Shortest Distance Message Broadcasting for an Applications in an irregular Mobile Topologies

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Abstract:-This paper introduces data forwarding algorithm for a particular applications within Mobile Adhoc networks that is based on the concept of selecting the neighbor node from a set of designated nodes. The algorithm, which is called Shortest Distance Message Broadcasting (SDMF), uses routing information to select the node with the shortest distance. The goal of the proposed algorithm is to reduce the average number of hops taken to reach the destination node that holds the desired data. Experimental evaluations using the Scalable Wireless Adhoc Network (SWAN) Simulator and AODV algorithm were performed to derive the confidence interval for the mean hop count between the source node and destination node. The results agreed with the numerical analysis of the proposed algorithm offers reduce the hop count and lesser delay when compared to the remaining algorithms.

Keyword: Message broadcasting-Adhoc Network-AODV Algorithm**-** Message search- Simulation.

I INTRODUCTION

Wireless communication technology is steadily and rapidly increasing. People wish to use their network terminals (laptops, PDAs, etc.) anywhere and anytime. Wireless connectivity gives users the freedom to move where they desire. There exist numerous different wirelesses networks varying in the way the nodes interconnect. In an ad hoc network, mobile nodes communicate with each other using multi-hop wireless links. There is no stationary infrastructure such as base stations. Each node in the network also acts as a router, forwarding data packets for other nodes. A central challenge in the design of ad hoc networks is the development of dynamic routing protocols that can efficiently find routes between two communicating nodes.

The routing protocol must be able to keep up with the high degree of node mobility that often changes the network topology drastically and unpredictably. Such networks have been studied in the past in relation to defence research, often under the name of packet radio networks. Recently there has been a renewed interest in this field due to the common availability of low-cost laptops and palmtops with radio interfaces. Interest is also partly fueled by growing enthusiasm in running common network protocols in dynamic wireless environments without the requirement of specific infrastructures.

Typical for networks with fixed infrastructure is using of access points. An access point (AP) can act as a router in the network, or as a bridge. Examples for this type of networks are GSM and UMTS cellular networks. APs have more information about the network and are able to route the packets the best way. In contrast, ad hoc networks have no fixed infrastructure or administrative support, the topology of the network changes dynamically as mobile nodes joins or leaves the network. In ad-hoc wireless networks the nodes themselves use each other as routers, so these nodes should be more intelligent than the nodes in an centralized networks with APs.

While DSR and AODV share the behaviour in that they initiate routing activities only in the presence of data packets in need of a route, many of their routing mechanics are very different. In particular, DSR uses source routing, but AODV uses a table-driven routing framework and destination sequence numbers. DSR does not rely on any timer-based activities, but AODV does to a certain extent.

One of the goals in this project is to extract the relative merits of these mechanisms. The motivation is that a better understanding of the relative merits will serve as a cornerstone for development of more effective routing protocols for mobile ad hoc networks

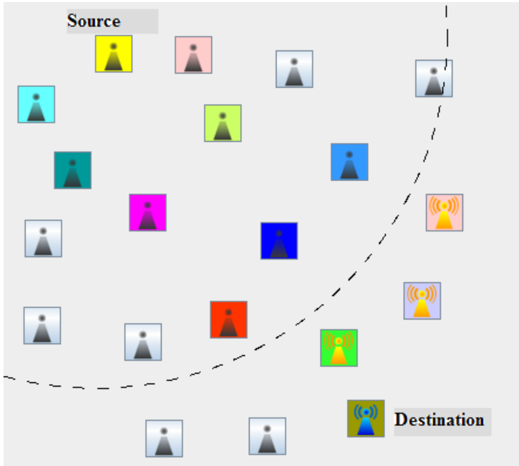


Fig 1: Data can be broadcasting from source to destination.

II IMPLEMENTATION OF AODV ALGORITHM

AODV determines a route to a destination only when a node wants to send a packet to that destination. Routes are maintained as long as they are needed by the source. Sequence numbers ensure the freshness of routes and guarantee the loop-free routing.

Routing protocol logic takes place in the user-space daemon, while packet forwarding is handled in the kernel. This is efficient because forwarded packets are handled immediately and fewer packets traverse the kernel to user-space boundary. All of the implementations discussed use HELLO messages to determine local connectivity and detect link breaks. In addition, all implementations support the expanding ring search and local repair optimizations.

When a node needs to determine a route to a destination node, it floods the network with a *Route Request (RREQ) message*. The originating node broadcasts a RREQ message to its neighbouring nodes, which broadcast the message to their neighbours, and so on. To prevent cycles, each node remembers recently forwarded route requests in a route request buffer. As these requests spread through the network, intermediate nodes store reverse routes back to the originating node. Since an intermediate node could have many reverse routes, it always picks the route with the smallest hop count.

When a node receiving the request either knows of a "fresh enough" route to the destination or is itself the destination, the node generates a *Route Reply (RREP) message*, and sends this message along the reverse path back towards the originating node. As the RREP message passes through intermediate nodes, these nodes update their routing tables, so that in the future, messages can be routed though these nodes to the destination. Notice that it is possible for the RREQ originator to receive a RREP message from more than one node. In this case, the RREQ originator will update its routing table with the most "recent" routing information; that is, it uses the route with the greatest destination sequence number. When a node originates or forwards a route request message to its neighbours, the node will likely receive the same route request message back from its neighbours. To prevent nodes from resending the same RREQs, each node maintains a *route request buffer*, which contains a list of recently broadcasted route requests. Before forwarding a RREQ message, a node always checks the buffer to make sure it has not already forwarded the request. RREQ messages are also stored in the buffer by a node that originates a RREP message. The purpose for this is so a node does not send multiple RREPs for duplicate RREQs that may have arrived from different paths. The exception is if the node receives a RREQ with a better route (i.e. smaller hop count), in which case a new RREP will be sent.

To prevent the route request buffers from growing indefinitely, each entry expires after a certain period of time, and then is removed. Furthermore, each node's buffer has a maximum size. If nodes are to be added beyond this maximum, then the oldest entries will be removed to make room.

Each node keeps track of a precursor list, and an outgoing list. A precursor list is a set of nodes that route through the given node. The outgoing list is the set of next-hops that this node routes through. In networks where all routes are bi-directional, these lists are essentially the same.
Whenever a node determines one of its next- hops to be unreachable, it removes all affected route entries, and generates a Route Error (RERR) message. This RERR message contains a list of all destinations that have become unreachable as a result of the broken link. The node sends the RERR to each of its precursors. These precursors update their routing tables, and in turn forward the RERR to their precursors, and so on. To prevent RERR message loops, a node only forwards a RERR message if at least one route has been removed.

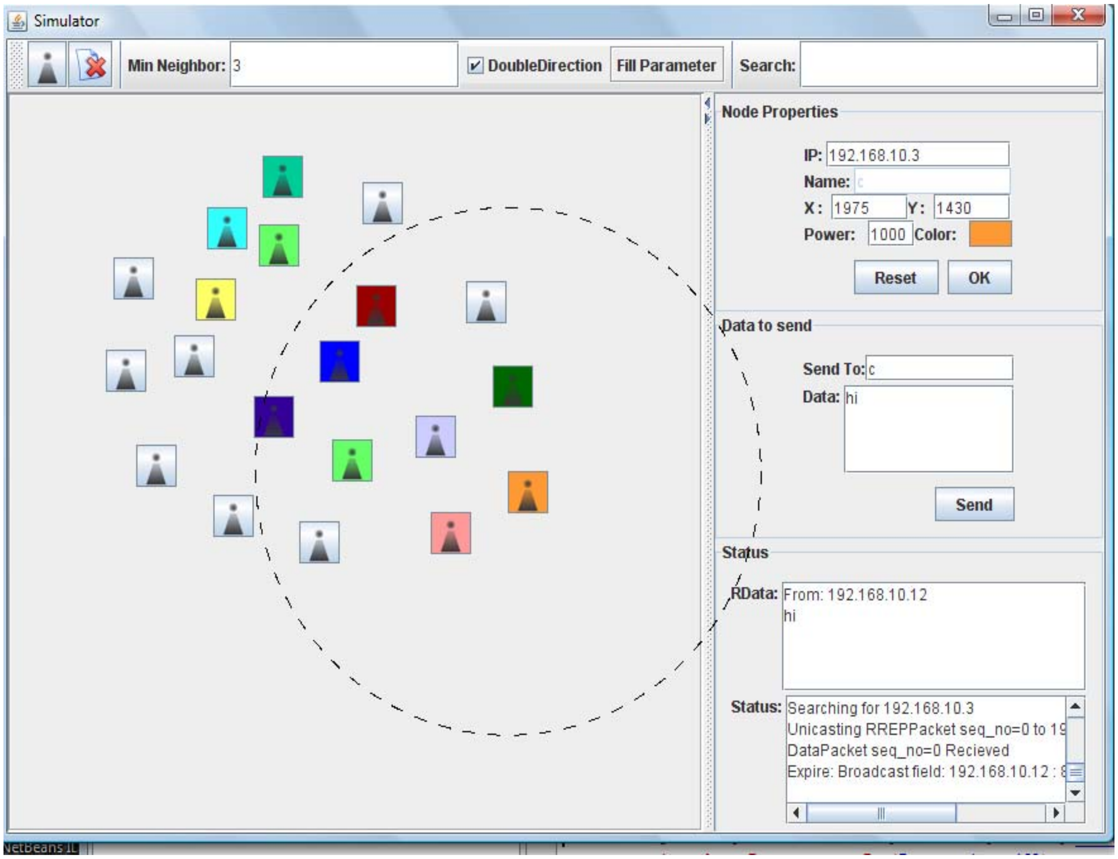
III RESULT ANALYSIS

Two key performance metrics are evaluated:

Packet delivery fraction - ratio of the data packets delivered to the destination to those generated by the CBR sources;

Average end-to-end delay of data packets - this includes all possible delays caused by buffering during route discovery latency, queuing at the interface queue, retransmission delays at the MAC, propagation and transfer times.

DSR has a better delay than AODV with 10 and 20 sources. The differential for 10 sources is large, often more than factor of 4 for lower pause times. The differential reduces for higher pause time. With 20 sources, the differential is much



smaller. With larger number of sources AODV has a lower delay than DSR for all pause times, the difference being large for lower pause times.

Our proposed shortest Distance message broadcasting (SDMB) algorithm is based on the same basic concept employed by AODV protocols in that it. Broadcast the particular message to the neighbor node that stores the desired data item. Actually, SDMB may be regarded as a high-level routing protocol operating on top of a AODV protocol, and thus, together they form a two-layer protocol that works to minimize the response time of a particular search application by following the consecutive shortest paths. The given analysis focuses on providing confidence intervals for the mean distance to reach the node with the desired data and the distance to traverse all the search nodes. Moreover, it will be demonstrated that SDMB distributes the average load caused by search traffic among the visited nodes nearly uniformly in spite of their possibly non uniform caching capacities.

Advantages:

- Maximize throughput
- Minimize the energy consumption
- If the nodes behave selfishly, they might not spend their energy in forwarding other nodes' traffic
- Not forwarding any packets on the other hand adversely affect the network functioning

IV CONCLUSION

This paper described a message search algorithm for use in mobile ad hoc networks. The techniques is called as to reduce the total distance (hop count) taken to reach the destination node in a set of mobile nodes while using local routing information of the nodes. This was proven through reliably obtained performance results that were compared to the other search techniques. The proposed algorithm which the paper analyzes and evaluates its performance may be regarded as being specific to MANETs since it accounts for their different dynamic aspects. This does not remove the fact that the carried analysis is valid for other types of networks. The value of this approach is that the only assumption that was used to derive the confidence intervals, while other statistical approaches assume that the sample size used by the simulation is sufficient to make the difference between the samples means distribution and the normal distribution eligible, with absolutely no evidence to back up this assumption.

FUTURE WORK

The future developments can be focused on how the proposed model can be imported to original network architecture and how the performance can still be achieved and also provide security to the message. The energy conservation models can also be proposed for the nodes so that a particular node can sustain in a network and to minimize the costs for finding energy-conserving routing.

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