ISSN: 2278 – 1323
International Journal of Advanced Research in Computer Engineering & Technology (IJARCET)
Volume 2, No 5, May 2013

Energy Enhancement in AOMDV

Alpesh chauhan(M-919327182311)
Information Technology Dept,Shantilal Shah Engineering college, Bhavnagar,Gujarat,India
Gujarat Technology University

Prof.B.V.Buddhdev(M-919825046179)
Principal Shantilal shah Engineering College, Bhavnagar, Gujarat, India
Gujarat Technology University

Abstract— Mobile computing is evolving rapidly with advances in wireless communications and wireless networking protocols. To facilitate communication, most wireless network devices are portable and battery-powered, and thus operate on an extremely constrained energy budget. However, progress in battery technology shows that only small improvements in battery capacity can be expected in the near future. Furthermore, because recharging or replacing batteries is costly or, under some circumstances, impossible, it is desirable to keep the energy dissipation level of devices low. Energy-efficient design in mobile ad hoc networks (MANETs) is more important and challenging than with other wireless networks.

Index Terms— **Energy-efficient design, Mobile computing, Manet, Wireless networking protocols, AOMDV-ENERGY,**

INTRODUCTION

Mobile computing is evolving rapidly with advances in wireless communications and wireless networking protocols. Despite the fact that devices are getting smaller and more efficient, advances in battery technology have not yet reached the stage where a mobile computer can operate for days without recharging. While research is on-going to build long-lasting batteries, sometimes we wonder if there is an electrochemical limit. If so, then advanced power conservation techniques are necessary.

Energy efficiency is a major challenge in wireless networks. To facilitate communication, most wireless network devices are portable and battery-powered, and thus operate on an extremely constrained energy budget. However, progress in battery technology shows that only small improvements in battery capacity can be expected in the near future. Furthermore, because recharging or replacing batteries is costly or, under some circumstances, impossible, it is desirable to keep the energy dissipation level of devices low. A mobile ad hoc network is a collection of two or more nodes equipped with wireless communications and networking capabilities without central network control, namely, an infrastructureless mobile network. Energy-efficient design in mobile ad hoc networks (MANETs) is more important and challenging than with other wireless networks. First, due to the absence of an infrastructure, mobile nodes in an ad hoc network must act as routers and join in the process of forwarding packets. Therefore, traffic loads in MANETs are heavier than in other wireless networks with fixed access points or base stations, and thus MANETs have more energy consumption. Second, energy-efficient design needs to Energy in mobile adhoc networks is of much important. Similarly shortest path from source to destination is also important for routing. To address these issues a routing protocol is proposed which gives an optimum between these issues. Consider the trade-offs between different network performances criteria. For example, routing protocols usually try to find the shortest path from sources to destinations. It is possible that some key nodes will over serve the network and have their energy drained quickly, causing the network to be partitioned. Thus simple solutions that only consider power constraints may cause severe performance degradation. Third, no centralized control implies that energy-efficient management in MANETs must be done in a distributed and cooperative manner, which is difficult to achieve.

Need For Conservation Of Energy

The main reasons for energy conservation in ad hoc networks are as follows:

•***Limited energy reserve:***. *The* improvement in battery technologies is very slow as compared to the advances in the field of mobile computing and communication.

•***Difficulties in replacing the batteries:*** *In situations like battlefields, natural* Disasters such as earthquakes, and so forth, it is very difficult to replace and recharge the batteries. Thus, in such situations, the conservation of energy is very important.

•***Lack of central coordination:*** *Because an ad hoc network is a distributed network* and there is no central coordinator, some of the nodes in the multi hop routing should act as a relay node. If there is heavy relay traffic, this leads to more power consumption at the respective relay node.

•***Constraints on the battery source:*** *The weight of the nodes may increase with the* weight of the battery at that node. If the weight of the battery is decreased, that in turn will lead to less power of the battery and thus decrease the life span of the battery. Thus, energy management techniques must deal with this issue; in addition to reducing the size of the battery, they must utilize the energy resources in the best possible way.

•***Selection of optimal transmission power:*** *The increase in the transmission power* increases the consumption of the battery charge. Because the transmission power decides the reachability of the nodes, an optimal transmission power decreases the interference between nodes, and that in turn increases the number of simultaneous transmissions.

•**Energy consumption model**

A wireless network interface can be in one of the following four states: Transmit, Receive,

Idle or Sleep. Each state represents a different level of energy consumption.[2]

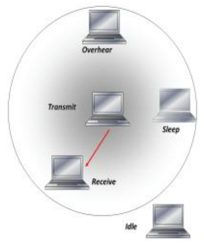


Figure 1. Energy consumption in a wireless network

In Table 1, typical values of consumption for a wireless interface (measured for a Lucent Silver Wavelan PC Card) are reported.

State	***Power value***
Transmit *Ptx*	1.3W
Receive *Prx*	0.9W
Idle *Pidle*	0.74W
Sleep *Psleep*	0.047W

Table 1. Power value in each radio state

The energy dissipated in transmitting (*Etx*) or receiving (*Erx*) one packet can be calculated as:

$$Etx = Ptx \times Duration$$
$$Erx = Prx \times Duration \qquad (1)$$

Where *Duration* denotes the transmission duration of the packet. When a transmitter transmits a packet to the next hop, because of the shared nature of wireless medium, all its neighbors receive this packet even it is intended to only one of them. Moreover, each node situated between transmitter range and interference range receives this packet but it cannot decode it. These two problems generate loss of energy. So to compute the energy dissipated by one transmission, we must take into account these losses as follows (Allard et al., 2006):

$$cost_{tx}(i) = E_{tx} + n \times E_{rx} \qquad (2)$$

Where *n* represents the number of non-sleeping nodes belonging to the interference zone of the transmitter *i*.

.

Minimum Total Transmission Power Routing (MTPR)

A first approach for energy-efficient routing is known as MTPR (Minimum Transmission Power Routing; Toh, 2001). That mechanism uses a simple energy metric, represented by the total energy consumed to forward the information along the route.[4]

Minimum Battery Cost Routing (MBCR)

Total transmission power is an important metric because it concerns the lifetime of mobile hosts. However, it has a critical disadvantage. Although this metric can reduce the total power consumption of the overall network, it does not reflect directly on the lifetime of each host. If the minimum total transmission power routes are via a specific host, the battery of this host will be exhausted quickly, and this host will die of battery exhaustion soon. Therefore, the remaining battery capacity of each host is a more accurate metric to describe the lifetime of each host [4].

Min-Max Battery Cost Routing (MMBCR)

To make sure that no node will be overused, the above objective function (Eq. 3) can be modified, as indicated in [8]. Battery cost Rj for route j is redefined as

$$R_j = \max_{i \in route_j} f_i(c_i^t) \qquad (d)$$

Similarly, the desired route i can be obtained from the equation

$$R_i = \min\{R_j \mid j \in A\}, \qquad (d)$$

Conditional Min-Max Battery Cost Routing (CMMBCR)

Our goal is to maximize the lifetime of each node and use the battery fairly. However, these two goals cannot be achieved simultaneously by applying MTPR or MMBCR schemes. MBCR can only fulfil both of them sometimes. It is still not clear at this stage if we can achieve these two goals simultaneously. To resolve this problem, they [3] use battery capacity instead of cost function as a route selection metric, and introduce the conditional max-min battery capacity routing (CMMBCR) scheme.[3]

The basic idea behind CMMBCR is that when all nodes in some possible routes between a source and a destination have sufficient remaining battery capacity (i.e., above a threshold), a route with minimum total transmission power among these routes is chosen.

They define the battery capacity *j* for route *j* at time *t* as

$$R^c_j = \min_{i \in route_j} c_i^t \qquad \text{(e)}$$

Where c_i is the residual battery capacity of node *i* on the route *j*.

Min-Max Residual Energy in AOMDV (MMRE-AOMDV)

Yumei Liu, Lili Guo,Huizhu Ma,Tao Jiang proposed a new routing protocol MMRE_AOMDV in order to balance the traffic load among different nodes according to their nodal residual battery and prolong the individual node's lifetime and hence the entire system lifetime.

The MMRE-AOMDV protocol has two main components.[1]

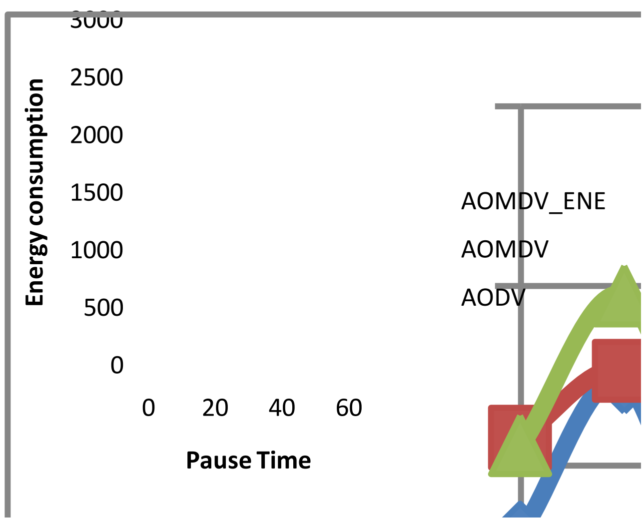
Finding minimal nodal residual energy

Several changes are needed in the AOMDV route discovery procedure to enable computation minimal nodal residual energy of each route between source-destination pairs. Each RREQ and RREP now carries an additional field called ***min re-energy*** *to indicate that all of nodes in the route have the* minimal nodal residual energy. When intermediate node receives RREQ packet, only if the sequence number of just received packet is greater than this node', its residual energy should be compared with the *min_re_energy of RREQ. If the residual* energy of this node is less than the *min_re_energy of RREQ,* we update the *min_re_energy field with it, in order to keep the* value of *min_re_energy lowest among all the nodes in this* route.

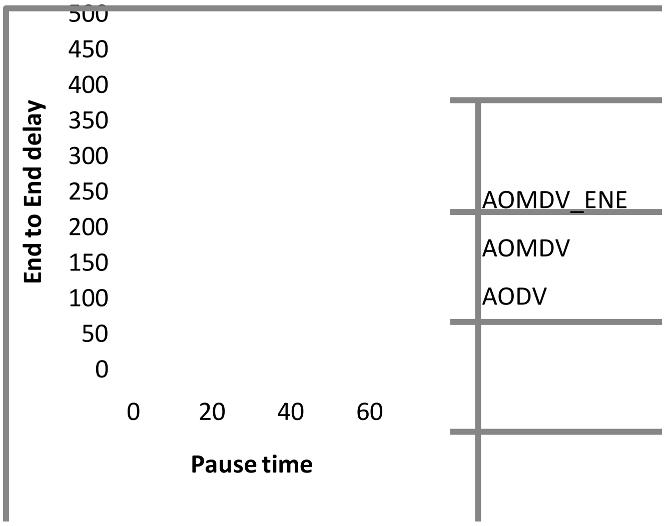
*A. **Sorting multi-route by descending nodal residual energy***

Same as finding minimal nodal residual energy phase, we still add another additional field ***min-re-energy*** *in the route_list.* The node with route_list sorted by the descending value of *min-re-energy can send data packets using the route with* maximal nodal residual energy when needed. When the source node receives a new route message containing information of maximal nodal residual energy, this new route should be adopted to forward rest data packets. Such process can prevent one or some critical nodes depleting their energy earlier and prolong network's lifetime.

Simulation result of AOMDV_ENERGY



AOMDV_ENERGY graph with energy consumption



END TO END DELAY OF AOMDV_ENERGY

CONCLUSION:

In this paper we have presented various techniques for improved energy function of AOMDV routing protocol and also prove with simulation result that AOMDV_ENERGY which is enhancement of AOMDV work better than AODV and AOMDV in End to End Delay and Energy consumption.

ACKNOWLEDGEMENTS:

I would like to say thanks to Prof. B.V.buddhdev, Prof. H.B.jethava , Prof. K.R.trivedi, Arvind sir and miss Asha Zala, Prasant sir and my parent to give me their valuable time and support.

REFERENCEs

[1] Yumei Liu, Lili Guo, Huizhu Ma, Tao Jiang " Energy Efficient On Demand Multipath Routing Protocol For Multi-Hop Ad Hoc Networks ", In The Proceedings Of ISSSTA-08, IEEE 10th International Symposium On Spread Spectrum And Applications, Bologna, Italy, August 25-27 2008,Pp-592-597.

[2] Marco Fotino And Floriano De Rango "Energy Issues And Energy Aware Routing In Wireless Ad-Hoc Networks", *University Of Calabria, Italy.*

[3] *C.-K. Toh, "*Maximum Battery Life Routing To Support Ubiquitous Mobile Computing In Wireless Ad HocNetworks", IEEE Communications Magazine • June 2001

[4] S. Singh And M. Woo, "Power- Aware Routing In Mobile Ad- Hoc Network" *Proc. Mobicom '98*, Dallas, TX, Oct. 1998.

[5] Singh S., And Ragavendra C.S., "PAMAS_ Power Aware Multi-access Protocol With Signaling For Ad Hoc Networks", ACM Commun. Rev., Pp.54-62, July 1998.

[6] Pavel Korshunov,Lu Liming And Jian, "Conserving Power In Mobile Ad Hoc Networks"

[7] M. Bheemalingaiah, M. M. Naidu, D. Sreenivasa Rao, G.Varaprasad, "Energy Aware Node Disjoint Multipath Routing In Mobile Ad Hoc Network", Journal Of Theoretical And Applied Information Technology.

[8] Benjie Chen, Kyle Jamieson, Hari Balakrishnan, and Robert Morris, "SPAN: An Energy-Efficient Coordination Algorithm for Topology Maintenance in Ad Hoc Wireless Networks," ACM Wireless Networks Journal 8(5) (2002) Pp.481–494.

[9] Getsy S Sara, Neelavathy Pari.S, Sridharan.D, "Energy Efficient Ad Hoc On Demand Multipath Distance Vector Routing Protocol (E^2AOMDV)" , International Journal Of Recent Trends In Engineering, Vol 2, No. 3, November 2009.

[10] Annapurna P Patil, Dr K Rajani Kanth , Batheysharanya, M P Dinesh Kumar, Malavika J, "Design Of An Energy Efficient Routing Protocol For Manets Based On AODV", IJCSI International Journal Of Computer Science Issues, Vol. 8, Issue 4, No 1, July 2011.

[11] Yuhua Yuan, Huimin Chen, and Min Jia, "An Optimized Ad-Hoc On-Demand Multipath Distance Vector (AOMDV) Routing Protocol", 2005 Asia-Pacific Conference On Communications, Perth, Western Australia, 3 - 5 October 2005

Alpesh Chauhan.- pursuing M.E.-I.T. from shantilal shah engineering college.

Prof.B.V.Buddhdev:- Principal Shantilal shah Engineering College.
M.tech from IIT-Delhi.