PRACTICAL ISSUES IN IPv4 TO IPv6 MIGRATION

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This dissertation was submitted in partial fulfillment of the requirement for the Degree of Master of Science in Computer Science

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ABSTRACT

When the vast population of the world which is over 6 billion people is taken into consideration with the necessity to introduce new applications demanding global Internet Protocol (IP) addresses like 3G mobile services, it is not surprising that there will be a shortage or IP addresses. Apart from this, the available IPv4 address space too is not evenly distributed across the world. USA and Europe have been allocated more IP addresses and as a result some countries in Asia will be the first to face a shortage of IP addresses. In Europe it is predicted that the IPv4 address space would become exhausted in over three years time. Further, in late 2008 it is predicted that the IANA unallocated address pool will be exhausted in 2010 and the R1R unallocated address pool will be exhausted in 2011. IPv6 has been designed to use a 128-bit address scheme whereas in IPv4 it has been only a 32-bit address space that is used

Japan's WIDE, US's 6REN/6TAP. and Europe's 6INIT are some of the major IPv6 projects around the world. As a developing country, Sri Lanka needs to follow in the footsteps of these economically advanced countries and adopt their approach at least to some extent. But perhaps due to lack of awareness, the development and deployment of IPv6 in Sri Lanka is at a very slow pace or it is not progressing at all

The global transition of the IPv4 to IPv6 protocol commenced in 1995. The need for the change of the globally used IPv4 protocol came from the limitations IPV4 had, the most important of them being the limited address space available.

Other than solving the problem of inadequate address space, IPv6 has also introduced significant improvements in security, mobility and quality of service and address allocation mechanisms. It is expected that migrating to IPv6 environment will become mandatory in a few years time and this will be common to Sri Lanka as well. Many organizations do not find enough reasons to adopt IPv6 right now. However, it is very important for all organizations to pay attention to the introduction of IPv6 because it is essential in the long run.

DECLARATION

In accordance with the requirements of the Degree of Master of Computer Science, I would like to present the following thesis titled "Practical Issues in IPv4 to IPv6 Migration" for my research project. This work was performed under the supervision of Dr. Chandana Gamage, Senior Lecturer in University of Moratuwa, dept. of Computer Science.

I declare that the work submitted in this thesis is my own, except as acknowledged in the text and the footnotes, and has not been previously submitted in part or as a whole to any other university or institution.

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Date

I hereby certify that the work presented in the dissertation is carried out by Sapumal Jayatissa under my supervision.

UOM Verified Signature

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Dr. Chandana Gamage

Date

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ABBREVIATIONS

APNIC	- Asia Pacific Network Information Center
BIS	- Bump In the Stack
CIDR	- Classless Inter Domain Routing
DHCP	- Dynamic Host Configuration Protocol
DNS	- Domain Name System
EUI	- Extended Unique Identifier
FTP	- File Transfer Protocol
HTTP	- Hyper Text Transfer Protocol
IANA	- Internet Assigned Numbers Authority
ICMP	- Internet Control Message Protocol
IE	- Internet Explorer
IETF	- Internet Engineering Task Force
IP	- Internet Protocol
IPSEC	- Internet Protocol Security
ISATAP	- Intra Site Automatic Tunnel Addressing Protocol
ISP	- Internet Service Provider
LAN	- Local Area Network
MAC	- Media Access Control
NAT	- Network Address Translation
NAT –PT	- Network Address Translation-Protocol Translation
NOC	- Network Operations Center
OS	- Operating System
PC	- Personal Computer
RIR	- Regional Internet Registry
RTT	- Round Trip Time
SLI	- Sri Lanka Insurance
SLT	- Sri Lanka Telecom
SMS	- Short Message Service
SMTP	- Simple Mail Transfer Protocol