A New Automatic Route Shortening for DSR

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Abstract

We suggest an enhanced automatic route shortening method for dynamic source routing (DSR) protocol. DSR is a request / response based protocol which has low routing overhead owing to node movement. The original automatic route shortening is performed on the only nodes that belong to the source route of packets. On the contrary, our suggested method allows all neighbor nodes hearing the packet to participate in automatic route shortening. It makes all possible route shortenings be performed. So we maintain maximal short routes of ongoing data connections. Simulation results show that our method pays small extra overhead for ARS, but increases the ratio of packet transmissions and ARS' are performed from 2 to 5 times as much as original ARS.

1. Introduction

With recently performance advancements in computer and wireless communications technologies, advanced mobile wireless computing is anticipated to see increasingly extensive use and application. The network scenarios cannot rely on centralized and organized connectivity, and can be conceived as applications of *Mobile Ad Hoc Networks*. A MANET is an autonomous collection of mobile users that communicate over relatively bandwidth constrained wireless links[1]. Since the nodes are mobile, the network topology may change rapidly and unpredictably over time. MANET nodes are equipped with wireless transmitters and receivers using antennas that may be broadcast.

In section 2, we will explain original DSR protocol. In section 3, our new automatic route shortening will be suggested and we will show simulation results in section 4. Finally we will conclude.

2. Overview of DSR protocol

The Dynamic Source Routing protocol is a routing protocol for ad-hoc networks, where all nodes in the network are mobile. The DSR protocol is a source-routed on-demand protocol. There are two major phases for the protocol: route discovery and route maintenance [2]. The Dynamic Source Routing is that the routing information is contained in the packet header. Because the routing information is contained in the packet header, hence the intermediate nodes do not need to maintain routing information. DSR is suited for small to middle sized networks as its overhead can scale all the way down to zero. The Dynamic Source Routing use a promiscuous receive mode, hence if a node sent packet, many node can know this happening. So we will consider this feature of DSR to develop our new mechanism.

3. Our New Automatic Route Shortening

In order to shorten the route, we have to discard some unnecessary hops. We will use an example to explain the mechanisms of original Automatic Route Shortening. The source node is node S. The destination is node D. In this example, protocol has already found the route from source to destination. It is the Path [S, B, E, F, J, D]. If node F overhears a message, the message is sent from node B to node E for later forwarding to node F, node F will return a *gratuitous* reply message to the original sender and gives the shorter route. This mechanism can shorten the route. So as you think it is original DSR Automatic Route Shortening mechanism. But we hope we can mention other Automatic Route Shortening mechanism, and we also hope our new Route Shortening mechanism can improve efficiency of DSR.

Because DSR uses a promiscuous receive mode, so if an initiator node send s a Request, in his broadcast range a lot of nodes can receive the Request. But many of them are not the target and also have not a usable route to the target. So they can' t Reply to initiator node. But when a Reply returns to initiator node, the neighbor node of initiator overhears the route. The neighbor node find, although it can' t reach to the target immediateness, but it can reach to neighbor of the target by using his route cache information. So it can return a Reply message to advise the initiator node, from my route cache you can find a shorter route. When the initiator node receives a Reply from its neighbor, it will realize perhaps this way is a better way. Consequently initiator node may use this way.

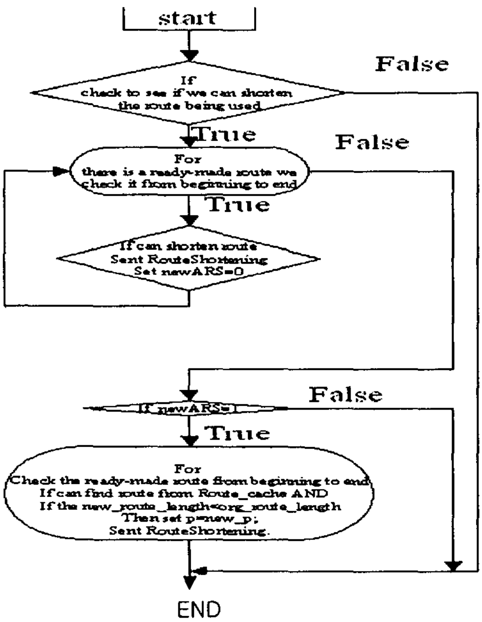

Figure.1 Our new ARS mechanism

Figure 1 shows the logic about our new Automatic Route Shortening.

4. Performance Evaluation

In this section, we evaluate our new Automatic Route Shortening protocol by comparing the performance with original DSR. We implement our proposed protocols using ns-2 [3], which is a discrete event-driven network simulator with support for assorted mobile ad hoc network routing protocol.

4.1 Simulation Environment

In our simulation scenario, a network with 30 mobile nodes is placed in a rectangular region of size 670 x 670 unit. The simulation time is 1000 seconds. The migratory speed of mobile node is 20 m/sec. We respectively define pause times are 100, 200, 300, 400 500, and 600 seconds.

4.2 Simulation Results

Figure 2 shows the overhead about our new Automatic Route Shortening by comparing the performance with original DSR Route Shortening.

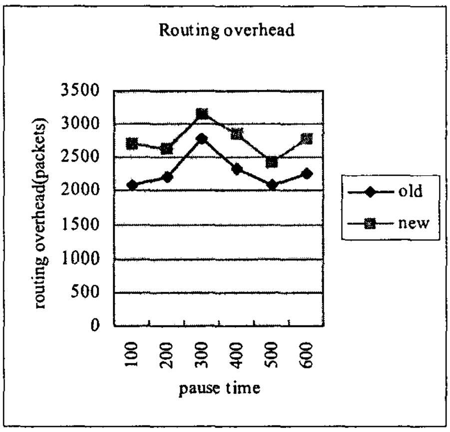

Figure. 2 Routing overheads

From figure 2, we can see that the overhead of new Automatic Route Shortening is not very higher than original Automatic Route Shortening. Consequently we can know that our Route Shortening Protocol does not waste a good many of overhead.

Figure 3 shows the packet delivery ratio about our new Automatic Route Shortening by comparing the performance with original DSR Route Shortening.

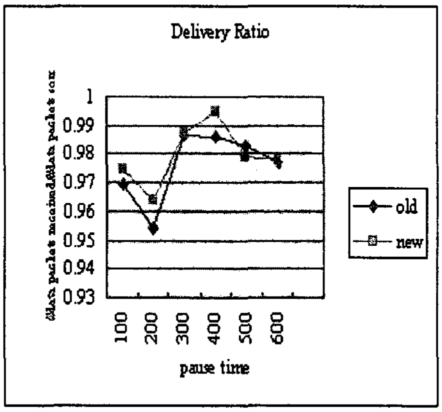

Figure.3 Packet delivery ratio

From figure 3, we can see that the packet delivery ratio of new Automatic Route Shortening is higher than original Automatic Route Shortening. Consequently we can know that our new Route Shortening Protocol doe s not lose so many packets. So by using our new Automatic Route Shortening can improve efficiency of DSR.

Figure 4 shows the number of Automatic Route Shortening packets of our new Route Shortening by comparing the performance with original DSR Route Shortening.

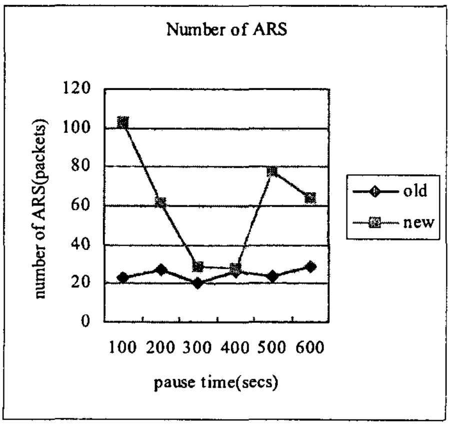

Figure. 4 Number of ARS Processing

From figure 4, we can see that the number of ARS is higher than original Automatic Route Shortening. Consequently we can know that our new Route Shortening Protocol can produce more ARS packets. So by using our new Automatic Route Shortening we can obtain more Automatic Route Shortening packets.

From our simulation result we can find that our new idea is better than original DSR' s Automatic Route Shortening.

5. Conclusion

In this paper, we propose a new Automatic Route Shortening protocol for Dynamic Source Routing. By comparing with original Automatic Route Shortening, we can find our new protocol' s efficiency is better than original one. Simulation results show that our method pays small extra overhead for ARS, but increases the ratio of packet transmissions and ARS are performed from 2 to 5 times as much as original ARS. Obviously by using our new Automatic Route Shortening, we can obtain more possibility from Route Shortening.

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