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Minimization of Routing Overhead by Energy Estimation, Traffic Analysis and Destination Location Tracking in MANET

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Abstract

In MANET ,node within its transmission range can be communicated directly and the nodes that are out of its transmission range may be communicate via other intermediate nodes .In many cases reactive routing protocol in MANET uses AOMDV for route discovery ,but it may lead to routing overhead due to flooding of RREQ and RREP packet. A node consumes some energy level for receiving and forwarding data packets. A path loss may happen due draining of node energy level or node moves out of coverage area. In our proposed system, novel Enhanced Energy and load aware adhoc on demand multi path distance vector routing (EEALA-AOMDV) protocol is used for minimizing path loss and routing overhead. In this instead of broadcasting RREQ packet, we are going to multicast only to few neighbor nodes. The neighbor node is selected based on the energy level, available node inter queue space and location of the destination node. The proposed systems not only minimize the path loss and routing overhead but also establish the best path between source and destination.

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INTRODUCTION

In MANET, nodes are in random mobility and it can communicate with neighbor node within its transmission range. Node can communicate directly or indirectly through its neighbor nodes.

When a source node wants to communicate to other node, that are not its coverage area, then it initiate route discovery process to find all possible routes to reach destination. AOMDV is a well know reactive routing protocol to establish multiple route path between sources to destination.

In AOMDV, a path loss may occur, when node energy is drained or nodes moves out of coverage. The packet loss may occur due to congestion in network as the node inter queue space is fully occupied.

In order to overcome this draw packet, a modified version of AOMDV, Enhanced Energy & Load Aware AOMDV is proposed. In this instead of broadcasting RREQ, we are going to multicast RREQ only tofew neighbor nodes based on the condition. The conditions involve availability of energy level and inter queue space. Thus proposed system can reduce the routing overhead, path loss and also establish the best path between sources to destination. We present our paper in the following manner.

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Section II briefly describe about the background and related works. Sections III elaborate our proposed system in detailed manner.

Simulation parameter and other metrics are discussed in our Section IV. At last we end with further work and conclusion in section V.

II. BACKGROUND AND RELATED WORKS

In [1] proposed Minimization of routing Overhead on the basis of multipath and Destination distance estimation Mechanism under MANET. The authors only discussed about inter queue space to avoid congestion but not consider about the energy level of node.

When the node losses its energy level it becomes unavailable and it may lead to path loss. When there is no alternative path we may go for route discovery process and it will to congestion and routing overhead.

In [2] Energy Efficient Reliable route Selection (RRS) Algorithm for improving MANET life time, the author deals with the selection of best path based on the cumulative energy level of nodes along the path and it can be used in our proposed system for the selection on best path among multiple path. The load sharing may also be performed based on the cumulative energy level among different path.

In [3] Energy Efficient Multipath Routing with selection of Maximum energy and Minimum Mobility in MANET, the author assigns a constant threshold energy level and it is used for node selection. Large amount of data transmission requires more time and needs more energy levels where as small data packet transmission needs only minimum time and energy level. so assigning fixed threshold energy level may not be a correct solution. In our proposed system we are going to calculate a average energy level value based a the number of packets to be sent and the value changes for different transmission.

In [4] Energy Efficient Adaptive forwarding scheme for MANETS, a cluster may be formed based on the transmission range. A node in a cluster may be elected as gateway node & it may transfer RREQ to all other nodes in the cluster. By using single node again and again for broadcasting RREQ packet, the node drainfaster and in near future it become unavailable.

In [5] Multipath Load Balancing Technique for congestion control in mobile ADHOC networks, the author discussed about the link cost and path cost for the efficient load balancing but not covered the routing overhead the occur in route discovery and energy level analysis among the nodes to avoid path loss during data transmission process.

In [6] Energy Efficient Hierarchical Routing Algorithm in MANET, a hierarchical energy HEEMCORP routing algorithm is proposed Where tertiary leader, Group leader nodes are selected and they take all responsibilities. These nodes may be congested due to heavy traffic or they losses their energy level.

III. PROPOSED WORK

A node may losses a small amount of energy in its sole state while moving and it may losses more amount of energy while receiving and forwarding the data packets. The energy level of all nodes along thepath must be sufficient enough, to transfer a data packet along a path over a period oftime otherwise path loss may happen.

Every packet routed in network is stored in the interfaces queue space of each node and from there it is processed and forwarded accordingly. Based on the packet arrived rate and node processing rate, the queue may be increase or decrease in queue level. In our proposed enhanced energy and load aware AOMDV Algorithm (EEALA-AOMDV) Implemented In Algorithm1,in prior before transmission we are going to examine whether there is sufficient amount of interface queue space available, in order to avoid congestion in the

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network.The congestion in network some times will lead to packet loss and reduces the throughput and packet delivery ratio

Based on the time interval between the packet transmission, size of packet and transmission period of complete data packets

Needed average interface queue space may be calculated shown in formula (2)

$$FAQS = ABS(PAQS + (PAR - NPR) \qquad (1)$$

FAQS-future available Queue Space

PAQS-present available Queue Space

PAR-packet Arrival Rate

NPR-node processing Rate

When the arrival rate is higher than the node processing rate then present available queue space may increase and in reverse case it will decrease in near future discussed formula (1)

$$NavgIQS = Psize * Ti \qquad (2)$$

NavgIQS-Needed average Interface Queue Space

- Packet size involved in transmission

Ti-time interval between the successive packet transmissions

In our proposed enhanced energy and load aware AOMDV Algorithm (EEALA-AOMDV). Source node examines the neighbor node interface queue spaces and Forward RREQ packet only to those neighbor nodes that satisfies these criteria In Figure 1

The intermediate neighbor node also does the same process to select their neighbor node for multicasting RREQ. This process is repeated until the destination node is reached. Once destination node is travel in reverse direction and reaches the source node. As a result multiple best path is established between the source and destination.

ALGORITHM 1 Enhanced Energy & Load aware AOMDV.

1. N_S – Source nodes having data to send

N_D- Destination node

2. Select on-hop neighbor nodes of NS. Let it be NN_1, NN_2………$NN_{n.\ Assume}$ n number of neighbor node.
3. Calculate average energy level (Avg EL) and needed Average Interface Queue Space (NAvg IQS) needed for transmission based on number of packets to be sent.
4. For i=1 to n

If((Energy level (NN_i) ≥ Avg EL) && Available Interface queue Space (NN_i) ≥ NAvg IQS)) then

If (NN_i) ≠ ND) then

Forward RREQ →NN_imake NN_i as source node N_S then step-2

Else

Make RREP in reverse direction to source node

End if

Else

Rejected neighbor node NN_i& move to next neighbor NN_{i+1}

End if

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Flowchart for Algorithm1:

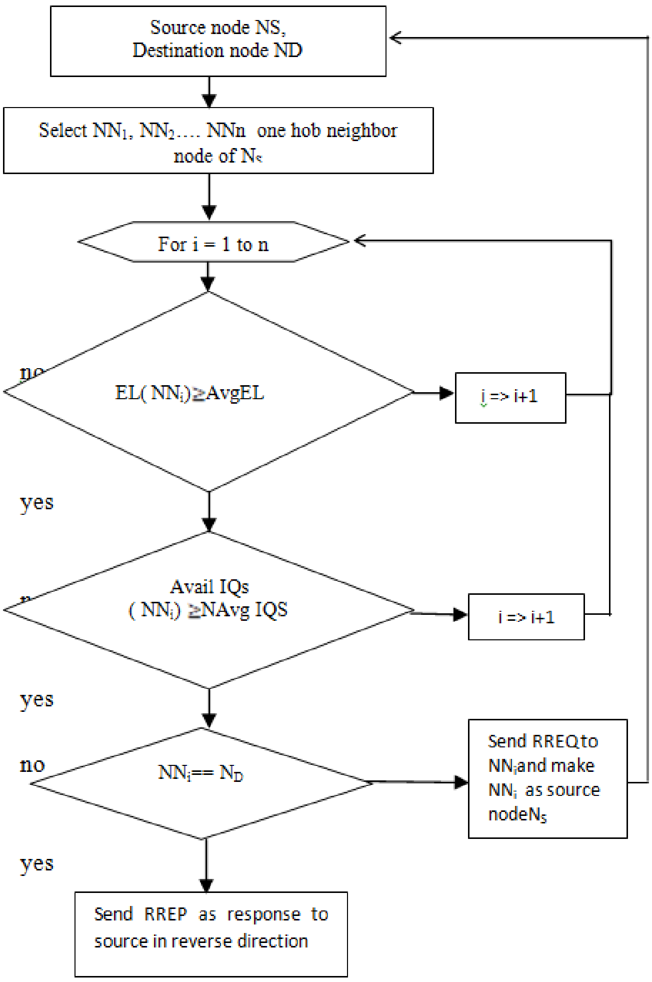

FIGURE 1 FLOWCHART-EEALA-AOMDV

Moreover speed and direction of each node in the path is recorded in order to trace node when they are out of coverage. A local route repair may be performed when a node move out of coverage and initiation of route discovery process may be avoided.

IV. SIMULATION RESULTS:

A. Simulation model and parameters:

Ns-27in Minimization of Routing Overhead by Energy Estimation, Traffic Analysis and Destination Location Tracking In Manet,The Routing Overhead ,Throughput And Packet Delivery ratio. In this Systems not only minimize the path loss and routing overhead but also establish the best path between source and destination.

TABLE 1: Simulation parameters

Number of nodes	50
Area Size	1500 X 1500
MAC protocol	802.11
Radio Range	300 m
Antenna	Omni directional antenna
Simulation Time	50 Sec
Traffic Source	CBR
Routing protocol	AOMDV,EEALA-AOMDV
Packet Size	1200 bytes
Mobility Model	Random Way Point
Rate	100 KB, 200 KB, 300 KB
Maximum number of packets in queue	200
Speed (m/Sec)	2m/Sec

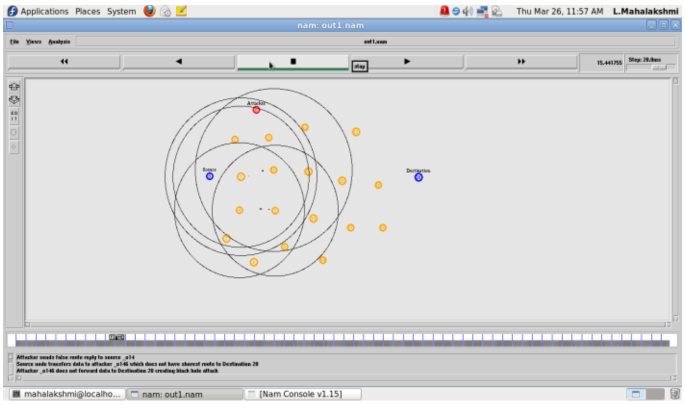

Figure 2Route Discovery process in EEALA-AOMDV

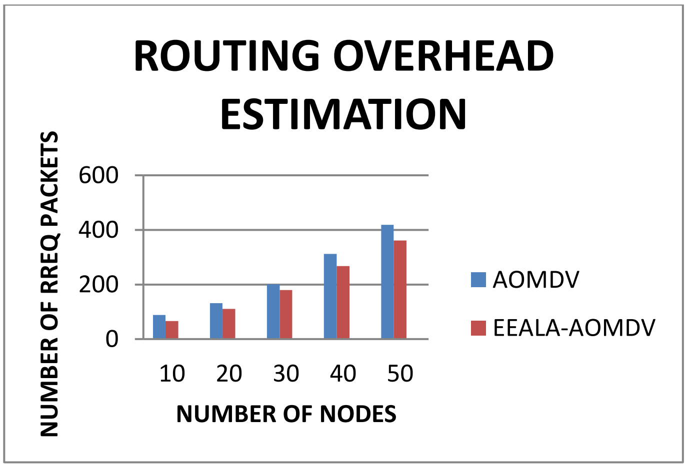

Figure3Numbers of Nodes vs. RREQ Packets

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In fig 3Routing Overhead Estimation of EEALA-AOMDV is 3.3% greater than that of AOMDV, here number of nodes vs. RREQ packets are draw in this figure. When RREQ is multicast to few neighbors rather than broadcasting all neighbor nodes, we achieve reasonable routing overhead minimization. .

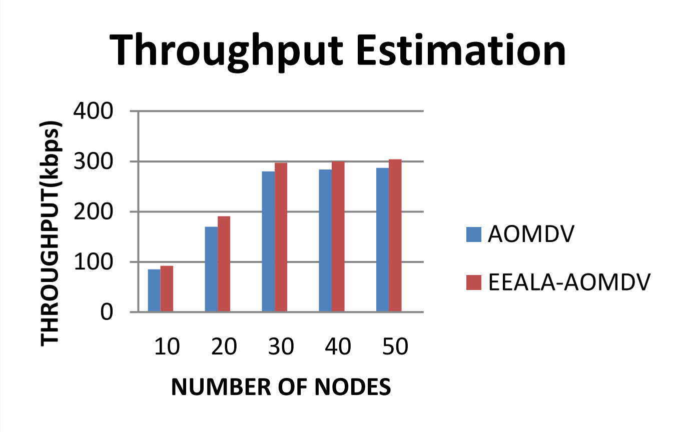

Figure 4 Number of Nodes Vs Throughput (Kbps)

In fig 4Throughput Estimation of EEALA-AOMDV is 1.44% greater than that of AOMDV, here number of nodes vs. throughput are draw in this figure. Establishment of best path based on energy level analysis between the sources to destination will increase throughput in reasonable manner. .

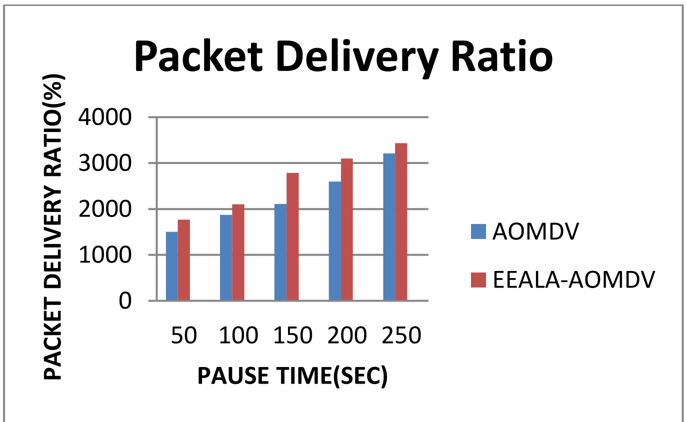

Figure 5 Pause Time Vs Packet Delivery Ratio (%)

In fig 5 Packet Delivery Ratio of EEALA-AOMDV is 3.38% greater than that of AOMDV, here Pause Time vs. Packet Delivery Ratio are draw in this figure. Measure of node inters queue space to avoid the congestion and node energy level analysis to avoid path loss, will increase packet delivery ratio then the AOMDV.

V. CONCLUSION AND FUTURE ENHANCEMENT

As a result of enhanced energy load aware EEALA-AOMDV routing protocol routing overload and path loss may be minimized and throughput, packet delivery notice may be increased in reassemble manner. Further load showing based on energy level and inter queue space may be done for efficient data transmission.

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