Energy Efficiency and Better Throughput in MANET

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Abstract **- The limited power capacity required by different mobile nodes in Mobile Ad-hoc Network (MANET). Energy efficiency with better in mobile ad hoc network is very important. There always an important issue for energy improvement with better throughput. The DREAM (Distant routing effect algorithm for mobility) with better throughput and energy will maintain the information about output per interval and routing table which contain the information about energy consumption by an individual node. The throughput is the average of the throughputs of all hosts active in the network. It will remove the unnecessary flooding from the network. This paper is base d on several performance measurement of AOMDV(Ad-hoc on demand distance).Our result will be base on basis of several parameters like PDR (Packet Delivery Ration), Routing load, node residual energy.**

Index Terms – AOMDV, DREAM, Transmission power, Throughput, Power conservation.

I. INTRODUCTION

Ad hoc network are the temporary network. Ad hoc network short-range network and they are created when device uses the same protocol. Ad-hoc network does not need any subscription service. With the help of ad-hoc network it reduces the cost and improves the security. [5] A Mobile ad hoc network [MANET] is a decentralize network where mobile nodes are connected by wireless links without any pre-established infrastructure. [2] MANET provides several advantages like unpredictable mobility, restricted battery power, limited bandwidth, multi hop routing, dynamic topology, security etc. Among all these energy efficiency and better throughput is important concerns as node are battery operated.

MANET routing protocols can be classified into two classes. Proactive protocols, they requires the nodes to periodically exchange the table information to update the pre-determine routes between any pair of source destination nodes. Reactive protocols can establish routes only when they require. [6]

The most significant characters of MANET are mobility. This means that nodes can join or leave the network in MANET dynamically. This leads to rapid change in topology. In order to keep the routing information available, all the nodes need to know the topological changes occurring anywhere in the network. [5] AOMDV protocol is simply an extension of the AODV protocol to improve the throughput and energy utilization operation. AOMDV with a route tables contain a list of paths for each destination, to support multipath routing. [6].In DREAM Protocol however, according to the location information, the data packet is flooded in a restricted directional range without sending a routing packet. Although this kind of forwarding effectively guarantees delivery, its energy use is notably high especially in large-scale networks. [10] There should be a mechanism at node for robust communication of high priority messages.

MANETs deliver lower bandwidth than wired networks; therefore, the information collection during the formation of a routing table is expensive [1]. For reducing the energy consumption in mobile node, so many approaches are to be developed. But at this moment, most of the researchers are trying to reduce the energy of each node at network layer and develop various approaches to save energy of each node during packet transmission time.[3] MANET routing protocols can be classified on the bases of the methods of delivery of data packets from source to destination. Single Path routing protocols learn routes and select a single best route to each destination. These protocols are incapable of load balancing traffic. Multi-path routing protocols learn routes and can select more than one path to a destination.[6]

In this paper, we apply new energy efficiency metrics to MANET routing protocol. The goal of energy-aware routing protocol is to maximize the network lifetime. Apart from that we also measure the performance of DREAM protocol with energy factor and compare the results with normal AOMDV location based routing.

II. LITERATURE REVIEW

A number of research has been conducted on the geographic routing in MANET but still current result are not appropriated for MANET and geographic routing for MANET is still an open problem for research work[7].

Classification of Routing Protocols in MANETs MANET routing protocols could be broadly classified into two major categories based on the routing information update mechanism:

1. *Proactive Routing Protocols:* Proactive protocols continuously learn the topology of the network by exchanging topological information among the network nodes.
2. *Reactive Routing Protocols:* The reactive routing protocols are based on some sort of query-reply dialog. Reactive protocols proceed for establishing route(s) to the destination only when the need arises.
3. *Hybrid Routing Protocols:* Often reactive or proactive feature of a particular routing protocol might not be enough; instead a mixture might yield better solution.

Calculating Residual Energy of a Node [2]

The Residual Energy can be calculated by the following methods,

Consumed power = Transmitted power (TP) * time(t) … (1)
The power consumed for receiving a packet is given by

Consumed power = Receiving power (RP) * time(t) … (2)

Where t=Data size(Ds)/Data rate(Dr) … (3)

So the residual energy(E) of each node can be calculated using equation (1), (2) and (3)

E = Current energy – Consumed energy

Wherever we get the value of the residual energy (E), We calculate the nest path with minimum nodal residual energy. Then we select the routes on the basis of descending value of nodal residual energy. Finally select the path with maximum nodal residual energy to forward the data packets In order to improve the throughput by dynamically controlling the contention window (CW). The throughput is the average of the throughputs of all hosts active in the network. We can also use the idle sense method for increasing the number of host and improve the value of throughput. The advantage of *Idle Sense* is more in providing better fairness along with similar level of throughput.[9].If the value of contention window will set to minimum in order to improves the throughput. This value is the smallest one that allows any other host which becomes active to enter the competition for channel access.

If we maintain the information about the throughput for an individual operations then the entry with the best throughput value will be considered for the next operations. It will maximize CPU utilization by selection of the path with shortest distance to the destination.

For Simulation Environment we can use NS2 which is an open-source event-driven simulator designed specifically for research in computer communication networks. The NS-2 simulation environment offers great flexibility in investigating the characteristics of mobile networks because it already contains flexible models for energy-constrained wireless ad hoc networks. NS2 has continuously gained tremendous interest from industry, academia, and government. On the basis of simulation parameters given in Table 1 simulation has been done in ns-2 simulator.

III. CASE STUDY

We can consider the following parameter for analysis of our work.

Parameters for Case Study

Table 1 - Simulation Parameters for Case Study

Simulator Used	NS-2.31
Number of nodes	25
Dimension of simulated area	800m×600m
Routing Protocol	AOMDV
Other protocol	DREAM
Simulation time	100 sec.
Traffic type (TCP & UDP)	CBR (3pkts/s)
Packet size	512 bytes
Number of traffic connections	6
Node movement at maximum Speed	random (30 m/s)
Transmission range	250m
Transmission Energy Consumption	1.5 joules
Receiving Energy Consumption	1 joules
Idle Energy Consumption	0.01 joules
Sleep Energy Consumption	007.0 joules

In addition to above parameters we will include following parameters to improve throughput of the system

Table 2 – Proposed Parameters for Throughput

Packet delivery ration
End to end delay
Normal Routing Load
Ideal Sense
Contention Window

Packet Delivery Ratio

Ratio of the data packets received at the destination nodes to the packets that were sent by the sources.

End To End Delay

Includes all the delays encountered by the packet at the different hops from the time it was sent by the source until the time it was received at the destination.

Routing Load

Number of routing packets (and supporting protocol control packets) transmitted per data packet delivered at the destination.

Contention Window

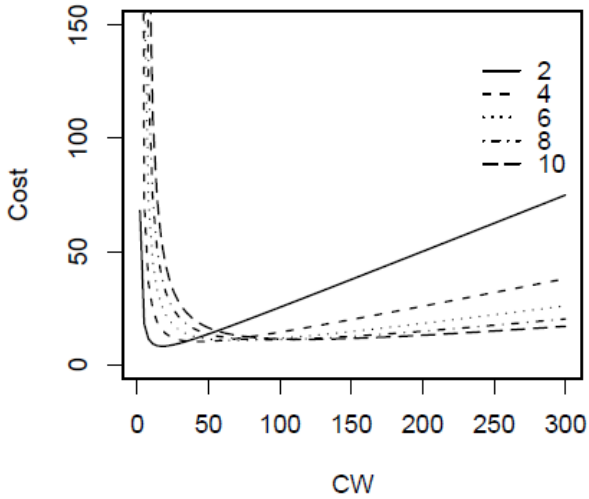

Fig 1Cost Function with Respect to Contention Window (CW)

Figure plots the *Cost of* (*CW*) function for several values of *N*, the number of hosts, with respect to the contention Window *CW*. As expected, the optimal value of *CW* increases with *N* while the cost function becomes less and less sensitive to the variations of *CW*, which leads to sub range estimation of the number of competing stations

IV. PROPERTIES OF IDLE SENSE

Besides achieving high throughput and guaranteeing short term fairness an access method dedicated to wireless LANs also needs to adapt the bit rate to channel conditions and deal with the issue of time-fairness. The quality of received signals changes dramatically even over short time intervals due to multiple causes: noise, attenuation, interference multipath propagation, and host mobility.

V. CONCLUSION AND FUTURE ENHANCEMENT

We conclude that the proposed location based multipath (AOMDV) can reduce the energy consumption by nodes and improve the throughput of the system. Only the forwarding neighboring nodes are involved in routing while the non-forwarding nodes are switched to idle state. This ensures reduction in energy consumption in the network. The results of DREAM location based protocol are very effective as compare to normal AOMDV routing and energy based AOMDV routing.

VI. REFERENCES

[1] International journal of engineering research and applications (IJERA),” Development of Energy Efficient and Reliable Congestion Control Protocol for Multicasting in Mobile Adhoc Networks compare with AODV Based on Receivers”, K.Srinivasa Rao, R.Sudhistna Kumar, P. Venkatesh, R.V.Sivaram Naidu,2012.

[2] International joint conference on information & communication technology,” Energy Efficient Techniques for Wireless Ad Hoc Network”, Niranjan Kumar Ray, Ashok Kumar Turuk,2010

[3] Journal of information, knowledge and research in computer engineering,” A review paper on energy efficient algorithm in manet”, *N. C. Kaneriya, Dr. P. P. Kotak, Prof. A. M. Lathigara,2013.*

[4] Journal of scientific research,” Energy Efficiency of Load Balancing in MANET Routing Protocols”, Sunsook Jung, Nisar Hundewale, Alex Zelikovsky,2010.

[5] International Journal of Advanced Research in Computer Science and Software Engineering,” Survey Paper on Energy Efficient Routing Protocol in MANET”, Anu Kumari ,Arvind Kumar ,Akhil Sharma,2013.

[6] IOSR Journal of Computer Engineering (IOSR-JCE),”A Research Paper on Comparison between Energy Efficient Routing Protocol with Energy and Location in MANET*”,*Ruchi Gupta, Akhilesh A.Waoo, Sanjay Sharma and P. S Patheja ,2013.

[7] International Journal of Computer Science Issues,”Design of an Energy Efficient Routing Protocol for MANETs based on AODV” ,Annapurna P Patil, Dr K Rajani kanth , BatheySharanya, M P Dinesh Kumar, Malavika J,2011.

[8] International Journal of Computer Science Issues,”A Review of Power Conservation in Wireless Mobile Adhoc Network ” , Neeraj Tantubay, Dinesh Ratan Gautam and Mukesh Kumar Dhariwal,2011.

[9] LSR-IMAG laboratory grenoble, france” idle sense: an optimal access method for high throughput and fairness in rate diverse wireless lans”.

[10] International Journal of Modern Engineering Research (IJMER),”Enhanced Energy Aware Geographic Routing Protocol in MANET:”Gaurav Sachan, D.K.Sharma, Karishma Tyagi, Abhimanyu Prasad, 2013.