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Mobility Based Route Selection on the Basis of Nodes for Stable Link Management

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Abstract— The major problem for mobile ad hoc network is the routing protocol design. The topology of the network changes frequently and this becomes a major technical challenge. The major cause of loss of the network resources is the failure of nodes and link breakages in the network. The present paper proposes a method based on mobility based route selection on the basis of nodes for stable link management which works in two phases first is the comparative measure between signal strength and the RSSI value if it is greater than threshold value then it is accepted for further processing otherwise it is discarded if it is not find any route if this approach is not work then it switch to second phase means work like as normal AODV. The benefit of this scheme is by selecting a strong route to the destination, increases the lifetime of the network. Simulation results show that SLM-AODV has performance better than AODV routing protocol in terms of the metrics: Packets delivery ratio, throughput, average end to end delay.

Keywords- AODV ;Link Failure ;MANETs; Reliable Routing; RSSI

I. INTRODUCTION

Mobile ad-hoc networks (MANETs) are infrastructure-free networks of mobile nodes that communicate with each other in Wireless mode [1]. There are several routing schemes that have been proposed and several of these have been already extensively simulated or implemented as well [2]. The primary applications of such networks have been in disaster relief operations, military use, conferencing and environment sensing.

There are several ad hoc routing algorithms at present that utilize topology information to make routing decisions at each node[3]. A mobile adhoc network (MANET) are collection of wireless mobile devices, which can communicate with each other without any infrastructure support .it use radio frequency technology that allows more mobility to the user because the absence of cable.manet is a network, which does not require infrastructure or central administration to suddenly establish a temporary network. A MANET is install easily in such condition where requiring quick set up and modification, such as military battlefields or accident recovery areas. All MANET applications require the dissemination of packets, from node to node, on time-varying channels and time-varying topologies.

Communication, between non-neighboring nodes, requires a routing protocol, so a stable and efficient routing method is required for longer live transmission. Ad hoc networks consist of mobile nodes which suffer from deployment in an unorganized way. Since all nodes in MANET move randomly so topology of the network is constantly changing which lead to frequent Disconnection between source and destination nodes.there are two type of routing protocol one is reactive or on demand routing protocol, and another one is proactive or table- driven routing protocol Proactive routing (such as DSDV [4]) create routing table which contains an entry of every node in the network. They update the route table periodically and recalculate the distance to all nodes. In reactive method (such as DSR [5] and AODV [6]), whenever route is required it calculate the route between source and destination. A stable route is defined as routes which provide connectivity in highly mobile network and not disconnect for any acceptable period of data transfer.

II. RELATED WORK

It is very challenging issue in highly mobile network to finding a stable route between source and destination. Various approaches have been proposed to deal with node mobility.

A. ENERGY SUPPORTED AODV (EN-AODV) FOR QOS ROUTING IN MANET

In this paper the author provided the energy supported AODV (EN-AODV) for quality of service routing in manet.Routing protocols should incorporate QoS metrics in route finding and maintenance, to support end-to-end QoS. The QoS parameters like throughput, PDR and delay are affected directly.

The Energy based AODV protocol (EN-AODV) announces energy and based on nodes sending and receiving rates and the sizes of the data to be transmitted it justifies whether its energy level is maintained or decreased. It calculates the energy levels of the nodes before they are selected for routing path. A threshold value is defined and nodes are considered for routing only if its energy level is above this threshold value.

B. AN ENTROPY-BASED LONG-LIFE MULTIPATH ROUTING ALGORITHM IN MANET

In this research work the author provided the Entropy-Based Long-life Multipath Routing Algorithm in MANET. So far, much of the effort of multipath routing has been focused on using the predefined alternate path when a relay on the primary path has failed regardless of the availability of the alternate path. This reactive route handoff can increase the overhead for frequent route discoveries. This paper gives a technique of Entropy-based Long-life Multipath Routing algorithm in MANET (ELMR). The key idea of ELMR algorithm is to construct the new metric-entropy and select the stability multipath with the help of entropy metric to reduce the number of route reconstruction so as to provide QoS guarantee in MANET.

C. A RELIABLE ROUTE SELECTION ALGORITHM USING GLOBAL POSITIONING SYSTEMS IN MOBILE AD-HOC NETWORKS.

In this research paper provided the integrated approach for A Reliable Route Selection Algorithm Using Global Positioning Systems in Mobile Ad-hoc Networks The technique of this paper is to select the most reliable route that is impervious to failures by topological changes by mobile nodes' mobility.

To select a reliable route, we introduce the concept of *stable zone* and *caution zone*, and then apply it to the route discovery procedure of the existing on-demand routing protocol (i.e., AODV). The concept of the *stable zone* and *caution zone* which are located in a mobile node's transmission range is based on a mobile node's location and mobility information received by Global Positioning System (GPS).

D. M-MAC: MOBILITY BASED LINK MANAGEMENT PROTOCOL FOR MOBILE SENSOR NETWORK

In this paper [9] every node maintains the RSSI table ,RSSI table contain the signal strength value of node's all neighbor, with the help of this RSSI table, when changes is occur in node table RSSI value node predict that his neighbor node is moving away from us, after predicting the link failure it performs following steps:

1. **Dropping:** if quality of link is broken or we can say that signal strength is not good then packet may be drop and retransmission may occur.
2. **Relaying:** In this technique, a node can become a forwarding node when both sender or receiver are in its neighbor table and forward the data between source and destination, if the link between source and destination is fail.
3. **Selective forwarding:** we can say that if intermediate node come from bad link then it will drops the packets.

III. PROPOSED WORK

In the MANET, one of the major issues is how to reduce the link failure due to the mobility of node in the network, for this reliable route is required which is more stable in mobile networks. Stable route in MANETs is a route that is established for an acceptable period for transmission.For this purpose in this paper, we propose a new method for routing in MANETs that created routes have more stability. In this method there is two phase in first phase we use signal strength metric to route the data to the destination [10], in first phase if there is no route on the basis of signal strength then it goes into second phase means it work as normal AODV and find route on the basis of minimum hop count, because in signal strength based protocol [10] node select those node which have signal strength of RREQ packet is predefined threshold value.

A. ROUTE DISCOVERY

When the route is needed, the source sends the RREQ packet to his entire neighbor after that node check if RREQ retry is less than Retry threshold (RET) then it select the route on the basis of signal strength of the RREQ packet means it compare the signal strength of RREQ packet of the sender's node if it is greater than signal threshold value then intermediate node receive this packet otherwise it will discard this packet with the help of this approach routing protocol search the stable path to the destination, on the basis of signal strength if there is no route to the destination so node again send the RREQ packet to the neighbor node and RREQ retry is also increase by one, if it greater than Retry Threshold value then it switch to normal AODV and find the route on the basis of minimum hop count so we can always find the best path among available path even in the distant node.

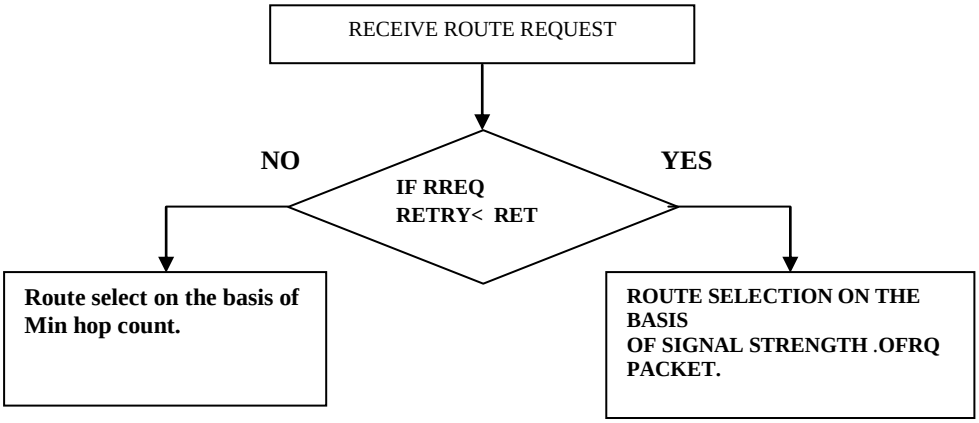


Figure 3 : Route selection procedure in SLM-AODV

IV. PERFORMANCE EVALUATION

In this section, the performance of SLM-AODV is evaluated using NS2 [12] [13]. First we describe how the RSSI value is calculated then the simulation environment is described and the simulation results are discussed with comparison.

A.Calculation of RSSI value

The RSSI value is calculated with the help of two ray ground model

$$P_R(d) = \frac{P_T \; G_T \; G_r \; h_t^2 \; h_r^2}{d^4 \, L}$$

P_r = Power received at distance d
P_t = 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)

V. PARAMETERS EVALUATION

The simulation parameter has shown in Table 1. Here, we designed and implemented our test bed using Network Simulator (NS-2.35) to test the performance of both Routing algorithms. The data transmission rate is 4 packets/sec. The total simulation time is 100 second.

Table I. Simulation Parameters

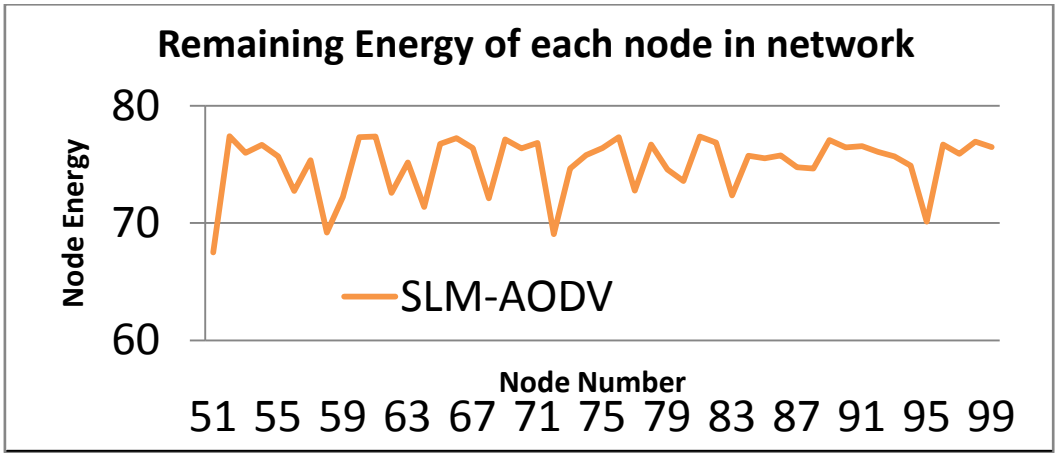
PARAMETER	**VALUE**
Simulation duration	100s
Topology area	1000 m x 1000 m
Number of nodes	100
Mobility speed	2 to 16 m/s
Mobility model	Random way point
Transmission range	250 m
Packet rate	4 packets/s
Packet size	512 b
Traffic type	Cbr

VI. SIMULATION RESULTS

We simulated SLM-AODV using NS2. In this section, we present the simulation results and presenting the remaining energy of nodes and the throughput value. In this scenario we change the number of nodes shows that as the number of node increases routing overhead also increases, SLM-AODV avoid unreliable mobile nodes from the route, it requires less rerouting and leads to less control overhead so in large network SLM-AODV perform better than AODV.

Table II. comparison of NORMAL and SLM AODV

Parameters	Evaluation for NORMAL AODV	Evaluation for SLM AODV
Average throughput	75.85 kbps	134.5 kbps
Average end to end delay	43.28 m/s	33.2 m/s
Packet delivery ratio	96.54.%	99.6%



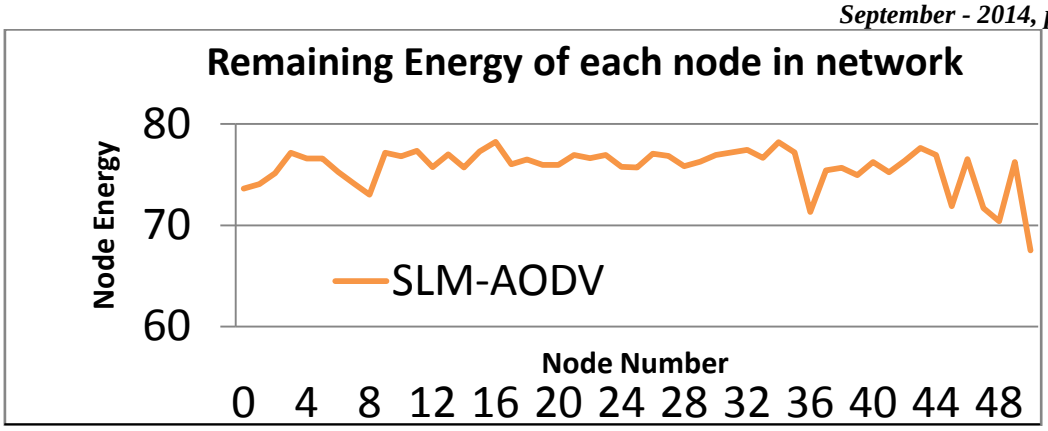


Figure 1 : Remaining energy of 100 nodes for SLM AODV

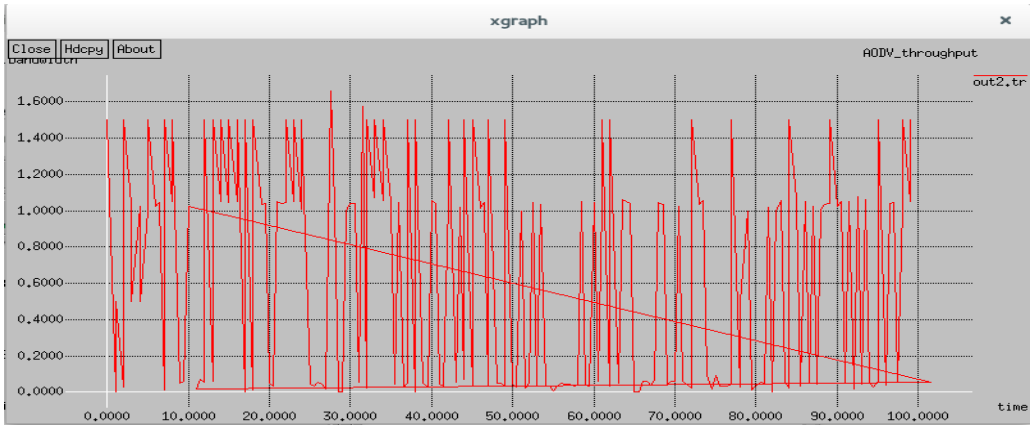


Figure 2 : Throughput for SLM AODV of 100 nodes

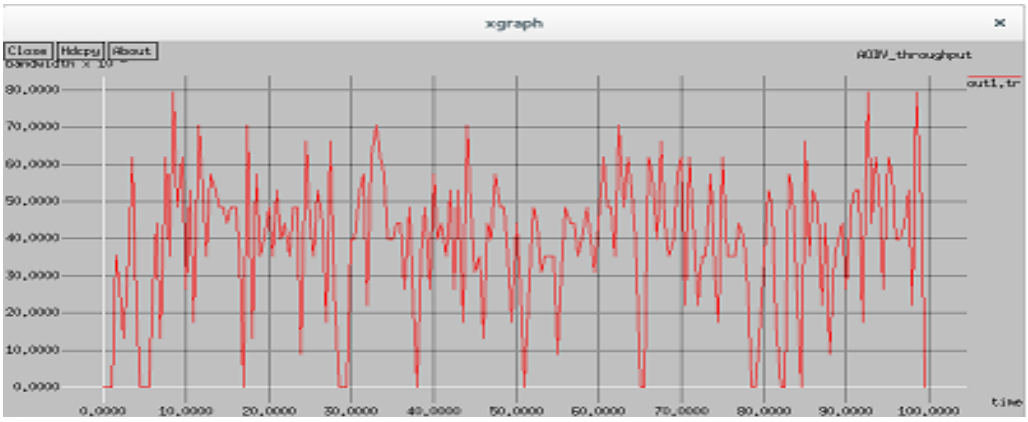


Figure 3 : Throughput for NORMAL AODV of 100 nodes

VII. CONCLUSION

In this research work a comparison has been made between NORMAL AODV and SLM AODV for 100 nodes and the throughput value for both, along with packet delivery ratio and average end to end delay has been calaculated.From all the results calculated for different simulations it is concluded that SLM AODV performs better than NORMAL AODV in case of throughput, packet delivery ratio and average end to end delay.The remaining energy of nodes in case of SLM AODV is more than in case of NORMAL AODV. .SLM-AODV not only enhance the network performance but also more reliable in data transmission as it reduces the network partition and packet loss in the networks.

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