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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

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like delay, throughput, energy and overhead are analyzed. The results are plotted into xgraphs and analyzed.

III. LITREATURE SURVEY

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BLOCKDIAGRAM

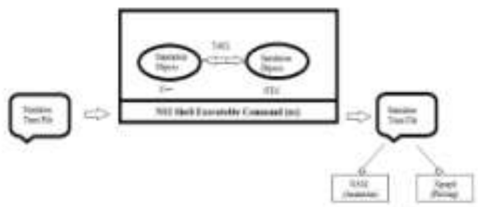

Fig. 1. Block Diagram

BLOCK DIAGRAM DESCRIPTION

Figure 1.3 shows the basic architecture of NS2. NS2 provides users with an executable command "ns" which takes one input argument, the name of a Tcl simulation scripting file. In most cases, a simulation trace file is created and is used to plot graph and/or to create animation. NS2 consists of two key languages: CCC and Object-oriented Tool Command Language (OTcl). While the CCC defines the internal mechanism (i.e., a backend) of the simulation, the OTcl sets up simulation by assembling and configuring the objects as well as scheduling discrete events (i.e., a frontend). The CCC and the OTcl are linked together using TclCL. Mapped to a CCC object, variables in the OTcl domains are sometimes referred to as handles. Conceptually, a handle is just a string (e.g., "_o10") in the OTcl domain and does not contain any functionality. Instead, the functionality (e.g., receiving a packet) is defined in the mapped CCC object (e.g., of class Connector). In the OTcl domain, a handle acts as a frontend which interacts with users and other OTcl objects. It may define its own procedures and variables to facilitate the interaction. Note that the member procedures and variables in the OTcl domain are called instance procedures (instprocs) and instance variables (instvars), respectively. Before proceeding further.

IV. IMPLEMENTATION METHOD

SYSTEM ENVIRONMENT

Ns2Introduction

Network Simulator (Version 2), widely known as NS2, is simply an event-driven simulation tool that has proved useful in studying the dynamic nature of communication networks. Simulation of wired as well as wireless network functions and protocols (e.g., routing algorithms, TCP, UDP) can be done using NS2. In general, NS2 provides users with a way of specifying such network protocols and simulating their corresponding behaviors. Due to its flexibility and modular nature, NS2 has gained constant popularity in the networking research community since its birth in 1989. Ever since, several revolutions and revisions have marked the growing maturity of the tool, thanks to substantial contributions from the players in the field. Among these are the University of California and Cornell University who developed the REAL network simulator,1 the foundation on which NS is invented. Since 1995 the Defense Advanced Research Projects Agency (DARPA) supported the development of NS through the Virtual InterNetworkTestbed (VINT) project [10].2 Currently the National Science Foundation (NSF) has joined the ride in development. Last but not the least, the group of researchers and developers in the community are constantly working to keep NS2 strong and versatile. Again, the main objective of this book is to provide the readers with insights into the NS2 architecture. This chapter gives a brief introduction to NS2. NS2 Beginners are recommended to go thorough the detailed introductory online resources. For example, NS2 official website [12] provides NS2 source code as well as detailed installation instruction. The web pages in [13] and [14] are among highly recommended ones which provide tutorial and examples for setting up basic NS2 simulation. A comprehensive list of NS2 codes contributed by researchers can be found in [15]. These introductory online resources would be helpful in understanding the material presented in this book. In this chapter an introduction to NS2 is provided. In particular, Sect. 2.2 presents the basic architecture of NS2. The information on NS2 installation is given in Sect. 2.3. Section 2.4 shows NS2 directories and conventions. Section 2.5 shows the main steps in NS2 simulation. A simple simulation example is given in Sect. 2.6. Section 2.7 describes how to include CCC modules in NS2. Finally, Sect. 2.8 concludes the chapter

Basic Architecture:

Figure 5.1 shows the basic architecture of NS2. NS2 provides users with an executable command "ns" which takes one input argument, the name of a Tcl simulation scripting file. In most cases, a simulation trace file is created and is used to plot graph and/or to create animation. NS2 consists of two key languages: CCC and Object-oriented Tool Command Language (OTcl). While the CCC defines the internal mechanism (i.e., a backend) of the simulation, the OTcl sets up simulation by assembling and configuring the objects as well as scheduling discrete events (i.e., a frontend). The CCC and the OTcl are linked together using TclCL. Mapped to a CCC object, variables in the OTcl domains are sometimes referred to as handles. Conceptually, a handle is just a string (e.g., "_o10") in the OTcl domain and does not contain any functionality. Instead, the functionality (e.g., receiving a packet) is defined in the mapped CCC object (e.g., of class Connector). In the OTcl domain, a handle acts as a frontend which interacts with users and other OTcl objects. It may define its own procedures and variables to facilitate the interaction. Note that the member procedures and variables in the OTcl domain are called instance procedures (instprocs) and instance variables (instvars), respectively. Before proceeding further.

MODULES

1. Implementation of VANET and Qos Analysis

In this module, 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.

2. Implementation of 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.

3. Performance analysis

In this module, the performance is analyzed on both the implementations. The results are logged in a separate trace file. The values for the parameters like delay, throughput, energy and overhead are analyzed. The results are plotted into xgraphs and analyzed.

4. Data base storage

Data security is one of the most daunting tasks for IT and infosec professionals. Each year, companies of all sizes spend a sizable portion of their IT security budgets protecting their organizations from hackers intent on gaining access to data through brute force, exploiting vulnerabilities or social engineering. Throughout this guide are links that will help you learn more about the challenges related to securing sensitive data, ensuring compliance with government and industry mandates, and maintaining customer privacy. Along with the challenges, you'll find advice on how to solve them.

5. Wifi module

Wireless Module means a device that is a fully integrated wireless communications product, including all required ASICs, which is sold to a third party for physical integration into other devices such as handsets, vending machines, computers, laptop computers, sensing/telemetry applications, motor vehicles and fixed wireless telephone systems.

V. RESULT& DISCUSSION

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

VI. CONCLUSION

We proposed a 2-D Markov chain queueing model for analysing the QoS performance of the IEEE 802.11p broadcast scheme in VANETs. Our 2-D model characterises the unsaturated traffic condition by including an idle state and postbackoff states, and integrates the queueing process with the DCF backoff procedure.

The 2-D Markov chain was solved efficiently by adapting our CTB method to VANETs. Important QoS measures were obtained and validated by extensive simulations. Our analytical results revealed a QoS performance degradation due to the lack of binary exponential backoff and retransmission in VANETs.Such performance deterioration can be avoided by proper traffic control, and our 2-D Markov chain model pointed to a traffic load threshold beyond which the network QoS degrades. This threshold can be used as traffic control guidelines to maintain good QoS performance for VANETs

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