Review on Comparison of AODV in MANET

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Abstract**—**In this revolutionary world mobile devices are very important for human being. Without mobile no one can fulfill their daily routines. For this scenario we study mobile ad-hoc network (MANET). In MANET mobile nodes communicate with each other using some wireless links without any infrastructure. Many routing protocols are needed for communication in such a network. There are many performance metrics to compare Ad hoc routing protocols. In this paper, there is comparison between two protocols AODV and AODVE (AODV with energy). In which average delay, packet delivery ratio, throughput measured respectively. This paper also provides a way that how to carry out such a comparative study, which could be used for future research.

Keywords—*MANET, AODV*

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I. Introduction

In MANET mobile nodes communicate with each other nodes via some communication medium using wireless links. The main challenge in the design of MANET is development of routing protocols. In Mobile Ad hoc network nodes moves randomly, therefore network experience sudden change in topology. MANET have limited range of transmission between nodes. Many routing protocols are design for achieving the efficient routing in MANET. In MANET energy consumption is a big and common issue. Mobile devices have limited battery power.The ad hoc routing protocols can be divided in to two classes:table- driven routing protocols and on –demand routing protocols.In table-driven routing protocols at each node maintain a up-to date routing information, whereas in on-demand routing the routes are created only when desired by the source node[1] .Existing methods for energy conservation are focus on transmission power control and dynamic turning off active nodes in network[2]. A working group called “manet” has been formed by the Internet Engineering Task Force (IETF) to study the related issues and stimulate research in MANET. In recent years, a number of studies have been done in different layers, such as MAC layer and application layer, to achieve energy conservation. Our work only focuses on the routing network layer [5].Routing protocols without consideration of energy consumption tend to use the same paths for given traffic demands, which results in a quick exhaustion of the energy of the nodes along the paths if those traffic demands are long-lasting and concentrated. This problem can occur when you separate the network more than two, if one of nodes consume all of the energy, that node can no longer participate in the network [5].

Characteristics of MANET [4]

- Communication via wireless network
- Easy to Deploy
- Dynamic network topology
- No infrastructure needed
- Frequent routing updates
- Flexible

Some of the application of MANET

- Defence development
- Disaster relief operations
- Mine site operations

II. OVERVIEW OF AODV

In this section we study about Ad hoc On Demand Distance Vector (AODV) which is designed for use in MANET. AODV is based on distance vector routing algorithm. It is a reactive routing protocol i.e. it requests the routes when needed. This algorithm was motivated by the limited BW that is available in media used for wireless communications [4].

A. WORKING OF AODV

When a node requires to send packets to some destination, it will checks its routing table to decide if it has current route to destination. If Yes, forwards the packet to next hop node [4] .

1. Route Discovery

It will start with broadcasting of RREQ to its neighbors for certain destination. After receiving RREQ message from intermediate node, it checks its routing table for route to destination. If yes, sends RREP to source. If No, it rebroadcast to its neighbor node, It will then set up a reverse path to source node in its route table. It ignores RREQ if it is processed already. Once RREQ reaches to destination node, it will unicast RREP to source node by using reverse route to source node[5].

2. ROUTE MAINTENANCE STAGE

Broadcasting of active nodes is done periodically by hello message. As there is no hello message from neighbor up streams node notifies source with an RRER packet and entire node is invalidated. Initialization is done by source to a new route discovery stage. And then it will floods the RREQ packet [6].

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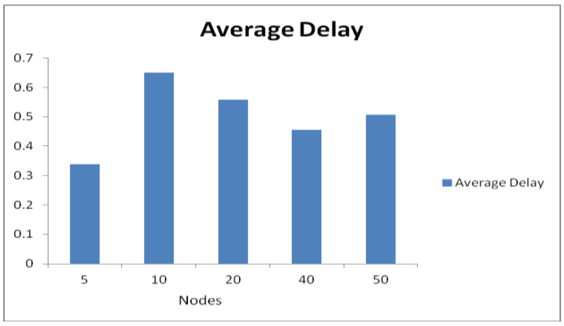
III. COMPARISON OF AODV AND AODVE ROUTING PROTOCOL

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[1].

A. Average Delay



Graph 1:

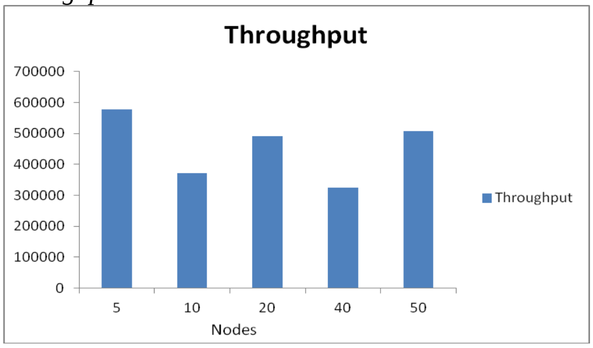
Graph 1 is description of comparative analysis of all cases that we took. For experimental purposes 5, 10, 20, 40 and 50 nodes scenarios have been created. These scenarios are generated using TCL script. All these are simulated using NS2.34 and run using random scenario model.

For making the scene more realistic and real life situations, speed and pause time have been used. For 5 nodes number of connections are 2. For 10 nodes this connection varies from 3 to 5. The case changes for 20 nodes, where connections established are 7-11. For 40 and 50 nodes 11-13 and 13-15 connections have been established respectively.

Graph1 shows delay in packets transfer for various scenes. In this case normal AODV is run and average delay is calculated.

In sparse medium of 5 nodes delay is less and at node 10 average delay increase and after that node it is increase somewhere and decrease also according to their parameter. So at every node average delay is calculated respectively. In case of nodes density increasing, the calculation part is less after route establishment so delay reduces.

B. Throughput



Graph 2:

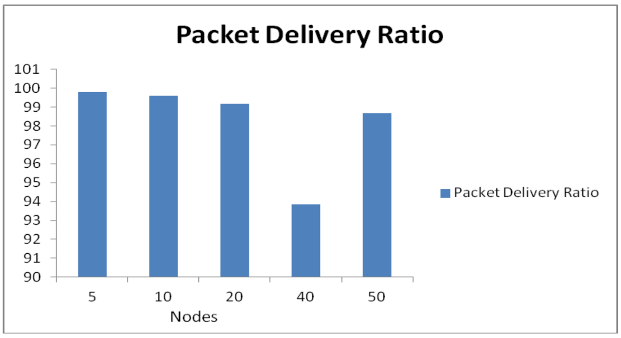
Graph 2 is description of comparative analysis of all cases that we took. For experimental purposes 5, 10, 20, 40 and 50 nodes scenarios have been created. These scenarios are generated using TCL script. All these are simulated using NS2.34 and run using random scenario model.

For making the scene more realistic and real life situations, speed and pause time have been used. For 5 nodes number of connections are 2. For 10 nodes this connection varies from 3 to 5. The case changes for 20 nodes, where connections established are 7-11. For 40 and 50 nodes 11-13 and 13-15 connections have been established respectively.

Graph2 shows throughput in packets transfer for various scenes. In this case normal AODV is run and throughput is calculated.

In sparse medium of 5 nodes throughput is more and at node 10 throughput decrease and after that node it is increase somewhere and decrease also according to their parameter. So at every node throughput is calculated respectively. In case of nodes density increasing, the calculation part is less after route establishment so throughput increase.

C. Packet Delivery Ratio



Graph 3:

Graph 3 is description of comparative analysis of all cases that we took. For experimental purposes 5, 10, 20, 40 and 50 nodes scenarios have been created. These scenarios are generated using TCL script. All these are simulated using NS2.34 and run using random scenario model.

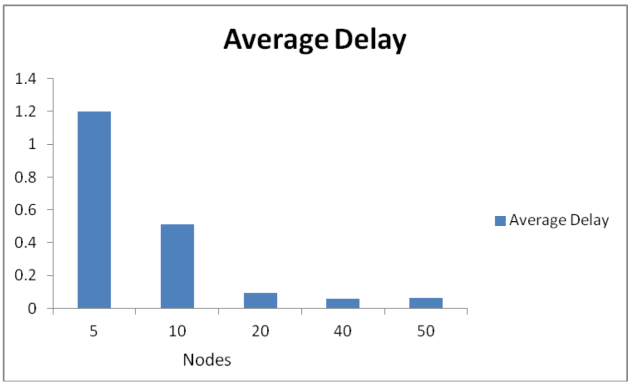
For making the scene more realistic and real life situations, speed and pause time have been used. For 5 nodes number of connections are 2. For 10 nodes this connection varies from 3 to 5. The case changes for 20 nodes, where connections established are 7-11. For 40 and 50 nodes 11-13 and 13-15 connections have been established respectively.

Graph3 shows packet delivery ratio in packets transfer for various scenes. In this case normal AODV is run and packet delivery ratio is calculated.

In sparse medium of 5 nodes packet delivery ratio is more and at node 10 throughput decrease less and after that at node 40 it decrease a lot and again at node 50 this ratio is increased again according to their parameter. So at every node packet delivery ratio is calculated respectively. In case of nodes density increasing, the calculation part is less after route establishment so packet delivery ratio decrease.

AODVE:

D. Average Delay



Graph4:

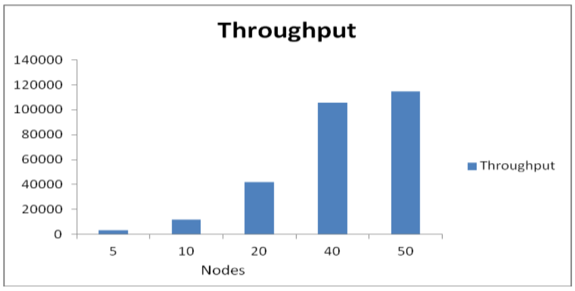
Graph 4 is description of comparative analysis of all cases that we took. For experimental purposes 5, 10, 20, 40 and 50 nodes scenarios have been created. These scenarios are generated using TCL script. All these are simulated using NS2.34 and run using random scenario model.

For making the scene more realistic and real life situations, speed and pause time have been used. For 5 nodes number of connections are 2. For 10 nodes this connection varies from 3 to 5. The case changes for 20 nodes, where connections established are 7-11. For 40 and 50 nodes 11-13 and 13-15 connections have been established respectively.

Graph4 shows delay in packets transfer for various scenes. In this case AODVE is run and average delay is calculated.

In sparse medium of 5 nodes delay is more and at node 10 average delay decrease and after that node it is decrease according to their parameter. So at every node average delay is calculated respectively. In case of nodes density increasing, the calculation part is less after route establishment so delay reduces.

E.Throughput



Graph 5:

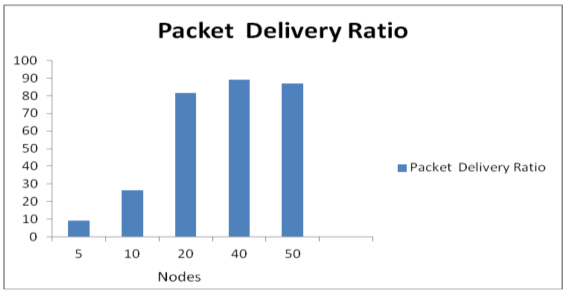
Graph 5 is description of comparative analysis of all cases that we took. For experimental purposes 5, 10, 20, 40 and 50 nodes scenarios have been created. These scenarios are generated using TCL script. All these are simulated using NS2.34 and run using random scenario model.

For making the scene more realistic and real life situations, speed and pause time have been used. For 5 nodes number of connections are 2. For 10 nodes this connection varies from 3 to 5. The case changes for 20 nodes, where connections established are 7-11. For 40 and 50 nodes 11-13 and 13-15 connections have been established respectively.

Graph5 shows throughput in packets transfer for various scenes. In this case AODVE is run and throughput is calculated.

In sparse medium of 5 nodes throughput is less and at node 10 throughput increase and after that node it increase according to their parameter. So at every node throughput is calculated respectively. In case of nodes density increasing, the calculation part is less after route establishment so throughput increase.

F. Packet Delivery Ratio



Graph 6:

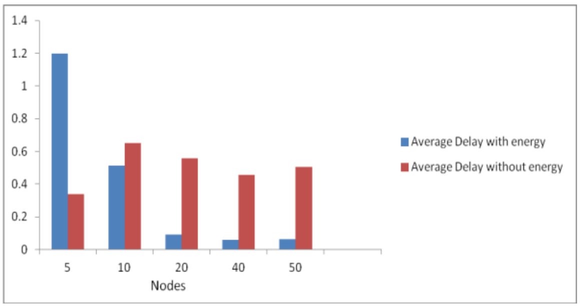
Graph 6 is description of comparative analysis of all cases that we took. For experimental purposes 5, 10, 20, 40 and 50 nodes scenarios have been created. These scenarios are generated using TCL script. All these are simulated using NS2.34 and run using random scenario model.

For making the scene more realistic and real life situations, speed and pause time have been used. For 5 nodes number of connections are 2. For 10 nodes this connection varies from 3 to 5. The case changes for 20 nodes, where connections established are 7-11. For 40 and 50 nodes 11-13 and 13-15 connections have been established respectively.

Graph 6 shows packet delivery ratio in packets transfer for various scenes. In this case AODVE is run and packet delivery ratio is calculated.

In sparse medium of 5 nodes packet delivery ratio is less and at node 10 packet delivery ratio is increase and after that node it is increase according to their parameter. So at every node packet delivery ratio is calculated respectively. In case of nodes density increasing, the calculation part is less after route establishment so packet delivery ratio reduces.

Comparison of AODV and AODVE:



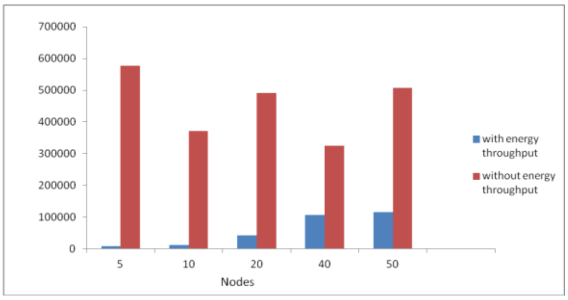
Graph 7:

Graph 7 is description of comparative analysis of all cases that we took. For experimental purposes 5, 10, 20, 40 and 50 nodes scenarios have been created. These scenarios are generated using TCL script. All these are simulated using NS2.34 and run using random scenario model.

For making the scene more realistic and real life situations, speed and pause time have been used. For 5 nodes number of connections are 2. For 10 nodes this connection varies from 3 to 5. The case changes for 20 nodes, where connections established are 7-11. For 40 and 50 nodes 11-13 and 13-15 connections have been established respectively.

Graph7 shows delay in packets transfer for various scenes. The comparison has been made using two cases. In case 1 normal AODV is run and in second case energy parameters are added and case is checked.

In sparse medium of 5 nodes delay is more with energy parameter attached while in all other cases the delay reduces considerably. In case of nodes density increasing, the calculation part is less after route establishment so delay reduces.



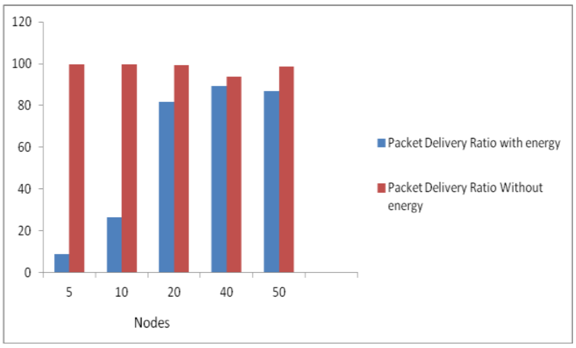
Graph 8:

Graph 8 is description of comparative analysis of all cases that we took. For experimental purposes 5, 10, 20, 40 and 50 nodes scenarios have been created. These scenarios are generated using TCL script. All these are simulated using NS2.34 and run using random scenario model.

For making the scene more realistic and real life situations, speed and pause time have been used. For 5 nodes number of connections are 2. For 10 nodes this connection varies from 3 to 5. The case changes for 20 nodes, where connections established are 7-11. For 40 and 50 nodes 11-13 and 13-15 connections have been established respectively.

Graph 8 shows throughput for various scenes. The comparison has been made using two cases. In case 1 normal AODV is run and in second case energy parameters are added and case is checked.

In sparse medium of 5 nodes throughput is less with energy parameter attached while in without energy cases the throughput increased considerably. In case of nodes density increasing, the calculation part is less after route establishment so throughput increases.



Graph 9:

Graph 9 is description of comparative analysis of all cases that we took. For experimental purposes 5, 10, 20, 40 and 50 nodes scenarios have been created. These scenarios are generated using TCL script. All these are simulated using NS2.34 and run using random scenario model.

For making the scene more realistic and real life situations, speed and pause time have been used. For 5 nodes number of connections are 2. For 10 nodes this connection varies from 3 to 5. The case changes for 20 nodes, where connections established are 7-11. For 40 and 50 nodes 11-13 and 13-15 connections have been established respectively.

Graph 9 shows packet delivery ratio for various scenes. The comparison has been made using two cases. In case 1 normal AODV is run and in second case energy parameters are added and case is checked.

In sparse medium of 5 nodes packet delivery ratio is less with energy parameter attached while in without energy cases the packet delivery ratio increased considerably. In case of nodes density increasing, the calculation part is less after route establishment so packet delivery ratio reduces.

IV. NS-2 SIMULATION ENVIRONMENT[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-2.35 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. 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)[1].

A. Performance Metrics

While analyzed the AODV ,we focused on three performance metrics for evaluation which are average dealy, throughput, packet delivery ratio.

a. Average Delay
It is the average time from the transmission of a data packet at a source node until packet delivery to a destination which includes all possible delays caused by buffering during route
discovery process, retransmission delays, queuing at the interface queue, propagation and
transfer times of data packets[1].

b. Throughput
It is the average number of messages successfully delivered per unit time number of bits delivered per second[1].

c. Packet Delivery Ratio
Packet delivery Ratio (PDR) is the ratio of all the received data packets successfully at the destinations over the number of data packets [1].

V. CONCLUSION

In this paper ,the routing protocols AODV and AODVE are evaluated for the Performance Metrics like Average Delay, Throughput, Packet Delivery Ratio up to 50 nodes. And the conclusion is AODVE works better than AODV. In AODVE performance increased and average delay decreased respectively. And overall efficiency is increased in AODVE. So proved AODVE better than conventional AODV.

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