International Journal of Advanced Research in

Computer Science Engineering and Information Technology

Volume: 1 Issue: 1 06-Jun-2013,ISSN_NO: 2321-3337

# Energy-Reduced Aodv (Er-Aodv) Routing Protocol For Improving Network Life Time In Wireless Ad-Hoc Networks

M.Arthi and prof G.I.Pandian Department of Computer science and engineering,
Ganadipathy Tulsi's Jain Engineering College, Kaniyambadi,Tamil nadu,India
arthimdas@gmail.com ;9994311391

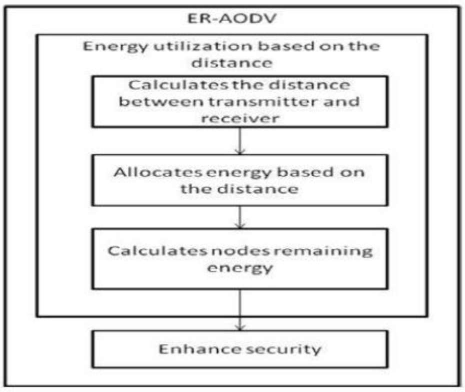
**ABSTRACT** –*Ad-hoc network is a collection of wireless mobile host forming a temporary network without any centralized administration. There is no fixed infrastructure in which nodes depend on each other to keep network connected. All nodes of the network behave like router. The main requirements of ad-hoc routing protocols are in terms of power efficiency and security. Reactive protocol like on-demand routing protocol are active whenever there is a connection requirement. In Ad-hoc on demand routing protocol routes are created when required. The main aim of this project is to pick an algorithm to compute energy efficient path. Since routing considers available battery energy, our aim is to minimize total energy required to transport a packet by good route. Since node is key on the network, if the energy of each node goes down very quickly, so network lifetime will also go down . In ad-hoc network mobile nodes are basically small-size terminals depending on the battery operated. When a node exhausted its energy is unable to efficiently communicate with others. So here we use energy reduced AODV which calculates the distance between transmitter & receiver node and allocates transmission power based on the distance. In this project we are going to prove the energy consumed by ER-AODV is less when compared to AODV in terms of single source, multiple source, and high-traffic density situations.*

**Keywords - AD-HOC, AODV, ER-AODV and High Traffic Scenario.**

## 1, INTRODUCTION

In an ad hoc network, nodes rely on each other to keep the network connected. Each node itself acts as a router for forwarding and receiving packets to/from other nodes. Routing in ad-hoc networks has been a challenging task ever since the wireless networks came into existence. The feasible routing protocols need take into account energy, time-delay, overhead, reliability and soon .In ad hoc networks mobile nodes are basically small-sized terminals depending on battery operated. When a node exhausted its energy, it is unable to efficiently communicate with others. At the same time all other nodes in virtue of the node need search new communicating path and whole network is likely to be fragmented. The main goal of this protocol is to consider about the energy consumption. Section 2 contains introduction about AODV protocol. Section 3 explains about ER-AODV protocol. Section 4 contains results and discussion. Section 5 contains conclusion. AODV AODV is an on-demand hop-by-hop based routing protocol, which attempts to determine route when it is required bythe source. In AODV, when a node has data to send, it checks first to see if it has a valid route to the destination. If a route exists, it uses the known route to send the data to the required destination. Otherwise it initiates the route discovery

**ER-AODV :**




process.

**Figure 1. ER-AODV protocol**

The above Figure 1 describes about the function of ER-AODV. 1.Initially calculate the distance between transmitter and receiver.2.Allocates energy based on the distance. Hence the amount of energy utilized will be reduced. The formula used to calculate is as follows: $Pr = Pt*(\lambda/4\pi d)n*Gt*Gr$ (1) Pr = received power Pt = transmitted power d = distance between the transmitter and the receiver Gt = gain of transmitting antenna Gr= gain of receiving antenna n = 2 for friss transmission = 4 for two ray propagation (two-ray propagation is used in this project). 3. This protocol enhances the security by using the trust based node selection [3]. Results and Discussion To prove the performance of ER-AODV single source and multiple source scenarios are used. Simulation is performed by NS2 Tool. The graph in figure 4 was plotted from values obtained after simulation network1 with a single source using AODV and ER-AODV routing. The graph shows a small difference in the remaining energy per node, after packets were routed using AODV and ER-AODV routing. The average energy remaining per nodes at the end of simulation using AODV is 99.7786 joules. The average energy remaining per node at the end of simulation using ES-AODV is 99.7832 joules. Energy conserved is .0046 joules

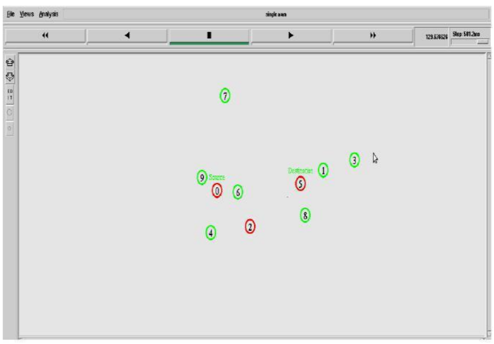


**Figure 2.Single Source scenario**

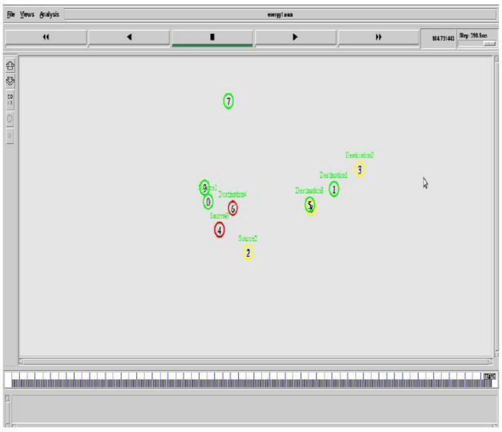
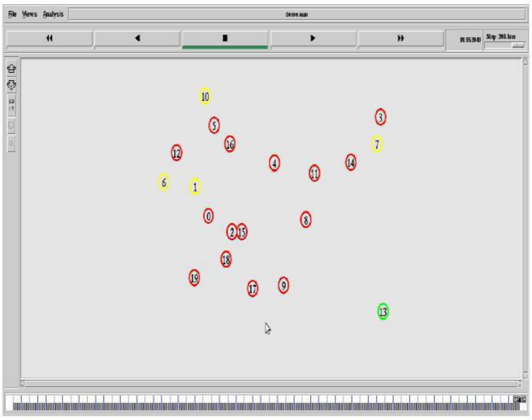


**Figure 3.Multiple source scenario**

In the figure 3 the nodes with multiple source scenario is created. Here the remaining energy of all the nodes is calculated. The remaining energy of AODV and ER-AODV is compared.



In figure 4 the dense area network is taken This is to show the energy level in the case of high traffic situation. Here the remaining energy of AODV and ER-AODV is compared. The remaining energy in the case of ER-AODV is high than that of original AODV.


**Figure 5.Energy level for node 0 using original AODV**

The graph in figure 5 shows the energy variation of node 0 in the case of original AODV. Here we can see that there is a sudden drop of energy level.

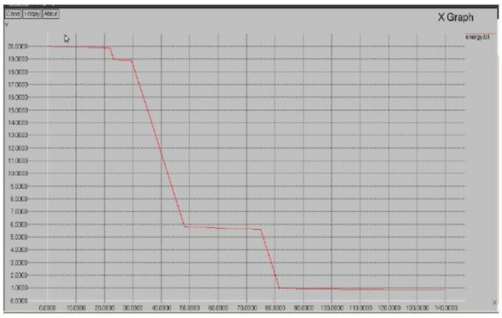



**Figure 6.Energy level for node 0 using modified**

The above figure shows the energy value of node 0 using ER-AODV. Here we can see the gradual decrease in the energy level. When compared to the figure 5, figure 6 gives the increased network life time. Figure 4 is drawn from the values obtained Average Energy remaining per node after routing using AODV at the end of simulation is 99.4144832 joules. Average Energy remaining per node after routing using ES-AODV at the end of simulation is 99.5013326 joules. Energy saved is .0868494 joules. The graph was plotted using values obtained after simulation of Network available in Figure 2 with 40 nodes and multiple sources.

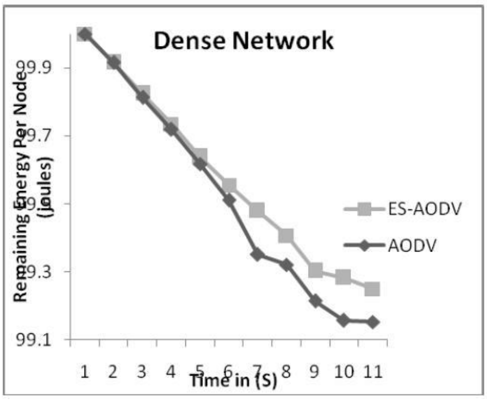
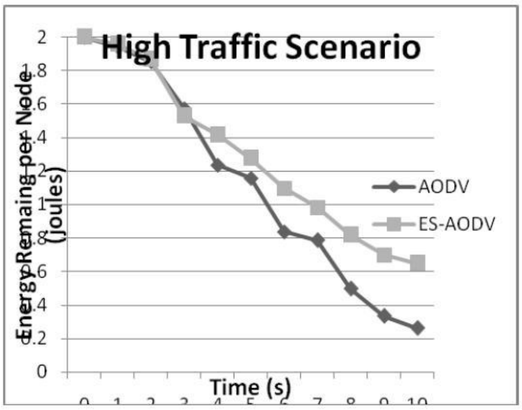



**Figure 5. Graph plotted Dense Network**




after simulation [7] for network with high traffic using AODV and ER-AODV routing. From this graph we can see that the energy conserved is more as the number of sources in the network increases. This graphs shows significant conservation of energy. This is because in a dense network internodal distance is less and as transmission power levels are set according to internodal distance in ER-AODV there is significant reduction in energy consumed for transmission. Average energy remaining per node after routing through AODV at the end of simulation is 99.1529 joules. Average energy remaining per node after routing through ER-AODV at the end of simulation is 99.25 joules. Energy saved is .3863 joules The graph was plotted using values obtained after simulation of Network 2 with 40 nodes in a high traffic scenario. The graph show in figure 6 shows that the average energy remaining in nodes after routing with AODV is less than quarter of the initial energy whereas average energy remaining in nodes with ER-AODV routing is more than half the initial energy. Initial energy is set to 2 joules. Average energy remaining per node after routing through AODV at the end of simulation is .2616 joules. Average energy remaining per node after routing through ER-AODV at the end of simulation =.648 joules. Energy conserved .386 joules. The figure 7 shows the energy remaining in each node in condition described above.

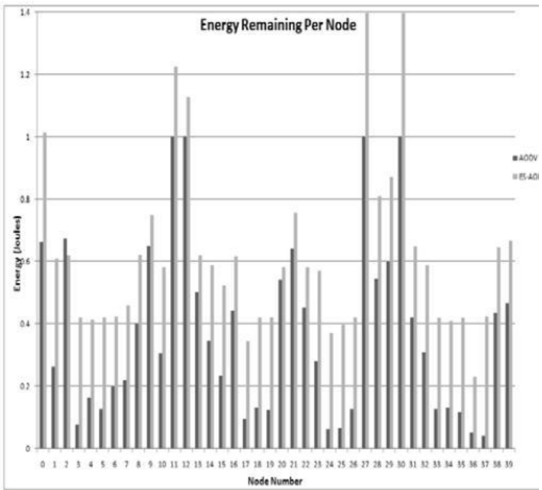



**Figure 7. Energy remaining per node**

It shows that using AODV routing the network will soon will loss connectivity as more than 16 of its nodes are nearing death. While with ER-AODV all the nodes have connectivity and can continue operating for longer period of time. The green color on the node shows the nodes having most energy remaining. The yellow color on the nodes denotes the nodes that have used up a lot of their energy but has more than 25% of their initial energy, while the red color shows that the nodes have below 25% of their initial energy left and will soon die. It can be understood from these diagrams that the ER-AODV save more power and therefore guarantee longer life for each node; which in-turn guarantees full connectivity for a longer time and increased operation time for the entire network.

## CONCLUSION

In this paper packets are forwarded between nodes using AODV routing protocols. But to decrease energy consumption and extend operation time of the network transmission power control has beenincorporated into AODV. The transmission power is varied according to distance between receiver and transmitter using two- ray propagation equation [1]. From the results it can be seen that the desired improvement over AODV has been attained. The networks using Energy Reduced AODV are less energy consuming and assure full connectivity over a longer period of time.

## REFERENCES

[1] “An Energy Balancing Routing Protocol Based on AODV”, by Jingbo Yuan, Shunli Ding, Dan Zhang, IEEE 2010.

[2] “Energy-aware AODV Routing for Ad Hoc Networks”, by Cao Jianglian Zhang Zhaoxiao, Zeng Wenli, Pei Tingrui.

[3] “Trust Based Secured Adhoc On Demand Distance Vector Routing Protocol for Mobile Adhoc Networks:, R.S.Mangrulkar,Dr.Mohammad Atique. [4]”Energy Saving Routing Protocol Based on AODV” by Xingsheng Wang, Qing Liu

[5]Caching strategies in on-demand routing protocols for wireless ad hoc networks, by Yih-chun Hu and Divid B. Johnson, http://monarch.cs.cmu.edu

[6]Highly Dynamic Destination-Sequenced Distance-Vector Routing for Mobile Computers, Pravin Bhagwat, Charles E. Perkins

[7]Dynamic source routing in ad hoc wireless networks, by David B. Johnson and David A. Maltz, http://www1.ics.uci.edu/~atm/adhoc/paper-collection/johnson-dsr.pdf