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# Performance Evaluation of AODV and OLSR Routing Protocols for Different Node Density in MANETs

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**ABSTRACT:** In this paper a comparative study is done for different routing protocols in mobile ad-hoc network by using directional antenna. The directional antenna is meta material rectangular patch antenna. Performance of MANET can be improved using meta material antenna, because of directivity and compact size of meta material antenna. Complexity of routing is day by day increasing between mobile users because of dynamic nature of mobile nodes and rapid change in mobile topologies in MANET. However, it is possible to reduce the network congestions by using the directional antenna. To find out which routing protocol gives better result for mobile ad-hoc networks, in the paper, the scenario of directional met material antenna is simulated for comparing and analyzing of different routing protocols such as AODV, OLSR using QualNet simulator 6.1. The metrics used for performance evaluation of different routing protocols we used throughput, average unicast end to end delay, and average uncast jitter of routing protocols.

**KEYWORDS:** AODV, MANET, OLSR, Qualnet.

## I. INTRODUCTION

### 1. 1 MANET

A Mobile Ad-hoc Network is a collection of independent mobile nodes that can communicate to each other via radio waves. The mobile nodes that are in radio range of each other can directly communicate, whereas others need the aid of intermediate nodes to route their packets. Each of the node has a wireless interface to communicate with each other. These networks are fully distributed, and can work at any place without the help of any fixed infrastructure as access points or base stations. Figure 1 shows a simple ad-hoc network with 3 nodes. Node 1 and node 3 are not within range of each other; however the node 2 can be used to forward packets between node 1and nodes 2. The node 2 will act as a router and these three nodes together form an ad-hoc network. Someof the characteristics are: Distributedoperation, Multi hop routing, Autonomous terminal, Dynamic topology, Light-weight terminals, Shared Physical Medium.[1].

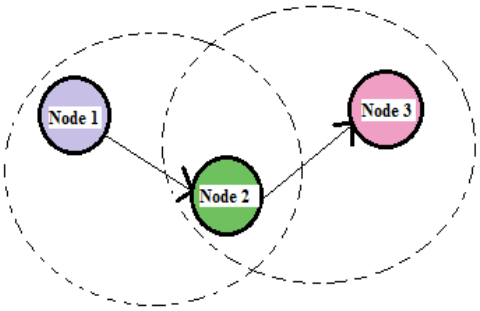



Figure. 1 Example of mobile ad-hoc network

## II. Routing protocols

MANET uses some of the reactive and proactive protocols ,here we are using AODV and OLSR routing protocols[2].

### 2.1 AODV(Ad hoc On-demand Distance Vector):

AODV is a widely accepted on-demand routing protocol in ad hoc networks proposed by C. E. Perkins and E. M. Royer. Ad hoc On-demand Distance Vector (AODV) is a combination of both DSR and DSDV. It follows the basic on-demand mechanism of Route Discovery and Route Maintenance from DSR, plus the use of hop-by-hop routing, sequence numbers, and periodic beacons from DSDV[3]. It uses destination sequence

numbers to ensure loop freedom at all times and by avoiding the Bellman-Ford "count-to infinity" problem offers quick convergence when the ad hoc network topology changes. AODV finds routes only when required and hence is reactive in nature.

**2.2 OLSR (Optimized Link State routing):**

Clausen and Jacquet proposed the Optimized Link State Protocol, a point-to-point proactive protocol that employs an efficient link state packet forwarding mechanism called multipoint relaying. It optimizes the pure link state routing protocol[4]. Optimizations are done in two ways: by reducing the size of the control packets and by reducing the number of links used for forwarding the link state packets. Here each node maintains the topology information about the network by periodically exchanging link-state messages among the other nodes. OLSR is based on the following three mechanisms: neighbour sensing, efficient flooding and computation of an optimal route using the shortest-path algorithm. Neighbour sensing is the detection of changes in the neighbourhood of node. Each node determines an optimal route to every known destination using this topology information and stores this information in a routing table. The shortest path algorithm is then applied for computing the optimal path. Routes to every destination are immediately available when data transmission begins and remain valid for a specific period of time till the information is expired. OLSR reduces the route discovery delay

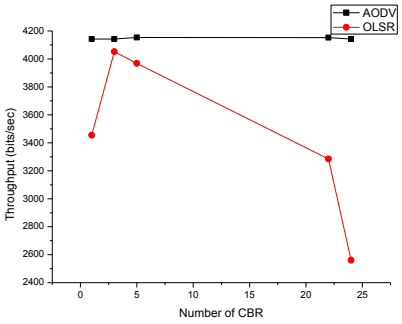
## III. Parameters for Simulation Setup

In this work Qualnet 6.1 network simulator has been used to evaluate the performance of AODV and OSLR protocols of mobile ad-hoc networks. Table 1 describes the different parameters used for the simulation setup for Qualnet Simulator 6.1.

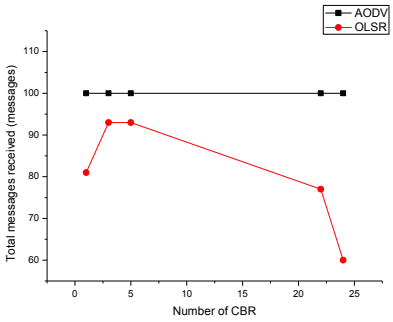
| Parameters | Values |
|---|---|
| No. of Nodes | 25,49 |
| Area | 1500m*1500m |
| Routing Protocols | AODV, OLSR |
| Simulation time | 300 sec |
| Node Placement | Grid |
| Traffic Source | CBR |

Tables 1. Parameters for simulation setup scenarios

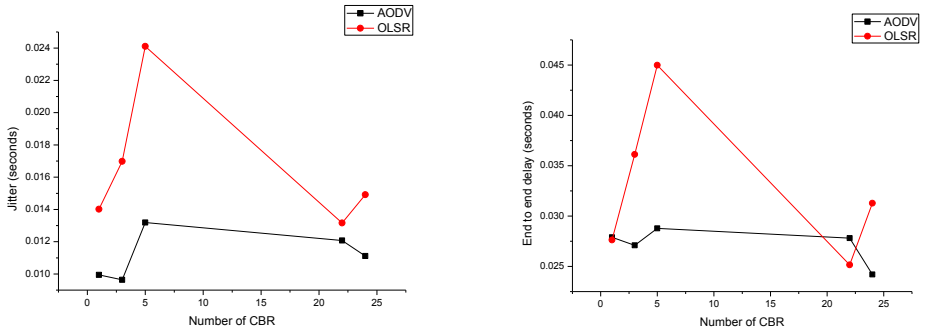
## IV. Results and Discussion




(a)



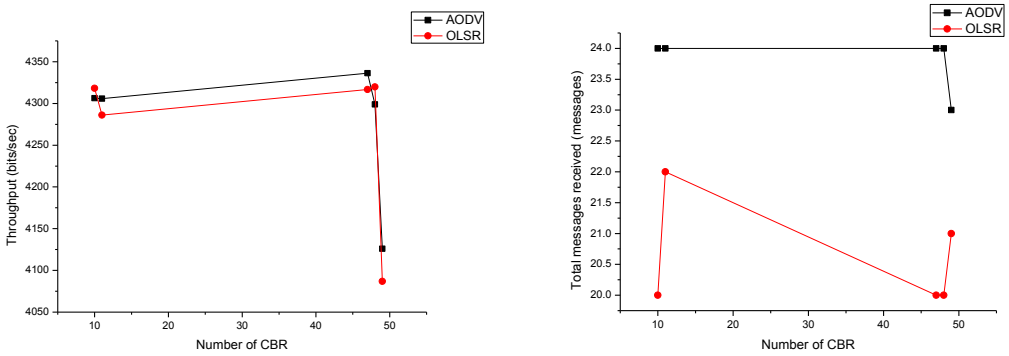

(b)




(c) (d)

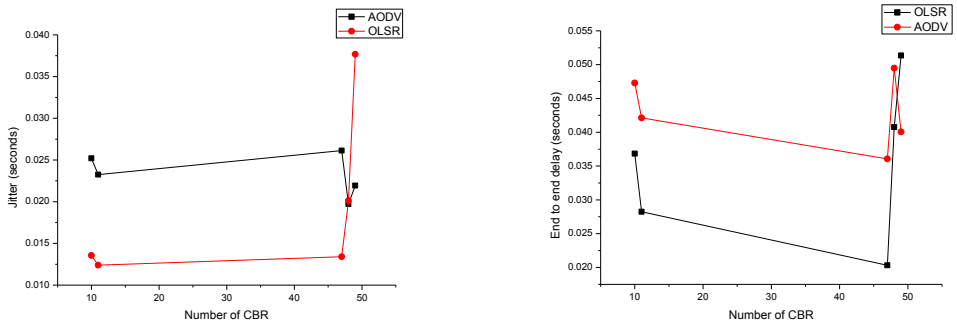
Figure 4 Plots of 25nodes(a)Throughput ,(b)Total messages received,(c) Jitter,(d)End to End delay

Figure 4 shows the Throughput ,Total messages received, Jitter, End to End delay for the node density of 25 nodes here we can observe that the AODV has the better performance compared to the OLSR i.e., the AODV has the better throughput compared to the OLSR shown in the figure 4.a,figure 4.b shows the Total number of messages received is also more in the AODV protocol then the OLSR, we can see in the figure 4.c and figure 4.d that the OLSR has the more Jitter and more delay compared to the AODV.




(a) (b)

Figure 5: Plots of 49 nodes (a)Throughput (b) Total messages received




(a) (b)

Figure 6: Plots of 49 nodes (a) Jitter(b) End to End delay

Figure 5 shows the Throughput ,Total messages received, Jitter, End to End delay for the node density of 49 nodes here we can observe that the AODV has the better performance compared to the OLSR i.e., the AODV has the better throughput compared to the OLSR shown in the figure 5.a,figure 5.b shows the Total number of messages received is also more in the AODV protocol then the OLSR, we can see in the figure 6.a and figure 6.b that the OLSR has the more Jitter and more delay compared to the AODV.

## V. Conclusion :

From the above results we can observe that the AODV has better performance compared to the OLSR routing protocol i.e., more throughput, more number of messages received and lesser Jitter and Delay is obtained in the AODV routing protocol and this can be further improved by the proper modification of the codes

**VII. Acknowledgement**

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