Chapter 31
A Detailed Study on Security Concerns of VANET and Cognitive Radio VANETs

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ABSTRACT

Wireless ad hoc networks are dynamic networks in which nodes can move freely in the network. A new type of Vehicular Ad Hoc Network (VANET) that allows smart transport system to provide road security and reduces traffic jams through automobile-to-automobile and automobile-to-roadside communication. In this, vehicles rely on the integrity of received data for deciding when to present alerts to drivers. Because of wireless network the VANET messages are vulnerable to many attacks and the security concerns are also major issues. So, with respect to these methods, this article will discuss the Denial of Service (DoS) attack, masquerading, and their vulnerabilities. Also, it classifies the securities and their prevention mechanisms in overcoming these security issues in VANET and Cognitive Radio VANET perspectives.

INTRODUCTION

Nowadays VANET are the most important and upcoming recent technology which allow many vehicles to communicate with each other with in a network. In common, a VANET is formed from a number of vehicles which are in the same road to form ad-hoc network. In the presence of these networks will create the way for a wide range of applications such as travelling safely, mobility and connectivity for both

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driver and passengers to exploit the transport systems in a smoothly, efficiently and safer way. There are three most common component in VANET they are onboard unit (OBU), Road side unit (RSU) and Application unit (AU) for communication among vehicles. And it is the challenging research area to provide an Intelligent Transportation System (ITS) services to every user in the network. Every vehicle with in that network will be installing (OBU), which will integrate the respective vehicles where the micro-sensors, embedded systems, wireless communications, and Global Positioning System (GPS) would be there in the vehicle (Al-Sultan et al., 2014; Jiang et al., 2006). In this VANET the Cognitive Radio (CR) is introduced and it is used as extended application in wireless communications. This Cognitive radio verifies the availability of electromagnetic spectrum and permits the waves for the transmission parameter. Here the communication takes places in open air medium. Wireless networks lack the complexities of infrastructure setup and administration, enabling devices to create and join networks “on the fly” – anywhere, anytime. A wireless ad hoc network is a type of computer-to-computer connection. In ad hoc mode, one can set up a wireless connection directly to another computer without having to connect to a Wi-Fi access point or router.

COMPONENTS

On Board Unit (OBU)

This OBU is the central processing power where the vehicular node is installed in vehicle. This unit can contain a variety of devices that are used for communication and information processing like:

- A processor that are processing the application to obtain the communication protocols.
- A wireless transceiver is used to transmit and receive data among itself, other vehicles and with road side units.
- A GPS is used here for viewing the vehicles location.
- A set of sensors is used to measure various parameters which can then be processed in a distributed network. Special sensors can also be used to measure driver’s mental status.
- Network interfaces used for VANET are IEEE 802.11p card and other networks like Bluetooth and infrared for communication.

Mode of Operation

Once the data has been entered, the vehicle gets activated for automatic system by comparing the GPS signal and information from positioning sensors with the motor network information, the OBU automatically detects whether the vehicle is on a route segment, and determines which segments are used. Based on the route and vehicle data that has been saved automatically, OBU can calculate the toll charges, saves this information, and transmit it through radio signal (GSM) to the computing center.

Application Unit (AU)

The application layer of the network is intended to provide a safety measures and non-safety applications. AU is a device with input output interfaces like monitor, keypad, headphone jack, USB port etc

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