ijecs open access www.ijecs.in
International Journal Of Engineering And Computer Science ISSN:2319-7242
Volume 2 Issue 5 May, 2013 Page No. 1555-1559

AN EXPLORING DYNAMIC NATURE ROUTING TO INCREASE NLT AND LLT IN MOBILE AD-HOC NETWORK

Saranya. S[1], Chandrasekaran.R[2]
[1]*PG Student, Computer Science and Engineering, Bharath Institute of Science and Technology, Chennai, India*
saran.harshu@gmail.com
[2]*Asst.Prof, Computer Science and Engineering, Bharath Institute of Science and Technology, Chennai, India*
chanindira@yahoo.com

Abstract- In mobile ad-hoc network (MANET), a node may drain its power or diverge without giving any notice to its neighboring nodes. It causes changes in network topology, and thus, it significantly degrades the performance of a routing protocol. Several routing protocol studies are based on node lifetime and link lifetime. The main objective here is to evaluate the node lifetime and the link lifetime utilizing the dynamic nature, such as the energy drain rate and the qualified mobility estimation rate of nodes. These two performance metrics are incorporated by Route lifetime-prediction algorithm. The exponentially weighted moving average method is used to estimate the energy drain rate. The receiver can measure the signal strength when it receives the packets from sender in same power level and then it calculates the distance between two nodes by applying the radio propagation model. The proposed EDNR protocol outperforms the conventional DSR protocols and it is simulated using NS2.

Keywords— Radio propagation model, Conventional DSR protocols;

INTRODUCTION

A mobile ad hoc network (MANET) consists of many mobile nodes that can communicate with each other directly or through intermediate nodes. Frequently, nodes in a MANET operate with batteries and can roam freely, and thus, a host may exhaust its power or move away, giving no notice to its neighboring nodes, causing changes in network topology. Most of the routing protocols do not consider the energy consumption during routing process. This can have an adverse impact on the end to end performance metrics like packet delivery fraction, network life time and link breaks. The infrastructure less networks, Commonly known as ad hoc networks, infrastructure network consist of network with fixed and wired gateways. The mobile unit can move geographically[1] while it's communicating. When it goes out of range of one base station, it connects with new base station and starts communicating through it. While in ad hoc networks all nodes of these networks behave as routers and take part in discovery and maintenance of routes to other nodes in the network. Thus each mobile node operates not only as a host but also as a router, forwarding packets for other mobile nodes in the network that may not be within the transmission range of the source.

Characteristics of Ad-Hoc Networks

- **Dynamic topology**

  Hosts are mobile and can be connected dynamically in any arbitrary manner[2]. Links of the network vary and are based on the proximity of one host to another one.

- **Autonomous**

  No centralized administration entity is required to manage the operation of the different mobile hosts.

- **Bandwidth constrained**

  Wireless links have a significantly lower capacity than the wired ones; they are affected by several error sources that result in degradation[3] of the received signal.

- **Energy constrained**

  Mobile hosts rely on battery power, which is a scarce resource the most important system design criterion for optimization may be energy conservation.

- **Limited security**

  Mobility implies higher security risks than static operations because portable devices may be stolen or their traffic may cross insecure wireless links.

Related Work

One of the major problems that plague radio frequency networks is multi-path fading[4]. This refers to the rapid fluctuations in signal strength when received at the receiver, and it is usually caused by propagation mechanisms, notably, reflection, refraction or diffraction of the transmitted signal.

The main contribution of this paper is that we combine node lifetime and Link Lifetime in route lifetime-prediction algorithm, which explores the dynamic nature of mobile nodes the energy drain rate of nodes and the relative mobility estimation rate at which adjacent nodes move apart in a route-discovery period that predicts the lifetime of routes discovered, and then, we select the longest lifetime route for persistent data forwarding when making a route decision. The proposed route lifetime-prediction algorithm[5] is implemented by an exploring dynamic nature routing (EDNR) protocol with large scale environment based on quadrant based dynamic source routing.

CONNECTION LIFETIME-PREDICTION ALGORITHM

Easy to measure the distance between nodes *Ni* and *Ni*−1 when we use Global-Positioning-System-based location information . Senders transmit packets with the same power level a receiver can measure the received signal power strength when receiving a packet and then calculates the distance by directly applying the radio propagation model.

If the received signal power strength is lower than a threshold value[6], we regard this link as an unstable state and then calculate the connection time. Our proposed method requires only two sample packets, and we implement piggyback information on route-request (RREQ) and route-reply (RREP) packets during a route-discovery procedure with no other control message overhead, and thus, it does not increase time complexity

Evaluate the LLT using the connection lifetime; however, it is difficult to predict the connection lifetime T_{ci} between two nodes (N_i-1, N_i) because the nodes in MANETs may move freely. This algorithm had handle the connections that are in an unstable state and only last for a short period particularly, ignoring the stable one for simplicity. The reasons are given as follows: First, concerned with the minimum node lifetime or the connection lifetime in a route from. Two nodes[7] of a stable connection are within the communication range of each other, the connection lifetime may last longer, and they are not a bottleneck from the outer to which they belong. Second, it is easier to model the mobility of nodes in a short period during which unstable connections last. The connection time Tci depends on the relative motion between N_i and N_i-1, and the connection is said to be broken when two nodes (N_i-1, N_i) are moving out of each other's radio transmission range R. Apparently, there are two important issues here. How to measure the distance between nodes N_i and N_i-1. While the other is how to compute the relative velocity of these two mobile nodes. It is easy to measure the distance between nodes N_i and N_i-1. When use Global-Positioning-System-based location information[8] and then compute it must as described. Another simple method, which is our approach, is to measure the received signal strength. Assuming that senders transmit packets with the same power level, a receiver can measure the received signal power strength when receiving a packet and then calculates the distance by directly applying the radio propagation model. If the received signal power strength is lower than a threshold value, we regard this link[9] as an unstable state and then calculate the connection time. The relative motion of two nodes (N_i-1, N_i) t relative velocities v_i and (v_i-1) relative to ground at a given time t. The ground is used as a reference frame by default. If we consider node Ni as the reference frame, node N_i-1 is moving at elative velocity of v, as given by the following: $v = v_{i-1} - v_i$.

To calculate the connection time $TC_{i,}$ apply a triangle geometry theory and improve

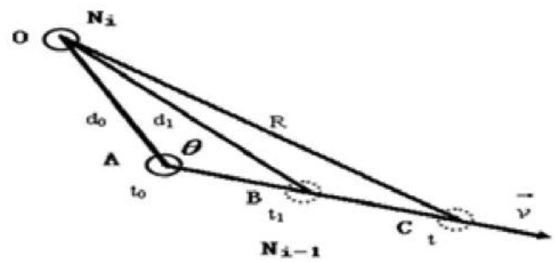

Fig. 1. LLT Prediction Algorithm

Predicts the link expiration time for reactive route maintenance in the previous work. Proposed method requires only sample packets, and implement piggyback information on route-request (RREQ) and route-reply (RREP) packets during a route-discovery procedure[9] with no other control message overhead, and thus, it does not increase time complexity. If node N_i is set to the reference frame[3], node N_i-1 moves at velocity v relative to the velocity of node N_i. N_i-1 receives two packets from node N_i at time t0 and t1. Assume that node N_i-1 moves out of node N_i's radio transmission range[10] at prediction time t. At time t0, node Ni−1 receives a packet from node N_i, and the received signal power is p0; thus, the distance do between the two nodes can be calculated by using a radio-propagation model[4]. A two-ray ground model for simulation in NS-2. By using the same method, d1 can also be calculated as

$$D_1^2 = d_0^2 + [v\,(t_1 - t_0)]^2 - 2d_0 v(t_1 - t_0)\ \mathrm{COS}\Theta$$

$$L_0 = d_0 + R + v\,(t - t_0)/2$$
$$L_1 = d_0 + d_1 + v\,(t_1 - t_0)/2$$
$$L_2 = d_1 + R + v\,(t - t_1)/2$$

above are all formulated by v and t, and then, there are three unknown parameters (t, v, Θ). Thus, the connection breakage time t can be obtained by solving these simultaneous equations, and the residual connection time T_{ci} is calculated as

$$T_{ci} = (\,t - t_1)$$

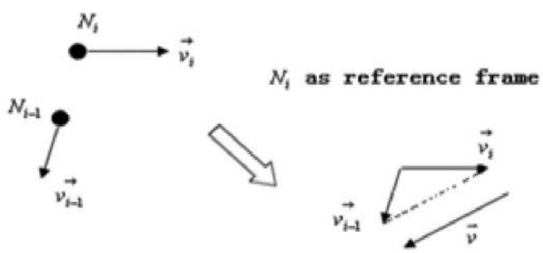

Fig.2 Relative motion

Each node tries to estimate its battery lifetime based on its past activity. This is achieved using a Simple Moving Average (SMA)[11] predictor by keeping track of the last N values of residual energy and the corresponding time instances for the last N packets received/relayed by each mobile node. This information is recorded and stored in each node. We have carefully compared the predicted lifetimes based on the SMA approach to the actual lifetimes for different values of N and found N=10 to be a good value. Our motivation in using lifetime prediction is that mobility introduces different dynamics into the network. In [13] the lifetime of a node is a function of residual energy in the node and energy to transmit a bit from the node to its neighbors. This metric works well for static networks for which it was proposed.

Algorithm1:Update RREQ packets

Input: A RREQ packet from node s
Input: Last two received power measurements P1, P2, for node s
if No Power Samples **then**
CUM   CUM + 1; return
end if
if P2 < P1 **then**
Compute relative speed estimate v
CEM   CEM + v
end if
if P2 > P1 **then**
Compute relative speed estimate v
CCM   CCM + v
end if

However, it is very difficult to efficiently and reliably compute this metric when we have mobility since the location of the nodes and their neighbors constantly change. PSR does not use prediction and only uses the remaining battery capacity. We believe LPR is superior to PSR since LPR not only captures the remaining (residual) battery capacity but also accounts for the rate of energy discharge. This makes the cost function of LPR more accurate as opposed to just using battery capacity.

Simulation is carried out in NS2 under LINUX platform for analyzing the route lifetime algorithm the following table 4.1 shows that the important parameters chosen for the NS2 simulation:

Table 1 Simulation parameters

Simulation Time	100s
Topology Size	1000m x 1500m
Number Of Nodes	100
MAC Type	MAC 802.11
Radio Propagation Model	Two Ray Model
Radio Propagation Range	250m
Pause Time	0s
Max Speed	4m/sec-24m/sec
Initial Energy	100J
Transmit Power	0.4W
Receive Power	0.3W
Traffic Type	CBR
CBR Rate	512 bytes x 6 per second
Number of Connections	50

ESTABLISHING ONE HOP AND TWO HOP NEIGHBORS

The main scenarios used for the simulation of wireless ad-hoc network are, the propagation model is Two-Ray Ground; the MAC protocol is MAC 802.11; the ad hoc routing protocol is ENDR

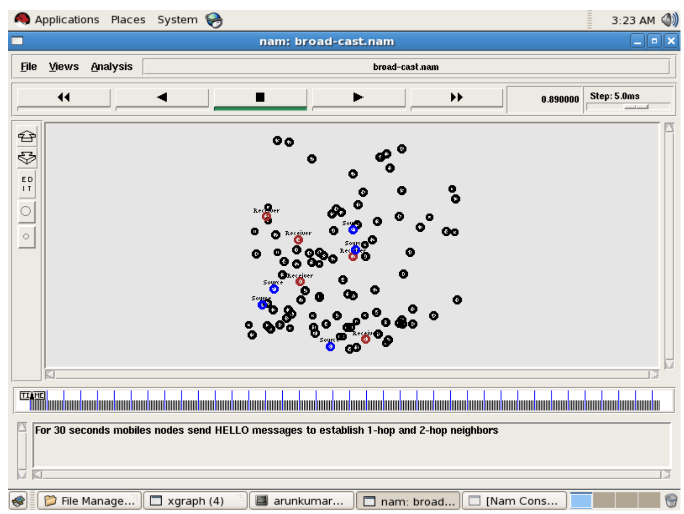

Fig. 3 Establishing one hop and two hop neighbors

Fig..3 shows the simulation environment in which 100 nodes are placed. In this setup 5 nodes are designated as a sender and another 5 nodes are designated as a receiver.

TRAFFIC CREATION

The main scenarios used for the simulation of wireless ad-hoc network are, the propagation model is Two-Ray Ground; the MAC protocol is MAC 802.11; the ad hoc routing protocol EDNR

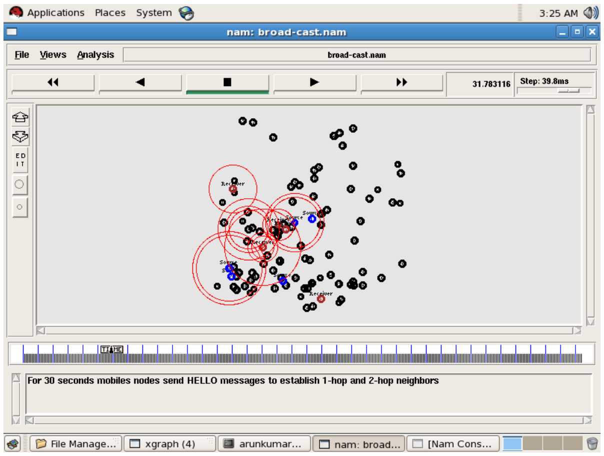

Fig.4 Traffic creation

Fig. 4 describes the transmission between sender and receiver. EDNR is used to find out the shortest path distance between the two nodes while transmission.

PACKET DELIVERY RATIO

Packet Delivery Ratio (PDR) is calculated by dividing the number of packets received by the destination through the number of packets originated by the source.

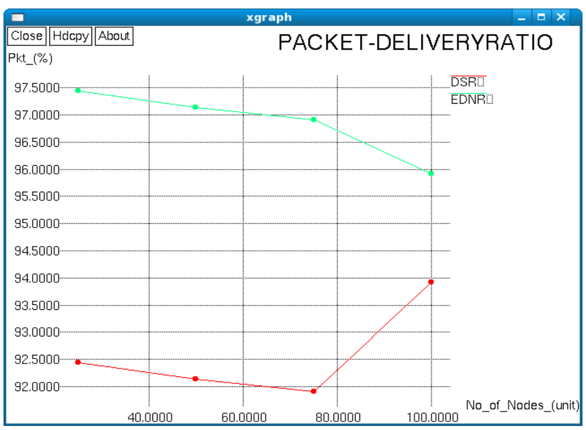

Fig.5 No of Nodes Vs packets

Fig.5 presents the efficient packet delivery Ratio by the EDNR compare to the DSR.

BANDWIDTH

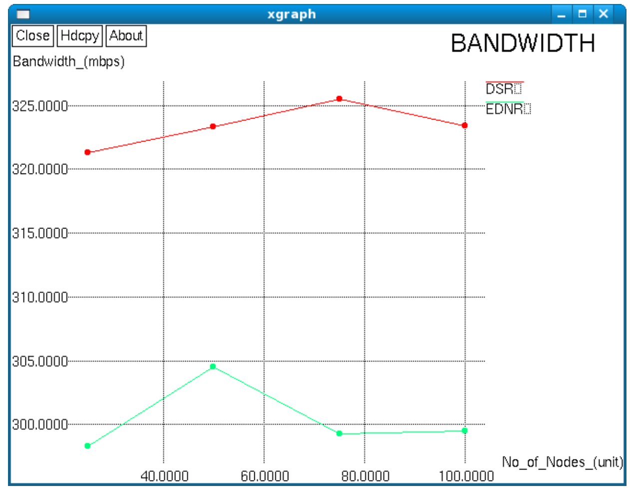

Fig.6 No of Nodes Vs bandwidth

Fig.6 presents better bandwidth of EDNR compared to the DSR protocol.

ENERGY CONSUMPTION

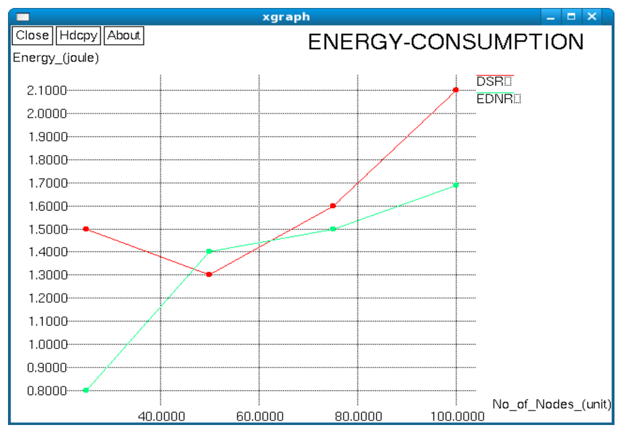

Fig.7 No of Nodes Vs energy

Fig.7 presents an efficient energy consumption of EDNR when compared to a DSR protocol.

CONCLUSION

In MANETs, a link is formed by two adjacent mobile nodes, which have limited battery energy and can roam freely, and the link is said to be broken if any of the nodes dies because they run out of energy or they move out of each other's communication range. The node lifetime and the LLT to predict the route lifetime and have proposed a new algorithm that explores the dynamic nature of mobile nodes, such as the energy drain rate and the relative motion estimation rate of nodes, to evaluate the node lifetime and the LLT. Combining these two metrics by using our proposed route lifetime-prediction algorithm, select the least dynamic route with the longest lifetime for persistent data forwarding. Finally, evaluate the performance of the proposed EDNR protocol based on the DSR. Simulation results show that the EDNR protocol outperforms the DSR protocol implemented with LPR and SSA mechanisms. The future work is to introduce Bounding algorithm by replacing the primitive method to improve the performance. It is expected that it can achieve a better performance in terms of total number of connected nodes, packet delivery ratio, latency and number of packets received.

REFERENCES

Bettstetter. C, Resta. G and Santi P (2003) "The node distribution of the random waypoint mobility model for wireless ad hoc networks", IEEE Trans.Mobile Comput., Vol. 2, No. 3, pp. 257–269.

1. Dube. R, Rais. C.D, Wang. K.Y and Tipathi S.K (1997) "Signal stability based adaptive routing (SSA) for ad hoc mobile networks", IEEE Pers.Commun., Vol. 4, No. 1, pp. 36–45.

2. Gerharz. M, de Waal. C, Frank. M and Martini P (2002), "Link stability in mobile wireless ad hoc networks", in Proc. 27th Annu. IEEE Conf. Local Comput. Net. pp. 30–42.

3. Le Boudec. J Y and Vojnovic M (2005) "Perfect simulation and stationary of a class of mobility models", in Proc. IEEE INFOCOM, pp. 2743–2754.

4. Maleki. M, Dantu. K and Pedram. M (2003) "Lifetime prediction routing in mobile ad hoc networks" ,in Proc. IEEE WCNC, pp. 1185–1190.

5. Marbukh. V and Subbarao. M (2000) "Framework for maximum survivability routing for a MANET", in Proc. MILCOM, pp. 282–286.

6. Misra. A and Banerjee. S (2002), "MRPC: Maximizing network lifetime for reliable routing in wireless environments", in Proc. IEEE WCNC, pp. 800–806.

7. Qin. L and Kunz. T (2002) "Pro-active route maintenance in DSR", ACM SIGMOBILE Mobile Comput. Commun. Rev., Vol. 6, No. 3, pp. 79–89.

8. Samar. P and Wicker. S.B (2004) "On the behavior of communication links of a node in a multi-hop mobile environment", in Proc. Int. Symp. Mobile Ad Hoc Netw. Comput, pp. 145–156.

9. 9 Sarkar. T.K, Ji. Z, Kim. K, Medouri. A, and Salazar Palma. M, (2003) "A survey of various propagation models for mobile communication", IEEE Antennas Propag. Mag., Vol. 45, No. 3, pp. 51–82.

10. 10 Shrestha. N and Mans. B (2007) "Exploiting overhearing: Flow-aware