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LOCATION AIDED ROUTING (LAR)

Pooja Sharma
Dept. Of IT
Amity University
Noida, U.P., INDIA

***Abstract*— In mobile ad hoc network (MANET), various wireless mobile platforms move frequently. Because of the movements there is variation in routes and we require mechanisms for determining new routes. There are several routing protocols made to fulfill this purpose.**

In this paper we focus our attention on utilizing the location information for the improvement of routing protocols in Mobile ad hoc Network.

By using the concepts of routing followed by the mechanism of flooding, proposed LAR. This protocol has confined our search for new route to a smaller "request zone" of the MANET due to which there is a decrement in the number of routing messages. We put forth two algorithms for the determination of the request zone, and propose possible Optimization to our calculations.

Keywords—.

I. INTRODUCTION

To comprehend Location Aided routing related to mobile ad hoc network we initially need to understand the basic ideas identified with routing, for example, what is routing, what are routing protocols, where it is utilized and why do we have to use these in our networks? So beginning with the most essential term routing we will comprehend the idea of Location Aided Routing. Routing is basically the procedure of choosing the better way in any given network. Routing is performed in different sorts of networks, for example, information network and transportation networks. In the process of routing, the transfer of packet from one computer to another is usually done on the basis of routing tables which have the record of the courses to various system destinations. This requires a router to have a routing table. When the router receives the packet to be forwarded, it looks at this table to track the path to its final destination. There are two sorts of routing tables:-

1. STATIC ROUTING TABLE - contains data entered manually.
2. DYANAMIC ROUTING TABLE - is updated automatically by utilizing dynamic protocols.

Presently there are distinctive sorts of routing conventions i.e. the routing protocols and the routed protocols. We will further study about the sorts of routing protocols in mobile ad hoc networks followed by area helped routing (LAR). As the name recommends location based routing is identified with the location data of the router which is found by utilizing GPS or different means. Further we will go over the diverse plans of LAR and about distinctive zones of area helped routing

II. ROUTING

As talked about before routing is basically the procedure of choosing the better way in any network. It is performed in a wide range of networks. Switch packet innovation is generally utilized now days. In packet exchanging networks, routing coordinates parcel sending (the travel of sensibly tended to network parcels from one computer to the definitive destination computer) through middle of the road nodes. The nodes are the network hardware gadgets like switches, scaffolds, passages, switches and so on a typical PCs can likewise forward packets and perform routing, yet it doesn't have specific equipment and may experience the results like poor execution. The procedure of routing as a rule oversees sending on ground of routing tables which keep the trace of routes to various network targets. Along these lines, building routing tables, which are put away in the router's memory, is extremely crucial for productive routing. Almost all the routing algorithms can use only one network path at a particular time but Multipath routing techniques allows the use of multiple alternative paths at the same time. It is a technique of using multiple alternative paths through a network, which can produce a mixture of advantages, for example, expanded data transfer capacity, enhanced security or adaptation to non-critical failure.

III. ROUTING PROTOCOLS

A routing protocol determines how routers communicate with each other, spreading the data that allows them to choose routes between any two nodes on a network. The particular decision of route is decided by routing algorithms. All routers have information about the networks that are joined specifically. Routing protocol shares this data among the neighbors and after that all through the network. There are two sorts of routing protocols:-

1. **Interior Gateway Protocol**:-

a. **Link state routing protocols**- In this kind of protocol that produces a graphical representation of the network is the principal information utilized for every node. For the creation of its own map, all the nodes surges the entire network with data about with the neighboring nodes. Every node then brings together this data into a map all alone. Utilizing the map, every node autonomously decides the minimum expense way from itself to each other node utilizing standard most brief ways algorithms. Example- OSPF and IS-IS.

b. **Distance-vector routing protocols**- This strategy doles out a cost number to each of the associations between every node in the system. Nodes will send information from X to point Y through the way that results in the most negligible total cost. This works in a great way. Right when a node begins, at first it just knows of its nearest neighbors, and the total cost included in communicating them. As time goes on, every one of the nodes in the network will locate the best next jump for all destinations, and the best total cost. Fr ex- RIP and EIGRP.

2. **Exterior Gateway Protocol**-these are routing protocols utilized on the Internet for trading routing data between Autonomous Networks, for example, Path Vector Routing Protocol.

a. **Path vector routing protocol**- The intradomain routing protocols get to be unmanageable when the area of the operation turns out to be very large. Hence a third protocol was proposed i.e. the path vector protocol. It is similar to distance vector protocol however here we accept that there is stand out node in each self-governing framework that follows up on act of the entire framework. This is an interdomain protocol.

IV. DIFFERENCE BETWEEN ROUTED PROTOCOL AND ROUTING PROTOCOL

Routed protocol- It is a system protocol which can be utilized to send the user information starting with one network then onto the other network. It carries user activity, for example, messages, record exchanges and so forth routing protocols utilize a tending to framework which can address a specific system and a host inside the system. Web protocol (IP) is the most generally utilized directed protocol. Routed protocols are essential piece of system as they are accessible in every gadget which is available in the system. Example-IP, IPX.

Routing protocol- these protocols takes in the way for directed protocols. Routing protocols are protocols used to powerfully promote and take in the systems joined and the accessible routes. Routing protocols working in diverse routes exchanges updates between one another. They have a capacity to know about network when a new network is added and detect if a network is not available. Example-RIP, EIGRP

V. FLOODING

At the point when a router advances a packet from one node to other nodes near it with the exception of the node from which the packet has arrived is called flooding. It is one approach to disseminate data redesigns rapidly to each node in the large network. It is additionally utilized as a part of multicast packets (from one source node to numerous particular nodes in a genuine or virtual system). OSPF uses flooding. There are numerous sorts of flooding algorithms. There are two sorts of flooding:-

1. **Controlled flooding**- it has two algorithms of its own which make it more dependable; SNCF (arrangement number controlled flooding) and RPF (reverse way flooding). The first one gives its own location and the numbers in a legitimate arrangement. On the off chance that the memory gets any packet, it drops it in the meantime while in RPF, the node will send the packet forward.

2. **Uncontrolled flooding**-It is the lethal law of flooding. All nodes have neighbors and route packets inconclusively. More than two neighbors make a telecast storm.

VI. Location Aided Routing

The basic idea of Location Aided Routing is using the location information to reduce the number of nodes to whom route request is propagated. This type of routing is based on "limited" flooding.

VII. FINDING ROUTES THROUGH FLOODING

1. In this algorithm we acknowledge that node S can examine that path is broken just in the case that it attempts to utilize the route by sending information packet and accepting course lapse messages – it starts for route discovery of D.
2. The route demand may reach each node in the system that is reachable from S (conceivably all nodes in the MANET). Here, usage expect that node S can analyze that course is broken just in the event that it endeavors to utilize the course by sending information packet and getting route lapse messages – it starts path discovery for D.
3. Basic Algorithm of flooding is the Timeout plan is additionally used to re-start route ask for with new succession number because of transmission mistake or node D is inaccessible from S.

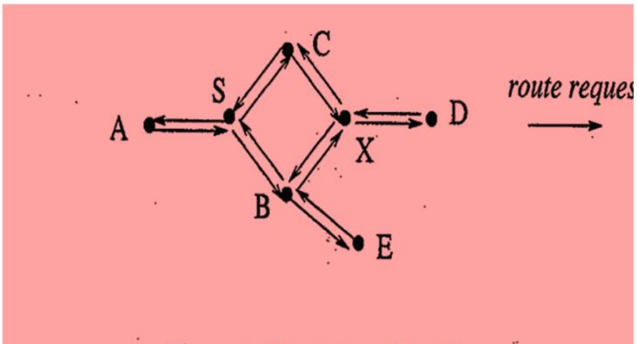

Figure 1: Illustration of flooding

Location information

The purpose behind calling it as Location Aided Routing is that it makes utilization of location data to diminish overabundance of routing. Location Information utilized as a part of the LAR convention is given by the Global Positioning System (GPS). With the accessibility of GPS, it is workable as a mobile platform for knowing its physical areas. As a general rule, position data given by GPS incorporates some measure of error, which is the distinction between coordinates computed by GPS and the red coordinates. At first, it was expected that the host knows its area exactly. But now, the thoughts recommended here can likewise be connected when the area is known pretty nearly - the Performance Evaluation segment considers this plausibility. We additionally expect that the mobile nodes are moving in a two dimensional plane and have two zones which are expressed beneath.

Expected zone

Consider a node S that needs to discover a path to node D. assuming that node S already knows that node D was at zone L at time to, and that the present time is t0. By then, the "expected zone" of node D, from the perspective of node S at time t1, is tie area that node S might want to contain node D at time t1. Node S can focus the expected zone in context of the information that node D was at district L at time to. example, if node S knows that node D keeps running with expected rate v, then S may assume that the request zone is the engaged area of range v(t1 – t0), focused at region L . In the event that the certified speed happens to be more than the ordinary, then the destination might really be outside the expected zone at time t1.Thus, expected zone is just an evaluation made by node S to focus on a district that possibly contains D at time t1. On the off chance that node S does not know a past area of node D, then node S can't sensibly focus the expected zone - for this circumstance, the whole locale that may possibly be controlled by the ad hoc system is thought to be the expected zone. Algorithms declines to the basic flooding algorithms.

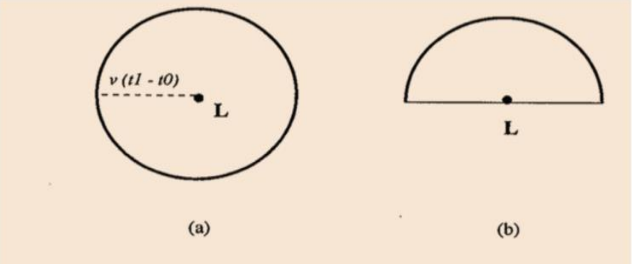

Figure 2: Examples of *expected zone*

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Request Zone

Consider node S that needs to center a route to node D. The proposed LAR algorithms use flooding with one change. Node S defines (positively or explicitly) a request zone for the route request A node propels a route request just for the situation that it has a spot with tie request zone. To increase the probability that the route request will go to node D, the request zone should fuse the expected zone (delineated beforehand). Additional, the request zone may moreover fuse distinctive territories around the request zone. There are two reasons behind this:-

1. When the expected zone does not include host S, a route from host S to host D must fuse has outside the expected zone. In this way, additional district must be joined in the request zone, so that S and D both have a spot with the request zone.

2. The request zone joins the expected zone from the figures above. In a figure all routes from S to D consolidate has that are outside the request zone. As needs be, there is no surety that a way can be found involving just of the hosts in a picked request zone. In this way, if a route is not found within a suitable timeout period, our tradition Wows S to begin another route exposure with an expanded request zone – in our simulations, the expanded zone contains the entire network space. For this situation the time taken in choosing the route to D may be longer.

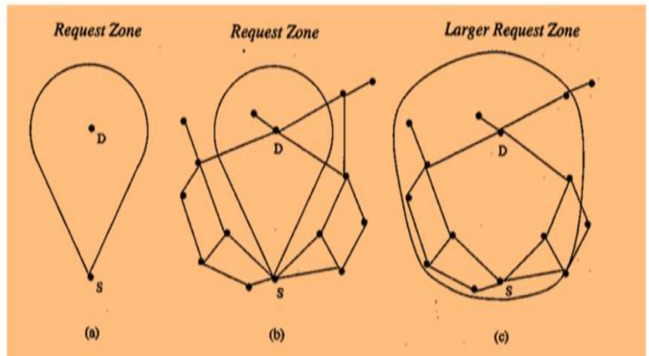


Figure 3: Request zone: An edge between two nodes means that they are neighbors

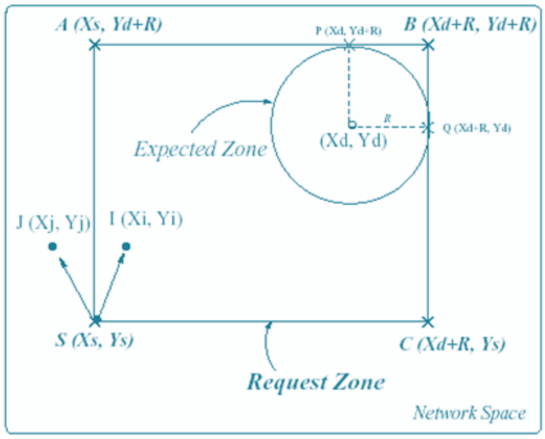
VIII. LAR SCHEME 1

The main scheme utilizes a request zone which is rectangular fit. Assuming that node S already knows that the location of node D is (Xd , Yd) at time t0. At time t1, node S begins another path revelation for destination D. We accept that node S likewise knows the expected speed with which D can move. Let this speed b v. by this, node S opposes the expected zone at time t1 to be the circle of radius R=v (t1– t0) with (Xd , Yd) as center.

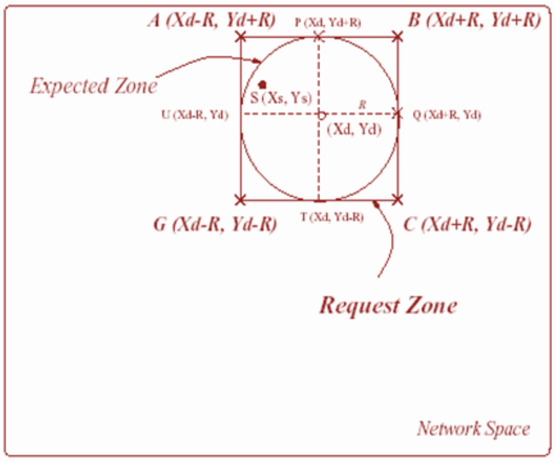
In LAR algorithms, the request zone is characterized as the smallest rectangle that incorporates current location of S and tie expected zone, in a manner that the sides of the rectangle are parallel to both X and Y axis. In Figure the request zone is a rectangle which have S, A, B and C as its corners, while in the following figure A, B, C and G are the edges of the rectangle. In this figure, the present area of node S is signified as (Xs, Ys).

The reference node S can focus the four sides of the expected zone. S contains their directions with the route request message transmitted when starting route disclosure. At the point when a node gets a path request it disposes of it if the node is not inside of the rectangle indicated by the four comers included in the route ask.

At the point when node D gets the route demand message, it reacts by sending a route answer message by the utilization of fundamental flooding algorithms. However, if there should arise an occurrence of location based routing, node D contains its present area and time in the way answer message. At the point when node S gets this route answer message (closure its route disclosure), it stores the area of node D. Node S can utilize this data to figure out the request zone for a future way disclosure. It is additionally workable for D to contain its expected speed more than a late interim of time, with the route answer message. This data can be utilized as a part of a future for route discovery.



(a) Source node outside the Expected Zone



(b) Source node within the Expected Zone

IX. LAR SCHEME 2

In LAR scheme 1, reference node S clearly specifies the request zone in its route request message. In LAR scheme 2, node S contains two pieces of information with its path request.

Let node S knows the location (Xd, Yd) of node D at time t0 and the time at which path discovery is initiated by node S is t1,where t1 $\leq$ t0. Node S computes its distance from location (Xd, Yd), denoted as DISTs, and contains this distance with the route request message.

2. The coordinates (Xd, Yd) are also contained with the route request.

When a node I gets the path request from sender node S, node I computes its distance from location (Xd, Yd), denoted as DISTi, and:

For some parameter α, if $DIST_{\alpha}$, + α≥ $DIST_i$, then node I forwards the request to its neighboring nodes. When node I forward the route request it now contains $DIST_i$; and (X_d, Y_d) in the mute request.

- Else $DIST_{\alpha}$, + α< $DIST_i$. In this case, node I drops the route request.

When another node J receives the mute request (originated by node S) from node I, it uses a criteria same to above: if node J has received this request previously, drops the request Otherwise, node J calculates its distance from (Xd, Yd), denoted as DISTj. Now, The path request received from I contains DISTi. If DISTi +α ≥ DISTj, then node J forwards the request to its neighboring nodes. Before forwarding tie request J replaces the DISTi value in the path request by DISTj.

- Else $DIST_i$ + J < $DIST_j$. Here, node J drops the request.

Thus a node J forwards a path request forwarded by I (originated by node S), if J is "at most α farther' from (X_d, Y_d) than node I. For the purpose of performance evaluation, we use α = 0 in the next section. Non-zero α might be used to trade-off the possibility of searching a route on the attempt with the cost of tiding the route. Non-zero α may also be suitable when location lapse (error) is non-zero, or when the hosts are likely to move significant distances while the time required to carry out path discovery.

X. CONCLUSION

In this paper we came across routing which in simple words is the selection of best path in the network. Routing now days is used in all types of networks. The most common technology used is the packet switch technology which uses the process of forwarding packets of information to their destination. We learnt about the types of routing i.e. static and dynamic routing out of which the dynamic routing is more efficient and has a wide application whereas the static routing has limited scope. Then there are routing protocols which determine the path of communication between two routers and then between all the routers present in the network.

Flooding is a process of distributing information throughout the network quickly and is further classified into two types i.e. controlled an uncontrolled flooding. This technique is used in our main topic which is location aided routing. Flooding is used to find the routes in mobile ad hoc networks. Here the location information is found via GPS (Global Positioning System). This concept assumes that the mobile nodes are moving in two dimensional way and has two zones which are the request zone and expected zone. Expected zone is determined as a region to hold current location of the destination. Request zone is an estimate made by a node to

determine the area where the other nodes are present. There are two schemes- LAR Scheme 1 and LAR Scheme 2.
LAR Scheme 1 – when nodes I and K get tie route request for node D (started by node S), they forward the route request for as both I and K are inside of the rectangular request area. Then repeating the same when node N gets tie route request for the same, it tosses the request as N is outside the rectangular request zone.
In LAR plan 2- expecting α = 0 when nodes N and I get the route ask for from node S, both forward the route demand to their neighbors, in light of the fact that N and I are both closer to (Xd, Yd) than node S. when node K receives the route request for from node I, node K disposes of the route request because K is more distant from (Xd, Yd) than node I.

Location information is used to reduce the routing overhead in ad hoc networks. We present two location-aided routing (LAR) protocols. These protocols limit the search for a route to the so-called request zone, determined based on the expected location of the destination node at the time of route discovery.

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