A Survey of IPv6 Deployment

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Abstract

The global internetworking (or popular known as Internet) has been very aggressively developed in the last recent years. The technologies of Internet including hardware, software, and protocols expand drastically years by years. IPv6 as the most popular Internet Protocol for Internet will be the main focused for this research. This future promising Internet Protocol which is going to replace the current Internet Protocol (IPv4) is in the right track with so many researches being carried out. This research focused a survey of IPv6 deployment all over the globe. This research also converge the research and development of IPv6 specifically in Malaysia. Although IPv6 technology is very promising, the deployment and development of IPv6 in Malaysia is quite slow compare to other countries. As a conclusion, A survey of IPv6 came out with a suggestion and solution on how to evoke IPv6 technology in Malaysia.

Keywords: *IPv6; deployment.*

1. Introduction

Internet Protocol version 6 (IPv6) is the Internet Layer protocol for packet switching internetworking communication. It is the succesor of the IPv4 that function as a domain version and the first Internet protocol for communication.

IPv6 founded in early 1990 by *Internet Engineering Task Force* (EITF). It is an alternative to the limitation of IPv4 addressing scheme. The research group, *Address Lifetime Expectation* (ALE) in their research founded that IPv4 address will shortedges anytime in between 2005 to 2011.

2. Literature Review

The literature review of this research focused on the survey of IPv6 deployment all over the world, the impact and issues of IPv6 deployment in Malaysia, and the strategies on how to encourage the IPv6 deployment in Malaysia.

(a) IPv6 in USA

United States has developed project groups that focused to the IPv6 development. The project groups are as follows:

(i) Formation of North-America IPv6 Task Force (NAv6TF)
- Providing considerable awareness and boost to the IPv6 deployment progress.

(ii) ARIN:
- ARIN is the Regional Internet Registry (RIR) that manages the distribution of Internet number resources, including IPv4 and IPv6 address space and AS numbers.
- ARIN has allocated over 40 prefixes of IPv6.

(iii)6Bone:
- Testbed for Internet Protocol version 6.
- 185 U.S. sites registered, including Academia, Government Organizations, ISP, Research Labs, Vendors etc

The government of United States has issued a general instructions to all vendors (especially for civilian and defense area) to switch to an IPv6 platform starting 2008. The US Department of Defense in May 2003 announced that IPv6 is a procurement requirement. All of this action will dynamically influence the deployment of IPv6 in coming years. As the results, Microsoft releases an IPv6 technology preview version for Windows 2000. Microsoft Windows Vista has supported IPv6 and enabled by default. Google also launched a public IPv6 web interface to its popular search engine at the URL. The impact goes to all of the vendors all over United States. Their decision should further encourage the private sector and the rest of the World to migrate as well.

(b) IPv6 in Canada

IPv6 Canada is a sub-chapter of the North American IPv6 Task Force. Government of Canada appointed Viaginie as a consultant, and research and development firm to specialize in advanced computer networking technologies. Viaginie has developed a tunnel server, the freenet6.net to allow the IPv4 node to be connected to the 6Bone. International connectivity of IPv6 has been achieved with US and other countries through native IPv6 and over IPv4 tunnels.

(c) IPv6 in Japan

IPv6 in Japan recieved a strong support from the government. The progress of deployment are listed as follows:

(i) Major and rural ISP's has start up the IPv6 related services.
(ii) Major router vendors and terminal vendors for home appliances are yet 'v6-ready'.
(iii)The IIJ which is the first IPv6 tunnel in Japan has more than 100 customers.
(iv)JGN (Japan Gigabit Network) - IPv6 over ATM and Native IPv6 transport launched.
(v) Backbone of IPv6 have started functioning

(d) IPv6 in China

The Chinese government has announced the five-year China's Next Generation Internet project (CNGI). The objective of this project is to cornering a significant proportion of the Internet space by implementing IPv6 early. Chinese universities, companies and carriers have begun to build trial networks, develop IPv6 equipment and applications. There are already several IPv6-enabled products in China.

China completed their largest IPv6 deployment event on Beijing 2008 Olympics with a successful performance. Everything from the small cameras to large vehicles is IPv6 enables. The live streaming and coverage of the Olympic events done via IPv6, and it's done successfully. This event touted as the largest showcase of IPv6 technology since the inception of IPv6.

(e) IPv6 in France

France started their IPv6 ambition with the development of IPv6 Task Force on 25th September 2002. In 1998 the first native IPv6 internal network developed and connected to 6Bone on 2000. The following events show the evolution of IPv6 deployment in France:

(i) Migration of France Telecom's IPv6 nationwide experimental VTHD Network from tunnelling to full Dual-Tack between 2001 to 2003.

(ii) Deployment of the native IPv6 international commercial network in 2002 - OpenTransitv6
(iii) IPv6 migration of FTs Commercial IP word wide network (OpenTransit) in 2005.

(f) IPv6 in Africa

An increasing number of internet exchanges is essential to the growth of the internet in Africa and to prepare the continent for the upcoming IP convergence. The Khawarizmi concept was first presented at the Egyptian IPv6 Summit in May 2005 and suggested to expand it to Africa with 6Mandela..

The main idea was to:

- negotiate consensus and approval of carriers/ISP's involved, this under the auspices of national and regional IPv6 fora, with support of national Ministries of Information Technologies
- set up a budget for the acquisition of tunnel brokers where required
- start with a core of two, preferably three countries to demonstrate ease of feasibility and trigger a domino effect.
- consider some applications (i.a. mobile IPv6 push service)

(g) IPv6 in Latin America

Since 1998, academic institutions of Brazil (RNP) and Mexico (UNAM) began research and first tests with IPv6. The Test-Bed of Latin America connected through 6Bone set up a world wide connection to 9 Latin America country including Argentina, Brazil, Chile, Colombia, Cuba, Dominican Republic, Mexico, Peru, and Uruguay.

Since 2000 academic institutions, and later the first ISPs got their own production prefixes from ARIN. Later on, with the creation of LACNIC in 2002, the number of allocations has grown, in 2005 it duplicated.

(h) IPv6 in Malaysia

IPv6 was well introduced in Malaysia 6 years before but the progress of the research development is quite slow. Malaysian got their IPv6 awareness program since NTT Japan is active in IPv6. NTT brought the IPv6 concept into Malaysia when their branch, NTT MSC Malaysia was opened.

Malaysia started their IPv6 activity with the role of research groups such as NTT MSC, Network Research Group (NRG) and Malaysian Advanced Network Integrated System (MANIS). has started off quiet smoothly in a very small scale. They tested Tunelling, and then moved to stack analyzing. They focused in researched and developing the expertise in order to encourage IPv6 in future.

NTT MSC takes the major action in developing IPv6 in Malaysia. They introduce the broad array of IPv6 solutions. The solution taken includes the development of Native IPv6 connectivity, IPv6 over IPv4 Tunneling, IPv6 Web-hosting and IPv6 Co-location Services. They finally launched Arcnet6 as an IPv6 national test-bed for Malaysia. These indirectly mark the revolutionary move to the advancement of this protocol and eventually promote other research groups to be more active.

Malaysian Government finally developed Malaysian Advanced Network Integrated System (MANIS) to get rid the IPv6 movement in Malaysia. MANIS has successfully set up and offers the tunneling service to 6 of public Universities in Malaysia. These connections allow the 6 universities to connect to the world with IPv6 connection. MANIS allocate IPv6 address from 3ffe:80d0:ff00::/48 to 3ffe:80d0:ff50/48 for

institution usage. For other organizations, the allocation starts from 3ffe:80d0:fe00::/48 to 3ffe:80d0:fe50::/48.

MANIS launched a research to get the detail on the number of people that is aware of IPv6 in Malaysia. The research has been conducted through the online survey. Based on that survey, out of 317 people, 20% are not aware about IPv6. Do refer Figure 1 to see the scale of the survey.
move to IPv6.

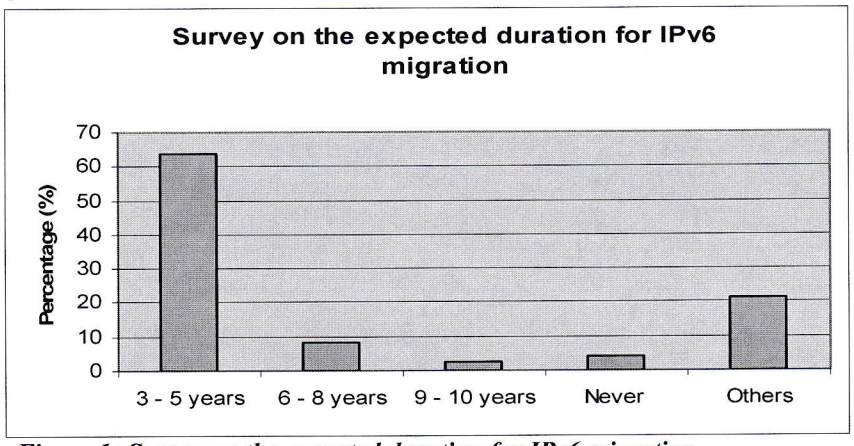

Figure 1: Survey on the expected duration for IPv6 migration

To get more precise detail on the awareness on IPv6 in Malaysia, another survey in a larger scale should be conducted.

3. Problems

From the survey that was conducted by MANIS, there are few factors that have contributed towards the slow rate of IPv6 development and deployment in Malaysia.

- *Lack of awareness*
  - Many of the end users are not aware of the changes that is taking place in the Internet world especially IPv6.

- *Coordination and information sharing*
  - Until now researches are not coordinated among the research groups. Because of this most of the organizations do not share their research information to others.

- *Funding*
  - The lack of funding cause the ideas either has been dropped or not given to organizations those are willing to develop the idea.

The other problem is the interest of institutions to participate in IPv6 research. This can be seen with the number of IPv6 blocks that has been allocated. Even though plenty of

IPv6 blocks available, only few institutions and organizations obtained these addresses for their use. This also shows the level of awareness and lack of publicity in Malaysia.

4. Outcomes

To be competitive in Internet Technology, specifically IPv6, Malaysian Government has been outlined the strategies to succeed in IPv6. It consist of 6 modules with each one is explained listed below.

- *Training*
  - Universities and institutions are urged to train Malaysian with IPv6. They are responsible to sketch the guidelines for ipv6 studies. The objective of this action is to create the IPv6 experts.
  - Universities are also responsible to do training on IPv6. It is important to increase awareness and keep the Malaysian community up to date to IPv6.

- *Research*
  - Universities and institutions are encouraged to do a hard works on research and development of IPv6 matter.

- *IP address management*
  - IPv6 address allocation must be monitor even though the addresses distributed evenly. There must be body to monitor these addresses.

- *Policies*
  - Government now is announcing the policies of IPv6 implementation. Policies include plan and standard of step by step guide for migration. It will be distributed throughout the country through various affiliates and collaborators.

- *IPv6 Middleware*
  - Government is now focusing to develop tools, intermediate application and libraries. These will affect communities in terns of developing IPv6 technology and software.

- *Infrastructure*
  - Government will give the assistant to whom that concerned to migrate to IPv6. The assistant mainly focused to the infrastructure development.

7. Conclusion

There are still a lot of work should be done in order to make sure IPv6 established in Malaysia. Government should take the huge action to increase the growth rate of IPv6 deployment in Malaysia. With the right and proper strategies, IPv6 developers will be highly produced. This will not only make Malaysia as part of IPv6 runner but also will be

a great source for IPv6 researchers worldwide. Although government are important to make sure IPv6 dreams turn realistic, but we as the community of Malaysia should together take part in order to realize it as fast as possible.

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