



## Efficient Approach for Network Intrusion Detection System in VANETs

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**Abstract**— Vehicular Ad-hoc Networks (VANETs) are becoming wide technology in traffic system. This type of networks has great potential to improve road safety and reduce the number of accidents via the exchange of alert messages between the neighbourhood vehicles. The unwanted data can disturb the network communication. The wrong information or malicious data can jam the traffic on roads. Security is lost when a user or group of users try to send invalid information into the network. The aim of this paper is to give an overview of intrusion detection techniques and malicious data detection in VANETs

**Keywords**—VANETs, Intrusion detection, Ontology, Security.

### I. INTRODUCTION

Vehicular Network (VANET) is a form of Mobile ad-hoc network, to provide vehicles to communicate with each other in a peer-to-peer manner without any access points. In VANET, there is no fixed infrastructure. This type of network is used to reduce the number of accidents via the exchange of alert messages between the neighborhood vehicles.

Several solutions to these problems are proposed, the symmetric cryptography, authentication and secure routing protocols, the problem of these solutions is that they are mostly specialized for a specific attack. In addition, they do not offer the possibility to detecting new attacks, nor even to defend the network against internal compromise nodes[5].

Security always remains a challenging task in VANETs due to the high mobility of the nodes[5]. While nodes share the information with other nodes, these are the chances of leakage of information sent by one node to other. In such a case, we say that nodes are compromised the nodes that access the information of the other nodes in an unauthorized manner to breach the integrity and availability are called as intrusions detection in the network.

#### Characteristics of VANET

VANETs have unique attractive features over MANETs, the key hindrance in operation of VANET comes from the high speed and uncertain mobility of the mobile nodes (vehicles) along the paths [2]. The feature of VANET mostly resembles the operation technology of MANET in the sense that the process of low bandwidth, Radio Transmission criteria, self management, self organization.

- Predictable Mobility: -If the current velocity and road trajectory information are known, then the future position of the vehicle can be predicted.
- Higher transmission power and storage:- The network nodes (vehicles) in VANETs are usually equipped with higher power and storage than those in MANETs. The movement of the network nodes in a VANET can be predicted because they move on a road network
- Higher computational capability: - Operating vehicles can afford higher computing, communication and sensing capabilities than MANETs.

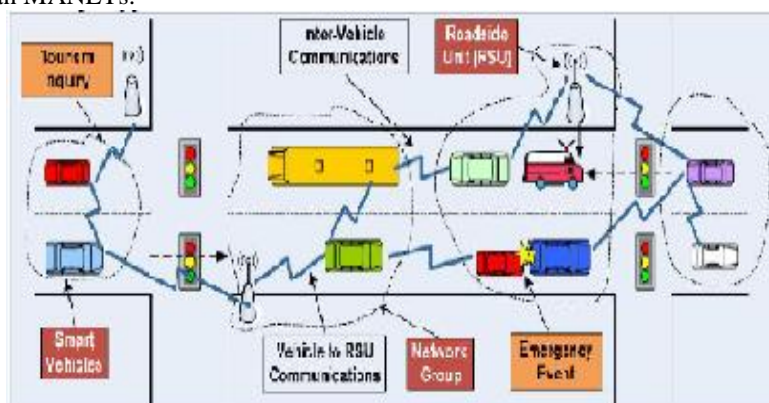


Fig1.A Basic Structure of VANETs

## II. RELATED RESEARCH WORK

### 1. An Ontology-Based Intrusion Detection

Ontology is used in the field of semantic web and refers to a structured set of concepts in a particular field of knowledge[2]. In this Paper provide a complete classification which takes into account the impact of attacks and intrusions on the offered service. Concepts are defined in relation to each other using a graph model to organize knowledge within an Ontology. Manipulation of knowledge and which enables reasoning.

□ **High Level Ontology:** Highest level of abstraction The first class, Attacks includes all concepts related to the intrusion.

□ **Ontology types of attacks:** show a clear separation between the types of attacks.

□ **Ontology of possible vulnerabilities:** The class vulnerabilities of upper High Level Ontology describes VANETs vulnerabilities such as: shared wireless medium, the highly dynamic network topology, the absence of centralized security service and the cooperatives relationships.

□ **Ontology of consequences:** Consequences of intrusion in a vehicular ad hoc network may be: Degradation of network performance, flight of personal information, insulation of nodes, lead to road accidents and road congestion.

### 2. Providing security in Vehicular ad hoc networks (VANETs) through historical data collection:

Security is lost when user send invalid information into the network for individual purpose. In this paper, Dr. Kamal Jamshidi worked on historical data and helps the driver to make true and proper decisions. Assign unique ID to each vehicle in the network. When a message is sent it contains both the information and ID of the sender. Every vehicle has a data base., Validity probability is affected when the event /incident occurred and it is stored in database for every reported event. we call that history[3].

Validity probability for each event has a primary value at first in the data base, when its first report receives. A When any vehicle reports the incident and others receive its report. If they trust this report they may decide to change their way, but in other hand the message might be invalid. If it is the first time this incident is reported, in other word one vehicle has reported this incident, its validity probability is not enough, but its sender ID and primary probability is saved in data base of both other vehicle and RSU. Trust to this message is not recommended and it can be used just to inform the driver. This simple approach helps vehicle in making true decisions on the roads. If different vehicles (with different ID) report the incident, it is more probable that it has happened. It is obvious that in area with a large number of vehicles this method is very useful and helps the driver to make true and proper decisions.

### 3. Malicious Data Detection in VANET

Vehicular Network are wide technology used in traffic system mechanism[1]. A poorly designed VANETs that grant a serious attack on network which can degrade performance and goal of the network. Malicious/wrong information is capable of jamming a traffic on the roads. This types of information is called as malicious/unsolicited data.

In this paper, Gurpreet Singh and seema developed an infrastructure/simulated environment in order to detect fake message on the basis of Intrusion detection system(IDS). IDS compare incoming and outgoing messages with predefined pattern. The trace file is used to collect the behavior of VANET in given time slot. The file format contains Event ID, Messages send and Received, Source node, Destination node, Route no, and Flag. Check for number of safety messages. if number of safety messages are greater than Threshold then there occurs malicious data and check for route frequency otherwise normal number of messages.

**Impact of attack:** When attack was introduced huge volume of increase in safety messages. Due to this, vehicles starts changing their routes as they receive safety message of accident and lead to traffic jam. While the attacker one who enjoy free road

### 4. Collaborative trust aware intelligent intrusion detection in VANETs

Most of these solutions may not be suited for VANETs as the nodes in the VANETs have high mobility. States of individual vehicles along with the transitions from one state to another change quickly in VANETs[5].

A new Collaborative LA based algorithm is proposed for intrusion detection in VANETs. The proposed algorithm takes inputs as the density, mobility and direction of motion of the vehicles and the corresponding automaton performs its action based upon these parameters.

A Collaborative Trust Index (CTI) is computed for each of the action performed by the automaton. The values in CTI are added or removed according to the successful or unsuccessful operations, i.e, automaton receives the penalty or reward from the environment. Based upon these parameters, the action probability vector of the automaton is updated which is used for the next iteration. Finally, after performing the action for finite number of times, the solution converges to a particular value.

Anomaly based schemes generates high false alarms and requires large data sets of training data for constructing the normal profile in the network.

Signature based scheme can detect only known attacks.

constructing the normal profile in the network

Hence there is a requirement of system which capture the information about the states and transitions from state to state so that all activities of the vehicles in a particular time interval can be monitored. Keeping in view of the above issues, Neeraj Kumar, Naveen Chilamkurti proposed a new Trust aware Collaborative Learning Automata based Intrusion Detection System (T-CLAIDS) in VANETs.

### **5. A Novel Reputation Management Framework for Vehicular Ad Hoc Networks:**

Attackers can diffuse bogus information in the network to affect other drivers' behaviors and cause intelligent collisions. In this paper, Qing Ding, Xi Li assume that Vehicles in VANETs are equipped with a detection mechanism to identify false information. Each vehicle equips with a tamper-proof positioning device, such as GPS. Then its status data, such as speed, and direction, etc. are all carried out by this device. These data can be embedded to messages, and sent to another vehicle automatically by the beacon message. Beacon message which includes a vehicle's status, such as location, velocity, and direction and is broadcasted by this vehicle is encrypted and signed.

In this paper, a novel reputation management framework is presented, which mainly works with the integration of entity-centric mechanism and event-centric mechanism to establish trust in VANETs.[4]. The majority of people drive their vehicles locally for their daily commute. Thus it is feasible to let the RSUs take charge of managing the long-term reputation values for these commute vehicles, event-centric mechanism is adopted if the reputation value of a vehicle cannot be queried based on the fact that this vehicle just has a new route when the traffic event happens.

If the value of gathered event data is over the predefined safety threshold, the information is sent to the traffic safety application in the vehicle. At the same time, the traffic warning messages will be broadcasted to neighboring vehicles. Its own location information and the reputation value of the event are attached to this message. The message is also encrypted and signed by ER's privacy key. EOs receive the message, and it can decide if this message is from a ER by comparing the event location, vehicle location from warning message and the vehicle location from beacon message it received at the most recent time. Then it will send a reputation query message to the nearby RSU.

If the RSU returns the reputation value of ER during this time, this value will be directly used to determine if the message is bogus. If not, event-centric mechanism is adopted to calculate the reputation value of the event, and decide whether to forward the event again. Then according to the observation to ER's subsequent behavior, the reputation of ER is re-calculated and updated into RSU later. EPs and EOs have the basically same way to process messages, but they do not start the abnormal behavior analysis algorithm since they cannot observe ER's behavior.

### **III. CONCLUSION**

Detection of an intrusion in VANETs is always a challenging task as the nodes in VANETs have high mobility and varying density on the road. Hence a novel IDS for such networks is required which will detect any misbehaving nodes in the networks under the constraints of high mobility and varying density of the nodes in the network. Keeping in view of the above issue, in this paper we have done literature survey for detecting the malicious data and intrusion detection techniques in Vehicular Ad-hoc Networks (VANETs).

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