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Cloud-Assisted Safety Message Dissemination in VANET–Cellular Heterogeneous Wireless Network

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Abstract *–VANETS should be a vital features the possibility to affect people's life or death decisions. In this projected work a framework for fast message dissemination that combines the benefits of various communication and cloud computing technologies. Specially, we tend to proposed novel cloud assisted Message Downlink dissemination scheme (CMDS), with that the security message within the cloud server are 1st delivered to the appropriate mobile gateways on relevant roads with the assistance of cloud computing. VANETs have emerged as an exciting analysis and application are progressively vehicles are being equipped with embedded sensing element. Process and wireless communication capabilities opening a myriad of prospects for powerful and potential life ever-changing application on safety, efficiency, comfort, public collaboration and participation while they are on the road.*

Keywords*: Cloud Computing (CC), Data Downlink Dissemination, Safety Message (SM), VANET cellular network, vehicular ad hoc network (VANET).*

I. Introduction

Information and communication technology are the driving force behind some of the most important innovations in the automotive industry and in our society. In the last two decades, mobile communications have changed our lifestyles allowing us to exchange information, anywhere at any time. The use of such mobile communications systems in vehicles is expected to be a reality in the next years. This new paradigm of sharing info among vehicles and infrastructure can modify a variety of applications for safety, traffic efficiency, driver assistance, documentary, and urban sensing, to be incorporated into trendy vehicle styles. These applications are a reality once emerging transport networks within the types of intra-vehicle, vehicle-to-vehicle and vehicle-to-infrastructure communications are wide accessible. this is often expected to be the case since industry, telecommunication and network operators, academia, and governments worldwide are devoting expressive resources on the deployment of vehicular networks to have a more secure transportation infrastructure.

A typical application in a VCPS is to disseminate safety and traffic messages among vehicles, including accident warning, congestion information, route suggestion, etc., by dedicated short-range communication (DSRC)-based VANETs. In general, such VANETs provide two types of wireless communications, i.e., Vehicle-to-vehicle (V2V) communication and vehicle-to-infrastructure (V2I) communication, respectively. Based on them, many VANET-based message dissemination schemes have been developed. Although these VANET-based schemes are viable, it is still challenging to timely and reliably disseminate messages to a targeted area under the inherently intermittent vehicular networking environment, due to the limited transmission range of DSRC as well as the contention-based carrier-sense multiple access with collision avoidance (CSMA/CA) scheme in IEEE802.11p protocol. In this context, a transportation infrastructure more secure means to provide information about traffic jams, accidents, hazardous road conditions, possible detours, weather conditions, and location of facilities (e.g., gas stations and restaurants); more efficient means an increased road network capacity, reduced congestion and pollution, shorter and more predictable journey times, lower vehicle operating costs, more efficient logistics, improved management and control of the road network, and increased efficiency of the public transport systems. Vehicles can also be used to collect, analyze and share knowledge of and Area of Interest (AoI) [60] in applications such as civilian surveillance (photo shots of violence scenes in progress sent to public authorities via infrastructure),pollution control, roads and traffic planning and in numerable others urban aware applications.

Finally, more enjoyable means to provide Internet access, tourist/advertising information, social media on the road, guidance for people to follow each other on the road, games, file downloads, and social applications (e.g., micro blogs and chats). These applications are typical examples of what we call an Intelligent Transportation System (ITS), whose goal is to improve security, efficiency, urban awareness and enjoyment in transportation systems through the use of new technologies for information and communication.

II. VANET

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.1. Intelligent Transportation Systems

The inter-vehicle communication conformation Figure no: 1 uses multi-hop multicast or programme to transmit traffic correlated information over multiple hops to a group of receivers. In intellectual transportation systems, vehicles need only be concerned with activity on the road forward and not behind.

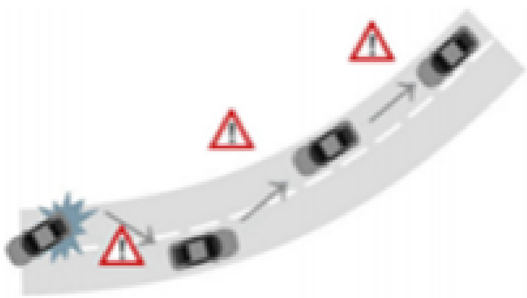

Fig.1 intelligent transportation systems

II.2. *Vehicle-to-roadside communication and*

The vehicle-to roadside communication formation Figure no: 2 characterizes a single hop transmission where the roadside unit sends a broadcast message to all prepared vehicles in the vicinity. Vehicle-to-roadside communication formation provides a high bandwidth link between automobiles and roadside units. The roadside units may be placed every kilometre or less, succeeding high data rates to be continued in heavy traffic [4].

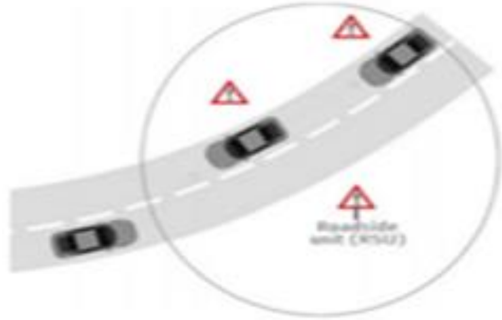

Fig: 2 Vehicle-to-roadside.

II.3. Routing-based communication:

Full The routing based communication arrangement Figure no: 3 is a multi-hop unicast where a message is broadcasted in a multi Figure no. 3 Routing based announcement hop fashion until the vehicle carrying the anticipated data is reached. When the request is received by a vehicle preserving the desired piece of information, the application at that vehicle instantly sends a unicast message containing the information to the vehicle it established the request from, which is then exciting with the task of forwarding it towards the query source.

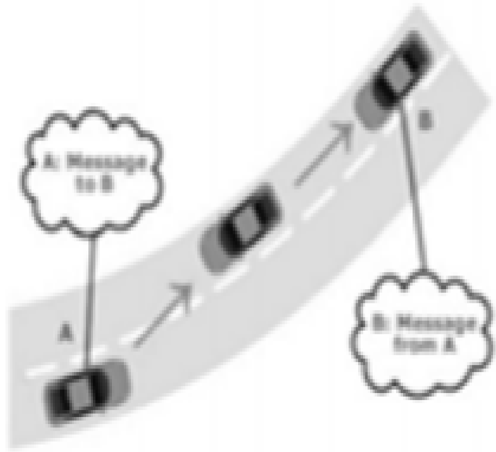

Fig. 3 Routing Based Communication

A numerous of applications are intended for these systems, some of which are already probable in some recently designed vehicles Figure no: 4

- Vehicle collision cautioning
- Safety distance warning
- Motorist assistance
- Co-operative driving
- Co-operative cruise control
- Distribution of road information
- Internet access
- Map location
- Instinctive parking
- Driverless vehicles

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Fig: 4 Various VANET applications

III. Method

In the proposed system used in the tool was sumo sim tool Cloud-Assisted safety Message Dissemination in VANET–Cellular Heterogeneous Wireless Network. The development of "Simulation of Urban Mobility", or "SUMO" for short started in the year 2000. The major reason for the development of an open source, microscopic road traffic simulation was to support the traffic research community with a tool into which own algorithms can be implemented and evaluated with, without the need to regard all the artifacts needed to obtain a complete traffic simulation, such as implementing and/or setting up methods for dealing with road networks, demand, and traffic controls. By supplying such a tool, the DLR wanted to i) make the implemented algorithms more comparable, as a common architecture and model base is used, and ii) gain additional help from other contributors.

Two major design goals are approached: the software shall be fast and it shall be portable. Due to this, the very first versions were developed to be run from the command line only - no graphical interface was supplied at first and all parameter had to be inserted by hand. This should increase the execution speed by leaving off slow visualization. Also, due to these goals, the software was split into several parts. Each of them has a certain purpose and must be run individually. This is something that makes SUMO different to other simulation packages where the dynamical user assignment is made within the simulation itself, not via an external application like here. This split allows an easier extension of each of the applications within the package because each is smaller than a monolithic application that does everything. Also, it allows the usage of faster data structures, each adjusted to the current purpose, instead of using complicated and ballast-loaded ones. Still, this makes the usage of SUMO a little bit uncomfortable in comparison to other simulation packages.

The ever increasing world population, added to the always present need of human transportation, makes road traffic in the big cities a huge and urgent issue, and, consequently, the target of substantial investigation. This paper introduces the first task of a larger project called COSMO. Using the city of Coimbra as the base, the goal of this project is to simulate the city traffic using a micro traffic simulator. For that, the SUMO platform was used and different experiments were conducted varying the number of cars being simulated, as well as other variables. At the end, the results show that the selected simulator was capable of simulating the Coimbra urban traffic in a realistic fashion, using an origin destination matrix based on real data and routing algorithms. These results show that the simulator can be used in future works related to urban traffic, namely in road network management.

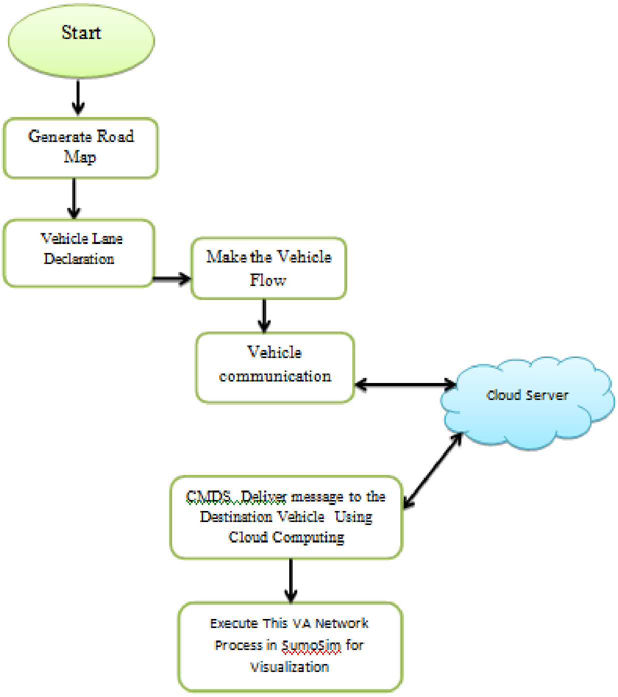

Fig 5 Flow diagram of proposed work

IV. Testing of Product

System testing is the stage of implementation, which aimed at ensuring that system works accurately and efficiently before the live operation commence. Testing is the process of executing a program with the intent of finding an error. A good test case is one that has a high probability of finding an error. A successful test is one that answers a yet undiscovered error.

Testing is vital to the success of the system. System testing makes a logical assumption that if all parts of the system are correct, the goal will be successfully achieved. The candidate system is subject to variety of tests-on-line response, Volume Street, recovery and security and usability test. A series of tests are performed before the system is ready for the user acceptance testing. Any engineered product can be tested in one of the following ways. Knowing the specified function that a product has been designed to from, test can be conducted to demonstrate each function is fully operational. Knowing the internal working of a product, tests can be conducted to ensure that "al gears mesh", that is the internal operation of the product performs according to the specification and all internal components have been adequately exercised.

V. RESULTS

In figure 6 cloud assisted safety message dissemination in VANET-Cellular Heterogeneous wireless Network project starting window is shown on which starting button is shown in which after click on it next window is pop up .

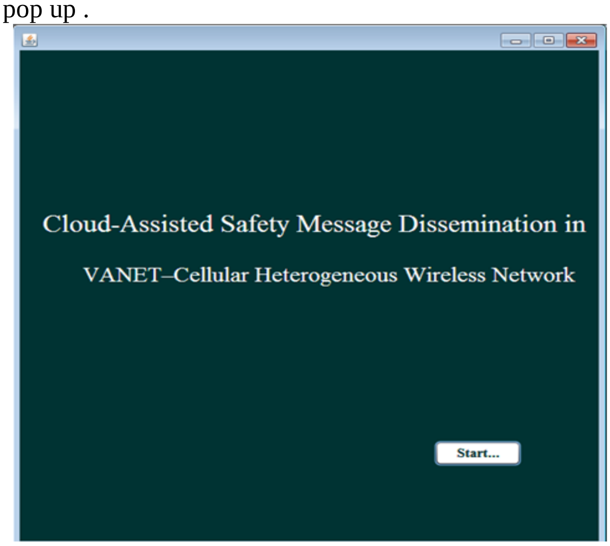

Fig 6:- Starting of Project user interface

Figure 7 shows the selection of road map from browse method from file, select appropriate road map which is shown into the file path, after that click on view map, then map of selected road should be shown after that click on next button.

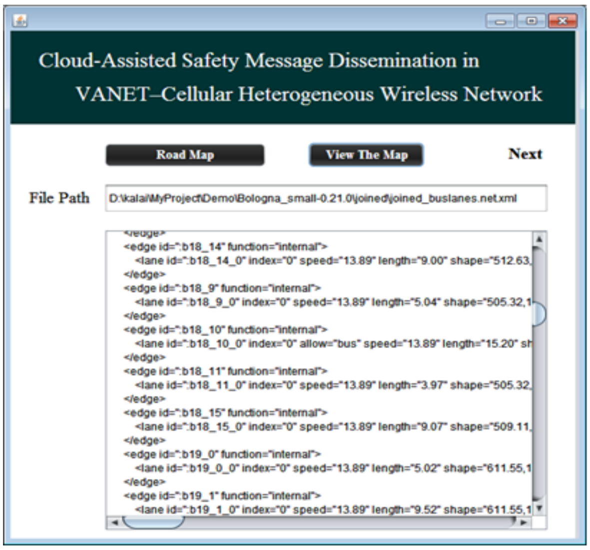

Fig 7:- Road map selection and map view key window

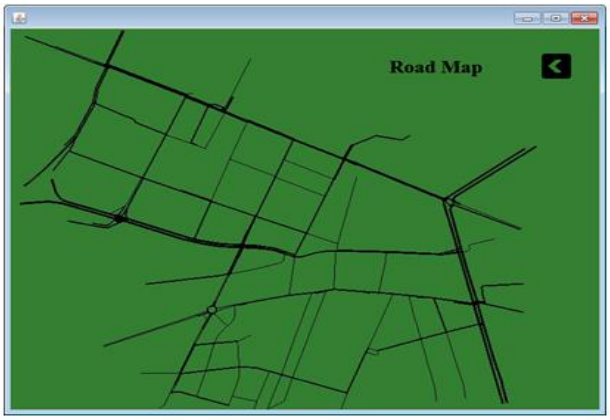

Fig 8:- Road map window

Figure 8 shows the selected road map which is selected from file browsing method.

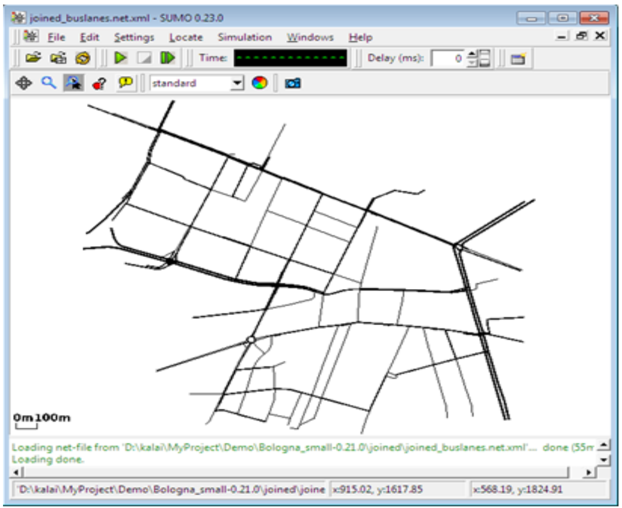

Fig 9:- Sumo window for simulation

Figure 9 shows the sumo window which is the simulation window in which lane is selected from network in which road map is inserted.

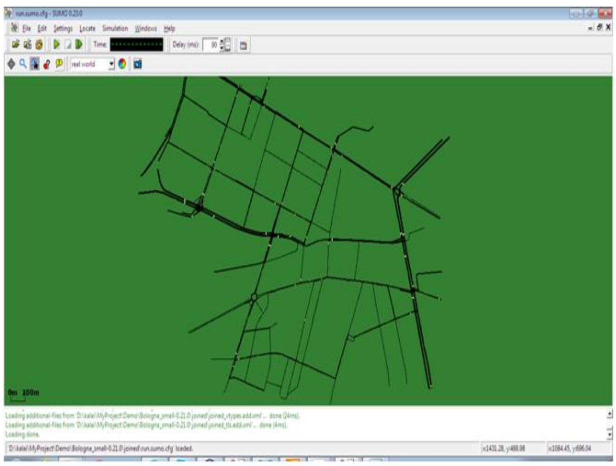

Fig 10:- Sumo window with Real word simulation path

Figure 10 shows the sumo window which is the simulation window in which lane is selected for real network in which road map is inserted.

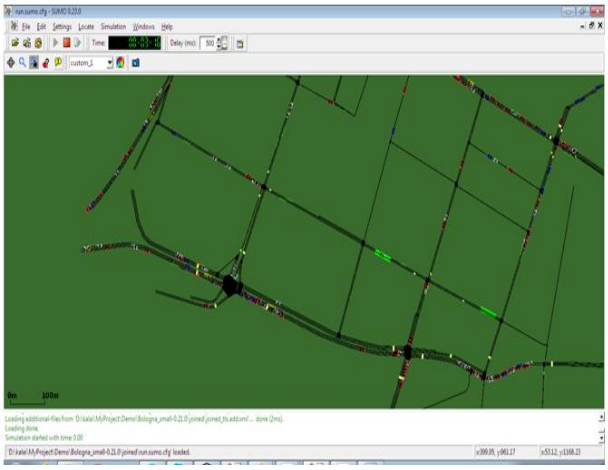

Fig 11:- Sumo window with Real word simulation path after simulation run

Figure 11 shows the sumo window with real window simulation output.

VI. Conclusion

In this paper, we have 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 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 have designed a parallel multipoint safety message dissemination approach. To evaluate the performance of the proposed scheme, we have mathematically analyzed the dissemination delay of our scheme, which is helpful to understand how the safety message is swiftly transmitted to the desired receivers. We also have verified the effectiveness of our scheme by extensive 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.

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