ISSN:0975-9646

Energy Efficient Self Adaptive on Demand Geographical Routing Protocols in MANET

Miss. Prachi Nikate,
Department of Computer Engineering SCOE, Sudumbare,
Savitribai FulePune Uiversity *Pune Maharastra, India*

Prof. Prashant. Kumbharkar
Research scholar JJT University, Rajasthan ,India

***Abstract*— The greatest challenge manifesting itself in the design of wireless ad-hoc networks is the restricted availability of the energy resources. These resources are considerably limited in wireless networks than in wired networks. Geographic routing protocols are position based protocols which are usually more scalable and reliable routing protocols with their forwarding decisions based on the local topology. Even though geographic routing has many advantages and has shown a vast prospective, the inaccurate knowledge of local geographic topology can greatly affect routing performance.**

This not only leads to a high packet delivery latency, more collisions and energy consumption but can also result in a routing failure. They act upon proficient forwarding choices, based on the positions of their immediate neighbours. To maintain neighbour position, periodic broadcasting of beacon packets that contain the geographic position of the nodes is a well-liked method used. In our job called Low Energy Self Adaptive (LESA) on-demand geo-routing reduces control overhead compute up to the proactive schemes which provides reliable routing at the same time with a lesser amount of energy utilization.

***Keywords*— Self Adaptive, SOGR-GR, SOGR-HR, SOGR-LESA**

INTRODUCTION

Geographical routing protocols in progress a different approach from the existing topology based routing. It eliminates the reliability of topology storage since; it uses the physical location information to take the routing decision. In geographical routing protocols, no require to persist end-to-end route information. Hence, it can simply handle the dynamic behaviour of network topology and scale really well for outsized network.

In MANET, wireless devices could self-configure and form a network with a arbitrary topology [7]. Such a system may function in a independent fashion, or may be connected to the larger Internet. The nodes themselves operate as routers as well. Due to the limited transmission range of wireless nodes, intermediate nodes may be required to collaborate in forwarding a packet from source to destination. Therefore, nodes beyond direct wireless transmission range of each other will be able to communicate via multihop routing. Based on forwarding decisions [8] i.e. on local topology it is a big challenge to develop a routing protocol that can meet different application needs and optimize routing paths according to the topology changes in mobile ad hoc networks. Geographic routing protocols have drawn a lot of attentions in recent years. On-demand routing mechanism reduces control overhead compared to the proactive schemes which are normally adopted in current geographic routing protocols. Additionally, route optimization scheme adapts the routing path according to both topology changes and real data traffic requirements.

routing paths adaptive to the change of topology and traffic, and robust to the position inaccuracy. The routing schemes naturally handle the destination position inaccuracy. Each node can set and adapt the protocol parameters independently based on the environment change and its own situation. In order to provide efficient communication there need to be a wireless backbone [4]. The backbone must change to reflect the changes in the network topology as the nodes move. The algorithm to choose the backbone should be very fast and On-demand geographic routing protocols that can provide transmission paths based on the need of applications. Self-adaptive on-demand geographic routing for mobile ad hoc networks reduces control overhead, the routing path is built and the position information is distributed on the traffic demand. A more flexible position distribution mechanism helps to notify the topology change in a timely manner and thus more efficient routing is achieved

I. FACTORS AFFECTING ROUTING DESIGN

commonly adopted in existing geographic routing protocols may not only effect in a high signaling cost but also outdated local topology knowledge at the forwarding node, which leads to non-optimal routing and forwarding failures. we consider a reference transmissions range to analysis. To explain why the outdated local topology knowledge may lead to non-optimal routing, let us look at the example in 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 neighbours closer to the destination 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.

A. Non Optimal Routing

Let us look at the example in Fig.1.1a. 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 neighbours 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.

B. Forwarding Failures

A neighbour'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 neighbour information, thus resulting in forwarding failure (e.g., Fig.1.1b).

This would lead to packet dropping or rerouting. More severely, before detecting the unteachability, 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

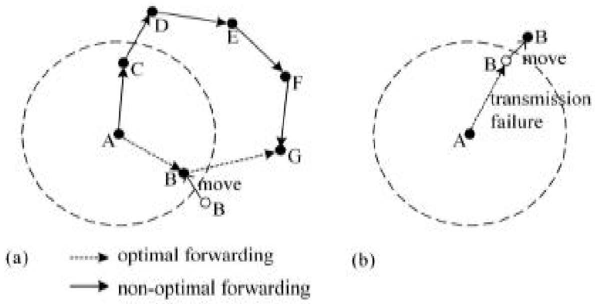

Fig.1.1. Negative effects of outdated topology information (a) optimal forwarding (b) Non-optimal forwarding

II. EXISTING SYSTEM

Two self-adaptive on demand Geographical routing protocols are:

1.SOGR-HR(SOGR with hybrid reactive mechanism) and
2.SOGR-GR(SOGR with reactive mechanism)

Both protocols contain an adaptive route optimization component which the position of a next-hop node is estimated before the transmission to avoid position outdate and transmission failure[10][11], and the route is optimized according not only to the topology change but also to the actual data traffic requirements. In SOGR-HR scheme the forwarding node forwards the packet to neighbors that are close to the destination with keeping condition hop count H=1 if we are not finding the closest neighbors to the destination with one hop condition then again it searching for Hop count H=2 still if it not finds closets neighbours it reaches max hops which is more overhead in MANETS. In this scheme we are calculating backoffperiod[11] for each node to determine whether neighbors nodes closer to destination reply sooner and suppress other's reply.

$$backoff = hops \times Intval_{backoff} \times \left(1 - \frac{dis_{(F,D)} - dis_{(N,D)}}{hops \times R}\right),$$

Where F is Current Forwarding node. D is destination R is Transmission Range Hops=1; If reply is not received with back off time than recovery search is performed**.**

In Second scheme (SOGR-GR) it adopts a reactive beaconing Mechanism which is *adaptive* to the traffic need. [5]The periodic beacon is used only when a node overhears data from its neighbours first time. The beaconing is stopped if no data is heard for a predefined period even if it is efficient mechanism cost of beaconing message is more. In Both the scheme the cost of beaconing and route searching is energy consuming.

To overcome the drawbacks of both scheme we are using the proposed Energy efficient algorithm (SOGR-LESA) which reduces the searching of hops count in network. Our performance studies demonstrate that our algorithm achieve higher delivery ratio, lower control overhead and delay, and energy efficient mechanism in all scenarios tested, with the variations of mobility, traffic, node density and Inaccuracy of destination position.

The procedures for finding the next-hop forwarders proposed by existing beaconless schemes may be used with our algorithms and protocols which will help to support more robust and efficient transmissions in various Dynamic conditions.

A. Existing System Problem

The problem with both existing system scheme's is due to forwarding node F will try to forward a packet to a neighbour closest to the destination D .In this hop number is restricted to 1 i.e.; h=1.

This method has no particular IP address or it has no particular topology if we are not able to find the any neighbours which are more optimum close to destination again it goes for second condition. In this hop number is not restricted, initially hop is set as h=2,it can reach to until max hops.

In both protocols the cost of beaconing and route search is energy consuming And Lot of inconsistent routes remain cached in intermediate route which leads of high probability of routing failures. Hop searching range will be larger because of no closer neighbour.

III. PROPOSED SYSTEM

In geo-routing the protocol must be adaptive to the dynamic topology of the network. So designing an energy efficient self-adaptive algorithm for mobile nodes is a challenging issue.

The mobile ad hoc network can be modelled as a set of nodes SN = {1 … N} and a set of cluster heads SC = {1 … C} where N is total number of nodes and C is the total number of cluster-heads. The set of nodes SN remains static throughout the network lifetime but the cardinality of set of cluster-heads i.e. ǀ SC ǀ changes due to the energy considerations and mobility of the nodes. Each node ni∈ N has a unique integer identifier ni, a wireless transmission range ri and initial energy Ei. The ordinary node is the node that ϵ SN and SC .Every ordinary node ϵ SN inside the range of the cluster-head ϵ SC is eligible to be assigned to SC. The communication is assumed to be single hop in nature.

A. Basis of the Approach:

The proposed clustering algorithm and the protocols have the following features:

1. A node can be assigned to a cluster-head iff the node comes within the range of the cluster head.
2. Cluster-heads are selected from among the nodes randomly which is very practical in case of wireless ad hoc networks instead of having a fixed set of cluster heads.
3. Set of cluster heads are selected dynamically after a periodic interval in a round schedule balancing the load (energy dissipation) throughout the nodes of the network.
4. Every node communicates to other node through a cluster-head and is not directly connected to any other ordinary node (Single hop architecture).

B. *System Architecture*:

The architecture of a system is shown in figure. The components of system are:

Viewer:It is the front end of the system. User configures the system as well as the view the output results using the viewer. User can configure the node movement, location to be presented for the Node. It also configures the location service with the expiry timer for the cached entries. Three routing methodologies are present in the system. They are SOGR-HR, SOGR-GR, and SOGR-LESA.

SOGR-HR:

Greedy Forwarding: There are various approaches, such as Greedy forwarding tries to bring the message closer to the destination in each step using only local information.[10] Thus, each node forwards the message to the neighbor that is most suitable from a local point of view. The most suitable neighbor can be the one who minimizes the distanceto the destination in each step (Greedy).

Recovery Forwarding: Greedy forwarding can lead into a dead end, where there is no neighbour closer to the destination. Then recovery routing helps to recover from that situation and find a path to another node, where greedy forwarding can be resumed.

b. SOGR-GR :

Position Distribution: Position Distribution which is adaptiveTo make the beacon sending on demand, every node keeps three time values treq, treqHeard, and tbc, in which treq records the time when the latest REQ or data packet was sent out, treqHeard is the time when the latest REQ or data transmission was heard, and tbc saves the last beaconing time. A REQ message or a data packet also serves as a beacon since it contains the forwarder's position[13].

Parameter Settings: In both protocols with parameter settings, each node can determine and adjust the protocol parameter values independently according to different network environments, data traffic conditions and mobile nodes' own requirements

c. SOGR-LESA (SOGR with Low Energy Self Adaptive mechanism):

SOGR-LESA algorithm apply on nodes after it deploy. It requires modification to route look up process at each node at any time, only those entries in a nodes routing that correspond to current coordinators can be used as valid next-hops.

Optimization: Optimization schemes are applied so theta forwarding node and its neighbours can collaborate to adapt the path to both topology change and traffic demand and thus improve transmission path opportunistically. Both routing schemes could better deal with the inaccuracy of destination position and its resulting routing inefficiency and failure.

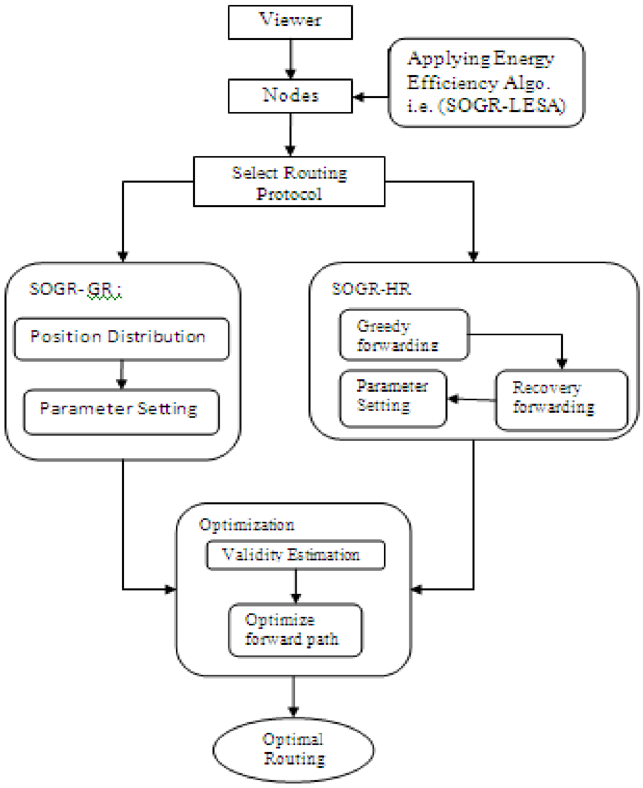

Fig 3.1. System Architecture

IV. PRELIMINARY RESULTS

In our work, we have proposed low energy self-Adaptive on-demand geo-routing for mobile ad hoc networks improve performance. We have implemented the algorithm in existing techniques by making necessary changes in the existing system.

The following choices are made for simulation considering accuracy of result and available resources then, we carry out quantitative and comprehensive evaluation of performance in terms of packet delay, throughput and finally network lifetime. The analysis of routing protocols for parameters like throughput, packet delay. The parameters are defined in the following section.

1*) Control overhead:* The total number of control message Transmissions divided by the total number of data packets received.

2) Throughput: The total number of data packet forwarding accumulated from each hop (including rerouting and retransmissions due to collisions) over the total number of data packets received. Both the non-optimal routing and rerouting due to unreachable next hop will increase the forwarding overhead.

3) Packet delay: The average time interval for the data packets to traverse from the CBR sources to the destinations. The delay of packets can be due to buffering during route discovery latency, queuing at interface queue, retransmission delays at the MAC and transfer times may cause this delay. Once the time difference between every CBR packets sent and received was recorded, dividing the total time difference over the total number of CBR packets received gives the average delay for the received packets. Lower the delay better is the performance of the protocol.

4) Network Lifetime: The Network Lifetime is defined as the duration from the beginning of the simulation to the first time a node runs out of energy. Network lifetime increase the performance due to less energy consumption of nodes in the network.

V. CONCLUSION

We have proposed an energy efficient on-demand geo-routing for mobile ad hoc networks. The main idea is to add to provide reliable and energy efficient feature to existing schemes in order to increase the lifetime of the network. Our proposed approach considers both the progress made towards the destination by providing reliable routing and at the same time with less energy consumption. It can efficiently adapt to different scenarios and perform better than existing geographic routing protocols and conventional on-demand protocols. Simulation results show that our proposed is well suited for mobile ad hoc networks since it ensures throughput, network lifetime and meets the delay constraint. There has been promising area of research that uses location information is that location aware services which are based on the use of geographic information. so the use of geographic routing protocols seems logical here. It could also be argued that as geographic routing protocols use location information for routing they are themselves a form of location-aware service as the routing they perform is essentially a service to the end users.

FUTURE WORK:

There has been promising area of research that uses location information is that location aware services which are based on the use of geographic information. so the use of geographic routing protocols seems logical here. It could also be argued that as geographic routing protocols use location information for routing they are themselves a form of location-aware service as the routing they perform is essentially a service to the end users.

ACKNOWLEDGEMENT

Our heartfelt thanks go to Siddhant College of Engineering for providing a strong platform to develop our skills and capabilities. We would like to thank to our guide & respected teachers for their constant support and motivation for us. Last but not least, we would like to thanks all those who directly or indirectly help us in presenting the paper.

REFERENCES

[1] Chiasserini, C.F.,Chlamtac, I.,Monti,P.,Nucci,A.: Energy Efficient Design of wireless ad-hoc network.LNCS 2006, vol. 2345, pp. 376-386.

[2] D. Son, A. Helmy and B. Krishnamachari. The effect of mobility-induced location errors on geographic routing in ad hoc networks: analysis and improvement using mobility prediction. In *Proc. WCNC 2004*.

[3] S. Mishra, and S. M. Satpathy Energy Efficiency In Ad hoc Networks (IJASUC) Vol.2, No.1, March 2011

[4] F. Kuhn, R. Wattenhofer, and A. Zollinger, “An Algorithmic Approach to Geographic Routing in Ad Hoc and Sensor Networks,” IEEE/ACM Trans. Networking, vol. 16, no. 1, pp. 51-62, Feb. 2008

[5] M. Zorzi and R. R. Rao. Geographic random forwarding (GeRaF) for adhoc and sensor networks: Energy and latency performance. IEEE Trans.Mobile Computing, 2(4), Oct.-Dec. 2003.

[6] NAVSTAR GPS operations, available via WWW at URL: http://tycho.usno.navy.mil/gpsinfo.html.Y. Li, Y. Yang, and X. Lu, Routing Metric Designs for Greedy, Face and Combined-Greedy-Face Routing.*Proc. IEEE INFOCOM 09*, Page(s):64 -72, Apr. 2009.

[7] Weigang Wu, Jiannong Cao, Jin Yang, and M. Raynal. Design andPerformance Evaluation of Efficient Consensus Protocols for Mobile AdHoc Networks. IEEE Trans. on Computers, 56(8), Page(s):1055 - 1070, Aug. 2007.

[8] X. Xiang and X. Wang. An Efficient Geographic Multicast Protocol for Mobile Ad Hoc Networks.In *IEEE International Symposium on a Worldof Wireless, Mobile and Multimedia Networks (WoWMoM)*, Niagara-Falls,Buffalo, New York, June 2006.

[9] X. Xiang, X. Wang, and Y. Yang, Stateless Multicasting in Mobile Ad Hoc Networks. In IEEE Transactions on Computer, vol. 59 no. 8, pp. 1076-1090, Aug. 2010.

[10] X. Xiang, X. Wang and Z. Zhou, Robust and Scalable Geographic Multicast Protocol for Mobile Ad Hoc Networks. In Proceeding of IEEE INFOCOM, minisymposium, Anchorage, Alaska, May 2007.

[11] X. Xiang, Z. Zhou, and X. Wang, “Self-Adaptive On Demand Geographic Routing Protocols for Mobile Ad Hoc Networks,” IEEE TRANSACTIONS ON MOBILE COMPUTING, VOL. 11, NO. 9, SEPTEMBER 2012.

[12] Y. Kim, J.-J. Lee and A. Helmy. Modeling and analyzing the impact of location inconsistencies on geographic routing in wireless networks. *Mobile Computing and Communication Review*, 8(1), 2004.

[13] YanliCai, Wei Lou, Minglu Li, Xiang-Yang Li. Energy Efficient Target-Oriented Scheduling in Directional Sensor Networks. IEEE Trans. On Computers, 58(9), Page(s):1259 - 1274, Sept. 2009.

[14] Z. Yang, Y. Liu, and X.-Y. Li, “Beyond Trilateration: On the Localizability of Wireless Ad-Hoc Networks,” IEEE/ACM Trans. Networking, vol. 18, no. 6, pp. 1806-1814, Dec. 2010.