



Effect of Speed and Data Rate over Performance of Proactive and Reactive Ad-Hoc Networks Routing Protocols with Variable Nodes

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Abstract: In last some year, a large growth in wireless & communication technologies. Wireless network classified in two types. Infrastructure wireless network and Infrastructure less wireless network (MANET or Ad-Hoc). Ad-Hoc network is a collection of a no of movable nodes. Nodes are free to move from one place to another place, so topology in Ad-Hoc wireless network is not fixed (topology is random in nature)[1]. In this paper we evaluate the performance analysis of proactive (DSDV) & reactive (AODV) routine protocols on the basis of some performance metrics like PDF, Avg. end-to-end delay and packet loss with variable parameter such as speed and data rate for different wireless networks (15 node & 35 node). The simulation can be carried out by using NS-2 simulation S/W. Results show that the performance of AODV is better than DSDV.

Key Words: Ad-Hoc, PDF, Avg End to En Delay, Pkt Loss, AODV, DSDV etc.

I. Introduction

We know the wireless network is two types. Mobile communication comes under the categories of infrastructure wireless network. This type of wireless network having a predefined infrastructure. Mobile communication network used some fixed pattern of call processing because there are some central coordinating element (BSC, MSC etc.). While in infrastructure less wireless network (Ad-Hoc), no predefined infrastructure network exists. Ad-Hoc networks are collection of no of movable node. Topology is random due to random motion of nodes. It is very imp. to use a perfect routing protocol during simulation. This is important because when the mobile nodes move randomly with variable speed & data rate, to have a valid route between sender & receiving nodes. In our simulation we consider AODV & DSDV routing protocols.

II. Routing Protocols

Interfacing provided the point of interconnection between the different nodes. Routing protocols transmit data with the help of this interconnection point with some set of rules.

Types of Routing Protocols:

Two types of routing protocols are used.

- 1) Proactive
- 2) Reactive

In this paper we considered AODV as a reactive & DSDV as a proactive routing protocols.

Destination Sequenced Distance Vector Protocol (DSDV):

DSDV routing protocol totally based on routing table mechanism. Each host in Ad-Hoc networks having the information about the nodes on the basis of routing table. In DSDV protocol message directed from source to destination with the help of intermediate nodes. When the nodes move from one place to another. Routing table automatically updated.

Ad-Hoc on Demand Distance Vector Protocol (AODV):

AODV protocol (Reactive) activated whenever the demand created. In other word we can say routes are determined when needed. In AODV routing protocols sender (source) transmit data packets to a destination with the help of routing tables. If the routes are not available then it broadcast the route request message to all the neighboring nodes confirmed the valid routes by the reception of route reply packet within a specific time. [2]

III. Simulation environment

Performance analysis can be carried out using network simulator which is an openly (freely) available networking tool. NS2 dev. Coding written in C++ and OTCL.

For new simulation, the following operation is performed:

1. The data packets are generated by CBR (used specific command). This CBR file provides the traffic in the form of bit.
2. After generation of CBR files, simulation required scenario. It means how the nodes are connected to each other. This can be done with the help of scenario file. Which is developed by using appropriate command. With the help of these scenario file, we can easily transfer the data between the nodes.
3. After generating CBR and scenario file we use a TCL script for wireless network. In this TCL script used different different CBR and scenario files and generating trace files. After generating trace file we calculate the data of performance matrices using awk command. At last by these matrices data we can

easily draw the graph by using NS2 .The other parameter which used during simulation are listed below

4. In this dissertation work we compare the performance of routing protocols (AODV and DSDV) on the basis of some matrices like PDF ,packet loss ,delay with variable speed or data rate for different wireless network (large and small).Here we develop wireless network of 15 node and 35 node.
5. When we develop CBR file and scenario file we can easily change no. of nodes, speed, sending rate (data rate) etc.in this paper at a time we change only one parameter which may be speed or data rate.
6. Evaluate the performance of routing protocols (AODV and DSDV) on the basis of above mentioned metrics for different (large or small) wireless network.[3][4][6]

IV. Performance Matrices

A) Throughput: how many no of packet received by the destination.

B) Packet delivery fraction: it is the ratio of data packets received by the destination to the packets generated by source.

C) Avg end to end delay: this is the time required to reach the data packet from source to destination .in other word we can say that it is the time difference between the sending time and receiving time.

D) Packet loss: how many no of data packet losses during transmission of packet from source to destination.[7]

Simulation Result & Analysis:

Here we show the simulation results for DSDV &AODV routing protocols in the form of graph .In all the simulation results data rate is in packets/second and speed is in m/second. The performance analysis is totally based on pre describe matrices (PDF, delay and loss).we have consider two wireless network small wireless network (15 node) and large wireless network (35 nodes)

Variation in Speed

A) Packet delivery fraction vs. Speed:

Fig 1-2 shows PDF variation with speed. In both the fig we analysis that the PDF of AODV is higher than DSDV.when we increase the speed, PDF of AODV is rises up while PDF of DSDV is continuously decreases. The reason behind this is that, DSDV is a table driven protocol based on routing table mechanism .when the speed increased it is very difficult to maintain routing table. When we increase the node the performance of DSDV is continuously degraded means PDF of DSDV is increased. Performance of AODV is same for large and small wireless network (approx.)[3]

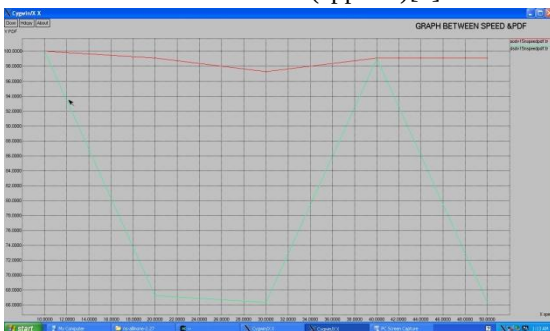


Fig No 1: PDF VS SPEED (15 Nodes)

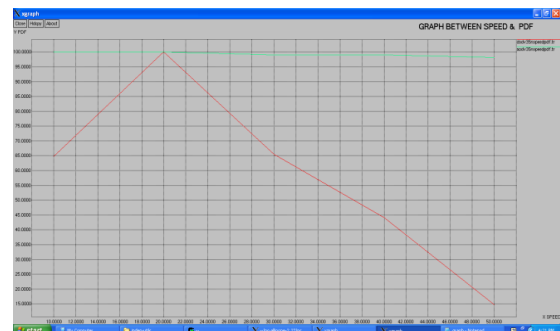


Fig No 2: PDF VS SPEED (35 Nodes)

B) Avg end to end delay Vs Speed:

Fig 3-4 shows that the delay of AODV is greater than DSDV.Before establishing path between source and destination AODV is always generate route request ant route reply than transfer data. While DSDV totally based on routing table mechanism. so the delay of AODV is large than DSDV when we increase the size of wireless network (35 node)the delay of AODV &DSDV is increased as compare of small wireless network(15 node)due to a large no of intermediate nodes available between speed and data rate



Fig No 3: DELAY VS SPEED (15 Nodes)

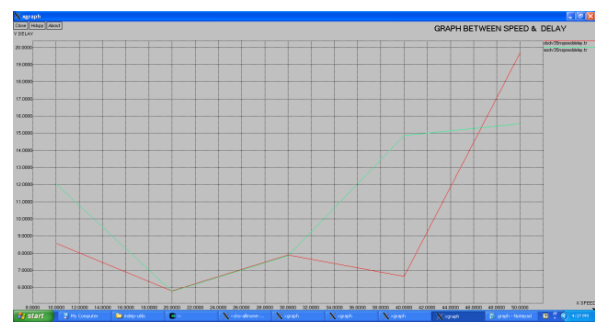


Fig No 4: DELAY VS SPEED (35 Nodes)

C) Packet loss Vs speed:

Fig 5-6 shows the packet loss with respect to speed. Fig shows the packet loss of DSDV is higher than AODV with variable speed. When we increase the speed the packet loss for both protocols is increased. Delay of DSDV is higher because it is proactive (table driven) protocol. As we earlier discussed AODV based on route request and route reply. So it first establishes path then transmits the data. So AODV has less delay in comparison of DSDV. When we increase the network load (size) the delay for both protocols increases. [5] [6]

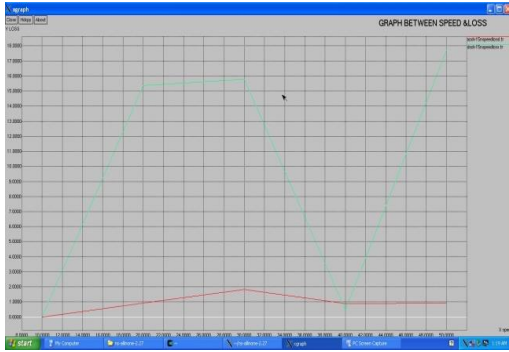


Fig No 5: PKT LOSS VS SPEED (15 Nodes)



Fig No 6: PKT LOSS VS SPEED (35 Nodes)

Variation in data rate:

The variation of data rate with different performance matrices data rate is vary from 10 bit/sec to 50 bit/sec. Here we show the graph for small wireless network (15 node) and large wireless network (35 node).

A) Packet deliver fraction Vs data rate:

Fig 7-8 shows the PDF variation with speed. In both the fig we analysis that packet delivery fraction is goes high when the value of data rate is increasing. In other word we can say that for higher value of data rate, PDF of both protocols is high. If we compare the PDF of both protocols we see that PDF of AODV is higher than DSDV for small and large wireless network. We know that DSDV is table driven protocol so whenever size of wireless network and data rate increased. It is difficult to maintain routing table properly. While AODV is an on demand routing protocol so the PDF of AODV is higher than DSDV.

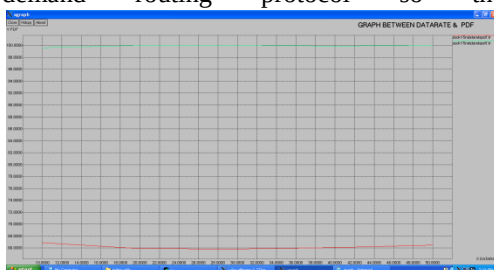


Fig No 7: PDF VS DATA RATE (15 Node)

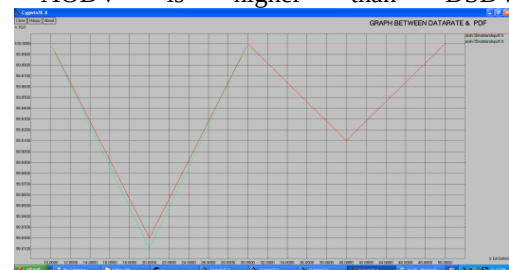


Fig No 8: PDF VS DATA RATE (35 Node)

B) Avg end-to-end delay Vs data rate:

Fig 9-10 shows the graph between Avg end-to-end delay Vs data rate. In both the figs we observe that the Avg end-to-end delay is slightly decreases. When the data rate is increased Avg end-to-end delay is high for AODV in comparison of DSDV. It is clearly shows by the fig in AODV route request and route reply technique used so the delay of AODV is high as compare to DSDV. It is observe that from both the fig, if we increase the wireless network size the Avg- end -to end delay is low for large wireless network. Here delay of 35 node wireless network is low as compare to 15 node wireless network. In large wireless network a lot of routes available. So the delay is less.

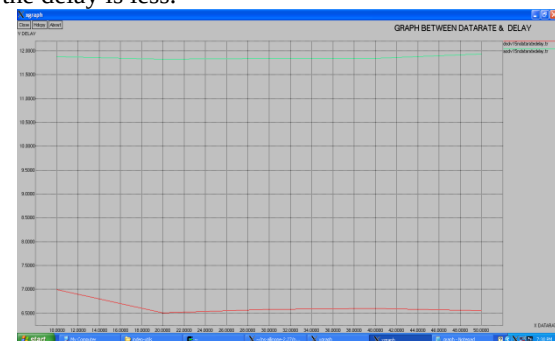


Fig No 9: DELAY VS DATA RATE (15 Node)

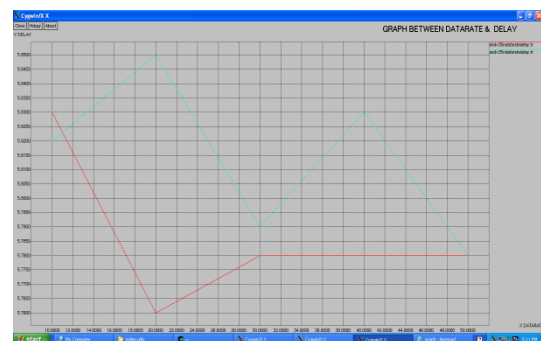


Fig No 10: DELAY VS DATA RATE (35 Node)

C) Packet loss vs. data rate:

Fig 11-12 shows the variation of packet loss with variable data rate. It is clearly observed from the fig the packet loss of DSDV is higher than AODV for small and large wireless network .DSDV is a proactive table driven protocol .when the data rate and network size increased it very difficult to maintain the routing table properly so the packet loss of DSDV is higher than AODV when the data rate increase the packet loss slightly increased due to less availability of route between source and destination.[4]

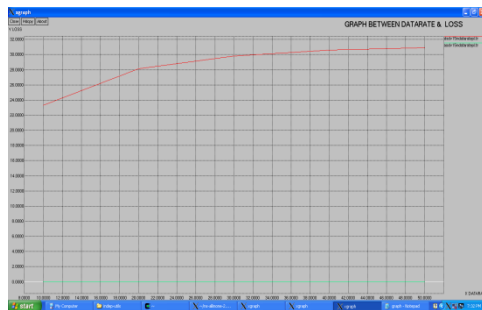


Fig No 11: PKT LOSS VS DATA RATE (35 Node)

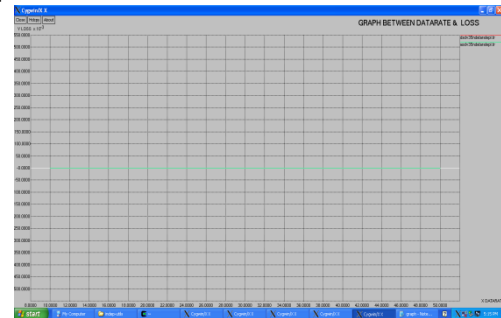


Fig No 12: PKT LOSS VS DATA RATE (35 Node)

V. Conclusion

In this paper we found that the performance of AODV is better than DSDV on the basis of parameters like PDF, Pkt Loss and Avg. End to End Delay with variable speed and data rate. Performance of AODV and DSDV is approximate same for small wireless network (15 nodes) but for large wireless network performance of AODV is better than DSDV.

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