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DESIGN AND IMPLEMENTATION OF STREET-CENTRIC ROUTING PROTOCOL BASED ON MICRO TOPOLOGY IN VANET

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Abstract: In a vehicular ad hoc network (VANET), high mobility and uneven distribution of vehicles are important factors affecting the performance of routing protocols. The high mobility may cause frequent changes of network topology, while the uneven distribution of vehicles may lead to routing failures due to network partition, and even high density of vehicles may cause severe wireless channel contentions in an urban environment.The micro topology (MT), which consists of vehicles and wireless links among vehicles along a street as a basic component of routing paths and even the entire network topology. The MT model reflecting the dynamic routing-related characteristics in practical urban scenarios along streets, including the effect of mobility of vehicles, signal fading, wireless channel contention and existing data traffic. Analyze the end side-to-end side routing performance in an MT as a basis of routing decision.Then a novel Street-centric Routing Protocol based on Micro Topology (SRPMT) along the streets for VANETs. Simulation results show that SRPMT protocol achieves higher data delivery rate and shorter average end-to-end delay compared with the performance of the GPSR and GyTAR.

1. INTRODUCTION

A basic understanding of networking is important for anyone managing a server. Not only is it essential for getting your services online and running smoothly, it also gives you the insight to diagnose problems. It will provide a basic overview of some common networking concepts. The discussion basic terminology, common protocols, and the responsibilities and characteristics of the different layers of networking. This guide is operating system agnostic, but should be very helpful when implementing features and services that utilize networking on your server.

2. BACKGROUND OF VANET

In a vehicular ad hoc network (VANET), high mobility and uneven distribution of vehicles are important factors affecting the performance of routing protocols. The high mobility may cause frequent changes of network topology, while the uneven distribution of vehicles may lead to routing failures due to network partition, and even high density of vehicles may cause severe wireless channel contentions in an urban environment. In this paper, we propose a novel concept called the micro topology (MT), which consists of vehicles and wireless links among vehicles along a street as a basic component of routing paths and even the entire network topology. We abstract the MT model reflecting the dynamic routing-related characteristics in practical urban scenarios along streets, including the effect of mobility of vehicles, signal fading, wireless channel contention and existing data traffic. We first analyze the endside-to-endside routing performance in

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an MT as a basis of routing decision. Then we propose a novel Street-centric Routing Protocol based on Micro Topology (SRPMT) along the streets for VANETs.

Simulation results show that our proposed SRPMT protocol achieves higher data delivery rate and shorter average end-to-end delay compared with the performance of the GPSR and GyTAR. Vehicular Ad hoc Network (VANET) integrates the wireless communication capacity of vehicles, which is one of newly emerging wireless networks and aims to compose vehicular self-organizing networks for intelligent transportation systems (ITS) [1]. Each vehicle equipped with communication device can act as not only a communication node but also a wireless router, which can achieve flexible rapid organization, without limitation of service providers and communication extension[2]. Many distributed applications for vehicles have been proposed for supporting traffic safety, commercial demand military uses, and other requirements of communication in VANET [3] [4] . All these applications require an efficient routing protocol to deliver packets by multi-hop forwarding with high packet delivery ratio and low average end-to end delay. Due to high mobility and uneven distribution of vehicles in urban environments, efficient routing in VANET has been considered as a challenging problem to deal with such dynamic network scenarios. On one hand, high mobility of vehicles and complex environment of wireless channel may cause frequent changes in network topology. A packet transmission may suffer from failure when one vehicle moves out of the communication range of the other vehicle or cannot successfully access to the wireless channel, etc. Therefore, the availability and channel contention state of links among vehicles vary according to the locations and moving directions of vehicles, especially for the links between two oppositely moving vehicles, and the situations of channel contention. On the other hand, the mobility and distribution of vehicles in a vehicular environment suffer from restricted road infrastructure. Vehicles along the streets with a sparse vehicular density may encounter a potential network partition, in which the packets may suffer from long delay due to queuing in the buffer and high packet loss probability caused by timeout or overflow in the queue. Vehicles in the streets with a dense vehicular density may suffer from a severe contention problem due to shared wireless channels. In routing protocols for delivering data packets, a street centric forwarding scheme was proven to be better than a node centric forwarding scheme. The street-centric scheme usually consists of two modules: selection sequence of street-level segments and a relaying strategy inside the selected streets. The sequence of street-level routing segments constitute the routing path, which consists of a series of streets from a source to a destination node. When a packet is forwarded along a street, the temporary geographical destination of the packet is set to the other side of the street. The street-centric routing requires the assistance of the corresponding street-level digital map, which indicates the information with streets and intersections. Two key issues affecting the routing performance in the street-centric scheme are how to select a street as part of routing path and deliver the packet through the streets efficiently. For example, vehicle Vs can deliver packets to destination Vd through a routing path Vs S12 S24 vd, as shown in Fig. 1. However, if vehicle Vs selects street S13 as the next street, the packets may encounter a network partition, which seriously reduces the routing performance. The efficient routing decision for a path of streets from the source to the destination depends on the the routing-related characteristics of the streets.

3. RESULTS AND DISCUSSION

Micro Topology with more number of vehicles is created using vanet mobisim output of vanet is fed as input to ns2 for mobility of nodes. Transmission of packets is done using NORMAL SCHEME and parameters such

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as end to end delay, packet delivery ratio, and energy spent more. Throughput is calculated and the output is shown using graphs.

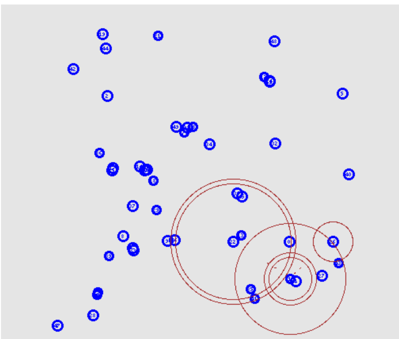

Fig: 1 Output for transmission of packets between nodes (Normal Protocol)

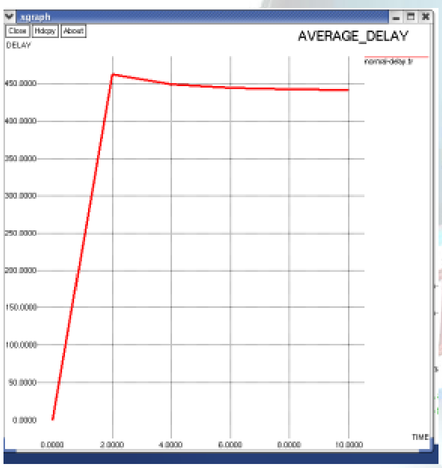

Fig: 2 Output graph for Average delay (Normal Protocol)

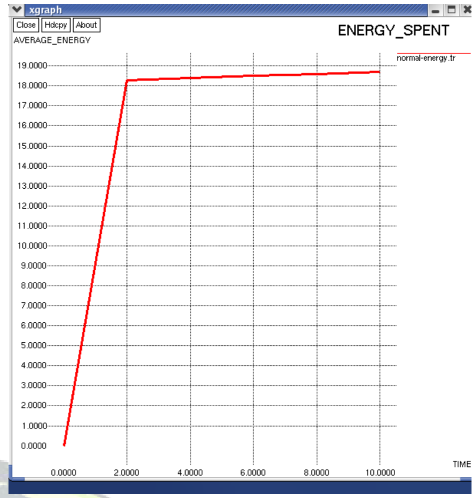

Fig: 3 Output graph for Energy Spent (Normal Protocol)

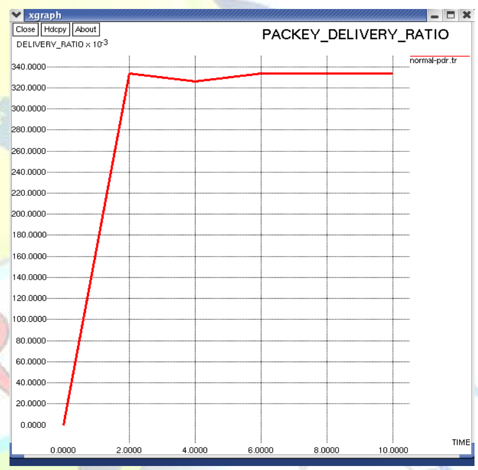

Fig: 4 Output graph for Packet delivery ratio (Normal Protocol)

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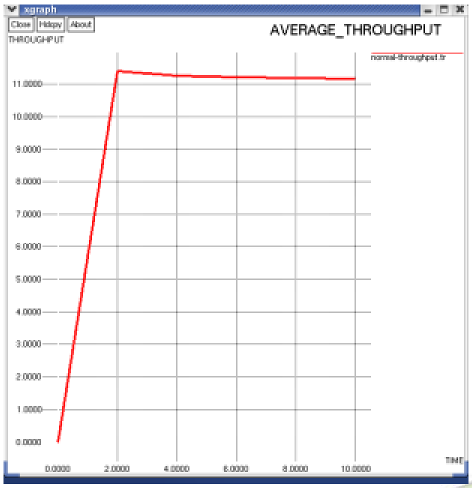

Fig: 5 Output graph for Average Throughput (Normal Protocol)

COMPARISION

The Comparison between Normal Scheme and Street Cent ric Routing Protocol (SRPMT) is done on various parameters and output is shown using graphs. The Graph plot with module 2 and module 3 using Bar graph.

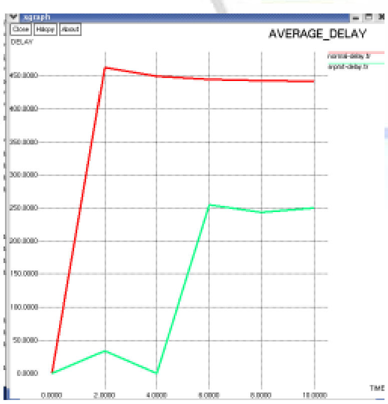

Fig: 6 Output graph for comparison for parameter Average delay

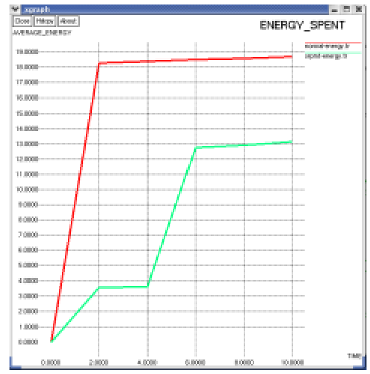

Fig: 7 Output graph for comparison for parameter Energy Spent

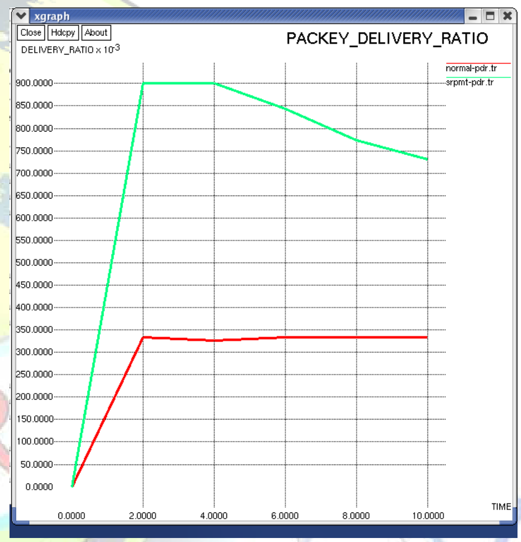

Fig: 8 Output graph for comparison parameter Packet Delivery Ratio.

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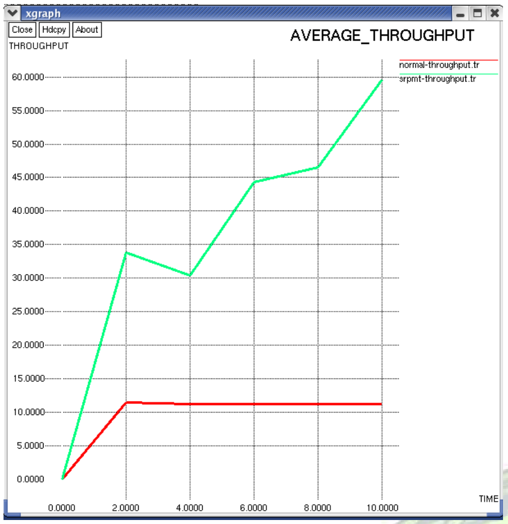

Fig: 9 Output graph for comparison parameter Average Throughput.

CONCLUSION

The novel concept of a micro topology (MT) andendside-to-endside routing performance of the MT as a basis of routing decision were analyzed. I took into account the link stability and channel contention in various vehicular scenarios and the effect of existing data traffic in the MT. With the help of MT, packets can be relayed through the street effectively and also proposed a routing protocol aiming at urban scenario called SRPMT which is based on the estimated remaining delay including delays in the candidate MT set and remote end side to the destination. Simulation results showed that proposed SRPMT significantly improves the data delivery ratio and decreases the average end to-end delay with acceptable routing overhead under various environments, such as for varying the number of vehicles, data generation rates, and the number of CBR connections.

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