# An Efficient Location Based Routing for Mobile Adhoc Networks

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**ABSTRACT:** A Mobile Ad hoc Network (MANET) is an autonomous system of mobile stations connected by wireless link to form a network. It does not rely on predefined infrastructure to keep the network connected therefore it is also known as infrastructure less network. A designed protocol must provide scalable routing with better security. In this paper, we proposes the location based protocols of Dynamic Remote Routing (DFR) and Dynamic Location Routing (DLR) schemes, considering location information and distance between the nodes as the routing metric. DLR uses the anchored methods that square measure discovered and managed by sources, using one among two low overhead protocols: Friend Aided Path Discovery and Geographical Map-based Path Discovery. Performance of these protocols will be compared with God domain protocol of Ad hoc on demand Distance Vector Routing (AODV) protocol by using simulation software NS-2.

**KEYWORDS:** MANET, Location-based routing, Adhoc on Demand Distance Vector Routing, scalable routing.

## I. INTRODUCTION

Mobile circumstantial networks include wireless hosts that communicate with one another within the absence of a hard and fast infrastructure. They are utilized in disaster relief, conference and parcel environments, and received important attention in recent years [1,2,3].Many existing routing protocols (DSDV, OLSR, DSR, AODV, TORA) projected among the MANET social unit of IETF, are designed to scale in networks of a couple of hundred nodes. They consider state regarding all links within the network or links on a route between a supply and a destination. This might lead to poor scaling properties in larger mobile circumstantial networks. In additional recently, there has been a growing specialize in a category of routing algorithms that bank for the most part or fully, on location information.[2] This idea is to use the situations management messages, packet delay, to create simplified forwarding selections (GPSR).

Issues

LAR is an on-demand routing protocol wherever location data is employed to reduce the search house for a desired route. The source uses the last far-famed destination location so as to estimate the zone during which the destination is predicted to be found. [7] This is used to determine a request zone, as a set of nodes that should forward route requests. GPSR use solely neighbor location data for forwarding knowledge packet to a neighbor nearer to the physical location of the destination. This native optimum alternative repeats at every intermediate node till the destination is reached.[6] AODV may be a reactive routing protocol, it minimizes the amount of broadcasts by making routes primarily based on demand.[4] Once any supply node desires to send a packet to a destination, it broadcasts a route request (RREQ) packet. The neighboring nodes in flip broadcast the packet to their neighbors and the method continues till the packet reaches the destination. It will increase the overhead as a result of the exaggerated quantity of management messages.

Our Proposed Approach

We proposed a routing protocol, referred to as Dynamic routing, that aims at keeping the measurability edges of location-based routing, whereas addressing the two problems with irregular topology and node quality. we tend to conjointly found that our routing methodology will perform higher than the present AODV protocol we tend to compared it to. Dynamic routing uses the subsequent ingredients to realize its goal. First, it combines a location-based routing methodology with a link state-based mechanism. Second, it uses a special variety of restricted search mode (Restricted Native Search, RNS). These first two ingredients solve problems due to the inaccuracy of location information, in particular for control packets. Third, it introduces the concept of anchors, which are geographical points imagined by sources for routing to specific destinations. This helps efficiently route around connectivity holes. An overview of dynamic routing is given in Section 2, and a detailed description in Sections 3 and in the form of protocol walkthrough. We tend to evaluate the performance of our protocol by elaborated simulations and its measurability by analysis in Section 4.In all cases; dynamic routing is characterized by low routing overhead, even when we include the overhead of location management.

## II. OVERVIEW OF DYNAMIC ROUTING

2.1 Combination of Local and Far Routing

Dynamic routing uses a combination of location-based routing (Dynamic Far (Remote) Routing, DFR), used when the destination is far, and link state routing (Dynamic Local Routing, DLR), used when the destination is close. DLR uses location independent addresses only. DFR uses a combination of direct paths, perimeter mode, and anchors, as described in the rest of this section.

A direct path is an approximation of the straight line, and is built as follows: Assume that the source S knows an approximate location of the destination D. S sends the packet to a neighbor that brings the packet closer to the assumed location of D, and this is repeated by inter mediate nodes, as long as it works. Fig. 1a shows an example of where the direct path works well.

DLR: When a packet has arrived up to two hops away from the destination, a link state approach is used, which does not use location. In Fig. 1a, some intermediate node on the direct path finds that D is one or two hops away, using its DLR reachability information (which is based on permanent addresses, not location).The combination of DLR and DFR is able to keep the scalability benefits of location-based routing, while avoiding problems due to mobility. However, combining DLR and DRR in one protocol poses a number of design challenges (in particular, avoiding loops), which we solved by using the mechanisms described in Section 3.

Perimeter Mode: Fig. 1b shows a case where the direct path does not work well: The packet may be "stuck" at a node that does not have a neighbor closer to the destination than self. Here, DFR uses perimeter mode to circumvent the topology hole, similar to GPSR [3]. Perimeter mode may give very long suboptimal paths. Furthermore, it can cause frequent routing loops in mobile ad hoc networks. Thus, we restrict the use of perimeter mode to discovery phases, when a better mode is not available to the source.

2.2 Anchored Paths in DFR

In order to avoid perimeter mode, we introduce the concept of anchors, which are imaginary locations used to assist in routing. In Fig. 1c, source S uses three anchors to route the packet to D[5]. The anchors are geographical locations, not nodes. The list of anchors is written by the source into the packet header, similar to IP loose source routing information. The packet is sent by intermediate nodes in the direction of the next anchor in the list until it reaches a node close to an anchor, at which point the next anchor becomes the following in list.
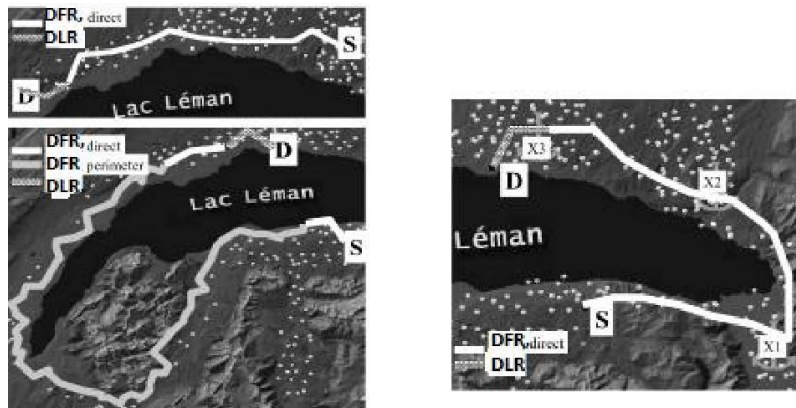
Fig. 1. (a) Packet forwarding from S to D with DFR and DLR along a direct path, no anchors . (b) Direct path does not work, perimeter mode is used instead. Fig.1(c) Direct path does not work, anchors X1 to X3 are used, thus avoiding perimeter mode

The location of the final destination takes the role of the last anchor.DLR is used when the packet comes close to the final destination, as previously shown. Second, even when perimeter and anchored paths use similar directions, perimeter mode paths tend to be more contorted and use more hops. The source decides that anchors are needed if the packet path is significantly longer than estimated from the distribution of the number of hops along the greedy path.

2.3 Computing Anchors

Anchored paths, however, come at the price of computing good anchors. We propose two methods. They are always implemented at sources:

☐ Friend Aided Path Discovery (FAPD, Section 3.1) assumes that some nodes (FAPD responders) are able to provide assistance to others, typically because they have a stable view of the network density.[4] FAPD responders help find anchors, but are not used in the data path.

☐ Geographical Map-based Path Discovery (GMPD, Section 3.2) assumes that network density maps are available to a source node. This is for an ad hoc network where all nodes are individually mobile, but the node density can still be predicted a common assumption for car networks.[3] We find that GMPD performs better, but requires the overhead of map distribution; methods for distribution of density maps are left outside the scope of this paper.

2.4   Restricted Native Search

We tend to account for things wherever the accuracy of location management is low and DLR alone is not comfortable to deal with it. Our novel methodology, referred to as Restricted Native Search (RNS), sends four to six packet duplicates within the region wherever the destination is anticipated to be, therefore increasing the likelihood of reaching the destination. RNS recovers from location inaccuracies when the destination is within several transmission ranges from the node that starts RNS. In massive networks, causing duplicates invariably has significantly less overhead than flooding. RNS is employed for two kinds of discoveries: 1) search a restricted

space for a given node or for a node sort (FAPD respondent, (Section 3.1.2) and 2) establish long distance relations.

2.5 Assumptions on Addressing and Location Services

Dynamic routing assumes that each node has a Permanent address or End-system Unique Identifier (EUI) and a temporary, location information called Location Dependent Address (LDA). The LDA is a triplet of geographic coordinates (longitude, latitude, altitude) obtained, for example, by means of the Global Positioning System (GPS) can be used. We assume that there exists a location management that enables nodes in the network to determine approximate locations of other nodes. First, a location tracking algorithm is assumed to exist between nodes when they have successfully established communication; this allows communicating nodes to continuously update their correspondent LDAs.[4] Second, a location discovery service is used at the source to obtain a probable location of the destination D (LDAd) that S is not tracking by the previous method. In Section 4, we present the location management scheme that we used in simulations to evaluate the performance of dynamic routing.

### III. PROTOCOL WALKTHROUGH: ANCHORED PATH DISCOVERY

Anchored path discovery is triggered by a source node when it estimates that a non anchored path does not perform well or the current anchored path becomes stale. There are two methods for anchored path discovery: Friend Assisted Path Discovery (FAPD) and Geographic Map-based Path Discovery (GMPD).

3.1 Friend Aided Path Discovery (FAPD)

FAPD uses nodes, called FAPD responders, which provide assistance to other nodes to discover anchored paths. We assume that some percentages of nodes in the network are configured to act as FAPD responders.[]8 FAPD responders maintain "friendship" connections to a number of other FAPD responders in the network. When a responder receives from some source node a request to assist in anchored path discovery, and it does not know a path to the destination, it contacts its friend FAPD responders. Several FAPD responders can participate in an anchored path discovery. We present the main FAPD operations invoked in typical phases at source and FAPD responders. [7]

3.2 Geographical Map Based Path Discovery

- Source S determines from its own location LDAs the town area (ST) in which S is situated (or, the nearest town to LDAs if it is not in the town area). In addition, since S knows the location of destination D (LDAd), it can determine from the LDAd the town area DT, where D is situated (or, the nearest town to LDAd if it is not in the town area).

- Then, S accesses the network map in order to find the anchored path from S to D. We call this operation a map lookup. An anchored path is the list of the geographical points: The points correspond to centers of the towns that the packet has to visit from ST in order to reach DT.[5] One possible realization of the map lookup operation, which is used in our simulation, is to find a list of towns that are on the shortest path from ST to DT in the graph of towns; the length of a path can be given either as the number of towns between ST and DT, or the length of the topological (Euclidean) shortest path connecting ST and DT in a graph of towns.

### IV. SIMULATION RESULTS AND PERFORMANCE COMPARISON

This section presents a comparative analysis of the performance metrics generated with the employment of the use of Network Simulator 2.34. Performance metrics that have been proposed for the performance evaluation of

an ad-hoc network protocol. The following metrics are applied to comparing the protocol performance. Some of these metrics are suggested by the MANET working group for routing protocol evaluation.

Table 1: Simulation parameters

| Simulation Parameters | |
| --- | --- |
| Tested Protocol | DFR,DLR |
| Propagation Model | Drop Tail |
| Type of Antenna | Omni directional |
| Power Threshold | -95dBm |
| Time | 100seconds |
| Area (m x m) | 500*500 |
| Number of Nodes | 50 |
| Number of Packets | 30 |
| Data rate | 11 Mbps |

4.1 Performance Based on Packet Delivery Fraction Ratio (PDR):

The ratio between the number of data packets originated by the "application layer" CBR sources and the number of data packets received by the CBR sink at the final destination.[6] The packet delivery

ratio between DLR and AODV protocols are shown in figure 2. It gives the packet delivery ratio of 48% than the AODV protocol.
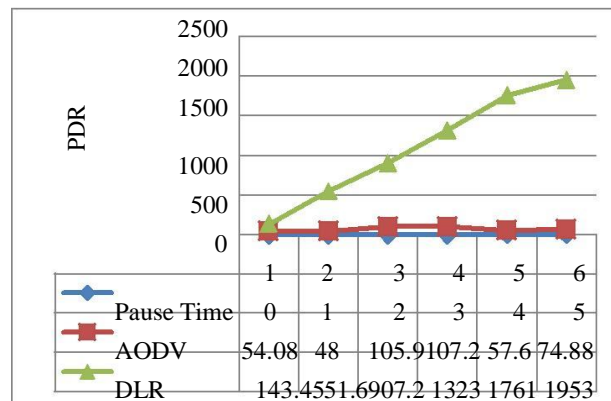


| | 1 | 2 | 3 | 4 | 5 | 6 |
| --- | --- | --- | --- | --- | --- | --- |
| Pause Time | 0 | 1 | 2 | 3 | 4 | 5 |
| AODV | 54.08 | 48 | 105.9 | 107.2 | 57.6 | 74.88 |
| DLR | 143.45 | 51.6 | 907.2 | 1323 | 1761 | 1953 |

Fig2.Comparsion result of PDR with DLR Vs AODV protocol.

4.2     Performance Based on Packet Routing Control Overhead (RCO):

Routing management overhead is that the total range of transmissions routing management packets transmitted throughout the simulation. For packets sent over multiple hops, every transmission of the packet (each hop) counts together transmission.[6] The performance of the RCO between DLR and AODV protocols are shown in figure3. In AODV, we have to the send the control messages to all the nodes even if it is not responding because

of its flooding nature. So the overhead of the network get increased.Figure3 shows that the DRR protocol offers the less management overhead of 30% than the AODV protocol. So, that the throughput of the network will get increased.
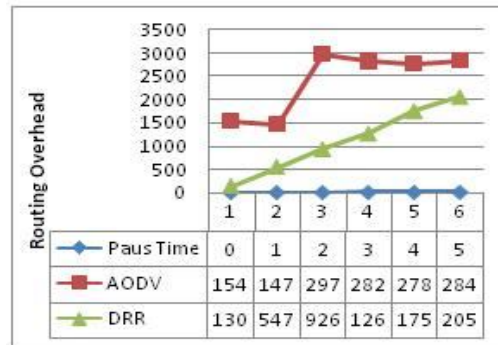


Fig 3. Comparison result of RCO with DRR Vs AODV protocol.

4.3  Performance Based on Packet Delay:

Delay is outlined as however long it takes for a packet to travel across the network from supply to destination [6].The performance of the delay between DLR and AODV protocols are shown in figure4. It shows that DLR protocol offers 20% of delay less than the AODV.
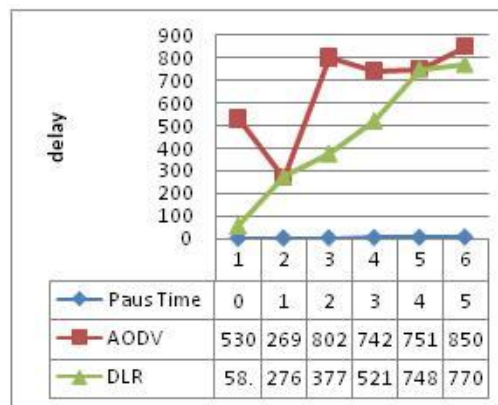


Fig4.Comparsion result of PDR with DLR Vs AODV protocol.

**V.   CONCLUSION AND FUTRE WORK**

Dynamic Far (Remote) and Local Routing aims to support location-based routing on irregular topologies with mobile nodes. It achieves its goal by combining a location-based routing method with a link state-based mechanism. Further, it introduces the concept of anchors, which are geographical points imagined by sources for routing to specific destinations, and proposes low overhead methods for computing anchors. Last, a special form of restricted search mode solves problems due to the inaccuracy of location information, in particular for control packets. The proposed protocol is simulated using the NS 2.32 simulator and the results shows that the proposed protocol outperforms the existing AODV protocol.

For enhancing the security in MANETs, which are vulnerable to attacks, robust learning methods against these attacks are required. As a part of future work is to test the protocols (DRR & DLR) to detect the malicious node attacks in the MANET and improve the QOS parameters.

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