IOSR Journal of Computer Engineering (IOSR-JCE)
e-ISSN: 2278-0661,p-ISSN: 2278-8727, Volume 17, Issue 2, Ver. VI (Mar – Apr. 2015), PP 24-29
www.iosrjournals.org

Energy Consumption of Intermediate node in AODV

Shah Bhavisha[1], Khushboo Parmar[2], Asmita Patel[3], Parita Savaliya[4], Nital H. Mistry[5]
[1]*Student,SVMIT,Bharuch,India*
[2] *Student,SVMIT,Bharuch,India*
[3]*Student,SVMIT,Bharuch,India*
[4]*Student,SVMIT,Bharuch,India*
[5]*Asst.Proffessor,SVMIT,Bharuch,India*

Abstract: *An A MANET(Mobile Ad-Hoc NETwork)is a network of wireless mobile nodes,without a centralized control.MANET can be characterized as unstructured Ad-Hoc,mobile nodes with limited resources including energy.AODV is one of the most popular,widely accepted and researched reactive protocol of MANET.AODV doesn't consider the residual energy and local situation of the nodes while route selection.So,sometimes the choosen route gets fail because either the node starts acting selfishly(because of their low energy) or the node gets disconnected(because of battery life). To analyse this problem,in this paper, authors have studied in detail role of the nodein a communication for AODV protocol i.e source,intermediate and destination.The goal of this work is to find out where are the chances of energy being more consumed.Either as source or intermediate or as destination.For this NS-2 simulator has been used.The simulator study/research can concluded that intermediate node consume more energy.*

Keyword: *MANET, AODV ,Route Discovery, Route Maintenance ,intermediate node,Reactive, Proactive,Hybrid, RREQ, RREP, RRER,*

I. Introduction

LAN has taken its position at various places.According to the consequences obtained by recent research it has ben observed that wireless technology is gaining popularity in world of communication. Now a days people like to stay connected with each other all over the world and also share resources of different places with help of wireless technology. Mobile Ad-Hoc NETwork(MANET) are rapidly expanding in area of Mobile mobility very importantly[1]. Mobile Ad-hoc NETwork as a rule has a dynamic behavior and fixed bandwidth.Due to more dynamic and diffused nature key matter in MANET is routing. Such connection between mobile nodes are known as MANET and nodes forming a temporary network without any centralized stand alone communication. MANET node communicate in direct way or indirect way with intermediate nodes[1]. Due to reason of efficient operation wireless network in mobile,it involve functionality of routing which is nothing but mobile host which saves energy and lesser down routing overhead for another nodes[2].The intermediate node is taken in consideration only when source node cannot directly transfer data to destination node. It happens only when source node and destination node are within communication. By this it states MANET networks are self organizing and configuring which changes accordingly. Node acts in both way as host and also route which route data to another node of network. Battery power of nodes's of mobile as a limitation,energy efficient routing has convincing affects on MANET . Replacement and recharging of batteries cannot be possible at complex locations.

MANET is needed almost at location where infrastructure is very costly and impractical[3]. In recent year,a huge research has taken place for development of routing protocol for MANET, and from it classifies in 3 parts 1.Reactive 2. Proactive 3. Hybrid by different perspectives. Different properties are satisfied by this protocols and this includes battery capacity , fast route- discovery, dispersed, implementation , bandwidth efficient usage[7.]

A area where MANET is useful are
1 .Military surroundings.
2. Civilian surroundings.
3. Commericials.

II. Taxonomy Of Routing Protocol

MANET takes help of different routing protocol to fulfill the need and to face challenges. Routing protocol are protocols in which nodes are control.Further routing protocol are divided into 3 parts Reactive,Proactive,Hybrid[2].

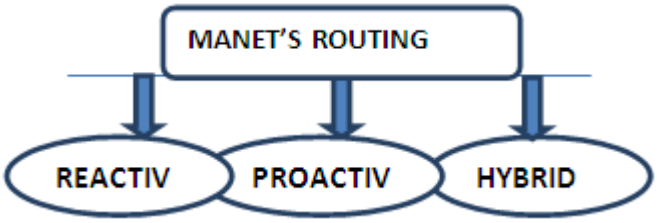

Fig 1 Classification of routing protocol

A. Reactive routing Protocol

Reactive protocols are active protocols which are called when it is needed means it is on-demand routing protocols[4].When source node wants to communicate with other available node than on demand it search for route and create connection for transmitting packet. Maintanance of routing table and newest route topology regularly does'nt occur as it is on demand[8] EX: Dynamic source routinf(DSR), Ad-hoc on demand distance vector(AODV).

B. Proactive Routing Protocol

Proactive protocols comes under table driven protocols,when source node communicate,it route are already defined so it works on predefined route for communication with another node[8].Maintenance and updation of routing tableon regular basis happens in proactive routing protocol[9]. EX: DSDV,WRP,OLSR.

C. Hybrid Routing Protocol

Combined characteristic of reactive and proactive routing protocol is known as hybrid protocol.Hybrid protocols works more quickly as it includes features of both and route can be easily found for transmitting data to one node to another[7].

III. Ad-Hoc On Demand Distance Vector Routing (Aodv)

Ad-hoc on demand distance vector routing(AODV) is on demand and reactive routing protocol. AODV sustain the information of active paths and route are needed. Routing tables are updated at each and every node.Every time route table updated and route table stores <destination addr,next-hop addr,destination sequence no,life-time>[1]. AODV is combined mixture of DSDV and DSR. Unicast and multicast routing both are possible in AODV. Trees are created to connect the members in multicast. In AODV the two main important features are 1. Route Discovery 2.Route Maintenance. AODV uses bidirectional links. For finding a route,cycle of route discovery is used and maintain the route which are active.It minimize no. of active route between an active source and destination but it follows and implementation is done only a single route because it is difficult to manage multiple route for same pair of source and destination. Monotonically increment in sequence number is maintain by every node →Neighbouring topology change and increment in node every time[6]. Two sepearte counters for every nodes is protected by Boradcast and a node sequence number[4].

Advantage Of AODV

1. It supports least congested route,on behalf of short path as it is favorable for unicast and multicast packet transmission, same in constant movement.
2. Active routes of topological affects are also fastly responds.
3. Extra overheads of data packets are not done.

D. For AODV protocol

1) Route Discovery

When communication is done between source node to another node,path discovery is initialized. i.e, is source node sends data to the destination node. It starts with sending request to neighbouringnode(RREQ) packet till it reaches is its destination node. RREQ packet has following key points : source node IP address,broadcastid,current consecution number,destination IP address,destination consecution number[4].

A node sends a reply RREP(Route reply) packet using back route. Route table updated with reverse path entrance to source of an intermediate node after getting RREQ packet. Reverse path contain : source IP address,Source consecution number,number of hops to source node,IP address of node in which RREQ achieved[10]. Broadcasting is done via Flooding. Flooding provide high reliabilities of data delivery and reason is that packet may be deliver on multiple path to destination[12].

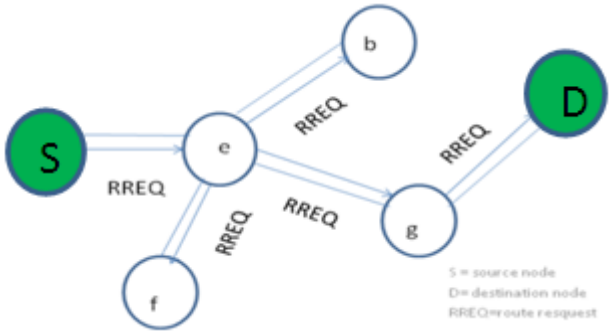

Fig 2 Route request mechanism in AODV

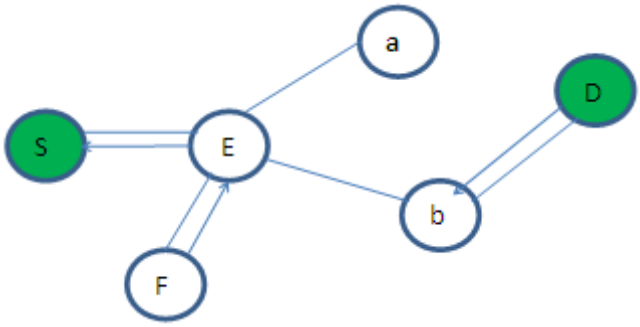

Fig 3 Route reply mechanism in AODV

2) Route Maintanence

Route Maintenance is completed by taken in granted(REER) route error packet.The route will get dead if it is not recently in use[4].The RERR is initiated by upstream by node of the break and it affected destination is affected by it. When source node receive an RERR,the route discovery can reinitiated[10].

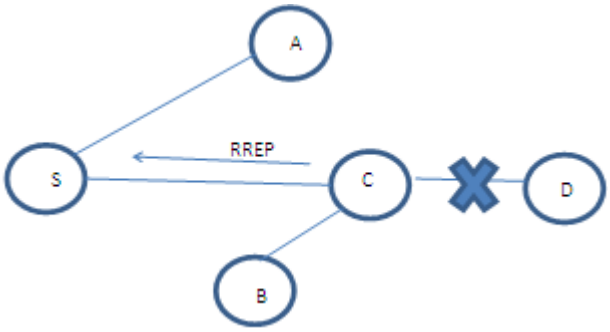

Fig. 4 Breakdown in communication

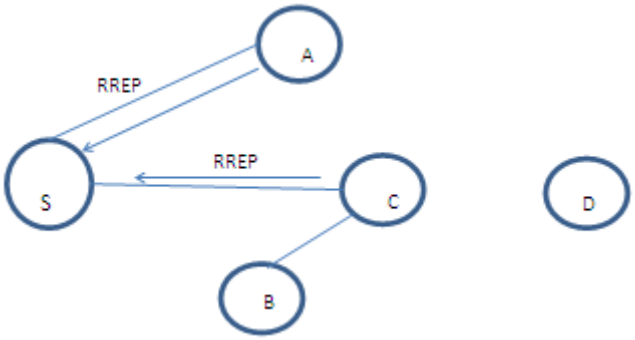

Fig. 5 Route Maintanence

In figure it shows that link between C and D breaks, node c counts D as invalid and remove it and now again node C create RERR message. RERR received by node A it checks where next hop on route to D to C. It

delete D and make it infinite and forward RERR to S. Node S receive RERR and discovery is still in progress if it is needed[1].

3) Role of odes in AODV

a) Source node
The node from where the message sending is started.
b) Intermediate Node
The node from which the message from source node to destination node is transfer.
c) Destinaion Node
The node is known as goal node in which message is reached from source node.

IV. Role of intermediate node in route discovery

1. The Communication between source node and destination node is done with the help of intermediate node.
2. When a packet from sender received by intermediate node it checks in its own routing table that whether the packet entry is there or not ,if it has entry than it declare as duplicate and packet is dropped.
3. If the packet is new in routing table than routing table is updated and sended to its neighbor for further process.
4. Many times it happens that intermediate act selfishly because of 2 reasons.

a. Even when packet does not belong to the intermediate node it consume the receiving and transmitting power. Due to this it simply dropped packet and go to idle state (sleep mode).

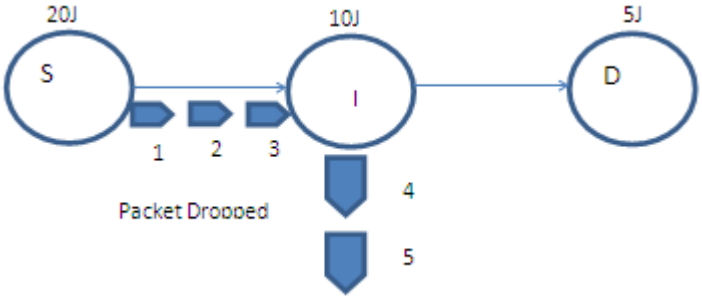

Fig. 6 Packet Sending from source to destination

b. After some time it gets switch off as no more energy is left because all energy of receiving and transmitting is utilized by intermediate node due to which communication stop.

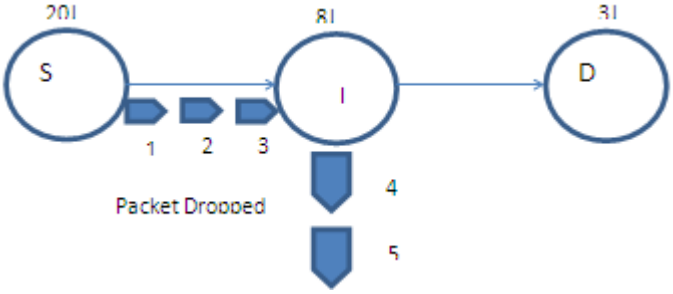

Fig. 7 Packet dropped by intermediate node

5. That means the intermediate node is the main soul of communication between source and destination.

V. Simulation parameter

E. Simulation Environment:

The simulation results in this paper were obtained using Network Simulator 2 version 2.35 (NS2) to perform comparison between source node, intermediate node and destination node energy in AODV protocol. NS2 is a discrete event, object oriented, simulator developed by the VINT project research group at Carnegie Mellon University which includes: nodes mobility, a realistic physical layer that includes a radio propagation model, radio network interfaces and the IEEE 802.11 Medium Access Control (MAC) protocol using the

Distributed Coordination Function (DCF). NS2 is one of most popular network simulator tools worldwide. The NS2 was installed under Ubantu 12.0.4 as a simulation platform. The transmission range is assumed to be 250m and the packet size is fixed at 512 bytes. In order to have performance result, we use 3 to 7 nodes on the simulation separately. The parameter values taken during simulation are as follows:

Parameters	Values
MAC Layer Type	IEEE 802.11
Radio Propogation Model	Two Ray Ground
Reception Queue Length	30
Initial Energy	20 Joules
Transmission power(TP)	0.6 W
Reception power(RP)	0.3 W
Packet size	512 bytes
Total Simulation Time	50 Secs
Area	800*600

VI. Results:

The graphical representations of analysis of energy consumption in AODV by the source node, intermediate node and destination node with the time interval are as follows:

Table 1: Readings of different Nodes

Time	Source node	Intermediate node	Destination node
10	20	20	20
15	18.25615	18.202491	18.508752
20	16.712953	16.349566	17.009202
25	15.089022	14.513714	15.497626
30	13.242531	12.73259	14.004531
35	11.449911	10.956877	12.516751
40	9.649434	9.176368	11.04637
45	7.669288	7.451457	9.605851
50	5.868854	5.672825	8.132455

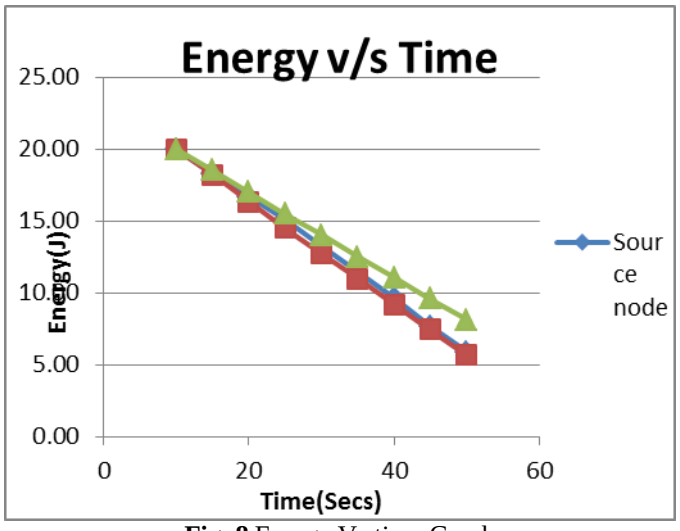

Fig. 8 Energy Vs time Graph

VII. Conclusion

We presented the results of comparing the energy consumption behavior of source node, intermediate node and destination node respectively, in AODV. The result obtained from the simulation allow us to conclude that among these three types of nodes the intermediate node is consumed more energy than the other two. Because the intermediate node receives the packet from the source node as well as transmit the packet to the receiver node. So, the intermediate node utilize the receiving energy as well as the transmitting energy, when source node utilize only transmitting energy and destination node utilize only the receiving energy.

References

[1]. Perkins, "Ad hoc on-demand distance vector (AODV)routing",RFC3561,July2003.

[2]. P. S. Karadge, Dr.S.V.Sankpal, "A Performance Comparison of Energy Efficient AODV Protocols Mobile Ad hoc Networks", International Journal of Advanced Research in Computer and Communication Engineering Vol.2, Issue1, January2013

[3]. Anjum Asma1, Gihan Nagib2, "Energy Efficient Routing Algorithms for Mobile Ad Hoc Networks –A Survey", Web Site: www.ijettcs.org Email: editor@ijettcs.org, Volume 1, Issue3,September–October2012.

[4]. R.Rajeshkanna, Dr.A.Saradha, "Energy Efficient Enhanced AODV Routing Protocol for maximize the lifetime of Mobile Ad hoc Networks", IJCTA et al, Int.J.Computer Technology & Applications,Vol 4 (5),856-863

[5]. C E Perkins and E M Royer "Ad Hoc On Demand Distance Vector (AODV) Routing draft-ietf-manet aodv-txt" 02-Nov (work in progress)

[6]. Dr. Aditya Goel & Ajaii Sharma, "Performance Analysis of Mobile Ad-hoc Network Using AODV Protocol", International Journal of Computer Science and Security (IJCSS), pages-334-343, Volume (3): Issue (5).

[7]. Dinesh Singh, Deepak Sethi, Pooja, "Comparative Analysis of Energy Efficient Routing Protocols in MANETS (Mobile Ad-hoc Networks)", IJCST Vol. 2, Issue 3, September 2011

[8]. C. E. Perkins, "Ad Hoc Networking," AddisonWesley,2001

[9]. Sanjay Kumar Dhurandher1, Sudip Misra, Mohammad S. Obaidat, Vikrant Bansal, Prithvi Raj Singh and Vikas Punia "EEAODR: An energy-efficient ad hoc on-demand routing protocol for mobile ad hoc networks",International Journal.

[10]. David A. Maltz "On-Demand Routing in Multihop Wireless Mobile Ad Hoc Networks" PhD. Thesis in School of Computer Science Carnegie Mellon University, 2001.

[11]. Jae-Hwan Chang and Leandros Tassiulas, "Energy Conserving Routing in Wireless Ad Hoc Networks," The Conference on Computer Communications (IEEE Infocom 2000), pp.22-31,2000

[12]. Juan-Carlos Cano and Pietro Manzoni, "A Performance Comparison of Energy Consumption for Mobile Ad Hoc Network Routing Protocols," Camino de Vera, Valencia, SPAIN. August 2008