An Extension to Proposed Model for Ant Based Routing Using Two Step Method

Rekha
M.Tech Student, SPGOI College of Engineering, MD University, Rohtak (India).

Abstract – A mobile ad-hoc network (MANET) is a set of mobile nodes which communicate over radio and do not need any infrastructure. This kind of networks is very flexible and suitable for several situations and applications. Nodes not only have to fulfill the functionality of hosts, but each node has also to serve as a router, forwarding packets for other nodes. Here in this paper I have provide basic implementation to the proposed 2 step improvements in Ant – Based Routing Protocol for enhancing improvement in the network and to reduce overburden of the network.

Index Terms – MANET, Ant Based Routing.

1. INTRODUCTION

Ad hoc networks are emerging as the new generation of networks and defined as a collection of mobile nodes (MNs) forming a temporary network without the aid of any centralized administration or standard support services. An ad hoc network is usually thought of as a network with nodes that are relatively mobile compared to a wired network. Hence, the topology of the network is much more dynamic and the changes are often unpredictable oppose to the internet which is a wired network. This fact creates many challenging research issues, because the objectives of how routing should take place is often unclear because of the different resources such as bandwidth, battery power and demands like latency. The routing protocols used in ordinary wired networks are not well suited for this kind of dynamic environment. In contrast to infrastructure based wireless networks, in ad hoc networks all nodes are mobile and can be connected dynamically in an arbitrary manner.

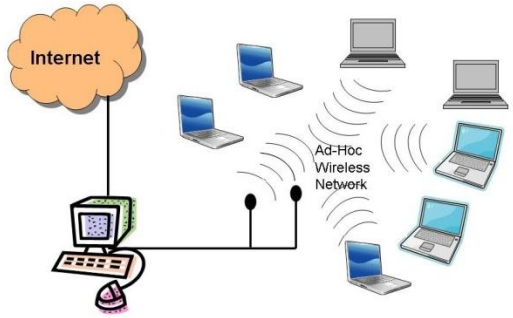

Figure 1. Mobile ad-hoc netwrok

In the case where only two hosts, within the transmission range, are Involved in the ad hoc network, no real routing protocol or routing decisions are necessary. But, in many practical ad hoc networks, two hosts that wish to communicate may not close enough to be within wireless transmission range of each other. These hosts could communicate only if other hosts between them, also participating in the ad hoc network, are willing to forward packets for them.

2. BASIC OF MULTI ANT BASED ROUTING PROTOCOL

It utilizes a collection of mobile agents or "ants" to perform optimal routing activities. These "ants" are simple routing packets that collect and disseminate useful routing information as they travel throughout the network. In the case of MARP, the nodes periodically produce multi-sequence ants and send them out into the network in reactive manner and are maintained by proactive way. MARP offers quick adaptation to dynamic link conditions, low network utilization and determines multicast routes to destinations within the ad hoc network.

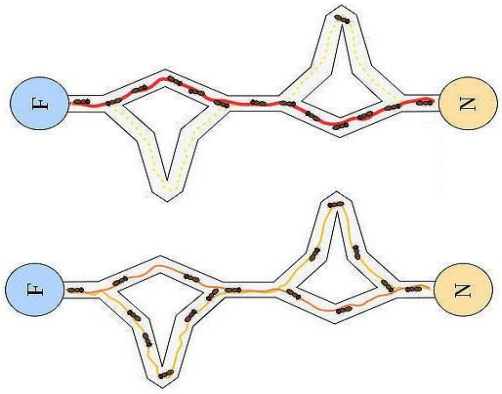

Figure 2: Source to destination

Mobile Ad-Hoc Network is a frequently disconnected network consisting of multi-hop from a source 'A' to a destination 'B' because of the dynamic nature such as the topology change caused by node's mobility. In order to resolve this situation, existing routing protocols for MANETs have performed route repair scheme to repair the disconnected route. In Case, when a source node unnecessarily start the route rediscovers for the whole path even just one node moves and moreover, even if the rest of path needs not to be re – arranged. Now, in this type of case, the time for rediscovery of the whole path may often take

too long. In order to solve this problem, a new ant – based routing has been proposed in combination with local repair scheme called "ant-based local repair routing protocol".

3. LIMITATION OF EXISTING SCHEME

When the node detecting that the route is break down then following steps will be followed:

1. Node broadcasts a route-repair packet with TTL.
2. The route - repair packet is forwarded to certain nodes which are located two-hops away from detecting node.
3. The reply message then has to undergo same procedures as normal route discovery phase.

The whole time required in this processes may take too long. In order to minimize the bad effect of the route error, the route has to be recovered as soon as it can. In this manner, LRR is not proper for prompt route repair scheme. Also, AODV-BR adopts the same procedure because let nodes get explicit information about neighbor nodes.

Now, continuously operating in procedure increases much overhead to nodes in terms of energy consumption. Moreover, AODV-BR sometimes recovers the route longer than before. This is another overhead because the source node has to be noticed about changed hop counts.

4. PROPOSED ANT BASED LOCAL REPAIR ROUTING

New proposed[1] Ant Based Local Repair Routing is as follows:

Step 1: Addition of witness Node in the Network

A witness node is defined as a host which can overhear a transmission in the network that are not supposed to be. Figure shows how witness's node can be added into the network and will participate in the routing process. In the taken network our source is the 'S' Node and destination is the 'E' node. Process can be defined in following steps:

1. Witness node W1 will hear A's transmission to node B, which makes them potential active witnesses of node A.
2. At this point, they will wait to see if node B attempts to deliver the packet to node C, which would mean that node B received it from node A.
3. If any one of the witness node does not hear the transition from node B to node C, Now witness assume that packets from node A to B failed to reach node C
4. In this case, they both attempt to deliver the packet directly to node C, although, indirectly, they target node B as well because node W1 and node W2 do not necessarily have a way to communicate with each other.
5. If node C rejects their packets, it means that it has already received the packets from node B. and thus path exit in the network. This is just a network error.
6. Now if, Node C accepts the packets from witness node that means Node B is moved out of the network.
7. At this stage witness node call form Local Repair Scheme. This is link failure.

Step 2: Local Repair Scheme

In the case of a link failure, this proposes local repair technique can be used locally on the upstream node to recover the network. Assuming that a mode is moved away from the network then the path recovery can be done in following ways at local level:

1. Witness node registers that the particular node is no longer available in the network.
2. Witness node send message to the entire nodes in the network to update the routing table and initiate route discovery process.
3. Then all nodes in the network remove all associated entries regarding the moved node from its routing table.
4. Nodes in network starts route discovery process by sending out TTL packets with max length 2 hops. Thus every node in the networks updates its routing table.
5. All node receive the message and update their routing table using the available node in the network

5. IMPLEMENTATION

5.1. Taken Network Architecture

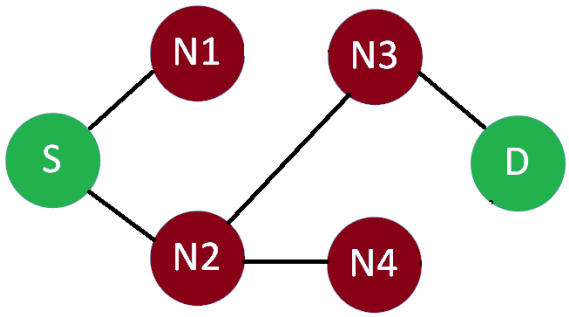

Figure 3: Taken network architecture

For the implementation of the proposed Ant Based Local Repair Routing Protocol I have assumed the following network architecture. In the assumed network architecture, network consists of six nodes source node and destination node is in green color represented by S and D respectively. Rest of the node in the network is in Brown color represented by N1, N2, N3, and N4 respectively.

5.2. Updated Network Architecture

In this updated network architecture is represented in which a witness node is added in the center of the network. Major role of the witness node is to keep in touch with the each and every node in the network. Witness node is represented by purple color in the network. Purple color links are also added in the network that represents the link of witness node with each and every node in the network.

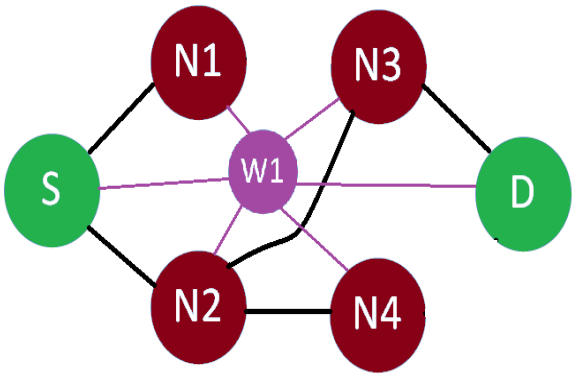

Figure 4: Updates made into the network

5.3. Communication Process in Step – 1

Communication process in the proposed scheme (Step – 1) is represented as below link architecture. In this communication process starts by source node S and the target node is D in the network. From Source node S to Destination node D path will be link from node S to node N2, from node N2 to Node N3, further from node N3 to our destination node D in the network.

For this when communication process starts packet originate from source node S travels to wards the Node N2 in the network this transmission will be hear by witness node W1 in the network here I assumes that network is working in its full phase and there is no error in the network.

Further when node N2 forwards packets to node N3 in the network here assuming network in not in its ideal state and this transmission is not listen by the witness node W1. Now in this case node W1 try to communicate with the target node N3 in the network. N3 receive the packet from the W1 node in network in place of desired node N2. If node N3 rejects the packet from Node W1 that means node N3 received that packet from node N2. At this stage this is a network error and all of the nodes in the network are in proper place to communicate with each other. At this stage W1 node prevent network from extra burden of initiating route discovery process as the network is in ideal stage and only congestion is present in the network due to heavy traffic.

In case Node N3 accepts the packet from the node W1 that means node N2 is moved out of the network. At this point Step – 2 will come under process as network topology changes.

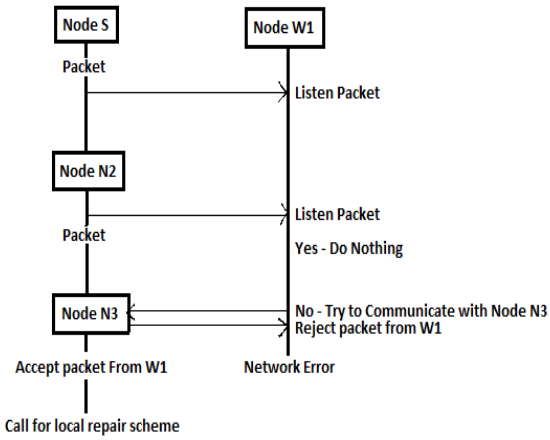

Figure 5: Communication Process in step – 1

5.4. Working of Step – 2

Step – 2 will come in process when network topology changes in any ad-hoc network and is initiated by the W1 witness node in Communication process of step – 1.

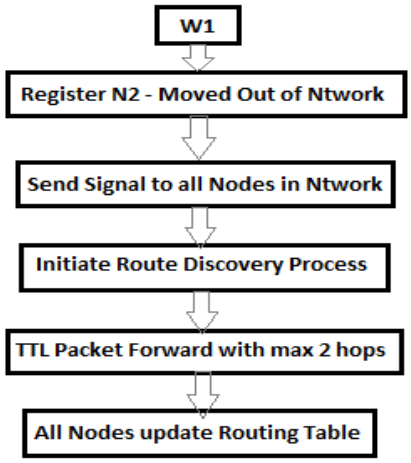

Figure 6: Working in Step – 2

Step – 2 process starts by witness node W1 by registering node N2 is moved out of the network and node N2 cannot be contacted again in the network. At this stage witness node W1 will sends signals to each and every node in the network that node N2 is moved out of the network. Thus witness Node W1 initiate route discovery process. In route discovery process time to live of packet that generate at every node in the network is of two hopes means a packet can only traverse two hope in its life cycle in both direction. By this routing table maintained at every node only contain list of node that can be reached in one hope in other words routing table at every node only

contains adjacent node in the network. By this every node in the network will update its routing table.

6. BI – DIRECTIONAL REPRESENTATION OF NETWORK

In this representation of the network architecture I have taken concept of the bi – directional weighted graph.

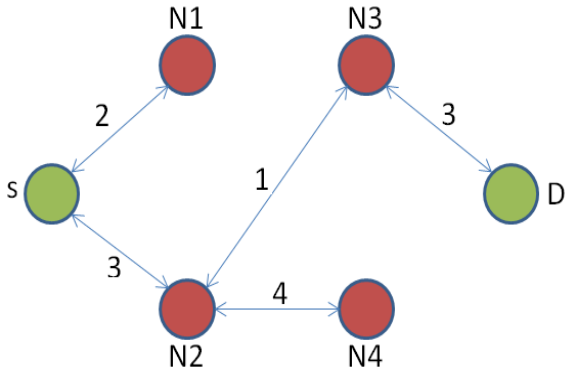

Figure 7: Bi – Directional representation of network

In which every communication link in the network is represented by bi – directional link and the weight on the network is represented by the cost of the communication from one node to another in the network. I calculation of the shortest path from source to destination in the network can be calculated by the represented weights on link in the weighted graph.

7. BI – DIRECTIONAL REPRESENTATION OF THE UPDATED NETWORK

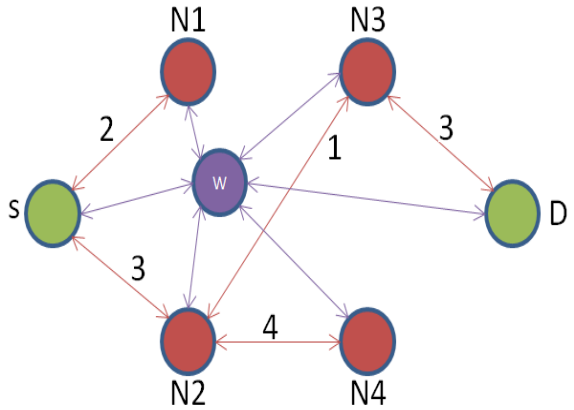

Figure 8: Bi – Directional representation of updated network

In the updated network a witness node is added in the network there for in weighted graph representation of our network a new terminal W is added in purple color in the network and link are also in purple color so that the links can be differentiated from the network communication links. A weight on all of such types of links is 1 or negligible thus I have not mentioned weight on the purple links.

8. FUTURE WORK

Working representation of implementation is under process.

9. CONCLUSION

By this new two – step approach routing in ad – hoc network will be light weighted in terms of communication. Major overhead of the network will be reduced by this implementation. Communication channels will remain free for the communication purposes instead of routing and forwarding route discovery packets in the network.

REFERENCES

[1] A Proposed Model for Ant Based Routing Using Two Step Method – Rekha - M.Tech Student, SPGOI College of Engineering, MD University, Rohtak (India) - Imperial Journal of Interdisciplinary Research (IJIR) Vol-2, Issue-6, 2016 ISSN: 2454-1362, http://www.onlinejournal.in

[2] A study and implementation of ant based routing algorithms for mobile ad hoc networks - Siva Kumar - faculty of information and communication engineering, Anna university Chennai, Chennai - 600 025

[3] Dynamic routing in traffic networks and MANETs using Ant Based algorithms - Bogdan Tatomir, Joost Boehle, Leon Rothkrantz1; DECIS Lab, Delftech park 24, 2628 XH Delft, The Netherlands

[4] Performance Analysis Of Bio-Inspired Routing Protocols Based On Random Waypoint Mobility Model - Defense S & T Technical Bulletin, Science & Research Technology Institute for Defense (STRIDE), Vol. 5, No. 2, November 2012, pp. 114-134, ISSN:1985-6571 - Vaibhav Godbole - Department of Information Technology, Fr. Conceicao Rodrigues College of Engineering, India

[5] The Efficient Ant Routing Protocol for MANET - Srinivas Sethi et. al. / (IJCSE) International Journal on Computer Science and Engineering Vol. 02, No. 07, 2010, 2414-2420 - Srinivas Sethi, Siba K.Udgata

[6] Efficient Ant Colony Optimization (ACO) based Routing Algorithm for Manets - By P. Kranthi Kumar & Dr. V. V. Rama Prasad - Global Journal of Computer Science and Technology: E Network, Web & Security - Volume 15 Issue 3 Version 1.0 Year 2015.