration taken is less. There are node disjoint, link disjoint or non-disjoint routes searched when there is a process followed for route discovery process. When the link failure occurs, the source node is notified regarding it so that it can minimize the data transmission rate or can find any alternate path for it. As all the congestion control mechanisms involve transmission control protocol, they all can notify the source regarding the congestion issue. The gathering of users is very important for maintaining and allocating the network resources in an effective manner. The bandwidth of relation and the queues on the routers or switches are the resources that are shared. The packets that are waiting for transmission are queued [8]. An overflow of the queue occurs when there are too many packets waiting for one same link to be free. This results in dropping the packets and preventing the overflow to occur within the network. If there is frequent dropping of packets within the network, the network is considered congested and there arises the issue of link failure within the network.

III. LITERATURE REVIEW

Asha Ambhaikar et.al, (2012) proposed in this paper [9] the case where any two nodes are not in the radio range of each other. For the purpose of routing packets within such scenarios, the intermediate nodes are utilized. The movement of the source node as well as the intermediate node may cause link failure within the network. The solution to this problem is necessary. A Route Discovery Protocol (RDP) is reinitiated in the case where the source node is mobile. This is done to recognize a new route to the destination path with the help of updating the path. For the purpose of updating the path, a local repair procedure is utilized in case of intermediate node link breakage. The behavior as well as performance analysis of the method is done. It is seen that the performance of the system in enhanced on the basis of various metrics within the AODV routing protocol.

Harpreet Kaur et.al, (2014) proposed in this paper [10], the improved AODV protocol. The path that has the highest signal strength is followed by the methods. Within the RREQ message, the header part is included that provides the destination. The vicinity of the adjacent nodes is evaluated by the destination nodes. Further, the vicinity of other nodes is done by the adjacent nodes. The average of the path is further calculated by the source and the path with highest average value is chosen as the final path. The issue related to the link failure as well as packet loss is resolved through this work.

Preetha K G et.al, (2013) explained in this paper [11] that there is a growth in popularity of the wireless network as well as the application in MANETs. The topology of these networks is extremely dynamic. The nodes are also highly mobile such that the rate of link failure is high within MANETs. The instability of the route within the AODV protocol is an important issue to be analyzed and to be solved. A new approach is proposed in this paper which minimizes the route failure by sorting out the alternate node within the intermediate nodes.

Praveen Yadav et.al, (2012) proposed in this paper [12] that the routing process in MANETs is a very difficult task as the topology of MANETs is highly dynamic. The categorization of the routing protocols is done as proactive and reactive routing protocols. There are many link repairing methods proposed for solving the issues within this network. Each method comes up with its own disadvantages. On the basis of link failure localization a new routing algorithm known as DSR-LFL is proposed in this paper. On the basis of the location of link failure within the source route, the decisions are based within this proposed method. There are enhancements made on the basis of various parameters here.

P. R. Jasmine Jeni et.al (2014) explained in this paper[13] the Quantum based routing protocol (QRP) which is related to the Local Link Failure Recovery Algorithm (LFFR) method. For the purpose of enhancing the QoS within the scalable networks, the QRP is a routing protocol that utilizes the DSR as well as AODV. The link failure recovery is recognized very quickly when there is link failure within the QRP and the LFFR. There are various parameters that help in providing a proper analysis on the basis of certain parameters within the ns2 tool.

Mohammad Amin, et.al, (2011) proposed in this paper [14] that the link failure losses being made within the network cannot be identified through the standard congestion control mechanism. The link failure is mainly caused within the network due to the mobility of nodes or lack of power due to high energy consumption. An end-to-end threshold-based algorithm is proposed in this paper for improving the congestion control and also removing the link failure loss in these networks. As per the various results achieved, the performance of this method is analyzed. The results achieved are compared with the already existing techniques as well. It is seen through the results that the existing method is very beneficial for certain aspects and provides better results as compared to the other methods.

IV. RESEARCH METHODOLOGY

This work is based on to improve performance of AODV protocol in mobile ad hoc network. In the AODV protocol, the source node flood route request packets in the network. The nodes which are adjacent to destination node will revert back with the route reply packets. The best path will be selected on the basis of hop count and sequence number. The path which has minimum hop count and maximum sequence number will be selected as best path from source to destination. The network has decentralized nature, due to which some nodes can change its location anytime which leads to link failure in the network. To reduce the chances of link failure in the network, the node which detects the link failure will send the ICMP message and ask for the energy and number of resources. The nodes in the network will revert back with the energy and no of resources. The nodes which have maximum energy and maximum resources will be selected as best path recovery node from source to destination.
Deploy mobile ad hoc network with fixed number of mobile nodes

Apply AMODV routing protocol to establish secure and reliable path between source and destination

Path node move and link failure occur

Yes

No

Node which detect link failure with broadcast path recover message to its adjacent nodes

Node which the path to destination will reply back to requesting node with its energy

Node which has high energy will be selected as best node for path recover

Source keeps on sending data to destination

STOP
V. EXPERIMENTAL RESULTS

As shown in figure 1, the throughput graph is plotted in which the old throughput in which link failure scenario is analyzed. The new throughput is shown with green line in which link failure problem is resolved. The figure shows that throughput of new scenario is better than existing scenario.

As shown in figure 2, the graph is plotted of end-to-end delay in the network. In this graph red lines shows the graph of old scenario in which link failure caused. The second green line is of new scenario in which problem is link failure is resolved. The delay in new scenario is less as compared to old scenario.
As shown in figure 3, the packet-loss comparison is shown between old and new scenario. The old line is of old scenario in which packet-loss is more due to link failure. In the new scenario packet-loss is less because the problem of link failure is resolved in the network.

VI. CONCLUSION

In this work, it is been concluded that ad-hoc network is the decentralized type of network due to which quality of service is the major issue of the network. The link failure is the major issue of the mobile ad-hoc network which reduces efficiency of the network. In this paper, energy, resource based technique is proposed which recover path in case of link failure. The simulation results shows improvement in throughput, delay and packet loss.

REFERENCES


