Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X

IJCSMC, Vol. 2, Issue. 12, December 2013, pg.244 – 248

RESEARCH ARTICLE

A Dynamic Heuristic Mechanism to Improve Throughput in MANET against Path Failures

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Abstract - Recent work in mobile node routing for MANET has focused on solutions only on the frequent link breakages and route discoveries through reduced performance. Due to high mobility of nodes in mobile ad hoc networks (MANETs), route discovery and broadcasting is a fundamental and effective data dissemination mechanism, where a mobile node rebroadcasts blindly the first received route request packets unless it has a route to the destination, and it creates the broadcast storm problem. In this work, we propose a novel routing mechanism based on metrics that estimate link quality to maximize throughput through aggressive path selection. Nodes must collaborate in order to compute the path metric by accommodating accusation-based reaction techniques. Also incorporating the neighbour coverage-based probabilistic rebroadcast protocol for reducing routing overhead in MANETs. In order to effectively exploit the neighbour coverage knowledge rebroadcast delay to determine the order of rebroadcasting, and then we can obtain the more accurate additional coverage ratio by sensing neighbour coverage knowledge. Also introduces a connectivity factor to attain the node density adaptation. By combining the coverage ratio and connectivity factor, a reasonable rebroadcast probability is attained. Our approach combines the advantages of the neighbour coverage knowledge and the probabilistic method, which can significantly decrease the number of retransmissions so as to reduce the routing overhead and also, can improve the routing performance.

Keywords –broadcasting; gossip; probabilistic; SBA; NCPR

I. INTRODUCTION

MOBILE ad hoc networks (MANETs) consist of a collection of mobile nodes which can move freely. These nodes can self-organized into arbitrary topology networks dynamically without a fixed infrastructure. One of the important challenges of MANETs is the design of dynamic routing protocols with less overhead and good performance.

However, due to mobility of nodes in MANETs, link breaks frequently which may cause frequent path failures and route identification, which could increase the overhead of routing protocols and reduce the packet delivery ratio and increasing the end-to-end delay. Thus, reducing the routing overhead in route discovery is an essential problem. Many Techniques are defined to solve these problems.

II. LITERARY SURVEY

A).BROADCASTING

Broadcasting is an effective mechanism for Route Discovery. In pure sense broadcast can be defined as the process of sending messages to multiple host. A straight forward approach used here is that a host rebroadcasts the message upon receiving a broadcast message for the first time.

Main advantage is that this is a simple scheme.

Problems arises while considering some assumptions that

- Broadcast is spontaneous
- Broadcast is unreliable
- No RTS/CTS dialogue.

Broadcast storm is a big problem of broadcasting.

This happens mainly due to three problems.

- Redundant rebroadcasts
- Contention Problem and
- Collision Problem.

Also found that rebroadcast is very costly, increases overhead and consumes much network resources. Creates large routing overhead. Thus optimizing rebroadcast in route discovery is one good solution.

B).GOSSIP-BASED APPROACH

Here each node forwards a packet with a particular probability. In a simple gossiping approach each process periodically and randomly selects a partner with whom it exchanges recently observed information. Information disseminated by gossiping protocol spreads quickly and reliably with high probability.

Also found that gossip-based approach can reduce network overhead by 35% as compared to flooding. And gossip based approach is scalable. It is robust against failure. And is global in the sense that trust is evaluated based on relevant system information but not based on local information. Gossip or epidemic protocols have emerged as a powerful strategy to implement highly scalable and resilient reliable broadcast parameters. Also these are appealing since that works on overlays that have less cost. Seems obvious candidates to applications that requires extremely high resilience to failures of large number of nodes. Useful for routing through an unreliable network. Introduces randomness which leads to probabilistic randomness.

This approach fails if the network density is too high or if the traffic load is heavy, then the improvement of gossip based approach is limited. Also the natural redundancy of gossip protocol makes them less efficient than other approaches. High network packet loss rates and high process failure probabilities.

C).PROBABILISTIC-BROADCASTING

Based on coverage area and neighbor confirmation. Uses coverage are to set rebroadcast probability and neighbor confirmation to guarantee reachability. In this approach, each intermediate node rebroadcasts received packets only with a predetermined forwarding probability. To determine an appropriate forwarding probability, Season have suggested the use of random graphs and percolation theory in MANETs. Also have claimed that there exists a probability value $P_c < 1$, such that by using P_c as a forwarding probability, almost all nodes can receive a broadcast packet, while there is not much improvement on reachability for $p > P_c$. Since P_c is different in various MANET topologies, and there is no existing mathematical method for estimating P_c, many probabilistic methods use a predefined value for P_c.

Advantage of this approach is simplicity. Also considerably reduces degrading effects of other approaches.

Problems involve poor reachability especially in sparse networks due to assigning the same forwarding probability at every node in the network.

D).DPR

Dynamic probabilistic route discovery scheme. This introduces a new VAP(Velocity Aware Probabilistic) route discovery scheme which can exclude unstable nodes from constructing routes between source and destination. Idea is to use velocity vector information to determine stable and unstable nodes.

Main advantages are high performance, less end-end delay, less RREQ broadcast number and good link stability. Reduces overhead and improves throughput.

Main problem faced here is route discovery. One a route is found efficiently than all other works smoothly. But route identification is a tedious task here.

E).AODV-DFR

AODV protocol with Directional Forward Routing (AODV-DFR) which takes the directional forwarding used in geographic routing into AODV protocol. This is a hybrid routing mechanism. While a route breaks, this protocol can automatically find the next-hop node for packet forwarding. This is one of the on-demand reactive routing protocol. Combines on-demand and proactive routing When a source starts communication , it first finds the destination as in an on-demand fashion Once the notification of destination is obtained, then it initiates periodic routing updates in a proactive fashion. Here it selects the most productive neighbor in the forward direction. So it need stable location oriented information to determine direction. Fast and refreshed local reference is needed(GPS).Destination begins proactive advertisement after receiving data packets from source.

Main advantage is that this is a feasible approach. And is robust to mobility. Not any global reference is needed. Local references will do. Continuous advertisements will be obtained from destination. No location server system is required. High delivery fraction ratio. Delay also is minimum. Overhead is also to an average level. Better performance than AODV and GPSR.

One problem is that it doesn't incorporates global coordinating system. So ongoing work is intended to accomplish this.

F).NCPR

Neighbour coverage-based probabilistic routing protocol. So in order to effectively exploit the neighbor coverage knowledge, there arise need of a novel rebroadcast delay to determine the rebroadcast order, and tusing this we can get a more precise coverage ratio. And in order to keep the network connectivity and reduce the redundant retransmissions, there arise the need of a connectivity factor metric to determine how many neighbors should receive the Route Request packet. After that, by combining the additional coverage ratio and the connectivity factor, there is a rebroadcast probability, which can be used to control the number of rebroadcasts of the Route Request(RREQ) packet, to improve the routing performance. The rebroadcast probability can be considered of containing two parts:1)additional coverage ratio, which is the ratio of the number of nodes that should be covered by a single broadcast to the total number of neighbors and 2)connectivity factor, which reflects the relationship of network connectivity and the number of neighbors of a given node.

This scheme uses a rebroadcast delay which helps us to identify the forwarding order and more efficiently exploit the neighbor knowledge. Creates less rebroadcast traffic than flooding and other schemes. Because of less redundant broadcast it mitigates network collision and contention and so increases packet delivery ratio and decreases average packet end-end delay. Also has high performance when the network is in high density or the traffic is in heavy load.

Calculation of distances to all neighbors does not rely on trustworthy nodes. Requires lengthy multi-round computations involving several nodes that seek consensus on common neighbor verification. This suits static sensor networks and it requires several nodes to exchange information on the signal emitted by the node whose location has to be verified. This approach in forces a node to collect several data on its neighbor movements before a decision can be taken, making the solution not fit too many situations where the location information is to be obtained and verified in a short time span. Moreover, an adversary can fool the protocol by simply announcing false positions that follow a realistic mobility pattern.

III. COMPARISON

PROTOCOL	MESSAGE OVERHEAD	DELAY	COST	OTHERS
1)BROADCASTING	HIGH	AVERAGE	HIGH	SIMPLE SCHEME
2)GOSSIP BASED APPROACH	REDUCE OVERHEAD BY 35%	AVERAGE	-------	ROBUST AND SCALABLE, HIGH PACKET LOSS

3)PROBABILISTIC BROADCASTING	LESS	OCCURS DUE TO POOR REACHABILITY	LESS	SIMPLICITY, REDUCES DEGRADING EFFECTS
4)DPR	LESS	LESS	NO COST CONSIDERATION	ROUTE DISCOVERY PROBLEM
5)AODV-FR	AVERAGE	LESS	LESS	FEASIBLE, ROBUST, ONLY LOCAL INFORMATION NEEDED, NO GLOBAL COORDINATES
6)NCPR	VERY LESS	LESS	LESS	EFFICIENT, HIGH PACKET DELIVERY RATIO, HIGH PERFORMANCE, LENGTHY COMPUTATIONS ATTACK CHANCES

IV. CONCLUSION

Here I have compared many previously existing schemes and found NCPR as one among the better one. It still possess some problems. Main problems are calculation of distances to all neighbors does not rely on reliable nodes, but it is designed for sensor networks which are static, and requires lengthy computations involving several nodes that seek consensus on common neighbor verification. Neighbor schemes suits static sensor networks and it requires several nodes to exchange information on the signal emitted by the node whose location has to be verified. Moreover, it aims at evaluating not the position but whether the node is within a given region or not. This approach in forces a node to collect several data on its neighbor movements before a decision can be taken, making the solution not fit to many situations where the location information is to be obtained and verified in a short time span. Moreover, an third person can fool the protocol by simply announcing false positions that follow a realistic mobility pattern.

So a new system was proposed such that in Mobile network, communication neighbors of a node all the other nodes that it can reach directly with its transmissions. Each node has idea of its own position with some maximum error, and that it shares a common time reference with the other nodes: both requirements can be met by equipping communication nodes with GPS receivers. In addition nodes can perform Time-of-Flight (ToF) based RF ranging with a maximum error. Because of this reasonable assumption, although it requires advanced changes to off-the-shelf radio interfaces; also, reliable and efficient techniques for accurate ToF-based RF ranging have been developed. At the time of protocol execution positions of nodes do not vary significantly, since a complete message exchange takes very less time (milli seconds). The relative spatial movements of the nodes during such a period are taken into account through the tolerance value. Nodes carry a unique identity and can authenticate messages of other nodes through public key cryptography.

In the Transmission, Each node owns a private key and a public key, as well as a set of one-time use keys as proposed in emerging architectures for secure and privacy-enhancing communication. Node can encrypt and decrypt data with its keys and the public keys of other nodes; also, it can produce signatures(ie digital) with its private key. We assume that the binding between Node and public key can be checked and controlled by any node, as in secure communication architectures. Nodes are correct if they comply with the Neighbor Position Verification (NPV) protocol, and otherwise if they deviate from it.

As authentication essentially thwarts external adversaries, and we focus on the more powerful internal nodes, i.e., nodes that possess the cryptographic material to participate in the NPV and try to exploit it, by advertising arbitrarily erroneous own positions or inject misleading information. Internal adversaries cannot create messages on behalf of other nodes whose keys they don't know. Thus, attacks against the cryptosystem are not considered, since correct implementation of cryptographic primitives makes them computationally infeasible. Adversaries classified into: knowledgeable, unknowledgeable and independent.

Main advantages are proposed NPV protocol is the first to provide a fully distributed, lightweight solution to the NPV problem that does not require any infrastructure or a priori trusted neighbors and is robust to several different attacks, Also proposed solution is suitable for both low and high mobile environments and it only assumes RF communication.

ACKNOWLEDGEMENT

We thank the reviewers and others those who have helped us in preparing this

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