DSR and OLSR Routing Protocol Based Performance Evaluation and Integration on MIP with MANET

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APPROVAL

This Project titled **"DSR and OLSR Routing Protocol Based Performance Evaluation and Integration on MIP with MANET"** submitted by Sadia Humaira, Shamara Fahin, and Ashraf Siddik to the Department of Information and Communication Engineering (ICE), Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Electronics and Telecommunication Engineering and approved as to its style and contents. The presentation was held on January, 2019.

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We hereby declare that; this project has been done by us under the supervision of **Dr. A.K.M Fazlul Haque, Professor Department of ETE and Associate Dean, Faculty of Engineering, Director, IQAC, Daffodil International University**. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

In the modern era mobile users are growing day by day, So, the demand of low delay, real-time application, scalable network, best quality of service, low packet loss and the proper handoff is the concern in the large area network. This paper describes the integration of mobile IP in mobile ad hoc network in large area network between 8 nodes, where latency, delay, throughput is considered for the quality of service consideration. For the best result of MIPMANET, the dynamic source routing protocol (DSR) and optimized link state routing protocol (OLSR) are considered. Although MANET has others routing protocol in MIPMANET integration in NS2 the DSR performs better. Mobile IP is used for doing the dynamic topology to static topology as the nodes are movable in an ad-hoc network. There will be some discussion about the home agent, foreign agent, mobile node, handoff. There is also shown the good things about mobile ad hoc network and mobile IP. The simulation results suggest that the MANET is better in dynamic source routing protocol with MIP as the amount of packet drop is low and throughput is high.

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Chapter 1

Introduction

1.1 General Introduction

Presently a-days varieties of systems with varieties of targets are existing together under the heterogeneous condition. It is fundamental from the client perspective to have the pervasive method of system availability and all-inclusive straightforward to every one of the clients. In the meantime, a new application requests more transmission capacity and lower costs. Therefore, a great deal of intrigue has been produced among the analyst amid recent years giving a straightforward omnipresent correspondence between divergent systems under heterogeneous condition. Our point is to concentrate such endeavors of mix utilizing the system layer convention Mobile IP. We use organize test system NS-2 for recreation. NS experiences various incongruencies and weaknesses, which limit its use and advancement of conventions for new situations in wired, remote, portable and identified with future heterogeneous systems. Our point in this paper is to show a reasonable and summed up the technique for executing versatile IP convention [1].

IEEE 802.11 standard depends on Wireless neighborhood (WLAN) and has turned out to be exceptionally prominent as the remote system requests increment. WLAN offers rapid (up to 54 Mbps) contrast with different remote principles with higher client mobility highlights and minimal effort. WLAN likewise underpins a wide range of utilization like sight and sound and voice that utilization IEEE 802.11 conventions, for example, VOIP, video conferencing, live broadcast, video spilling mixed media gushing and so on. Nature of Services (QoS) is a standout amongst the most imperative parameter to be considered while giving and supporting these mixed media and ongoing administrations to end-clients [2]. Handoff is the way toward changing the channel (recurrence, vacancy, spreading code, or the mix of them) related to the present association while a call is in advancement. It is regularly started either by intersection a phone limit or by crumbling in nature of the flag in the present channel.

Communication has moved from a transcendently wired setup towards a completely remote setup, or a merger. PC systems help in quicker and dependable interchanges over long separations. The Internet, a system of systems, has turned into an essential utility in our lives that empower us to impart far and wide [3]. Versatility as an element in correspondence has picked up the acknowledgment of end-clients. In this way, it isn't amazing that Mobile Ad hoc Networks (MANETs) have pulled in much consideration from specialists. A MANET is a self-sufficient, framework less, self-forming and self-fixing information system of cell phones that help multi-jump correspondence. MANET could be utilized to give Internet availability past the scope of settled or cell framework [1].

On the Internet (IP) condition, when a portable hub moves and connects itself to another system, it needs to acquire another IP address. This changing of IP address implies that all current IP associations with the versatile hub should be ended and afterward restored. This is fundamental as the IP steering systems depend on the topological data implanted in the IP delivery to convey the information to the right end-point. Portable IP (MIP) depicts a worldwide arrangement that conquers this issue using indirection given by a lot of system operators. It doesn't require any alterations to existing switches or end reporter hubs. With MIP, every portable hub is distinguished by a location from its home system, paying little respect to the point of connection. While a portable hub is far from its home system, it gets an IP address from the meeting system and registers it with a home operator inside its home system [4]. The home operator blocks any parcels bound to the portable hub, and burrows or expressly courses (source steering) them to the versatile hub's present area. Subsequently, starting this indirection requires an opportune location reconfiguration system and a home system enlistment process. The time is taken for a portable hub to arrange another system care-of location in the meeting system, and the time taken to enroll with the home specialist together establish the (generally) handoff dormancy [5].

Mobile IP is the present standard for supporting IP mobility of mobile hubs in the remote systems with the framework. Mobile IP empowers the portable hub to get to the Internet and changes its passageway without losing the association. The mobile hub ought to be in the inclusion scope of Mobile IP base station (passage) and has an immediate association with it [3]. MANET is a sort of remote system design that can be adaptably conveyed in any condition (e.g., gathering rooms, backwoods, front lines, and so on.) without the need of system framework or concentrated organization. Every hub in a MANET fills in like a switch and performs mobility functionalities in a self-governing manner. Integration of MANETs to the settled framework IP get to organize has numerous utilization situations, and it gives numerous references to both Infrastructure and MANET arranges together. MANET clients can get to the Internet and access an extensive variety of Internet administrations and applications [1]. Due to the restricted inclusion of MANETs, joining of MANETs with the settled foundation IP get to the network can build this inclusion. Joining of MANETs with the settled framework IP get to arrange dependent on IP portability conventions empowers MANET hubs development between various MANETs without losing the association. It can give portability bolster between various nonoverlapping and covering MANETs with different doors [6].

1.2 Objective

In the last few years, wireless communication has improved many enhancements works. Day by day mobile users are increasing and wants to roam freely and access to internet services anytime anywhere in the world. In that case, the ad hoc network is the easiest way because we can design that type of network anytime anywhere and it is helpful where users cannot depend on infrastructure. For supporting scalable, efficient and compatible network it is necessary for existing application and internet protocol like mobile IP. The goal of mobile IP is to maintain TCP connection between the static host and mobile host whatever their location will be changed. We want to design and analyze solutions for using mobile IP on Dynamic Static routing protocol in mobile ad hoc network. We also want to reduce delay time and latency in MIPMANET integration. Besides, we measure the quality of service (QoS) for this network.

1.3 Motivation

Wireless networks have two modes like infrastructure and ad hoc mode. Infrastructure mode has some complexity because here devices communicate through an access point like router and it is more costly than ad hoc as they use hardware device. But ad hoc is the easiest way to design anywhere anytime for emergency situation. When devices or products are connected by internet of services or IoT there will be happened many problems like latency increasing, delay increasing. So, latency is the concern for devices that can run effectively. As mobile ad hoc is dynamic topology that's why mobile IP is useful as it has static IP. So, when one mobile host pass away to another through foreign network there will be handoff. So, it is important to simulate how mobile IP works with the increasingly expanded mobile usage in mobile ad hoc network.

Chapter 2

Background and Related Work

2.1 Literature Review

In a proposition for associating MANET to the Internet utilizing Mobile IP is displayed, in which an altered Routing Information Protocol (RIP) like DSDV was utilized in directing parcels inside the MANET. In this proposition, a solitary steering table is utilized and shared by Mobile IP and the MANET directing convention, to diminish the administrative assignments associated with keeping up isolated steering tables for Mobile IP and the MANET convention. Along these lines, a course director is acquainted with arranging course table administration between Mobile IP and the altered RIP on the common steering table. With this, neither Mobile IP or the changed RIP could alter the steering table straightforwardly. Course control demands are sent to the course supervisor which at that point follows up in the interest of the conventions. Despite the fact that this proposition was fruitful in giving Internet access to the MANET, it was progressively proactive and did not bolster responsive MANET conventions; since it depended on the intermittent control messages of the MANET directing convention to engender specialist advertisement.

In the paper title “Hierarchical Mobile Ip Ns-2 Extensions for Mobile Ad Hoc Networks” This paper portrays and assesses augmentations for the help of the various leveled Mobile IP convention in the Network Simulator (ns-2). These augmentations take into consideration the meaning of staggered orders while taking into consideration the programmed arrangement of reproduction situations. The progressive association of the Mobile IP foundation plans to upgrade its mobility and to quicken handovers that outcome in low bundle misfortune.

Also, the quality of service draft “Low Latency Handoff for Wireless IP QOS with Neighbor Casting” described Neighbor Casting, for use in wireless IP, organizes that use neighboring Foreign Agent [FA] data. Neighbor Casting depends on the arrangement of using, or maybe notwithstanding squandering, wired transfer speed between Foreign

Agents, while limiting rf (radio frequency) data transmission trades, all together that handoff inactivity is limited.

Again, the title “A Survey of integrating Ip Mobility protocols and Mobile ad hoc networks” described the development of the Internet and its administrations and applications and have prompted an expanding interest for empowering MANET hubs to associate with the Internet and utilize its administrations and applications.

And the paper title “Mobile IP on Mobile Ad Hoc Networks: An Implementation and Performance Evaluation Using NS2” discussed consolidating MANETs with the Internet, is the utilization of Mobile Internet Protocol (Mobile IP) nearby a MANET directing convention, to course bundles between the Internet and the MANET, by means of Gateway operators. actualized Mobile IP on Ad hoc On-request Distance Vector (AODV), Ad hoc On-request Multiple Distance Vector (AOMDV) and Destination-Sequenced Distance Vector (DSDV) steering conventions, and thought about exhibitions dependent on Throughput, End-to-End Delay (E2ED).

The paper title “Handoff Management: Issues and Challenges” depicted about underline ideas of handoff and couple of calculations dependent on different strategies, for example, fluffy rationale, hereditary calculations, neural systems, and so on. This paper likewise centers around issues as yet remaining and should be engaged for working up of a proficient calculation for handoff the board.

2.2 Related Work

In the different research paper various work has done about the MANET and mobile IP. A mobile ad hoc network is an infrastructures network, self-configuring where devices connected wirelessly. The correlation between the Mobile ad hoc routing protocol and mobile IP is important for communication in the large area network. The connectivity with the internet changing its access point without losing the connection is the main concern of mobile IP. Many solutions have been proposed to access internet with mobile IP in the MANET. Fekri M.Abdullah et al described a review of answers for incorporating MANETs with the internet, with the plan of filling in as a speedy reference to momentum inquire about proposition for internet availability for coordination is exhibited [7].

Kingsley K. Ofosu et al described the execution of mobile IP on MANET in network simulator 2 (NS2). Ad hoc On-demand Multiple Distance Vector (AOMDV) and Destination-sequenced Distance Vector (DSDV) routing protocols were used to measure throughput, End to End Delay(E2ED), packet delivery ratio (PDR) and normalized packet ratio (NPR) [1]. Nima Sarshar et al described the scaling of the quantity of hops in wireless ad hoc network (WANET) including the problem of network latency, packet loss, power and memory [8].Fredrik Alrisson et al described about MIPMANET to provide internet access by using mobile IP with foreign agent care-of addresses and reverse tunneling and AODV routing protocol was used for routing within the ad hoc network [9].

2.3 Problem Description

MANET is an infrastructure less or decentralized network. MANET is a quickly developing system. MANET is adaptive and self-sorting out in nature. Devices are interfaces with one another and perform correspondence for sharing of information and administrations. Although ad hoc is an easiest network but it has some matter of contention and provocation. Limited Bandwidth is the problem to remote systems has a constrained data transfer capacity in contrast with the wired systems. The remote connection has brought down limit as the contrast with framework systems. The impact of blurring, various gets to, and impedance condition is low in Ad hoc organizes in contrast with most extreme radio transmission rate [10]. Dynamic topology is another problem because the nodes have less most genuine between them. High Routing in Ad hoc organizes because of dynamic topology a few nodes change their position which influences the directing table. The Collision of the packets are held because of the transmission of bundles by those nodes which are not in the immediate transmission scope of sender side yet are in scope of collector side. By expanding in crashes, concealed terminals, obstruction, unidirectional connections and by the portability of nodes visit way breaks a higher bundle misfortune has been looked by Ad hoc networks. Because of the dynamic conduct and changes in the system topology by the development of the nodes [11]. Ad hoc networks face way breaks and it likewise changes in the course every now and again. New security challenges convey by Ad hoc organizes because of its remote nature [7]. In Ad hoc systems or remote systems, the trust the board between the nodes prompts the various security issues. In the present usage of wireless networks, when a node moves to start with one passageway then onto the next passageway, it restores the association each time with an alternate IP address. This expands the Latency of the system and furthermore gives an intruded-on administration. This sort of correspondence can be productively actualized utilizing Mobile IP. Mobile IP, which is an expansion to standard Internet Protocol proposed by the Internet Engineering Task Force (IETF) [9]. It keeps up a similar IP address notwithstanding when the host node moves from one system to the next. While enlisting with the home operator Mobile IP could be reached out to envelop every one of the advancements for consistent portability if the accompanying issues are settled. These are Security Issues, Triangulation Problems, Reliability Issues, and Latency Issues [11].

2.4 Future Work

Amid this thesis, we have come crosswise over many fascinating issues and as the field of specially appointed systems administration still is very juvenile there is a great deal of work that would be exceptionally intriguing to see more of. The MIPMANET idea is still a long way from flawlessness. Numerous parts would be extremely intriguing to ponder in more detail:

i. We didn't work about MIPMANET security. Mobile IP utilizes a solid validation conspire for security purposes. All enrollment messages between a Mobile Node and Home Agent are required to contain the Mobile-Home Authentication Extension (MHAE).

ii. It would be future work how to anchor directing and how to set up a protected key administration benefit in a mobile ad hoc networking systems administration with mobile IP condition. These two issues are basic to accomplishing security objectives.

iii. Utilization of suitable test systems like Qualnet and Opnet Modeler for near investigation of soft handoff and hard handoff can be considered.

iv. Alongside RSSI (relative received signal strength) and speed, the bearing must likewise be considered for getting the precision of the development of the mobile node.

v. What amount does it cost to utilize multicast in ad hoc network systems? If it doesn't be excessively expensive it would be a decent method for making mobile IP versatile in specially appointed systems.

vi. We have not run simulations with various hub mobility. As there are numerous clocks included (reference point time period, solicitation interim etc.) such reenactment ought to be considered.

2.5 Background Information

2.5.1 Latency

Latency is a systems administration term to portray the aggregate time it takes an information bundle to set out starting with one hub then onto the next. In different settings, when an information parcel is transmitted and returned back to its source, the aggregate time for the round trek is known as idleness. Dormancy alludes to time interim or postpones when a framework segment is sitting tight for another framework part to accomplish something. This term of time is called inactivity.

Chapter 3

Mobile IP

3.1 Mobile Ip Review

Mobile IP is meaningful as there are presently more compact gadgets (PCs, palmtops, PDAs, cell phones and so on) that require IP association for the applications running on them. As these portable STAs moves around the system, they at times move out of their home system (the beginning purpose of connection) into an adjacent outside system [5].

In this paper, we will focus on IP adaptation 4 (IPv4) while examining Mobile IP. The reason for this is IPv4 is a more present theme than IPv6 which lies more later on and we trust that it is in this manner all the more fascinating to focus on IPv4.The objective of Mobile IP is to give portability support to a versatile host associated with the Internet without changing its IP addresses. The versatile hub is typically joined to the Internet by a remote connection. This connection may in this way have a much lower data transmission and higher blunder rate than the wired connections on the Internet. It is along these lines an objective of Mobile IP to limit the number of messages sent over the connection by which the portable hub is appended to the Internet and to keep these messages as little as conceivable. Since the portable hubs are probably going to be battery controlled, doing as such additionally lessens the control utilization of the portable hub [1].

3.2 Some Essential Wordings of Mobile IP

i. Mobile Node (MN): A host or switch, which changes its passage starting with one subnet then onto the next without changing its home IP address. MN gadgets are at first related to the home system address, and they can wander from systems to another without changing its IP address. An MN can be any remote gadgets, for example, workstations, mobile phones or even a switch [3].

ii. Home Agent (HA): A switch situated on a mobile node home network. The HA catches the information packets and conveys to the MN. At the point when the MN wander far from its home system and into a remote system, HA recognizes its consideration of location and finds the MN's area. HA utilizes a strategy called burrowing to forward the packets to the remote operator [4].

iii. Foreign Agent (FA): A switch situated in each remote system, which can empower the mobile node to get to the Internet. They catch the information bundles from the HA and redistribute them to the MN. FAs convey guide flags occasionally. As the MN enters the outside specialist go and recognizes these reference points flags, the FA enlists the MN with a consideration of location. With the consideration of location, the HA now advances all information bundles to the predetermined FA [4].

iv. Corresponding Node (CN): A corresponding node is another MIP part which a MN is speaking with. A CN might be another mobile or stationary gadget, or a host [3].

v. Care- of Address (CA): This is a delivery appointed to a mobile node by an outside system. It may be an outside consideration of location, which is a location of the remote specialist, or a co-found consideration of location which is a brief deliver allocated to the MN by the MN itself. Care-of Address enables the HA to demonstrate its present area and conveys the parcels individually. At the point when the MN is enlisted with this impermanent location, the MIP convention signals HA. At that point, the HA advances the information parcels to the remote specialist with this location [3].

vi. Tunnel: The information packets get transported through a passage, where the parcels get typified. A passage is an association between the personal residence and the consideration of location. Burrowing is an instrument utilized by the MIP to exchange any packets over the system through a passage [3].

3.3 How Mobile IP works

For whatever length of time that the mobile node is on its home system, it gets and sends packets as per typical IP components. The home system has an operator, called the home agent (HA) that keeps up data about the area of the MN. The HA likewise transfers bundles to the MN when it is outside its home system, as we clarify underneath.

At the point when the MN moves outside its home system, to what is known as a remote system, it gets the care-off address (COA) in the residential area of the outside system from a specialist in this organization called the foreign agent (FA). The Mobile IP convention can utilize two kinds of COA [12].

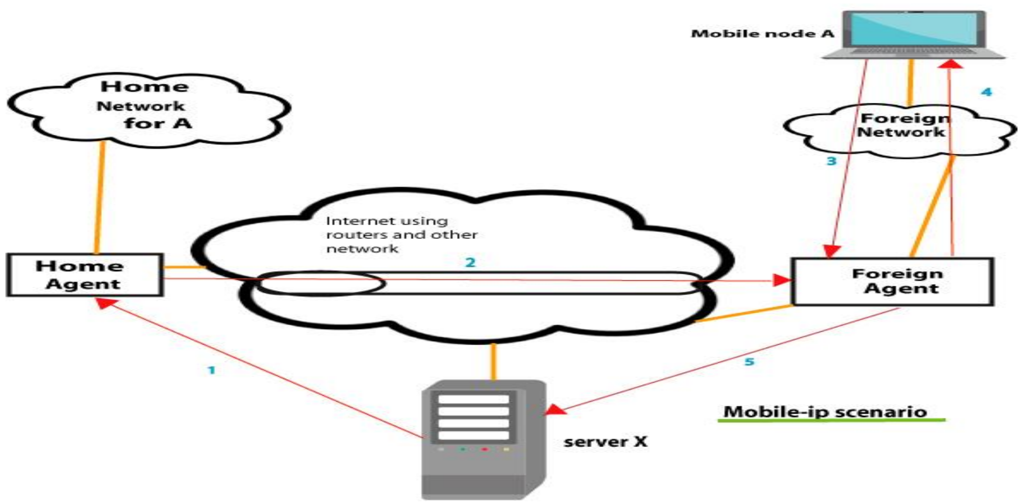

Figure 3.1 Mobile IP Structure

In the first case, the COA is allocated to the MN. For this situation, we say that the COA is co-founded. In the second case, the COA is allocated to the FA and is known as a foreign agent COA. An outside operator COA is the IP address of the remote specialist with which the versatile node is enrolled while a co-found COA is an IP address briefly appointed with the versatile hub. Since it is confused to manage the two cases, we pick in this work to just manage outside operator COAs. Except if generally particularly said, when we discuss COA in this report we mean outside specialist COA. In the wake of having gotten a COA, the MN sends a Registration Request to its HA advising it about its new area [13]. In the main case (co-found COA), the MN sends this Registration Request specifically to the HA. In the second case (FA COA) the MN sends the Registration Request through the FA.

Any hub on the Internet (alluded to as correspondent node, CN) sends bundles bound for the MN to the MN's street number in its home system. The HA captures these bundles and massages them to the COA of the MN. The end of the passage is the FA if the MN has an

FA COA or the MN itself on the off chance that it is a co-found COA. A more definite depiction of Mobile IP can be discovered in [12].

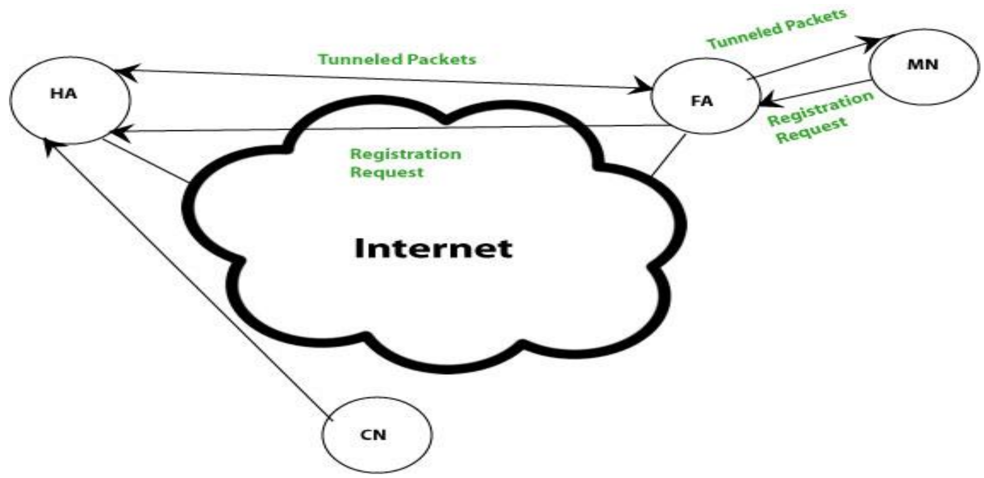

Figure 3.2 MN moving to a foreign network in mobile IP

3.4 Architecture method and basic functionality

Mobile IP utilizes three related components to help its activity [3]:

(1) Discovery of the Care - of-Address: The disclosure component when the MN discovers its new IP address outside its home system as it moves along in the Internet.
(2) Registration with the HA: Once the MN knows the IP address at its new purpose of connection, it needs to enlist that IP address with its Home Agent.
(3) Tunneling to the Care - of-Address: The conveyance of datagrams to the mobile node when the MN is far from home.

3.4.1 Discovery of the Care – of-Address

This is the procedure by which a portable hub recognizes its area on the system, that is, regardless of whether it is on an outside system, in which case IP datagram is sent to it by an HA, or on its home system getting datagram straightforwardly. Disclosure is a persistent procedure, done by the STA, in light of the fact that the handoff starting with one system then onto the next happens at the physical layer and can happen whenever without advising the system layer as the STA travels from an HN to an FN [4]. Home Agents and Foreign Agents communicate specialist commercials [14] at standard interims. These specialist promotions make the HAs and FAs known to a portable hub. On the off chance that an MN cannot anymore hear specialist commercials from an FA that already had offered a COA to the MN, the MN presumes that the FA is no longer inside its range and begins hunting down another COA. There are presently two conceivable outcomes for the MN: it can either enlist with a current FA or scan for again one.

3.4.2 Registration of the Care –of –Address

Enrollment is the procedure by which the versatile hub enlists its new consideration of location with the home specialist. The HA utilizes the new consideration of delivery to coordinate movement bound to the versatile hub to it. The enrollment procedure includes four steps. The four stages included are:

i. The mobile node sends enlistment demand to FA.
ii. FA sends the demand to the HA
iii. HA either supports or denies the demand and sends an enlistment answer to the FA
iv. FA transfers this answer to the portable hub [5].

The above procedure does not hold when the portable hub is utilizing a co-found location (there is no FA). For this situation, the versatile hub discusses straightforwardly with the home specialist. The enrollment message utilizes client datagram convention (UDP), a connectionless convention since the enrollment process includes basic demand reaction correspondence [12].

3.4.3 Tunneling of the Care – of –Address

The HA utilizes IP-in-IP epitome [12] to burrow the datagrams it gets to the MN. This implies that the HA embeds another IP header (additionally called the passage header) before they got datagram's IP header (see Figure 3.3). In this IP header, the MN's COA is the jail IP address and the HA is the source address. As clarified over, the finish of the passage can either be the FA (if the MN has an FA COA) or the MN (in the event that it is a co-found COA). Once gotten by the opposite end of the passage, the passage header is expelled and the first datagram is conveyed to the MN (on account of FA COA).

New IP Number	Original IP Header	IP Payload

Figure 3.3IP Encapsulation

3.5 Problem issue for Mobile IP

There are a few issues with Mobile IP. Two noteworthy issues are the directing wastefulness issue and the loss of bundles amid handovers. We will discuss these two issues in the following two subsections [5].

3.5.1 Routing Inefficiency

In Mobile IP, when a CN needs to send a bundle to an MN, it initially sends the packet to the HA of the MN. The HA at that point sends the bundle to the FA which conveys the packets to the MN. Whenever the CN is near the present area of the MN and the HA is exceptionally far away, this strategy results in a parcel way that is any longer than would normally be appropriate. It is attractive to conquer this issue by some kind of directing improvement and there have been a few recommendations for how to accomplish this steering advancement. A portion of these proposals are outlined in part. Be that as it may, we don't concentrate on this issue in this report [15].

3.5.2 Loss of Packets amid handover

At the point when the MN moves, it will, in the long run, escape its present FA's span and need to enlist with another FA, as we clarified prior. At the point when the MN is outside its old FA's range and previously the HA has gotten the MN's new COA, the HA sends packets bound for the MN to its old FA and in this way the bundles are most likely lost. This is the thing that "loss of packets amid handoff" implies. This loss of parcels is the issue that we center around in this work [3].

Chapter 4

Mobile Ad Hoc Network

4.1 Mobile Ad hoc Networks

A mobile ad hoc (MANET) is an infrastructure less, self-governing, and independent system. A MANET can be adaptable and just conveyed in any condition, yet it has constrained remote inclusion and its network is restricted to the MANET limit. The developments of the Internet and its administrations and applications have prompted an expanding interest for empowering MANET hubs to interface with the Internet and utilize its administrations and applications [1]. Versatile IP and IP micro-mobility conventions empower a portable hub to get to the Internet and change its passage without losing the association. The versatile hub ought to be in the inclusion scope of the passageway and ought to have an immediate association with it. In this way, with the participation between MANET steering conventions and the IP versatility convention, Internet network to MANET hubs can be accomplished. Numerous arrangements have been proposed to empower MANETs to interface with the Internet utilizing IP portability conventions [6]. This article introduces an overview of answers for coordinating MANETs with the Internet, with the purpose of filling in as a brisk reference to momentum investigate proposition for Internet availability for versatile impromptu systems dependent on IP portability conventions [7].

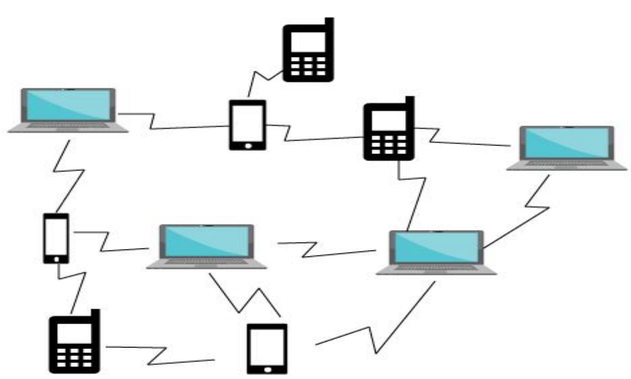

Figure 4.1 Mobile ad hoc network

4.2 Why Mobile Ad Hoc Networks

The key advantage of mobile ad hoc networks is that they don't require any pre-setup correspondence foundation. A specially appointed system can be set up in territories where there is no infrastructure or in a circumstance when the current framework is either unseemly or excessively costly to utilize. The "executioner application" for ad hoc networks is yet to be found, however, there are numerous possible applications as of now [8]. A few situations that are constantly called attention to are fiasco recuperation circumstances with harmed or non-existing correspondence framework and gatherings where members can from brief systems without using any previous infrastructure. The up and coming Bluetooth innovation is another region where ad-hoc organizing appears attractive. Bluetooth gadgets can associate with one another and convey specially appointed, and the short range makes the different capacities of versatile impromptu systems alluring to join [9].

Communication in space is a zone where mobile specially appointed systems administration is exceptionally applicable. The long separations make remote correspondence necessary. Furthermore, there are no settled focuses in space, all hubs are in some sense portable. For adventures profound into space, the separations may turn out to be large to the point that multi hop correspondence is essential so as to reach back to the Earth. In the course of the most recent few years, a few business satellite systems utilizing supposed low-earth-orbiting (LEO) satellites have been conveyed to give satellite-based individual media communications. As these satellites are not geostationary the client utilizes diverse satellites which come into and leave run ceaselessly [10].

4.3 Characteristics

Mobile ad hoc networks specially appointed systems are not the same as different networks in numerous ways. Here are probably the most vital characteristics [12]:

1) Dynamic Topology: Since the node in a mobile ad hoc network system are allowed to move arbitrarily, a course will regularly not be legitimate for as long in a settled system.

2) Restricted transfer speed: Remote connections have generally had exceptionally constrained limit contrasted with wired connections. Furthermore, there are numerous components that can additionally diminish the genuine throughput of a remote connection commotion, impedance, fading etc.
3) Restricted mode limit: Mobile nodes utilizing remote interfaces will normally be battery powered. Thus, vitality is a constrained asset. Since vitality is constrained, the CPU and capacity limit, and so forth are probably exceptionally restricted as well. Different reasons constraining the node's ability are weight and cost.
4) Restricted physical security: Wireless connections are increasingly defenseless eavesdropping, spoofing, and denial-of-service assaults than their wired partners.

4.4 Routing

The principal ways to deal with oversee directing in versatile specially appointed systems were proactive. A proactive directing convention continually attempts to monitor the courses in the system with the goal that when a host needs to send a datagram a course to the beneficiary is known beforehand. Traditional separate vector and connection state steering conventions are proactive [10].

There are some significant worries with applying a proactive way to deal with an impromptu network, caused by the dynamic topology and the constrained vitality of the system. The dynamic topology can make it hard for a proactive steering convention to converge. Control message must be traded intermittently in the system so as to keep a consistent perspective of the system the rate at which these messages are traded decides the maximum rate of the topology changes. Considering the constrained vitality of the hubs in the system visit intermittent back rub are undesirable. what if none of the hubs needs to send any datagrams for a timeframe? The proactive directing convention will, in any case, send its back rubs so as to be prepared at whatever point somebody needs to send [6]. Accordingly, it is conceivable that hubs in the system could come up short on vitality despite the fact that no genuine information was traded.

4.4.1 Dynamic Source Routing Protocol

The Dynamic Source Routing (DSR) is a responsive unicast directing tradition that makes usage of source guiding figuring, where each datum distributes complete the process of coordinating information to achieve its scattering. At the point when the source center point needs to send a package to an objective, it investigates its course store to choose whether it starting at now contains a course to the objective. In case it finds that an unexpired course to the objective exists, by then it uses this course to send the divide [16]. In any case, if the center does not have such a course, by then, it begins the course divulgence process by imparting a course request the package. Each transitional center checks despite whether it knows about a course to the objective. If it doesn't, it connects it convey to the course record of the package and advances the bundle to its neighbors. A course answer is made when either the objective or a midway center point with current information about the objective gets the course request the package. A course request divide to such a center point starting at now contains, in its course record, the gathering of skips taken from the source to this center point [17]. DSR uses two sorts of packs for course upkeep: Route Error package and Affirmations. At the moment that a center point encounters a deadly transmission issue at its data interface layer, it produces a Route Error divide. Exactly when a center point gets a course botch allocate, clears the hop in a misstep from its course store. All courses that contain the hop in a slip-up is truncated by at that point. Insistence bundles are used to check the correct assignment of the course interfaces. This in addition consolidates detached insistences in which a center point hears the accompanying bounce sending the bundle along the course. The DSR tradition is made out of two frameworks that collaborate to allow the disclosure and support of source courses in the extraordinarily designated framework [16].

4.4.1.a Working of DSR

To send a package from source to objective center point, the sender fabricates a source course in the package's header. This course has the area of each center point in the framework through which the package will be end to accomplish the objective center point. The sender transmits the package over the framework by finding the principle center point in the source course [17]. Exactly when a package is gotten at the host, it checks its header and if this host isn't the last objective of the bundle, it essentially transmits the package to the following center point found in the source course in the package's header. As it accomplishes its last objective, the package is passed on to the framework layer of that have. This may result in high overhead for long ways or tremendous areas. To go without using source coordinating, DSR tradition similarly uses a stream id elective that empowers groups to be sent on a hop by ricochet start. This tradition keeps up information on flexible center points since it is in perspective of source coordinating. The DSR tradition is made out of two frameworks that coordinate to allow the disclosure and support of source courses in the unrehearsed framework [17].

4.4.1.b Course Discovery

Course Discovery is the instrument by which a center S wishing to send a parcel to an objective hub D gains a source course to D. Course Discovery is used exactly when S tries to send a bundle to D and don't know the course to D [17].

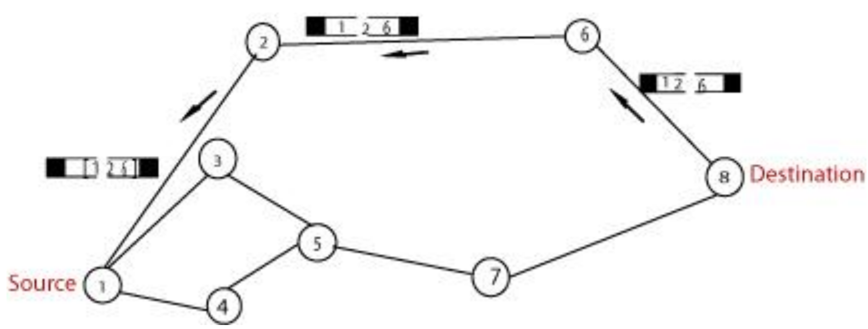

Figure 4.2 Course Discovery in DSR

4.4.1.c Course Maintenance

Course Maintenance is the instrument by which center point S can recognize while using a source course to D. In case the framework topology has changed, this infers it can never again use its course to D in light of the way that the association along the course never again works. Exactly when Route Maintenance demonstrates that the source course is broken, S can use whatever another course that knows the course to D, or request Course

Discovery once more to find another. Course bolster is used exactly when S is truly sending groups to D [16].

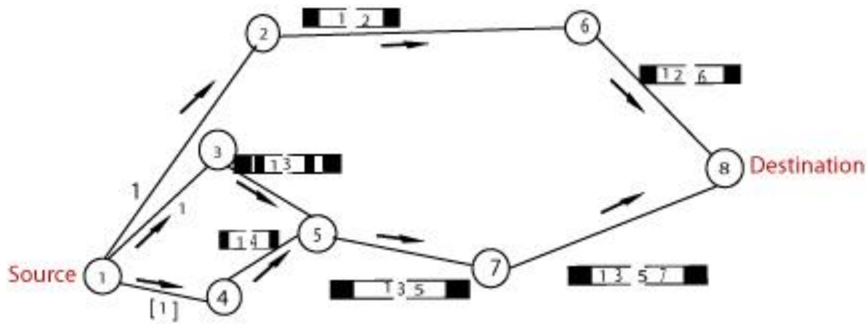

Figure 4.3 Course maintenance in DSR

4.4.1.d Course Reply Mechanism

To return course answer package to the initiator of the course disclosure the goal has must have a course to the initiator. If the goal has a section for this objective in its course hold, by then it might send the course answer allocate this course in the undefined course from is used in sending some other the bundle which is showed up Generally, the goal may alter the course record from the course request the package and use this course to send the course answer divide. This nevertheless, requires the remote framework correspondence between all of these arrangements of hosts to work comparably well in the two direction, which may not be legitimate in a couple of circumstances or with some MAC level traditions [16].

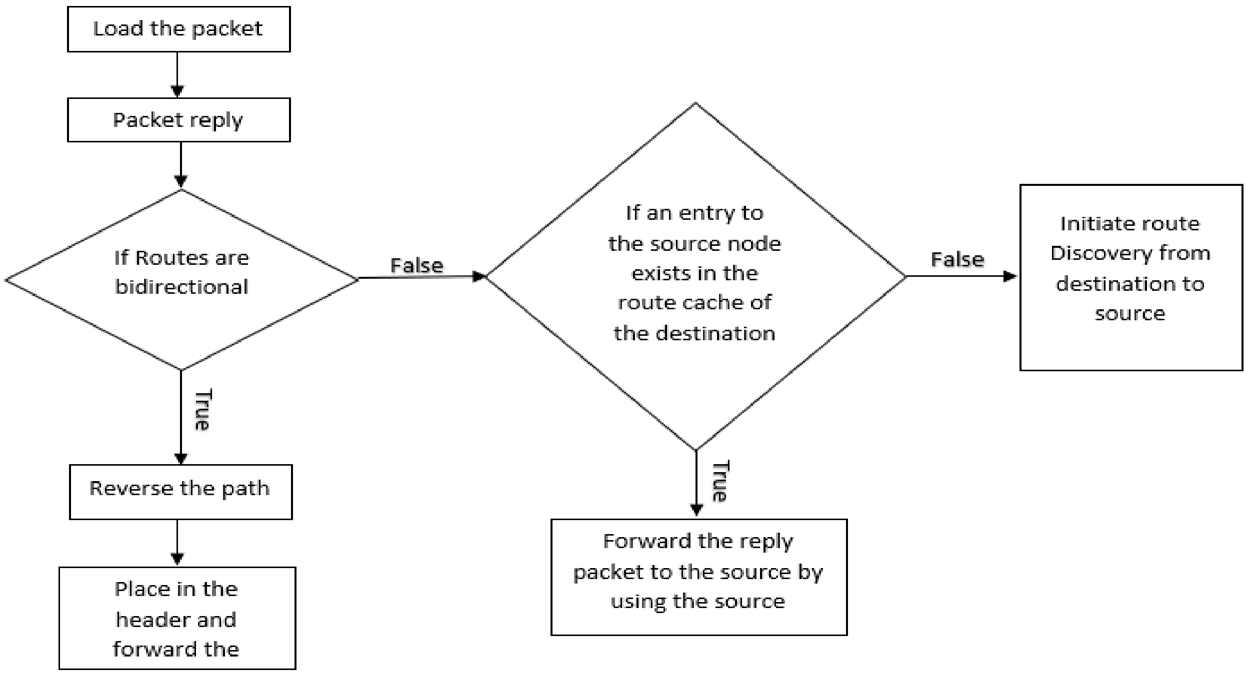

Figure 4.4 Route Reply Mechanism

4.4.1.e Course CACHE

A host may use its course hold to avoid inciting a course request bundle got from another host. Expect a host gets a course request a package for which it isn't the goal, furthermore, isn't starting at now recorded in the course record of the package, and for which the consolidate "initiator address, request it "isn't found in its summary of starting late watched sales. On the remote possibility that the host has a course hold area for the target of the interest, it may include this save course to the accumulated course record in the bundle, and may reestablish this course in a course answer bundle to the initiator without inducing the course inquire. Before replying from its course store a host plays out the going with exercises [16].

1) Picks a concede period.
2) In case package is gotten by this host in the midst of the delay time frame directed to the goal of this course disclosure, and If the length of the seminar on this the package isn't as much as (put off period), by then drop the postponement and don't

transmit the course reply from this have, this host may determine that the initiator of this course divulgence has viably gotten a course reply, giving a proportional or better course. A couple of enhancements to this fundamental tradition have been proposed and have been evaluated to be astoundingly effective by the makers of the tradition. Some of them are:

i. Data Salvaging – If a center hub encounters a broken association and has a reinforcement strategy to the objective in its store, it can try to protect the package by sending it by methods for the course from its hold.
ii. Gratuitous Replies – When a hub gets a package not steered to itself, it confirms if the bundle could be guided by methods for itself to get a shorter course. Expecting this is the situation, the center point sends a superfluous response to the wellspring of the course with this new better course.
iii. Route Snooping – A hub that gets a data distribute does not have the course exhibited in the parcel's header in its very own store, adds the course to it save for at some point later.

4.4.2 Optimized Link State Routing Protocol

An OLSR is a proactive or table driven, connect state directing convention. Connection state steering calculations pick best course by deciding different attributes like connection stack, delay, data transfer capacity and so forth. Connection state courses are increasingly solid, steady and precise in computing best course and more confounded than bounce check. To refresh topological data in each node, periodic message is communicated over the system. Multipoint transfers are utilized to encourage productive flooding of control message in the system. Course figuring's are finished by multipoint transfers to shape the defeat from an offered hub to any goal in the system. The OLSR convention is created to work autonomously from different conventions. Thoughtfully, OLSR contain three nonexclusive components: an instrument for neighbor detecting, a system for productive flooding of control traffic, and a particular of how to choose and diffuse adequate topological data in the system so as to demonstrate ideal courses [18].

4.4.2.a Neighbor Detecting

In OLSR, neighbor hubs related data are assembled with "Hello" messages which are sent over system intermittently. These "Welcome" messages recognize changes in neighbor hubs and related data, for example, interface address, sort of connection symmetric, awry or lost and the rundown of neighbors known to the hub. Every hub refresh and keep up a data set, depicting the neighbor and two-jump neighbor occasionally after some time [19].

4.4.2.b Multipoint Relays

A hub N chooses a discretionary subset of its 1-jump symmetric neighbors to forward data traffic. This subset, referred to as MPR set, covers all the hubs that are two bounces away. The MPR set is determined from data about the hub's symmetric one jump and two bounce neighbors. This data is separated from HELLO messages. Like the MPR set, an MPR Selectors set is kept up at every hub. An MPRS elector set is the arrangement of neighbors that have chosen the node as an MPR. Upon receiving a packet, a node check it's MPR Select or set to see if the sender has chosen then other as an MPR. If so, the packet is forwarded, else the packet is processed and discarded [20].

4.4.2.c Route Calculation

The briefest way calculation is utilized for course counts, which is started when a change is detected in either of the following: the link set, the neighbor set, the two-jump neighbor set, the topology set, or the Multiple Interface Association Information Base. To calculate the routing table, information is taken from the neighbor set and the topology set. The estimation is an iterative procedure, in which course sections are included beginning from one-hop neighbors, expanding the jump check each time through. A more detailed outline is found in [19].

4.4.2.d Topology Control Information

Topology Control messages are diffused with the motivation behind furnishing every hub in the system with adequate link state data to permit course count. TC messages are communicated occasionally by a hub. Like "Hello" messages with these TC messages the topological data are diffused over the whole system. A base criterion for the hub is to send in any event the connection of its MPR Selector Set [20].

Chapter 5

MIPMANET

5.1 Mobile IP on Mobile AD HOC Network

As displayed before, Mobile IP in the convention to use with versatile hubs on the Internet that desire to move between their home system and other IP subnets. Since hubs in a specially appointed system are naturally versatile, Mobile IP appears to be exceptionally appealing to use on impromptu systems as well. The qualities of an impromptu system contrast considerably from those of the settled Internet. Since Mobile IP was intended for the settled Internet, a few issues emerge while applying it to portable promotion cultivator organizing [1].

We will depict and clarify some real worries that emerge when attempting to utilize Mobile IP on a portable impromptu system. At that point in Section, we will go into more debt upset issues and furthermore present some possible alterations to Mobile IP that could improve it perform in the specially appointed condition and analyze what effect these adjustments have on the impromptu directing [3]. We will exhibit and spur which of the possible adjustments and arrangements we have incorporated into the MIPMANET idea and to additionally examine in our reproduction think about. After that, we will take a gander at the impact that MIPMANET has on the AODV directing convention. The goal for this postulation was to plan and investigate answers for utilizing Mobile IP with on-request directing conventions in versatile impromptu systems. It ought to be noticed that we have decided to possibly take a gander at the situation when outside specialist care-of addresses are utilized and left co-found consideration of addresses for future work [6]. The purpose behind this will be clarified in this paper.

5.2 General Consideration

So as to run Mobile IP in an impromptu system that uses on-request steering there are a few issues that must be managed This segment will investigate the issues that the multihop idea of specially appointed systems suggests, at that point the issues that the on-request directing infers, lastly propel why we have chosen to take a gander at remote operator care-of addresses as it were [7].

5.3 Implication of Multihop communication

One of the key highlights of impromptu systems administration is that it permits multihop correspondence, in truth when all is said in done it requires it! Versatile IP then again was intended to have the remote specialist and the meeting hub on a similar connection. When they have interface layer network, bundles to the versatile hub are sent by the remote operator utilizing its connection layer address [12]. In an impromptu system, the remote specialist and a meeting hub probably won't have interface network, yet rather need to utilize multihop correspondence. connected to a specially appointed system Mobile IP must depend on the directing convention utilized in the impromptu system for transportation of parcels between the remote operator and the versatile hub [10].

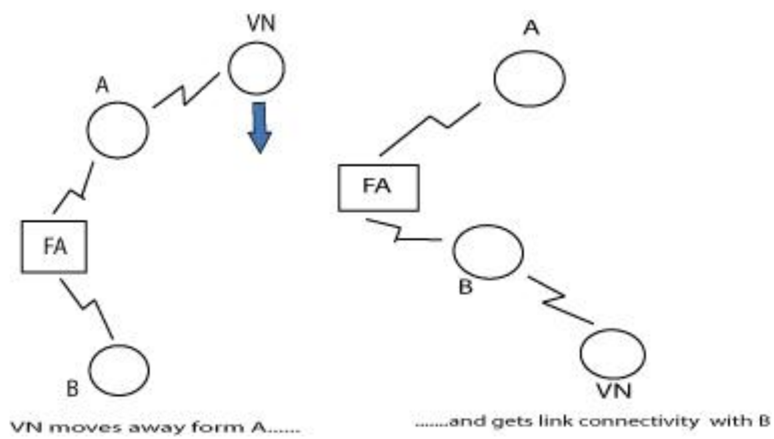

Figure 5.1 Implication of Multihop Communication

This cure demonstrates that a remote specialist can't utilize the link-layer address put away in its guest rundown to convey bundles to a meeting hub. The meeting hub, VN, in the figure changes interface layer availability from hub A to hub B. In the event that common Mobile IP was utilized, FA would have related VN's place of residence with A's connection layer address [7]. It would in this manner have attempted to convey bundles to VN utilizing A's connection layer address. On the off chance that rather FA depends on the steering convention to discover a course to VN, bundles bound for VN reach VN despite the fact that it has changed to having availability with FA through B rather than A.

In the event that the course to the meeting hub is multihop, an IP deliver must be utilized the inquiry is then which IP deliver to use for sending bundles to a versatile hub can the place of residence be utilized on the impromptu network [12].

i. In the event that the place of residence is utilized consideration must be taken to abstain from directing circles since there are two hubs associated with the Internet that need to get parcels sent to a solitary IP address (the home specialist and the portable hub). Rather than achieving the meeting hub, bundles sent by the remote operator could maybe be directed out on the Internet again and back to the home specialist.
ii. On the off chance that a location on her than the place of residence is utilized, there could be issues with straightforwardness When bundles from a hub achieve a host on the Internet, parcels must have the street number as source address all together for larger amount conventions like TCP to work. This could be cultivated by giving the outside specialist a chance to work as an intermediary.

Another probability may be to give the portable hub a chance to utilize numerous IP addresses as though it really were a few hosts associated with it, as it as of now works as a switch [6].

5.4 Implications of On-Demand Routing

As depicted in this section many promising directing conventions for specially appointed systems use on-request activity. Versatile IP makes sure that a meeting hub can keep up reachability from the settled Internet, despite the fact that the meeting hub is quiet, by trading data between the outside specialist and the meeting hub [9]. This specifically clashes mind h the idea of an on-request steering convention where data is just traded on-request. Along these lines, the fundamental plan of the two is not by any stretch of the imagination good. On the off chance that Mobile IP ought to be utilized on a specially appointed system where an on-request steering convention works, either Mobile IP ought to adjust to the receptive methodology of the directing convention or the steering convention ought to adjust to the proactive methodology of Mobile IP [10]. There are various viewpoints that ought to be mulled over when choosing which way to deal with use. A portion of these are [9]:

- **i.** Limitations of the impromptu system (data transmission, battery control, and so on).
- ii. The proportion of the number of hubs utilizing Mobile IP (visiting hubs) to the number of hubs not utilizing Mobile IP.
- iii. Service prerequisites by the meeting hubs, for example, handoff and reachability

For example, choosing to influence Mobile IP to work in a more on-request form would have the negative impact on a few Mobile IP instruments (counting specialist revelation, development identification, and reachability) since the meeting hubs would get fewer data about existing remote operators. Then again, to give the meeting hubs as much data as in customary Mobile IP, different hubs commercials and operator requesting flooding the system force [12].

5.5 Problems and conceivable solution

In what manner can Mobile IP, that was intended for single bounce proactive correspondence between the remote specialist and the portable node be changed to fit into a situation that utilizes multihop receptive correspondence? As talked about before there is no direct arrangement that clearly suits each circumstance. In this area we will take a gander at the distinctive instruments of Mobile IP, which issues that emerge and furthermore talk about a few possible arrangements. We will likewise show a few thoughts regarding progressively broad adjustments to Mobile IP that may improve it perform in a specially appointed condition [8].

5.6 Periodic Agent Advertisements

Mobile IP, outside operators communicate specialist notices intermittently with a reference point time of around one moment. At the point when connected to an impromptu system, this implies the entire specially appointed system is overflowed intermittently by the remote operators. This is obviously an expensive activity, as depicted in Section Implication of Multihop communication.

We can think of four adjustments how the intermittent operator ads could be taken care of to lessen their expense. they are [9]:

i. Increased reference point period time.
ii. Unicast commercial to the enlisted hub as it were.
iii. Limit the TTL commercial as it were.
iv. Use an accumulation plot.

5.7 Increased beacon period time

By expanding the signal time frame time between two back to back specialist commercials, the number of operator promotions flooding the system will be decreased. This is most likely important to do in a data transmission imperative specially appointed system however sadly there are some real disadvantages [9].

An expanded guide period time effects affect all the focal systems in Mobile IP i.e., operator revelation, development identification, and reachability. In the event that the reference point period time is expanded the meeting hubs will get fewer data from the current remote operators. This will make it harder for the hubs to identify on the off chance that they have lost contact with the remote specialist they are enrolled with. They will likewise see new remote operators substantially more gradually than previously. This will make the handoff less effective and the likelihood for operator sales will increment, including overhead [8].

5.8 Unicast periodically

Another method for diminishing the overhead is to unicast operator promotion to enlisted hubs as it were. This methodology will carry on in a more on-request form than if specialist promotions had been communicated as in standard Mobile IP since it is just the hubs that need data from the outside operators that get it. On the off chance that no hub is enlisted through an explicit remote specialist, that outside operator won't send any occasional promotions. The fundamental downsides of this methodology are the absence of smooth handoffs and that the portable hubs are less plausible to discover new and better outside specialists to enlist with [6]. The main path for a versatile hub to locate a remote operator is to communicate a specialist requesting. This strategy must give a path to the outside specialist to identify if a portable hub is as yet reachable or not, generally, the operator notices will cause the course disclosure component of the directing convention to surge the system. When the remote operator views the enlisted hub as inaccessible it expels the versatile hub from its guest rundown and quits sending notices to it, our answer for this is to utilize criticism from the IP steering that the goal, i.e., the meeting hub, is inaccessible if a course to the meeting hub can't be found. In the event that it gets such input it can expel the hub from its guest list and view the hub as deregistered [12]. The remote specialist will obviously likewise expel a hub from its visitor list if the hub's enrolment lapses, similarly as in standard Mobile IP Letting the outside operators unicast operator promotions intermittently to the enlisted hubs just does not generally lessen the overhead, as it initially may appear. On the off chance that there is an extensive number of versatile hubs utilizing Mobile IP the remote operator would need to send a great deal of unicast specialist notices rather than just sending one communicate. On the off chance that most of the hubs in an impromptu network don't utilize Mobile IP, this methodology produces less traffic. Then again, if most hubs utilize Mobile IP this arrangement will likely produce more overhead than customary Mobile IP since numerous unicasts are utilized rather than a solitary broadcast [9].

5.9 Limited TTL

A third method for constraining the flooding's of specialist promotion is to set the TTL-field in the IF. header to only a couple of jumps [7]. Along these lines, just versatile hubs that are nearer than a specific number of jumps to an outside specialist will get operator promotions from it and in this way additionally, have the capacity to enroll with it. Hubs that are a larger number of bounces than the TTL esteem utilized in the specialist promotions won't have the capacity to get notification from the remote operator. The disadvantage with this strategy is that hubs that are not close enough may not locate any outside operators to enlist through. Be that as it may, it is exceptionally easy to execute this strategy and it can without much of a stretch be joined with different procedures, for example, the accumulation conspires [6].

Figure 5.2 represents this strategy. It demonstrates one impromptu system where the remote operators, FAI and FA2, each send specialist notices with the TTI esteem set to 3.

As appeared in the figure, a portion of the hubs just gets specialist notices from one of the two outside operators. The hubs that are inside three jumps from both outside specialists get operator advertisements from both, and can accordingly choose which remote operator to be enlisted with. One hub does not get any specialist retirement whatsoever since it is found multiple jumps from both the outside operators [9].

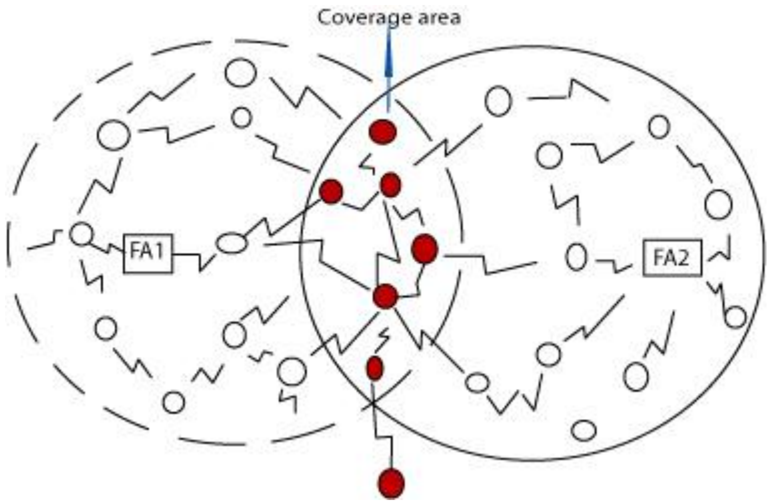

Figure 5.2 Limited TTL

5.10 Aggregation Scheme

Envision that there are a few outside specialists in an impromptu system and every communicated operator promotions occasionally, Instead of having every hub in the system forward each communicated ad, we could let hubs that get different notices to check and settle on a choice of which commercial is ideal and just forward that ad. the ads One method for doing this could be to just let the halfway hubs forward operator notices that have crossed fewer bounces than each other specialist commercial that was gotten before inside a guide period [8]. The pleasant element about this methodology is that each communicated specialist promotion will just surge parts of the system, since every hub won't forward each gotten commercial If this strategy is utilized it would here and there happen that an operator notices from a remote operator that a portable hub is enlisted through does not achieve the versatile hub despite the fact that regardless they have availability to one another [9]. This happens when a middle versatile hub does not forward the ad since it as of now has sent a commercial from a closer remote specialist. Since the portable hub possibly enlists with another foreign specialist if that remote operator has been nearest for a specific number of successive notices, this ought not be an issue. There is one genuine downside with not sending all ads to all hubs in the impromptu system: hubs can have diverse necessities on what benefits an outside operator should bolster. The best way to check whether an outside specialist bolsters the required administrations is to get an operator advertisement from it. In the event that a hub chooses to just forward ads from the nearest remote operator, a hub that requires a unique sort of administration that just an outside specialist found more distant away backings won't have the capacity to get that benefit. To defeat this issue, just commercials that promote indistinguishable administrations might be disposed [6].

5.11 Multicast

At a first look, multicast is by all accounts a definitive method for making Mobile IP work well with each sort of specially appointed system. We could commit one multicast gathering to special sales and operator commercials, and let all meeting hubs and outside specialists join that gathering. Along these lines, sales and ads would just include those versatile hubs and outside operators utilizing MIPMANET, without irritating different hubs more than should be expected. The issue is that it tends to be difficult to build and keep up a multicast tree in a specially appointed network, because of the dynamic topology of the system. It is in this manner not sure that the multicast approach would prompt less overhead traffic, or that the hubs not utilizing MIPMANET would be less affected. The multicast approach won't be reasonable until the point when it tends to be effectively bolstered by the directing convention. There is bolster for multicast determined in the AODV draft (40) however assessment of its proficiency has not yet been distributed [9].

5.12 Adaptive Solution

As we talked about before the decision of arrangement depends altogether on what number of the hubs are utilizing Mobile IP to associate with the Internet. In this way, a versatile arrangement whose conduct relies upon this appears to be best [8]. One arrangement is given the outside operator a chance to choose when it is significant to send specialist advertisement by means of a communicate or unicast to enrolled portable hubs. At the point when there are just a couple of portable hubs enrolled with an outside operator, it will just unicast to those hubs. As the quantity of enlisted portable hubs expands the number of enrolled hubs will achieve a limit when the outside specialist chooses to begin sending communicate operator promotions [9].

Chapter 6

Simulation Result

6.1 General Information

The simulations have been performed utilizing Network Simulator 2 (Ns-2) especially mainstream in the specially appointed systems administration network. The source-goal sets have been spread haphazardly over the system. Amid the reenactment, every hub begins its adventure from an arbitrary spot to an irregular picked goal. When the goal has been achieved, the hub takes a rest timeframe in second and another irregular goal is picked after that stop time. This procedure rehashes all through the recreation, causing ceaseless changes in the topology of the basic system [21].

6.2 Network Simulator 2

Network Simulator 2 is an open-source occasion driven test system structured explicitly for research in PC correspondence systems. It has persistently increased gigantic enthusiasm from industry, the scholarly world, and government. Having been under consistent examination and improvement for a considerable length of time, in this simulator now contains modules for various system segments, for example, directing, transport layer convention, application, and so on [22]. To examine organize execution, scientists can basically utilize a simple to-utilize scripting dialect to arrange a system, what's more, watch results created by NS2. Without a doubt, it has progressed toward becoming the most broadly utilized open source organize test system and a standout amongst the most generally utilized system test systems.

The essential utilization of this is in system investigates to different types of wired/wireless neighborhood and wide zone systems; to execute arrange conventions, for example, TCP and UPD, traffic source conduct, for example, FTP, Telnet, Web, CBR and VBR, switch line the executive’s component [21].

6.3 Architecture of NS2

It gives clients an executable order ns which goes up against info contention, the name of a Tcl recreation scripting file. Clients are bolstering the name of a Tcl reproduction content (which sets up a recreation) as an info contention of an NS2 executable order ns. Much of the time, a reenactment follow file is made and is utilized to plot a diagram as well as to make liveliness. NS2 comprises two key dialects: C++ and Object-situated Tool Command Language (OTcl). In the OTcl area, a handle goes about as a frontend which collaborates with clients and other OTcl objects. It might defines its own methodology and factors to encourage the collaboration. Note that the part methodology and factors in the OTcl area are called example strategies instrokes) and occasion factors (instars), individually [22].

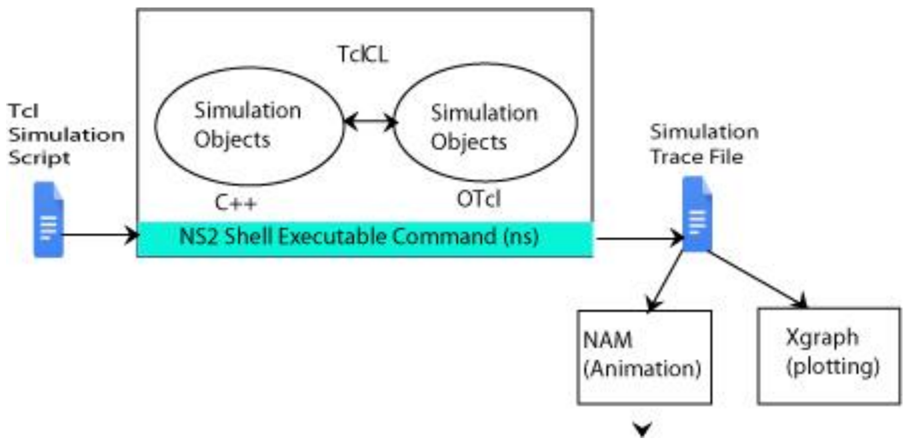

Figure 6.1 Basic architecture of ns2

Table 6.1 Simulation Parameters and Specifications

Simulation Parameter	Value
Channel Type	Wireless Channel
Radio-propagation model	Two Ray Ground Model
Network interface type	Wireless Physical
MAC type	802_11 b
Interface Queue Type	Drop Tail Primary Queue
Antenna model	Omni Direction
Number of Mobile nodes	8
Ad Hoc Routing Protocol	DSR & OLSR
Simulation Area	500m x 400m
Simulation Time	150 MS

Traffic Type	TCP, UDP
Nodal speed	3-10 m/s
Packet size	1000 Byte (Data Packets)

6.4 Performance Parameters

There are different kinds of aspects for the performance assessment of the Routing protocols. These have different patterns of the overall program performance. This project has been assessing five aspects for the assessment of our study on the overall program performance. These aspects are Throughput, Delay, Latency and Packet drop, for techniques assessment. These aspects are important in the consideration of assessment of the Routing protocols in a connections program. These techniques need to be tested against certain aspects for their performance. To check technique performance in finding a path towards location, we will look to the source that how much control information it provides. It gives the course-plotting technique inner algorithm’s performance. If the Routing Protocols gives much end to end delay so probably this Routing protocols is not efficient as evaluate to the technique which gives low end to end delay. In the same is the case with the throughput as it represents the successful transport of packages in time. If a technique shows high throughput so it is the efficient and best technique than the course-plotting technique which have low throughput. The same way a routing protocol providing Lower Packet drop and lower routing overhead is called efficient Routing Protocol.

6.4.1 Throughput

Throughput is defined as; the ratio of the total data reaches a receiver from the sender. The time it takes by the receiver to receive the last message is called as throughput. Throughput is expressed as bytes or bits per sec (byte/sec or bit/sec). Some factors affect the throughput as; if there are many topology changes in the network, unreliable communication between nodes, limited bandwidth available and limited energy. A high throughput is absolute choice in every network. Throughput can be represented mathematically as in equation [23].

$$\textbf{Throughput} = \frac{\textbf{Number Of Delivered Packet} * \textbf{Packet Size} * \textbf{8}}{\textbf{Total Duration of Simulation}}$$

6.4.2 End to End Delay (seconds)

The average time it takes a data packet to reach the destination. This metric is calculated by subtracting "time at which first packet was transmitted by source" from "time at which first data packet arrived to destination". This includes all possible delays caused by buffering during route discovery latency, queuing at the interface queue, retransmission delays at the MAC, propagation and transfer times. This metric is crucial in understanding the delay introduced by path discovery [9].

6.4.3 Packet Drop

Packet drop occurs when one or more packets of data traveling across a network fail to reach their destination [23].

6.4.4 Latency

Latency in network is measured as either one-way or round-trip delay time. One-way latency is measured as the time from the source sending a packet to the destination receiving it. And round-trip delay is the one-way time from source to destination plus the time from destination to the source [24].

6.5 Simulation Topology

It is shown that the network topology of mobile ad hoc network consists of 8 nodes. The source is node n0 and n1 where the destination is n5 and n8. Where TCP and UDP protocol is used to send data.

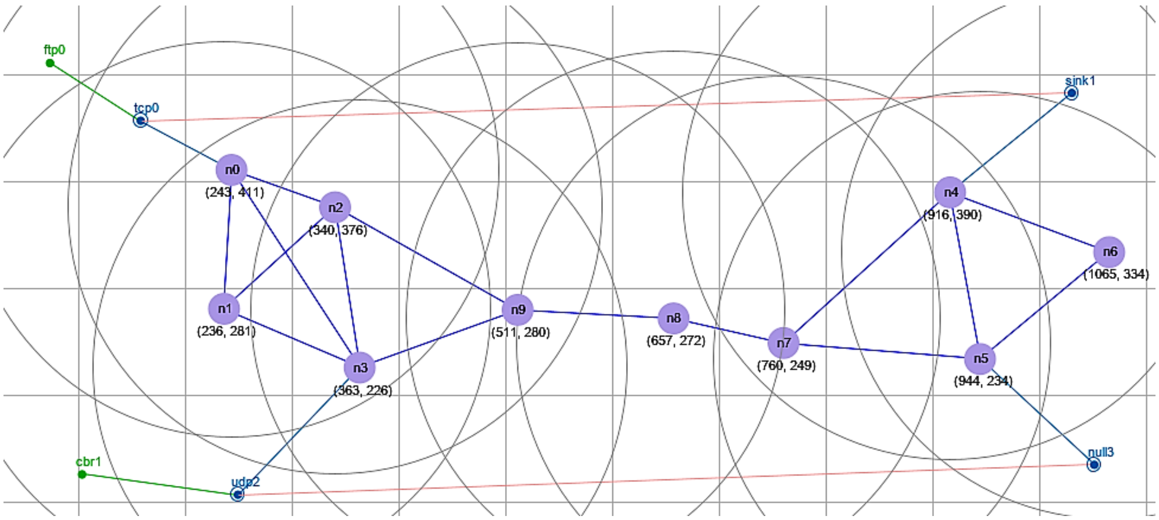

Figure 6.2MIPMANET simulation topology

6.6 Route Discovery

In this figure it shown that when a packet is sent to the destination and it is not found in the outing table, then broadcast process will be started and discover the rout path for the destination.

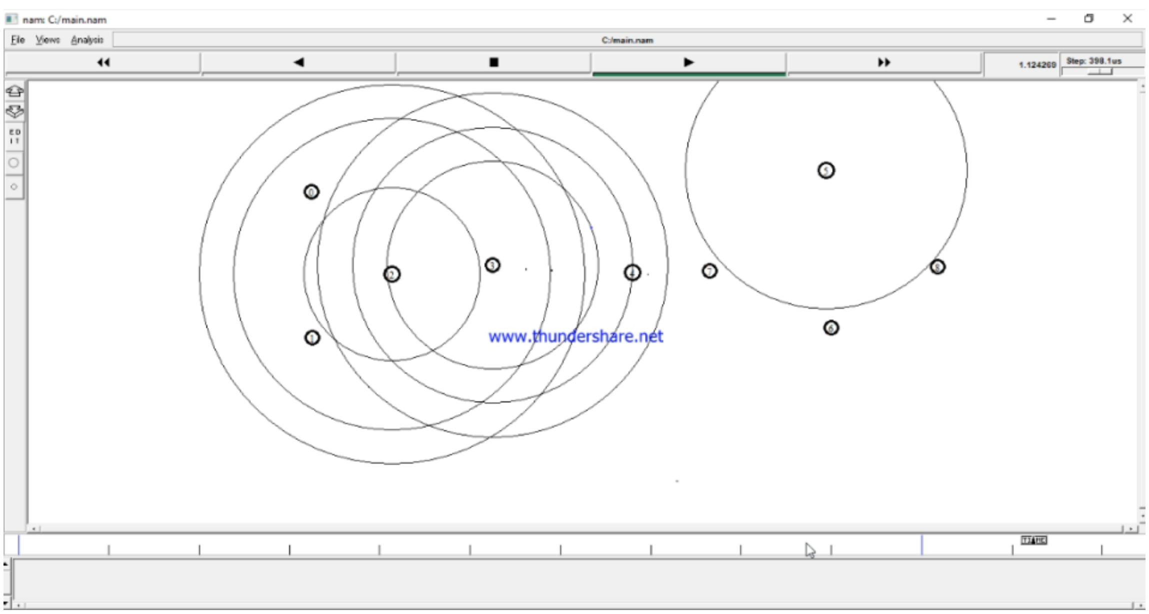

Figure 6.3 Route Discovery

6.7 Simulation Result

6.7.1 Throughput

The throughput of the network is data packets per second

6.7.1.a Throughput of DSR routing protocol

The data is shown in the table below.

Time(s)	Throughput(bit/sec)	Simulation Time
10	52800	0.09152117
20	45600	0.03039
30	27200	0.0188125
40	39200	0.0259228
50	28800	0.2278873

Table 6.2 Data table of throughput

In this figure it is shown that throughput of DSR routing protocol in MIPMANET which is quite high. Let's see what is happening in OLSR routing Protocol.

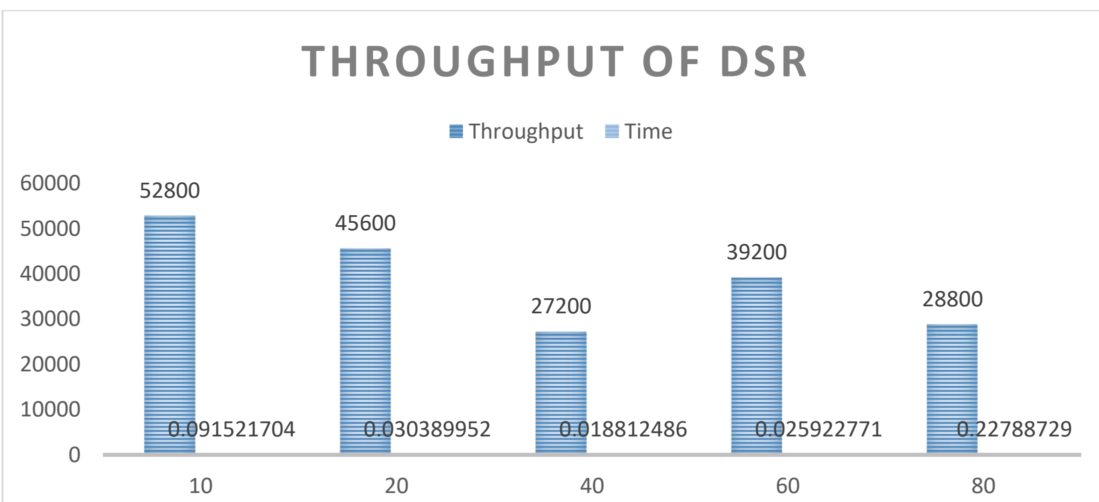

Figure 6.4 Throughput for DSR routing protocol

6.7.1.b Throughput of OLSR routing protocol

The data is shown in the table below.

Time(s)	Throughput(bit/sec)	Simulation Time
10	15200	0.070694
20	26000	0.059664
30	7600	0.029186
40	12800	0.022042
50	15000	0.01382

Table 6.3 Data table of throughput (DSR)

In this graph it is shown that throughput of OLSR routing protocol in MIPMANET is lower than DSR.

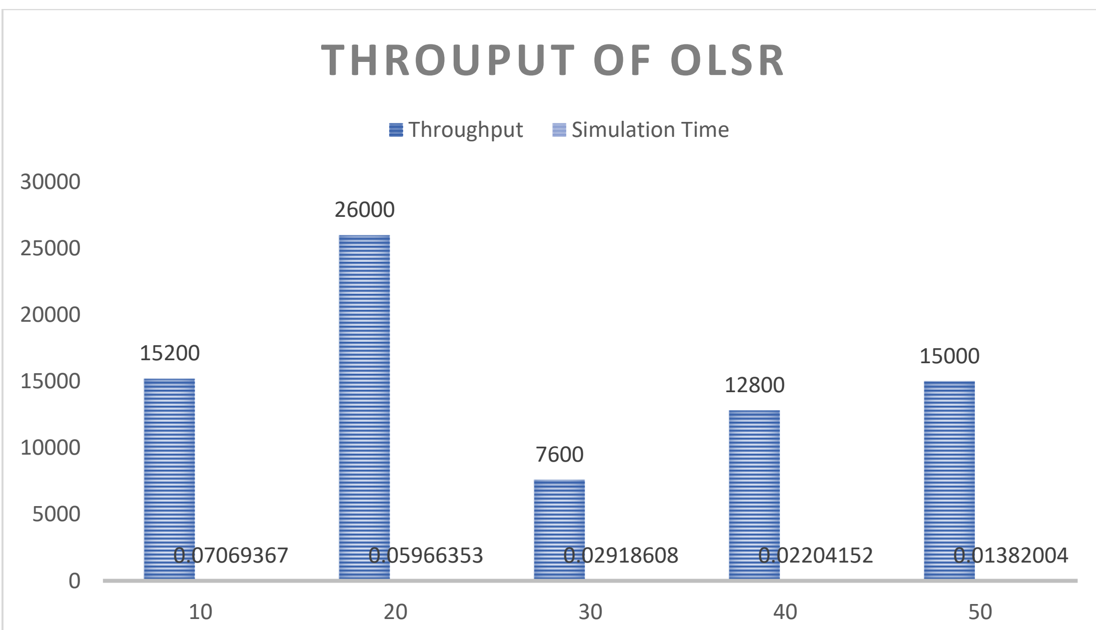

Figure 6.5 Throughput for OLSR routing protocol

6.7.1.c Comparison of throughput between OLSR and DSR

This comparison is clearly shown that throughput of DSR routing protocol is higher than OLSR routing protocol. By the meaning of this DSR is better than OLSR.

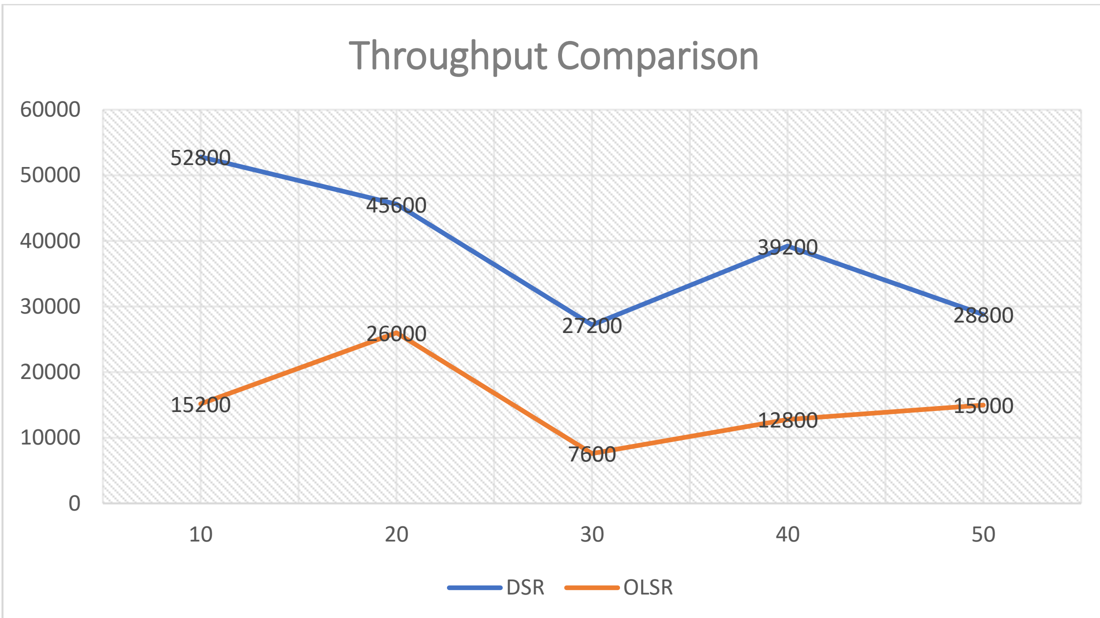

Fig 6.5 Comparison of throughput between OLSR and DSR

6.7.2 End to End delay

End to End delay is the time taken for transmitting a packet from source to destination.

6.7.2.a End to End delay of DSR

The data is shown in the table below.

Node	Simulation Time
1,2	0.0007205
5,7	0.0003527
2,3	0.0005325
4,7	0.0001200
1,3	0.0010490
3,4	0.0003527

4,3	0.0003047
1,6	0.0003142
6,8	0.0003526
1,8	0.0002281

Table 6.4 Data table of end to end delay

In this figure End to End delay is shown for different nodes. When packets are sent from node 1 to node3 the end to end delay is high because that time some packets are dropped. The end to end delay is less for node 4 to node 7.

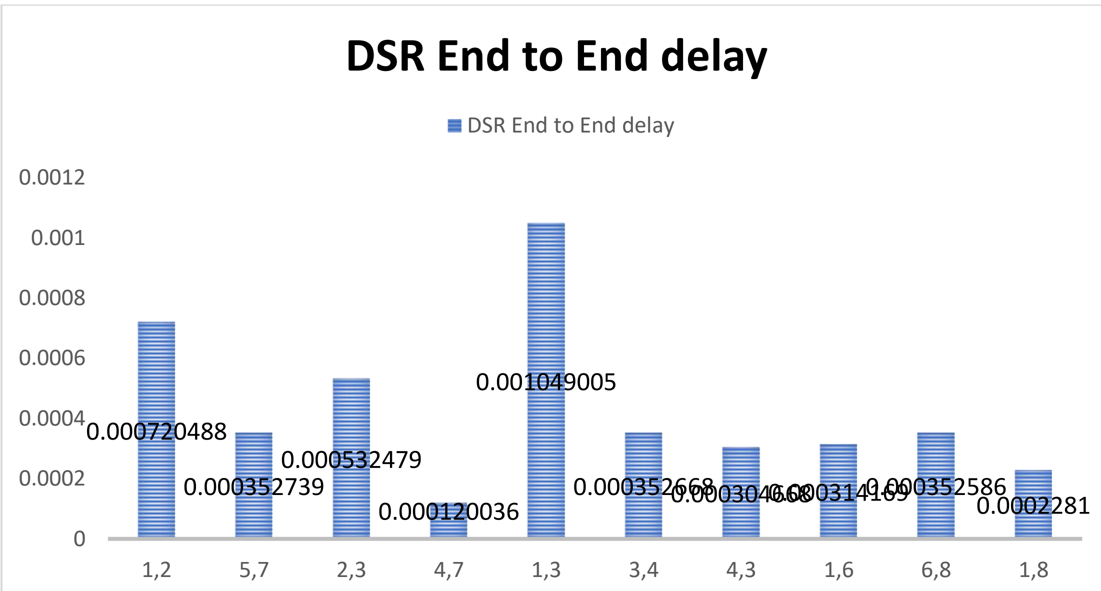

Figure 6.7 DSR End to End delay for MIPMANET

6.7.2.b End to End Delay of OLSR

The data is shown in the table below.

Node	Simulation Time
1,2	0.0008485
5,7	0.0003047
2,3	0.0003525

4,7	0.0007844
1,3	0.0007493
3,4	0.0003526
4,3	0.0003047
1,6	0.0002249
6,8	0.0003526
1,8	0.0004111

Table 6.5 Data table of End to End delay OLSR

In this figure it is shown that the end to end delay is high for the same node number as described for DSR end to end delay.

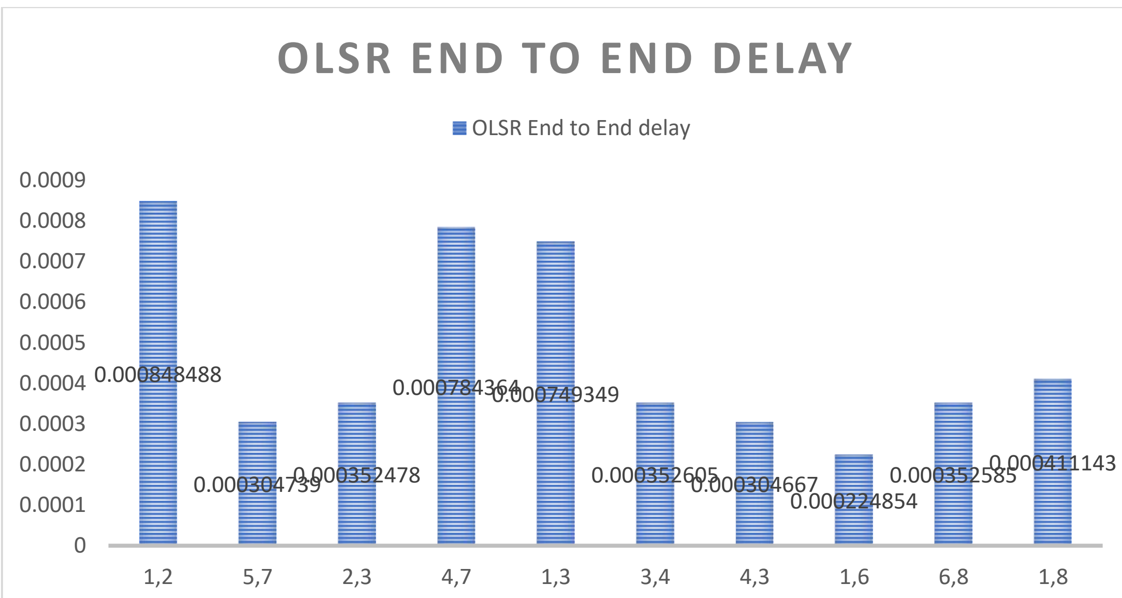

Figure 6.8 OLSR End to End delay for MIPMANET

6.7.2.c Comparison of end to end delay

In this graph it is shown that the end to end delay between DSR and OLSR in the same node is higher in the OLSR routing protocol. Where DSR routing protocol has lower end to end delay.

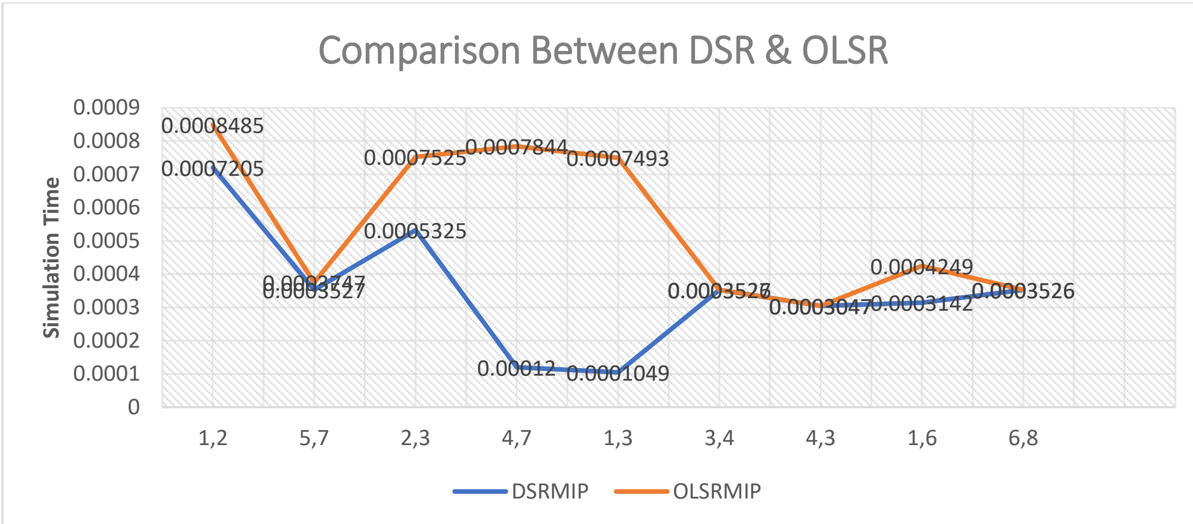

Fig 6.9 Comparison of DSRMIP and OLSRMIP

6.7.3 Latency

Latency is measured by round trip time by sending a packet from source to the destination and returned to the source.

6.7.3.a Latency of DSR

The data is shown in the table below.

Node	Simulation Time
6,8	0.0006564
5,8	0.0006568
7,6	0.0006565
4,7	0.0006563
7,5	0.0006562
2,3	0.0006561
0,2	0.0006560
1,2	0.0006560

Table 6.6 Data Table of DSR

In this graph latency is shown here. This is pretty much good.

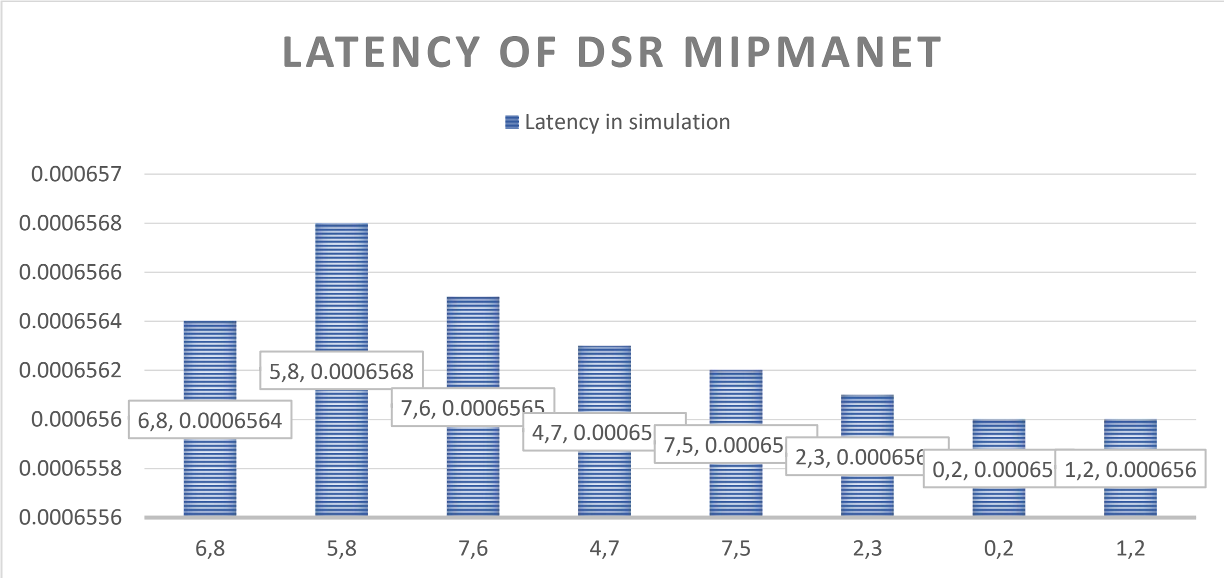

Figure 6.10 Latency for DSR routing Protocol

6.7.3.b Latency of OLSR

The data is shown in the table below.

Node	Simulation Time
6,8	0.0006572
5,8	0.0006575
7,6	0.0006573
4,7	0.0006567
7,5	0.0006575
2,3	0.000657
0,2	0.0006571
1,2	0.000657

Table 6.7 data table of OLSR

In this graph latency is shown here. This is clearly shown that it is higher than DSR.

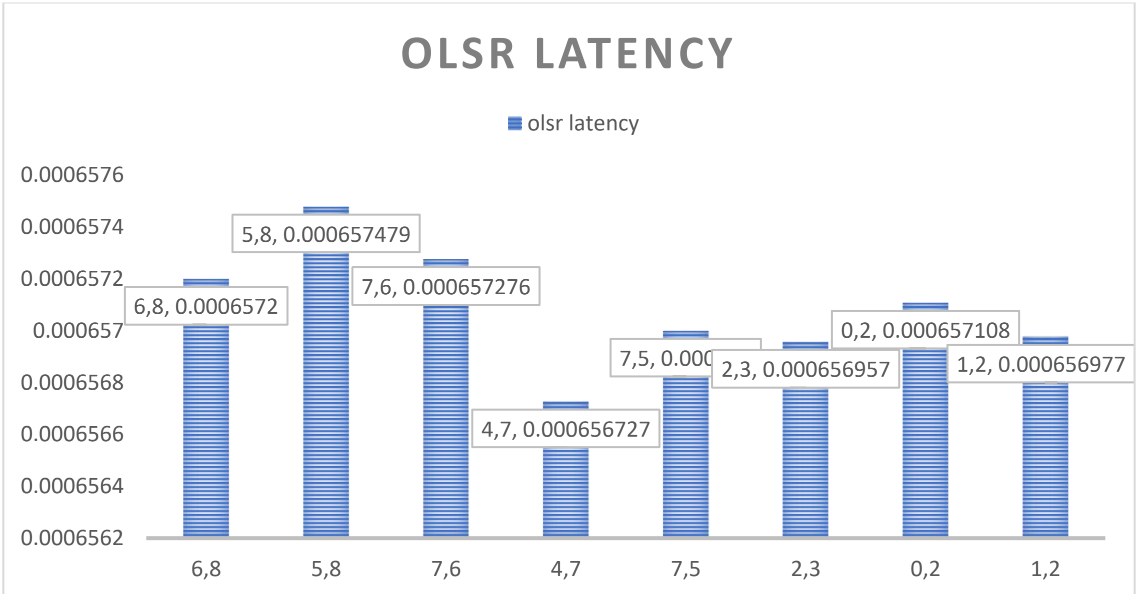

Figure 6.11 Latency for OLSR routing protocol

6.7.3.c Comparison between DSR and OLSR

In this figure the comparison of latency for DSR and OLSR is shown. It is clearly shown that latency of OLSR is higher than DSR. By the meaning of this DSR is better than OLSR.

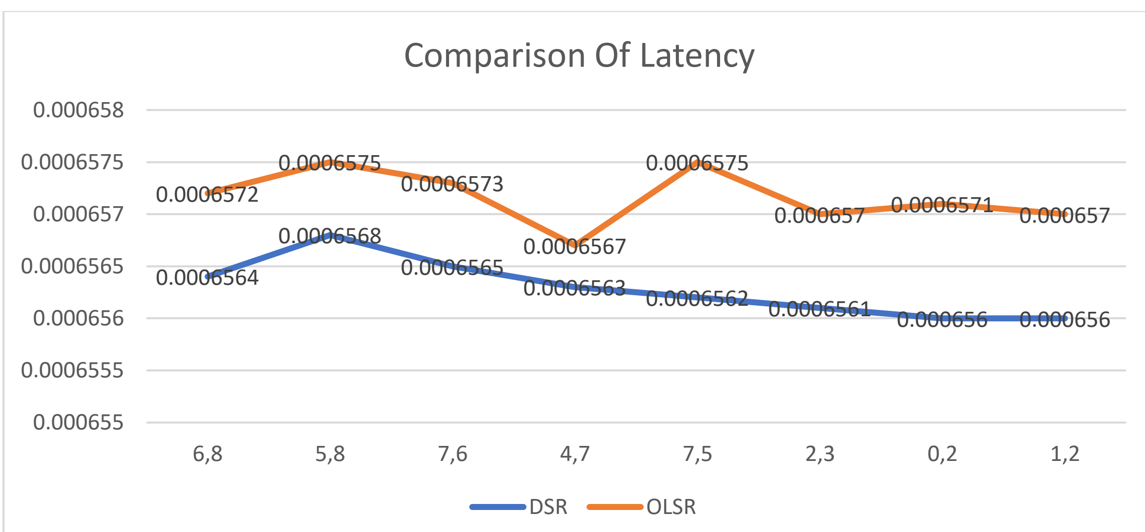

Fig6.12 Comparison between DSR and OLSR

6.8 Analysis

All of the data is shown here, what can decide that which routing protocol is better. At first, we find out the throughput of both DSR and OLSR routing protocol of MIPMANET. Obviously if one routing protocol can send more packets than another that protocol must better. IN here DSR routing protocol has higher number of delivered packets per second. At the time of end to end delay both are almost same. But in DSR routing protocol has less end to end delay. And then we find out latency. But in this case DSR has much more better values than OLSR.

Finally, we can decide by the result of simulation that, DSR routing protocol is better than OLSR routing protocol in MIPMANET.

Chapter 7

Conclusion

The paper has done exceptionally valuable by giving entirely comprehension of MIP, NS-2, MIPMANET and different devices. Mobile ad hoc network has different routing protocol but here DSR and OLSR routing protocol were used. MIP always in regular day to day existence and it will keep on being a fundamental compact as mobility happens to expand significantly in networks. It was additionally interesting to figure out how MN to permit steady information exchange between the MN and CN. Another vital operation was learned about the extraordinary abilities of NS-2. An execution assessment of Mobile IP on MANET also discussed in this paper. Mobile IP on MANET utilizing Dynamic Static Routing convention for directing bundles inside the MANET. The performance of Mobile IP utilizing the DSR protocol on mobile ad hoc network was better. It has been seen that a few recommendations have attempted to help miniaturized scale mobility by coordinating Mobile IP with MANETs, and just a single of them has applied to use the upsides of the IP smaller scale portability protocol. Simulation results got from the integration proposed that the execution of Mobile IP on MANET with respect to normal end-to-end delay, throughput, latency, and standardized packet proportion. The overall performance of DSR was better for all measurement than OLSR.

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Chapter 8

Appendix

Source Code:

DSR Routing Protocol:

```
set channel Wireless

set val(prop)   Propagation/TwoRayGround

set val(netif)  Phy/WirelessPhy

set val(mac)    Mac/802_11

set val(ifq)    Queue/DropTail/PriQueue

set val(ll)     LL

set val(ant)    Antenna/OmniAntenna

set val(ifqlen) 10

set val(nn)     9

set val(rp)     DSR

set val(x)      1211

set val(y)      583

set val(stop)   10.0

set val(MIP)    MobileIP

Set val(HA)     Home Agent

set ns

set  new Topography

set new Simulator
```

set tracefile [open main.tr w]

set namfile [open main.nam w]

llType $val(ll)

macType $val(mac)

ifqType $val(ifq)

ifqLen $val(ifqlen)

antType $val(ant)

propType $val(prop)

phyType $val(netif)

channel $chan

topoInstance $topo

agentTrace ON

routerTrace ON

macTrace ON

movementTrace ON

setup 9 nodes

Setup a TCP connection

ns attach-agent tcp0 in n0

set sink1 [new Agent/TCPSink]

ns attach-agent sink1 in n5

ns connect tcp0 and sink1

Setup a UDP connection

set udp2 [new Agent/UDP]

ns attach-agent udp2 in n1

set null3 [new Agent/Null]

ns attach-agent null3 in n8

setup ftp0 over TCP connection

ftp0 attach-agent in tcp0

ns at 1.0 ftp0 start

ns at 2.0 ftp0 stop

Setup a CBR Application over UDP connection

ns at 1.0 cbr1 start

ns at 2.0 cbr1 stop

Setup MobileIP

ns node-configure and mobileIP ON

set temp 1.0.0 2.0.0

set HA

set FA

proc finish

global ns tracefilenamfile

close tracefile

close namfile

exec nammain.nam

exit 0

if it is True

i 0

if it is False

i less than $val(nn)

incri

ns at val(stop) "\$n$i reset"

OLSR Routing Protocol:

set val(chan) Channel/WirelessChannel

set val(prop) Propagation/TwoRayGround

set val(netif) Phy/WirelessPhy

set val(mac) Mac/802_11

set val(ifq) Queue/DropTail/PriQueue

set val(ll) LL

set val(ant) Antenna/OmniAntenna

set val(ifqlen) 10

set val(nn) 9

set val(rp) OLSR

set val(x) 1951

set val(y) 100

set val(stop) 10.0

set val(MIP) MobileIP

Set val(HA) Home Agent

Set val(FA) Foreign Agent

Mobile IP Source Code:

Setup MobileIP

ns node-configure

mobileIP ON

set temp 1.0.0 2.0.0

Trace File:

DSR Routing Protocol:

s 1.004734590 _1_ MAC --- 3 DSR 90 [0 ffffffff 1 800] ------- [1:255 8:255 32 0] 1 [1 1] [0 1 0 0->0] [0 0 0 0->0]

r 1.005455078 _2_ MAC --- 3 DSR 32 [0 ffffffff 1 800] ------- [1:255 8:255 32 0] 1 [1 1] [0 1 0 0->0] [0 0 0 0->0]

s 1.046483022 _0_ MAC --- 17 DSR 90 [0 ffffffff 0 800] ------- [0:255 5:255 32 0] 1 [1 2] [0 2 0 0->0] [0 0 0 0->0]

f 1.046554915 _4_ RTR --- 11 DSR 92 [0 ffffffff 3 800] ------- [1:255 8:255 32 0] 4 [1 2] [0 2 0 0->0] [0 0 0 0->0]

s 1.060678480 _6_ MAC --- 11 DSR 210 [0 ffffffff 6 800] ------- [1:255 8:255 32 0] 6 [1 2] [0 2 0 0->0] [0 0 0 0->0]

f 1.061110848 _3_ RTR --- 17 DSR 68 [0 ffffffff 2 800] ------- [0:255 5:255 32 0] 3 [1 2] [0 2 0 0->0] [0 0 0 0->0]

r 1.062359066 _8_ MAC --- 11 DSR 152 [0 ffffffff 6 800] ------- [1:255 8:255 32 0] 6 [1 2] [0 2 0 0->0] [0 0 0 0->0]

s 1.080296439 _7_ MAC --- 17 DSR 178 [0 ffffffff 7 800] ------- [0:255 5:255 32 0] 5 [1 2] [0 2 0 0->0] [0 0 0 0->0]

r 1.081720802 _4_ MAC --- 17 DSR 120 [0 ffffffff 7 800] ------- [0:255 5:255 32 0] 5 [1 2] [0 2 0 0->0] [0 0 0 0->0]

s 1.090423965 _5_ MAC --- 42 DSR 134 [13a 7 5 800] ------- [5:255 0:255 254 7] 6 [0 2] [1 2 6 0->5] [0 0 0 0->0]

r 1.091496704 _7_ MAC --- 42 DSR 76 [13a 7 5 800] ------- [5:255 0:255 254 7] 6 [0 2] [1 2 6 0->5] [0 0 0 0->0]

D 1.091521704 _7_ IFQ ARP 24 DSR 84 [13a 7 7 800] ------- [8:255 1:255 252 4] 7 [0 2] [1 2 7 1->8] [0 0 0 0->0]

s 1.121978091 _5_ MAC --- 0 RTS 44 [6ee 7 5 0]

r 1.122201396 _3_ MAC --- 0 ARP 28 [13a 3 2 806] ------- [REPLY 2/2 3/3]

D 1.122212426 _7_ MAC COL 0 RTS 44 [6ee 7 5 0]

OLSR Routing Protocol:

s 1.871211729 _5_ MAC --- 0 OLSR 106 [0 ffffffff 5 800] ------- [5:255 -1:255 2 0] [0x2 7 2 [8 5] [1 8]] (REQUEST) r 1.872060432 _8_ MAC --- 0 OLSR 48 [0 ffffffff 5 800] ------- [5:255 -1:255 2 0] [0x2 7 2 [8 5] [1 8]] (REQUEST)

s 1.896646138 _6_ MAC --- 19 cbr 1078 [13a 8 6 800] ------- [1:0 8:0 25 8] [15] 5 0

r 1.904000000 _1_ RTR --- 120 cbr 1000 [0 0 0 0] ------- [1:0 8:0 32 0] [113] 0 0

r 1.939314169 _3_ MAC --- 20 cbr 1020 [13a 3 2 800] ------- [1:0 8:0 29 3] [16] 2 0

s 1.944000000 _1_ AGT --- 126 cbr 1000 [0 0 0 0] ------- [1:0 8:0 32 0] [118] 0 0

r 1.949120172 _4_ MAC --- 20 cbr 1020 [13a 4 3 800] ------- [1:0 8:0 28 4] [16] 3 0

s 1.949949315 _2_ MAC --- 0 RTS 44 [242e 3 2 0]

r 1.950301794 _3_ MAC --- 0 RTS 44 [242e 3 2 0]

s 2.348189853 _0_ MAC --- 0 OLSR 102 [13a 2 0 800] ------- [0:255 5:255 30 2] [0x4 1 [0 6] 10.000000] (REPLY)

r 2.349006407 _2_ MAC --- 0 OLSR 44 [13a 2 0 800] ------- [0:255 5:255 30 2] [0x4 1 [0 6] 10.000000] (REPLY)