International Journal of Contemporary Research in Computer Science and Technology (IJCRCST) ISSN: 2395-5325
Volume 3, Special Issue 1 (February '2017)
Special Issue on 1st National Conference on Advanced Computing and Communication Technologies,
Conference held at Siri PSG Arts and Science College for Women, Sankari,Tamilnadu,India.

A STUDY ON AODV AND DSR MANET ROUTING PROTOCOLS

S.Malathi,
Research Scholar,
Department of Computer Science,
Sri PSG Arts and Science College for Women,
Sankari,Tamilnadu,India.

K.Sumathi,
Head cum Assistant Professor,
Department of Computer Science,
Sri PSG Arts and Science College for Women,
Sankari,Tamilnadu,India.

Abstract: An Ad-hoc mobile network is a collection on self configuring wireless nodes, without any central administration. Due to the mobility the nature of the nodes in dynamic. Routing in MANET has immense challenges due to dynamic network topology, limited bandwidth, and limited transmission range, and power constraints and then they can communicate with each other directly. Otherwise the nodes can't communicate other. Due to mobility nature in the network, we need routing protocols that can handle the numerous changes in the topology without any lose in communication. Here main aim of this paper is to simulate and analyze the dynamic performance of ad hoc routing protocols of AODV AND DSR. That performance is basis of Packet delivery ratio, packet dropped ratio, Average end-to-end delay, throughput, and false packets are measured as performance parameter for evaluating the performance of AODV and DSR protocols.

Keywords: MANET, AODV, DSR, performance matrices, NS 2 simulation.

1. INTRODUCTION

In MANET mobile nodes communicate with each other using multihop wireless links without infrastructure. Every node in the network act as a router as well as packet forwarding agency for other nodes. A central challenge in the design of MANET is the development of dynamic routing protocols that can efficiently find routes between two communicating nodes. In MANET nodes moves randomly, therefore the network may experience sudden and unpredictable change in topology. Nodes in MANET normally have limited transmission ranges, therefore some nodes cannot communicate directly to other nodes and those are beyond the limit of range of mobile node. So many protocols have been proposed MANETs for achieving the efficient routing. Every protocol uses a new searching methodology for new route or modifying a known route, when hosts move. Energy consumptions in MANET are very critical issue. Because, mobile devices have limited battery power and processing power. So routing protocols is very important for path selection and route recovery in MANET.

1.1 MANET CHARACTERSTICS

The routing protocols for ad hoc wireless network should have the following characteristics

i) A routing protocol should be distributed.
ii) It must be loop free and free from old routes
iii) Route comparison.
iv) It must be adaptive to regular topology changes by the mobility of nodes.
v) Consider its security.
vi) It must optionally use scarce resources such as bandwidth, computation power, memory, battery power.

1.2 MANET APPLICATIONS

There are many applications of MANET. Some of them are mentioned below.

i) Military network
ii) Sensor network
iii) Emergency services
iv) Wearable computing

2. RELATED WORK

Adhoc routing protocols can be categorized in the following two classes depending on the way they find routes. Proactive and reactive routing protocols. Proactive routing protocols or table driven routing protocol attempt to have at all times up to date route from each node to every possible destination. This requires the continuous propagation of control information throughout whole network in order to keep routing table up to date and have consistent view of network proactive topology. Proactive routing protocols defer in the type and number of routing tables and the way in which topology changes are broadcasted. While reactive protocols are also called on demand routing protocols, only setup a route when required. Node start with route discover phase by broadcasting route request within the network when source require path to the destination. Then the route maintenance procedure is used by the source to keep active routes up to date as long as in required. In case of link failure route repair procedure may be started. Different reactive routing protocols differ in terms of the strategy to deal with route maintenance and route repair. And hybrid routing protocol try to combine proactive and reactive mechanism to reduce protocols overhead. Position based routing protocols use geographic information to optimize routing process. A hierarchical protocol such as clustering protocols introduces hierarchy in the network in order to reduce overhead and improve scalability.

3. A COMPARISON OF AODV AND DSR ROUTING PROTOCOLS

In reactive routing protocols, a route is discovered only when needed. A source node initiates route discovery by

broadcasting route query or request messages into the network. All nodes maintain the discovered routes in their routing tables. However, only valid routes are kept and old routes are deleted after an active route timeout. The scheme improves network routing efficiency preventing the use of stale routes. A serious issue for MANETs arises when link failure occur due to high mobility. At the same time new links may also be established between previously distant nodes. This significantly increases the network broadcast traffic with rapid link/break effect of intermediate nodes. Therefore, reactive routing protocols are subjected to an increase in network control overhead. The following sections discuss some of the reactive ad hoc routing protocols.

3.1 DYNAMIC SOURCE ROUTING (DSR) PROTOCOL:

DSR in an entirely on-demand ad hoc network routing protocols composed of two parts: route discovery and route maintenance. In DSR, when node has a packet to send some destination and does not currently have a route to that destination in its route cache, the node initiates route discovery to find a route. This node is known as the initiator of the route discovery. And the destination of the packet is known as the discovery's target. The initiator transmits a ROUTE REQUEST packet as a local broadcast, specifying the target and unique identifier from the initiator. Each node receiving the ROUTE REQUEST, if it has recently seen this request identifier from the initiator, discards the REQUEST .otherwise, it appends its own node address to a list in the REQUEST and rebroadcasts the REQUEST. When the ROUTE REQUEST reaches its target node, the target sends a ROUTE REPLY back to the initiator of the REQUEST, including a copy of the accumulated list of addresses from the REQUEST. When the REPLY reaches the initiator of the REQUEST, it caches the new route in its route cache. Route maintenance is the mechanism by which a node sending a packet along a specified route to some destination detects if that route has broken, for example because of two nodes in it have moved too far apart.DSR is based on source routing: when sending a packet is to be forwarded. Each node along the route forwards the packet to the next hop indicated in the packets header, and attempts to confirm that the packet was received by that next node. A node may confirm this by means of a link-layer acknowledgement. If after a limited number of local retransmissions of the packet, a node in the route is unable to make this confirmation, it returns a ROUTE ERROR to the original source of the packet, identifying the link from itself to the next node as broken; the sender then removes this broken link from its route cache. For subsequent packets to this destination, the sender may use any other route to that destination in its cache, or it may attempt a new route discovery for that if necessary.

3.2 AD HOC ON-DEMAND DISTANCE VECTOR (AODV) ROUTING PROTOCOL:

The AODV routing protocol is an "on Demand "routing protocol, which means that routes are established when they are required. This routing protocol is based on transmitting route reply (RREP)packets back to the source node and routing data packets to their destination. Used algorithm consists of two steps: route discovery and route maintenance. Route discovery process begins when one of the nodes wants to send packets. That node sends route request (RREQ) packets to its neighbors. Neighbors return RREP packets if they have a corresponding route to destination. However, if they don't have a corresponding route, they forward RREQ packets to their neighbors, except the origin node. Also they use these packets to build reverse paths to the source node. These processes occur until a route has been found. Routing tables which only have information about the next hop and destination are used for routing information maintenance. When a route link disconnects, for example a mobile node out of range, neighbor nodes will notice the absence of this link. If so neighbor nodes will check whether there is any route in their routing tables which uses a broken link. It exists all sources that send traffic over the broken link will be confirmed with route error(RRER)packet source node will generate a new RREQ packet, if there is still a need for packet transmission.

4. NS-2 SIMULATION ENVIRONMENT

4.1 SIMULATION MODEL

Here we give the significance for the evaluation of performance of Ad hoc routing protocol with varying the number of mobile nodes. The network simulations have been done using network simulator NS-2.the network simulator NS-2 discrete event simulation software for network simulations which means it simulates events such as sending, receiving, forwarding and dropping packets. The latest version, ns all-in one-2.35, supports simulation for routing protocols for ad hoc wireless networks such as AODV, DSR.NS2 is an object oriented simulator, written in C++, with an OTcl interpreter as a front-end. This means that most of the simulation scripts are created in Tcl (Tool Command language).If the components have to be developed for ns2, and then both tcl and C++ have to be used. To run simulation with NS-2.35, the user must write the OTCL simulation script. We get the simulation results in an output trace file and here we analyzed the experimental results by using the awk command. The performance parameters are graphically visualized in GRAPH.NS-2 also offers a visual representation of the simulated network by tracing nodes movements and events writing them in a network animator (NAM).

4.2 SIMULATION PARAMETERS

In our work, the performance of routing protocols AODV and DSR is evaluated by varying the network size (number of nodes).here below mentioned table shows the simulation parameters used in NS 2 simulation.

PARAMETERS NAME	*DSR*	*AODV*
NS version	NS 2-34	NS 2-34
Channel type	Wireless channel	Wireless channel
Mac protocol	Mac/802.11	Mac/802.11

Radio propagation	Two ray ground	Two ray ground
Antenna type	Omni antenna	Omni antenna
Mobility model	Random way point	Random way point
Mobility	60 m/s	60 m/s
Ifq	Queue/droptail/priqueue	Queue/droptail/priqueue
Ifqlen	50	50
Packet size	512 bytes	512 bytes
Number of nodes	30,40,50.60.70	30,40,50.60.70
Routing protocol	DSR	AODV
Area	200*200	200*200
Transmission range	250 m	250 m
Simulation time	1500 sec	1500 sec
Topology	Hybrid topology	Hybrid topology
Traffic type	CBR(DSR)	CBR(AODV)
Link layer type	LL	L L

4.3 PERFORMANCE METRICS

The performance is measured on the basis of some parameters which are described as follows

4.3.1 Packet delivery ratio

It is the percentage ratio between the number of packets sent by sources and the number of received packets at the sinks or destination.

PDR=∑ No of packets received at destination/
∑ No of packets sent by source

4.3.2 Packet dropped ratio

The total number of packets dropped during the simulation.

Packet dropped ratio = Number of packet send – Number of packet received.

The lower value of the packet lost means the better performance of the protocol.

4.3.3 End –to-end delay

Average end –to –end delay signifies how long it will take a packet to travel from source to destination node. It includes delays due to route discovery. Propagation delay transfer time.

Average end-to-end delay = ∑e P / e=T_d.Ts

T_d=time when packet received at destination

T_s=time when packet created by source

P=total packets

4.3.4 Throughput

The average rate of successful packet delivery over a communication channel called throughput. The throughput is usually measured in bit/s or data packets/sec. It is the ratio of the total amount of data that reaches a receiver from a sender to the time it takes for the receiver to get the last packet. When comparing the routing throughput by each of the protocols, DSR has the high throughput. It measures of effectiveness of a routing protocol. The throughput value of AODV slowly increases initially and maintains its value when the time increases. AODV performs well than DSDV since AODV is an on-demand protocol. The throughput value of DSR increases at lower pause time and grows as the time increases. Hence, DSR shows better performance with respect to throughput among these two protocols.

4.3.5 False packet

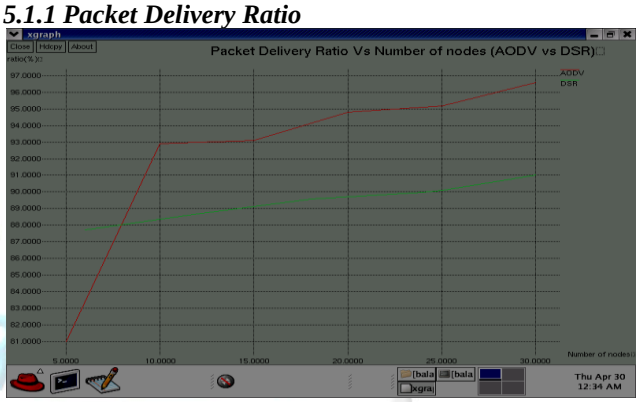
The false packet in measurement of how much of packets dropped and except remaining packets are false packets.

False packet = total no of packets – total no dropped packets =no of remaining packets

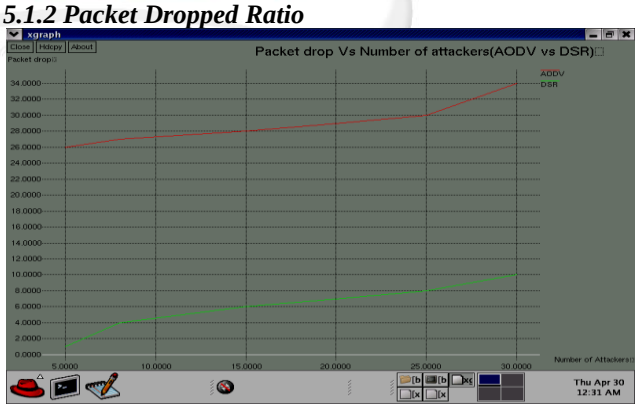
5. SIMULATION RESULTS

5.1 RESULT IN 30 NODES

5.1.1 Packet Delivery Ratio

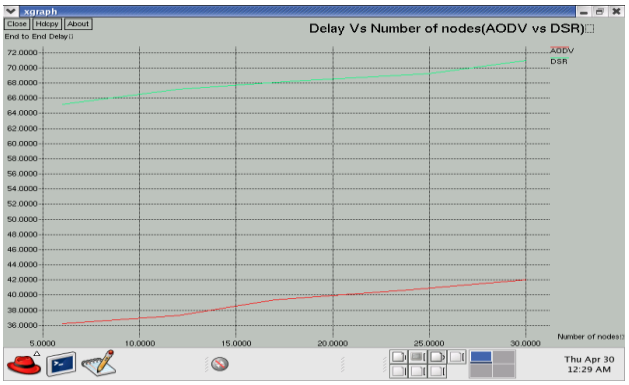


5.1.2 Packet Dropped Ratio

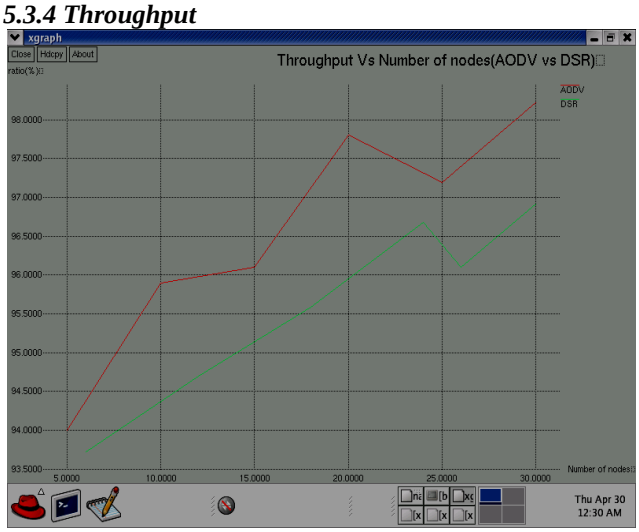


*10

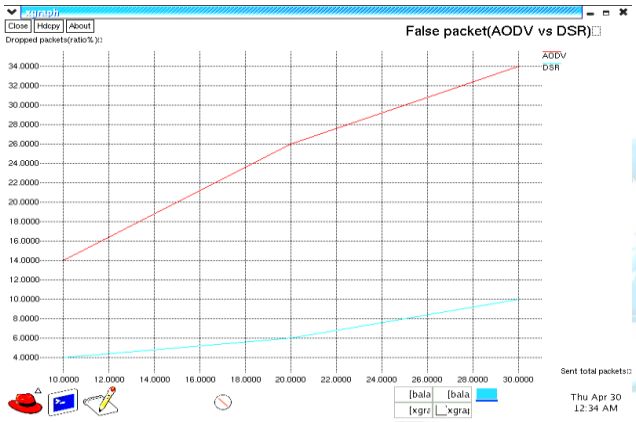
5.1.3 Average End-to-End Delay



5.3.4 Throughput



5.3.5 False Packet



6. CONCLUSION

In this paper performance comparison of DSR and AODV routing protocols for mobile Ad hoc network is done as a function of number of nodes (network size).performance metrics such as Packet delivery ratio, packet dropped ratio, Average end-to-end delay, throughput, and false packets .in our assumed scenario AODV (ad hoc on-demand distance vector) shows best performance than DSR (dynamic source routing).

7. REFERENCES

[1]. Arti Gupta, Manish Pradhan" A Comparative Study of Current Routing Protocol in
[2]. Wireless Ad-Hoc Network" in International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 5, May – 2013.
[3]. Maahi Amit Khemchandani and Prof .B.W.Balkhande" Comparative Analysis of AntHocNet, AODV, DSR Routing Protocols for Improvising Loss Packet Delivery Factor "(IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 5 (5) , 2014.
[4]. Mrs. Vaishali D. Khairnar*, Dr. Ketan Kotecha " Simulation-Based Performance Evaluation of Routing Protocols in Vehicular Ad-hoc Network" International Journal of Scientific and Research Publications, Volume 3, Issue 10, October 2013.
[5]. Charu Wahi , Sanjay Kumar Sonbhadra " Mobile Adhoc network routing protocol a compartive study" International Journal of Ad hoc,Sensor & Ubiquitous Computing (IJASUC) Vol.3, No.2, April 2012 .
[6]. Mr Surendra H.Raut, Hemant P.Ambulegar" Proactive and Reactive Routing Protocols in Multihop Mobile Ad hoc Network" International Journal of Advanced Research in Computer Science and Software Engineering (IJARCSSE) volume 3,issue 4,april 2013.
[7]. Preeti Gaharwar, Mr. Sunil R.Gupta "Performance Comparison of Routing Protocols" International Journal of Advanced Research in Computer and Communication Engineering
[8]. Vol. 2, Issue 4, April 2013.
[9]. Amandeep, Gurmeet Kaur ―Performance Analysis of AODV Routing Protocol in MANETS‖ International Journal of Engineering Science and Technology (IJEST), Vol. 4 No.08, pages 3620-3625, August 2012.