# Load Based Co-Operative Node Assignment in Cluster based Vehicular Ad hoc Networks

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***Abstract*** **- VANET is an emerging technology in the field of intelligent transportation system. The rapid topology changes cause frequent disconnections between node links during data communication. In VANET the prime importance given to safety and traffic information. Due to frequent disconnections in network delay may occur which degrades network performance. Traditional algorithm focused on link status, position, link expiration time to address the above issues. The proposed load-based node allocation technique selects co-operative node efficiently by considering current load and activeness of the node. It is demonstrate that LBN technique performs better than traditional approaches. In terms of increasing packet delivery ratio and throughput. Figure.1 shows Vanet's Architecture.**

***Index Terms*** **- VANET's, node assignment, clustering, load calculation, routing.**

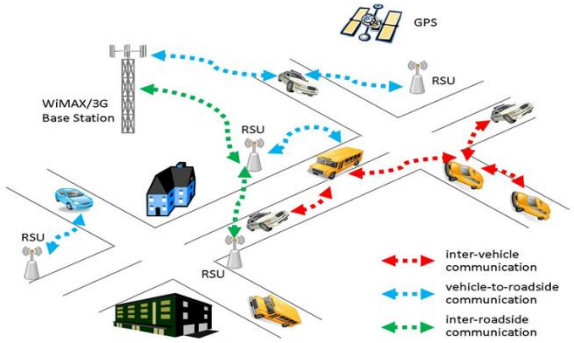


Figure.1 :Vanet's Architecture

## I.INTRODUCTION

Vehicle Ad hoc Network or VANET is a vast development in the field of intelligent transportation system. The advanced features in VANET are dynamic network partitions and fast cooperative communication, collaboration with other networks increases research developments in the area of VANETS.VANET can establish communication between V2V (vehicle-to- vehicle) or V2I(vehicle- to-infrastructure).Due to rapid speed of vehicles in VANET the communication links will get frequently disconnected which causes delay. The data is carried by intermediate nodes between source to destination. Whenever there is a link break, the network has to choose immediate neighbour nodes to forward data to avoid communication delay.

The data packets sent by the source node will be reached to nearby nodes using multi-hop-communication. This process continues until packets reach destination. If the number of vehicles are more, then identifying the neighbour node process is very simple otherwise delay may be arised if vehicles number is low. For establishing reliable communication, the U.S. Government communications fixed the frequency band between 5.8 to 5. 9GHz.They divided it into 7 channels. Among those CH178 is allotted as Control Channel (CCH) which is used for safety and control applications. The remaining channels are allotted for data services.

In research tree based dynamic bandwidth allocation techniques are used for forwarding packets to neighbour nodes. It is also termed as Zone of Interest (ZOI). The messages would be forwarded only to the neighbours in the spatial geographic zone. GPSR uses greedy technique for forwarding packets. Initially it catches information about neighbour nodes. Whenever packets forwarding is not possible it identifies the neighbour nodes by calculating perimeter of the region.

## II. RELATED WORK

*2.1 Proactive and Reactive Routing Protocols*

These two are traditional protocols used to establish path between source and destination. In proactive technique, initially hello packets are flooded among all the neighbour nodes to collect the status of each and every node. The tables are used to store the information. Here, total path details are known to the network before forwarding packets. Here path identification process is very simple. However the dynamic nature of VANET would not keep the

network same for long period of time. It requires continuous updates at every point along the path[ ] which increases the network overhead.

*2.2 Reactive Routing Protocols:*

RRP establishes path on demand. Initially it floods packets to only neighbour nodes. Based on their response RRP forwards packets to neighbour nodes. This process continuous until packets each destination. Here network overhead is minimized but delay may occur when the neighbour node is not available.

*2.3 Hybrid Routing Protocol:*

In HRP, to establish route the algorithm uses both reactive & proactive measures. Basically, it constructs path using table information and later depend on situation dynamically selects neighbour nodes. Example: HLAR [].

*2.4 Geographic-based routing protocols*

GRB establishes path between source and destination using intermediate nodes. The node selection process is based on geographic position information given by GPS and digital maps. Among group of nodes nearest neighbour is chosen for packets forwarding. Example: greedy perimeter stateless routing protocols which chooses intermediate node by making greedy decisions. GPRC (greedy perimeter coordinator routing) uses graph theory to select neighbour nodes.

*2.5Cluster-Based Routing (CBR) protocol:*

Cluster based routing techniques separates vehicles into groups based on speed, direction and position. The vehicle with maximum life time in cluster is elected as Cluster Head(CH).The CH is going to act as coordinator among cluster members like sharing information, control the signals and allocation of bandwidth [ ]

*Moving-Zone-based protocol:*

A Moving Zone based (MoZo)[ ] protocol uses Dijkstra's algorithm to find the shortest path in a particular zone. Tree based techniques were used to find vehicles with identical attributes like speed, velocity and direction. Here control overhead is minimized because of grouping the vehicles with same attributes.

*Link Expiration Time (LET)* is used to establish path in which cluster head selects node with high link expiration time. Here node load is not considered which increases the packet drop ratio[ ].

## III. PROPOSED WORK

The proposed load based node allocation technique is used to create path between source and destination. The allocation of node is based on the present traffic conditions.

The nodes in cluster carries packets and hand over's to next neighbour node using AODV technique.

Cluster Head maintains information table which provides cluster members information like current load to maximum load, position, directions. The proposed load-based node allocation technique balances traffic among all the nodes which minimises condition and improves network throughput.

*MODULES:*

*Cluster Formation:*

The vehicle with maximum Lifetime in cluster at a given specific time will be considered as a Cluster Head. Once it reaches the Threshold point a new head selection process will be initiated, then complete information exchanges with new Cluster Head.

*Node selection process:*

Whenever link break occurs in between data transmission, the Cluster Head immediately selects the node with minimum load and maximum link stability. Link stability can be calculated by sending HELLO messages to the neighbour nodes based on their positive acknowledgment time within the stipulated time.

The information table is continuously sorted with link status parameter.

The neighbour node is identified by considering the probability of load and link status factors of a node [Prob(load, link status)]

*Path Establishment:*

In this phase the competent nodes are chosen to establish path between source and destination.

## IV. ALGORITHM

1. For x = whenever and x <= simulation time do

If vehicle had entered into clustering zone,
2. Vehicle status = Cluster Member and it should wait for $\vartheta$ sec,
Where $\vartheta$ is the constant value and we set as 5s.
3. If Cluster Member receives $CH$ message,
vehicle status = Cluster Member reply to
CH with $<CM_{ID};\ R_{LT}(CM)>$
else
vehicle status i.e. equal to CH
every $\vartheta$ sec it should send $CH$
end if
end for
for all $i \in$ Vdo
$(\Omega, D) \leftarrow computejobloads\ (\Theta throughput$
$\leftarrow$ ComputationofThroughput$(\Theta, \Omega)$
$increment \leftarrow Throughput$
end For.

## V. RESULTS

| PARAMETER | VALUE |
|---|---|
| Simulator | NS-2.34 |
| Topology | Highway scenario |
| Number of nodes | 100 |
| Propagation Model | Two Ray Ground |
| Channel Model | Wireless channel |
| Simulation time | 6000s |
| Traffic type | CBR,UDP |

Figure 2 : Simulation Parameters

*Performance Evaluation:*
The Network Simulator-NS2 is used to simulate proposed system. The results are shown in the below table. The graphs are generated based on packet delivery and ratio, delay, throughput. the proposed work is compared with existing protocols and there is significant improvement in terms of overall network performance.

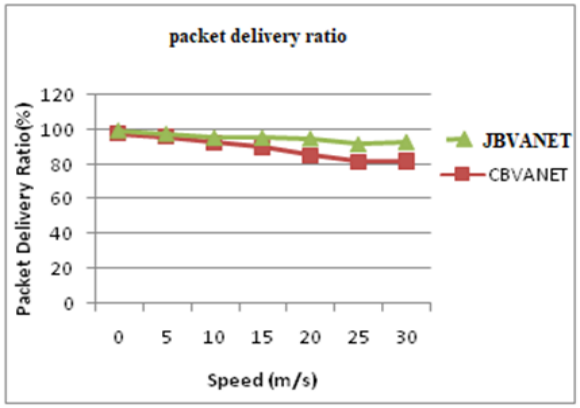


Figure 3: Packet delivery ratio

The above figure is the graph between packet delivery ratio and speed. We observe that the packet delivery ratio gradually increases than before.

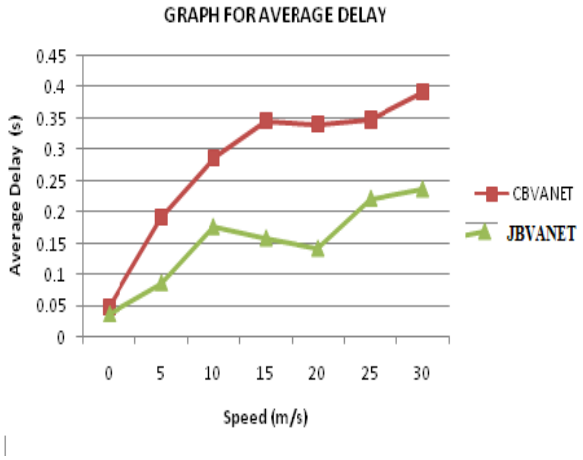


Figure 4: Graph for average delay

The above figure is the graph between average delay and speed. We observe that the graph gradually increases than before.

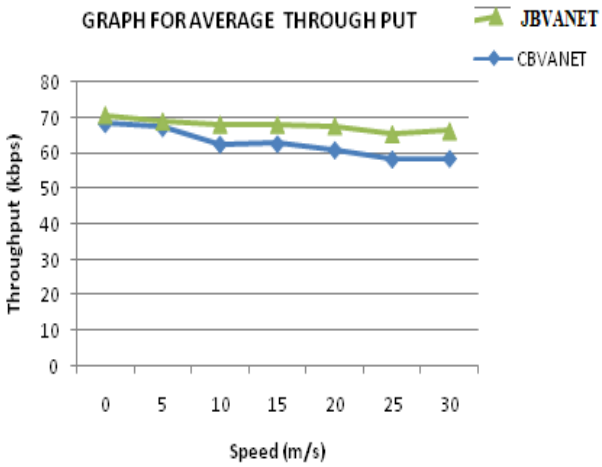


Figure 5: Graph for average throughput

The above figure is the graph between throughput and speed. We observe that the graph gradually increases.0

## VI.CONCLUSION

The proposed load-based node assignment technique efficiently handles the routing problem in dynamic Vanets. This technique selects nodes with high stability and minimum load. The simulation results shows that proposed approach maximises throughput and improves overall network performance. In this

approach Cluster Head selects best choice among the remaining nodes.

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