Vehicle Routing with Dynamic Routing

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ABSTRACT
The primary strategy to design any wireless network is done through routing protocol. In ad-hoc networks (MANET &VANET), for sending packets from source to destination, many routing protocols are available. They depend on traffic analysis. The path is calculated from one position to another by applying dynamic routing algorithm for traffic analysis. In this paper we have shown an analysis of AODV and DSDV for TCP and UDP. Also we have proposed modifications in AODV to reduce redundancy of packets and thereby controlling congestion.

Keywords
Mobile/Vehicle adhoc networks,TCP, UDP, AODV, DSDV, NS2.

1. INTRODUCTION
Ad-Hoc Networks (MANET and VANET) are dynamic networks. An AdHoc network contains interconnected nodes which forms network without a fixed infrastructure and nodes can be arranged dynamically. The interest on Ad-hoc network is increasing day by day because of the availability of wireless communication devices.

The primary objective of this paper is to diagnose the performance of different routing protocols under different traffic conditions. Through this paper, we also propose modification to AODV. The network performance of different protocols varies under different parameters for TCP and UDP. In order to achieve this, File Transfer Protocol (FTP) and Constant Bit Rate (CBR) traffic conditions is used. In this emphasized on end to end delay, throughput, packet delivery ratio,congestion window, etc. This analysis is done to check the quality of service provided by routing protocols under different traffic conditions. This paper consists of basic idea of protocols, modifications, environment used, simulation analysis, results, conclusion and future work.

2. ROUTING PROTOCOLS IN MANET/VANET
MANET and VANET consist of 3 parts i.e. Mobile/vehicle (changeable or portable), Ad-Hoc (Temporary or for specific purpose) and Networks (Flexible data applications that communicate in network). MANET/VANET is a wireless ad-hoc network consisting of self-governing nodes. In this infrastructure less (MANET/ VANET) network the routing is a challenging work, because there is no fixed device, all are movable and each device act as a node as well as a router. Major factor that affects such a network that characterized by dynamically changing topology is the performance, while routing with robustness performance is one of the key challenges in deploying MANET/VANET. We have used Ad-hoc On-Demand Distance Vector Routing (AODV) – a reactive protocol and Destination sequence Vector (DSDV) –a proactive protocol.

2.1 AODV routing protocol
AODV is an adhoc on demand distance vector routing which is one of the type of reactive protocol. It is a Source drive type routing protocol. In the AODV routing protocol the communication takes place onlywhen desirable. A hop-to-hop methodology takes place in AODV. AODV routing protocol is a combination of on demand and distance vector. Distance vector means a link-state protocoland on demand means the communication takes place only when needed. In AODV routing protocol a RREQ (Route Request) is send to each and every node in the network under work. When all intermediate nodes have a proper valid and appropriate route to the destination node then the RREP (Route Reply) packets are sending to the source node by the nodes or by the destination node itself. If no valid route is found by the nodes then the RERR (Route Error) is send back to the source node.

2.2 DSDV routing protocol
DSDV is a Destination Sequenced Distance Vector .It is a type of proactive protocol. DSDV routing protocol is a table driven approach which means that a route is preinstalledor predefined from source node to destination node. There is no need of route discovery in DSDV routing protocol form source node to destination node. DSDV routing protocol guarantees a loop free path to each destination node without requiring nodes to participate in any complex update coordination protocol. In DSDV routing protocol the path is update randomly. The data packets do not follows the same path for whole time it updates its route which consumes more power and more bandwidth. This process of route updating sometimes fully dump the network.

3. PROPOSED MODIFICATION
AODV protocol is protracted with a drop factor that generates a randomness feature to lead in Modified AODV protocol. During the route discovery process, all intermediary or router nodes that comes between the source and the destination nodes decides to either broadcast/forward the RREQ packet further towards the destination or drop it. Before forwarding a RREQ packet, every node computes the drop factor which is a function of the inverse of the number of hop counts traversed by the RREQ packet. This drop factor lies in the range of 0 to 1. Also, the node develops a random number from 0 to 1. If this random number generated is higher than the drop factor, the RREQ packet is being forwarded by the node. Otherwise, the RREQ packet is dropped. This is due to the matter of fact that the original broadcasting by the source node results in multiple RREQ packets via the neighbors. Hence, the aim is to minimize on these redundant RREQ packets resulting in a decrease of network congestion. The following algorithm is:

Step 1: Calculate dfactor=(1/(Hopcount+1))

Step 2:Calculate a random value in the range of 0 to 1.

Step 3:If (randomvalue> dfactor)

Then broadcast/forward RREQpacket

Else drop RREQpacket.

4. SIMULATION METHODOLGY AND PERFORMANCE METRICS

4.1 Ns2 (Network Simulator)

NS2 is the tool which is used to carry out the performances of routing protocols of wired and wireless networks. The main components of NS2 which is used for performance analysis are: NS 2.35, Tcl, Nam 1.15, Xgraph, Awk .

Table 1. Parameters for Model I Parameters	**Values**	
TCP/FTP	**UDP/CBR**	
Traffic Agent Type	FTP	CBR
Data Type	TCP	UDP
Channel	Wireless	Wireless
Network Size	800m X 400m (x X y)	800m X 400m (x X y)
Routing Protocol	AODV	AODV
Number of nodes	30	30
Speed of mobile nodes	Random	Random
Simulation time	80 to 150 seconds	80 to150 seconds

4.2 Performance Metrices

The performance metrics helps in determining the behaviour and performance of routing protocols to achieve the quality of service (QOS). Metrics are End-to-End Delay, Throughput, Packet Delivery Ratio (PDR), etc.

5. RESULT ANALYSIS

All metrics (Y-axis) are plotted against simulation time(X-axis).

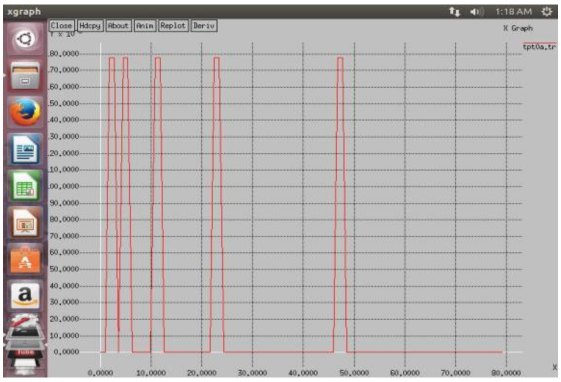

Fig. 1: Throughput of AODV with TCP/FTP

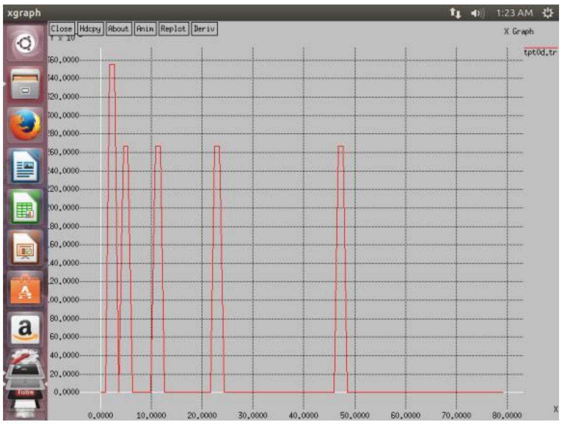

Fig 2: Throughput of DSDV with TCP/FTP

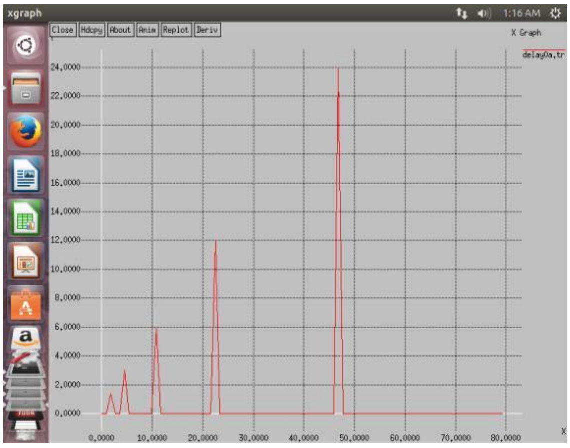

Fig 3: Delay in AODV with TCP/FTP

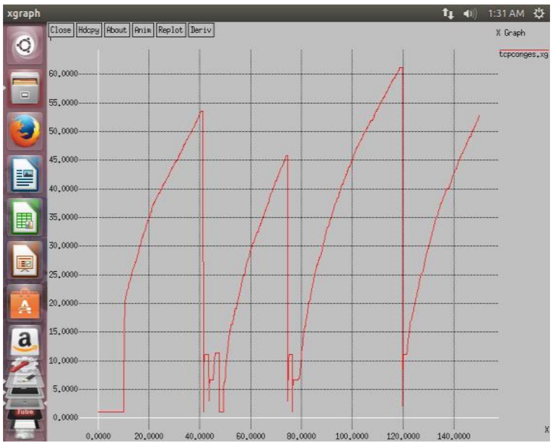

Fig 4. TCP congestion in AODV

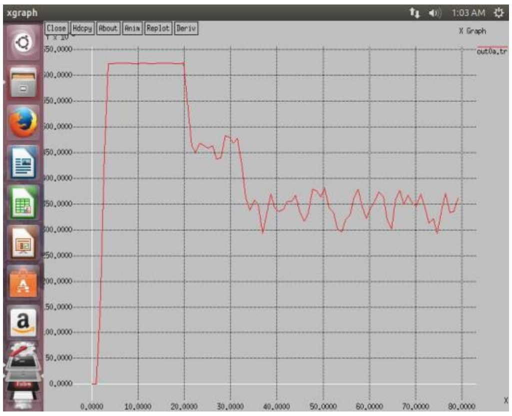

Fig 5. Throughput of AODV with UDP/CBR

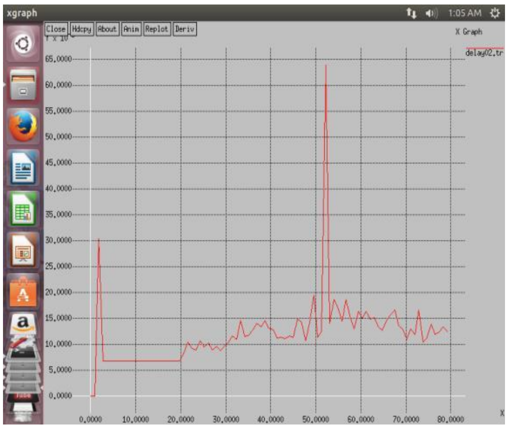

Fig 6. Delay in DSDV with UDP/CBR

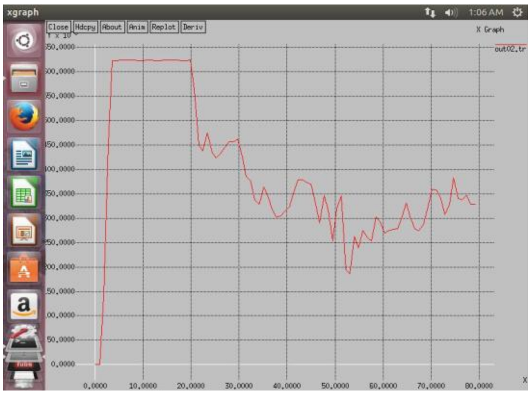

Fig 7. Throughput of DSDV with UDP/CBR

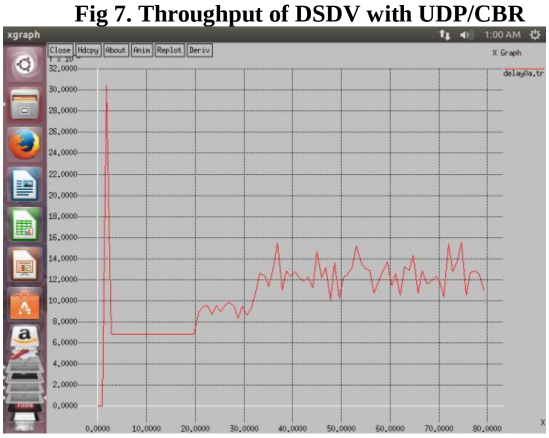

Fig 8. Delay in AODV with UDP/CBR

Table 1: Average AWK results for TCP/FTP

	AODV	DSDV
Throughput(kbps)	571.23	610.7
Packet Delivery Ratio	0.9833	0.9954
End to end delay(ms)	45.3	23.6

Table 2. Average AWK results for UDP/CBR

	AODV	DSDV
Throughput(kbps)	200.3	226.7
Packet Delivery Ratio	0.9763	0.9801
End to end delay(ms)	36.5	12.1

Table 3. AWK results for AODV & Modified AODV

	AODV	Modified AODV
Packets Received	24,659	20,453
Dropped Packets	91	1056
End to end delay(ms)	18.6	12.1

6. CONCLUSION

In this paper, the analysis of AODV and DSDV is carried out for TCP over FTP and UDP over CBR traffic scenarios. Some modifications for congestion control in AODV are also proposed.On the basis of our work completed and its result analysis we can conclude that DSDV is better for smaller networks and AODV is more suitable for general ad-hoc networks.For the future work, new approaches for congestion control could be explored to work on and that will help in cheaper deployments.

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