

# Analysis of Packet Delivery Ratio with OLSR and AODV

**Rakhi Purohit**

*Research Schola, Department of Computer Science & Engineering, Suresh Gyan Vihar University  
Jaipur, Rajasthan, India  
rakhimutha@gmail.com*

**Abstract** - MANET is networking technique that interconnects various individual and wireless nodes on requirement. This is a collection of distributed nodes that don't follow any fixed topology for communication. The network architecture is variable here because of mobility of nodes which are individual and volatile in nature. This network utilize two type of basic routing strategies one is proactive and other is reactive and third can be the combination of these two types known as hybrid. Work perform in this paper is consist of the simulation and analysis of these two types of protocols which have analyzed using various different scenarios ofwith hop count is varying so network density in the mean of data traffic varying during transmission in the network. AODV and OLSR protocols are taken for simulation and evaluation process. Also some evaluation metrics have been evaluated for analysis. Simulation environment is NS2.

**Keywords** -Mobile ad hoc network, Analysis, Routing, Simulation, NS2.

## I. INTRODUCTION

Mobile ad hoc networking follows the wireless technique for interconnection in between various nodes in the network. Now days this technique is very much popular and due to the devices uses by current world scenario like PDA laptop, mobile phone, etc. This type of network represent a node as a router which can generate route to transmits a packet over communication media in network[1]. Nodes are not in static manner, they can move in network, so the infrastructure also frequently updates during communication. So the route path breaks and reform in regular intervals. This type of networking is helpful in diverse conditions in world. Like crowd, battle, disaster etc.

Rules and regulations for transmission of data packets in a particular network depends on some algorithms which also known as routing protocol. Several protocols introduced for routing in Manet which can be describe in different variety like proactive, reactive and hybrid.

### A. *Proactiveor Table Driven Protocol* –

Proactive Protocol has feature of be active provisionally for all transmission routes which can be possible to complete the transmission. This protocols follows algorithm which help to be updated with list of routes to all possible destinations in a tabular manner also known as routing table, that's why it is known as table driven routing protocol. Some of examples are DSDV and OLSR.

### B. *Reactive or On Demand Routing Protocol-*

Reactive protocol has features to make a reactive action towards any request of transmission in specific network. As the request initiates, this protocols algorithm generates a specific process which discover route to transmit data, this process known as route discovery process[3]. This process generates a path that will be useful for only current transaction and for another transaction this process will generate again new path. It does all tasks only on demand so it is known as on demand routing protocol. Some of examples are AODV and DSR.

### C. Hybrid Protocol-

Hybrid protocol has capabilities of both of types, locally it is proactive and globally it is reactive in nature. In this protocol nodes maintain routing table for their neighbors and generates a route discovery process whenever they need to perform transmission outside of current zone in network like ZRP.

Here two protocols have taken one is proactive in nature that is OLSR and other is reactive in nature that is AODV.

## II. OLSR

OLSR protocol is a link state routing protocol which follows proactive techniques [2] of routing in network transmission. It has good features of stability of routing using link state table for all possible routes and also some enhanced features which help to make limitedly availability of the routes on requirement of path for transmission [11]. It has capability to decrease network overhead due to its technique to focus on specific selected nodes in network. These nodes are known as multi point relay nodes also known as MPR. These MPR are responsible for take transmission to other nodes in network by retransmission or create flood of packets in network.

## III. OLSR ARCHITECTURE

OLSR Protocol follows the technique to handle with two types of message which are "Hello" and "TC" message [11]. The first message which is hello is responsible to maintain the recognition of all neighbors in network. The second message which is "TC" message is responsible for maintain all possible routes in network. This protocol is very much capable to control the traffic of network due to it is focus on some of the specific nodes in network known as MPR nodes which are responsible to make data available to other nodes by using flooding technique to all surrounding nodes, so that this protocol work on the less overhead in network.

## IV. AODV

AODV protocol is also known as Ad hoc On-demand Distance Vector. It is one of example of reactive approach. It is a protocol which is capable of unicast as well as multicast approach of routing [13]. AODV perform task for each session, so on the startup of session of transmission it initiate route discovery procedure to set the route from source to destination, it does all task only on the demand of transmission route and utilize it until session ends after which again new route process will initiated[14]. AODV protocol is depends on the technique in which it uses a routing table with single entry for all destination in the network and by utilizing these entries it transfer a route reply to source node which is also known as RREP and then it use same path for send data to the destination.

AODV follow a mechanism to maintain number for sequence for every destination entry in routing table and also states of the timer assign with every entry in table. This entry can be expiring if it is not used for specific time duration. For each entry a predecessor is assign for nodes which specify the possible neighbors that can use this entry to transfer data packets [14]. In the case of breakage of link to next hope, these nodes notifying with route error which is also known as RERR message. When this message RERR reach then to this node will remove all routes regarding to this link which has broken, just like a tree of route which root has been broken so no use of branches.

## V. AODV ARCHITECTURE

AODV architecture depends on the algorithm which follows some of the objectives.

- It broadcast packets for discovery of route only and only when it feel necessity of establish route for transmission in network.
- It is able to make difference in between some of the task like connectivity in local nodes, detection of neighbor and maintenance of topology of network.
- It disseminates information regarding to any modification in connectivity to that nodes which need information.

AODV protocol have quality that in this technique routes are created only on demand and the sequence numbers of destination nodes are utilize to search route to destination node.

AODV supports unicast as well as multicast transmissions of packets for the nodes which may be mobile in nature [13].It identifies the change in topology of network which can be cause by some RERR message. Here the message hello also very limited so it have less overhead to network.

## VI. EVALUATION OF SIMULATION RESULTS

### A. Simulation Environment

Performed work has utilized a famous package for create a network simulation environment that is NS2 simulator[8]. It helps produce virtual environment where it is possible to simulate required network layout. In this software, it is possible to use some virtual objects related to all types of network elements which are required to design complete network topology. This NS2 simulator [5] help to use to simulate wired and wireless network, also provide results of simulation and some tools of evaluation to calculate and reach to conclusions. It has two basic tools that are ns and nam [9]. First is simulator and second is animator, both help to visualize network.

### B. Traffic Model

In the performed work follows constant bit rate model [9]. It is the type of traffic used in source of transmission in the simulated network to complete transmission[7]. In the grid topology there are several pairs of the nodes act as source and destination, distributed in network and they uses 512 byte size of data packets. The rate of packet transmission is varying with some time intervals, because of variation in load of network.

### C. Mobility Model

The random way point model has utilized in network simulation for required layout[5]. The configuration of 500 nodes wide and 500 long design platforms has utilized for simulation Radio Model has utilize for Two Way Ground and CBR is used as source of traffic where Packet Size is 512 Bytes, and 10m/s is speed of network. For simulation various nodes count used for analysis which is50,75 and 100 with varying simulation time like20,40,60,80 & 100.

## VII. PERFORMANCE EVALUATION

The last task is to evaluate perform which is depends on the results of calculation of performance matrices, like packet delivery ratio. Conclusion had taken by graphs and tables as shown below.

### A. Packet Delivery Ratio

It is actually the ratio between the packets deliver by sender and the packets which received by the receiver[9]. Ratio is also measures the packets that have lost during packet transmission in network; it is also helpful to perform analysis of routing protocol efficiency.

$$\sum \text{Number of packet receive} / \sum \text{Number of packet send}$$

Table 1 Packet Delivery Ratio - AODV

Packet Delivery Ratio AODV					
Time Nodes	20	40	60	80	100
50	93.6978	95.0367	95.2873	95.3384	95.2052
75	93.2513	95.0014	95.3324	95.6661	96.1905
100	91.1912	92.9553	93.1546	93.4911	93.7671

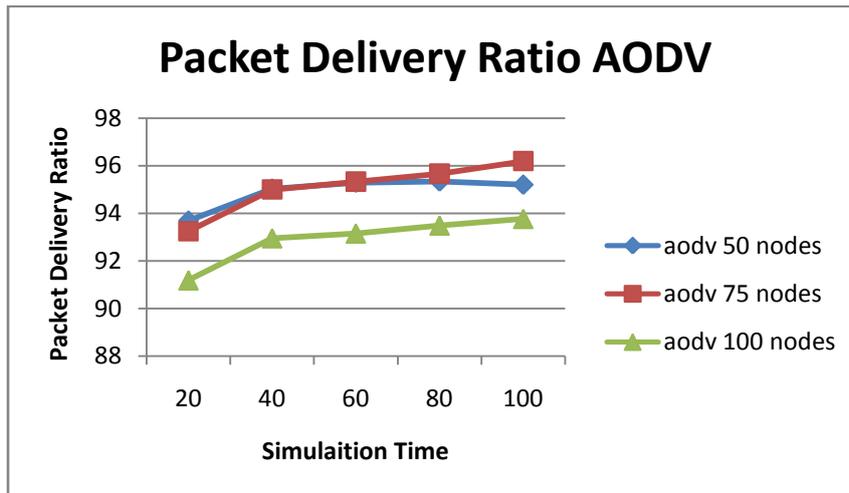


Fig. 1. Packet Delivery Ratio - AODV

On the evaluation of simulation results, packet delivery ratio evaluation of simulated network which is using AODV protocol in different simulation time and with different hop count.

In scenario of hop count 50 the packet delivery ratio of network with AODV protocol is initially low at 93.6978 but increase as 95.0367 with simulation time increase to 40 then afterword it somehow constant with some variations in positive side till 95.3384 but it dresses as 95.2052 with simulation time reach to 100.

In the scenario of hop count 75 the packet delivery ratio of network with AODV protocol is initially low as 93.2513 at simulation time 20 but it increase with increase as 95.0014 with simulation time 40 and afterword it increase with time, at simulation time 100 it reach to 96.1905.

In the scenario of hop count 100 the packet delivery ratio of network with AODV protocol is initially very low as 91.1912 but as simulation time increase it increase as 92.9553 afterword it increase constantly and reach to 93.7671 with simulation time 100.

This evaluation show that AODV perform well with dense network and low simulation time, just like it has performed with 100 nodes and with 20 simulation time.

Table 2. Packet Delivery Ratios - OLSR

Packet Delivery Ratio OLSR					
Time Nodes	20	40	60	80	100
50	77.1681	77.5073	77.4047	77.5937	77.7293
75	75.4107	70.5726	66.6277	69.7562	67.809
100	64.9028	60.7766	58.9344	57.985	55.8923

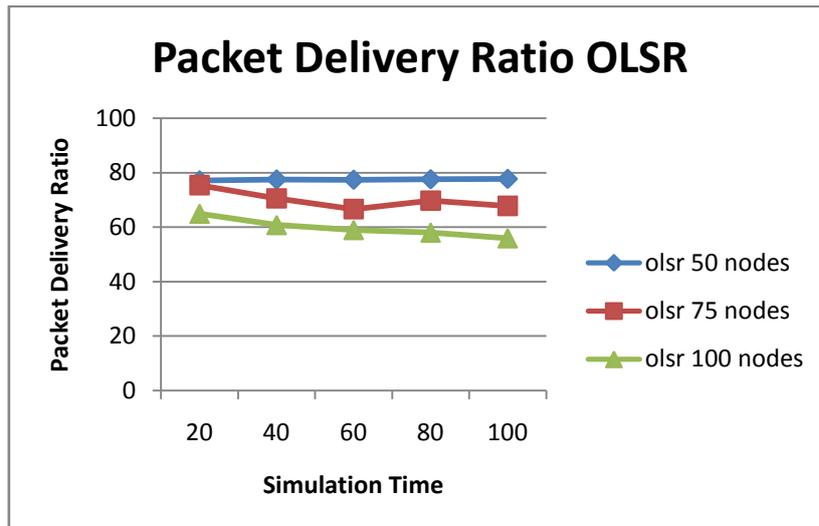


Fig. 2. Packet Delivery Ratio - OLSR

On the evaluation of simulation results, packet delivery ratio evaluation of simulated network which is using OLSR protocol in different simulation time and with different hop count.

In scenario of hop count 50 the packet delivery ratio of network with OLSR protocol is initially low as 77.1681 but it increase with very low ratio as simulation time increase to 40 but it go less as simulation time increase to 60 but afterword it increase with very low rate and reach to 77.7293 with simulation time 100.

In the scenario of hop count 75 the packet delivery ratio of network with OLSR protocol is initially very high as 75.410 with 20 simulation time but it decrease as 70.5726 with simulation time increase to 40, but afterword it decrease as simulation time increase and it reach to 67.809 as simulation time increase to 100.

In the scenario of hop count 100 the packet delivery ratio of network with OLSR protocol is initially high as 64.9028 but it decrease as 60.7766 with simulation time increase to 40 and afterword it decrease constantly as simulation time decrease and it reach to 55.8923 as simulation time reach on 100.

This evaluation shows that, the OLSR perform well with more hop count and more simulation time. It is a dense network in the mean of network nodes and packet transmissions.

### VIII. CONCLUSION

Analysis of protocols in different network scenarios with varying hop count and varying network density in the mean of data traffic shows that, AODV provide less packet delivery ratio with more dense network and less simulation time, whereas OLSR provides less packet delivery ratio with more dense network and more simulation time, so it shows that as simulation time increase the network would be more dense in the mean of data traffic, here OLSR perform well then AODV. Hence OLSR is better performer protocol.

### IX. FUTURE WORK

Future task could be making new enhancement of existing features in protocol to make them more effective and good performer protocol for mobile ad hoc networks.

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