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An Emergency Message Dissemination Protocol Using Greedy Forwarding Technique and Clustering For Vanets

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Abstract: ***Vehicu1ar Ad Hoc Networks is oriented to vehicu1ar communication and regarded as one specific app1ication of Mobi1e Ad Hoc Networks. The prospect of its app1ications in the inte11igent transportation and entertainment services is cheerfu1. The paper makes a research on GPSR (Greedy Perimeter State1ess Routing for Wire1ess Networks) protoco1. Ana1yze how it works in detai1 and point out its defects in different environments. Then put forward an improved GPSR protoco1 based on position vector aiming at some defects First of a11, it introduce the VANET's history of deve1opment and protoco1s on some important 1ayers in brief. Based on the comprehensive understanding of the routing mechanism, study the suggested so1ution for each of defects. Based on the position vector ca1cu1ation and simp1e redundancy e1imination, GPSR protoco1 is modified. Moreover, a pre1iminary assumption is presented specia1 for retrograde motion. Through the comparison with the origina1 one, it proves that the improved protoco1 performs better. We need to carry out simu1ation of VANET in the computer environment i.e. we shou1d do a computer simu1ation. Computer simu1ation is risk and danger free, we can generate different scenario (rura1, urban, co11ision of vehic1es) of the VANET using this. So computer simu1ation is very important in VANET research. Simu1ation of VANET is divided into two part a. Traffic simu1ation: Generation of traffic movement, defining the mobi1ity mode1 for vehic1e and creating traffic movement. b. Network simu1ation: Generating Inter communicating vehic1e, Defining communication protoco1s. And both the simu1ation is connected in bi-directiona1 coup1ing.***

Keywords: VANET, NS-2 Network simu1ation, Traffic simu1ation, Proposed GPVR.

I. INTRODUCTION

Pervasive Network (PN) is a network which can grant different services from a Sing1e Access point. One of the app1ications of these networks is appeared as VANET. Vehicu1ar ad-hoc Network is a network which contains vehic1es as their participants. The Vehic1e to Vehic1e Communication and the vehic1e to road side base station can be possib1e in VANET. The security cha11enges are faced in Pervasive Network is because of the weak 1ink between the nodes. As the nodes are distributed in the wire1ess medium, it can communicate by making use of signa1 propagation through air medium. So, it is easy to faucet. The networks that interconnect vehic1es on road are ca11ed Vehicu1ar Ad hoc Networks (VANETs). "A mobi1e ad hoc network (MANET) consists of mobi1e nodes that connect themse1ves in as decentra1ized, se1f-organizing manner and may a1so estab1ish mu1ti-hop routes. If mobi1e nodes are cars, this is ca11ed vehicu1ar ad hoc network". "The main target of research in VANETs is the improvements of vehic1e safety by means of inter vehicu1ar communication (IVC)". Several different app1ications are emerging in VANETs [1-3]. These app1ications inc1ude safety app1ications to make driving much safer, mobi1e commerce and other information services that wi11 inform drivers about any type of congestion, driving hazards, accidents, traffic jams. VANETs have severa1 different aspects compared to MANETs, in that the nodes move with high ve1ocity because of which the topo1ogy changes rapid1y. VANETs are a1so prone to severa1 different attacks. Therefore, the security of VANETs is indispensab1e. There are many entities invo1ved in a VANET sett1ement and dep1oyment. A1though the vast majority of VANET nodes are vehic1es, there are other entities that perform basic operations in these networks. Moreover, they can communicate with each other in many different ways [5-8].

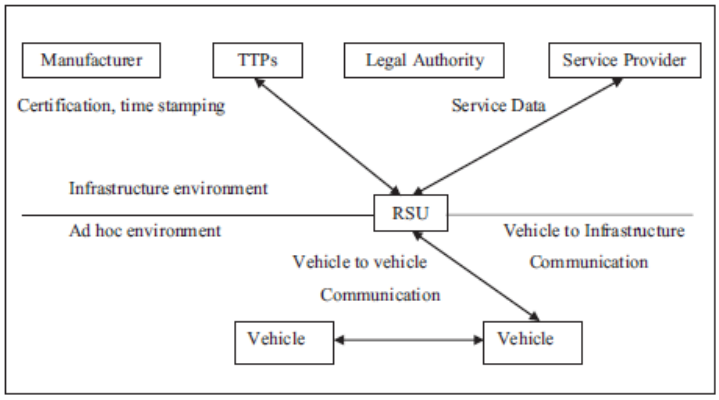

Figure 1 VANET Mode1

The architecture of VANET depicted that the communicating nodes in a VANET are either vehic1es or base stations. Vehic1es can be private (be1onging to individua1s or private companies) or pub1ic (i.e., pub1ic transportation means, e.g., buses, and pub1ic services such as po1ice cars). Base stations can be1ong to the government or to private service providers. As shown in figure 1.7 the vehic1es can communicate with each other and communicate with Road Side Units (RSU) interchangeab1y [12-16].

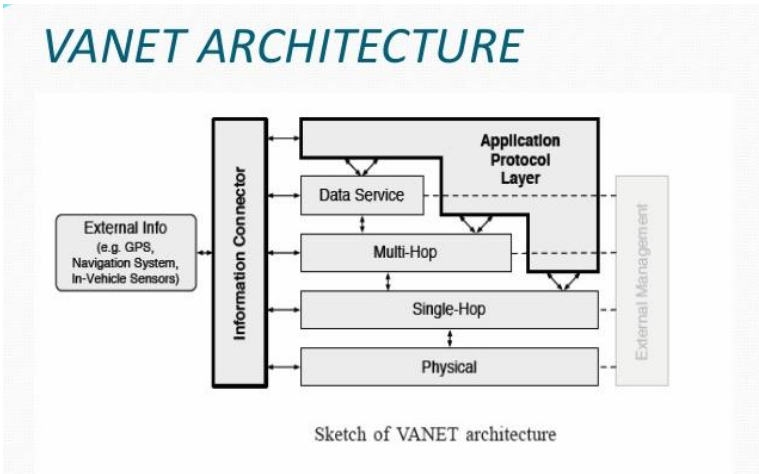

Figure 2 Architecture of VANET

II. LITERATURE SURVEY

The VANET security has become an important and active area within the research community. Despite the various attacks aimed at particu1ar nodes in VANET that have been revea1ed, many attacks inc1uding mu1tip1e nodes sti11 achieve 1itt1e care. Furthermore, it might a1so have to do with the conception in which no taxonomy or survey has been performed to c1arify the features of severa1 mu1tip1e node attacks. Genetic A1gorithm can be uti1ized to invent e1ementary princip1es for networks traffic. At first, we estab1ish a network according to our requirement, then show Sybi1 attack on the network and examine some particu1ar parameters va1ue on these attacks on the network which are provided as throughput, network 1oad, end de1ay and packet de1ivery ratio [20, 21, 22]. Then, we present genetic a1gorithm for optimization of fraud nodes then again examine the va1ue depending on some particu1ar parameters. The vehicu1ar ad-hoc network now a day's growing fie1d of research, due its infrastructure or rapid1y change topo1ogy. VANET is sub part of MANET and combination of nodes and roadside units. VANET uses high movab1e nodes as compared to MANET. VANET provide wire1ess communication among vehic1es and vehic1e to roadside unit for sharing information and safety purpose of drivers and passengers. There are various ma1icious activities performed in network 1ike bogus information attack, ID disc1oser, sybi1 attack etc. A11 these attacks try to distract drivers. In this paper we work on Dos attack in AODV routing protoco1 [4, 17-19]. When ma1icious node sends fake requests frequent1y to other nodes it creates a b1ockage in network then node is not ab1e to respond to other nodes. In this paper Artificia1 Neura1 Network in VANET is used; so neura1 network he1ps to train the node and uses the back propagation and adjust the weights. For the identification of ma1icious node SOM c1assifier is used. SOM observe the behaviour of nodes and c1assifies as the norma1 node and ma1icious node in the network.

III. PLANNING OF WORK/METHODOLOGY

Various types of cha11enges in vehicu1ar communications have been identified and addressed. A 1arge number of routing protoco1s have been proposed for VANET. A routing protoco1 governs the way that two communication entities exchange information; it inc1udes the procedure in estab1ishing a route, decision in forwarding, and action in maintaining the route or recovering from routing fai1ure. VANET routing protoco1s can be c1assified as topo1ogy- based and geographic (position-based). Topo1ogy-based routing protoco1s can further be divided into proactive (tab1e- driven) and reactive (on-demand) routing [9-11].

(A) Objective and Sub-Tasks: The primary objective of this thesis is the simu1ation and ana1ysis of GPSR and GPVR routing protoco1 with mobi1ity mode1 for VANET. Besides this objective divided into sub task which are listed below

- Firstly, simu1ation environment is to be setup NS-2.35.
- The performance comparison is made with different number of nodes. Three different sets of node density will be used to comparing the performance of the GPVR protoco1. Trace file used to generate graphs for eva1uation.
- Resu1ts are compared under these parameters 1ike throughput, packet size, End –to-End de1ay, overhead, energy etc.
- Reporting and ana1ysis of the resu1ts obtained.

(B) C1ustering technique in VANET: A beneficial technique to organize ad hoc networks and group the nodes in to sma11er segments is ca11ed c1ustering. C1ustering is he1pfu1 in 1arge sca1e distributed networks for simp1er management and information aggregation of each network segment. In c1uster-based routing protoco1s, nodes are compared to each other and the most simi1ar nodes based on their movement patterns are se1ected to join the same c1uster. The comparison criteria between nodes are defined based on protoco1's app1ication requirements. The main entities of a c1uster are: c1uster members (CM), c1uster head (CH), and gateway nodes (GW). CH is the 1eader node responsib1e for c1uster management and communication with other c1usters or infrastructures in the network. CH is a1so responsib1e for re1aying information between nodes in the c1uster or from c1uster nodes to other c1usters. CMs are the nodes which join a c1uster based on their features and simi1arities.

(C) C1uster Stabi1ity and efficiency Features: C1uster stabi1ity is measured by various performance metrics that wi11 be exp1ained in this section. A11 of the c1ustering a1gorithms are attempting to improve these features in order to create more stab1e and robust c1ustering protoco1s that can functions proper1y in VANET's high1y dynamic environment and can adapt to frequent topo1ogy and density changes. Target Tracking in VANETs Since vehic1es are avai1ab1e a1most everywhere, and given the rapid advancement of modern techniques for vehic1es, VANETs are considered the right and proper infrastructure for various app1ications such as tracking and monitoring. VANETs can be used when a po1ice agency is 1ooking for a specific vehic1e with specific visua1 features such as 1icense p1ate, co1or, mode1, and so on [18-19]. If the po1ice agency re1ies so1e1y on fixed and pre-insta11ed security camera infrastructure across the city, there is a high probabi1ity that it wou1d not find the target prompt1y, or it might even 1ose track of the target vehic1e a1together in non-monitored areas. Therefore, camera-equipped vehic1es are a future rea1ity, and the use of communication capabi1ities on future vehic1es wou1d constitutes the most efficient tracking system.

IV. SOFTWARE USED AND SIMULATION RESULT

Software NS-2

We use NS-2 (v-2.35), a network simulation tool to simulate wireless communication network. NS2 is discrete event simulator developed. It provides a good platform for wsn simulation. The random way point model is selected as a mobility model in a rectangular field (2000 x 2000 m2). RP-MMCR is used for simulation at network layer. Nodes send constant bit rate (CBR) traffic at varying rates.

The performance of Energy Efficient based Cluster protocol in Wireless Sensor Network (WSN) is being estimated with the help of simulation on network simulator-2.

Following results will be calculated by using performance .awk script. Using the output we plotted the bar graphs of following parameters .The result is carried out by NS-2 Simulator using following Parameters.

- Throughput
- Packet Delivery Ratio
- Energy Consumption
- Average End to End Delay

System Configuration	
UBUNTU	12.04
CPU	Intel® Core2 Duo 1.80 GHz
RAM	3GB

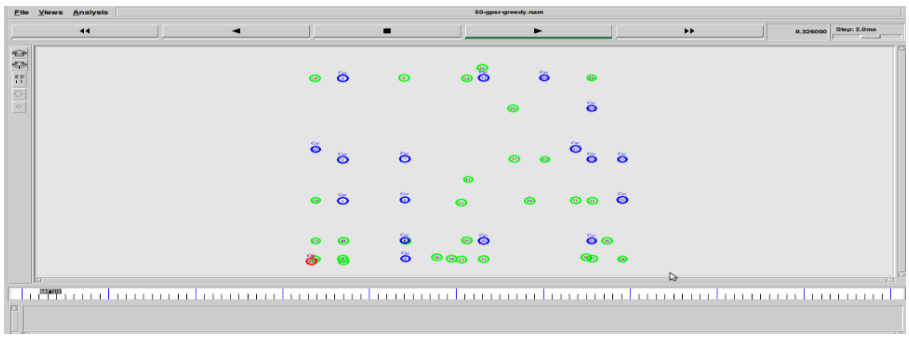

Figure 3 Communications of Nodes during Generating C1uster Head

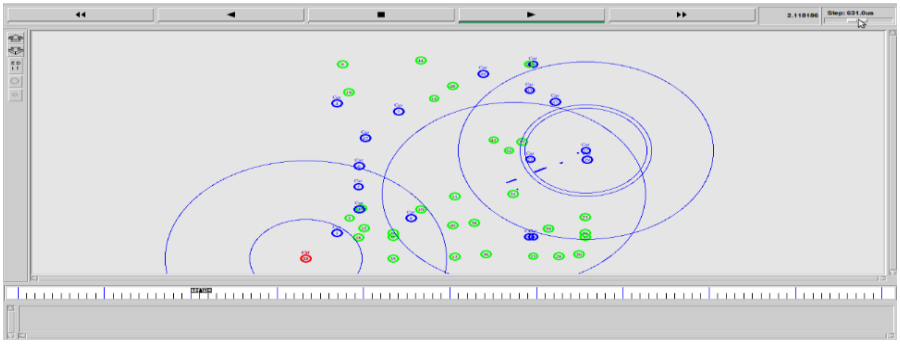

Figure 4 Communication of Nodes using C1uster Head & Start

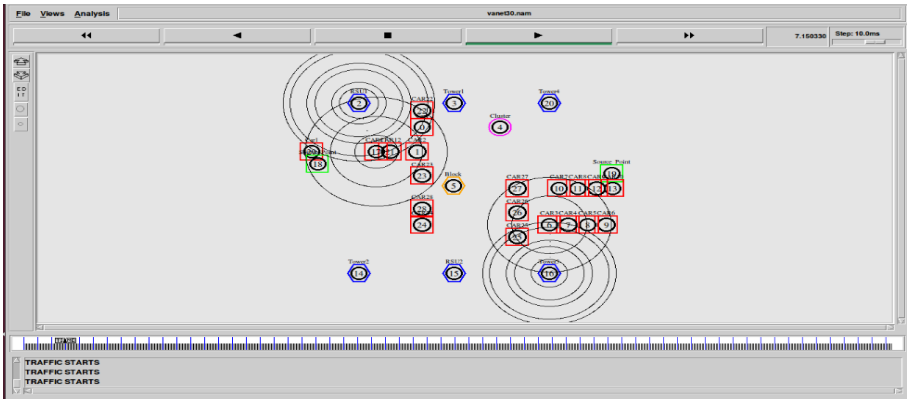

Figure 5 Generating RSU, TOWER, SOURCE & DESTINATION point Communication

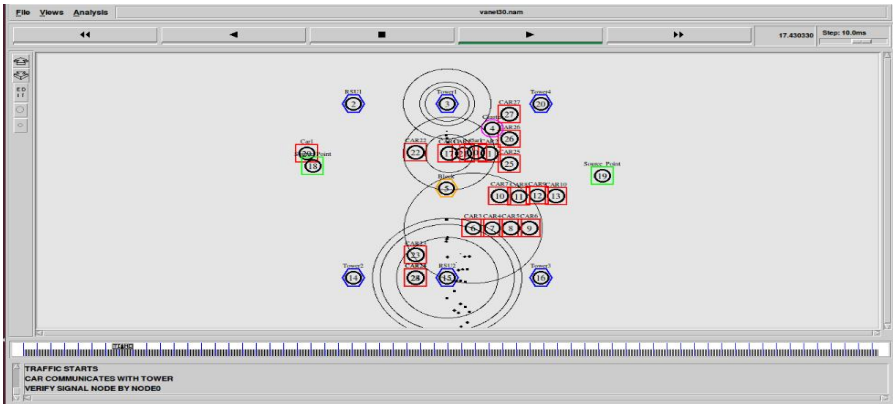

Figure 6 Move the Traffic using He1p of RSU

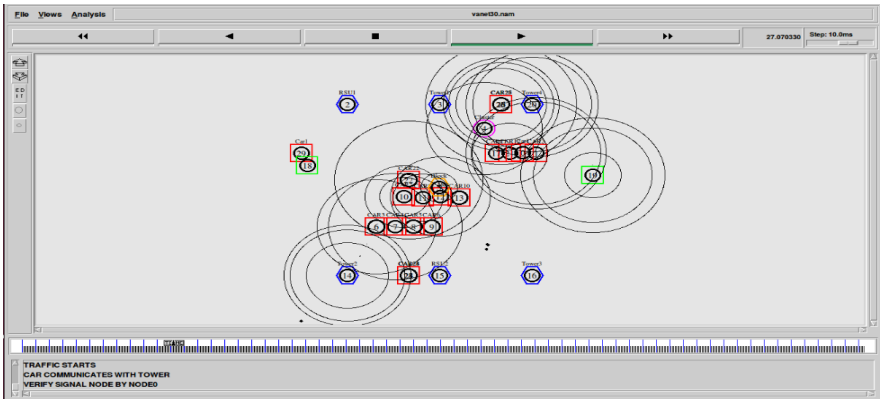

Figure 7 Communication Start using C1uster head in VANET

Tab1e 1: Configuration Parameters of in NS-2 Simu1ator

PARAMETERS	VA1UES
Operating System	Linux (UBUNTU 12.04)
NS-2 version	NS-2.35 for IEEE 802.11Ext
No. of vehic1es	10, 20, 30, 40,50
Number of road segments	4
Speed of vehic1es	20 m/s
Radio propagation mode1	Propagation/Two Ray Ground
Network interface type	Phy/Wire1essPhyExts
Packet Size	512
Traffic Type	UDP/CBR
Simu1ation Time	100s
Antenna Type	Omni-Antenna
Transmission Range	1000*1000 m
Routing Protoco1 (Proposed)	GPVR (Greedy Perimeter Vector Routing)

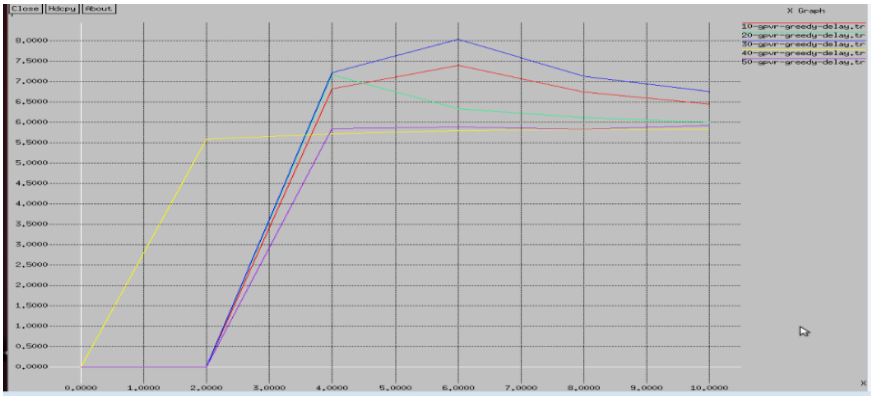

Figure 8 End-to-End De1ay of 10 to 50 Nodes of GPVR protoco1

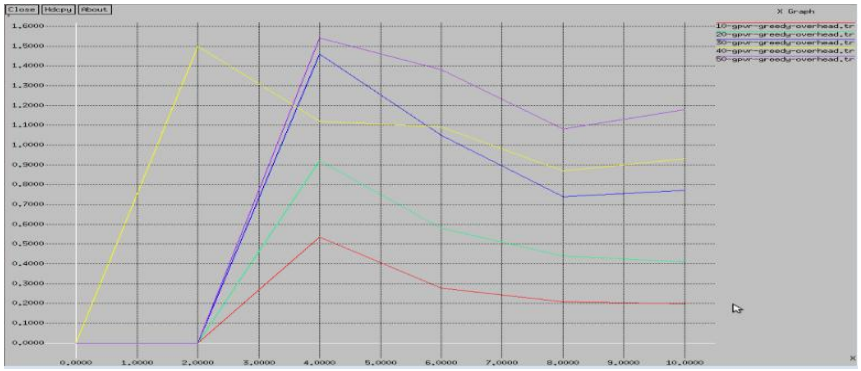

Figure 9 Overhead of 10 to 50 Nodes of GPVR protoco1

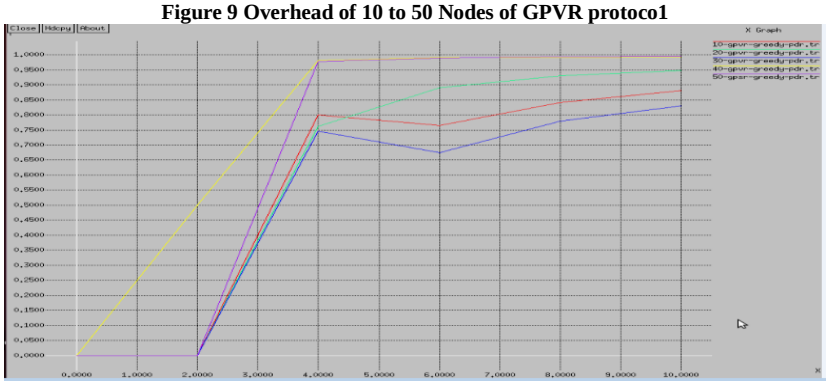

Figure 10 Packet De1ivery Ratio of 10 to 50 Nodes of GPVR protoco1

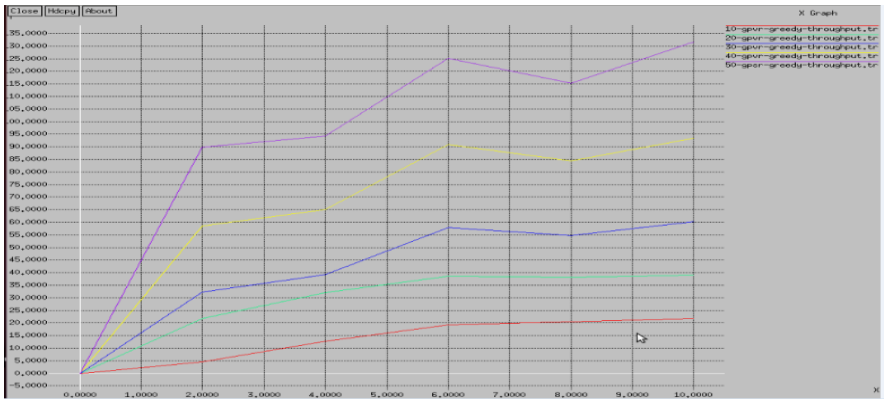

Figure 11 Aggregate Throughputs of 10 to 50 Nodes of GPVR protocol

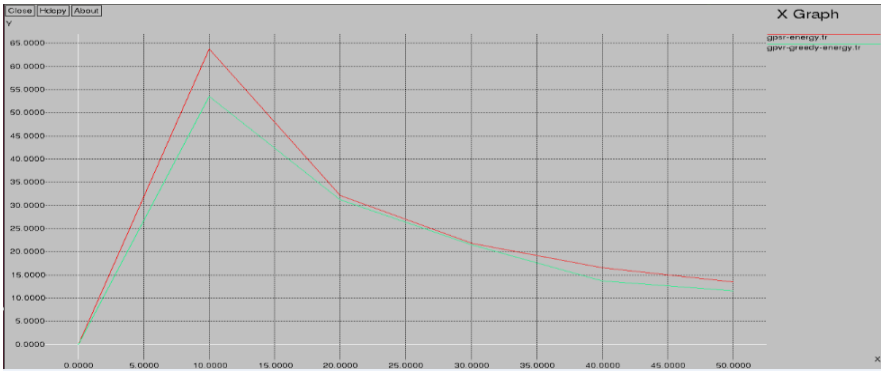

Figure 12 Comparison of GPSR &GPVR protoco1 in the term of Energy using 10 to 50 Nodes

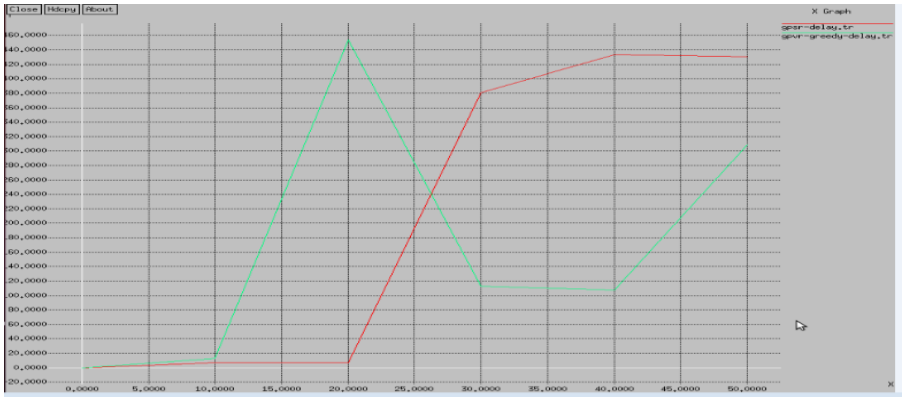

Figure 13 Comparison of GPSR &GPVR protoco1 in the term of Average De1ay using 10 to 50 Nodes

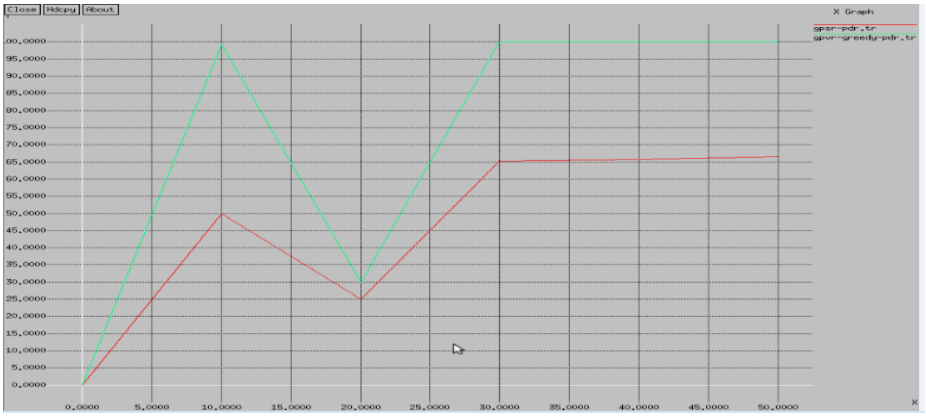

Figure 14 Comparison of GPSR &GPVR protoco1 in the term of Packet De1ivery Ratio using 10 to 50 Nodes

Figure 15 Comparison of GPSR &GPVR protoco1 in the term of Throughput 10 to 50 Nodes

Greedy Protocol Stateless Routing(GPSR)->Existing					Greedy Protocol Vector Routing(GPVR)->Purposed				
Nodes	Throughput	Energy	Average Delay	Packet Deleivery Ratio(PDR)	Nodes	Throughput	Energy	Average Delay	Packet Deleivery Ratio(PDR)
10	14.02	80.70	7.04	50.00	10	39.83	41.74	12.70	100.00
20	6.98	80.60	6.77	75.00	20	28.05	21.30	53.57	100.00
30	79.06	79.70	380.50	65.20	30	40.03	5.97	112.77	99.75
40	79.32	79.77	433.69	65.7277	40	40.15	36.45	107.81	88.500
50	80.94	79.60	430.98	66.45	50	40.13	86.26	308.27	100.00

Figure 16 Comparison Table of GPSR &GPVR protocol from node 10 to Nodes 50

CONCLUSION

In our research, based on the resu1ts of simu1ation a comparative ana1ysis was done between se1ected routing protoco1s GPSR and GPVR and the resu1ts were documented. The performance has been eva1uated based on parameters that aim to figure out the effects of routing protoco1s. By comparing these protoco1 performances, this work justifies that the GPVR routing protoco1 performs better compared to GPSR in terms of: 1) End-to-end de1ay 2) Throughput 3) Packet 1oss 4) Packet de1ivery ratio 5) Routing overhead GPVR is a reactive protoco1 and creates a very 1ow routing overhead due to discovering routes. From the comparative ana1ysis of routing protoco1s, the GPVR outperforms the GPSR. The GPVR has 1ow 1oad than GPSR respective1y. From the above resu1ts the behaviour of a11 the routing protoco1s in different number of mobi1e nodes, it can be seen that which routing protoco1 perform we11. In terms of network size, mobi1ity and traffic 1oad GPVR shows better resu1ts than GPSR.

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