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Saya TEO CHEE THONG
(HURUF BESAR)

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Alamat tetap: 99, Dataran Tasek Timur 8,
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Tarikh: 02 Julai 2009

(TANDATANGAN PENYELIA)
En. Erman bin Hamid

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COMPARISON OF IPv4 AND IPv6 PROXY SERVER

TEO CHEE THONG

This report is submitted in partial fulfillment of the requirements for the

Bachelor of Computer Science (Computer Networking)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DECLARATION

I hereby declare that this project report entitled

COMPARISON OF IPv4 AND IPv6 PROXY SERVER

is written by me and is my own effort and that no part has been plagiarized without citations.

STUDENT : _____ Date: 02/07/09

(TEO CHEE THONG)

SUPERVISOR : _____ Date: 2/7/2009

(EN. ERMAN BIN HAMID)

DEDICATION

To my dearest parents, your love and support are my greatest, for continuous love, and motivation.

To my friends, it is your sacrifices, support, and encouragement.

To my lecturer, for being respective and critical, and challenging me to be better student

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It is therefore difficult to name all the people who have directly or indirectly helped me in this effort; an idea here and there may have appeared insignificant at the time but may have had a significant causal effect. However, special thanks and apologies must first go to my family, who over the duration has been neglected even ignored, during my deepest concentrations.

All the experiences and knowledge that I have gained from all are very valuable and thankful. Thank you for giving me better perspective.

ABSTRACT

A proxy server is a server (a computer system or an application program) that acts as a go-between for requests from clients seeking resources from other servers. A client connects to the proxy server, requesting some service, such as a file, connection, web page, or other resource, available from a different server. The proxy server evaluates the request according to its filtering rules. For example, it may filter traffic by IP address or protocol. If the request is validated by the filter, the proxy provides the resource by connecting to the relevant server and requesting the service on behalf of the client

ABSTRAK

Proxy server ialah satu pelayan (sebuah sistem komputer atau aplikasi komputer) yg berfungsi sebagai *go-between* untuk permintaan dari pelanggan mencari bahan daripada pelayan yang lain. Sebuah pelanggan bersambung dengan *proxy server*, meminta sesetengah perkhidmatan , seperti satu fail, penyambungan, laman web, atau bahan lain, yang didapati dari pelayan lain. *Proxy server* akan menentukan permintaan berdasarkan *filtering rule*. Contohnya, ia mungkin *filter* trafik berdasarkan alamat IP atau protokol. Kalao permintaan ialan tidak berlanggar dengan *filtering rule*, *proxy* akan memberi bahan yg diminta dengan menyambungkan pelayan yang berkaitan dan meminta servis bagi pihak pelanggan.

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ACRONYM	WORD
IP	Internet Protocol
OS	Operating System
PC	Personal Computer
DNS	Domain Name System
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6

CHAPTER I

INTRODUCTION

1.1 Project Background

IPv6 (Internet Protocol version 6) also known as IPng (Internet Protocol Next Generation), has been developed by IETF (Internet Engineering Task Force) since early 1990 to replace IPv4 (Internet Protocol version 4) due to the limitations and shortcomings of IPv4 and more importantly, the exhaustion of IPv4 addresses.

The Internet has experienced astronomical growth, with the number of connected networks continuously doubling in less than a year for much of the past 10 to 15 years. Amazing as the growth is, it is not sufficient to cause the IP address crunch we are experiencing in the late 1990s [1]. It is clearly stated that the current IPv4 that we are used is going to exhaust, and its availability is decreasing rapidly. The development of IPv6 is about to overcome this problem. The IPv6 technology provides many benefits than IPv4, which are scalability, security, real-time applications, plug-and-play, mobility, optimized protocol, addressing and routing and extensibility [2].

The development of IPv6 Proxy Server is necessary before IPv4 has been exhausted. Proxy Servers, also known as application gateways, provide protection for your network at the application layer. The proxy server is important especially for offices and schools. It can hide the internal clients from external network and blocking the dangerous URLs that content viruses and spyware [3].

1.2 Problem Statements

According to RIRs (The Regional Internet Registries) and IANA (The Internet Assigned Numbers Authority), the exhaustion of the unallocated address pool is predicted occur on year 2011 for IANA pool, and year 2012 for RIRs pool.

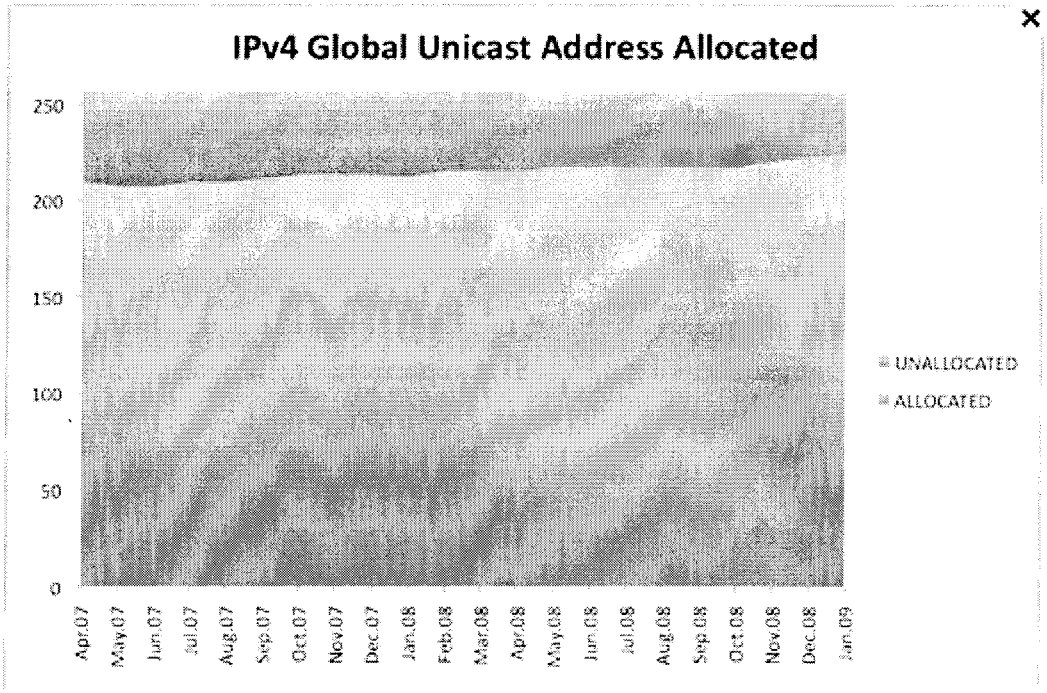

Figure 1.1: IPv4 Global Unicast Address Allocated.

Since year 2007, Intec NetCore, Inc, visualize the status of IPv4 address exhaustion. The graph in Figure 1.1 above shows the result of the allocated and

unallocated addresses for IPv4 address since April, 2007 until January, 2009 [4]. The blue color indicates the allocated addresses of IPv4, and the red color indicates the unallocated addresses. The available IPv4 addresses are getting lesser by year and it is going to be exhausted.

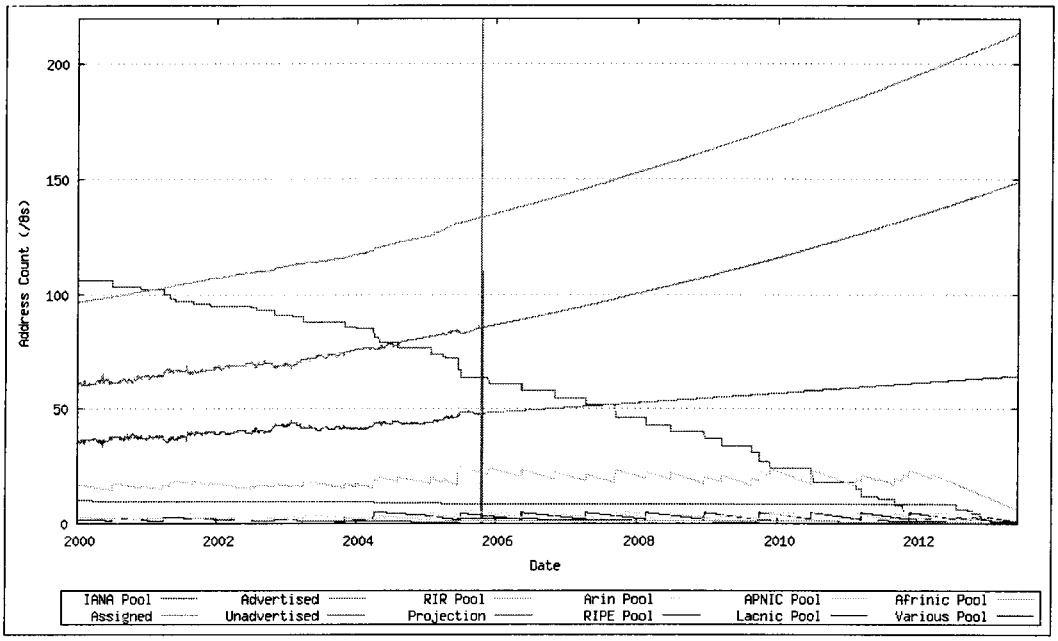

Figure 1.2: IPv4 Address Consumption Model. (Source: Geoff Huston, 2005)

Figure 1.2 above shows the complete model for IPv4 address consumption [5]. From this model, it can be assumed that IANA pool exhaustion will be on 7 May 2012 and RIR pool exhaustion will be on 20 May 2013 [5].

Besides the exhaustion, IPv4 also revealed some other limitations such as insufficient IP address space, address prefix allocation, complexity of configuration, data security, and the Quality of Service (QoS).

1.3 Objectives

Objectives that will be achieved at the end of this project are:

- Setup a Proxy Server in IPv4 environment with and without DNS Server.
- Setup a Proxy Server in IPv6 environment with and without DNS Server.
- Make the testing for both the IPv4 and IPv6 Proxy Server.
- Make the comparison between the IPv4 and IPv6 Proxy Server.

1.4 Scope

The scope for this project is designed for the users in the several places such as schools, offices, companies and government departments. The flexibility of the web browsers such as Internet Explorer might be considered inappropriate for places stated above since it allow client computers to surf the web unencumbered and any web page that is requested by the client is automatically accessed and retrieved by the client without regard to content or appropriateness [6].

1.5 Project Significance

The IPv6 Proxy Server will control the accessibility and authorization of users from private local area networks (LANs) to the Internet. Network administrator can categorize the user's privileges based on their job descriptions. Consequently, IPv6 Proxy Server allows the LAN users to connect to Internet more safety.

1.6 Expected Output

The final result/product of this project is a workable IPv6 Proxy Server that can manage the accessibility for all the users in IPv6 environment.

1.7 Conclusion

The day that all the IPv4 addresses will be exhausted is nearer; sooner, all of the world will be using IPv6 in all areas in human's life. Therefore development of IPv6 Proxy Server is a must to replace the existing IPv4 Proxy Server and to ensure that LANs are more easily to control and manage.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

Internet Protocol (IP) is a set of rules which govern the transmission and reception of data from one computer to another over the Internet. Each computer that connected to the Internet must be assigned at least one unique Internet Protocol address (IP address), or more. Although Internet Protocol version 4 or IPv4 is the most popular and widely used version of the Internet Protocol, but there are few limitations of IPv4. According to Joseph Davies (2003) [7], the initial design of IPv4 did not anticipate the following:

- **The recent exponential growth of the Internet and the impending exhaustion of IPv4 address space**

  Although the 32-bit address space of IPv4 allows for 4,294,967,296 addresses, previous and current allocation practices limit the number of public IP addresses to a few hundred million. As a result, IPv4 addresses have

become relatively scarce, forcing some organizations to use a Network Address Translator (NAT) to map a single public IP address to multiple private IP addresses. Although NATs promote reuse of the private address space, they create performance and application bottlenecks. Additionally, the rising prominence of Internet-connected devices and appliances ensures that the public IPv4 address space will eventually be depleted.

- **The growth of the Internet and the ability of Internet backbone routers to maintain large routing tables**

  Because of the way that IPv4 network IDs have been (and are currently) allocated, there are routinely over 85,000 routes in the routing tables of Internet backbone routers today. The current IPv4 Internet routing infrastructure is a combination of both flat and hierarchical routing.

- **The need for simpler configuration**

  Most current IPv4 implementations must be either manually configured or use a stateful address configuration protocol such as Dynamic Host Configuration Protocol (DHCP). With more computers and devices using IP, there is a need for a simpler and more automatic configuration of addresses and other configuration settings that do not rely on the administration of a DHCP infrastructure.

- **The requirement for security at the IP level**

  Private communication over a public medium like the Internet requires cryptographic services that protect the data being sent from being viewed or modified in transit. Although a standard now exists for providing security for IPv4 packets (known as Internet Protocol Security, or IPSec), this standard is optional for IPv4 and proprietary security solutions are prevalent.

- **The need for better support for real-time delivery of data-also called quality of service (QoS)**

  Although standards for QoS exist for IPv4, real-time traffic support relies on the 8 bits of the historical IPv4 Type of Service (TOS) field and the