Performance Analysis of VANET by Reducing Queuing Delay of Packets using Additional Tail to Data-Grams

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Abstract— Vehicular ad hoc network & mobile ad hoc networks is a promising approach for future intelligent transportation system. These networks have no fixed infrastructure & instead rely on vehicles themselves to provide network functionality. Moreover, due to mobility constraint & upper level mobility, Vehicular ad hoc network exhibit features that are dramatically different from many generic MANETs. Vehicular Ad hoc Networks are particularly challenging class of Mobile Ad Hoc Networks, used for communication & cooperative driving among nearly vehicles & between vehicles. Main objective of VANET is to assist drivers of vehicles & to create safer roads by reducing number of automobile accidents.

Key words: VANET, MANET, AD HOC, WLAN

I. Introduction

Vehicular Ad hoc Networks are notable from mobile ad hoc networks due to their special characteristics such as high mobility of nodes, partitioned network & dynamic network topology. Vehicular Ad hoc Networks utilize of advanced information processing communications, sensor & control technologies & management strategies in an integrated manner to improve functioning of transportation system. These systems provide traveler information to increase safety & efficiency of ground transportation system for passengers & freight in both urban & rural areas & inter-city & international corridors, including border crossings. Vehicular Ad hoc Networks also provided special, original time information to system operators such as transit systems, commercial vehicle fleets & emergency & security vehicle fleet operators. These applications bring system users, vehicles & infrastructure together into one integrated system that enables exchange of information for better management & use of available resources. Ad hoc networks are vary in size ranging from body area network, personal area network. Mobile ad hoc networks vehicular ad-hoc networks, intelligent vehicular ad-hoc networks & internet based mobile ad-hoc networks. Vehicular ad-hoc networks are further categorized in to Inter-Vehicle Communication (IVC), Roadside-Vehicle Communication (IVC) & Hybrid-Vehicle Communication (HVC). Inter Vehicular communication intends vehicle-to-vehicle, Vehicular Sensor networks & vehicular-to-portable (V2P), whereas road side vehicular communication could be either vehicular-to-infrastructure or Infrastructure-to-vehicular (I2V). Hybrid vehicular communication combines both IVC & RVC.

II. VANET Architecture

VANET based on cellular gateways & WLAN use access points at traffic intersections to connect to Internet & collect traffic information for routing purposes. network architecture under this scenario is a pure cellular or WLAN structure. Stationary or fixed gateways around sides of roads could provide connectivity to vehicles but are eventually unfeasible considering infrastructure costs involved. In such a scenario, all vehicles & roadside wireless devices could form a mobile ad hoc network to enable vehicle-to-vehicle communications [15].A hybrid architecture could be formed by combining cellular, WLAN & ad hoc networks together for VANET. Hybrid architecture uses some vehicles within both WLAN & cellular capabilities as gateways & mobile network routers so that vehicles within only WLAN capability could communicate through multi-hop links

III. Research Methology

End point in an inter process communication is known as network socket for disambiguation. Most communication among computers is dependent on Internet Protocol. Data transmission among two sockets is generally managed by communications protocols that are implemented in the operating system. The application software usually writes data to these sockets and read from these sockets. So it is considered that network programming is essential for socket programming. It is generally possible for two different network applications to start so it develops sense to design communicating network software in order to perform network operation one after other instead of simultaneously. Server runs first. It waits to for request from client. Client runs second. Client sends packet to server. After contact has been developed either client or server becomes eligible to send & receive data.

IV. Tools & Technology

A. Hardware Requirement

- Model : HP Pavilion dv4 Notebook PC
- Processor : Intel(R) Core (TM) i3 CPU M 350 @ 2.27 GHz
- Installed Memory : 2.00 GB
- System Type: 32 bit operating System

B. Software Requirement

- Operating System : Windows 7 Home premium
- Front end Used : C#.net
- Framework : .Net framework
- Back end : Text Files

V. Proposed Work

A. Improve the Quality of Service in VANET

In order to improve the quality in we have to speed up the packet transmission providing them better security. Here in this research during packet transmission the preprocessing time, post processing time and transmission speed must be considered.

Here we followed two approaches to improve the transmission speed.

1) Using replacement policy to reduce the packet size during transmission.
2) Avoid the resending of same data again by buffering packet in temporary database.

B. Using String Replacement Policy To Reduce The Packet Size During Transmission

We have to initialize the PSIZE1 and PSIZE2 variable to categories the packet according to their size. Packets during transmission are put in a batch according to their size. Here PSIZE1<PSIZE2.

PSIZE2 depends on sum of preprocessing, post processing, transmission time of packet. If packet is too large that it takes long time for transmission as compare to small packets then it would be put in separate batch.

According to Case 1 data would be transmitted as it is. According to Case 2 the data would be replaced with small corresponding strings.

If the packet to be transmitted is less than PSIZE1 then case1 would be applied. And if packet is more than PSIZE2 than case 2 would be applied.

Step 1: Put the packets in batches according to size of packets. Suppose we have following packets

Step 2: Start iteration on step 3 for Batches BN1,BN2,BN3

Step 3

1) In case of first batch apply the case1 as the size of packets is very small the replacement policy would take lot of time during preprocessing.
2) In case of Second batch the sum of all packet size is checked if the time taken to transfer packet is more than total transmission time where preprocessing time is also considered then apply replacement policy on packets. But if the time is less than preprocessing time and transmission time then packets are set as it is.
3) In case of third batch the apply replacement policy on all packets of that batch.

Algorithm for the content replacement policy to reduce the size of packets

- Step 1: In this step the words have large size are considered
- Step 2: Here we count the words having maximum frequency.
- Step 3: Calculate the corresponding word for replacement in database
- Step 4 : Here we have to check whether there is no same corresponding string in data base
  - If condition is false then to step 3.
  - If condition is true then proceed further
- Step 5: Replace with corresponding string and map it in database.

C. Proposed Model for String Replacement Policy to Reduce the Packet Size during Transmission

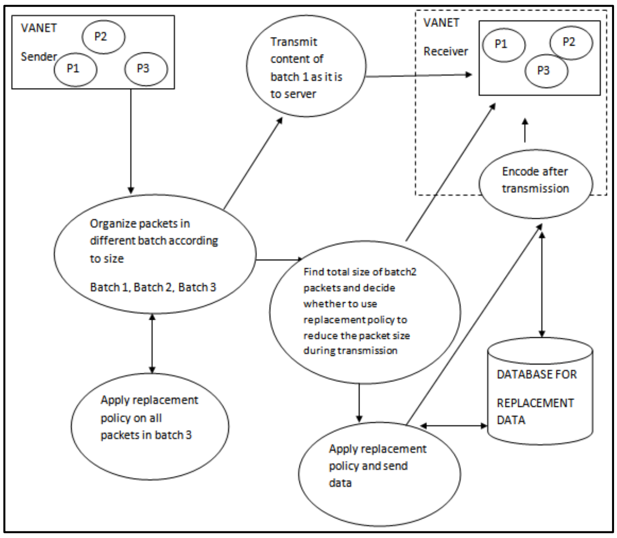


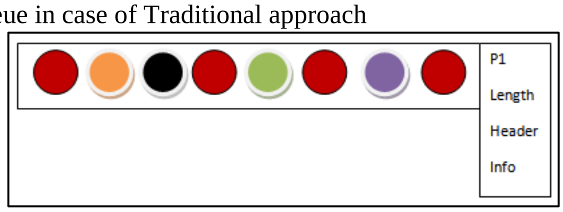
Fig. 1: Proposed Model

D. Reducing Queueing Delay Of Packet Using Additional Tail to Datagrams and Buffering Packet in Temporary Database.

Algorithm to reduce queuing delay (Transmission speed, Reduce congestion, Network overhead, loss of energy, orderly delivery of packet)

- Step 1: In this step we initialize the packet for transmission.
- Step2: Here we have to Check whether same packet is available in the queue.
  - If condition is false
  - Then place packet in queue for transmission of the packet and make entry in temporary table on receiver end with its ID.
  - If condition is true
  - Set the packet ID at the tail of predecessor packet in queue. Do not place that packet in queue. On receiving end id would be replaced by corresponding packet data from table stored on receiver end.
- Step 3 Start iteration of step 1 and step 2 until packets are not placed in queue.
- Step 4 after transmission of all packets and completion of session remove the temporary buffer on client end.
- Step 5: Stop

Queue in case of Traditional approach



Queue in case of proposed approach

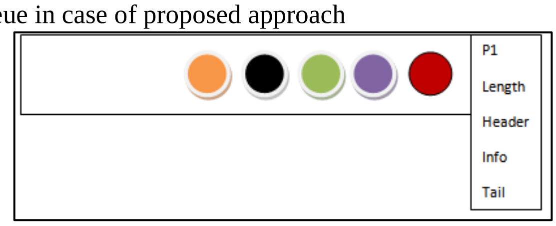


Fig. 2: Comparison between tradition and proposed queue

VI. RESULT AND DISCUSSION

A. Comparative analysis of overall Time consumption in tradition and proposed comparison system

```
x=[10 20 30 40 50 60 70 80];
y=[5 5 8 8 10 10 11 11];
y1=[2 2 3 3 4 4 5 5];
hold on;
plot(x,y,'r+-');
plot(x,y1,'b+-');
title('Comparative Analysis Processing delay of Proposed and traditional work');
xlabel('Packets');
ylabel('Time Taken Sec');
legend('Traditional', 'Proposed');
```

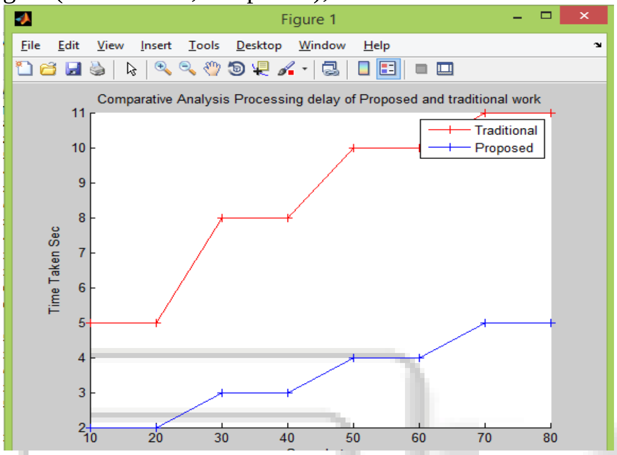


Fig. 3: Comparative analysis of overall Time consumption

B. Comparative analysis of Queuing delay in tradition and proposed comparison system

```
x=[10 20 30 40 50 60 70 80];
y=[6 6 9 9 11 11 13 13];
y1=[3 3 4 4 4 4 5 5];
hold on;
plot(x,y,'r+-');
plot(x,y1,'b+-');
title('Comparative Analysis Queuing delay of Proposed and traditional work');
xlabel('Packets');
ylabel('Time Taken Sec');
legend('Traditional', 'Proposed');
```

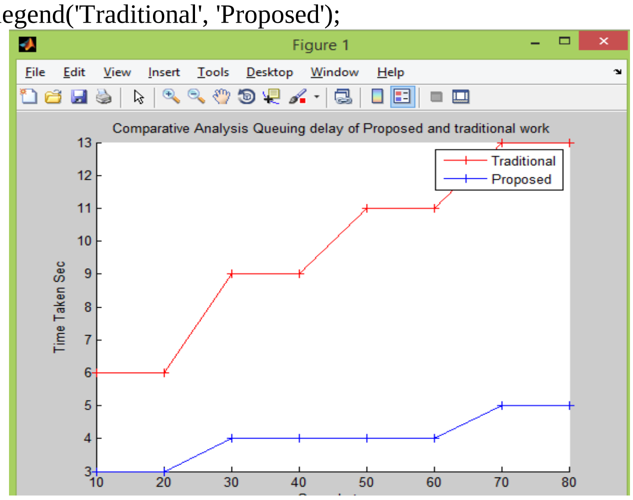


Fig. 4: Comparative analysis of Queuing delay in tradition and proposed comparison system

C. Comparative analysis of File Size in tradition and proposed comparison system

```
x=[10 20 30 40 50 60 70 80];
y=[4020 8090 12100 16201 20300 24200 29002 33100];
y1=[1020 2050 3600 4201 5100 6300 7210 8543];
hold on;
plot(x,y,'r+-');
plot(x,y1,'b+-');
title('Comparative Analysis File Size of Proposed and traditional work');
xlabel('Packet');
ylabel('File Size Kb');
legend('Traditional', 'Proposed');
```

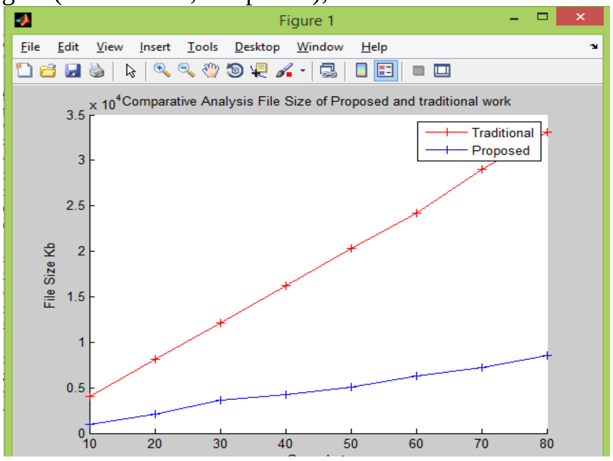


Fig. 5: Comparative analysis of File Size in tradition and proposed comparison system

VII. CONCLUSION

In this research, to speed up the packet transmission providing them better security, we have studied the preprocessing time, post processing time and transmission speed during packet transmission.

The goal of this research is to improve the transmission speed using replacement policy to reduce the packet size during transmission. Also, avoiding the resending of same data again by buffering packet in temporary database. This survey can be used to develop a new solution which will provide the QoS/QOE support for V2I/V2V based communication. Scope of work can be extended by providing the QoS support for VANET in different environments and using other moving objects i.e. Airbus, Trains, Submarines etc.

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