Aligns Formation and Information Sharing For VANET (Vehicular Adhoc Networks)

Maharuf Ali
Final Year ME(Communication Systems) Student
Easa College of Engineering and Technology

***Abstract* - VANET is a higher version of Mobile Ad-hoc Network (MANET). Which protocols used in the MANET is suitable to the VANET also. Many researchers are involved in VANET field, which can provide life safety and traffic management system. In Sudden deep growth of the vehicular industry, designing and implementing VANET is a complex and wide area of research. Thus, as usual that these studies and practices are still simulation based because it is impracticable to use the vehicles for the large scale in numbers in different conditions to develop new algorithms and protocols for VANET. A wireless channel is uniform and lossy so simulators for VANET require a model of these characteristics. Have highlighted the need of abundant radio propagation models for VANET with NS2 simulators as these factors play an important role to adopt the protocol suitable for vehicle communication.**

1.1 INTRODUCTION

VANETS support a wide range of applications that enhance safety, comfort, and transportation. The vehicles communicate among themselves and with the RSUs which, in turn, connect with the Internet, thereby enabling the formation of networks of intelligent transportation systems (ITS). Vehicles communicate with one another using different wireless communication protocols to provide highly secure highway traffic environment. VANETs can be secured using stochastic learning automata-based techniques for intrusion detection. VANETs can reduce on-road accidents and improve the traffic condition by cooperatively shares datas in accordance with traffic Clearance and road condition, and vehicular movement information among themselves.

Multi-path fading, interference and other wireless channel characteristics results in the intermittent connectivity problem in VANETs. Consequently, two nodes can have connectivity problem while maintaining good connection with another node, even though both the nodes are within the transmission range of each other. This intermittent connectivity problem can be overcome by cooperative communication techniques in which the neighboring nodes listen to ongoing communication and transmits the message in times of transmission failure. Uplink capacity of a node can be considerably improved by employing user cooperation . VANETs can improve reliability and throughput gain by exploiting the broadcast nature of wireless transmission by using cooperative communication techniques. In cooperative communication, relay node selection is an important task, as the network performance depends on it heavily.

Existing literature on cooperation in VANETs concentrate on maximizing the received revenues by RSUs by serving data to the vehicles. Specifically, in a seminal work by Saad et al. addressed the task allocation problem with a centralized receiver approach, in which the wireless agents collect data and pass them to the central receiver. Such an approach is not suitable for service-based message sharing in VANETs. The existing works discussed cooperative communication in VANETs, but do not consider the effect of intermittent connectivity problem and, therefore, fails to provide reliable message delivery with reduced retransmission.

In this case, a higher transmission rate in the MCS doesn't imply a higher instantaneous PER and thus, the traditional link adaptation algorithms used in SIMO (single-input multiple-output) legacy systems become hardly effective. This motivates the development of crosslayer link adaptation algorithms based on AMC for VANETOFDM systems, in one hand the key elements of the FLA optimization process are, on the other hand a high quality instantaneous PER prediction tool at the PHY layer for all possible MCS/VANET modes, packet lengths and channel realizations, and, a MCS/VANET mode selection methodology at the MAC layer that ensures the fulfilment of QoS constraints. There is no simple and systematic approach for predicting PER assuming arbitrary MCS/VANET modes, packet sizes, and channel realizations in frequency selective channels with arbitrary channel correlations. Nevertheless, propose PHY abstraction techniques that enable accurate PER prediction based on frame-by-frame bit error rate (BER) prediction.

Abstraction techniques which based on an approach that maps system parameters like the selected MCS/VANET operation mode, packet length and channel realization in to a link quality metric (LQM) which can be associated to the PER by means of simple look-up tables. Appropriate LQMs are derived for each VANET detection strategy used at the receiver side. Moreover, also presents an MCS selection approach that fulfils the optimization constraint on the PER outage probability.

Hardware and software configuration parameters used in our experiments are listed in Table IV. The Access Point (N0) and the PC (N1) wireless card adopt "2x2" VANET technology for data rates of up to 300Mbps. In order to make the scenario more realistic, we use a tunable waveform generator that allows injecting of Adaptive White Gaussian Noise (AWGN) at different power levels and a desired frequency band. AWGN is commonly used to simulate background noise of the channel, in addition to multipath and terrain blocking, interference, ground clutter and self interference that modern radio systems encounter in terrestrial operation.

However, in our experiments, the distance between two devices and their mobility variations are adjusted by changing the noise power created by the AWGN generator. To increase the distance between a sender and a receiver, then we should increase the noise power in the channel. TCP provides reliable, ordered delivery of streams and it is the protocol used by major Internet applications. Since, TCP check the packets are correctly sent to the receiver.

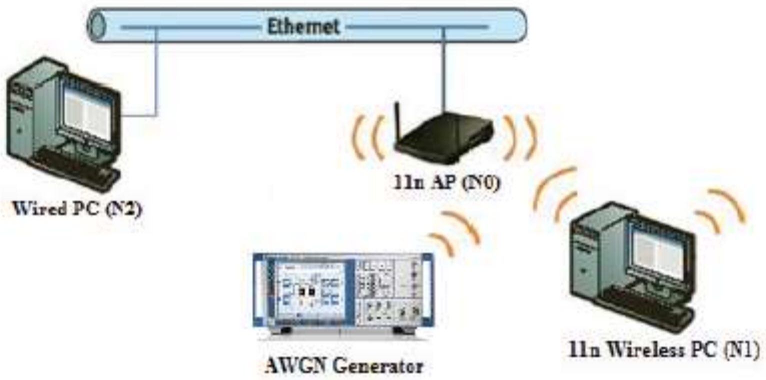

Figure 3.2.Network topology

Saturated TCP packets and report the achieved throughput for each network link between the client (N1) and the server (N2). All the equipment used are placed in a typical office with several concrete obstacles, and then the paths between the AP and the client PC may not be line-of-sight. experiments with a static client but in different channel conditions by changing the SNR. To get RSSI variations such as in mobility cases, we modify the noise power level that is injected by the AWGN generator. Every experiment is run for about 20 minutes.

The throughput results for each RSSI value are grouped together and a statistical average measure is reported over more than three experimental runs. For our performance evaluation, we have designed three different experimental scenarios. In scenarios S1 and S3, the injected noise is, respectively, varied slowly in decreasing order and rapidly in increasing and decreasing order, at the sender area. For the scenario S2, we decrease slowly the SNR at both client and AP sides.

The throughput achieved by the existing scheme reduces faster than that of our algorithm. The main reason is attributable to the several failed transmissions and the longer time spent to reach the best data rate. The gain in throughput achieved is almost ~20%. This is also true in where the channel condition worsens but with a 15% gain. This figure demonstrates that the TCP throughput achieved by our proposed RA algorithm significantly outperforms that achieved by the existing Atheros VANET RA scheme, which can hardly attain the threshold to scale up by one.

However, our rate control can respond to the variations rapidly enough by probing intelligently at the candidate rates and jumping immediately to the new long-term data rate. Also, the feature of dynamic probing time can improve more the TCP throughput performance by decreasing the wastage of time, This is due to fact that our new scheme probes quickly when it observes an improving or deteriorating channel by using the short-term statistics. On the other hand, the existing RA spends much more time before reaching the best MCS.

It waits 10 seconds at each MCS before scaling to the next upper rate. Another feature of our proposed scheme is its rate stability by using long-term statistics. In our strategy, the dominant factor to decide a rate change is the expected throughput or, equivalently, the expected PER. In the probing periods, the long-term rate is not changed, since it may be suboptimal under some transient channel conditions. As long as the sender observes that the selected rate does not perform as well as expected, it falls back immediately to the previously used long-term MCS. Specifically, our scheme continually examines the long-term MCS also during the transmission periods and can tune to the channel variations as soon as possible. However, the different transient variations are resolved by using the multi-rate retry mechanism. Indeed, if it selects a wrong data rate to probe, it can perceive this error after two consecutive failed attempts and continue to transmit and test simultaneously the next lower MCS.

Under favourable link conditions, the transmit queue is almost empty, resulting in less packet delay. However, with link quality degrading, the number of packets in the queue grows, which is caused by the retransmissions. The goal of the rate adaptation algorithm is to select instantaneously the best MCS and transmit the packets back to back until the queue becomes empty again. In this section, compare the responsiveness of our algorithm with the existing rate control, as shown in Figure 6. It is quite clear from this figure that our scheme responds to the variations quickly enough and especially when the link quality decreases suddenly. Indeed, our sender predicts and tunes to the channel conditions rapidly with little delay, utilizing both the long-term and the short-term statistics. Under high varying channels, the new RA algorithm still achieves better performance than the existing Ath9k scheme mostly with dynamic probing time. The reason is attributable to our proposed fast and efficient rate selection strategy.

5.4 SIMULATION RESULTS

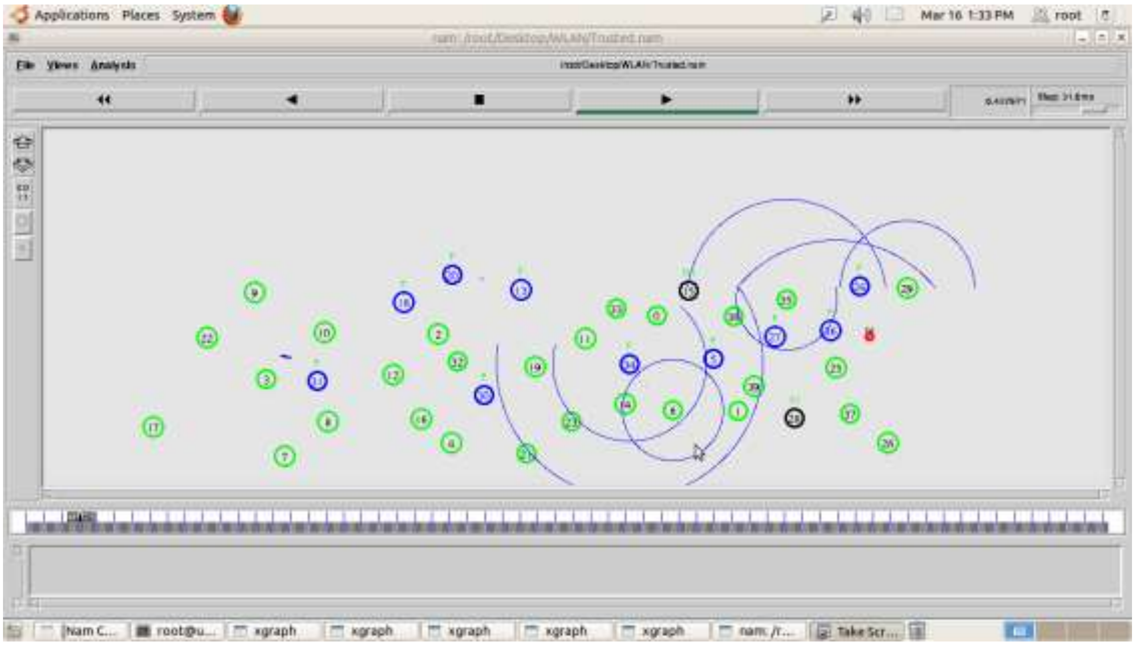

Figure 5.3 Communicate between various nodes

The short term changes in the link quality are controlled by multi-rate retry series, while the long term variations are manipulated by changing the values of *ri*. However, it keeps the mechanism of multi-rate retry with four retry series but modifies the values of *ci*'s. Thus, this mechanism is used to solve transient channel variations by retransmitting the lost packet at different data rates, which are always in decreasing order, until a there is a success or exceeding of the retry limit. The successive retry values of the four multi-rate retry series are important to responsiveness performance. A high value makes the second and later attempts using the same rate as the first, which may cause additional retransmissions where the channel condition is really degrading.

CONCLUSIONS AND FUTURE WORK

Service-message providers are the transmitter nodes, which are, typically, a RSU or ordinary nodes generating service-messages. The service-messages are represented as packets, and each service-message can be distinguished from the others by its message type. Each node has its preference of which type of service it will access and share among the other neighboring nodes. The cooperative service-based message sharing problem is modeled as a coalition formation game among the nodes. The coalition formation function is a distributed mechanism that runs on each node in the network and forms coalition among the nodes that access the same type of service-message.

The performance of the studied FLA algorithms in term of throughput is significantly affected, reducing the whole performance in ≈ 1.5dB for any methodology. Moreover, the instantaneous PER occasionally goes above the target. A new variant of FLA algorithm has been introduced that is based on BER prediction (rather than PER) using EESM. This technique performs almost identically to its PER-based counterpart while simplifying the costly calibration/prediction procedure.

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