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Study of Secure Communication in VANET–Cellular Heterogeneous Wireless Network

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***Abstract* - Inter-vehicle communication procedure have the potential to extend the protection, effectiveness, and simple transport classification linking aero plane, train, automotive vehicles, and robot. The applications unit divided into kind categories that share common communication organization and performance needs. IVC protocols unit surveyed one by one and their basic characteristics are disclosed. Power Aware Routing could be a concept in associate extraordinarily manner that it minimizes the energy consumption whereas routing the traffic, aims at minimizing the entire power consumption of all the nodes within the network, minimizing the overhead etc and so, at increasing the lifetime of the network victimization some Power Aware Routing Protocols. Therefore a review of various VANET protocols, comparison the attack is absolutely essential to originated up with new proposals for VANET. Thus this review has come up with an entire survey and comparison of different classes of VANET routing protocols.**

***Index Terms* - Cloud Computing (CC), Data Downlink Dissemination , Safety Message (SM), VANET–cellular network, vehicular ad hoc network (VANET).**

I. INTRODUCTION

Vehicular ad-hoc networks (VANETs) are networks in which vehicles are connected by wireless communication. As VANET approach in the type of Ad-Hoc Network that may be a very powerful suggests that of communication throughout floods, earthquakes or any other disaster, it became a field of analysis. Vehicular ad-hoc networks (VANETs) area networks that are created by equipping vehicles with wireless transmission equipment. VANETs offer great potential to improve road safety and to provide information and entertainment applications for drivers and passengers. VANETs and different CPSs share a number of characteristics that need basically new approaches for security, which differ from existing IT security necessities. Critical usage scenarios CPSs often control systems where failure or malfunction might have severe consequences, as well as massive loss or loss of lives. Often, these systems fall into the term critical infrastructures (CI) [1]. The connected vehicle project has become a promising solution to intelligent transportation system. As a result, many car makers are beginning to develop the connected vehicles. The development and test of connected vehicles requires many test beds in multiple locations. As the self-driving cars start appearing on roads, the network between these self-driving cars will be an essential part of driving. These cars will get more information from other vehicles and drive more safely by themselves. This is the technology can be available in the near future.

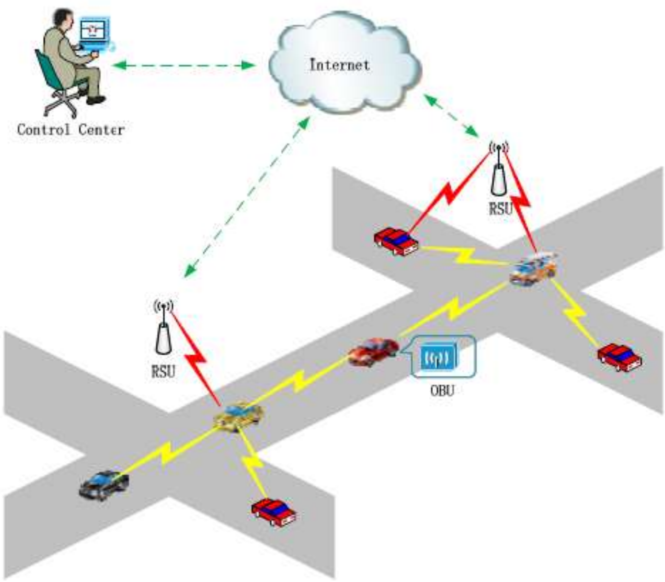

Fig.1. A typical structure of VANETs

A typical structure of the VANET is shown in Fig. 1. Communications in VANETs are often divided into 2 types: Vehicle-to-Vehicle (V2V) communication and Vehicle-to-Infrastructure (V2I) communication. Each variety of communications is controlled by a short-range wireless communication protocol, referred to as the Dedicated Short vary Communication (DSRC) protocol. By using the OBU and therefore the DSRC protocol, every vehicle will communicate with near vehicles and Road side Units (RSUs) situated at margin and may communicate with the control center through the net. Due to the wireless communication mode, adversaries against VANETs could control communication channels fairly easily, i.e. adversaries could intercept, modify, replay and delete messages transmitted in VANETs easily. Therefore, VANETs are vulnerable to many kinds of attacks [7, 8]. In observe, the vehicle or OBU should verify the validity and integrity of received messages before taking any actions as a result of the adversaries might replace or modify the first messages or impersonate some vehicle to broadcast wrong messages. These messages might cause the control center to create wrong selections and end in traffic chaos or maybe result in traffic accidents. As an example, an adversary might impersonate a machine to broadcast a message to ask the light to show green and alternative vehicles to create approach for his/her pass. Therefore, the security of messages transmitted in VANETs is very important for many practical applications.

Vehicular networks permit cars to communicate with each other and with a distinct infrastructure on the road. Infrastructures can be purely ad hoc between cars or facilitated by making use of an infrastructure. The organization typically consists of a set of so called roadside units that are connected to each other or even to the Internet.

VANET uses three systems:

(1) Intelligent transportation systems

(2) Vehicle-to-roadside communication and

(3) Routing-based communication

II. LITERATURE SURVEY

Bingyi Liu et al.[1] "Cloud-Assisted Safety Message Dissemination in VANET–Cellular Heterogeneous Wireless Network", In this paper, we have proposed a cloud-assisted downlink security message dissemination framework to effectively disseminate traffic information by exploiting the advantages of both wireless networking and cloud computing technologies. In our framework, the cloud collects massive traffic flow information and selects a set of gateways, which are buses equipped with both cellular and VANET interfaces. Once a gateway receives the message from the cellular network, it will further distribute the message to nearby vehicles by V2V communication. To minimize packet loss and redundancy caused by broadcasting, we've designed a parallel multipoint safety message dissemination approach. To judge the performance of the projected scheme, we've mathematically analyzed the dissemination delay of our scheme that is useful to know however the protection message is swiftly transmitted to the required receivers. We tend to even have verified the effectiveness of our scheme by in depth simulation experiments. These results show that the proposed scheme not only can disseminate messages efficiently and rapidly but also can significantly reduce the cellular communication cost.

Ghayet zhioua et al. [2] "A Fuzzy Multi-metric QoS-balancing Gateway Selection Algorithm in a Clustered VANET to LTE Advanced Hybrid Cellular Network", this paper existing an original algorithm based on a fuzzy logic for gateway selection from a VANET network to the LTE higher infrastructure. This new approach has been compared to the standard deterministic approached that uses the CH as a default gateway. Two clustering and CH selection algorithms have been studied and simulation results show that our protocol performs better results in terms of delay and packet loss than the deterministic approach for both algorithms. Moreover, simulations show that an efficient CH election algorithm is important to ensure good performances as with C-DRIVE higher packet loss averages have been observed than with middle algorithm. In our future works, we will focus on studying the performances of FQGwS algorithm and investigating its adaptability while performing cluster head handovers in a clustered architecture and optimizing the gateway solicitation phase where selected gateway candidate might be identical for several source nodes belonging to the same cluster specially in case of small clusters.

Qingwen Zhao et al.[3] "When 3G Meets VANET: 3G-Assisted Data Delivery in VANETs", Efficient information delivery is crucial for sensory information gathering applications of VANETs. However, we've got discovered that a clear percentage of information packets fail to be delivered even once there's a large range of vehicles within the network and lots of APs are deployed using the epidemic routing formula. Thus, it's extremely useful to use 3G to more improve the information delivery performance during a VANET. During this paper we've got created the primary plan to exploring the matter of 3G-assisted information delivery in VANETs. we've got given AN approach known as 3GDD that initial allocates the 3G budget to every time slot by resolution the ILP formulation of the initial improvement drawback, and so selects those packets that are most unlikely delivered via VANET for 3G transmissions. The packet choice is performed before whenever slot starts and this makes certain that the packet choose will replicate the most update network standing. Comprehensive simulations supported synthetic and real vehicular traces are performed and comparative results show that our approach achieves higher overall utility than the opposite different schemes.

Dongyao Jia et al.[4] "Improving the Uplink Performance of Drive-Thru Internet via Platoon-Based Cooperative Retransmission", In this paper, we've investigated the transmission performance of drive-thru internet in error-prone environments. By conjointly considering traffic quality and wireless communication, we tend to project a unique platoon-based cooperative retransmission scheme that may considerably improve the transmission performance of drive-thru web. to judge the performance of the projected scheme, we tend to developed a 4-D Markov chain to model the cooperative retransmission behavior within the projected scheme. Our scheme and analytical model are valid by in depth simulation in OMNeT++. Numerical results show that the projected platoon-based cooperative retransmission scheme not only will considerably improve the transmission output of drive through web however will significantly decrease the entire transmission times for a given amount of transfer information yet, which might cause greener mobile multimedia system communications.

Kejie Lu et al.[5] "A Disturbance-Adaptive Design for VANET-Enabled Vehicle Platoon", In this paper, we've got investigated the dynamics of a VANET-enabled platoon under disturbance. Above all, we tend to initial projected a completely unique DA-Platoon design, during which each platoon dynamics and VANET behaviors are taken into thought. With a specific design of the

DA-Platoon architecture, we have analyzed the intraplatoon dynamics, and we have identified three possible transient responses to different disturbance scenarios. Based on the analysis, we have further derived the desirable intraplatoon spacing and platoon size, under traffic disturbance and VANET constraints. Next, to mitigate the adverse effects of traffic disturbance, we have also designed a novel driving strategy for the leading vehicle of DAPlatoon, with which we can determine the desired interplatoon spacing. Finally, extensive simulation experiments have been conducted which validate our analysis and demonstrate the effectiveness of the proposed driving strategies, in terms of acceleration noise, fuel consumption, and exhaust emissions..

III. METHOD

In clouds we've totally different variety of services like Infrastructure as a service, Network as a service, software as a service etc. Auto-mobile trade are performing on integration the on board units at intervals the vehicles to the cloud platform to produce totally different services, this can be called Infrastructure as a service. The various architectures in VANET are

1. Centralized architecture: during this architecture individual vehicle is severally managed at the back-end cloud by a service supplier.
2. Distributed architecture: during this architecture the cloud is entirely managed by vehicles.
3. Hybrid architecture: during this architecture transport cloud management is motor-assisted by transport nodes and managed at the cloud level by service supplier.

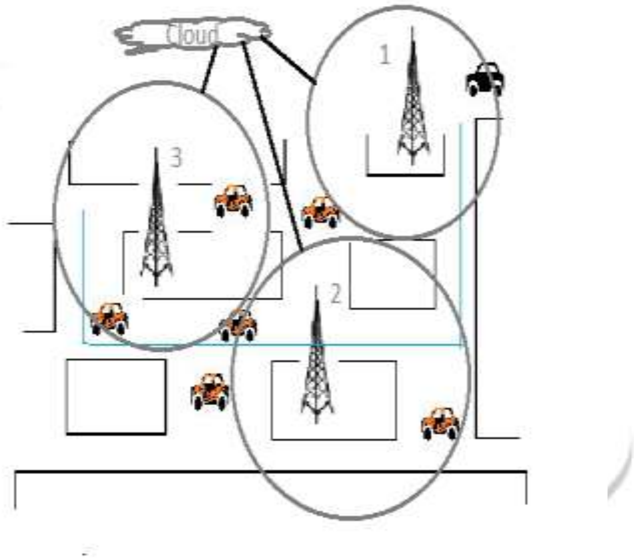

Fig.2. System Architecture

The proposed solution can be explained with the help of figure shown in figure 2. The vehicle shown in black color request for a resource from RSU1 and RSU1 starts transmitting the information. As vehicle is moving it will leave the range of the RSU1, let us suppose that at this point vehicle has received some amount of data.

The goal of this work is to make the decision of a source vehicle upon the gateway to select to connect to the LTE Advanced infrastructure. Obviously, sending the traffic of each source vehicle directly to the infrastructure without defining a gateway is in theory the ideal scheme. Thus, decreasing cellular network resources consumption, by aggregating distinct source nodes' flows to one default gateway, i.e. the CH, that handles to send them to the infrastructure seems to be an advantageous solution for a clustered VANET architecture. Therefore, the key challenge we address in this work is how to select for a source vehicle the appropriate V2I gateway while considering at the same level the QoS traffic class, the CH features and the cellular network load.

In VANET the effective way to communication is through broadcasting which results in broadcast storm problem. The communication involves sending and receiving messages, notifications and alternative application services.

Topology primarily based Protocol:- These protocols confirm the route and maintain it during a table previously the sender starts communication information. They're advance divided into Proactive, Reactive and crossbreed protocols.

Pro-active Protocol: The proactive protocol is additionally recognised as table driven routing protocol. The proactive protocols don't have initial route discovery delay however ingests heap of bandwidth for periodic updates of topology.

Re-active Protocol: These protocols are known as on-demand routing protocols as they periodically update the routing table, once some information is there to send. However these protocols use overflowing method for route discovery, that causes a lot of routing overhead and additionally suffer from the initial route detection method, that build them inappropriate for safety applications in VANET.

Hybrid Protocol: The hybrid protocols are bestowed to reduce the management overhead of proactive routing protocols and reduce the initial route discovery delay in reactive routing protocols.

IV. CONCLUSION

In survey of Cloud-assisted safety message dissemination in VANET–cellular heterogeneous wireless network and related work, some consequences occur which are summarized as conclusion of paper. In [1] authors proposed a cloud-assisted downlink safety message dissemination framework to effectively disseminate traffic information by exploiting the advantages of both wireless networking and cloud computing technologies. In [2] presented an original algorithm based on a fuzzy logic for gateway selection from a VANET network to the LTE Advanced infrastructure. This new approach has been compared to the standard deterministic approaches that use the CH as a default gateway. In [4] investigated the transmission performance of drive-thru net in error-prone environments. By together considering traffic quality and wireless communication, we tend to plan a unique platoon-based cooperative retransmission scheme that may considerably improve the transmission performance of drive-thru net.

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