Assessment of Reactive Routing Protocols of MANET (AODV and DSR)

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Abstract

This research evaluates the performance of Dynamic Source Routing (DSR) and Ad-hoc on-Demand Distance Vector (AODV) that are both reactive in nature in OPNET V 14.5. This study evaluates the performance of reactive routing protocols by applying different parameters like Number of nodes, topology change, mobility of nodes, throughput and also evaluates the behavior of these protocols when implemented in a various environment. In this research, result showed that AODV outperforms best in all.

I. INTRODUCTION

In this era of new Technology, the advents of portable computing devices have changed our global village and also have evoked great interest from the public. Administrative, nongovernmental associations, Universities, military, organizations and a few offices are at present utilizing this new and proficient innovation. The expansion of creative, intense, solid, reduced and portable conveying gadgets like mobile phones, tablets, work force computerized partners (PDAs) and pagers that have enormous registering and handling power change the method for expectation for everyday comforts of the individual and increment the interest in business sectors. Now the trend can move from the beginning of first generation era to the Pervasive innovation age in which each individual use a few registering frill, in the meantime, through which they can get to all the required data whatever and at whatever point he required. The expansion sought after of registering gadgets that makes the remote systems more compelling and least demanding answer for their Interconnecting and, accordingly, the remote innovation has been confronting exceptional creation in the most recent couple of years [5][13].

Routing protocols is the set of rule and regulation in which message packets are sent from initial node to the final destination in the whole network. There are many types of routing protocols are discoverer till yet but every routing protocol are used according to the network scenarios. Figure 1 describes the basic division of the routing protocols.

Re-active Routing Protocols these protocols also called on demand routing protocols. Whenever a devise desires to send data to some other devise it first step the route finding for data propagation on emergency basic[6]. It follows the two steps first it initiates a route discovery and after that it maintain its route.

Table-Driven Routing Protocols another name of routing protocol is proactive routing protocol. In this protocol, all path information is already given to the routing tables. Whenever a node wants to send data its check in routing table and sent to the destination. 1n routing table up to date routing information are store. Every node contains one or more routing tables for data sending. Whenever a link breaks in whole network, they send periodically updates for changing the routing table's routes in whole network that maintain the up to date routing table. The main difference between is that burden is more high as compared to the reactive routing protocol because of routing tables [2][7][11].

After studying and evaluating the routing protocols, the research methodology done in simulator. Simulator provides an environment for testing protocols similar to realistic scenarios[12][1]. In this simulation technique, essential parameters are set to obtain the desired output results. There are various simulators available like OMNET++, GloMoSim, NS2 and OPNET, QualNet and OPNET are well-developed commercial software products. GloMoSim is available for download only if the IP address resolves to an academic domain name. Ns2 is free to download and it helps for simulating mobile adhoc networks.

II. REVIEW OF LITERATURE

Ahuja et al., (2013) described briefly on the performance of AODV by using for different data type and different packet size in heterogeneous and homogeneous by using the Simulator OMNeT++ simulation. Rajput et al., (2013)After the simulation, the result shows that size of the packets have a great effect of its performance matrix like Throughput, Delay and packet delivery ratio transmit. As the size of message is increase their throughput and packet delivery ratio also increased expect in some cases when the channel is busy because of the packet size. They divided their work into three parts. Ramanathan et al., (2002) 1n first the communication can be done in the MANET field. In second scenarios communication, can check between MANET and wireless medium and in third scenario three types of media are used MANET, wireless and Wired media.

Ahuja et al., (2013) The result of first scenario is higher than second scenario and result of second scenario is higher than in terms of throughput. Ramanathan et al., (2002) The result of first state is higher than second state. At the end conclude that performance of AODV is better in first scenario as compared to second scenario. They also give the guideline for future work to enhance the performance of AODV that meet the user expectation in future.

.Rajput et al., (2013) describe in this paper split the Routing protocols of MANET can into three different types. Ahuja et al., (2013) First one is re-active, pro-active, or hybrid in which debated many sub-types of routing protocol like OLSR, AODV-BR,TBRPF , AOMD, TORA and OSPF etc. and second one is Central or spread on the basic of some intermediate or gateway nodes that helps in delivery of packets from one cluster to other cluster and third one is on the basic of its unique behavior Dynamic or static.

Prakash (2014) present in their paper to various types of MANET routing protocols with respect to various situations. The numerous classifications provide a complete and improved summary of the MANET routing protocols. Ramanathan et al., (2002) They classified Adhoc Routing into three types i.e. Geographic Position, Hierarchical routing, flat routing and Information Assisted routing. They further divide Hierarchical routing into the three types Cluster Based, Core Node Based and Zone Based and also classified flat routing into Proactive and Reactive routing. In last of the paper he demonstrates very important fact that invention of many new protocols is not good solution because there are large number of routing protocols already exist.

Ramanathan et al., (2002) focus on their paper to present of two types of Mobile Adhoc routing protocols by using various situations. In this paper, they evaluate the performance of two new routing protocols that are AODV and ARDSR (Any cast Routing based Dynamic Source Routing) by using simulator. Ahuja et al., (2013) The performance matrix is end-to-end delay, packets delivered ratio, energy consumption and routing load by using different mobility model. Advantages, Disadvantages and applications of both routing protocol are evaluated and studied.

III. METHODOLOGY

In this research, the simulation done in OPNET Modelers 14.5. OPNET is an application management network and network software distributed and designed by corporation OPNET Technologies Inc. This software provides simulations of technologies, devices, protocols in a virtual environment. OPNET provide the enhancement and evaluation of wirelesses network like[11][3].

In this research OPNET Modeler 14.5 is use for simulation. Here we used four scenarios for simulation and the simulation duration is 600 sec. Simulation were performing many time for verify up to date and reliable result. We use two routing protocol AODV and DSR. We use global statistics for collecting results and result can be view on time average on right side of Statistics. I used HTTP high load traffic for each scenario for evaluation of routing protocols and also use FTP as a CBR. The mobility model is random way point that is default waypoint in this simulation.

IV. RESULT AND DISCUSSIONS

Analyzes the results of each scenario of simulations. First start from the route discover time in compression of AODV and DSR protocols. After that use FTP traffic to evaluate both protocols with the parameters of download response time.in the last use evaluate WLAN with parameter of Wireless LAN throughput (bits/sec). Here we use global statistics for collecting result for the whole network and discuss it in detail[1][9].

A. Route discovered time on different numbers of nodes

The performance of two routing protocols AODV, DSR in terms of throughput is shown in results on different number of nodes. When nodes are 25 the throughput of AODV is better than DSR.As increasing the traffic DSR takes more time to discover a path. On the other hand, increasing in traffic doesn't affect the performance of AODV. On 50 nodes DSR uses more time as compare to AODV when the traffic increases gradually DSR consume more time and AODV route discovery time is very low it is all most 0 second but the DSR have 15 second[7]. By increasing nodes up to 75, throughput of AODV is better than DSR.As increasing the traffic DSR takes more time to discover a path. On the other hand, increasing in traffic doesn't affect the performance of AODV. When number of nodes are 100, DSR uses more time as compare to AODV when the traffic increases gradually DSR consume more time and this figure shows that AODV route discovery time is very low butt we see that when we increase number of nodes AODV route discovery time increases butt the overall performance of AODV is better than DSR[14].

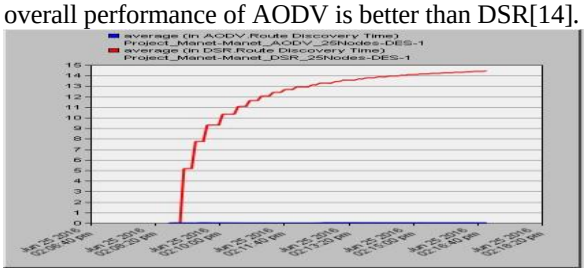

Figure. 1: Route discovered time 25 nodes

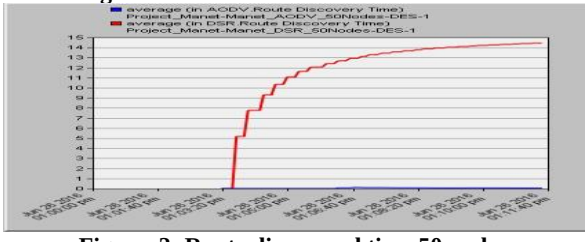

Figure. 2: Route discovered time 50 nodes

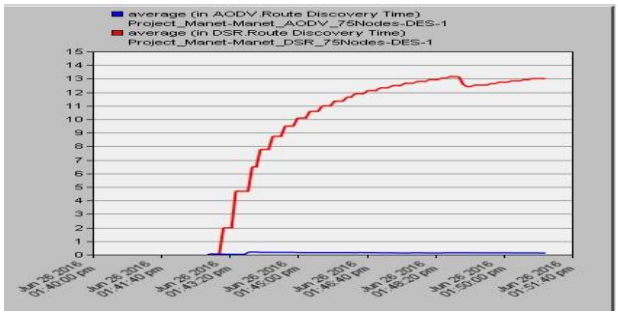

Figure. 3: Route discovered time 75 nodes

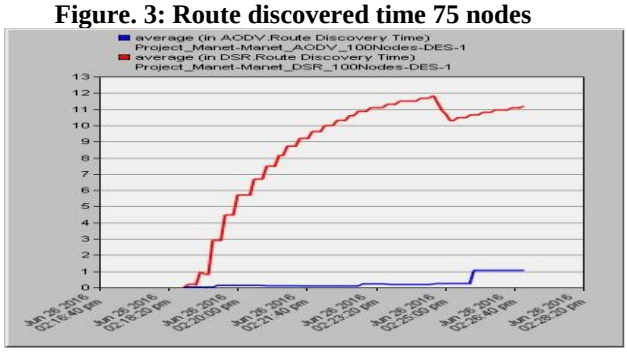

Figure. 4: Route discovered time 100 nodes

Network Simulator	Opnet 14.5
Topology	WLAN
Protocol	DSR,AODV
Node Density	Variable 25 nodes,50 nodes,75 nodes,100 nodes
Parameter	Route Discovered Time
Traffic Type	HTTP FTP (CBR)
Simulation Time	600 Sec
Mobility Model	Random Way Point

Table. 1: Variables Table

B. FTP (File Transfer Protocol)

Using FTP traffic as a CBR for the comparison of reactive routing protocols that is AODV and DSR using following parameters. By using FTP traffic as a CBR for the comparison of reactive routing protocols that is AODV and DSR. Download Response Time for 25 nodes: The FTP download response time of both AODV and DSR is same. As the traffic increases the response time of AODV abruptly increases because it discovers the route more quickly as compared to DSR. So AODV is more efficient than DSR. For 50 nodes in AODV FTP download response time in starting of simulation is less than DSR but after some minutes it increases rapidly because AODV have less route discovery time as compare to DSR so AODV have a more traffic when traffic increases download response time also increases[12][15]. In download response time by using 75 nodes both AODV and DSR is same. As the traffic increases the response time of AODV sharply increases because it discovers the route more swiftly as compared to DSR. So AODV is more proficient than DSR. On 100 nodes AODV download response time is gradually increases at the passes of time of FTP but DSR in start increase its response time but after some time its constant. AODV have less route discovery time as compare to DSR so AODV have a more traffic when traffic increases download response time also increases[12][13][15].

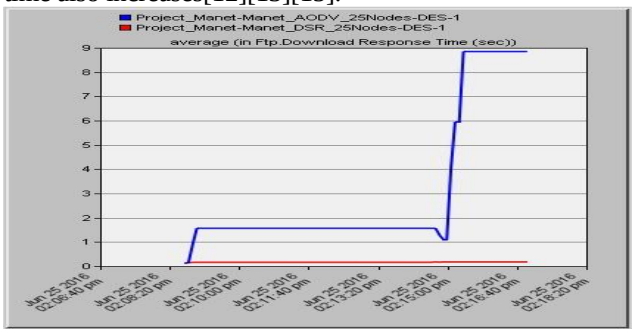

Figure. 6: Download Response Time for 25

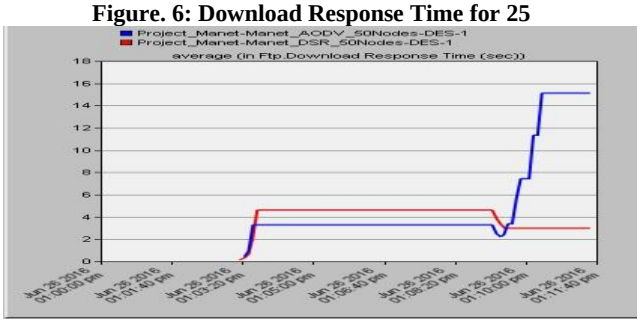

Figure. 7: Download Response Time for 25

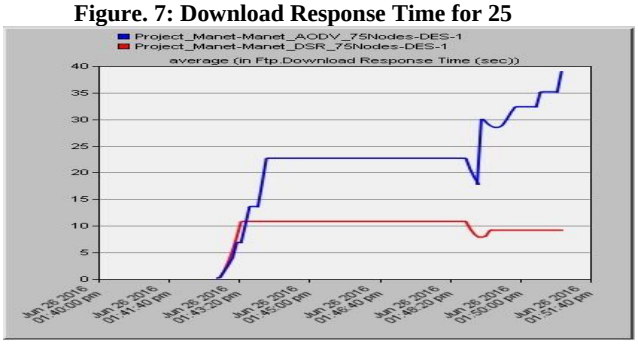

Figure. 8: Download Response Time for 25

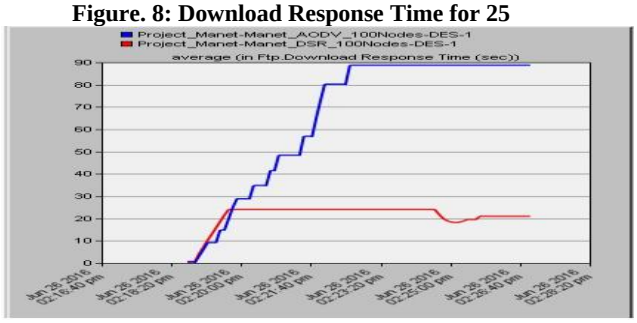

Figure. 9: Download Response Time for 25

Network Simulator	Opnet 14.5
Topology	WLAN
Protocol	DSR,AODV
Node Density	Variable 25 nodes,50

	nodes,75 nodes,100 nodes
Parameter	Download Response Time
Traffic Type	HTTP FTP (CBR)
Simulation Time	600 Sec
Mobility Model	Random Way Point

Table. 2: Variables Table

C. Wireless LAN throughput (bits/sec)

The performance of two routing protocols AODV, DSR in terms of throughput while using 25 nodes AODV throughputs round about 1300000 bits per second whether DSR throughputs 800000 bits per second that is why AODV is more efficient than DSR. Data throughputs vary with increasing in traffic in both AODV and DSR. On 75 nodes AODV throughputs round about 10000000 bits per second whether DSR throughputs round about 3000000 bits per second that is why AODV is more efficient than DSR. Data throughputs vary with increasing in traffic in both AODV and DSR. On 100 nodes AODV have much throughput as compare to DSR throughput of AODV in 10 minutes' round about 16,000,000 (bits/sec) butt DSR have through just 3,000,000 (bits/sec) so the overall performance of AODV is better than DSR[3][14].

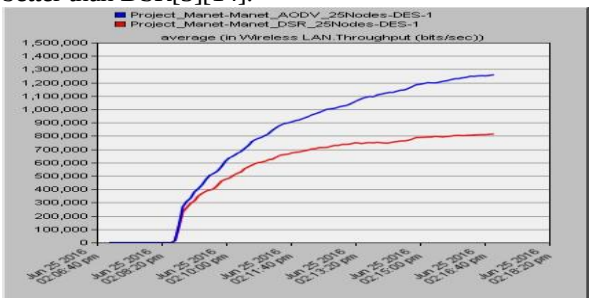

Figure. 10: Wireless LAN throughput (bits/sec) 25

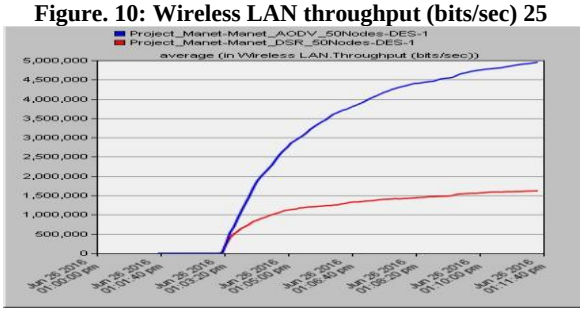

Figure. 11: Wireless LAN throughput (bits/sec) 50

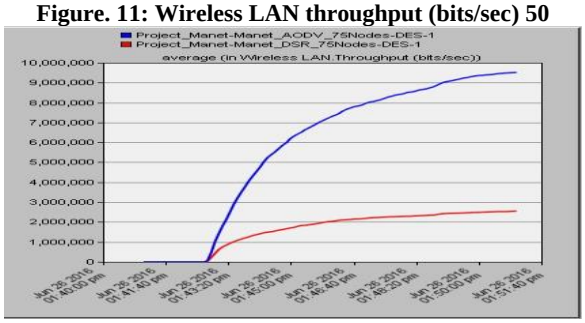

Figure. 12: Wireless LAN throughput (bits/sec) 75

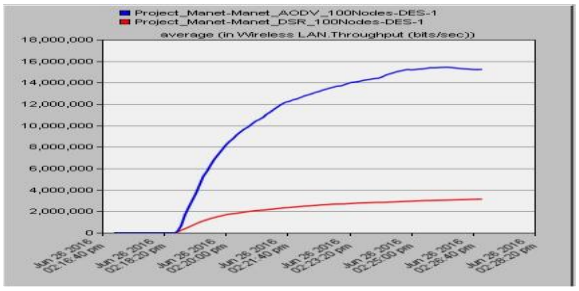

Figure. 13: Wireless LAN throughput (bits/sec) 100

Network Simulator	Opnet 14.5
Topology	WLAN
Protocol	DSR,AODV
Node Density	Variable 25 nodes,50 nodes,75 nodes,100 nodes
Parameter	Wireless LAN throughput
Traffic Type	HTTP FTP (CBR)
Simulation Time	600 Sec
Mobility Model	Random Way Point

Table. 3: Variables Table.

V. CONCLUSION

In this research, result showed that AODV performs best in all environments where the network size and mobility of nodes are increased and also change traffic type like HTTP and FTP in terms of Throughput as compared to DSR. In future work, the course of this examination will demonstrate that the likelihood of building up another or modifying the routing algorithm that will repay the issues that the MANET routing protocols faced in this exploration area[5][12].

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