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Cloud-Assisted Safety Message Dissemination in Hybrid Vehicular Network

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ABSTRACT: Inter-vehicle communication protocols have the potential to increase the safety, efficiency, and convenience of transportation systems involving planes, trains, cars, and robots. The applications targeted embody peer-to-peer internetworks for net sport, coordinated braking, runway incursion hindrance, accommodative management, vehicle formations, and many of others. the vary of the applications and their potential communication protocols has challenged a scientific literature survey. we've got an inclination to use a classification technique to IVC applications to provide a taxonomy for careful study of their communication desires. The applications area unit divided into kind classes that share common communication organization and performance desires. IVC protocols area unit surveyed one by one and their basic characteristics are disclosed. The protocol characteristics area unit then accustomed make sure the connectedness of specific protocols to specific varieties of IVC applications. This paper presents review on energy economical routing protocol for VANET (Vehicular Ad-Hoc Network). In VANET nodes area unit Vehicle so routing and power management is important issue. Power consumption can occur because of receiving the data, sending the data traffic, quality etc. breakdown of mobile node not alone affects the node itself but to boot its ability to forward packets on behalf of others and so overall network fundamental measure. it'd not be possible to replace/recharge a mobile node that is powered by batteries. to need full advantage of life time of nodes, traffic got to be routed in associate degree extremely manner that power consumption is reduced. Power Aware Routing might be an idea in associate degree extremely manner that it minimizes the energy consumption whereas routing the traffic, aims at minimizing the complete power consumption of all the nodes inside the network, minimizing the overhead etc and then, at increasing the lifetime of the network victimization some Power Aware Routing Protocols. although establishing correct and economical routes may be a crucial vogue issue in mobile impromptu networks (VANETs), a harder goal is to provide power economical routes as a results of conveyance nodes operation time is that the foremost vital limiting issue. each protocol has definite advantages/disadvantages and is analogous temperament definitely things. the aim of this paper is to facilitate the analysis efforts in combining this solutions to provide a ton of power economical routing mechanism.

KEYWORDS: VANET, Inter-Vehicle communication, Road Side Unit, Gateway, Infrastructure**.**

I. INTRODUCTION

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. Due to the unique properties of VANETs, this type of network has attracted many researchers, including those in the domain of security. The security challenges in VANETs include the requirement for strong privacy, the computationally constrained environment, and the ephemeral nature of connectivity. VANETs and other CPSs share a number of characteristics that require fundamentally new approaches for security, which differ from existing IT security requirements.

Critical usage scenarios. CPSs often control systems where failure or malfunction may have severe consequences, including massive financial loss or loss of lives. Often, these systems fall under the term critical infrastructures (CI) [1]. VANETs are one example where failure or malfunction may lead to massive congestion with subsequent delays and financial losses or even to accidents with loss of lives in worst case. Anomaly Detection (AD) systems that generate models of network behaviour for both web and database network interactions. In such multitier architectures, the back-end database server is often protected behind a firewall while the web servers are remotely accessible over the Internet.

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Unfortunately, though they are protected from direct remote attacks, the back-end systems are susceptible to attacks that use web requests as a means to exploit the back end.
No clear security perimeter. In many of these systems, there is no clear boundary between insiders and outsiders. Instead, the logically and physically distributed nature of CPSs leads to unclear security perimeters and possible insider attacks. VANETs are again a core example[3], as such networks are cooperatively formed by vehicles and road-side equipment. As vehicles are under distributed ownership and control, it needs to be assumed that some of the vehicles are under full control of attackers.

II. RELATED WORK

A new mobile infrastructure based VANET
The vehicular ad hoc network (VANET) has attracted a lot of interest recently. However, traditional VANET is just an instantiation of MANET in which nodes are treated equally for data delivery. We first analyze the unique features of urban VANET that vehicles have different types, and move as clusters due to the influence of traffic lights. Then a two tier architecture called Mobile Infrastructure Based VANET (MIVANET) is proposed. In this architecture, the buses constitute a mobile backbone for data delivery while the low tier is composed of ordinary cars and passengers. MI-VANET will not only bring the benefit that ordinary cars do not have to forward packets for other nodes, but also improve the network connectivity. The corresponding Mobile Infrastructure Registering (MIRG) and Mobile Infrastructure Routing (MIRT) algorithms are also presented. The bus line information is made full use in MIRT. Simulation results show that there is a 40-55% improvement in delivery ratio while the throughput is even doubled compared to GPSR in traditional VANET[1].

Dynamic clustering-based integrated VANET-3G heterogeneous wireless networks
The research aims for clustering gateway candidates (i.e., to be described later) according to key relevant metrics and selecting out of each cluster, a cluster head that serves as the gateway to interface VANET with the 3G network. In the existing literature, clustering within VANETs was performed based upon metrics such as vehicle velocity, inter-vehicular distance, and the direction of movement. Concerning the velocity, the variance in the speed of vehicles at different instances is not consistent. This variance in velocity results in drastic changes in the inter-vehicular distance because of the unpredictable behaviour of drivers. As a result, different clusters of vehicles may be frequently formed, subsequently resulting in significant signalling overhead, service instability, and so forth. Instead of vehicular velocity, this paper envisions using the UMTS received signal strength metric of the vehicles for dynamic clustering mechanism, due to its relatively better consistency along a pre-defined direction. This shall subsequently elaborate upon the impact of the backbone 3G network on gateways. In addition to the UMTS signal strength, the direction of movement of vehicles and their inter-vehicular distance metrics are also considered for the purpose of dynamic clustering of vehicles. In this paper, we introduced a novel architecture that integrates 3G/UMTS networks with VANET networks. In this architecture, a minimum number of gateways, per time instance, is selected to connect ordinary vehicles with the UMTS network. Route stability, mobility features, and signal strength of vehicles are all taken into consideration when clustering vehicles and selecting vehicle gateways. Gateway discovery and migration scenarios are also considered and adequate solutions are presented[5].

A fuzzy multi-metric QoS-balancing gateway selection clustered VANET to LTE advanced hybrid cellular network
Intelligent transportation systems are currently attracting the attention of the research community and the automotive industry, which both aim to provide not only more safety in the transportation systems but other high-quality services and applications for their customers as well. In this paper, we propose a cooperative traffic transmission algorithm in a joint vehicular ad hoc network-Long Term Evolution Advanced (LTE Advanced) hybrid network architecture that elects a gateway to connect the source vehicle to the LTE Advanced infrastructure under the scope of vehicle-to-infrastructure (V2I) communications. The originality of the proposed fuzzy quality-of-service (QoS)-balancing gateway selection (FQGwS) algorithm is the consideration of QoS traffic class constraints for electing the gateway. Our algorithm is a multi-criteria and QoS-based scheme optimized by performing the fuzzy logic to make the decision on the appropriate gateway. Criteria are related to the received signal strength (RSS) and load of the cluster head (CH) and gateway candidates (GwCs), as well as the vehicle-to-vehicle link connectivity duration (LCD). Simulation results demonstrate that our algorithm gets better results than the deterministic scheme for gateway selection. Moreover,

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results show the efficiency of the FQGwS algorithm as it adapts its gateway selection decision to the cluster density and the relative velocity of the source node[7].

Emergency services in future intelligent transportation systems for vehicular communication networks".

Over the years, we have harnessed the power of computing to improve the speed of operations and increase in productivity. Also, we have witnessed the merging of computing and telecommunications. This excellent combination of two important fields has propelled our capability even further, allowing us to communicate anytime and anywhere, improving our work flow and increasing our quality of life tremendously. The next wave of evolution we foresee is the convergence of telecommunication, computing, wireless, and transportation technologies. Once this happens, our roads and highways will be both our communications and transportation platforms, which will completely revolutionize when and how we access services and entertainment, how we communicate, commute, navigate, etc., in the coming future. This paper presents an overview of the current state-of-the-art, discusses current projects, their goals, and finally highlights how emergency services and road safety will evolve with the blending of vehicular communication networks with road transportation[4].

3G Vs VANET:

A sensory data gathering application of a vehicular ad hoc network (VANET) in which vehicles produce sensory data, which should be gathered for data analysis and making decisions. Data delivery is particularly challenging because of the unique characteristics of VANETs, such as fast topology change, frequent disruptions, and rare contact opportunities. Through empirical study based on real vehicular traces, we find an important observation that a noticeable percentage of data packets cannot be delivered within time-to-live. In this paper, we explore the problem of 3G-assisted data delivery in a VANET with a budget constraint of 3G traffic. A packet can either be delivered via multihop transmissions in the VANET or via 3G. The main challenge for solving the problem is twofold. On the one hand, there is an intrinsic trade-off between delivery ratio and delivery delay when using the 3G. On the other hand, it is difficult to decide which set of packets should be selected for 3G transmissions and when to deliver them via 3G. In this paper, we propose an approach called 3GDD for 3G-assisted data delivery in a VANET. We construct a utility function to explore the trade-off between delivery ratio and delivery delay, which provides a unified framework to reflect the two factors. We formulate the 3G-assisted data delivery as an optimization problem in which the objective is to maximize the overall utility under the 3G budget constraint. To circumvent the high complexity of this optimization problem, we further transition the original optimization problem as an integer linear programming problem (ILP). Solving this ILP, we derive the 3G allocation over different time stages. Given the 3G budget at each time stage, those packets that are most unlikely delivered via the VANET are selected for 3G transmissions. We comprehensively evaluate our 3GDD using both synthetic vehicular traces and real vehicular 3G traces. Evaluation results show that our approach outperforms other schemes under a wide range of utility function deflations and network configurations

III. PROPOSED ALGORITHM

The project consider a typical LBS in VANETs, which comprises an SP, some deployed RSUs affiliated to the SP, and a large number of vehicle users

$U\_ = \{U1, U2, . . .\}$........ (1)

moving around the area, as shown. The SP in the area can provide various services, e.g., the SP can help a vehicle user to find the nearest shopping mall to its current location, provide some local traffic information, or establish a virtual on-road community such that vehicle users who have common interests can talk with each other or broadcast messages in the virtual community. Because the vehicle users move along the road, the SP cannot directly reach the vehicles. Therefore, after being connected with the SP by wired links or any other links with high bandwidth and low delay, the affiliated RSUs can serve as the service gateways, i.e., RSUs can help the SP to broadcast and/or relay messages to vehicle users via vehicular communications. The stationary RSUs are usually located at the road side and perform two main functions: broadcasting and relaying. The broadcasting component is responsible for broadcasting service contents that originated from the SP to the vehicle users on the road, where the service contents can either directly reach the passing-by vehicles or reach other vehicles in a multihop manner. The relaying component helps vehicle users with forwarding some requests to the SP and also helps the SP relay the responses back to the vehicle users. In some

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cases, it could also help the SP to pre-authenticate some requests to reduce the burdens at the SP. RSU is trustable and usually equipped with not only high-storage capacity but strong computational capability as well, which causes its high cost. Then, due to the high cost, it is impractical to erect RSUs to cover the whole area, particularly at the early deployment of LBSs in VANETs. Therefore, in our network model, only a small number of RSUs are deployed at some spots.

Under the aforementioned network model and security requirements, our design goal is to develop a privacy-preserving dynamic key management scheme for LBS in VANETs. Specifically, two desirable objectives should be achieved.
1) PPA. For any LBS in VANETs, as a prerequisite for resisting various attacks, authentication needs to be conducted at the beginning of communications between a vehicle and the SP or among vehicles. However, in the civilian environment, a vehicle user may not be likely to expose its real identity to either the SP or other vehicle users. Therefore, our design should support the PPA in the vehicle-user-joining phase, i.e., the SP can check the validity of vehicle users without knowing their real identities. In addition, the double-registration check should also be conducted to mitigate the possible Sybil attacks to the LBS [24].

2) Fast and secure session key update considering forward secrecy, backward secrecy, and collusion resistance. For any LBS in VANETs, a secure session key should be employed and periodically updated when vehicle users join/ depart from an LBS session to achieve forward secrecy, backward secrecy, and collusion resistance. However, unlike other networks, VANETs are very sparse, which may cause a long delay when the key update procedures are executed. Therefore, our design should also enable vehicle users to autonomously update the session key with a one-way hash function to achieve forward secrecy for the *user-joining event* and use the VANET's unique characteristic, i.e., unidirectional communication from RSUs to vehicle and the dynamic threshold technique [26], to accelerate the key update procedure and achieve backward secrecy and collusion resistance for the *user departure event.*

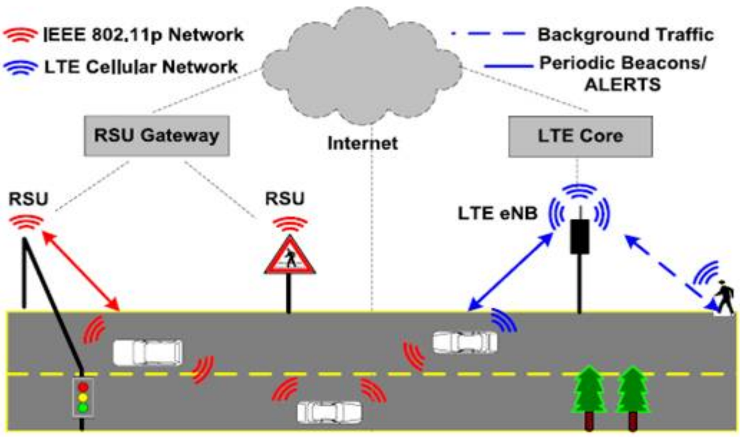

Fig 1 :Architecture Diagram of Proposed Model

IV. PSEUDO CODE

The cost involved in servicing can be calculated as the data transmitted by the time taken to transmit the data,which is nothing but the bandwidth.The payoff can be calculated as

Step 1 : Payoff P = Throughtput(TP) – Resource Cost(RC) – Transmission Rate(TR)
Step 2 : P = TPi^j – RCi^j – TRi^j
Step 3 : Where TP is Throughtput of vehicle i In RSU j
Step 4 : RC Resource Utilised by vehicle i In RSU j
Step 5 : TR is Transmission Rate of vehicle i In RSU j
Step 6 : Hi^j is the handoff cost
Step 7 : Ω * Rf *Dv

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Where Rf is the request files that have finished and Dv is the distance that vehicles have driven in RSU's coverage. Transmission Rate can be calculated as

Step 8 : TR = Amount of data sent / Time taken.
Step 9 : TR = Ad/Tt
Step 10 : DT = N/R
Step 11 : DT:Transmission Delay
Step 12 :N:Nummber of bits
Step 13 : R:Rate of transmission

V. RESULTS

The integration of knowledge associate degree communication technology with transport infrastructure and vehicles would change an array of conveyance safety, traffic potency, and motion picture applications. These applications would facilitate in considerably reducing the quantity and severity of road accidents, improve traffic management, and enhance traveller convenience. whereas there ar many forms of useful and performance demand, the most focus of this paper is on the system performance like minimum permissible delay, range (i.e., coverage distance), rate and knowledge notification, or transmission frequency. so as to supply economical network practicality, many of those needs need to be met simultaneously:

(1). Active road safety applications: Enabled by a group of elaborated knowledge each from native detector measurements and obtained from different participants inside the conveyance network, these applications offer drivers with associate degree unprecedented , intensive field of read on the driving surroundings. The goal is to decrease the chance of injuries normally and, ultimately, to cut back the quantity of traffic deaths to a minimum. System performance needs of active road safety applications embody lower latency (≤100 ms), short to long coverage distance (300 m to twenty km), minimum transmission frequency of ten Hertz, and low-to-medium knowledge rates(1 to ten kbps).

(2). Cooperative traffic potency: Cooperative traffic efficiency applications are meant to supply additional data via wireless communication links to boost the traffic flow, to boost the traffic coordination and management, and to cut back the environmental impact. Traffic regulation messages can usually be triggered by traffic management entities controlled by the authorities. System performance needs of cooperative traffic potency applications embody medium latency (≤200 ms), short to medium coverage distance (300 m to five km), minimum transmission frequency between one and ten Hertz, and knowledge rates from one to tens of kbps.

(3). motion picture: Infotainment applications offer the user with data to boost the traveller comfort/convenience or change international web services. System performance needs of motion picture applications embody comparatively longer delay (≤500 ms), short to long coverage distance which may varies from a couple of meters to full communication vary, minimum transmission frequency of one Hertz, and knowledge rates of 1 to tens or many many kbps for knowledge transmission (depending on the contents).

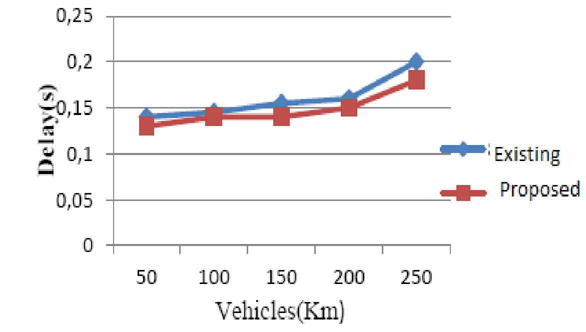

Fig.2. Compairision of delay

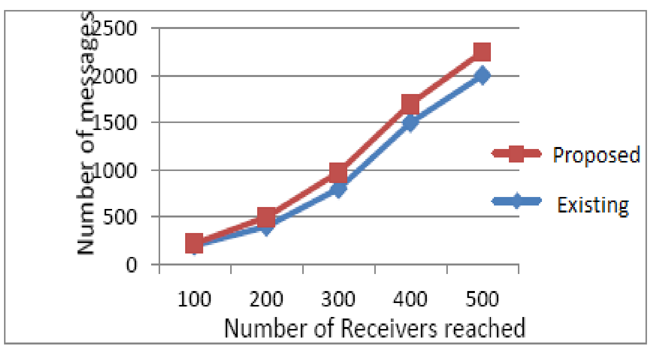

Fig. 3. Number of messages transmitted and received

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VI. Conclusion and Future Work

The simulation results showed that the proposed algorithm performs better with the total transmission energy metric than the maximum number of hops metric. The proposed algorithm provides energy efficient path for data transmission and maximizes the lifetime of entire network. As the performance of the proposed algorithm is analyzed between two metrics in future with some modifications in design considerations the performance of the proposed algorithm can be compared with other energy efficient algorithm. We have used very small network of 5 nodes, as number of nodes increases the complexity will increase. We can increase the number of nodes and analyze the performance.

We have performed Associate in Nursing intensive survey of inter-vehicle communication applications and systematically classified them into four kinds at intervals a taxonomy. This structure approach allowable us to identify the communication wants distinctive to each kind and specialise in the foremost necessary protocol vogue issues facing developers. we've an inclination to carefully reviewed these issues and lighted the alternatives victimization protocol examples taken from the past decade of research on IVC. the planning choices involve trade-offs which will greatly impact the quality of communication services provided to the applying. These were highlighted and used to analyze a representative set of protocols, that were classified by every their subject characteristics and application connexion. we've an inclination to given additional detail on elect protocols applicable to each of the printed application kinds, which we have a tendency to mentioned some necessary strengths and weaknesses of current analysis. we have a tendency to additionally thought-about the long-term evolution of inter-vehicle applications into complete transportation systems that support multiple protocols operational beneath a typical management framework. The developing paradigm of low cost, present method and wireless technologies, combined with the increasing congestion of all major transportation systems, is maybe reaching to accelerate the preparation of IVC systems over resultant decade. Effective communication will improve the protection, capacity, and convenience of motorcar systems whereas at identical time lowering ancient barriers to adoption, like infrastructure value and quality. The future extension focus on Application and protocol researchers area unit rejected on by this demand and face style of recent and existing issues. to boot, there is a general would really like for application researchers to state lots of complete communication wants, whereas remaining wise, and for protocol researchers to handle application wishes lots of comprehensively, whereas taking into account realistic operational environments. This survey may operate a begin line for these efforts**.**

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BIOGRAPHY

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