ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

Reactive Routing Protocols under V2V Communication in VANETs

Sneha Awasthi[1], Prof. Shivendu Dubey[2]

Research Scholar, Department of Computer Science Engineering, Gyan Ganga Institute of Technology and Science, Jabalpur [M.P] India[1]

Assistant Professor, Department of Computer Science Engineering, Gyan Ganga Institute of Technology and Science, Jabalpur [M.P] India[2]

ABSTRACT: Vehicular networks are emerging class of wireless networks that have emerged because of recent advances in wireless technology. Vehicular Ad-hoc Network (VANET) is an enhanced form of Mobile Ad-hoc Network (MANET). In VANET communicating nodes are replaced by moving vehicles. VANETs promises many improvements in terms of accident avoidance and in better utilization of roads and resources such as fuel and time. Because of many applications, VANETs have fascinated many research authorities and automotive industries. An enhanced version of IEEE 802.11p standard is developed for VANET, which is suitable for high speed vehicular communication. Many researches are being carried out to better understand the functioning of various routing protocols in VANET. Being motivated from these researches on VANET, in this dissertation two reactive routing protocol AODV and DSR are examined to satisfy various properties, like: average throughput, Packet Delivery Ratio, Routing Overhead, Number of Drop Packets and Normalized Routing Load with increasing speed of vehicles and send rate of packets. This work is an attempt to analyze the performance of these VANET routing protocols on the basis of IEEE 802.11p standard.

KEYWORDS: *MANET, VANET, AODV, DSR, PDR, NRL.*

I. INTRODUCTION

Vehicular Ad Hoc Network [14] is an enhanced class of MANETs that has emerged because of recent growth in wireless technology and sensors. Vehicular Ad Hoc Network is also known as VANET. VANET is one of ad-hoc network real applications, where communication among vehicles and nearby fixed equipment is possible. The introduction of VANET will significantly reduce both traffic congestion and vehicles accidents, which are serious issues throughout the world.

In VANET, Vehicle [13] can communicate with each other by directly forming vehicle to vehicle communication (V2V) or communicate with fixed equipment next to the road, referred to as road side unit (RSU) forming vehicle to infrastructure communication (V2I).

II. DESCRIPTION OF VANET ROUTING PROTOCOLS

A large number of ad hoc based routing protocols were proposed in the last ten years for VANET. These protocols can be categorized on the basis of their "routing strategy" because they follow to search a path "route" from a source to a destination and vice versa. These routing protocols can be categorized into five major categories.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

- Ad Hoc Based Routing Protocols
- Location Based Routing Protocols
- Cluster Based Routing Protocols
- Broadcast Routing Protocols
- Geocast Routing Protocols

2.2. AODV (Ad-hoc On demand Distance Vector)

The Ad hoc on demand Distance Vector routing protocol (AODV) co mbines the mechanis ms of DSR and DSDV. The periodic beacons, hop -by-hop routing and sequence numbers (guarantee of loop -freedo m) of DSDV and the pure on demand mechanis m of Route Discovery and Route Maintenance from DSR are combined [5][6]. Route Discovery: If there is already a valid route between the two communication peers, then AODV will not initiate any route discovery process. But if the route has become invalid or missing between the two communicating partners or nodes, e.g. whenever a new route to a destination is needed, a link is broken, or the route has expired , then source node will broadcast a RREQ message in order to discover a route to the destination.

2.2. DSR (Dynamic Source Routing)

The Dynamic Source Routing Protocol (DSR) [7] is a reactive routing protocol. Using this protocol each node can discover dynamically a source route to any destination in the network over multiple hops. It provides a loop free route from source to destination by providing an ordered list of the nodes (i.e stored in the packet header) through which the packet must pass. The two main mechanisms of DSR are Route Discovery and Route Maintenance, which work together to discover and maintain source routes to arbitrary destinations in the network.

ROUTE DISCOVERY

Route discovery process takes place by flooding the network with route request (RREQ) packets . Each node receiving an RREQ packet rebroadcasts it, unless it is the destination or it has a route to the destination in its route cache. Such a node replies or responds to the RREQ with a route reply (RREP) packet that is routed back to the original sou rce. RREQ and RREP packets are also source routed. The RREQ builds up the path traversed across the network. The RREP routes itself backward to the source by traversing in this path backward. The route carried back by the RREP packet is cached at the source for future use.

ROUTE MAINTENANCE

If any link on a source route is broken or down, the source node is informed by a route error (RERR) packet. The source node removes all those routes which are using this link from its cache. A new route discovery p rocess must be initiated by the source node if this route is still needed.

III. PERFORMANCE METRICS

The following performance metrics [8] are used to compare the performance of routing protocols. These performance metrics are given by VANET working group for evaluation of routing protocol performance. The parameters considered are important in terms of measuring the performance of any routing protocol.
Average Throughput: The total number of the data packets generated by each source, counted by k bit/s.
Normalized Routing Load: This includes the number of packets such as RREQ, RREP
and RERR involve during routing process.
Packet Delivery Ratio: The ratio of number of data packets generated by the "application layer" with

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

CBR source and the number of data packets received by the CBR sink at the destination.
Routing Overhead: The ratio of total number of routing packets received and total number of data packets received
Number of Drop Packets: The number of the data packets generated by the sources failure to reach at the destination.

IV. SIMULATION AND RESULT

The V2V communication network is created with 50 vehicles or nodes, which are distributed in a square area of 800m X 800m road map created with the help of Manhattan model.

Table 6.1: Basic Simulation Scenario

Parameter	Value
No. of nodes	50
Speed in km/h	30, 60, 90
Simulation Time	100s
Propagation Model	Two Ray Ground
Antenna	Omni Antenna
Packet Send Rate	256kbps, 512kbps, 1024kbps
Traffic Type	CBR
Packet Size	512byte
Routing Protocol	AODV, DSR
Area	800m X 800m
Network Interface	WirelessPhyExt
MAC Type	802.11p

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

6.2. Results

The following evaluation has been measured with 50 vehicles or nodes with increasing mobility speed of 30 km/h, 60 km/h and 90 km/h:
The Average Throughput in AODV and DSR protocols with increasing speed of vehicles under 802.11p standard is shown in the following figure:

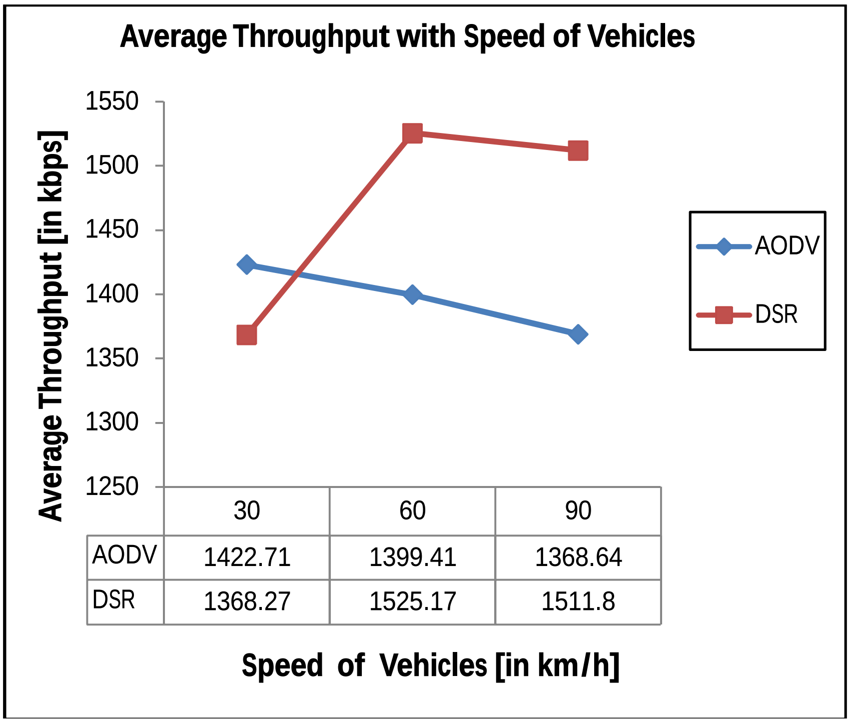


Figure 6.1: Average Throughput in AODV and DSR with increasing speed of vehicles

Figure 6.1 show that the Average Throughput decreases in AODV and increases in DSR protocol with increasing speed of vehicles. The Average Throughput of AODV protocol is better than the DSR protocol under slower speed, while Average Throughput of DSR protocol is better than the AODV protocol under medium and high speed. The Average Throughput of AODV protocol decreases from slow to high speed, where as Average Throughput of DSR protocol increases from slow to high speed.

Figure 6.2 shows the performance of Packet Delivery Ratio (PDR) parameter in AODV and DSR protocols with increasing speed of vehicles under 802.11p standard. The PDR in AODV protocol is better than the DSR protocol under slower speed, while PDR in DSR protocol is better than the AODV protocol under medium and high speed. The PDR in AODV protocol decreases from slow to high speed, whereas PDR in DSR protocol increases from slow to high speed.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

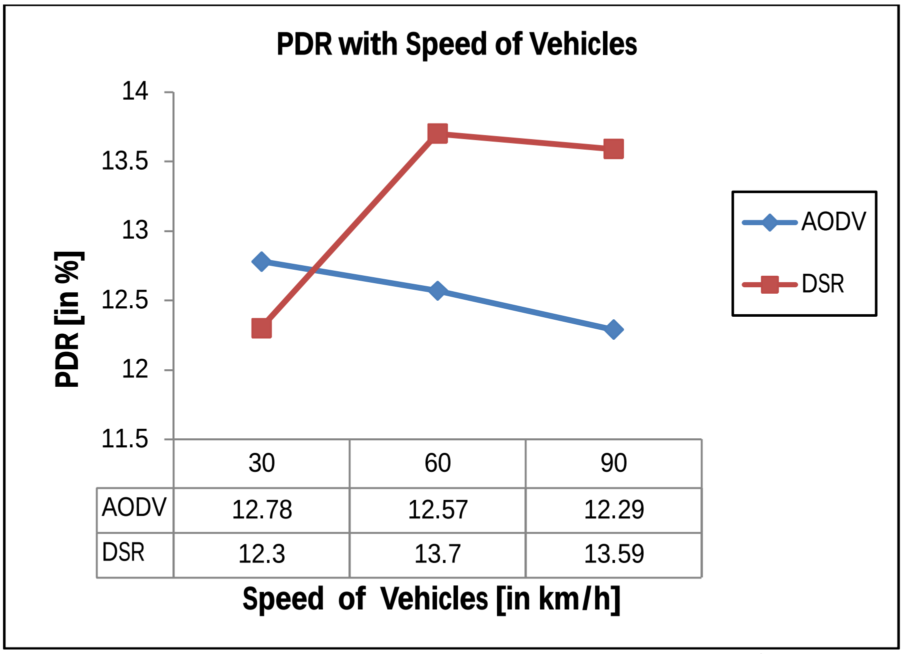


Figure 6.2: PDR in AODV and DSR with increasing speed of vehicles

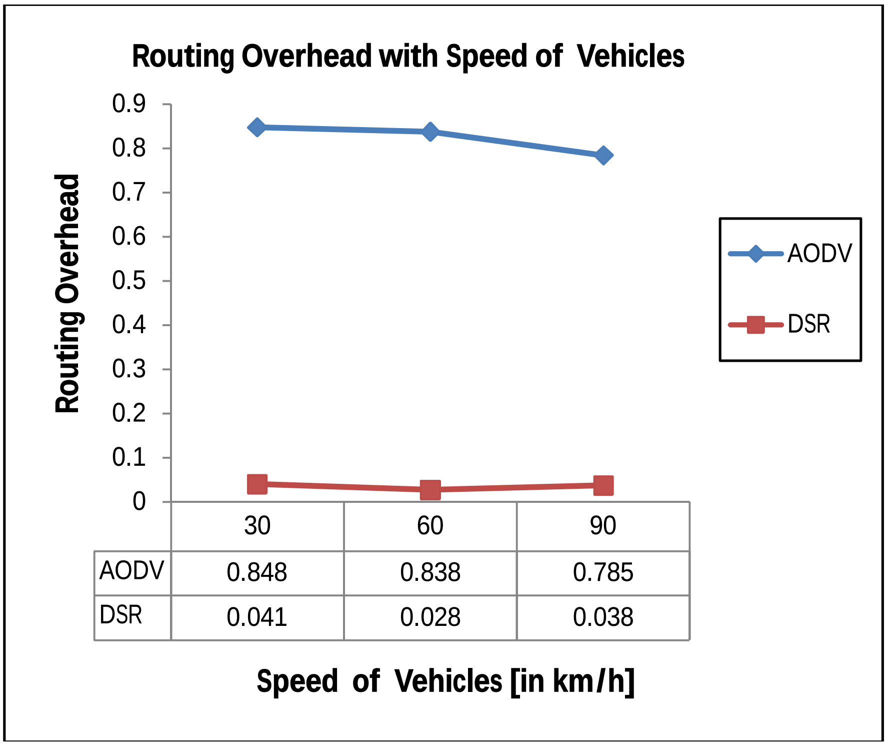


Figure 6.3: Routing Overhead in AODV and DSR with increasing speed of vehicles

Figure 6.3 shows the Routing Overhead in AODV and DSR protocols with increasing speed of vehicles under 802.11p standard. In both AODV and DSR protocol, Routing Overhead decreases from slow to high speed. In all cases,

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

Routing Overhead in DSR protocol is much better than the AODV protocol.

The following figure 6.4 shows number of Drop Packets in AODV and DSR protocols with increasing speed of vehicles under 802.11p standard. The number of Drop Packets increases in AODV protocol, while in DSR protocol, number of Drop Packets decreases with increasing speed of vehicle. The number of Drop Packets is higher in DSR protocol in comparison of AODV protocol under slow speed, whereas number of Drop Packets is less in DSR protocol in comparison of AODV protocol under medium and high speed.

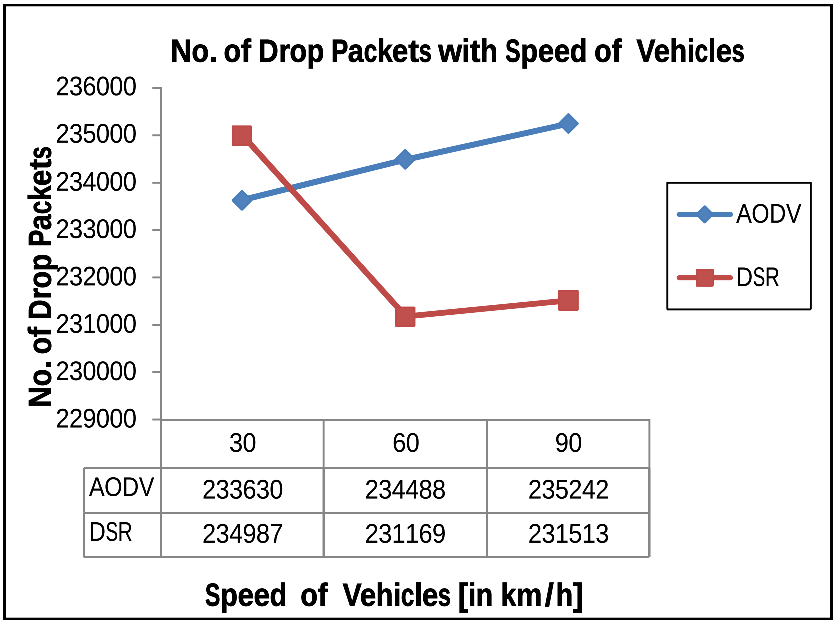


Figure 6.4: Number of Drop Packets in AODV and DSR with increasing speed of vehicles

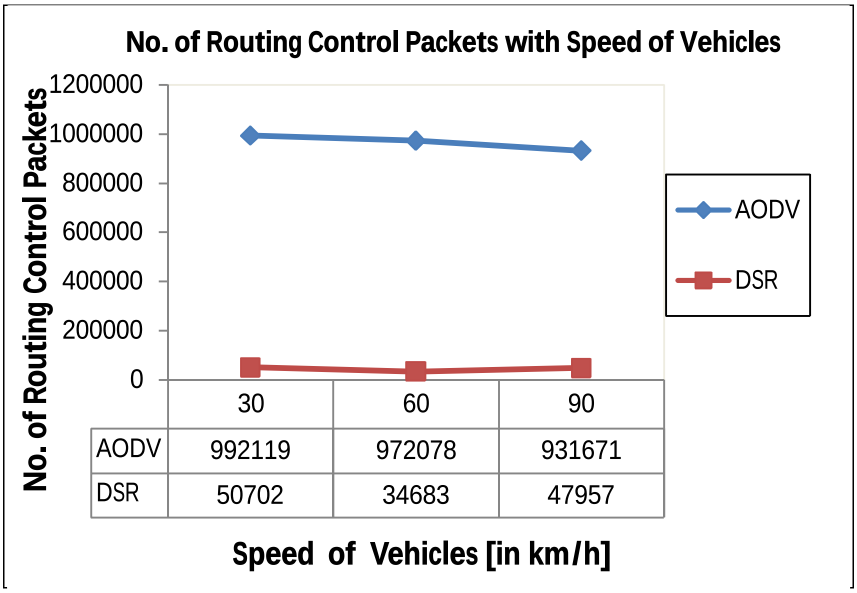


Figure 6.5: Number of Routing Control Packets in AODV and DSR with increasing speed of vehicles

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

Figure 6.5 shows the number of Routing Control Packets in AODV and DSR protocols with increasing speed of vehicles under 802.11p standard. In both AODV and DSR protocol, the number of Routing control packets decreases from slow to high speed. In all cases, in terms of number of Routing control packets, DSR protocol performs much better than the AODV protocol.

The following evaluation has been measured with increasing send rate of packets 256 kbps, 512 kbps and 1024 kbps at 30 km/h speed of vehicles or nodes with 50 vehicles:

The Average Throughput in AODV and DSR protocols with increasing send rate of packets under 802.11p standard is shown in the following figure:

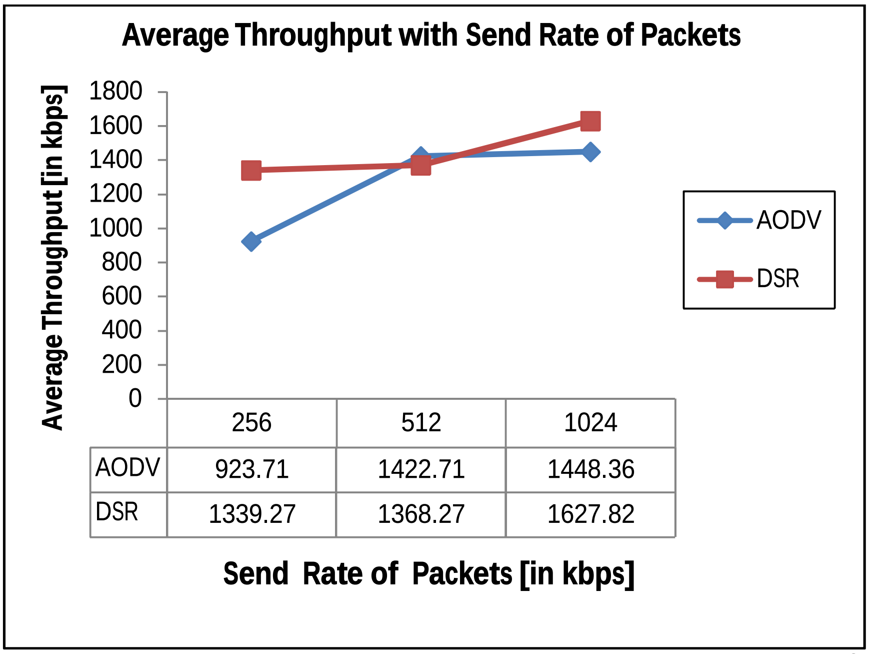


Figure 6.6: Average Throughput in AODV and DSR with increasing send rate of packets

Figure 6.6 show that the Average Throughput increases in both AODV and DSR protocols with increasing send rate of packets. The Average Throughput of AODV protocol is better than the DSR protocol under medium send rate, while Average Throughput of DSR protocol is better than the AODV protocol under low and high send rates.

The following figure 6.7 shows the performance of Packet Delivery Ratio (PDR) parameter in AODV and DSR protocols with increasing send rate of packets under 802.11p standard. The PDR in DSR protocol is better than the AODV protocol under low and high packet send rate, while PDR in DSR protocol is less than the AODV protocol under medium send rate of packets. The PDR in both AODV and DSR protocols decreases from low to high send rate of packets.

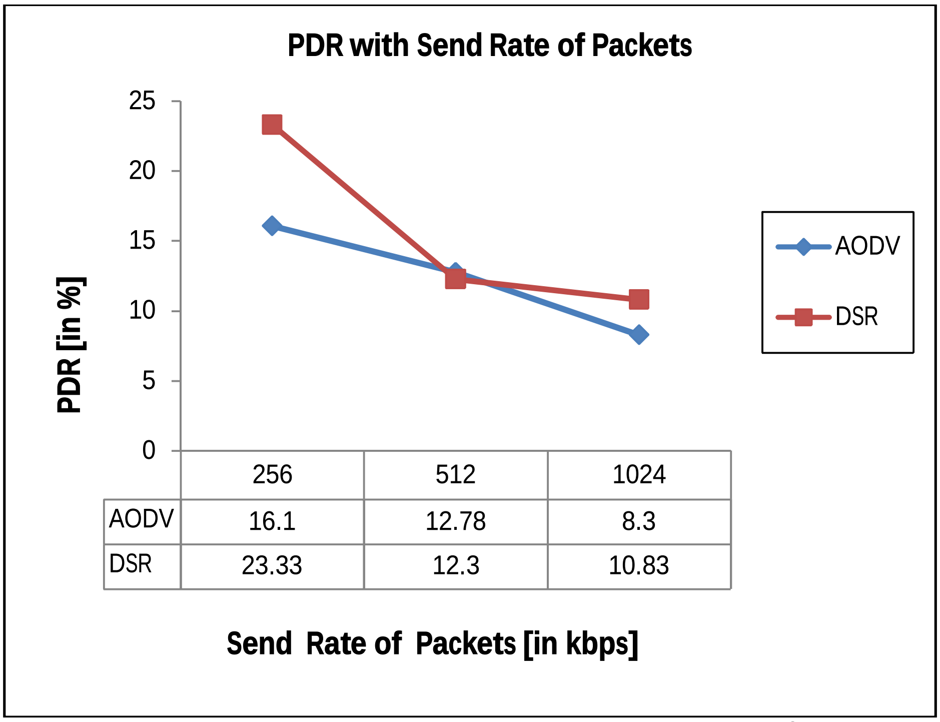
ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

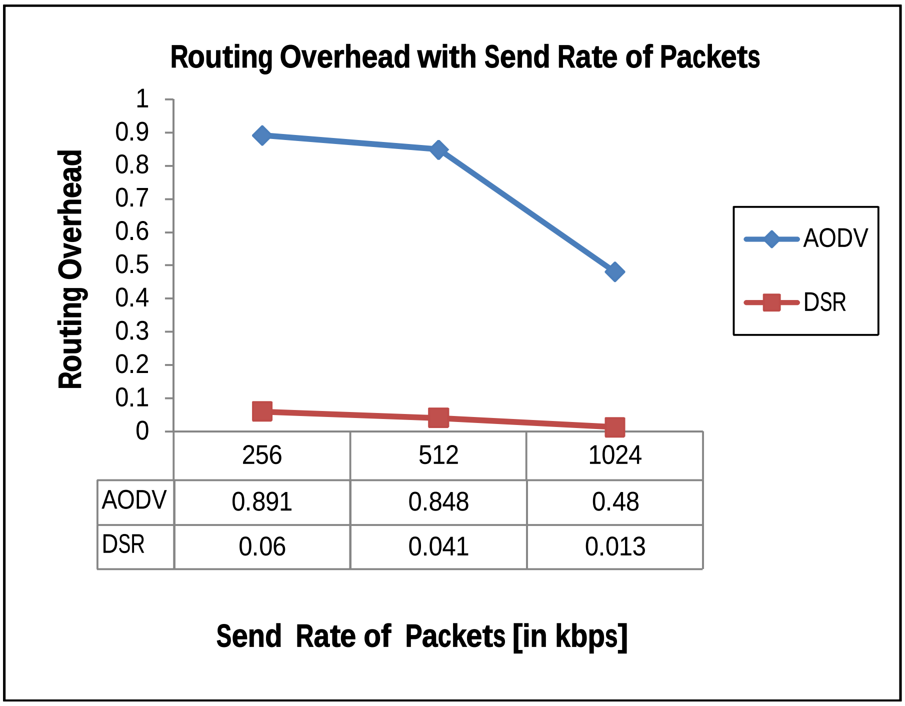
Website: www.ijircce.com

Vol. 6, Issue 5, May 2018



	256	512	1024
AODV	16.1	12.78	8.3
DSR	23.33	12.3	10.83

Figure 6.7: PDR in AODV and DSR with increasing send rate of packets



	256	512	1024
AODV	0.891	0.848	0.48
DSR	0.06	0.041	0.013

Figure 6.8: Routing Overhead in AODV and DSR with increasing send rate of packets

Figure 6.8 shows the Routing Overhead in AODV and DSR protocols with increasing send rate of packets under

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

802.11p standard. In both AODV and DSR protocol, Routing Overhead decreases from low to high send rate of packets. In all cases, Routing Overhead in DSR protocol is much better than the AODV protocol.

The following figure 6.9 shows number of Drop Packets in AODV and DSR protocols with increasing send rate of packets under 802.11p standard. The number of Drop Packets increases in both AODV and DSR protocols with increasing send rate of packets. The number of Drop Packets is higher in DSR protocol in comparison of AODV protocol under medium send rate of packets, whereas number of Drop Packets is less in DSR protocol in comparison of AODV protocol under low and high send rate of packets.

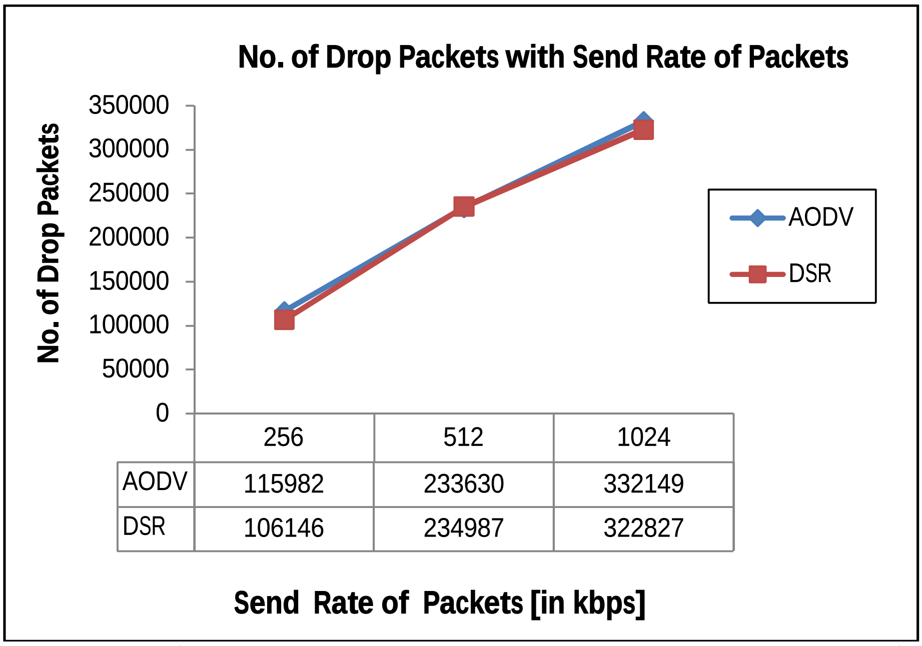


Figure 6.9: Number of Drop Packets in AODV and DSR with increasing send rate of packets

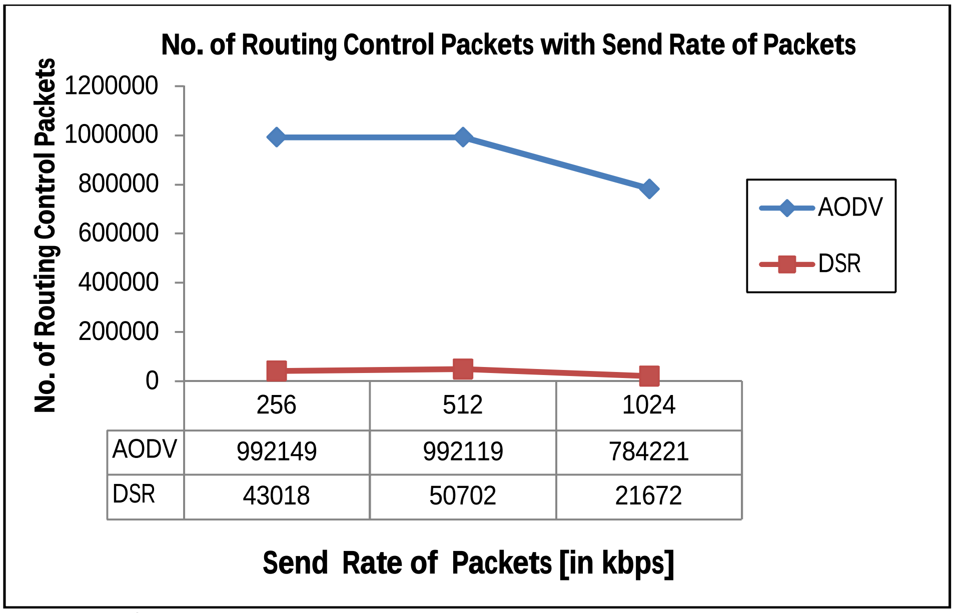


Figure 6.10: Number of Routing Control Packets in AODV and DSR with increasing send rate of packets

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

The figure 6.10 shows the number of Routing Control Packets in AODV and DSR protocols with increasing send rate of packets under 802.11p standard. In both AODV and DSR protocol, the number of Routing control packets decreases from low to high send rate of packets. In all cases, in terms of number of Routing control packets, DSR protocol performs much better than the AODV protocol.

VI. CONCLUSION

The simulation results indicate that DSR protocol perform well over AODV protocol in terms of parameter Average Throughput, PDR, Routing Overhead, number of Drop Packets and NRL with increasing speed of vehicles as well as increasing send rate of packets.

These results state that the DSR routing protocol perform well over the AODV routing under V2V type of VANET with increasing speed of vehicles and increasing send rate of packets. In future attempt will be made to analyze and evaluate the other routing protocols performance for various scenarios under V2V as well as V2I type of VANET.

REFERENCES

[1] Memon et. al., “Performance Evaluation of Routing Protocols in VANET on Highway: Police Cars Communication Scenario”, Engineering Science and Technology International Research Journal, Volume 1, No. 3, Sep 2017, pp. 16-22.
[2] Alowish et. al., “Performance Evaluation of a Cluster Based Routing Protocol for VANETs”, Journal of Communications, Volume 12, No. 2, Feb 2017, pp. 137-144.
[3] Husain and Sharma, “Simulated Analysis of Location and Distance Based Routing in VANET with IEEE802.11p”, Third International Conference on Recent Trends in Computing, Procedia Computer Science (ELSEVIER) 57, 2015, pp. 323–331.
[4] Kaur and Malhotra, “On the Selection Of Qos Provisioned Routing Protocol Through Realistic Channel For Vanet”, International Journal of Scientific & Technology Research, Volume 4, Issue 07, July 2015, pp. 191-196.
[5] Choudhury et. al., “Simulation and Analysis of Ad-hoc routing protocols under varying density and mobility in VANET”, International Journal of Engineering And Computer Science, Volume 4, Issue 6, June 2015, pp. 12731-12734.
[6] Jamra et. al., “Review of Reactive & Proactive Routing Protocols for Vehicular Ad hoc Networks”, International Journal of Emerging Engineering Research and Technology, Volume 3, Issue 4, April 2015, pp. 10-15.
[7] Usop et. al., “Performance Evaluation of AODV, DSDV & DSR Routing Protocol in Grid Environment”, International Journal of Computer Science and Network Security, Volume 9, No. 7, 2009, pp. 261–268.
[8] Tracy Camp, Jeff Boleng and Vanessa Davies, “A Survey of Mobility Models for Ad Hoc Network Research”, special issue on Mobile Adhoc Networking: Resources, Trends and Applications, Vol. 2, No. 5, 2008, pp 483-502.
[9] www.isi.edu/nsnam/ns/tutorial Marc Greis tutorial on ns2.
[10] Matthias Transier “ Ns2 tutorial running simulations ”.