Packet Flow Analysis and Jitter Base Comparison of AODV,DSDV and AntHocNet Routing Algorithm.

N.S.Labhade, Asst.Prof.S.S.Vasekar

Abstract: Due to the convenient nature of the internet and the falling prices of mobile hand held devices, more computer users are choosing to communicate with different portable devices. These include 3G phones, laptops, any other device capable of exchanging information and videos. This increasing demand for internet raises the importance of mobile ad hoc networks. High mobility, rapid movement, limited power and various transmission impairment characteristics all conspire to make routing in mobile ad hoc networks (MANETs) as an important current topic. On the other hand, in Ad Hoc networks each node must implement distributed medium access control (MAC) mechanisms and deal with exposed and hidden terminal problems, adding considerable complexity to nodes, especially in multi-hop networks, where they also act as routers. Besides, Ad Hoc networks must cope with other wireless medium problems, such as low transmission rate, high bit error rate (BER), and significant variations in physical medium conditions. This complexity makes transmission of real-time traffic a great challenge.For transmission of video signal it is necessary to have the algorithm which is capable to find the shortest path from source to destination and also have the characteristics of adaptively and robustness. Due to intrinsic dynamic nature of wireless ad hoc networks, a large number of routing implementations have been proposed in recent year. In this work different routing algorithms are studied and compare their performance on the basis of different QoS parameters. From these comparisons better algorithm is selected for video transmission.

1. Introduction

The basic idea behind Ant Colony Optimisation (ACO) algorithms for routing is the collection of routing information through sampling of paths using small control packets, which are called ants. The ants are generated concurrently and independently by the nodes, with the task to test a path to required destination. An ant going from source node to destination node collects information about the quality of the path using end-to-end delay, number of hops and uses this on its way back from destination to source to update the routing information at the intermediate nodes. Ants always sample complete paths, so that routing information can be updated in a pure Monte Carlo way, without relying on bootstrapping information from one node to the other.

The routing tables contain for each destination a vector of real-valued entries, one for each known neighbor node. These entries are a measure of the goodness of going over that neighbor on the way to the destination. They are termed pheromone variables, and are continually updated according to path quality values calculated by the ants. The repeated and concurrent generation of path-sampling ants results in theavailability at each node of a bundle of paths, each with an estimated measure of quality. In turn, the ants use the routing tables to define which path to their destination they sample: at each node they stochastically choose a next hop, giving higher probability to those links which are associated with higher pheromone values. This process is quite similar to the pheromone laying and following behavior of real ant colonies. Like their natural counterparts, the artificial ants are in practice autonomous agents, and through the updating and stochastic following of pheromone tables they participate in a stigmergic communication process. The result is a collective learning behavior, in which individual ants have low complexity and little importance, while the whole swarm together can collect and maintain up-to-date routing information. Routing protocols are divided in to three main category namely Reactive ,Proactive and Hybrid Protocol. Example of these protocols are AODV,DSDV and AntHocNet respectively.

2. Flow chart of the System

From each network node s mobile agents are launched towards specific destination nodes d at regular intervals and concurrently with the data traffic. The agent generations processes happen concurrently and without any form of synchronization among thenodes. These agents moving from their source to destination nodes are called forward ants.

Each forward ant is a random experiment aimed at collecting and gathering at the nodes non-local information about paths and traffic patterns. Forward ants simulate data packets moving hop-by-hop towards their destination. They make use of the same priority queues used by data packets. The characteristics of each experiment can be tuned by assigning different values to the agent's parameters (e.g., the destination node) Ants, once generated, are fully autonomous agents. They act concurrently, independently and asynchronously. They communicate in an indirect, stigmergic way, through the information they locally read from and write to the nodes.

The specific task of each forward ant is to search for a minimum delay path connecting its source and destination nodes.

The forward ant migrates from a node to an adjacent one towards its destination. At each intermediate node, a stochastic decision policy is applied to select the next node to move to. While moving, the forward ant collects informationOnce arrived at destination, the forward ant becomes a backward ant and goes back to its source node by moving along the same path as before but in the opposite direction. For its return trip the ant makes use of queues of priority higher than those used by data packets, in order to quickly retrace the path.

At each visited node and arriving from neighbor the backward ant updates the local routing information related to each node in the path followed by the forward ant and related to the choice of hop as next hop to reach each destination.

Once they have returned to their source node, the agent is removed from the network.about the traveling time and the node identifiers along the followed pathData packets are routed according to a stochastic decision policy based on the information contained in the data-routing tables.Routing strategies aim to provide robust routes among nodes and try to minimize the amount of time required to rebuild a broken connection. However, factors such as node velocity, node positioning, the distance between nodes, the reliability of and delay between links can seriously affect the stability of a particular route.

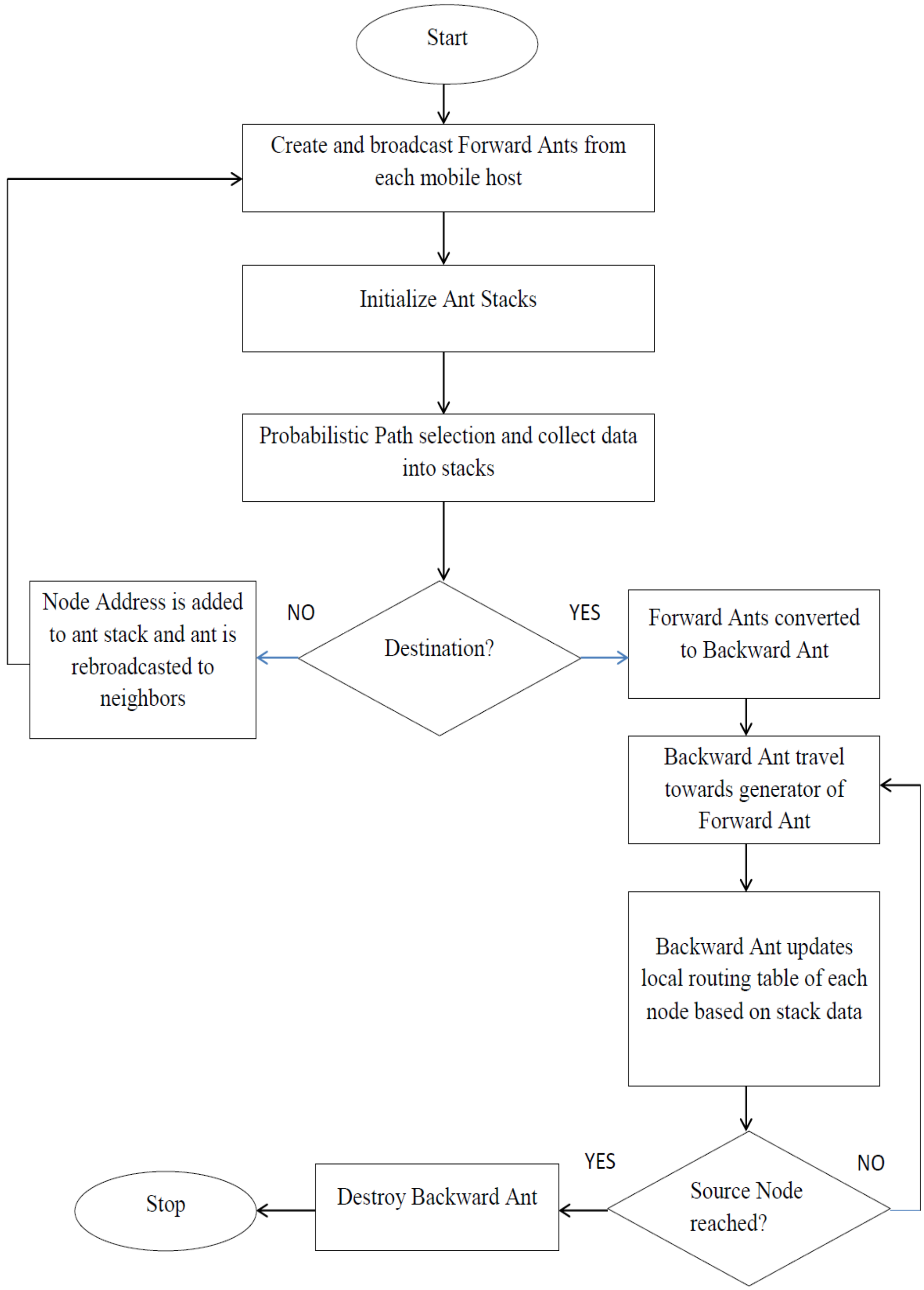

Figure 1: Flow Chart of the System.

3. SIMULATION DATA SPECIFICATION

In this study, use of version 2.34 of NS-2 with an overhauled 802.11 PHY and MAC. NS-2 is a good choice considering its credibility among network research community. The study reveals NS-2 as the most frequently used simulation tool in MANET researches. Some of the main parameters and their corresponding values used here are shown in Table 1. Brief descriptions of the parameters are given as under:

Table 1: Simulation Parameter Setup

Sr.No	Parameter	Corresponding Value
1	Channel type	wireless
2	Radio propagation model	Two ray propagation model
3	Network interface type	wireless
4	MAC Type	MAC/802.11
5	Layer Type	Link Layer
6	Antenna model	Omnidirectional
7	Simulation time	Variable (25-100Sec)
8	Frequency	5.18 GHz
9	Basic data rate	600Kbps
10	Antenna height	1.5 m
11	Maximum packets in queue	Variable(0-1000 Packets)
12	Transmission Range	Variable (200m,250m,300m,350m)
13	Packet Size	512 bytes
14	Dimension of topology	500X500m
15	Maximum number of nodes	Variable (0-350)

4. SIMULATION RESULT

- **Results for Packet Flow Analysis**

Packet Flow Analysis is defined as the number of packets received at the destinations from those generated by sources. Results show the numbers of sources are plotted on the x- axis and the number of packets received is plotted on the y- axis. Different varying parameters such as number of nodes, Simulation time, Queue length, transmission ranges of node are used to observe the effect on number of packets received of all three algorithms.

Effect of varying number of nodes (50,150,250,350)

Figure 2: Graph of Packet Flow Analysis for number of nodes=50

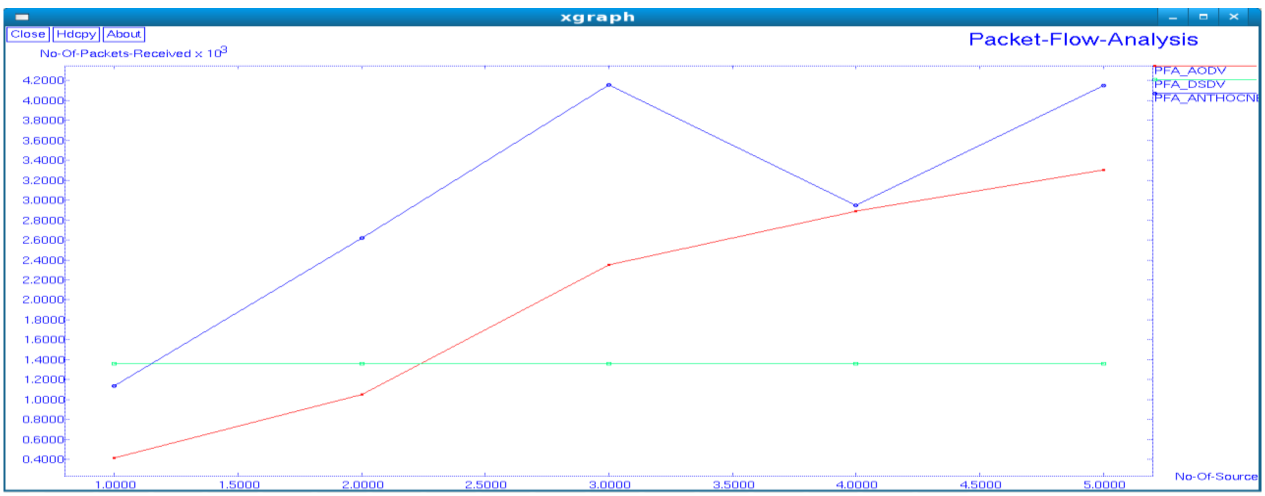

Figure 3: Graph of Packet Flow Analysis for number of nodes=150

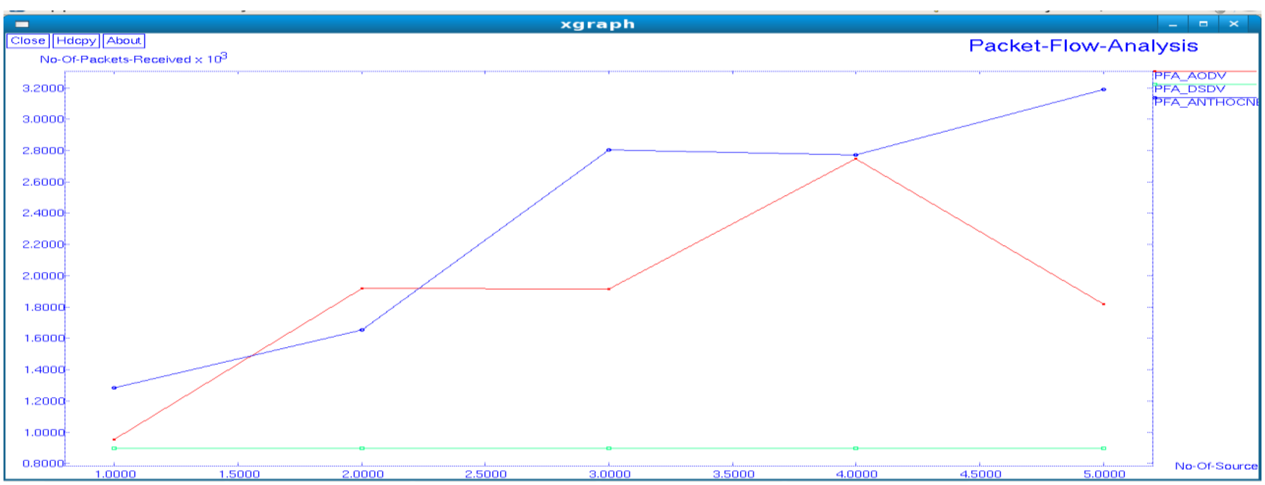

Figure 4: Graph Packet Flow Analysis for number of nodes=250

Figure 5: Graph of Packet Flow Analysisfor number of nodes=350

Comparison of AODV, DSDV, AntHocNet algorithm on the basis of number of packets received for effect of varying number of nodes is shown in the above graphs. As it can be seen from the above results, number of packets received is high in AntHocNet than AODV and DSDV in all scenarios despite the increase in the number of nodes.

- **Effect of varying Simulation Time (25 Sec, 50 Sec, 75 Sec, 100 Sec)**

Figure 6 to figure 9 shows the comparison of AODV, DSDV, AntHocNet algorithm on the basis of Packet Flow Analysisfor effect of Simulation Time from 25 to 100 Sec with step of 25Sec. As it can be seen from the above results, Packet Flow Analysis is higher in AntHocNet followed by AODV and DSDV in all scenarios despite the increase in the Simulation Time

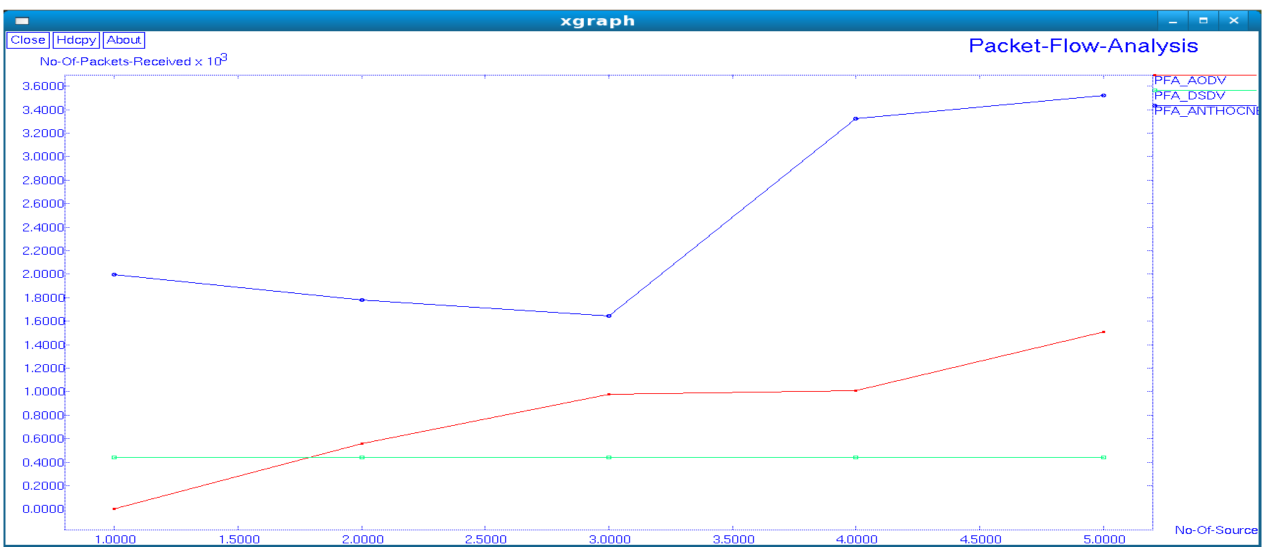

Figure6. Graph of Packet Flow Analysisfor Simulation Time=25sec

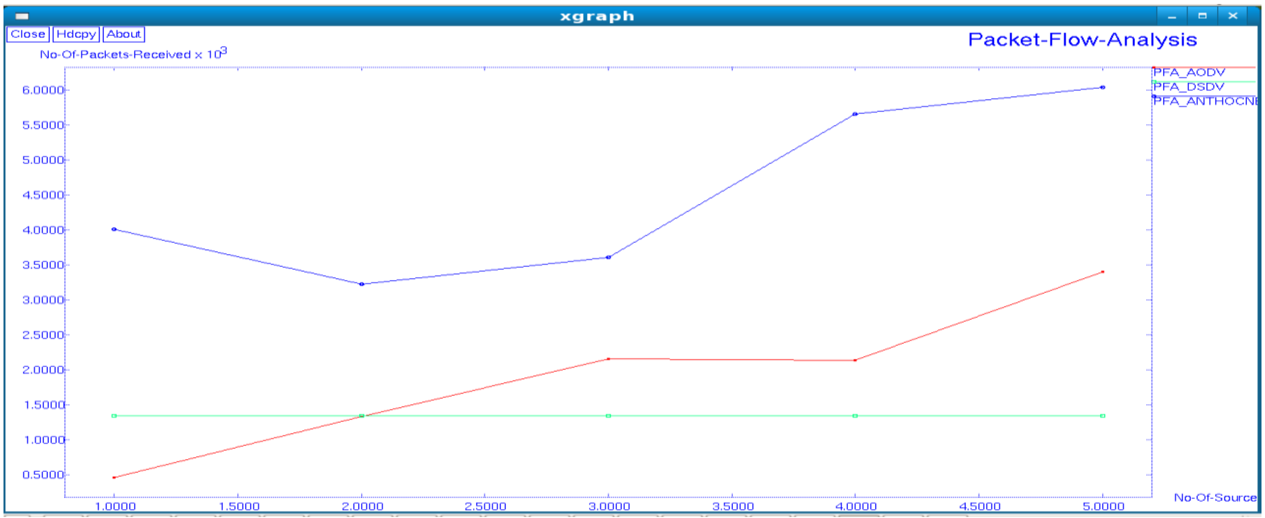

Figure7. Graph of Packet Flow Analysisfor Simulation Time=50sec

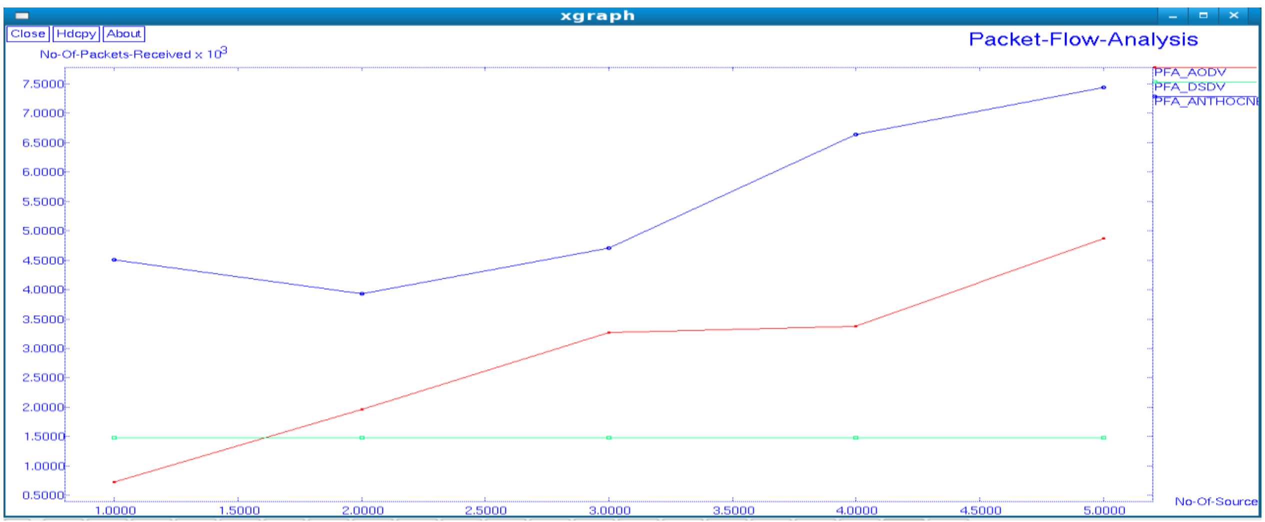

Figure 8: Graph of Packet Flow Analysisfor Simulation Time=75sec

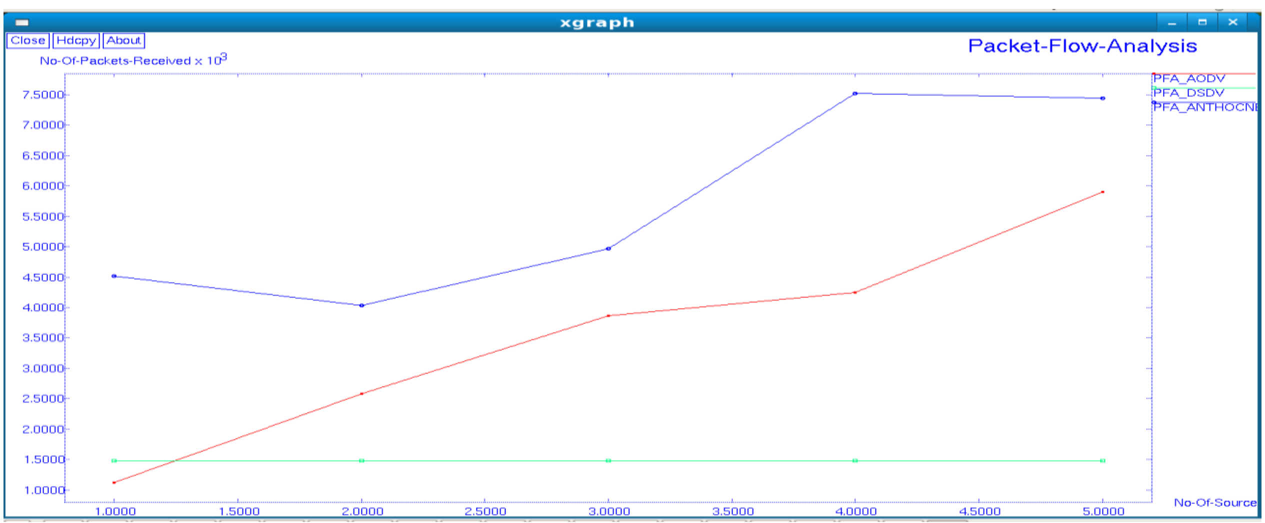

Figure 9: Graph of Packet Flow Analysisfor Simulation Time=100sec

Graphs shows the comparison of AODV, DSDV, AntHocNet algorithm on the basis of number of packets received at the destination for effect of simulation time from 25 to 100 Sec with step of 25Sec. As it can be seen from the above results, number of packets received at the destination is higher in AntHocNet than AODV and DSDV in all scenarios despite the increase in the simulation time.

- **Results for Jitter Analysis**

Jitter describes the degree of variability in packet arrivals, which can be caused by network congestion, timing drift or because of route changes. Jitter is the delay variance from point-to-point or transmitter to Receiver. In this section, the performance of AODV, DSDV and AntHocNet are analyzed.

Effect of varying Number of Nodes (50,150,250,350)

Figure 10 to figure 13 shows the comparison of AODV, DSDV, AntHocNet algorithm on the basis of Jitter of packet for effect of varying number of nodes from 50 to 350 with step of 100. As it can be seen from the above results, average Jitter of packet is less in AntHocNet than AODV and DSDV in all scenarios despite the increase in the number of nodes.

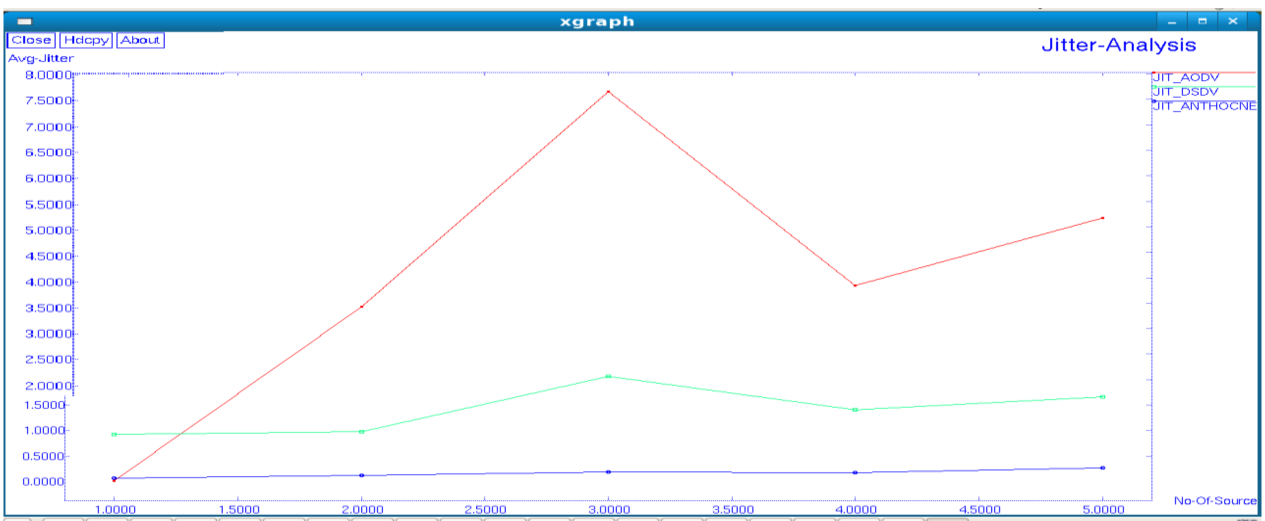

Figure 10: Graph of JitterAnalysis for Number of Nodes=50

Figure 11: Graph of JitterAnalysis for Number of Nodes=150

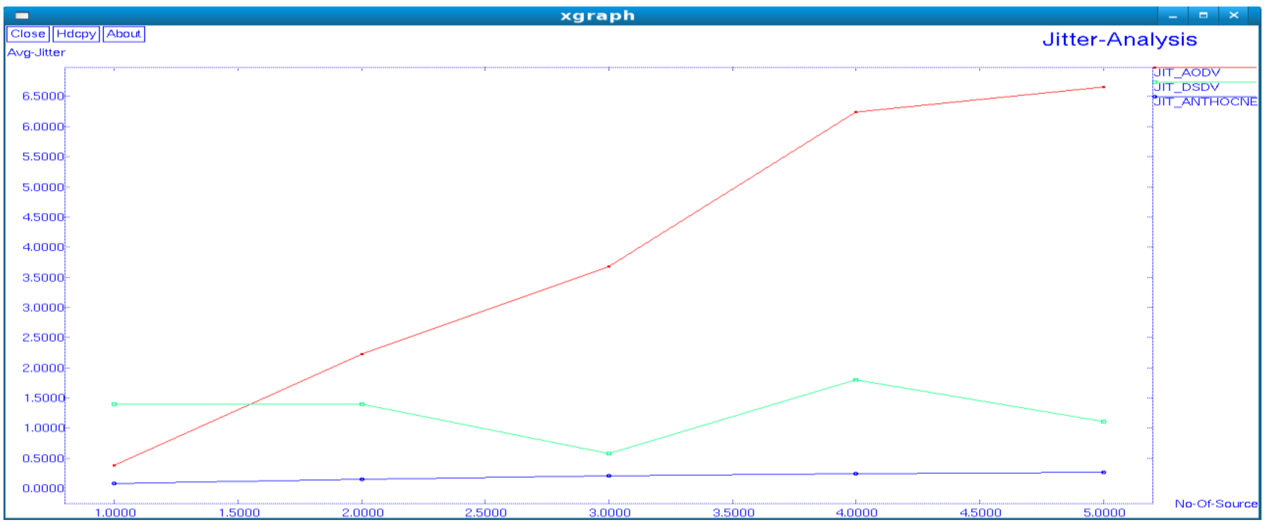

Figure 12: Graph of JitterAnalysis For Number of Nodes=250

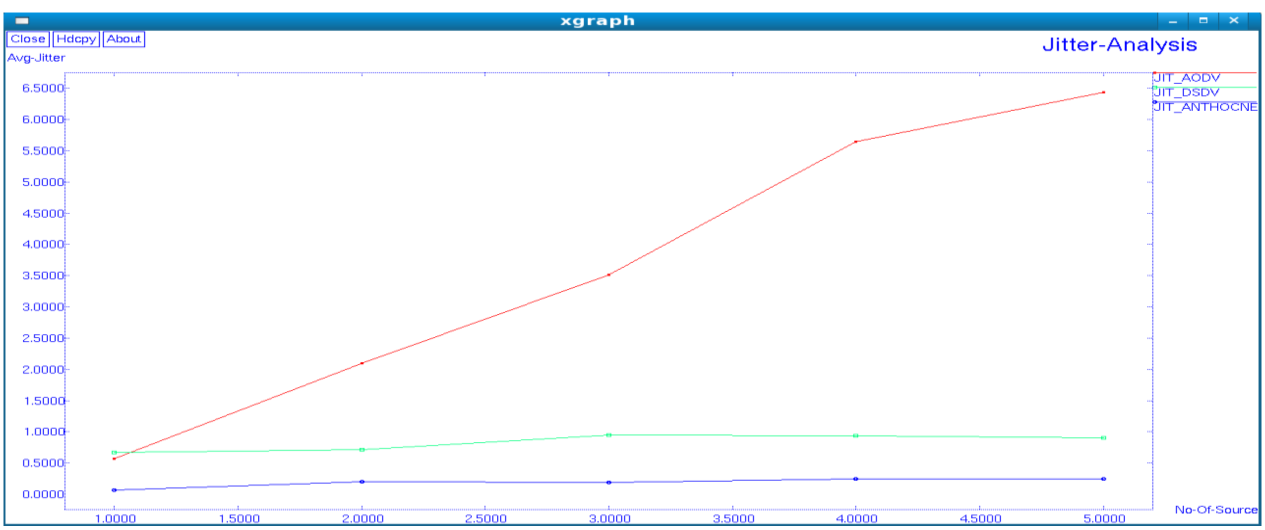

Figure 13: Graph of JitterAnalysis for Number of Nodes=350

The comparison of AODV, DSDV, AntHocNet algorithm on the basis of Jitter for effect of varying number of nodes from 50 to 350 with step of 100 is shown in Table no 5.13 As it can be seen from the above results, Jitter is less in AntHocNet than AODV and DSDV in all scenarios despite the increase in the number of nodes. Since AntHocNet is a multipath protocol, two subsequent packets may follow different paths and reach the destination. Hence the delay incurred between the arrivals of these packets is small.

- **Effect of varying Simulation Time (25 Sec, 50 Sec, 75 Sec,100 Sec)**

figure 14 to figure 17 shows the comparison of AODV, DSDV, AntHocNet algorithm on the basis of average Jitterof packet for effect of simulation time from 25 to 100 Sec with step of 25Sec. As it can be seen from the above results, Jitterof packet is less in AntHocNet than AODV and DSDV in all scenarios despite the increase in the simulation time.

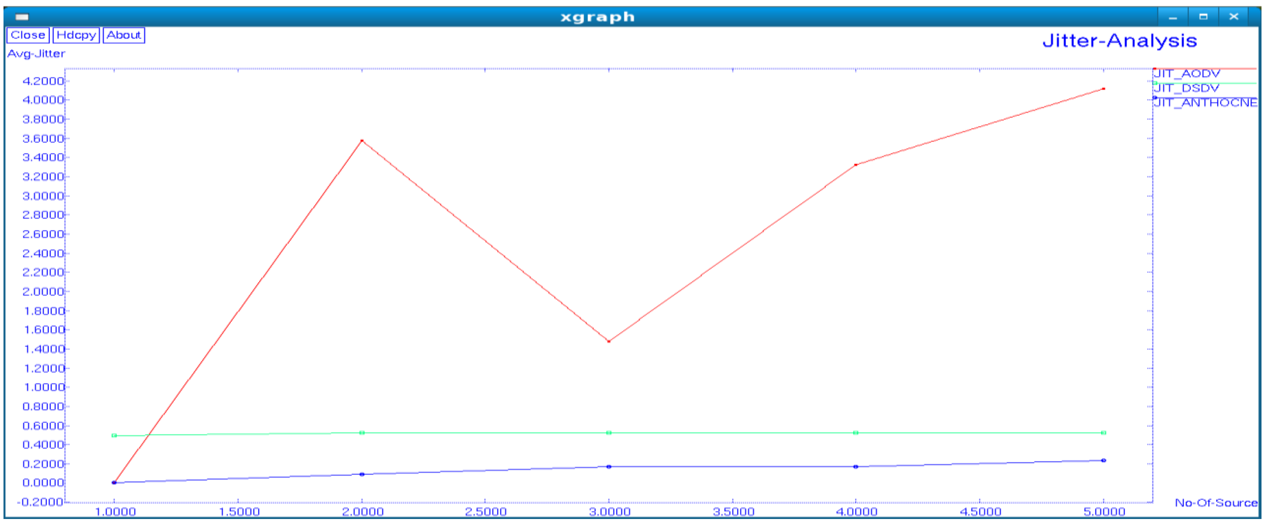

Figure 6.21 Graph of Jitter analysis for Simulation Time=25sec

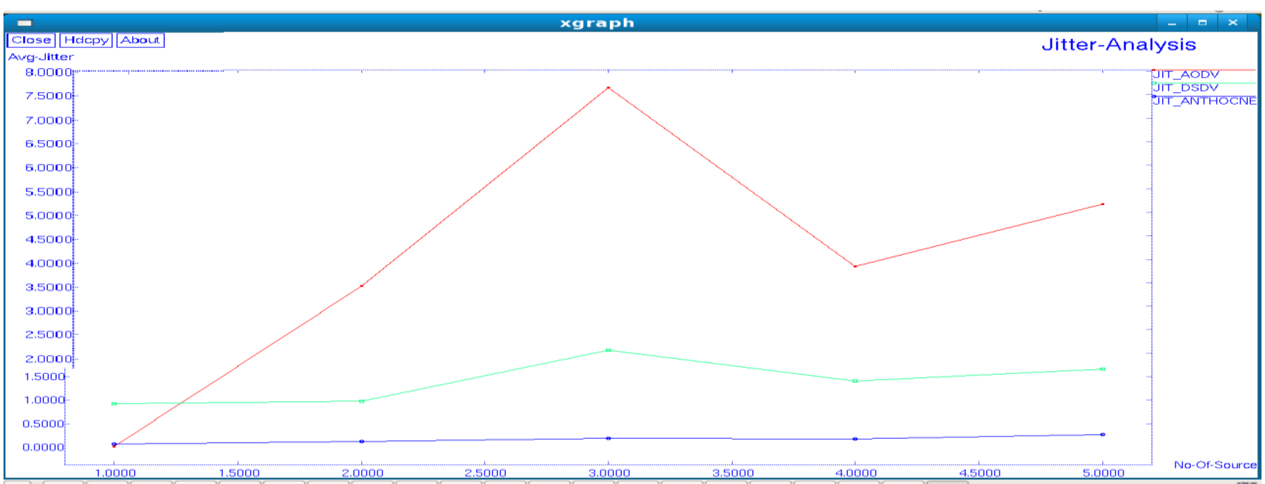

Figure 6.22 Graph of Jitter analysis for Simulation Time=50sec

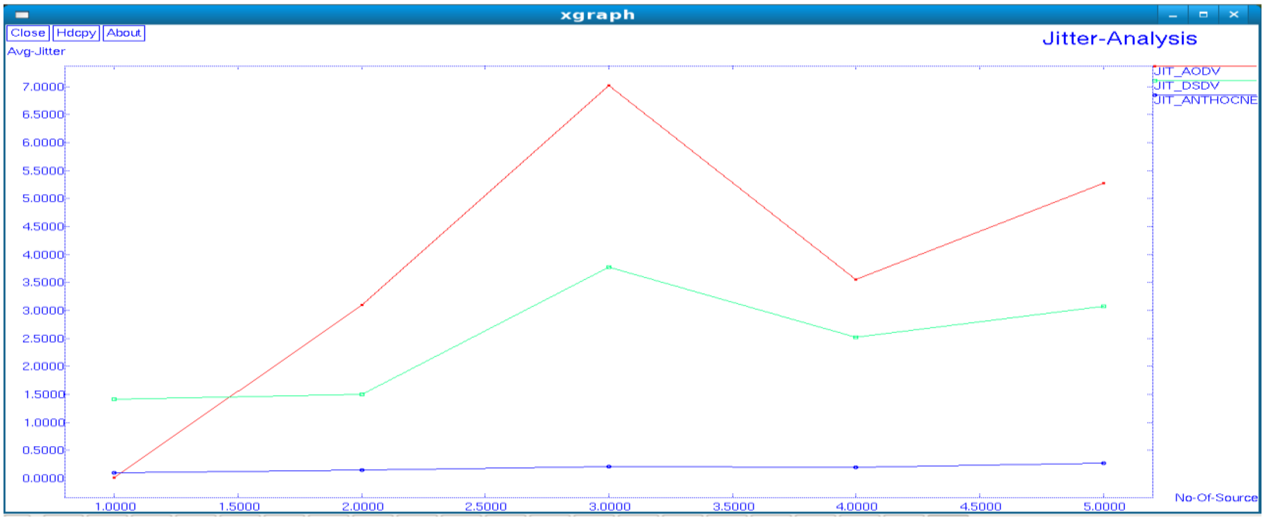

Figure 6.23 Graph of Jitteranalysis for Simulation Time=75sec

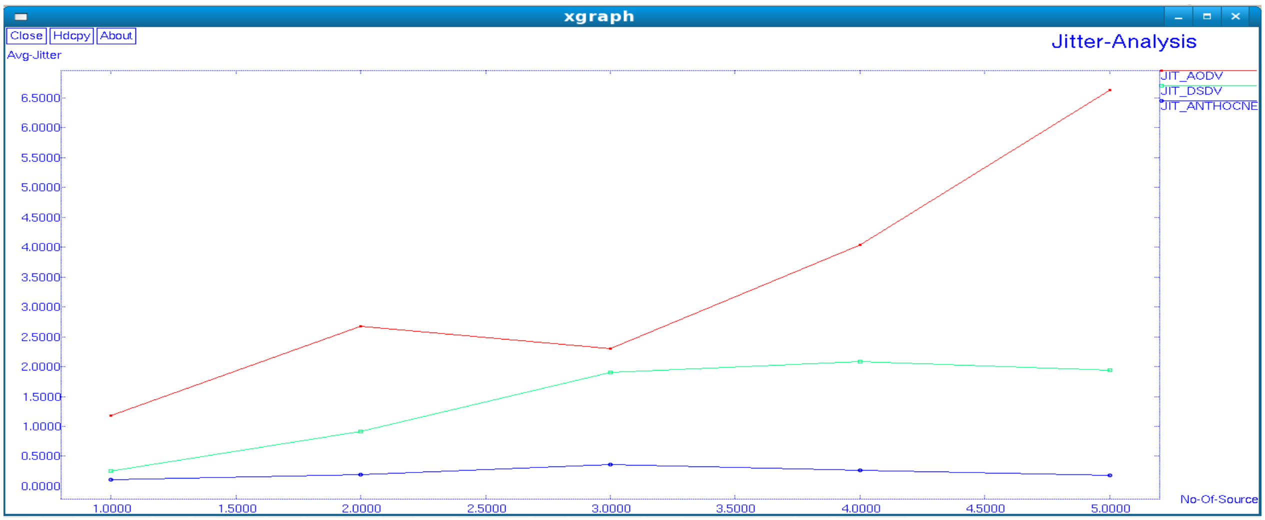

Figure 6.24 Graph of Jitter Analysis for Simulation Time=100sec

Table 5.14 shows the comparison of AODV, DSDV, AntHocNet algorithm on the basis of Jitter for effect of simulation time from 25 to 100 Sec with step of 25Sec. As it can be seen from the above results, Jitter is less in AntHocNet than AODV and DSDV in all scenarios despite the increase in the simulation time.

5. Conclusion

In this paper performed the simulation to compare the performance of three different routingprotocols. Such as AODV, DSDV, AntHocNet with various number of nodes and simulation time with performance parameter is Packet Flow Analysis and Jitter.The results showedthe performance of the AntHocNet were better thanAODV AND DSDV.AntHocNetrouting protocol have higher number of received packets and less Jitter compare the other two routingprotocols.

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Authors

N.S.Labhade received her B.E degree in Electronics and Telecommunication Engineering from Smt. Kashibai Navale College of Enggineering,Pune in May 2008. She is studying now M.E degree in Signal Processing from same college. Her area of interest is in areas of mobile Ad Hoc Networks.	**Asst.Prof.S.S.Vasekar** received her B.E. (Electronics and Telecommunication Engineering) degree from Walchand College of Engineering, Sangali in 2003 and M.E. (Digital Systems) from Sighgad college of Engineering, Pune in 2008. She is presently working as a Asst.professor in the department of electronics and Communication Engineering, Smt. Kashibai Navale College of Enggineering, Pune. She is having total 10 years of experience. She has published 3 papers in International and National Journals.

