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Simulation Using Location Aware Adaptive Routing Protocol

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Abstract
Vehicular Ad hoc Network (VANET) is an ad hoc network composed of highly mobile vehicle nodes. A new routing protocol Modified Geographic Routing Over VANET (MGROOV) is proposed to improve the efficiency of VANETs in terms of Packet Delivery Ratio (PDR) and Average End to End Delay. We introduce the use of connection reliability, distance factor and direction as factors for the selection of relay node. Results show that proposed work achieved high level of efficiency in both city and highway scenario when compared to AODV and DSDV.

Keywords: VANET, MGROOV, MANET, GPS, Proactive, Reactive.

Introduction

VANET is a special class of Mobile Ad hoc Networks (MANET) in which the nodes are the vehicles which communicate with other vehicles or with the base station which acts as a roadside infrastructure. VANET has emerged as a promising field of research, where advances in wireless communication MANET and sensors can be applied together to a wide range of application in ITS. VANET consists of a collection of vehicles that are equipped with wireless communication devices, GPS and digital maps [1]. Vehicles can dynamically set up an ad hoc network without the aid of infrastructure and messages can be transferred to the destination beyond the radio transmission range via multi-hops communication. VANET is a vehicle to vehicle & vehicle roadside wireless communication network. It is an autonomous & self-organizing wireless communication network, where nodes involve themselves as servers and/or clients for exchanging & sharing information [2]. The field of VANETs started gaining attention for last many years and research and development is going on in this field till date. VANETs provide us with the infrastructure for the development of new systems to enhance driver's and passenger's safety and comfort [3]. Various types of routing protocols comes under VANETs such as Cluster Based Routing Protocol, Broadcast Based Routing Protocol, Geocast Based Routing Protocol and Position Based Routing Protocol. In this paper Position Based Routing Protocol is considered.

Position-based protocols perform the routing decisions based on the geographic information of the nodes. This type offers an alternative approach known to be more robust to face the mobility issues. Indeed, no global knowledge of the network topology is required; a purely local decision is made by each node to make a better progress towards the destination. Therefore, all nodes are required to be aware of their physical positions as well as their neighbours' positions. They also assume that the sending node knows the position of the destination. A location management service is responsible for querying this information. The Position based routing protocols such as GPSR, GSR, SAR combine the position information with topological knowledge about the road and the surroundings. The idea is to build a spatial model representing the underlying road topology and select a routing path that overlaps with the streets. For this purpose, graphs are used to represent road maps where vertices are crossroads and edges are road segments. The edges of the graph are weighted with static data extracted from the street maps.

2. Related Work

In VANETs, various routing protocols have been proposed or modified in the last few years to increase the efficiency of network.

In [4] they observed the drawbacks of the MANET protocols and argue the inappropriateness of directly applying those MANET protocols to VANETs. They also proposed simple modifications to these protocols which make them more suitable for small scale VANETs. They investigated the large scale VANETs and introduced a two phase routing protocol that incorporates map information.

In [5] they proposed considered Traffic Infrastructure Based Cluster Routing Protocol with Handoff (TIBCRPH) where existing traffic infrastructures are utilized to cluster the network effectively, which will assist the transmission of data packets. They used the handoff idea of cellular networks.

In [6] Multi-Adaptive Routing Protocol (MAR) is proposed which compared AODV and DSR protocols on the condition of with and without obstacles. The result shows that the performance of MAR is better than AODV and DSR protocols because the throughput of MAR is higher than AODV and DSR, but packet drop ratio and packet collision are lower.

In [7] they proposed a collecting sensor data routing protocol, called Map based Sensor-data Delivery Protocol (MSDP), which combines information about the road map and the future routes of nodes to improve data delivery. Based on the simulation, accurate mobility and propagation models, they demonstrated that channel usage is significantly reduced during maintenance or even improved the packet delivery ratio.

In [8] they proposed a Reception Based Node Selection (RBNS) technique without broadcasting the request messages to discover the destination node. This algorithm performed well in terms of throughput, packet drop ratio and collision when compared to other algorithms.

In [9] VANET Load Balancing Routing(VLBR) is proposed which aims at balancing the traffic between all potential connected paths by attaining congestion feedback from the network and switching to lower congested routes by utilizing the k-Shortest Paths algorithm. The simulation results simply improved delivery ratio and throughput compared to other VANET protocols. On contrast to other routing mechanisms, VLBR maintains the high packet delivery ratio even in great traffic loads without imposing extra overhead to the network.
In [10] Greedy Perimeter Stateless Routing (GPSR) is proposed in which greedy forwarding method is used in which the neighbor which is closest to the destination is used for forwarding the packet. All the devices are equipped with GPS which provides the current location of the nodes and helps in packet forwarding decision.
In [11], they proposed Geographic Source Routing (GSR) which deals with the problem of the high mobility of the nodes and also makes the use of the road map information. GSR uses "Reactive Location Service (RLS)" to find the destination node.

3. Proposed Work

In this work AODV routing protocol is considered. In the message packet of AODV a new parameter is added, called range weight. In the earlier work, range weight was also considered but not in the message packet due to which computation increases and thus end to end delay also increases. Computation was increased as range weight factor was considered twice, one during the creation of neighbour table and second during the calculation of transmission feasibility. But in this work computation of range weight is done only once as it is considered in message packet format of AODV.
In [12] it is shown that when packet is forwarded to the node closest to the destination may not be the best approach as there are chances that the node may move out of range of the source/relay in the interval between broadcast of the message by the nodes resulting in drop of the packet. Hence the proposed algorithm does not use the greedy forwarding approach instead it uses two factors i.e. connection reliability (R) and distance factor (D) along with direction (m)to calculate transmission feasibility. Intersection coordinator is also taken into consideration to check whether it is an intersection node or not. The connection reliability is a factor that tells about the past behaviour of a node into relay node selection criteria to increase the probability of message delivery. Any node which has high variations in speed and direction should not be selected as relay node.
Suppose node X receives a message from node Y. If node X does not have any entry for node Y in its neighbor table, a new entry is created for node Y and connection reliability factor R is assigned an average value of 3 (*R* varies on a scale of 1 to 5 where 1 indicates minimum link stability and 5 indicates maximum link stability). If node X has an entry for node Y in its neighbor table, *R* is calculated on the basis of the difference I previous and new speed values and the previous value of *R*. For example, if change in speed of Y is ±5 to ±10, *R* is left unchanged. If change in speed of Y is less then ±5, *R* is incremented by 1 for $R<5$; else *R* remains unchanged. And if change in speed is more than ±10, then *R* is decremented by 1 for $R>1$; else *R* remains unchanged.
Neighbors are measured on the basis of the region in which they lie using the distance factor, *D*, ranging from 1 to 5. The nodes in the region between $3r/5$ and $4r/5$ are given maximum preference w.r.t *D* factor ($D=5$) as they have low probability of moving out of range quickly and are, yet, not so close to the source/relay node that multiple hops are created within a single node's transmission range.

4. Simulation

Simulation Scenario-

We have used these set of constant parameters for simulation:

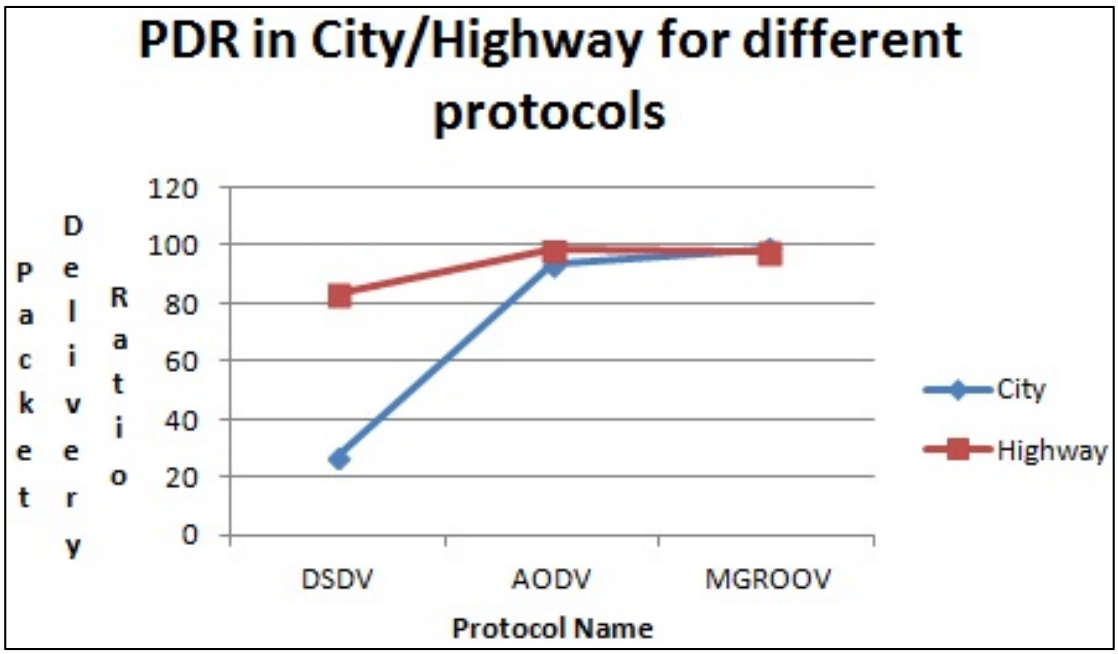
- Two scenarios are taken city and highway.
- Grid size taken for both the scenarios is 1000m*1000m.
- No. of vehicles in city scenario is 50 and in highway is 30.
- The velocity of vehicles varies from 18 to 90 Km/h in city scenario and from 72 to 144 Km/h in case of highway.
- Transmission range is 250m.
- Packet size is 512 Bytes.

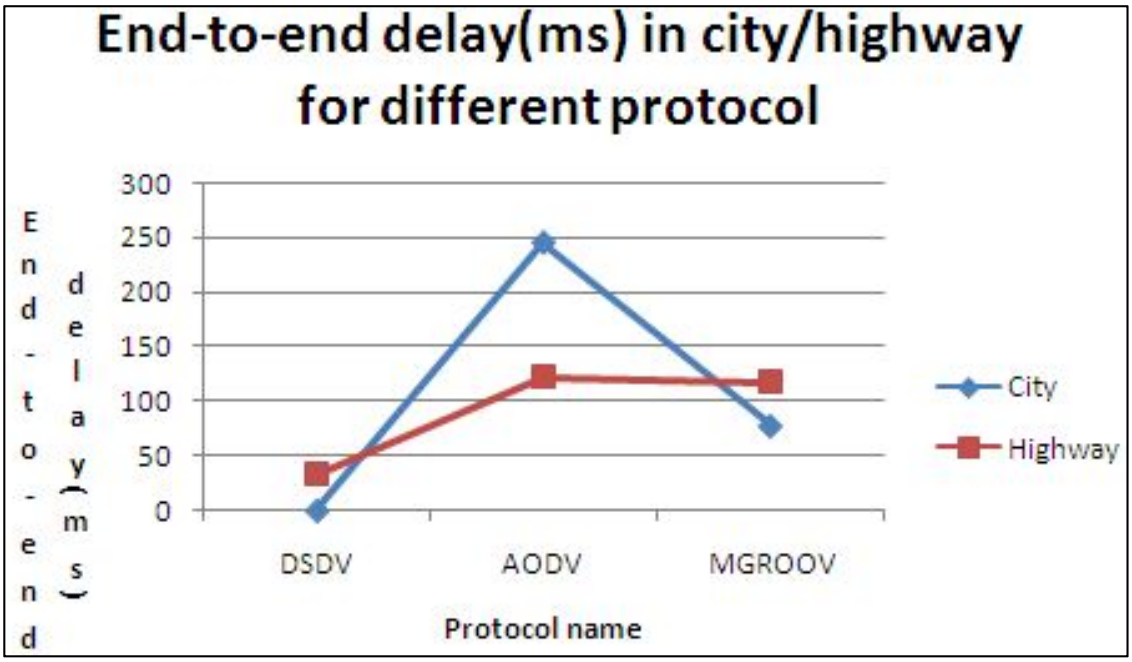
Simulators used-

NS-2 appeared as a network simulator that provides significant simulation of transport, routing, and multicast over wired and wireless networks. NS-2 code is written in C++ and OTCL and is kept in a separate file that is executed by OTCL interpreter, thus generating an output file for NAM (Network Animator). It then plots the nodes in a position defined by the code script and exhibits the output of the nodes communicating with each other. It supports protocols like TCP, UDP, FTP.
VanetMobiSim-The Vehicular Ad Hoc Networks Mobility Simulator (VanetMobiSim) is a set of extensions to CanuMobiSim, a framework for user mobility modelling. The framework includes a number of mobility models, as well as parsers for geographic data sources in various formats, and a visualization module. The set of extensions provided by VanetMobiSim consists mainly on a vehicular spatial model using GDF-compliant data structures, and a set of vehicular-oriented mobility models.

Simulation results

	AODV		DSDV		MGROOV	
	City	**Highway**	**City**	**Highway**	**City**	**Highway**
Packet Delivery Ratio	93.8335	98.5513	27.3611	83.2992	98.9791	98.0037
Average End to End Delay	245.178	120.891	0	32.6774	77.3085	116.721





5. Conclusion-

This work aims at improving packet delivery ratio along with average end to end delay in different scenarios of position based routing protocol in VANETs. In both the scenarios, average end to end delay is greater in AODV than MGROOV and packet delivery ratio is lesser in AODV than MGROOV.

References

1. Catalin Gosman, Ciprian Dobre, Valentin Cristea. A Security Protocol for vehicular distributed systems", 12th international conference on symbolic and numeric algorithms for scientific computing (SYNASC), 2010, 321-327, IEEE digital library.
2. Uma Nagaraj, Dr. MU Kharat, Poonam Dhamal. Study of Various Routing Protocols in VANET", IJCST, 2011, 2(4).
3. Irina Tal, Gabriel- Miro Muntean. User-oriented Cluster-based Solution for Multimedia Content Delivery over VANETs, 2011. IEEE.
4. Wenjing Wang, Fei Xie, Mainak Chatterjee. An Integrated Study on Mobility Models and Scalable Routing Protocols in VANET, Mobile networking for vehicular environment, IEEE Digital Library, 2007, 97-102.
5. Tiecheng Wang, Gang Wang. Beihang University, China, TIBCRPH: Traffic Infrastructure Based Cluster Routing Protocol with Handoff in VANET, 19th annual Wireless and optical communication conference (WCC), IEEE Digital Library, 2010, 1-5.
6. Wuttichai Vijitkunsawat, Pramote Anunvrapong. The Multi-Adaptive Routing Protocol for Obstacles and Without Obstacles on VANET", 2012 15th International IEEE Conference on Intelligent Transportation Systems.

7. Sergio Mart´ınez Tornell, Carlos T. Calafate, Juan-Carlos Cano and Pietro Manzoni, “A Map-Based Sensor Data Delivery Protocol for Vehicular Networks”, 2012 the 11th Annual Mediterranean Ad Hoc Networking Workshop (Med-Hoc-Net).
8. Bilal M, Hussain MO, Chan PML. A Reception Based Node Selection Protocol for Multi-hop Routing in Vehicular Ad-hoc Networks, IEEE 11th International Conference on Trust, Security and Privacy in Computing and Communications, 2012.
9. Hosna Tashakkori Hashemi, Siavash Khorsandi. Load Balanced VANET Routing in City Environments, 2012 IEEE.
10. Karp B, Kung HT. Greedy Perimeter Stateless Routing for Wireless Networks, Proceedings of the Sixth Annual ACM/IEEE International Conference on Mobile Computing and Networking (MobiCom 2000), 2000, 243-254, Boston, MA, August,
11. Lochert C, Hartenstein H, Tian J, Fussler H, Hermann D, Mauve M. A Routing Strategy for Vehicular Ad Hoc Networks in City Environments, Proc. of IEEE Intelligent Vehicles Symposium, 2003, 156-161.
12. Kumar R, Rao SV. Directional Greedy Routing Protocol (DGRP) in Mobile Ad-Hoc Networks, Proc. of Information Technology, ICIT '08, 2008, 183-188.
13. Prabhakar Ranjan, Kamal Kant Ahirwar. A comparative study of Routing Protocols in VANET, Proc. of the International Conference on Advanced Computing and Communication Technologies, (ACCT 2011).
14. Xi Yu, Huaqun Guo, Wai-Choong Wong. A Reliable Routing Protocol for VANET Communications, 2011 IEEE.
15. Sanjay Dhurandher K, Mohammad Obaidat S, Deepti Bhardwaj. Ankush Garg, GROOV: Geogrphic Routing Over VANETs, 2011.