Fault Tolerant Routing Algorithm Based On Dynamic Source Routing*

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Abstract

A wireless ad hoc network is a decentralized wireless network. The network is ad hoc because each node is willing to forward data for other nodes, and so the determination of which nodes forward data is made dynamically based on the network connectivity. In this paper, we proposed new route maintenance algorithm to improve the efficiency and effective in order to reach destination node. In this algorithm we improve existing route maintenance in Dynamic Source Routing protocol, to improve the algorithm we make a new message we call Emergency Message (EMM). The emergency message used by the node moved to provide information of fault detection.

1. Introduction

On-Demand routing protocol has two kinds of routing. First is Source Routing, data packets carry the complete addresses from source to destination, no routing table in intermediate node, not scalability. DSR is an example of source routing. Second is Hop-By-Hop Routing, data packets carry the address of the destination and the next hop, all nodes maintain localized routing tables, scalability. AODV is an example of Hop-By-Hop routing.

Ad-Hoc routing protocols have two phases operation. The first is the route establishment, in this phase nodes broadcasts RREQ (Route Request) packet flooded by source node and RREP (Route Reply) packet returned to source node by destination or intermediate node. The second is route maintenance, in this phase consist of route reconstruction and route deletion.

Route maintenance in DSR triggered when a link breaks between two nodes along the path from source to the destination. To solve the link breaks source node erase the route from the cache and use another cached routes, or request a new route.

In our scheme propose a fault recovery system with an EMM (Emergency Message) that will be used to provide notice to the neighboring node that the node failed, so the node was no return to the source node to give error notice.

The rest of the paper is organized as below. Section 2 Related Works. Section 3 Design of New Algorithm. The last section concludes the paper.

2. Related Works

Dynamic Source Routing (DSR) has been proposed a routing maintenance algorithm. When route maintenance detects a problem with a route in use, the route maintenance phase is triggered when a link breaks between two nodes along the path from the source to the destination. Nodes that discover the break send a Route Error (RRER) to inform the source node about the broken link. Source node erases the route from the cache, and Use another cached routes, Or Request a new Route. Again, the route discovery phase is initiated to determine the most viable route. The route maintenance mechanism does not locally repair a broken link. Stale route cache information could also result in inconsistencies during the route reconstruction phase.

Ad hoc On-Demand Distance Vector (AODV) has been proposed a routing maintenance algorithm. A route is considered active as long as there are data packets periodically traveling from the source to the destination along that path. Once the source stops sending data packets, the links will time out and eventually be deleted from the intermediate node routing tables. If a link break occurs while the route is active, the node upstream of the break propagates a route error (RERR), message to the source node to inform it of the now unreachable destination(s). After receiving the RERR, if the source node still desires the route, it can reinitiate route discovery. When error is detected, Route Error RERR is sent to the source. New AODV discovery will be started. Node that detects next-hop failure sends Route Error message to upstream nodes of the affected routes

3. Design of New Algorithm

3.1 Assumption

1. Each node is seldom moving only 1% - 2% node in sensor field
2. Moving node knows its own energy capacity

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3. A node is aware of itself starting moving or stopping

We assume that all host communicate with other host within the ad-hoc network and each node is seldom moving only 1% - 2% node in sensor field, this means that only very few nodes are moving. Distance movement is very short from the previous node, Moving node occur only maximum two hops neighbor. Each node knows its own energy capacity, when the nodes energy capacity low or going down below threshold, the node broadcast its neighbor to send message.

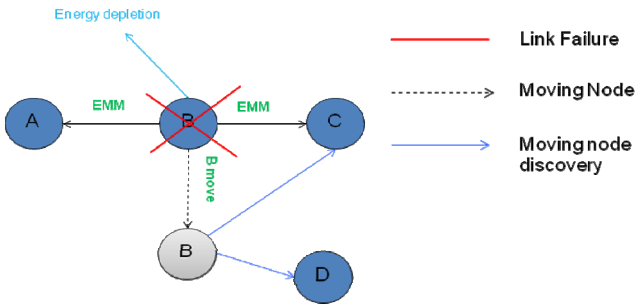
Hosts within the ad-hoc network may move at the time and if any hosts move the host give notice to neighbor. This means the moving node depend on limitation time that they use after updating its route cache information. If there is some node move, during node moving then stop broadcasting and after node move broadcast will be continue along with updating each nodes route cache.

3.2 Route Recovery

Node's movement can emerge link failure in the sensor field. Figure 1 show an example moving node. To detect the movement, before a node B moves to another place, it sends Emergency Message (EMM) to its neighbour nodes, to warn them about the future event about to happen. We assume that a node moves not further than 2 hops from initial location. The links to neighbours will be disconnected from the B node and it moves to the new location.

At the new location, B will do neighbour discovery, and declare its existence. It will update the route cache and if some previous neighbours still existed, it will keep the previous route data as it may be useful in the future. Meanwhile, the old neighbour of B still can use B as its path to Destination Node.

Let us call node A as the old neighbour of B. when A needs node B to send data to destination, A will do broadcasting to find current location of B. Then, ask if B is able to transmit data to destination. If, B says yes, then the route from A to B will be updated in A route cache, and will be used in the future data sending. In this process moving node knows own energy.



(Figure 1) Example of Route Recovery Process

3.3 Management of Route Cache :

1. Disconnected Neighbor Node

When the node received an emergency message, remove route to the sender cache in the cache, then wait for a certain time limit that do a broadcast to find location of moving node. Ask to the moving node if it is able to forward the data to the destination, if yes, add the route data to the cache.

2. Moving Node

Send Emergency Message to inform the neighbors of the node is moved. The node will moves to the new location. After moving node update neighbor data, delete absolute route of the old neighbor, and keep the usable exiting route to the destination

4. Conclusions

This paper has presented a new route maintenance algorithm in Dynamic Source Routing protocol. Route maintenance of existing algorithm indicates that maintenance mechanism does not locally repair a broken link. Stale route cache information could also result in inconsistencies during the route reconstruction phase. When error is detected, Route Error RERR is sent to the source. New AODV discovery will be started.

In our algorithm if there is Node's movement emerge link failure in the sensor field. To detect the movement, before a node moves to another place, it sends Emergency Message (EMM) to its neighbour nodes, to warn them about the future event about to happen, then moving node broadcast request to the neighbors. This algorithm can reduce the number of messages and recovery fault detection without returning to the source.

5. References

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