3G-Assisted Data Delivery in VANETs

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Abstract:

In today's wireless networking domain, various wireless technologies area unit utilised for sharing information and providing information services. 3G and VANETs have recently attracted huge attention. Information delivery is especially difficult attributable to the distinctive characteristics of VANETs, like quick topology modification, frequent disruptions, and rare contact opportunities.

In this paper, an integration of VANET and 3G networks mistreatment mobile gateways is introduced. A packet will either be delivered via multi-hop transmissions within the VANET or via 3G. we will maximize the delivery quantitative relation of packets and meantime to attenuate the delivery delay by our planned system.

Keywords: ***VANET; Data Forwarding; 3G.***

1 Introduction

The transport unexpected Network (VANET) has received significant attention in recent years, and also the connected standards and applications [1][2] area unit promoted in several countries. A VANET could be a specialised Mobile unexpected network (MANET) that connects vehicles and wayside facilities. The VANET provides each Roadside-to-Vehicle Communication (RVC) and Inter-Vehicle Communication (IVC). Information packet routing plays a very important role to change any application in IVC. as a result of the similarity between VANETs and MANETs, several analysis efforts study the practicability of existing routing protocols in transport environments. The study shows that standard topology-based routing protocols in MANETs [3][4][5][6][7] have poor performance in VANETs as a result of high node quality and large-scaled environments.

In this paper we tend to contemplate knowledge gathering in VANETs. Every vehicle could generate sensory knowledge packets which ar destined to a central server for knowledge analysis and creating choices. We tend to contemplate a VANET with Associate in Nursing infrastruc ture with wayside access points (APs) that ar connected to the net. Because the central server is additionally connected to the net, it's ample for every vehicle to deliver its packets to 1 of the APs. it's fascinating for the data gathering application that the central server will collect knowledge packets from the vehicles with high success rate and low latency.

2 Related Work

The performance of a geographical forwarding strategy is influenced by the choices of next forward nodes. In PDGR [8], consequent forward node ought to be near and moving toward the destination. In GPCR [9], a node that's situated within the space of a junction is a lot of preferred to be consequent forward node. In MOPR [10], an extra demand for increasing affiliation stability needs to be glad, that consequent forward node ought to be inside the transmission vary of the present forward node when a brief fundamental quantity. Another forwarding strategy known as flight forwarding wherever the whole forward path is such that by a flight. A flight (or known as anchor path) is solely recorded by a sequence of geographical positions (or known as anchor points). ways like galvanic skin response [11] and VVR [12] choose the shortest street path because the

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forward flight. In GyTAR [13], information forwarding is on a street path with the very best traffic density. VADD [14] selects a street path with the shortest forward delay. In GVGrid [15], the whole geographic region is logically divided into regular grids, and a forward flight is recorded by grid symbol numbers. Automotive [16] often forwards packets to road-side units for reducing packet loss over mobile nodes. In another automotive protocol [17], a route request packet is flooded into the network, and the shortest route to the destination is recorded into a sequence of anchor points. Forwarding primarily based approaches got to alter the cases once there's no any appropriate next forward node (local highest or network hole problem). In GPSR, the forwarding section tunes into perimeter mode to detour spherical any network hole. In conveyance environments, creating a detour may take long hops. Another approach is predicated on carry and forward [18]. once a current forward node couldn't realize an appropriate next forward node, this node buffers packets till encountering an appropriate one.

3 THE VADD MODEL

In this section, we tend to 1st provide the assumptions, the summary of Vehicle-Assisted knowledge Delivery (VADD)

A. Assumptions

We assume vehicles communicate with one another throughshort vary wireless channel (100m-250m). The packet delivery data like supply id, supply location, packet generation time, destination location, expiration time, etc, is specified by the information supply and placed within the packet header.

A vehicle is aware of its location by triangulation or through GPS device that is already fashionable in new cars and can be common within the future. Vehicles will notice their neighbors through periodic beacon messages that conjointly enclose the physical location of the sender.

We assume that vehicles area unit equipped with pre-loaded digital maps, which offer street-level map and traffic statistics like traffic density and vehicle speed on roads at different times of the day. Such quite digital map has already been commercialised. the most recent one is developed by MapMechanics [2], which incorporates road speed knowledge Associate in Nursingd an indication of the density of vehicles on every road.

Yahoo is additionally engaged on desegregation traffic statistics in its new version of Yahoo Maps, wherever real traffic reports of major US cities area unit out there. we tend to expect that additional elaborate traffic statistics are going to be integrated into digital map within the close to future.

Note that the price of fitting such a transport network can be even by its application to several road safety and commercial applications [25], [27], [29], that don't seem to be restricted to the planned delay tolerant knowledge delivery applications.

B. VADD summary

VADD relies on the concept of carry and forward. The most important issue is to pick out a forwarding path with the smallest packet delivery delay. Though geographical forwarding approaches like GPSR [13] that continuously chooses consequent hop nearer to the destination, area unit terribly economical for knowledge delivery in circumstantial networks, they'll not be appropriate for sparsely connected transport networks.

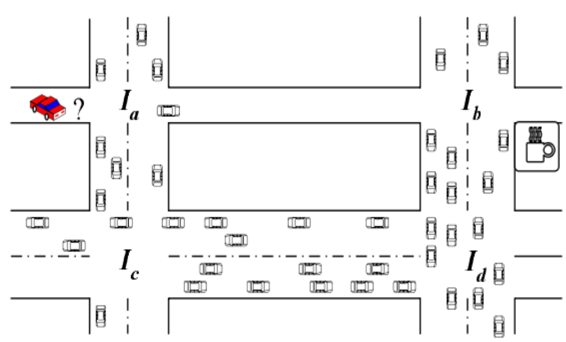

Fig. 1. Find a path to the coffee shop

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As shown in Figure one, suppose a driver approaches intersection Ia State and sends missive of invitation to the coffee bar (to build a reservation) at the corner of intersection Ib . To forward the request through Ia → Ic , Ic → Id , Id → Ib would be faster than through Ia → Ib, despite the fact that the latter provides geographically shortest attainable path. the rationale is that in case of disconnection, the packet has got to be carried by the vehicle, whose moving speed is considerably slower than the wireless communication.

In sparsely connected networks, vehicles ought to attempt to build use of the wireless communication, and resort to vehicles with quicker speed otherwise. Thus, our VADD follows the following basic principles:

1) Transmit through wireless channels the maximum amount as attainable.

2) If the packet has got to be carried through bound roads, the road with higher speed ought to be chosen.

3) Attributable to the unpredictable nature of transport ad-hoc networks, we have a tendency to cannot expect the packet to be successfully routed on the pre-computed optimum path, so dynamic path choice ought to unceasingly be dead throughout the packet forwarding method.

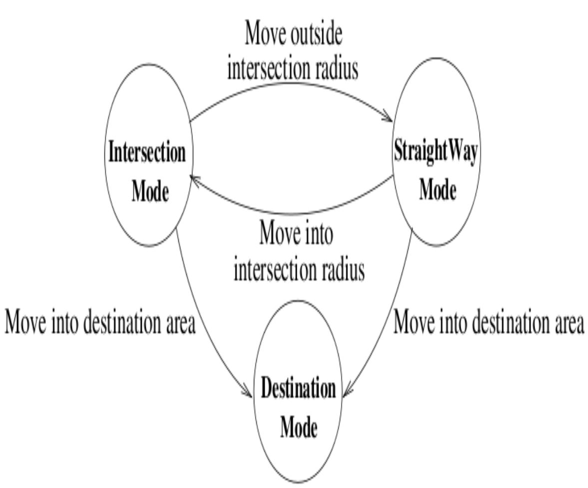

Fig.2. knowledge delivery in circumstantial networks

4 PROPOSED SYSTEM

In this paper, we tend to think about a sensory information gathering application of a VANET within which vehicles manufacture sensory information, that ought to be gathered for information analysis and creating selections. we tend to introduced a completely unique design that integrates 3G/UMTS networks with VANET.

We formulate the 3G-assisted information delivery as associate improvement downside during which the target is to maximise the utility underneath the 3G budget constraint and also the main call variables characterize which packets at which period slots to delivery via 3G.

5 ARCHITECTURE:

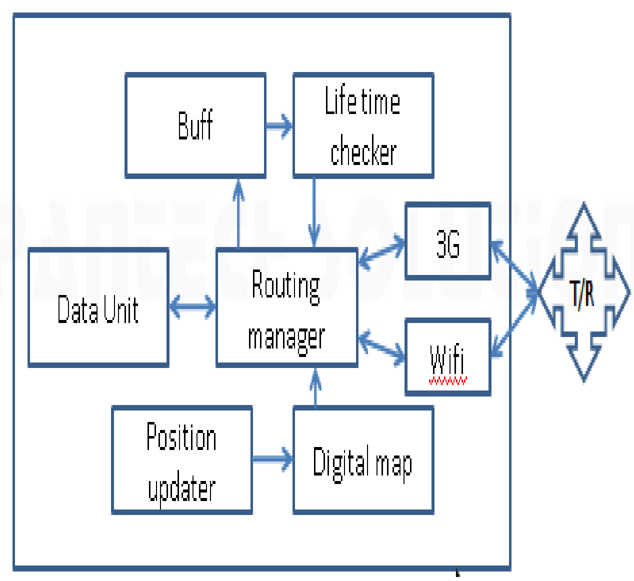

Fig.3. Architecture in VANET

6 Modules

- Neighbor node discovery
  - Sorting location information
  - Sorting neighborhoods of neighbors
  - RSU prediction technique
  - Digital map processing

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- TTL based Data transmission
  - Buffered packet verification
  - Packet & 3G budget scheduling

Neighbor Node Discovery:

- Sorting location information

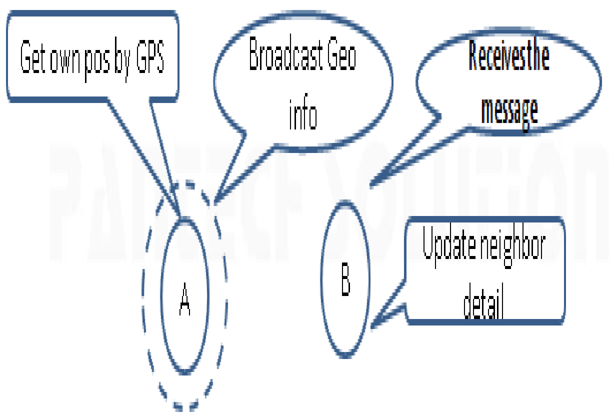

Fig.4. Sorting Location Information

- Sorting neighborhoods of neighbors
  - Each node can know about neighbor node by sharing the beacon information
  - Each nodes adds the no of neighbors details into the beacon, while broadcast
  - From beacon info, each node can update the details about neighborhoods of neighbors

RSU Prediction

- Digital map processing
- In this project, we are considering each node has digital map.
- Digital map contains location information especially the details of RSU where its available
- Each vehicle can predict when it will be inside/outside of RSU coverage area.

Digital Map Processing

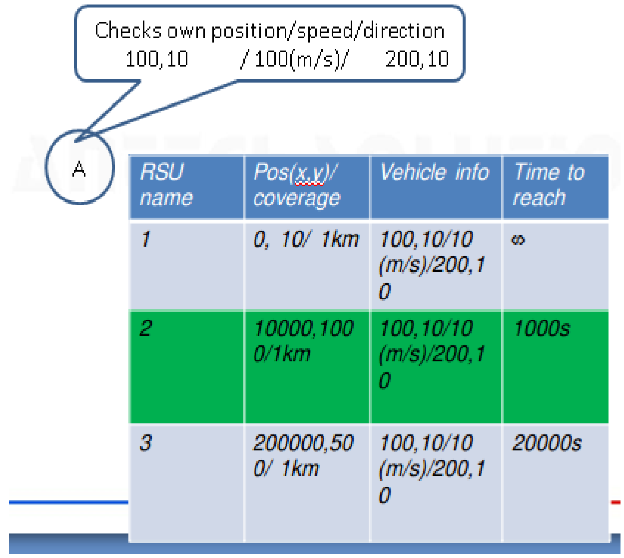

Fig.5. Digital Map Processing

TTL based Data transmission:

- Each node can generate it's own data packet with limited life time
- Generated packets will deliver to the destination as v-v communication when dest… node available within coverage.
- If dest… node not available within range source node will checks 3G budget availability. If node has more budget slot then it will transfer the data through the 3G.
- If 3G budget is limited then it checks the life time of the packet and utility function (whether it will reach to dest… within limited time).
- If its not satisfactory then data will be deliver through 3G otherwise DSRC(V-V) mode or AP.

7 Conclusion

Efficient data delivery is crucial for sensory data gathering applications of VANETs. However, we have observed that a noticeable

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percentage of data packets fail to be delivered even when there is a large number of vehicles in the network and many APs are deployed using the epidemic routing algorithm. Thus, it is highly useful to exploit 3G to further improve the data delivery performance in a VANET. In this paper we have made the first attempt to exploring the problem of 3G-assisted data delivery in VANETs.

An approach called 3GDD is proposed which first allocates the 3G budget to each time slot by solving the ILP formulation of the original optimization problem, and then selects those packets that are most unlikely delivered via VANET for 3G transmissions. The packet selection is performed before each time slot starts and this makes sure that the packet select can reflect the most update network status. Comprehensive simulations based on synthetic and real vehicular traces have been performed and comparative results show that our approach achieves better overall utility than the other alternative schemes.

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