VCN: Vehicular Cloud Network Using RBMR Protocol for Efficient Link Stability to Improve the Throughput

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***Abstract* — VCN is Vehicular Cloud Network which is the combination of VANET and cloud. Vehicular ad hoc networks (VANETs) technology has been used in many of the applications such as avoiding traffic jam on roadways and airways, preventing the vehicles from accidents and so on. It serve as one of the best platform to meet with group-oriented services which comes under one of the primary application classes. Multicast routing is used to support such services. In such cases one must have to ensure better packet delivery ratio, lower delays and reduced control overheads. Thus, there is a need to design stable and reliable multicast routing protocols for VANETs. In this paper, we proposed a Receiver Based Multicast Routing Protocol that finds a best way to perform the multicast traffic. RBMulticast stores destination list inside the packet header, this destination list provides information on all multicast members to which this packet is targeted .And it stores the traced information or data in the cloud for given period of time. Thus, the multicast tree is not required for this process and therefore no tree state stored at the intermediate nodes.**

I. INTRODUCTION

Vehicles that falls under the Vehicular Ad hoc Network (VANET) can form an ad hoc vehicular cloud in order to share the services between these vehicles. Cloud computing is a type of Internet-based computing that provides shared computer processing resources. In future high-end vehicles are expected to under -utilize the on-board computation, communication, and storage resources. VANET will become World's largest and best ad-hoc network for the vehicular system .VANET is the sub dividend class of MANET (Mobile Ad Hoc Network), in which each vehicle acts as a node creating a network in the road with either another node or with a road side unit (RSU) located along the road. This technology has been used in many of the applications such as avoiding traffic jam on roadways and airways, preventing the vehicles from accidents and so on. For ad hoc networks a multicast mesh is a type of routing. Each and every device accepts messages even if the device is not on the shortest path from sender to receiver. This provides richer connectivity, and is robust when devices come and go. A Vehicular Ad hoc Networking (VANET) working group has been created within the Internet Engineering Task Force (IETF) to develop a routing framework for IP-based protocols in ad hoc networks. A VANET is collection of mobile nodes communicating over wireless links which is termed as MANET. Users can communicate with each other in a temporarily where it does not have any centralized administration and in a dynamic topology that changes frequently. Each node participating in this network acts both as a host and a router and must therefore bit tends to forward packets for other nodes. The features which are described in VANET are similar to the technology of a MANET. It combines the self organization and self- management it reduces the bandwidth and able to share the radio transmission. The link stability provided in MANET which is used for multicasting the routing path. But in VANET the link stability clears the routing traffic which is based on the reverse based multicast routing.

II. VANET CHARACTERISTICS

Predictable mobility

VANET differs from other types of ad hoc networks mobile which nodes can able to move in a random way, because vehicles are constrained by road topology and layout and by the requirement to obey road signs and traffic lights and to respond to other move in vehicles leading to predictability in term of their mobility.

Providing safe driving, improving passenger comfort and enhancing traffic efficiency

VANET supplies direct communications of data among moving vehicles, thus allowing a set of applications, demanding direct communication between nodes to be implemented over the network. Such applications can give drivers travelling in the same direction with warning messages about accident, or about the necessity for sudden hard breaking; leading the driver to build a

broader figure of the road ahead. Moreover, additional kinds of applications could be implemented via this type of network in order to improve passenger comfort and traffic efficiency by disseminating information about weather, traffic flow and point of interest information.

No power constraints

VANET of the power is not a difficult challenge as MANET's because vehicles can have the ability to give continuous power to the OBU via the long life battery.

Variable network density

VANET network density is use to varies depending on the density of traffic, which can be very high in the case of a traffic jam or as in sub urban traffic.

Rapid changes in network topology

High speed represents moving vehicles, especially at the highway leading to rapid changes in network topology. Moreover, driver behavior is affected by the necessity to react to the data received from the network which causes changes in the network topology.

Large scale network

The network scale could be large in dense urban areas such as the city Centre, high ways and at the entrance of the big cities.

High computational ability

Because the nodes in VANET are vehicles, they can be provides with a sufficient number of sensors and computational resources; such as processors, a large memory capacity, advanced antenna technology and global position system (GPS). These resources increase the computational capacity of the node, which help obtaining reliable wireless communication and acquiring accurate information regarding its current position, speed and direction.

III. ISSUES IN VANET

There are many issues in VANET such as

Routing: There more number of Routing protocols which should provide optimize path where the nodes or vehicles can communicate easily [14].

Quality Service (QoS): QoS challenges are packet delivery ratio and connection duration.

Broadcasting: Most messages in Vanet are broadcast messages. Collisions affect message delivery.

*Security attacks and threats***:** In Vanet there is more number of security and privacy attacks which makes the system more vulnerable.

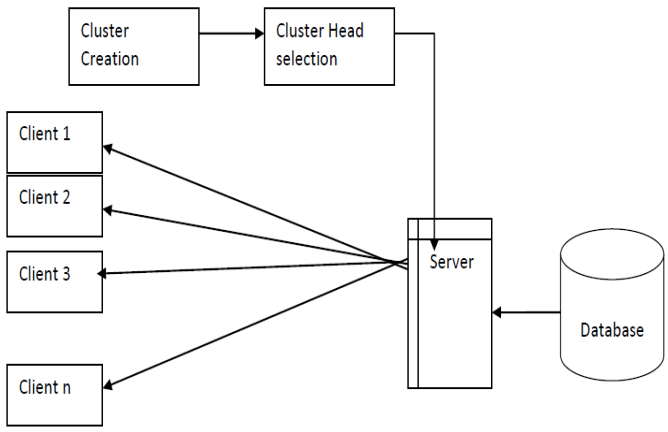
Collision and interference: The vehicles move quickly there is a possible of collision which makes the vehicle to crash.

IV. CLOUD COMPUTING

Cloud computing is also known as utility computing which is based on pay-as-you-go service. The scenario could be easily compared with our daily life, where we use gas and electricity in our homes as much as we need and at the end of the month we pay for exactly what we have used, neither more nor less [7].Cloud computing is a shared pool of configurable computing resources as network, servers, storage, applications and other services that can be rapidly provisioned and released with minimal management efforts and service provider interaction [10].

All services provided to customers present on remote machine you need not to install any service on your machine you need to use only interface (browser) to connect that remote server and such idea is provided by cloud computing. Cloud provides on demand self- service, resource pooling, scalability, location independent online access etc. [8]. Cloud computing started from the realization that instead of buying and installing necessary software and hardware, businesses may rent the needed infrastructure and software to run their applications. Cloud computing saves time as there is not installation and up gradation of software application. The goal of Vehicular- Cloud Network is to create a vehicle cloud and to bring collaborations amongst cloud members to produce advanced vehicular services that individual alone cannot make. Unlike the Internet cloud that is created and maintained by a cloud provider, the vehicle cloud is temporarily created by inter-connecting resources available in the vehicles and Road Side Units (RSUs). Such networked resources operate as a common virtual platform on which the efficiency of collaboration is maximized. VCC and ICN together contribute to creating the cloud and to running the virtual platform efficiently. [3]

BLOCK DIAGRAM



This block diagram shows how the clients are clustered. It consists of n number of clients in which each client is connected to the server which in turn connected to the database. Here the location of the nodes will be stored in the server .The work of the cluster creation is to integrate the neighbouring location of each nodes. After the nodes are clustered then from each group one node is chosen as head thus called as cluster head selection. We can choose the cluster head using many technique such as using election algorithm. The work of the cluster head is to send the messages to each node of its own group so that no nodes will be missed and all the nodes will receive the messages correctly.

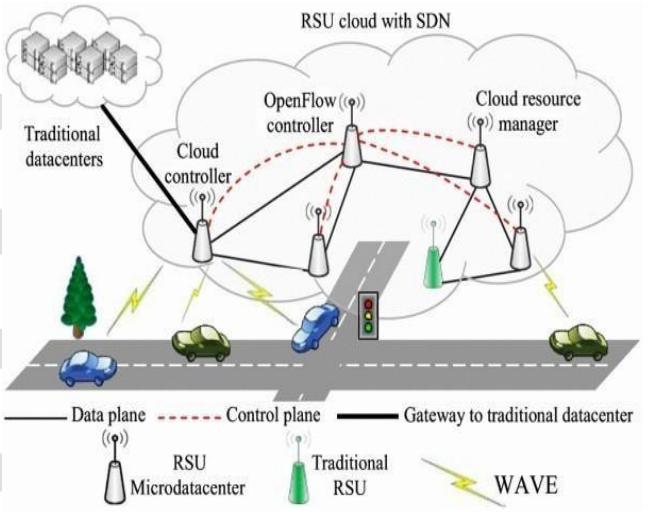
V. PROPOSED SYSTEM

In this project, we are using Receiver-Based Multicast technique for a stable path between the nodes. RB Multicast utilize geographic location data to route multicast packets, where nodes split the network into geographic "multicast regions" on the locations of the multicast members. A destination list inside the packet header stored by RB Multicast. This destination list allow data on all multicast members to the packet is targeted. So, there is no necessity for a multicast tree and hence no tree state is stored at the intermediate nodes. If a sender like to send a message to more than one receiver then we can multicast the message to all the nodes. While sending the data location of the nodes will not be same and while reaching it will not be same, there are possibility of sending wrong node also. Thus, to overcome that situation we are creating the path stable. If the path is stable then the message will reach to the nodes at any cost without any failures. In this protocol the sender node does not need a routing table or a neighbor table to send packets but instead uses a "virtual node" as the packet destination. Thus, RB Multicast requires the least amount of state of any existing multicast protocol. It can achieve high success rates, low latency, and low overhead in terms of the number of bits transmitted in the network for both static and dynamic scenarios. In this protocol the sender node does not need a routing table or a neighbor table to send packets besides alternatively uses a "virtual node" as the packet destination. Hence, RB Multicast requires the minimum amount of state of any existing multicast protocol. It can achieve high success rates, low latency, and low overhead in terms of the number of bits transmitted in the network for both static and dynamic scenarios.

VI. RECEIVER BASED MULTICAST ROUTING PROTOCOL

Thus, we own expanded a stateless receiver-based multicast protocol that simply uses a list of the multicast members (e.g., sinks), placed in packet headers, to enable receivers to decide the best way to forward the multicast traffic. This protocol, called RBMulticast (Receiver-Based Multicast), uses the knowledge of the geographic locations of the nodes to take away the need for costly state maintenance (e.g., tree/mesh/neighbor table maintenance), making it theoretically suited for sensor network multicast applications. RB Multicast was applied in Tiny OS and tested using a sensor network applied as well as TOSSIM simulation. Both simulation and experimental result confirm that RB Multicast gives high success rates without the burden of state maintenance it uses keeping stable link between the nodes. The routing table is not needed for multicasting and also traffic flow will be reduced and to avoid congestion. Multicasting the message to all selected node with efficient manner. Message will be trace by trace file and stored in cloud.

VII. ARCHITECTURE



VANET is integrated new technology the potentials of new-generation wireless networks into vehicles. A vehicular network is not structured and self organized network, where vehicles supplied with short-range wireless, communication with each other to allow communication with road side infrastructure equipment or with other vehicles. VANET provides a wireless communication between vehicles moving by using DSRC(Dedicated short range communication).It is essentially IEEE 802.11a amended for low overhead operation to 802.11p; the EEE standardizes the communication in whole stack using 1609 family of standards referring to Wireless access in vehicular environment(WAVE).There are three types of communication in VANET such a Vehicle to Vehicle(V2V), Vehicle to infrastructure(V21), Infrastructure to vehicle(I2V), vehicle use to communicate directly with other vehicle using vehicle to vehicle communication (V2V) or communicate with fixed equipment next to other road, refer to a roadside unit (RSU) forming vehicle to infrastructure communication(V2I).A multicast mesh is a type of routing for ad hoc networks. Each devices receive

messages even if the device is not on the shortest path from sender to destination. This supplies richer come and go. A vehicular ad hoc connectivity, and is robust when devices Networking(VANET) functioning group has been created within the Internet Engineering Task Force (IETF) to develop a routing framework for IP-based protocols in ad hoc networks.

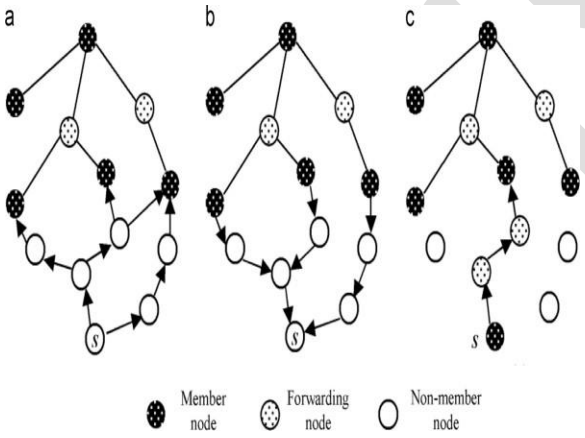
A VANET is an autonomous collection of mobile nodes communicating over wireless links, User can communicate with each other in a temporary manner with no centralized administration and in a dynamic topology that changes often. Each node participating in this network acts both as a host and a router and must therefore be willing to forward packets for other nodes.

VIII. ROUTE DISCOVERY IN VANET-AODV

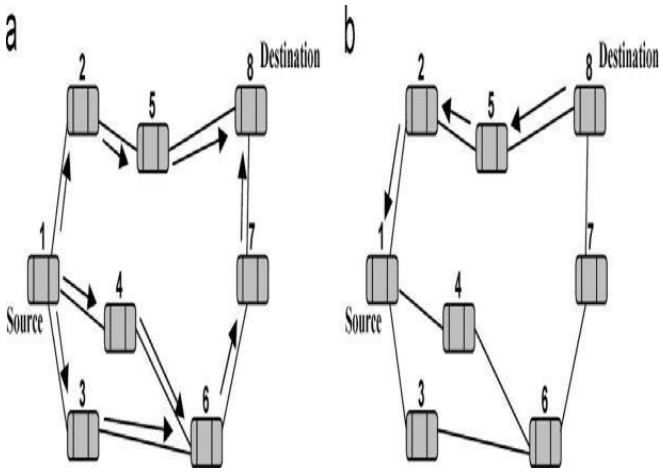
In Ad hoc on demand vector, Hello signal are used to initiate the source node of the routing protocol which are helpful to detect the neighbor node.

MAODV join operation:

(a) RREQ message
(b) RREP message
(c) MACT message



Here the request message will be send to find the trace for destination by source node, which broadcast the route request packet (RREQ), then the packet is used to broadcast RREQ by the neighboring nodes to their neighboring nodes to their neighboring nodes to their neighboring nodes until it should reach their sink node. The IP address of the source node should be carried by route request packet (RREQ), then the packet is used to broadcast RREQ by the neighboring nodes to their neighboring nodes to their neighboring nodes to their neighboring nodes until it should reach their sink node. The IP address of the source node should be carried by the RREQ packets. It also carries current sequence number, destination node of the IP address.

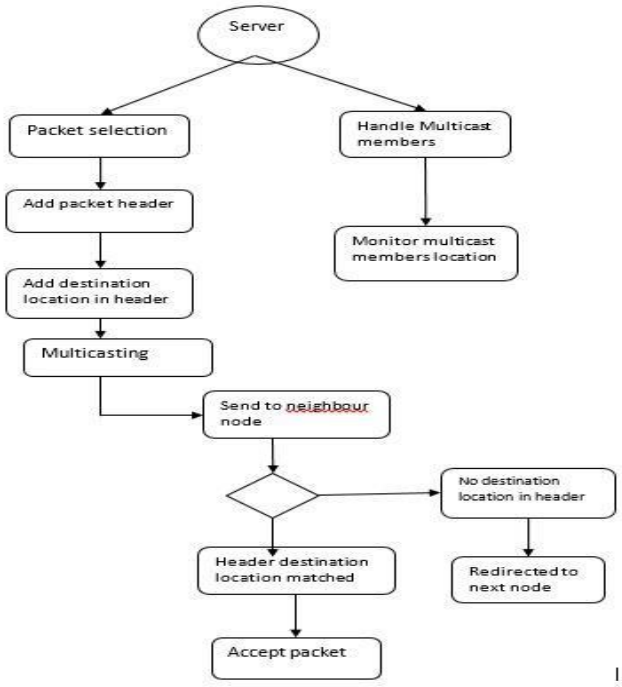


AODV routing protocol:

(a) Propagation of RREQ
(b) RREP's path to the source.

When the RREQ packets are received then the nodes are going to registered in their address of the routing table. After reaching the sink node, a route reply packet (RREP) is sent through the path from backward learning process to the source node.

Data flow diagram for Receiver based Multicasting in VANET



IX. CONCLUSION

Receiver based multicast protocol that finds the best way to forward the multicast traffic. RBMulticast stores a destination list inside the packet header, this destination list provides information on all multicast members to which this packet is targeted. Thus, there is no need for a multicast tree and therefore no tree state is stored at the intermediate nodes. So the packets are able attain a stable path. Link Stability is achieved in VANET and the problem is not occurring due to multicast traffic. Throughput will be high when we sending packets from source to destination through its neighbor node. Thus, the every packet will be traced according to certain period of time and the traced information are stored in the cloud.

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