

# Dynamic Resource Allocation In Vehicle-To-Vehicle (V2V) Communications For Control Congestion

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**Abstract-** Vehicle traffic congestion and monitoring has become one of the critical issues in road transport. A new context-aware approach to find the current status and density of traffic and dynamic management of traffic signals along with the environmental situations. Therefore, a density-based traffic reporting mechanism is proposed wherein vehicles report to the server only if the road density is higher than a predefined threshold. This mechanism is beneficial for both the rerouting effectiveness and the vehicle privacy, since the server can still accurately detect the congestion signs at the cost of lower user privacy exposure. Due to the heavy traffic in the road many people are suffering. Even though there is traffic signal available at various places it is not easy to control the crowd. In order to avoid traffic problem heavily on the road, designed and developed a system so called as traffic controller.

**Keywords-** Vehicular participatory sensing, social welfare, network stability, lyapunov optimization

## I. INTRODUCTION

Mobile Computing is a technology that allows transmission of data, voice and video via a computer or any other wireless enabled device without having to be connected to a fixed physical link. The mobile communication in this case, refers to the infrastructure put in place to ensure that seamless and reliable communication goes on. These would include devices such as protocols, services, bandwidth, and portals necessary to facilitate and support the stated services. The data format is also defined at this stage. This ensures that there is no collision with other existing systems which offer the same service.

## TRAFFIC CONTROL SYSTEM

Traffic Re-routing System for Congestion Avoidance differs from the above research in three aspects. First, it take full communication to perform scalable re-routing. Thus, each vehicle can get accurate global knowledge of the travel time and, at the same time, is able to exchange route planning decisions with surrounding vehicles more efficiently.

Therefore, it is more scalable since it reduces the computation burden of the central server. A privacy enhancement mechanism, where each vehicle only uploads its location report when located in low sensitivity areas.

### A. Congestion prediction

Periodically, the service checks the road network to detect signs of congestion. A road segment is considered to exhibit congestion signs is a threshold. Choosing the right value for is particularly important for the service performance.

### B. Selection of vehicles to be re-routed

When a certain road segment presents signs of congestion, the service looks for nearby vehicles to re-route. Specifically, select vehicles from incoming segments (i.e., segments which bring traffic into the congested one). To decide how far from congestion to look for candidates for re-routing, the service uses a parameter L (level), which denotes the furthest distance (in number of segments) the vehicle can be away from the congested segment.

### C. Re-Routing Strategies

This section presents three re-routing strategies; all of them use the estimated travel time in the computation of the (k-) shortest path(s) for each of the vehicles selected as described in the previous section.

## II. RELATED WORK

A vehicular ad hoc network (VANET) [1] is an ad hoc wireless communication system setup between multiple vehicles (vehicle-to-vehicle or V2V) or between a vehicle and some roadside infrastructures (V2I). Many applications have been proposed on VANETs for different purposes such as safety, infotainment, financial, navigational aid etc. [2]. Traffic congestion has been studied extensively in traffic flow theory for various reasons such as road capacity planning, estimating average commute times etc. Congestion information can be useful for many VANET applications also, such as for route

planning or traffic advisories. Typically, congestion information is collected as the number of vehicles passing a point per unit time by some roadside equipment and transmitted to other places for broadcasting to vehicles. Moreover, the congestion information [3] is usually available only at a single macroscopic level for all vehicles and is not customized for the requirements of each vehicle.

### III. SYSTEM MODEL

Hence, the main contribution of this article is the distributed system for re-routing. This system, has four main features: (1) a scalable system architecture for distributed rerouting, (2) distributed re-routing algorithms that use VANETs to cooperatively compute an individual alternative path for each vehicle that takes into account the surrounding vehicles' future paths. (3) privacy-aware re-routing that significantly decreases sensitive location data exposure of the vehicles, and (4) optimizations to reduce the VANET overhead and thus improve vehicle-to-vehicle communication latency. When a road is selected to compose the alternative route, its weight is updated considering the impact each vehicle will have in that road.

a) Identify and detect the congestion, its location, severity and boundaries.

b) Ones detect the congestion broadcast the information by affected vehicles to nearby vehicles which take decision.

Logically, the traffic guidance system operates in four phases executed periodically:

- (1) Data collection and representation;
- (2) Traffic congestion prediction;
- (3) Vehicle selection for re-routing; and
- (4) Choosing alternative routes for each such vehicle and pushing the guidance to the vehicles.

Since data collection has been studied extensively in the literature, it assume that the centralized service receives traffic data from.

Due to this many Automobile industries are taking initiative to find efficient solution for congestion control, unaware of congestion increase the severity of it. The more severe the congestion, the more time it will take to clear once the cause of it is eliminated. The ability for a driver to know the traffic conditions on the road ahead will enable him to seek alternate routes saving time and fuel. In order to provide drivers with useful information about traffic ahead a system must:

a) Identify and detect the congestion, its location, severity and boundaries.

b) Ones detect the congestion broadcast the information by affected vehicles to nearby vehicles which take decision

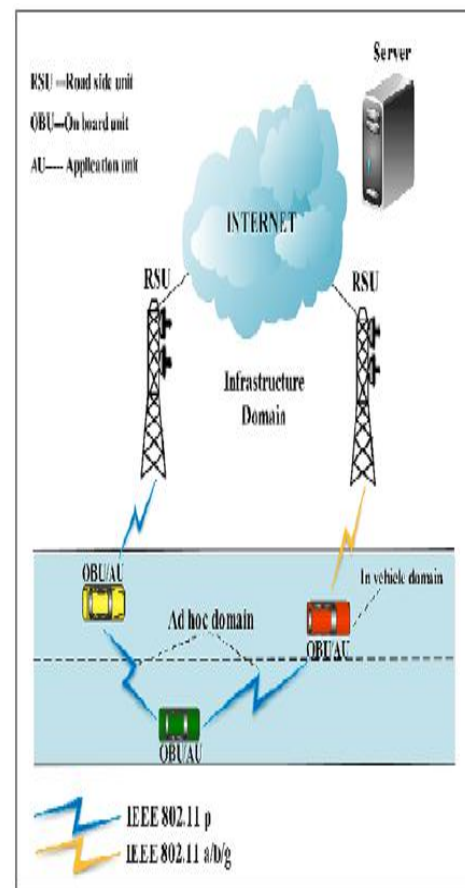


Fig 3.1: RSU Monitoring

### IV. PERFORMANCE EVALUATION

Researchers now are so much interested in automatic real-time traffic congestion estimation tool as it is the most significant factor on which intelligent transportation systems are based. Some of the researchers have focused in their work on traffic flow estimation. It is measured as the rate at which vehicles pass a fixed point (e.g. vehicles per minute). They used spot sensors such as loop detectors and pneumatic sensors to quantify the traffic flow. However, the sensors are very expensive and need a lot of maintenance especially in developing countries because of the road ground deformations. In addition, metal barriers near the road might prevent effective detection using radar sensors. It is also found that traffic congestion also occurred while using the electronic sensors for controlling the traffic.

Table 2. Parameter values for the simulations.

Parameter	Value
Density of vehicles (veh./km <sup>2</sup> )	25, 50, 75, 100, 125, and 150
Number of RSUs	1, 2, 4, 8, and 16
Simulated city	Madrid
Simulated area	2000 m × 2000 m
Number of crashed vehicles	2
Downtown size	1000 m × 1000 m
Downtown probability	0.7
Warning message size	13 and 18 KB
Packets sent by vehicles	1 per second
Warning message priority	AC3
Normal message priority	AC1
Mobility generator	CAR [2]
Mobility models	Krauss [7] and downtown [10]
MAC/PHY	802.11p
Radio propagation model	RAV [11]
Maximum transmission range	400 m
Broadcast storm reduction scheme	eMDR [4]

Fig 4.1: Report

## V. EXPERIMENTAL EVALUATION

The main objective of simulation-based evaluation is to study the performance of the distributed re-routing strategies in DIVERT.

## VI. IMPLEMENTATION

### Privacy-aware Density Reporting

The estimated density is computed locally by each vehicle, which obtains information about its neighbor vehicles by periodic exchange of beacons.

```

1: procedure onDensityCheckTimeout()
2:  $N_i = \text{getEstimatedNumberOfCars}(r_i, \text{side}, \{\text{beacon}_k\})$ 
3: if  $N_i \geq \max[\theta * N_{max}, \text{bound}]$  then
4:    $p = 1/N_i$ 
5:   if  $\text{rand} < p$  then
6:      $\text{sendtoTMC}(N_i, r_i, \text{side})$ 
7:   end if
8: end if

```

As depicted in Algorithm, each vehicle periodically checks the number of vehicles  $N_i$  on the current road  $r_i$ . To obtain accurate traffic information, each vehicle encapsulates in the beacon the current road identifier (i.e.,  $r_i$ ) and direction of traffic (i.e., side). When a vehicle estimates the number of cars, it only counts the beacons with the same  $r_i$  and side as itself.

### K Shortest Path Compression

```

1: procedure compresskpath()
2:  $k = \text{KPaths.size}()$  {the number of k}
3:  $P = \text{KPaths}[0]$  {the shortest path}
4: while  $k > 0$  do
5:    $P_k = \text{FindMostOverlappingPath}(P)$ 
6:    $P = \text{Compress}(P, P_k)$ 
7:    $k = k - 1$ 
8: end while

```

Let us notice that only dEBkSP (distribution Entropy Based k Shortest Paths) can take advantage of larger k values, while the centralized version cannot. A larger k allows for better traffic balancing but introduces higher computational complexity since the centralized server needs to compute k paths for all the selected vehicles. This is not a problem for dEBkSP which distributes the path computation to individual vehicles. Therefore, dEBkSP can result in higher performance than EBkSP when higher k values are used.

## VII. CONCLUSION

In system, on the other hand, is designed to be effective and fast, although not optimal, in deciding which vehicles should be re-routed when signs of congestion occur as well as computing alternative routes for these vehicles. DIVERT, offloads a large part of the re-routing computation at the vehicles, and thus, the re-routing process becomes scalable in real-time. V2V communication to better balance the need for privacy, scalability, and low overhead with the main goal of low average travel time.

### FUTURE SCOPE

Vehicular Ad-hoc network (VANET) has emerged as a possible solution to design networks that can solve traffic congestion detection problems. In proposed system the numbers of vehicles entering are detected by using IR sensors the IR sensors is connected to the microcontroller. This can be enhanced in such a way as to control automatically the signals depending on the traffic density on the roads using sensors like IR detector/receiver module extended with

automatic turn off when no vehicles are running on any side of the road which helps in power consumption saving. Number of passing vehicle in the fixed time slot on the road decide the density range of traffics and on the basis of vehicle count microcontroller decide the traffic light delays for next recording interval.

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