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Energy Aware Routing Protocol for MANET

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***Abstract* - *MANET* is mobile adhoc network which is relay on power of network. Battery is important factor in Manet. Manet is collection of nodes which are move freely and changing the topology of network. AODV is on demand protocol. Energy of nodes is effect of network lifetime. Blind flooding in AODV which are improving contention in network also it increased higher number retransmission. In the proposed algorithm which modifies the conventional AODV which find more stable path improve the performance better than conventional AODV.**

***Keywords* - AODV Routing Protocol, MANET**

I. INTRODUCTION

A mobile ad hoc network (MANET) is one subsist of a set of mobile hosts which can operate separately with-out infrastructure base stations[1].Due to no need for any fixed infrastructures, MANET can help communications in the situations that it is hard to deploy base stations, such as battlefields, disaster areas, and etc. It is also a prospective candidate to solve the "last-mile" problem for broadband Internet service providers.With these characteristics, MANET has attracted a lot of attention recently[2]. The Ad hoc On Demand Distance Vector (AODV) routing algorithm is a routing protocol designed for ad hoc mobile networks. AODV is capable of both unicast and multicast routing. It is an on demand algorithm, meaning that it builds routes between nodes only as desired by source nodes. It maintains these routes as long as they are needed by the sources. Additionally, AODV forms trees which connect multicast group members. The trees are composed of the group members and the nodes needed to connect the members. AODV uses sequence numbers to ensure the freshness of routes. It is loop-free, self-starting, and scales to large numbers of mobile nodes.To find a route to a particular destination node, the source node broadcasts a RREQ to its immediate neighbors. If one of these neighbors has a route to the destination, then it replies back with a RREP. Otherwise the neighbors in turn rebroadcast the request. This continues until the RREQ hits the final destination or a node with a route to the destination. At that point a chain of RREP messages is sent back and the original source node finally has a route to the destination.

II. RELATED WORK

Link Stability And Energy Aware Routing Protocol(LSEA)

In this technique,ourfocus is mainly in showing how to improve the route discovery process whenever a source node attempts to communicate with another node for which it has no routing information.

$$LET = \frac{-(a+b) + \sqrt{(a^2+c^2) + c^2 - (ad-bc)}}{a^2+c^2}$$

Where

$a = v_i \cos\theta_i - v_j \cos\theta_j$, $c = v_i \sin\theta_i - v_j \sin\theta_j$

$b = x_i - x_j$, $d = y_i - y_j$.

We get the link lifetime between any two nodes using equation. When the link lifetime between any two nodes equal , that imply after 1 second the link between those two nodes will breaks.In LSEA, when there is data to transmit, the source nodebroadcast a RREQ, the neighboring nodes decides whether to forward the RREQ based on its remaining battery as well as the expiration time of the link with the RREQ sender. In essence, simplicity, together with effectiveness, is one of the major goals of our work. Our LSEA is different from all previous work in a way that on receiving a RREQ at any node, it can decides immediately whether to forward the RREQ or not based on its remaining battery as well as the expiration time of the link with the RREQ sender, rather than all nodes forward any RREQ and give the destination a chance to select one RREQ that contain nodes having a good link lifetime among them in case of link lifetime used as metric or that contain nodes having a good power level in case of power used as metric. Hence in LSEA the question rose up, why the node forward a RREQ while the link lifetime with the RREQ sender going to break and can't reach the RREQ sender to send back a RREP or the node energy level is very low and this node going to die soon. In addition, sending any RREQ will incur more overhead and at the end only one RREQ will select to create a path throught it.

For instance in Fig. when S tries to sends data to D with no data available for D in S routing table. S broadcast a RREQ packet and all its neighbors will receive this packet. In conventional AODV, nodes 1, 2, and 3will rebroadcast the RREQ if they don't have a valid route to D.LSEA node 1 will check the link lifetime with S. Node 1 find out that a link lifetime is good (more than 3second). Then it will go to check the second condition which is the energy level. Node 1 finds out that it has very low energy level. Simply according to our scheme it decides to discard the received RREQ. The same thing will happen with node 3, as it has a good energy level (more than 3) but the link lifetime with node S is very weak and likely will broke after 2 second. So, node 3 will decides to discards the RREQ. In this example the only node allow to rebroadcast the RREQ is node 2 as it satisfied our requirement for energy level and the link lifetime[6].

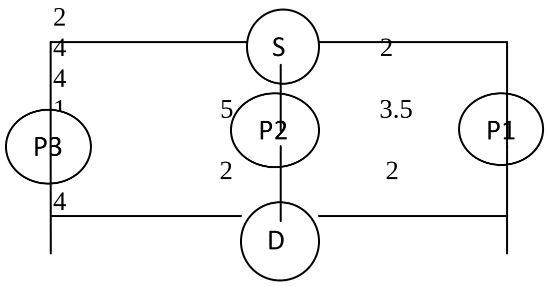

Fig 1 Link Lifetime + Energy

Enhanced AODV Protocol Applied To Energy Mean Value

AODV Protocol and DSR protocol use similar algorithms in a Route Discovery process by using RREQ and RREP control message in the route searching process, when a flooding is initiated. Mobile nodes create a Reverse path based on neighbouring nodes that send the RREQ message. And when RREQ message reaches to destination node, a Forward path is generated.

When AODV activates a flooding RREQ message, AODV sets a Reverse Path towards the node which sent the RREQ message to each mobile node's routing Table of its own. When the RREQ message arrives atvits destination node. A RREP Message is transmitted through the created Reverse Path for the construction of a Forward Path.

This paper explains our research to find out how to extend the entire network lifetime by efficiently consuming the limited battery power in mobile nodes, which is one of the biggest constraints in establishing an AODV (On -demand routing. protocol) platform Ad-hoc network.

Traditional AODV constructs a route path by using basic route discovery algorithms regardless of a node's energy status. In that case, energy consumption rises dramatically if a node holds many paths, which will force the node to fail to participate in the network. In order to extend the entire network lifetime by reducing the energy concentration on a certain node in the network and distributing it to the whole network, the energy state of each node & the entire network should be considered. Based on this observation, the following experiment is made to increase the entire network lifetime through the delaying method of RREQ flooding **by** considering the node's energy state & the entire node's Energy Mean Value [3].

III. PROPOSED WORK

In fig.2 when source tries to send data to destination so first of all it will check route is available or not if route is available so source can send the data directly but if route is not available so source send the RREQ their neighbour nodes. After send the RREQ its check is it intermediate node or not after that if it is not the intermediate node then it node must be destination node but if it is intermediate node then check RSS value of that particular intermediate node now this intermediate node become a source node and the same procedure will happen again and again till to find to destination node. When find the destination node check the RSS of that particular destination node.so after check the RSS value of destination node find optimal path from source to destination and send RREP to the source node and source will send packet on this optimal path.

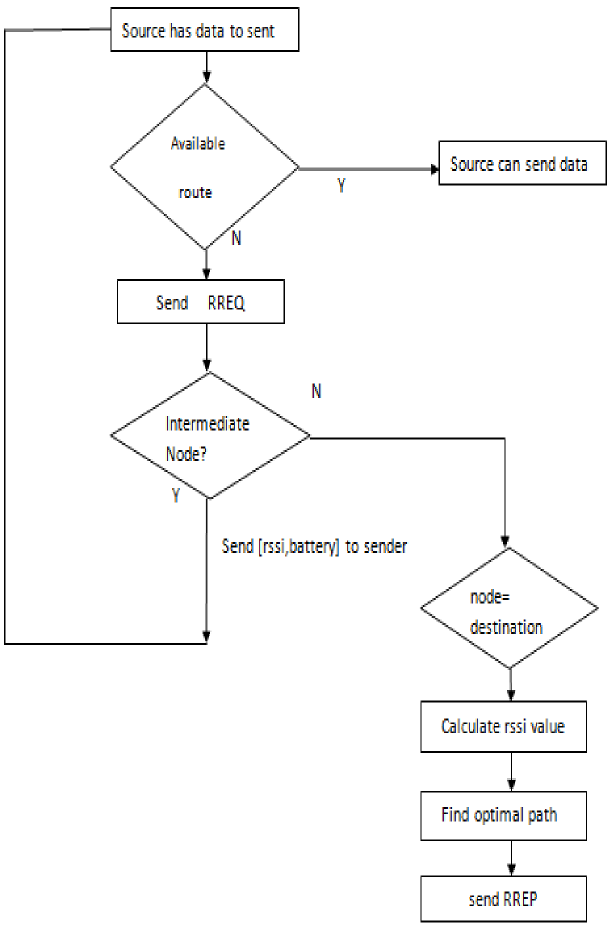

Fig 2

$$P_r(d) = \frac{P_t * G_{t*} G_r * h_t^2 * h_r^2}{d^4 L}$$

Pr: Power received at distance
Pt: Transmitted signal power
Gt: Transmitter gain (1.0 for all antennas)
Gr: Receiver gain (1.0 for all antennas)
d: Distance from the transmitter
L: Path loss (1.0 for all antennas)
ht: Transmitter antenna height (1.5 m for all antennas)
hr: Receiver antenna height (1.5 m for all antennas)

The RSSI value is calculated with the help of two ray ground model Request otherwise it discards this RREQ packet then intermediate node checks its routing table for the desired destination. If it found then send a reply to the source otherwise it forwards the RREQ to his neighbour.

IV. PERFORMANCE EVALUTION

Simulation Parameter

Parameter	Value
Simulation Duration	100s
Topology Area	500 m x 500 m
Number of nodes	10 to 50
Mobility Speed	10(m/s)
Mobility Model	Random waypoint
Transmission Range	250m

Packet rate	4 packets/s
Packet size	512 b
Traffic Type	cbr
Number of cbr	4

Simulation Graph

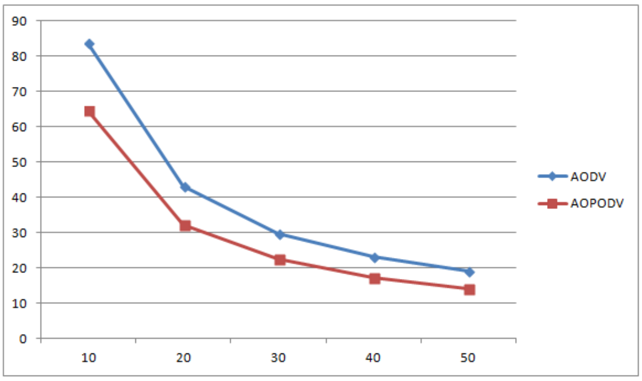

Fig 3 Energy Vs Number Of Nodes

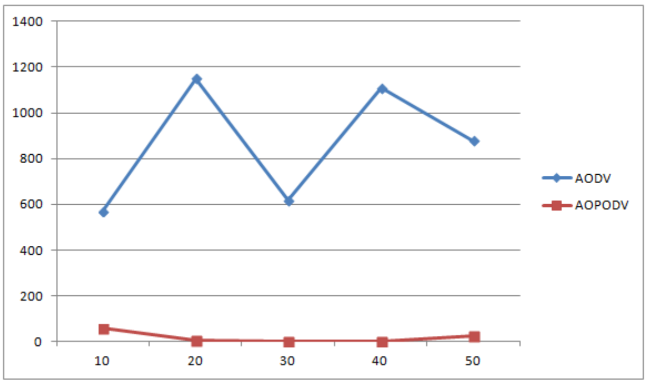

Fig 4 Delay Vs Number Of Nodes

First graph illustrates that Number of nodes increased Energy Consumed in AODV is more than AOPODV so we can conclude that route discovery is successfully to energy expenditure.AOPODV has a maximum network life time than AODV. Delay is the Average time taken by a data packet to arrive the in the destination. It includes the delay caused of route discovery process and the queue in data packet transmission only data packets which are successfully delivered to destination that counted. Equation for delay is ∑(arrive time – send time) / ∑ Numbers of Connections and delay graph illustrates that AOPODV delay lower than AODV so means that better performance of AOPODV protocol. Packet delivery ratio is the ratio of number of delivered data packet to the destination so above graph illustrates the level of delivered data to the destination. Equation for pdr ∑ Number of data packet receive / ∑ Number of packet send. In pdr graph thirty and fourth node of AOPODV has a higher packet delivery ratio than AODV where ten, twenty and fifty node of AODV has a higher packet delivery ration than AOPODV.

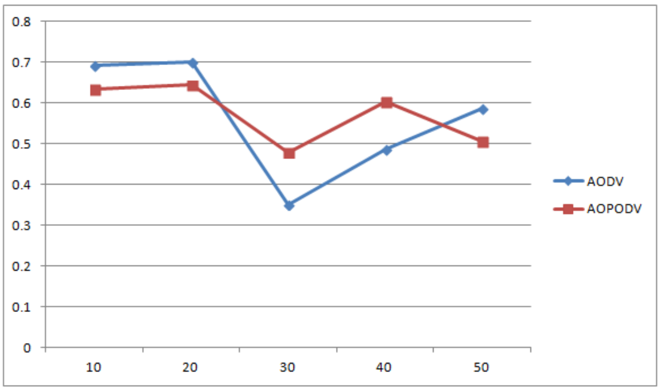

Fig 5 Packet Delivery Ratio Vs Number Of Nodes

V. CONCLUSION

In this survey paper various energy aware techniques has been overviewed.there is also brief introduction about aodv and manet.From this survey paper we can conclude that MANET is basically depend on battery. Enhancing the lifetime of an entire network is an major issue so to overcome that we have proposed a new energy aware routing algorithm which will outperforms over conventional energy aware routing algorithm.

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