Energy Efficient Data Transmission in MANET using Modified AODV Routing Protocol

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Abstract— In this paper we are showing the energy efficient transmission in MANET using routing protocol AODV with some of modification so that in proposed technique there is good results obtain for same that can be shown using some of the characteristics of Ad-hoc network such as PDR, Average Jitter, No of Dropped Data packets, etc.

Index Terms— MANET, Ad-Hoc, AODV, PDR, JITTER, RREP, RREQ

1 INTRODUCTION

A Mobile Ad-Hoc Network (MANET) is a set of wireless mobile nodes which forms a temporary network communicate with each other without using any existing infrastructure or central administration. Quick and easy deployment of ad-hoc network makes them feasible to use in military, search and rescue operation, meeting room and sensor networks. Ad-hoc networks do not rely on any pre-established infrastructure and can therefore be deployed in places with no infrastructure. This is useful in disaster recovery situations and places with non-existing or damaged communication infrastructure where rapid deployment of a communication network is needed. Ad-hoc networks can also be useful on conferences where people participating in the conference can form a temporary network without engaging the services of any pre-existing network. In MANET, nodes can move randomly thus, each node function as a router and forward packet. Due to high node mobility network topology changes frequently. Therefore, routing in ad-hoc network becomes a challenging task. Many routing protocols have been proposed for ad-hoc networks such as FSR, AODV, DYMO, LANMAR, LAR1, OLSR, DSR, TORA, ZRP, DSDV, STAR etc.

MANET has gained increasing attention from both the research community and actual users. As sensor nodes are generally battery-powered devices, the critical aspects to face concern how to reduce the energy consumption of nodes, so that the network lifetime can be extended to reasonable times.

2 RELATED WORK

Ad hoc on demand distance vector routing protocol is an on demand routing protocol. In this protocol, routing discovery process is initiated when route is required. AODV is a reactive routing protocol in which the network generates routes at the start of communication. Each node has its own sequence number and this number increases when links change. Each node judges whether the channel information is new according to sequence numbers. Figure 1 illustrates the route discovery process in AODV.

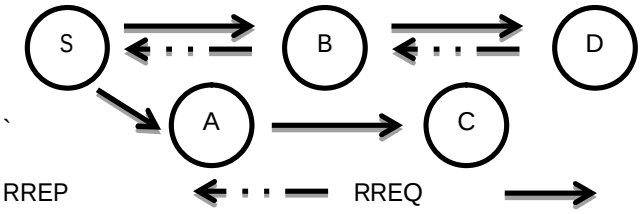


Fig: 1 Route Discovery Process

In this figure, node S is trying to establish a connection to destination D. First, the source node S refers to the route map at the start of communication. In case where there is no route to destination node D, itsends a Route Request (RREQ) message using broadcasting. RREQ ID increases one every time node S sends a RREQ. Node A and B which have received RREQ generate and renew the route to its previous hop. They also judge if this is a repeated RREQ. If such RREQ is received, it will be discarded. If A and B has a valid route to the destination D, they send a RREP message to node S. By contrast, in case where the node has no valid route, they send a RREQ using

broadcasting. The exchange of route information will be repeated until a RREQ reaches at node D. When node D receives the RREQ, it sends a RREP to node S. When node S receives the RREP, then a route is established. In case a node receives multiple RREPs, it will select a RREP whose the destination sequence number (Dst Seq) is the largest amongst all previously received RREPs. But if Dst Seq were same, it will select the RREP whose hop count is the smallest. When node B detects disconnection of route, it generates Route Error (RERR) messages and puts the invalidated address of node D into list, then sends it to the node A. When node A receives the RERR, it refers to its route map and the current list of RERR messages. If there was a route to destination for node D included in its map, and the next hop in the routing table is a neighboring node B, it invalidates the route and sends a RERR message to node S. In this way, the RERR Message can be finally sent to the source node S.

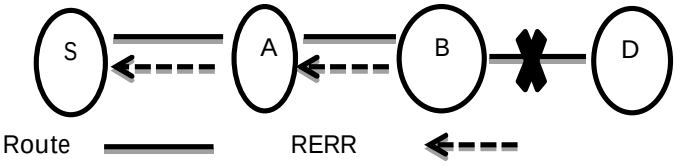


Fig: 2 Route Error

3 SIMULATION ENVIROMENT & PERFORMANCE ANALYSIS

Network simulator 2 is the result of an on-going effort of research and development that is administrated by Researchers at Berkeley. It is a discrete event simulator targeted at networking research. It provides substantial support for simulation of TCP, routing, and multicast protocols. The simulator is written in C++ and a script language called OTcl. NS uses an Otcl interpreter towards the user. This means that the user writes an OTcl script that defines the network (number of nodes, links), the traffic in the network (sources, destinations, type of traffic) and which protocols it will use. This script is then used by ns during the simulations. The result of the simulations is an output trace file that can be used to do data processing (calculate delay, throughput etc) and to visualize the simulation with a program called Network Animator (NAM).NAM is a very good visualization tool that visualizes the packets as they propagate through the network

Simulation Parameter	Values
Channel	Wireless Channel
No Of Nodes	25
Routing Protocol	AODV
Model	Propagation/Two Ray Model
Node Arrangement	Drop Tail
Standard	IEEE 802.11 & 802.15.4

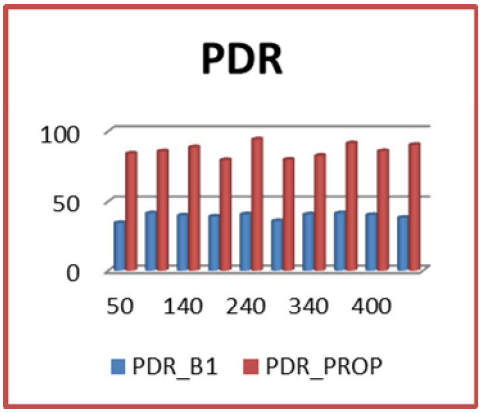
Table-1 Simulation Parameter

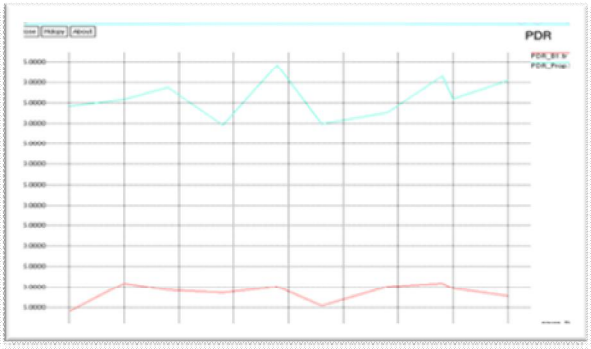
A. Packet Delivery Ratio:

Packet delivery ratio is the fractions of packets sent by the source to that are successfully received by the receiver.

$$PDR = \frac{Sucessfull\ Delivered\ Packets}{Total\ Number\ Of\ Transmitted\ Packets}$$

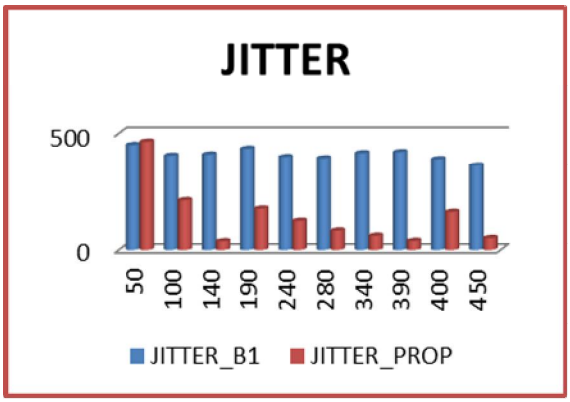
For better performance of a routing protocol, it should be better. The simulation results of packet delivery ratio verses pause time for 25 nodes are shown in figure.

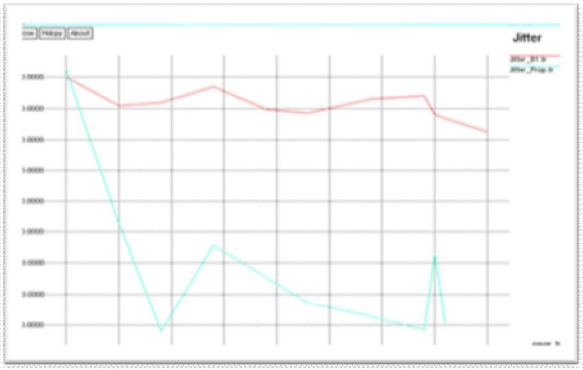




B. Average Jitter:

It is the time variation between two sequential packet arrivals, caused by network congestion, timing drift, or route changes. For an efficient routing protocol, it should be as low as possible. The average jitter is shown in figure





In our result it is shown between two AODV protocols one is general and one is proposed for energy efficient transmission.

4 CONCLUSION

In this paper we have observed the working of AODV routing protocol over MANET but for energy efficient transmission we have worked on number of parameters of network some of them are represented over here we have seen during simulation over NS-2 environment that for our purpose of efficient transmission the PDR should be high. The average Jitter Should be high. And other parameters such as delay must be low. Throughput must be high. For the batter performance of the given network with this protocol.

5 REFRENCES

I. Zayene, M.A.; Tabbane, N.; , "Performance evaluation of Location Aided Routing protocols in ad hoc networks," Global Information Infrastructure Symposium, 2009 (GIIS '09), pp.1-6, 23-26 June 2009.

II. Ismail, Z.; Hassan, R.; , "Performance of AODV routing protocol in Mobile Ad Hoc Network," International Symposium in Information Technology 2010 (ITSim), vol.1, pp.1-5, 15-17 June 2010.

III. T. Zheng, S. Radhakrishnan and V. Sarangan, "Pmac: an Adaptive Energy-efficient MAC Protocol for Wireless Sensor Networks", Proc. of the 19th IEEE International Parallel and Distributed Processing Symposium (IPDPS 2005), Denver, CO, April 2005.

IV. Charles E. Perkins and Pravin Bhagwat, "Highly dynamic Destination-Sequenced Distance-Vector

V. Charles E. Perkins and Pravin Bhagwat, "Highly dynamic Destination-Sequenced Distance-Vector routing (DSDV) for mobile computers". In Proceedings of the SIGCOM '94 Conference on Communications Architecture, protocols and Applications, pages234-244, August 1994. A revised version of the paper is available from http://www.cs.umd.edu/projects/mcml/papers/Sigcomm94.ps. (1998-11-29)

VI. Mobile Ad-hoc Networks (MANET). URL: http://www.ietf.org/html.charters/manet-charter.html.(1998-11-29).

VII. A-SAODV Homepage. [Online]. Available: http://saodv.cefriel.it/

VIII. P. Ning and K. Sun, "How to misuse AODV: A case study of insider attacks against mobile ad-hoc routing protocols," in Proc. 4th Annu. IEEE Inf. Assurance Workshop, Jun. 2003, pp. 60–67.