

## Comparative analysis of IPv4 and IPv6 proxy server

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**ABSTRACT** – IPv6 is the latest version of Internet Protocol (IP), which aims to replace IPv4 when IPv4 is no longer able to accommodate demand. This study focuses on comparative analysis between the implementation of Proxy Server as one of the IP protocols, in both IPv4 and IPv6 platforms. The methodology that is used is the Process Model methodology, to evaluate which platform is more efficient in Proxy Server implementation. The Proxy Server is developed in both IPv4 and IPv6 platforms using Squid, CCProxy, and FreeProxy as testing tools, ended with IPv4 is still ahead of IPv6 in the context of Proxy Server applications.

### 1. INTRODUCTION

IPv6 (Internet Protocol version 6) is an IP has been developed by IETF (Internet Engineering Task Force) since early 1990 [1]. It is touted to replace IPv4 (Internet Protocol version 4) due to the limitations and shortcomings of IPv4, and more important, to overcome the exhaustion problem of IPv4 addresses [2][3].

Proxy Servers, also known as application gateways, is a mechanism to provide protection for network at the application layer [4]. The proxy server is important especially for personal network, either at home or at office; can protect the internal user from external network and blocking the dangerous URLs that may content unwanted access such as viruses and spyware [5].

A Proxy Server is a server that acts as the front web server for the entire network in a Local Area Network (LAN), which lies between the clients' computers and Internet [6][7]. The Proxy Server acts as a "guard" that controls the access of clients to the Internet and vice versa. Proxy Server's control list stores the list of web pages' accessibility [8]. Different types of clients will be having different kind of authorizations and accessibility to certain web pages. For example, system administrator may access to local host's site where all the important and secure information/data stores but anonymous and usual clients' privileges are prohibited.

In other words, if the web page request is not on the Proxy Server's access control list, the request is processed normally and the retrieved web page is sent back to the requesting client [9]. If, however, the requested web pages or web site is on the control list, the Proxy Server will check the clients' authorization to the particular web page and if the client have the privileges to the web page, the retrieved web page will

be sent back to the requesting client, otherwise, the client instead receives a message indicating that the URL is not accessible or not valid.

This projects are underway to compare the weakness and strengths on between proxy server implementation in between IPv6 environment and IPv4 environment. It is important due to the widespread use of IPv4 in addition to the development in the implementation of IPv6, making the study to evaluate which platform is more efficient is a necessary action.

### 2. ANALYSIS AND DESIGN

Process Model has been chosen as the methodology and it involves (i) identifying, gathering and understanding system (users, applications, host and network) requirement and characteristics. (ii) developing thresholds for performance, and (iii) determining specified services [10]. It helps to (i) better understand the possible behaviour of the network being designed, (ii) be more objective and informed in selecting the network technologies, and (iii) to size properly the networks and component [11].

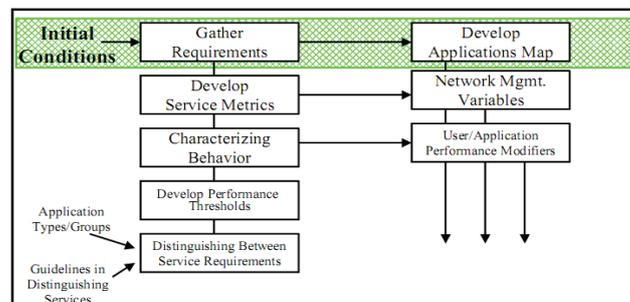


Figure 1 The process model for requirement analysis

The Figure 1 illustrates the process model for requirement analysis. Service requirements are gathered and developed with initial conditions on the design, with input from end users, customers, and network personnel, and then refined by applying our experience and knowledge about the analysis process. After gathering requirements for the design, the next step is to analyze these requirements in order to be able to distinguish between various performance and service levels in the network. The service metrics for reliability are including availability, recoverability, error and loss rates at various levels. The goal of characterizing behavior for the design environment is to determine if network performance can be estimate through understanding how users and their applications will function across the network [12].

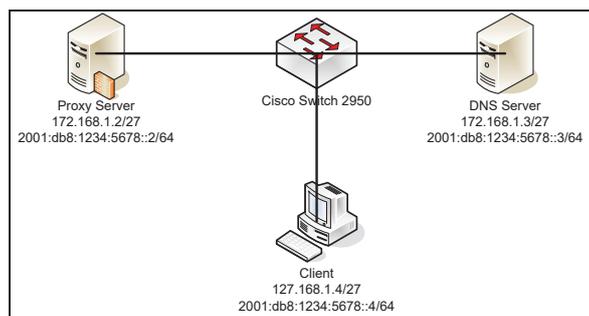


Figure 2 Logical design

In Figure 2, the Proxy Server will be assigned 172.168.1.2/27 for IPv4 address and 2001:db8:1234:5678::2/64 for IPv6 address. DNS Server will be assigned 172.168.1.3/27 and 2001:db8:1234:5678::3/64 and lastly client will be assigned 172.168.1.4/27 and 2001:db8:1234:5678::4/64. All three clients and servers will be connected to a Cisco switch 2950 series.

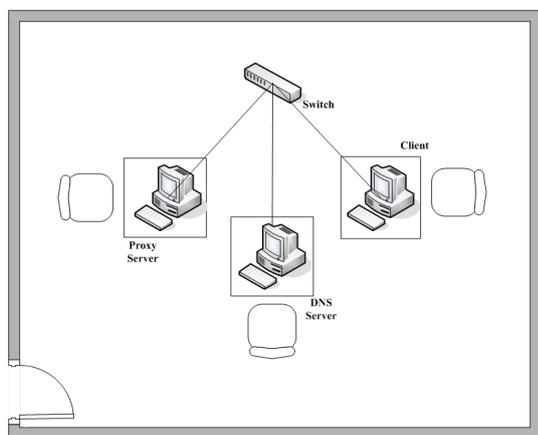


Figure 3 Physical Design.

Figure 3 illustrates the physical design for this project. The location that this project will implement is in the CCNP lab, UTeM. All three clients and servers will connect to Cisco switch 2950 series with straight through cable.

### 3. IMPLEMENTATION AND TESTING

The dual stack protocol proxy server is implemented with and without DNS server in order to show the difference and the importance of the DNS. The project then continued with the following phases of development and testing:

- 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.

**Testing 1.** Implementation of dual stack protocol proxy server without DNS server: Only two workstations and

one switch will be used. One of the workstation will act as Proxy Server and the other one will act as client for testing purpose. Both workstations will be connected to a switch.

First scenario, the IPv4 Proxy Server will be tested by assigning the IPv4 address for both Proxy Server and client. The sequence of the tested softwares and the Operating System that will be used are shown in Table 1.

Table 1 List of softwares that used in testing phase

Softwares	OS
Squid	Fedora Core 8
CCProxy	Windows Vista
FreeProxy	Windows Vista

Second scenario, the IPv6 Proxy Server will be tested by assigning the IPv6 address for both Proxy Server and client. For each scenarios and software's, the result of the testing will be explained at the end of this chapter.

**Testing 2.** To test the dual stack protocol proxy server with DNS Server. Three workstations and one switch will be used. The role of each workstation is DNS Server, Proxy Server and client respectively. All three workstations will be connected to the switch by straight cable. Both the scenarios (IPv4 and IPv6 environment) will be conducted on squid only.

### 4. RESULT

The Proxy Server in both IPv4 and IPv6 environment are tested using Squid, CCProxy and FreeProxy. It was tested using aspects listed and stated in the Table 2.

Table 2: Result of the testing in both IPv4 and IPv6 Platform

Tested Software	With DNS Server	Tested Aspects	IPv4 Environment	IPv6 Environment
Squid	No	Block restrict site result	Success	Failed
	Yes	Block restrict site result	Success	Failed
CCProxy	No	Block restrict site result	Success	Failed
FreeProxy	No	Block restrict site result	Success	Failed

### 5. CONCLUSIONS

Implementation in the IPv4 platform is clearly still more practical than IPv6, as stated in the Table 3.

Table 3 Weakness and Strengths

Weaknesses	Strengths
Clients and servers inside the network (LAN) and does not connected to Internet.	The IPv4 Proxy Server is able to function properly with and without the DNS Server.
The firewalls for all three workstations are disabled so that each one of it can communicate with each other, as the firewall is been turned off, the security for the workstations are relatively weak.	The comparison of both the IPv4 and IPv6 Proxy Server in many aspects such as step on configuration was being explained.
The IPv6 Proxy Server is still cannot been established successfully.	The testing for certain software that could be IPv6 supported is being carried out. Justification on the versions of the software that are still not IPv6 supported.

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