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A ROUTING PROTOCOL FOR A VANET SYSTEM BASED ON SUMOSIMULATION TECHNIQUE

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Abstract - VANET (Vehicular Ad-hoc Network) is a topology network which is specially designed mobile based Ad-hoc network for transferring the data between different modules. In this topology every vehicle is considered as a node and a combination of these nodes are used to establish a mobile dynamic network. This VANET had a wide range of applications like avoidance of interference, increasing the traffic efficiency. The Vehicles are stilted by the pragmatic traffic environment and the network simulations cannot simulate the authentic trace of the vehicle. In this paper we nominate a synergic simulation with SUMO (Simulation of Urban Mobility) to assess the account of Ad-hoc routing protocols. For this we consider the rendition measurements by setting delay and throughputs for the packets delivered.

Keywords– VANET, Adhoc routing protocol, mobile dynamic network, AODV Network, SUMO Model

I. Introduction:

As we know the motor vehicle and freight industry play a prominent role in present day society, Governments commence on establishing importance to applying this new technology to intensify the efficiency of traffic systems. The main aim of VANET is to provide a wireless connectivity for the vehicles in a slender area to interchange the information of each other and establish various applications for conflict avoidance, safety and traffic efficiency as provisioned by ITS (Intelligent Transport System) Community.

Developing such a system in day to day realistic traffic surroundings requires plenty of human and material resources. In order to overcome squandering these resources and to verify the system effectiveness we are liable to build a simulating traffic environment to investigate the performance of vehicles in VANET. Network and traffic simulations cannot simulate authentic trace of vehicle. So here we are nominating a synergic simulation with SUMO to assess the account of Ad-hoc routing protocols.

Basic VANET model (o**r) Architecture**:

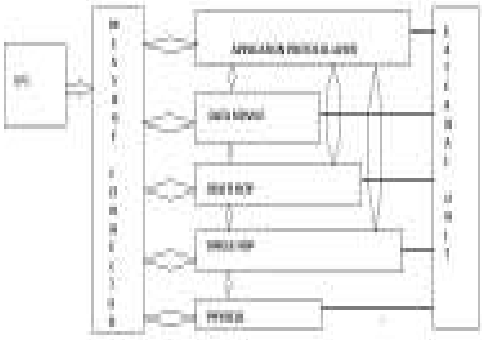

Fig 1 VANET model (or) Architecture

The main aim of ITS (Intelligent Transport System) is to increase the safety because many people are killed worldwide because of road accidents every year. With the help of VANET traffic optimization is possible. The problem of accidents and traffic jams are solved by providing timely information to the drivers. VANETs use broadcasting to provide important control and route establishment, we can observe fixed infrastructure for VANET when compared with MANETs.

The functions of blocks present in the basic structure of VANET are as follows:

- Purpose of application layer is to select multiple service access points to lower layers
- The communication to direct radio neighbours is done by Single-Hop layer
- Purpose of Multi Hop layer is to forward the data packets to neighboured nodes treating neighbours as forwarders.
- The Position of neighboured nodes when changed and offering of interface to events are managed by information connector.

Schematic Representation of VANET:

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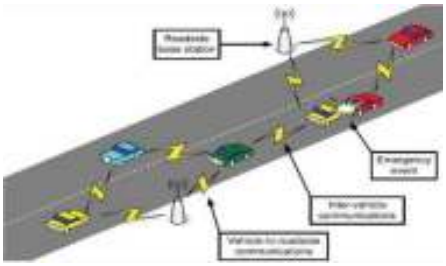

Fig 2 Schematic Representation of VANET

The Communication in VANET is done through Wireless Access for Vehicular Environment (WAVE). The wireless communication devices such as Wi-Fi or Wi-Max are used by WAVE. The used sensors or wireless devices can form a VANET network which resides on top of the vehicle.

Existing System:

In Present days VANET become very popular because of active research works on this made tremendous potential to improve vehicle road safety & traffic efficiency. After making review on standards of VANET by making some trials we identified the outline of the VANET research tasks that still need to be enable all-over implementation and widespread adoption of scalable, reliable, robust, and secure VANET architectures, protocols, technologies and services.

Proposed System:

In this model we are proposing a MAC layer of standard 802.11p in order to establish wireless atmosphere in vehicular systems to measure receiving and delivery ratio of packets for various clusters with identical nodes and speeds. With this we can reduce the time so that the information is received very fast. Present routing protocols for VANET are not coherent to meet every traffic layout, so this proposing model will provide methodical architecture for service response procedureThus design of an efficient routing protocol has taken noteworthy observation. By studying different routing protocol in VANET we have seen that further performance evaluation is required to verify performance of a routingprotocol with other routing protocols based on various traffic scenarios. . To design a new proposal protocol for VANET using SUMO and MOVE the comparison of different VANET protocols characteristics is essential.

Routing Protocols:

Two types of routing protocols are observed first is topology based and second is geographic routing. Topology based protocols uses the links information to forward the packets whereas geographic protocols uses the information about the location of destination.

Topology based is again divided into Reactive or Proactive protocols. Here we move with a reactive protocol named as AODV (Ad-hoc on Demand distance Vector).

AODV:

In VANET the vehicles have high mobility and they travel with high speed. So Proactive protocols are not preferred as they require more bandwidth so we move with reactive protocol named as AODV which operates on hop-by-hop pattern.

AODV allows vehicles to receive routes rapidly for new destinations, and does not require nodes to maintain routes to destinations that are not in active communication.

Research Methodology Used:

Simulation tools:

The simulation module created using TCL makes use of two tools to simulate the implementation and evaluate its performance

Enlarging a VANET in real time application is very much costly therefore to test and to assess the protocols simulators are used. Simulation of protocol is the inceptivestepof implementation of VANET protocols. Several communications network simulator already exist to providea platform for testing and evaluating network protocols, such as NS-2, OPNET, and Qualnet.Behind the available simulators, several simulation tools available such as PARAMICS, CORSIM, MOVE and SUMO, etc that have been developed to analyze transportation scenarios at the micro and macro- scale levels.

SUMO "**Simulation of Urban Mobility"**is an open source, highly transverable, infinitesimal road traffic simulation package planned to handle large road networks. It allows the user to build a specialized road topology, in addition to the import of different readymade map formats of many cities and towns of the world.

It is script based tool. It allows users to estabish a road topology with vehicles movement in accordance to user's requirement. It also allows user to define the departure and arrival properties, such as the lane to use, the velocity, or the position can be defined. These all properties are defined when the vehicle is created and its flow definitions are set.

MOVE (Mobility model generator for Vehicular networks) is a Java-based application built on SUMO with an ability of GUI. In this paper, a tool MOVE has been used to allow the users togenerate realistic mobility models for VANETsimulations. The output of MOVE is a mobility tracefile that contains information of realistic vehicle movements which can be used by popular simulation tools such as NS-2. MOVE consists of two main components:

Mobility model and Traffic model generator

Routing protocols (AODV) have been implemented over the generated realistic mobility model to analyze their behaviour and performance. Following steps are involved in the implementation process:

Firstly select "Mobility Model" on the main top level menu. It has three main modules: map editor, vehicle movement editor, simulation. Map editor is used to generate the map, here one has to specify nodes, which act as junction or dead ends and edges which represent roadways, and one can either create new topology manually or can generate any random maps. Vehicle movement editor is used to create vehicles. This module is responsible for defining number of vehicles, flow of vehicles that will specify the groups of vehicle movements flow on the simulation and turning ratio that will define the probability of directions on each junction. Simulation module is used to visualize the configured topology and also specify the beginning and end time of simulation.

Simulation Results:

Simulation has been performed on each protocol on 25 to 150 nodes. The simulation of VANET includes monitoring traffic, location of lost vehicle, speed control and monitoring the environment. In this VANET vehicle to vehicle communication and Vehicle to Infrastructure communication is done by nodes. In V2I communication model, vehicles communicate to Road-Side-Unit (RSU) through Road-Side-Routers (RSR). Data Transmission is established between nodes using UDP agent and CBR traffic, the reactive on demand routing protocols establish the route to a particular destination only if it is needed

Experimental analysis:

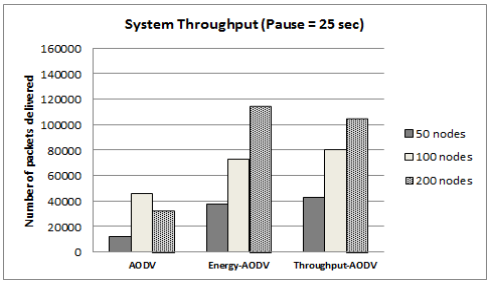

Fig:3 AODV throughput

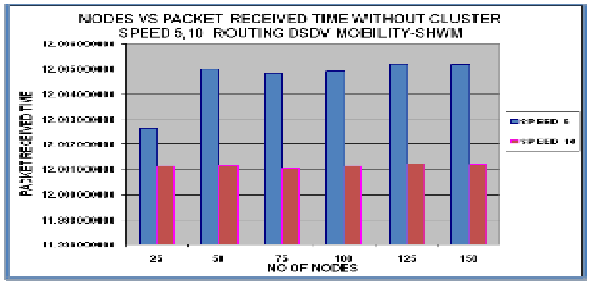

Fig: 4 AODV Packet forward ratio

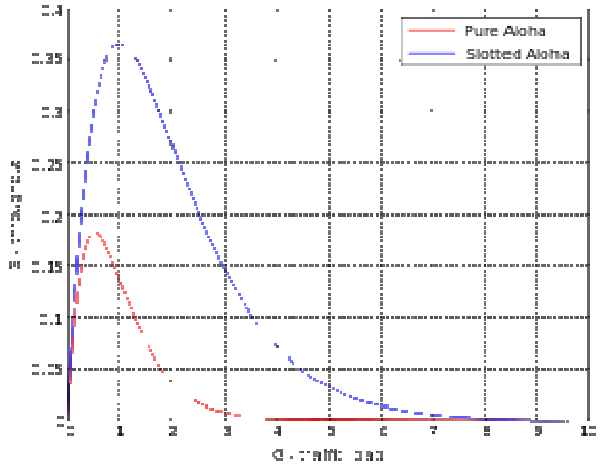

Fig:5 Sending Packets throughput

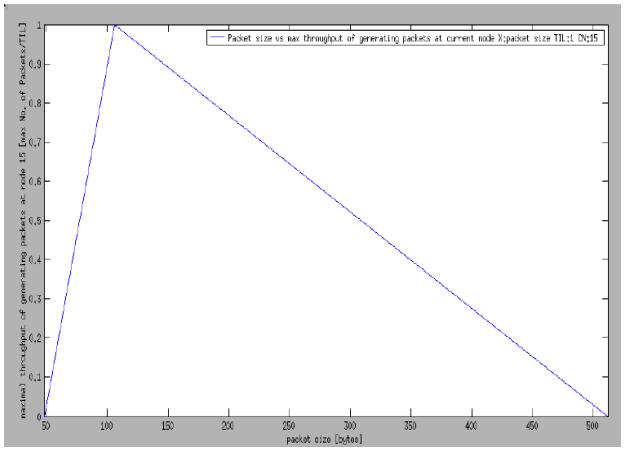

Fig 6 Receiving Packets throughput

Conclusion

Finally we simulated AODV in a realistic approach with the help of microscopic mobility model we examined the behaviour of routing protocol AODV. Here we used a tool named MOVE along with SUMO in order to implement a realistic model. Mad editor and vehicle movement editor helped us in visualization and configuration of vehicles in time to time basis.

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