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RESEARCH ARTICLE

PERFORMANCE EVALUATION OF AODV AND DSR IN FEASIBLE AND RANDOM PLACEMENT MODELS

K. Narasimha Raju[1], Dr. S.P.Setty[2]

[1]Research Scholar, CS&SE Department, Andhra University, INDIA

[2]Professor, CS & SE Department, Andhra University, INDIA

[1] bcoolmind@gmail.com; [2] drspsetty@gmail.com

Abstract— Routing is a challenging issue in Mobile Ad hoc Network to pass the data packets through intermediate hops in an efficient manner. In this paper, Reactive routing protocols namely AODV and DSR are evaluated under the feasible placement and random placement models. Simulation results shows that AODV and DSR are performing better in feasible placement approach comparative to the existing random placement approach.

Keywords— AODV, DSR, MANETs, Performance metrics, Placement models, Reactive Routing Protocols

I. INTRODUCTION

In the recent communication technologies, Wireless communication became a part of everyday human needs. Mobile Ad hoc Networks are an excellent solution where the infrastructure based network is unable to provide the network services during unexpected disasters to the users. Passing the data packet in an efficient manner through multi-hop nodes is a challenging issue in Mobile Ad hoc Networks (MANETs)[1][2]. Many routing protocols were come into existence in Mobile Ad hoc Network. In this, the reactive routing protocols [3] namely AODV [4][5] and DSR[6][7] are considered for performance evaluation.

II. RELATED WORK

S.J.Lee conducted a simulation study on Table driven routing protocols and on demand routing protocols to evaluate the performance [8]. C.-E. Perkins et.al conducted a comparative study to evaluate the performance of two on demand routing protocols[9]. J Broch et.al conducted several experiments for performance analysis of both proactive and reactive routing protocols[10]. Dr.S.P.Setty evaluated the performance of DSR in Random, Grid and Uniform Placement models[11]. Syed Basha shaik analysed the performance of AODV,DSR and ANODR for Grid Placement[12].Dr.S.P.Setty analysed the performance of AODV and FLBNTTPEAODV in various placement models[13].K.Narasimha Raju et.al analysed the performance of AODV in feasible placement model in various pause timings and propagation models[14].

III. AD HOC ON DEMAND DISTANCE VECTOR (AODV)

The on-demand behaviour of AODV played a significant role in the routing protocols for Mobile Ad hoc Networks. The Route Request (RREQ) packets, Route Reply(RREP) packets and Route Error (RERR) packets are the responsible things in the route discovery and route maintenance mechanisms. Sequence number is an important element in the route establishment.

IV. DYNAMIC SOURCE ROUTING (DSR)

A well known reactive routing protocol in Mobile Ad hoc networks is Dynamic Source Routing protocol. Source routing is the fundamental mechanism used in it. The route discovery and route maintenance are confirmed through Route Request (RREQ) Packets, Route Reply (RREP) packets and Route Error (RERR) packets.

V. SIMULATION ENVIRONMENT

Various network simulation softwares namely NS2[15] ,GloMosim[16] and Qualnet[17] etc., are available to evaluate the performance of Mobile Ad hoc Networks. Qualnet simulator is used in the experimental evaluation process. The simulation parameters used in the experiment1 and experiment 2 to evaluate performance AODV and DSR in Feasible and Random placement models under various simulation timings are shown in the tables 1 and 2 respectively.

A. Experiment 1

The performance of AODV is evaluated in Random Placement model and Feasible placement models under various simulation timings. The experiment is also conducted at various network sizes.

Table 1 : Simulation parameters for AODV in various simulation timings

Parameter	Value
Simulation Time (s)	120,180,240,300,360
Area(sq.m)	1000x1000
Propagation Model	Two Ray
Packet Size	512 bytes
Nodes	25,50,75,100

Antenna Type	Omni directional
Transmission Range	250m
Receiver Range	250m
Mobility Model	RandomWaypoint
Pause time(s)	0
Node Placement	Random,Feasible
Routing Protocols	AODV
Speed	15 m/s

B. Experiment 2

The performance of DSR is evaluated in Random Placement model and Feasible placement models under various simulation timings. The experiment is also conducted at various network sizes.

Table 2 : Simulation parameters for DSR in various simulation timings

Parameter	Value
Simulation Time (s)	120,180,240,300,360
Area(sq.m)	1000x1000
Propagation Model	Two Ray
Packet Size	512 bytes
Nodes	25,50,75,100
Antenna Type	Omni directional
Transmission Range	250m
Receiver Range	250m
Mobility Model	RandomWaypoint
Pause time(s)	0
Node Placement	Random, Feasible
Routing Protocols	DSR
speed	15 m/s

VI.RESULTS

To evaluate the reactive routing protocols AODV and DSR, performance metrics namely Average jitter, Average end-to-end delay, Average throughput and percentage of packet delivery ratio are considered. Average jitter represents the delay between two successive packets. Average end-to-end delay represents the time taken by a packet to travel from one entity to the destination node. Average Throughput indicates the total amount of data received by the destination node during the end of the simulation period. Packet Delivery Ratio denotes the ratio of the number of data packets delivered to the number of data packets sent from source entity to the target node

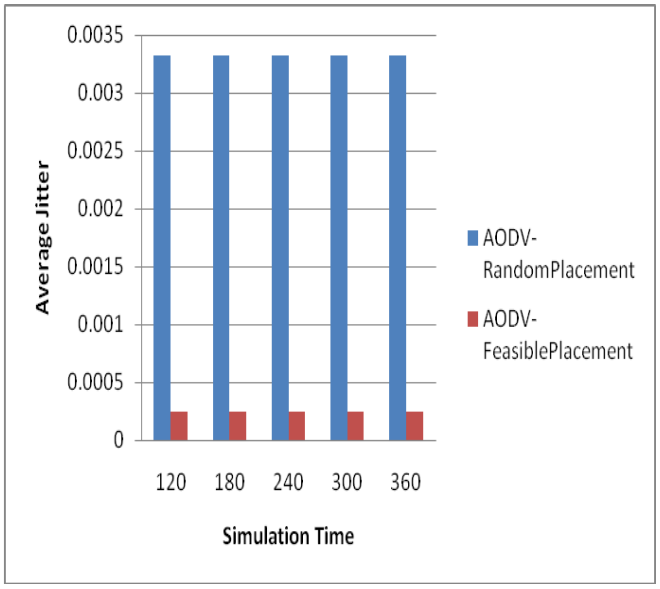


Figure 1 : Average Jitter(s) for 25 nodes in AODV

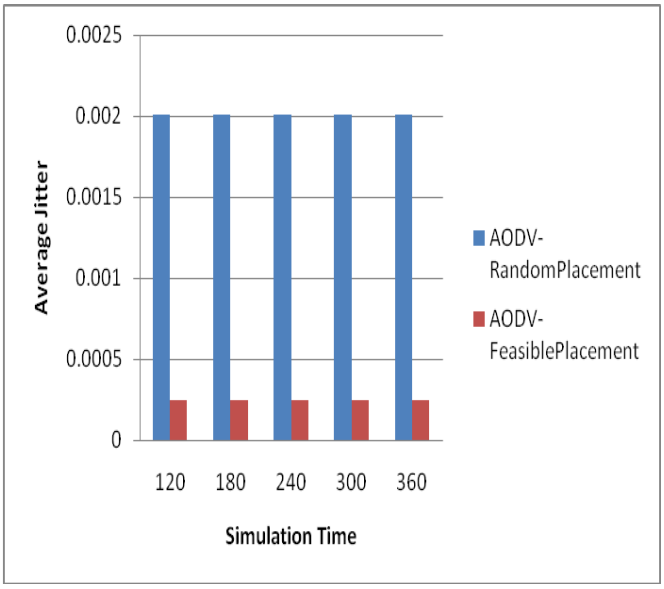


Figure 2 : Average Jitter(s) for 50 nodes in AODV

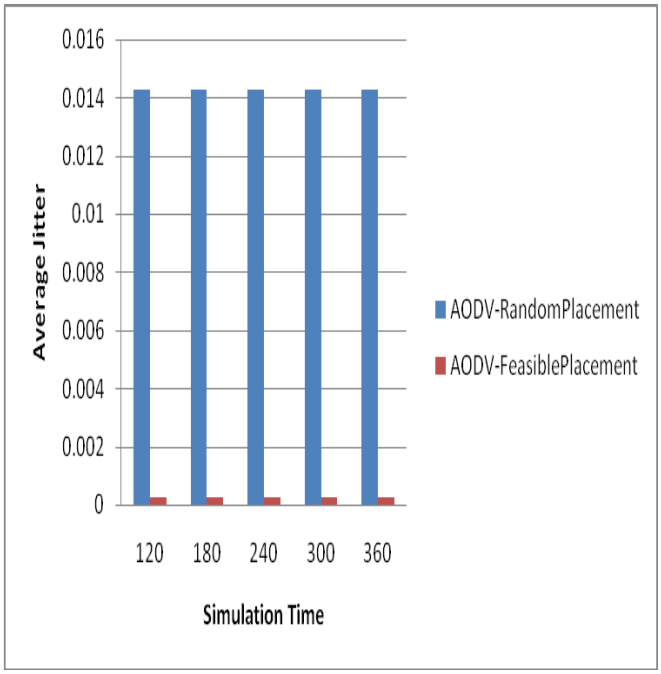


Figure 3 : Average Jitter(s) for 75 nodes in AODV

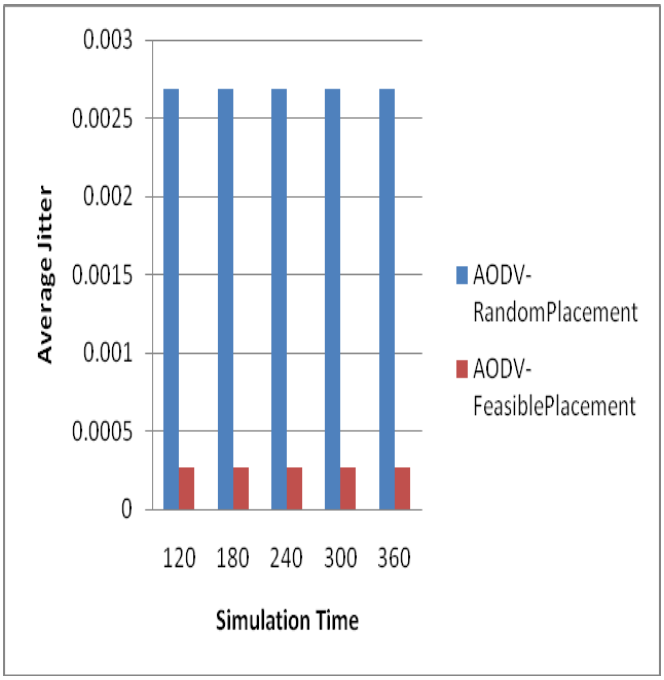


Figure 4 : Average Jitter(s) for 100 nodes in AODV

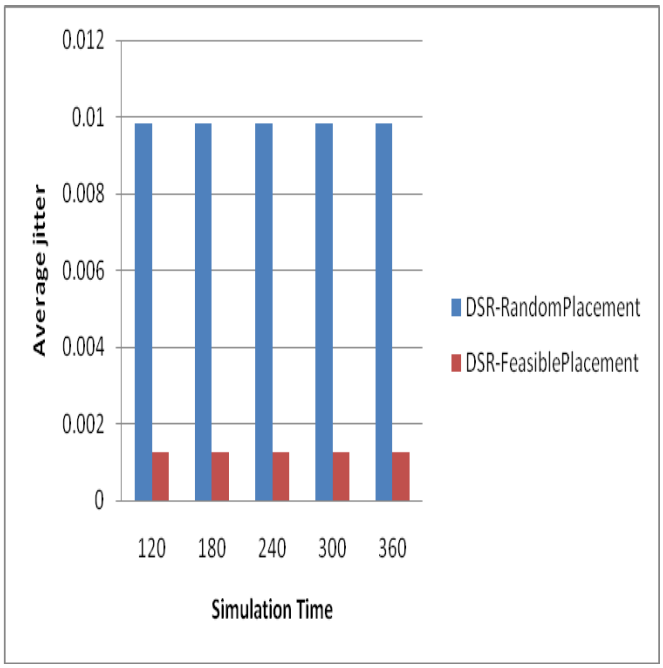


Figure 5 : Average Jitter(s) for 25 nodes in DSR

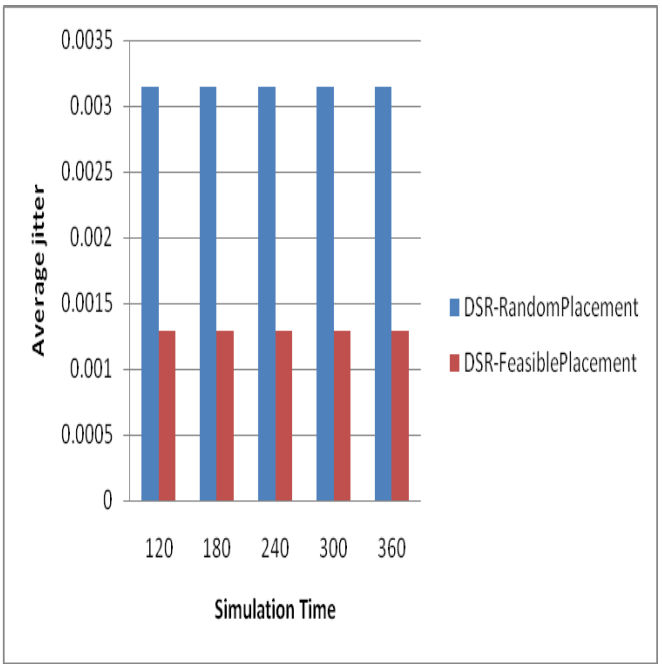


Figure 6 : Average Jitter(s) for 50 nodes in DSR

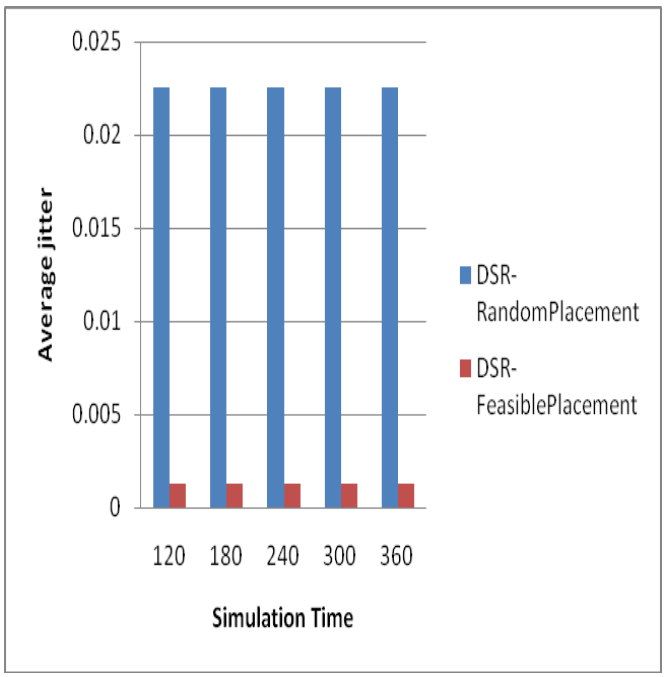


Figure 7 : Average Jitter(s) for 75 nodes in DSR

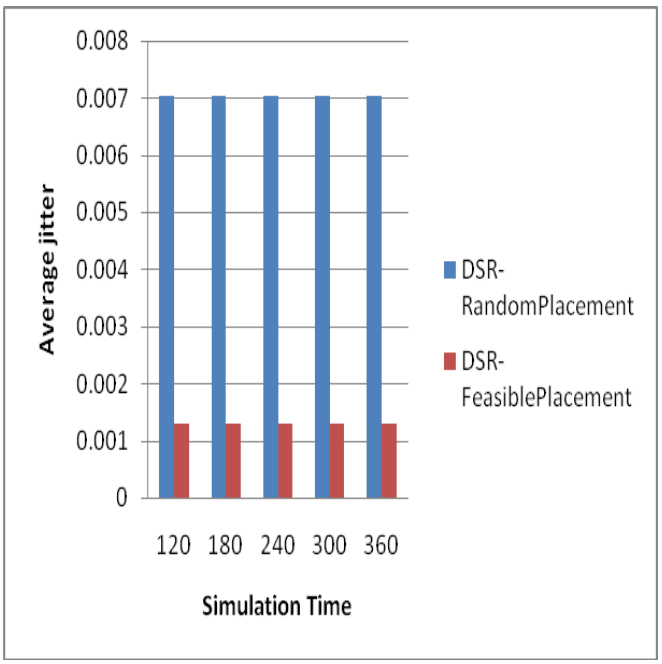


Figure 8 : Average Jitter(s) for 100 nodes in DSR

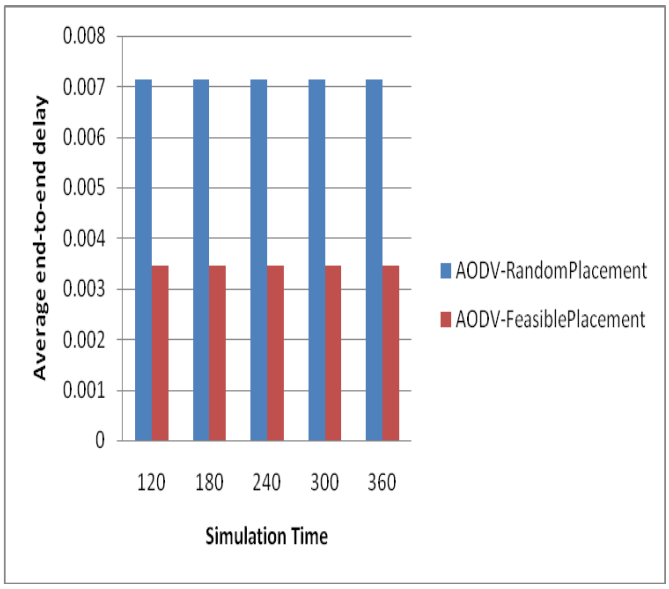


Figure 9: Average end-to-end delay(s) for 25 nodes in AODV

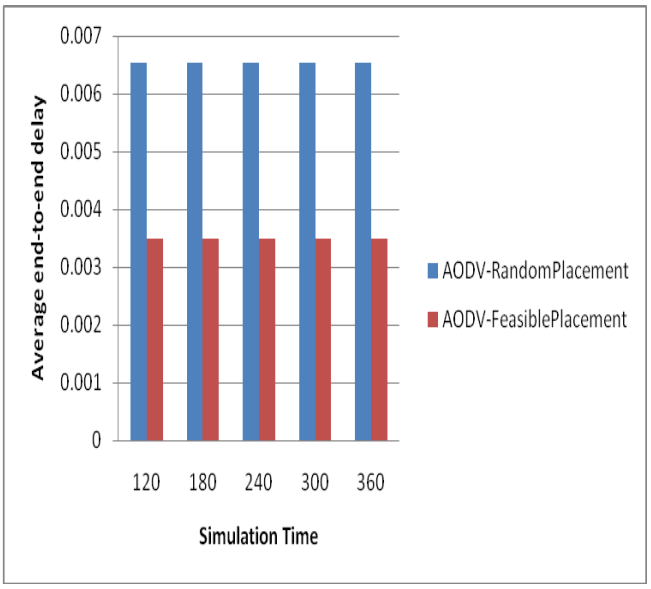


Figure 10: Average end-to-end delay(s) for 50 nodes in AODV

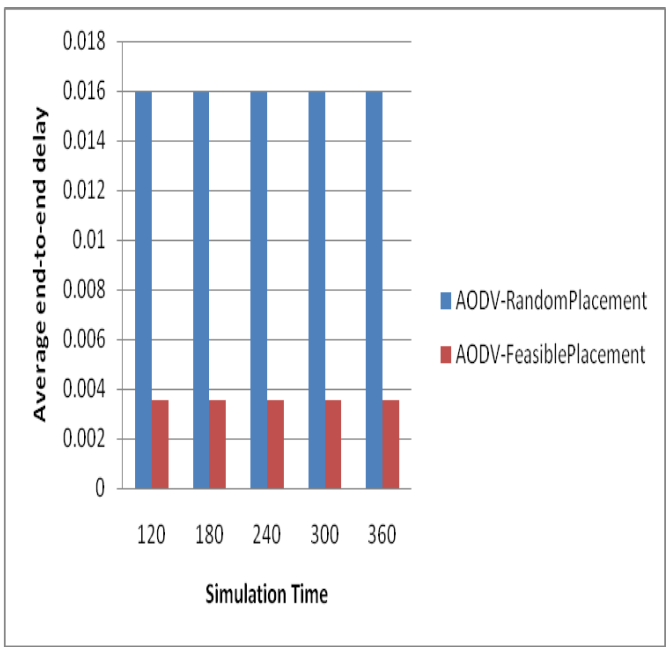


Figure 11: Average end-to-end delay(s) for 75 nodes in AODV

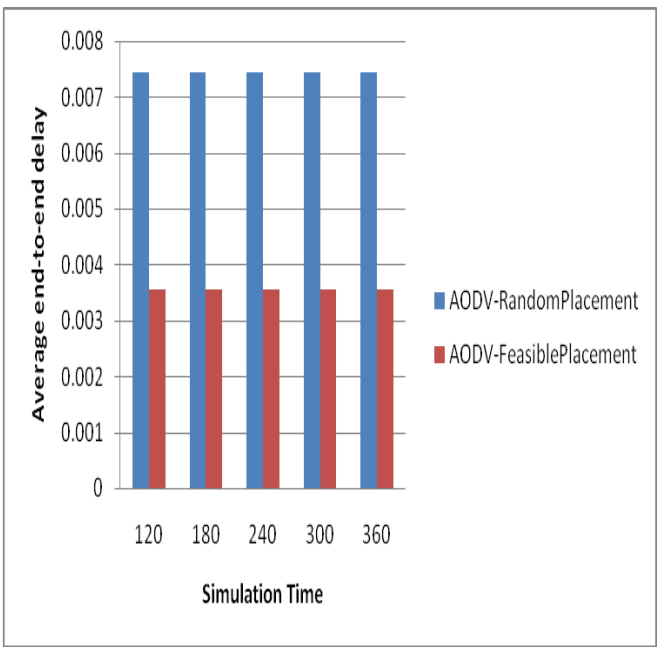


Figure 12: Average end-to-end delay (s)for 100 nodes in AODV

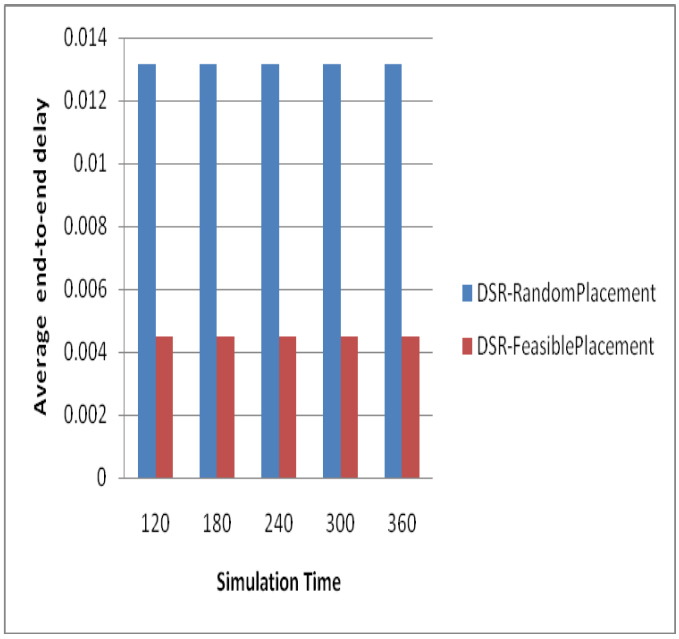


Figure 13: Average end-to-end delay(s) for 25 nodes in DSR

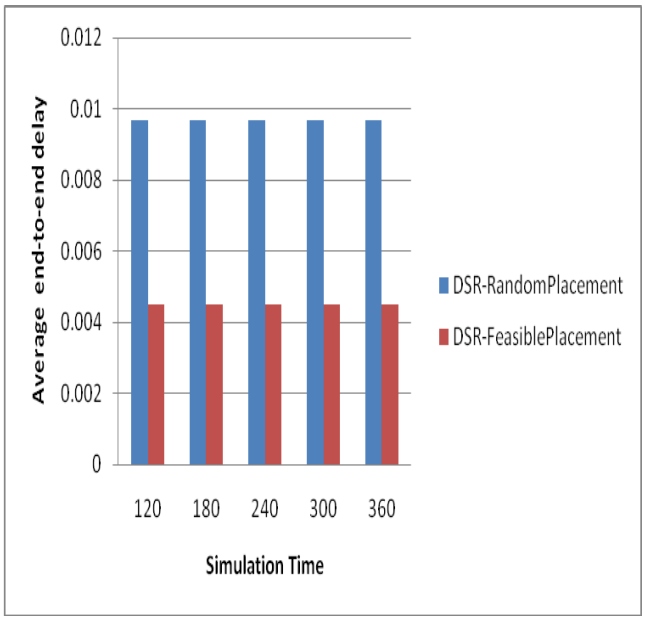


Figure 14: Average end-to-end delay(s) for 50 nodes in DSR

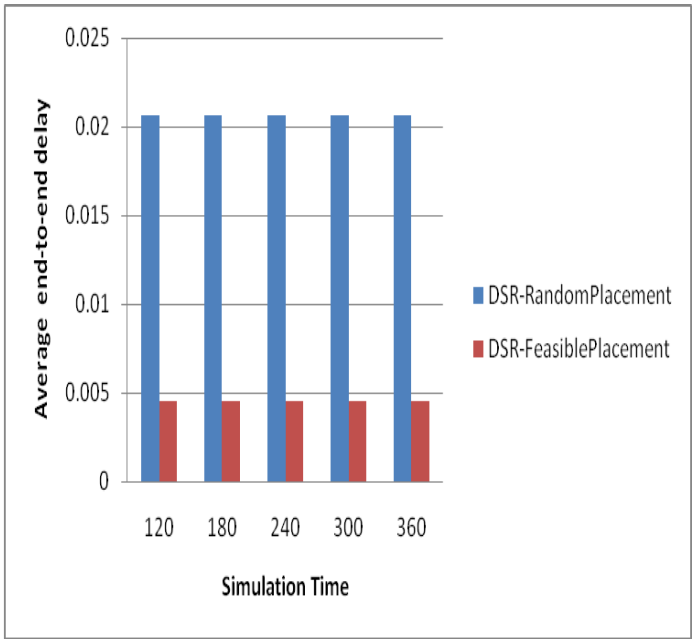


Figure 15: Average end-to-end delay(s) for 75 nodes in DSR

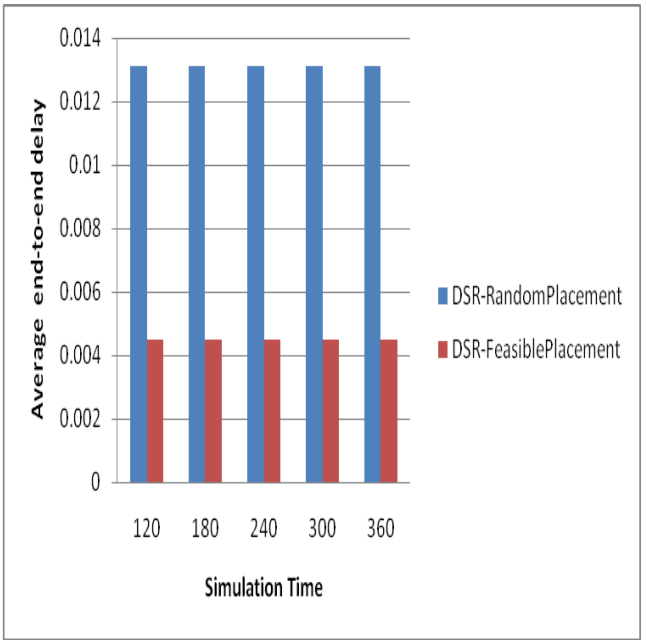


Figure 16: Average end-to-end delay(s) for 100 nodes in DSR

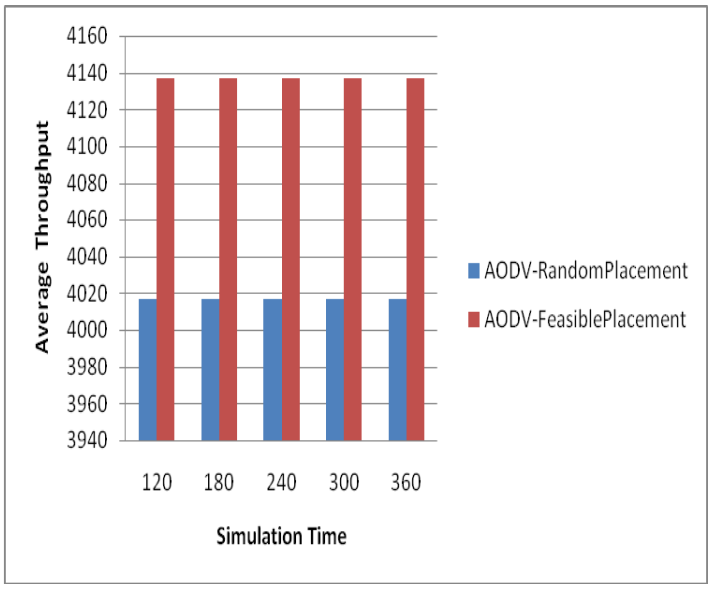


Figure 17: Average Throughput for 25 nodes in AODV

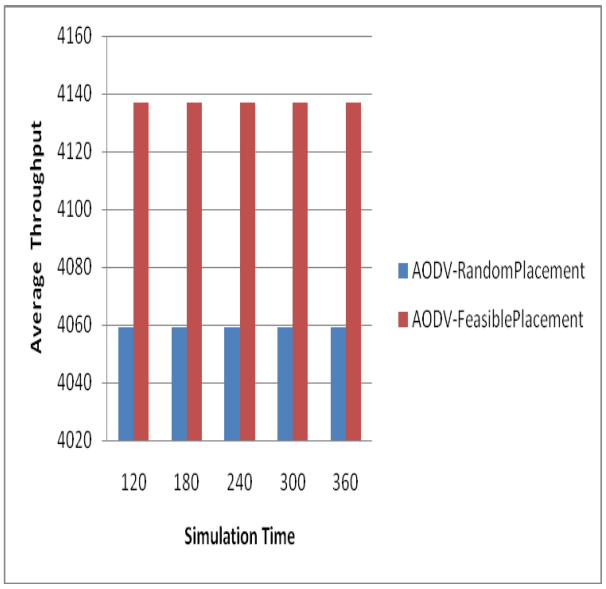


Figure 18: Average Throughput for 50 nodes in AODV

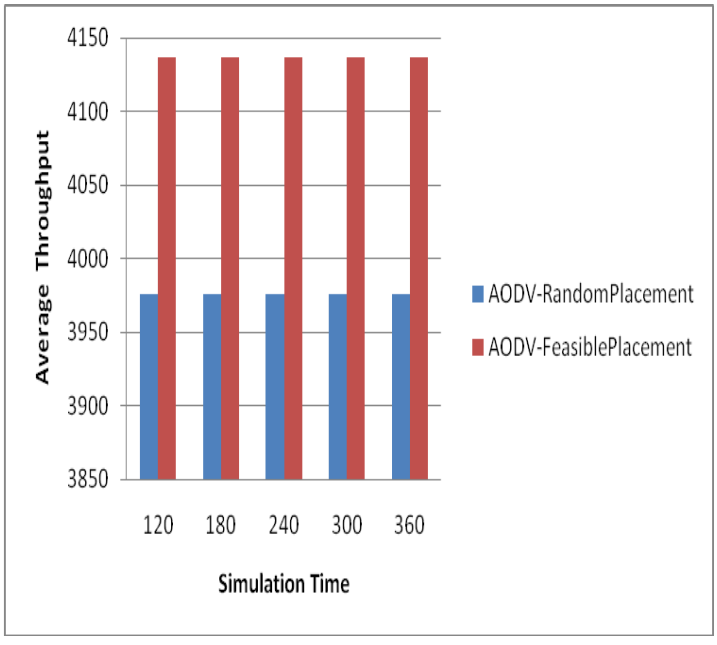


Figure 19: Average Throughput for 75 nodes in AODV

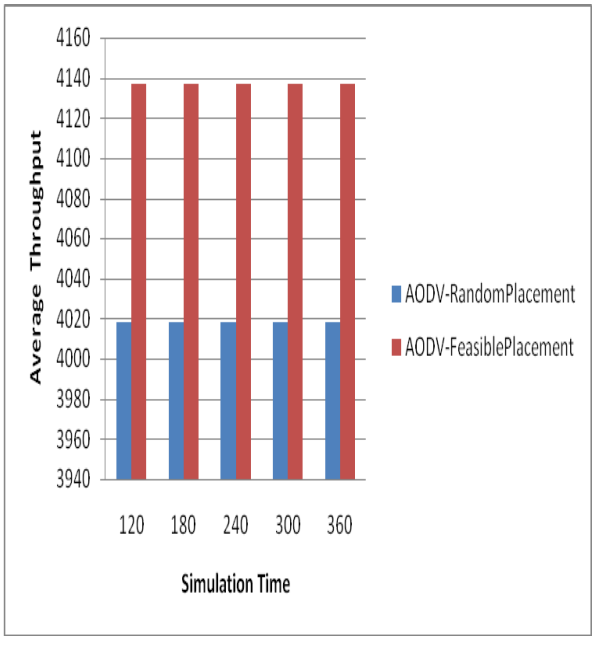


Figure 20 : Average Throughput for 100 nodes in AODV

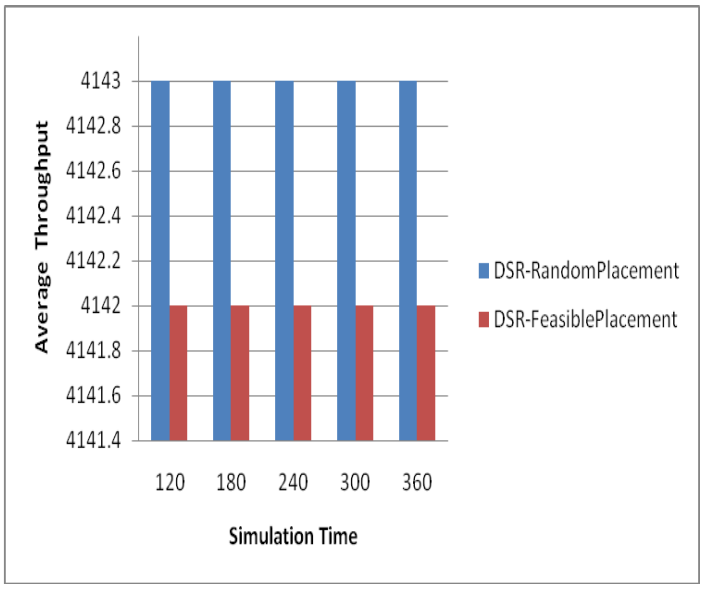


Figure 21: Average Throughput for 25 nodes in DSR

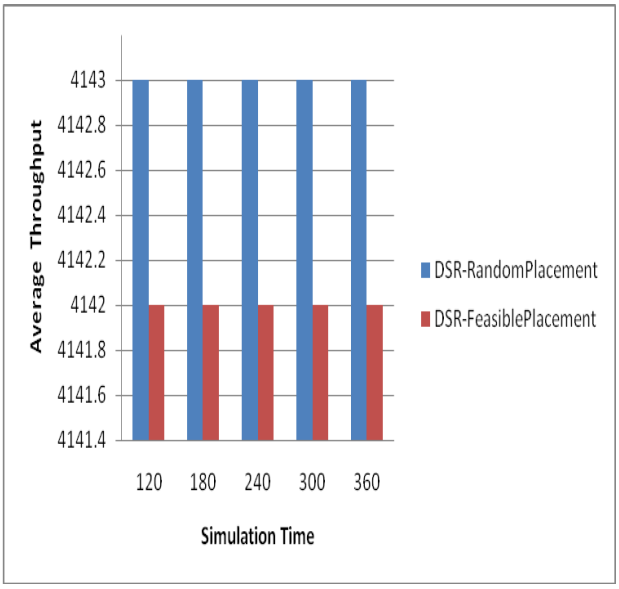


Figure 22 : Average Throughput for 50 nodes in DSR

Figure 23: Average Throughput for 75 nodes in DSR

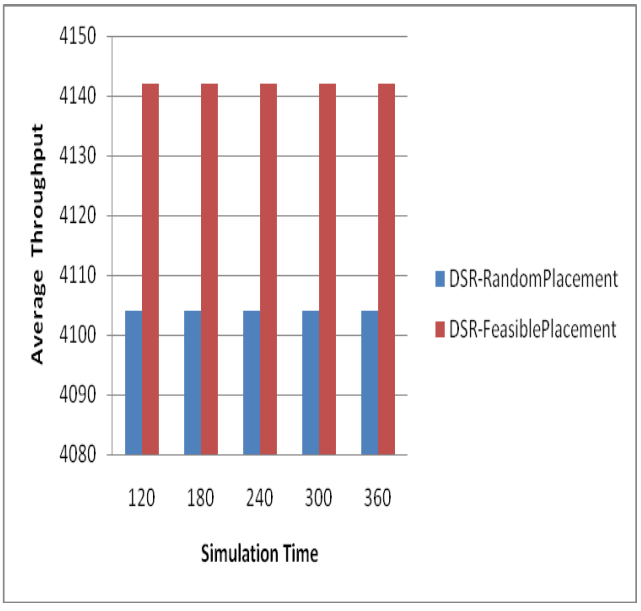
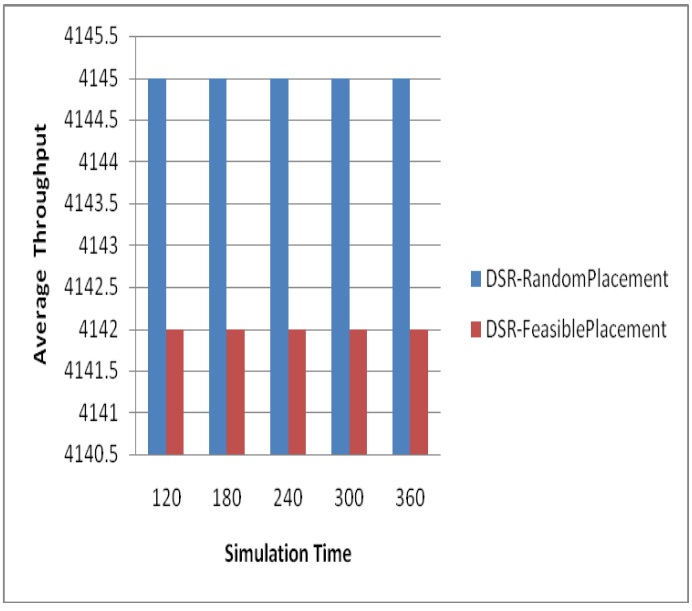


Figure 24 : Average Throughput for 100 nodes in DSR



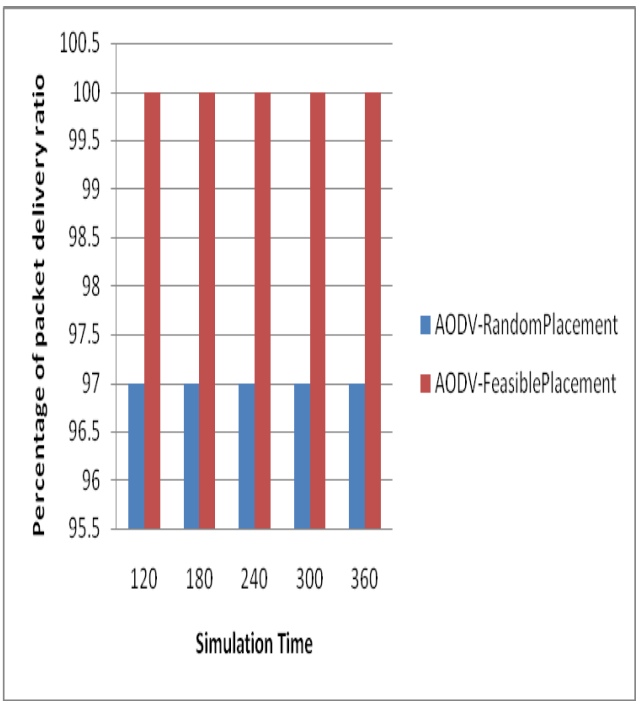


Figure : 25 Percentage of Packet delivery ratio for 25 nodes in AODV

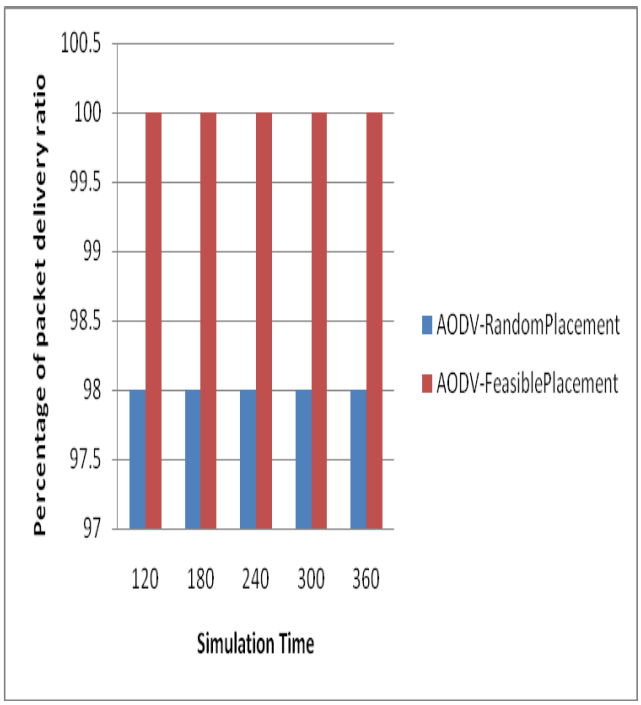


Figure 26: Percentage of Packet delivery ratio for 50 nodes in AODV

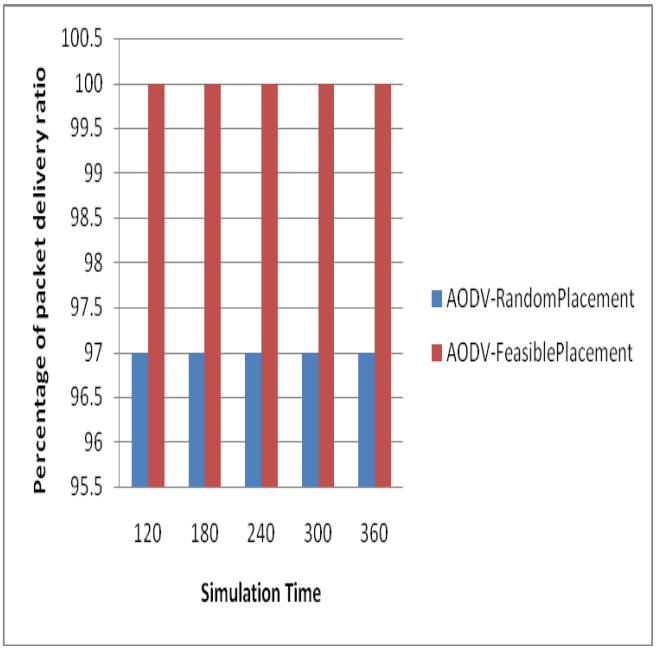


Figure 27 : Percentage of Packet delivery ratio for 75 nodes in AODV

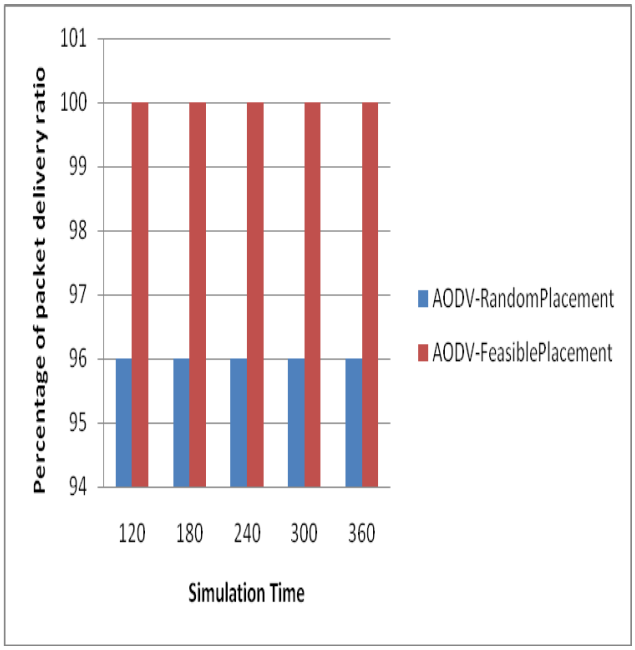


Figure 28: Percentage of Packet delivery ratio for 100 nodes n AODV

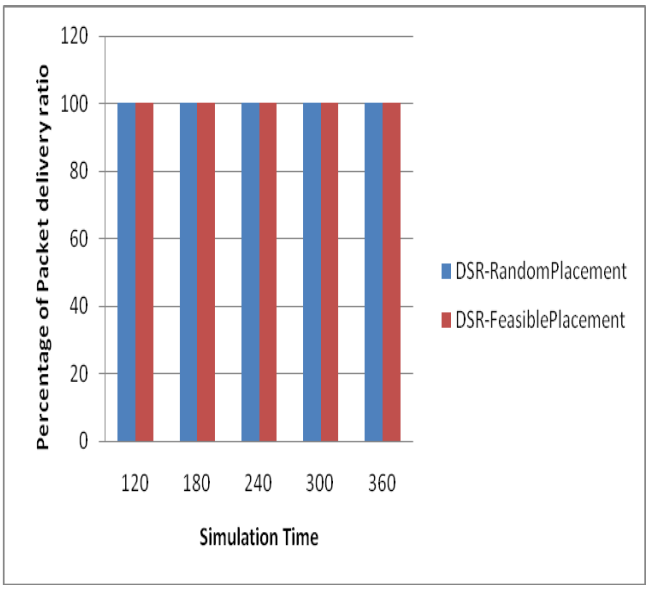


Figure 29: Percentage of packet delivery for 25 nodes in DSR

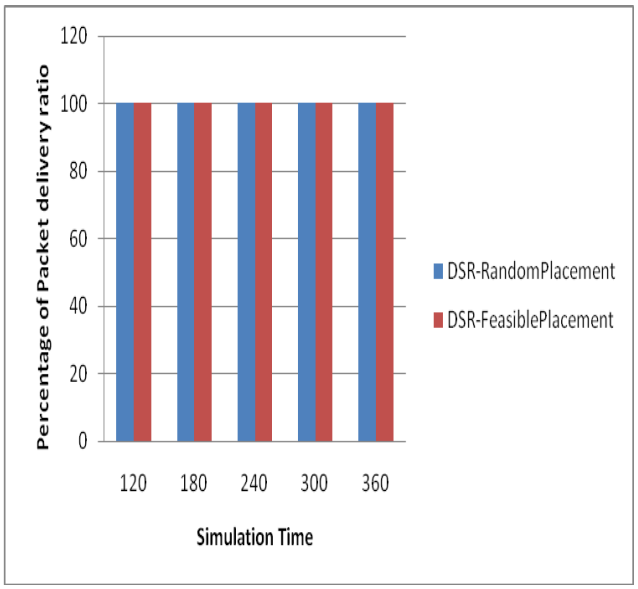


Figure 30 : Percentage of packet delivery for 50 nodes in DSR

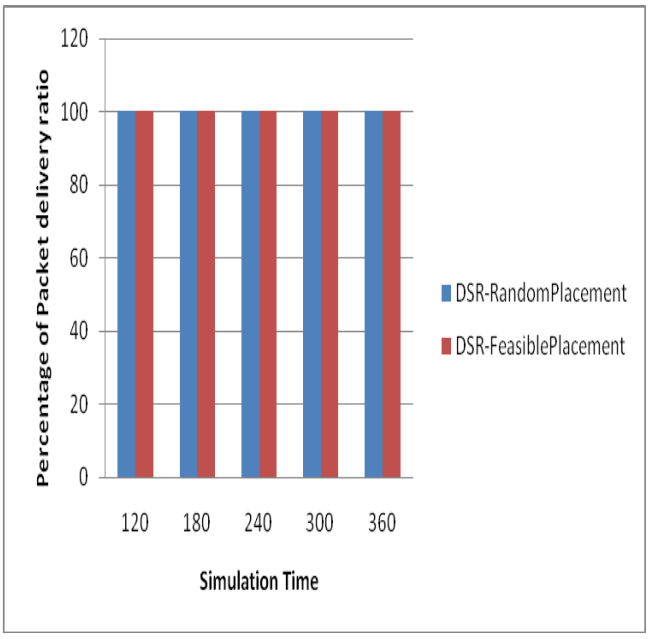


Figure 31: Percentage of packet delivery for 75 nodes in DSR

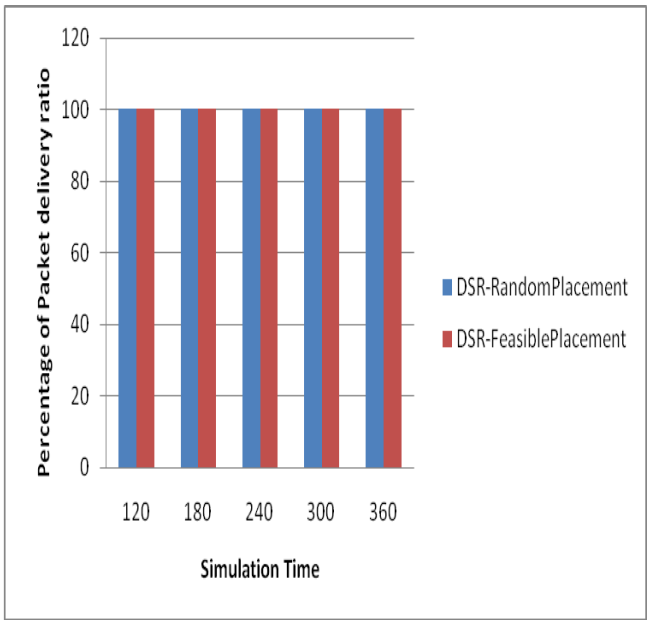


Figure 32 : Percentage of packet delivery for 100 nodes in DSR

Average jitter of AODV for various network size 25,50,75 and 100 is shown in the figures 1,2,3 and 4. Average jitter of DSR for various network size 25,50,75 and 100 is shown in the figures 5,6,7 and 8. Average end-to-end delay of AODV for various network size 25,50,75 and 100 is shown in the figures 9,10,11 and 12. Average end-to-end delay of DSR for various network size 25,50,75 and 100 is shown in the figures 13,14,15 and 16. Average throughput of AODV for various network size 25,50,75 and 100 is shown in the figures 17,18,19 and 20. Average throughput of DSR for various network size 25,50,75 and 100 is

shown in the figures 21,22,23 and 24. Percentage of packet delivery ratio of AODV for various network size 25,50,75 and 100 is shown in the figures 25,26,27 and 28. Percentage of packet delivery ratio of DSR for various network size 25,50,75 and 100 is shown in the figures 29,30,31 and 32.

VII. CONCLUSIONS

From the simulation results, it was observed that AODV performs better in Feasible placement model comparative to Random placement model. DSR also performs well in Feasible placement model comparative to Random placement model. The Feasible placement model can further be studied in different packet sizes.

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