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CONSISTENT ACCESS OF INTERNET IN VEHICULAR NETWORKS

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Abstract - ***Usage of an internet in moving vehicles has been rapidly growing. The overburdening issue of vehicular networks is increasing due to mobile data eruption. SWIM is a new technology which has taken massive attention in the recent years. Due to fast topological change and frequent interruption makes it difficult to design an effective routing protocol to route the data among vehicles, called V2V or vehicle to vehicle communication and vehicle to road side infrastructure, called V2I. SWIM is highly potential in research areas. Thus Wi-Fi networks are considered as a promising technology to discharge vehicular networks. There are several problems in vehicular environment in providing the continuous internet access. Vehicular networks provide continuous internet connection, but with relatively expensive cost. The groups of APs are deployed to communicate with a client called AP range, and the transmission succeeds if any AP in the group completes the delivery with the client.***

Besides, the short-term network destruction problem and the broadcast storm problem they are further considered in designing routing protocols in SWIM. This is caused by fast variable topological impact on the performance of data transmissions. Hence we propose this SWIM protocol to minimize the delay in packet transmission and to increase the throughput in vehicular communication.

Key Words: *Access point, V2V*

1. INTRODUCTION

The growth in the improved number of vehicles are furnished with wireless transceivers to communicate with one another to form a particular class of wireless networks, known as SWIM. Due to the explosive growth of the subscriber number and the mobile data, cellular networks are suffering burden, and the user experiences quality degradation. Compared with cellular networks, Wi-Fi has obvious advantages: less in cost and high throughput. Thus Wi-Fi is considered as a suitable solution for cellular traffic offloading. It is difficult to provide Wi-Fi based internet access to users in moving vehicles. The reasons are elaborated as follows. First and foremost, station circumstance in a vehicular environment is harsh due to fading, interference, and noise, which results in high packet loss rate and makes the communication less efficient. Second, a client moves at a particular speed in vehicle, it is extremely challenging to be always associated with the suitable AP. Third, owing to the restricted exposure of each AP, a client suffers a numerous connection disturbances caused by frequent handoffs and re-associations.

Usually, wireless ad hoc networks do not trust on fixed infrastructure for communication and spreading of information. SWIM follows the same principle and apply it to the dynamic environment of surface transportation. The architecture of SWIM falls within three categories: pure cellular/WLAN, pure ad hoc, and hybrid. SWIM may use fixed cellular gateways and WLAN / Wi Max access points at traffic intersections to connect to the Internet, gather traffic information, or for routing purposes. The network architecture in this scenario is a pure cellular or WLAN structure. SWIM can combine both WLAN and cellular network to form the networks so that a WLAN is used where an access point is available and a 3G connection otherwise [3].

Static gateways around the sides of roads could provide connectivity to mobile nodes (vehicles), but are unfeasible in considering the infrastructure costs. In such a case, all vehicles and road-side wireless devices can form a pure

mobile ad hoc network in order to perform vehicle to vehicle communications and achieve the goals. Hybrid architecture of combining infrastructure networks and ad hoc networks together has also been a possible solution for SWIM.

2. PROPOSED METHODOLOGY

In the proposed work, a suitable protocol has to be identified to eliminate the packet loss in the existing system in order to improve the quality of communication in real time traffic. This will improve the throughput in communication between sender and receiver and also reduces the delay in packet transmission. The proposed system uses the SWIM protocol. It is one of the most commonly used reactive protocols in vehicular networks.
The implementation of uplink and downlink is done with help of this SWIM protocol. SWIM is a special type of short-range wireless communication mobile ad hoc network (MANET) in which all nodes are vehicles that move generally at high speed. Thus this SWIM can communicate among themselves as well as with other vehicles via multiple wireless connections. Hence we propose this protocol will minimize the delay in packet transmission and to increase the throughput in vehicular communication.

There has been a lot of research on the real time traffic and a constant internet access with a relatively high throughput. The SWIM protocol achieves the original meaning of these features. The existing system uses UNICAST method to establish communication between sender and receiver in uplink whereas in downlink, broadcast is used for communication where the packet is broadcast to all the vehicles within the range

2.1 SWIM PROTOCOL ARCHITECTURE

In SWIM, vehicles are communicate with each other via V2V communication in Ad hoc fashion, and V2I communication through road-side-units (RSU). Traditional services include vehicle and road safety services, traffic ability and management services. Vehicle and road security services are planned to reduce the road side accidents and safeguard the life of vehicle holders. Traffic proficiency and management services aim to improve traffic flow, traffic coordination, and to provide local and map information. These services aims to provide information and entertainment such as multimedia data transfer and global Internet access.

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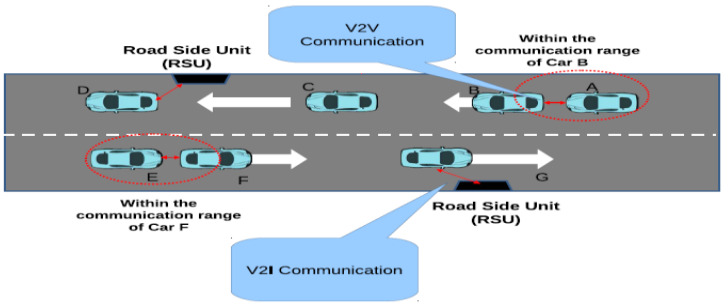


Fig -1: Communication of SWIM Protocol

SWIM also come with several puzzling characteristics, such as possibly large scale and high agility. Nodes in the vehicular environment are much more energetic because most cars usually are at a very high speed and change their position constantly. The high agility also leads to a dynamic network topology, while the links between nodes connect and disconnect are often. Besides, SWIM have a possibly large scale which can include many applicants and extend over the entire road network

2.1 UNICAST

It is the term used to describe communication where a piece of information is sent from one point to another point. In this scenario there is only one sender, and one receiver. Unicast transmission, in which a packet is sent from a single source to the particular destination, is still the major form of transmission on LANs and within the Internet. All IP networks and LANs (e.g. Ethernet) support the unicast transfer mode, and most users are known with the standard unicast applications (e.g. http, smtp, ftp and telnet) which employ the TCP transport protocol.

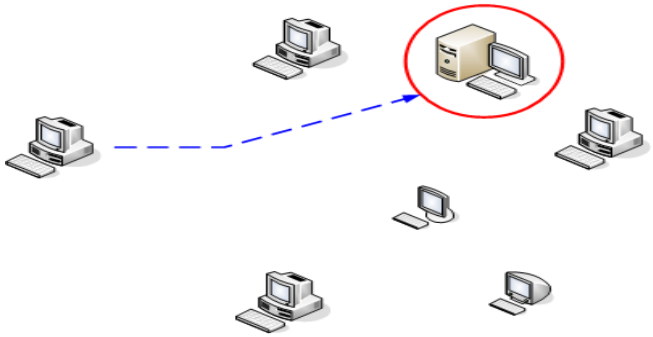


Fig -2: Unicast Protocol

Unicast messaging is used for all network processes in which a private or unique resource is requested. In this protocol a single server which can request or respond a

single system only. This methodology is used for V2R communication and it is very easy for communicating with single devices.

2.2 BROADCAST

Broadcast is the term used to explain communication where a piece of information is sent from one point to all other points. In this scenario there is only one sender, but the information is sent to all connected receivers.
This transmission is allowed by most of the LANs (e.g. Ethernet), and may be used to send the same message to all computers which are connected on the LAN (e.g. the address resolution protocol (ARP) uses this to send an address resolution query to all computers on a LAN). Protocols under network layer (such as IPv4) also support a form of broadcast that allows the same packet to be sent to all systems in a logical network (in IPv4 this consists of the IP network ID and an all 1's host number).

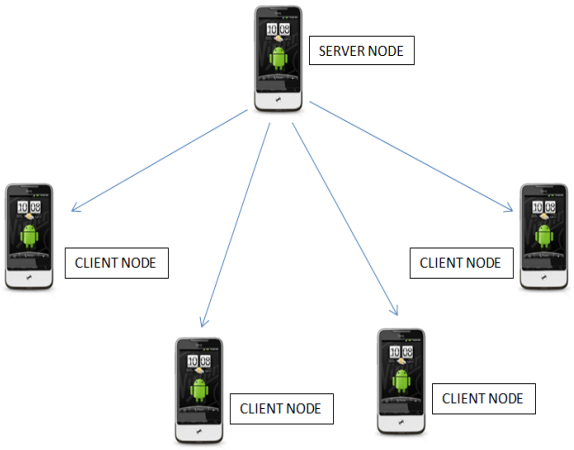


Fig – 3 : Broadcast protocol

2.3 NETWORK SETUP

In NS2, the node can be defined in tcl code but the nodes can be generated automatically in ns2 nam. Whereas NS2 is not a GUI interface we can specify the color for respective nodes. For instance, we simulate a real time traffic model. In this module, there is a static node called gateway which cannot be moved and surrounding this node there are many dynamic nodes which are movable. The static nodes acts as a gateway for the moving vehicles, through which the data gets transferred from one vehicle to another vehicle. Similarly, the dynamic nodes acts as a vehicle, which transfers the packet to another vehicle through gateway.

3. RESULTS AND DISCUSSIONS

3.1 PERFORMANCE METRICS

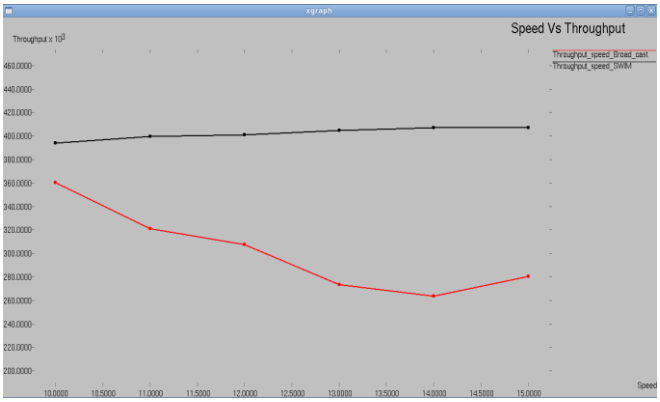
The performance of the system is evaluated using the routing protocols with the help of network simulator NS2. The performance metrics are

1. Throughput
2. Delay

AVERAGE THROUGHPUT: This metric is defined as the number of packets that are received at destination over simulation time.
PACKET DELIVERY RATIO: This metric is defined as the number of packets that are successfully delivered at destinations by the number data packets that were sent by sources.
PACKET LOSS: Number of packets that do not reach the destination.

3.2 SIMULATION RESULTS

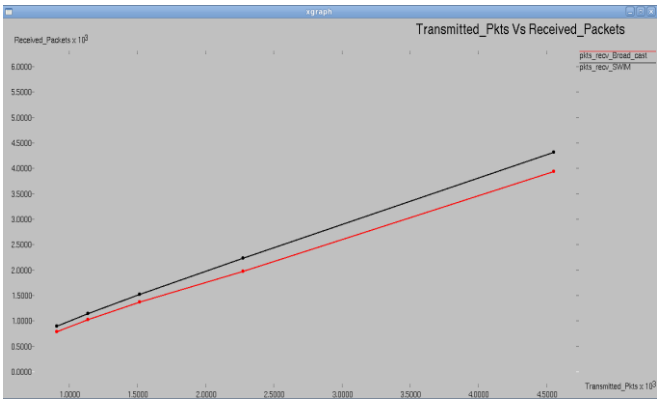
The performance of the system is analyzed using the real time traffic. Network simulation is analyzed using awk file. Using the trace file we have predicted the sending and receiving of data packets. For instance we have send hundred packets to the client without any breakage or disturbance it can safely reach the destination. Network simulator easily analyzed the packet transmission with the help of trace files and graphs. By this we have achieved the cent percent data transmission and reduced the delay.



Graph - 1: Speed versus throughput

The above graph compares the existing system and proposed system's throughput and speed. In the existing system, the throughput reduces upon increasing the speed

whereas in proposed system throughput maintains its quality.



Graph - 2: Transmitted packets versus received packets

The above graph shows the comparison results of transmitted packets versus received packets. The existing system uses the broadcast technique to send and receive the data whereas the proposed system uses the SWIM technique to send and receive the data packets.

3. CONCLUSIONS

This paper is about providing the constant internet access to the users who access internet during their travel. The internet connection may break due to several disruptions in physical environment. Hence SWIM protocol provide an efficient method to handle such a problem. Thus user can access a constant internet connection during their travel. By providing a continuous connection, the system achieves high throughput and reduces the delay in packet transmission. Hence the system supports unified and proficient Wi-Fi based Internet access in vehicular networks. It consists of SWIM protocol in both uplink and downlink. Seamless roaming of clients was gracefully achieved, while channel utilization efficiency was dramatically improved. Experimental results from the simulations revealed the feasibility and effectiveness of this system.

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