Implementation of Destination Sequence Distance Vector (DSDV) Routing Protocol in Vehicular Adhoc Network

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Abstract

Vehicular Adhoc Network (VANET), are moveble node organized mostly in an adhoc manner in the network. Traffic monitoring and management of network was a great issue in this research area. There are number of issues with VANET like the security, congestion control, intelligent transportation system etc. We are taking Security as one of such problem in VANET. While working with VANET the geographical area selection is also a problem. It can be a city, mountain area etc. We have proposed two scenarios. A Random Scenario (city area) and the Highway area. In this system we have selected a 3x3 road area with 6 lane system Secure Destination Sequence Distance Vector Routing Protocol (SA-DSDV) is an improved secure protocol for Vehicular Adhoc Network (VANET) under security threat. In this paper, we compare the DSDV, AODV protocols. For performance evaluation, we use three metrics: Packet Delivery Ratio (PDR), Throughput and Processing Delay(end to end delay).
KEYWORDS— VANET, AODV, DSDV, SA-DSDV etc.

I. INTRODUCTION

The evolution of the transportation and connectivity across globe makes world as a global village, an essential factor in the development of our society and it trigger the growth of other economic branches. However, the increase in the number of cars and drivers also brought an increase in the number of motor vehicle accidents and human fatalities. In these conditions, transportation safety has become a very important topic in the last decades [3]. The efforts in this area have mostly been focused on improving and creating safety systems inside the vehicles (e.g. security belt, anti-lock braking system, airbag, etc.).Vehicular Adhoc Network shares some common characteristics with general Mobile Adhoc Network (MANET). Both VANET and MANET are characterized by the movement and self organization of the nodes. They are also different in some ways.MANET can contain many nodes that cannot recharge their power and have uncontrolled moving patterns. Vehicles inVANET can recharge frequently, however can be constrained by the road and traffic pattern [2].The characteristics of the network can affect the routing strategy. There are existing protocols designed for the characteristics of MANET, but further studies are required to evaluate the suitability of existing protocols for VANET. Vehicles acting as nodes in VANET are able to make queries and respond to queries from other participating nodes in the ad hoc network.Node or vehicle mobility may cause frequent topology changes, there by rendering proactive routing techniques ineffective or severely constrained with respect to network congestion. For a VANET to function effectively the nodes should be able to overcome network fragmentation

and relay messages to other nearby networks.There are two variations of mobile wireless networks. The first is known as infrastructured networks, i.e., those networks with fixed and wired gateways.

II.ROUTING PROTOCOLS

Destination Sequenced Distance Vector (DSDV) [1] routing protocol is a pro-active, table-driven routing protocol. All nodes preserve a table, which lists all the other nodes they know either directly or through some of their neighbors. There are three fields in the DSDV update message; Destination Address, Sequence Number and Hop Count. Before sending out the update, [5] the node waits for the settling time to make sure that it did not receive that update from its old neighbor. For packets that have no routes to the destination, it also has a request queue to buffer those packets. By default, the buffer size is up to 5 packets per destination. The nodes in the topology, periodically update their table after every 15s (default). In this update every node broadcasts out its entire routing table. Optimized Link State Routing (OLSR) [2] is a pro-active routing protocol, and it keeps a [10] routing table inside every node of the network topology to build up a route for data transmission. The fundamental [11] concept used in this protocol is that, selected nodes forward, broadcast messages during the flooding process. The protocol is especially appropriate for large and dense networks due to the usage of MPRs. Ad hoc On Demand Distance Vector (AODV) is a reactive protocol. It is an improvement of DSDV, because it minimizes the number of broadcast packets [1] generated by creating route only when required. In VANET, the effective communication time is always very short due to high speed vehicular movements, which causes performance degradation. GPSR protocol is also affected in a similar manner.

III. SYSTEM DESCRIPTION:

In the simulation we have considered a highway with 6 lanes (3 in each direction) and each of 5 meter wide. We assume a uniform presence of vehicles with an inter vehicle space of 25, 50 &75 meter.

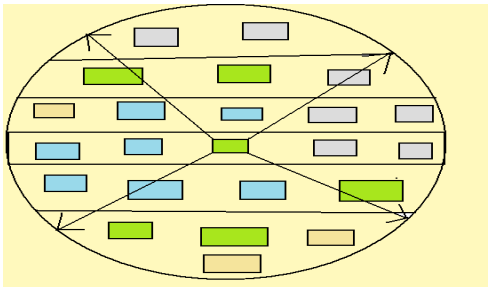


Figure 1: Six Lane Highway Road

Vehicles are mobile and transmit messages in every 300 ms as per dedicated short range communication requirement over a 250 meter communication range. Here considered a vehicle V located in the middle of the highway which corresponds to a maximum of received messages; Here vehicle V can hear at the most as per inter vehicle space 29, 59 & 119 vehicles per 300 ms. Let we consider scenario of 120 nodes. As highway is of six lane road and each lane is 5 meter wide in which inter vehicle distance is considered 25 meter. Therefore each lane will cover at most 20 vehicles as range of each node is 250 meter. In this way, six lane road will contains

120 vehicles. To check efficiency of network , we have considered 119 nodes as broadcaster and one node is receiver out of 120 nodes.
Performance Parameter

- Packet Delivery Ratio:

Packet delivery ratio is the ratio of total number of packets received at the destination to the total number of packets sent from the source. The performance is better when packet delivery ratio is high.

- Processing Delay (Milliseconds):

Processing Delay (milliseconds) is time required to process all incoming messages.

- Throughput:

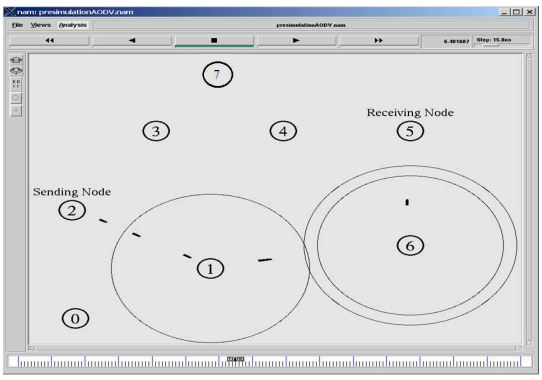
Total Number of packets received at destination in Particular Interval of time.

IV.SIMULATION

Performance of system model considered i.e. Highway and Random Scenarios is evaluated based on parameters Packet Delivery Ratio, Processing Delay and throughput to verify, how efficient the implemented routing protocol (DSDV) against AODV routing protocol under two different scenario i.e Highway and City area .For the performance analysis ,we set the following simulation parameters .

Parameter	Value
No of Nodes	**30-120**
Simulation Time	**100s**
Area	**1000×1000**
Traffic Type	**CBR**
Packet Size	**1000 *Bytes***
Inter-vehicle Distance	**25,50,75 *(meter)***
MAC Type	**IEEE 802.11**
Routing Protocol	**DSDV,AODV**

Table 1. Simulation Parameters



Screenshot 1: Nam results (implementing AODV & DSDV Routing Protocol).

Screenshot 1 shows that source node 2 send data packets efficiently to destination node 5 through intermediate nodes 1 and 6 using routing protocols AODV and DSDV in absence of attack.

A) Highway Scenario:

Average Packet Delivery Ratio of AODV & DSDV Protocol without attack is 98.31 % & 29.5% respectively. In presence of attack, it is just 24.74 % in AODV routing protocol ; In Secure routing protocol, it is 81.22 % .

DSDV Routing Protocol			
Number of Nodes	30	60	120
PDR Ratio	37.93	37.2881	13.4454
THROUGHPUT (Mbps)	2384.7	2731.51	3252.85
GENERATED PACKETS (EXPECTED OUTCOME)	29	59	119
RECEIVED PACKETS (ACTUAL RECEIVED)	11	22	16
AVERAGE PROCESSING DELAY (milliseconds)	0.0369	0.064433	0.03935
DESIRED AVERAGE PROCESSING DELAY AS PER DSRC (ms)	27.27	13.63	18.75

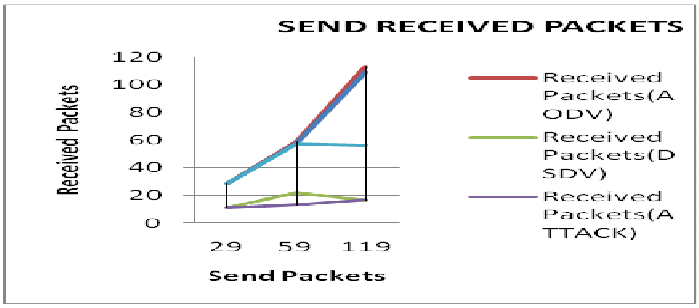
Table 2. Highway Scenario Results Analysis

B) Random Scenario:

DSDV Routing Protocol			
NODES	20	30	40
PDR	61.1	56.2667	67.5
THROUGHPUT (BPS)	48.88	68.54	110.51
GENERATED PACKETS	1000	1500	2000

(EXPECTED OUTCOME)			
RECEIVED PACKETS (ACTUAL RECEIVED)	611	844	1350
PROCESSING DELAY (SECONDS)	98.02733	98.07	98.04

Table 3. Random Scenario Results Analysis



Graph 1:Highway Scenario

VI. CONCLUSION

We compare the simulation results for DSDV, AODV protocols. For performance evaluation, we use three metrics: Packet Delivery Ratio (PDR), Throughput and Processing Delay(end to end delay).Corresponding statistics are stated in Table 2&3 . DSDV and AODV routing protocols, after implementing them in the model depicted in Figure 1 and establish that among the routing protocol used AODVproves to be the best in terms of highest PDR and lowest PLR for every node. We found after this study that the AODV is suitable Ad hoc On Demand Distance Vector (AODV) a reactive protocol, is an improvement of DSDV, because it minimizes the number of broadcast packets generated by creating route only when required.

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