An Improved Routing Metric Based on link state for VANET

[1]Hiral Patel, [2]Krunal Panchal

[1] Student ,Computer engineering, L.J.I.E.T, Gujarat, India
[2] Assistant Professor, Computer engineering, L.J.I.E.T, Gujarat, India

ABSTRACT

Vehicular ad hoc network (VANET) is suffering from the frequent link breakage and low packet delivery rate, which challenges routing protocols. Greedy forwarding is widely adopted in geographic routing protocols for VANETs since it selects the neighbour that is geographically closer to the destination as the next hop and is considered efficient. Because of the highly dynamic network topology and various impairment of radio signal, the link chosen according to the greedy algorithm regardless of the link state is unstable to a large extent, and frequent retransmissions lead to a waste of the network bandwidth and longer end to end delay. so that we can improve the result with the use of different technique that demonstrates significant reductions of end to end delay , PDR and increases throughput.

Keyword : *VANET; geographic opportunistic routing; greedy forwarding, Link state; EOA*

1. Introduction

1.1 VANET

Vehicular Ad hoc Network (VANET)[7] is a kind of Mobile Ad hoc Network formed by mobile vehicles, also known by mobile nodes. These vehicles are equipped with a WLAN technology that permits the establishment of a wireless ad hoc communication between the vehicles in the network Vehicle-to-vehicle (V2V) communication, or the establishment of a wireless ad hoc communication with stationary gateways, known by Road Side Units (RSU), implanted in the network Vehicle-to-Infrastructure (V2I) communication.

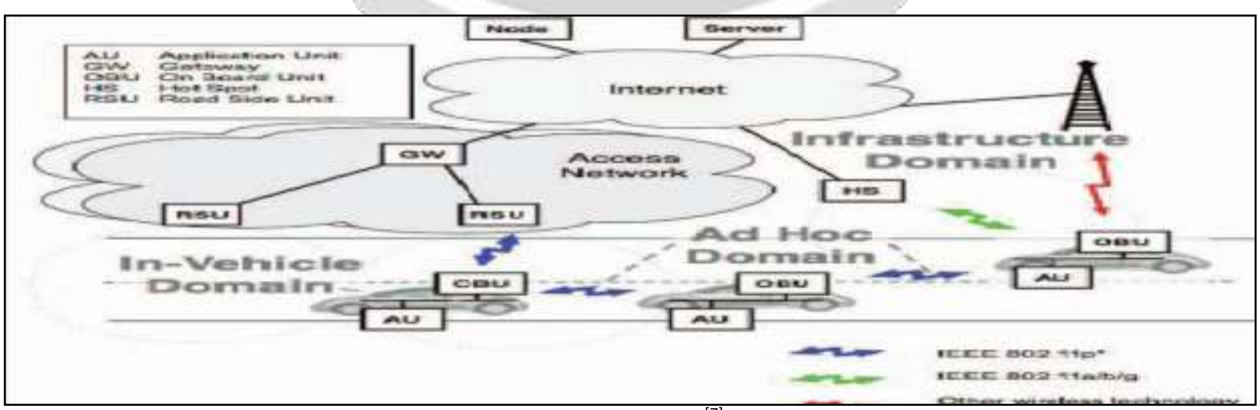


Fig -1: VANET[7]

1.2 Link state routing

Link-state routing[11] protocols are one of the two main classes of routing protocol used in Packet switching networks for computer communications, the other being distance-vector routing protocols. Examples of link-state routing protocols include Open Shortest Path First (OSPF) and intermediate system to intermediate system (IS-IS).

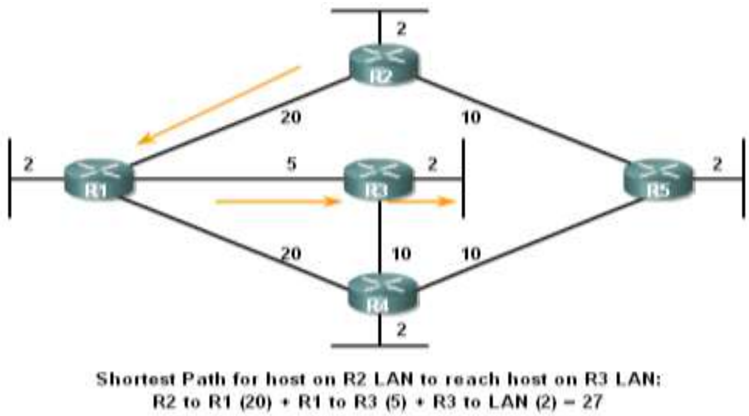


Fig -2: Link state routing[11]

The link-state protocol is performed by every switching node in the network (i.e., nodes that are prepared to forward packets; in the Internet, these are called routers). The basic concept of link-state routing is that every node constructs a map of the connectivity to the network, in the form of a graph, showing which nodes are connected to which other nodes. Each node then independently calculates the next best logical path from it to every possible destination in the network. The collection of best paths will then form the node's routing table[10]

2. Related work

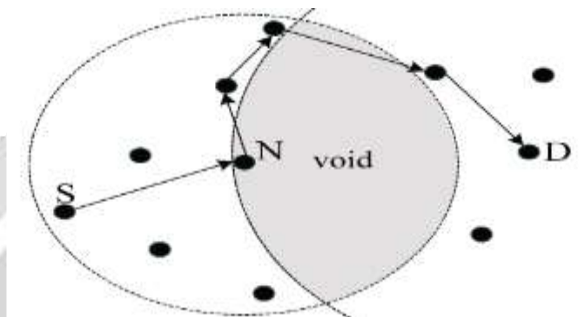
Weiwei Dong, Changle Li and Zhifang Miao[1] proposed a Geographic Opportunistic Routing protocol based on Link state and Forwarding quality inside node (LF-GOR). We first calculate and estimate the impact factors related to node quality including distance, direction, link state and forwarding quality inside a node.[1]

Table -1: Filtering Rules [1]

Source node	Neighbor node R	R:Y/N
Close	Close	Y(high priority)
	Still	Y(low priority)
	Far away	N
Still	Close	Y
	Still	Y
	Far away	N
Far away	Close	Y
	Still	Y
	Far away	Y

LF-GOR include two modes: source node mode and relay node mode. Both modes include in two common parts: Candidate node selecting and prioritizing strategy and opportunistic forwarding strategy and relay node mode there are two cases considering: Relay node is the destination node and Relay node is the next hope temporary destination node appointed by current node.

ChangleLi, LiranWang, YingHe, ChunchunZhao and HangLinandLinaZhu[2] proposed the expected transmission count(ETX) metric to evaluate the quality of certain link demonstrates the expected number of transmission required fro sending a packet over the link and a better quality link has smaller value of ETX.



. **Fig -3** :Forwarding process of GPSR [2]

Greedy perimeter stateless routing(GPSR) is a well known geographic routing protocol in wireless multi-hop networks. The routing algorithm consists of two parts, a greedy forwarding mode and a perimeter mode [2].

Yuhong Bai, Dongliang Xie , Siyu Wang and Ming Zhong[3] proposed a network based multi-path transmission protocol: NCMPTCP in the Vehicular Ad hoc Network(VANET), so as to make us to get the content we wanted more faster.

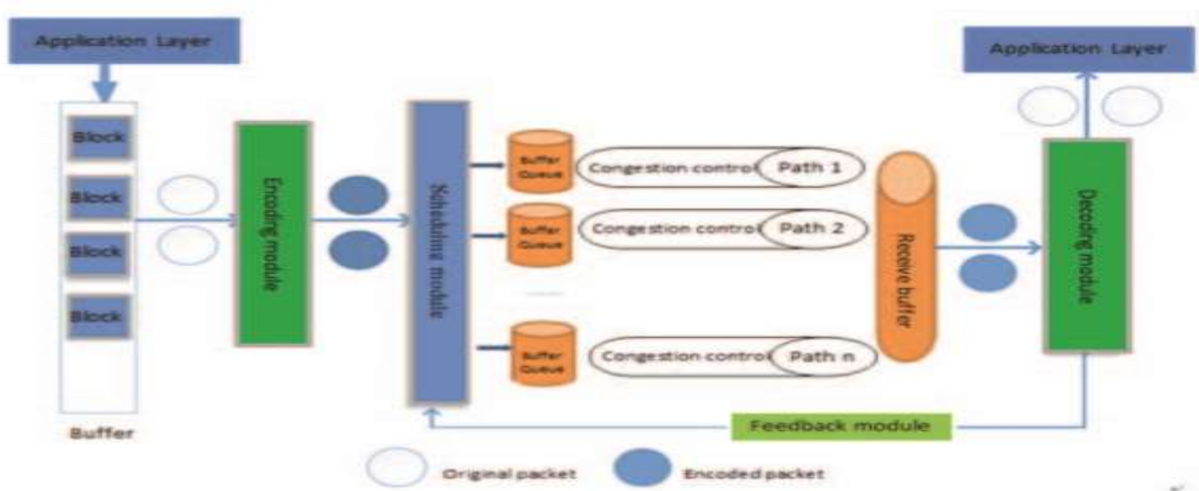


Fig -4 :The architecture of NCMPTCP[3]

Architecture are the encoding module, scheduling module ,decoding module, congestion control module and the feedback module. The encoding module is used to encoding the original packets, the scheduling module is to dispatch encoded packets based on the estimated delivery time of the sub-flow. Encoded packets are decoded through the decoding module [3]

Xuelian Cai, Ying He, Chunchun Zhao, Lina Zhu and Changle Li* [4] proposed current node could select the appropriate intermediate node as its next hop. So far, geographic routing protocols are widely used in VANETs. However, there are some problems in conventional geographic routing protocols.

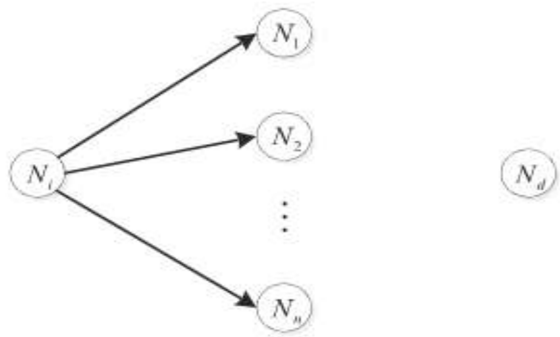


Fig -5 : Basic model of opportunistic routing [4]

Node N_i wants to send a data packet to the destination node N_d, and the N_d is outside of the effective transmission range of N_i. We define $C_i = \{N_1, N_2, \cdots, N_n\}$ as a candidate node set of node N_i, which is a subset of neighbor nodes and contains all the forwarders selected based on a candidate node selection strategy. C_i is an ordered collection, and the order of the elements in the set is the same as the priority they forward the received data packet[4]

Christos Bouras1,2(B), Vaggelis Kapoulas1,2, and Enea Tsanai2[5] proposed an enhancement of the GPRS protocol that takes into account the motion of the vehicle to estimate their position at future times, as well as the nature of the urban environment. and measures the packet delivery ratio, the end to end delay and the power consumption for each routing protocol in various scenarios

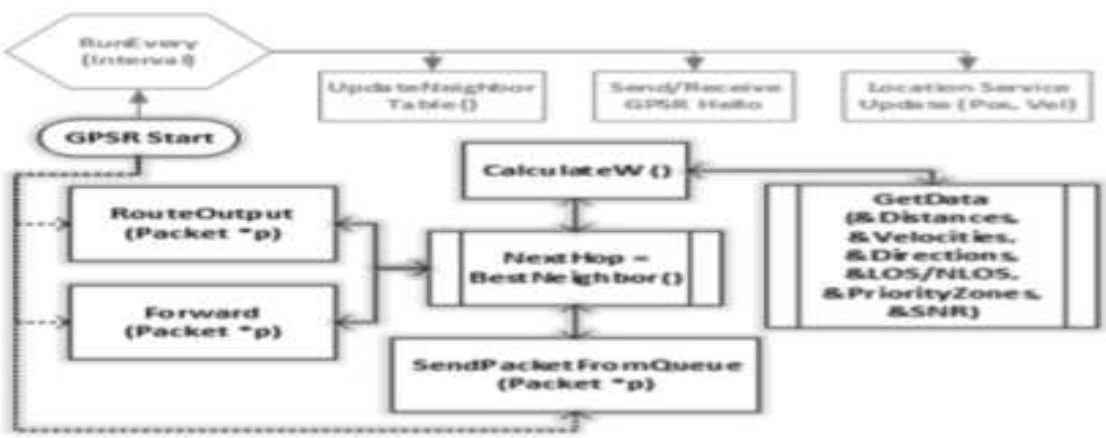


Fig -6: Enhanced GPSR architecture[5]

The main procedures of the proposed mechanism are the Best Neighbor and Calculate W and are executed every time a node executes the Route Output, Forward or Send Packet From Queue [5]

3.COMPARITION TABLE

Sr. no .	Title	Author	Publish year, Publisher	Method Use	Advantages	Disadvanta ges
1	Joint Link State and Forwarding Quality: A Novel Geographic Opportunistic Routing in VANETs	Weiwei Dong, Changle Li* and Zhifang Miao	2016 IEEE	LF-GOR	Improve the reliability of transmission, and reduces the end-to-end delay brought by the timer-based scheduling mode of many normal opportunistic routing protocols	Timer based scheduling
2	A link state aware geographic routing protocol for vehicular ad hoc networks	ChangleLi*, LiranWang, YingHe, ChunchunZhao ,HangLinandLinaZhu	2014 Springer	EOA	Higher through put and packet delivery rate	little more end-to-end delay.
3	Multi-path Transmission Protocol in VANET	YuhongBai, Dongliang Xie, Siyu Wang, Ming Zhong	2015 IEEE	NCMPTCP	Reduce transmission delay ,improve network throughput and transmission time	Bottleneck problem
4	LSGO: Link State aware Geographic Opportunistic routing protocol for VANETs	Xuelian Cai, Ying He, Chunchun Zhao, Lina Zhu and Changle Li*	2014 Springer	LSGO	Packet dropping rate is reduced and the network throughput is improved.	little overhead in exchange for a higher delivery rate

5	Performance Evaluation of Routing Mechanisms for VANETs in Urban Areas	Christos Bouras, Vaggelis Kapoulas and Enea Tsanai2	2015 Springer	GPSR	GPSR protocol manages to significantly increase the delivery ratio without increase power consumption and decrease end to end delay.	The limitations imposed by the nature of the network topology are not clear.
6	Moving Direction Based Greedy Routing Algorithm for VANET	Hung-Chin Jang , Hsing-Te Huang	2010 IEEE	Greedy Routing	AODV algorithm has been proved to have good performance while both the source vehicle and target vehicle have the same moving direction .	MDBG algorithm is proposed to leverage the problem while source vehicle and target vehicle move far apart in opposite directions.

4. PROPOSED WORK

A. Proposed Flow Chart

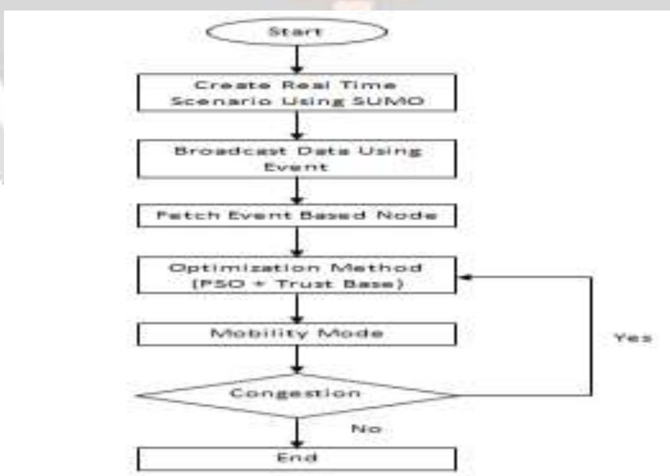


Fig 4.1 Proposed Flow Chart

In this model create real time scenario with using SUMO. After that node broadcast with using event. Fetch event based data. After apply optimization method. After check that node with apply mobility mode. we will get the congestion so that time repeat that process with using optimization method and we will not get the congestion so we will get the destination node. This optimization method is used for increase the data rate, throughput and decrease the end 2 end delay.

B. Parameter evaluation

Increase Packet Delivery Ratio

Increase Throughput

Decrease End to End Delay

c. Performance Criteria

Table 4.1 Performance criteria

Simulation Parameter	Value
Simulation Tool	NS2.35 , SUMO
Simulation Area	200 x 200 m
Protocol	AODV
Propagation Model	Two ray ground
No. of Nodes	5,20 nos.
Simulation Time	200 ms
Mobility Model	Random Way Point

5. RESULT & ANALYSIS:

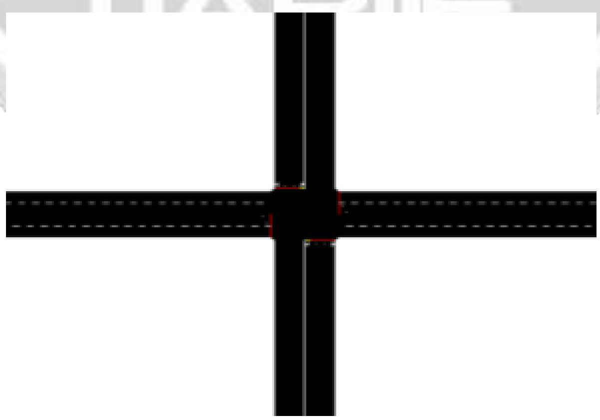


Fig 5.1 Normal Cross Road

This is a snapshot of SUMO tool which shows Normal Cross Road as primary stage at initial time.

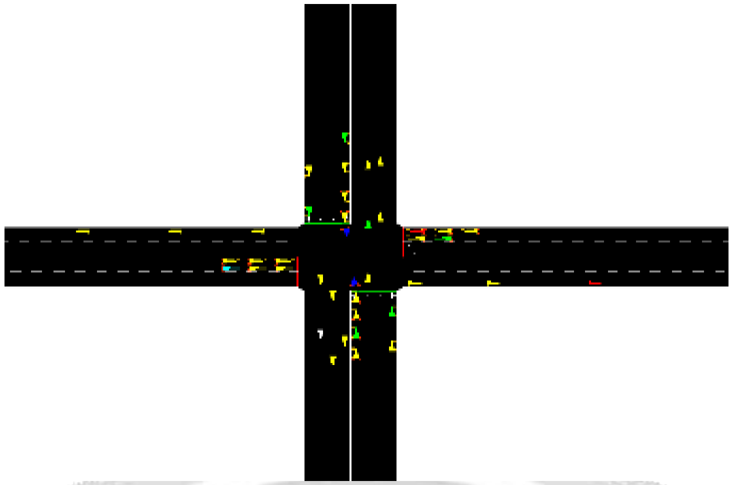


Fig 5.2 Traffic Condition

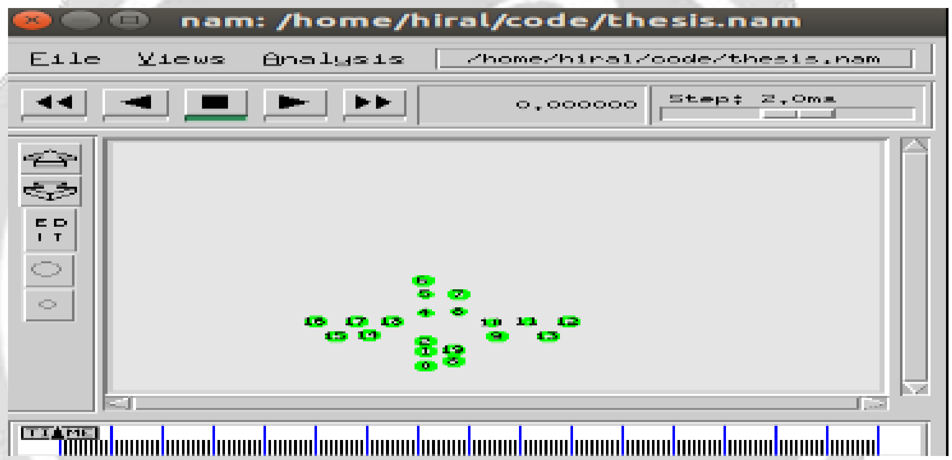


Figure 5.3: Nodes in nam

The above snap shows 'The Network Animator' each 20 nos. of nodes as vehicle in normal 'No Traffic Congestion' situation.

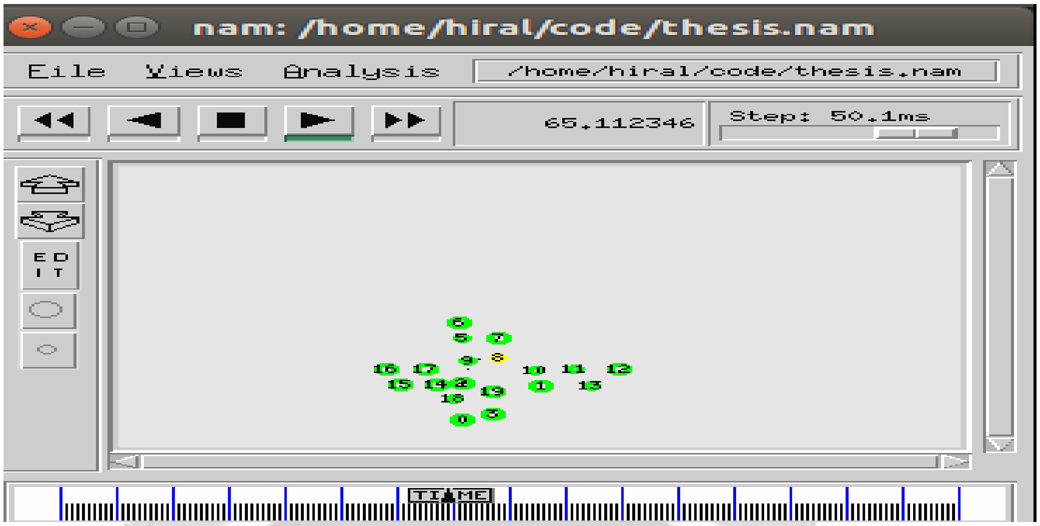


Figure 5.4: Accident condition

The above snap shows 'The Network Animator' in which vehicles 2 & 4 nos. nodes as in abnormal 'Traffic Congestion' situation.

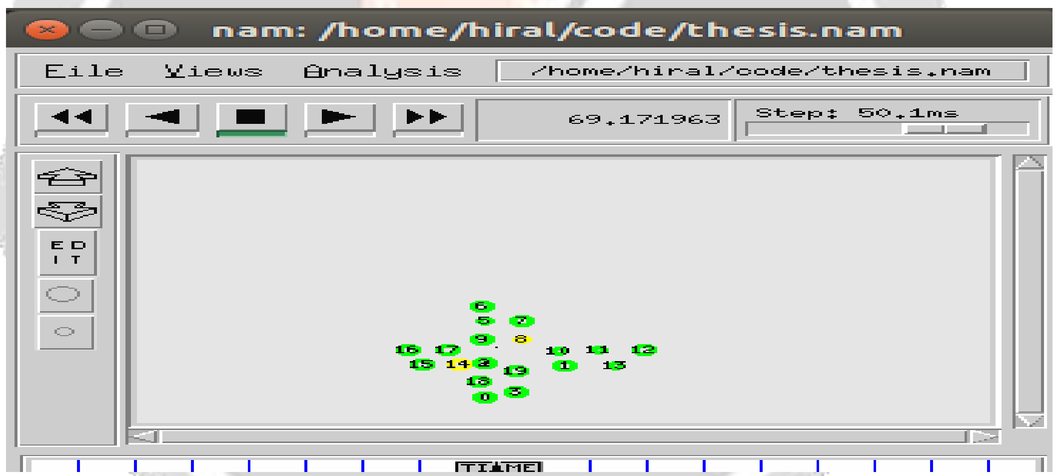


Figure 5.5: Data sending

The above snap shows vehicles 2 & 4 nos. nodes as in abnormal 'Traffic Congestion' situation and vehicle 8 work as source which transmit congestion signal and nearer vehicle node 4&2 as destination for receiving congestion signal from source.

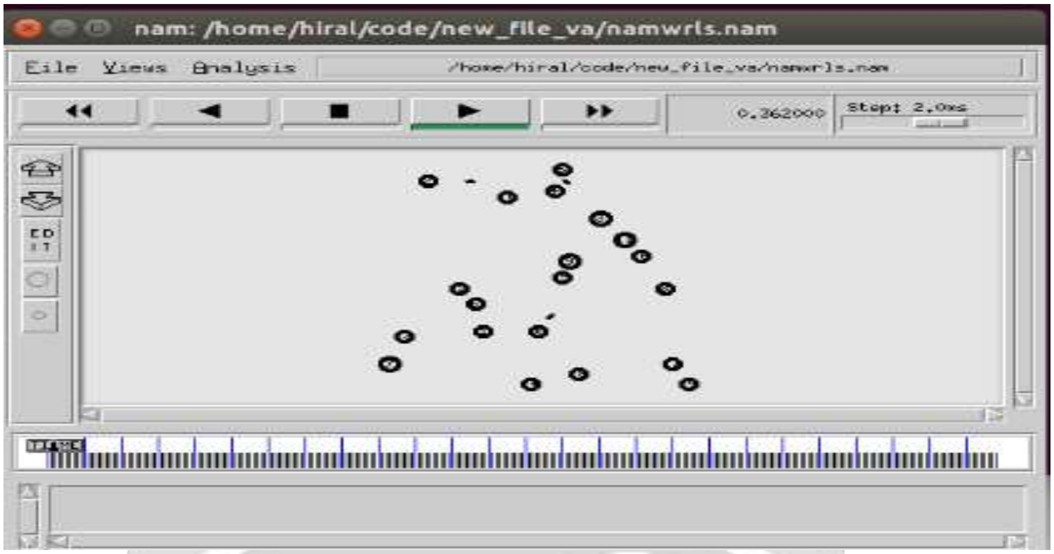


Figure 5.6: Select path from source node 0 to destination node 2

The above snap shows Check the All path distance from source node 0 to destination node 2.

Figure 5.7: Selection of node

Above Figure illustrate the selection of node 5 with optimum distance and after check further path.

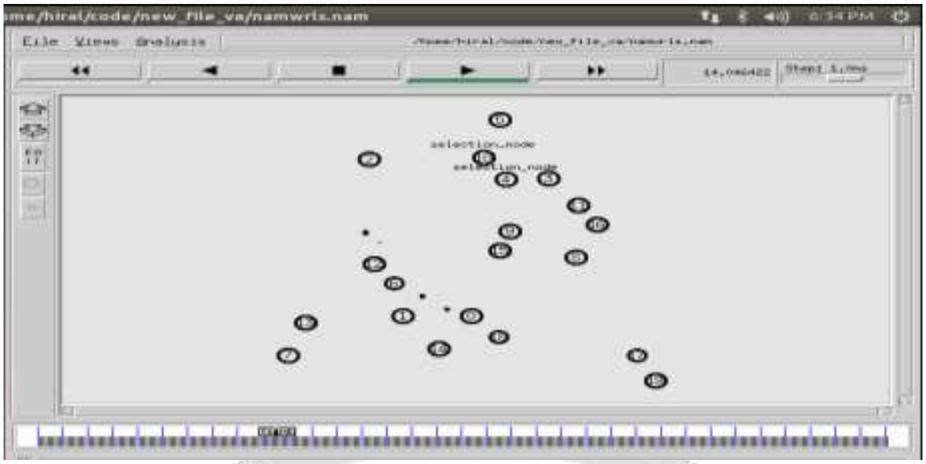


Figure 5.8: Selection of node

Above Figure illustrate the selection of node 5 and 4 with optimum distance and after check further path.

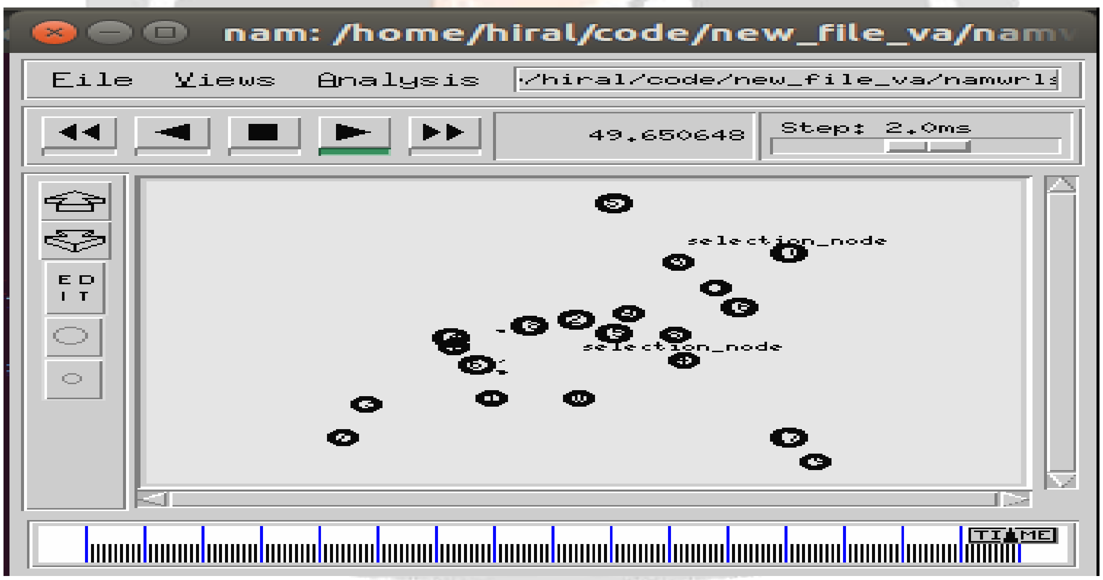
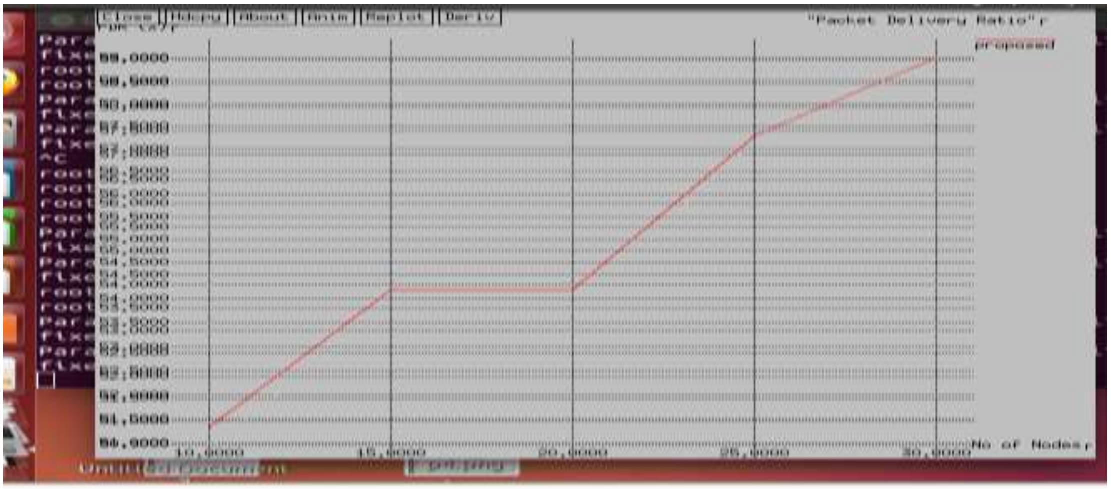


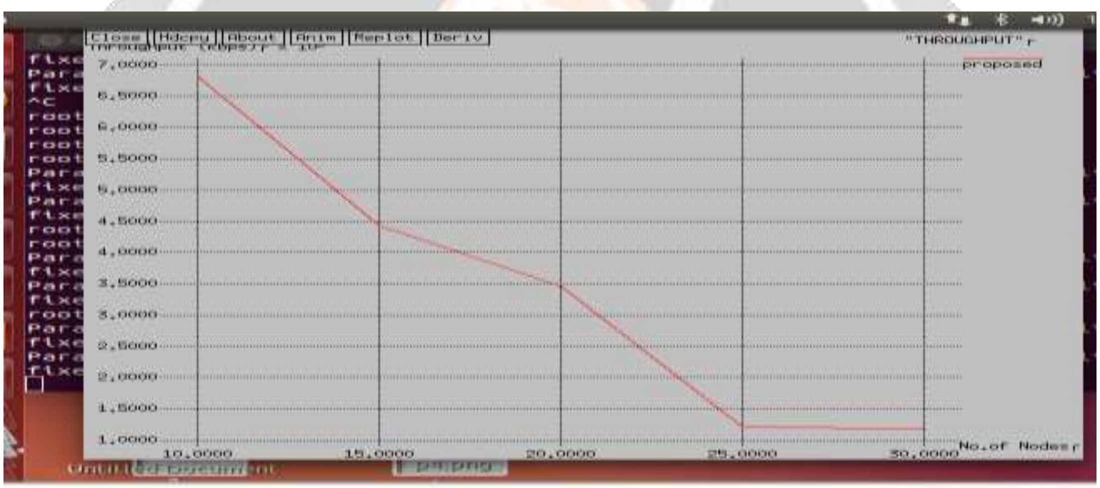
Figure 4.9 Optimum Path

At last we get the minimum distance

PDR:



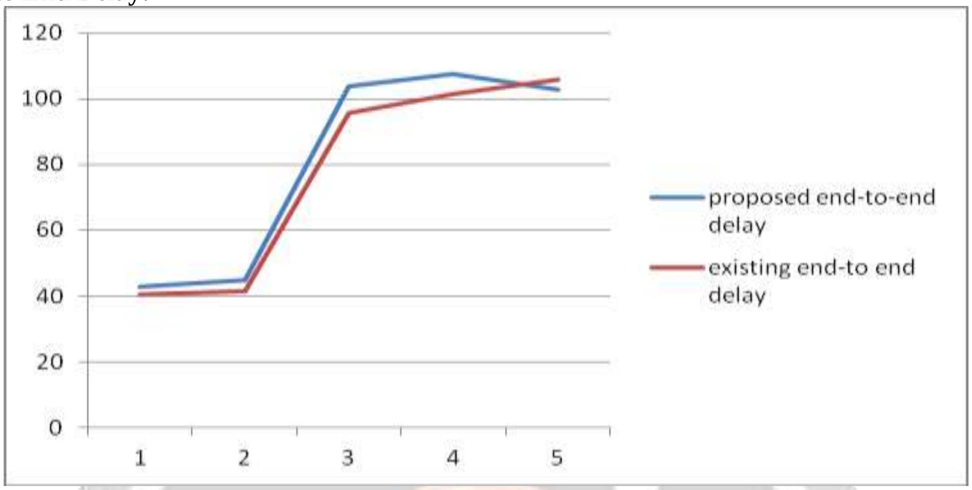
Throughput:



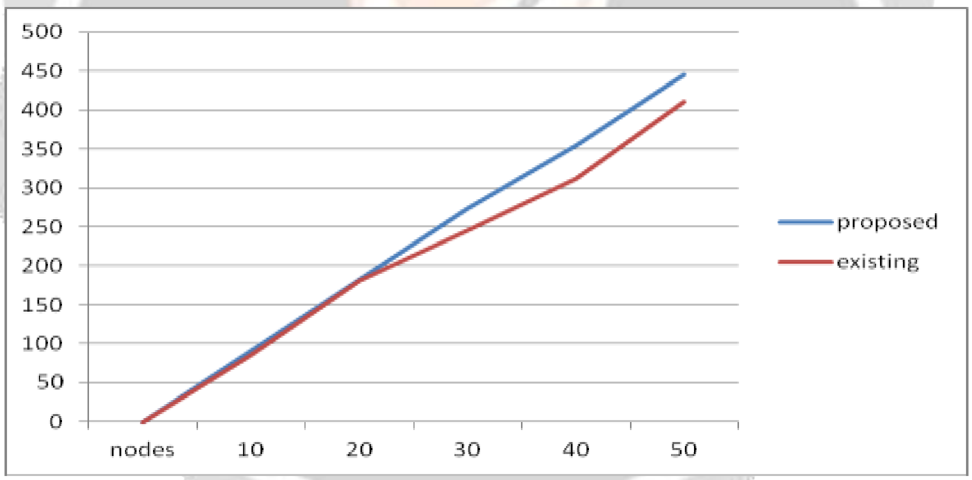
End to End Delay:

Comparison of existing and Proposed System:

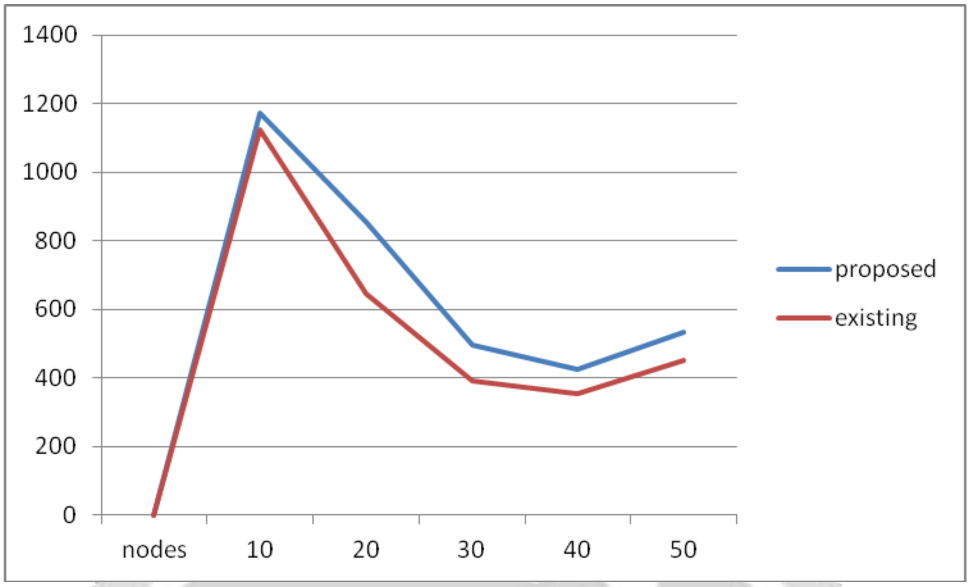
End to End Delay:



Packet Delivery Ratio:



Throughput:



6.CONCLUSION

Based on Literature survey focus on optimization selection of node which take part in VANET for V2V and V2I with using PSO with trust value for improving optimization selection of node with dynamic mobility model consider parameter like location ,energy ,frequency count. So set initial energy and base on initial count identify optimum node to improve different parameters PDR ,end 2 end and throughput.

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