Geographical Routing in MANET using Flexible Combination of Push and Pull Algorithm

E. Rathidevi[1], N. Senthil Kumaran[2]

[1]M. Phil Research Scholar
Department of Computer Science,
Vellalar College for Women (Autonomous), Erode -12, India
elangorathi86@gmail.com

[2]Director of MCA Department
Vellalar College for Women (Autonomous), Erode-12, India
n.senthilkumaran@hotmail.com

Abstract: ***Combining mobile platforms such as manned or unmanned vehicles and peer assisted wireless communication is an enabler for a vast number of applications. A key enabler for the applications is the routing protocol FGRP that directs the packets in the network. The FGRP protocol has been implemented using GLOMOSIM simulator .Routing packets in fully connected mobile ad hoc networks (MANETs) has been studied to a great extent, but the assumption on full connectivity is generally not valid in a real system. This means that a practical routing protocol must handle intermittent connectivity and the absence of end-to-end connections. Routing overhead increase as data bits added to user-transmitted data, for carrying routing information and error correcting and operational instructions. Routing overhead because of location information collection and retrieving information using geographic routing in MANET. Developing a new framework for quantifying routing overhead in MANETs employing geographic routing, examining how the routing overhead (measured in the unit of bits meters per unit time) proposed required to disseminate and acquire location information of the nodes, scales with the number of nodes. For Spray and Wait this involved a new packet level implementation in GLOMOSIM as opposed to the original connection level custom simulator. Assume that nodes can deliver their location information at timeslot t 2 f1; 2; . . . g ¼: IN to any other nodes within the same timeslot, assuming that nodes know where to access it, they can retrieve the location information of other nodes during the same timeslot.***

Keywords: MANET, GLOMOSIM, Global positioning system, FGRP, Flexible Combination of Push and Pull (FCPP) algorithm.

1. Introduction

Geographical routing uses a node's location to discover path to that node. Nodes know their own geographical Location. Nodes know their 1-hop neighbors. Routing destinations are specified geographically (a location or a geographical region).Each packet can hold a small amount (O, 1) of routing information.

Ad hoc networks are attractive because they are easy to deploy: no network administration is required when computers join or leave the network. Geographic forwarding is a scalable, low overhead technique for building mobile ad hoc wireless networks. By using geographic locations to route packets, geographic forwarding can make purely local decisions to route packets, avoiding the routing protocol overhead incurred by other ad hoc routing protocols in large networks. Furthermore, geographic forwarding provides network participants with a rich data type: location. Location information enables context-sensitive computing and many location specific applications, such as service and resource discovery and mapping. Although geographic forwarding has the potential to be the foundation for scalable ad hoc networks, it has three main problems: first, geographic forwarding can only send data to network clients with known locations; second, geographic forwarding assumes each computer on the network knows its own position for making forwarding decisions; and third, geographic forwarding performs poorly with some network topologies. The first problem requires that a working geographic forwarding system include a location service to map destinations to locations, and has been solved. We address the second two problems in this paper, with location proxies and intermediate node forwarding. Two main problems prevent the deployment of geographic forwarding in real systems: geographic forwarding requires that all nodes know their locations, and it has trouble routing around local dead ends. This paper presents practical solutions to each problem. The location proxy technique allows a node that does not know its location to find a nearby location aware node to use as a proxy for geographic forwarding. The technique works over a large range of densities of location aware nodes, and allows a tradeoff between bandwidth used for routing information and expense of providing location information. The intermediate node forwarding (INF) mechanism is a probabilistic solution for routing around bad geographic topologies via intermediate geographic locations. Existing solutions unrealistically assume that nodes have identical radio propagation; INF works on a restricted set of situations but makes assumptions that better match reality.

2. Existing System

Geographic Routing is that nodes are equipped with Global Positioning System (GPS) devices and know their positions, which are assumed accurate throughout. Each node is aware of exact locations of its immediate neighbors. This can be done either by exchanging the GPS location information between one-hop neighbors (for example, by piggybacking it in HELLO messages) or by observing the received signal strength and angle in which signals arrive. Nodes employ geographic (or position-based) routing; they route packets using location information of the destinations. It has been suggested that geographic routing leads to better performance in large multi hop wireless networks than other routing schemes that do not exploit location information (e.g., destination-sequenced distance vector (DSDV) routing or dynamic source routing (DSR). A main reason for the performance gain is that, while routing schemes such as DSDV require global topological information that can change frequently, geographic routing allows nodes to make local decisions based on the locations of their immediate neighbors and the destination, without having to learn end-to-end route information.

Obviously, for proper operation of geographic routing, the location information of the destination contained in packets must be accurate enough so that nodes can route them to their destinations using the destination ID and location information. Hover, more accurate location information requires more bits, hence larger overhead.

3. Proposed System

The provided location information of destinations is accurate enough so that multi hop packet routing can be performed using the location information without having to flood the neighborhoods of destinations with packets while minimizing the number of bits required describing location information. Our study aims at:

1) Developing a new framework for quantifying routing overhead in MANETs employing geographic routing, and
2) Examining how the routing overhead (measured in the unit of bits x meters per unit time proposed) required to disseminate and acquire location information of the nodes, scales with the number of nodes.

More precisely, assume that

1) Nodes can deliver their location information at timeslot t 2 f1; 2; . . . g ¼: IN to any other nodes within the same timeslot (assuming network connectivity discussed in the following subsection)

2) Assuming that nodes know where to access it, they can retrieve the location information of other nodes during the same timeslot.

Implicitly assumes that the network has sufficient bandwidth to handle all overhead, including routing overhead, and to transport data in a timely manner. In practice, however, the delays incurred during dissemination and/or acquisition of location information can be non negligible and cause inconsistency or staleness of location information.

4. FCPP Routing Algorithm steps

Focus on flexible cache consistency maintenance in MANET which reduces future flooding process and thus reduce network overhead. To satisfy consistency requirements under the location service model, propose the Flexible Combination of Push and Pull (FCPP) algorithm.

Nodes are distributed within particular dimension with base station or server and client nodes with respective cache node.

Source node or client node need to pre fetch the required data's for future use from the server with the help of intermediate nodes.

The pre fetched data's are stored in the respective cache for future use. At the time of required data client must get it from cache if not again establish path to the server and get the data otherwise just access its cache node.

The terminal may choose to (pre)fetch data items from the server during periods of high link quality (low channel stress) and store them locally in anticipation of future user requests.

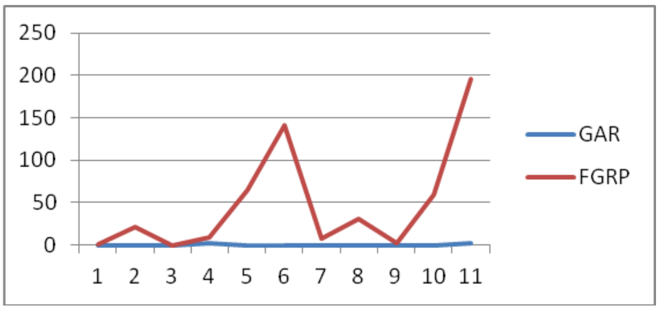
5. Result and Discussion

Implementation is stage in the thesis where the theoretical design is turned into the working system. The most crucial stage is giving the users confidence that the new system will work effectively and efficiently. The performance of reliability of the system is tested and it gained acceptance. The system was implemented successfully.

Implementation is a process that means converting a new system in to operation. Proper implementation is essential to provide a reliable system to meet organization requirements. During the implementation stage a live demon was undertaken and made in front of end-users. The various features provided in the system re discussed during implementation.

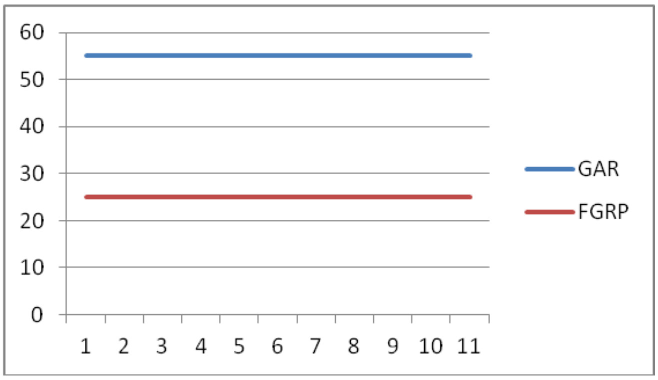
4.1 Comparison of Collision with GAR and FGRP routing protocol

Nodes	*GAR*	*FGRP*
0	0	1
1	0	21
2	0	0
3	2	9
4	0	65
5	0	141
6	0	8
7	0	31
8	0	2
9	0	59
10	2	195



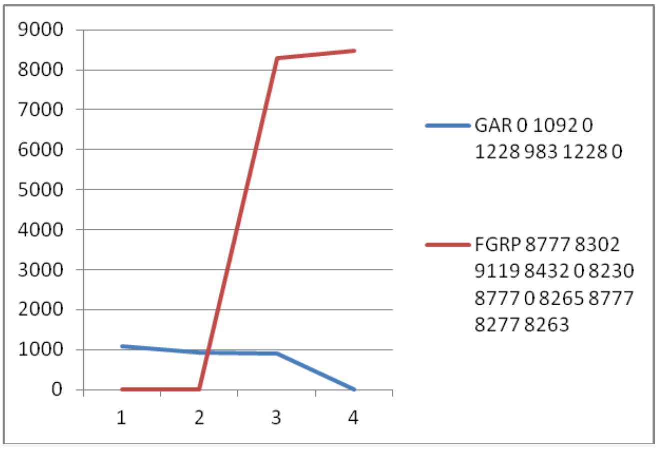
4.2 Comparison of Energy consumption with GAR and FGRP protocol

Nodes	*GAR*	*FGRP*
0	55	25.006
1	55.001	25.004
2	55	25
3	55	25.007
4	55.001	25.001
5	55.001	25.004
6	55.001	25.012
7	55	25
8	55	25
9	55	25.009
10	55	25.018



4.3 Comparison of Throughput with GAR and FGRP protocol

Nodes	*GAR*	*FGRP*
0	0	8777 8302
1	1092	9119 8432
2	0	0
3	1228	8230 8777
4	983	0
5	1228	8265 8777
6	0	8277 8263
7	1092	0
8	936	0
9	910	8279
10	0	8483



6. Conclusion

The availability of node location information enables the use of efficient geographical routing protocols in MANETs. A major component for a geographical routing protocol is a performing location service. The location service will provide information on where a destination is located in order to have a point to route a packet towards. In this thesis we have shown that by using a MANET broadcast gossiping technique and continuous modification of packet location information, geographical routing in MANETs is feasible. It is clear from our findings that when nodes mobility is independent, the locations of destinations are mutually independent and introduce the linear term n in the scaling law (as pointed out in the introduction). When nodes mobility is correlated, however, the expected routing overhead may grow slower; the exact manner, in which it will grow, is likely to depend on many factors, including the details of correlation structure imposed on nodes mobility as to as the selection of source-destination pairs.

7. Future Work

Current work includes evaluation of a many cast algorithm in disaster area networks where pockets of intense activity and large sparse areas can be simultaneously present. Also, the location service performance should be studied for very large systems (thousands of nodes). For the very sparse systems information dissemination will probably be very slow and it is not certain that geographical routing is the best choice in such a scenario. For very large systems the challenge will be how to distribute the location information for all the nodes in the system. To do this one probably has to employ some kind of data compression or approximation methods for nodes located far away. If parts of the network become very dense the transfer of location data may start to consume too much bandwidth locally at the dense spots. It might be interesting to study some throttling techniques to free up bandwidth. As found in the experiments reported in this paper it is important to start to route a message even if the exact location is not known. It would be interesting to study the best approach to use if you have no or very old location data for a node that you want to communicate with. Another topic that should be studied is how to handle areas permanently void of nodes (for example no fly zones for UAVs). If these zones do not have a convex shape then it is possible that packets get stuck in local minima and never manages to navigate past the empty area.

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Author Profile

E. Rathidevi received the B. SC (IT) and MCA from Bharathidasan University, Trichy in 2007 and 2010, respectively. She is currently doing M.Phil degree in Computer Science from Bharathiar University, Coimbatore, India.