Issues and Challenges in Vehicular Ad Hoc Networks using Wireless Technology

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Abstract—Vehicular Ad-hoc Networks (VANETs) is a class of wireless Ad-hoc network with the characteristics of high node mobility and rapid transform in the topology. The Vehicular Networks can provide wide variety of services, range from safety-related warning method to refined routing mechanisms and information related applications. Researchers identify the issues related to the vehicular communications includes, network architecture, protocols, routing algorithms and security. Here we proposed a reliable integrated VANETs system architecture comprises Vehicle to Vehicle (V2V) and Vehicle to Infrastructure (V2I) communication based on Wi-Fi technologies to build heterogeneous vehicular network structure. Then we design routing protocols for VANETs communication with high node mobility of vehicles and dynamic topology to improve delay performance, communication delay, communication overhead, and time complexity as low beneath the vehicular constraints of speeds, high dynamic topology, and channel bandwidths. Next we concentrate on Security and Privacy feature to manage the data dissemination in VANETs. Finally, Field Operational Tests (FOTs) is performed to solve the unknown and critical system properties in a large and complex system with technology components.

Keywords—VANETs; V2V; Routing Protocol; Challenges;

I. INTRODUCTION

VANET is a possible solution to design networks that can solve traffic congestion problems for short range communication [1, 2] limited up to 1Km. Vehicle equipped with V2V devices can serve the purpose of dedicated short range communication [3, 4]. If density of vehicles is low or if the vehicle is breaks down, V2V will cease to be effective, it cannot solve the problems of early warning over a large range so as to allow vehicles to take alternate routes [5, 6, 7]. The V2I is the other possibility which offers larger range and other benefits that occur from longer range. It has long range and data processing and transmission of message to a full region covering all vehicles, but large resource is needed as communication towers are very expensive [8]. V2I Communication range depends on its power and spacing between the towers [9, 10, and 11]. Traffic congestion is a serious problem on express Highway and in urban areas. The accident happens due to the misbehavior of the driver, weather conditions and failure of vehicles. Due to this, vehicles are either stand still or moving with very low speed. Few hours or few days it may take to clear the Traffic Congestion.

II. OBJECTIVE AND SCOPE

VANETs are an incredible self-organizing network of Intelligent Transportation System (ITS). The main objectives are,

• To improve the performance of communication, we extend our focus on designing a reliable integrated system architecture that can make use of multiple different technologies (e.g., IEEE 802.11p DSRC, WAVE, ITS G5, Wi-Fi, or 3G/4G) and heterogeneous vehicular networks.

• To design good routing protocols for VANETs communication with high mobility of vehicles and high dynamic topology.

• By designing vehicular communication is to provide good delay performance with the low communication delay, the low communication overhead, and the low time complexity under the vehicular constraints of speeds, high dynamic topology, and channel bandwidths.

• To improve the Security and Privacy we obtain the mainstream solution still relies on “key pair / certificate / signature.”

• Need to improve the performance on Safety application and Traffic monitoring application that helps to add security to these networks so that damage to life and property could not occur.

The most favourable target is the more useful, efficient and safer roads will built through vehicular networks by informing to basic authorities and drivers on time in the future. Another target is to discover the advancement of vehicular Ad-hoc networking (VANET) wireless technologies. The purpose is to secure and to make possible commercial requests through range of communication systems or other networks (VANET). These technologies would support main concern for critical time secure communication and fulfill the Quality of Service (QOS) needs of other multimedia software or e-commerce mobile. Next goal to create high presentation, extremely measurable and secured technologies of VANET shows an unusual challenge to the investigate community of wireless. So far, the specific restrictions normally assumed in Ad-hoc networks are alleviated in VANET. Such as, VANET might assemble comparatively huge means of computational.
III. LITERATURE REVIEW

Over wireless network many schemes and algorithms were studied, experimented to solve traffic Congestion problems in [1] discuss about Congestion Detection using CDCA algorithm and shows the one effective way to detect congestion. In [2] multi agent based congestion control scheme are explained, which intensely get hold of the status of the adjacent node information and decides the safe delivery of packets with congestion free path. This gives guarantees the trustworthiness and messages delivery. In [3] implement an algorithm for fine-tuning the Distributed Fair transmits Power Adjustment for VANETs congestion control approach. The beacon congestion matter in VANET were deal in [4] here congestion detection and control scheme were explain ,safety application have need of timely and steadfast broadcasting of the event driven forewarning message address.

In [5] proposed and implement algorithms here Carrier Sense (CS) threshold value can be assigned vigorously for fine tuning, the distributed fair transmit power adjustment D-FTPA of VANET congestion control approach. The D-FTPA algorithm can be used any situation i.e. traffic and non-traffic condition. The study of exiting congestion control algorithm to solve the congestion problems were discuss in [6] also depict the limitation and advantages of congestion control algorithm. Adaptive multichannel approach discussed in [7] based on current traffic condition the flexible multichannel usage, average packet delay and throughput parameters are studied for system performance. Probability model checking techniques were used to analyzed the congestion control protocols also investigate the correctness of the system were explain in [8].

In [9] discuss the research challenges and issues also the explain the various techniques which control the load on radio channel, cooperative system were explain for congestion control. Using different system parameter the routing protocol performance was discussed and simulate using NS-2 Network simulator in [10]. MAC-to-MAC delay reliability, Decentralized congestion control (DCC) state stability parameters were consider for performance analysis to control the congestion in VANET, also active DCC multistate method proposed in [11].

IV. ISSUES AND CHALLENGES

The main issue in VANET is network connections may not be stable for a long time period. The three aspects of VANETs research issues are routing, security and privacy, and applications.

- Security and Privacy presents many solutions that come at significant drawbacks. For instance, VANET is time critical where safety related message should be delivered with 100ms transmission delay. Even authenticate node can perform malicious activities can disturb the network.
- To discover previously unknown and critical system properties. Besides, validation has become more difficult under the wider range of scenarios.
- VANET applications are still need to be addressed in order to enable the deployment of VANET technologies.

V. CONCLUSION

VANETs are efficient in terms of communication between moving vehicles. In this paper numerous research issues and challenges have presented and security issues have been addressed. It has been discovered that a novel approach on VANETs method based on wireless technology is utilized to make reliable communication between V2V systems. From this short survey it has been realized that standard protocols must exist that enables effective communication for various applications all together in a multidimensional way and overcome issues related to VANETs applications and also provides better V2V platform and communication with advanced technology.

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REFERENCES


