4

ANALYSIS OF ROUTING PROTOCOL

CONTENTS

4.1 INTRODUCTION

In this research we have used wireless sensor network to transmitting the data from different nodes in this case we need a routing protocol to routes the data from source to destination consuming minimum energy and better Packet Delivery Ratio (PDR). So during this phase we analyze the different routing protocols which are used in wireless transmission [62].

4.2 MANET (Mobile Ad Hoc Network) ROUTING PROTOCOL

We analyze two main MANET protocols, AODV Protocol (Ad hoc On-Demand Distance Vector) as reactive protocols and DSDV Protocol (Destination Sequenced Distance Vector) as proactive protocol.

a) Ad-hoc On-demand Distance Vector (AODV)

AODV is a combination of on-demand and distance vector i.e. hop-to-hop routing methodology. When a node needs to know a route to a specific destination it creates a ROUTE REQUEST. Next the route request is forwarded by intermediate nodes which also create a reverse route for itself for destination. When the request reaches a node with route to destination it creates again a REPLY which contains the number of hops that are require to reach the destination. All nodes that participate in forwarding this reply to the source node create a forward route to destination. This route created from each node from source to destination is a hop-by-hop state and not the entire route as in source routing [63].

b) Destination Sequenced Distance Vector (DSDV)

DSDV is a hop-by-hop distance vector routing protocol requiring each node to periodically broadcast routing updates based on the idea of classical Bellman-Ford Routing algorithm. Each node maintains a routing table listing the “next hop” for each reachable destination, number of hops to reach destination and the sequence number assigned by destination node. The sequence number is

used to distinguish stale routes from new ones and thus avoid loop formation. The stations periodically transmit their routing tables to their immediate neighbors. A station also transmits its routing table if a significant change has occurred in its table from the last update sent. So, the update is both time-driven and event-driven. The routing table updates can be sent in two ways: a "full dump" or an "incremental" update [63, 64].

4.3 SIMULATION AND ANALYSIS METHOD

The simulations were performed using Network Simulator (Ns-2), which is popularly used for ad hoc networking community. The routing protocols were compared based on the following 3 performance metrics: -

1. **End-to-End Delay (EED):** It is the time taken for an entire message to completely arrive from the source to destination.
   End-to-End delay depends on the following components i.e.
   Propagation time (PT), transmission time (TT), queuing time (QT) and processing delay (PD). Therefore, EED is evaluated as:
   EED = PT + TT + QT + PD.
2. **Throughput:** It is the measure of how fast a node can actually sent the data through a network. So throughput is the average rate of successful message delivery over a communication channel.
3. **Packet Delivery Ratio (PDR):** It is the ratio of the total data bits received to total data bits sent from source to destination.

By using the awk scripts, the performance metrics of 50 nodes for AODV and DSDV routing protocol is been calculated and shown below.

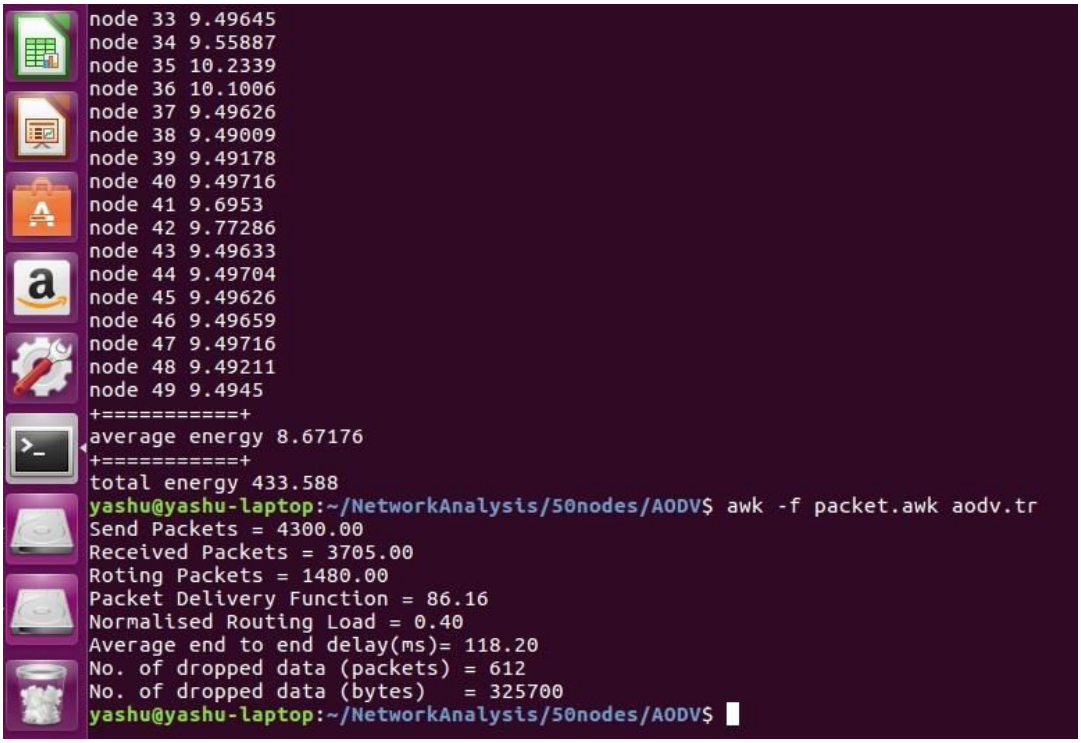

Figure 4.1: Performance metrics of AODV Protocol

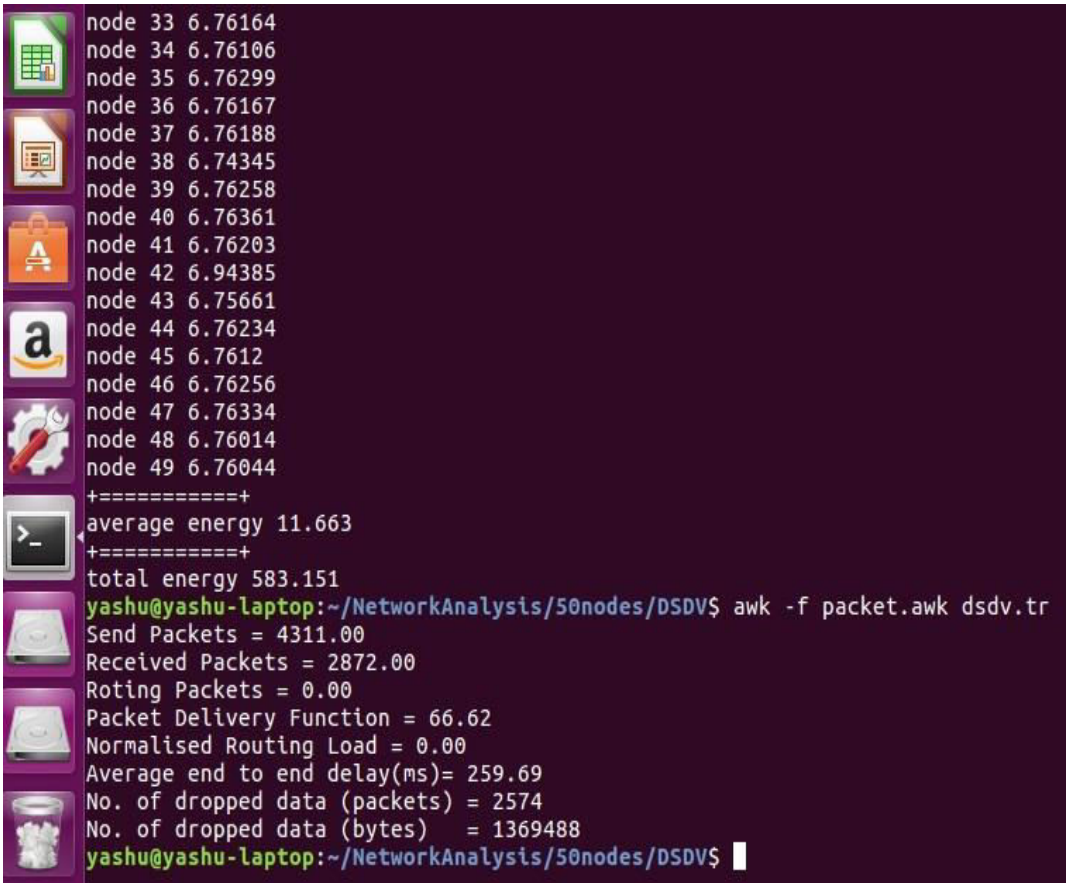

Figure 4.2: Performance metrics of DSDV Protocol

Following are the results of xgraph for the different performance metrics such as throughput, delay and packet loss of 50 nodes for AODV and DSDV routing protocols

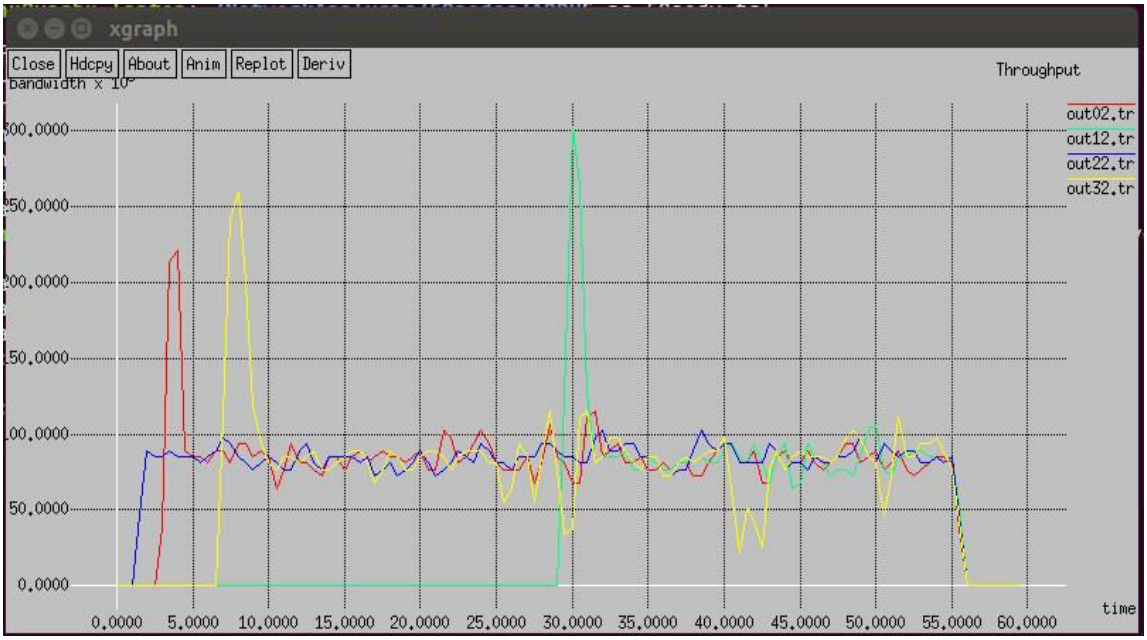

Figure 4.3: Throughout for AODV Routing Protocol

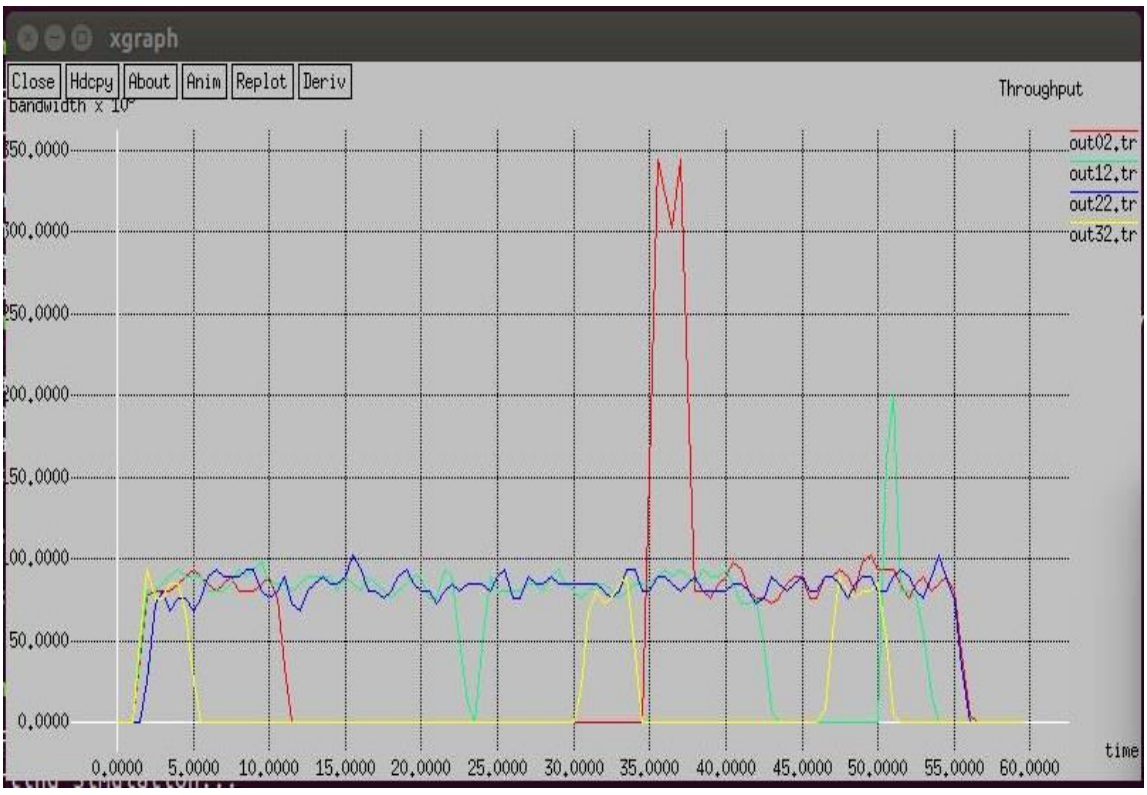

Figure 4.4: Throughout for DSDV Routing Protocol

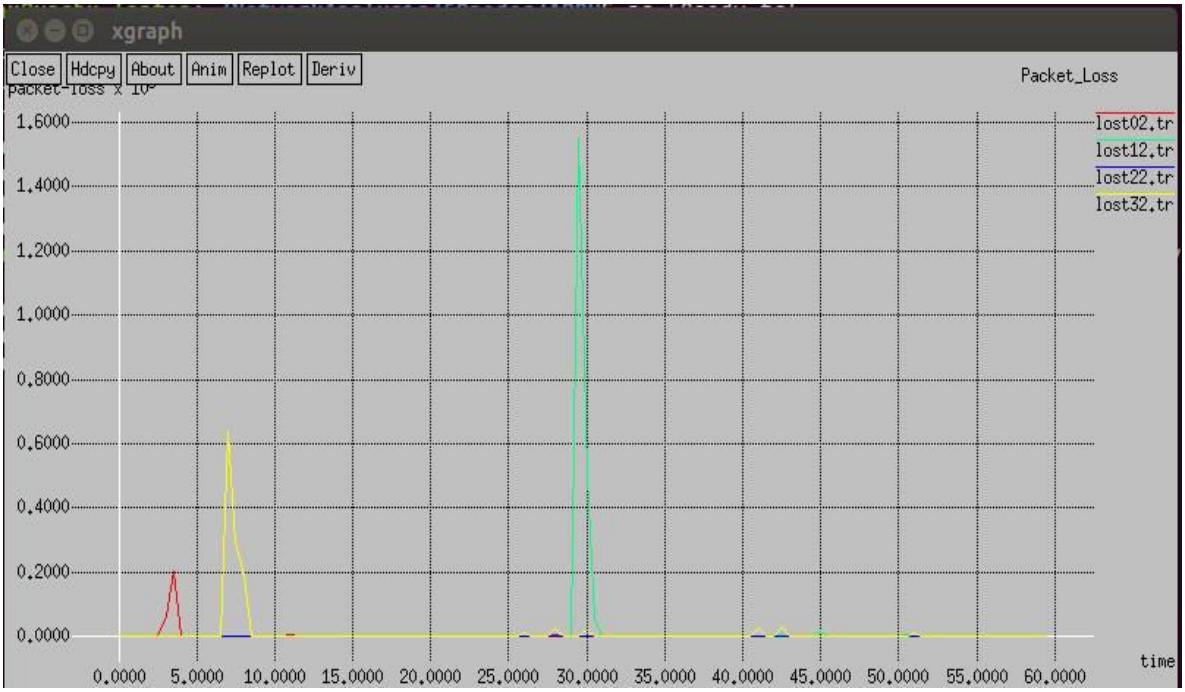

Figure 4.5: Packet loss for AODV Routing Protocol

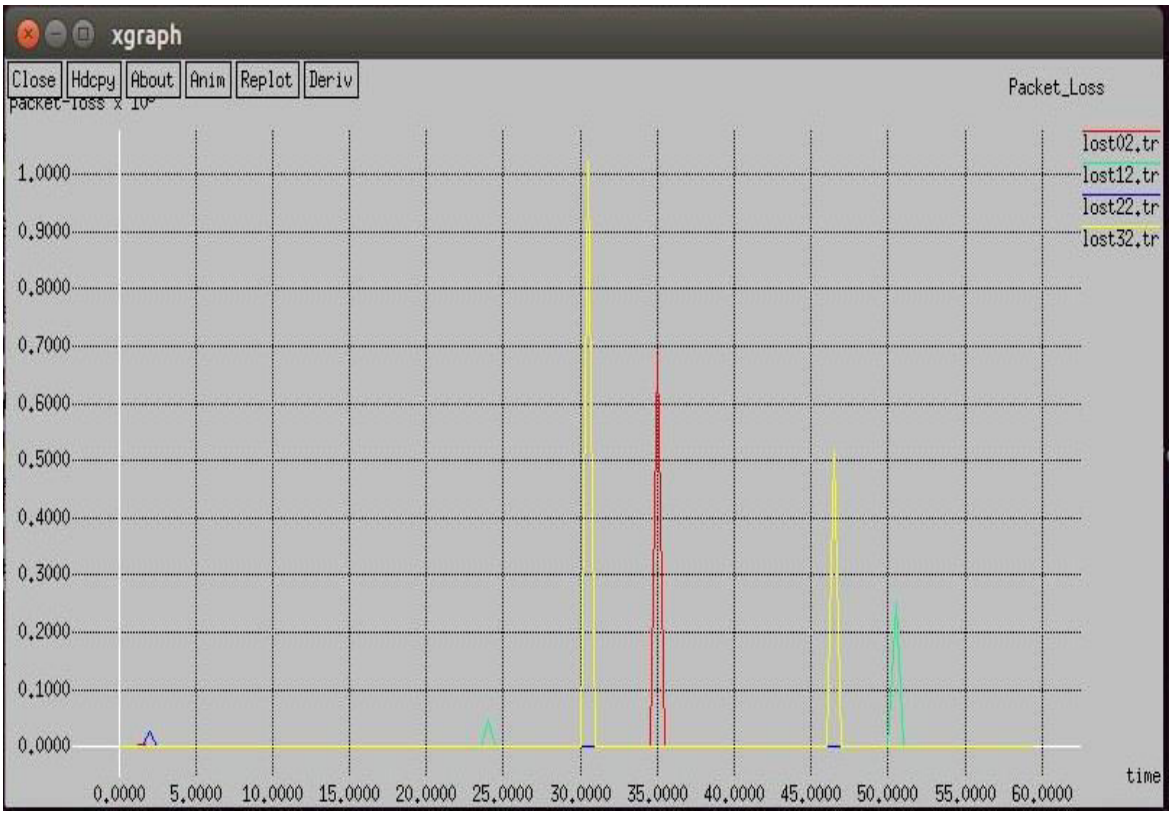

Figure 4.6: Packet loss for DSDV Routing Protocol

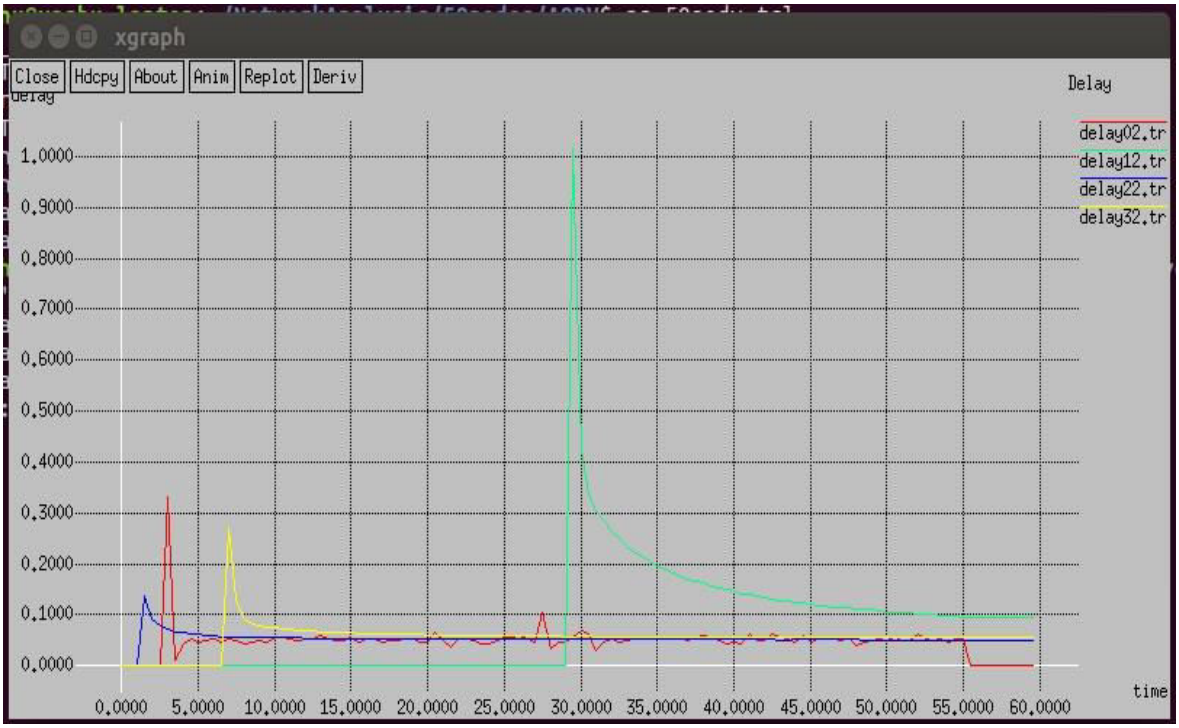

Figure 4.7: Delay for AODV Routing Protocol

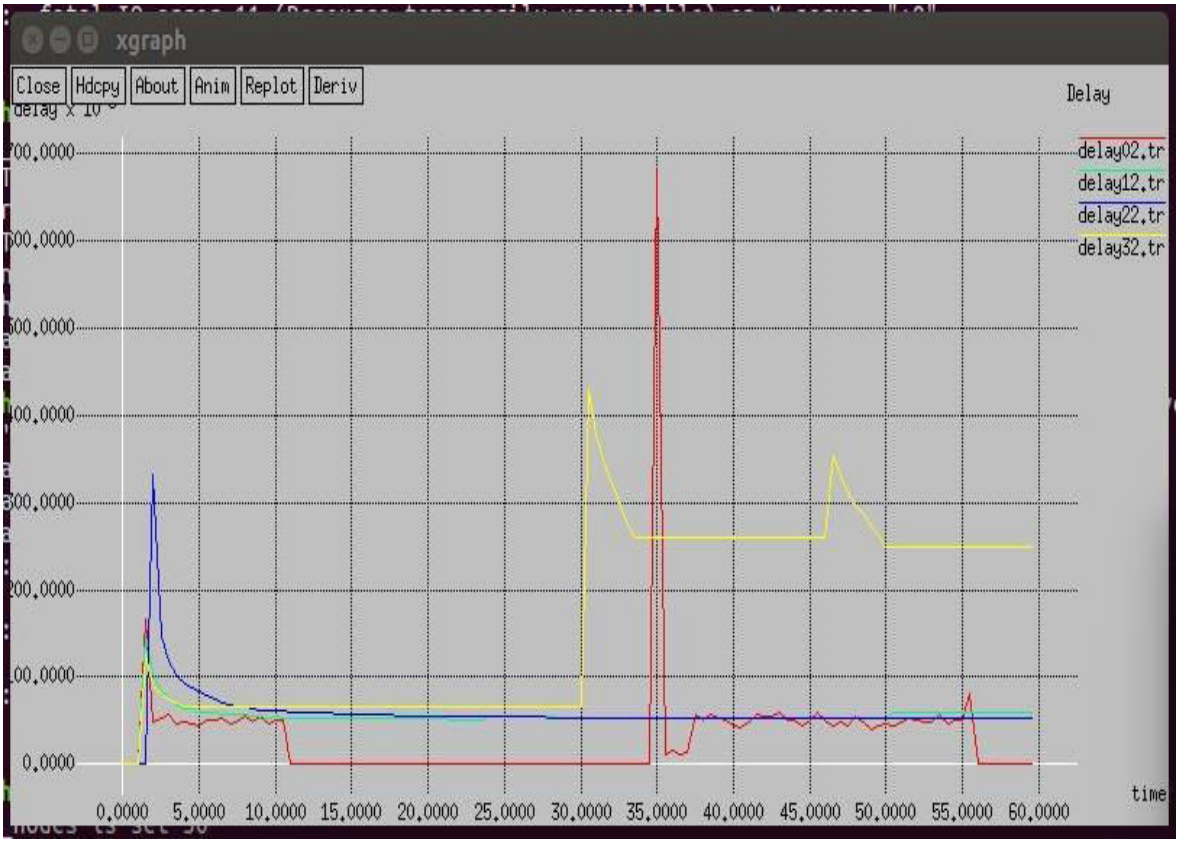

Figure 4.8: Delay for DSDV Routing Protocol

Table 4.1: Table for Analyzing Data of 50 nodes for AODV and DSDV routing protocol

Protocols / Legend	AODV Protocol (Ad-hoc On-demand Distance Vector)	DSDV Protocol (Destination Sequenced Distance Vector)
Average Energy	8.67176	11.663
Total Energy	433.588	583.151
Packet Delivery Ratio (PDR)	86.16	66.62
Avg. End to End Delay (ms)	118.20	259.69
Throughput (KBps)	1.7360	1.5840

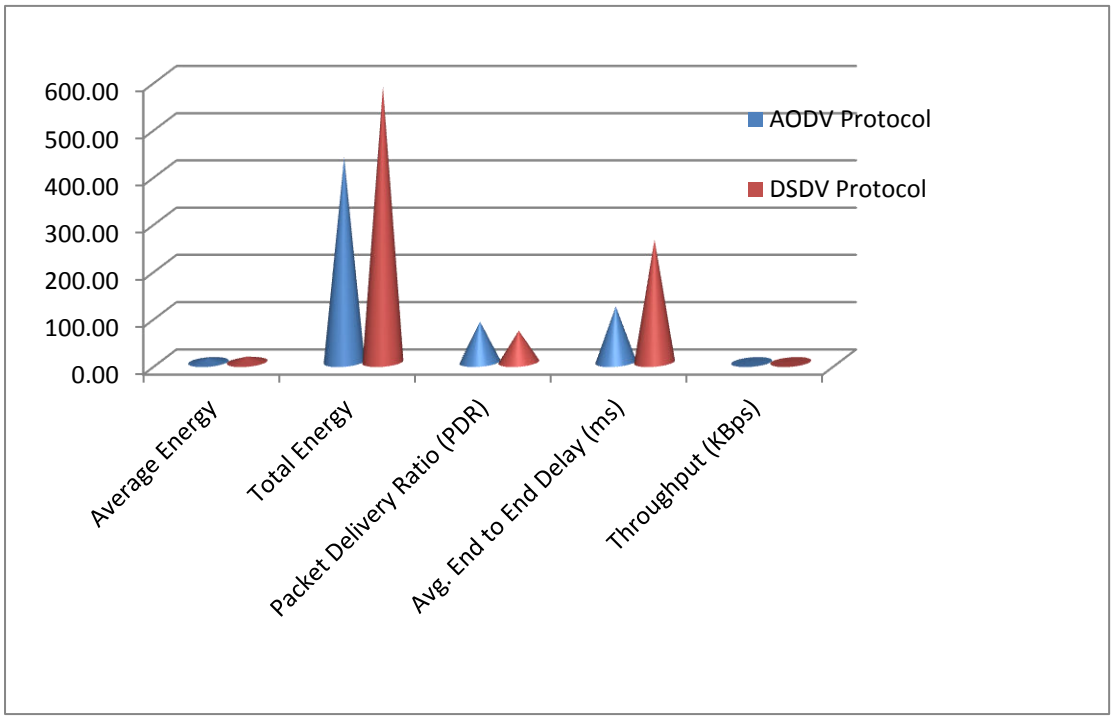

Figure 4.9: Graph for comparison of AODV and DSDV in different parameters.

We compared the two MANET (Mobile Ad Hoc Network) Routing Protocol AODV and DSD. Simulation results show that DSDV (Destination Sequenced Distance Vector) has a higher End to End Delay as compared to AODV (Ad-hoc On-demand Distance Vector). DSDV (Destination Sequenced Distance Vector) has a less PDR (Packet Delivery Ratio) than AODV. From the above analysis AODV (Ad-hoc On-demand Distance Vector) is better in terms of packet delivery ratio and energy consumption. We are using zigbee module for data transmission in this research and zigbee module use AODV protocol. So we have analyzed this protocol along with other MANET (Mobile Ad Hoc Network) Routing Protocol. After analysis we got zigbee module fulfill our requirement for this research.