# Performance Evaluation of Different Routing Protocol

Submitted in partial fulfillment of the requirements
of the degree of

(Bachelor of Engineering)

By

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# Certificate

This is to certify that, the dissertation titled
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is a bonafide work done by

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and is submitted in the partial fulfillment of the requirement for the degree of
**Bachelor of Engineering**
in
**Electronics and Telecommunication Engineering**
to the
**University of Mumbai**.

Head of Department

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# Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included. I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Date: 25/04/2017

Place: Panvel

# Certificate of Approval by Examiners

This is to certify that the dissertation entitled "**Performance Evaluation of Different Routing Protocol**" is a bonafide work done by **Pathan Raza Ahmed and Siddiqui Siraj Ali** under the guidance of **Mrs. Chaya.S** This dissertation has been approved for the award of **Bachelor's Degree in Electronics and Telecommunication Engineering**, University of Mumbai.

**Examiners:**

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# Acknowledgement

I have immense pleasure in expressing my thanks and deep sense of gratitude to my guide ***Mrs. Chaya S., Assistant Professor, Department of Electronics and Telecommunication Engineering, AIKTC*** for her guidance throughout this project.

I would also like to express my deepest appreciation to my project coordinator ***Mrs. Chaya S., Assistant Professor, Department of Electronics and Telecommunication Engineering, AIKTC*** for her technical support in my project.

I also express my sincere thanks to ***Prof. Mujib Tamboli, Head of the Department, AIKTC*** for extending his help.

I wish to express my profound sense of gratitude to ***Dr. Abdul Razak Honnutagi, Director, AIKTC*** for his encouragement, and for all facilities to this project.

I express my sincere gratitude to ***Mr. Sayyed Abrar, Assistant Professor, Department of Electronics and Telecommunication Engineering, AIKTC*** and ***Mr. Altaf Balsingh, Assistant Professor, Department of Electronics and Telecommunication Engineering, AIKTC*** and all the members of faculty, non-teaching staff, our family and friends who contributed their valuable advice and helped to complete the project successfully.

# ABSTRACT

In this project, we are creating mobile-adhoc network(MANET) in which there are nodes which are moving in a particular speed through which we are selecting the shortest path which will decide to reach the destination from source.

Here, we are using **NS-2 SIMULATOR** where we create **20 Nodes** in this we are send the packet which is set of 1&0's from source to destination with the help of shortest path by using different routing protocol such as **DSDV, DSR and AODV.**

We measure how much packet is received by destination, how much energy consume by intermediate nodes, how much data packet is drop during sending, how much time it take to reach the destination. These all above condition can be measure with the help of routing parameter such as

1. **THROUGHPUT**
2. **PACKET DELIVERY RATIO (PDR)**
3. **ENERGY**
4. **END-TO-END DELAY**

We measure all routing parameter for all routing protocol (DSDV,DSR and AODV) and we compare all parameter with help of graph.

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# CHAPTER NO:01

# INTRODUCTION

## 1.1 OVERVIEW

Networking is a process of connecting two or more computers for sharing. Through the networking, computers share information such as email, file, documents and resources such as printer, internet and disk storage. This article presents a brief overview of what computer networking is and how it works.

Networking has single purpose and that is sharing. So if you have nothing to share, networking has nothing for you. If you anything to share, networking is everything for you. Computer networking is not a new concept. It has been here since the computers used to look like abacuses. At that time networking was used to share abacus answer with others. Over the time abacuses became computers and networking became more sophisticated. However the purpose of networking is still same: sharing the information as fast as possible. To achieve this goal networks now use electrical cables, fiber optical cables, and wireless radio signals.

When a computer has data for another computer in network it initiates a session for transmission. During this process both computers finalized the rules of transmission such as speed of transmission, size of data file, security measurement of transmission, flow control etc. These rules are called **protocols**. Protocols control the entire data transmission through the network. Protocols are defined in various network models such as TCP/IP Layer model, OSI Layer model.

During the data transmission sender computer break the data file in small pieces. These pieces are called segment. Each segment properly wrapped with network information. Resulting segments are known as **packets**. Packets are sent to the destination computer through the network, where they are reassembled into the original data.

`Here, we are dealing with Mobile ad hoc network (MANET) is a network which is infrastructure less. This network consists of mobile nodes and wireless machine nodes connected to each other . There is no centralized administration mechanism in MANETs. In MANET every node acts as a router. As the name indicates, Mobile means the nodes are not stationary, Ad hoc means no fixed infrastructure. Therefore a network with no fixed topology or infrastructure is called adhoc network. In

MANET, a node can send packets directly to another node if both the nodes are in their respective transmission ranges or else packet transmission can be multihop. Due to arbitrary movement of nodes, network topology changes rapidly. Since the nodes are changing much rapidly it is very difficult for the routing protocols to perform their task correctly. Hence a topology approximation mechanism, known as Ad hoc On-demand Distance Vector (AODV) routing protocol, is used to perform simulation of a typical routing protocol which addresses the problem of mobility . AODV routing protocol is a reactive routing protocol, which means that route from source node is created in an on demand basis.

## 1.2 TYPE OF WIRELESS NETWORK

### WLANS: Wireless Local Area Networks

WLANS allow users in a local area, such as a university campus or library, to form a network or gain access to the internet. A temporary network can be formed by a small number of users without the need of an access point; given that they do not need access to network resources.

### WPANS: Wireless Personal Area Networks

The two current technologies for wireless personal area networks are Infra Red (IR) and Bluetooth (IEEE 802.15). These will allow the connectivity of personal devices within an area of about 30 feet. However, IR requires a direct line of site and the range is less.

### WMANS: Wireless Metropolitan Area Networks

This technology allows the connection of multiple networks in a metropolitan area such as different buildings in a city, which can be an alternative or backup to laying copper or fiber cabling.

### WWANS: Wireless Wide Area Networks

These types of networks can be maintained over large areas, such as cities or countries, via multiple satellite systems or antenna sites looked after by an ISP. These types of systems are referred to as 2G (2nd Generation) systems.

### Comparison of Wireless Network Types:

| Type | Coverage | Performance | Standards | Application |
|---|---|---|---|---|
| Wireless PAN | Within reach of a person | Moderate | Wireless PAN Within reach of a person Moderate Bluetooth, IEEE 802.15, and IrDa Cable replacement for peripherals | Cable replacement for peripherals |
| Wireless LAN | Within a building or campus | High | IEEE 802.11, Wi-Fi, and HiperLAN | Mobile extension of wired networks |
| Wireless MAN | Within a city | High | Proprietary, IEEE 802.16, and WIMAX | Fixed wireless between homes and businesses and the Internet |
| Wireless WAN | Worldwide | Low | CDPD and Cellular 2G, 2.5G, and 3G | Mobile access to the Internet from outdoor areas |

Table 1.1 shows comparison of wireless network

# CHAPTER NO: 02

# LITERATURE SURVEY

## 2.1 IEEE 2016 Papers :

**1. Evaluating feasibility of using wireless sensor network in agricultural land through simulation of DSR, AOMDV, AODV, DSDV protocol.**

In this paper, they have developed a wireless sensor network for an agricultural land and evaluated its performance through different routing protocols with fixed network model considering different parameters that includes packet delivery ratio, end-to-end delay, normalized routing overhead, throughput and energy consumption involved during routing mechanism. From the simulation results it had been concluded that on-demand protocols perform better than the table-driven protocol.

**2. Performance Assessment of Reactive Routing Protocols in Mobile Ad-hoc Networks under CBR Traffic using NS2.**

In this paper, they have analyzed the behavior of reactive routing protocol of MANET under CBR traffic. They concluded that, with the increase of mobility, these Reactive Routing protocols sometimes perform better in small network and sometimes in large and medium networks in all aspects. The selection of protocol is quite difficult for any network. The aim of their research work to develop an understanding of the effects of mobility designs on MANET routing protocols performance.

**3. An Energy Consumption Evaluation of Reactive and Proactive Routing Protocols in Mobile Ad-hoc Network.**

In this paper, they have analyzed that DSR is efficient with scenarios where it consumes less amount of energy in all scenarios this is due to it applies route caches and uses source routing without using any periodic transmission. It also uses caching and keeps more than one route for each destination. This paper show that routing protocols in MANET used currently may require more enhancement to reduce the energy consumed in the network.

## 2.2 IEEE 2015 Papers :

**1. Cooperative Reinforcement Learning Approach for Routing in Ad Hoc Networks.**

In this paper, they have analyzed On demand routing protocols such as AODV and DSR returns good performance in terms of packet delivery ratio but at high mobility and heavy load situations, both of them fail to work. SWARM protocol based on reinforcement learning algorithm returns consistent result as compared with AODV and DSR protocols. SWARM protocol generates high Normalized routing overhead due to its broadcasting nature and also delay is comparatively more as compared with AODV and DSR protocol. It is also necessary to optimize the performance of SWARM protocol and test it further with existing routing protocols.

**2. Effect of Propagation Models on Energy Consumption of MANET.**

In this paper the analysis of energy consumption in transmission mode, receiving mode and idle mode has been carried out. Performance of different ad-hoc routing protocols (AODV, DSDV, DSR, and AOMDV) for two-ray and shadowing propagation models are different in different scenario. These performances are carried out by taking random waypoint mobility model, it is found that in sender mode the minimum energy consume by AODV as compare to other protocols when traffic is TCP. In receiving mode the DSR protocol is consuming less energy compare to other protocols, but in idle mode both AODV and DSR consuming
minimum energy.

**3. Performance Analysis and Comparison of Routing Protocols in Mobile Ad Hoc Network.**

The operating mechanism of four routing protocols(AODV, DSR, DSDV, and AOMDV are analyzed, and the Performance of the four routing protocols with the network topology changing are compared in NS2 simulation tool. Simulation results showed that when the network topology is not changing frequently, the performance of the four routing protocols are all satisfactory. While with the network topology changing frequently, the performance of the four protocols decreased gradually, especially the DSDV routing protocol. So it can be found that DSDV does not fit the network topology changing frequently.

## 2.2 OBJECTIVE:

- The objective of this project is to evaluate three of the proposed routing protocols, namely, AODV, DSR and DSDV, for wireless ad-hoc networks based on performance. This evaluation should be done theoretically and through simulation. The project also included the goal to generate a simulation environment that could be used as a platform for further studies within the area of ad-hoc networks.

## 2.3 PROBLEM DESCRIPTION:

- Mobile Ad hoc networks are the collection of wireless nodes that can exchange information dynamically among them without pre existing fixed infrastructure. Because of highly dynamic in nature, performance of routing protocols is an important issue.

- This evaluation should be done theoretically and through simulation. The project also included the goal to generate a simulation environment that could be used as a platform for further studies within the area of ad-hoc networks.

- The goal of this project is to:

  1. Get a general understanding of ad -hoc networks.
  2. Implement of AODV, DSR and DSDV routing protocols for wireless ad-hoc networks.
  3. Analyze the protocols theoretically and through simulation.
  4. Compare all three routing protocol based on following parameter as:
     - Throughput
     - Packet density ratio
     - End-to-End delay

## CHAPTER NO:03

# METHODOLOGY

## 3.1 ALGORITHM:

**Step1:** Start

**Step2:** Make an instance of simulator

**Step3:** Set up trace file by opening file "trace.tr" in write mode and call trace by "trace all".

**Step4:** Design a topology object.

**Step5:** Topography grid

**Step6:** Make an GOD

**Step7:** Configure node using node configuration API.

**Step8:** Create node and disable their random movement .

**Step9:** Now Design the network scenerio by giving the node position manually.

**Step10:** Set up the node movement i.e speed,movement, location of the node.

**Step11:** Set up the traffic flow between node.

**Step12:** Set up the stop time of simulation and flush out the trace file.

**Step13:** Run the simulator.

**Step14:** Collect all the parameter by using certain command from the trace file.

**Step15:** Generate the graph.

**Step16:** Stop.

## 3.2 FLOWCHART :

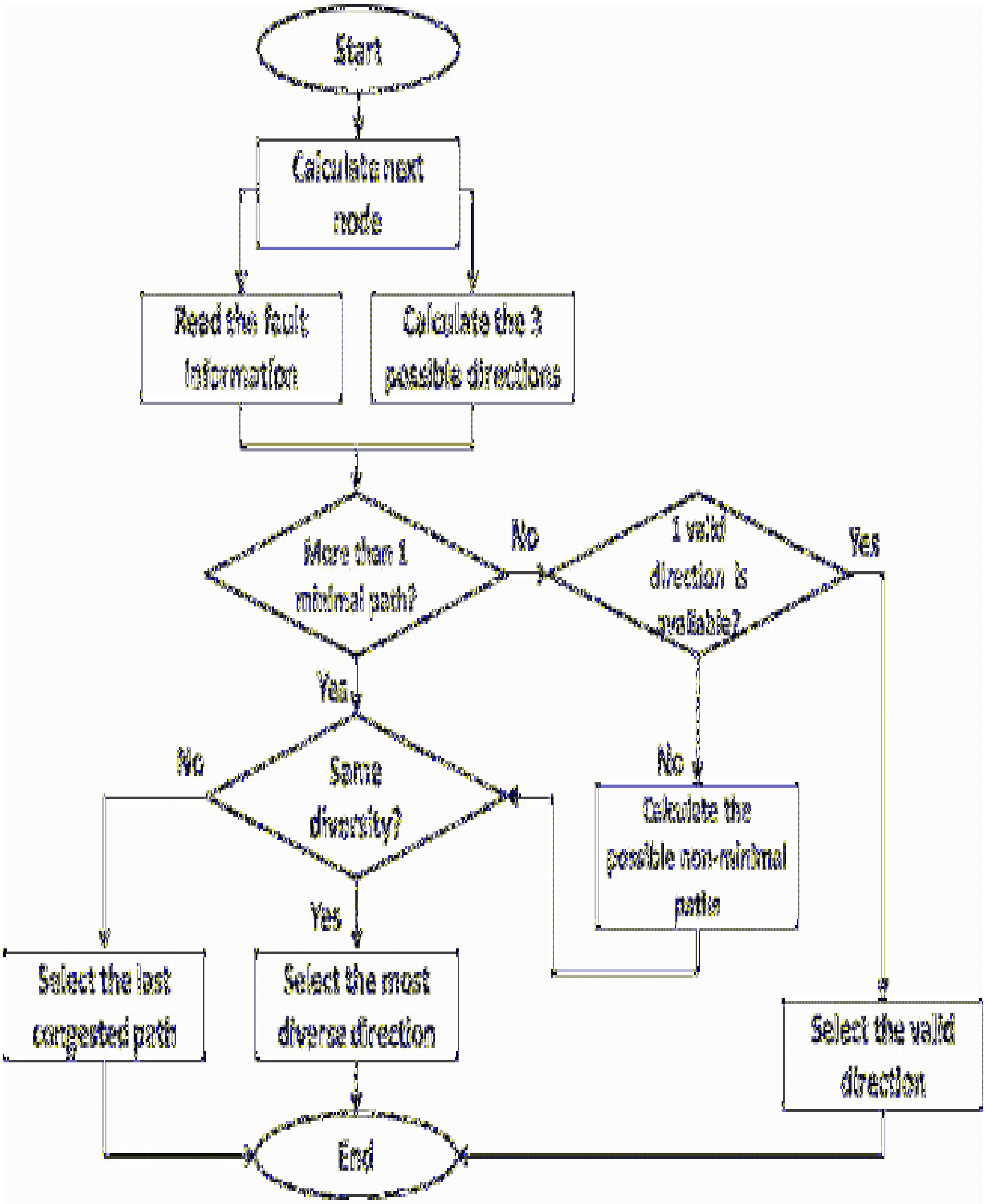


Fig 3.1 Flowchart

# CHAPTER NO:04

# ROUTING PROTOCOL

## 4.1 ABOUT ROUTING PROTOCOL

A Routing Protocol specifies how routers communicate with each other, disseminating information that enables them to select routes between any two nodes on a computer network. Routing algorithms determine the specific choice of route. Each router has a priori knowledge only of networks attached to it directly. A routing protocol shares this information first among immediate neighbors, and then throughout the network. This way, routers gain knowledge of the topology of the network.

Routing is the act of moving information across an inter-network from a source to a destination. Along the way, at least one intermediate nod typically is encountered. It's also referred to as the process of choosing a path over which to send the packets. Routing is often contrasted with bridging, which might seem to accomplish precisely the same thing to the casual observer. The primary difference between the two is that bridging occurs at Layer 2 (the data link layer) of the OSI reference model, whereas routing occurs at Layer 3 (the network layer). This distinction provides routing and bridging with different information to use in the process of moving information from source to destination, so the two functions accomplish their tasks in different ways. The routing algorithm is the part of the network layer software responsible for deciding which output line an incoming packet should be transmitted on, i.e. what should be the next intermediate node for the packet.

Routing protocols use metrics to evaluate what path will be the best for a packet to travel. A metric is a standard of measurement; such as path bandwidth, reliability, delay, current load on that path etc; that is used by routing algorithms to determine the optimal path to a destination. To aid the process of path determination, routing algorithms initialize and maintain routing tables, which contain route information. Route information varies depending on the routing algorithm used.

While designing a routing protocol it is necessary to take into account the following design parameter:

- Performance Criteria: Number of hops, Cost, Delay, Throughput, etc

- Decision Time: Per packet basis (Datagram) or per session (Virtual circuit) basis.
- Decision Place: Each node (distributed), Central node (centralized), Originated node (source) .
- Network Information Source: None, Local, Adjacent node, Nodes along route, All nodes.
- Network Information Update Timing: Continuous, Periodic, Major load change,Topology change.

## 4.2 Routing Algorithm Metrics:

Routing algorithms have used many different metrics to determine the best route. Sophisticated routing algorithms can base route selection on multiple metrics, combining them in a single (hybrid) metric. All the following metrics have been used:

- Path Length
- Delay
- Bandwidth
- Load
- Reliability

- **Path length** is the most common routing metric. Some routing protocols allow network administrators to assign arbitrary costs to each network link. In this case, path length is the sum of the costs associated with each link traversed. Other routing protocols define **hop count**, a metric that specifies the number of passes through internetworking products, such as routers, that a packet must pass through in a route from a source to a destination.
- **Routing delay** refers to the length of time required to move a packet from source to destination through the internet. Delay depends on many factors, including the bandwidth of intermediate network links, the port queues (receive and transmit queues that are there in the routers) at each router along the way, network congestion on all intermediate network links, and the physical distance to be traveled. Because delay is a conglomeration of several important variables, it is a common and useful metric.
- **Bandwidth** refers to the available traffic capacity of a link. All other things being equal, a 10-Mbps Ethernet link would be preferable to a 64-kbps leased line. Although bandwidth is a rating of the maximum attainable throughput on a link, routes through links with greater bandwidth do not necessarily provide better routes than routes through slower links. For example, if a faster link is busier, the actual time required to send a packet to the destination could be greater.
- **Load** refers to the degree to which a network resource, such as a router, is busy. Load can be calculated in a variety of ways, including CPU utilization and packets processed per second. Monitoring these parameters on a continual basis can be resource-intensive itself.

- **Reliability**, in the context of routing algorithms, refers to the dependability (usually described in terms of the bit-error rate) of each network link. Some network links might go down more often than others. After a network fails, certain network links might be repaired more easily or more quickly than other links. Any reliability factor can be taken into account in the assignment of the reliability ratings, which are arbitrary numeric values, usually assigned to network links by network administrators.

### 4.3 Classification of routing protocols :

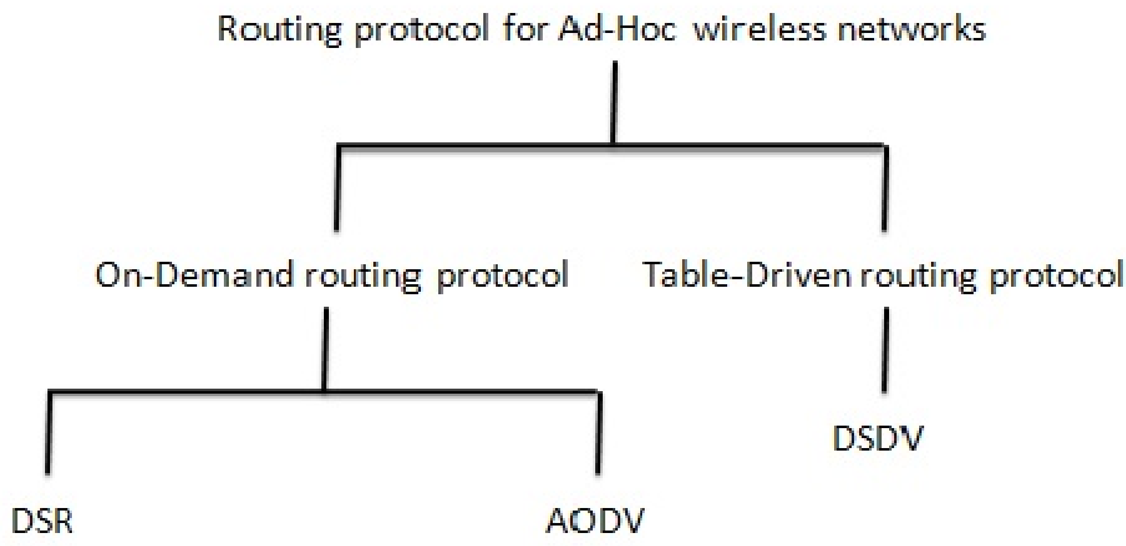


Fig 4.1 Classification of routing protocols :

### A. On-Demand routing protocol:

On-Demand routing protocol first performs a path developing process and then communicate for transferring routing information but, only that time when a path is required up-to destination node.

1) DSR*:* Dynamic Source Routing protocol is an ondemand protocol, it overcomes the bandwidth issue of tabledriven routing protocols by taking control packets into the picture and wipe out periodic table updates which is mandatory in table-driven approach. Basically this protocol having two stage process Path Build and Path Maintenance. The Source Routing is a loop-free routing that intermediate nodes do not need any up-to-date routing information by allowing nodes to cache the routing information for future use . In Path Building phase, source node flooding RouteRequest (RREQ) packets into the ad-hoc wireless network, whenever an intermediate node gets this RREQ packet

it just sends or floods the packet to neighboring nodes. When destination node receives the RREQ packet it generates a RouteReply (RREP) packet and sends back to source node through the same path traversed by RREQ packet. Similarly in Path Maintenance DSR uses cache to intermediate nodes, it's usually fulfilled with different paths to destination node. So, sometimes if intermediate gets the RREQ packet then it simply sends the path information to source node directly.

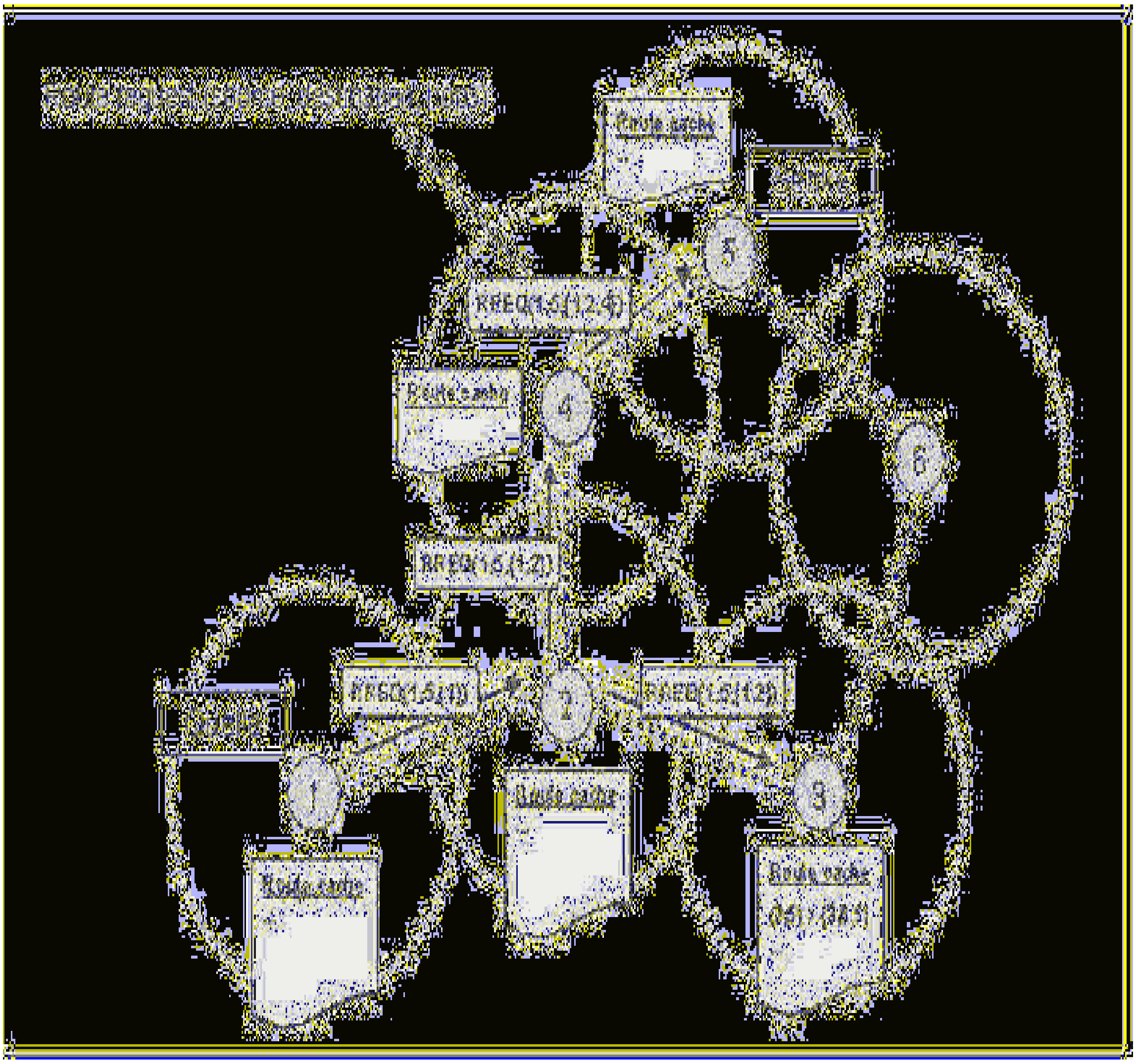

Fig 4.2 Senerio of DSR Protocol

2) AODV: Ad-hoc On-demand Distance Vector protocol is on-demand routing protocol. It establishes a path between source and the destination node whenever they want to communicate or to transfer some data. The main difference between DSR and AODV is in DSR it carries complete path to be traversed in a single data packet, Where in AODV the source node and all intermediate nodes stores next hop information. Source node floods the RREQ packet in the network when path is unavailable to destination node. AODV uses the sequence numbers maintained at each destination to determine the route freshness of routing information and to prevent routing loops.

Before sending a data packet every node N first checks its routing table to see if there is a valid route to the destination or not. If it has, it sends the data packet along this route immediately. Otherwise, the route discovery procedure starts which is as follows:

- **Route discovery**: RREQ (Route Request) packet is broadcasted through-out the network if the route between source and destination is not available. As soon as a node receives a RREQ packet, it first checks whether it has received this packet earlier. If yes, then the node simply discards the packet and if not, a reverse routing entry towards the originator of RREQ packet is created. This route can be used to forward route reply later on. If any inter-mediate node has a valid route towards the destination node, it unicasts a RREP (Route REPly) packet towards the source node. A node on receiving RREP packet creates a reverse route entry towards the originator of RREP packet.

- **Route maintenance**: In order to indicate its presence, every node in the network periodically broadcasts HELLO messages to its neighbors. A particular route is marked as invalid if a node does not receive a HELLO message from its neighbor and the node is considered to be exhausted or moved away from the network. Hence a RRER packet is sent to all the nodes and the routing table is updated. In order to get rid of loops, a sequence number is maintained by every node in the network. This sequence number is incremented by the node every time a packet is sent and is stored along with the route information in the route table. It is sent along with RREQ (for source) and RREP (for destination). The most recent path to the destination is indicated by the node with larger sequence number. Therefore such nodes are always preferred.

If a source node wants to send a data packet, it first checks the routing table for a valid path to the destination. If it is available, then the packet is forwarded through that route otherwise RREQ is broadcasted. This packet contains source ID, sequence number of source broadcast ID, sequence number of destination, previous ID, hop count and destination ID. The purpose of destination sequence number is to prevent the loop in the route discovery process. Every node has its own sequence number which is incremented by one every time there is a link breakage. A node upon receiving this packet checks whether it has received this packet earlier, if it has it simply discards the packet otherwise a RREP packet is unicasted to the source along the reverse path to that of RREQ packet. Setting of a forward path entry to the destination is done when an intermediate node receives this RREP packet. AODV protocol has following 4 states:

- **Routecheck**: It checks the routing table to find whether the source node has an unexpired path to the destination node or not. This is done using the guard has validRoute().

- **RREQInit**: Its main function is to initiate the RREQ message when necessary. The RREQ message is rebroadcasted using the function arc rebroadcast() if necessary.

- RREQProcess: This subpage initiates the RREP process if there is a route to the destination, or if there is no route it forwards RREQ message. This functionality is achieved by arc newBID() and arc initiateRREP().

^

- RREPProcess: This subpage plays an important role in the updation of the routing table and also to forward the RREP message if necessary. To achieve these functionalities, two functions arc updateRoute() and arc forwardRREP() are used. RREQInit, RREQProcess and RREPProcess are three substitution transitions. If a node desires to send data packet, primitively it enters Routcheck state to check for an existing path. If there is no existing route in the routing table, the node enters RREQInit state and initiates route discovery process i.e broadcasting of RREQ packet.

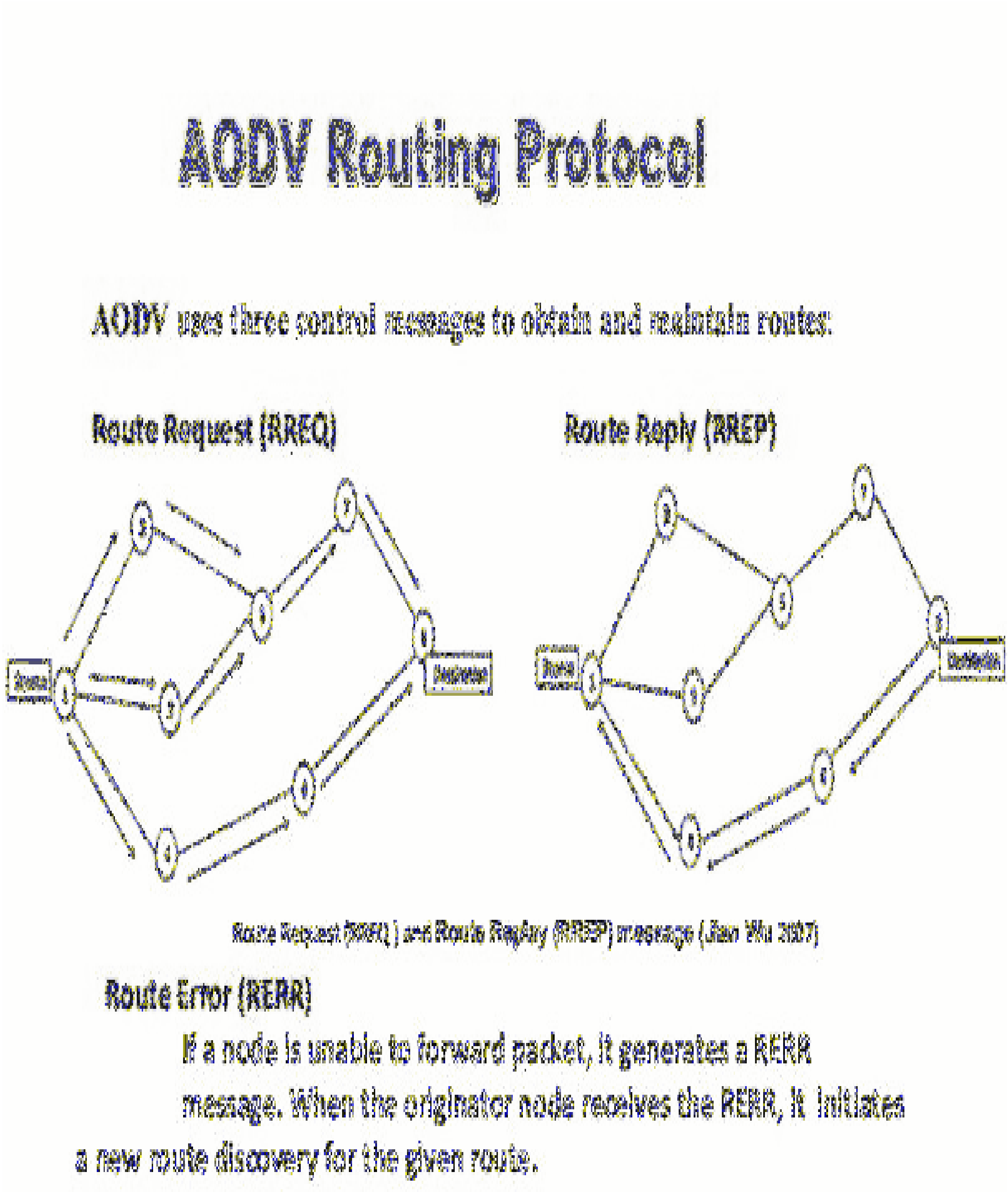


Fig 4.3 Senerio of AODV Protocol

## B. Table-Driven routing protocol:

Table-Driven routing protocols are like wired network routing protocol where each node maintains a table about topology information of whole network. Similarly, to maintain consistency and accuracy in tables, they are frequently updated all tables at a time.

*1)* DSDV*:* Destination Sequenced Distance Vector is the first protocol proposed for ad-hoc wireless network by Perkins and Bhagvat. It is table-driven proactive type of protocol and the extension of distributed bellman-ford algorithm where every node maintains a table to find out shortest path from node to every other node. Path to the destinations are available at every node all the time due to updating topology information frequently. The update tables are exchanged

between node and their neighbors in two cases, in first case after some time intervals whole network gets updated called as incremental update and in second case whenever any node recognizes significant change in topology called as full dump update.

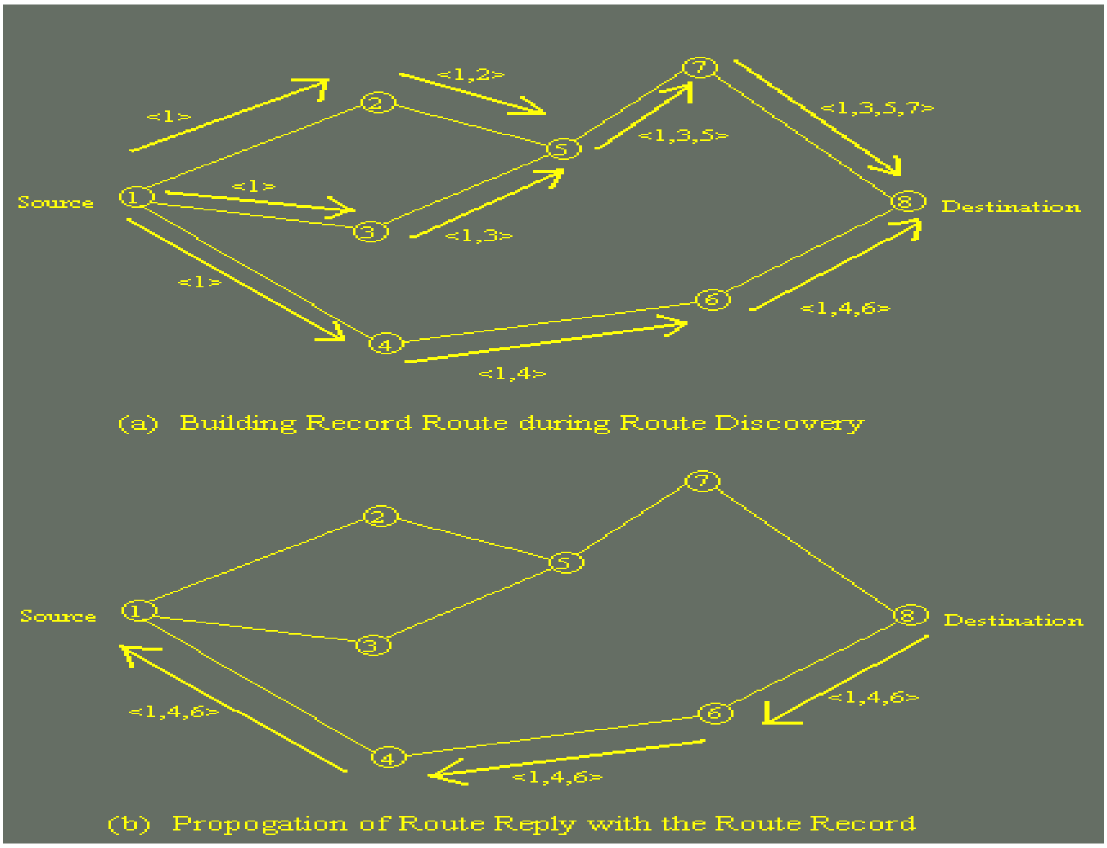


Fig 4.4 senerio of AODV

**CHAPTER NO:05**

# NS2 SIMULATOR

## Description:

NS2 is a discrete event simulator targeted at networking research. It provides substantial support for simulation of TCP, routing and multicast protocols over wired and wireless networks. It consists of two simulation tools. The network simulator (ns) contains all commonly used IP protocols. The network animator (nam) is use to visualize the simulations. NS2 fully simulates a layered network from the physical radio transmission channel to high-level applications.

NS2 is an object-oriented simulator written in C++ and OTcl. The simulator supports a class hierarchy in C++ and a similar class hierarchy within the OTcl interpreter. There is a one-to-one correspondence between a class in the interpreted hierarchy and one in the compile hierarchy. The reason to use two different programming languages is that OTcl is suitable for the programs and configurations that demand frequent and fast change while C++ is suitable for the programs that have high demand in speed.

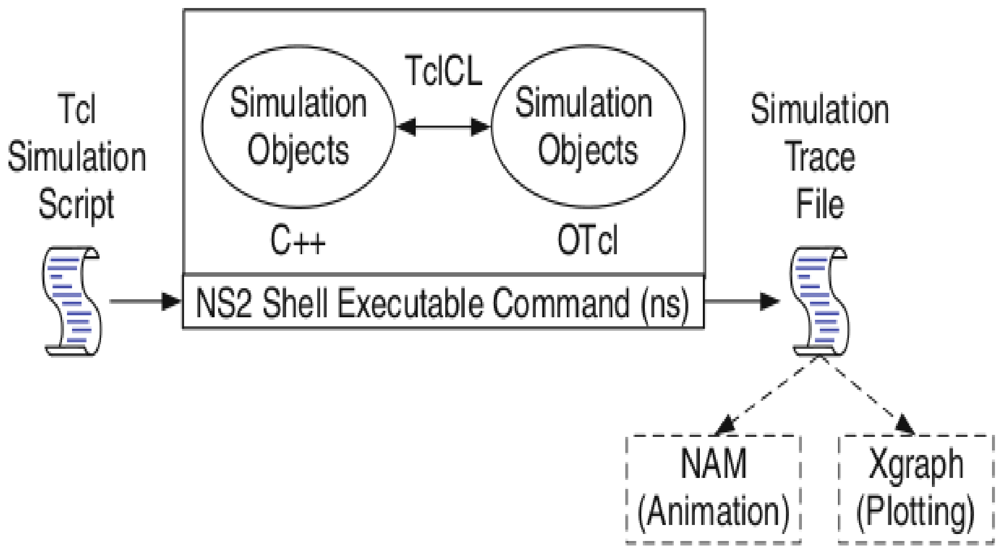


Fig 5.1 shows NS2 architecture

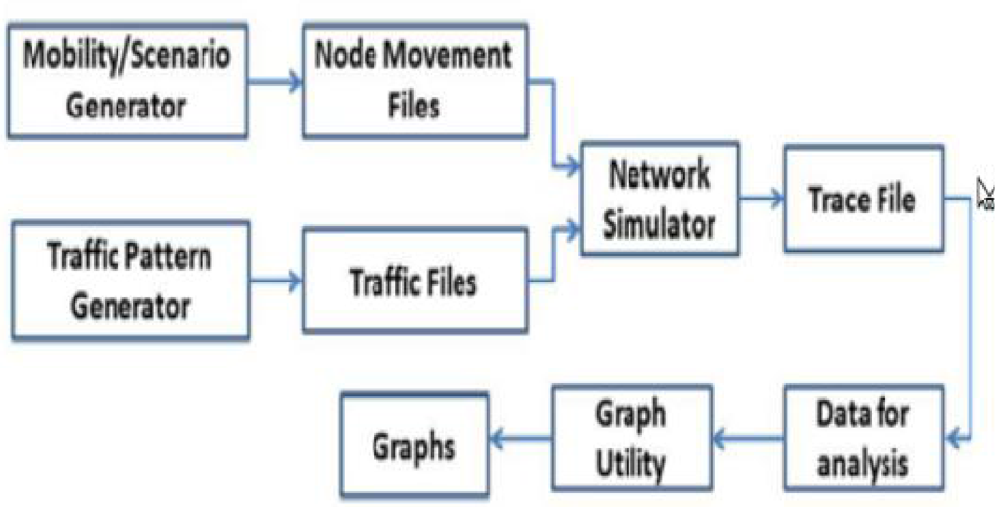

Fig 5.2 shows Overview of simulation model

NS2 is highly extensible. It not only supports most commonly used IP protocols but also allows the users to extend or implement their own protocols. The latest NS2 version supports the four ad hoc routing protocols, including DSR. It also provides powerful trace functionalities, which are very important in our project since various information need to be logged for analysis. The full source code of NS2 can be downloaded and compiled for multiple platforms such as Unix and Windows.

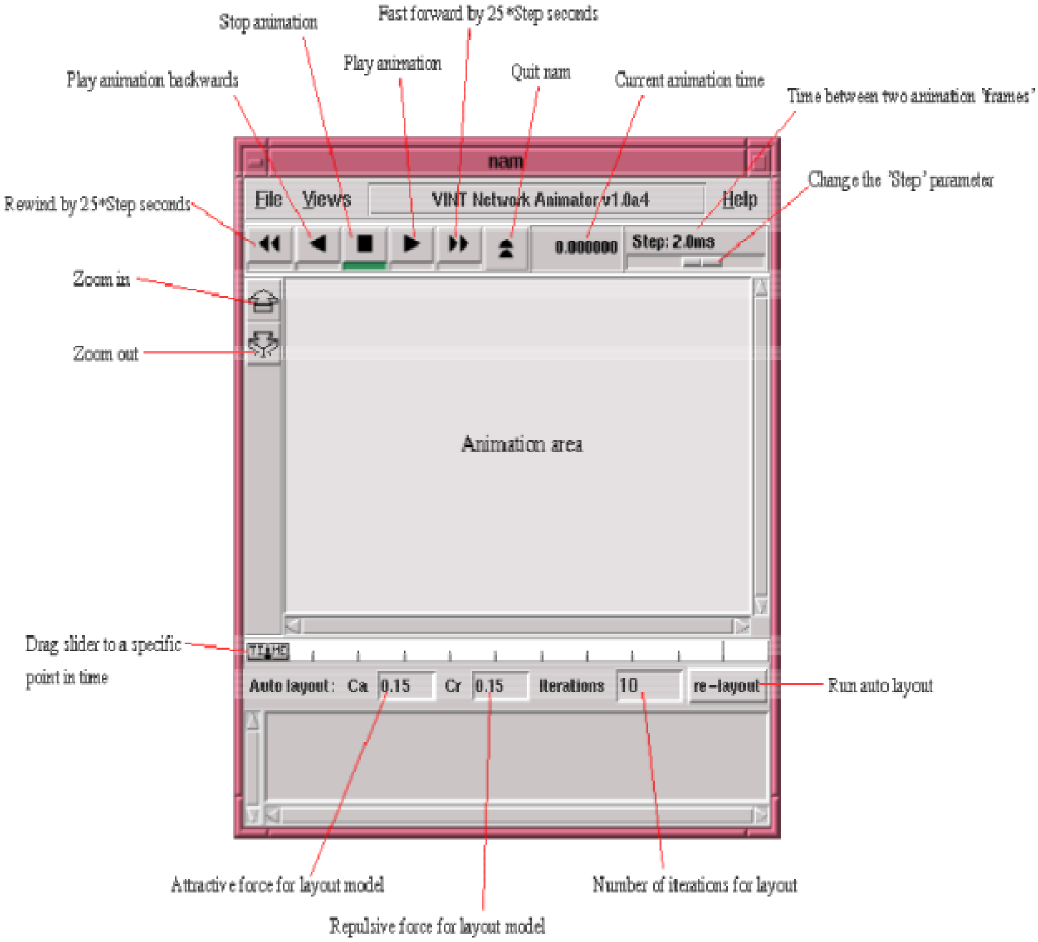


Fig 5.3 shows The Network Animator

**CHAPTER NO:06**

# SIMULATION RESULT

## 6.1 Simulation on DSDV:

Here, we are creating a network topology of 20 nodes which are mobile in nature. First, source node sends a broadcast packet to all other nodes when the topology is configure even when packet is not transferred. It stores all route path in routing table during entire simulation.

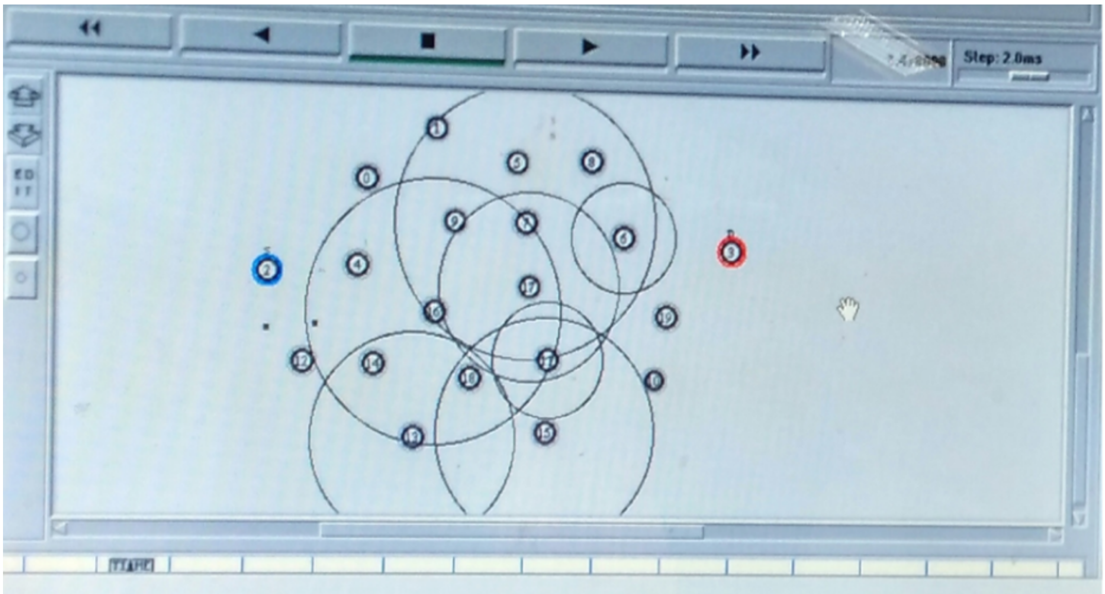

Fig.6.1 Broadcast of nodes using DSDV Protocol

If there is some node failure then it will select the new path from the routing table. It will send packets to destination node with the help of intermediate nodes. Route request packet consist of source node number, destination number, hop count and broadcast id. One by one all the node number of intermediate nodes is recorded in the route request packet. From destination node which sends route reply packet to source node which show that destination is reached with the help of intermediate nodes. After then, process start of sending packet to destination node.

## 6.2 Simulation on DSR:

Here, we are creating a network topology of 20 nodes which are mobile in nature. In DSR protocol, all the data packet containing the address to destination on the header of packet. Sender node start first to sends the route request packet to neighbour nodes then after it will reached to the destination with the help of that intermediate nodes. It will keep the record only of the shortest path to destination and store that address on packet. Sender node starts to send packet to destination node through the shortest path.

After sometimes, when some intermediate nodes moves away from their original place or node failure then it will start finding the new path by sending route request packet to their neighbour nodes and finally get the new path and sending the data packet to destination. One of the disadvantage is that it has route cache and all nodes are compulsory to have the route cache .

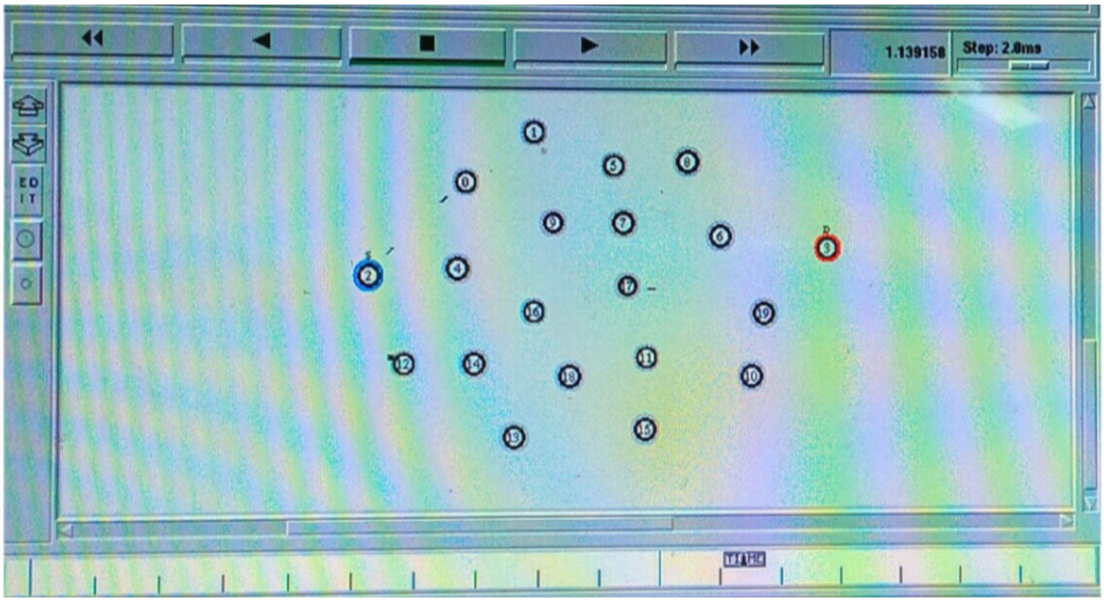


Fig.6.2 Sending data packet to destination through intermediate nodes.

## 6.3 Simulation on AODV:

To overcome the presence of route cache in nodes and making the nodes complex and to avoid unnecessary of storing the address of destination on each data packet. This protocol comes with new feature of not storing the address of destination on each packet. Sender node sends route request packet to their neighbour nodes and start finding the path to destination. As this route request packet is reach to the destination node then it sends route reply packet to sender nodes through intermediate nodes. Finally sender node keep all these path and selects the shortest path to destination.

Once shortest path is recorded then it sends data packet to destination through the intermediate nodes. After sometime when the link is break or node failure then packet drop takes place which cause the loss of packet then immediately it will resends the route request packet to their existing neighbour nodes for finding the path to destination nodes.

But, it is observed that packet drop and link failure is comparatively less than the packet drop and link failure in DSR and DSDV.

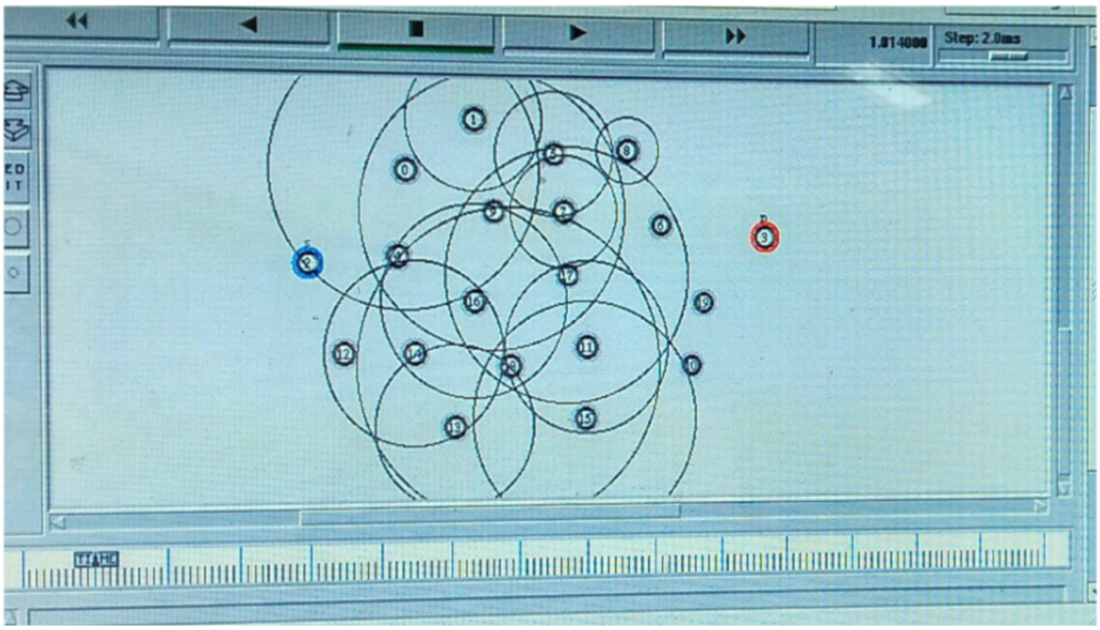

Fig.6.3 Sending broadcast packet using AODV

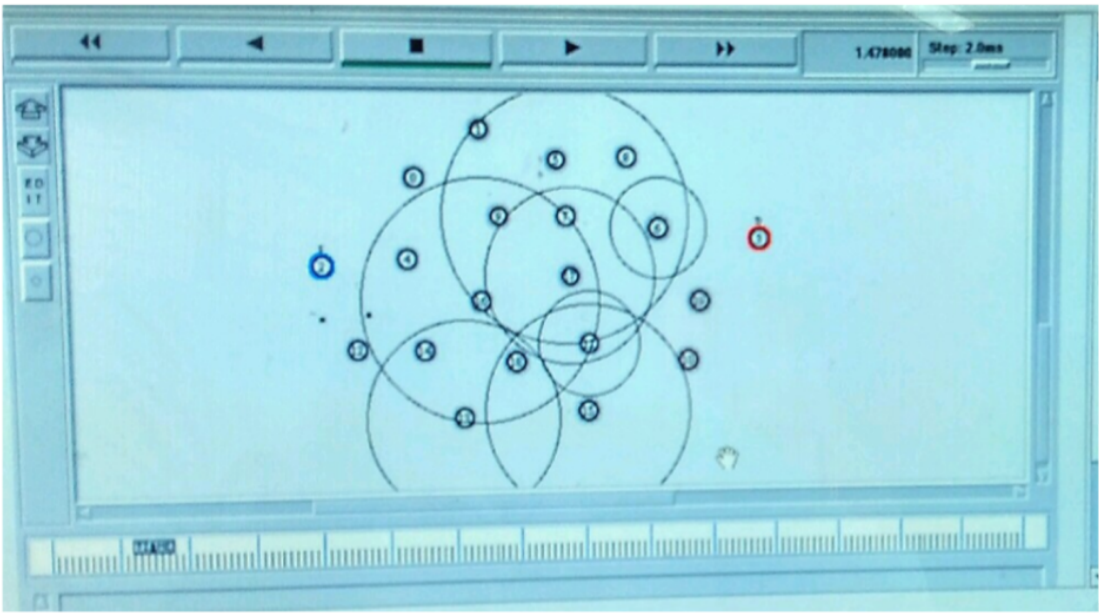

Fig.6.4  Packet drop in senerio using AODV

## 6.4 Performance Metrics:

### 6.4.1 Packet Delivery Ratio (PDR) :

PDR is the ratio of data packets delivered to the destination to those generated by the sources [8] and is calculated as follows:

*Packet Delivery Ratio= (Number of Packets Received / Number of Packets Sent) x 100.*

### 6.4.2 Throughput :

It is the ratio of total amounts of data that reaches the receiver from the source to the time taken by the receiver to receive the last packet. It is represented in packets per second or bits per second

.

*Throughput (bits/sec) =*

*(Number of delivered packets * Packet Size * 8) / Total simulation period.*

### 6.4.3 Energy of the Nodes:

The energy of the node is defined in a node has an initial value that is the level of energy the node has at the beginning of the simulation. This energy is termed as initialEnergy_. In simulation, the variable "energy" represents the energy level in a node at any specified time. The value of initialEnergy_ is passed as an input argument. A node looses a particular amount of energy for every packet transmitted and every packet received. As a result, the value of initialEnergy_ in a node gets decreased. The current value of energy in a node after receiving or transmitting routing packets is the residual energy. Data Transmission is established between nodes using UDP agent and CBR traffic. Residual energy of the node is evaluated by accessing inbuilt variable "energy" in findEnergy procedure at different times.

## 6.5 Simulation Parameter :

| Component | Type |
|---|---|
| Set val(Chan) | Wireless channel |
| Set val(Prop) | TwoRayGround |
| Set val(Netif) | WirelessPhy |
| Set val(Mac) | Mac/802_11 |
| Set val(Ifq) | Drop Tail |
| Set val(LL) | LL |
| Set val(Ant) | OmniDirectional |
| Set val(X) | 1500 cm |
| Set val(Y) | 1500 cm |
| Set val(Ifqlen) | 1000 (max packet size) |
| Set val(Adhoc Routing) | AODV,DSDV and DSR |
| Set val(nn) | 20 nodes |
| Set val(Stop) | 10ms |

Table 6.1 Simulation Parameter

## 6.6 THROUGHPUT of DSDV,DSR and AODV (for 10 path) kbps:

| Path | DSDV | DSR | AODV |
|---|---|---|---|
| 1 | 58.06 | 100.41 | 180.99 |
| 2 | 41.87 | 101.13 | 185.98 |
| 3 | 10.73 | 101.27 | 190.98 |
| 4 | 15.23 | 101.77 | 192.95 |
| 5 | 16.48 | 109.5 | 200.91 |
| 6 | 85.58 | 109.42 | 205.96 |
| 7 | 11.26 | 107.78 | 210.85 |
| 8 | 108.80 | 103.20 | 215.97 |
| 9 | 20.78 | 109.22 | 215.84 |
| 10 | 154.25 | 108.75 | 225.91 |

Table 6.2 Comparison table of DSDV,DSR and AODV based on THROUGHPUT

## 6.7 Packet Delivery Ratio of DSDV,DSR and AOD(for 10 path) :

| Path | DSDV | DSR | AODV |
|---|---|---|---|
| 1 | 12.32 | 16.74 | 104.61 |
| 2 | 8.073 | 11.20 | 68.543 |
| 3 | 6.003 | 8.217 | 50.969 |
| 4 | 4.778 | 6.549 | 40.5638 |
| 5 | 3.968 | 5.444 | 33.692 |
| 6 | 3.393 | 4.658 | 28.810 |
| 7 | 2.964 | 4.070 | 25.163 |
| 8 | 2.631 | 3.614 | 22.336 |
| 9 | 2.365 | 3.250 | 20.080 |
| 10 | 2.148 | 2.952 | 18.237 |

Table 6.3 Comparison table of DSDV,DSR and AODV based on PDR

## 6.8 Energy of DSDV,DSR and AODV (for 10 path) :

| Path | DSDV | DSR | AODV |
|---|---|---|---|
| 1 | 0.274 | 12.84 | 0.446 |
| 2 | 14.71 | 3.729 | 14.81 |
| 3 | 13.70 | 1.420 | 13.87 |
| 4 | 10.71 | 1.288 | 10.96 |
| 5 | 13.78 | 1.575 | 13.94 |
| 6 | 9.241 | 1.063 | 9.343 |
| 7 | 14.02 | 1.611 | 14.18 |
| 8 | 11.42 | 1.313 | 11.55 |
| 9 | 13.95 | 1.604 | 14.12 |
| 10 | 12.26 | 1.409 | 16.40 |

Table 6.4 Comparison table of DSDV,DSR and AODV based on Energy

## 6.9 Comparison graph of DSDV,DSR and AODV

## THROUGHPUT

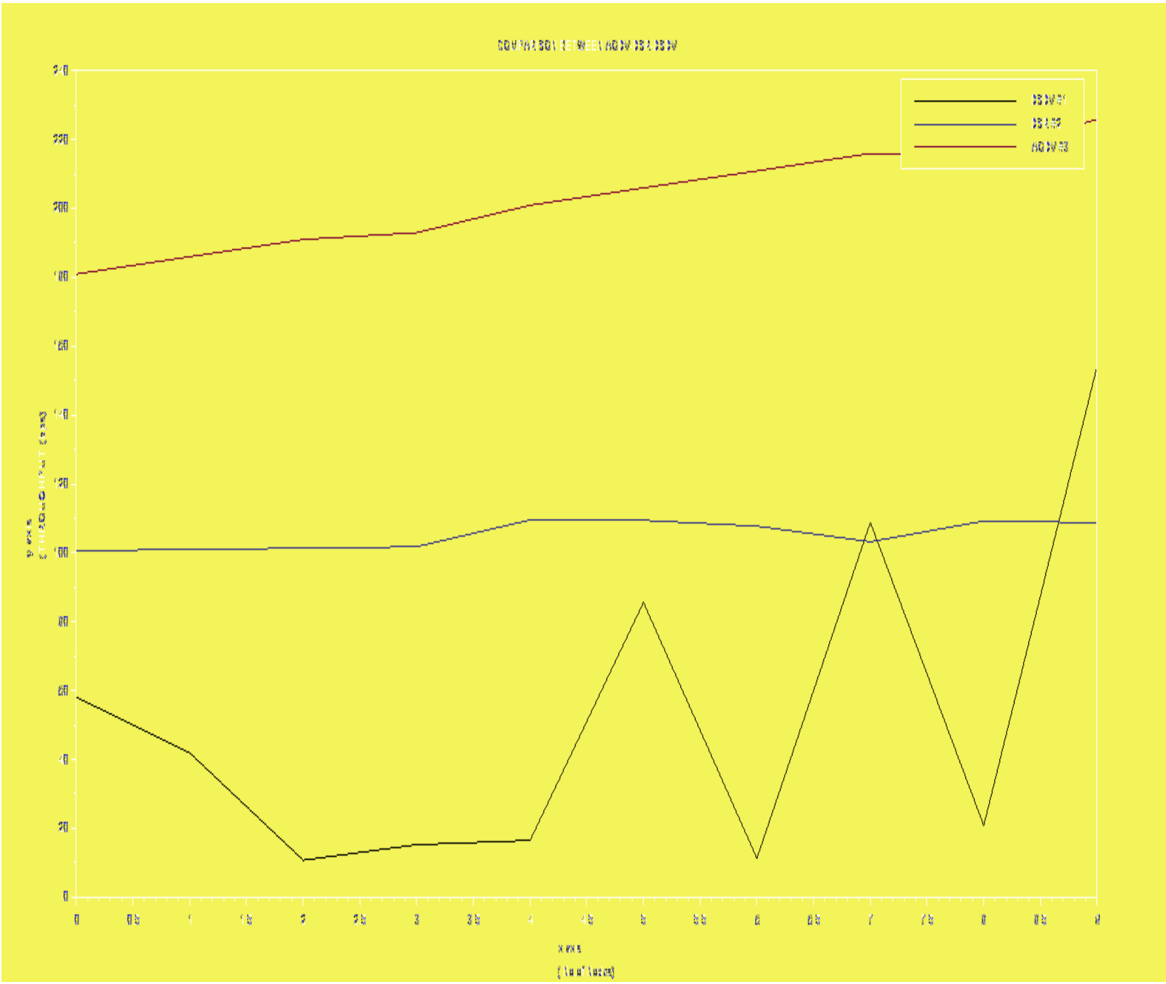

Fig 6.5 Comparison graph of DSDV,DSR and AODV based on Throughput

## 6.10 Comparision graph of DSDV,DSR and AODV

### Packet Density Ratio(PDR)

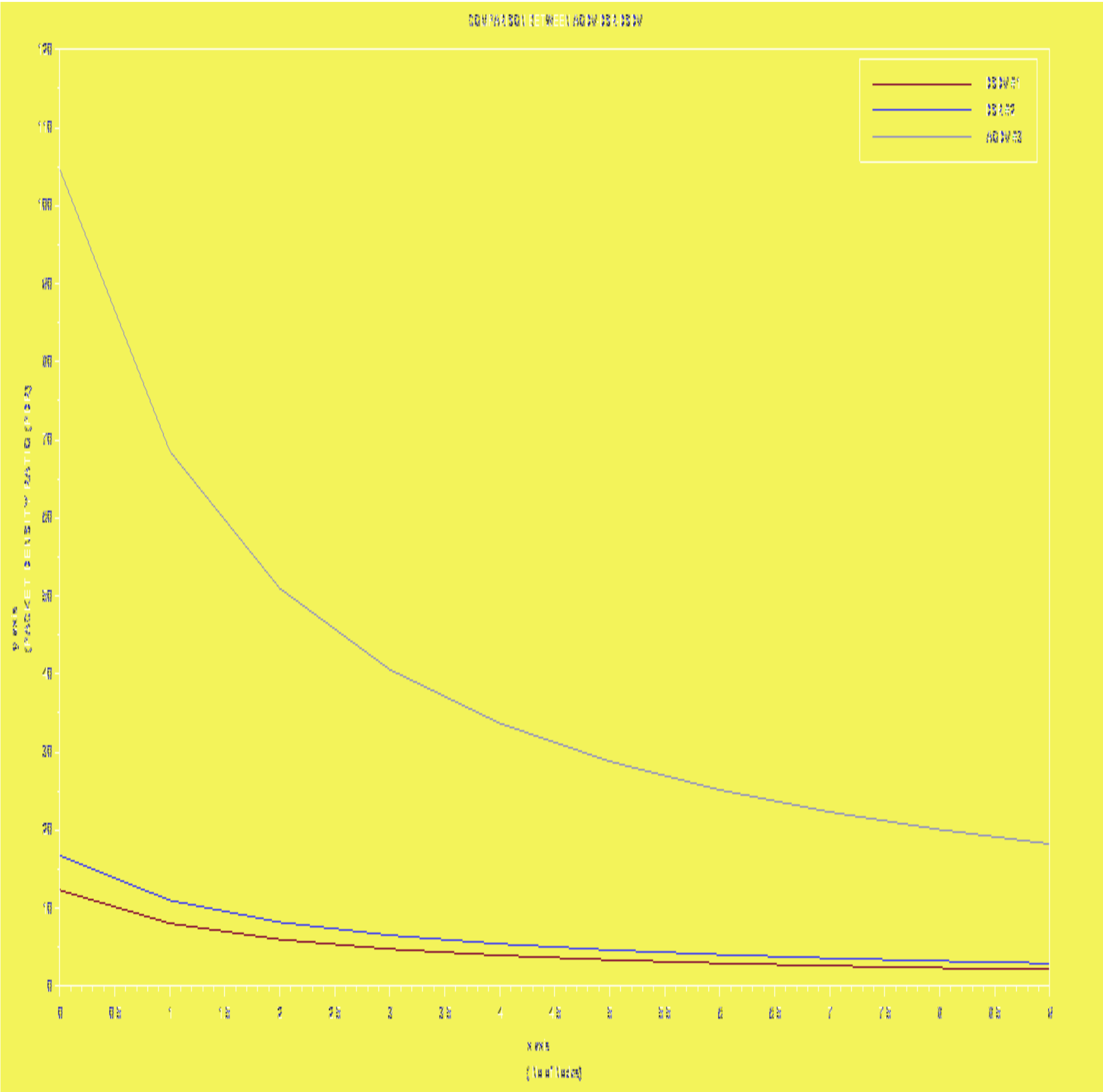

Fig 6.6 Comparison graph of DSDV,DSR and AODV based on PDR

## 6.11 Comparision graph of DSDV,DSR and AODV based on Energy

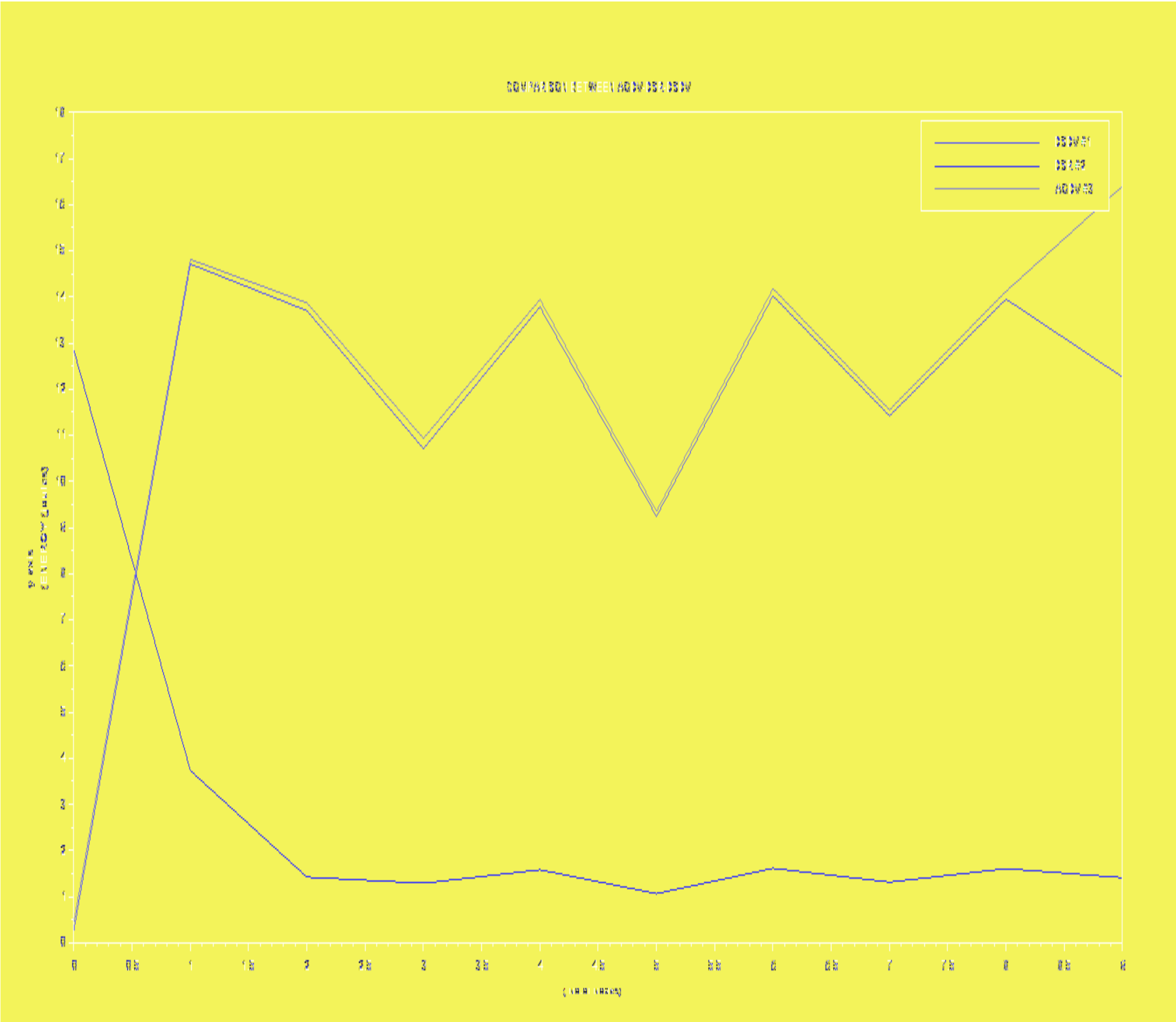


Fig 6.7 Comparison graph of DSDV,DSR and AODV based on Energy

## CHAPTER NO:07

# APPLICATIONS

1.EMERGING OPERATION:

-- In environments where the conventional infrastructure based communication facilities are destroyed due to war or due to some natural calamities.

2.Wireless Mesh Network

# CHAPTER NO:08

# Future scope

1.FOR VEHICULAR AD-HOC NETWORK:

--Safety Application.

--Traffic control Application.

2.Wireless Sensor Network.

# CHAPTER NO:09

# Conclusion

The process of this wireless simulation including simulation of network on platform of NS2, and the use of trace file for post simulation in detail. We have compare different routing protocol performance which shows AODV works better as compare to DSR and DSDV routing protocols.

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