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Analysis and Adaptive Optimization of Vanet

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ABSTRACT - Quality of service (QoS) and queue management are critical issues for the broadcast scheme of IEEE 802.11p systems in vehicular ad hoc networks (VANETs). However, existing 1-dimensional (1-D) Markov chain models of 802.11p systems are unable to capture the complete QoS performance and queuing behavior due to the lack of an adequate finite buffer model.We present a 2-dimensional (2-D) Markov chain that integrates the broadcast scheme of the 802.11p system and the queuing process into one model. The extra dimension, which models the queue length, allows us to accurately capture the important QoS measures, delay and loss, plus throughput and queue length, for realistic 802.11p systems with finite bufferunder finite load. We derive a simplified method to solve the steady state probabilities of the 2-D Markov chain. Our 2-D Markov chain model is the first finite buffer model defined and solved for of 802.11p . The 2-D model solutions are validated by extensive simulations. Our analyses reveal that the lack of binary exponential backoff and retransmission in the 802.11p system results in poor QoS performance during heavy traffic load, particularly for large VANETs. We demonstrate that our model provides traffic control guidelines to maintain good QoS performance for VANETs.

I. INTRODUCTION

IEEE 802.11 refers to the set of standards that define communication for wireless LANs (wireless local area networks, or WLANs). The technology behind 802.11 is branded to consumers as Wi-Fi. As the name implies, IEEE 802.11 is overseen by the IEEE, specifically the IEEE LAN/MAN Standards Committee (IEEE 802).

In queueing theory, a discipline within the mathematical theory of probability, an M/M/1 queuerepresents the queue length in a system having a single server, where arrivals are determined by a Poisson process and job service times have an exponential distribution.

In VANETs with high-speed vehicles and frequent topology changes, broadcast has been proved an effective message delivery mode. Additionally, route messages are exchanged through broadcasts periodically between neighboring vehicles to establish routes, such that congestion and/or emergency messages can be relayed to avoid further delay or damages when an accident happens. In addition, most network services (e.g., address resolution protocol, dynamic host configuration protocol) also use some form of broadcast/multicast communication.

II. SYSTEM DESIGN

Implementation of VANET and Qos Analysis, a vanet is implemented. Nodes are randomly deployed in the network area. Nodes are moving in inconsistent speed in different direction. Data communication is enabling and data packets are transmitted between the vehicular nodes. The malicious node is randomly selected and configured. The malicious nodes are configured to attract and disturb the data flow. CTB model: Here we apply the CTB method to the 802.11p protocol, where each packet is transmitted as a broadcast and only once, regardless of whether the packet is received correctly or not. Using the 802.11 terminology, both modes have post-backoff, backoff stage-0, the idle state and carrier sensing. The contrast is that the 802.11p protocol only has backoff stage-0, since it has no acknowledgement and no retransmissions, whereas the 802.11 DCF protocol additionally has backoff stage-1 to backoff stage-s, where s is the maximum number of retransmission attempts. Performance analysis, the performance is analyzed on both the implementations. The results are logged in a separate trace file. The values for the parameters