Improve Efficiency Of Medium Access Control Protocol for Vehicular Ad hocNetwork

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ABSTRACT: *VANET (Vehicular Ad hoc network) plays an important role in connecting the nodes in the mobility. Here security is a major issue while passing messages from one node (vehicle) to another (vehicle). In wireless network, messages are passed with a wireless router or node. Considering the benefits of VANET, organizing security is a challenging task. Black hole attack is one of the security threats. The black hole attack is a type of a hiding itself as if it has the shortest and the fastest way to the destination node. There can be situations where there can be multiple such nodes which can act as black hole nodes. Our solution is addressing such issues with modified DSR protocol. In the proposed approach, Street side units are put in the crossing point of streets and may acknowledge to exchange bundles when a vehicle experiences an issue of package transmission. The solution protocol differs from AODV that it refreshes the value of sending message flag by taking its neighbourhood nodes into consideration. The results will prove the efficiency of the proposed approach.*

Key Words: *VANET, Mac protocol, Multi Channle operation ,Cognitive Radio.*

I. INTRODUCTION

Vehicular Specially appointed Systems (VANETs) is innovation that coordinates the capacities of new age remote systems to vehicles. VANET fabricates a powerful Specially appointed system between portable vehicles and roadside units. It is a structure of MANET that sets up correspondence among close-by vehicles and nearby fixed device, normally depicted as roadside device.

VANET can accomplish emotional correspondence between moving hub by utilizing distinctive specially appointed systems administration apparatuses, for example, Spouse IEEE 802.11 b/g, WiMAX IEEE 802.10, Bluetooth, IRA[6],.

Vehicle to Vehicle (V2V) Correspondence happens in the middle of vehicle to vehicle without the sponsorship of any foundation. It is fitting for speaking with in short range[6]. It is dependable and fast. VANET is chiefly gone for giving wellbeing related data and traffic the board. Security and traffic the executives involves constant data and straightforwardly influence lives of individuals going out and about. Effortlessness and security of VANET system guarantees more prominent productivity. Security is acknowledged as prime trait of Vehicular Impromptu System (VANET) framework. Most of all hubs in VANET are vehicles that can shape self sorting out systems without earlier learning of one another. VANET with low security level are progressively helpless against regular assaults. There are wide scope of uses like business foundations, customers, diversion where VANET are sent and it is exceptionally important to add security to these systems with the goal that harm to life and property proved unable happen [12].

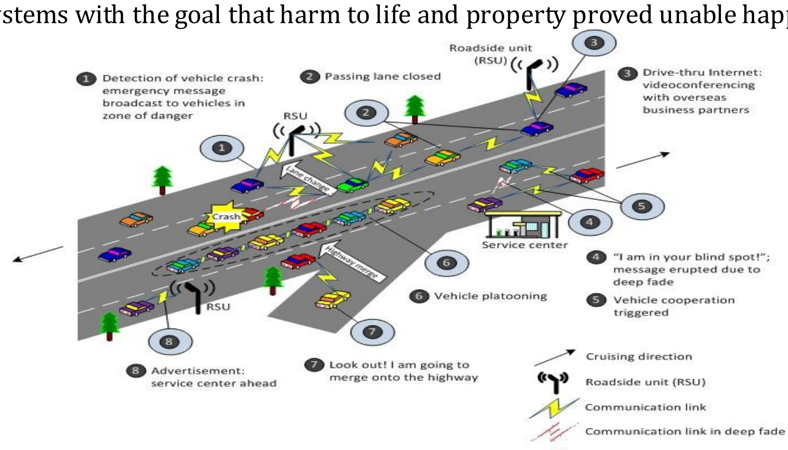

Fig. 1: Example of Safety Applications in VANET.[12]

II. Ad-hoc Networks:-

Most as of late, another system investigate zone known as impromptu systems has risen in remote correspondences which is introducing signicant difficulties to 4G interchanges. Versatile impromptu Systems (MANETs) are in a flash made by remote portable hubs; in this manner, they don't have cell framework, for example, base stations. These are types of friend topeer systems with appropriated control. In this sort of systems, every hub moreover tobeing the source or goal of the information, collaborates with different hubs for the transportation of the data the system. In this way, every portable client goes about as a store-and-forward hub for the data that it gets from its neighbors. The specially appointed systems might be remain solitary or may have interfaces to wire-line systems. Fig 1.2 contrasts the customary cell foundation and the specially appointed plan. Among the wide number of utilizations of impromptu systems, the future applications can be classied dependent on the accessibility of customary foundation based cell systems. Framework isn't accessible. In certain circumstances, actualizing a framework for correspondence isn't attainable. The model could be arrangement of a crisis reaction organize for an inquiry and salvage activity in a region where a quake has happened. In this situation, the impromptu system can give correspondence among salvage groups on the scene[12].

This is because of a traffic flood in crisis or changes in land circulation of traffic. The precedent is correspondences among drivers for closure a superior course in transportation parkways. In this circumstance, the cell design is deficient for giving the required data limit, as it is immersed[3].

At the point when the traffic is neighborhood, the steering isn't important through the system's foundation outer to the area.

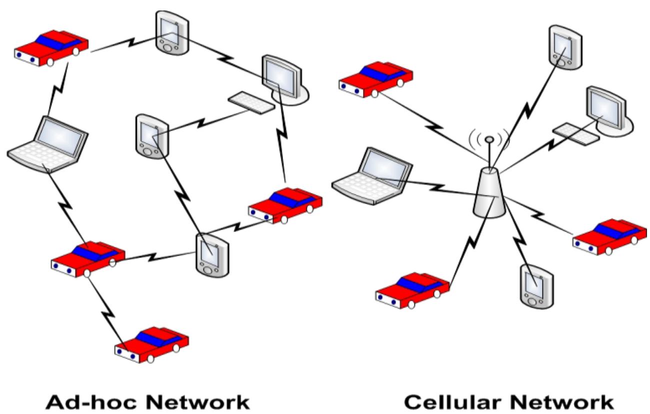

Figure 1.1: Ad-hoc Network versus Cellular Network[12]

For instance, correspondences in a gathering room or a building site can be taken care of with a specially appointed engineering. Another model is the voice communication inside a cell which is typically steered through the framework which squanders the phone limit. Voice communication may he gave through impromptu interchanges with the exception of when the end clients are situated at various cells. Impromptu systems administration had initially been proposed for military applications, however as of late, numerous business applications have additionally risen. A portion of the essential administrations which officially executed are Bluetooth innovation, in this gadget to gadget conferencing applications, and PC to PC specially appointed correspondence. In spite of the fact that these advancements work in a specially appointed way, their applications are restricted to one-bounce correspondences.

When the traffic is local, the routing is not necessary through the network's infrastructure external to the location. For example, communications in a meeting room or a construction site can be handled with an ad-hoc architecture. Another example is the voice telephony inside a cell which is usually routed through the infrastructure which wastes the cellular capacity. Voice telephony may he provided through ad-hoc communications except when the end users are located at different cells. Ad-hoc networking had originally been proposed for military applications, but recently, many commercial applications have also emerged. Some of the basic services which already implemented are Bluetooth technology, in this device to device conferencing applications, and PC to PC ad-hoc communication. Although these technologies work in an ad-hoc manner, their applications are limited to one-hop communications.[12]

1. Multi-Channel Operation Approach

As Per IEEE 1609.4 describes a concept of channel intervals in which time is divided into alternating Control Channel (CCH) and Service Channel (SCH) intervals.The general concept calls for each interval to be 50ms long. A pair of a CCH and SCH intervals forms a Sync interval. There are ten Sync intervals per second. This is motivated by a desire to map Sync intervals to the generally assumed 10Hz vehicle safety messaging rate. The start of a CCH interval is aligned with the start of a Coordinated Universal Time (UTC) second or multiples of 100ms thereafter. It is generally envisioned that a DSRC onboard unit should, by default, be tuned to the CCH to send and receive safety messages continuously. If it is engaged in some non-safety application communications in a SCH, then it is expected to actively switch between.CCH and SCH channels for the duration of the service session1. With this alternating channel access, the DSRC radio is used for safety communications during CCH intervals and used for other applications during SCH intervals. Each DSRC radio, even if it is in continuous access on the CCH, is expected to track the start and end of CCH and SCH intervals at all times. The concept is that such a radio would send safety messages during the CCH interval for the benefit of other nearby radios that might be engaging in alternating channel access [1].

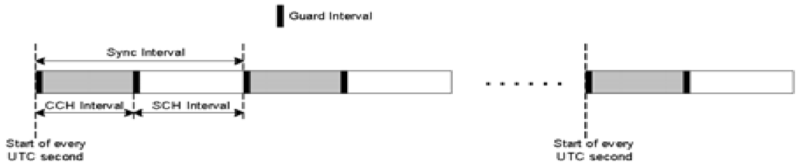

Figure 6 CCH, SCH, Guard and Sync intervals[1]

The standard further defines a Guard interval at the start of each channel interval, be it SCH or CCH. This is meant to account for "radio switching and timing inaccuracies among different devices." Accordingly, the Guard interval is defined as the sum of the Sync_Tolerance and Max_Channel_Switch_Time parameters. Sync_Tolerance describes the expected precision of a device's internal clock in aligning to the UTC time. Max_Channel_Switch_Time is the time overhead for a radio to be tuned to and made available in another channel. Currently, the assumed value for the Guard interval ranges from 4 to 6 ms. If a radio is actively switching channels, it suspends MAC activities at the start of a Guard interval. After the channel switching and at the end of the Guard interval, it starts the communications activities in the new channel or resumes such activities if they were suspended from the last Sync interval [1].

IV. Cognitive Radio:

The emerging CR technology has been identified as the solution to the issues of spectrum scarcity and the underutilization of the available spectrum. The primary idea behind this emerging technology is to allow the Secondary (unlicensed) Users (SUs) to share the available spectral resource of the Primary (licensed) Users (USs) without causing harmful interference to the rightful licensed users [8]. In other words, CR devices intelligently detect spectrum hole (also known as spectrum availability) and allocate the spectrum bandwidth to suitable SUs for effective utilization without causing interference to the licensed users. CR devices are capable of adapting to their internal states by sensing their surrounding environs and making changes in certain operating parameters, accordingly. The concept of CR was first proposed by Mitola and Maguire [8]. The authors proposed a Radio Knowledge Representation Language (RKRL) with CR to intelligently manipulate the protocol stack so as to adapt and efficiently satisfy the user needs. This changes radio stations from mere blind executors of pre-defined protocols into smart radio domain nodes that dynamically deliver services with the realization of CR technology. Vehicular networks also referred to as VANETs have been foreseen as an important application with enormous societal impact [10-11] which includes road safety, traffic efficiency and infotainment services. Efficient, reliable, and timely exchange of current and upcoming traffic information among moving vehicles can reduce road accidents, minimize hours spent on the motorways due to traffic jams, and reduce fuel consumption. Other applications of VANETs include location-based, and road side information services such as information about gas stations, road side restaurants, parking, road side lodges, etc. The IEEE 1609.4 [8] protocol stack which was proposed by a delegated IEEE Working Group (WG) is meant to provide mechanism for multi-channel operations in wireless access for vehicular environments (WAVE), where all the seven channels (i.e., one control channel (CCH) and, six service channels (SCH)) are periodically synchronized at intervals for efficient message transmission. The United States' Federal Communication Commission (US FCC) made the pioneering step to support vehicular networks by allocating 75 MHz spectrum in the 5.9 GHz spectrum band for the WAVE system. In other words, all vehicular users will have to contend for the channel access and use it to exchange both safety and non-safety related information in the 5.9 GHz spectrum band. However, in order to realize the full potentials of VANETs, vehicles should be able to communicate with one another using vehicle to vehicle (V2V), vehicle to roadside infrastructure (V2I), and vehicle to other pedestrians' handheld devices

(V2X) communications by leveraging on the wide range of wireless spectrum, and networks such as Wi-Fi networks, cellular networks, TV bands, and satellite networks, depending on the availability, and location of vehicles. Fig. 1 a V2V communication scenario with CR enabled vehicles which enables opportunistic spectrum usage while moving.

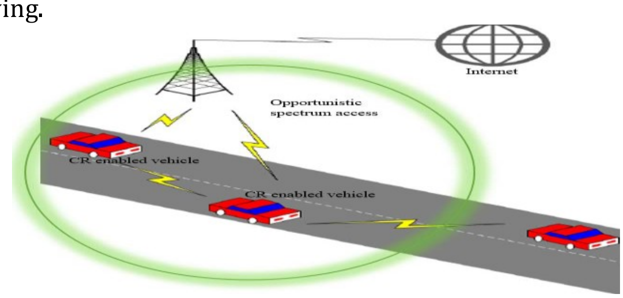

Fig. 1: V2V communication scenario with CR enabled vehicles[8]

IV. PROPOSED MECHANISM:

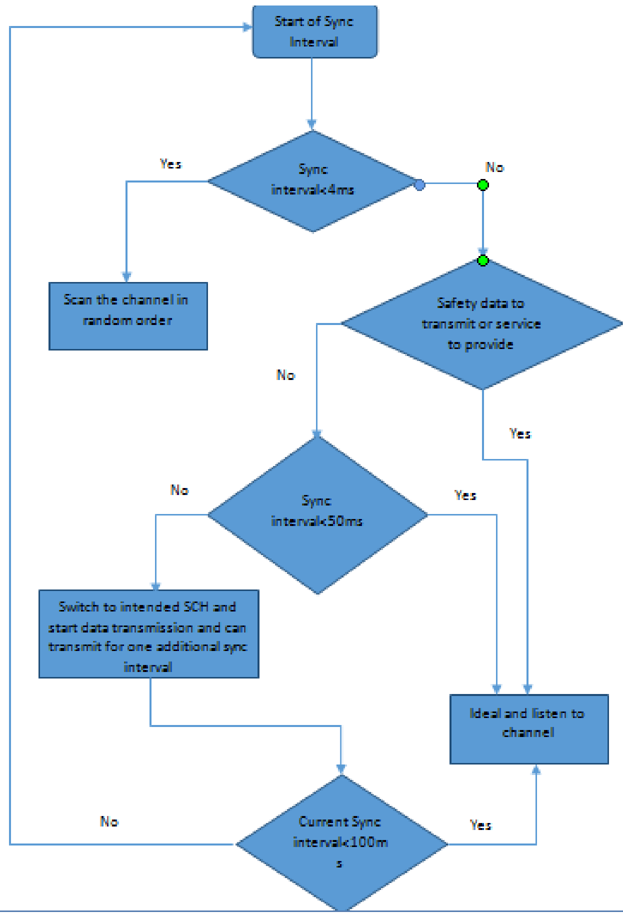

Fig. 5: flow chart of proposed work

- **Algorithm Steps:**
  1. Begin (Start)
  2. Synchronize Interval
  3. If Synchronize Interval<4ms Scan the channel in random odder else go to step 4
  4. Safety data to transmit or service to provider or no go through next
  5. Increase the synchronize interval timing
  6. If synchronize interval timing<50 ms then we able to get ideal channel if no go through next
  7. Switch to intended SCH and start data transmission and can transmit for one additional sync interval
  8. If current sync interval is<100ms yes able to get ideal channel no go through next step
  9. Go to step 1

V. SOFTWARE REQUIREMENTS:

Simulation: NS version 2.35
Language: TCL and C++
Operating System: Ubantu 14.04 LTS 64-bit

- **EXPERIMENTAL SETUP:**

Table 1: simulation parameter

Parameter	Value
Environment Size	800*600 meters
Total Number of Nodes	100
Node Speed	5m/s, 25m/s, 60m/s, random
Node Type	Mobile
Packet Type	UDP
Simulation Time	2.0ms

VI. IMPLEMENTATION RESULT:

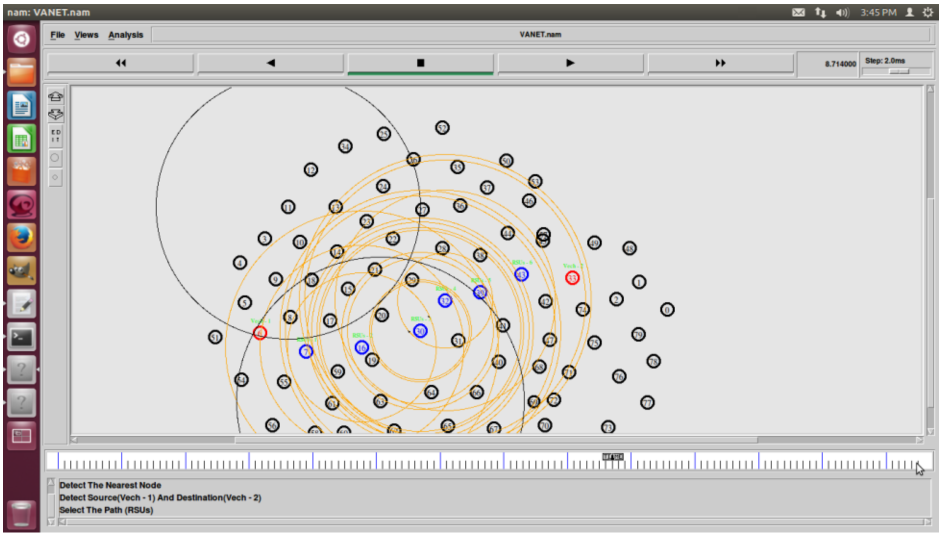

Fig.initial for 100 node using TDMA

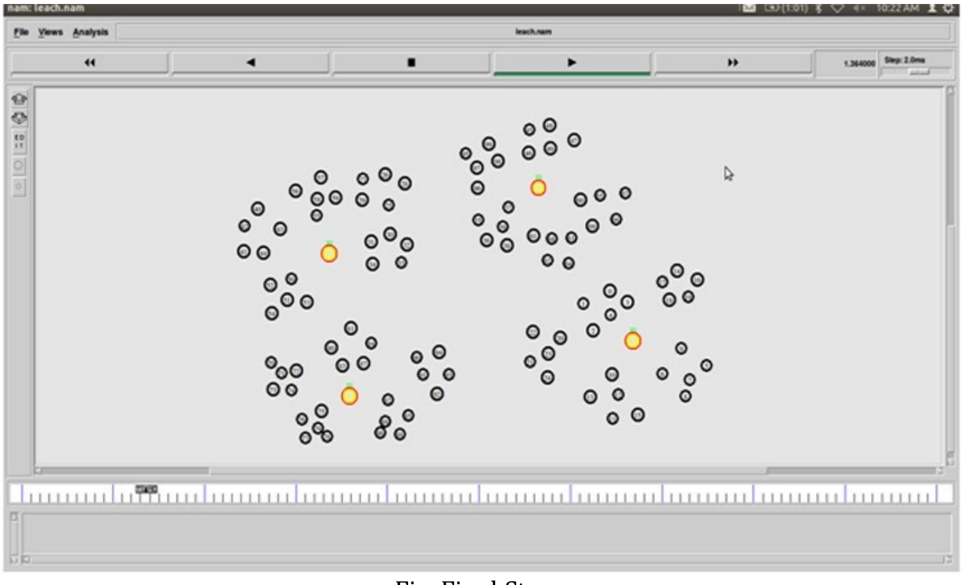

Fig. Final Stage

Table 2: result table

Number of Nodes	50	100
Packet Delivery Ratio	72.5	76.761

VII. CONCLUSION

Multichannel cognitive MAC protocol is introduced, followed by an enhancement mechanism of EDCA and safety message acknowledgment for improving the performance of MAC's contention and reservation in vehicular networks.MAC design guidelines were highlighted. Following a top down approach, diverse multiple access schemes were explained and then the most suitable protocols for VANETs were discussed .From the perspective of using different MAC architectures, overviews of the existing MAC solutions for a vehicular environment were briffely introduced.

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