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DESIGN OF A VEHICULAR Ad-Hoc NETWRORK (VANET)

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Abstract - *Today wireless communications is becoming the most usable form of sending data, and the most active research field. In this I will present one of the most applicable forms of the Ad-Hoc networks; the Vehicular Ad-Hoc Networks. VANET is the type of technology of creating a Ad-Hoc network with robustness between vehicles and each other, as well as, between mobile vehicles and with all roadside unit also. The basic or main concept of using this technology is very simple, take the universally accepted and cheap wireless local area network (WLAN) technology that will connect nodes computers to one another and the Internet, and, within a some tweaks, will install this on all the vehicles. If it was rightly said that straight, the currently active VANET research of community will likely to have never made and this is my thesis will have never been written.*

Keywords: Robustness, Data, Mobile, Roadside, Wireless

1. INTRODUCTION

The basic or main concept of using this technology is very simple, take the universally accepted and cheap wireless local area network (WLAN) technology that will connect nodes computers to one another and the Internet, and, within a some tweaks, will install this on all the vehicles .If it was rightly said that straight, the currently active VANET research of community will likely to have never made and this my thesis will has never been written. If I say all the vehicles can go direct to communicate with one another and with also infrastructure, then there will new paradigm for all of the vehicle's safety uses can be created. Even any other non-safety applications will can greatly can enhance any road and also the vehicle performance. Second point, new challenges are to be created by fast vehicle speeds and operating environments. Third point, new need that we required by any new safety-of-life uses, applications, taking into the new expectations for fast packet delivery and total packet's latency. Furthermore, customer's acceptance as well as governmental thought would bring more expectations of our privacy and security. Even today, vehicles generate and analyze large amounts of data though hardly this data will be self-contained in a vehicle and we can say with a VANET, the horizon of our awareness for all of the vehicles or driver will increase. Now communication in technology VANETs can be done by directly among vehicles as one-using hop communication, or when vehicles will retransmit messages anytime, therefore it will enable the our so named multihop communication. In our order to be increased coverage or for the robustness of its communication, it will stand only at the any roadside will be deployed. Roadside infrastructure is can also be utilized as a path to the Internet and, therefore, context and data information could be collected, can be stored and then processed anytime (e.g. the upcoming Cloud Computing1). Figure 1.1 describes full overview of a Vehicular Adhoc Networks (VANETs).

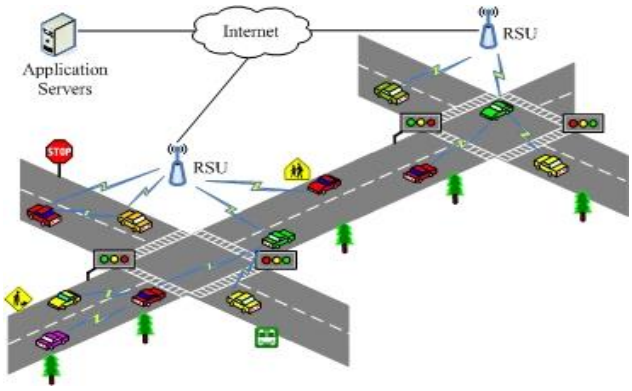

Figure 1: Overview of a VANETs

1.1 Overview of Communication System in VANETs:

This section presents the CAR-2-X (with this term it is intended car-to-car and car-to-infrastructure communication) system architecture and details of Geocas protocols [32] that serve as a basic building block for CAR-2-X communication in many European R&D projects. The in-vehicle domain refers to a network logically composed of an On-Board Unit (OBU, which is responsible for CAR-2-X communication) and (potentially multiple) Application Units (AUs). It also provides communication services to AUs and forwards data on behalf of other OBUs in the ad hoc domain. An OBU is equipped with at least a single network device for short-range wireless communications based on IEEE 802.11p radio technology, and may also be equipped with more network devices, for example, for non-safety communications, based on other radio technologies such as IEEE 802.11a/b/g/n. The distinction between AU and OBU is logical: they can also reside in a single physical unit. The ad hoc domain, or vehicular ad hoc network (VANET), is composed of vehicles equipped with OBUs and stationary units along the road, termed road-side units (RSUs). OBUs form a mobile ad hoc network (MANET), which allows communications among nodes in a fully distributed manner without the need for centralized coordination. OBUs directly communicate if

wireless connectivity exists among them. In the case of no direct connectivity, dedicated routing protocols allow multihop communications, where data are forwarded from one OBU to another, until they reach the destination. An RSU can be attached to an infrastructure network, which in turn can be connected to the Internet. As a result, RSUs may allow OBUs to access the infrastructure. In this way it is possible for AUs registered with an OBU to communicate with any host on the Internet, when at least one infrastructure-connected RSU is available.

1.2 Characteristics of VANET

The main characteristics of VANETs can be summarized as follows

- High mobility of our nodes
- No prior information or any kind of data about the exact location of neighbor nodes
- Predictable topology (to some extent)
- Critical latency requirement especially in cases of safety related applications
- No problem with overall power
- Slow migration rate
- High possibility to be fragmented
- Crucial effect is there of security and privacy

2. VANETs APPLICATIONS:

According to the DSRC, VANETs has a large number of applications . Few of them applications shown below are :

- **Warning of Co-operative Collision:**

It is an OBU-to-OBU safety based application, which may be used in case of if there is change in speed or direction of driving .

- **Warning of Lane Change*:***

This type of application will only depend on broadcasting.

- **Warning Intersection Change:**

It is an OBU-to-RSU type safety based application.. This type of application always use only broadcast type of messages.

- **Warning of Rollover:**

It is an OBU-to-RSU type safety based application. It will broadcast only information related to curve angle and condition of roads so that, coming vehicles may determine the large possible speed.

- **Warning of Work Zone:**

It is an OBU-to-RSU type safety based application. A RSU is situated in work zones so that they can warn coming vehicles of the danger of probable and will ask them to reduce the speed and change the direction of driving lane.

- **Decoupling/Coupling:**

It is an OBU-to-OBU type non-safety based application which is used to link various trucks or multiple buses into a train to reduce the given distance and time of traveling and to reduce rear-end accidents.

- **Communication of Inter-Vehicle:**

It is an OBU-to-OBU type non-safety based application which will make travelers enable to communicate among one another using the file transfer of instant, chatting voice or we can say even video calling or chatting.

- **Electronic Toll Collection (ETC):**

It is an OBU-to-RSU type non-safety based application which will supports the payment's collection at toll plazas by taking the use automated systems to improve the operational throughput.

3. CONCLUSIONS

For the safety traffic, each and every vehicle will send messages one after another that are, called "beacons". In very crowded traffic situations beacons maybe responsible for very high congestion, thus decreasing the chances of safety messages. Therefore a transmission power control methods are needed to face these kind of problems.

- The performance of the network will slowly improve as number of node density will increase.

- The performance of network in form of PDR, output and delay of network considerably increase when formation of cluster will be included in the network.

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