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A SURVEY ON VARIOUS BROADCASTING PROTOCOLS IN VANET

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Abstract:
Vehicular Adhoc Network (VANET) is a type of Mobile Adhoc Network (MANET) inwhichthe vehicle nodes act as router furthermore as a host for propagating data among near vehicles and near mounted road side equipment's that improves the influence and quality of driving in terms of safety, time and speed. In VANETs, it's necessary to route data expeditiously from source to destinationso as to avoid collisions, accidents and traffic jams etc. The main objective of this survey paper is to study and analyse various broadcasting protocols for data dissemination that outline to transfer data in highways and urban situations with minimum propagation delay, redundancy and acknowledgments that offers the guarantee of message that has been reached its destination effectively.

KEYWORDS: VANET, Broadcasting, Safety Messages, Relay node.

INTRODUCTION

The VANET (Vehicular AdhocNETwork) has received tidy attention in recent years, and a few connected standards and application sareen courage din several countries. The VANET is considered to be a special type of MANET (Mobile AdhocNETwork) where the mobile nodes are considered to be the vehicles. It is considered to be one of the inducing areas for the development of Intelligent Transportation System (ITS) in order to offer wellbeing and safety to the road users. VANETs are self-organised, distributed and highly mobile networks of interacting through wireless media. VANET provide two types of communication such as Vehicle-to-infrastructure communication (V2I) and Vehicle to Vehicle communication (V2V).Routing can be well-defined as finding finest path between source and destination node and then sendingmessageon that path therefore that message canreachits destination simply, quickly and ontime.The main problem that needs to be solved inVANETsishow to exchange information in scalablemanner.The answer lies in Data Dissemination Protocols. Data Dissemination Protocols vary from one another in terms of that some of them are used in highway while others are used in urban areas and some can be used in both scenarios. Traffic safety by broadcasting safety messages is considered to be one of

the most important applications of VANETs. Safety message broadcasting is considered delay sensitive to overcome the complexity and constraints of driver reaction time for taking proper actions towards potential incidents ahead.

A. Characteristicsof VANETs

VANETs own unique network characteristics that differentiate it from other types of Adhoc network sand few important characteristics of VANET s are as follows:

1. HighlyDynamicTopology
2. Frequent Network Disconnection
3. GeographicalKindofCommunication
4. DifferentCommunicationAtmosphere s:
5. AdequateStorageandEnergy
6. InteractionwithOn-BoardSensors
7. HardDelayRestrictions

B. Applications of VANETs

The threemainapplications of VANETs aregiven below

Safety applications*:* Safety applications are the fore most vital applications type that's primarily cantered onto decrease the probabilities of road accidents and therefore the loss of lifetime of the occupants of vehicles. An outsized variety of accidents that occural together components of thee artha related to vehiclecollisions.This category of applications primarily provides activeroa safety to avoid collisions by helping the drivers with timely info. Info is shared between vehiclesandro adsideunits that are additional inclined to predict vehicle collisions. Safety data will be depicted with vehicle's speed, position, intersection position and distance heading. Moreover, dangerous locations, like slippery sections or potholes on road sareoften simply settled with the help of the exchanging data between the vehicles and therefore the road side units.

Infotainment applications: Infotainment applications provide suitability and luxury to passengers and drivers. The idea of infotainmentapplications intends to give all kind of messages that provides amusement and helpful messages to the passengers and drivers. Few examples of infotainment applications are locating the nearest mall, fuel station, cinema which provides the best price in that particular area.

Traffic Monitoring and Management Applications: This class primarily focuses on refining the traffic flow, traffic coordination and traffic aid. It is necessary for providing updated local data, maps and relevant messages restricted in time and space.

C. Challenges In VANETs

VANETsupports various ranges of on-road applications and therefore eneeds efficient and activeradiore source management schemes.Thisconsist of capacity enhancement,QoScontrol,interference control, bandwidth reservation, packet loss reduction, call admission control(CAC), packets scheduling and fairness assurance. Following are the key research challenges in VANET.

1. Multihopmessage delivery is difficult task as frequent disconnections and high quality is there in VANETs.
2. Gathering of data like accident, regulation, obstacle information, and traffic conditions etc. for amusement convenience purpose.
3. Vehicles ought to be chosen for data delivery in such the way that

packets are transmitted with minimum delay to destination.

BROADCASTING IN VANETS

Broadcasting is a communication mechanism to spread safety messages in VANETs. One of the simplest methods is flooding which is used to send the safety messages to all the vehicles. However in flooding all vehicles that have received the message will participate in further communication which leads to broadcast storm problems and redundant message retransmission. Thus, many selective retransmission protocols are proposed to overcome the broadcast storm problem. These retransmission protocols grab redundant message retransmission by allowingonly the selected relay vehicles to perform a rebroadcast of the received message among vehicles within the same radio range.

A. Requirements For VANET Broadcasting

The Broadcast protocols for VANET must satisfy the following requirements. They are summarized as follows

1. Efficiency:

The broadcast protocol needs to remove message redundancy to exclude the broadcast storm problem.

2. Scalability:

The broadcast protocol needs to pact with both sparse and dense networks to guarantee the correct operation of safety applications in such states.

3. Delay-tolerant Dissemination:

The broadcast protocol has to temporarily store disseminated messages when the network is disconnected. And the protocol has to forward them later when new vehicles are connected to the network.

4. Dissemination Delay:

Without any delay the broadcast protocol has to immediately broadcast safety messages

5. Effectiveness:

The broadcast protocol has to guarantee that all vehicles in the destination region receive the broadcast messages

6. **Robustness:**

The broadcast protocol has to pact with packet loss with the purpose of operating accurately in vital safety applications.

BROADCASTINGPROTOCOLSINVANET

For the period of the last few years, a lot of broad casting protocols for VANET shave been stated in the literature. They can be mostly classified into two main classes according to the dissemination of information packets in the network. These categories are

A.* Single-hop Broadcasting*: In single-hop broadcasting, information packets are not flooded by vehicles. Instead, when a packet is received by a vehicle and information is kept in the vehicle'son-boarddatabase. Periodically, every vehicle selects some of the records stored in its database to broadcast. Hence, in single-hop broadcasting, each vehicle carries the traffic information with itself sit travels, and this information is transferred to all other rvehiclesin itsone-hopneighbourhoodin the next broadcast cycles. Ultimately, vehicle's mobility is involved in disseminating the information in single-hop broadcasting protocol.

A.1FixedIntervalBasedSingle Hop Broadcasting Protocols*:* These protocol attentions only on the selection and aggregation of information. Traffic Info is an example of fixed broadcast interval protocol in which every vehicle is equipped with a digital road map and global positioning system (GPS) and periodically broadcasts the traffic information stored nits database.

A.2AdaptiveIntervalBasedSingle Hop Broadcasting Protocols: In these protocols, an adjustment of broadcast intervals is also taken into consideration. Collision Ratio Control Protocol (CRCP) use adaptive broadcast interval in which each vehicle disseminates the traffic information periodically.

B. Multi-hopBroadcasting: On the opposite hand, in multi-hop broadcasting strategy, a packet is disseminate in an exceedingly network by the method of flooding. Generally a sender vehicle broadcasts a data packet; variety of vehicles within the neighborhood of the sender can become successive relay vehicles by rebroadcasting the packet more within the network. Similarly, once a relay vehicle (node) rebroadcasts the packet, a number of the vehicles in its neighbourhood can become successive relay nodes and perform the task of forwarding the packet more. As a result, the data packet is ready to propagate from the sender to the opposite distant vehicles.

B.1. Delay Based Multi Hop Broadcasting Protocols*:* In an exceedingly delay-based multi-hop broadcasting theme,

Completely different waiting time before rebroadcasting the packet is appointed to every receiving vehicle. Basically, the vehicle having a shortest waiting time gets the very best priority to transmit the packet. Additionally, redundancy is avoided by the opposite vehicles by aborting their waiting method once they apprehend that the packet has already been rebroadcasted. Whereas completely different delays are appointed to every vehicle in delay-based broadcasting protocols, a unique transmit chance is appointed to every vehicle in an exceedingly probabilistic-based protocol.

B.2. Probability Based Multi Hop Broadcasting Protocols*:* In probabilistic-based broadcasting approach, each vehicle re broadcasts a packet according to the assignedrobability.Sinceonlyfewvehicleswill rebroadcastthepacket, redundancy and packet collisions are reduced. The third category of multi-hop broadcasting is network coding which has caught attention in the field of ad hoc wireless communications.

B.3. Network Coding Based Multi Hop Broadcasting Protocols: Network coding may be a new method of data dissemination which might be applied to a settled broadcast approaches, leading to important reductions within the variety of transmissions within the network and therefore yields a higher output than the standard way of transmission.

RELATED WORKS

There has been a number of broadcast schemes proposed to support safety related applications in VANETs. They are reviewed as follows.**C.Y.Yang et al. [1]** presented astreet-basedbroadcastschemeand each vehicle periodically broadcasts the hello message which contains its position information to neighboring vehicles. In case of a traffic accident, a vehicle broadcasts an emergency message, and the farthest neigh

bouring vehicle serves as the relaying node to forward the emergency message. Here a smart relay mechanism was proposed. The future enhancement of this work is to prevent false warnings from malicious people.

XiaominMa et al. [2] proposed across-layer broadcast scheme for safety related message dissemination.Thescheme divides safety related messages inVANETs into three groups and assigns them different priorities. As the class-thre message, beacon messages are periodically exchange damongneigh bouring vehicles, which include the speeds, positions, travel interval, and moving directions of these vehicles. However, repeatedly broadcasting helloorbeacon messages induces the disadvantage of signaling overhead, and consumes many of wireless channel resources.

Y.Bi et al [3] proposed a Cross Layer Broadcast Protocol (CLBP) which selects a forwarding node according to an volumetric considering the distance, relative velocity, and packeterrorrate, achieving alowlatency and high reliability in the highwayscenario.However,the drawback of this approach is lackofmulti-directional broadcast support at intersections in urban scenarios and there exists severe packet collision.

F.J.Martinezetal. [4] presented an enhanced Street Broadcast Reduction (eSBR) schemeisto address the broadcast storm problem in urban VANETs. On reception of an emergency message, a vehicle checks by searching the message ID list when theft he message has already been received or not. It keep stheemergency message if the message is received at the firs time, and then decide store broadcast the message if it distance to the sender is larger than the threshold.

M.Fogueetal [5] proposed a Profile-driven Adaptive Warning Dissemination Scheme (PAWDS) which focuses on safety related message dissemination in real urban environments. This scheme uses a mapping technique based on adapting the dissemination strategy according to both characteristics of street area and density of vehicles. This scheme is combined with enhanced street broadcast reduction (eSBR) to improve the performance. one of the drawback of this scheme is even though eSBR and PAWDS relieve redundant messages to some extent, they are unable to guarantee a single forwarding node at each hop.

G.Korkmaz, et al [6], designed an AdhocMultihopBroadcast (AMB)and Urban Multihop Broadcast(UMB)to address the broadcasts or latency, and reliability issues. They utilize the directional broadcast to select remote forwarding nodes by the Request to Broadcast (RTB)/Clear to Broadcast (CTB) hand shake on straight roads. At intersections, UMB embraces the repeater to broadcast emergency messages, while AMB enables a hunter vehicle to select the closest vehicle to the intersection which is used to forward emergency messages in each road direction. One of the drawback of UMB is the cost incurred on repeaters is high, and in case of AMB, it is waste of time in finding the vehicles closest to intersection.

J.Sahoo,et al BPAB[7]utilize different broadcast strategies according to the positions of emergency message senders. On a road, the direction al broadcast scheme is adopted to it relatively divide the transmission range to select the furthest

neighboring gnode. A tinter sections, the broadcast scheme selects forwarding nodeintheinnerregion.Nevertheless, the RTB/CTB hand shake maybe interrupted, and additionally the directional broadcast is sequentially embraced in different road directions, which increases the emergency message transmission delay.

Ming Li et al [8] presented a opportunistic broadcast protocol which involves two kinds of broadcast phase, where one phase quickly broadcasts the warning message using relatively long hops, and the other phase make use of additional make up transmissions to guarantee Packet Reception Ratio (PRR). The design of both phases is optimized to minimize the total number of transmissions. Secondly, a distributed opportunistic broadcast coordination function (OBCF), an underlying MAC-layer broadcast primitive is proposed for the recipients of a single broadcast to agree on who will be elected as the actual relay nodes. The future extension of this work is to adapt the OppCast to different kinds of road topologies and disconnected networks

Francisco J. Ros et al [9] proposed a broadcast protocol which is extension to the Parameter less Broadcast in Static to highly Mobile (PBSM). This approach tries to reduce the protocol redundancy. The main novelty is the modification of the algorithm to handle acknowledgments of broadcast messages. The drawback of this approach is degradation in message reception rate when the vehicle density goes up.

Martin Koubek, et al [10] presented G-SRMB a geo broadcasting which is an extension to the Slotted Restricted Mobility Based (SRMB) broadcasting protocol which restricts the SRMB broadcasting to a geographical area where dissemination is restricted to a specific direction. This approach greatly reduces or decreases the number of redundant transmissions. G-SRMB satisfies the emergency messaging from the reliability & end-to-end delay perspective.

AUTHOR	YEAR	BROADCASTING PROTOCOL/ SCHEME	ISSUE
C.Y.Yanget al	2010	Street Broadcast (SB) with smart relay	The traditional security issues such as integrity and non-repudiation should be considered in future.
XiaominMaet al	2012	A cross - layer broadcastscheme.	Signalling overhead, andconsumesmanyofwirelesschannelresources.
Y.Biet al	2010	A CrossLayerBroadcastProtocol	Lackofmulti-directional broadcastsupportatintersectionsinurbanscenarios
F. J. Martinez et al	2010	enhancedStreet BroadcastReduction (eSBR)	Still exists transmission delay

M.Fogueetal	2013	Profile-drivenAdaptiveWarningDissemination Scheme (PAWDS)	Unable to guarantee a single forwarding node at each hop.
G.Korkmaz et al	2007	AdhocMultihopBroadcast (AMB)andUrbanMultihopBroadcast(UMB)	UMB is the cost incurred on repeaters is high, and in case of AMB, it is waste of time in finding the vehicles closest to intersection.
J.Sahoo et al	2011	Binary-partitionassisted MAC-layer broadcast (BPAB)	Still exists transmission delay
Ming Li et al	2009	opportunistic broadcast protocol (OppCast)	The future extension of this work is to adapt the OppCast to different kinds of road topologies and disconnected networks
F. Ros et al	2009	AckPBSM, an extension to the Parameter less Broadcast in Static to highly Mobile (PBSM)	Degradation in message reception rate when the vehicle density goes up
Martin Koubek, et al	2010	G- SRMB a geo broadcasting extension to the Slotted Restricted Mobility Based (SRMB) broadcasting protocol	Wastage of communication channel and decrease in message delivery ratio.

TABLE1. Comparison of broadcasting protocols/ Schemes for VANETs

DISCUSSION AND FUTURE DIRECTION

According to the survey, though there are many broadcasting schemes are available which reduces the message redundancy and provide fast data transmission still there exists the traditional security issues such as integrity and non-repudiation which needs to be considered in future and it is necessary to focus on preventing false warning from malicious people who is elected as a single hop forwarder and to improve the message reliability when the vehicle density goes up. Table 1 shows the comparison of various broadcasting protocol for VANETs.

CONCLUSION

Broadcasting is an important communication mechanism to disseminate safety messages in VANETs. Inthis paper, survey is done on various broadcasting protocols for VANETs.These protocols reveal that different disseminating techniques are used indifferent scenariosi.e.some protocols are beneficial for propagating detain urban areas while some are beneficial for highways. Each protocol has its own pros and cons. This survey provides the future direction to overcome some of the issues in each broadcasting protocol.

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