

# Performance Analysis of AODV, DSR and OLSR in MANET

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**Abstract:** A mobile Ad hoc network (MANET) consists of all the mobile wireless nodes. There is no centralized control which is required to communicate between the mobile nodes which are involved. OPNET is used to compare the three protocols that are AODV, DSR and OLSR. The OPNET modeler is used to work in the sonorous manner. The protocol would be hence judged on the basis of the three metrics that are supposed to be delay, network load and throughput.

**Keywords:** MANET, Protocol, OLSR, analysis, simulations.

## 1. Introduction

Full form of MANET is Mobile Ad hoc Network. It is basically an autonomous network which is set to be decentralized and would also consist of lots of nodes which are free. MANET could also be known as the network which is basically mobile mesh and is set to be a self guiding and self configurable network so far. A MANET [3] would also consist of set of devices such as the transmitters, receivers and the smart antennas that would rather channelize the efforts of the system panel in the network. The antenna to be talked about could be of any type ever since to be taken. The nodes that are going to participate in this particular effort could be static or could be mobile. The term node though is used to refer the body that is moving all around randomly. These nodes could be figured as the phones or the laptops or the PDA which could roam in various directions. These nodes could be located in the cars and the ships and the MP3 players also which could also consist of the personal computers also. Nodes communicate with one another by just forwarding packet in the laid fashion forward.

Following the gigantic research over the MANET, still it do not completely follow the complete form of the INTERNET based standards to be seen. The recognition of the tentative Request for comments (RFC) since the time of 2003[1] is been used. In that the questions were unanswered whose basic concern was implementation the routing protocols. But the algorithms were proposed which as the trial of the technology would be taken and there would be lot more of chances that the standard would be developed. Widespread research has been done and the major studies are taken on the variety of the protocols which may consist of the AODV, DSR, TORA and OLSR. Along with the standardization of the interface solution and routing protocol the network has been established in the set of network system that may be taken in, MANET working group WG [8]. Large amount of the research is done and the performance has been evaluated over the years and the NS2 network simulator arise to be the best choice when considering the simulation reports agreed upon the work [4] [5]. We need to have a broader view of the sources and the work done in the large expansion. The theme would so consist of the Proactive MANET protocol (PMP) and the other one that is Reactive MANET protocol in the OPNET modeler 14.5[2]. For all the comparisons considered in the work we could easily use the FTP for the traffic control work in the particular ad hoc network system. The goal of the project would be evaluation of the working of the pro-

ocols which are reactive and the proactive in nature. In my simulations performed would have a very keen and robust link with comparison in the field of network? The FTP traffic the performance is done practically and in the real time service. This study would also give great benefit in future work.

## 2. Aims and Objectives

The two most widely described groups of the routing protocol are Proactive MANET protocol (PMP), Reactive MANET protocol (RMP) whereas the third which could be derived from both the above could be called as HYBRID MANET protocol. The prior is generally referred to as the protocol which is basically table driven and would detect the network periodically over the time. Second one is also known to be an on demand routing protocol and would find the route network when the source would even ask for it. This particular network would be suitable when the network topologies of high speed and the network is set and the data is sent over the network. Hybrid MANET protocol would integrate the advantage of both the above protocols and would work effectively.

## 3. Research Question

My objective in this thesis would be evaluation of the performance of both proactive and the reactive MANET protocols. These two categories of the protocols would definitely have the dissimilar behaviors taking in mind the wireless routing. The major fault would be to select the most trustworthy, organized and right routing protocol of the MANET. Some question need to be answered before proceeding further they are what are the factors which would be influenced by the working of the three set of the protocols? Finally to give the difference between the protocols.

To answer all the above questions the model needs to be established in the MANET scenario which would be having different parameters each defined. The working of the AODV, DSR [6] and OLSR would be judged with respect to the parameters considered like delay, network load and throughput [7]. Simulations would be done with respect to above laid factors. Which protocol would be providing best performance out of the three considering the mobile network? The answer to this question would be given by the overall performance judgment of the network protocols with

the given topology.

#### 4. Scope of Research

As the two categories of the routing protocol is known. A hybrid tends to be the best of combination of the two which is called proactive and the reactive protocols. It tends to have the best qualities of the both the other protocols. In the following work the three protocols are considered which are need to be the AODV [9] and DSR which are reactive and OLSR which is tend to be proactive. In the following work the evaluation need to be done for the mentioned above protocols and the network need to be implemented upon it. I would also test the performance of the protocols which are to be performed and how the network simulation is done. The design would also focus on the effect of the protocols. These effects would be varying with time of pause which would not be taken in consideration.

#### 5. Ad hoc on Demand Distance Vector Protocol

AODV is a protocol which works on the procedure of the on demand routing. The AODV also would thus give an easy way to be linked to the network topology. The notification would thus be canceled. Taking example if a particular link failure information is been sent in the network nodes then the unicast route would be built from the source to the destination and the traffic also created would be minimum of its own kinds. AODV would never entertain the procedure of the extra routing when not in use to be done. If any of the 2 nodes wants to communicate with one another than the AODV is the one which is responsible for building of the multi hop route. AODV would rather use the destination sequence number 9DSN0 to avoid counting and causing the problem of the infinite looping in the network topology. The favorable route is also been selected on the basis of the well defined sequence number been used.

#### 6. Dynamic Source Routing

DSR is a non demand routing protocol which is to be known as reactive protocol. It is the one which is meant for the source routing and is yet very simple and efficient one to work with. It could be used in the multi hop wireless networks that are ad hoc networks. The DSR is self managing and self attainable protocol. It does consist of just two of the mechanisms that are route discovery and the route maintenance.

#### 7. OLSR

It is the one which is basically meant for the system of the table driven manner to be taken. It would permanently update and store the routing information inside its cache and would maintain a table out of it. It would also keep the track of the data in the network so as to get the best work done on the system. It could be easily implemented in the table so as to see the working. The figure 3-5 shows how the work has been done in the case of OLSR which could be implemented in ad hoc networks. The multi point relay would then help to get the node in the time.

#### 8. Performance

There are suppose to be variety of the parameters which help in the evaluation of the performance of the protocol been used. They have different behavior for all the network topologies been defined. There would be in exact the three parameters which needs to be evaluated. These parameters may be the delay, network load and the throughput on the basis of which the working is done and the measurements are been judged in the system.

##### 8.1 Delay

The packet would also cost the end to end delay at the time of the generation of the packet by the source up to the work of the destination reception been done. So this would be the time which a packet takes to travel and go across the network to set the boundaries to be done in the network. This time would be expressed in seconds and hence all the delays in the network are supposed to be known as the end to end packet delay. Sometimes these delays could be also called as the latency of the network to be seen which is supposed to be same as the delay packet end to end delivery delay with the constraints that the network is set and the packet is sent over the network topology to be taken. Some application the delay is major drawback and they are rather sensitive to it such a voice application which could not withstand the delay. So in that case the voice would rather require the low delay in the network. FTP is rather much more tolerant to the delay of the network in the system.

$$D(\text{end-end}) = N [d(\text{trans}) + d(\text{prop}) + d(\text{proc})]$$

##### 8.2 Network load

Load of the network is the total amount of the bit/sec to be submitted to the wireless network to be seen the data is set to the wireless network LAN layers which is taken by all the higher layers of the network [23] When there would be more and lot of traffic which is been coming on the network system then it would become time by time difficult for the network to handle the traffic been taken in the network topology. The better and well organized network would handle up the network in the unique fashion to be stayed to work within the system. Various techniques are also been introduced for that.

##### 8.3 Throughput

Above word could be defined as the perfect ratio of the total data which would reach the receiver from the sender. The time taken by the receiver to receive the packet sent by the sender is called the throughput of the particular network been taken. This could be easily expressed in the bytes and bits defined per second. Some of the factors that are been affecting the changes in the networks are the unfaithful communication among the moving nodes. The limited amount of bandwidth that is been used. The limited amount of the energy been used. A throughput is a major point so it is needed to high and to work in the unique fashion to be done.

Equation used:

Number of the packets delivered in network\*packet size\*8) / (total duration taken)

## 9. Software Environment

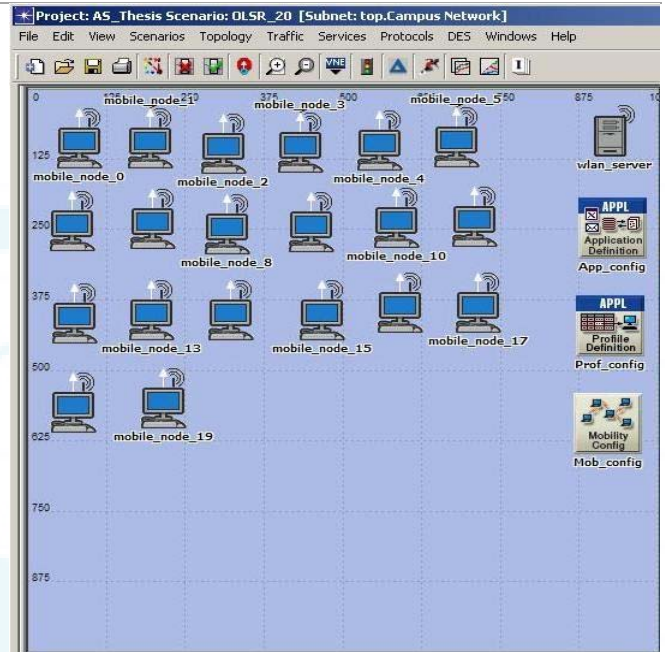
I am using the OPNET V14.5 software for making my simulation of the project. OPNET is the network simulator. It thus helps in providing the large amount of solutions for the network management and the application for example the operations of the networks, research been done on the network, development phase of the network, Planning been done on the network. It would also help to take care of the technologies been used in the network.

### 9.1 Simulation Environment

The master thesis has the simulations that are been carried with the help of the OPNET modeler been used. Below diagram would rather make it clear how the work had been done and how it needs to be done in the network. The key parameter that are been provided in such simulations are having 20 mobile nodes for OLSR routing protocol. The major feature of this particular state is that it has different amount of nodes been attached to it in the working been done to the system been done. In the case of the first scenario 20 nodes are been taken which are put through the parameters of the throughput, delay and load. In the next one 40 nodes are been taken and in the following 80 been taken. Each would have the running of 240 seconds. All the simulations would be taken and the results would be shown eventually. Under each we would check the behavior of AODV, DSR and OLSR. We would then get multiple graphs of simulations that are of delay, network load and throughput being taken. I would rather collect the DES on each of the protocol taken and the wireless LAN assumed/ I would also rather check the average of the work been taken and the throughput be adjusted. A model of the network of the campus is been assumed below where the network is been spread in 1000m x 1000m. The file transfer is been analyzed with bit rate of 11.

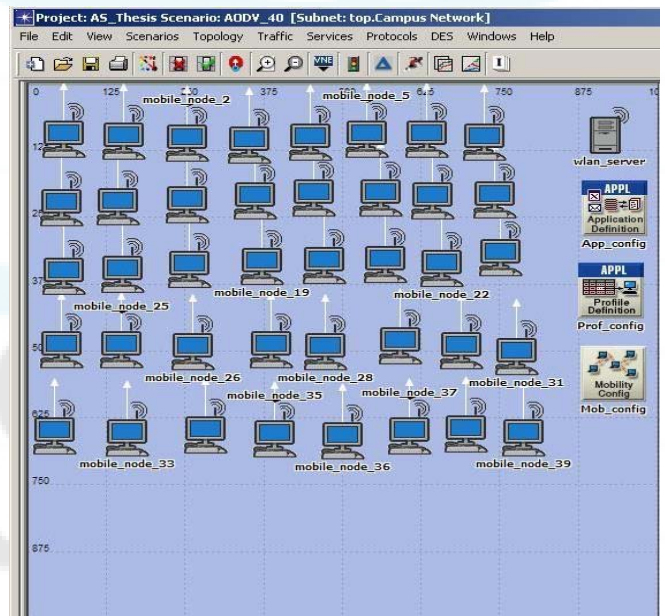
### 9.2 Simulation of first scenario

In the case of the first and the foremost scenario been taken the 20 nodes which could be mobile and one of the server which is WLAN and it is supposed to be fixed. The network topology would be of size 1000 x 1000 meters. After the allotment of the IPv4 addressing which was been assigned to all the nodes which have been working. The configuration of the application been done and the profile is been tested all over the network topology. Now you could deploy and configure the profile. The judgment is done on the basis of the network where the FTP would be selected as the traffic load occurs and so the deployment is been done in the network. The configured first scenario has been shown in the figure given below.



### 9.3 Simulation of Second Scenario

In case of relayed second scenario, where the total nodes are 40 which all are mobile. All the characters would be the same but the number of nodes would be changed in each and every scenario been taken in the network topology. It would be give the appropriate name and the work to be seen. In the case of the Second network in the protocol the parameters are tend to be the same. The whole network is been shown in fig below.

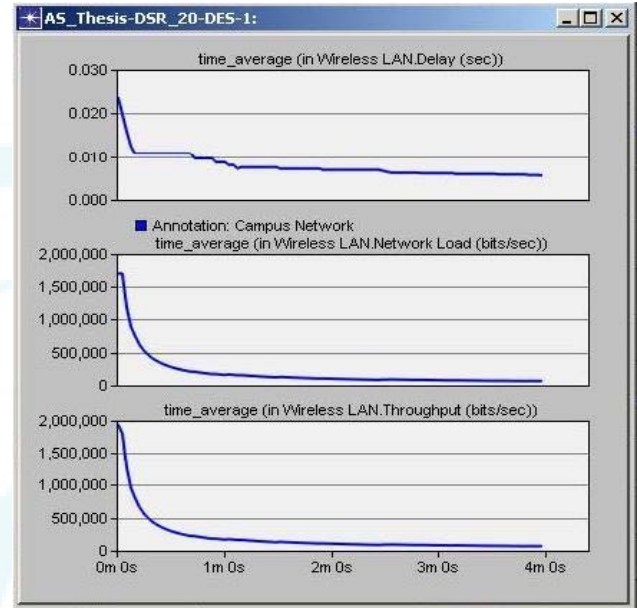
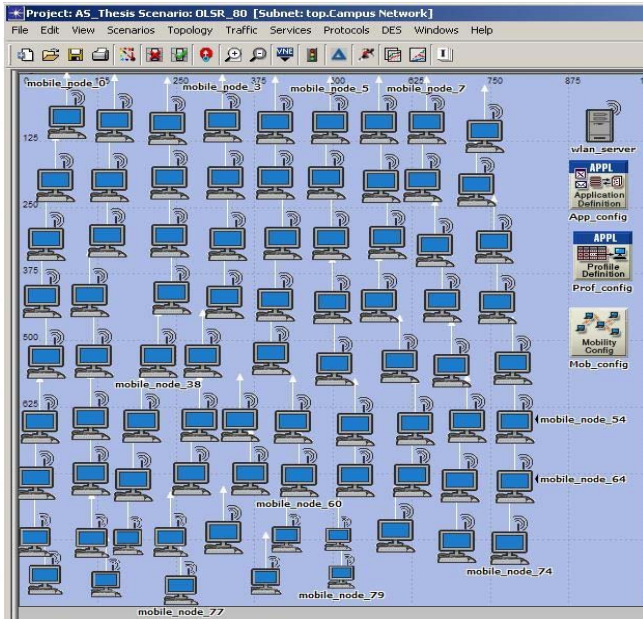


### 9.4 Simulation of Third Scenario

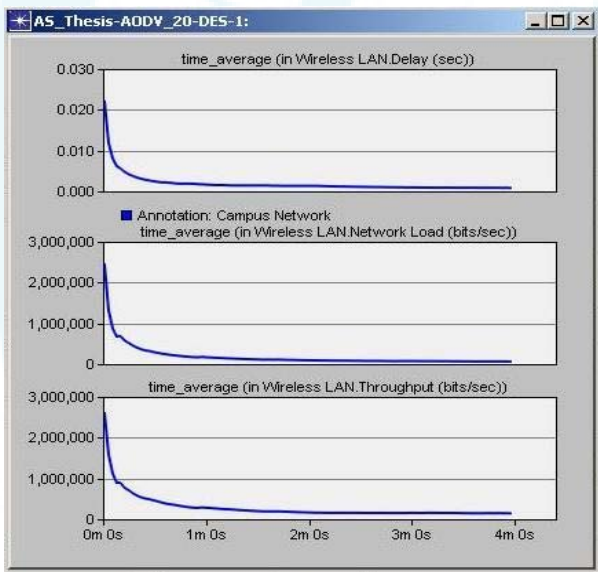
In the case of the third one the number of the nodes would be taken as 80. The same way would be taken to see that whether the network to be seen is there. By clicking on the scenario and giving the appropriate work to be done in the name. All these steps would be remaining in the work and the number of nodes to be seen in the work. The reason where the mobile nodes would be profound and the perfor-

mane of the protocols to be judged in the third scenario.

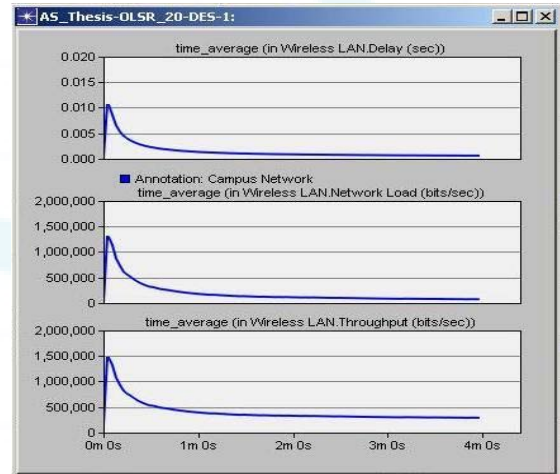
### 9.6 Overall OLSR Performance



### 9.5 Overall AODV Performance



### 9.6 Overall DSR Performance



## 10. Conclusion

AODV and DSR protocols in terms of delay, network load and throughput in 20 mobile nodes. In 40 mobile nodes again the OLSR perform well than AODV and DSR in delay and throughput. The AODV puts low load than OLSR and DSR respectively. In 80 mobile nodes OLSR is again showing good results in delay and throughput than AODV and DSR respectively. AODV offer good results in offering low load on the network than OLSR and DSR respectively. The average values are taken from the graphs. From the above given graphs it is shown clearly that the OLSR gives the outstanding results in delay and throughput and the AODV performs well in the network load. High network load affects the MANET routing control packets. By comparing AODV and DSR the results in the entire figures, it can be seen that AODV perform well than DSR in delay, network load and throughput. Average values are shown in the above table 5.1. The study of the protocols is been done and it would rather show that OLSR is better choice when talked about the MANET and accordingly the simulation results

but it might not be the case. OLSR would always perform well. It might perform differently in the different networks. Selection should be done accurately when the network topology is been taken and at that time it would ultimately influence the efficiency of the network in the magnificent way.

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The study of these routing protocols shows that the OLSR is better in MANET according to our simulation results but it is not necessary that OLSR perform always better in all the networks, its performance may vary by varying the network. At the end we came to the point from our simulation and analytical study that the performance of routing protocols vary with network and selection of accurate routing protocols according to the network, ultimately influence the efficiency of that network in magnificent way.

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