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A Routing Model for Managing Large Adhoc Networks using Segments

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ABSTRACT

In last few years, mobile ad hoc networks have turned out to bull's eyes and motivated lots of researchers for doing their research on various aspect of MANET. Ad hoc mobile networks (MANETS) are nodes of mobile nodes, such as laptops and sensors that communicate with each other without the help of centralized infrastructures that can be an access point or connections, while others. Many of other things which are consider for related studies like routing, network, synchronization, power consumption, bandwidth consideration etc. Presently, for improvement of network performance of routing protocols. In the investigation, OLSR (Proactive) routing, AODV (Reactive) routing protocol and have been combined to obtain new and distinct which exhibits much better performance. In the resent scenario, when network size increases the performance of AODV routing algorithm decreases. For the optimization new protocol has been made. The alternate model has been suggested which divide the network into segments and connected together each other.

Keywords— Ad hoc, Wireless Communication, AODV, OLSR, Ad hoc, Performance comparison, Routing protocols, Simulation, NS2.

I. INTRODUCTION

In today's fast and busy world, there is a urge of efficient and advance routing in wireless ad hoc networks which has given origin to a plethora of routing protocols. Due to the different demanding character of these networks, the criteria followed to design the routing algorithms are somewhat distinct from the ones used in traditional, wired or wireless, networks with infrastructure. The optimise criteria range from the minimum of the number of hops to reach destination, number of retransmissions, energy efficiency or topological considerations. With the occurrence of "large-scale" those routing strategies wireless ad-hoc networks, visit often with new constraints in mind, such as the scalability and the capability for self-organization. To comprehend the distinctions of substantial scale and little scale remote specially appointed systems are the scaling laws was recognized for single-course extensive scale remote systems.

Routing protocols networks are divide into two parts: Reactive and Proactive. Reactive protocols is also knows as on-demand routing protocols create routes when they are needed

by the source host and these routes are maintained while they are needed by the source host and these routes are maintained while they are needed. Such protocols use distance-vector routing algorithms. Proactive routing protocols are also knows as table-driven protocols and they always maintain current up-to-date routing information by sending control messages periodically between the hosts which update their routing tables. The proactive routing protocols use routing algorithms which frequently flood the link information about its neighbours.

Our goal is to improved advantage of the performance study of two routing protocols for ad hoc network namely Optimized Link State Routing (OLSR) protocol and Ad hoc On Demand Distance Vector (AODV) Routing Protocol.

II. DESCRIPTION OF ROUTING PROTOCOLS

A. AODV

- AODV Protocol is a loop free and avoids the counting to infinity problem, which were typical to the classical distance vector routing protocols, by the usage of the sequence numbers.
- AODV has great advantage in having less overhead over simple protocols which needs to keep the entire route from the source host to the destination host in their messages.
- AODV reacts relatively quickly to the topological changes in the network and updating only the hosts that may be affected by the change, using the RRER message.
- AODV protocol is a flat routing protocol it does not need any central administrative system to handle the routing process.

B. OLSR

- OLSR is an optimization version of a pure link state protocol. So the topology changes cause the flooding of the topological information to all available hosts in the network. To reduce the possible overhead in the network protocol uses Multipoint Relays (MPR).
- OLSR uses the table-driven approach of maintaining routing information; it is not as adaptive to the route changes that occur during high mobility.
- OLSR optimizes a pure link state because it reduces the size of information sent in each message and also reduces the total control overhead by minimizing the number of retransmissions flooding an entire network.
- OLSR is well suited to large and dense mobile networks. Because of the use of MPRs, the larger and more dense a network, the more optimized link state routing is achieved.
- OLSR Protocol is more efficient in networks with high density and highly sporadic traffic. But the best situation is when there is a large number of hosts.

C. COMPARISON OF AODV AND OLSR

Although, OLSR is a proactive routing protocols and AODV is a reactive routing protocols. They work differently in a number of aspects. A good performance comparison of OLSR and AODV can be found .Below are the major differences between OLSR and AODV:

Performance Constraints	OLSR	AODV
Category	Table drive or Proactive	On Demand or Reactive
Protocol Type	Link state scheme	Distance Vector
Route Maintained	Route Table	Route Table
Loop Freedom	Yes	Yes
Multiple routes	No	No
Route Philosophy	Flat	Flat
Multicast	Yes	Yes
Message Overhead	Minimum	Moderate
Periodic Broadcast	Possible	Possible
Route reconfiguration methodology	Control message sent in advance to increase the re-activeness	Erase Route notify Source
Requires sequence data	No	Yes
Summary	Control message for Link Sensing, Neighbor Detection, Multiple Interface Detection , Route calculation	Route Discovery, Expanding Ring, Search Setting Forward path.

Table 1: Comparison of Routing Protocol.

III. RELATED WORK

In this section, we study a no. of different AODV Routing Protocols which are suggested in the literature. Different Protocols are available for study of networks when segregated in segments. All routing protocols have their particular advantages, disadvantage and scope for further research.

- Rendong Bai and Mukesh Singhal[30], in their work they suggested protocol for new routing and named it DOA. This proposed protocol is a grouping of DSR, AODV routing protocol. In DOA phone no. of between nodes on a path is selected the route is branched into section by the waypoints. Model results shown that DOA scales well for huge networks with more than 1,000 nodes, incur about 60 pct –four score percent less overhead than AODV, while additional metrics are similar to AODV and DSR.
- Elizabeth M. Royer [23], in this different directing reunion for specially appointed net are analyzed and assessed in view of a given parcel of parameters. The paper gives a review of eight unique conventions by showing their attributes and usefulness, and after that gives a correlation and discourse of their individual benefits and disadvantages.

- Kemal Akkaya, Mohamed Younis[24], This paper surveys recent routing protocols for sensor networks and presents a classification for the various approaches pursued. The three main categories explored in this paper are data-centric, hierarchical and location-based. Each routing protocol is described and discussed under the appropriate category. Moreover, protocols using contemporary methodologies such as network flow and quality of service modeling are also discussed. The paper concludes with open research issues.
- Samir R.Das [25], in his appropriate execution of DSR an Aodvare looked at. In view of the perception, paper suggested about how the execution of either convention can be made strides.
- S.S. Tyagi [26], this report exhibit misrepresentation constructs correlation and execution examination in light of a variety of parameters like steering overheads and bundle misfortune. The examination is around three fundamental conventions DSR, Aodv (receptive) and dsdv (proactive).
- Raghav Bhaskar Javier Herranz, [28]in this work he formalizes a nascent idea, total assigned confirms signature plans, which is helpful for confirmation of courses in responsive conventions. They proposed a specific and effective plan with provable security in the discretionary prophet demonstrate.
- K. PallaviKhatri, Monika Rajpoot , AlankarShastri and KeshavSolanki[29],in this work , an endeavour had vertizing be complete to think about the implementation of the responsive impromptu steering conventions utilizing op net modeller as for expanding nos. of customers in the system.

IV. ROUTING PROTOCOL

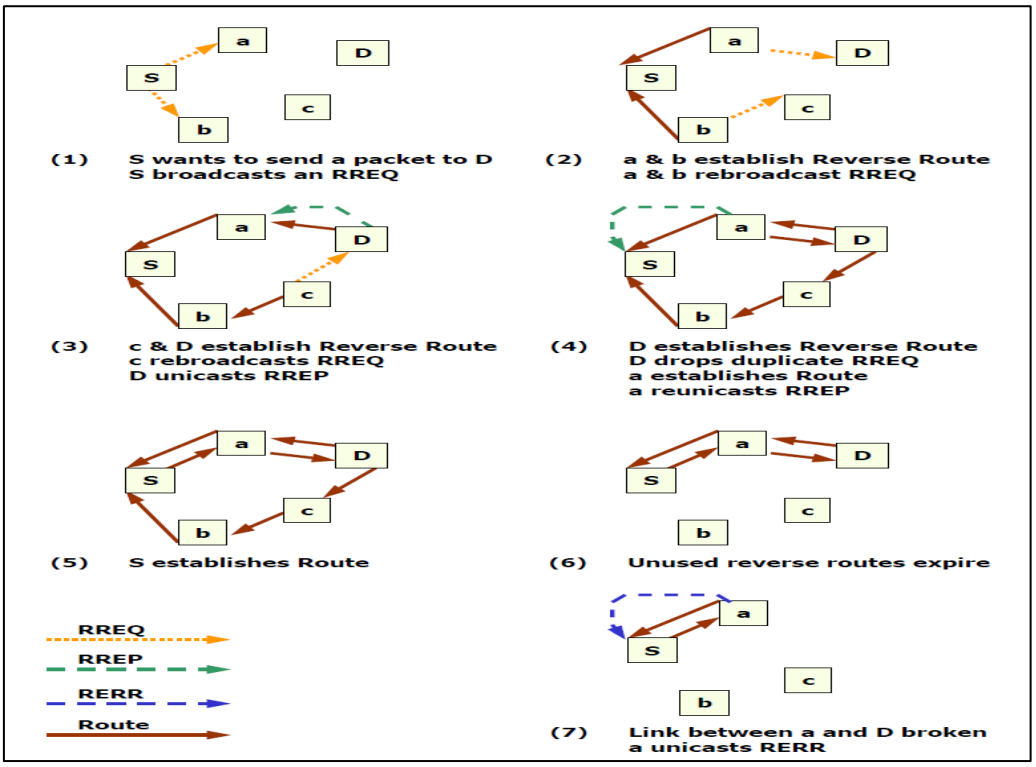
AODV is to decrease the phone figure of program substance s sent all through the web by finding agenda s on-prerequisite as opposed to staying up with the latest schedule data. In an AODV each customer knows its neighbour and the expenses to scope them. A thickening keeps up its own directing forbidden exhibit, putting away all hubs in the cross

section, the separation and the following record jump to them. In the event that a hub isn't reachable the separation to it is set to endlessness. Each hub sends its neighbours occasionally its entire directing table. So they can check if there is a helpful schedule to another hub utilizing this neighbour as next bounce. when a connection good fortunes a Count - To-Infinity could happen. Being a receptive steering convention AODV utilizes customary directing tables, one section for every goal and sequence nos. are utilized to decide if directing data is breakthrough and to evade steering circles. It underpins broadcasting, multicasting and unica sting.

A. Control Messages

- Route Request Message (RREQ): If a hub needs to send a parcel to a hub for which no course is accessible it communicates a RREQ to discover the course. A RREQ incorporates an extraordinary identifier (RREQ ID), Destination IP address, Destination succession no, Source IP address, Source grouping no, Hop Count instated to 0 and a few banners. At the point when a hub gets a RREQ, it coordinates the RREQ ID, and on the off chance that it isn't gotten already i.e. another RREQ, at that point it sets up a switch course to the sender. It checks its steering table on the off chance that it knows the course to the goal with a higher grouping number then it makes a RREP and unicast to the source utilizing reverse courses. In the event that it doesn't know the course it essentially builds the jump tally and rebroadcast the refreshed RREQ. Any intermediated hub which contains the course to the goal can likewise produce RREP.
- Route Reply Message (RREP): If a hub is the goal, or has a substantial course to the goal, itunicasts a RREP back to the source. The reason one can unicast RREP back is that each hub sending a RREQ message stores a course back to the source hub.
- Route Error Message (RERR): When a connection is identified, a RERR message is utilized to advise different hubs that the loss of that connection has happened. The RERR message shows those goals which are not any more reachable as a result of connection breakage.
- Route Reply-Acknowledgment Messages (RREP-ACK): RREP-ACK is another message compose that must be sent because of a RREP message. This is regularly done when there is peril of unidirectional connections keeping the fruition of a Route Discovery cycle.
- Hello Messages: If a node doesn’t receives any communication from its neighbours for a extended time it broadcasts periodically a hello message to ensure if the route is still dynamic and no linkage breakages are assumed by its neighbours. If a link breakage is found it tries to repair the route locally.

B.



Aodv Message types

Fig 1: AODV Message Types.

C. Combining AODV And OLSR

For the issue of what protocols are suitable for multi segment routing , theoretically many existing protocols can be used. In our instantiation,OLSR is a proactive link-state routing protocol AODV is used for local multi segment routing and this instantiation is termed OLSR and AODV multi segment (proposed model) routing protocol. Our choice of these protocols is motivated by the following reasons:

- OLSR is a proactive and AODV is a on-demand routing protocols. By combining them hierarchically, we expect multi-segment (proposed) to inherit the strengths of both OLSR and AODV, thus , exhibit better scalability and performance. Our simulation study shows that this combination indeed improves the scalability of OLSR greatly and reduces the overhead of AODV significantly.

- In networks with more or less static connectivity (i.e., little mobility), AODV performs best. The control overhead is kept at a minimum, so both bandwidth and energy consumption by control overhead is greatly reduced. These point make AODV more suited to resource and bandwidth critical situation.

- OLSR must maintain an up-to-date routing table at all times, a decrease in network performance is expected as more network overhead is needed. Most control overhead in AODV is related to route discovery, which is initiated when a path break occurs. In network with low mobility, path breaks occurs less frequently, making AODV perform well.

- OLSR will perform best when the traffic is sporadic, that is, when the traffic can benefit from having found a route proactively. This follows from that the single packet transmission delay is relatively small compared to running a route request protocol, as is done in AODV. For long duration traffic, however, AODV might perform better.

V. RESEARCH METHODOLOGY

A. PROPOSED MODEL

In the proposed demonstrate we endeavoured to separate a system into sections. These distinctive sections are associated together with the goal that entomb correspondence between various fragments can be performed. Each portion having two exceptional hubs as takes after:

1. Gateway head

Entryway head hubs are characterized as a hub of a section that gives a correspondence between various portions. The genius designation of calculation program depends on choosing an entryway head and it's a difficult activity since the incessant changes to the portal is a not prescribe. In the recommended display the hub which is in the fragment for the longest timeframe is chosen as a passage hub.

2. Gateway queue

On the off chance that the door head leaves the system, at that point there should be a hub to go about as a portal head. The portal line hub is held for this reason. Determination strategy of the entryway line hub is like that of passage line head. The hub which is in the fragment for the longest timeframe after door head is chosen as a passage line. When passage head leaves the portion the entryway line will turn into the new door head and will inform every one of the hubs of a specific section, alongside portal heads of other associated fragments with respect to this difference in door head. In the recommended display inside activity and entryway line inside the section is overseen utilizing Aodv directing convention. Bury section movement among various portions is overseen utilizing multi point hand-off component.

FIG 2 : PROPOSED MODEL CREATION

B. FOCUS POINTS OF PROPOSED MODEL

1. The system measure builds the execution of AODV directing calculation diminishes. To beat this issue in recommended approach hubs is joined into fragments. The minute size of fragment increments by some predefined estimate, it should naturally make another portion. This execution can be enhanced even with the bigger systems.

2. When a handle on the course movement out or flops, rather than disposing of the entire unique course and finding another course from source to goal, just the two Gateway Heads of the open casing portion need to get through another fragment.

3. Suggested model when contrasted with Cluster head-Gateway Switch Routing (CGSR) is that in CGSR two groups share a typical Gateway. In this manner, if a solitary Gateway hub flops, at that point both the bunches containing that Gateway hub will be influenced.

4. Suggested model Gateway Head are not imparted to various portions, i.e, each section has its own Gateway Head. On the off chance that one of the Gateway head flops, at that point just that fragment containing will be influenced in this way overhead lessens.

VI. NETWORK SIMULATION

A. Simulation Model:

The Network Simulator NS- 2 has been utilized as a part of the present assessment which is a discrete occasion driven test system. It is discovered that, NS-2 is particularly reasonable for planning new conventions and its correlations and activity assessments. The principle importance of NS-2 is that it is a question situated reproduction which is composed in C++, with an Octal mediator as a frontend. All in all, NS-2 utilizes two unique dialects since test system needs to manage two particular viewpoints that is nitty gritty re-enactment of conventions which require a framework programming dialect which has to productively control bytes, bundle headers and execute calculations, and research including marginally shifting parameters or rapidly investigating various situations.

B. Simulation Parameters:

In our work the performance of Routing Protocols AODV, OLSR is evaluated by varying the network size (number of mobile nodes).

SIMULATION PARAMETERS	
SIMULATOR	ns-2.34
PROTOCOL	AODV, OLSR
SIMULATION TIME	50 seconds
ENVIRONMENT SIZE	1000m x 1000m
NUMBER OF NODES	50
MOVEMENT MODEL	RANDOM WAYPOINT
CHANNEL	WIRELESS
PAUSE TIME	50 seconds
MAXIMUM SPEED	DEFAULT
PACKET RATE	512 Kbps
TRANSMITION RANG	400m

Table 2: Simulation Scenario Parameters

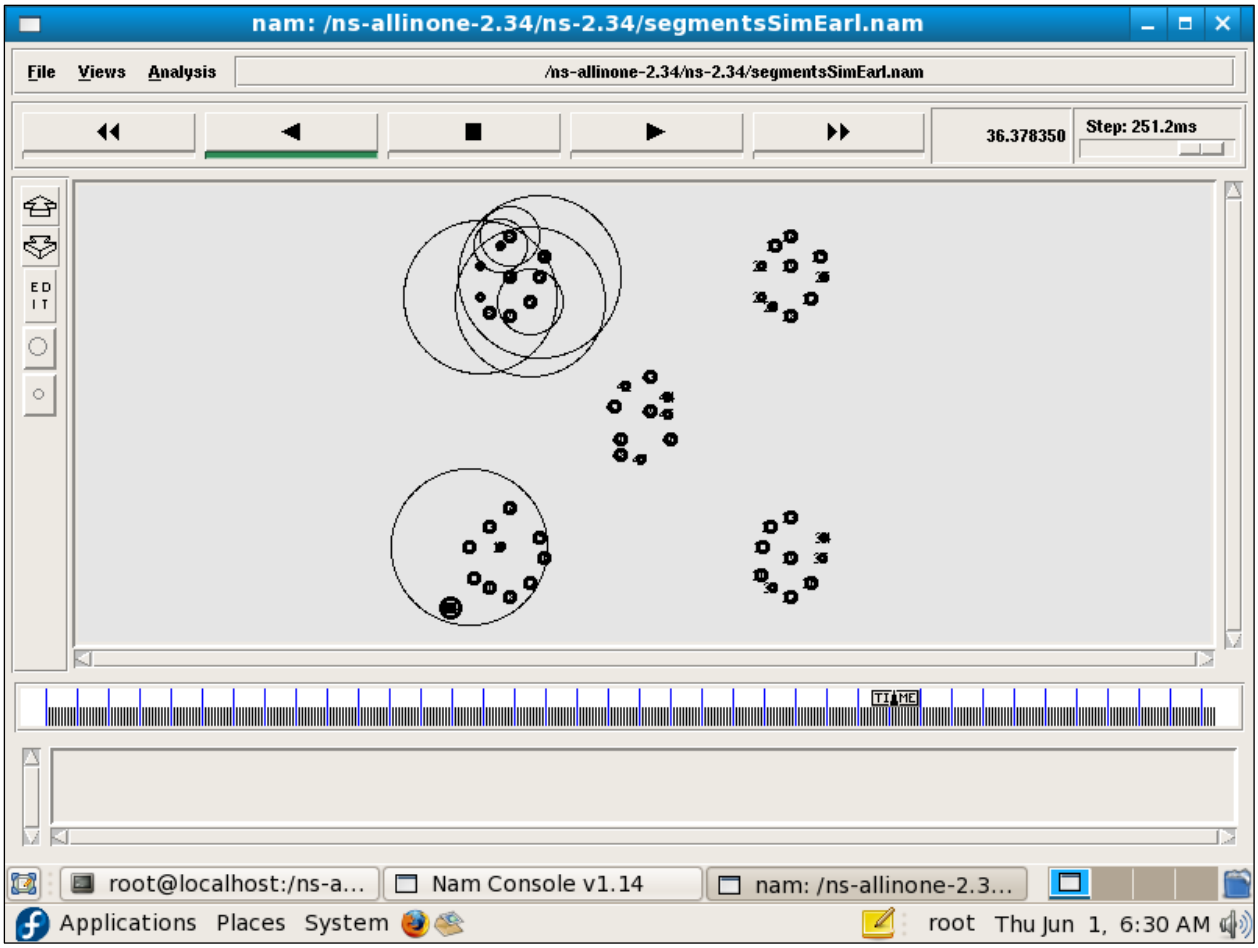


Fig4. Simulation Scenario

VII. RESULT AND ANALYSIS

The Simulation comes about are appeared in the following section in the form of line graphs. Diagrams demonstrate correlation between two Protocols by shifting distinctive number of nodes on the basis of different performance matrices.

A. End to End Delay

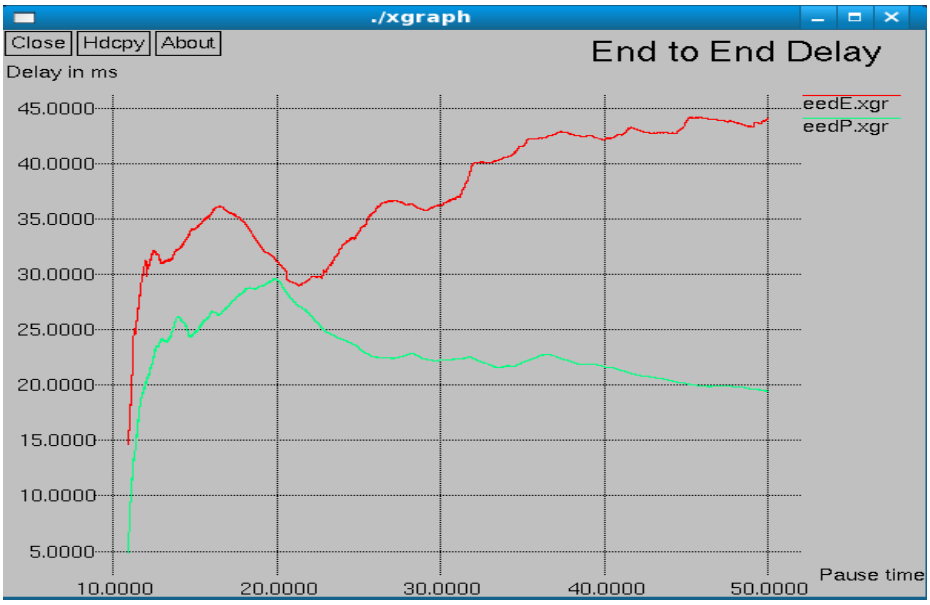


Fig 5 : End to End Protocol

B. Throughput

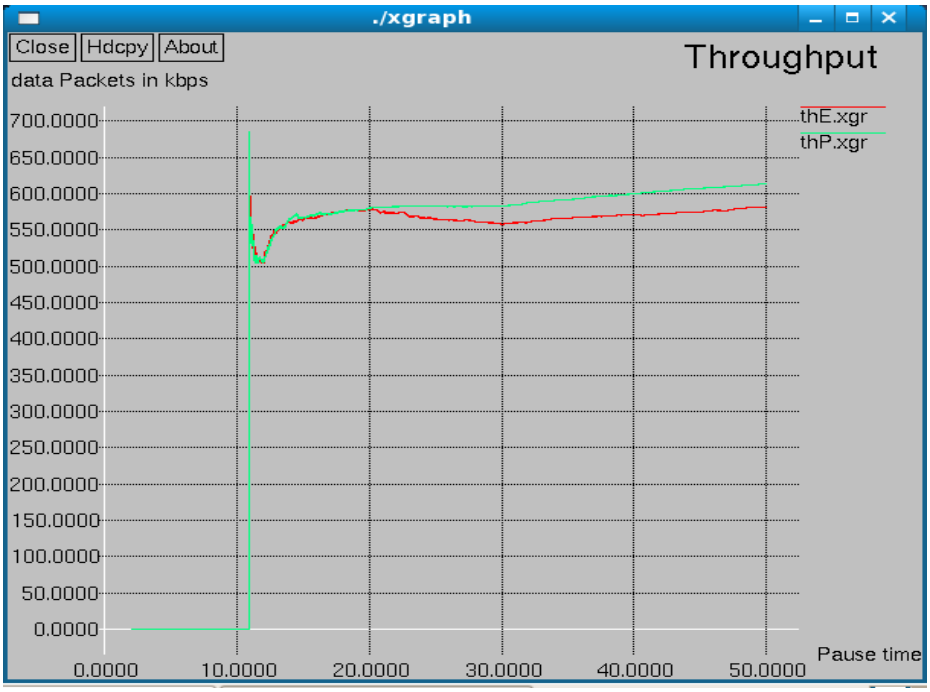


Fig 6 : Throughput

C. Packet delivery fraction

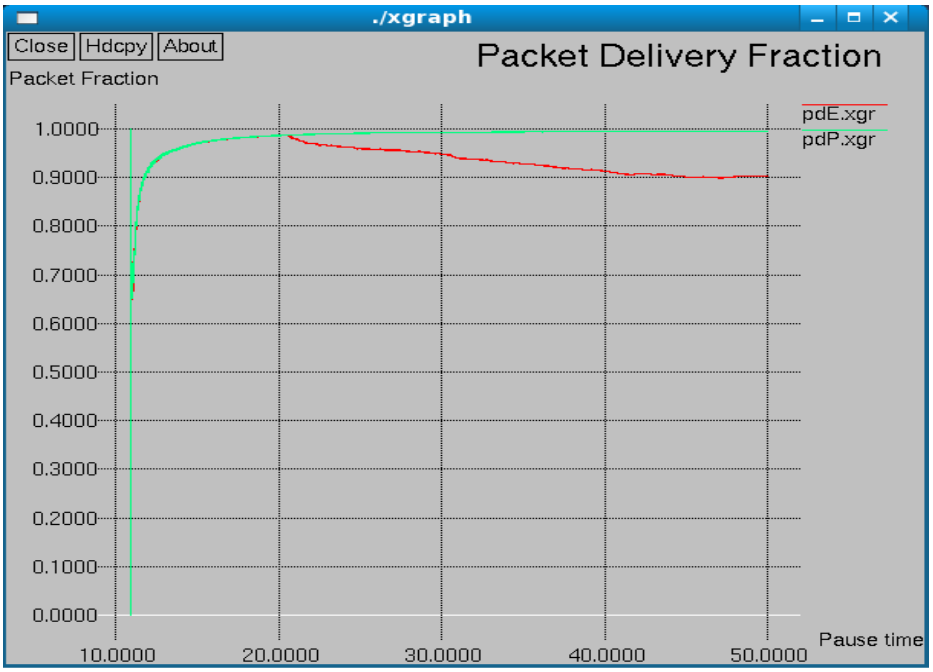


Fig 7 : Packet Delivery Fraction

After analysis of all the graphs, we analysed that Proposed model helps in reducing the load over the network which is caused due to making segments of the network. By overall analysis, we observe that while maintaining the performance can be improved even of the large network. Firstly, we compared the average end-to-end delay of multi segment model with AODV and OLSR. End-to-end delay reduced the time delay, Secondly we compared the throughput of multi segment with AODV and OLSR. Lastly we compared packet delivery fraction of multi segment with AODV and OLSR routing protocol.

AVERAGE

There is a Calculation of Send, Received Packets,Average PDF,Average End-To- End Delay,Average Throughput for AODV simulation with 50 nodes by running Different AWK script.

- **Average End to End Delay**
- **Average Throughtput**
- **Average Packet Delivery Fraction**

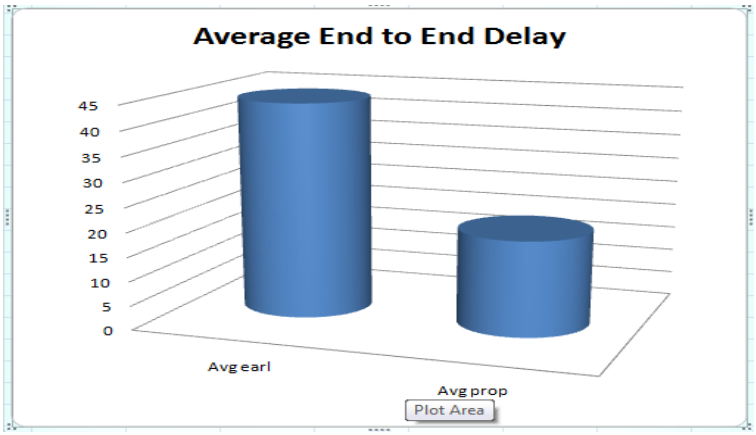


Figure 8: Average End to End Delay

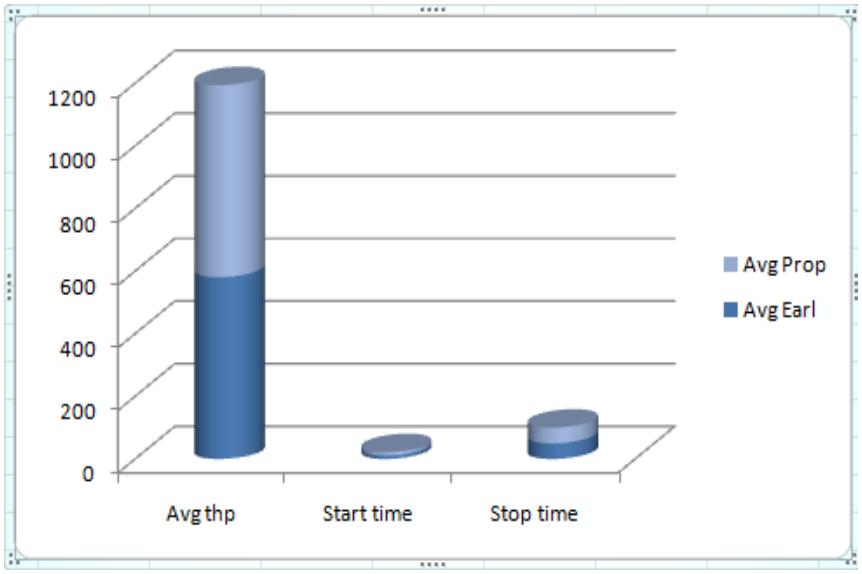


Figure 9: Average throughtput

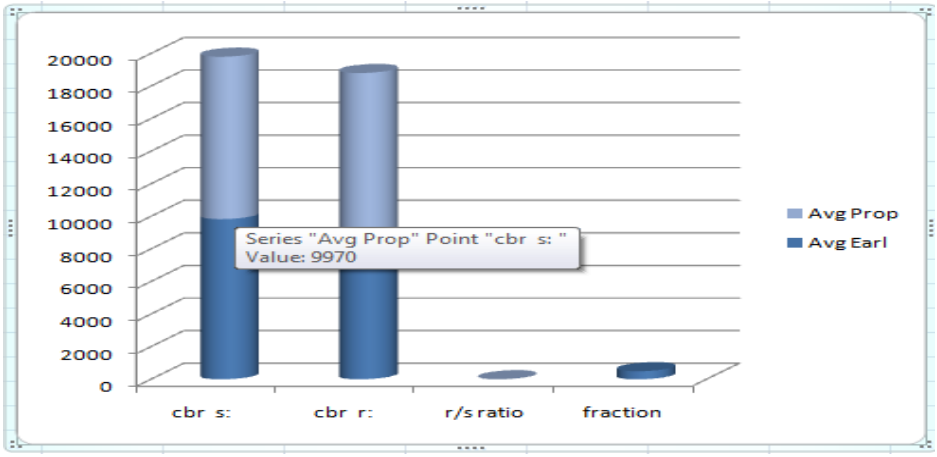


Figure 10: Average Packet Delivery Fraction

VIII. CONCLUSION AND FUTURE WORK

An ad-hoc Network is an integral part of the Communication which develop itself in a network without having its on fixed infrastructure and entities for communication and direct it to a capable candidate to execute its operation in fields like defence, emergency services. It's like utilising a existing infrastructure available during that time and in the vicinity and coagulate it into a solid communication network by linking it by various mess available to the network.

Our study was terminated to evaluate the functioning of suggested manikin, MSLR and AODV routing protocol in terms of Packet Delivery Ratio, Average back to back delay and Throughput. From the compare it is concluded that overall performance of multi segment protocol is better than AODV and MSLR. In order to achieve a quicker back to back delay an enhanced packet boat delivery parameters our algorithmic rule can control the overhead generated nodes.

The future enhancement could be to develop upon various options and methods to go ahead in limiting the dealing on burdening and making comparison based algorithm for other hands on Practical and automatic routing. Amalgam and fusion routing of suggested algorithm is currently being worked out and is being investigated.

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