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New Modified AODV for MANET

Madhusudan G , Kumar TNR
Asst. Professor, Department of CS&E,SJCE,Mysore
madhusjce@yahoo.co.in
Asst.Professor,MSRIT,Bangaluru
tnrkumar@msrit.edu

Abstract: Mobile Communication is a wireless connection between two nodes which is having limited bandwidth and high rate of data disconnnection. So there is a requirement of new MANET routing protocol having low rate message overhead. Hence it is necessary to enhancement the performance of MANET. The reduction of routing overhead decreases the usage of bandwidth of the network. The increase of bandwidth will increase the throught and decrease the latency of the nodes of the network. This Paper proposes the new Routing Protocol which will increase the throughput,reliability and decrease the latency of the network.

1. Introduction: The mobile adhoc network[1] does not have any fixed infrastructure and base station of the network and thats why the name is used.There are many applications for ad-hoc networks like conferencing, emergency services, personal area networks, embedded computing, and sensor dust. A MANET is a network that allows direct communication of two nodes, when radio propagation conditions exist between two nodes. If there is no direct connection between the source and the sink nodes, multi-hop routing is used. In multi-hop routing, a packet is forwarded from one node to another, until it reaches the destination.

A routing protocol is necessary in adhoc networks; this routing protocol has to adapt quickly to the frequent changes in the adhoc network topology. Ad-hoc routing protocols are classified into three categories. The first category is Table-driven (Proactive) routing protocols such as DSDV [2], CGSR [3], GSR [4], FSR [5], and OLSR [6]. The second category is on-demand (Reactive) routing protocols such as AODV [7], DSR [8], ABR [9], SSA [10], and TORA [11]. The third category is Hybrid (Reactive and proactive) routing protocols such as ZRP [12] and ZHLS [13].

AODV is a well known on-demand routing protocol where a source node initiates route discovery when it needs to communicate to a destination that doesn't have a route to it. Once a route is discovered between the two nodes, data transfer occurs through until the route broken due node movement or interference, due the erroneous nature of wireless medium. Route maintenance initiated when a route failure happens between two nodes. The upstream node of the failure tries to find a repair to the route and this process called local repair.

This paper proposes a new adaptive routing protocol for MANET called AODVWLRT (AODV with Local Repair Trials). The AODVWLRT modifies the local repair algorithm used in the route maintenance of the AODV routing protocol. The AODVWLRT mainly reduces the routing message overhead resulted from the original AODV local repair algorithm. This enhancement leads to higher throughput,reliability and lower latency than the basic AODV.

2. AODV description:AODV is a widely researched protocol among the research community. Most of research effort has focused on simulations aimed at determining the performance of AODV, and also comparison in the performance of other ad-hoc routing protocols. Currently there exist several AODV implementations that comply with a varying degree to the protocol description.

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.

Route discovery process: During a route discovery process, the source node broadcasts a route request packet RREQ to its neighbours. If any of the neighbors has a route to the destination, it replies to the request with a route reply packet RREP, otherwise, the neighbors rebroadcast the route request packet. Finally, some request packets reach to the destination.This process will continue tll all the packets reaches the destination.

Routing tables: Each AODV node maintains a routing table, AODV deals with route table management. Routing table information must be kept even for short-lived routes, as they are created to temporarily store reverse paths towards nodes originating RREQs. AODV uses the following fields with each route table entry. Each node is having the information contains routing table entry contains the following information: Destination IP address, Destination sequence number, Next hop, Number of hops to reach destination (hoc count), Active neighbors for this route (precursor list), Expiration time for this route table entry, Routing flags and Network interface.

Maintaining Local Connectivity: Because nodes can move, link breakages can occurs frequently. If a node does not receive a Hello message from one of its neighbors for specific amount of time called Hello interval, then the entry for that neighbor in the table will be set as invalid and route error message (RERR) message will be generated to inform other nodes of this link breakage. RERR messages inform all sources using a link when a failure occurs. Each forwarding node should keep track of its continued connectivity to its active next hops, as well as neighbors that have transmitted Hello messages during the last Hello interval. A node can also maintain accurate information about its continued connectivity to these active next hops, using one of any suitable link layer notification, If layer-2 notification is not available, passive acknowledgment should be used when the next hop is expected to forward the packet, by listening to the channel for a transmission attempt made by the next hop to detect transmission within a specified interval (or the next hop is the destination) to determine connectivity. If a link to the next hop cannot be detected by any of these methods, the forwarding node should assume that the link is lost.

Local Route Repair: When a link break in an active route occurs, the node upstream of that break may choose to repair the link locally. During local repair data packets should be buffered. If, at the end of the discovery period, the repairing node has not received a RREP (or other control message creating or updating the route) for that destination, it transmits a RERR message for that destination. On the other hand, if the node receives one or more RREPs (or other control message creating or updating the route to the desired destination) during the discovery period, it first compares the hop count of the new route with the value in the hop count field of the invalid route table entry for that destination. If the hop count of the newly determined route to the destination is greater than the hop count of the previously known route, the node should issue a RERR message for the destination, A node that receives a RERR message with the ’N’ flag set for not deleting the route to that destination.Then the originating node may choose to reinitiate route discovery. Local repair of link breaks in routes sometimes results in increased path lengths to those destinations. Repairing the link locally is likely to increase the number of data packets that are able to be delivered to the destinations, since data packets will not be dropped as the RERR travels to the originating node. Sending a RERR to the originating node after locally repairing the link break may allow the originator to find a fresh route to the destination that is better, based on current node positions. The TTL of the RREQ should initially be set to the following value:

Max(MIN REP AIR T T L, 0.5 ∗ #hops) + LOCAL ADD T T L ....(1)

Where MIN REPAIR TTL is the last known hop count from the upstream node of the failure to the destination. #hops is the number of hops from the upstream node of the failure to the source of the currently undeliverable packet. LOCAL ADD TTL is a constant value.

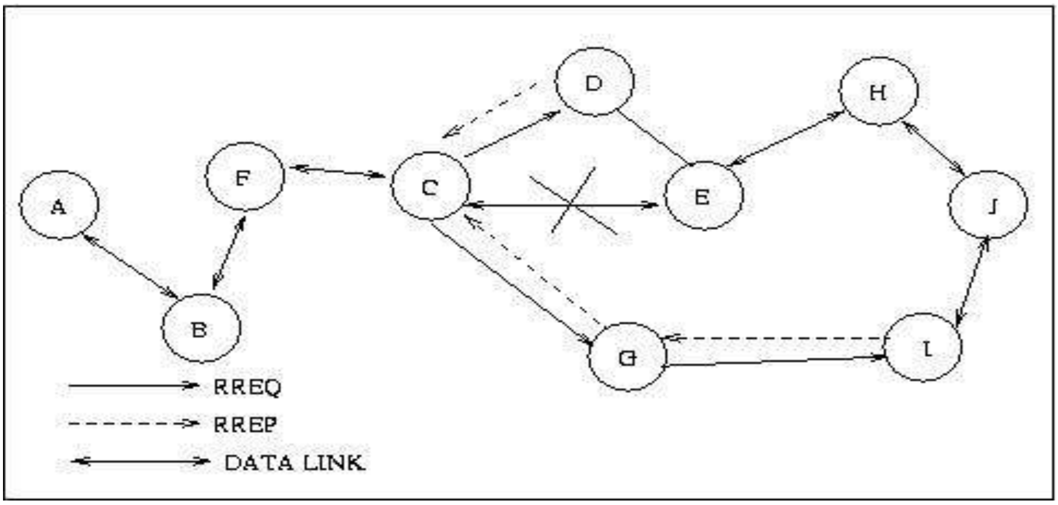

Figure 1.1 with RREQ, RREP, and Data Link

Description: As shown in above figure, there is a route ABFCEHJ. The relative mobility of node c and node E results in the link breaks between them. Node c would set the route leading to node j as invalid and c instead of sending RERR back to source node carries out local repair. For the local repair, If node D receives RREQ and has a route to node j, it will return RREP and establishes a route entry in its routing table with j as its destination node and E as its next one hop node. Similarly G also receives RREQ and has a route to node j, it will also return RREP and establishes a route entry in its routing table with j as its destination and i as next one hop node. In this way Local Route Repair process is completed.The REPLY is sent back to the source node, which contains number of hop information. The source node sends the data using the shortest route.

New Proposed Algorithm 1: Link Failure Detection and Local Route Repair

```
begin
      {
            Node checks NPL and PDT Table periodically
            if  link strength is ≥ LFTHRSH  then
            do not set LFF
            else
            Let the LFF of the link to one
end
Node checks LFF of the link
if   it is set then
Broadcast RERR
Perform Local route repair
else
Do not Broadcast RERR
end
Let the LFF of the link to zero
end
       }
```

3.0 Results: The Results are shown Considering undirected graph and Directed Graph. The algorithm works fine considering both types of connected graph.In Figure 2.1 first graph shows all possible paths from source to destination. The second graph shows the from source A to destination F.

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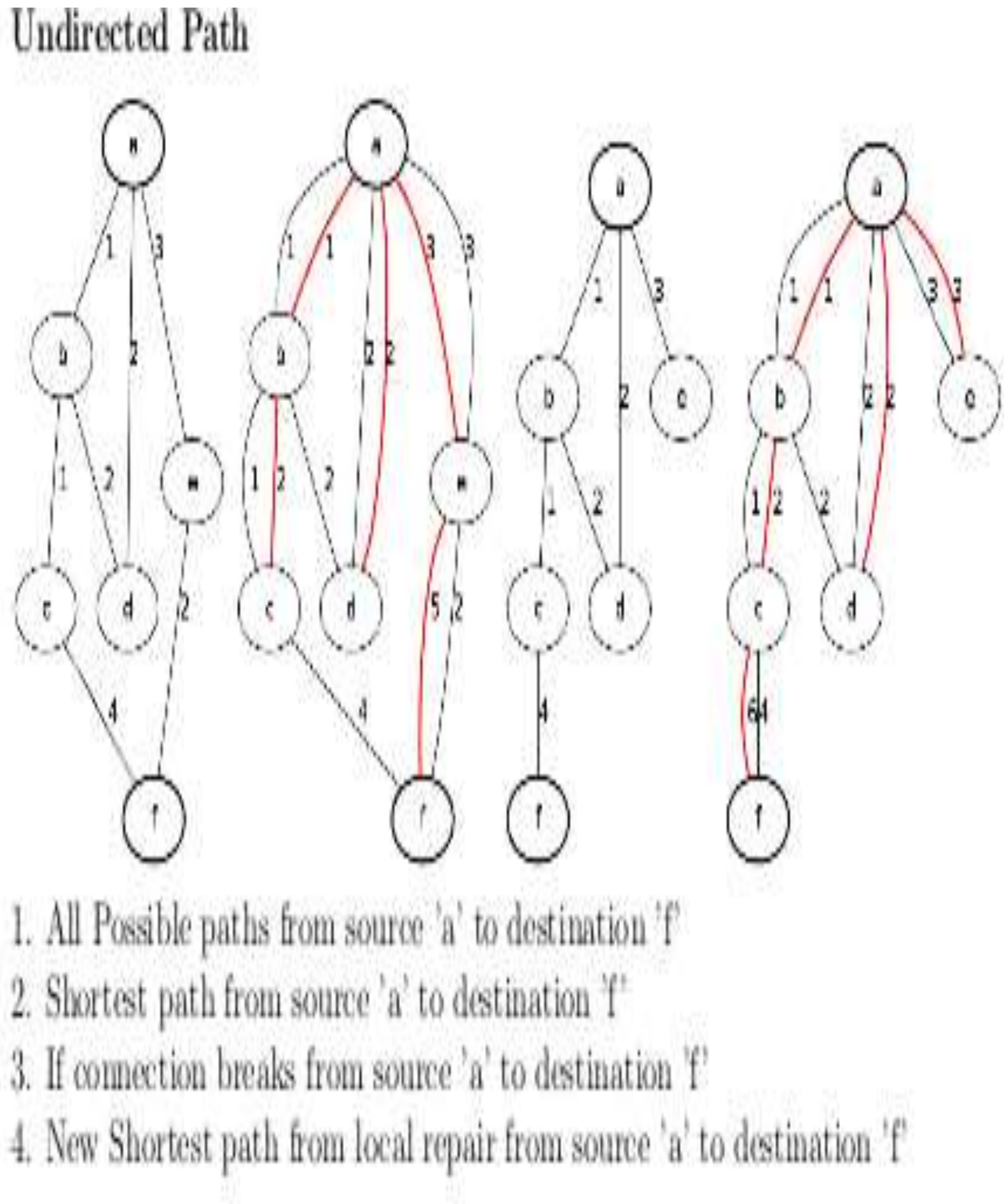

Undirected Graph

Figure 2.1 shows all Possible Paths from Source to Destinaltion for the undirected graph

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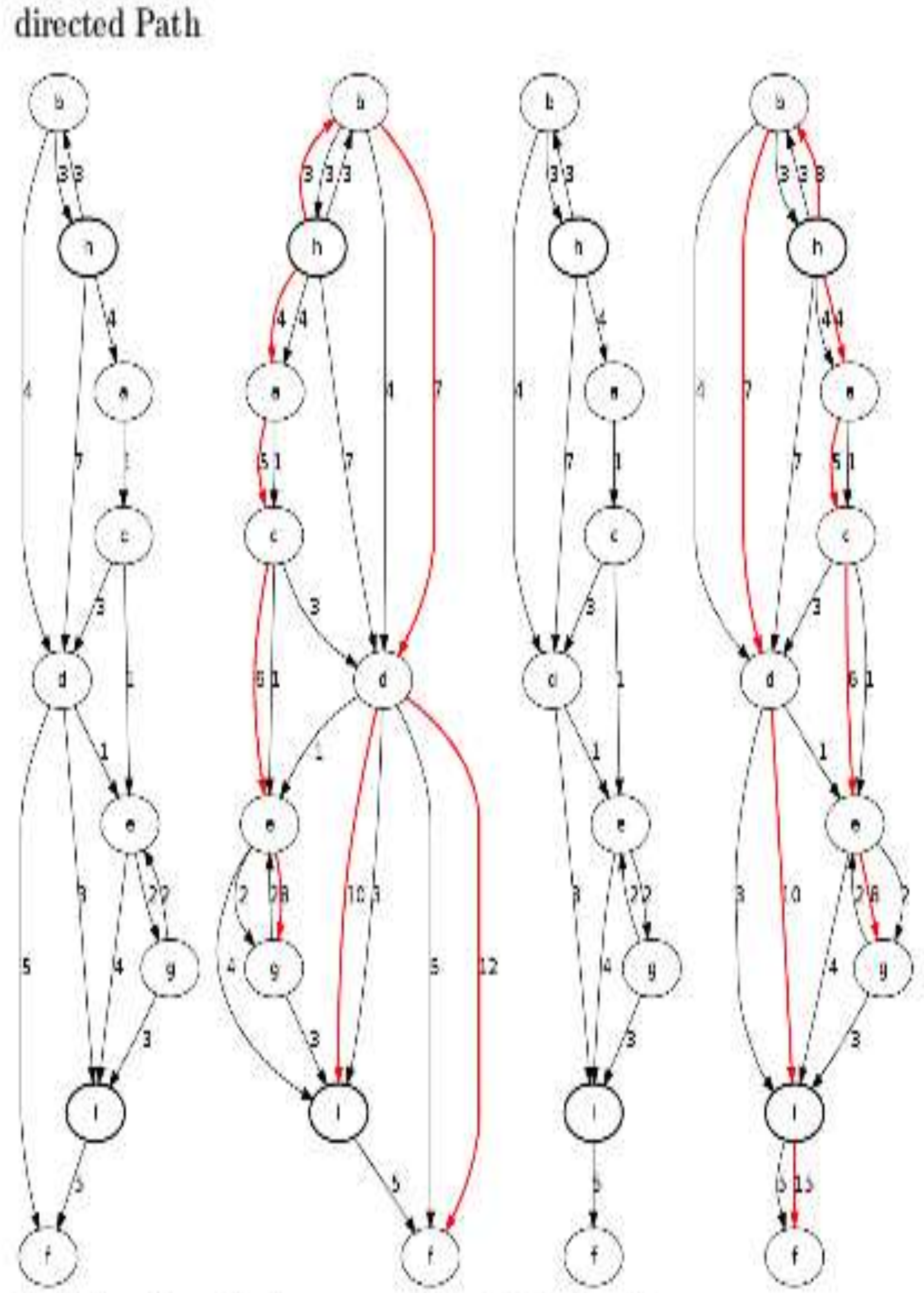

Figure 2.2 New Shortest path from local repair from source 'b' to destination 'f'

4. Conclusion: The simulation of the local repair and shortest path finding for MANET is done. The reduction of the routing

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message overhead will decrease the wasted portions of bandwidth that used for exchange routing messages between nodes, and increase the bandwidth available for transmission of data,which in turn increases the network throught and decreases the latency.

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