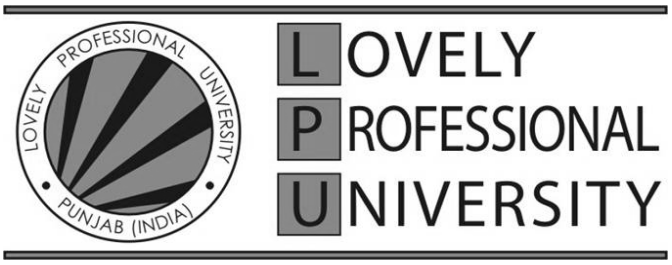

Enhancement in AOMDV Protocol to Reduce Chances of Link Failure in Mobile Adhoc Network

A Dissertation proposal submitted by

Manveer Kaur

10804721

To

Lovely School of Computer Science Engineering

In partial fulfillment of requirement for the

Award of the Degree of

Master of Technology in Computer Science

Under the Guidance of

Mr. Ambrish Gangal

Assistant Professor

UID: 15856

April 2015

LOVELY PROFESSIONAL UNIVERSITY

School of: Lovely faculty of Science and Technology

DISSERTATION TOPIC APPROVAL PERFORM...

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Qualification: MS

Research Experience: 5 years

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PROPOSED TOPICS

1. Mobile Ad-hoc Network Efficiency
2. Vehical Ad-hoc Network
3. Sensor Network

Signature of Supervisor 15857

PAC Remarks:

Have good chances of getting a Research paper published in good Journal on the above topic.

APPROVAL OF PAC CHAIRPERSON: Signature: 1011 Date: 11/10/14

...pervisor should finally encircle one topic out of three proposed topics and put up for approval before Project Approval ...mittee (PAC)

*...iginal copy of this format after PAC approval will be retained by the student and must be attached in the ...ject/Dissertation final report.

*...y copy to be submitted to Supervisor.

ABSTRACT

The mobile ad hoc network is the self configuring and decentralized type of network. The network has not fixed topology as mobile nodes can move freely in the network. Due to dynamic type of topology and self configuring nature of mobile ad hoc network many issues get raised which are routing, security, quality of services and many more. During data transmission, there is a problem of link failure which degrades the performance of the network. AOMDV protocol provides the alternative path for data transmission but not focus on energy so I use the EAOMDV. The nodes are deployed in the network and path is established according to EAOMDV protocol from source to destination. There are some nodes in the path having much movement than other nodes. Due to these nodes link failure problem occurs. So link failure problem is responsible for performance degradation and low reliability of the network. A novel technique is proposed to overcome link failure problem in EAOMDV.

CERTIFICATE

This is to certify that Manveer Kaur has completed M.Tech dissertation proposal titled "**Enhancement in AOMDV Protocol to Reduce Chances of Link Failure in Mobile Adhoc Network**" under my guidance and supervision. To the best of my knowledge, the present work is the result of her original investigation and study. No part of the dissertation proposal has ever been submitted for any other degree or diploma. The dissertation proposal is fit for the submission and the partial fulfillment of the conditions for the award of M.Tech Computer Science &Engineering.

Date: 4 May, 2015

Signature of Advisor
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ACKNOWLEDGEMENT

This is to say that I Manveer Kaur, a student of B.Tech-M.Tech (CSE) has successfully doing my dissertation-II entitled "**Enhancement in AOMDV Protocol to Reduce Chances of Link Failure in Mobile Adhoc Network**" under the proper guidance of "Mr. Ambrish Gangal". I want to thank here to all people and my co-mates who helped me a lot while doing my dissertation- -II work.

First of all, I would like thank my guide Mr. Ambrish Gangal for his immense support and cooperation. Secondly I would like to thank the university authorities for providing us all the facilities which makes it easy for me.

THANKS TO ALL

Dated- May 4, 2015

Submitted by:

Manveer Kaur

DECLARATION

I hereby declare that the dissertation entitled, **"Enhancement in AOMDV Protocol to Reduce Chances of Link Failure in Mobile Adhoc Network"** submitted for the M.Tech degree is entirely my original work and all ideas and references have been duly acknowledged. It does not contain any work for the award of any other degree or diploma.

Date: 4 May, 2015

Manveer Kaur
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CHAPTER 1
INTRODUCTION

Wireless network

Wireless network refers to the type of networks in which the communication between devices is implemented without use of wires. Two waves are used for communication wireless network Radio wave and microwaves. Both devices that are communicating to each other, they remain within the radio range of each other. The IEEE standard for wireless network is 802.11. Wireless networks have many properties such as easy, mobility and economic and cost saving installation. Wireless networks can be classifies into two types:

- Infrastructure network
- Ad-Hoc networks

Infrastructure networks: This type of network is controlled by center controller that is Access Point (AP). All the wireless devices are connect with each other through Access point and Access point is responsible for data routing. Access point is a fixed base station and all wireless devices that are communicating to each other are connected to access point. In this figure 1.1 show two wireless devices are connected to Access point and these devices are communicating to each other by using Access point.

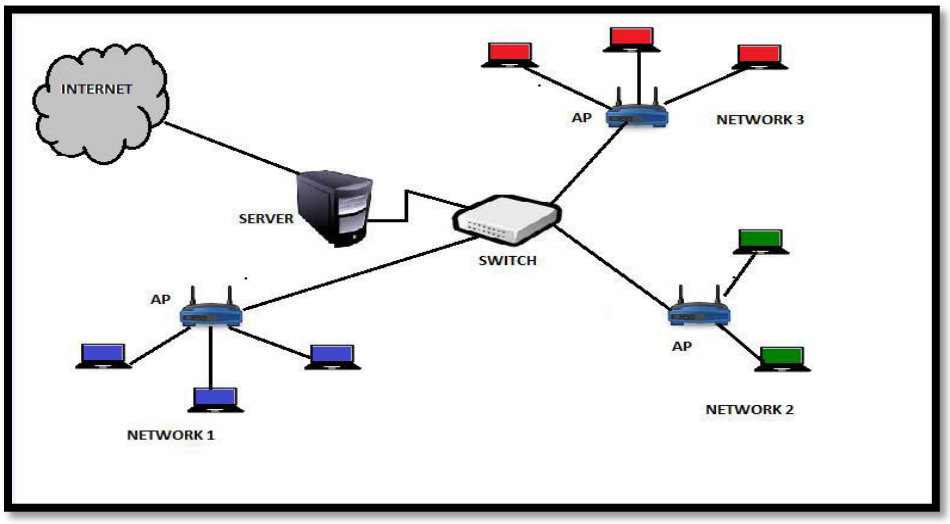

Figure 1.1 Infrastructure network

Ad hoc networks (Infrastructure-less): In this type of networks, there is no central controller means no Access point. Ad hoc networks are without controller type of wireless networks. Node is entered in the network by forwarding the data to the destination, and so the decision of the nodes forward data is made at run time execution is based upon the network connectivity. Ad-hoc networks latest technique of wirelessly join for mobile hosts. It is a network which is used for emergency purpose. In ad hoc wireless network there is no base station or fixed infrastructure. Which nodes in range of each other can communicate directly on the other hand nodes which are not in the range; can communicate indirectly and intermediate nodes between the communicating nodes are responsible for data forwarding. figure 1.2 shows the ad hoc wireless networks. Here three nodes are communicating to each other directly without any Access points.

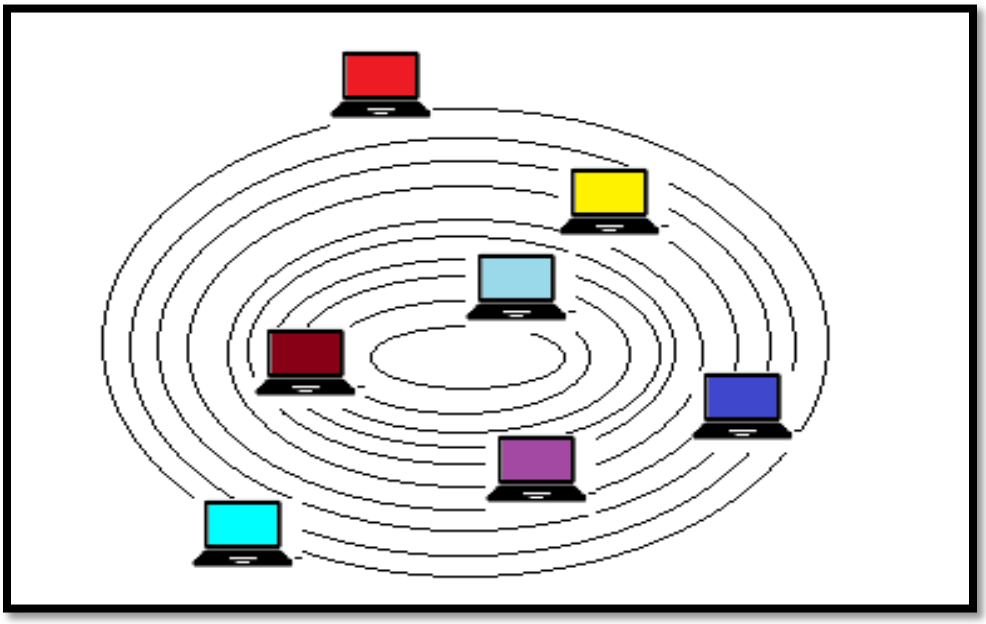

Figure 1.2 Ad hoc network

1.1 Types of Ad hoc Network

The following are the types of ad hoc network

a) MANET (Mobile Ad hoc network)

b) WSN (Wireless Sensor Networks)

c) WMN (Wireless Mesh Networks)

a) MANET

MANET is a network in which there is number of nodes which are move freely in any random direction. These nodes are connected with their neighboring nodes and there neighbored nodes further connected to their respective neighbor nodes so on they make a wireless interconnected network. There is no any central point every node itself acting as a central node.

b) Wireless Sensor Network

In wireless sensor network sensing devices are connected wirelessly with each other and communicate with each other. All devices are having ability to talk to its sense, peer and process. It is not a decentralized system. It is very cheap and easy to install and no wire is required for data transfer.

c) Wireless Mesh Network

Wireless mesh network is consisting of radio nodes and these radio nodes are communicated with each other. Which are range in a topology which is present in the mesh. Wireless mesh networks consisting of gateways, mesh routers, mesh clients. The mesh customer anything like computer, mobile phone and other wireless devices. The load is move through mesh to router and router to gateways but not forward to the internet.

1.2 Mobile and Ad hoc Networks

A mobile node is consisting of collection of end to end mobile nodes that have capacity to link with each other without help of any infrastructure or any centralized controller. There is no access point or base station for communication between devices. Every device in the network act as router for sending and the receiving data from other device. An ad-hoc network is configured itself and less infrastructure network. Mobile devices are wireless, they connected with each other without any wire. Each node in a MANET is independent to move freely in any path, and between the links of these devices is change frequently. There is a router for communication. The important work of the mobile device is maintaining the information about the route load. In Mobile Ad hoc Network is a collection of nodes which can move any direction and these nodes are connected with each other through wireless

medium. Those mobile nodes are directly communicated with each are which are present near to radio range whereas others nodes need to add the middle of the route.

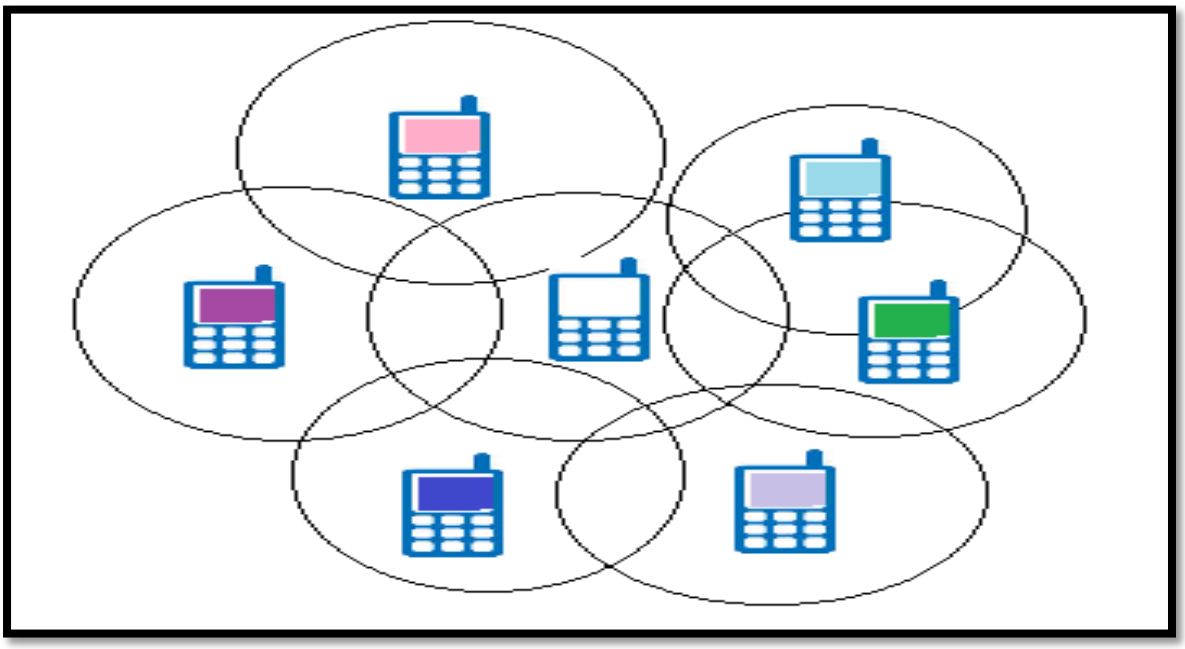

Figure 1.3 MANET

1.2.1 Characteristics of MANET

- Communication wireless between devices
- Nodes act like a hosts and routers.
- Run time add network topology and automatically Routing Updates
- Can be set up anywhere
- Autonomous, no infrastructure needed
- Energy Constraints
- Limited Security

1.3 Classification of MANETs Routing Protocols

Routing mechanism is one of the difficult and important mechanisms to maintain in ad hoc networking. An ad hoc routing protocol is nothing but an agreement amongst nodes as to how they control routing packets amongst themselves. The route is discovered by the nodes

in an ad hoc network as the nodes don't have any accurate knowledge about the network in a topology MANETs are classified three different type of routing protocol according to their functionality :-

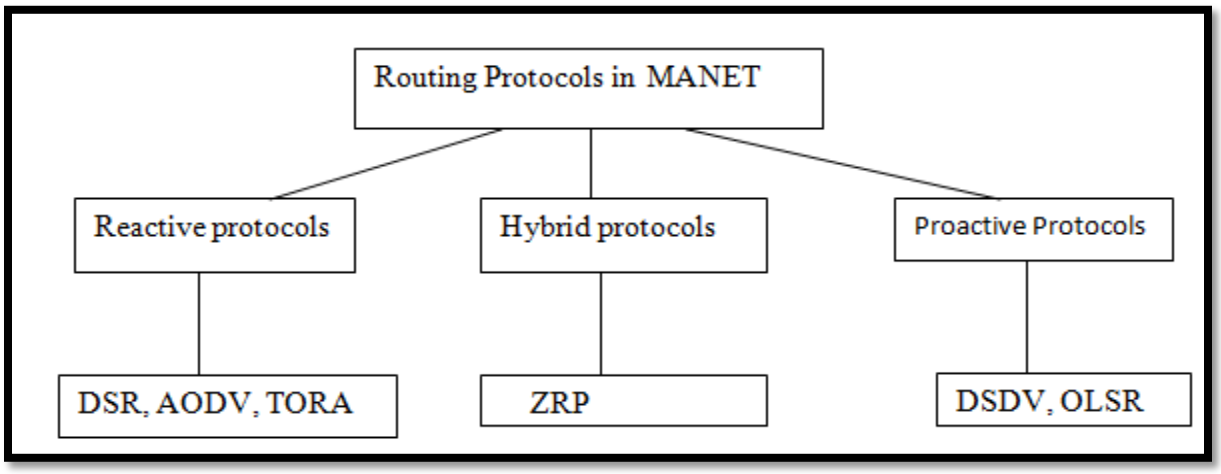

Figure 1.4 Types of Routing Protocols in MANET

1.3.1 Reactive protocols: Reactive protocol is also called On Demand protocol which is use for routing purpose. They do not preserve routing activity or routing information at that area if there is no communication between nodes. It means route are creates only when the source node is present. In the network when node send a packet to another node then this protocol found the route according to the demand of the nodes and then creates the connection in sequence to send and receive the packet. In this, the source node begins the route discovery phase. This is also called as source routing protocols. Routes are added to the list once the Route Reply packets originated from the destination reach the source via various forwarders. Under reactive protocol many protocol are available E.g like TORA is Temporally-Ordered Routing Algorithm, DSR protocol is Dynamic Source Routing and AODV is Ad hoc On Demand Protocol,. AODV is the most important protocol under the reactive protocol; it is use for routing to improve the energy of the routing nodes which is freely moved in the network.

a) Dynamic Source Routing Protocol (DSR): DSR is basically used source routing but it cannot use relaying on routing table at every device with in a network. The header of the

request contains all the information about the path which is start from a sender to receiver. If a new

Packet is made to some other node destinations then DSR take the information of the packets header. A source route giving the sequence and number of hopes which that packet follows.

b) Ad hoc On Demand Distance vector routing Protocol (AODV): it is a useful protocol in the ad hoc because it is work correctly for the routing purpose. In this no fixed structure topology will change automatically. It takes most of the outcomes of the method from DSR and DSDV algorithms. AODV protocol maintain from DSR and nearby near count routing. It is handle destination sequence number for finding the path of the destination. This protocol is similar to other routing protocols which provide a easy and smooth adaptation for change in nodes link. Some time when obstacles occurs link fail occur, message are sent only to the nodes which are affected by the failure of link in the network. This message tell the affected node that do not transfer the data through the affected link but there are some disadvantages of this like low memory overhead and network performance getting low .There is minimum routing traffic since on demand route is build. If in the network two nodes are connect with each other, it will enable them to build multihop routes between the mobile nodes which are involved in network.

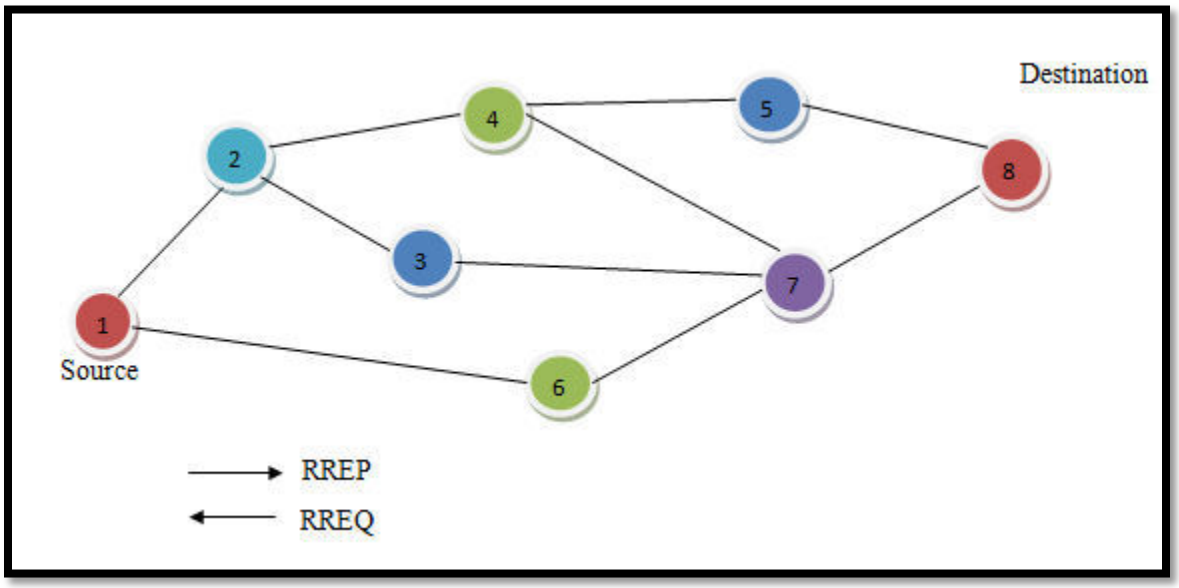

Figure 1.5 AODV algorithm

AODV have one distinguishing feature from the other protocol, it use Destination Sequence Numbers (DSN) to avoid counting to infinity. This protocol is loop free protocol. In which node send the request in a network .this request contain destination sequence number along with all routing information to the destination .Based upon this it select the optimal path. In AODV Path is selected on the basis of three parameters. These three parameters are Route Requests (RREQs), Route Replies (RREPs) and Route Errors (RERRs).These are used for maintain and discover the route from sender to receiver .it use the UDP. This path discovery process has one route request (RREQ) which is broadcast in the network. The RREQ go the neighbor of sender and further neighbor to neighbor. By doing so it reaches the destination and the destination node send route reply (RREP). In this way route established and data will start flowing from source to destination. If link failure occur Errors (RERRs) message is generated.

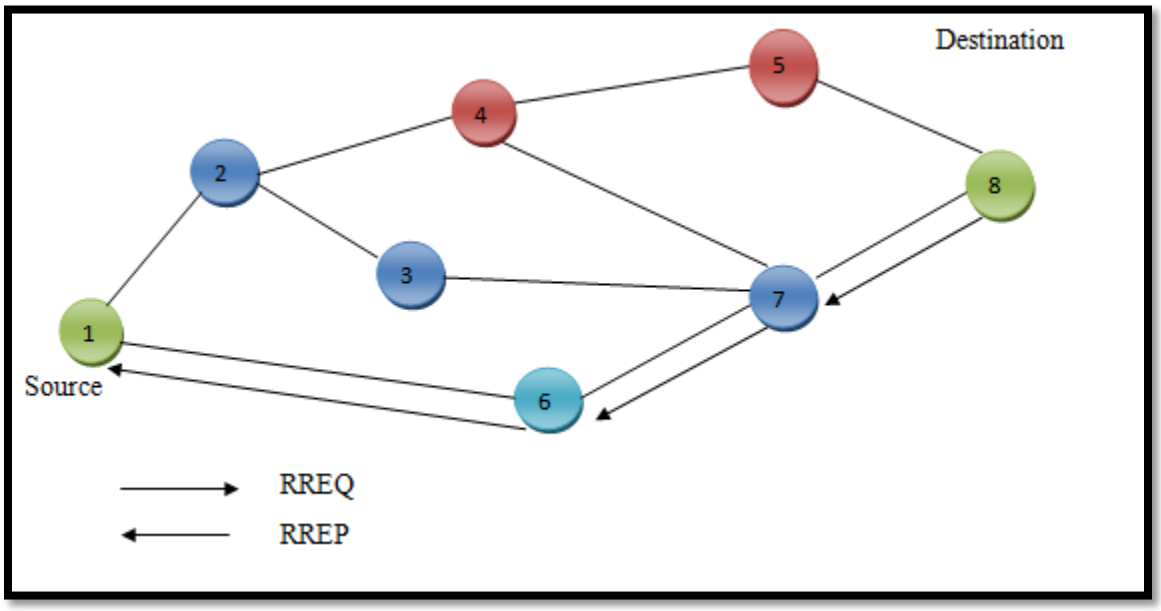

Figure 1.6 Best path with minimum Hop Count

In figure 1.6 there are one source node and one destination node and 6 intermediate nodes. First S broadcast the route request to all its intermediate nodes. Each and every node maintains sequence number and broadcast id itself. Broadcast id is not fixed it is vary according the nodes. When intermediate nodes have a route to the destination then it revert to route reply with corresponding sequence number.

1.3.2 Proactive Protocols: proactive protocol needs the information about the routing so they consist that information. They maintain the up to date information of the every node which is present in the network. Routing table is maintaining the information about the routes and sequentially updated when the topology change in the network. Proactive routing protocols are table driven routing protocols. The routes are updated continuously and it uses an already available route when a node wants to route packets to another node, the routes to the destination are maintained by these protocols even though a few of the routes may not be needed. The routing tables are maintained by entire nodes in the network and when the network topology changes, updates are sent across the network. The most famous proactive protocols type are destination sequenced distance vector (DSDV) routing protocol and optimized link state routing (OLSR) protocol.

a) Destination Sequenced Distance Vector (DSDV): in the DSDV mobile station is entered in the network constantly without any noise in the network. So that changes in table entry are very quickly and the data should be made rapidly to ensure that every node in the network can locate its neighbors. Each node sequentially broadcasts routing updates. DSDV continuously update the routing information in the routing table, which use the more battery power but it is less use of the bandwidth when all nodes are free in the network

b) Optimized Link State Routing (OLSR): OLSR is dynamic protocol which is provide the link to the nodes for communication and control the link state information. OLSR used for at runtime calculate the routing table entry.

1.3.3 Hybrid Protocols: A hybrid protocol is made up of the proactive and reactive routing. To combines the advantages of proactive and of reactive routing in this protocol. E.g. Zone Routing Protocol (ZRP) and temporally-ordered routing algorithm (TORA).

1.4 Routing Information Protocol (RIP)

RIP is routing information protocol which is send all the routing table to all the active interface which is present in the network ,at every 30 section it will up to date the routing table. To determine the beat path RIP use the hop count, hop count mean how many router are connected with each other. RIP perform a routing within a single autonomous system by using routing traffic in all internet and an interior gateway. Routing Information Protocol (RIP) is using same reasonably technology for designed the work with moderate-size

networks. Thus it is capable for an Interior Gateway Protocol (IGP) for many organizations and for original networks using serial lines. A speed of serial line is not varying widely. It is not use in complicated places or environment. RIP v1 is a class full routing protocol it is less use so new version is available RIP v2. RIP v2 is a protocol which is classless. The subnet Mask of class full protocol is not included, which is with the network address and updates of routing, by which a problem is occurred results in the discontinuation of the subnets of any network that use Variable-Length Subnet Masking (VLSM). RIP version2 is a without any class protocol in the classless protocol subnet mask is include for routing update. Subnet mask is use for RIP v2 to make the route more efficient as compare to the RIP v1.Distance vector protocols give information about the routing by send messages which is out the interfaces on a router.

1.4.1 RIP Address To The Following Distance Vector characteristics

- RIP work on the periodic routing updating.
- RIP send the full routing table entry (every 30 sec).
- RIP use the distance like a metric.
- RIP determine the best path by using Bellman-Ford Distance Vector algorithm for a particular destination.
- RIP help in the Internet protocol and IPX routing.
- RIP maintain user datagram protocol.
- RIP have distance of 120 from the admistrative.
- RIP has a hop count of 15 hops.

1.5 Open Shortest Path First (OSPF)

Open shortest path first (OSPF) is protocol used for routing. It is made for internet protocol (IP) networks. It is used for finding a best route in the network for sending the data within the network. It is made for replacing the RIP protocol so that the problems occurred in RIP can be resolved. OSPF is introduced for the purpose of request for comments. OSPF can be called as link state routing protocol in which DSDV and IGRP present. DSDV is used for routing and sending the information about the updates within the routing to the neighbor nodes .link state advertisement is send by OSPF to the neighbors' node. Shortest path first technique is adopted by OSPF, so that is by it first checks the path to the all the neighboring

node and path which is shortest is selected for routing. OSPF select the low cost path and that path which are very much reliable .The SPF and LSA are the two protocols which are used by OSPF to calculate the paths between the source and the destination.

1.5.1 OSPF Networking Hierarchy

Sometime OSPF act like hierarchy so its called hierarchy protocol .In the hierarchy administrative can be first check the smaller routing table and then switch to smaller are in the network. OSPF contain all the information which is present in the previous network. so in this many important component is available which is following:

- Stub Areas
- Areas (area 0)
- AS Boundary Routers
- Area Border Routers
- Backbone Areas
- Not-So-Stubby Areas
- Totally Stubby Area
- Transit Areas

1.5.2 Advantages of OSPF

- OSPF not related to any other component.
- OSPF is also hierarchical, at the top of hierarchy area is always zero
- OSPF network much larger than that of RIP, so as compare to rip it is more use.
- OSPF use Link State Algorithm.
- OSPF supports VLSM so its result is more efficient for use in networking.
- Multicast routing is used by the OSPF. The only routing tables which are changed can receive updates from OSPF.
- The administration can improved logically in OSPF and by using areas it can reduce the size of routing tables.

1.5.3 Disadvantages of OSPF

- A very high processing time, because it includes the SPF
- It is memory hungry process, because it maintains multiple copies of routing information.
- OSPF is a difficult or very heavy protocol as compared to RIP.

1.6 Ad hoc On Demand Multipath Routing Protocol (AOMDV)

AOMDV Ad hoc on demand multipath distance vector routing protocol is based upon the AODV protocol. It consists multipath so it is reactive protocol. The main key differences between AODV and AOMDV have multiple paths instead of single path between source to destination as in AODV. The multiple paths in AOMDV are grunted to be loop free and disjoint. In AOMDV, when RREQ request is sent from sender to receiver it generates multiple reverse paths on both receiver node and intermediate node. Then multiple RREP requests travel through these reverse paths to form forward paths AOMDV has three main different aspects than other on demand multipath protocol. These three different aspects are in AOMDV inter nodes coordination is not higher. secondly the alternative route are disjoint without and use of source routing and last one that the path which are computed by AOMDV have minimal additional overhead over AODV. The source node sends a route request to all its neighbored nodes in the form of flood. Route request has two main parameters one is hope count and another one sequence numbers. With the help of these parameters loops can be avoided.

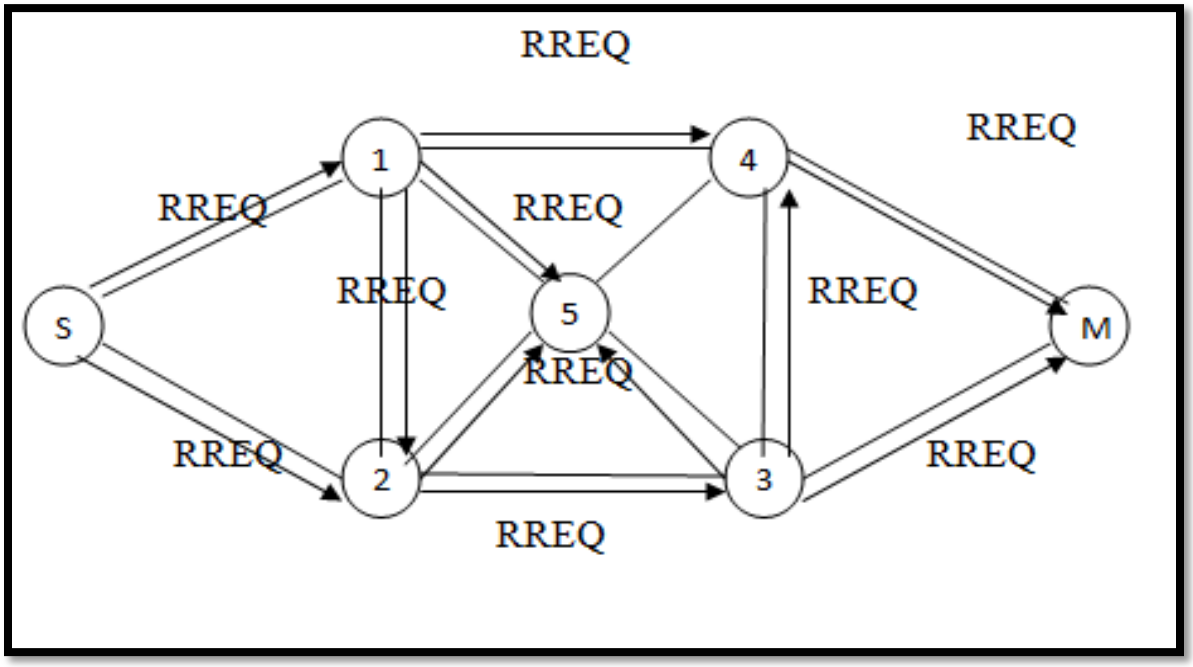

Figure 1.7 AOMDV Route Request

In figure 1.7 source broadcast the Route Request to all neighboring node.

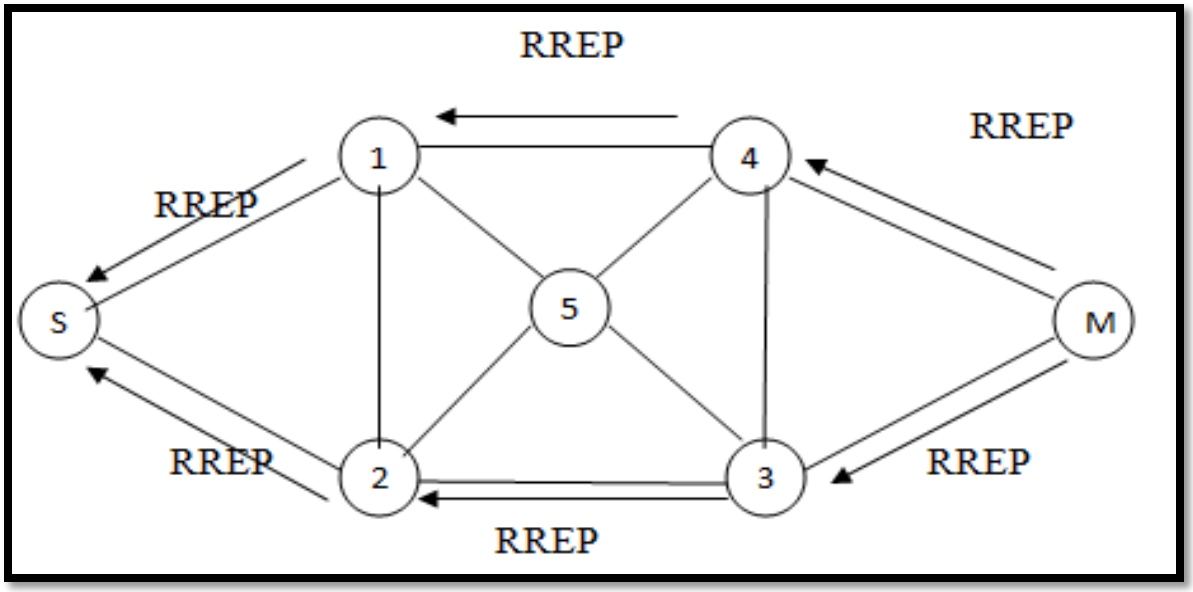

Figure 1.8 AOMDV Route Reply

In figure 1.8 Route Reply in from destination to source using multiple path. These multiple path node disjoint and link disjoint with neighboring nodes.

1.6.1 Advantages of AOMDV

- Efficient packet delivery (packet loss chances are decrease).
- Load Balancing (Decrease the load on the network).
- Choose alternative path for routing.

1.6.2 Disadvantages of AOMDV

In the AOMDV protocol not calculate the threshold values or energy of node by which it can send packet through low energy node results in packet loss.

1.7 Energy Based Multipath Routing Protocol(EAOMDV)

EOMDV protocol is efficient energy routing protocol which is implementing to remove the disadvantages of the AOMDV protocol. In EAOMDV calculate the threshold value which is help for to check the lightly or heavily load on the nodes. Using threshold value we consume more energy and control the congestion on the network and give the more reliable routing as compare to the AOMDV protocol.

1.8 Security Services of Wireless Network

1) Confidentiality

Confidentiality is the security of the transmitted data from the eavesdropping. When the data transmitted different type of security on the data can be recognized. It is a protection of data transmitted between two users over a period of time. On the other confidentiality is the security provide to the traffic flow from analysis. This provides that an attacker does not examine the source and destination, length or other characteristics of the communication facility.

2) Authentication

It provides access control to the network by denying access to client stations that fail to authenticate properly. The authentication is be composed with confirm that a communication is authentic. In authentication when a connection is initiated, it guarantees that the two entities are authentic i.e. the each entity it claims to be and also the authentication must confirm that the connection is established in such a way that the intruders cannot interrupt one of the two authenticated parties for the purposes of unauthorized transmission and reception.

1.9 Link Failure in MANET:

Multipath routing establishes number of routes from source to destination. If when link failure problem occurs communication from source and node continue through other routes. Route disconnections cause data transmission failure. During route discovery procedure to find the node disjoint, non-disjoint and link-disjoint for route the packets. Link –disjoint means there are no common links between nodes but nodes are may be common. In Node-disjoint both are not common link and node but in Non-disjoint routes also use links or nodes in common. If any node move or link failure occurs in link-disjoint and non-disjoint routes, routes are (main and backup) disconnected at same time. If main route fail then the backup route is selected for transmission the data. Link failure is a main problem in AOMDV which is responsible for the degradation of the network and packet lost. There are many nodes in the network. Source is host node from where data has to be send and destination node is final node. An active node which is responsible for updating of table entry. When source node

move, new route discover. If intermediate nodes or the destination move then following conditions possible:

- Routing tables are updated when link failure occurs.
- All active neighbors are informed by Route Error message.
- The next hop links break resulting in link failures.

During link failure, source is report about the link failure it may be find the alternative path which may be not perfect or data transmission is slow. There are many congestion method which are able to inform the source about congestion problem and that time source use the transmission control protocol for slow data transmission. In the network resource allocate and support is the major issue. At resource shared time typical focus on bandwidth utilization and queue on the router or switch. In the queue packets are waiting for transmission. When in the queue two or many packet is demanding for similar link, the packets have to be dropped and queue is overflow. When packet is dropped in network that situation is called congestion problem and link failure.

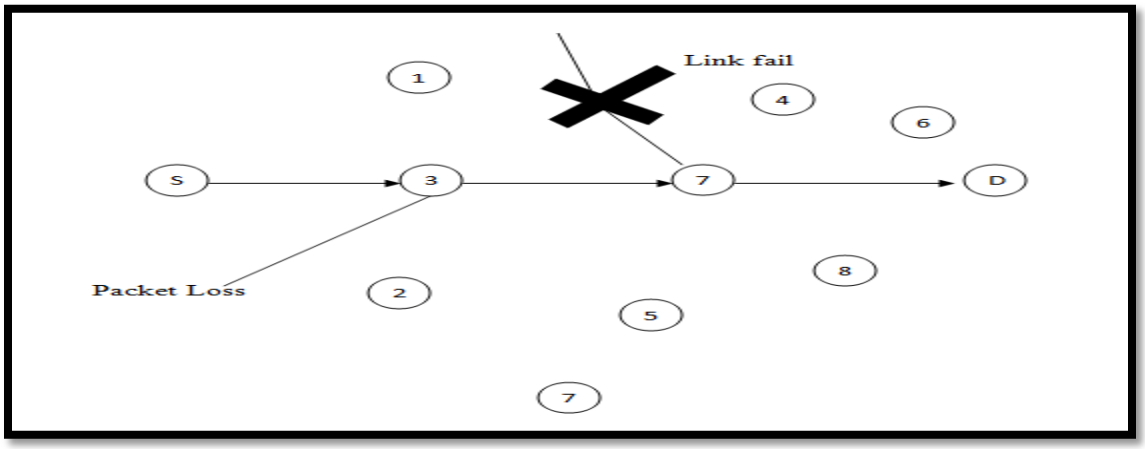

Figure 1.9 Link Failure in MANET

In fig. 1.8, Network is deployed having finite numbers of nodes. After that, Path is established between source and destination. In this case node 7, which is intermediate nodes moves from its position. So packet loss occurs at node 3.

CHAPTER 2
REVIEW OF LITERATURE

Young J.Lee and George F.Riley,"**A Workload-Based Adaptive Load Balancing Technique For Mobile Ad Hoc Networks**",2009 [25] they discussion about novel load balancing techniques for MANET. This new technique which is very easy but it is more usable to manage load balance within congestion problem. In the ad hoc routing protocol more load balancing capacity ,often they fail to perform the good, when the node are present in large area where the more load is available in the network. The new schema is observation ad hoc on demand routing protocol to send the messages to all present routes, only those nodes are response which is capability to forwarding the intermediate nodes .if any node ignore the message within the period of time that node excluded in the additional communication .in other schema message are forwarding . The selecting node give the load information of the each node so node is more loaded and they are remove from the request path. this schema utilizes queue content and workload is control request message and the threshold values is update when the new node is receives the message so in this paper they use threshold update algorithm for the calculation of the threshold value. in this paper they also compare the base protocol where we enhance the new protocol .this protocol reduce the packet latent period as well as reduce packer overload without effect of the network throughput and easy balance the network load among nodes. They also calculate the threshold value.

Rachida Aoudjit et.al,**"Load Balancing: An Approach Based on Clustering in Ad Hoc Networks",** 2009 [20] they explained about mobile ad hoc networks which are having a nodes which can move free in any direction and these nodes send the data to other nodes in a network and also do a large amount of calculations. The energy and the running time is the main concern in this type of network one more problem is of load unbalancing. The ad hoc networks need the sharing of load between the nodes which are over loaded to the nodes which are idle. Based upon the clustering a new algorithm which is a load balancing in nature is purposed. In this algorithm nodes cluster head subnets are selected and some load is maintain with the cluster overheads by which the cost of communication is reduced. The

main purpose of doing so is to reduce the time of processing tasks by spreading the work load within the node and to increase the time of life of node which is previously overloaded. In this algorithm the threshold value tell that the node is highly or lightly loaded. It's very important for the load balancing algorithm to base upon the calculation the execution load of a node can be found. If this threshold value is more than the load balancing algorithm than it is not effective. The simulation results shoes that the performance of network is delivered the load to some of the idle nodes which are present in the network.

Mohammad Amin Kheirandish Fard**, "Enhanching Congestion Control To Address Link Failure Loss Over Mobile Adhoc Network",**2011 [11]This paper introduced in they tell when the link is fail then congestion control is difficultly to remove in this case due to mobility occure and power in multi-hop Ad-Hoc network. Moreover of successive executions of Back-off algorithm deficiently grow Retransmission Timeout (RTO) exponentially for new route. The main thing of responding and detecting link failure losses is to prevent sender from remaining idle unnecessarily and manage number of packet retransmission overhead. In contrast of the Cross-layer technique which require feedback data from lower layers, this paper operates on the base of Transport layer. This paper explore algorithm which is threshold base and purpose link failure loss in the congestion control in ad hoc network. Link failure is a main problem in AODV which is responsible for the performance degradation and packet lost. Suppose we have number of nodes in our network. Source is host node from where data has to be send and destination node is final node. Any active nodes have responsible for the updating of table entry. When source node move freely, new route discovery start. It consists have two schema. First, schema is threshold-based loss classification algorithm distinguishes losses due to link failure by estimating usage of queue based on Relative One-way Trip Time protocol (ROTT). Second is adjusts the retransmission timeout when new route is come in the network than new route broke the present route using transport layer such as ROTT and hops are present**.**

P.Periyasamy1 and 2Dr.E.Karthikeyan "**Performance Evaluation of AOMDV Protocol Based On Various Scenario and Traffic Patterns**" 2011[16] In this paper the performance of AOMDV protocol is evaluated. This protocol is selected because it is very effective

protocol as compared to other protocols in different parameters such as reducing delay, routing load etc. As MANET is a crowd of moving nodes in a random direction in which the dynamic topology is there. To transmit any data different routing protocols are used and play an important role in transmission of data. The routing protocols are off two types in terms of path unipath and multipath. The AOMDV is multipath and it is evaluated by considering four mobility modes which are MGM, RPGM, GMM and RWM. In two different traffic like CBR (Constant bit rate) and TCP (transmission control protocol).In a simulation tools ns2 and Bonn motion. Both CBR and TCP traffic in RPGM mobility model. The results are very effective of AOMDV protocol. In RWM model is used commonly because of randomness in mobility of mobile nodes.

Alan D.Amis, Ravi prakash , **"Load Balancing Cluster In Wireless Ad Hoc Network'',** 2012 [1]They discuss about cluster head to provide longer duration and with no load balancing in network .In this network nodes are move and independent via wireless link .In this mobile node are logically set in the cluster based mean make a group of the nodes which are proximately close to each other .cluster head is that which make a virtual backbone and provide a routing to the packet which is present in the cluster. Cluster head select based upon the node id. In the cluster the assumption is made that nodes have non deterministic moveable pattern. Different nodes and different rules to select cluster head. Several of these rules is based on the some nodes. This is responsibility of nodes may loss their faster energy, that cause nodes leave out of the network. We perform a load balancing heuristic to increase the life of cluster head to the maximum budget before allowing the cluster head to retire and give way to another node. In this paper we provide the longer duration of the cluster head, while decreasing the variance, increase stability. cluster head duration mean once a node is select by a cluster head and stay as cluster head .this is measure of stability ,the longer duration is the more stable the system .

Sreenivas B.C G.C. Bhanu Prakash K.V. Ramakrishnan, **"An adaptive congestion control technique for MANET based on link layer measurements",** 2012 [21] they telling about congestion control is a main problem in mobile networks. Congestion has a severe effect on the routing and throughput, performance. Identifying the occurrence of congestion in a

MANET is a not easy task. So they try to detect the congestion control problem in this paper using technique based upon the link layer base upon the providing method transmission control protocol. The congestion control method provided by Transmission Control Protocol (TCP) is specially designed for wired networks. There are several schema designed over TCP for detecting and overcoming the congestion. This is considered of congestion control design of Link-Layer wireless networks, where the bandwidth and delay measured at each node along the path. Based upon the calculated values the receiver calculates the newly size window and transmits this information to the sender as feedback. The sender behavior is altered correctly. The proposed method is also reliable with standard TCP.

Prof. S.A. Jain, Mr. Abhishek Bande, **"An Improvement In Congestion Control Using Multipath Routing In Manet",** 2012 [17] they proposed the connections between nodes, which have many advantages for mobile ad hoc network. Mobiles nodes are move and there is no centralized management. Routing is an main factor in mobile network which works well within a narrow network, but it also work well when network area get extended dynamically. Routing in MANET is an important responsible identity considered among all the issues. Mobile nodes in ad hoc have limited capacity for transmission, they communicate with each other through multi hop. Multi hop routing have many issues such as restricted wireless bandwidth, low device power, high vulnerability to Failure, and dynamically changing network topology. For solving these issues, many routing algorithms in ad hoc were proposed. These algorithms provide the routing table for moving the nodes from one place to another place .But one most famous problems occurs in routing algorithm is congestion which reduce the overall performance of the network so in this paper we are trying to found the best routing algorithm which will help improve the congestion control mechanism among all the Multipath routing protocols.

Archana Shukla,Sanjay Sharma, **"Queue Length based Load Balancing Technique using with AOMDV Protocol in MANET"** 2013 [4] they introduced load balancing algorithm in queue length based multipath in Routing. Multipath routing gives the alternative path between the communications between devices. AOMDV protocol is elaborated from a AODV protocol. For discovering multiple paths occur from the one source node to

destination to use AOMDV route discovery protocol. Multiple paths is guaranteed they are loop free and disjoint in the multipath routing if first path break the load balancing algorithm provide the dynamically topology. It provide the dynamically nature because load balancing due to the dynamic and unpredictable nature .AOMDV protocol used for communication between the source and receiver. Load balancing algorithm is used for congestion control as per existing network traffic levels and node processing loads. AOMDV provide the increment in routing as compare to simple AODV protocol. AOMDV have advantage it create multiple paths between the sender to destination in a one route discovery process. So, they need discover new, when the chance of the paths fail. In AOMDV protocol with queue based which help to decrease the congestion by using non congestion route to send message, packet and move the load if the packets start out to the congested. In other word paths which exist in the network have long life and nodes have small queue length. Queues are selected for the packet routing along them. AOMDV protocol give the identification of the possible multiple node path start the source to destination and path identify based upon the performance of the nodes.

Shancang Li, **"Adaptive and Secure Load-Balancing Routing Protocol for Service-Oriented Wireless Sensor Networks",**2014 [22]they proposed that Service-oriented architectures for wireless sensor networks have been suggest to provide an area which is integrated, where new applications can be occurring developed through flexible service. In wireless sensor network the existing multipath routing schemes have demonstrated the effectiveness of traffics distribution over multipath to full fill the quality of service requirements of applications. However, the link failure might significantly affect the transmission performance, reliability and scalability, security of wireless sensor network. Thus by considering the congestion control, reliability and security for multipath, it is desirable to design for a reliable and service-driven routing scheme to provide efficient and failure-tolerant routing scheme. In this paper, an evaluation path vacant ratio and metric is proposed to evaluate and then find a set of link-disjoint paths from all available paths. A load balancing and congestion control algorithm that can adjust the load over multipath is proposed. A sharing threshold algorithm is applied to split the packets into multiple segments that will be delivered via multipath to the receiver depending on the vacant path ratio.

Simulations elaborate the performance of the secure and adapting load-balance routing scheme.

Harpreet kaur, Gurbinder singh brar "**To Propose a Novel Technique To Reduce Link Failure Problem In MANET",** 2014 [9] In this paper focus on the link failure. In MANET mobility of node is decrease the performance in network. At data transmission time some node are move. When nodes are move that time link failure occurs in the network and data will not received by the receiver. They will use the B-AODV (backward AODV).B-AODV is novel technique as compare to AODV give the best path recovery. To reduce link failure based upon the signal strength, hop account and sequence number when AODV broadcasted the route request at that time the header length is added with route request which is helpful for find a destination when destination receive the route request after that destination check the vicinity of the each adjacent node and that node check further using this procedure. after that source node find the average path, average path is selected based upon the maximum average value and that average value lie between 1 to 10 .using this to find the best signal strength and hop count is find based upon the shortest path and use sequence number. But in this paper they are not checking the energy of each node if energy of node is decrease that cause also link failure occur.

Er.Rubia Singla, Er.Jasvir Singh, **"Review on Node-Disjoint Multipath Routing Based on AOMDV Protocol for MANETS", 2014** [7] they explain the NDMP-AOMDV protocol. This protocol is node-disjoint (no common link between nodes). AOMDV is multipath if one path is fail then chose the alternative path. In this node-disjoint it has two routes one is backup route and another is main route, transmission is always take place through main route. If main route fail then the backup route is selected for transmission the data. Backup route is alternative. Using backup route delay is decrease because in single path when link fail the time pause for establishing a new path which cause slow data transmission and packet loss. This protocol work on route maintain, discover and selecting phase. Route maintain is used in both phases i.e. is discover and selective. NDMP-AOMDV protocol work in efficient manner as compare to AODV protocol. There are different routes available in NDMP-AOMDV. If the link through main route is fails than backup route is selected they improve

this route selection process and also improve node-disjoint concept based upon congestion threshold. In order to satisfied the user application requirements.

CHAPTER 3
PRESENT WORK

3.1 Problem formulation

MANET is a group of nodes which are free to move with wireless network interfaces without any fixed structure. So MANET have many characteristics like resource constraints, No infrastructure, limited physical security and dynamic topology, it is assessable to a number of attacks. The main problem occurs when transfer of data from source to destination is of congestion problem in AODV protocol. As we discussed earlier in MANET number of nodes are present which move freely in the area. In mobile network controller is not present. So moves are free to move easily so it is self configuring system. So when send packet from source to destination congestion control problem occur easily due to free or easily movements of the nodes. To overcome the problem of congestion in the network various techniques of load balancing had been proposed in the previous times. Among all the proposed techniques multiple path routing is the most efficient and advanced technique for a load balancing in energy efficient mobile adhoc networks. In the proposed technique dynamic queues are defined on the basic of threshold values for load balancing in MANET. As discussed earlier, MANET is the self configuring network in such network it is very difficult to define threshold values in the AOMDV, so for improving in routing we use EAOMDV protocol and EAOMDV provide multipath routing. In this work, we will enhance the proposed EAOMDV protocol for load balancing in MANETs. The enhancement will be based on the actual values of the networks. Link failure leads to problem of network performance degradation, delay, packet loss and consume more energy. As shown in figure 3.1 network is deployed with finite number of nodes. Path is established with AODV routing protocol. Data transfer begins from source to destination through established path. At one moment, intermediate node moves from its actual position. Due to this, link failure problem occurs and packet loss problem starts at node 3 in figure 3.2.

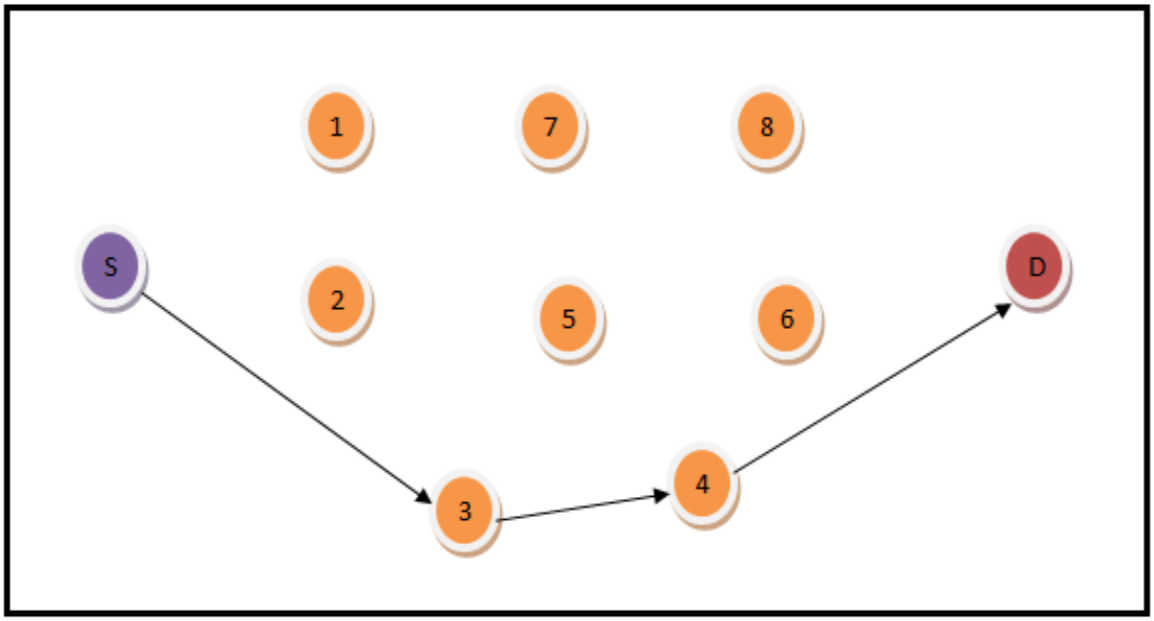

Figure 3.1 Path Establishment in MANET

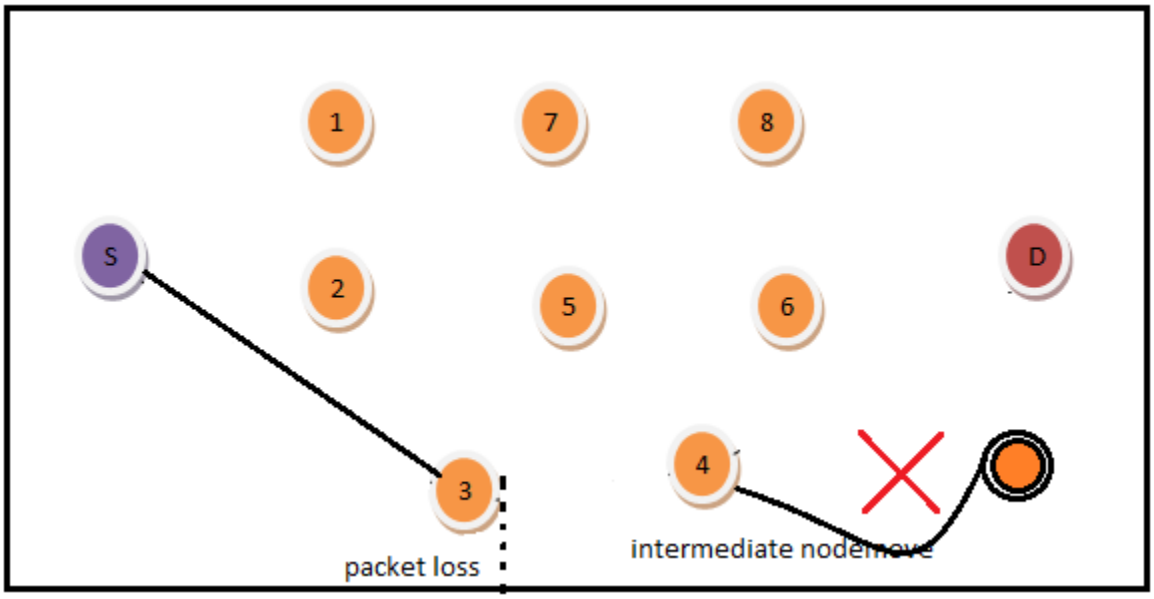

Figure 3.2 Link failure occur due to node 4 move

3.2 Objectives

The aim of the study is:-

1 To Propose enhancement in EAOMDV protocol for congestion control in MANET.

2. The novel technique will be based on knowledge based learning which increases network reliability and throughput.

3. To analysis and improve the network reliability by enhancing the EAOMDV protocol.

4. To implement proposed technique and compare results with the existing problem.

3.3 Research Methodology

The MANET is the mobile ad hoc networks which is the self configuring type of network. The self configuring means that any mobile nodes can join or leave the network when they want. The nodes are deployed in the network and path is established according to EAOMDV protocol from source to destination. There are some nodes which is more moveable in the path. Due to these nodes link failure problem occurs. So link failure problem is responsible for performance degradation and low reliability of the network. A novel technique is proposed to overcome link failure problem in EAOMDV.

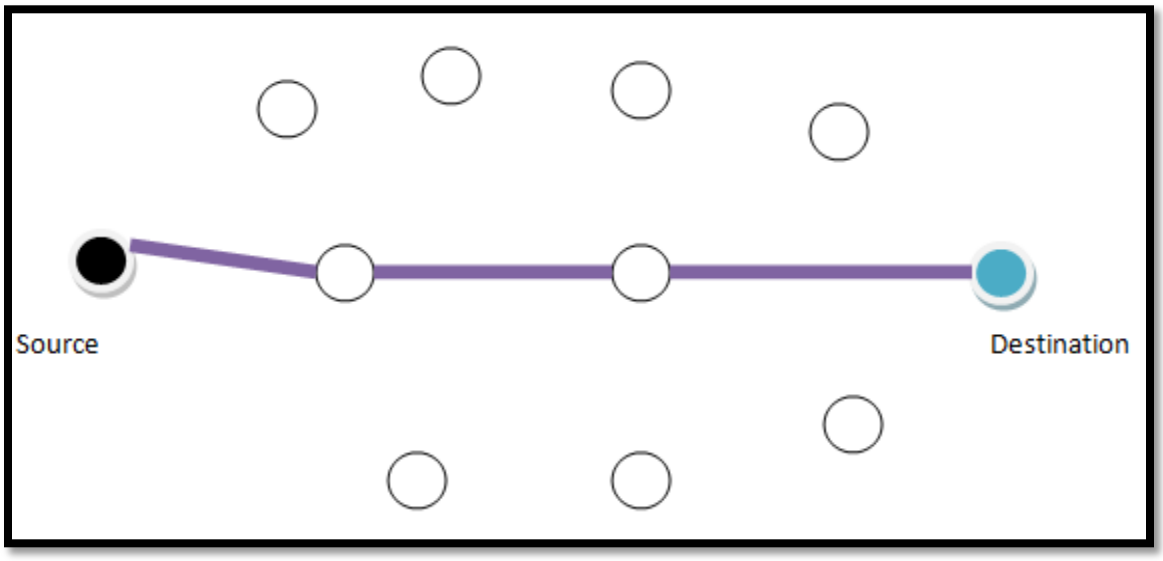

Figure 3.3 Data Transmit through final path

In figure 3.3 Final Path has been established using AODV protocol. Now source sends packet from source to destination through intermediate nodes.

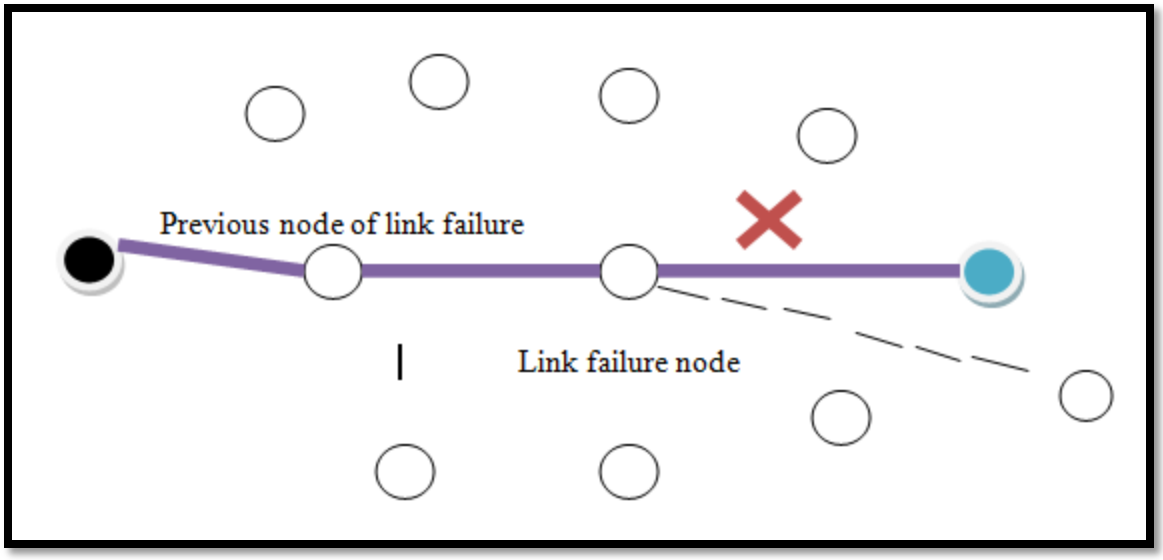

Figure 3.4 Link Failure problem occurs

In figure 3.4 Source sends packets through optimal path. In the mean time, one intermediate moves from its position. Now connection between two nodes fails and link failure problem occurs.

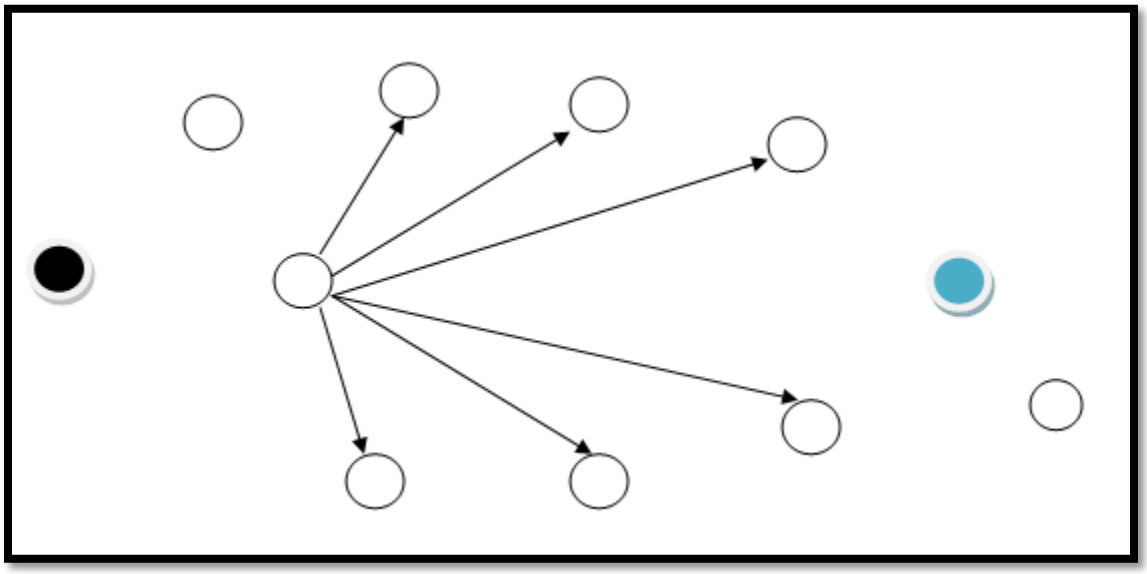

Figure 3.5 Previous node of link failure Floods message

In figure 3.5 When link failure problem occurs than the node previous to link failure nodes floods message to its adjacent nodes in the forwarding position to get the reply message of battery power of each node.

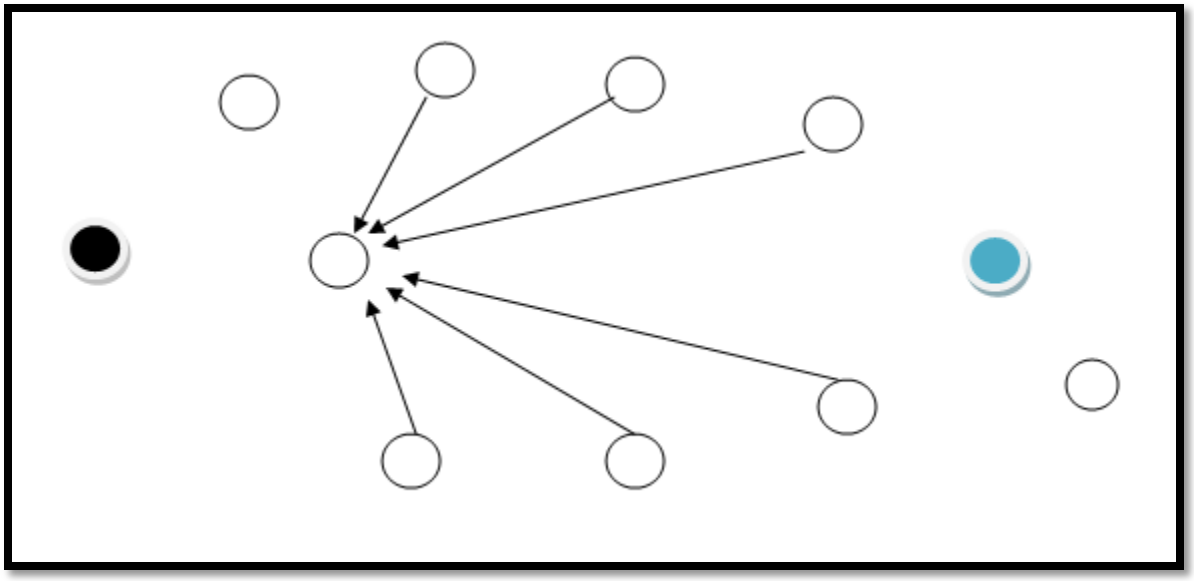

Figure 3.6 RREP to update table

In figure 3.6 now all the adjacent nodes send RREP message to the message sender node with their battery power. The message sender node maintain table for all the nodes. In table, Node number and their battery power are written.

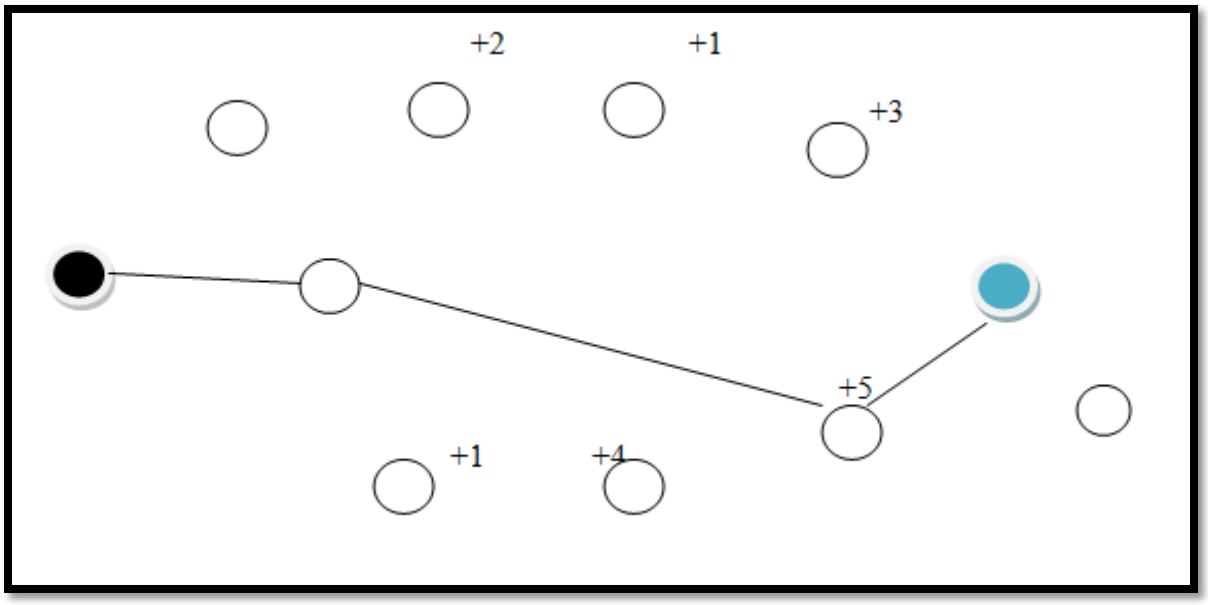

Figure 3.7 Choose new optimal path

In figure 3.7 the message sender node selects the node which has the highest battery power. New path will be established using node of highest battery power to recover link failure.

ALGORITHM

Set M Mobile Node's

Set S sender and R receiver

Node Routing = AOMDV

Set Route

{ If (route from S to R found)

{ Check number of route;

If (route => 1) //means alternative route exist in network

{

Find (energy of each route && energy > 20)

Select only 3 routes as a best route //shortest path

Send route acknowledge through all exist path }

}

Else {route unreachable} } {

Source send(Ping message, adjacent nodes)

{

Adjacent nodes revert back to source which can recover path

Check (Node which has higher energy is path recover node)

{

Increment-Q;

Store incoming data;

} Receiver receives data from I node;

Send ACK to sender S ;} } }

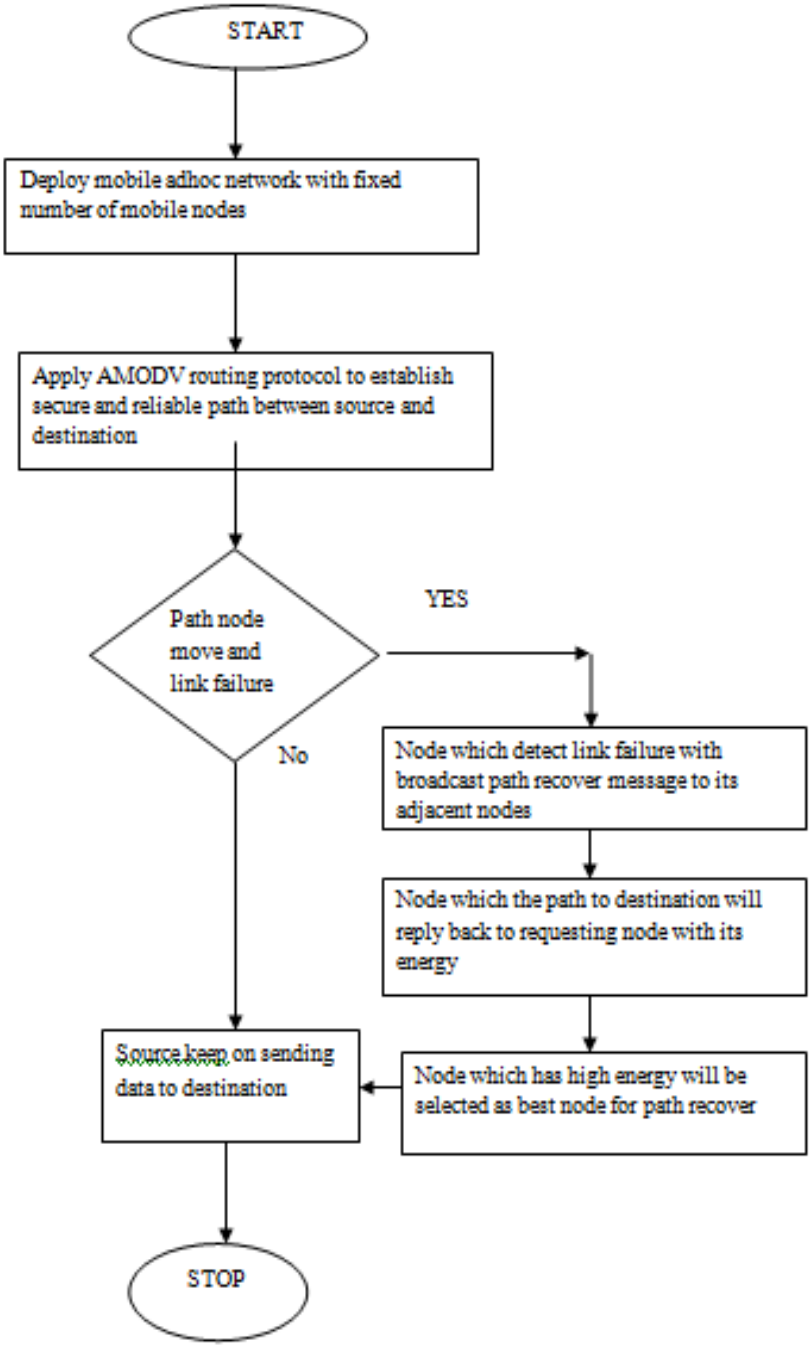

Figure 3.8 Flow Chart of Research Design

CHAPTER 4
RESULTS AND DISCUSSIONS

NS2 Overview: The network simulator deployed by UC Berkeley maintained by USC.NS2 is developed for supporting network research and education. So that to study the traffic and protocol design and also to compare some protocol.NS2 provide collaborative environment. It is freely available and open source code. Two machine language is use C++ and OTcl. C++ is run fast but slower to code and change. On the other hand OTcl is easy to code but run slowly .It require detailed simulation of protocol (Run Time Speed) varying parameters and configuration.NS2 support wired, ad hoc routing and sensor network. There are different model which are used in NS2 like constant bit rate and random way point model.NS2 has mainly 4 components

1. NS2 the simulator itself
2. nam animator by which a user can slow the graphical representation.
3. Pre processing which is traffic and topology generator.
4. Post processing is simple trace analysis.

There are various steps for writing a script in NS2

- Turn on tracing
- Setup routing
- Transmit application level data
- Create the event scheduler
- Create transport connection
- Create network
- Insert errors
- Create traffic

4.1 Problem Implementation

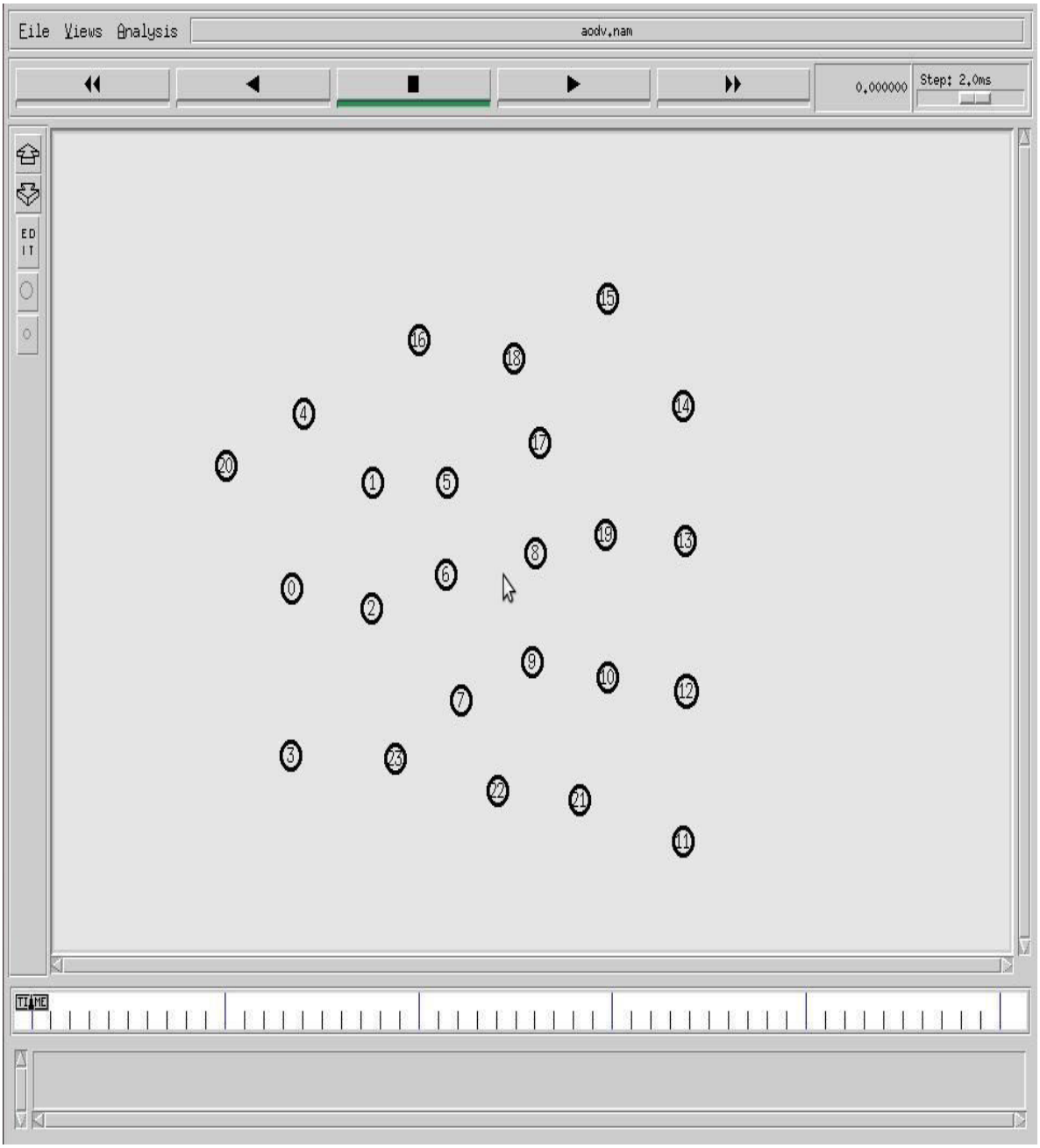

Figure 4.1: Network deployment

As shown in figure 4.1, fixed numbers of mobile nodes are deployed in a network. The nodes are adhoc is nature and can participate or leave the network when they want.

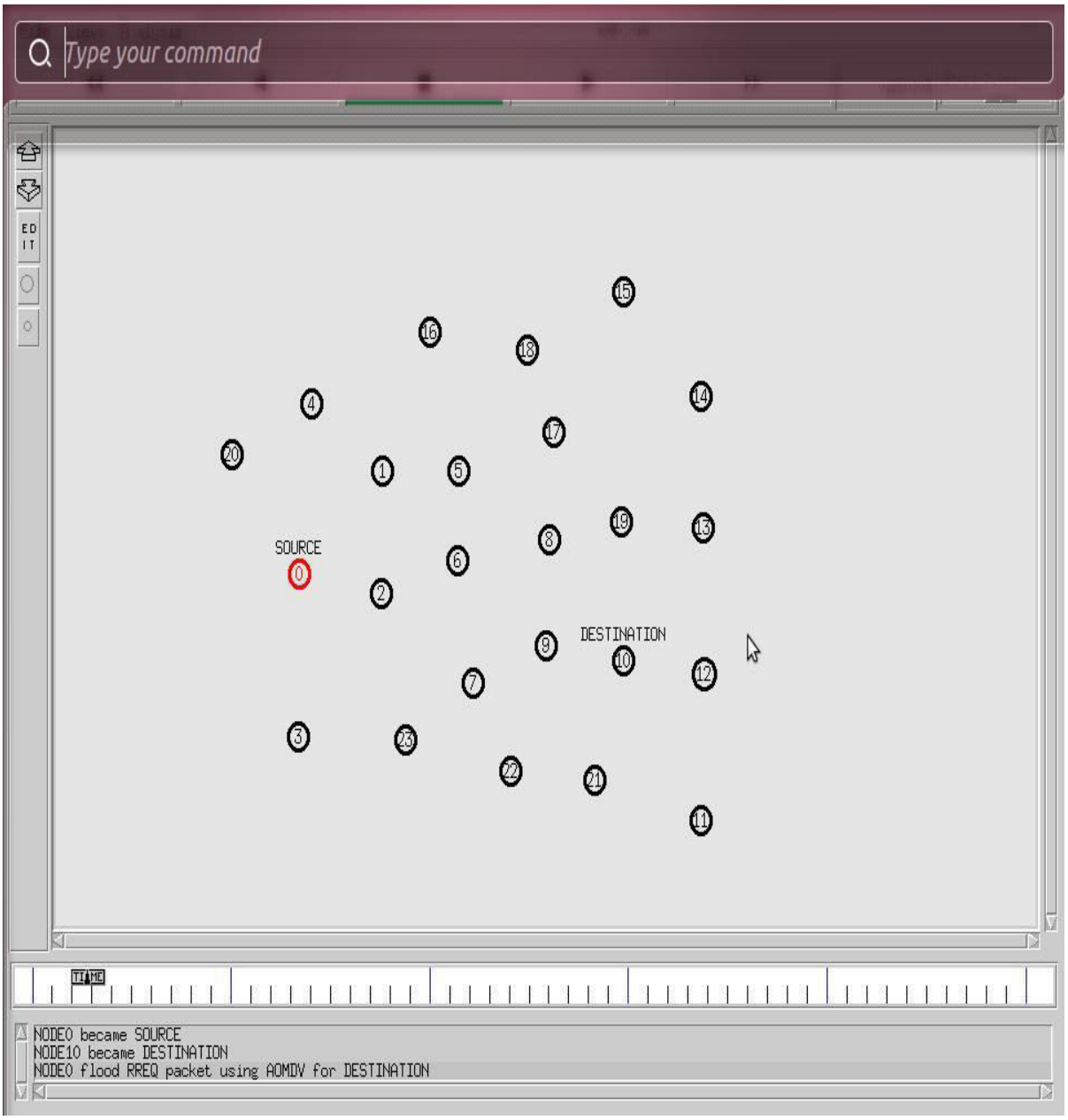

Figure 4.2 Source and destination declared

As shown in figure 4.2, fixed numbers of mobile nodes are deployed in a network. The nodes are adhoc is nature and can participate or leave the network when they want. In the network which is deployed source and destination nodes are declared.

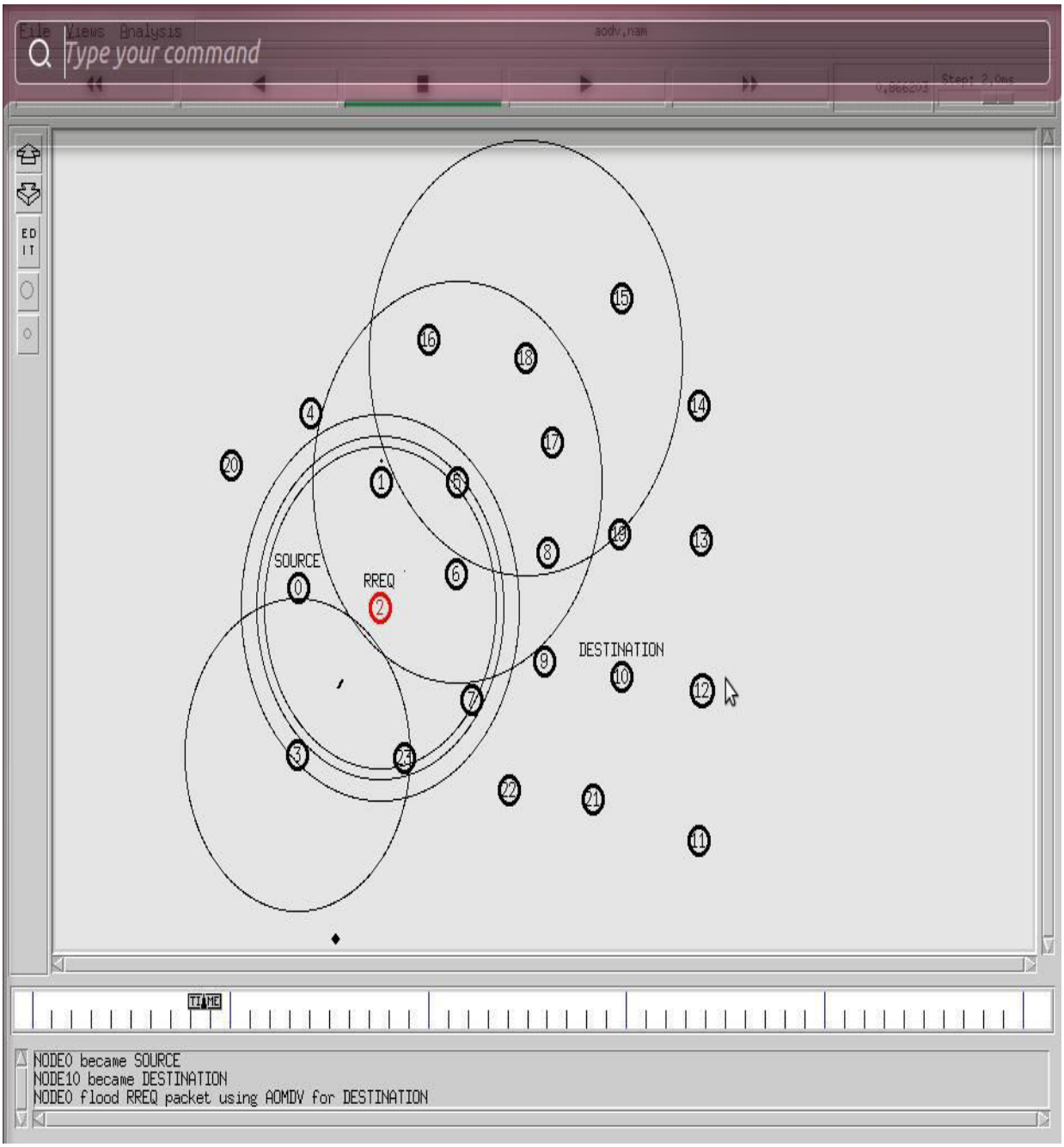

Figure 4.3 Flooding of route request packets

As shown in figure 4.3, fixed numbers of mobile nodes are deployed in a network. The nodes are adhoc is nature and can participate or leave the network when they want. In the network which is deployed source and destination nodes are declared. The source node flood route request packets in the network to establish path to destination.

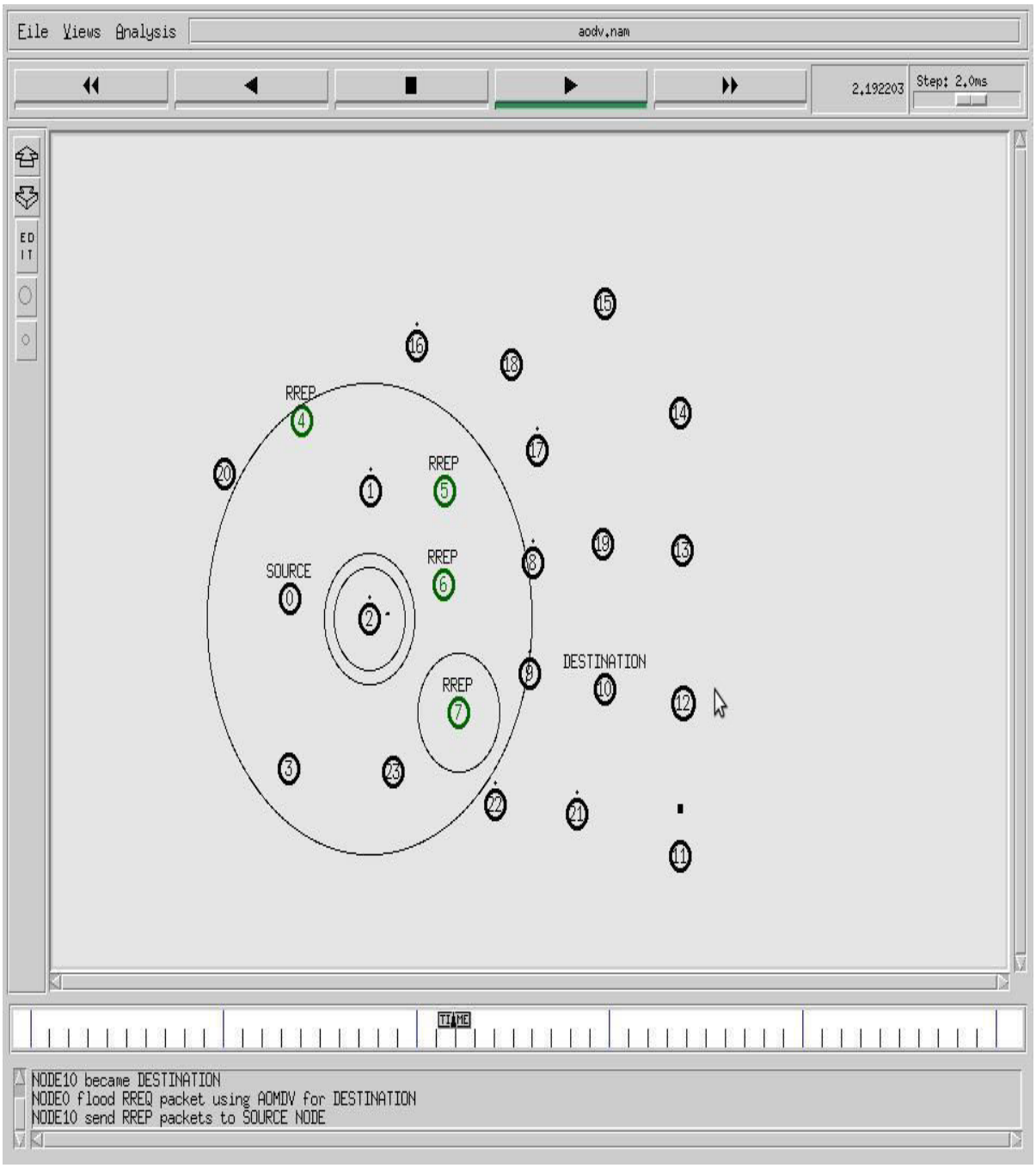

Figure 4.4 Receiving route reply packets

As shown in figure4.4, fixed numbers of mobile nodes are deployed in a network. The source node flood route request packets in the network to establish path to destination. The adjacent nodes of destination which is having direct path to destination which reply back with route reply packets.

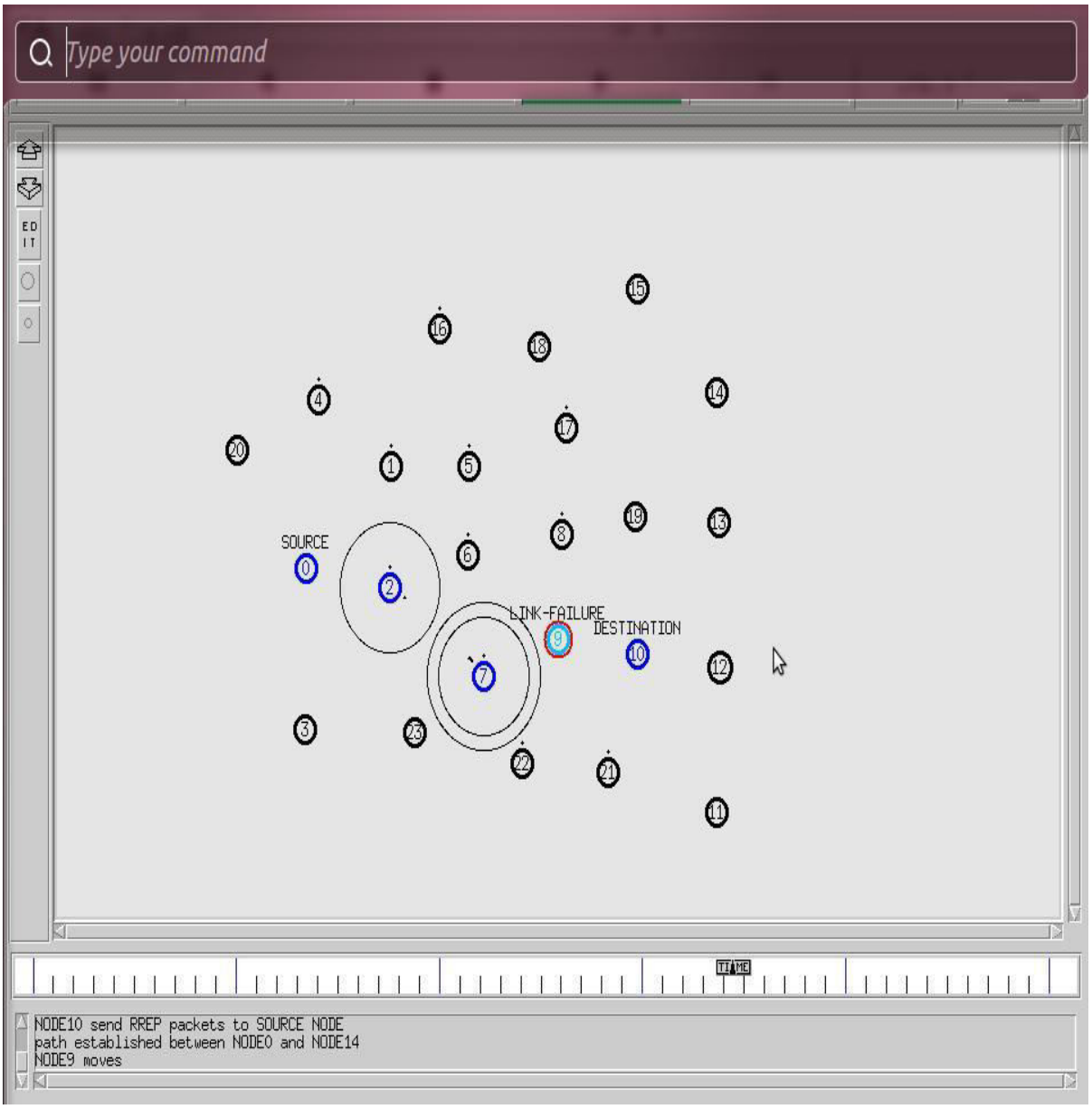

Figure 4.5 Path establishment and link failure

As shown in figure4.5, fixed numbers of mobile nodes are deployed in a network. The source receives route reply packets from various paths. The source node select best path from source to destination on the basis of hop count and sequence number. The path which is selected has minimum hop count and maximum sequence number. In the selected path, mobile node changes its position due to which link failure occurred.

4.2 Solution Implementation

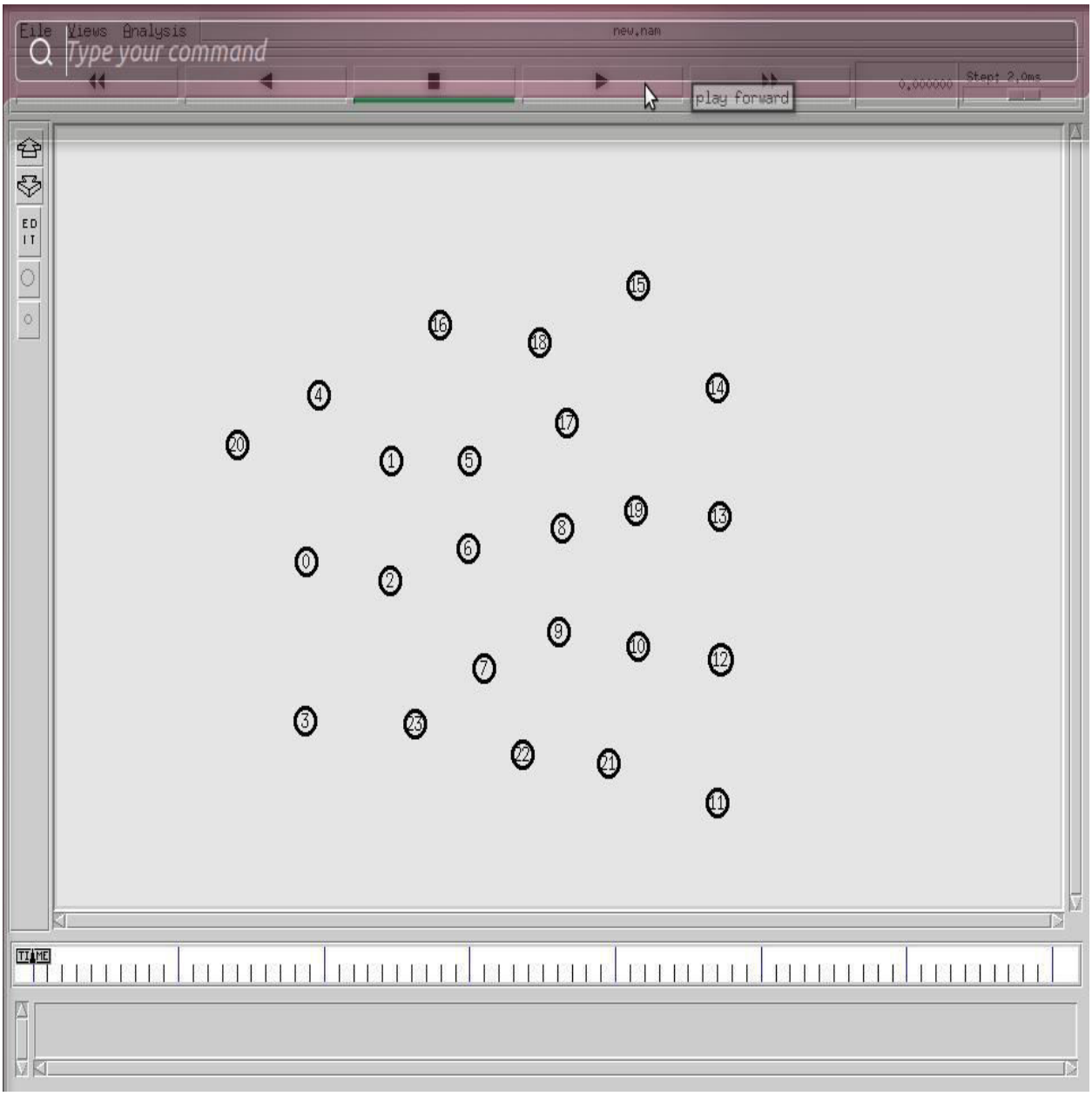

Figure 4.6 Deployment of the network

As shown in figure 4.6, fixed numbers of mobile nodes are deployed in a network. The nodes are adhoc is nature and can participate or leave the network when they want.

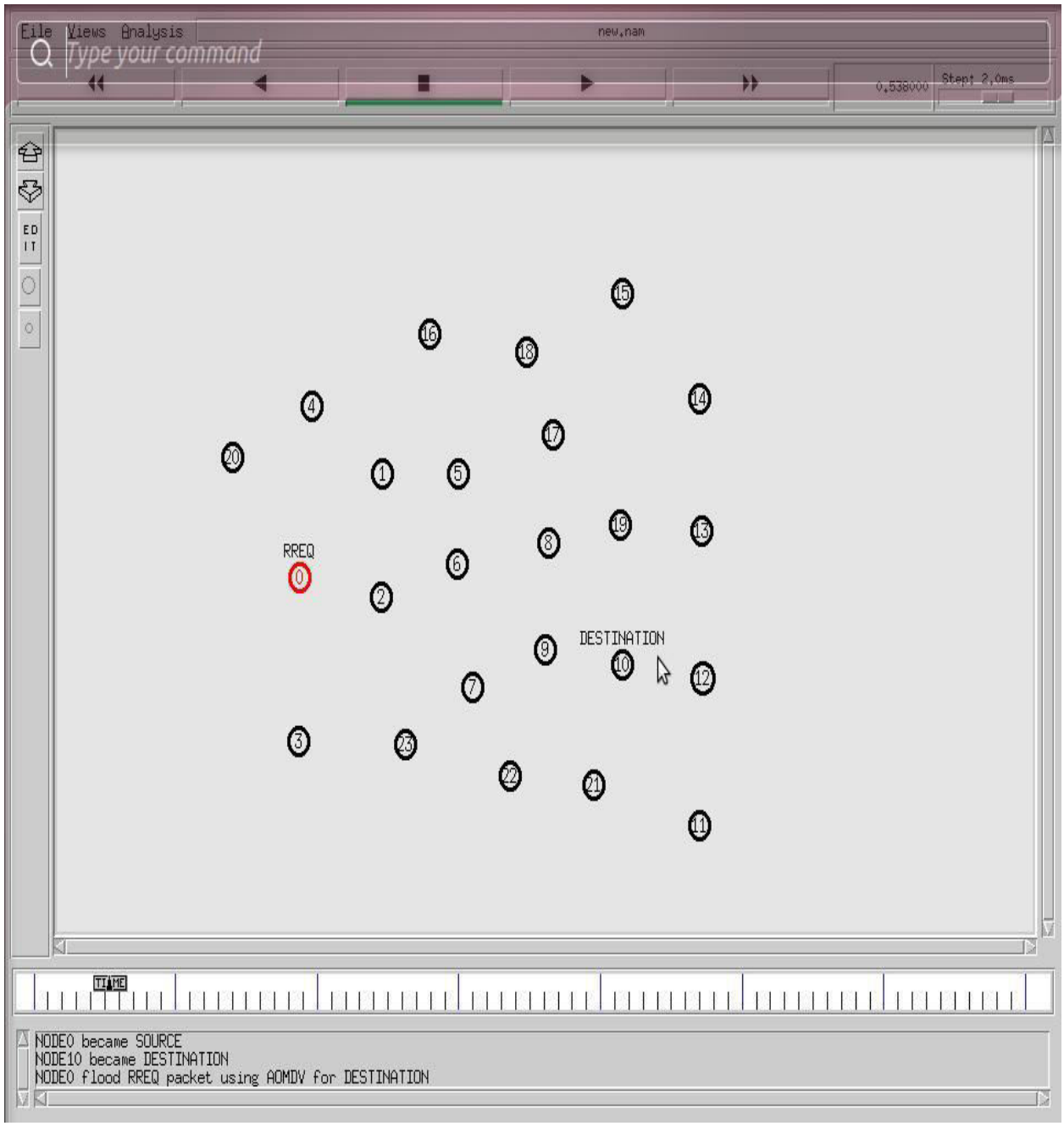

Figure 4.7 Source and destination declared

As shown in figure8, fixed numbers of mobile nodes are deployed in a network. In the network which is deployed source and destination nodes are declared.

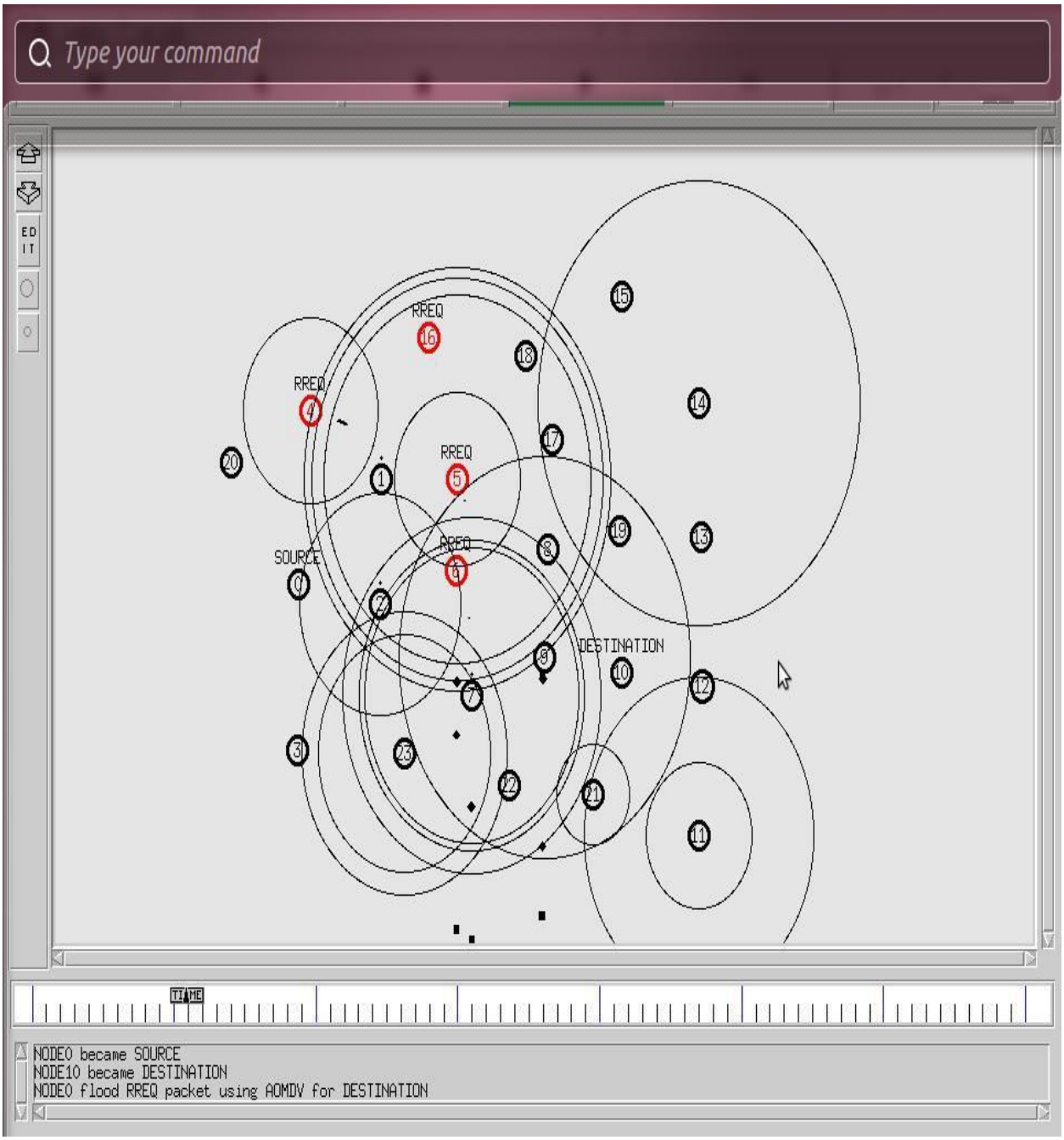

Figure 4.8 Flooding of route request packets

As shown in figure4.8, fixed numbers of mobile nodes are deployed in a network. The node is ad-hoc is nature and can join or leave the network when they want. In the network which is deployed source and destination nodes are declared. Flood of route request packets are delivered by the source node in the network to establish path to destination

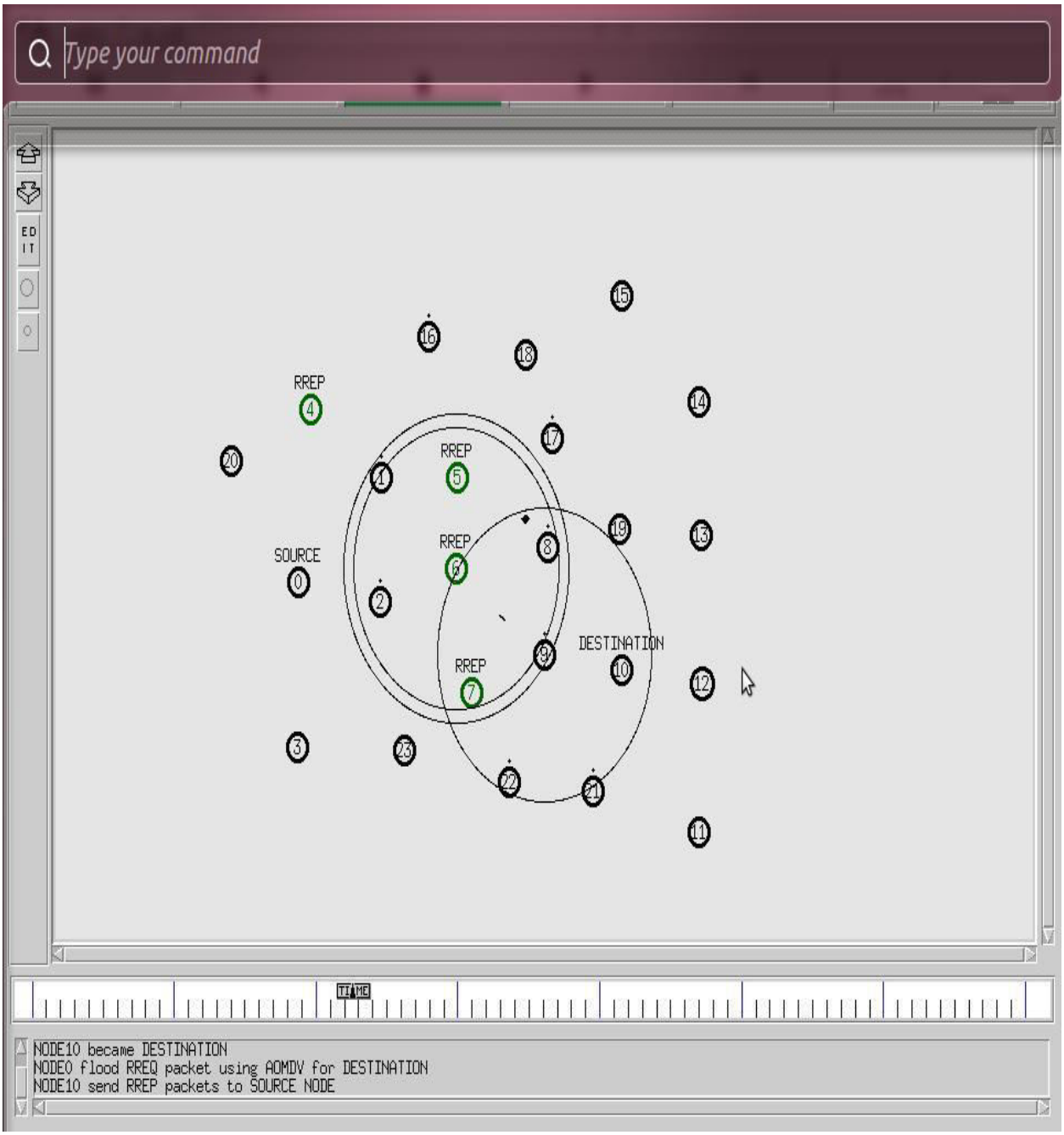

Figure 4.9(a) Receiving route reply packets

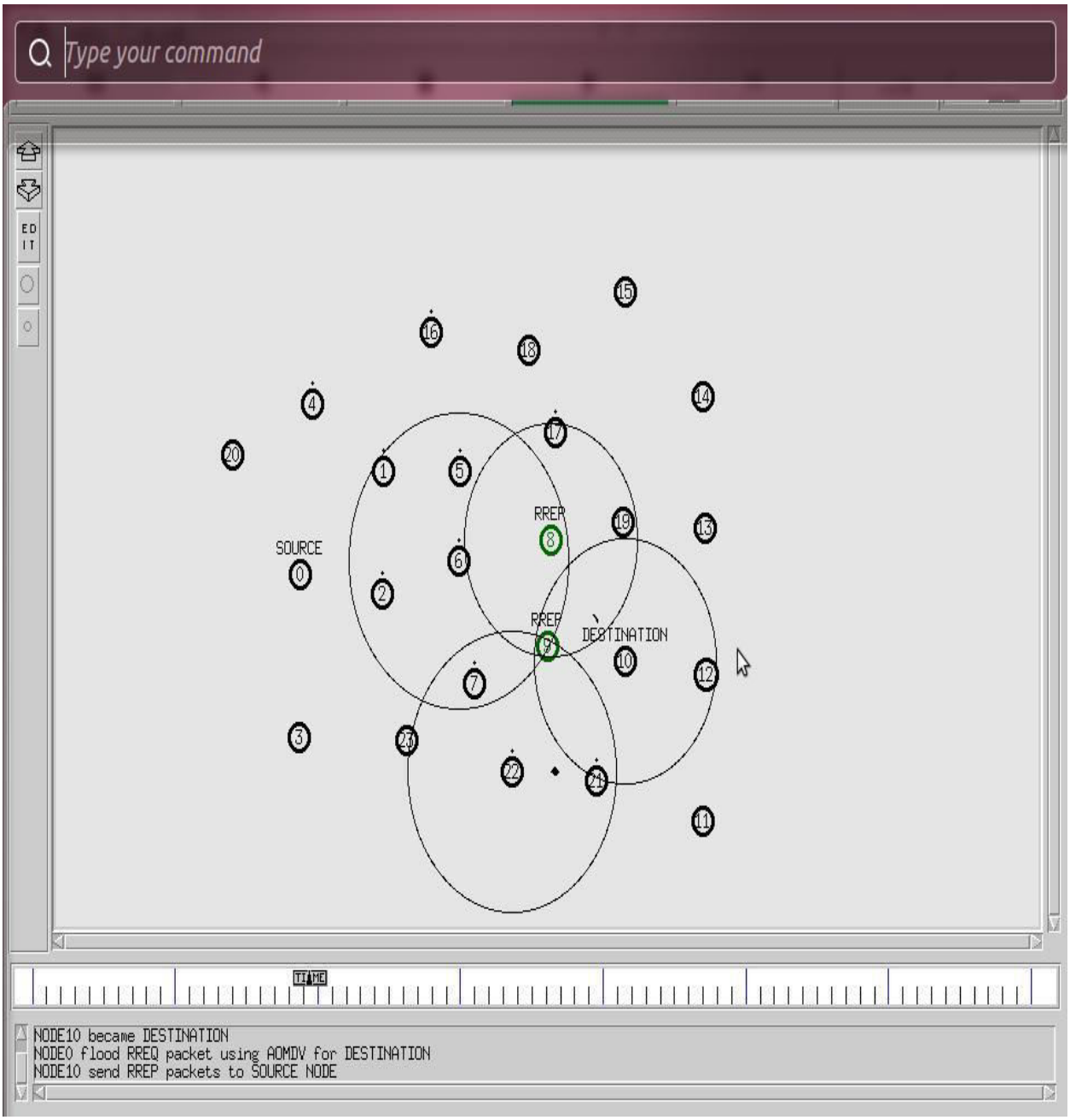

Figure 4.9(b) Receiving route reply packets

As shown in figure4.9 (a,b) the fixed number of mobile nodes are deployed in a network. The source node flood route request packets in the network to create path to destination. The adjacent nodes of destination which is having direct path to destination which reply back with route reply packets.

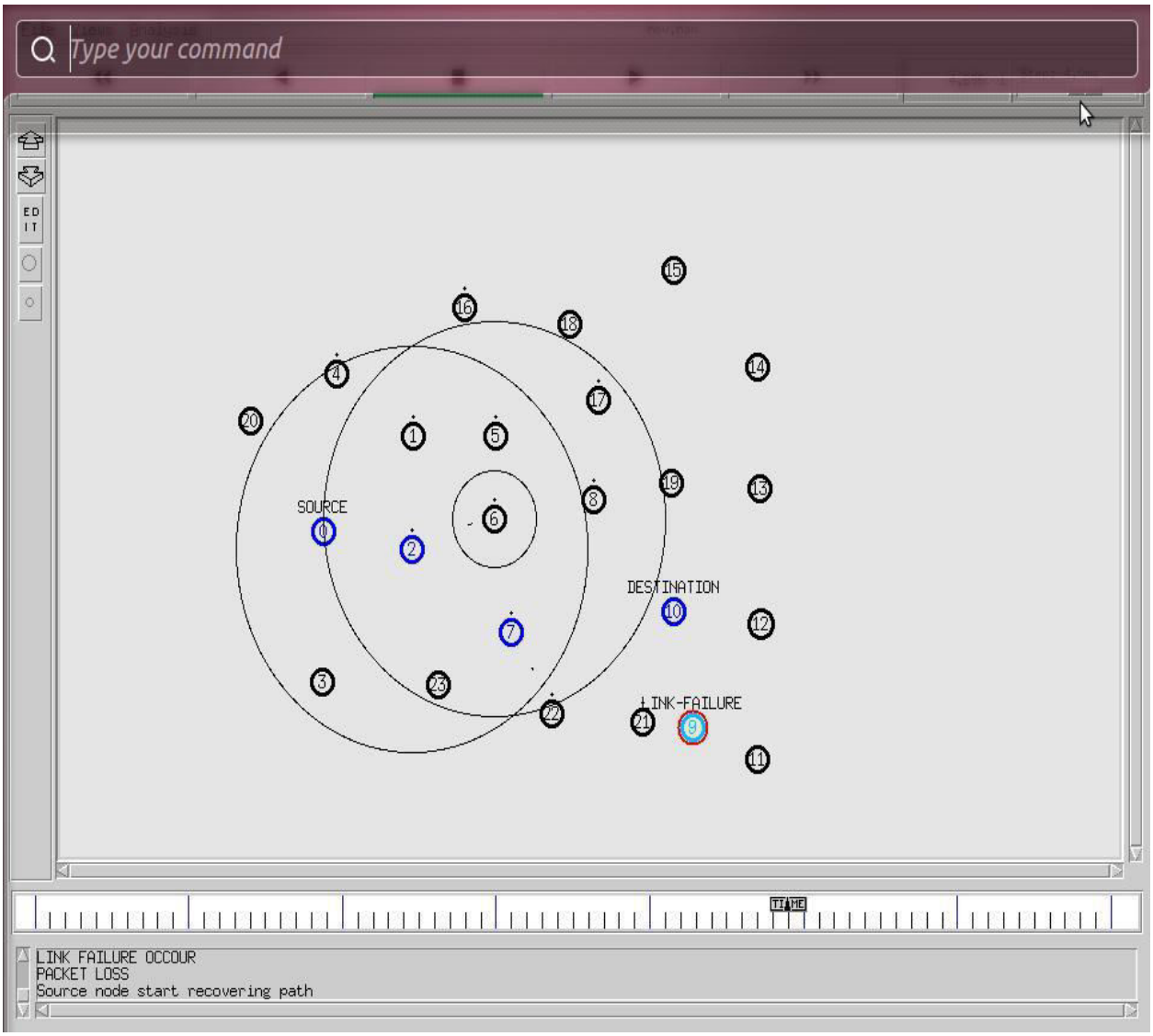

Figure 4.10 Link Failure in established path

As shown in figure4.10, fixed numbers of mobile nodes are deployed in a network. The node is ad-hoc is nature and can leave or join the network when they want. In the network which is deployed source and destination nodes are declared. Flood of route request packets are delivered by the source node in the network to establish path to destination. The adjacent nodes of destination which is having direct path to destination which reply back with route reply packets. The path is established between source and destination on the basis of hop count and sequence number. The link failure problem may cause due to node mobility. The node which detects the link failure will send link recover message to its adjacent nodes. The revert back with its batteries and source node receive the message and store by maintaining a table.

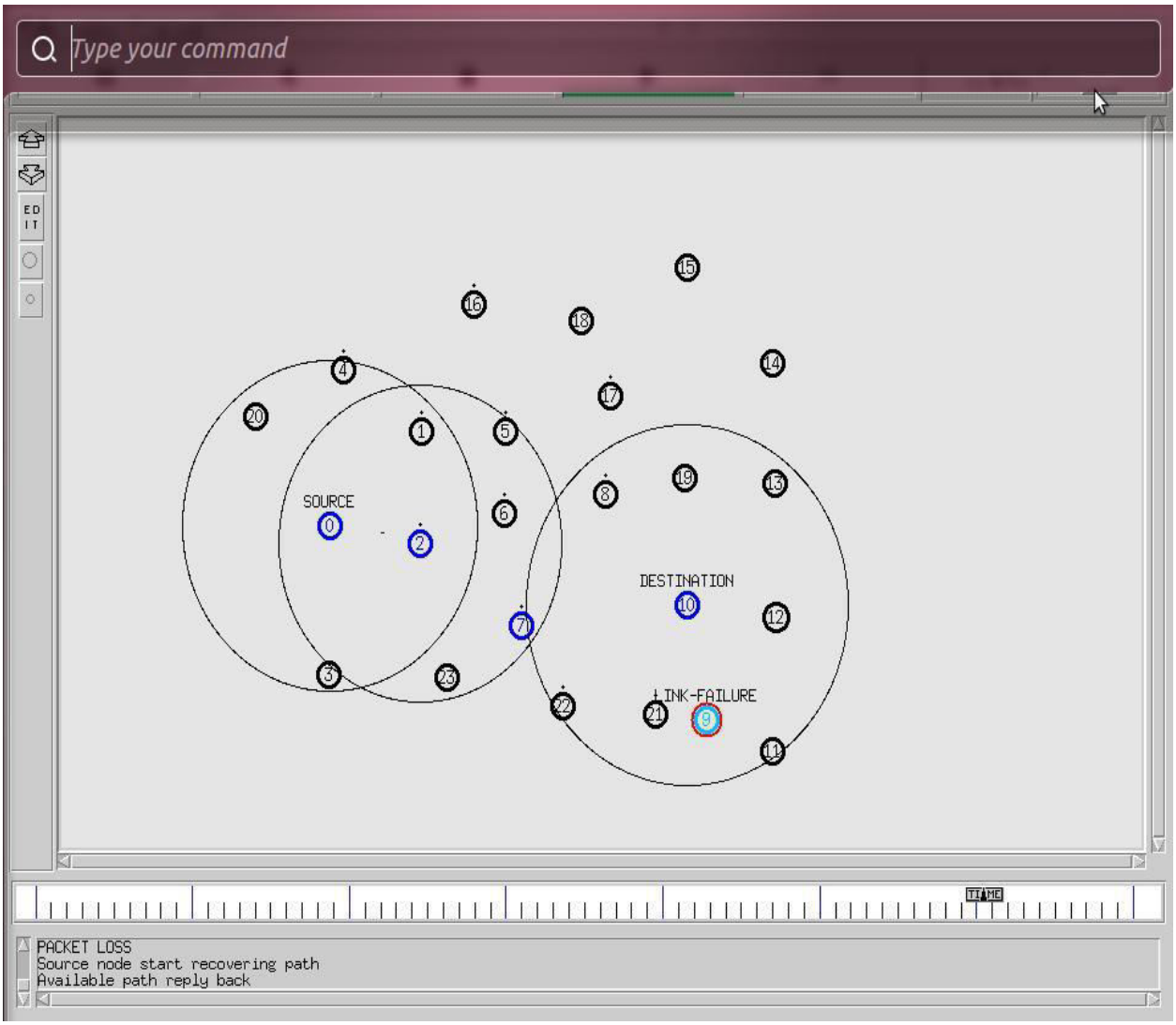

Figure 4.11 Path recovered

As shown in figure14, fixed numbers of mobile nodes are deployed in a network. The node is ad-hoc is nature and can join or leave the network when they want. In the network which is deployed source and destination nodes are declared. Flood of route request packets are delivered by the source node in the network to establish path to destination. The adjacent nodes of destination which is having direct path to destination which reply back with route reply packets. The path is established between source and destination on the basis of hop count and sequence number. The link failure problem may cause due to node mobility. The node which detects the link failure will send link recover message to its adjacent nodes. The revert back with its batteries and source node receive the message and store by maintaining a table. The nodes which have high battery power are used to recover the failed path.

4.3 X-Graph

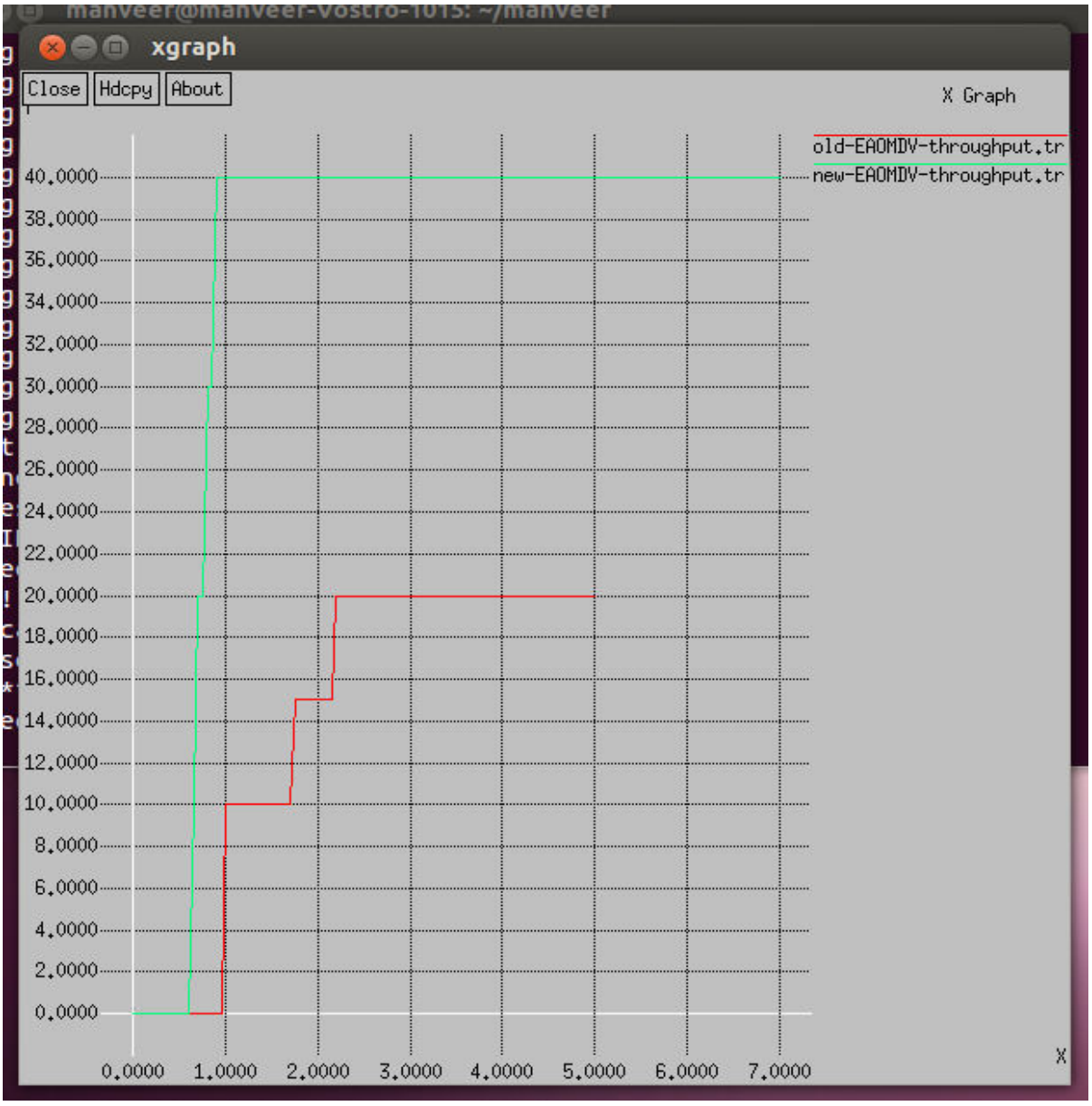

Figure 4.12 Throughput graph

As shown in figure 4.12, the throughput graph is plotted in which the old throughput in which link failure scenario is analyzed. The new throughput is shown with green line in which link failure problem is resolved. The graphs shows that throughput of new scenario is better than existing scenario.

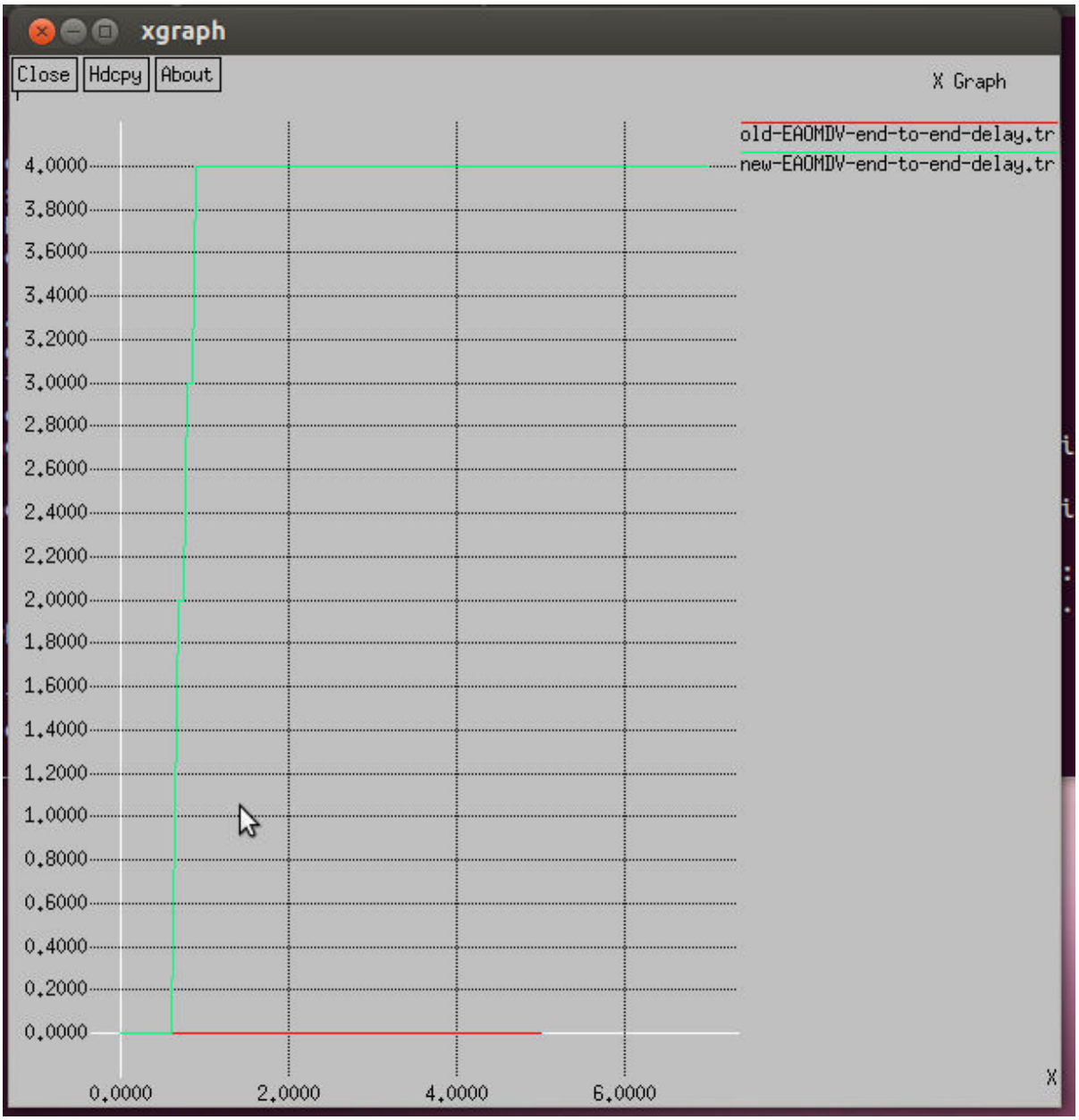

Figure 4.13 End-to-end delay graph

As shown in figure 4.13, the graph is plotted of end-to-end delay in the network. In this graph red lines shows the graph of old scenario in which link failure caused. The second green line is of new scenario in which problem is link failure is resolved. The delay in new scenario is less as compared to old scenario.

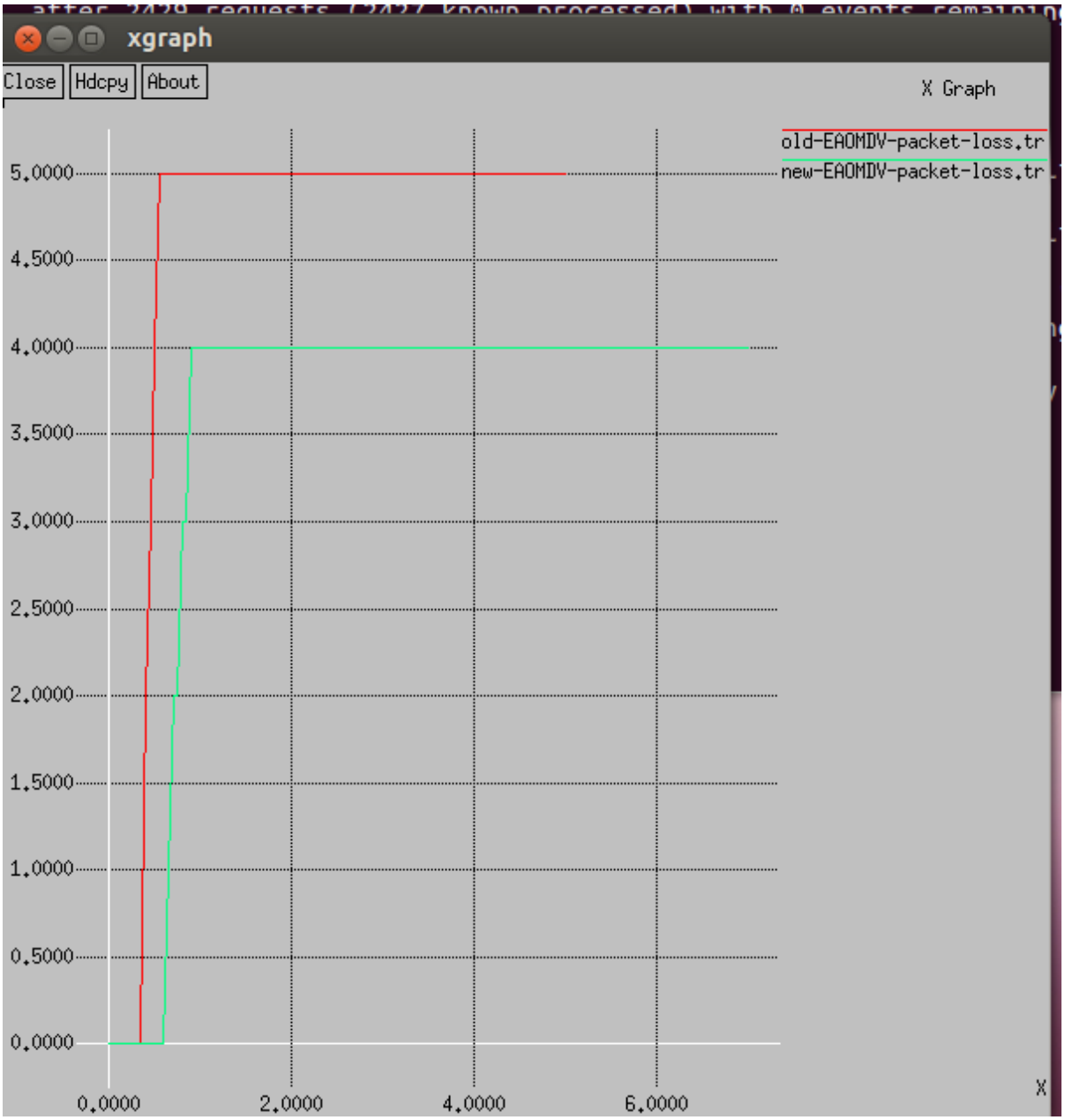

Figure 4.14 Packet-loss graph

As shown in figure 4.14, the packet-loss comparison is shown between old and new scenario. The old line is of old scenario in which packet-loss is more due to link failure. In the new scenario packet loss is less because the problem of link failure is resolved in the network.

CHAPTER 5
CONCLUSION AND FUTURE SCOPE

As MANET is the self configuring type of network, the problem of load unbalancing generally exists. During data transmission there is a problem of link failure in MANET which decreases network performance and reliability. In the previous type various techniques had been proposed for load balancing. The most advanced and energy efficient technique is multipath routing which is based on dynamic queue threshold values. In this work enhancement in the proposed technique will be done to increase its efficiency in terms of energy, throughput and delay. A new technique had been proposed to recover path from source to destination which will be broken due to link failure in the network. In this work, novel technique had been proposed to recover established path using concept of energy. In future, enhancement will be proposed in novel technique for path recover and that technique will have less packet overhead as compared to proposed novel technique. The technique with less packet overhead will consume less network resources in terms of bandwidth.

CHAPTER 6
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CHAPTER 7
APPENDIX

Abbreviations

AODV: Ad hoc On Demand Distance vector routing Protocol

AOMDV: Ad hoc On-demand Multipath Distance Vector Routing

B-AODV: Backward Ad hoc On Demand Distance vector routing Protocol

DSDV: Destination-Sequenced Distance Vector routing

DSN: Destination Sequence Number

DSR: Dynamic Source Routing

EAOMDV: Energy Ad hoc On-demand Multipath Distance Vector Routing

GMM: Gauss-Markov Mobility

IGP: Interior gateway protocol

IP: Internet Protocol

LSA: Link-state advertisement

MAC: Media Access Control

MANET: Mobile ad hoc network

MGM: Manhattan Grid Mobility

NDMP: Node Disjoint Multipath Protocol

OLSR: Optimized Link State Routing Protocol

OSPF: Open Shortest Path First

RREQ: Route Request

RREP: Route Reply

RERR: Route Error

RIP: Routing Information Protocol

RPGM: Reference Point Group Mobility

RTO: Retransmission Timeouts

RIPV: Routing Information Protocol Version

ROTT: Relative one Way Trip Time Protocol

RWM: Random Way point Mobility

SPF: Shortest Path First

TCP: Transmission Control Protocol

TORA: Temporally ordered routing algorithm

TR: Trace File

UDP: User Datagram Protocol

VLSM: Variable-Length Subnet Masking

VINT: Virtual Internetwork Test-bed

WMN: Wireless Mesh Network

WSN: Wireless Sensor Network

ZRP: Zone Routing Protocol