Evaluation of IPv4 and IPv6 in Testbed Performance

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Abbreviations

6iNet	Sintok IPv6 Network
DES	Data Encryption Standard
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Server
FIT	Faculty of Information Technology
ICMP	Internet Control Message Protocol
IPv4	Protocol Version 4 Internet Protocol
IPv6	Version 6
LAN	Local Area Network
MANIS	Malaysian Advance Network Integrated System
NAT	Network Address Translation
NIC	Network Interface Card
RFC	Request for Comment
UUM	Universiti Utara Malaysia

Abstract

The urgent need for IP addresses, which led to drive for IPv6 implementation, which is considered the only alternative to meet the needs of new users. There is no doubt that the change from IPv4 to IPv6 is not uncomplicated, whereas the users already feel at ease about using IPv4. Our main goal in this project is to design an experimental network testbed for the next generation network research in order to use this network in evaluating the performance of IPv4 and IPv6 towards other applications. This report explains and documents the process of implementing an IPv6 testbed using based machines running Linux Redhat. The steps taken to verify the functionality of the testbed have also been documented.

Chapter 1

Introduction

1.1 Preamble

The vital issue which IPv6 is treating is requiring for enlarged IP address: IPv4's 32-bit address space is nearly exhausted, while the number of Internet users continues to grow exponentially [1]. And as it is expected that in the early stage of the next few decades, the internet will be routinely used in ways unfathomable to us nowadays, since its usage is expected to extend to multimedia notebook computers, cellular modems and even appliances at home, such as TV, toaster and coffee maker. Virtually all the devices, with which we interact, at home, at work, and at play, will be connected to the internet.

The global need for IP addresses has forced to the drive for IPv6 implementation, which is considered the only solution that will accommodate billions of new users.
Simply stated, IPv6's ample (128-bit) address space provides an adequate number of globally unique addresses to support the anticipated growth and development of the Internet for the foreseeable future.
The new version of IP, IPv6[2], constitutes an effort to overcome the inborn limitations of IPv4, in order for the new protocol to be able to respond to the new needs as they shape today in the Internet. More than simply increasing the address space, IPv6 offers improvements like built-in security support, plug and play support, no checksum at the IP header and more flexibility and extensibility than IPv4.

The contents of the thesis is for internal user only

References

[1] K. N. Marcus Goncalves, *IPv6 Networks*, 1998.

[2] K. Thompson, G. J. Miller, and R. Wilder, "Wide Area Internet Traffic Patterns and Characteristics," pp. 10-23, 1997.

[3] C. Bouras, A. Gkamas, D. Primpas and K. Stamos, "Performance Evaluation of an IPv6-capable H323 Application," 2001.

[4] R. Desmeules, *Cisco Self-Study: Implementing IPv6 Networks (IPV6)*: Cisco Press, 2003.

[5] C. Gough, *Cisco Networking Academy Program CCNP 1: Advanced Routing Lab Companion Second Edition*: Cisco Press, 2003.

[6] I. v. Beijnum, *Running IPv6*, 2006.

[7] S. B. Wellington, "Firms Gain Local IPv6 Testing," tech. rep., 2004. IDSNet.

[8] R. Glenn, J. Wack., and H. Fang, "Project: IPv6 Technology," tech. rep., National Institution of Standards and Technology, 1996

[9] 6Bone, "Testbed for deployment of IPv6," *6bone*, March 2002. http://www.6bone.net

[10] S. Thomson and T. Narten, "IPv6 Stateless Address Autoconfiguration." Request for Comments 2462, December 1998

[11] S. Deering and R. Hinden, " IP Version 6 Addressing Architecture." Request for Comments 2373, July 1998

[12] A. Conta and S. Deering, "Generic Packet Tunneling in IPv6 Specification." Request for Comments 2473, December 1998.

[13] S. Deering and R.Honedn, "Internet Protocol Version 6 (IPV6) Specification."
Request for Comments 2460, 1998.

[14] B. Carpenter, "IPv6 and The Future of The Internet," 2001.
http://www.isoc.org/briefings/001.

[15] R. Blun., *Ntework Performance Open Source Toolkit.* Wiley Publishing, Inc.,Indianapolis, Indiana, 2003.

[16] S. Roa "IPv6: An answer to build future network for the information society". *In the proceeding of next generation networks workshop*, 2000. [Online]. Available: http://www.6init.or/presentation.html. [Accessed: June. 26, 2004]

[17] 6WINIT. IPv6 Wireless Internet Initiativ. *Electronic and Computer Science , University of Southampton,* 2004. [Online]. Available: http://www.6winit.org. [Accessed: Aug. 27 , 2004].

[18] University of Southampton, University College London, and Lancaster University. IPv6 Trials on UK Academic Networks : Bermuda 2. United Kingdom Universities os Southampton, UCL and Lancester, 2004. [Online]. Available: http://www.ipv6.ac.uk/bermuda2 [Accessed: Sept. 17 2004]

[19] Linux Online inc. "What is Linux?" . *Internet Web Page*, 2005. [Online]. Available: http://www.linux.org/info/index.html.

[20] Red Hat inc. "Red Hat". Technical report, Red Hat Inc., 2006. [Online]. Available: http://www.redhat.com .

[21] MIMOS, "Malaysian Advanced Network Integrated System (MANIS)," *MIMOS Brehad*, 2002. http://www.manis.net.my