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RESEARCH ARTICLE

Local Recovery Based Route Maintenance (AODV-LR) for AODV Routing Protocol

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Abstract - Ad hoc network is a collection of two or more mobile nodes that are equipped with wireless communications and also having network capability. It is an adaptive network. When there is a need in order to formed as well as deformed on the fly. There is no centralized administration. Based on update mechanism, the ad hoc network can be classified into three types. They are proactive, reactive and hybrid routing protocols. In this AODV is one of reactive routing protocol. This paper mainly concentrates on Route maintenance phase of AODV. In this work we suggest a new approach called AODV-LR. It includes the concept of local recovery with AODV. This approach will used to reduce the transmission time in case of path breakages occur and also it provides better packet delivery ratio. The proposed concept will increase the performance of AODV routing protocol.

Keywords — MANET, AODV, Route Discovery, Route Maintenance, Local Recovery, AODV-LR

I. INTRODUCTION

MANET is a self-configuring network. It does not have any infrastructure. MANETs allows portable mobile devices to establish communication path without having any central infrastructure [7]. In MANET the nodes are mobile. Mobile Ad hoc networks (MANETs) [6] are decentralized and also mobile nodes are act like as router and also as host. It does not have any standard services. The node movements are unpredictable in this network.

A mobile ad hoc network (MANET) is a self-configuring network made up exclusively of mobile hosts connected by wireless links to form an arbitrary topology [4]. The idea of MANET is also called infrastructure less networking [8].In this MANET every node acts like a router. The main challenges of MANET are node mobility and then dynamic topology. In this paper section I show Introduction, section II show existing route maintenance of AODV, section III show proposed work, section IV show Experimental study, and section V shows Conclusion.

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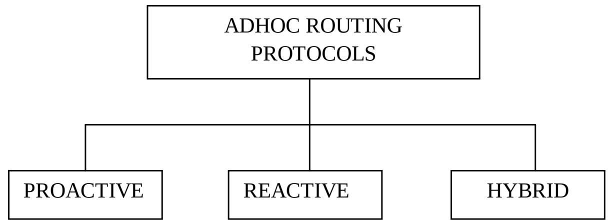

Fig.1 Classifications of Routing Protocols

Ad hoc On-Demand Distance Vector Routing:

Ad hoc On-Demand Distance Vector (AODV) [3] which stands for Ad hoc On Demand Distance Vector Routing. AODV is related to the Bellman –Ford distance vector algorithm [2]. It is one of the reactive routing protocols. It supports unicast as well as multicasting. In AODV, the packet size is constant. It is suitable for highly mobile networks. It creates routes based on on-demand approach. AODV consists of two phases. They are namely,

1. Route Discovery Phase
2. Route Maintenance Phase

A. Route Discovery Phase:

In route discovery phase there are two packets are used. They are RREQ and RREP. The RREQ packet contains six fields. They are SrcID, DestID, SrcSeqNum, DestSeqNum, BcastID, TTL. Set a timer that waits for reply. Many distance vector routing protocols suffer from a condition called Count to infinity [1]. In AODV, Each node maintains a unique sequence number which is differed from other nodes. The sequence number is used to denote the freshness of the link. When its sequence number is incremented, at that time another RREQ is generated or it generates RREP. In case it receives more than one replies, it will selects the route with the largest destination sequence number. Suppose, more route replies have same sequence numbers, the node will selects the path with minimum number of hops to the destination node. The receiving node checks the table [5] whether it contains the destination node's information.

II. EXISTING AODV ROUTE MAINTENANCE

In AODV, the nodes are mobile. Because of the unpredictable movements of the nodes, the link may be broken. In route maintenance phase, the HELLO packets are used to find and watch the links to the neighbour nodes. In this case, each node will propagate periodic HELLO packets to its all neighbour nodes in the network.

When a smashed link was found, the upstream node will broadcasts a RERR message to its all predecessor nodes. Again, it starts up the route discovery process. For that purpose it will sends the RREQ again. Once the source node gets the RERR, it can reinitiate route discovery if is still requires broken [9].

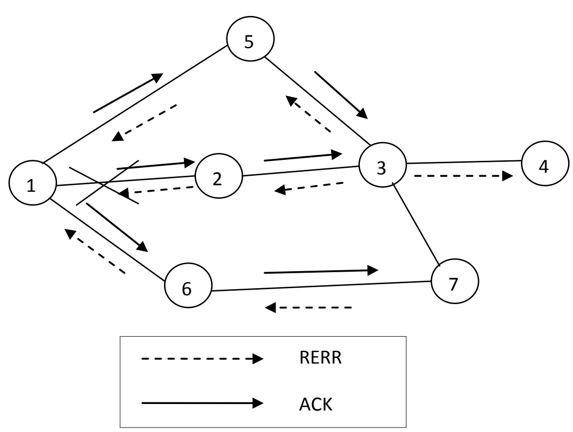

Fig.2 Existing Route Maintenance

III. PROPOSED ROUTE MAINTENANCE

A. Multi Path Label Switching:

Multi-Protocol Label Switching (MPLS) is a mechanism that is used for telecommunication networks. It transfers data from one network node to the short path link long network addresses. MPL have a concept of Local Recovery in case of path breakage occurs. The local recovery scheme provides the speedy data transmission. This scheme is implemented in our proposed work.

B. Proposed work

The aim of any local recovery mechanism [11] could be smashed links in a path that diminishes control aloft and select well founded paths.

The main goal of local recovery is to repair a smashed link in a fast manner and also implementing bandwidth efficiently by sustaining minimum aloft. So a routing algorithm with local recovery could have the backing individuals.

- Restore with cached routes when obtainable.
- Restore with local error recovery when stored paths are not obtainable.
- Make use of bandwidth efficiently.

Make use of both cached routes and local error recovery mechanism [11], is necessary for giving fast recovery in ad hoc networks. Using route catches, two advantages are available. They are,

- If a path breakage occurs, an alternate path is immediately obtainable.
- Employing route caches can gives limited control aloft that is needed to repair a path.

It is essential to reduce the effects of a smashed link on future transference by repairing all paths that currently use the smashed link.

C. AODV-LR Approach:

Using LR scheme in AODV, route maintenance phase, it can boost up the fast route recovery process in AODV, because the recovery process is initiated by the detecting node.

When there is a path breakage or connection loss occurs, the intermediate node will send RERR message only to the neighbour node, not sending to all other intermediate nodes in the network.

After receiving the RERR, the intermediate node will check the backup path list from the backup path table which it has. And then transmit the data packets through the alternate new path. This may be done by the intermediate node in the network.

This approach helps to reduce the transmission time of packets during the path breakages in the network. This approach is used to provide a better packet delivery ratio. Bandwidth utilization can be reduced by using this new approach. Routing overhead is also reduced.

This AODV-LR is also used to reduce the rate of occurrence of RREQ floods activated by smashed links.

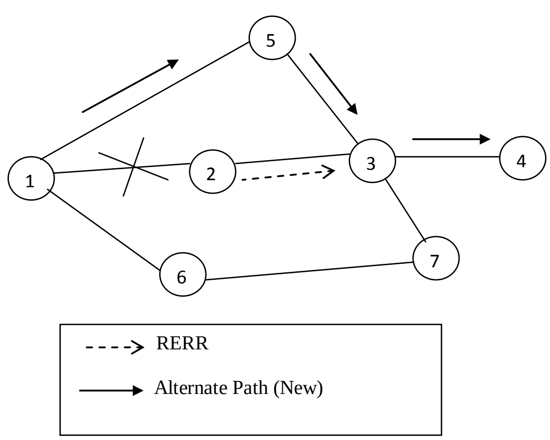

Fig.3 Proposed AODV-LR Approach

TABLE I

BACKUP PATH TABLE

Source	Destination	Neighbour Node	Possible Alternate Paths
1	4	3	1-7-8-3-4
1	4	3	1-5-3-4

In the above AODV-LR route maintenance approach figure shows the all possible paths between the intermediate node and the destination node.

This backup path does not store all the possible paths. It only stores the best and efficient path that is it checks the two metrics namely hop count and the signal strength (stability). Based on that metrics, it finds the alternate path from backup path table.

So, it gives the efficient packet delivery ratio as well as it uses minimum bandwidth.

D. Algorithm:

Start

Step 1: Route Establishment Phase

Step 2: Data Transmission

Step 3: During data transmission,

  If path breakage,

  Do step 4, 5, and 6

Step 4: RERR

Step 5: Fetch the new path from the backup path table.

Step 6: Go to Step 2

Stop

Based on the steps, the above algorithm is used to find the new alternate path from the backup path table.

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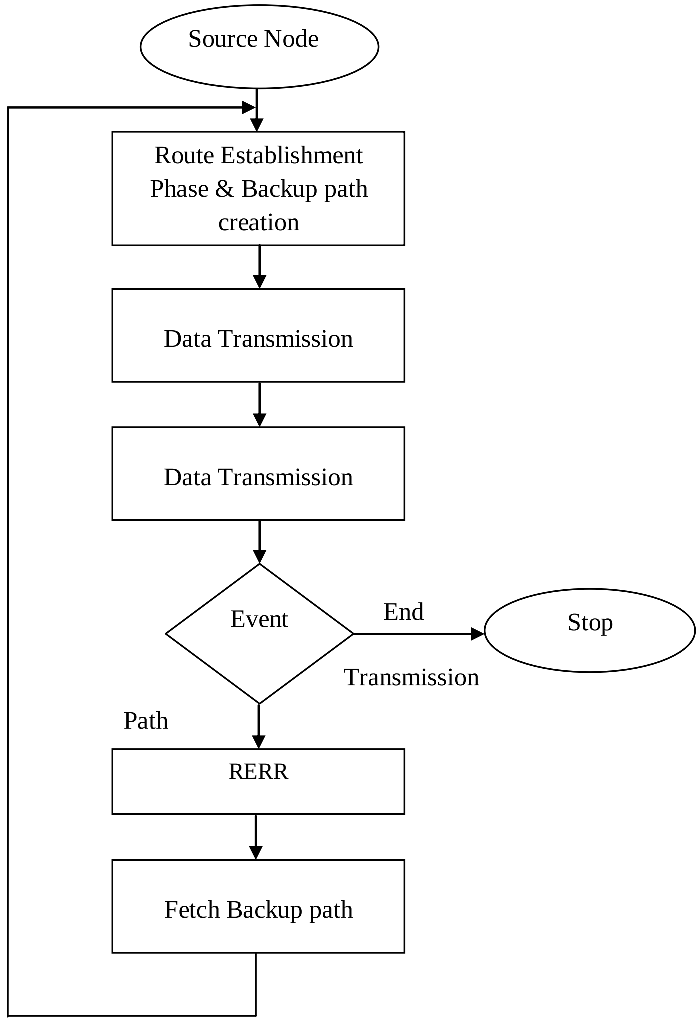
E. Flow Chart:



IV. EXPERIMENTAL STUDY

In case of path breakage, the above figure shows the transmission times:

A. Existing AODV:

For 7 nodes, transmission time 2ms can be taken by AODV. For 15 nodes it takes 3.9 ms, for 30 nodes 7.5 ms and for 60 nodes 15.5 ms.

B. Proposed AODV-LR:

AODV-LR increases the speed of data transmission time of the network. Here, the RERR message transmission time is 0.1 ms and 0.5 ms can be taken by AODV-LR for sending the data packets through the new alternate path. After, the path breakage the total data transmission time is 0.6 ms for 7 nodes. After increasing the nodes level it provides the rapid transmission time differences. For 15 nodes it takes 1.1 ms, for 30 nodes 2.6 ms, and for 60 nodes 5.2 ms. It shows the improvement of data transmission time. It gives 75% better performance when compared to classical AODV route maintenance.

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TABLE II

TRANSMISSION TIME OF AODV AND AODV-LR

Nodes	7 Nodes	15 Nodes	30 Nodes	60 Nodes
AODV	2 ms	3.9 ms	7.5 ms	15.5 ms
AODV-LR	0.6 ms	1.1 ms	2.6 ms	5.2 ms

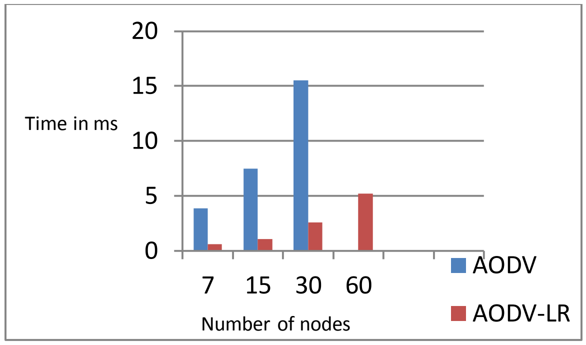

Fig. 4 Transmission time for Existing AODV vs. Proposed AODV-LR

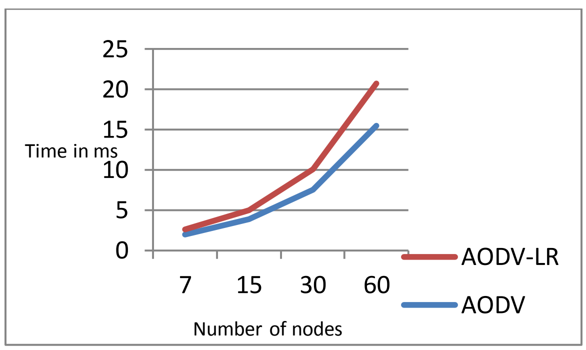

Fig.5 Transmission time for Existing AODV vs. Proposed AODV-LR

V. CONCLUSIONS

In this paper, we proposed one new scheme AODV-LR for route maintenance. This approach is introduced to enhance the performance of AODV routing protocol when there is a path breakage occurs. In route maintenance phase of AODV, this approach is helps to improve the efficiency. This concept always provides a fresh and better path. Because, hop count and signal strength is the two metrics are used by this new approach. So, this will give a best and efficient path based on that metrics. From the above simulation results the performance of AODV with Local Recovery Scheme works better than the classical AODV. These results will estimates the overall performance of route maintenance in AODV. The disadvantages of AODV in terms of control overhead, as well as bandwidth consumption, were overcome. AODV-LR provides the better packet delivery ratio as well as reduces the data transmission time when compared with existing AODV.

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