DETECTION OF DENIAL OF SERVICE (DoS) ATTACKS IN LOCAL AREA NETWORKS BASED ON OUTGOING PACKETS

MEHDI EBADY MANAA

UNIVERSITY UTARA MALAYSIA

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Detection of Denial of Service (Dos) Attacks in Local Area Networks Based on Outgoing Packets

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MEHDI EBADY MANAA

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ABSTRACT

Denial of Service (DoS) is a security threat which compromises the confidentiality of information stored in Local Area Networks (LANs) due to unauthorized access by spoofed IP addresses. DoS is harmful to LANs as the flooding of packets may delay other users from accessing the server and in severe cases, the server may need to be shut down, wasting valuable resources, especially in critical real-time services such as in e-commerce and the medical field. The objective of this project is to propose a new DoS detection system to protect organizations from unauthenticated access to important information which may jeopardize the confidentiality, privacy and integrity of information in Local Area Networks. The new DoS detection system monitors the traffic flow of packets and filters the packets based on their IP addresses to determine whether they are genuine requests for network services or DoS attacks.

Results obtained demonstrate that the detection accuracy of the new DoS detection system was in good agreement with the detection accuracy from the network protocol analyzer, Wireshark. For high-rate DoS attacks, the accuracy was 100% whereas for low-rate DoS attacks, the accuracy was 67%.

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LIST OF ABBREVIATION

DoS	Denial of Service
DDoS	Distributed Denial of Service
LAN	Local Area Network
DBMS	Database Management System
DNS	Domain Name System
DHCP	Dynamic Host Configuration Protocol
PoD	Ping of Death
CBF	Counting Bloom Filter
TTL	Time to Live
TP	True Positive
TN	True Negative
FP	False Positive
FN	False Negative
UML	Unified Modelling Language
XP	Extreme Programming
JPcap	Java Packet Capture

CHAPTER ONE

INTRODUCTION

This chapter briefly provides the research landscape and elaborates the main concepts leading to the conception of a novel detection system for Denial of Service attacks.

Section 1.1 describes the top-bottom research landscape and hierarchical architecture while providing important concepts pertaining to the network architecture and service related to the research undertaken. This is crucial in laying the foundation for understanding the intricacies of the research undertaken and paves the way for elucidating the impetus of the research work involved. This leads to Section 1.2 on the motivation of the research, followed by the problem statement, in Section 1.3, the corresponding research questions in Section 1.4, the objectives of the study in Section 1.5, the scope of the study in Section 1.6 and the significance of the study in Section 1.7. Finally, Section 1.8 provides the organization of the remaining chapters of the report.

1. Introduction

Information has become an organization's most precious asset. Organizations have become increasingly dependent on information. The widespread use of e-commerce has increased the necessity of protecting the system to a very high extent (Botha, Von Solms, Perry, Loubser, & Yamoyany, 2002), (P. Kiran Sree, 2008).

Within an organization, information is typically located on servers that are shared by the entire organization or by individual units. Alternatively, information

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