Internet Protocol (Ipv6)

Simmy Agarwal, Rekha

Dronacharya College of Engineering

Abstract: **Much work has been done on IPv6 standards and many IPv6 test beds have been deployed. However, little is known about the performance of the real IPv6 Internet, especially from the perspective of end users. In this paper, we perform a case study of current IPv6 performance from CERNET. We propose an active measurement methodology, which analyzes the traces of file transference from IPv4/IPv6 dual-stack Web servers. We study 936 dual-stack Web servers located in 44 countries by collecting and analyzing over 585,680 IPv4/IPv6 packet-level traces with 133,340 million packets. A comprehensive performance comparison of IPv4 and IPv6 is presented, including connectivity, packet loss rate, round-trip time and etc. We also present a brief case study on relationship of RTT and network topology, which is helpful to improve the performance of IPv6 networks. Finally, we discuss the generality and specialty of our CERNET case and results. To our best knowledge, this paper is the first performance study based on large scale IP traffic measurement in real IPv6 Internet.**

I. INTRODUCTION

IPv6 or IP version 6 is the next generation Internet protocol which will eventually replace the current protocol IPv4. IPv6 has a number of improvements and simplifications when compared to IPv4. The primary difference is that IPv6 uses 128 bit addresses as compared to the 32 bit addresses used with IPv4. This means that there are more available IP addresses using IPv6 than are available with IPv4 alone. For a very clear comparison, in IPv4 there is a total of 4,294,967,296 IP addresses. With IPv6, there is a total of 18,446,744,073,709,551,616 IP addresses in a single /64 allocation.

IPv6 availability depends on your Service Provider, either at home or for work. In a dual-stack environment, IPv4 and IPv6 co-exist along the same connection and don't require any special kind of connection. If dual-stack is not available, you might find yourself using an IP tunneling product or service to bring IPv6 connectivity to you. Even though IPv4 exhaustion has happened at IANA, IPv4 won't simply disappear off the face of the Internet, but continued

explosive growth requiring more unique IP address assignments will mean using more and more of the abundant IPv6 address space.

Many Operating System platforms have native IPv6 support these days. The UNIX based platforms like Linux, BSD (Free, Open, Net) & MacOSX have had IPv6 support enabled for years now. Microsoft Windows starting having native IPv6 support enabled by default with its Vista and Windows 2008 products. Earlier Windows versions like 2000/2003/XP had to have it installed optionally, and did not have as robust features that are available in the newer versions of Windows. Even common web browsing and email software will use IPv6 if it is enabled and available, without having to check off an option or special configuration.

II. METHODOLOGY

The increased deployment of IPv6 that has accompanied the exhaustion of the free IPv4 address pool has encouraged a wide range of organizations and individuals to conduct measurements related to IPv6 data and traffic. These studies range from analyses of IPv6 take-up per country and per organization, to technical examinations of the performance of IPv6-enabled websites.

Dual-Stack Web Server List

WWW is one of the most widely used service in current IPv4-based Internet For the purpose of smooth transition from IPv4 to IPv6, more and more Web servers are implemented and configured with both IPv4 and IPv6 protocol stacks. We choose these dual-stack Web sites as our data sources since we can gain better understanding of IPv6 performance as well as its distinctive problems by comparison with its IPv4 counterpart.

We have been monitoring the evolution of Web sites on the IPv6 Internet since May 2001 and found that

the number of IPv6 accessible Web sites keeps growing steadily. In this paper, we are interested in those dual-stack Web servers with both IPv6 and IPv4 global rout- able addresses. After removing duplicates with identical IPv6 and IPv4 address pairs but different hostnames, we finally obtain a list of 936 dual-stack Web servers, which is used for our data collection.

III. CONNECTIVITY

Connectivity is a fundamental requirement to a network. In the current IPv4 Internet, most of the time connectivity is not such a big problem as it was decades ago. How- ever, it might be an issue in the IPv6 Internet.

To examine the connectivity of the 936 dual-stack Web servers, we use both the traditional ping/ping6 and wget to test their connectivity. There is possibility that some server is up and responses to ICMP ping packets, but has nothing on service at 5 ports 80, or vice versa

the changes of connectivity of the 936 servers in a day by ping/ping6. It shows that the accessibility of IPv6 Web servers tend to be more variable during the day.

IV. SUMMARY

Internet Protocol is a set of technical rules that defines how Internet Protocol is a set of technical rules that defines how computers communicate over a network. There are currently two versions: IP version 4 (IPv4) and IP version 6 (IPv6).

The major difference between IPv4 and IPv6 is the number of IP addresses. There are 4,294,967,296 IPv4 addresses. In contrast, there are 340,282,366,920,938,463,463,374, 607,431,768,211,456 IPv6 addresses. The technical functioning of the Internet remains the same with both versions and it is likely that both versions will continue to operate simultaneously on networks well into the future. To date, most networks that use IPv6 support both IPv4 and IPv6 addresses in their networks.

IPv4 was the first version of Internet Protocol to be widely used, and accounts for most of today's Internet traffic. There are just over 4 billion IPv4 addresses. While that is a lot of IP addresses, it is not enough to last forever. IPv6 is a newer numbering system that provides a much larger address pool than IPv4, amongst other features. It was deployed in 1999 and should meet the world's IP addressing needs well into the future.

Internet Protocol version 4 (IPv4) Deployed Address Size Address Format Prefix Notation Number of Addresses 1981 32-bit number Dotted Decimal Notation: 192.149.252.76 192.149.0.0/24 2 = ~4,294,967,296 32

Internet Protocol version 6 (IPv6) 1999 128-bit number Hexadecimal Notation: 3FFE:F200:0234:AB00: 0123:4567:8901:ABCD 3FFE:F200:0234::/48 2128 = ~340,282,366, 920,938,463,463,374, 607,431,768,211,456 communicate over a network. There are currently two versions: IP version 4 (IPv4) and IP version 6 (IPv6).