Survey on Cross-Layer Optimization Based Routing Protocol for VANET

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ABSTRACT

Vehicular Ad-hoc Network is a distributed and self-organized network, have emerged as a new powerful technology to improve driving safety and traffic management. Being ad-hoc in nature, VANET is a type of networks that is created from the concept of establishing a network of cars for a specific need or situation. VANETs have now been established as reliable networks that vehicles use for communication purpose on highways or urban environments. Because of constraint roads and very high speed of vehicles routing is an issue in VANET. So we are analyzed the performance of topology based on routing protocol. Routing Overhead Load and End-to-End Delay metrics are considered for analysis of Cross-layer Design in routing protocol using SUMO tool and NS2 simulation.

Keywords: *VANET, Routing protocol, SUMO, ns2, Cross-layer Design*

1. INTRODUCTION

The Vehicular Ad-Hoc Network, or VANET, is a technology that uses moves cars as nodes in a network to create a mobile network. VANET turns every participating car into a wireless router or node, allowing cars approximately 100 to 300 meters of each other to connect and, in turn, create a network with a wide range. Vehicular Ad- hoc network is a distributed and self-organized network, have emerged as a new powerful technology to improve driving safety and traffic management. There exist two main forms of communication in VANETs:-Vehicle-to-Infrastructure (V2I),Vehicle-to-Vehicle (V2V) While V2I refers to communication between vehicles and road-side equipment , V2V relates to direct connectivity between vehicles without involving the intermediate infrastructure. The VANET system model is illustrated in Fig.1, which consists of three major Components:

- Trusted Authority (TA),
- Fixed RSUs
- On Board Units (OBUs) mounted on the moving vehicles

The VANET manufacturing can be fixed the unique vehicle identification number for the wireless networking. And it can derive all cities covered by the road side unit (RSU).

The local information about the physical location of nodes can be provided by the global positioning system (GPS), if vehicular nodes are equipped with a GPS receiver. Research analysis show that geographic (or location based) routing reduces the scalability problem, because geographic routing protocols do not exchange any link-state information and do not required any routing tables to maintain information. Then it reduced routing overhead.

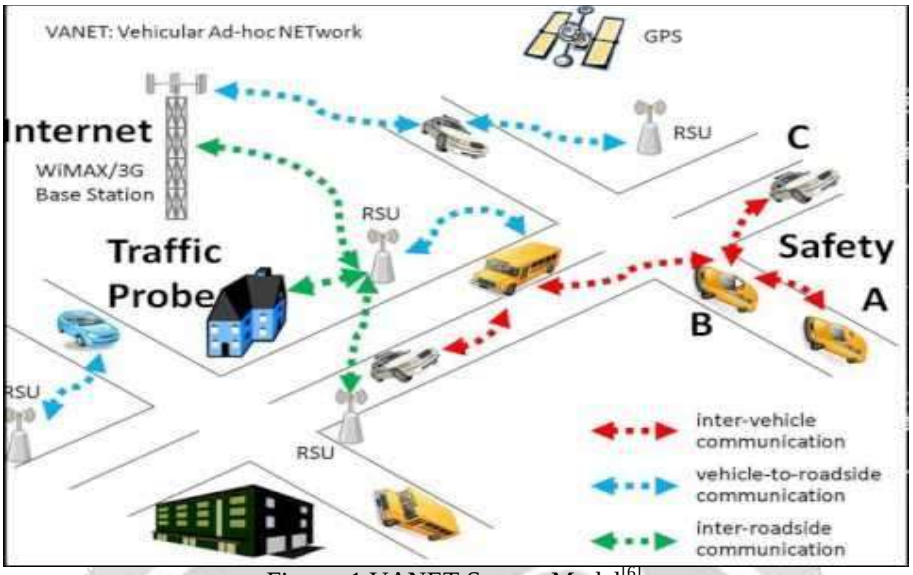

Figure .1 VANET System Model[6]

2. RELATED WORK

2.1 Jin Qian, Tao Jing, Yan Huo, Yikai Li, Wei Zhou, Zhen Li"A Next-hop Selection Scheme Providing Long Path Lifetime in VANETs"

As communication range is limited, multiple relay nodes are often required for establishing the multi-hop routing path between the source node and the destination node. Dependability of such routing path may be compromised due to different motion states of vehicles. So in this paper , we address this challenge by designing a new next-hop selection scheme named LPLS (Long Path Lifetime Scheme), in which each relay node uses the optimal stopping theory to choose a suitable next-hop node. Especially, this selection scheme can balance the tradeoff between routing path lifetime and selection efficiency.

This scheme not only considers the next-hop path lifetime, but also takes into account the selection efficiency by using the optimal stopping theory.

2.2 Hung-Chin Jang, Chang-Kwei Yang "A Hybrid Architecture of Routing Protocols for VANET with Cross-Layer Design"

Among all the proposed solutions, there is no a single solution which is applicable to all kinds of road environments. In this paper, we propose a hybrid architecture with cross-layer design to provide alternative routing protocols according to different needs. The hybrid architecture is based on multiple routing-path plane, cross-layer path selection, integration of broadcast packets, and a routing module integration layer (RMIL).
The proposed architecture aims to integrate different routing mechanisms into the wireless nodes of VANET such that each packet may have more than one path to select during routing. The proposed system architecture is realized through multiple routing-path plane, cross-layer path selection, integration of broadcast packets, and a routing

module integration layer.

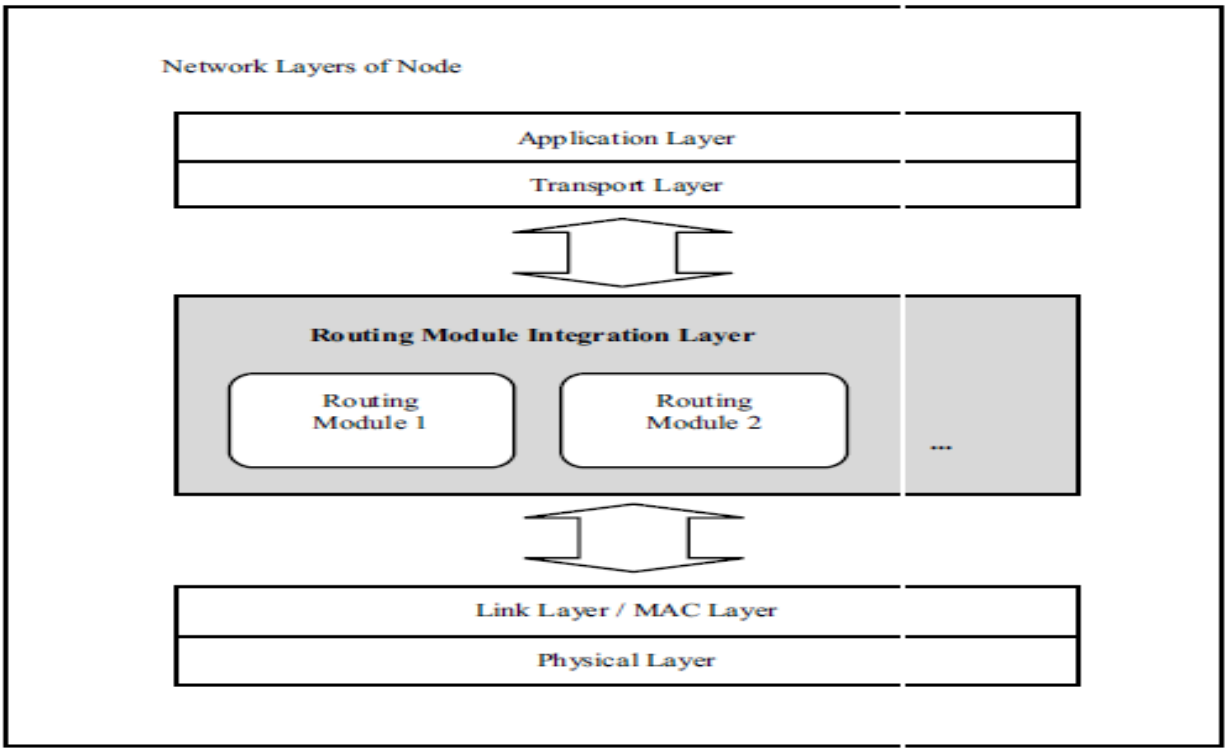

Figure 2. Architecture of Routing Module Integration Layer[2]

2.3 Sabih ur Rehman, M. Arif Khan, Tanveer A. Zia "Cross Layer Routing for VANETs"

This paper has proposed a novel routing scheme based on cross-layer approach for VANETs. The proposed protocol relies on the channel and queuing information from all neighbouring nodes of the source. Two main algorithms are presented to make routing decisions and gather information from multiple layers of VANET architecture. In contrast with other cross-layer routing schemes, the proposed scheme relies on SINR calculated by nodes under the Nakagami channel model. Using this information, the routing algorithm selects stronger routing links that reduce transmission failure and enhance system performance in terms of throughput, delay and packet delivery ratio. The paper also presents a probabilistic analysis for selecting nodes to be included/excluded in current neighbourhood set.

2.4 Shaik Shafi, B.N.Bhandari, D.Venkata Ratnam "An Improved Cross Layer Cooperative Routing for Vehicular Networks"

Cooperative routing has gained promising approach in Adhoc networks where nodes are assumed to be static. Recently there has been an increased heed in the cellular and vehicular Adhoc Networks (VANETs) where links between vehicles to vehicle are not fixed and inefficient. Towards this there exists only one cooperative routing scheme, Cross layer Cooperative Routing (CLCR) for route discovery on the fly similar to AODV, which requires more transmission power and energy consumption due to redundant transmission of Hello messages . Here an efficient cross layer routing mechanism is identified by the use of weighted Neighbor stability algorithm (WNS), which provides more stable, reliable routing path**.**

In this paper we have presented an improvement of Cross Layer Cooperative Routing (CLCR) protocol by proposing a new metric to evaluate routes. This metric is based on nodes weight computed by combining two parameters which are the power of node and its stability assumed to be the most important parameters in choosing routes.

2.5 G.Mary Valantina , S.Jayashri "A Novel Approach to Efficient and Reliable Routing in Vanets"

Vehicular Ad hoc Network (Vanet) is one of the emerging technology to support safety, traffic monitoring and comfort related services. Vanet is a subclass of Manet but its topology changes rapidly and network gets disconnected frequently. The prevailing routing protocol of Manet is very much applicable to Vanet. Because of its frequently disconnecting routes it is difficult to design an efficient routing protocol. Proper design of routing protocol for Vanet makes the network a successful one. In this paper we bring a concept of introducing Mesh routers in the network thereby optimal route is selected which leads to a decrease in routing overhead, packet end-to-end delay and an increase in packet delivery ratio.

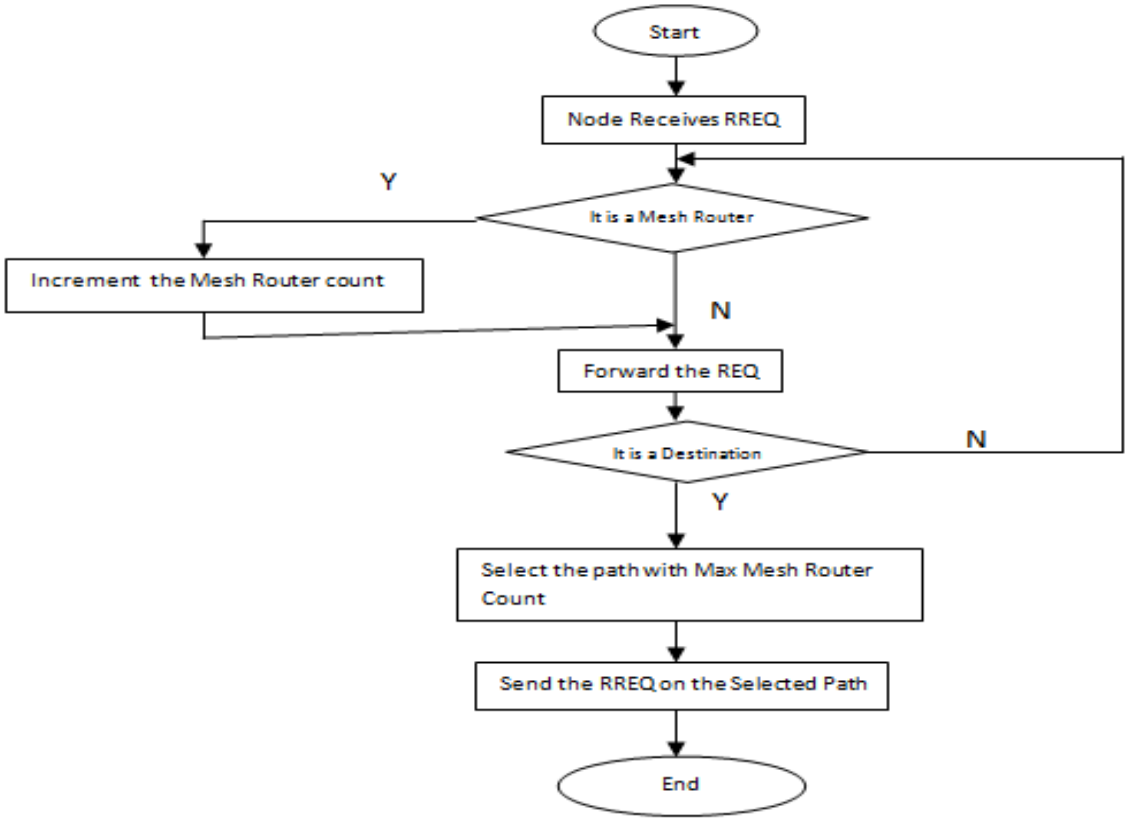

Figure 3: Flowchart of EV-AODV[5]

3. COMPARATIVE ANALYSIS

Table 1: Literature Comparison

Sr. No.	Paper Title	Method Used	Advantages	Disadvantages
1.	"A Next-hop Selection Scheme Providing Long Path Lifetime in VANETs"	Long path lifetime scheme	Dependable multi – hop routing path	Little time consuming

2.	A Hybrid Architecture of Routing Protocols for VANET with Cross-Layer Design"	Routing module integration layer	Increases delivery ratio	End-to-End delay increases with number of node is increases
3.	"Cross Layer Routing for VANETs"	Cross layer scheme	Less packet drops	Smaller delay in packet transmission
4.	An Improved Cross Layer Cooperative Routing for Vehicular Networks"	weighted Neighbor stability algorithm	Decrease end-to-end delay	Little time consuming
5.	"A Novel Approach to Efficient and Reliable Routing in VANETs"	Mesh router algorithm	Packet Delivery Ratio increases	Increases throughput

4. CONCLUSIONS

VANET is technology to improve driving safety and traffic management. Because of constraint roads and very high speed of vehicles routing is an issue in VANET. So we are calculate the Parameters like Packet Delivery Fraction, End-to-End delay using Cross Layer Design and Receive signal strength indicator, Link Congestion parameter.

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5. REFERENCES

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