Certain Investigations on Adaptive Routing Protocol Based on Geo location, Energy and Mobility for MANETS

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ABSTRACT

Position based routing protocols are kinds of routing protocols, which uses nodes location information, instead of links information for routing. In position based routing protocols, considered the packet source node has position information of itself and it's neighbors and the packet destination node. Greedy is a very important position based routing protocol. In one of it's kinds, named MFR (Most Forward Within Radius), the source node or packet forwarder node, sends packet to one of it's neighbors with most forward progress towards destination node (closest neighbor to destination). Using distance deciding metric in Greedy to forward packet to neighbor nodes is not suitable for all conditions. If closest neighbor to destination node has high speed, by comparing with the source node or intermediate packet forwarder node speed or has very low remained battery power, then the packet loss probability will increase. The Proposed strategy uses combination of metrics position and energy routing protocol, to deciding about to which neighbor the packet should be given.

Keywords: **Mobile-Ad-Hoc Network, Position based, Reliability, Routing**

1.INTRODUCTION

Mobile ad hoc networks consist of wireless hosts that communicate with each other in the absence of a fixed infrastructure. They are used in disaster relief, conference and battlefield environments, and received significant attention in recent years [3]. The position based routing protocols are the kinds of routing protocols, which use nodes location information, instead of links information to routing. The routing decisions, are based on source node, neighbor nodes, destination node locations. Each node finds it's location by GPS or another positioning system. Each node periodically broadcasts it's location information by hello packets, to it's neighbors and then they will update their location tables. The source node finds the location of destination node, by a suitable location server. Position based routing protocols, have not routing tables overhead [4,5,6] The target is improving the position based routing protocols, with least overhead. Greedy is a very important position based routing protocol. In one of it's kinds, named MFR, source node or packet forwarder node, sends packet to one of it's neighbors with most forward progress towards destination node [7,8]. Using distance metric in Greedy, is not suitable for all conditions. Proposed strategy increases Greedy reliability by using some other deciding metrics.

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2. GREEDY PROTOCOL

In greedy, packet sender node includes approximate position of the recipient in packet. This information is gathered by an appropriate location service. When an intermediate node receives a packet, it forwards packet to a neighbor lying in general direction of the recipient. Ideally, this process can be repeated until the recipient has been reached. Generally, there are different strategies that a node can use to deciding about, to which neighbor a given packet should be forwarded. In Figure 1, S and D denote the source and destination (recipient) nodes of packet. The circle with radius *r* indicates maximum transmission range of S.

One strategy is forwarding packet to closest neighbor to destination D. by using this strategy, node S sends packet to node C. This strategy is known as MFR, it tries to minimize the number of hops a packet has to traverse in order to reach D. In another strategy named NFP (Nearest with Forward Progress), packet sender node, sends packet to its nearest neighbor node (it's closest neighbor with forward progress towards destination node). In Figure 1, by using this strategy, node S sends packet to node A [7,8]. In compass routing

strategy, packet sender node sends packet to neighbor closest to supposed straight line between sender and destination nodes, by using this strategy , node S sends packet to node B .

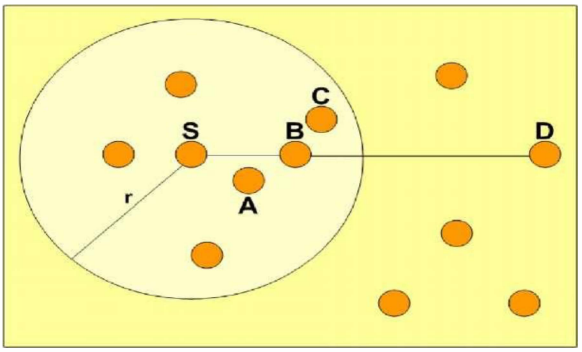


Figure 1. Greedy protocol

3. PROPOSED SCHEME

Greedy (MFR) just attends to distance deciding factor, and it does not attend to nodes conditions. This metric is not suitable for all conditions. If neighbor with most forward progress towards destination node has high speed, in compare with the source node or intermediate packet forwarder node speed (from Figure 2) or has very low remained battery power (from Figure 3), then packet loss probability will increase. It can be used other deciding metrics in addition to distance metric, to improve Greedy protocol and increase it's reliability, The metrics like power, velocity similarity. The proposed strategy introduces some new metrics to avoid loss of packets because of neighbor's high speed or low remained battery power, it uses combination (trade off between) metrics distance and energy routing protocol, to deciding about to which neighbor the packet should be given. In proposed strategy, the packet sender or forwarder node, selects some neighbor nodes which have forward progress towards destination node, and again selects some of them, which have more similar speeds to it's own speed (nodes with less speed difference with sender speed) and finally, selects one of them which has most remained battery power and sends packet to it. In Figure 2, if the proposed strategy is used to forward packet, node S sends packet to node C.

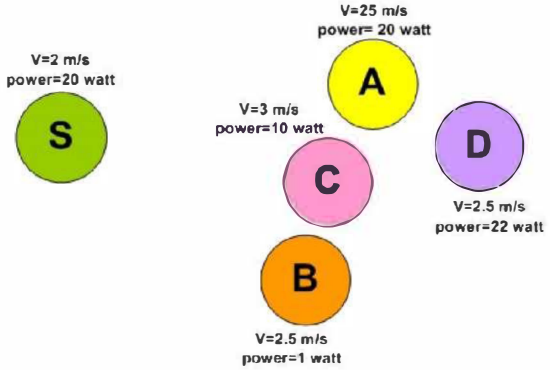


Figure. 2. Node (A) with most forward progress towards destination (D), has high speed in compare with the source node (S).

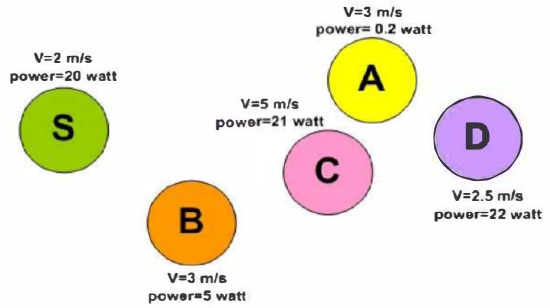


Figure. 3. Node (A) with most forward progress towards the destination (D), has very low remained battery power.

4. RESULT AND DISCUSSION

Table 1. Simulation Environment

Simulation environment	
Routing protocol	AODV
Simulation area	670m x 670m
Number of nodes	50
Simulation time	100 sec
Traffic type	CBR
Packet size	512 bytes
Energy	0 & 200 joules
Propagation path loss model	Two ray ground
Antenna used	Omni directional antenna

The simulation parameters shows that the scenario is created for 50 nodes by enabling AODV routing protocol, considering neighboring nodes (with & without energy), as shown in Figure 4. In this paper, the proposed Greedy strategy was implemented by using Network Simulator (NS-2). The simulation environment has been shown in Table 1.

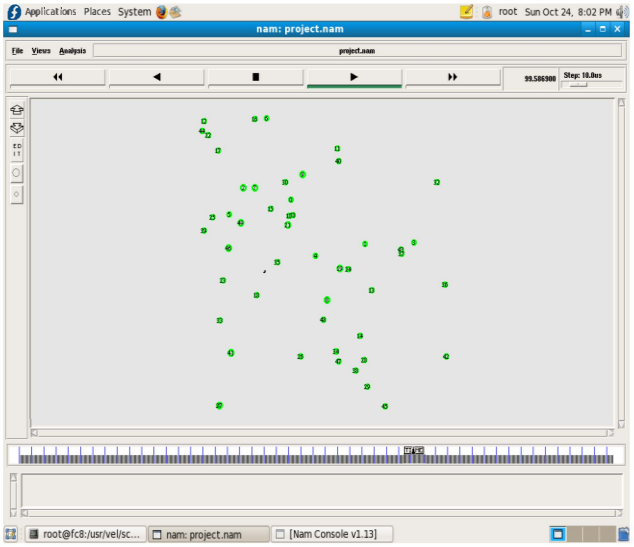


Figure 4. Simulation Scenario

In real network, each node finds its position by a positioning system like GPS, but in simulation, the energy is applied to every node, its position without any expense. Also, in real network and in simulation every node propagates its position to its neighbors, periodically. In real network, the packet source node finds the location of destination node by a suitable location server, but in simulation, we give position of destination node, to source node, without any expense. To simulate greedy (MFR), sender node calculates, the distance between it's neighbors and destination node, and sends packet to it's closest neighbor to destination node. In the simulation environment, the proposed strategy, sender node selects some (in this simulation, this number is 5) closer neighbor nodes to destination node, and again selects some (in this simulation, this number is 3) of them, which have more similar speeds to it's own speed (the nodes with less speed difference with sender node speed) and finally, selects one of them which has most remained battery power and sends packet to it. We define two scenarios, in the first one; neighbor nodes have low speed, in compare with the source node or intermediate packet forwarder node speed. In second one, the neighbor nodes have high speed, in compare with the source node or intermediate packet forwarder node speed. We simulated Greedy and proposed scheme and compared them by their packet delays and lost packets ratios.

A. The strategies Packet delivery Ratio.

The simulation results shown in Figure 5,the neighbor nodes have high speed, Greedy protocol has less packet delay. Because of lost packets, there will be less congestion and there are less packets, waiting in nodes queues, so received packets by destination node, have less delay.



Figure 5. Packet Delivery Ratio

B. The strategies node with energy and without energy

Figure 6 gives a comparative study of the nodes by considering with and without energy.

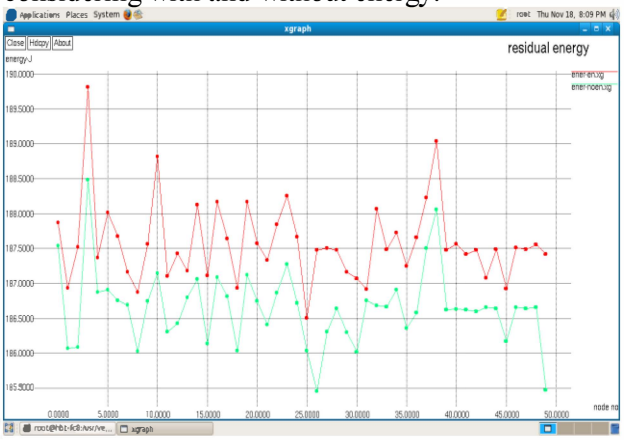


Figure 6 Node Vs Residual Energy

The residual energy of greedy protocol consumes less energy when compared to the node with energy.

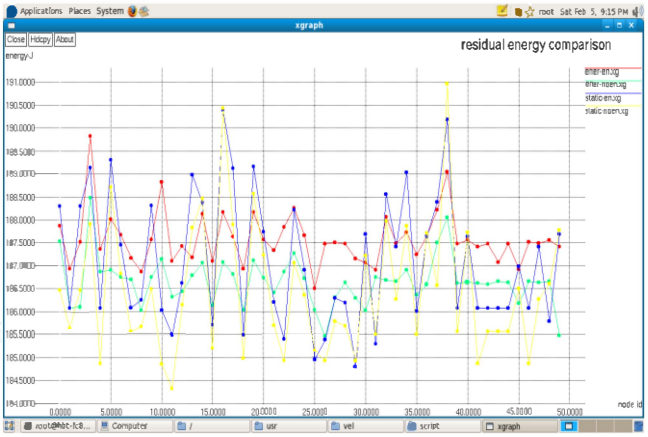


Figure 7. Node Vs Residual Energy (Over all)

The graph has plotted between energy Vs nodes for the following cases, by considering:

1. Static nodes with energy
2. Static nodes without energy
3. Dynamic nodes with energy
4. Dynamic nodes without energy

From the graph, by comparing static nodes with and without energy the average energy consumed by the static nodes was higher than the other conditions. By comparison, the dynamic node with energy consumes less power than the other three cases.

5. CONCLUSION

This paper considered a very important position based routing protocol, named Greedy. In one of it's kinds, named MFR, the source node or intermediate packet forwarder node, sends packet to it's closest neighbor to destination node. Using distance deciding metric in Greedy, is not suitable for all conditions. If closest neighbor to destination, has high speed (by compared with the source node or intermediate packet forwarder node speed) or has very low remained battery power, then packet loss probability is increased. This paper uses other deciding metrics in addition to distance metric, to improve Greedy and increase its reliability, the metrics like power, velocity similarity. The proposed strategy uses combination of (trade off between) metrics distance-energy routing protocol, to deciding about to which neighbor, the given packet should be forwarded. The simulation results show that the proposed strategy has lower lost packets average than Greedy, so it has more reliability. This work can further be extended to considering directional antennas instead of omni directional antenna for simulation environment of MANET.

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