Implementation of LAR Protocol Using MANETS

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Abstract

Mobile Ad-Hoc networks consist of wireless mobile hosts that communicate with each other, in the absence of a fixed infrastructure. Routes between two hosts in a Mobile Ad hoc network (MANET) may consist of hops through other hosts in the network. Host mobility can cause frequent unpredictable topology changes. Therefore, the task of finding and maintaining routes in MANET is nontrivial. Many protocols have been proposed for mobile ad hoc networks, with the goal of achieving efficient routing .These algorithms differ in the approach used for searching a new route and/or modifying a known route.

In this paper, we suggest an approach to decrease overhead of route discovery by utilizing location information for mobile hosts. Such location information may be obtained using the Global Positioning System (GPS) .We demonstrate how location information may be used by means of two Location-Aided Routing (LAR) protocols for route discovery. The LAR protocols use location information (which may be out of date, by the time it is used) to reduce the search space for a desired route. Limiting the search space results in fewer route discovery messages.

Keywords

Ad-hoc Networks, Requesting Zone, Location Parameters, Velocity, Hybrid Transmission Range

I. Introduction

We explore the possibility of using location information to improve performance of routing protocols for MANET. As an illustration, we show how a route discovery protocol based on flooding can be improved. When a node S needs to find a route to node D, node S broadcasts a route request message to all its neighbors2 – hereafter, node S will be referred to as the sender and node D as the destination. A node, say X, on receiving a route request message, compares the desired destination with its own identifier. If there is a match, it means that the request is for a route to itself (i.e., node X). Otherwise, node X broadcasts the request to its neighbours – to avoid redundant transmissions of route requests, a node X only broadcasts a particular route request once (repeated reception of a route request is detected using sequence numbers).
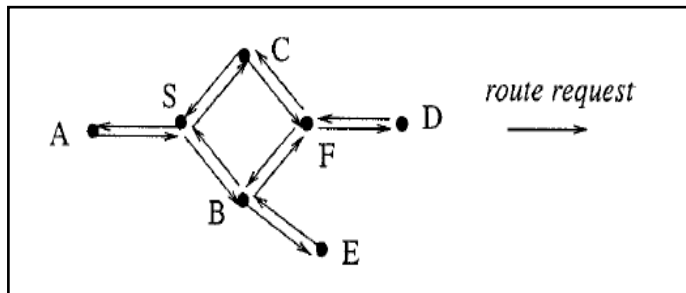

Fig. 1: Illustration of Flooding

We are going to rectify the problem of flooding as displayed below. In this figure, node S needs to determine a route to node D. Therefore, node S broadcasts a route request to its neighbours. When nodes B and C receive the route request, they forward it to all their neighbours. When node F receives the route request from B, it forwards the request to its neighbours. However, when node F receives the same route request from C, node F simply discards the route request.

Overview

The rest of the paper is organized as follows: Section II contains literature review about related work. Section III contains description of the system design. Finally paper is concluded in the Section IV.

II. Literature Review

The design and implementation of MANET routing algorithms remains the major challenge for MANET researchers.

[1] LAR (Location Aided Routing in Mobile Adhoc Networks) is an on demand routing protocol which uses the location information to identify the request zone and expected zone. Request zone in this protocol is the rectangular area including both sender as well as receiver. By decreasing the search area, this protocol leads to the decrease in routing over heads.

[2] DREAM (A Distance Routing Effect Algorithm for Mobility) is a table driven protocol which maintains each node's location information in routing tables. Data packet is send by using this location information. To maintain the location table accurately, each node periodically broadcasts a control packet containing its own coordinates.

[3] ILAR (Improved Location Aided Routing) is another location based technique which uses the concept of base line lying in between the source and destination node. Node which is closest to this line of sight will be chosen as the next intermediate node. As the transmitting node check the distance of every neighboring node from base line and find the closest neighbor for further transmission. This process will increase the delay in data transmission and also increases the nodal overhead and in turn decreases the battery life.

[4] This paper proposes a new MANET routing algorithm that includes quadrant based opportunistic routing, an intelligent energy matrix and energy status request messages with packet receipt acknowledgement notification. The proposed algorithm uses an intelligent energy matrix that creates a look up table including the key characteristics: reputation value, residual battery level and energy consumption. The proposed algorithm balances the traffic uniformly across four intermediate nodes in any desired quadrant. The simulation results presented in this paper demonstrate that due to the inclusion of the energy matrix and quadrant based routing, the number of broadcast messages decreases, reducing data flooding, providing improved channel efficiency and improves bandwidth utilization. Load balancing also increases the lifetime of intermediate nodes which provides improved route stability.

[5] In this paper, we compare the performance of different protocols for ad hoc networks Multipath routing based on fresnel zone routing (FZR), and Energy aware Node Disjoint Multipath Routing (ENDMR) protocol. Simulation results show that, with the proposed network coding in ad hoc network multipath routing protocol (NC-MR), packet delivery ratio, network lifetime and packet loss can be improved in most of cases. It is an available approach to multipath routing decision.

[6] In this paper, author constructs a shared bi-directional multicast tree for its routing operations rather than a mesh, which helps in achieving more efficient multicast delivery. The algorithm uses the concept of small overlapped zones around each node for proactive topology maintenance within the zone. Protocol depends on the location information obtained using a distributed location service, which effectively reduces the overheads for route searching and shared multicast tree maintenance. In this paper a new technique of local connectivity management is being proposed that attempts to improve the performance and reliability. It employs a preventive route reconfiguration to avoid the latency in case of link breakages and to prevent the network from splitting.

[7,8] These papers introduces Energy-efficient broadcast routing algorithms called Minimum Longest Edge (MLE) and Minimum Weight Incremental Arborescence (MWIA). MLE is able to achieve a longer network lifetime by reducing the maximum transmission power of nodes. With MLE, the likelihood that a node is overused is reduced significantly. This scheme was expanded by considering a scenario where we introduce edge weights on the basis of the remaining energy of the sending nodes and receiving nodes. MWIA was derived from this idea, which is the best possible solution for broadcast routing with the minimum largest edge-weight.

[9] Cheng et al. proposed the Minimum Incremental Power (MIP) algorithm and it is known as the most energy-efficient heuristic in terms of the total energy consumption among all the topologies. MIP is developed based on the Broadcast Incremental Power (BIP) algorithm. The MIP algorithm is used as a comparison for the solution to the Energy-balanced topology control problem, which instead of minimizing the total energy, minimizes the maximum energy consumption at each node.

[10] Energy Efficient Location Aided Routing (EELAR) Protocol was developed on the basis of the Location Aided Routing (LAR) [11]. EELAR makes significant reduction in the
energy consumption of the mobile node batteries by limiting the area of discovering a new route to a smaller zone. Thus, control packet overhead is significantly reduced. In EELAR, a reference wireless base station is used and the network's circular area cantered at the base station is divided into six equal sub-areas. During route discovery, instead of flooding control packets to the whole network area, they are flooded to only the sub-area of the destination mobile node. The base station stores locations of the mobile nodes in a position table.

[11] Li et al proposed the Online Max-Min (OMM) poweraware routing protocol for wireless ad-hoc networks dispersed over large geographical areas to support applications where the message sequence is not known. This protocol optimizes the lifetime of the network as well as the lifetime of individual nodes by maximizing the minimal residual power, which helps to prevent

the occurrence of overloaded nodes. In most applications that involve MANETs, power management is a real issue and can be done at two complementary levels (1) during communication and (2) during idle time. The OMM protocol maximizes the lifetime of the network without knowing the data generation rate in advance. The metrics developed showed that OMM had a good empirical competitive ratio to the optimal online algorithm [11] that knows the message sequence and the max-min achieves over 80% of the optimal node lifetime (where the sender knows all the messages ahead of time) for most instances and over 90% of the optimal node lifetime for many problem instances.

[12] The Power-aware Localized Routing (PLR) protocol is a localized, fully distributed energy-aware routing algorithm but it assumes that a source node has the location information of its neighbours and the destination. PLR is equivalent to knowing the link costs from the source node to its neighbours, all the way to the destination. Based on this information, the source cannot find the optimal path but selects the next hop through which the overall transmission power to the destination is minimized.

[13] Power-aware routing (PAR) maximizes the network lifetime and minimizes the power consumption by selecting less congested and more stable route, during the source to destination route establishment process, to transfer real-time and non real-time traffic, hence providing energy efficient routes. PAR focuses on 3 parameters: Accumulated energy of a path, Status of battery lifetime and Type of data to be transferred. At the time route selection, PAR focuses on its core metrics like traffic level on the path, battery status of the path, and type of request from user side. With these factors in consideration, PAR always selects less congested and more stable routes for data delivery and can provide different routes for different type of data transfer and ultimately increases the network lifetime. Simulation results shows that PAR outperforms similar protocols such as DSR and AODV, with respects to different energy-related performance metrics even in high mobility scenarios. Although, PAR can somewhat incur increased latency during data transfer, it discover routed that can last for a long time and encounter significant power saving.

III. Proposed System
The proposed system consist certain zones with the thus getting the acquired information of the nodes, resultant of which help in establishing the wireless connectivity in the network.
Expected Zone-
1. Consider a node S that needs to find a route to node D.
2. Assumption:
* Each host in the ad hoc network knows its current location precisely (location error considered in one of their simulations)
* Node S knows that node D was at location L at time t0, and that the current time is t1
* The below figure represent the expected zone of D the region that node S expects to contain node D at time t1, only an estimate made by node S
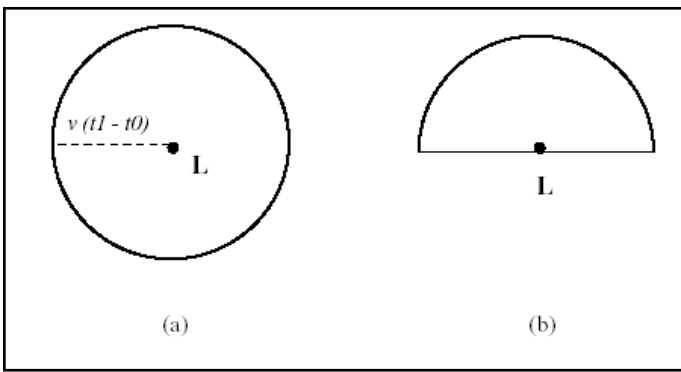
Fig. 2: Expected Zone

Requested Zone-

1. A node forwards a route request only if it belongs to the request zone. The request zone should include
- expected zone
- other regions around the expected zone
- No guarantee that a path can be found consisting only of the hosts in a chosen request zone.
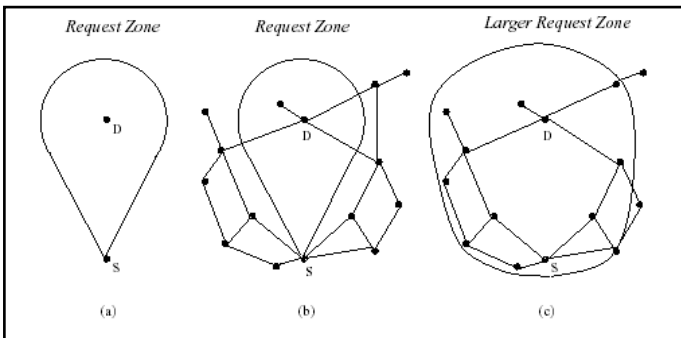- Timeout

expanded request zone

Fig. 3: Requested Zone: An Edge Between Two Nodes

1. To get the requested zone of the node, implementation of two schemes has being designed.
2. LAR Schemes 1-The figure shows the primary transmission of the dataflow and recognisation of the node in the wireless network with the help of requested zone and the expected zone.
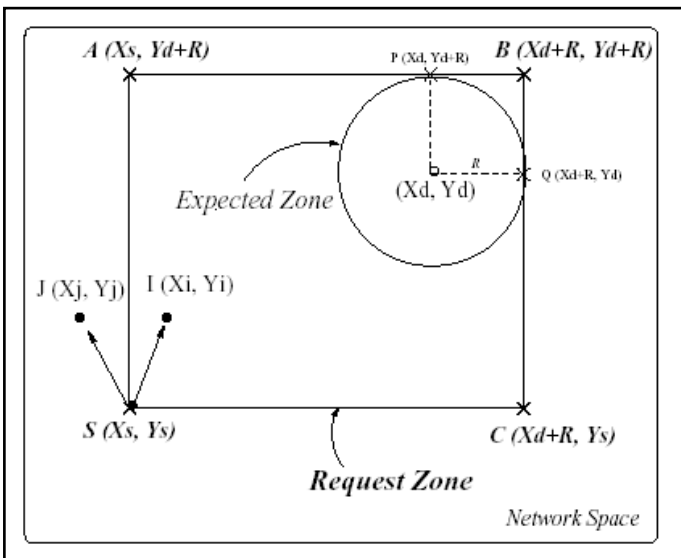

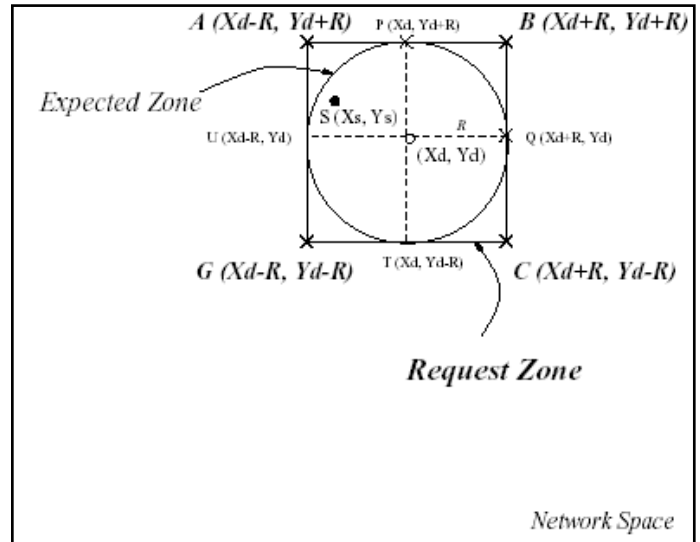Fig. 4: (a) Source Node Outside the Expected Zone
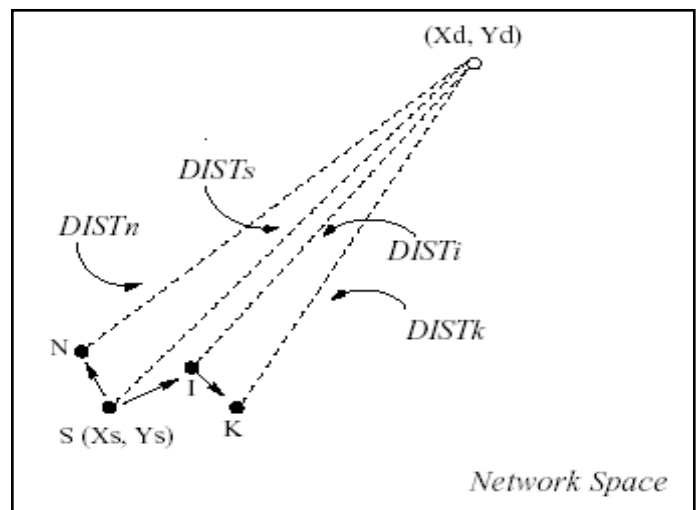

Fig. 4: (b). Source Node Within the Expected Zone

Fig. 5: Distance of Nodes With Respect to Co-Ordinates

- S knows the location (X_d, Y_d) of node D at time t_0
- Node S calculates its distance from location (X_d, Y_d): DISTs
- Node I receives the route request, calculates its distance from location (X_d, Y_d): DISTi
- For some parameter δ,
- If DISTs + $\delta \geq$ DIST$_i$, node I replaces DISK$_s$ by DISK$_i$ and forwards the request to its neighbors; otherwise discards the route request

Accuracy of a request zone (i.e., probability of finding a route to the destination) can be improved by adapting the request zone, initially determined by the source node S, with up-to-date location information for host D, which can be acquired at some intermediate nodes. Let us consider the case that node S starts search of a destination node D within a request zone Z at time t1, which is based on location information about D learned by S at time t0. Let us assume that the route request includes the timestamp t0, because the location of node D at time t0 is used to determine the request zone. Also, location of node S and the time t1 when the request is originated are also included. Now suppose that some intermediate node I within Z receives the route request at time t2, where t1 < t2. More recent location information for D may potentially be known by node I (as compared to node S), and the expected zone based on that information may be different from previous request zone Z. Therefore, request zone initially determined at a source node may be adapted at node I.
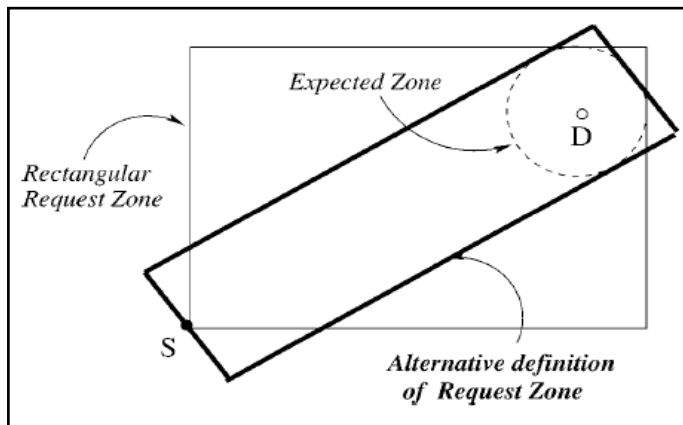
Fig. 6: Alternative Definition of Request Zone

For instance, when using LAR scheme 1, node I may determine the expected zone using more recent location information for node D, and define the adapted request zone as the smallest rectangle containing node S and the new expected zone for node D. Similarly, when using LAR scheme 2, node I may calculate distance from the more recent location of destination D that it knows, and use this distance in the decision rule (to decide whether to discard a route request) of scheme 2

The advancement in proposed system have an enhanced ideology of calculating the node in Adhoc network with more assurance of sending the fast transmission of the information within short stipulated time. So we represent a new recovery technique called AIMS (APPLYING INTERMEDIATOR MODIFIED SPECIMEN)

1. Applying Alternative Definitions Of Request Zone
2. Intermediate Part Of Both The Nodes
3. Modulated Local Search
4. Specimen Includes
• Velocity Constraint
• Location Constraint
• Hybrid Transmission Range
• Node Activeness Test

Velocity Constraint
• We have calculated in this paper the desirable relative velocity of nodes at a particular instance as V0 and V1 for timing parameter T0 and T1 respectively.

Hybrid Transmission Range
1. The overlapping range of node N1 over N2 gives us the mutual corporation range of two nodes known as Hybrid Transmission Range.
2. With respect to N1 and N2 we can find out the coordinates or dimensionality (X, Y) of this Hybrid Transmission Range as a resultant we could transmit the flow of data to desired destination.

Location Parameter & Node Activeness Test
1. Node which is in desired range for weather it is being active or not to be searched so as to easy way to accomplish the task and we will virtually place a calculated object at known position.
2. So with this calculated object we can find the distance of respective nodes N1 and N2 as a result we have found the desired location of the unknown destination node where the object is to be transferred.

IV. Conclusion
Wireless mobile ad-hoc network has very enterprising applications in today's world. With fast growing technology mobile laptop computers and wireless hardware costs are becoming very affordable. There is increasing use of wireless devises. Sales of mobile laptop will outperform sales of desktop computers by the end of year 2006 [Communication Magazine, Sep-2004]. Reactive protocols are active research area in the field of ad-hoc mobile network. There are still lots of simulations to be done in this promising field.

VII. Acknowledgement

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