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Efficient Working of Vehicular Ad-Hoc Network with Carry Forward Technique

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Abstract

Vehicular Ad-Hoc network for Mobile Ad-Hoc networks. VANETs helps in transmission of data in vehicle to vehicle and vehicle to road side units. Data Dissemination transfers the data from source to destination and it is used to improve the quality of driving in term of time, distance, and safety. Data Dissemination is also defined as the packets dropping when the data is transferred from source to destination. In this paper, we implemented carry forward technique in efficient data transmission from source to destination. We propose this technique to achieve the best performance in terms of data delivery ratio.

Keywords

Data Dissemination, Carry forward, Traffic information systems (TIS), VANET.

Introduction

Vehicular Ad Hoc networks are rising new technologies to combine the ability of new generation wireless networks to vehicles [1]. Data dissemination in VANETs can be used to inform drivers or vehicles for traffic jams and to propagate emergency warning among the vehicles (incident or accidents) to avoid the collision. VANET improves the efficiency of traffic system. Node mobility, extreme network density and changing topology from urban gridlock to rural traffic [2].

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In vehicular ad hoc network delivery is multi hop in many situations vehicle communicate for requesting data for proper transmission. With data dissemination various hops can transfer data with maximum utilization of data transfer rate. In data dissemination, a single source node streams data to one or more sink nodes. [3] Various data dissemination protocols are proposed to disseminate information about obstacle information, traffic conditions and mishap on the roads. Besides these there are some problems in data dissemination like the vehicular network consists of a multitude of data sources and the data users; each vehicle is potentially a data source and the user at the same time. Diverse type of the application, such as traffic management, situational awareness, and commercial services share the same networking infrastructure (RSUs) [4]. Flooding technique is used for broadcasting data.
The proper management of traffic is becoming a great attention today as traffic jamming becomes more and more brutal problem. In the large part of the world millions of hours and gallons of fuel wasted daily by vehicles due to traffic jamming. Therefore, overcrowded flow circumstances have a negative impact on the economy, health, and environment. The improvement of traffic flow and congestion reduction can be achieved by means of Traffic Information Systems (TISs) [5]. In general, the aim of TIS is to confine, calculate and distribute traffic regarding information. Conventional technologies (e.g. Traffic Management Center (TMC) and Road Data Services (RDS)) in TIS offer very limited bandwidth; therefore, traffic information details available less in number. These drawbacks can be overcome by Cooperative Traffic Information Systems (CTISs), where traffic regarding information is gathered individually by vehicles and exchanged between themselves using wireless networks [5,6].

In this paper we discuss different types of data dissemination and proposed approach which helps in improving the packet delivery from source to destination. The rest of this paper is organized as follows: In Section II, we describe different types of data dissemination. Section III, we describe related work. Section IV, we define the proposed approach and conclusion.

Types of Data Dissemination

Data Dissemination is a technique which helps in transferring the data from sender to receiver using different types of data dissemination techniques. Data Dissemination helps in delivering the data at receiver end and helps in end to end connection of sender and receiver. [7] There are different types of data dissemination techniques which are classified below.

i) V2I/I2V Dissemination (vehicle to infrastructural, RSU)
ii) V2V Dissemination
iii) Opportunistic dissemination
iv) Geographical dissemination
v) Peer-to-peer dissemination
vi) Cluster based dissemination

i) V2I/I2V Dissemination: In this type of data dissemination the data is transmitted by the sender to the RSU and the other way the data is transmitted by RSU to the vehicles and vice versa.

ii) V2V Dissemination: In vehicle to vehicle data dissemination the data is transferred from one vehicle to the other vehicle and vice versa.

iii) Opportunistic Dissemination: Due to clustering in VANET, some work such as, recommend the use of opportunistic diffusion of data in which message are stored in each intermediate node and forwarded to every encountered node till the destination is reached.

iv) Geographical Dissemination: When continuously topology change the end to end paths are not constantly present in VANET a geographic dissemination is used in by sending the message to the closest node toward the destination till it reaches. Sometimes geo-casting is also used to deliver message to several nodes in geographical area.

v) Peer-to peer Dissemination: In P2P solution, the source node stores the data in its storage device and do not send them in the network till another node asks for them. This is proposed for delay tolerant application.

vi) Cluster based Dissemination: For a better delivery ratio and to reduce broadcast storms, a message has to be relayed by a minimum of intermediate nodes to the destination .To do so, nodes are organized on a set of cluster in which one node or more gathers data in his cluster and send them after to the next cluster .cluster based solution provide less propagation delay and high delivery ratio with bandwidth fairness. [7]

Related Literature Review

VANET provides wireless communication among vehicles and vehicle to road side equipments. The communication between vehicles is used for safety and for entertainment as well. VANET enable dissemination of traffic information and road

conditions as detected by moving vehicles. Data dissemination is used to convey the message from source vehicle to destination vehicles. Data dissemination is used to improve the quality of driving in term of time, distance, and safety. [7]

The rapid evolution of wireless communication capabilities and vehicular technology would allow traffic data to be disseminated by traveling vehicles in the near future. Vehicular Ad hoc Networks (VANETs) are self-organizing networks that can significantly improve traffic safety and travel comfort, without requiring fixed infrastructure or centralized administration. However, data dissemination in VANET environment is a challenging task, mainly due to rapid changes in network topology and frequent fragmentation. We survey existing data dissemination techniques and their performance modeling approaches in VANETs, along with optimization strategies under two basic models: the push model, and the pull model. In addition, we present major research challenges. [8]

Intermittent connectivity, abrupt changes in network topology and low reception rate are the most important properties that distinguish VANET (vehicular ad hoc networks) from other types of ad hoc networks. To optimize reliability and time criticality metrics in data communication protocols for VANET, novel ideas are needed. We present a tutorial on methods (at the network layer), encountered in recent literature, for small and large scale routing protocols, and geo casting (broadcasting, data dissemination, and warning delivery) protocols. [9]

Vehicular Ad-hoc Network (VANET) is an emerging field of wireless networks providing different applications such as traffic information for participant vehicles and related authorities. However, deploying of such applications is mainly depending on the market penetration rate of this technology. We propose a new 3-steps approach for estimation of traffic volume in a road segment based on actual volume of wireless-equipped vehicles. For this propose, we first collect the traffic information for different groups of vehicles using a new clustering algorithm. Then, a chaining technique between the clusters transmits this information to a roadside cloud. Finally, we employ a generalization method to extension of the total traffic volume from the collected data. Performance of the proposed approach is evaluated using extensive simulation for different traffic densities, and the stability of the clustering technique and also estimation accuracy of the proposed approach is shown in comparison with state-of-the-art existing schemes. [10]

Proposed Approach

In this paper, we propose carry forward technique with AODV protocol. In this technique the node will act as carry forward node which will help in transfer of the data from source to destination. The node which acts as carry forward node, this node will change according the position of destination and every time this node will contain the best possible path for data delivery. The carry forward node contains path for data delivery to destination node than it will transfer the data otherwise it will find possible node to act as carry forward node. This technique will continue until and unless the data is deliver to destination. The carry forward nodes will keep on switching according to the requirement of data transmission. The algorithm used for this technique is given below.

Proposed Algorithm (VADD):

VADD (Vehicle Assisted Data Delivery Technique with carry forward technique)

Step 1: Generate network scenario using NS-2

Step 2: Start with some initial elements like 'transmission range', 'neighbor node', 'source destination vehicle'.

Step 3: Initialize with n no. of nodes.

Step4: Implement Carry forward technique.

Step 5: Start Data Transmission with VADD where carry forward system start.

Step 6: In carry forward technique, a node will be generated which will contain forward path for destination node.

Step 7: Then finally data will be transferred from source to destination with automatic switching of nodes for efficient data transmission.

Step8: This process continuation until the data dissemination is done.

With the above algorithm feasible solution are generated randomly for best possible data transmission. By choosing best possible node named as carry forward node for delivering data.

Results and Analysis

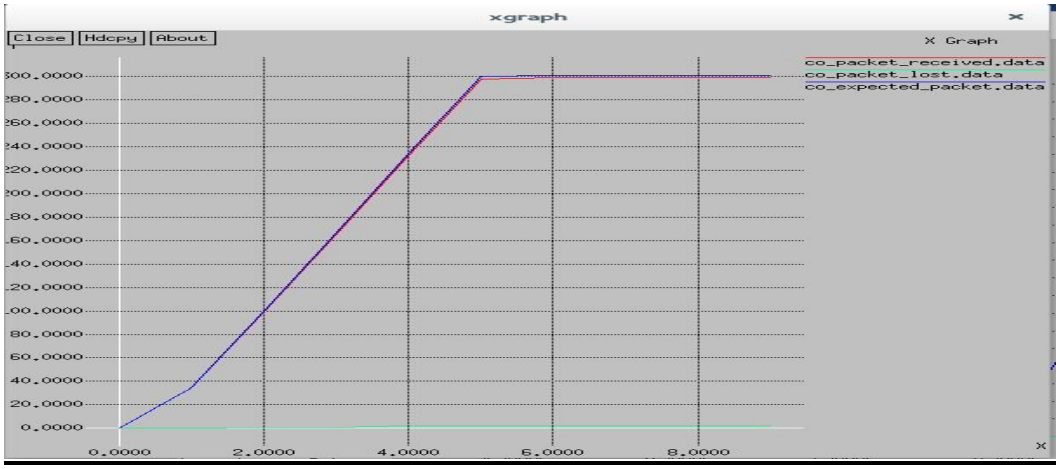

Fig.1. Efficient data transmission with carry forward technique.

The above figure 1 shows the result of efficient data transmission with carry forward technique.

Conclusion and Future Work

In vehicular Ad-Hoc networks the technology is changing very fast, the various algorithms are used for better data transmission a best algorithm is proposed according to the requirement. The efficient data dissemination techniques can provide significant benefits to vehicular ad hoc networks, in terms of both performance and reliability. Many data dissemination techniques for such networks have been proposed so far. Amongst the most popular one is carry forward system. This popular technique used to choose the reliable node for continuous data transmission. The propose technique is used to choose selective node for forwarding the data with carry forward technique.

The main performance metrics which calculate the performance of the network, the various factors are throughput, which calculates the sum of data that is being received at destination, packet delivery ratio which calculates the quantity of packets delivered to the destination in the network to maintain the connectivity, and end to end data transmission with less time which find how efficiently and quickly data reached at destination. The above factors are improved by carry forward technique in terms of factor used such as throughput, end to end delay and packet delivery ratio.

In future work, various data dissemination technique can be done with the help of various algorithm for efficient data security.

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