

A Secure Node Management Distributed Services Model for RSU Supported VANET

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Abstract— Vehicular Ad hoc Network (VANETs) is a sub class network of Mobile Ad hoc Network (MANETs). It has similar behavior as MANETs but different in mobility of nodes and their nodes speed. The mobility of nodes in VANETs organized in fixed pattern and speed of nodes is very high. Basically here VANETs vehicles can communicate to other vehicles directly or via intermediate fixed architectures. Most of time on highway or rural area the density of vehicles varies a lot and if any vehicle wants communicate with other vehicle directly may faces many problems. To overcome these problems the intermediate infrastructure needs to pay a very important role. In this thesis we analysis the performance of different placement strategies called DSR, AODV protocols which are traditional ones used to provide infrastructure based relays which is called as RSU (Radio Station Unit) with mobile vehicle nodes, which has been implemented using our proposed algorithm called Secure Node Management (SNM) to find that the case when RSUs are placed at both side of road with increasing mobile vehicle nodes has better performance in comparison to other. The simulation is done by using NS2 Simulator.

Key words: VANET, RSU, DSR, AODV, SNM, NS2

I. INTRODUCTION

VANET wireless distributed networks, called ad-hoc networks, are networks with no fixed infrastructure, such as underground cabling or base stations; here nodes are having capacity of moving dynamically in superior manner. Host in network perform as routers, which discover as well as updates routes to one to one nodes in the network. A part from this major challenge in the design and development of VANET networks is the development of routing protocols that can efficiently search and find best routes among the networking nodes [3].

Routing protocols can be accessed as generally use either in distance vector routing scheme or in link state routing scheme, both of which updating the information in specific session for routing advertisements to be broadcasting node to node by each router. However, such protocols do not perform well in dynamically changing ad-hoc network environments. The limitations of mobile nodes, such as limited bandwidth, constrained power, and mobility, make designing new ad-hoc routing protocols particularly challenging. To reduce such limitations, author go through the literature survey study of on-demand routing protocols, Dynamic Source Routing and AODV routing strategies [4].

Some of existing source-initiated routing protocols like DSR and AODV, during the route discovery procedure, attempt to choose a route having the minimal number of hop-count among the available routes. However, we also knew that long distance among neighboring nodes might provides shorter link as well as maintenance time required for routing

process, this affects the routing performance and throughput measurement. In case if one found that routes are getting fails since host mobility movement, it needs additional time to reprocess the route and reconfigure it from source node to destination node, it results in higher flooding level for controlling packets. So that, we cannot say that a route with having smallest hop-count is find as optimal. To get this goal, here we discovery algorithm known as Secure Node Management algorithm.

A. Ad-Hoc On-Demand distance vector

AODV routing protocol supports various routing as well as supportive communication services like the multi-hop routing among multiple mobile nodes for securing establishing and upgrading an mobile ad hoc network. AODV working is based upon the Destination-Sequence Distance Vector strategy worked as an algorithm. The difference from other ad hoc protocol is that AODV is reactive category of protocols, on the other hand DSDV is belongs to proactive. AODV works in the way in which it requests a route only when it is required, and it does not need any mobile nodes to gets routes to the destination.

To send or get connect a message to a destination node, a source node first initiates a route discovery investigation process to locate find the destination. A Route Request process control packet is works for flooded through the network activity until it gets to accurate destination or it reaches to a required node that having the details about routing to the destination node. On its way it will through the network nodes, the Resource REQ data unit it initiates the temporary routing information for the detail path at all the mobile nodes it passes.

On the other proceeding stage, Route Reply control packet will be used to find destination by uni-cast routing from source end it brings along the routing information temporary reverse route. Routes has been chosen by the route technique used for discovery process are works as follows. If a is suffered during the process of routing and if we found that route is divided due to the movement of the source mobile node, then it will it reprocess the route discovery procedure to get a new route to reach towards to its destination. If a route is divided since the movement of a mobile node in their route, its neighboring upstream mobile node notices such type of movement then it taken action and produces link failure message through its all remaining mobile nodes of the active upstream nodes to the source nodes.

A best feature of AODV is the use of sequence numbers for ordering purpose. Sequence numbers upgrading the newness or refreshes of routing information details and to prevent from routing loops cycle. If one found the process packets sequence is greater than its previous node in the nodes routing table information, it means that the packet

having its own newer routing details and the mobile node will update and maintain its routing table based on the process to updated information. It does not support to process multi-paths from any source node to destination. Each data packet has to be to know the address and details of routing of the next hop to get its requested destination place.

B. DSR

The Dynamic Source Routing protocol having many multiple verities like is a simple and robust routing protocol developed for support and use in wireless ad-hoc networks routing services of mobile nodes. The use of source mobile node routing allows data packets routing to be loop-free, in such a way it avoids need for up-to-date routing information at the intermediate mobile nodes via packets are to be transmitted, and it allows source nodes transmitting or to caching the routing information kept securely in them. Dynamic Source Routing is comes into the category of beacon-less protocol.

During routing phase, it designs a RREQ which is flooded in entire network. The similar process used by destination nodes responds by having RREP, which carries the information in route by the RREQ packet. Each RREQ packet having a sequence number created by source node which is used to secure loop formation and to protect by multiple transmission of the same RREQ packets by intermediate mobile node that receives it through information paths. DSR is also belongs to a purely on-demand ad hoc network routing protocol like AODV. This means that a route is designed and invented in dynamic manner means only when it is needed and no preprocess of connectivity is performed during the routing process.

Since it uses flooding for route discovery, so that nodes do not accumulate network topology details except for cached routes. Destination source routing includes two main procedures like: route invention and route information updating process. Route discovery is simple used to discover a route by using routing table from a given source to a given destination, while route maintenance is used to maintain node details of previously discovered routes, since we focused on route discovery. Route discovery is the combination of two processes: RREQ packets and RREP packets.

II. LITERATURE SURVEY

In [1] proposed a protocol called —RACSP , Router Assisted Capacity Sharing Protocol in the research titles as —On Achieving Low Latency at Data Centers , protocol is specially designed to make social networking as easy as possible, now are day's network provides social services efficiently that make such application is mostly desirable for the user's in result, the production of data is higher [19]. At present data in network is growing day by day that cause high latency problem due to the heavier traffic and data volume, now network need to implement such an intelligent protocols that can manage the increasing traffic as well as data, Munir A. et al, proposed a similar type of concept in RACS protocol that make it more desirable for —High Latency Error , Today's network are getting suffer with real time social application to manage online services like web searching , searching operation based on key words skill, social networking app like face-book etc. Protocol provides Low

latency which is must to improve user experience even it is important for operator revenue , traditional protocol like Approximate Processor Sharing Protocols is used to get resolve latency error but in case if one analyze and experiment it on wire are network social application one found the performance is low [2], to make it more reliable with better performance RACS protocol has been designed that support data center's to manage continuously produced high volume of data therefore it is also known as data centers transport layer protocol works on the concept of —Minimizes flow completion times by computing Shortest Remaining Processing Time First policy that result optimal computation even for maximum processes to reduce latency on run time computation in distributed manner , in proposed protocol rate has been assigned according to the different flows ,each flow has it associate weight that determines their priority to process , rate presents information value for father process [3,4] . Weight follows different scheduling to process the process; they had ranges to get variation between differences of weight. After the Experimental analysis of proposed protocols author found that RACS Protocol is much better in performance to get low latency with protocols like TCP, DCTCP and RCP data warehouse centre. One get the result that it improve high latency error up to 95% with TCP, 88% with DCTCP and 80% over RCP in this way RACS perform outstanding compare to others [5].

In [6] proposed a protocol for the purpose of management of resource allocation and services at data centers end, research titled as—PACE your Network: Fair and Controllable Multi Tenant Data Center Network, provides a specious way to use resources intelligently and efficiently with the resource allocation and management fair share scheme in peer to peer network, Multi-tenant data centers are doing a great job to manage the current multimedia applications with user demand [7]. Every user of network want, response time should be less as much as possible such desire has been mentioned in service level agreement therefore , network resources and traffic should be manage to meet service level agreement, traditional peer to peer network error control protocol is to slow in work , responsible for data loss some times, proposed protocol —PACE specially address the solution to meet data centers requirement specially when network provides multimedia run time applications services , PACE provides network resource assignment on demand dynamically , make response time higher , fair share of available resource and bandwidth, has capability to manage high number of processes simultaneously , reduce delay, prioritized processes completion services , prioritization of flows and high allocation of upcoming new flows , the experimental analysis demonstrate that it is fair with hundreds of concurrent processes and efficient for short communication dynamic network [6].

In [8] proposed an impressive design for the management of making highly reliable and controlled network , nowadays network has been growing due to the factor of access like high scalability and availability that manage —peer to peer control with the integration of QoS Service architecture that called as —Carrier Ethernet oriented transport protocol with a novel congestion with QoS integration analytical simulated and experimental validation

, research address the way to find solution regarding carries Ethernet, it is known as more flexible, scalable, interoperability and low maintenance network model , it provides peer to peer services with quality of services integration , such type of protocol is high bandwidth delay product, therefore tradition communication protocols are considered due to the desirable choice of transport protocol [30] ,the Ethernet service transport protocol are there to manage the ability of adjusting the required transmission rate dynamically that causes network higher efficient and greater response ,according to the level of traffic pattern in the WLAN network , protocol reflect something difference with other in the way that , it make network to become capable to adjust the rate instead of detect or avoid congestion situation. Rate estimation is the main function that makes approach more valuable. Ethernet protocol incorporates quality of services for more improvement for performance factor [9, 10]

As in [11], Wireless Distributed resource sharing with quality of service specification is a key problem's that has been concerned with allocation of computing network resources in such a way that network can smoothly perform its function as an some acceptable performance state . In order to understand the peer to peer network error control problem one need to discuss resource factor and its responsibility over communication network that conceptually describes actually how and Where Congestion has been occurred?[12] there are so many situation in the network where the chances of congestion is higher due to the resource capacity and availability that could be strong barrier in order to make communication successful , if one talk about the resource planning for the best network design they first need to manage bandwidth of channel, buffer optimization and management for buffer space computation, functioning of difference processing functions to help node to participate in successful data transmission in highly congested area [13]. Anytime network can cause failure due to unrelavent design of network that affect overall communication therefore network design need to be excellent, it is always possible to get increase the capacity of resource at higher level but it is not sufficient to control peer to peer network error control , they need to implement with required specification of network and planning even at low traffic since when such traffic get increased the problem of congestion takes important for the point of view of fairness and higher throughput both are need to be consider as equally important , here one can conclude it as per it definition as —without having accurate network resource design network always go down as load get heavier [14].

As in [15] Internet services are growing day by day, now it has been working as a great accelerator of today's business for void and data communication. In order perform information process there are so many factors have been introducing that consider as a barrio for business information process. In [16] presents a novel approach for dynamic peer to peer network error control mechanism for real time streams over RTP, this research presents the mechanism to handle growing network due to the high demand and production of multimedia applications, author suppose the problem due to the massive growth in multimedia oriented application which uses data in the form of streaming like audio, video, etc such application produces big amount of data continuously causes

stress over network that result, bottleneck problem on link due to heavy congested network , to address the solution regarding the bottleneck link author proposed a reliable, dynamic peer to peer network error control mechanism known as DCCM which works on the principle of RTP for stream delivery data services , author works on the conceptual principle as they convert persistence congestion from transient congestion.

In [17], presents mechanism for wireless network belong to the services category of protocol IEEE 802.11 wide area network. Author design a novel point to point connection oriented peer to peer network error control mechanism known as —Media access peer to peer network error control — the major object behind this research is to control on fluctuate rate of sender and receiver window[18] . MACC improve the performance by having control over sending rate. so that synchronized communication can be achieve to get successful communication in wide area network ,such peer to peer network error control has been done at MAC layer to get reduce flow error occur due to congestion, MACC is useful to utilize channel capacity effectively and also capable to manage fairness at both end. Proposed model has been design after the analytical study of wired and wireless communication architecture regarding the study of congestion. In order to eliminate congestion from wireless local area network author mainly focus on the experimental study of congestion at wireless network on TCP reliable congestion less protocol.

III. SIMULATION STUDY

SNM (Secure Node Management) algorithm has been implemented in following way to get best node picker to perform efficient communication at real time VANETs.

Find the source node and destination node:

- Find how many source and destination nodes are in the network.
- Based on number of source and destination, we need to provide the load balancing for the routing process.
- Send Request from destination to source with minimum number of hop by looking the Routing table.
- Once source, got the request from the destination, the below process will get started.
- Make the empty routing table.
- Find the neighbor nodes list from the source node.

Select the particular node which is available in all the 4 tables with high priority.

- Formula: $(\text{Table1 (Priority/Number of nodes)} * 100) + (\text{Table2 (Priority/Number of nodes)} * 100)$.
- Using the above formula, fill up the routing table from source to destination to pick up the intermediate nodes.
- Once the best path formed, Pre calculation to check the path won't get break till the end of the simulation.

IV. PERFORMANCE METRICS OF DELAY VS NODE MOBILITY

Figure 5.1 shows that the delay in various protocols. Delay state that the delays in transfer of data till the destination in terms of milliseconds. Compared with other protocol, the

proposed protocol SNM transfers the packet without any delay till the destination resource.

$$\text{Average End-To-End Delay} = S/N$$

$S = (T_r - T_s)$, where T_r is the receive time and T_s is the sent time. Where S is the sum of the time spent to deliver packets for each destination, and N is the number of packets received by the all destination nodes.

In fig. 1.1 Graphical representation of SNM with traditional protocols clearly defines, SNM performing better than other since SNM provides low delay with increasing number of nodes.

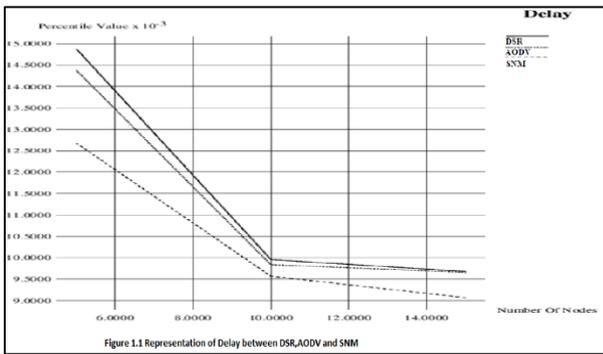


Figure 1.1 Representation of Delay between DSR, AODV and SNM

A. Throughput Vs Node Mobility

Figure 1.2 explains that the throughput value of SNM protocol. Throughput explains the speed of transfer of data till the destination resource. Compared with other protocol like- AODV protocol and DSR protocol, SNM protocol transfers the packet in very high speed.

$$\text{Throughput} = \frac{\text{Number of Packet Delivered}}{\text{Time Period Needed}}$$

Figure 1.2 represents Secure Node Management technique provides higher throughput with higher number of nodes compare to AODV and DSR.

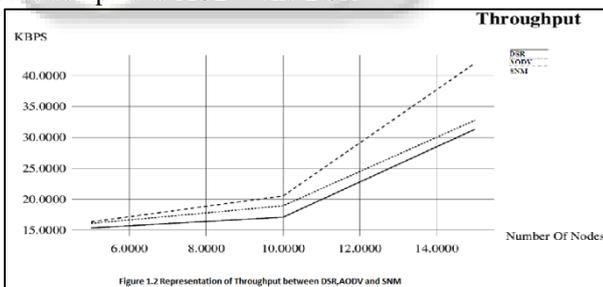


Figure 1.2 Representation of Throughput between DSR, AODV and SNM

B. Packet Delivery Ratio Vs Node Mobility

Figure 1.3 explains the packet delivery ratio of different protocols. Packet delivery ratio delivers the yields packets to the destination resource. It is expressed in terms of percentage. The proposed SNM protocol delivers the packet in the best manner with high ratio to avoid the loss of packet compared with other protocols.

$$\text{Packet Delivery Ratio} = \frac{\text{Number of Packet Delivered}}{\text{Time}}$$

Figure 1.3 represents Secure Node Management technique provides high packet delivery ratio and lower packet loss ratio from node to node in VANET.

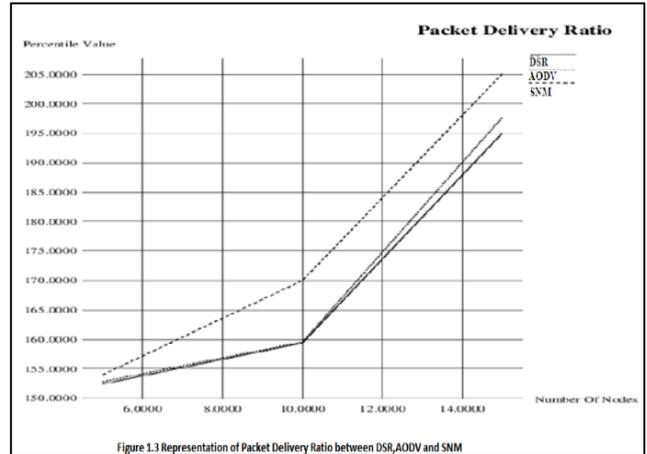


Figure 1.3 Representation of Packet Delivery Ratio between DSR, AODV and SNM

C. Packet Delivery Ratio Vs Node Mobility

Packet loss is the number of packets fails to reach to their destination. It is always recommended in wireless sensor network that it is essential to get less number of packets dropped during communication

$$\text{Packet Loss} = \frac{(\text{Total Packets Dropped} * 100)}{\text{Total Data Packets Sent}}$$

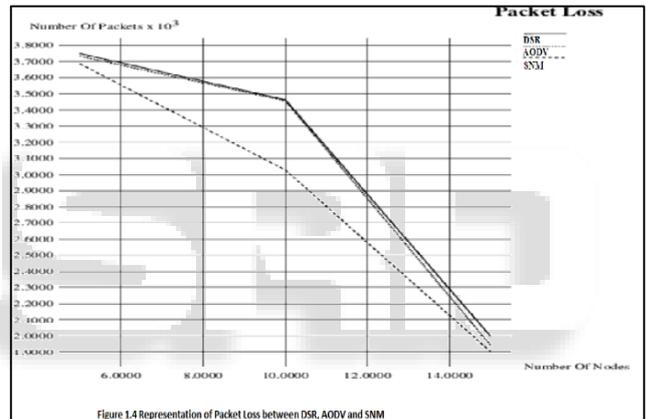


Figure 1.4 Representation of Packet Loss between DSR, AODV and SNM

V. CONCLUSION AND FUTURE WORK

This thesis focuses on the Secure Node Management algorithm and resource management for wireless VANET network and discusses the issues of VANET network on basis of performance and security. Each wireless node in a VANET network acts as a router by forwarding the packets in the network. Hence, one of the challenges in the design of routing protocols is that it must be tailored to suit the dynamic nature of the nodes. The second chapter discusses some of the other challenges faced by the designers of routing protocols for VANET network. A complete understanding of these issues will help in designing efficient and effective routing protocols..

The proposed protocol SNM transfer the data from the source resource, to the destination resource in high speed, high packet delivery ratio and without any delay with the consideration of resources distance, angle, bandwidth and energy level. Finally, we conclude that, if we follow the step by step implementation of SNM protocol in network, get a better performance in transferring data and VANET structure.

In future VANET is most valuable one since vehicle management , tracking oriented application will provides social benefits and safety condition during travel , it will

definitely reduces the complexity of driving system as well as it also reduces number of accidents and crimes as well.

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