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Pre Path Estimation for Better Resource Allocation to Avoid Path/Route Failure in Mobile Ad-Hoc Network

Shailja Kakkar
Computer Science Department
Doon Valley Institute of Engineering & Technology
Karnal, India

Ruchi Gupta
Computer Science Department
Doon Valley Institute of Engineering & Technology
Karnal, India

Abstract: A network which is made up of random nodes and in which every node is capable to communicate with other nodes. A mobile node works as individual router in such a network where nothing like fixed infrastructure or access points are available. But these networks often deal with many limitations like bandwidth problems, node movements, node unavailability, battery consumption & limited battery of remote nodes. Also it results in wastage of time and resources at other nodes. It results in power consumption at intermediate nodes even though they are not the actual sender or receiver of the data. And further the available power at remote nodes decides the lifetime of node and of the route selected as well. In this study we have proposed an algorithm based on which paths can be estimated from source to destination based on the remaining power at the nodes.

Keywords: M o b i l e Ad - H o c N e t w o r k, Pre Path Estimation, Better Resource Utilization.

I. INTRODUCTION

A MANET is a random n/w which creates its own network of dynamic nodes which moves openly from one location to another location. There are no fixed access points in case of mobile nodes. And every other node acts as a router for the other nodes for sending and receiving packets. One of the major benefits of dynamic nature is that it provides the flexibility of infrastructure. So MANET also follows dynamic topology because of the dynamic nature of the mobile nodes. It forms a self-organizing network. Mobile nodes search for all possible paths and from them best one is selected and all this searching mechanism is dependent on the protocols used. It includes proactive, reactive and hybrid protocols for efficient discovery of paths. In Proactive routing protocols routing information is exchanged on periodic and continuous nature whether nodes are using the route or not. It is wastes most of the resources in terms of energy and bandwidth which is not a desirable and accepted behavior[1]. But reactive or on-demand routing protocols don't exchange routing information periodically. They work on the basis of requirement. They only discover a route only when it is actually needed for communication between nodes. So it is good to use on demand routing protocols as compared to proactive or table driven routing protocols. But always using on demand protocols may cause of packet delay or even permanent packet loss. There are many reasons for packet loss. It may be because of some particular node in the route is not available or available battery power at the mobile node is not proper[1].

The proposed work is to resolve the issue of battery problem i.e. if some particular node is running below the threshold set then we will not choose that particular path and we will discard that route at initial stages. So it saves resources and also prevents from packet loss. AODV is used as an algorithm for successful and reliable delivery of the data packets. A packet is only transferred from source node to destination node only when all the nodes are available[2]. That is all nodes are above the minimum power requirement.

II. RELATED WORK

A lot of work has been done by various researchers in the field of MANET also in the field of path detection for the successful delivery of packets. From last many years many protocols has been proposed by various authors just to deal with the problem of route detection for efficient resource utilization. Route selection is random and it changes dynamically from source to destination [1]. One of the main reasons for route failure is because of the backup problem faced by the mobile devices. The algorithms proposed are "Dynamic Link Failure" and "Power Aware Reliable Routing". For this, two notations are used for discovering reliable routes: Normalized Link Failure and Normalized Node Failure. Here in proposed work we have focused on the single path instead of working with multiple routes. Only the route which is shortest and reliable is considered [3][6]. Reliability is in terms of availability of the nodes in discovered path. Instead of working with multiple paths only a single path is considered, which reduces the overall overhead of path maintenance. The aim of this work is to improve the network failure by improving the Node information to utilization the power of node by using routing mechanism in MANETs[8]. Link stability is assigned according to the transmission power needed to reach the destination node, along with the battery status of the sending and intermediate nodes. Our Objective is that choosing routes with maximum battery backup, will lead to better utilization of the power sources of the communicating devices.

III. PROBLEM DEFINITION

The main objective is to deal with the problem of route failure which can be caused by limited battery with mobile

devices. Some threshold value can be assumed for each mobile node available in the network. If the available power with mobile devices is below the threshold value then that particular route is discarded[4]. Here link stability of a node is determined according to the transmission power needed to transmit data packets from source node to destination node. Our target is in choosing nodes with maximum battery backup or the nodes which have battery backup greater than the minimum threshold value. The link quality is basically obtained from the awareness of the signal strength and of the lost rate. The signal strength reveals the channel state and more precisely its stability[9]. There are various solution used to remove the problem of link failure in Mobile Ad Hoc Network that we have discussed in literature review [5]. But some problems arise in those methods so we propose the new protocol to remove the problems of link failure due to power between source and destination. Suppose a node A want to send a packet to another node at destination D, then source does not know about the remaining power available at the mobile nodes[10]. It is a good idea to predict the available path between the nodes and if they are crossing a minimum threshold or not. So we are proposing a power aware routing protocol that provides accurate power information of current path used by source for communication.

IV. PROPOSED WORK

Many different methods had been proposed to deal with the problem of link/node/route failure. They were based on the energy saving mechanism on the basis of how energy can be saved at the remote nodes? But here we have proposed an algorithm for pre-path estimation to discover the nodes which are available above the minimum power requirement for sending packet from source to destination. It will result in improvement and to deal with the problem of link failure. This algorithm works well for improving the quality of services and for better utilization of resources. It is based on AODV. In this routing protocol, some important parameters are used like TTL, source address, destination address, power required etc. Route requests and Route reply mechanism is used. Route request packet can be send to the neighbor node based on the maximum required power. This protocol is use to improve the packet delivery ratio from source to destination because it provide the optimal and shortest path in terms of power, that improve the quality of service of this protocol. This algorithm uses AODV protocol to find out routes from source to destination with minimum available power. In this algorithm following terms are used for calculation and in packet header format.

ALGORITHM:

Step 1: IF "Time to Live" value is greater than zero then move to the 2nd step.

Step 2: Compare the Node_Id with Destination_Id IF the Node_id is equal to Destination_Id then move to the 3rd step otherwise 4th step

Step 3: (a) Consume the Route Request (RREQ) packet.
(b) Calculate the minimum power for all nodes.
(c) Choose the node of minimum power.
(d) Send the Route Reply (RREP) packet to the source node.

Step 4: (a) Enter remaining power into Power List (PL).
(b) Enter Node_Id into visited Node List.
(c) Flood the Route Request (RREQ).

Step5: Drop the other packets.

V. SIMULATION

The above proposed concept can be validated using MATLAB. Different no of nodes can be considered during simulations by changing source and destination address. A minimum required threshold value can be used for transmission of signals and data packets.

A. Steps for Using the Matlab:

Following steps can be used for using MATLAB.

Step1:- Fig 1 shows the snapshot after opening the MATLAB. In this snapshot there are three window: Launch Pad, Command History and Command Window. Launch Pad provides the description about the all toolbox that is used in the MATLAB. The Command History window displays a log of statements that ran in the current and previous MATLAB® sessions. The time and date for each session appear at the top of the statements listed for that session, in our operating system's short date format. All entries remain until we delete them, or until the command history file exceeds its maximum size of 200,000 bytes. When the file exceeds its maximum size, MATLAB automatically deletes the oldest entries. The command window displays the results of the statement that ran in MATLAB session.

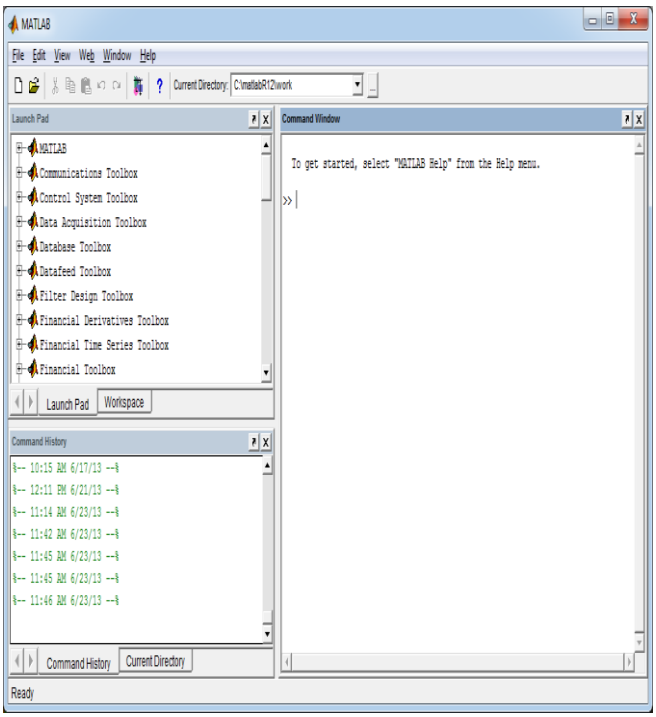

Figure 1. Screenshots of MATLAB

Step 2:- Fig 2 shows the snapshot for creating the new file in MATLAB software. A new blank page is open in which we write the program for getting better results as shown in third step Fig 3. This Fig shown that when we click on the File option then list is open for open the file with option Open and save the file with Save As and close the window with Close Command Window. Also there are various option like edit the file with copy , cut , paste. If we click on the File – New – GUI then the new window is opened that display the graphical window to draw the graph in the MATLAB.

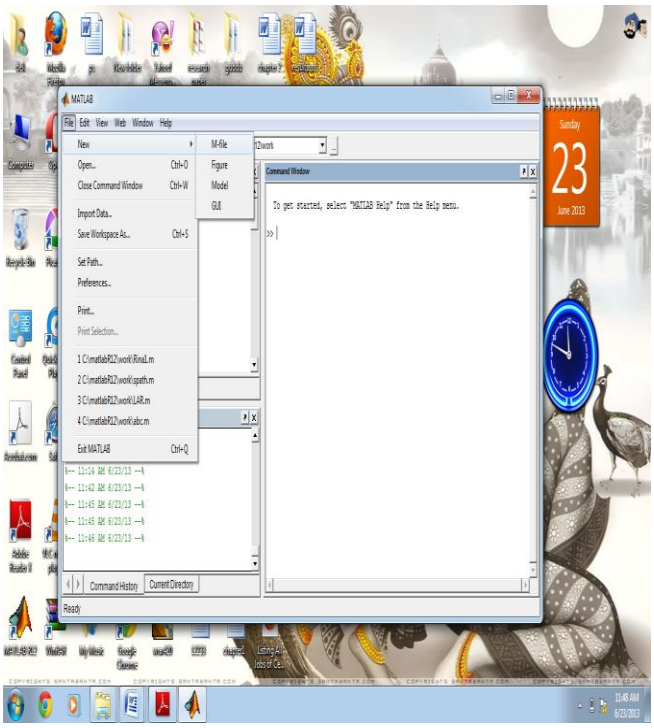

Figure 2. Snapshot for open the new file

Step 3:- Fig 4.3 shows the snapshot for blank new file in which we implement the new program. When we write the program then save it in the folder Work of MATLAB that is placed in Local Disk(C) – MATLAB R1- WORK.

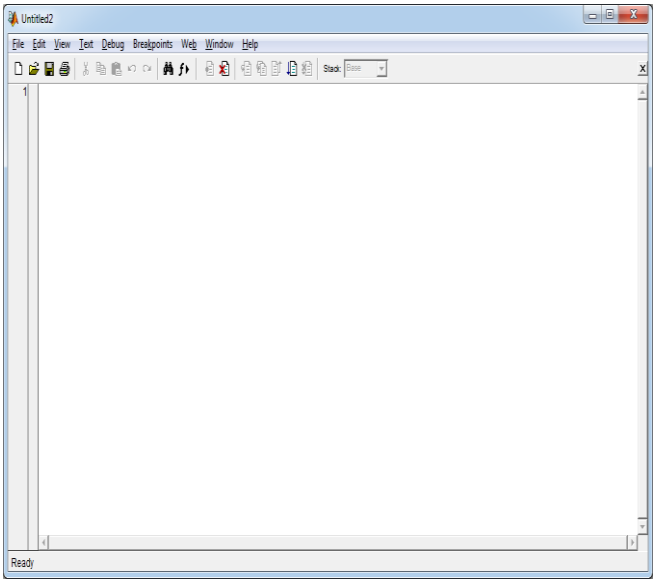

Figure 3. Snapshot for creating the new file

VI. RESULTS

During simulation we have assumed total 15 no. of nodes in the network. In figure 4 we have assumed node 5 as the source node and node 9 as the destination node. To find the path between two nodes we use the distance formula that calculates the distance between nodes. The distance between two nodes is calculated as

dist = sqrt((X(i) - X(j))^2 + (Y(i) - Y(j))^2)

If the calculated distance lies within the range between the nodes then path is found and data is transmitted otherwise the path is not found.

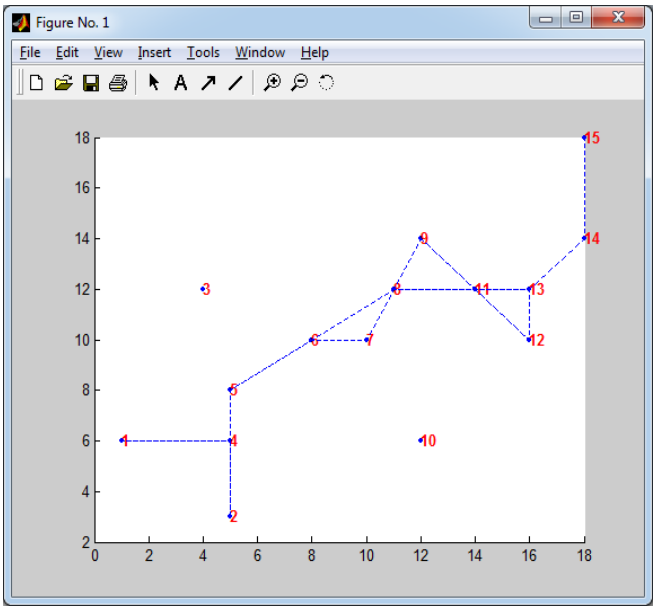

Figure 4. Snapshot for path not found

This figure shows the data flow from Node 5 to Node 9 in which the path is not found between source to destination so the packet is drop. From the nodes 5 to node 9 the nodes 6-7-8 are the intermediate nodes. In the second scenario when the no of nodes is 10 and where there is path found between the source and destination. In the Fig 5 node 1 is source node and node 5 is destination node and the path is found between the source and destination with the minimum power value 0.1100. From the node 1 to node 5 the node 4 is intermediate node. The path is found in this fig because the calculated distance between the two nodes is lies within the range of the network so the path is shown in this fig from node 1 to node 5 with the red line.

In the third scenario when the no. of nodes is increasing then packet delivery ratios and average no. of path is also increase.

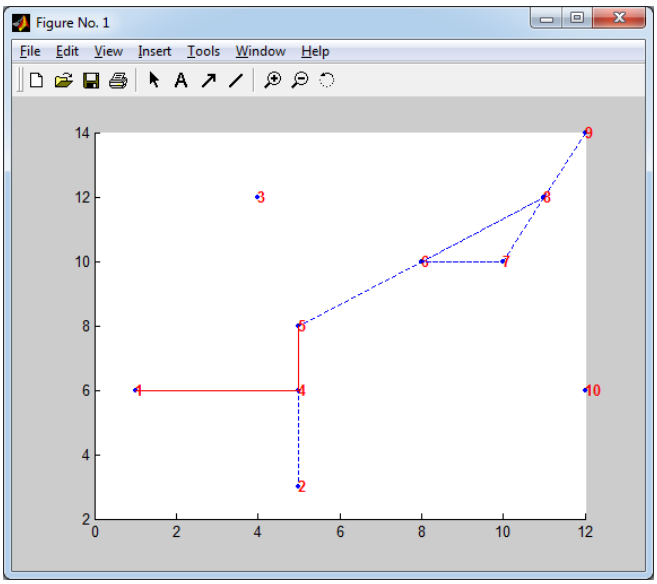

Figure 5. Snapshots for path found between nodes 1 and 5

In Fig 6 the no. of nodes is 15 and source node is 4 and destination node is 11 then the path is found from the nodes 4 to 11 with the intermediate nodes 5,6,7,8.9. So, the data can be transmitted from 4-5-6-7-8-9-11 with the min power values 0.1200 as shown in fig 5.4 that will provide the detail

of the route from the source to destination. When the no. of nodes increases or decreases the power values also varies. The fig 7 shows the detail about the source node, Destination node with encryption and decryption of nodes in the path from source to destination. The power values of the node and it gave the result means provide the path from source to destination and minimum power value for communication.

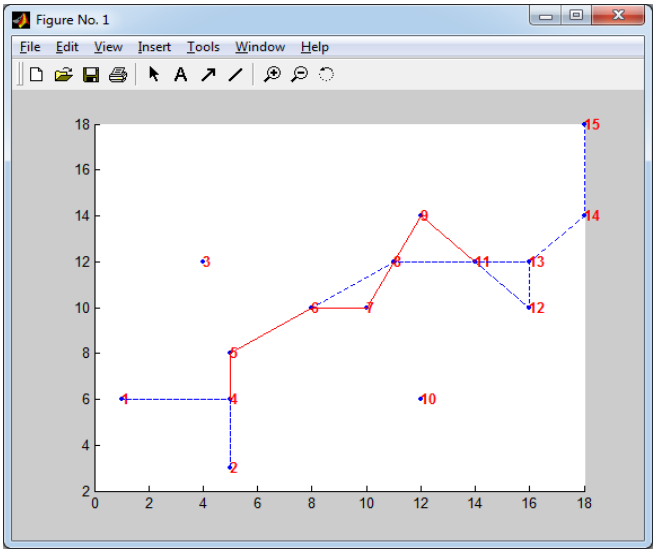

Figure 6. Snapshot for path found with power values 0.1200.

Our main hypothesis is to find the path from source to destination with the help of reactive routing protocol. This routing protocol determines the minimum available power between sources to destination. Then source node decided the path which has maximum available power between source node to destination node. By using the ILFRP protocol, improve the link failure problem due to power in between source to destination.

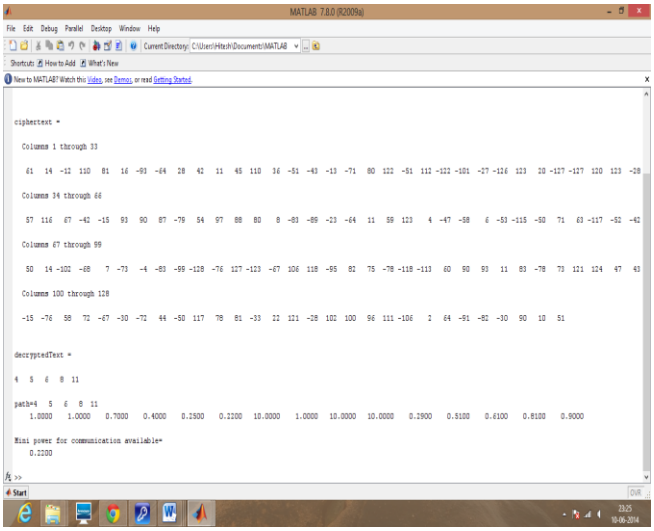

Figure 7. Explanation about path from source to destination with encrypted results

VII. CONCLUSION & FUTURE WORK

The main outline of this paper is to discuss with the characteristics of the adhoc mobile networks and the algorithm discussed above deals with the problem of link failure by pre-estimation of the routing path. It saves in routing overhead. It saves resource consumption. It ensures successful packet delivery of data. So by proper estimation we can conclude that packet delivery can be assured if it is known in advance that the route is working or not. And thereby we can also save our resources.

VIII. FUTURE PERSPECTIVE

Our work gives a betterment to improve successful packet delivery by detecting link failure in advance based on power availability. So in future our proposed protocol can be reconstruct to generate new protocol in terms of transmission range and movement of nodes that will improve the problem of link failure in Mobile Ad Hoc Network.

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