An PERFORMANCE ENHANCEMENT OF AODV ROUTING PROTOCOL IN MANETS

Jalpa Khamar[1], Avani Dadhania[2]

Khamar_jalpa@yahoo.co.in[1],avani26.22@gmail.com[2]

Abstract: Mobile Ad-Hoc Network (MANET) is a temporary network built up to satisfy momentarily certain condition. This paper gives an introduction to one of the MANET reactive routing protocol AODV i.e. Adhoc on demand distance vector routing protocol. It also includes general working of AODV protocol .It also includes survey of performance of AODV protocol depending on different input parameters. This paper also present NS2 simulator being used in simulating it's performance.

Keywords*:* MANET, AODV, NS2

1.INTRODUCTION

A MANET is a collection of mobile nodes that can communicate with each other without the use of predefined infrastructure or centralized administration. Due to self-organize and rapidly deploy capability, MANET can be applied to different applications including battlefield communications, emergency relief scenarios, law enforcement, public meeting, virtual class room and other security-sensitive computing environments. There are 15 major issues and sub-issues involving in MANET such as routing, multicasting/broadcasting, location service, clustering, mobility management, TCP/UDP, IP addressing, multiple access, radio interface, bandwidth management, power management, security, fault tolerance, QoS/multimedia, and standards/products. The routing protocol is required whenever the source needs to transmit and delivers the packets to the destination. Many routing protocols have been proposed for mobile ad hoc network. This paper is survey work done that include proposed modifications and related work done regarding AODV performance. Section 2 gives an overview of an AODV protocol .Section 3 describes working and performance of AODV protocol. Section 4 gives an introduction to NS2 simulator .Section 5 gives an overview of different mobility models. Section 6 gives simulation results and finally Section 7 concludes the paper.

2.OVERVIEW OF AODV

Ad-hoc routing protocols are mainly categorized into two groups proactive and reactive routing protocol. Proactive protocols are the one which maintain up-to date routing

information about the network whereas reactive protocols discover route on demand when packet is to be sent. Ad-hoc on demand vector routing protocol is one of the reactive protocol.AODV uses broadcast route discovery mechanism .It relies on dynamically establishing route table entries at intermediate nodes. To maintain the most recent routing information between the nodes, it uses the Concept of destination sequence number [2]. AODV protocol works in two steps

1. Path Discovery

2. Path Maintenance

Path discovery process is the first step , whenever a source node wants to send packet to another node, path discovery process is initiated .The source node initiates path discovery by broadcasting route request RREQ packet to its neighbor . Each neighbor either satisfies RREQ by sending route reply RREP back to the source or rebroadcasts RREQ to its neighbor after increasing hop-count. If a node cannot satisfy RREQ, it implements reverse path as well as forward path set up. As the RREQ travels from source to destination reverse path is set up automatically and when the RREP travels back to the source, each node along the path sets up a forward pointer to the node from which RREP came [2]. Second step is the Path maintenance process in which hello messages are used to ensure symmetric links as well as to detect link failure.

3. RELATED WORK

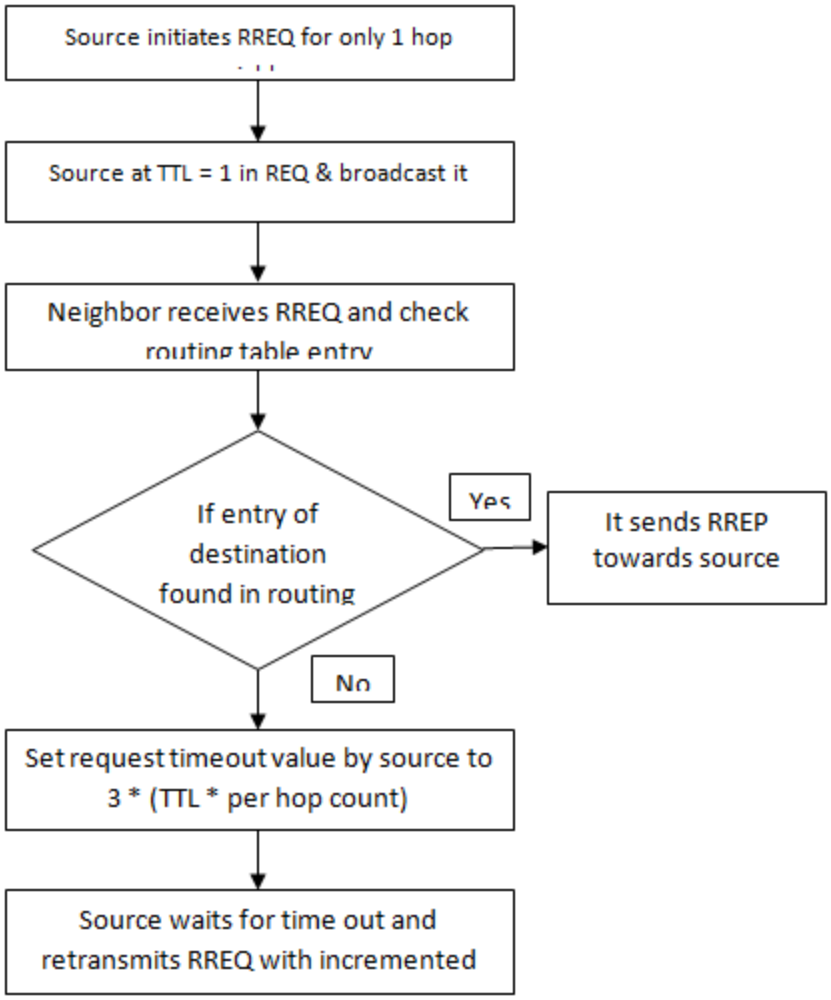
3.1Proposed work

MANET is an infrastructure-less architecture where nodes keep moving rapidly. Existing routing protocols do not consider mobility of nodes as a different issue. Packet loss due to mobility of nodes is very high and this reduces throughput also. Problem with both reactive and proactive protocols is the degradation of performance when mobility of nodes is high. In case of reactive protocol, the problem is breakage of link immediately after the discovery of the route. In this scenario, once route is discovered, the packet will travel on that discovered path without any knowledge of the broken link resulting in a route failure and rediscovery of the path. This will lead to extra routing overhead as well as increasing latency.

3.2 Suggested approach

One possible approach to reduce this packet loss due to mobility is suggested here. The approach uses Selective flooding technique [10]. The suggested approach uses AODV as a basic protocol and AODV is modified to use Selective flooding and also routing and forwarding module of traditional AODV is modified to implement the suggested approach. In order to follow selective flooding sender node will send RREQ with Time To Live(TTL)=1 to all the neighbor node..an neighbor node having the routing path will send reply and not all the adjacent nodes.Then at second hop again sender sends with TTL value incremented by 1. This process will be executed until TTL has reached to 0 and packet got delievered. We will check this approach for different number of nodes.

3.3 Proposed Architecture



3.4 Implementation steps

Now, to implement the algorithm protocol, changes are made in following files:
-ns-allinone-2.34/ns-2.34/aodv/aodv.cc
-ns-allinone-2.34/ns-2.34/aodv/aodv.h

After implementing proposed algorithm in NS-2, its results were compared with existing AODV.The comparision is shown in results.

3.5 Simulation results

Simulation table

Simulation area	1500*300m
Simulation time	500 sec
No of node	25,50
Packet Size	512 bytes
Pause Time	4sec
Traffic mode	CBR
Propogation model	TwoRayGround
Max speed	20m/sec
Type of protocol	AODV

3.6 Simulation environment

Simulations are performed using Network Simulator [16]. This simulation focuses on the mobility of the source node and intermediate node which may result link failure. It is able to reinitiate the Route Discovery Protocol (RDP) if a source node moves. It will find a new route to the destination by updating the path. A Local Repair Procedure is used to update the path in case intermediate node link breaks. Thus, resolving link failure in AODV. Simulation shows the behavior and performance improvement in AODV based on the evaluation metrics [16] .

Node mobility -Node mobility indicates the mobility speed of nodes. When the node mobility is very less the packet delivery ratio is very high.

Packet Delivery Ratio (PDR) -PDR is used to measure the reliability. It is defined as a percentage of data packets delivered to that of no. of data packets sent for that node. The Average PDR is calculated by considering all the nodes in the network.

Simulation table:

Simulation area	1500*300m
Simulation time	500 sec
No of node	25,50
Packet Size	512 bytes
Pause Time	4sec
Traffic mode	CBR
Propogation model	TwoRayGround
Max speed	20m/sec
Type of protocol	AODV

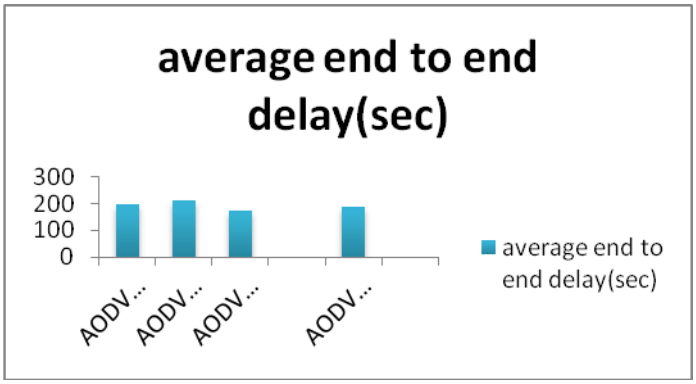
Simulation results are explained as under:

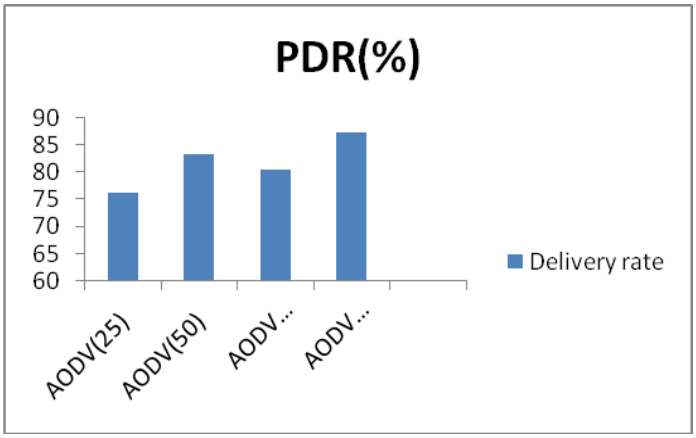
Packet Delivery Ratio:

Packet delivery ratio is the ratio of number of packets received at the destination nodes to the number of packets sent from the source nodes (Gupta et al, 2010). The performance is better when packet delivery ratio is high.

End-to-End Delay:

End-to-end delay is the average time delay for data packets from the source node to the destination node (Gupta et al, 2010). To find out the end-to-end delay the difference of packet sent and received time was stored and then dividing the total time difference over the total number of packet received gave the average end- to-end delay for the received packets. The performance is better when packet end-to-end delay is low.





4.CONCLUSION

In this paper we have provided brief information regarding AODV protocol and its various modifications. The work done in this research aims to modify protocol to improve performance.By using selective flooding technique an improvement has been seen using different number of nodes.

REFERENCES

[1] Corson S, Macker J , Mobile Ad hoc Networking (MANET) Routing Protocol Performance Issues and Evaluation considerations rfc2501, January 1999.
[2] Charles E. Perkin, Elizabeth M. Royer 'Ad-hoc On Demand Distance Vector Routing', Sun Microsystems Laboratories, Menlo Park, CA 94025.
[3] Sumit Gwalani, Elizabeth M. Royer, Charles E. Perkin 'AODV-PA: AODV with Path Accumulation' IEEE 2003.
[4] Jin-Man Kim, Jong-Wook Jang 'AODV based Energy Efficient Routing Protocol for Maximum Lifetime in MANET' In Proceedings of AICT/ICIW IEEE 2006.
[5] HongKi Lee, YongWoo Kim, JooSeok Song 'AOZDV: An Enhanced AODV Protocol based on Zone Routing in MANET' IEEE 2007.
[6] C.P.Agrawal, M.K.Tiwari, O.P.Vyas 'Evaluation of AODV Protocol for Varying Mobility Models of MANET for Ubiquitous Computing' IEEE 2008.

[7] Nadir Shah , Depei Qian , Khalid Iqbal ' Performance evaluation of multiple routing protocols using multiple mobility models for mobile ad-hoc networks ' IEEE 2008.
[8] LIU Jian , LI Fang-min ' An Improvement of AODV Protocol Based on Reliable Delivery in Mobile Adhoc Networks' IEEE 2009.
[9] Gowrishankar. S, SubirKumarSarkar, T.G.Basavaraju 'Simulation Based Performance Comparison of Community Model, GFMM, RPGM, Manhattan model and RWP-SS Mobility Models in MANET' IEEE 2009.
[10] Runcai Huang , Yiwen Zhuang , Qiying Cao ' Simulation and Analysis of Protocols in Adhoc Network' IEEE 2009.
[11] Asma Tuteja, Rajneesh Gujral, Sunil Talia 'Comparative Performance Analysis of DSDV,AODV and DSR Routing Protocols in MANET using NS2' IEEE 2010.
[12] Fahim Maan , Nauman Mazhar ' MANET Routing Protocols Vs Mobility Models: A Performance Evaluation' IEEE 2011.
[13] Guanghui Li, Jianming Chen ' The Research of Routing Algorithms Based on NS2 in Mobile Adhoc Networks' IEEE2011.
[14] Tracy Camp, Jeff Boleng , Vanessa Davies ' A Survey of Mobility Models for Adhoc Network Research ' 2002
[15] Network Simulator 2: Introduction by Ke Liu, Dept. Of Computer Science S UNY Binghamton Spring, 2006
[16] Performance Comparison of AODV, DSDV, DSR and TORA Routing Protocols in MANETs Mina Vajed Khiavi1, Shahram Jamali2, Sajjad Jahanbakhsh Gudakahriz.

