Efficient Resource Conservation Design in Mobile Ad hoc Networks Using Reactive Routing Protocol

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***Abstract*--Mobile Ad hoc Network is a compilation of wireless mobile terminals that are in contact with each other in the absence of a permanent infrastructure network. This gives a irregular formation. Many resources like power, energy, reliable data delivery and end to end delay plays a significant role in the network. But due to the dynamic movement of nodes, power management and energy conservation stands as a critical area. This is also due to the limited battery power and the maximum utilization of power by the nodes in the network .The responsibility of saving power has increased and it is possible by minimizing the consumption during the routing process. It is done in order to expand the lifetime of the network. In view of such a vital position, we introduce a new algorithm using an MAODV(Modified Ad Hoc On-Demand Distance Vector Routing Protocol) protocol which exactly concentrates on power awareness at the time of route selection. Power status of each and every node is observed to avoid excess consumption. It also makes sure that there is a rise in the speed of route selection and discovery process. Route Patch-Up scheme used in this algorithm results in optimum utilization of power using an Modified AODV (MAODV) protocol. Thus the idea proposed provides better performance through simulation over NS2.**

***Keywords*—AODV, MANETs, Power Management, Packet Delivery Ratio, End delay.**

I. INTRODUCTION

Ad Hoc network is a self helping system where decision of formation and deformation of the network is organised among themselves. This network has the capabilities of forming routes only when required by a source node having data packets for delivery. Nodes in this network can roam around randomly throughout the network.

Ad Hoc routing protocols can be branched into Table-Driven(proactive), On-Demand (reactive) and hybrid categories. DSDV(Destination sequenced distance vector) and CGSR(Cluster Head Gateway Switch Routing) are popular protocols under table-Driven routing. Each node in this routing maintains routing table that contains the routing information of all other nodes in the network. It has a greater advantage of high speed route discovery, but large bandwidth is consumed along with rapid changes in the topology. As unused information of other nodes is also maintained, bandwidth occupancy is more. Whereas AODV, DSR (Dynamic Source Routing), TORA, falls under On-Demand routing. In this case ,the routing information of the nodes is not collected and maintained. Only necessary details of the nodes in the chosen path is maintained.

Few like power i.e, (battery power is used most regularly), energy etc are major requirements but they remain constrained. Applications that runs using MANETS such as in exhibitions, conferences, meetings where temporary network formation is required, and also in military applications where communication is needed in emergency between soldiers in land and air. As battery life is reduced, the lifetime of the nodes in the network also remains only for a short period. Considering these factors, power consumption must be brought to a stage of declination at the time of selection of routes and while altering the broken links due to uncontrolled traffic among nodes.

II. EXISTING WORK

A.Issues

Regular distribution of Medium access control and its shared use in the network avoids collision. But high mobility and decentralized property in ad hoc networks results in collision which affects MAC property. Packets transmitted experiencing collision give rise to broken routes. So retransmission, repair has to take place causing delays.On demand routing protocols do not maintain the topology information. They build up paths only when required by source node for delivery of packets using connection establishment process AODV, DSR, etc are on demand protocols they use sequence numbers to ensure the freshness of the route.

Flooding of route request takes place throughout the entire network without any information of nodes and path efficiency. This increases power consumption. Further working on corrupted paths obtained due to collision and traffic to result in an energy efficient path also ends in rise of excessive delay and power usage

B.Protocol used

AODV protocol usually plays only on demand .it differs from other on demand protocols by using destination sequence number which declares which route to be selected. Main principle it follows is destination sequence number of the received data packet must be greater than of the destination sequence number already present. Route Error Messages are used. these messages are forwarded to source node on identification of link break. Re-establishment of routing process is performed again.

III. PROPOSED PLAN

To obtain a path having more stability and increased network lifetime a Modified AODV(MAODV) protocol is used. When a broken route is discovered, usual AODV rediscovers a new path informing the source node and re-establishment of the entire process takes place. Otherwise the delay causing route rectification keep taking place. Avoiding all this delay, exceeding power loss, Modified AODV protocol using a route patch up scheme is implemented in this proposed scheme.

A.Operation of the MAODV

When a source node (A) has data packets to be delivered to a particular destination (J), a usual AODV protocol selects a particular path for the travel of data packets and sends it. At the time of delivery, if any link break(between nodes D and E) is detected on comparing the destination sequence number ,Route Error Messages are sent back to source node indicating the link break so, Re-establishment of routing takes place but in case of the Modified AODV protocol this re-establishment process is avoided as the neighbour nodes of the link break take in charge of delivering the packets provided, they have the availability of route to destination(J) that which reduces delay ,increases the speed of delivery ,optimized consumption of power is provided etc.

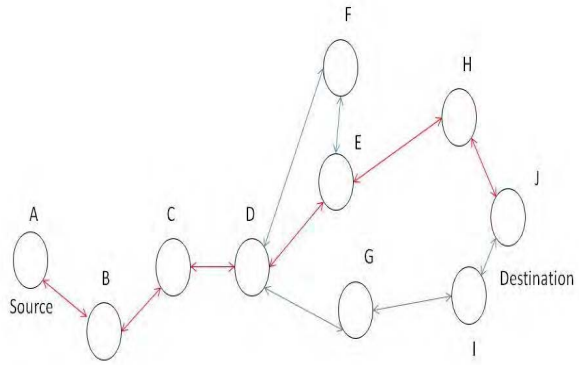

Fig.1 Data transmission setup

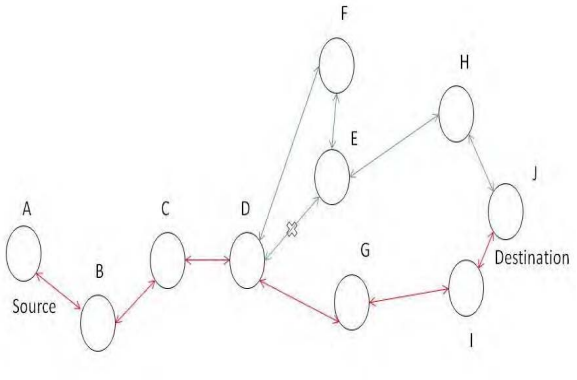

Fig.2 Local route Patch Up scheme

B.Proposed algorithm

Step1: Source node(A) (when needs to deliver a packet to a particular destination(J)) floods the route request (RREQ) to entire nodes in the network

Step2:A link Threshold value (LT) is chosen and a efficient path(ABCDEHJ) is set if link strength(LS) > LT, sending back with a route reply(RREP).

Step3: If (LS<LT) link failure takes place (between nodes D & E), modified AODV(MAODV) uses local route patch up scheme (LRUP).

Step4: Neighbour nodes checks for any possible route to destination (F & G), if so makes entry (next hop information and destination node) in its routing table.

Step5: After it makes entry neighbour nodes sends back RR'EP to the source node.

Step6: Source node selects the shortest route from the hop information in the routing table.

Step7: Packet is delivered to the corresponding destination with a reduced end to end delay and with low power consumption

IV. PERFORMANCE EVALUVATION

In this paper our proposed algorithm is simulated through the customized simulator. We consider the area of 500*500 square metre with fixed number of 50 mobile nodes. By varying the parameter of mobile nodes we get the output to show the reduction of end to end delay during the transmission.

In our expected results we vary packet delivery ratio with pause time to show the performance of our proposed algorithm .Thus our result shows a better improvement of power management by reducing the end to end delay using modified AODV compared to the normal AODV.

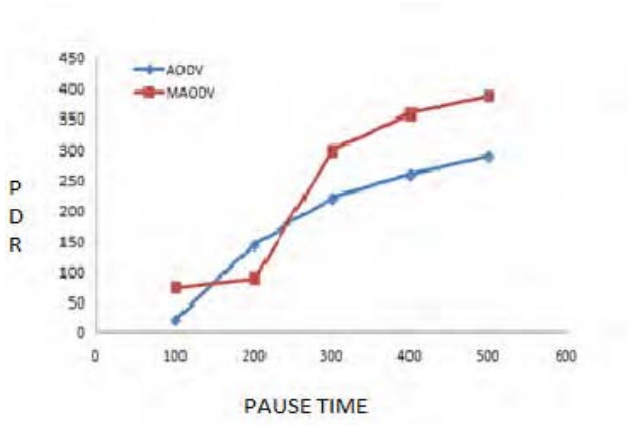

Fig. 1: Packet Delivery Ratio

Packet delivery ratio using pause time as a parameter is depicted in Fig. 1. Pause time is varied from o to 600 seconds. Results show that on usage of 50 mobile nodes packet delivery ratio of MAODV outperforms AODV.

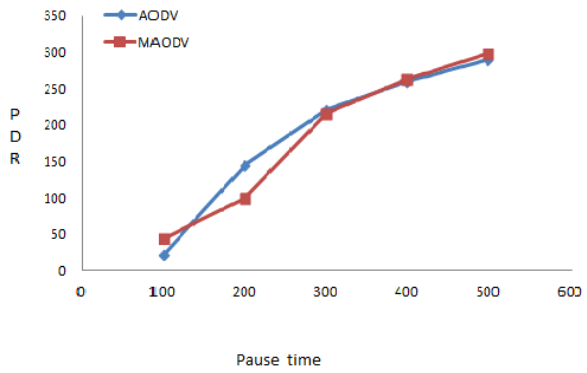

Fig. 2: End to End Delay

Fig. 2 depicts the amount of delay in the delivery of the packets and it is almost nearer in both the protocols AODV and MAODV compared. But delay value becomes negligible as the number of packets delivered to the destination node is high

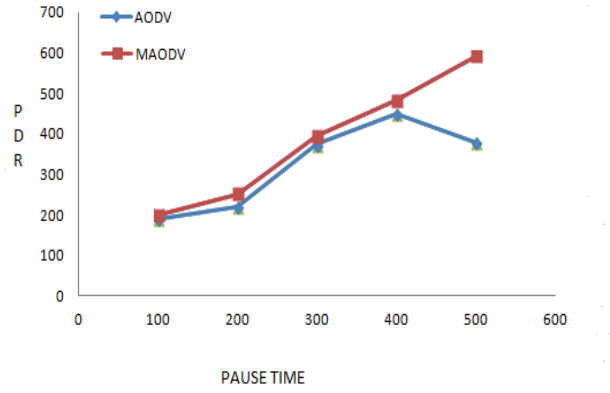

Fig 3: Throughput

Fig. 3 depicts the Throughput efficiency for MAODV shows a better performance than the normal AODV protocol by varying the packet delivery ratio with pause time for 50 mobile nodes

V. CONCLUSION

Route selection depends on the battery strength of the neighbouring nodes. As the neighbour nodes take the responsibility of delivering the data packets to the desired destination on broken link, the loss of data packets is avoided and results in better packet delivery ratio. Power management plays a major role in mobile ad hoc networks as a critical challenge. Reducing end to end delay can be used to overcome this critical challenge. In this paper our proposed algorithm using MAODV shows the better performance of power management by using the route patch up scheme when compared to normal AODV process.

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