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Analysis of Geographic Based Routing To Providing Link Stability for Ad-Hoc Networks

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ABSTRACT: *MANETs are made up of a number of nodes that are capable of communicating with each other without using a fixed base station. The limitation in transmission range and the highly dynamic nature of these networks makes data transmission between the source and the destination travel over multiple hops, which can vary over time. Optimize routing paths according to the topology change in mobile ad hoc networks. Basing their forwarding decisions only on the local topology, geographic routing protocols have drawn a lot of attentions in recent years. Proactive local position distribution can hardly adapt to the traffic demand. It is also difficult to preset protocol parameters correctly to fit in different environments. The local topology is updated in a timely manner according to network dynamics and traffic demands. Our route optimization scheme adapts the routing path according to both topology changes and actual data traffic requirements. Each node can determine node lifetime and link lifetime and adjust the protocol parameter values independently according to different network environments, data traffic conditions and node's own requirements. Simulation results obtained using the NS-2 network simulation platform.*

Keywords: *Routing protocols, wireless communication, ad hoc networks, geographic routing, adaptive, on-demand, topology.*

I. INTRODUCTION

There are increasing interests and use of mobile ad hoc networks with the fast progress of computing techniques and wireless networking techniques. In a mobile ad hoc network (MANET), wireless devices could self-config and f or m a network with an arbitrary topology. The network's topology may change rapidly and unpredictably. Such a network may operate in a stand-alone fashion, or may be connected to the larger Internet. Mobile ad hoc networks became a popular subject for research in recent years, and various studies have been made to increase the performance of ad hoc networks and support more advanced mobile computing and applications. The topology of a Mobile Ad Hoc Network is very dynamic, which makes the design of routing protocols much more challenging than that for a wired network. The conventional MANET routing protocols can be categorized as proactive reactive and hybrid.

The proactive protocols maintain the routing information actively, while the reactive ones only create and maintain the routes on demand. The hybrid protocols combine the reactive and proactive approaches. The proactive protocols incur high control overhead when there is no traffic, while for on-demand protocols, the network-range or restricted-range flooding for route discovery and maintenance limits their scalability, and the need of search for an end-to-end path prior to the packet transmission also incurs a large transmission delay .

1.1 Mobile Ad-hoc Networks

An ad-hoc network is a wireless network formed by wireless nodes without any help of infrastructure. In such a network, the nodes are mobile and can communicate dynamically in an arbitrary manner. The network is characterized by the absence of central administration devices such as base stations or access points. Furthermore, nodes should be able to enter or to leave the network easily. In these networks, the nodes act as routers. They play an important role in the discovery and maintenance of the routes from the source to the destination or from a node to another one.

1.2 Main Characteristics of Ad-Hoc Networks

- Dynamic topology
- Autonomous
- Bandwidth constrained
- Energy constrained
- Limited security

1.3 Need for Ad-Hoc Networks

Ad-Hoc networks are needed as mobile hosts need to communicate with each with no fixed infrastructure and no administrative help because,

i. It may not be physically possible for the establishment of the infrastructure.
ii. It may not be practically economical to establish the infrastructure.
iii. It may be because of the expediency of the situation does not permit the installation of the infrastructure.

II. RELATED WORK

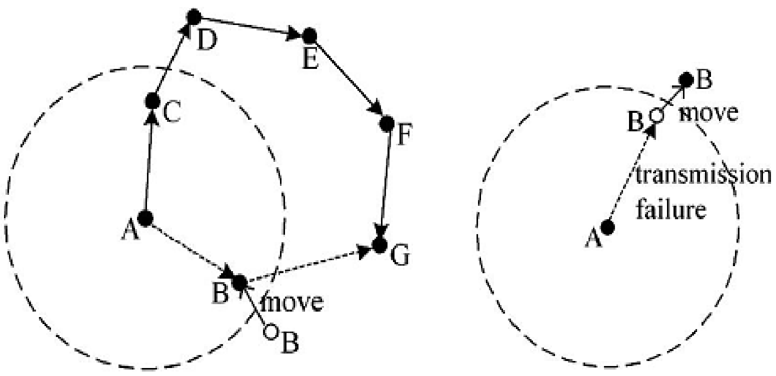
The conventional on-demand routing protocols often involve flooding in route discovery phase, which limits their scalability. LAR and DREAM make use of the nodes' position information to reduce the flooding range. In LAR, the flooding of route searching messages is restricted to a request zone which covers the expected zone of the destination. In DREAM, intermediate nodes forward packets to all the neighbours in the direction of the estimated region within which the destination may be located.

The position information has the following three sources which all impact routing performance, with the first two assumed to be known and the third one contained in geographic routing protocols: 1) Positioning system (e.g., GPS): each node can be aware of its own position through a positioning system, which may have measurement inaccuracy. 2) Location service: every node reports its position periodically to location servers located on one or a set of nodes. The destination positions obtained through these servers are based on node position report s from the previous cycle and may be outdated. 3) Local position distribution mechanism: every node periodically distributes its position to its neighbours so that an ode can get knowledge of the local topology. Recently, the impact of the position inaccuracy from the first source has been studied in and the second one is discussed. Being an important self-contained part of geographic routing protocols, the design of position distribution mechanism will affect local topology knowledge and hence geographic forwarding, but little work has been done to study and avoid its negative impact. Conducts a simulation-based study on the negative effect of mobility-induced location error on routing performance. Instead, we make a quantitative analysis on the negative effect. Most importantly, we propose two on-demand adaptive geo-graphic routing protocols that can meet different application and traffic needs and adapt to different conditions. Our routing schemes are designed to be efficient and robust, with adaptive parameter settings, flexible position distributions, and route optimization.

III. ANALYSIS ON THE IMPACT OF INACCURATE TOPOLOGY KNOWLEDGE ON GEOGRAPHIC ROUTING

A proactive fixed-interval beaconing scheme commonly adopted in existing geographic routing protocols may not only result in a high signalling cost but also outdated local topology knowledge at the forwarding node, which leads to *non-optimal routing* and *forwarding failures*.

The reference range can be conservatively calculated with the consideration of potential channel degradation. In our protocol, we consider channel variation due to fading and loss, and a signal is considered to be received only if the measured receiving signal strength is above a target threshold. The neighbors that are not reachable from the MAC layer are also removed from the neighbor table immediately to prevent a transmission failure.



(a) ----- optimal forwarding
(b) ___ non-optimal forwarding

Figure.1 Negative effects of outdating topology information on geographic routing: (a) Non-optimal forwarding; (b) forwarding failure.

3.1 Non Optimal Routing

Let us look at the example in Fig.1a. Node B just moved into A's transmission range, which is unknown to A before B sends out its next beacon message. Without knowing any neighbors closer to the destination G, A forwards the packet to node C then D by using perimeter forwarding. The greedy forwarding is resumed from D to E until reaching G. The resulted path has five hops, while the optimal path between A and G should have only two hops after B bridges the void between A and G. Due to the lack of timely and larger-range topology information, the inaccuracy of the local topology knowledge greatly affects the geographic routing performance.

3.2 Forwarding Failures

A neighbor's information will be removed if not updated within the time-out interval, which is often set to be multiple beacon intervals. As a result, a node may hold outdated neighbor information, thus resulting in forwarding failure (e.g., Fig.1b). This would lead to packet dropping or rerouting. More severely, before detecting the unreachability, the continuous retransmissions at MAC layer reduce the link throughput and fairness, and increase the collisions. This will further increase the delay and energy consumption.

IV. EXISTING SYSTEM

To alleviate the impact due to inaccurate local topology knowledge, the topology information is updated at a node in a timely manner according to network dynamics and traffic demand. On-demand routing mechanism in both protocols reduces control overhead compared to the proactive schemes which are normally adopted in current geographic routing protocols. Our route optimization scheme adapts the routing path according to both topology changes and actual data traffic requirements.

4.1Drawbacks

- Route Lifetime Prediction Algorithm calculates distance from the destination based on location information of the destination that will be extracted from the request packet while uses the relative neighborhood graph (RNG) which together with local information of distance to neighbors and distances between neighbors will minimize the total energy consumption while still maintaining the whole network coverage through broadcasting.
- Restricted flooding is based on distance from the node to the destination is used to determine nodes participation in the route discovery process. Nodes that are further away from source will not participate.

V. PROPOSED SYSTEM

Two Self-adaptive on-demand Geographic Routing (SOGR) schemes. In both schemes, we assume every mobile node is aware of its own position (e.g., through GPS or some in-door localization technique), and a source can obtain the destination's position through some kind of location service. We also make use of the broadcast feature of wireless network to improve routing performance and assume mobile nodes enable the promiscuous mode on their network interfaces.

In Sections 5.1 and 5.2, we will introduce their different reactive topology finding and maintenance schemes, the associated next-hop selection and recovery strategies, as well as their parameter adaptation schemes.

5.1 Scheme 1: SOGR with Hybrid Reactive Mechanism (SOGR-HR)

Without proactive beaconing to distribute local topology, a scheme needs to be designed for a forwarding node to find the path to the destination. In SOGR-HR, the next-hop of a forwarding node is determined reactively with the combination of geographic-based and topology-based mechanisms. By incorporating topology-based path searching, an important benefit of the proposed scheme is to obtain the topology information at a larger range when necessary to build more efficient routing path, while general geographic routing protocols are usually constrained by their local topology view. Furthermore, the planar graph based geographic routing strategy becomes unpractical under the real physical channel conditions [43]. The use of topology-based routing recovery scheme in SOGR helps overcome such shortcomings of geographic routing.

5.2 Scheme 2: SOGR with Geographic Based Reactive Mechanism (SOGR)

SOGR-GR depends only on one-hop neighbors' positions to make greedy and perimeter forwarding like other geo-graphic routing protocols [20]. However, it adopts a reactive beaconing mechanism which is adaptive to the traffic need. The periodic beaconing is triggered only when a node overhears data traffic from its neighbors the first time. The beaconing is stopped if no traffic is heard for a predefined period.

A forwarding node may broadcast a request (REQ) message to trigger its neighbors' beaconing when necessary and the neighbors will have random back off before broadcasting a beacon to avoid collision. With the neighbor topology information, SOGR-GR takes the same local void recovery method as existing geometric routing protocols to avoid the need of extra searching as in SOGR-HR. In addition, similar to SOGR-HR, the important protocol parameters of SOGR-GR are also set adaptively for optimal performance.

VI. CONCLUSIONS

In MANETs, a link is formed by two adjacent mobile nodes, which have limited battery energy and can roam freely, and the link is said to be broken if any of the nodes dies because they run out of energy or they move out of each other's communication range. The node lifetime and the LLT to predict the route lifetime and have proposed a new algorithm that explores the dynamic nature of mobile nodes, such as the energy drain rate and the relative motion estimation rate of nodes, to evaluate the node lifetime and the LLT. Combining these two metrics by using our proposed route lifetime-prediction algorithm, select the least dynamic route with the longest lifetime for persistent data forwarding. Finally, evaluate the performance of the proposed SOGR protocol based on the DSR. Simulation results show that the SOGR protocol outperforms the DSR protocol implemented with LPR and SSA mechanisms.

The future work is to introduce Bounding algorithm by replacing the primitive method to improve the performance. It is expected that it can achieve a better performance in terms of total number of connected nodes, packet delivery ratio, latency and number of packets received.

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