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# Seminar II Report

on

# INTELLIGENT BROADCAST PROTOCOL IN VANET

Submitted in Partial Fulfillment of
the Requirements for the Degree
of

## Bachelor of Engineering

in

## Computer Engineering

to

## North Maharashtra University, Jalgaon

Submitted by


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2016 - 2017

**SSBT's COLLEGE OF ENGINEERING AND TECHNOLOGY, BAMBHORI, JALGAON - 425 001 (MS)**

**DEPARTMENT OF COMPUTER ENGINEERING**

# CERTIFICATE

**This is to certify that the seminar II entitled** *Intelligent Broadcast Protocol in VANET*, **submitted by**

**More Sunita Bapu**

**in partial fulfillment of the degree of** *Bachelor of Engineering* **in** *Computer Engineering* **has been satisfactorily carried out under my guidance as per the requirement of North Maharashtra University, Jalgaon.**

**Date: September 26, 2016**
**Place: Jalgaon**

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# Acknowledgements

**I hereby take this opportunity to express our heartfelt gratitude towards the people whose help is very useful to complete our project work on topic of Intelligent Broadcast Protocol in Vanet. I would also greatly thankful to our principal Dr. K. S. Wani , H. O. D. Dr. Girish K. Patnaik for providing precious help and advice. I would like to express our heartfelt thanks to our project guide Mr. Paresh D. Sharma whose experienced guidance becomes very valuable for us. Finally I would like to thank all my friends and well-wishers who have a very important role in nurturing and strengthening our career.**

**More Sunita Bapu**

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# Abstract

**Intelligent Broadcast Protocol with Implicit Acknowledgement which broadcasts the messages based on the direction of vehicles. In emergency situations, a driver typically relies on the tail brake light of the car immediately ahead to decide his or her own braking action. Broadcasting is one of the most important operations for wireless ad hoc networks. A conventional broadcast method is to flood packets where each node rebroadcasts received packets. This approach is simple and reliable, but it suffers from the problems of network congestion, resource contention and signal collision.Broadcast service in VANETs is fundamentally used to propagate urgent information among vehicles efficiently and generate a controlled amount of traffic. The vehicle involved in an accident will propagate a warning message to all the surrounding vehicles and avoid chain collision.Designing an efcient multi-hop broadcast protocol is very important for the realization of collision avoidance systems and other many interesting applications in vehicular ad hoc networks (VANETs). Existing protocols are optimized for a specic scenario, and are not capable of working in various scenarios. Therefore, designing an intelligent protocol which can tune itself in relation to the change of network environment is particularly important.**

# Chapter 1

# Introduction

**VANETs have been considered as an important communication infrastructure for the intelligent transportation systems (ITS). In IEEE 802.11p, the dedicated short range communication (DSRC) is a core function and it is a US government project for vehicular network communication for the enhancement of driving safety and comfort of automotive drivers. The increasing demand of wireless communication and the needs of new wireless devices have tend to research on self organizing, self healing networks without the interference of centralized or pre-established infrastructure/authority. The networks with the absence of any centralized or pre-established infrastructure are called Ad hoc networks. Ad hoc Networks are collection of self-governing mobile nodes. Vehicular Ad hoc Networks (VANET) is the subclass of Mobile Ad Hoc Networks (MANETs).[5]**

**Section 1.1 describe the introduction of intelligent broadcast protocol,Next section 1.2 describe the need of intelligent broadcast protocol. Also next section 1.3 present the Summary of this chapter.**

## 1.1 Vehicular Ad-hoc Network

**The basic concept of VANET is straightforward - take the widely adopted and inexpensive wireless local area network (WLAN) technology that connects notebook computers to each other and the Internet, and, with a few tweaks, install it on vehicles. This calls for the technologists to come up with various safety applications which can work with VANETs and help reduce various hazards on the roads.[5]**

**Intelligent Broadcast Protocol is fundamentally used in VANETs to propagate urgent information among vehicles. A broadcast protocol should primarily**

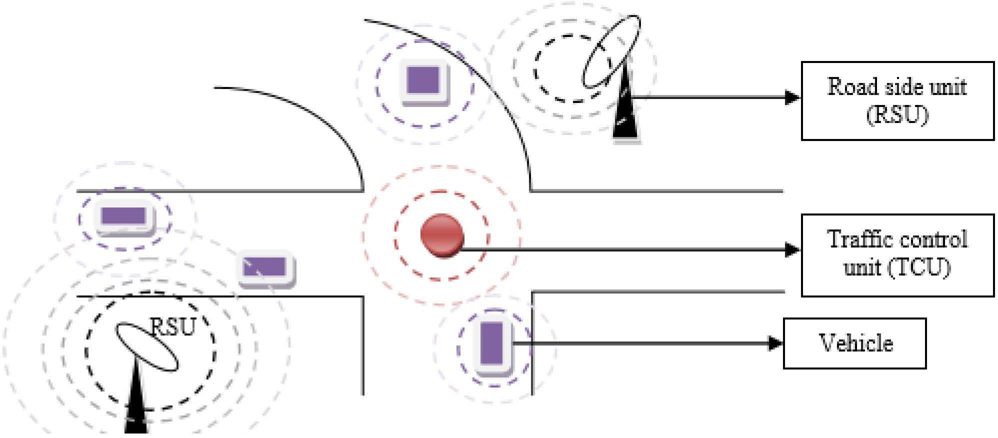


Figure 1.1: Overview of VANET

be highly reliable and efficient. If one vehicle is involved in an accident, it will send a warning message to all surrounding vehicles to avoid a chain collision. The broadcast of the alert message needs to be done very eciently so that the message reaches all the vehicles in the platoon and also controlled amount of traffic is generated. Flooding and Naive Broadcast are some of the conventional broadcast techniques used for the purpose. In the flooding mechanism, each individual vehicle periodically broadcasts information about itself. Every time a vehicle receives a broadcast message, it stores it and immediately forwards it by re-broadcasting the message. [7]

This mechanism is clearly not scalable due to the large number of messages ooded over the network, especially in high traffic density scenarios. In the Naive Broadcast mechanism, the detecting vehicle starts sending warning messages periodically at regular intervals. Upon receiving a warning message, a vehicle decides whether to decelerate and start generating its own warning messages depending on the direction of arrival of message. These techniques usually face the Broadcast Storm problem, where excessive number of broadcast packets is generated. They also face message redundancy, causing generation of duplicate messages, and higher message delivery latency, causing delay in message transmissions. These problems leads to severe contention at the link layer, packet collisions, inefficient use of bandwidth and processing power, and, most important, service disruption due to high contention.[2]

which broadcasts the messages based on the direction of vehicles. In emergency situations, a driver typically relies on the tail brake light of the car immediately ahead to decide his or her own braking action. Under typical road situations, this is not always the best collision avoidance strategy. The protocol exhibits context-aware packet forwarding and can be used for intra-platoon scenarios, where all vehicles within a platoon are assumed to be equipped with DSRC devices. According to the protocol, upon detecting an emergency event, a warning is broadcast by the detecting vehicle. The detecting vehicle as well as the other intermediary vehicles takes decision whether or not to forward the broadcast packets. This decision is taken by considering whether the message has reached to the back of the platoon. This protocol improves the system performance by reducing the number of messages and resolving the storm problem, decreasing message redundancy and delivery latency.[5]

## 1.2 Intelligent broadcast protocol

A conventional approach for broadcasting is simple flooding. As soon as node receive broadcast message receiving node rebroadcasts the message immediately. This approach can provide very high rate of data distribution. It is also simple as it does not require neighbours information. However, it does not execute well in dense and sparse areas. Particularly, in condensed area such as traffic jam during rush hours, the simple flooding is responsible for high collision, leading to low reliability with a lot of dispensable broadcast messages. This problem is also been applicable for route request (RREQ) mechanism of AODV on the Vehicular AdHOc Network environment. In sporadic area such as highways during night time, vehicles move fast and possibly have no neighbour in their transmission range. The effortless flooding in such disconnected network is useless as there is no neighbour being able to receive and convey the message VANET safety mechanism depend on interchanging the safety information among vehicles i.e. car to car (C2C communication) or between Vehicle to infrastructure i.e. car to infrastructure.(C2I Communication) using the control channel.[1]

VANET as comfort communication can be made by two means: Periodic Safety Message and Event Driven Message (refereed as Emergency Message here), both messages share only one control channel. The Beacon messages are messages about status of sender vehicle. Status information includes position, speed, heading towards, etc., about sender. Beacons provide resent or latest

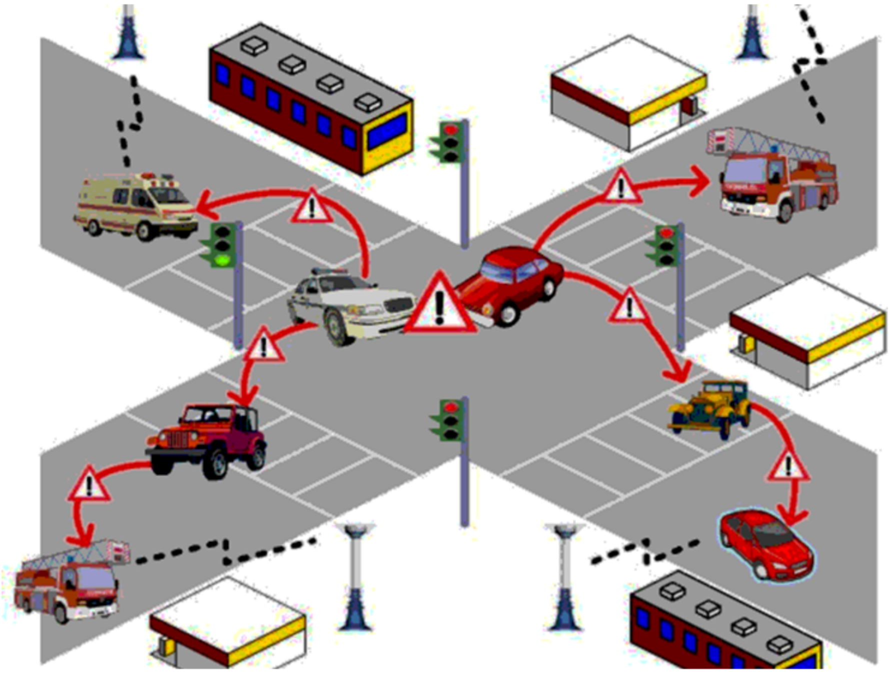

Figure 1.2: Architecture of IBP

**information of the sender vehicle to the all present vehicles in the network which will help them to know the position of the current network and anticipate the movement of vehicles. Beacons are sent antagonistically to neighbouring vehicles 10 messages each second. Emergency Messages are messages sent by a vehicle who defect a potential dangerous situation on the road, this information should be dispersed to alarm or worn other vehicles about a feasible danger that could affect the incoming vehicles. VANET is a high mobile or volatile network where the nodes are keep changing their position and they are moving in speeds, which means that this vehicles may be get influence, even if these vehicles are very far from the danger, they will reach near to danger very soon. In VANET Emergency messages are delivered in broadcasting way. Purpose behind this is all the vehicle within the communication range of the sender should receive the message.[3]**

## 1.3 Summary

**In this chapter, an overview of the Intelligent Broadcast Protocol is describe, Next chapter describe Literature Survey of Intelligent Broadcast Protocol.**

# Chapter 2

# Literature survey

**Although broadcasting has a limited usage in Ethernet and MANET (e.g. a DHCP Dynamic Host Configuration Protocol request), it has got a wider range of implementation in VANET applications. Almost all applications discussed depend on sending messages to intended vehicles without explicitly determining their identity, which is a broadcast in its nature.**

**Section 2.1 describes the History of Intelligent Broadcast Protocol. Next section 2.2 present the summary of this chapter.**

## 2.1 History

**All signaling techniques that are currently deployed in vehicles (e.g. brake lights and turning right / left lights) are considered a broadcast. With VANET technology, these signals will be exchanged directly between vehicles themselves. This will increase the driver awareness of the road and the traveling luxury as well. All of these contributions try to solve just two questions.[4]**

1. **How to deliver the broadcast message to nodes within a single communication range with the highest possible reliability which will be designated as reliable protocols and**

2. **How to deliver the broadcast message to the entire network which will be designated as dissemination protocols. Although both questions look similar to each other, the rst one is used with applications related to direct neighbors (e.g. collision avoidance) and the second is used with applications related to the entire network (e.g. traffic management).**

**Published reliable protocols use three methods: Rebroadcasting where the transmitter node retransmits the same message for many times, Selective ACK where the transmitter requires ACK from a small set of the neighbors, and Changing parameters where the transmitter changes transmission parameters according to the expected state of the network. Published dissemination protocols use two methods: Flooding where each node is responsible for determining whether it will rebroadcast the message or not, and Single relay where the transmitter is responsible for determining the next hop node. Biswas et al. gave an overview of highway cooperative collision avoidance (CCA), which is an emerging vehicular safety application using the IEEE- and ASTM-adopted Dedicated Short Range Communication (DSRC) standard. They also posed the various disadvantages of the conventional Naive Broadcast and introduced an implicit acknowledgment-based message generation and transmission strategy, intelligent broadcast with implicit acknowledgment (I-BIA), that can improve the system performance by reducing the number of messages that are injected within a platoon for a given vehicle emergency event.[2]**

**Yang et al. proposed two new concepts. The rst one shows that, the same degree of reliability can be achieved by retransmitting with a decreasing rate, and hence the protocol saves some unnecessary transmissions. The second one is that a single communication range (10-sec traveling time with a minimum of 110 meters and a maximum of 300 meters as suggested by the DSRC consortium) is sufficient for an easy slowing down. i.e. vehicles that are running away from that range should not be interrupted by that event. In case of the following vehicles react aggressively, they will be considered abnormal and send new warning messages by their own. In such situation, we will have a danger area that is covered by a cloud of warning messages initiated by the newly aected vehicles. In Alshaer et al. proposed an adaptive rebroadcasting algorithm where each vehicle determines its own probability of retransmission according to an estimate of the density of vehicles around it within two-hops. The density information is obtained from the periodical packets that are involved in the operation of the Ad-Hoc routing protocols. Ni et al. in was the rst to use ooding techniques in mobile Ad-Hoc networks, and introduced the term broadcast storm problem. That problem happens when attempting to send the intended message to all nodes by forcing each node to rebroadcast the message (simple flooding). Simple flooding will result in a serious redundancy (all neighbors have already received**

**the message), contention (nodes severely contend on the channel), and collision (concurrent transmissions and the lack of RTS/CTS). He presented different schemes to reduce the redundancy by inhibiting some nodes from rebroadcasting. Finally, the author concludes that the location-based scheme resulted in the minimum redundancy.[4]**

**Tameer et al. presented a formal model of data dissemination in VANETs and study how VANET characteristics, specifically the bidirectional mobility on well dened paths, affects the performance of data dissemination. They studied the data push model in the context of Traffic View, a system we have implemented to disseminate information about the vehicles on the road. Traffic data could be disseminated using vehicles moving on the same direction, vehicles moving in the opposite direction, or vehicles moving in both directions. Their analysis as well as simulation results show that dissemination using only vehicles in the opposite direction increases the data dissemination performance significantly. Da Li et al. proposed a distance-based broadcast protocol called Efficient Directional Broadcast (EDB) for VANET using directional antennas. In EDB, only the furthest receiver is responsible to forward the packet in the opposite direction where the packet arrives. Besides, a directional repeater located at the intersection helps disseminating the packets to the vehicles on other road segments of different directions. Also, they gave a formula for calculating the waiting time of the vehicle before rebroadcasting the message. [6]**

## 2.2 Summary

**In this chapter,History of Intelligent Broadcast Protocol is describe.Next chapter shows the Methodology of Intelligent Broadcast Protocol.**

# Chapter 3

# Methodology

**The rapid growth of applications on wireless ad hoc networks, many algorithms have been proposed to reduce redundancy overhead for broadcasting packets. Blind flooding, also called as pure flooding or simple flooding, requires each node to rebroadcast each packet the first time it receives the packet. Since nodes forward each unique packet to its neighbors, this guarantees that each packet will be broadcasted to every reachable node in the network if there is no collision. Although this approach seems to be effective, it makes nodes produce unnecessary broadcasting that leads to serious collisions. It is commonly used in wireless ad hoc networks with low node densities or high node mobility.[1]**

**Section 3.1 describes the Working of Intelligent Broadcast Protocol.Next section 3.2 describe the Stamping Broadcast algorithms of Intelligent Broadcast Protocol.Also next section 3.3 present the summary of this chapter.**

## 3.1 Working of Intelligent Broadcast Protocol

**To prevent infamize loops from transmitting packets over wireless ad hoc networks, a terminal condition is required for each broadcast algorithm to stop rebroadcasting a packet. Most broadcast algorithms require each node to cache identification of each unique packet received. Therefore nodes can identify whether a packet is duplicate upon receiving the packet. Several broadcast algorithms also make use of the TTL field in each packet to indicate the maximal remaining hops that the packet could be forwarded.Since more information of packets can be used to help nodes to make more accurate decisions, further packet information has also been utilized in several broadcast algorithms to determine whether to rebroadcast a packet. In order to obtain more information for processing a packet, each node keeps receiving duplicate packets for a short**

**time upon reception of an unseen packet. The short time is termed as the random assessment delay (RAD) and is randomly chosen within a range specified by each broadcast algorithm. It allows each node to collect more information from duplicate packets to decide to rebroadcast a packet or drop it. Besides, the random behavior of the RAD also prevents rebroadcasting from producing collisions.**

**For neighbor knowledge methods to broadcast packets in wireless ad hoc networks, they require that each node has neighbor information to ensure that there are additional nodes to be covered by rebroadcasting. Neighbor knowledge methods are classified into broadcast algorithms using i-hop neighbor information and 2-hop or more neighbor information.Flooding with self-pruning is a simple neighbor knowledge method using i-hop neighbor information. When a node broadcasts a packet, it adds its neighbor information to the packet. For each node receives a packet the first time, it compares its neighbor information to the information on the packet. If some additional nodes can be covered by rebroadcasting, the node then rebroadcasts the packet with its neighbor information.The scalable broadcast algorithm (SBA) is a simple neighbor knowledge method using 2-hop neighbor information. Since each sender of a packet is a neighbor of its receivers, a receiver can use their 2-hop neighbor information to find out if some of its neighbors are already covered by the sender. On first receiving a new packet, each node checks if all its neighbors are covered by the sender. If not, the node schedules a RAD and keeps receiving duplicate packets during the RAD. On receiving a duplicate packet, the node continues checking if it can cover additional nodes. If not, the RAD is canceled and the packet is dropped. After RAD expires, the packet is rebroadcasted by the node.[4]**

**The real-time and accuracy issues with the 2-hop neighbor information for redundancy check affect the performance dramatically. Sometimes redundancy is made by forwarding of nodes which don't have neighbor information about each other. In addition, 2-hop neighbor information is changed very often and less reliable in mobile ad hoc networks. In the proposed stamping approaches, each node always appends its own identity or up-to-date neighbor information to a packet while forwarding. After a node receives a packet, it can take the information appended into account to decide whether to forward the packet. After each node validates a packet, it stamps on the packet to make others know that it has processed the packet.[6]**

## 3.2 Stamping Broadcast Algorithm

Describe the assumptions and denotations in our algorithm. A network can be regarded as a graph G(V, E), where V is the set of nodes in the network and E is the set of connections between these nodes. Each node v in V has its own unique ill denoted as id(v), and all nodes have the same transmission range R. Nodes in the transmission range of node v are neighbors of v, denoted by N(v). For each node to obtain its neighbor information, packets that contain ill and neighbor information of each node are periodically broadcasted in the network. Based on the differences with the stamping information when forwarding and evaluation for additional coverage, the proposed stamping broadcast algorithms have three variations: basic stamping, advanced stamping and hybrid stamping. Details of these variations are described as follows.

### 3.2.1 Basic Stamping

Basic stamping is one of the neighbor knowledge methods that use I-hop neighbor information. By using the algorithm, each node uses its own unique ID as the stamping information that would be appended to packets it forwards. The node-stamp field keeps track of the up-to-the-minute nodes visited along the traveling path of the packet. By stamping forwarder's ID on rebroadcasted packets, receivers of these packets can use stamps on them to check if their neighbors have been already covered. As node r receives a broadcast message m, it checks if m is a duplicate message or not. If not, node r then uses the stamp of the message to see if its entire neighbor N(r) is covered. If there are uncovered neighbors, node r appends id(r) to the stamp of m and schedules for rebroadcasting.Figure shows a simple flow of broadcasting with basic stamping in a small network. The numbers of broadcast redundancy and duplicate packets for basic stamping are 4 and 10, respectively. Use the node a as the source node. At the beginning, node a broadcasts the packet with stamp "a". After node b and node c receive the packet, they first check if it is a duplicate packet. Because they don't receive this packet yet, they then use the stamp to check if all its neighbors have already received it. After ensuring that some neighbors have not been covered before, node b and node c rebroadcast the packet with stamps "a, b" and "a, c" respectively. On receiving packets rebroadcasted by node b and node c, node a immediately drops them because they have been broadcasted by itself before. Nodes b and c also receive a packet from each other, and drop them because they have received the same packet already. Node d receives two packets during the forwarding, and the node only rebroadcasts the message for the first time because it has not received the packet before at the time. Packets rebroadcasted by the last forwarding of node d are dropped by all its receiving nodes because they have already been covered by previous broadcasting.[1]

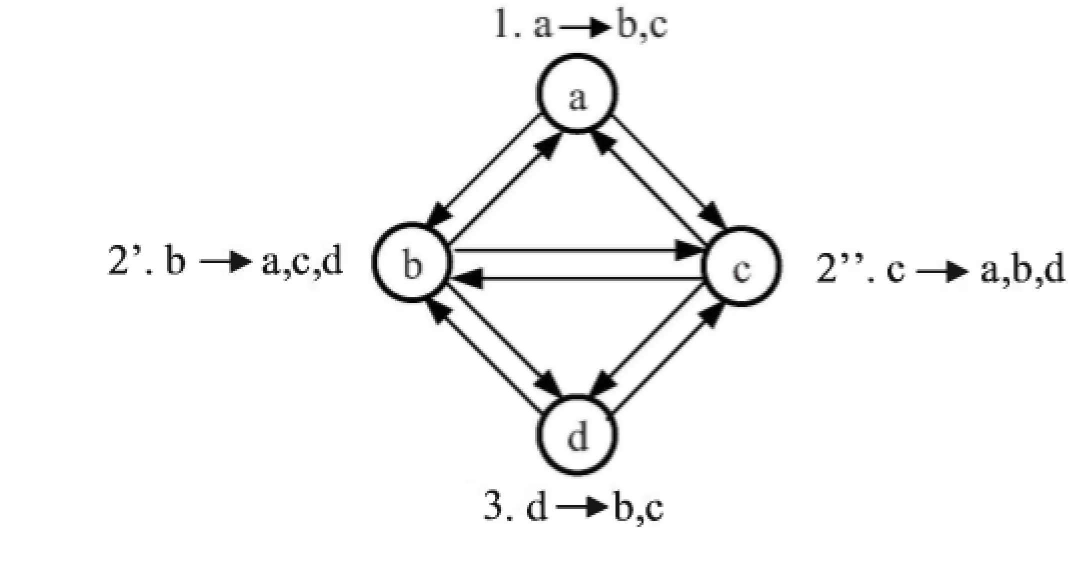


Figure 3.1: Broadcasting with Basic Stamping

The broadcast redundancy produced by the basic stamping is the same as blind flooding shown. Since basic stamping uses nodes' IDs that already passed as the stamp to avoid unnecessary rebroadcasting, it makes effects mainly on nodes that have only one neighbor. Since both flooding and basic stamping have history information for verification of duplicate packets, the stamping information used here is not sufficient as it provides little improvement over flooding. By using RADs, there are chances that some additional redundancy can be reduced if nodes receive packets from all their neighbors before RADs expire.The improvement of basic stamping is still limited with RAD. Therefore, simply adding IDs of each passed node to the stamp is not enough to reduce broadcast redundancy in ad hoc networks.[3]

### 3.2.2 Advanced Stamping

Advanced stamping is also a kind of neighbor knowledge methods using I-hop neighbor information. In addition to append the unique ID of each forwarding node to the stamp, IDs of each forwarding node's neighbors are also appended in advanced stamping scheme. Since neighbors of each forwarder are in the transmission range of the forwarder, they should receive every packet forwarded by the forwarder. Therefore, using stamps which contain I-hop neighbor information can be used to provide more accurate information of already covered nodes. After node r receives a broadcast message m for the first time, it uses the stamp of m to check if all its neighbors N(r) are already covered. If so, there is no need to rebroadcast the message because it doesn't make additional coverage; otherwise, node r appends id(r) and id(N(r)) to the stamp and schedules for rebroadcasting.[2]

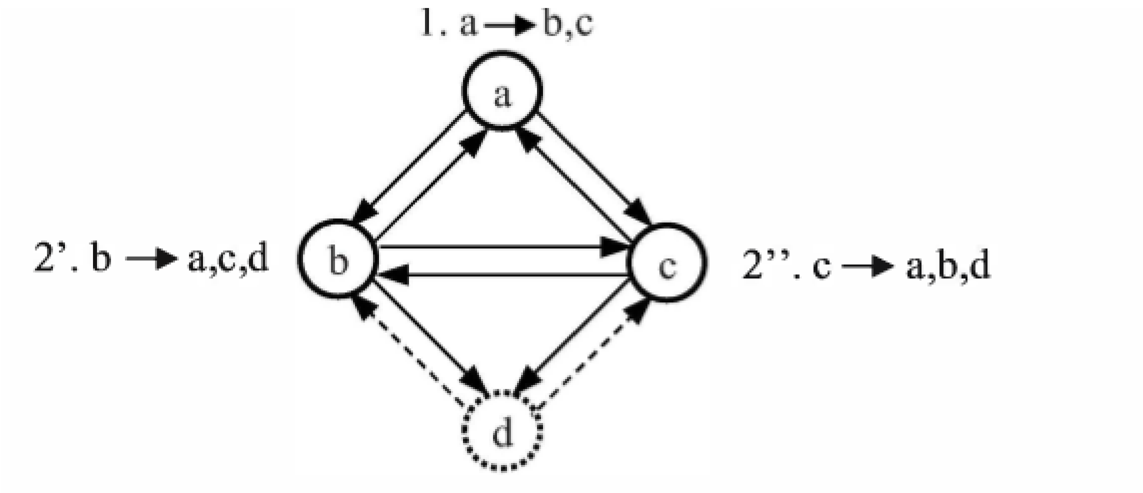


Figure 3.2: Broadcasting with Advanced Stamping

Figure shows the simple flow of broadcasting with advanced stamping in the same small network. At first, source node a broadcasts the message with a stamp "a, b, c". When node b and node c receive the message, they find out that the message is a new message and use the stamp of the message to evaluate additional coverage. Because one of their neighbors, node d, is not in the stamp, node b and node c then schedule for rebroadcasting using the stamp "a, b, c, d". After rebroadcasting, node a and node d receive two broadcast messages from node b and node c. At the same time, node b and node c receive a broadcast message from each other. For all of these nodes, stamps of the received messages contain all of their neighbors. Hence there is no need to schedule for further forwarding.[8]

Broadcast redundancy by advanced stamping is decreased by one compared to basic stamping in Figure. From the simple flow, we can notice that the broadcast redundancy reduced by advanced stamping is found in the comer of the network. This is because nodes in the comers of a network usually have some overlapped neighbors and no additional coverage can be reached by them. The simulation results shown later are similar to flooding with self-pruning, but some longer loop can be reduced since the stamp is accumulated to each packet. The RAD also plays an important role in reducing broadcast redundancy. In the situation after both node b and node c schedule with RADs in previous example, if the RAD in node b is expired earlier, node c will receive the redundant broadcast message before rebroadcasting. Because the stamp of the message forwarded by node b indicates all nodes have already been covered, node c then immediately aborts its scheduling for rebroadcasting. It indicates that RAD can make more improvement with advanced stamping, and there is still chance to improve further for stamping with more neighbor information.[8]

### 3.2.3 Hybrid Stamping

To improve broadcast efficiency further, hybrid stamping utilizes 2-hop neighbor information for pruning. Although advanced stamping can avoid the situation for receivers of the same packet to resend it to each other (like node b and node c in Figure), there are chances that these receivers share some common neighbors not presented in the stamp. With hybrid stamping, each node further checks if some of its neighbors can also be reached by other nodes in the stamp. If so, the node decides whether to forward for these neighbors by implementation of actual system design. In this paper, we assume that the node which has the ID of lowest alphabetic order is responsible to forward a packet to the node that several nodes can cover the same node. When node r receives a new message m, it first checks if its neighbors N(r) are all contained in the stamp of m. For each neighbor n not contained in the stamp, node r then tries to check if there is a neighbor pin N(n) is in the stamp. If node p has higher priority than node r, node r can assume node n will be covered by broadcasting from node p or node with even higher priority. Figure demonstrates the simple flow of broadcasting with hybrid stamping in the same network as shown above. Node a broadcasts the message with stamp "a, b, c" in the beginning. When node b and node c receive the message, they know it is a new message and check the stamp for the covered-node set. After examining the stamp, both of them find a neighbor, node d, is not covered but it can be reached by each other. With the pre-defined comparison method, node c knows that node b has higher precedence than itself, so it cancels the following processing. On reception of the broadcast message sent by node b to other nodes, each node immediately drops the message because all of their neighbors are in the stamp of the message. [6]

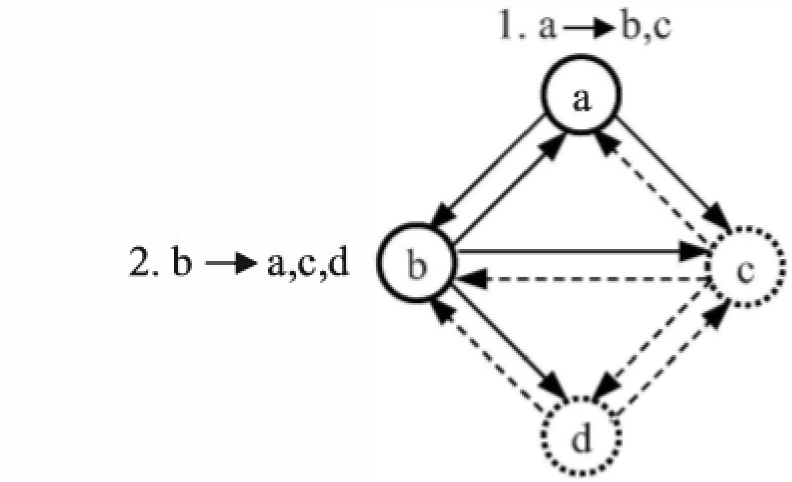


Figure 3.3: Broadcasting with Hybrid Stamping

Compared with advanced stamping, hybrid stamping can effectively reduce broadcast redundancy further for nodes covering overlapped neighbors. This method is especially suitable for delivering packets in a dense network where receivers of the same broadcasting event seem to have some common neighbors. From the simulation results shown later, hybrid stamping provides evident improvement over the other broadcast algorithms. Only simulate a simple node-selection method which may not select the best forwarding node; a better node-selection method may improve the performance of hybrid stamping further.[7]

## 3.3 Summary

In this chapter, Methodology of Intelligent Broadcast Protocol is describe and how it working and Stamping Broadcast Algorithms of Intelligent Broadcast Protocol is describe, Next chapter shows the Discussion of the Intelligent Broadcast Protocol.

# Chapter 4

# Discussion

This chapter includes the Discussion about the Intelligent Broadcast Protocol which describe as follows.

In this chapter section 4.1 describes the Advantages of Intelligent Broadcast Protocol. Next section 4.2 describe the Disadvantages, Next section 4.3 describes the Application of Intelligent Broadcast Protocol,And also next section 4.4 present the summary of this chapter.

## 4.1 Advantages

1. Minimize the number of vehicles involved in intraplatoon chain collisions.
2. Prioritize data from safety-related ITS applications over low-priority ITS applications.
3. Limit vehicle collisions in the presence of radio channel errors.
4. It is improve the traffic safety.
5. easy to communication for vehicle to vehicle, vehicle to infrastructure and roadside units.
6. It is avoid the accidents.
7. Reducing the number of collisions.
8. Faster and efficient propagation of warning messages.
9. Deal with the dynamic topology of VANETs.
10. Generate a lesser amount of traffic.
11. Decrease the delivery latency and redundancy.
12. The IEEE 802.11p is an approved to add wireless access in vehicular environment.

13. Data exchange between high speed vehicles and between the vehicles and roadside units.

## 4.2 Disadvantages

1. It is acquire more delay.
2. Message transfer time collision is occur.
3. No.of accidents on road.

## 4.3 Applications

A broadcast protocol should primarily be highly reliable and efficient. If one vehicle is involved in an accident, it will send a warning message to all surrounding vehicles to avoid a chain collision. The broadcast of the alert message needs to be done very efficiently so that the message reaches all the vehicles in the platoon and also controlled amount of traffic is generated.

Flooding and Naive Broadcast are some of the conventional broadcast techniques used for the purpose. In the ooding mechanism, each individual vehicle periodically broadcasts information about itself. Every time a vehicle receives a broadcast message, it stores it and immediately forwards it by re-broadcasting the message. This mechanism is clearly not scalable due to the large number of messages ooded over the network, especially in high traffic density scenarios. In the Naive Broadcast mechanism, the detecting vehicle starts sending.[5]

warning messages periodically at regular intervals. Upon receiving a warning message, a vehicle decides whether to decelerate and start generating its own warning messages depending on the direction of arrival of message. These techniques usually face the Broadcast Storm problem, where excessive number of broadcast packets is generated. They also face message redundancy, causing generation of duplicate messages, and higher message delivery latency, causing delay in message transmissions. These problems leads to severe contention at the link layer, packet collisions, inefficient use of bandwidth and processing power, and, most important, service disruption due to high contention.[3]

1. To develop a protocol for faster propagation of warning messages.
2. To develop a protocol which meets the requirements of ITS applications.

3. To develop a protocol which can be used in CCA application.
4. To increase the highway safety by reducing the chain collisions.
5. Satisfying the requirements of CCA Applications.

## 4.4 Summary

In this chapter describes the Advantages, Disadvantages and Application of Intelligent Broadcast Protocol, Next chapter includes an Conclusion and Future Scope.

# Chapter 5

# Conclusion and Future Scope

**The state-of-the-art survey of the various broadcasting techniques undertaken for building the safety applications for the VANETs clearly suggest that the conventional broadcast techniques used produce a signicant amount of unnecessary network traffic and ultimately have very low efficiency. The protocol implemented clearly has an upperhand over the naive broadcasting and flooding technique when it comes to faster propagation of warning messages and generation of network traffic causing a controlled amount of message redundancy and delivery latency. Looking at the share of chain collisions in the casualties caused by accidents every year, it becomes necessary for us to use the networking concepts to help the drivers get notied about the situation as soon as possible which will help them to react on time and hopefully save their lives.**

**The role of mobility of vehicles in the performance of any dissemination technique is very important. The future work will have to be concentrated on adapting the protocol in dierent mobility scenarios. Also, increasing the priority of the warning messages can even more increase the efficiency of the protocol, which is left as a part of future work.**

# Bibliography

[1] Chun-Hsin Wu* and Chi a-Wei Li -"Intelligent Broadcast in Wireless Ad Hoc Networks Using Live Packet Information" IEEE 2013.

[2] Satoshi Ohzahata, and Toshihiko Kato -"An Intelligent Broadcast Protocol for VANETs Based on Transfer Learning" IEEE 2015.

[3] Yitian Gu, Shou-pon Lin, Nicholas F. Maxemchuk -"A Fail Safe Broadcast Protocol for Collaborative Intelligent Vehicles" 2014

[4] Mahapurush C.V. Manvi S.S., Kakkasageri M.S. Performance analysis of aodv, dsr, and swarm intelligence routing protocols in vehicular ad hoc network environment. International conference on future Computer and Communication, pages 2125, April 2009.

[5] Wei Peng and Xi-Cheng Lu, "On the Reduction of Broadcast Redundancy in Mobile Ad Hoc Networks," International Symposium of Mobile Ad Hoc Networking and Computing, 2000.

[6] Raymond Tatchikou Subir Biswas and Francois Dion. Vehicle-to-vehicle wireless communication protocols for enhancing highway traffic safety. IEEE, 2005.

[7] Norton, D. E. (2004). The effective teaching of language arts. New York: Pearson/Merrill/Prentice Hall.

[8] Hyojun Lim and Cbongwon Kim, "Multicast Tree Construction and Flooding in Wireless Ad Hoc Networks," International Workshop on Modeling, Analysis and Simulation of Wireless and Mobile Systems, 2000.+