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# Effect of Increasing Nodes over Proactive & Reactive Routing Protocol in Vanet Using Ns3

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**Abstract**-Although inter-vehicle communications (IVC) technologies intend to improve driving safety and enable infotainment applications, empirical testing within large-scale deployments remains cost-prohibitive, thus highlighting the need for ac- curate simulation models. While using current models, sim- ulation practitioners limit future extensions and produce in- consistent results by choosing different design assumptions, thus motivating the following research objective: the goal of this research is to assess VANET network effectiveness by highly parameterizing in simulation mobility, radio prop- agation, and MAC/PHY models that realistically represent VANET scenarios. We develop a simulation script for ns-3 that we execute for several realistic VANET scenarios and compare routing throughput, end-to-end delay, and safety message packet delivery ratio (PDR) to assess routing pro- tocol performance of AODV and DSDV. We find that by combining synthetic highway or realistic vehicu- lar traces with parametric sensitivity, VANET network and routing protocol performance can be meaningfully assessed.

**Keywords-**VANET routing protocol;performance;ns-3

## I. INTRODUCTION AND BACKGROUND

Vanet is the network in which communication is done between road side units to cars and car to car within a short range of 100 to 300 m. There exists an authentication protocol to secure vehicular ad hoc networks (VANETs) are raising challenges day to day such as revocation, avoidance of computation, certificate distribution and communication bottlenecks, and reduction of the strong reliance on tamper-proof devices. In VANET, vehicles depend on the integrity of received data for deciding when to present alerts to drivers. Furthermore in the future, this data can be utilized as the basis of control decisions for autonomous vehicles. If this information is corrupted, vehicles may present unnecessary warnings to their drivers, and the results of control decisions based on this information could be even more dangerous.

The growth of the increased number of vehicles are equipped with wireless transceivers to communicate with other vehicles to form a special class of wireless networks, known as vehicular ad hoc networks or VANETs [1]. VANET is a special class of Mobile Ad hoc Network (MANET) to provide communication among nearby vehicles and between vehicles and nearby roadside equipment [2]. As mobile wireless devices and networks become increasingly important, the demand for Vehicle-to-Vehicle (V2V) and Vehicle to- Roadside (VRC) or Vehicle-to-Infrastructure (V2I) communication will continue to grow [3]. It is supposed that each vehicle has a wireless communication equipment to provide ad hoc network connectivity [4]. Such networks comprise of sensors and On Board Units (OBU) installed in the car as well as Road Side Units (RSU) [5]. The data collected from the sensors on the vehicles can be displayed to the driver, sent to the RSU or even broadcasted to other vehicles depending on its nature and importance. VANETs offer the potential for fast and accurate driving information (e.g. traffic, accidents and emissions) that would otherwise be more difficult to disseminate. Possible applications for such networks can be generally classified as safety and non-safety applications [6]. Safety applications include accident avoidance and cooperative driving. Non-safety applications include traffic information, toll service, Internet access, cooperative entertainment, etc.

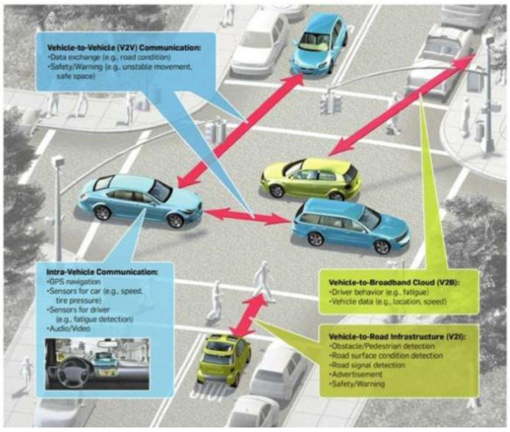


**Fig: 1.1 : Architecture of VANET**

## II. RELATED WORK

[5]. J. Bu and M. Liu. Has worked onEvaluation of Wireless Access in Vehicular Environments(WAVE) &VANET performance using ns-3.His research objective was to assess VANET network effectiveness by highly parameterizing in simulation mobility, radio propagation, and MAC/PHY models that realistically represent VANET scenarios.

[6].R.Chaudhary, S.Sethi, R.Keshari, S.Geol has worked on study of network simulator 2 & 3.They study that network simulators is extremely useful because it often allows research questions and prototypes to be explored at relatively lesser cost and time than that required to experiment with real implementations and networks.The network simulators allow one to model an arbitrary computer network by specifying both the behavior of the network nodes and the communication channels. It provides a virtual environment for an assortment of desirable features such as modeling a network based on a specific criteria and analyzing its performance under different scenarios. The newly proposed network simulator NS-3 supports coupling, interoperability, good memory management, debugging of split language objects, coding in C++ and object oriented concepts, as well as supports models supported by NS-2 and most suitable for wireless networks.

1. **DSDV ( DESTINATION SEQUENCED DISTANCE VECTOR ROUTING**)

It uses a shortest path algorithm & it implements the distance vector strategy & used only one route to destination which stored in routing table. All information about all accessible network nodes is stored in routing table and each entry in the routing table contain a sequence number initiated by the destination node.

i. Each node maintains a routing table which stores next hop, cost metric towards each destination a sequence number that is created by the destination itself.
ii. Each node periodically forwards routing table to neighbors.
iii. Each node increments and appends its sequence number when sending its local routing table
iv. Each node advertises a monotonically increasing even sequence number for itself.

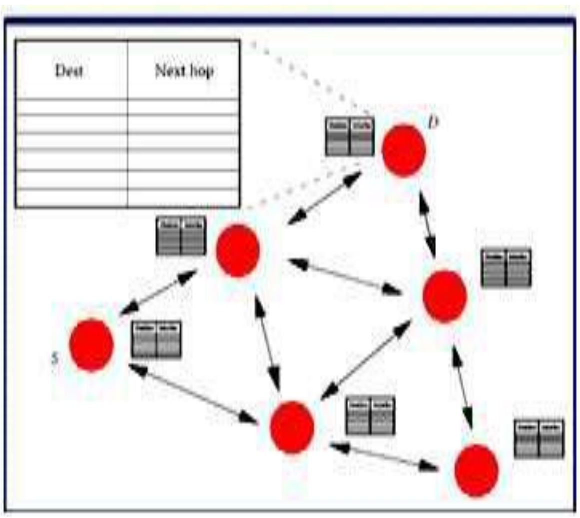


**Fig. 3.1 : Routing Table of DSDV**

## III. AODV (ADHOC ON DEMAND DISTANCE VECTOR ROUTING)

Ad hoc On-Demand Distance Vector (AODV)[11] routing is a routing protocol for VANETs and other wireless ad-hoc networks. It is jointly prepared in Nokia Research Centre of University of California, Santa Barbara and University of Cincinnati by C. Perkins and S. Das. AODV is based on the principle of an on-demand and distance-vector routing protocol, means in this protocol path is established from a target or destination node only on when required or demand. AODV[19][20] has the capability of both uni-casting and multicasting. It keeps these paths as long as they are wanted by the sources. The sequence numbers are used by AODV to ensure the freshness of routes. It is free from loops, self-starting, and scales to huge numbers of mobile nodes. AODV defines three types of control messages for route maintenance:

**RREQ-** A route request message is transmitted by a source node to the target or destination node. The expanding ring technique is employed for flooding of messages in case of optimization of AODV.

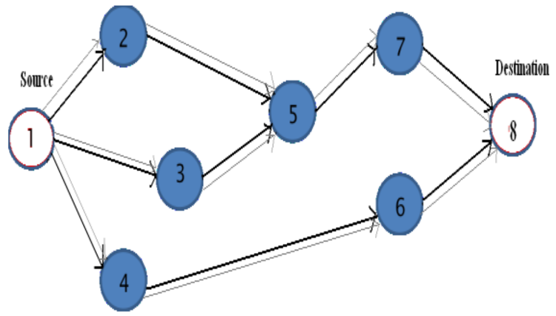


**Fig.4.1 :Route Request in AODV**

| Parameter | Value |
|---|---|
| Examined Protocol | AODV and DSDV |
| Number of Nodes | 02,20 and 50 |
| Simulation Time | 1000sec |
| Simulation Area | 150mX150m |
| Network Traffic | CBR |
| Packet Size | 512 Bytes |
| Simulator | NS 3.25 |

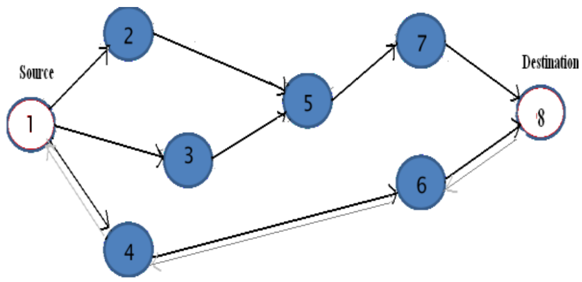


**Fig.4.2 Route Reply in AODV**

## 2. EXPERIMENTAL SETUP & RESULTS

Beyond its popularly in VANET literature, ns-3 was chosen over other open source and proprietary simulators because of its diverse set of suitable and architecturally-decoupled models that ease model selection and parameterization

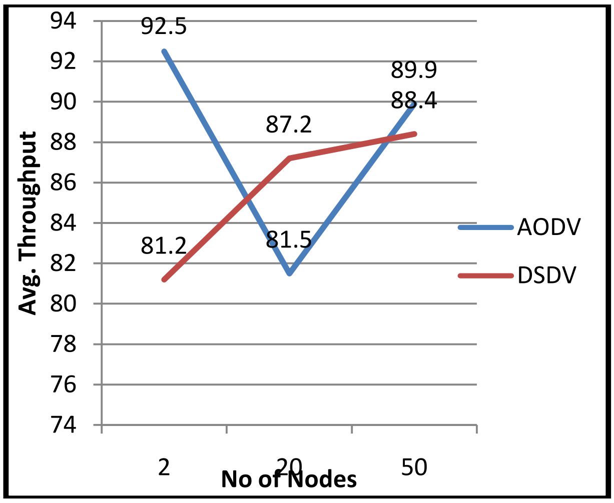


Fig 5.1 : Average Throughput

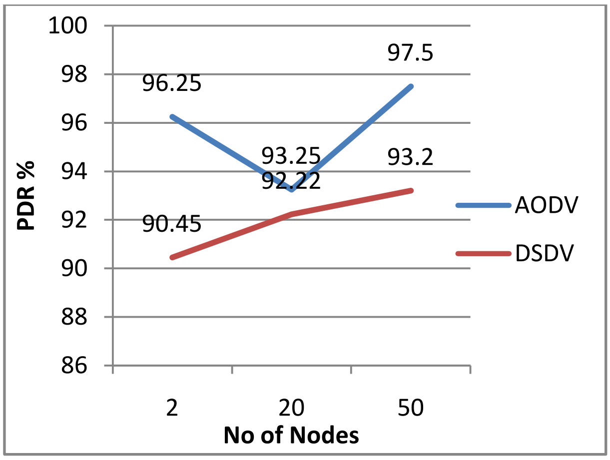


Fig.5.2 : PDR ( in %)

## IV. CONCLUSION

The above fig5.1 shows that the throughput of AODV decreases with increasing number of nodes but after 20 nodes it again increases. The throughput of DSDV increases but after 20 nodes it decreases The fig. 5.2 shows that the packet delivery ratio for AODV decreases for 20 nodes but again it increases with the increase in nodes. The PDR of DSDV decreases with increase in nodes i,e 50 nodes.

The overall results reveals that the performance of AODV is much better in terms of throughput and PDR as compared to DSDV

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