

# Comparison and Analysis of AD-Hoc routing protocols (Proactive, Reactive & Hybrid)

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## ABSTRACT

*It is commonly known to the wireless research community that use of efficient routing algorithms in ad hoc networks offers a number of benefits. Some of them are: larger throughput, lower average end-to-end delay, decrement in the number of lost data packets and generally an improved network performance. This paper presents a comparative study of the Ad-hoc routing protocols. In this paper, a comparison has been made in between different- different Ad- hoc Routing protocols(Proactive, Reactive and Hybrid), which are: FSR (Fisheye State Routing), OLSR (Optimized link state routing protocols), AODV (Ad hoc on- demand Distance Vector routing), DSR (Dynamic Source Routing), DYMO (Dynamic MANET On Demand) and ZRP(Zone Routing Protocol). The comparison have been made by using Qualnet Developer 5.2.*

**Keywords:** MANET, FSR, OLSR, AODV, DSR, DYMO, ZRP, Qualnet Developer 5.2.

## 1. INTRODUCTION

An ad-hoc network is a collection of wireless mobile hosts forming a temporary network without the aid of any centralized administration [1]. Mobile Ad-hoc networks are self-configuring multi-hop wireless networks[3]. Wireless ad-hoc networks have gained a lot of importance in wireless communications. Because, Wireless communication is established by nodes which will act as routers. Routing in these networks is highly complex due to moving nodes and hence many protocols have been developed [2].

Our contribution is to compare the performance of most popular routing protocols in ad hoc network and the goal is to test the efficiency of the above routing protocols in scenarios.

## 2. ROUTING PROTOCOLS OF MANET:

(1) Proactive routing protocol: Proactive routing or table driven routing protocol means which update routing table periodically and maintain routing information up to date proactive routing protocol like

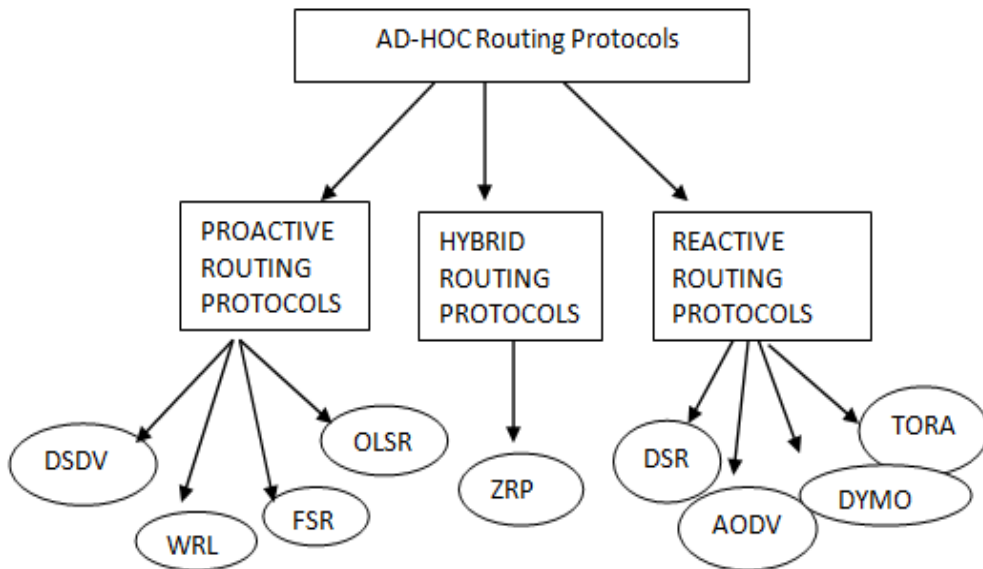
- Destination Sequenced Distance Vector Routing (DSDV)
- Wireless Routing Protocol(WRL)
- Fisheye State Routing (FSR)
- Optimized Link State Routing Protocols (OLSR)

(2) Reactive routing protocol: In reactive routing protocol routes are searched only when needed. Reactive routing protocols of ad hoc networks are:

- The Dynamic Source Routing (DSR)
- Ad hoc on- demand Distance Vector routing (AODV)
- Dynamic MANET On Demand (DYMO)
- Temporary Ordered Routing Algorithm (TORA)

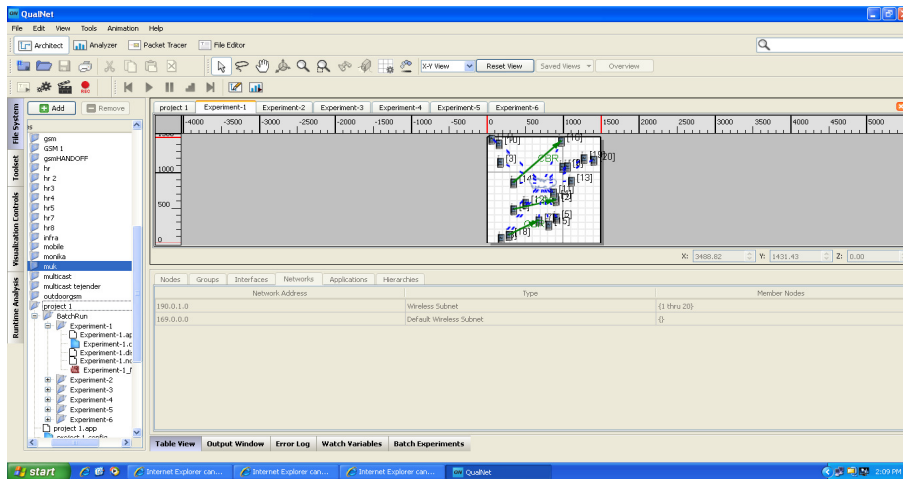
(3) Hybrid routing protocol: Hybrid routing protocol is a combination of proactive routing and reactive routing protocol like

- Zone Routing Protocol (ZRP)



### 3. SIMULATION OBSERVATION

For this, we are using the *QualNet Developer 5.2* because it is too fast specially for a large number of nodes. We used QualNet to simulate six Routing Protocols: Fisheye, OLSR, AODV, DSR, DYMO and ZRP.



**Figure 1**

Figure 1 shows a sample network created with 20 Nodes. It depicts a network with 20 fixed nodes whose behaviour has to be analyzed in the network with respect to time to determine the effecting features of each protocol. To investigate the performance of all six routing protocols with varying data rates, and network load. We evaluate three parameters which shows the different nature of these Protocols, the parameters are throughput, average end to end delay and average jitter.

#### 4. SIMULATOR PARAMETERS:

We consider a network of nodes placing within a 2200m X 500m area. The performance of Fisheye, OLSR, AODV, DYMO, DSR & ZRP is evaluated by keeping the network speed and pause time constant. Table 1 shows the simulation parameters used in this valuation.

**TABLE 1**

Simulation Parameter	
Simulator	Qualnet Developer 5.2
Protocol	Fisheye, AODV, DYMO, DSR & ZRP
Simulation duration	0.58887seconds
simulation area	2200m *500m
No. of nodes	20
Pause time	0.004sec
Packet rate	4 packets/sec
Traffic type	CBR
Data rate	1024 bites/sec

## 5. PERFORMANCE COMPARISON THROUGH SIMULATOR:

### Result

#### (1) Throughput:

It is clearly observed from the figure 2, depicts the throughput of the network with 20 nodes. The network throughput for DSR (Reactive Routing Protocol) is better as compared to other routing protocols. After DSR, ZRP performance is good rather than other routing protocols.

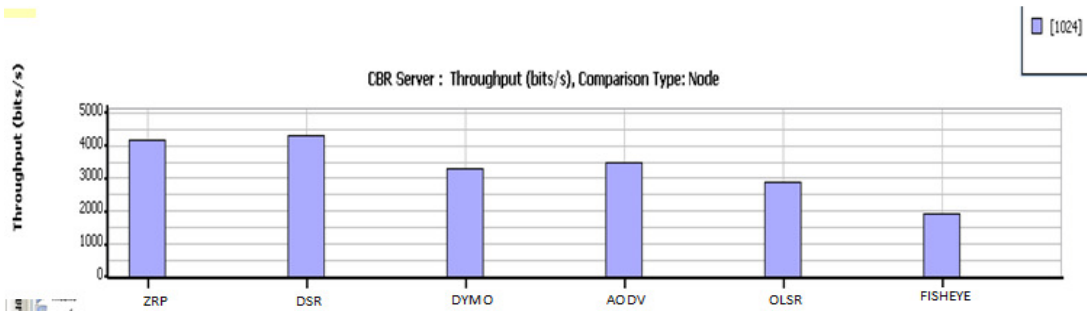


Figure 2

#### (2) Average End-to-End delay:

It is clearly observed from the figure 3, depicts the end-to-end delay of the network with 20 nodes. The network end-to-end delay for ZRP (Hybrid Routing Protocol) is better as compared to other routing protocols. After ZRP, OLSR performance is good rather than other routing protocols.

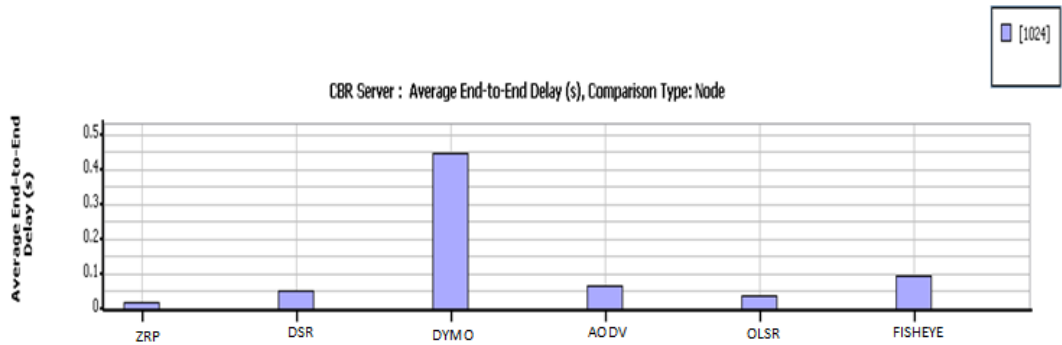


Figure 3

#### (3) Average jitter:

It is clearly observed from the figure 4, depicts the end-to-end delay of the network with 20 nodes. The network end-to-end delay for ZRP (Hybrid Routing Protocol) is better as compared to other routing protocols. After ZRP, OLSR performance is good rather than other routing protocols.

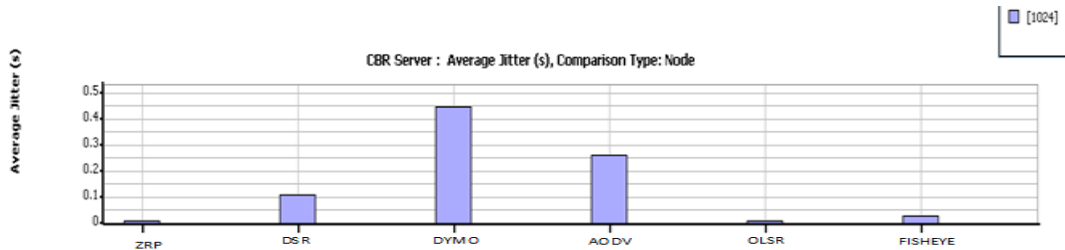


Figure 4

## 6. CONCLUSION

In this paper, we discussed in the six routing protocols (Fisheye, AODV, DYMO, DSR & ZRP) based on Qualnet simulations. Our motive was to check the performance of these six routing protocols in MANET in the above mentioned parameters. This is a critical issue to select efficient and reliable protocol. Here, in this simulation work we get different kinds of results. According to our simulation results and the study of all these routing protocols shows that the ZRP and DSR are better in MANET. But, its performance may vary by varying the network, it is not necessary that ZRP and DSR [8] perform always better in all the networks. At the end, we came to the result from our analytical and simulation study that the performance of routing protocols vary with selection of accurate routing protocols and also vary with network, finally manipulate the efficiency of that network in exceptional way. So proactive protocol OLSR lower in terms of average jitter and gets the same low delay. Same way, DSR shows best throughput, ZRP shows better result on delay and jitter. In future, we will focus on how to get stable and acceptable performance in dynamic ad hoc networks by constructing virtual bone networks using local broadcasting strategy.

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