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ENHANCEMENT OF NETWORK LIFETIME IN DSDV/AODV/DAODV (PROPOSED) IN MANET

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ABSTRACT

One of the main considerations in designing routing protocols for Mobile Ad -Hoc Network (MANET) is to increase network lifetime by minimizing nodes' energy consumption, since nodes are typically battery powered. Many proposals have been addressed to this problem; however, few papers consider a proactive protocol like ad hoc on-demand distance vector (AODV) to better manages the energy consumption. Some of them have explored modifications to the route selection mechanism, whereas others have investigated multiple cross layer parameters to increase the network lifetime. In this paper, we explored both modification to route selection and integrating appropriate routing metrics in the routing decision scheme to lessen effects of reason that lead to more energy consumption. Our DAODV version of DSDV and AODV is proven by simulations in MATLAB under a range of different mobile scenarios.

Keywords: MANET, AODV, DSDV, DAODV, Routing etc.

I. INTRODUCTION

MANET is a self-configured, infrastructure-less, network of mobile devices connected by wireless links, MANET can also be defined as, a collection of mobile wireless nodes that intercommunicate on share wireless channels. Individual devices in a mobile ad hoc network are free to move in any direction and frequently devices links changes occur. Since MANETs are highly suitable for applications involving special outdoor events, communications in regions with no wireless infrastructure, emergencies and natural disasters, and military operations [1][2]. Routing is one of the key issues in MANETs due to their highly dynamic and distributed nature, in recent years, many routing protocols have been proposed for MANETs. These protocols can be classified into three different groups: proactive, reactive and hybrid. In proactive routing protocols such as DSDV [3] and OLSR [4], the routes to all the destination (or parts of the network) are determined at the start up, and maintained by using a periodic route update process.
In reactive protocols such as AODV [5], DSR [6], routes are determined when they are required by the source using a route discovery process. Hybrid routing protocols combines the basic properties of the first two classes of protocols into one. In particular, energy efficient routing may be the most important design criteria for MANETs, since mobile nodes will be powered by batteries with limited capacity. Power failure of a mobile node not only affects the node itself but also its ability to forward packets on behalf of others and thus the overall network lifetime. For this reason, many research efforts have been devoted to developing energy aware routing protocols to increase network lifetime. Most existing energy-aware MANET routing schemes are reactive. In this paper we investigate an energy-aware mechanism suitable to be integrated with a proactive routing protocol. While proactive routing is known to be inefficient to scale to large-size mobile network, it has the advantage of handling heavier traffic without extra routing control overhead, which could be significant in reactive routing. There is still substantial room of enhancing MANET proactive routing in various aspects, including energy-aware routing approaches. The performance evaluation and comparison between DAODV,AODV, and DSDV has already been done using MATLAB (version 2014a) network simulator. Normally DAODV performs better than other routing protocols, although DDDV also performs satisfactorily in terms of PDR and DSDV performance metrics. For the performance metrics such as Delivery Ratio, Network Life Time and Energy gives better than all remaining protocols, although AODV, DSDV and DAODV also perform satisfactorily for Delivery Ratio, Network Life Time and Energy.

a. Ad-hoc On-demand Distance Vector (AODV)

Being a reactive routing protocol AODV uses traditional routing tables, one entry per destination and sequence numbers are used to determine whether routing information is up-to-date and to prevent routing loops. AODV (ad hoc on-demand distance vector) [2, 12, 13] is a distance vector routing protocol that operates reactively to reduce overhead finding routes only on demand. When a route does not exist to a given destination, a route request (RREQ) message is flooded by the source and by the intermediate nodes if they have no previous routes in their table. Upon receiving a RREQ message, the receiving node will record the route information in its own routing table. Once the RREQ message reaches the destination or an intermediate node, the node responds by unicasting a route reply (RREP) message back to the neighbor from which it first received the RREQ message. As the RREP message is forwarded back along the reverse path, nodes along this path set up forwarding entries in their routing tables, pointing to the node from which they received RREP message. Fig. 6 will resume the whole process from route discovery until the route maintenance.

b. *Destination Sequenced Distance Vector (DSDV)*

The DSDV (destination-sequenced distance vector) protocol [2, 12] uses the Bellman-Ford algorithm to calculate paths. The cost metric used is the hop count, which is the number of hops it takes for the packet to reach its destination. DSDV is a table-driven protocol. Every node maintains a routing table that lists all available destinations, the number of hops to reach the destination and the sequence number assigned by the destination node. The sequence number is used to distinguish stale routes from new ones and thus avoid the formation of loops. The nodes periodically transmit their routing tables to their immediate neighbors. When a route update with a higher sequence number is received, it replaces the old route. In case of different routes with the same sequence number, the route with the better metric is used. Updates have to be transmitted periodically or immediately when any significant topology change is detected.

II. PRELIMINARIES

Assumptions and Definitions

In this section, the main assumptions and definitions that we adopted in our work are presented.

- All sensor nodes are deployed randomly in a plane of two dimensions 2D.
- The radio coverage of a sensor node is a circular region centered at this node with radius R.
- Two sensor nodes cannot be deployed in exactly the same position (x, y) in 2D space.
- All sensor nodes are identical or homogeneous. For example, they have the same radio coverage radius R.
- Each node can determine its position at any moment in 2D space.
- The Sink is a node having sufficient capacity in terms of computation, communication, and memory of storage and energy autonomy.
- In our work, we do not take the target into consideration.

Definition 1: The radio coverage of the network is the portion of the area covered by sensor nodes.

Definition 2: Euclidean distance between two points u and v in a 2D space is denoted d (u, v) with: d (u, v)= (1 − 2) + (1 − 2, where (x1, x2) and (y1, y2) denote respectively the coordinates of the nodes u and v in a 2D space.

Definition 3: NS (u): set of neighboring nodes of node u, is formally defined by: NS (u) = {| (,) ≤}, where N is the nodes number.

1) The distance between node and its neighbors (D_i)

This is likely to reduce node detachments and enhance cluster stability. For each node i, we compute the sum of the distance $\mathbf{D_i}$ with all its neighbors j. This distance is given, as in [3, 9], by:

$$D_i = \sum_{j \in N(i)} \{dist(i,j)\}$$

2) The residual energy of a node $n_i(Er_i)$

After transmitting a message of k bits at distance from the receiver, this energy is calculated according to [3, 10]:

$$Er_i = E - \left(E_{Tx}(k,d) + E_{Rx\,elec}(k)\right)$$

Where:

- E: The node's current energy;
- ETx(k,d) = k.Eelec + k.Eamp.d^2 refers to the energy required to transmit a message; Eamp is the required amplifier energy.
- ERxelec (k) =k Eelec: refers to the energy consumed while receiving a message.

III. PROPOSED METHOD

Each DAODV node maintains two routing tables: one for forwarding packets and one for advertising incremental routing packets. The routing information sent periodically by a node contains a new sequence number, the destination address, the number of hops to the destination node, and the sequence number of the destination. When the topology of a network changes a detecting node sends an update packet to its neighboring nodes. On receipt of an update packet from a neighboring node, a node extracts the information from the packet and updates its routing table as follows:

1. If the new address has a higher sequence number, the node chooses the route with the higher sequence number and discards the old sequence number.
2. 2. If the incoming sequence number is identical to the one belonging to the existing route, a route with the least cost is chosen.
3. All the metrics chosen from the new routing information are incremented.
4. This process continues until all the nodes are updated. If there are duplicate updated packets, the node considers keeping the one with the least-cost metric and discards the rest.

In case of a broken link, a cost of metric with a new sequence number (incremented) is assigned to it to ensure that the sequence number of that metric is always greater than or equal to the sequence number of that node.

DAODV Packet Process Algorithm

Algorithm for our implementation

S_d= Distance based node sequence

F_{RREQ} = First Route Request

$NODE_{PRV}$ = Previous Node

Broadcasts RREQ packet: this protocol works in the route reply phase only

If RREP packet received then

Sends data packets

Otherwise

N_I ←Link Status for Next Hop Then RREQ=0; // where N_I =Intermediate Nodes

Let distance be a |v||v| array of minimum distances initialized to infinity.*
For each vertex v
Distance [v][v]← 0
For each edge (u,v)
Distance [u][v] ← w(u,v) //the weight of the edge (u,v)
For k from 1 to |v|
For i from 1 to |v|
For j from 1 to |v|
If distance[i][j] > distance[i][k] + distance[k][j]
Distance[i][j] ← distance[i][k] + distance[k][j]
End if
end of for j
end of for i
end of for k
End If

Verify Availability for trust Mechanism

while (prev){

if (Node_id->N_t){

prev = N_{prev}←NA_{prev}; // where N_{prev} =previous Normal Node and

// NA_{prev} =Previous of Advance Node

Advance node energy S_n= S_d>D' (Sequence Node energy) ------significance of this equation…why we do need energy more than the destination node.}

else {

prev = N_{prev}←NA_{prev};

if ((newnode->next = prev1->next))

newnode→next->prev 1

else

tail = newnode; prev->next = newnode; return; } }

If RREP packet received from suspected node **then**

Initiates a route to next node

if(T_{min} =no of node (node energy(in Jule))) //minimum Threshold $\mathbf{T_{min}}$

S_{dst}-- =>S, //Reverse route of source destination route should meet the trust requirement of the data packet. In other words, Non-Repudiated of the qualified route is greater than the requirement of the data packet. If such routes are found nexthop=S,

hop count=1

Sends FRREQ packet to next node

If FRREP packet received **then**

Extract FRREP packet information

If next node has a route to (destination &weak nodes) **then**

Discards FRREP packet

Unicasts RREP to source node

Otherwise Discards both RREP and FRREP packets

Broadcasts Normal energy node

while(prev)

{

if (then Node_id->N_sort<prev->Node_id->N_sort)

{

prev = prev->prev; // Go up the queue

}

else

{

newnode->prev=prev1;

if ((newnode->next = prev->next))

newnode->next->prev = newnode;

else

tail = newnode;

prev->next = newnode;

return;

}

End

IV. Result and Discussion

Simulation results of DAODV protocol along with AODV and DSDV in MATLAB shows that, DAODV protocol establishes multiple alternative paths during the path establishment stage. The packet delivery ratio, Network lifetime and the Energy are measured. As nodes in the robust path bear implicit geographic information about the intended path, they could react quickly to the link failure through cooperation. Although DAODV protocol establishes multiple backup paths to enhance the robustness against path breakage; it is possible that all paths fail simultaneously. As time elapses, paths become invalid. Since all nodes are moving, it is very likely that some links on several discovered paths break shortly.

Table 1.Simulation Parameter (Input):- Below mentioned is simulation parameter that we configure in our proposed simulation:

Parameters	**Value**
No of nodes, n	100
N/w size X × Y	100 × 100
Receiver Energy, ERX	50nJ
Transmitter Energy, ETX	50nJ
Free space Energy Consumption, E_{fs}	.01nJ
Multipath Energy Consumption, E_{mp}	.0013pJ
Initial Energy, E_0	0.5J
Data Aggregation Energy, EDA	5nJ
Packet size	1400bits
Percentage of advanced nodes, m	0.1, 0.2& 0.3
Multiple of normal node energy, a	1, 2, 3

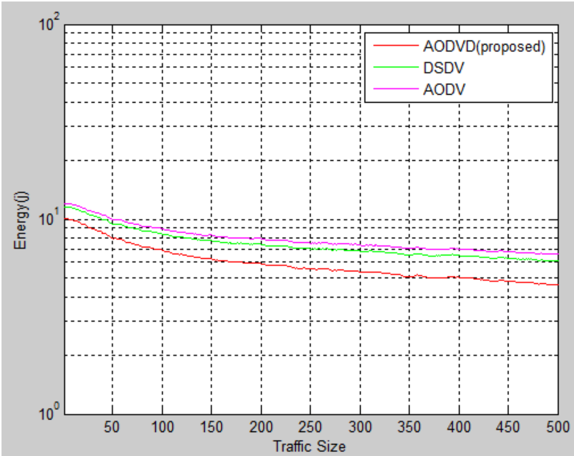

Figure 2: Energy on No. Traffic size

Figure 2 shows the comparisons of throughput obtained using DAODV protocol along with AODV, DSDV and DAODV protocols. Results show that DAODV protocol Mobile as a trust protocol similar to AODV, DSDV and DAODV protocols. Energy refers to the number of packets delivered to the base station by the sink node at any instance of time. When compared to the existing algorithm the Energy is high in the proposed algorithm. It traverses through the shortest path inside the sensing field and collects updated data on time and hence delivers more number of packets at any instance of time to the base station.

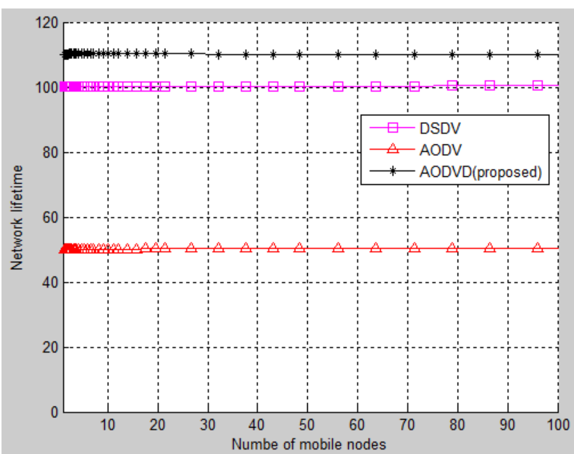

Figure 3: Network lifetime on No. Mobile nodes

In the event that the battery power is high in all the energy hubs in the MANET, organize lifetime is expanded. So this considers hub vitality. Expanding the system lifetime of MANET is extremely basic in light of the fact that the vast majority of the gadgets in this system work with the assistance of battery power. On the off chance that the battery control goes down in any of the hubs in this system, the course settled by means of that hub gets influenced and prompts bad transmission of information packages. One noteworthy issue is that building up the course and keeping up the course is extremely troublesome in MANET.

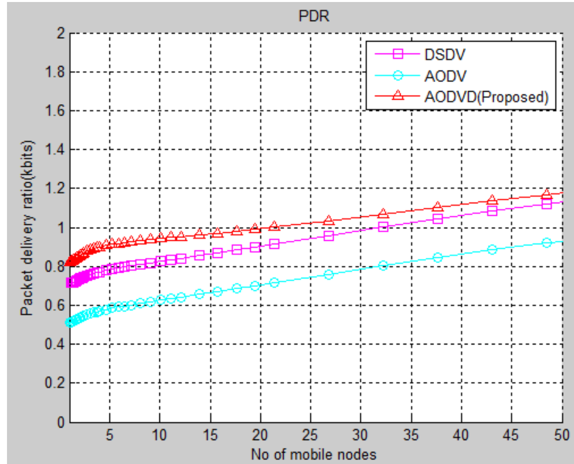

Figure 4: Packet delivery ratio on No. Mobile nodes

Figure 4 shows that the good degree of reliability while transmit as a multiple paths are kept in the routing protocol. The routing process in DAODV Mobile is similar to AODV and DSDV. It is clear from the figure above that packet delivery ratio of DAODV achieved more when compared to AODV and DSDV protocols.

V. CONCLUSION

We observed that Ad-hoc on demand distance vector routing protocol reduces the energy consumption compared to other routing protocol with the help of residual energy and hop count. In this route discovery process path is largest minimum residual energy and least hop count is chosen. According to neighbours range of nodes adjust the transmission power of the node. Thus proposed protocol optimizes the energy consumption compare to existing protocol. This paper compares of AODV, DSDV and DAODV routing protocols which are proposed for ad-hoc mobile networks. The comparison of these protocols is done with the parameters packet delivery ratio, Energy model, Lifetime. DAODV performs better than DSDV and AODV in packet delivery ratio, Energy model and Network lifetime.

Future work

Ad hoc networking is a boiling concept in personal communications worldwide research is going on in this area and many issues still have to be addressed. We focused on concepts like unipath and multipath routing protocols with respect to their performance in the mobile Ad hoc network. Multipath routing is a step towards achieving a network with better Quality of Service.

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