Effect of Terrain Size Over the Performance of Proactive & Reactive Protocol in MANET with Varying Nodes

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Abstract

Mobile ad hoc network is a hot area of research in wireless communication. Ad hoc network is the collection of no. of nodes. Nodes are free to move from one place to another place. Due to movement of nodes in ad-hoc network, topology is always random & they form a temporary network. A detailed study & simulation result of proactive and reactive routing protocol with different terrain size, data rate & variable nodes (small & large wireless network) are represented in this research paper. Simulation is carried out by using NS2 simulator. Performance of protocol totally based on some performance metrics like PDF (packet Delivery Fraction), Packet loss & End to End Delay.

Keywords

MANET, AODV, DSDV, PDF, End To End Delay, Packet Loss, NS-2

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Introduction

As we know communication industry is growing with the speed of light, it acquired the attention o media and main source of data transfer and information sharing. Now a day's wireless devices like cell phones, tablets, laptops are the essential part of daily life which is used for communication and data sharing. People use these devices in their homes, work place even when they are traveling in public transport or in personal vehicles. Basically these all devices get their services from fixed infrastructure like internet service providers, which provide them a platform to connect with the world. But what if we just want to connect with some limited peoples like conferences or in emergency crises like disaster prone areas where we required rapid and temporary connectivity to provide services; in that case we required such type of wireless connectivity which is temporary and for a special purpose such type of services will be fulfilled by Ad hoc network, since it has no infrastructure hence it can be deploy anywhere and anytime? Each node can act as router as well as host as per the requirement of the scenario. It is mobile hence vibrant topologies can be initiated. It consumed less energy hence more long lasting and reduces administrative cost. A suitable algorithm or routing technique is required to implement ad-hoc network basically the routing protocols of adhoc network is fall in two categories one is reactive and other one is proactive[1].

In reactive protocol we considered AODV i.e. Ad-hoc on demand distance vector routing protocol which discover path from source to destination using route request and route reply only when it is required or needed to share data. The routing tables are maintained properly for their active routes and inactive routes are expired even there is no change in topology[2]. To avoid broken routes and routing loops sequence numbers are used in it. The main feature of AODV is to minimize the no. of active paths between source and destination[4,5].

In terms of Proactive protocol we considered DSDV i.e. Destination sequenced distance vector routing table. In this protocol each node maintains routing table and periodically share its routing table with their adjacent neighbors. In this protocol nodes need to maintain all the routes in the network and update them on regular basis.

Simulation environment & performance parameters

Performance analysis of proactive and reactive ad-hoc network routing protocols can b done with the help of NS-2. In this simulation we use different – different terrain size with variable nodes & data rate. Details of simulation parameters used shown below:

Table 1. Table: 2.1 Parameters Used For Simulation

Parameters	Value/Specification
Terrain size	400x250,1000x750
No. of nodes	50,100
Node mobility model	Random way point
Max. speed	20m/s (fixed)
Data rate	30,60,90
Pause time	10s
Simulation time	150s
Mac protocol	802.1 IEEE
Routing protocol	AODV,DSDV
Type of data traffic	CBR(Constant Bit Rate)

Performance Parameter

Packet Delivery Fraction: - It is the ratio of no. of data packet received to the no. of data packet transmitted.

Avg. End to End Delay: - This is the amount of time taken by the data packet to reach from source to destination [3].

Packet Loss: - Number of data packets dropped (loosed) during transmission from source to destination.

Simulation Results and Analysis

Simulation result based on different-different terrain size with variable data rate (30, 60, 90) for small (having 50 nodes) & large (having 100 nodes) wireless network. The analysis is totally based on pre described performance metrics (PDF, end to end delay and packet loss).

In Small terrain area (400x250) the PDF of both protocol is high and in large terrain area (1000x750) PDF of both protocol is comparatively low because when the terrain area is increased then node density per unit area is decreased. Fig.4.1-4.4 shows that PDF of AODV is higher than DSDV. When increasing the no of node the PDF of both protocols is decreased because the congestion and collision is occur.

The Packet loss & avg. end to end delay of large terrain area is high as compare to small terrain area because in large terrain area the nodes are not comes in the transmission range of each other. Figure 4.5-4.12 shows that AODV having small packet loss and large delay while DSDV having large packet loss and small delay.

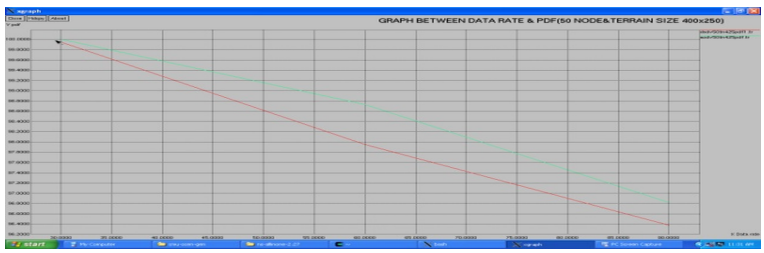

Figure 1. Packet delivery fraction vs data rate (nodes=50, Terrain area=400x250)

Figure 2. Packet delivery fraction vs data rate (nodes=100, Terrain area=400x250)

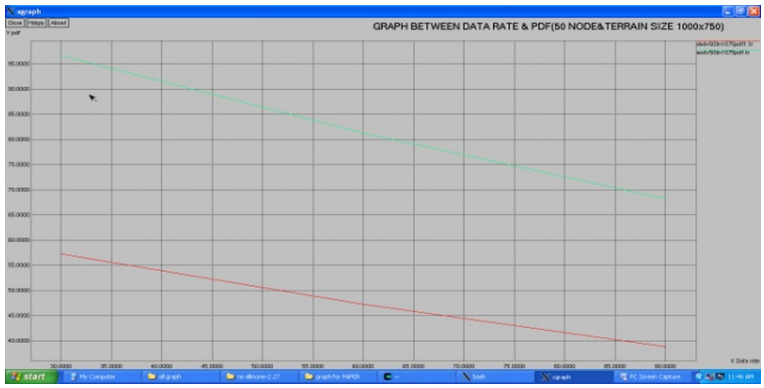

Figure 3. Packet delivery fraction vs data rate (nodes=50, Terrain area=1000x750)

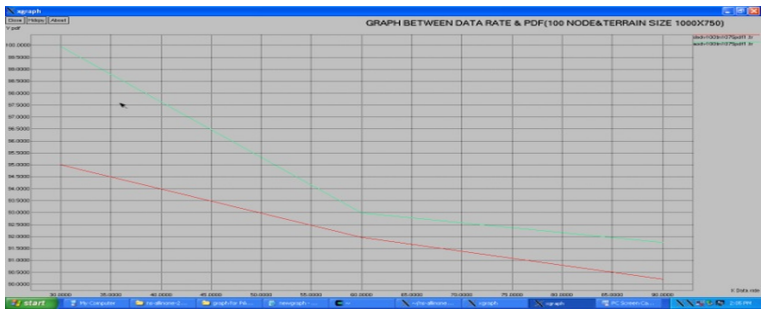

Figure 4. Packet delivery fraction vs data rate (nodes=100,Terrain area=1000x750)

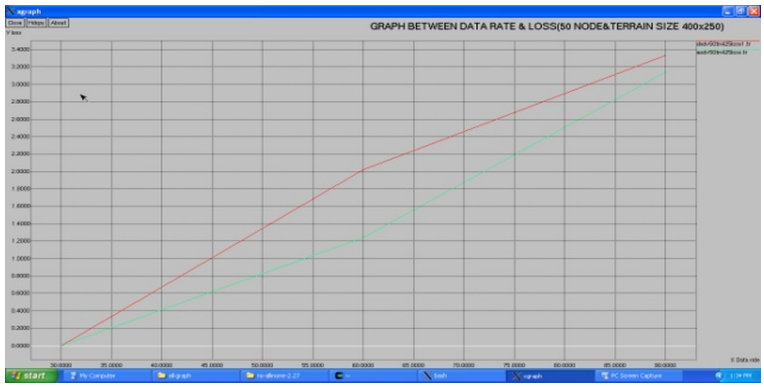

Figure 5. Packet loss vs data rate (nodes=50, Terrain area=400x250)

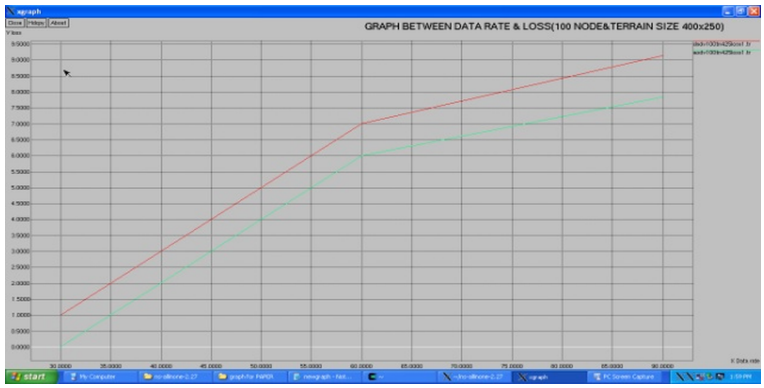

Figure 6. Packet loss vs data rate (nodes=100, Terrain area=400x250)

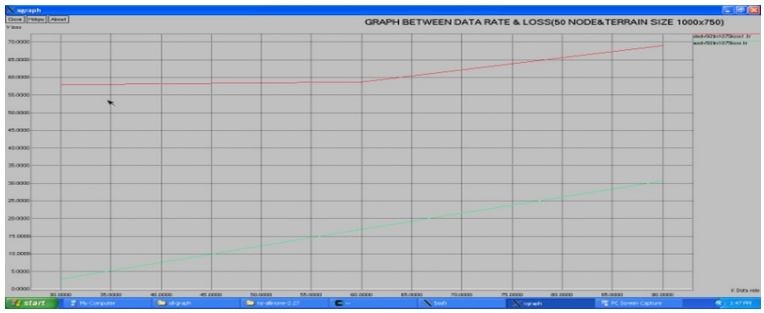

Figure 7. Packet loss vs data rate (nodes=50, Terrain area=1000x750)

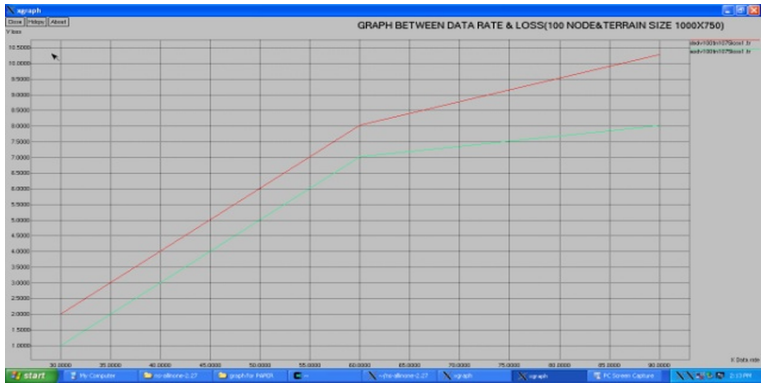

Figure 8. Packet loss vs data rate (nodes=100, Terrain area=1000x750)

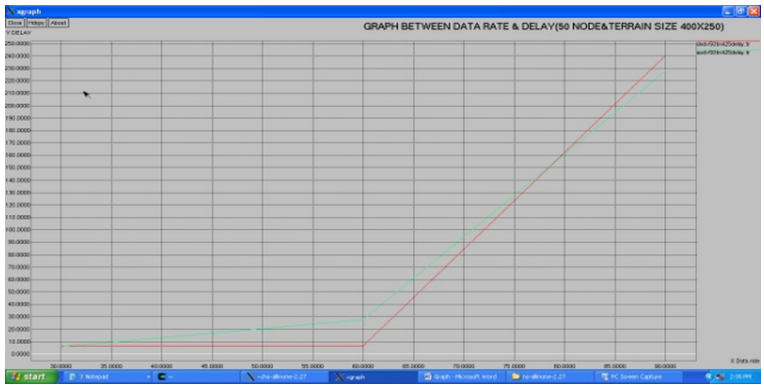

Figure 9. End to End delay vs data rate (nodes=50, Terrain area=400x250)

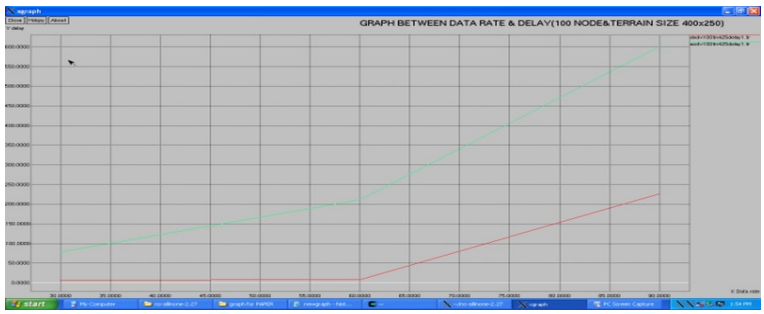

Figure 10. End to End delay vs data rate (nodes=100, Terrain area=400x250)

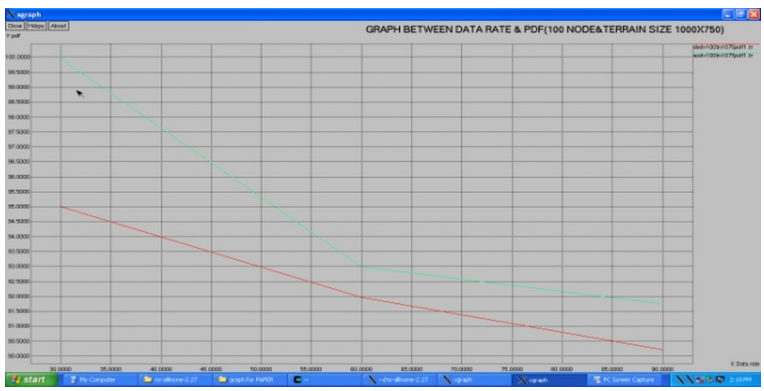

Figure 11. End to End delay vs data rate (nodes=50, Terrain area=1000x750)

Figure 12. End to End delay vs data rate (nodes=100, Terrain area=1000x750)

Conclusion

In this paper we compare the performance of proactive (DSDV) & reactive (AODV) ad hoc network routing protocol with variable terrain size.NS-2 simulator used for simulation with variable nodes. From the graph (1-12) is clearly observed that the performance of AODV routing protocol is better than DSDV in small & large terrain area, performance of AODV is much better in small terrain area, because no. of link failure is less in small, terrain area as compare to large terrain area. In small terrain area nodes are comes in the transmission range of each other[6]. So the PDF of AODV is higher than DSDV in small & large terrain area while packet loss of AODV is less than DSDV & Avg. End to End Delay of AODV is higher than DSDV.

So finally we conclude that the in small terrain size area performance of AODV is slightly better than DSDV. In large terrain area performance of AODV is much better than DSDV.

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