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Manets Routing: Simulation And Network Analysis for Aodv And Dsr

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Abstract: A mobile ad hoc network (MANET) is spontaneous network that can be established with no fixed infrastructure and hence called self-configuring networks. MANETS are considered as the demand of today as influences each and every sphere of life. Its Dynamic nature demands several policies for the communication of the mobile nodes in the network. Several routing protocols are proposed in MANETS. This paper consists of the comparative study of two prominent protocols AODV and DSR. Both routing protocols are analysed on the basis of certain metrics with the help of NS2-2.34 network simulator and graphical analysis is done for both the protocols by varying the number of nodes in the networks.

Keywords: Adhoc network , Routing , AODV , DSR

I. INTRODUCTION

With the widespread use of mobile devices, the users of Mobile Ad hoc network (MANET) become increasingly more, which results the rapid development of the technology. As MANET's are Adhoc in nature thus don't need the infrastructure, so it can be implemented easily and more conveniently in any environment. Dynamic nature of MANETs demands more dynamic and variable routing protocols. Several routing protocols are proposed in MANETs .Routing protocols are typically categorized into two classes namely table driven routing protocols and on demand routing protocols.[1] These routing protocol are made capable to cope with the new challenges that a MANET creates such as nodes mobility, security maintenance, and quality of service, limited bandwidth and limited power supply. These challenges set new demands on MANET routing protocols.

II. CLASSIFICATION OF ROUTING PROTOCOLS

Many different routing protocols [2,3] have been developed for ad hoc networks. It is also imperative to study the functioning of different routing protocols. These protocols have been classified into two categories:

Table-driven: Table driven routing protocols essentially use pro-active schemes. They attempt to maintain consistent, up-to-date routing information from each node to every other node in the network. These protocols require each node to maintain one or more tables to store routing information, and any changes in network topology need to be reflected by propagating updates throughout the network in order to maintain a consistent network view. The areas in which they differ are the number of necessary routing-tables and the methods by which changes in the network structure are broadcast.

On-demand: A different approach from table-driven routing is source initiated on-demand routing. This type of routing creates routes only when desired by the source node. When a node requires a route to a destination, it initiates a route discovery process within the network. This process is completed once a route is found or all possible route permutations have been examined. Once a route has been selected and established, it is maintained by a route maintenance procedure until either the destination becomes inaccessible along every path from the source or until the route is no longer desired.

Different Routing Protocols

The following are some of the existing ad-hoc routing protocols.

Ad hoc On-Demand Distance Vector Routing (AODV)

AODV is an on –Demand routing protocol which is confluence of DSDV and DSR. Route is calculated on demand, just as it is in DSR via route discovery process. However, AODV maintains a routing table where it maintains one entry per destination unlike the DSR that maintains multiple route cache entries for each destination. AODV provides loop free routes while repairing link breakages but unlike DSDV, it doesn't require global periodic routing advertisements. [3, 4]

Dynamic Source Routing (DSR)

Dynamic Source Routing is a Pure On-Demand routing protocol [6], where the route is calculated only when it is required. It is designed for use in multi hop ad hoc networks of mobile nodes. DSR allows the network to be self-organized and self-configured without any central administration and network infrastructure. It uses no periodic routing messages like AODV, thus reduces bandwidth overhead and conserved battery power and also large routing updates. It only needs the effort from the MAC layer to identify link failure. DSR uses source routing where the whole route is carried as an overhead. [2]

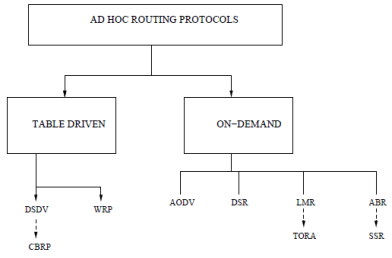

Fig1.The Categorization of the ad hoc routing protocols

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III. LITERATURE REVIEW

As a promising network type for future mobile application, MANETs are attracting more and more researcher. Mobile ad hoc networks are resource constrained and hence Routing in mobile ad hoc networks is more challenging task. Many researchers have done work on analysing the characteristics of different routing protocols in mobile ad hoc networks. Rachit Jain, Laxmi Shrivastava [7] analyzed the performance of AODV & DSR on the basis of Path Loss Propagation Models based on various performance metrics in order to create a substantial understanding of choosing the correct protocol for any active operating environment. Dhananjay Bisen et al. [8] studied the effect of pause time on AODV, DSR and DYMO routing protocols in mobile ad hoc networks based on parameters like Packet Drop Ratio (PDR), Throughput, Jitter and End to End Delay with variations in Pause Time of network. They concluded that DSR performs better than AODV and DYMO under different situations with variation in pause time and performance of DYMO is better than DSR in some situations. Monika at el.[9] Compared AODV, DSDV and DSR Routing Protocols in Vehicular Network Using EstiNet Simulator based on parameters like throughput, number of packets dropped. The performance of AODV found to be better in most situations.M.L Sharmaet al. [10]analysed the performance of MANET routing protocols under CBR and FTP traffic classes under different network scenarios like pause time, offered load (i.e. number of source destination pairs), node speed. The results shows that for CBR traffic, AODV performs better than DSR and WRP in terms of Packet Delivery Ratio(PDR), Throughput and routing overhead and for FTP traffic, DSR performs better than AODV and WRP in terms of packet delivery ratio and throughput. Liang Qin, Thomas Kunz [11] provides a method to increase the packet delivery ratio in DSR by link protection through link breakage prediction algorithm. They also proposed that Enhanced route cache maintenance based on the link status can further reduce the number of dropped packets.

IV. ROUTING PROTOCOLS STUDY AND RESULT ANALYSIS

All simulations are performed in NS-2.34[4, 5] on the platform Ubuntu 13[6]. The source destination pairs are spread randomly over the network. The mobility model is spread in area 1000x1000 with 10, 20 and 50 nodes. During this simulation, each node starts journey randomly from one point to other and source and destination are randomly chosen. The system is analysed based on three parameters average delay, throughput and packet delivery ratio (PDR) with respect to pause time and speed respectively. Where pause time is considered as the time after which the node starts transmitting while speed is considered as the velocity with which the nodes are moving in the network.

a) METRICS:-

- **DELAY:** -The average end-to-end delay of data packets is the interval between the data packet generation time and the time when the last bit arrives at the destination.
- **THROUGHPUT:-** It is one of the dimensional parameters of the network which gives the fraction of the channel capacity used for useful transmission selects a destination at the beginning of the simulation i.e., information whether or not data packets correctly delivered to the destinations.
- **PACKET DELIVERY RATIO:**-It is the percentage of number of packets received and dropped by total number of packets sent.

SIMULATION ENVIRONMENT

ENVIRONMENT SIZE	1000 X 1000
ANTENNA	OMNIANTENNA
QUEUE TYPE	DROP TAIL/FIFO
QUEUE LENGTH	50,60
TRAFFIC SOURCE	TCP
PROTOCOLS	AODV,DSR
NUMBER OF NODES	10,20,50
PAUSE TIME	100,200,300,400,500
SPEED	1,2,3,5,7,10
SIMULATION DURATION	500,600 Sec

TABLE: Experimental Setup

The following are the NAM files generated in NS-2 simulator for considered parameters.

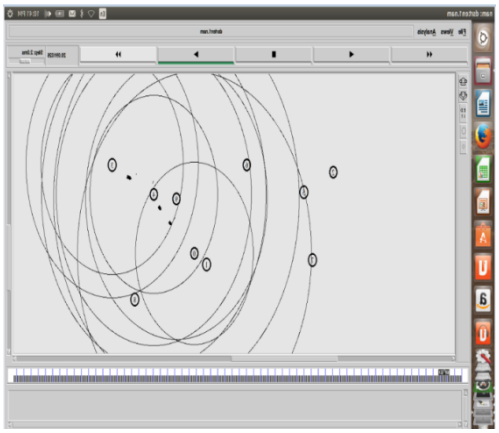

Fig2: AODV with 10 nodes with varying pause time

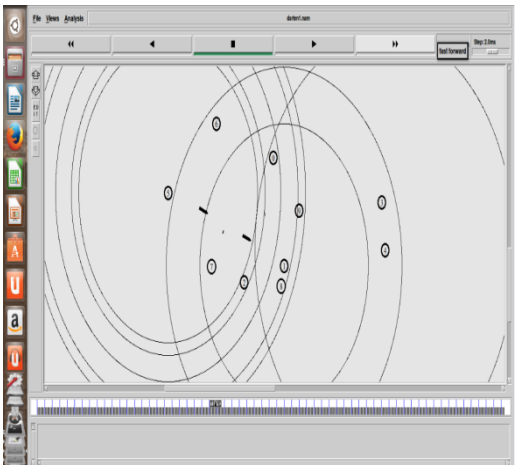

Fig3: AODV with 10 nodes with varying speed

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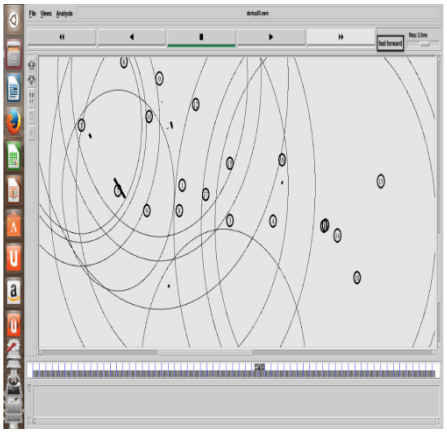

Fig4: AODV with 20 nodes with varying pause time

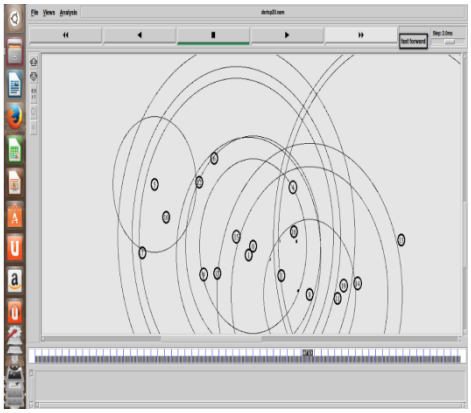

Fig5: AODV with 20 nodes with varying Speed

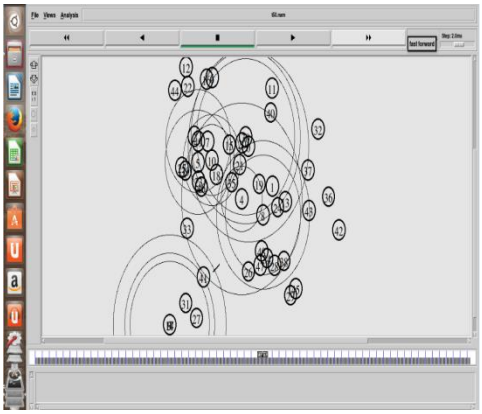

Fig6: AODV with 50 nodes with varying pause time

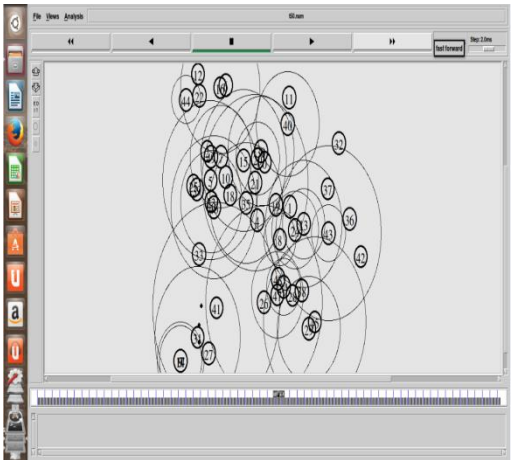

Fig7: AODV with 50 nodes with varying Speed

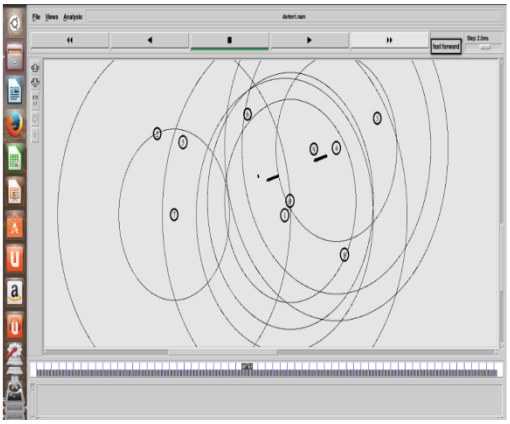

Fig8: DSR with 10 nodes with varying pause time

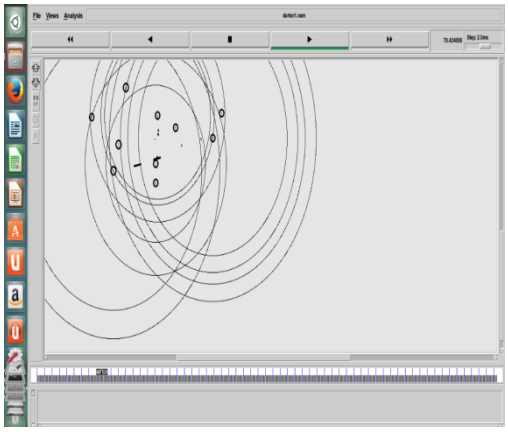

Fig9: DSR with 10 nodes with varying speed

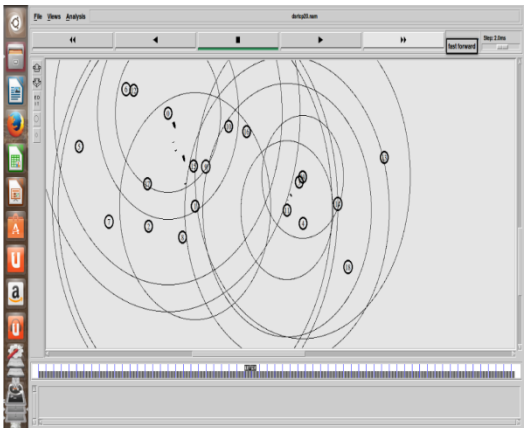

Fig10: DSR with 20 nodes with varying pause time

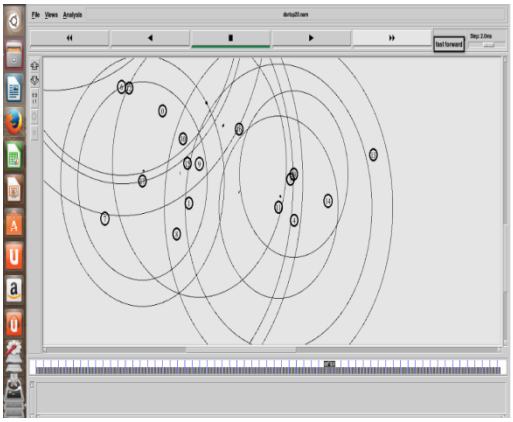

Fig11: DSR with 20 nodes with varying Speed

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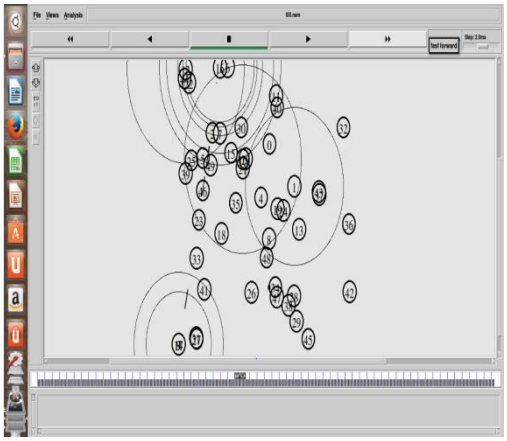

Fig 12: DSR with 50 nodes with varying pause time

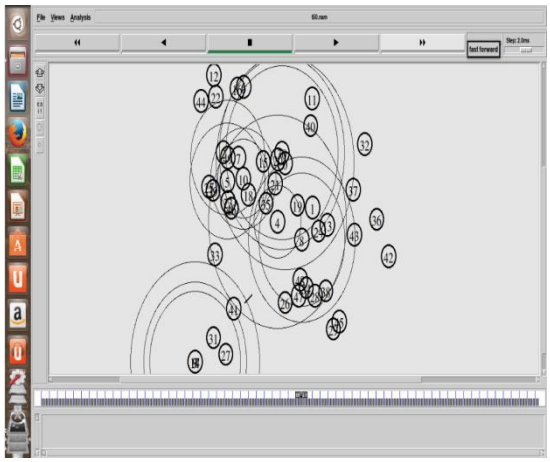

Fig 13: DSR with 50 nodes with varying speed

b) GRAPHS FOR COMPARITIVE STUDY BETWEEN AODV AND DSR TAKING 10,20 AND 50 NODESAODV VS DSR USING PAUSE TIME AS PARAMETER

PAUSE TIME RANGE(100,200,300,400,500)

AVERAGE DELAY VS PAUSETIME

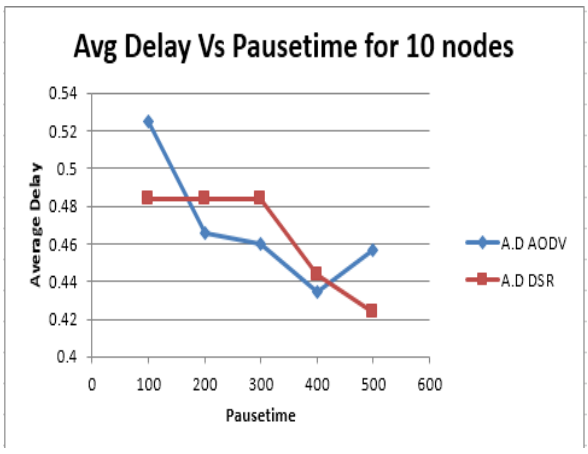

Fig 14.AVERAGE DEALAY vs PAUSE TIME FOR 10NODES

This graph (fig14) works as per the conditions and parameters assigned for 10 nodes ,shows the delay is more in case of AODV with respect to the pause time .

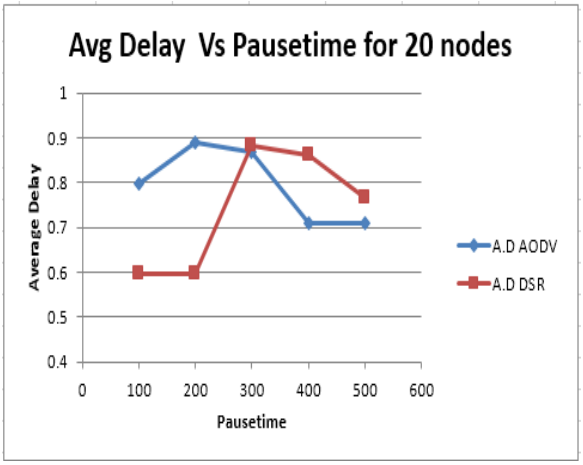

Fig15.AVERAGE DELAY VS PAUSETIME FOR 20NODES

This graph (fig15) shows the variance in average delay for 20 nodes and as resulted in case of DSR average delay is increasing with increasing the no. of nodes .

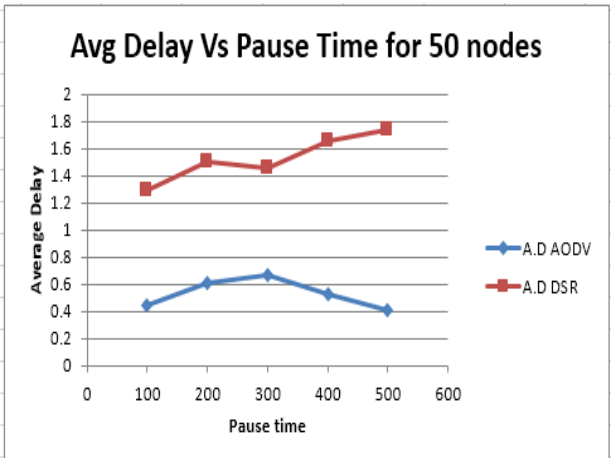

Fig16. AVERAGE DELAY FOR 50NODES

This graphs (fig16)shows that AODV is much better than DSR as the delay is decreasing while the nodes are increased to 50 which is as per the theory.

THROUGHPUT VS PAUSETIME

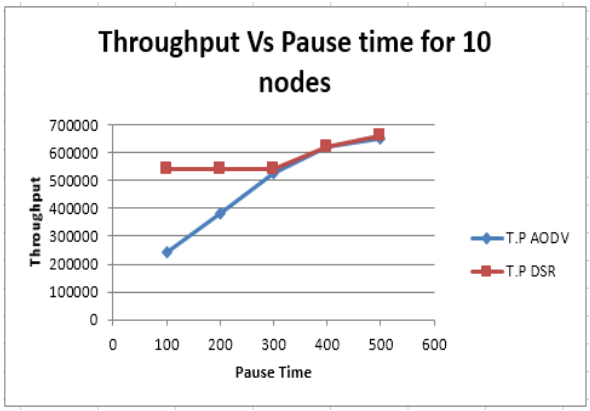

Fig17.THROUGHPUT vs PAUSETIME FOR 10NODES

This works (fig17) at 10 nodes and observerd results shows that throughput of DSR is more in case of 10 nodes.

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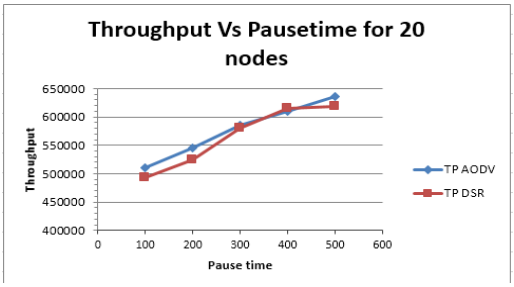


Fig18.THROUGHPUT VS PAUSETIME FOR20NODES

This graph (fig18)shows that throughput is increasing in case of AODV while nodes are increased to 20. Hence AODV works much better as per the theory suggested for AODV.

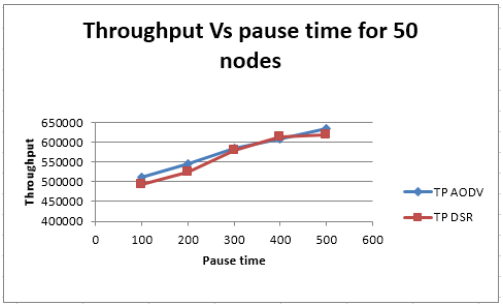
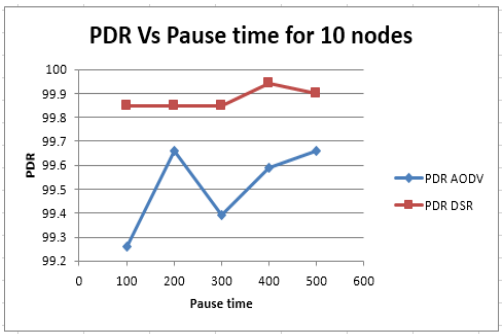


Fig19.THROUGHPUT VS PAUSETIME FOR 50NODES

This graph (fig19) shows that throughput is almost similar in case of both protocols, while observed results shows that ADOV gives more throughput while increasing the no. of nodes to 50. So as per the theory AODV is preffered over DSR with more congested networks.

PACKET DELIVERY RATIO VS PAUSETIME

Fig20. PDR VS PAUSE



TIME FOR 10NODES

This graph (fig20) works as per the plan at 10 nodes while varing the pause time . Though the delay is more in AODV but it is as per the theory DSR works better when nodes are less.

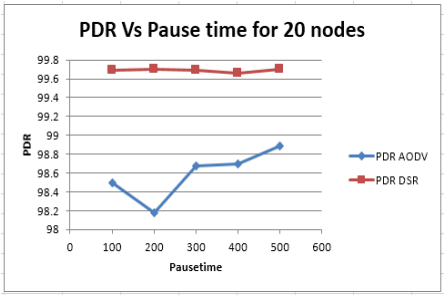


Fig 21.PDR VS PAUSETIME FOR 20NODES

This graph (fig21) shows the results at 20 nodes .Though the PDR is approximately remains in the range of 97-99% which is considered good for both the protocols.

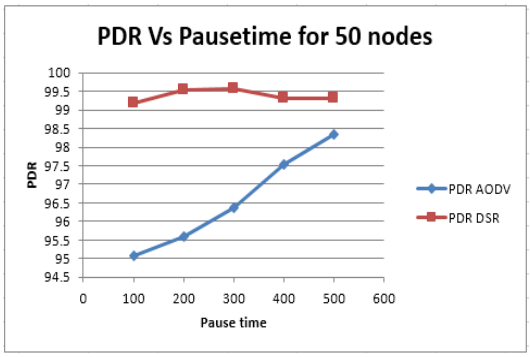


Fig22. PDR VS PAUSETIME FOR 50NODES

This graph (fig22)works at 50 nodes while varying the pause time. Though the PDR remains almost stable for DSR protocol but it increases in case of AODV it is as per theory. PDR increases in AODV with increase in no. of nodes.

AODV VS DSR USING SPEED AS PARAMETER SPEED RANGE(1,2,3,5,7,10)

AVERAGE DELAY VS SPEED

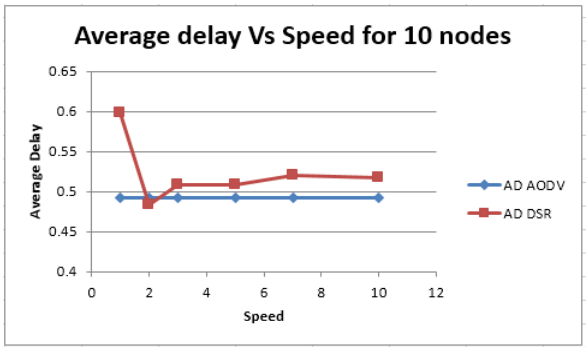


Fig 23.AVERAGE DEALAY VS SPEED FOR 10NODES

This graph (fig23) shows average delay at 10 nodes by varing the speed. Though the average delay remains constant in both the protocols but the AODV is better which is as per the theory.

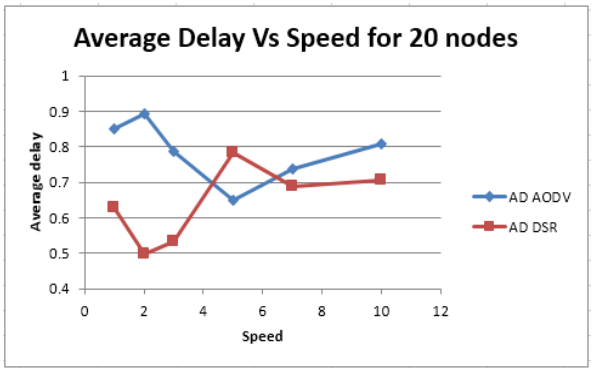


Fig 24.AVERAGE DELAY VS SPEED FOR 20NODES

This graph (fig24) shows the results at 20 nodes while varing the speed.though the delay varies in a specific range which is aproximately same for both protocols but in AODV the delay is less.

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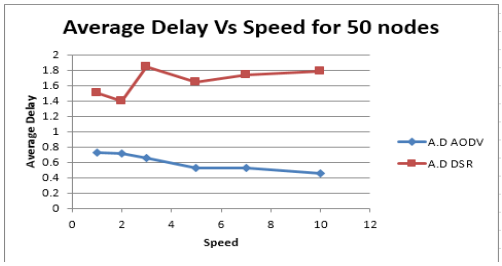

Fig 25. AVERAGE DELAY VS SPEED FOR 50NODES

This graph(fig25) shows the results at 50 nodes. Though the delay is varing with varing speed parmeter but the delay is much low in case of AODV. Thus,in case of AODV the delay is lowered with the increase of the nodes.

THROUGHPUT VS SPEED

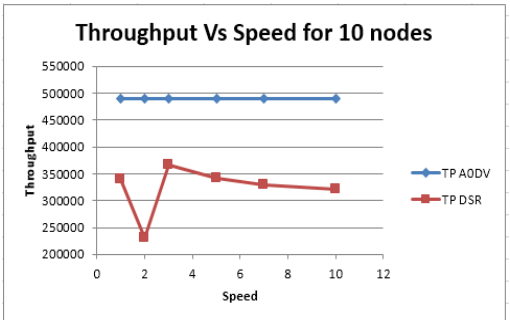

Fig26.THROUGHPUT VS SPEED FOR 10 NODES

This graph(fig26) shows throughput at 10 nodes while varing the speed . Though the throughput is stable for AODV but its high in AODV which is par the theory.

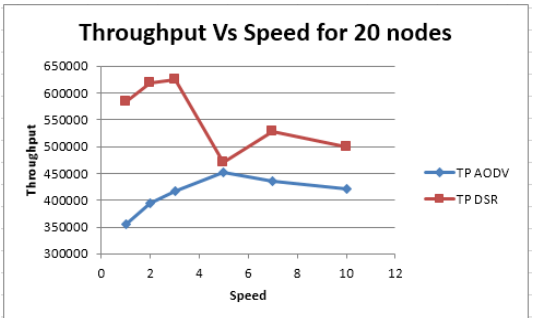

Fig27.THROUGHPUT VS SPEED FOR 20 NODES

This graph(fig27) shows the variance of throughput at 20 nodes while varing the speed parameter.Though the throughput of the DSR gives normal throughput still the AODV throughput increases comparitively with the increase of speed which is fine as per the theory.

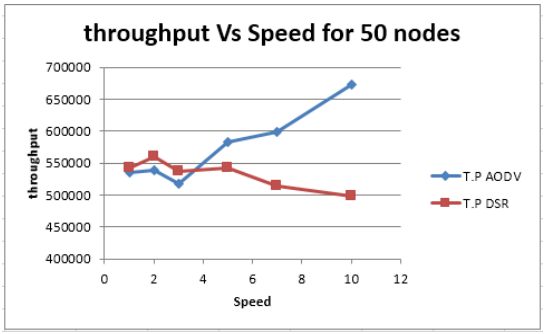

Fig28.THROUGHPUT VS SPEED FOR 50NODES

This graph(fig28) shows the variance of throughput at 50 nodes.Though the throughput is approximately(varies between the range of 50000-70000) similar for both protocols still AODV gives much better throughput with increase of speed.

PACKET DELIVERY RATIO VS SPEED

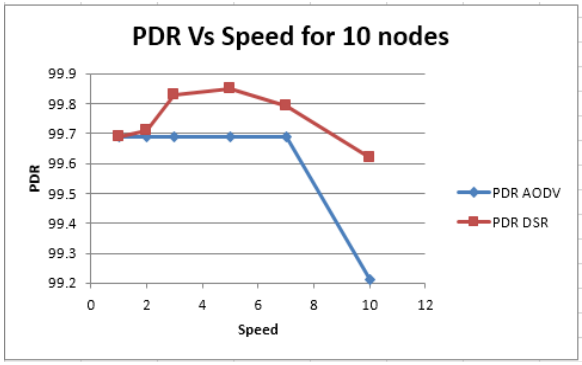

Fig29.PDR VS SPEED FOR 10NODES

This graph(fig29) shows packet delivery ratio (PDR) at 10 nodes while varying the speed. Although the PDR remains good for both the protocols but still DSR gives better results for less no. of nodes while increasing the speed of the nodes.

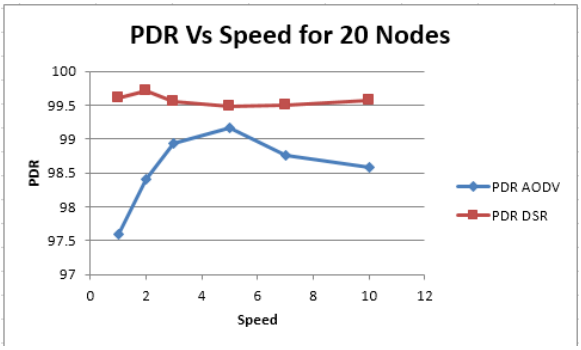

Fig30 .PDR VS SPEEDFOR 20NODES

This graph(fig30) shows PDR at 20 nodes while varing speed.Though the PDR is aproximately constant in case of DSR while it increases apruptly in case of AODV with increase of speed and then become much stable.

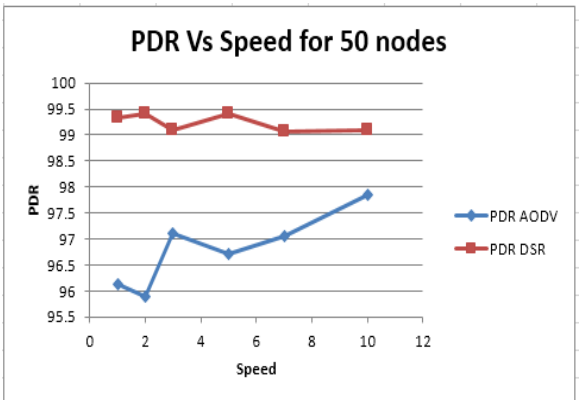

Fig31.PDR VS SPEED FOR 50NODES

This graph(fig31) shows PDR at 50 nodes while varing speed.Though the PDR is aproximately better for both the cases but it increases in case of AODV with increase of speed.

IV. CONCLUSION

Routing Protocols has great influence on MANETS. Every protocol has its own working procedure which enables to overcome the challenges faced by the MANETS due to its dynamic nature. The proposed paper shows that AODV and DSR both are effective reactive protocols. While graphs shows that AODV gives quite better results than DSR with the increasing number of nodes. This paper also studies the behaviour of both the protocols under various performance metrics.

REFERENCES

[1] Yan Zhang, Chor Ping Low, Jim Mee Ng, Wireless Sensor Network, 2011, 3, 92-105,doi:10.4236/wsn.2011.33010 Published Online March 2011 (htt p://www.SciRP.org/journal/wsn)

[2] J Broch, D.A. Maltz, D.B. Johnson, Y-C. Hu, and J. Jetcheva. A performance comparison of multi-hop wireless ad hoc network routing protocols. In 4th International Conference onMobile Computing and Networking (ACM MOBICOM'98), pages 85–97, Oct 1998.

[3] Elizabeth M Royer and Chai Keong Toh. A review of current routing protocols for ad hoc mobile wireless networks. IEEE Personal Communications, vol. 6:46–55, Apr 1999.

[4] Network simulator, www.isi.edu/nsnam/ns/tutorial

[5] Network simulator tutorial, http://nile.wpi.edu/NS/

[6] Ubuntu releases.ubuntu.com/13.10

[7] Rachit Jain1, Laxmi Shrivastava"Study and Performance Comparison of AODV & DSR on the basis of Path Loss Propagation Models"International Journal of Advanced Science and Technology Vol. 32, July, 2011

[8] Monika at el. "Comparative Study of AODV, DSDV and DSR Routing Protocols in Vehicular Network Using EstiNet Simulator"International Journal of Scientific & Engineering Research, Volume 3, Issue 6, Jun-2012 1 ISSN 2229-5518

[9] M.LSharma at el."Performance Evaluation of MANET Routing Protocols underCBR and FTP traffic classes"Int. J. Comp. Tech. Appl., Vol 2 (3), 392-400 ISSN: 2229-6093

[10] Liang Qin Thomas Kunz "Increasing Packet Delivery Ratio in DSR by Link Prediction"Proceedings of the 36th Hawaii International Conference on System Sciences -2003

[11] Murizah Kassim Ruhani Ab Rahman, Mariamah Ismail Cik Ku Haroswati Che Ku Yahaya," Performance Analysis of Routing Protocol in WiMAX Network," IEEE International Conference on System Engineering and Technology (ICSET), 2011.

[12] C.E. Perkins and P.Bhagwat,"Highly Dynamic Destination Sequenced Distance-Vector Routing(DSDV) for Mobile Computers,"IGCOMM,London,UK,August 1994

[13] A.Boukerche,"Performance Evaluation of Routing Protocols for Ad Hoc Networks, "Mobile Networks and Applications,Kluwer Academic Publishers,2004

[14] Yuan Xue, Member, IEEE, Baochun Li, Senior Member, IEEE, and Klara Nahrstedt, Member, IEEE," OptimalResource Allocation in Wireless Ad HocNetworks: A Price-Based Approach,2006