Novel Technique for VANET Routing by Optimizing the Social Information of Relay Node

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Abstract— VANET is highly dynamic wireless sensor network, which increase the drop packet. So decision of node selection is depend on routing. It is effective challenge these type of network in which drop increase of its dynamic properties, so how can take decision by network properties and optimization which monitor the dynamisms of VANET. In this paper approach social properties and optimization.

Keywords— *vanet, social, optimization,DTN*

I. INTRODUCTION

Recently, many works have provided in-depth studies of the VANET environment, including realistic mobility and propagation models. (VANETs) has grown over the last few years, particularly in the context of emerging intelligent transportation systems (ITS). However, efficient routing in VANETs remains challenging for many reasons, e.g., the varying vehicle density over time, the size of VANETs (hundreds or thousands of vehicles), and wireless channel fading due to high motion and natural obstructions in urban environments (e.g., buildings, trees, and other vehicles).

Safety and video surveillance car applications are key Information and Communication Technologies (ICT) services for smart city scenarios and have been attracting an important attention from governments, car manufacturers, academia, and society. Nowadays, the distribution of real-time multimedia content over. Vehicular Ad-Hoc Networks (VANETs) is becoming a reality and allowing drivers/passengers to have new experiences with on-road videos in a smart city. Multimedia VANETs are well-suited for capturing and sharing environmental monitoring, surveillance, traffic accidents, and disaster-based video smart city applications.

VANET (Vehicular Ad-hoc Network) is a new technology which has taken enormous attention in the recent years. Due to rapid topology changing and frequent disconnection makes it difficult to design an efficient routing protocol for routing data among vehicles, called V2V or vehicle to vehicle communication and vehicle to road side infrastructure, called V2I. It is autonomous & self-organizing wireless communication network, where nodes in VANET involve themselves as servers and/or clients for exchanging & sharing information. Vehicles can cooperate with each other to disseminate short videos of dangerous situations to visually inform drivers and rescue teams about them both in the city and on a highway.

The growing demand of wireless devices and wireless communication tends to research on self-curing and self-organizing networks without the support of any centralized management or pre-demonstrated authority/infrastructure. This kind of networks is known as Ad hoc networks.

VANET It minimizes both vehicle crashes and traffic congestion which are critical problems across the whole world [1].

Characteristics of VANET

VANET has some unique characteristics which make it different from MANET as well as challenging for designing VANET applications.

1. High dynamic topology: The topology of VANET changes because of the movement of vehicles at high speed. Suppose two vehicles are moving at the speed of 20m/sec and the radio range between them is 160 m. Then the link between the two vehicles will last 160/20 = 8 sec.
2. Frequent disconnected network: From the highly dynamic topology results we observe that frequent disconnection occur between two vehicles when they are exchanging information. This disconnection will occur most in sparse network.
3. Mobility modeling: The mobility pattern of vehicles depends on traffic environment, roads structure, the speed of vehicles, driver's driving behavior and so on.
4. Battery power and storage capacity: In modern vehicles battery power and storage is unlimited. Thus it has enough computing power which is unavailable in MANET. It is helpful for effective communication & making routing decisions.
5. Communication environment: The communication environment between vehicles is different in sparse network & dense network. In dense network building, trees & other objects behave as obstacles and in sparse network like high-way this things are absent. So the routing approach of sparse & dense network will be different.

6. Interaction with onboard sensors: The current position & the movement of nodes can easily be sensed by onboard sensors like GPS device. It helps for effective communication & routing decisions [2].

ROUTING PROTOCOLS IN VANET

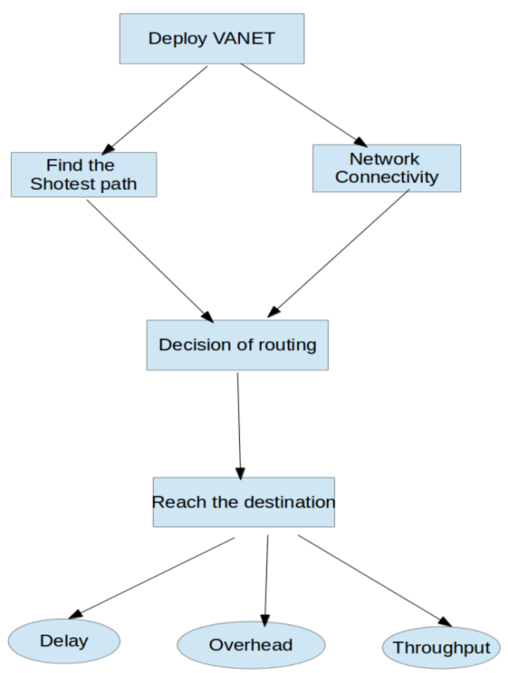
The characteristic of highly dynamic topology makes the design of efficient routing protocols for VANET is challenging. The routing protocol of VANET can be classified into two categories such as Topology based routing protocols & Position based routing protocols.

1. Topology based routing protocols: Topology based routing protocols use link's information within the network to send the data packets from source to destination. Topology based routing approach can be further categorized into proactive (table-driven) and reactive (on-demand) routing.
2. Position based routing protocols: Geographic or Position based routing is a routing that each node knows its own & neighbor node geographic position by position determining services like GPS. It doesn't maintain any routing table or exchange any link state information with neighbor nodes. Information from GPS device is used for routing decision [4].

II. LITERATURE REVIEW

In [1] Mohammad Al-Rabayah and Robert Malaney: In this paper, they propose a new hybrid location-based routing protocol that is particularly designed to address this issue. Our new protocol combines features of reactive routing with location-based geographic routing in a manner that efficiently uses all the location information available. The protocol is designed to gracefully exit to reactive routing as the location information degrades. They show through analysis and simulation that their protocol is scalable and has an optimal overhead, even in the presence of high location errors. Their protocol provides an enhanced yet pragmatic location-enabled solution that can be deployed in all VANET-type environments. In [2] Bijan Paul et al: In this paper the author presents the pros and cons of VANET routing protocols for inter vehicle communication. The existing routing protocols for VANET are not efficient to meet every traffic scenarios. Thus design of an efficient routing protocol has taken significant attention. So, it is very necessary to identify the pros and cons of routing protocols which can be used for further improvement or development of any new routing protocol. Due to rapid topology changing and frequent disconnection makes it difficult to design an efficient routing protocol for routing data among vehicles, called V2V. In [3] Mario De Felice et al: In this paper the authors introduces an application framework to handle multi-hop, multi-path, and dynamic environments and a routing protocol, the DBD (Distributed Beaconless Dissemination), that enhances the dissemination of live video flows on multimedia highway VANETs. DBD uses a backbone-based approach to create and maintain persistent and high quality routes during the video delivery in opportunistic Vehicle to Vehicle (V2V) scenarios. It also improves the performance of the IEEE 802.11p MAC layer, by solving the Spurious Forwarding (SF) problem, while increasing the packet delivery ratio and reducing the forwarding delay. Performance evaluation results show the benefits of DBD compared to existing works in forwarding videos over VANETs, where main objective and subjective QoE results are measured. In [4] NehaGarg, Puneet Rani: In this paper, they have improved the performance of Ad-hoc on Demand Distance Vector (AODV) routing protocol by using some parameters i.e. Active route time outs and hello interval to choose the best path for routing and compared the proposed AODV protocol performance with Normal AODV in terms of different performance metrics i.e. average throughput, average delay and average network load. They have used a simulation tool "OPNET Simulator v14.5" for performance evaluation. Results show that proposed AODV routing protocol has better performance as compared to normal AODV. In [5] K. Wang et al: In this paper the authors build redundant transmission trees, although the topology is highly dynamic. This proposal is difficult to implement in opportunistic and dynamic VANET environments: stability and availability of communication links over time are critical issues when dealing with real-time multimedia applications and they become much more challenging when coupled with vehicular mobility and frequent lane changes. Besides the overhead required for maintaining the overlay networks, the maximum bit rate considered is still somehow low for multimedia transmissions and the simulation study only takes into account a small amount of nodes (small-scale scenario). In [6] F. Naeimipoor et al: The authors use several VANET approaches and compare them, like delay-based and network coding techniques, mixed with probability, trying to minimize the number of forwarding nodes and the final packet loss; still when the data rate increases, performance gets worst. Since the authors are discussing the performance evaluation of VANET protocols for video delivery they should have also included QoE results into the paper. In [7] C. Rezende et al: The authors propose an opportunistic backbone-based geographic routing scheme for V2V video transmissions by using a Bayesian model for predicting where vehicles are going to be, so they can build the backbone by also considering such predictions. The relay node election is performed according to a delay-based fashion and, in order to tackle the broadcast storm problem, an additional safety delay is allowed. The idea is promising as a concept, but high data rates still results in a considerable degree of loss and decrease the video quality level. In [8] M. Di Felice et al: The authors aim to build a backbone and they include several features in their design: the backbone is opportunistic, delay-based and it keeps into account the vehicles speed and direction in order to keep the backbone operative as long as possible. Also this approach uses beacons and ACKs. The authors provide several evaluation scenarios (traffic safety, video transmission, and audio streaming), so the study is interesting, but also in this case, the protocol requires beacons and general overhead messages to work. The main weakness of the current backbone-based routing protocols is that they do not consider the SF problem in their decision schemes, as well as they do not evaluate the quality level of the delivered videos based on QoE metrics.

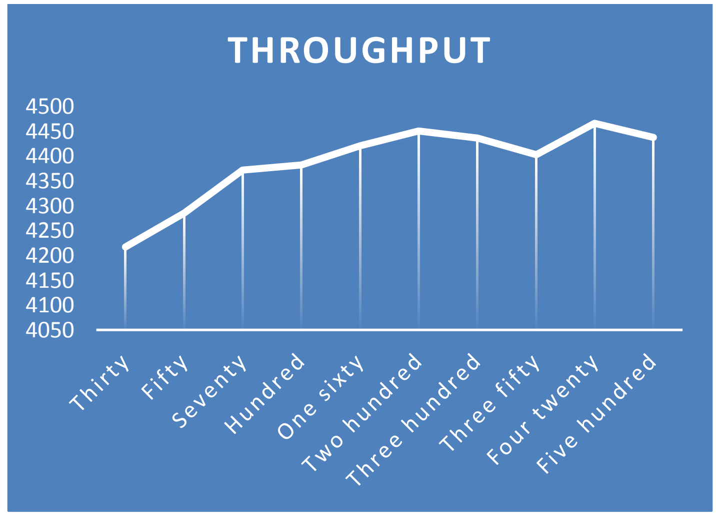
III. METHODOLOGY



Step1: Deploy the VANET (Vehicular ad-hoc network).
Step2: Find the shortest path and network connectivity.
Step3: Route is decided for transmitting the message.
Step4: Message is reached at the destination.
Step5: After result find the Delay, Overhead and throughput.

IV. RESULTS

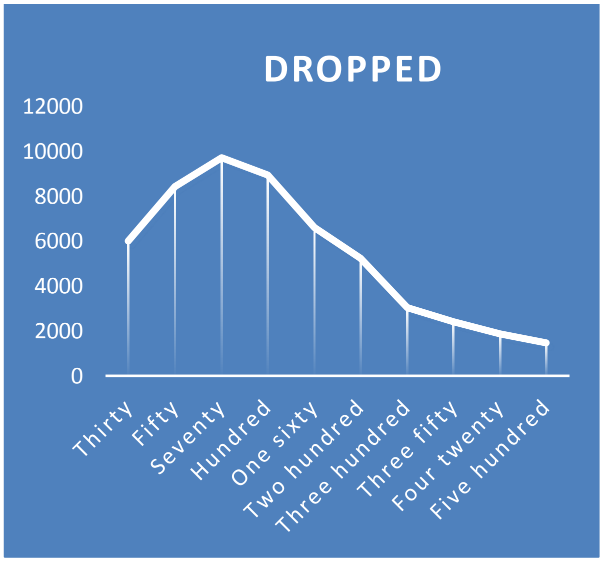
Throughput:- The amount of material or items passing through a system or process. Network throughput is the rate of successful message delivery over a communication channel. The data these messages belong to may be delivered over a physical or logical link, or it can pass through a certain network node. Throughput is usually measured in bits per second (bit/s or bps), and sometimes in data packets persecond (p/s or pps) or data packets per time slot.



Nodes	Throughput
Thirty	`4216.78
Fifty	4285.61
Seventy	4371.88
Hundred	4382.8
One Hundred Sixty	4421.30
Two Hundred	4450.83
Three Hundred	4435.93
Three Hundred Fifty	4403.4
Four Hundred Twenty	4465.63
Five Hundred	4437.411

In this graph throughput measures on various number of nodes.

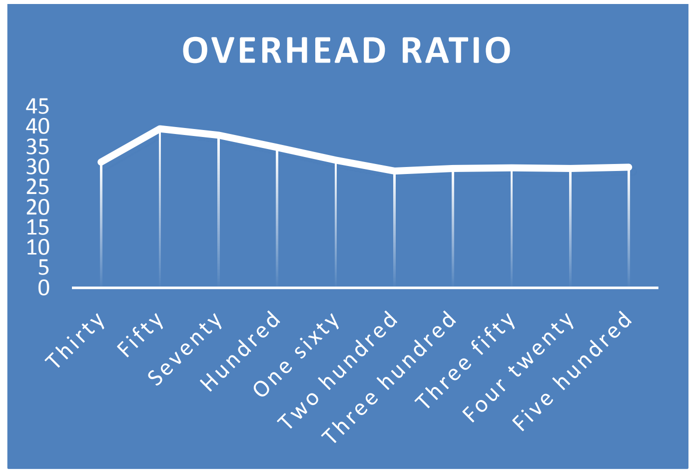
Dropped:-Packet loss occurs when one or more packets of data travelling across a computer network fail to reach their destination. Packet loss is typically caused by network congestion. Packet loss is measured as a percentage of packets lost with respect to packets sent. The Transmission Control Protocol (TCP) detects packet loss and performsretransmissions to ensure reliable messaging. Packet loss in a TCP connection is also used to avoid congestionand reduces throughput of the connection.



Nodes	Dropped
Thirty	6018
Fifty	8445
Seventy	9714
Hundred	8937
One Hundred Sixty	6600
Two Hundred	5238
Three Hundred	3048
Three Hundred Fifty	2418
Four Hundred Twenty	1887
Five Hundred	1470

In this graph drop packets are measure at various no of nodes. Drop packets are decrease when numbers of nodes are increase in the network.

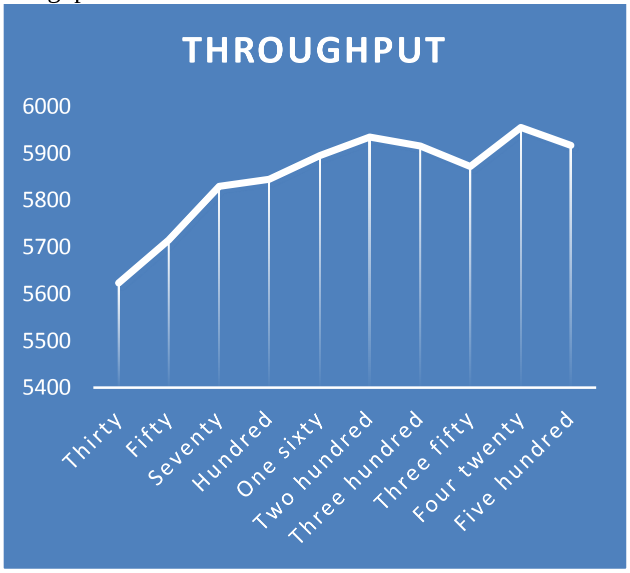
Overhead Ratio:-Overhead ratio is calculated by number of packet dropped, number of packet delivered and number of packet receive at a node.



Nodes	Overhead Ratio
Thirty	31.14
Fifty	39.51
Seventy	37.92
Hundred	34.86
One Hundred Sixty	31.71
Two Hundred	29.03
Three Hundred	29.56
Three Hundred Fifty	29.71
Four Hundred Twenty	29.52
Five Hundred	29.87

In this graph overhead ratio is measure at different nodes. Proposed new approach results:

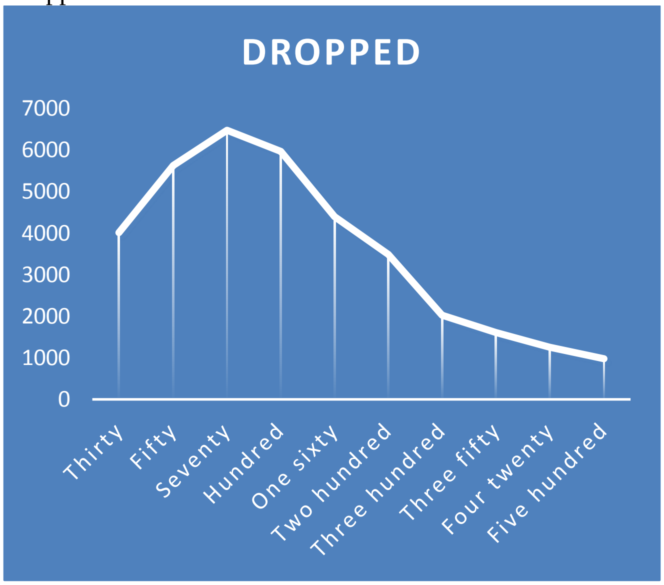
Throughput:-



Nodes	Throughput
Thirty	5622.385
Fifty	5714.14
Seventy	5829.17
Hundred	5843.77
One Hundred Sixty	5895.07
Two Hundred	5934.4
Three Hundred	5914.57
Three Hundred Fifty	5871.24
Four Hundred Twenty	5954.18
Five Hundred	5916.5

In this graph throughput is measure. This is proposed approach results these outcomes are better than previous approach.

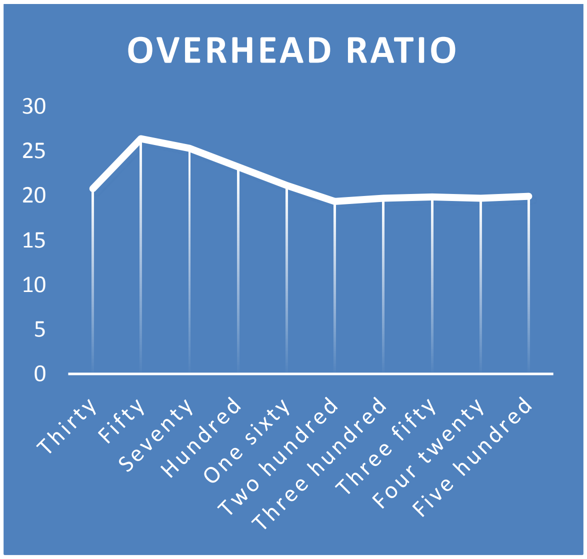
Dropped:-



Nodes	Dropped
Thirty	4012
Fifty	5630
Seventy	6476
Hundred	5958
One Hundred Sixty	4400
Two Hundred	3492
Three Hundred	2032
Three Hundred Fifty	1612
Four Hundred Twenty	1258
Five Hundred	980

In this graph drop packet are shown. With the help of newly proposed drop packet is decrease better than previous approach.

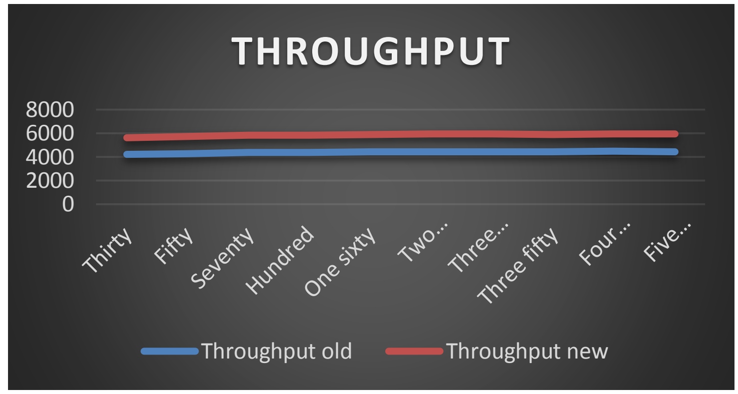
Overhead Ratio:-



Nodes	Overhead Ratio
Thirty	20.76
Fifty	26.34
Seventy	25.28
Hundred	23.24
One Hundred Sixty	21.14
Two Hundred	19.35
Three Hundred	19.71
Three Hundred Fifty	19.81
Four Hundred Twenty	19.68
Five Hundred	19.91

In this graph overhead ratio is measured at different nodes. Overhead ratio results are better than the previous results. Comparison of previous approach and new proposed approach:

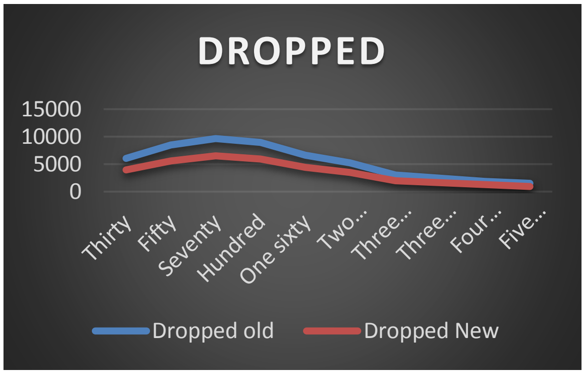
Throughput:- This graph shows the throughput of previous approach and new proposed approach:-



Nodes	Throughput old	Throughput new
Thirty	4216.78	5622.385
Fifty	4285.61	5714.14
Seventy	4371.88	5829.17
Hundred	4382.8	5843.77
One Hundred Sixty	4421.30	5895.07
Two Hundred	4450.83	5934.4
Three Hundred	4435.93	5914.57
Three Hundred Fifty	4403.4	5871.24
Four Hundred Twenty	4465.63	5954.18
Five Hundred	4437.411	5916.5

The throughput of previous approach is lies between 4000 – 5000 approx. And the throughput of new proposed approach lies from approximately 5000 – 6000. This graph shows that the throughput of new proposed approach is better than previous approach.

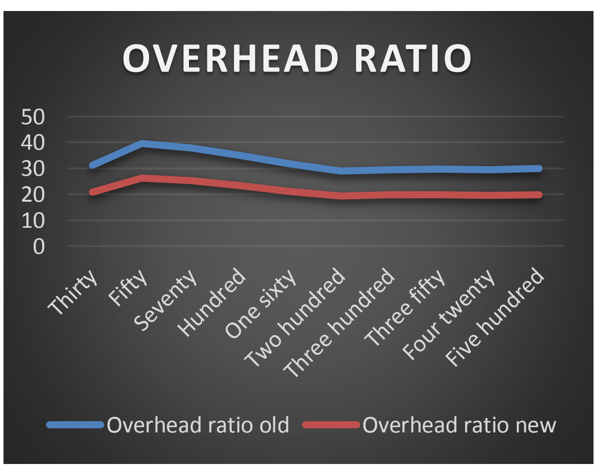
Dropped:-This graph shows the dropped packet ratio of new proposed approach and previous approach:-



Nodes	Drop packet old	Drop packet new
Thirty	6018	4012
Fifty	8445	5630
Seventy	9714	6476
Hundred	8937	5958
One Hundred Sixty	6600	4400
Two Hundred	5238	3492
Three Hundred	3048	2032
Three Hundred Fifty	2418	1612
Four Hundred Twenty	1887	1258
Five Hundred	1470	980

The dropped packet ratio of new proposed approach is less than the dropped packet of old approaches.

Overhead Ratio: This graph show the overhead ratio of both of approach:-

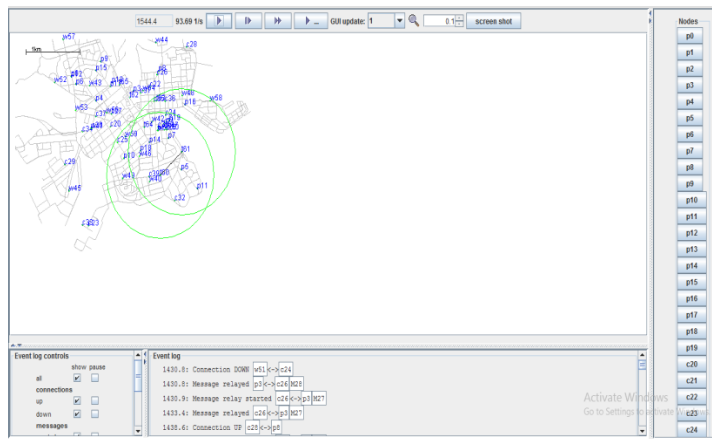


Nodes	Overhead Ratio Old	Overhead Ratio New
Thirty	31.14	20.76
Fifty	39.51	26.34
Seventy	37.92	25.28
Hundred	34.86	23.24
One Hundred Sixty	31.71	21.14
Two Hundred	29.03	19.35
Three Hundred	29.56	19.71
Three Hundred Fifty	29.71	19.81
Four Hundred Twenty	29.52	19.68
Five Hundred	29.87	19.91

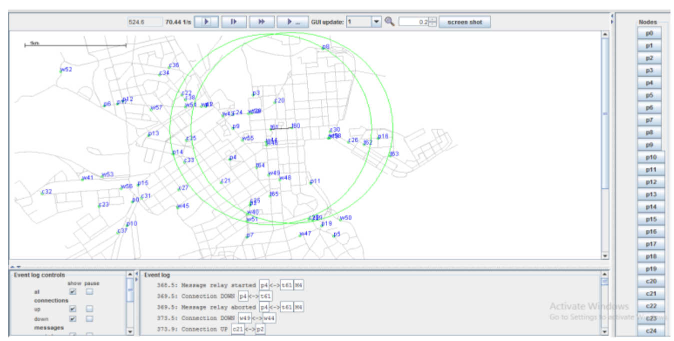
Overhead ratio of new proposed approach is better than the old one approach.

Simulation Results: new

At 30 nodes :-At the 30 node simulation are done. It shows how node are connected in a network.

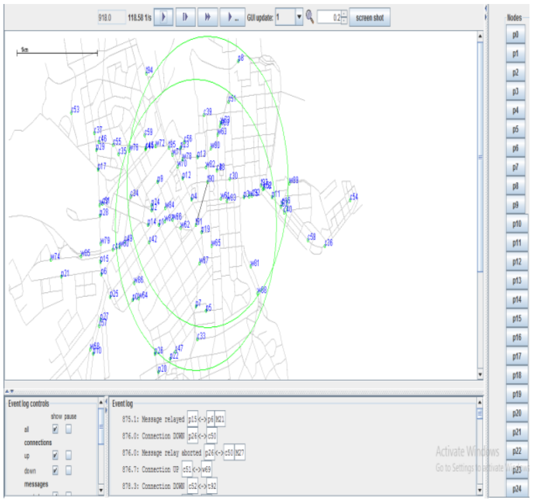


At 50 nodes:-At node 50 simulation is occur.

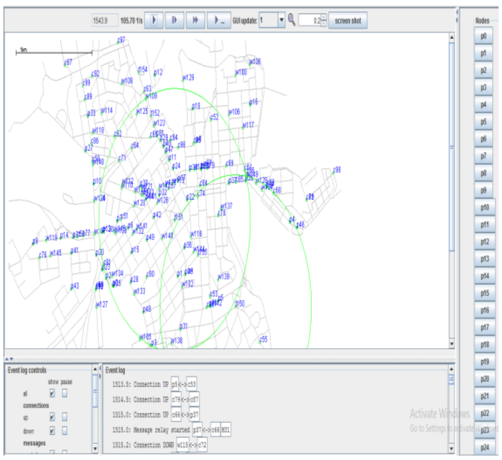


Old:

At 30 nodes:-simulation are done at 30 node in one group. Simulation shows communication between the node in a community.



At 50 nodes:-simulation are done at 50 node.



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