

APNIC input to the Vietnam Ministry of Information and Communications ICT Journal on IPv6

April 2013

Question One

Since APNIC formally announce that Asia – Pacific was the first region on the world coming into the periods of lacking IPv4 (15th, April, 2011), do you see any trends and deployment of IPv6?

Response

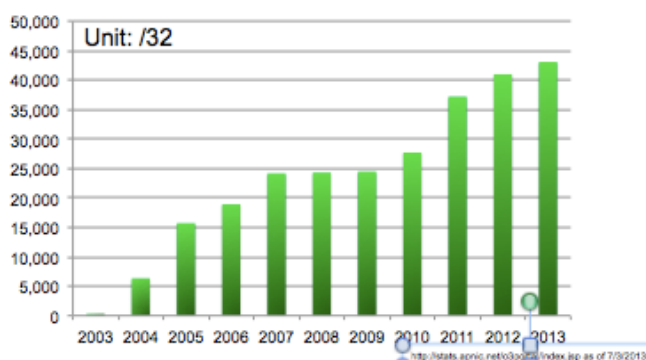
The Internet has many stakeholders including transit providers, Internet Service Providers (ISPs), access providers, content providers, content delivery networks, application providers, enterprise, government, civil societies, and end users. IPv6 deployment affects all stakeholders, and is crucial to the continued growth and stability for the Internet, but the timing of IPv6 deployment will vary each stakeholders. Therefore, when we talk about the trends and density of IPv6 deployment among these different stakeholders, for a holistic view, we should adopt a logical approach while considering related statistics.

To achieve this goal, it will be useful to divide these stakeholders into categories and review the trends and density of IPv6 deployment in each category.

Regional Internet Registry IPv6 address delegation

IPv6 addresses are distributed by Regional Internet Registries (RIRs) like APNIC to transit providers and ISPs including access network providers.

IPv6 address allocation (cumulative) APNIC

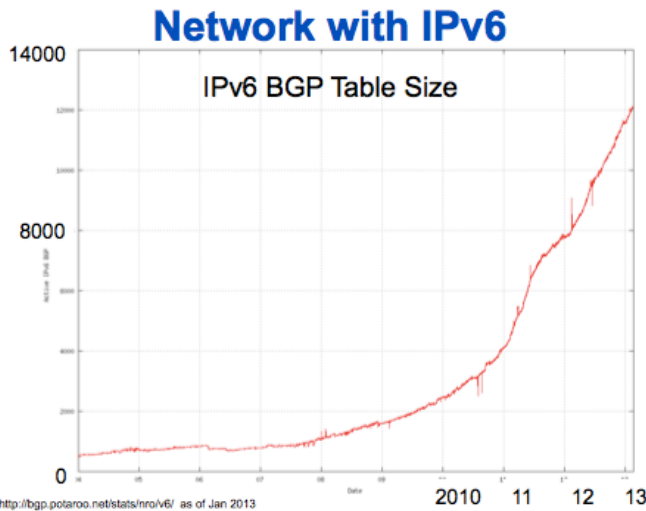


In order to deploy IPv6 networks, network operators must first obtain IPv6 addresses from RIRs. The attached graph shows cumulative IPv6 address allocations (in units of /32) over time, which are made by APNIC to its Members in the region (source: APNIC statistics).

IPv6 address allocation increased about 35% year-on-year in 2010 to 2011 compared to the previous year with a 10% increase during 2009 – 2010, and it has maintained steady growth until now.

It appears that organizations in the APNIC region that need IP addresses for business continuity took action, especially after IPv4 address exhaustion began in April 2011. IPv6 address allocation is growing steadily. APNIC will continue to encourage our community members who do not yet have IPv6 addresses to take action.

IPv6 deployment among network operators



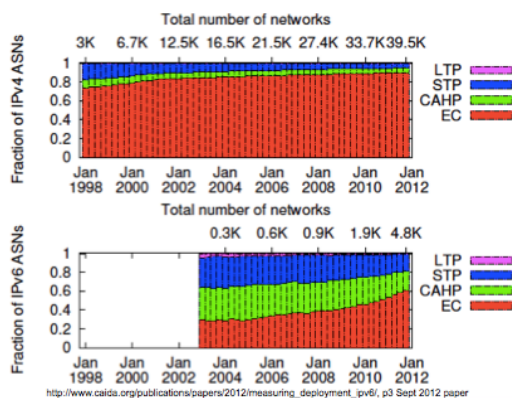
50% year-on-year growth rate in the 2011–2012 period. During this period, there were several major events that might have influenced IPv6 adoption, including IPv4 address exhaustion in April 2011 in the APNIC region, and two World IPv6 events – one in 2011 and the other in 2012. Such growth trends continue to be encouraging signs of increasing IPv6 deployment among transit providers, ISPs, and some content providers.

The next logical place to review to understand IPv6 deployment is network operators including transit providers. The below chart shows IPv6 prefixes announced into the Global Border Gateway Protocol (BGP) Table (Source: <http://bgp.potaroo.net/stats/nro/v6/>). It is important to note that the Global BGP Table size only provides one aspect of IPv6 network growth and it is not a complete indicator of the actual growth of commercial IPv6 networks, as experimental networks can also announce IPv6 prefixes.

Although this chart is not for the APNIC region specifically, but contains a global view, there is a steady trend of increasing IPv6 prefix announcements, which amounts to around a

Content providers and other enterprises

IPv6 growth trends by business type



The next logical step is to analyse is content providers and other enterprises.

The chart* on the left shows IPv6 growth trends by business type.

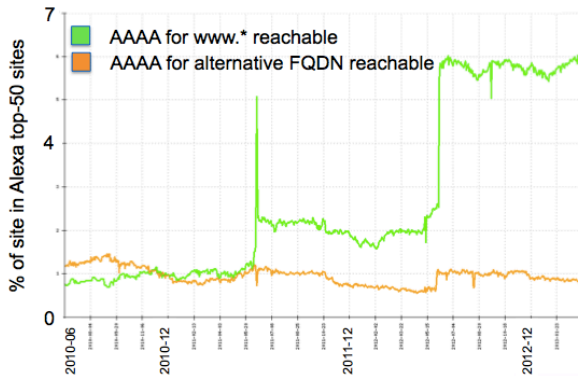
*Cooperative Association for Internet Data Analysis or (CAIDA), Sept 2012

CAIDA researchers categorized business type by Large Transit Providers (LTP), Small Transit Providers (STP), Content/Access/Hosting Providers (CAHP) and Enterprise Customers (EC), and compared the composition of business type between IPv4 and IPv6 adoption.

This chart does not specifically capture data from the APNIC region, as it is representation of global trends. According to this chart, most core Internet transit providers deployed IPv6, as we saw steady growth since 2010 to the present. The time frame within this chart includes major events such as IPv4 address exhaustion in the APNIC region and the World IPv6 launch events. However, edge networks such as enterprise networks, access providers, and content providers to some degree are lagging in IPv6 deployment.

IPv6 enabled www sites

www.vyncke.org/ipv6status



The chart to the left demonstrates the IPv6 readiness of the Alexa Top 50 content providers (source: www.vynche.org/ipv6status)

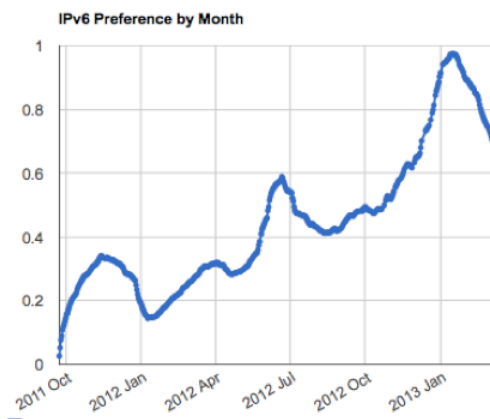
About 6% of the Alexa Top 50 web sites are currently ready for IPv6. These sites include Google, Facebook, YouTube, and Yahoo!. While this is encouraging, major local content providers also need to increase their efforts in adopting IPv6.. The fact that these major global providers are IPv6 ready debunks the myth that “No content is available on IPv6, therefore there is no point in deploying IPv6 in access networks”. It appears the impetus of the robust increase of IPv6 readiness for this group of stakeholders is the World IPv6 Launch events, and they have not been as impacted by IPv4 address exhaustion.

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ISPs, in particular access providers, need to pay attention to this growth trend of IPv6-ready content while they are preparing their access networks for future growth.

End user IPv6 readiness

IPv6 measurement End user readiness: World



Observing end users’ IPv6 readiness, we see an indicative ratio for the world average of IPv6 end users. About 1% of end users globally have a full connection from their computing devices via access networks and core networks to IPv6-enabled content (Source: labs.apnic.net). We do not see much influence from IPv4 address exhaustion in this group of stakeholders, keeping in mind the positive effects of the World IPv6 launch events..

It is important to note this is the world average and there are big differences in IPv6 end users’ readiness among different economies and regions.

For example, Romania’s current IPv6 end user readiness is about 10%, France is about 6%, and Japan is about 3.5%. This variability indicates an increasing trend in the ratio of IPv6 end user readiness.

Summary

In short, we have observed a high level of IPv6 readiness among core transit providers. It appears that IPv4 address exhaustion motivated the APNIC region, and the World IPv6 Launch events in 2011 and 2012 provided a further positive effect. However, when examining IPv6 deployment from the core towards the edge (that is, access networks, hosting providers, content providers, enterprises, and end users) less IPv6 readiness is seen. We still need to provide holistic support to the entire Internet ecosystem to increase IPv6 adoption.

Question Two

Could you give me the evaluation of the readiness of IPv6 address in Asia-Pacific region as general and in Vietnam as particular comparing with the proportion of deployment on the world?

Response

We reviewed the world average of IPv6 end user readiness in Question number 1 (see above). Please refer to our response to this first question. As of now, global IPv6 address readiness is about 1%..

According to statistical data provided by labs.apnic.net, the current average of IPv6 readiness for end users in South East Asia is about 0.1%; South Asia, about 0.03%, and East Asia, about 1%. Vietnam is about 0.001%.

Although there is evidence that some Vietnamese networks engage in IPv6 activities, Vietnam has some space to grow. Specifically, it is important for Vietnam to increase IPv6 readiness in the last mile within access networks. More detail about IPv6 deployment in Vietnam is discussed in response to Question number 5 (see below). Please refer to our response to the fifth question for additional detail.

Question 3

In Vietnam, there has been a National Action Plan on IPv6 with 3 phases: Phase 1 - Preparing (2011-2012): including network evaluation, experimental deployment on IPv6, and training; Phase 2 - Starting (2013-2015): Changing from IPv4 Only to supporting IPv4 and IPv6 in parallel and providing end users with experimental IPv6 services; Phase 3 – Completion (2016-2019): Completion of IPv6 networks and services, IPv6 technology become stable operation in Vietnam.

What is your opinion about the National Action Plan of Vietnam? Based on the promised result of the phase 1, do you think what are the necessary efforts for Vietnam on Phase 2 in order to get best result in promoting of IPv6 deployment?

Response

Establishing a national action plan and road map to support IPv6 implementation provides a good strategy to manage the challenge. Many economies in the APNIC region have adopted this approach. The government is in a good position to provide a long-term view of IPv6 implementation for the industry.

We hope that Vietnam has completed Phase 1 successfully at the national level. Such planning would include:

- Completing development of an IPv6 deployment plan for networks in government agencies with clear mandated dates;
- Updating procurement policies with IPv6 for ICT services and goods to suppliers and service providers that the Vietnam government requires; and
- Setting up IPv6 training plans for network engineers who manage government networks.

Implementing IPv6 in government networks also creates initial demand and learning opportunities for vendors and service providers in the industry that provide IPv6-enabled goods and services.

It is now the second quarter of 2013 and we hope that a rollout of Phase 2 has started smoothly. Phase 2 is vital as it is directly involves the actual deployment of IPv6. It is good to know critical Internet infrastructure in Vietnam including .vn, ccTLD, and VNIX all support IPv6.

The most critical aspect of Phase 2 is monitoring actual progress that is benchmarked against plans that were established during Phase 1. Setting up a monitoring and auditing mechanism will help to achieve these goals. If Phase 2 of the Vietnam National IPv6 Action Plan includes partnership between

the public sector and the private sector on IPv6 deployment, it will be helpful to frequently exchange information and status updates between these two parties to address issues as they arise as early as possible, so the original plans can be revised accordingly without compromising initial goals.

Question Four

What is the government's role in promoting IPv6 address using? What are the most important policies of government for promoting IPv6 implementation?

Response

Challenges we are facing in deploying IPv6 have been under discussion among various Internet stakeholders, including intergovernmental organizations such as Asia Pacific Economic Cooperation (APEC) for years. Positive intervention from governments may be justified, not only for the sake of national interests and competitiveness, but also for the health of the Internet itself.

The APEC Telecommunication Working Group (TEL) issued the "APEC TEL IPv6 Guidelines" (APEC TEL 42, 2010) in an effort to support IPv6 deployment in preparation for IPv4 address exhaustion.

<URL> This document describes the role a national government should play in a clear and concise manner.

Reviewing these guidelines will help reinstate the expected role of governments in relation to IPv6 deployment, as Vietnam is one of 21 APEC member economies and was proactively engaged in the preparation of this document. The document identifies the following items as guidelines for APEC member economies to support the effective deployment of IPv6.

- Overall planning
- Technical management
- Human capacity development
- International and cross-agency cooperation
- Leading the industry by example in adopting IPv6
- Partnership between government and industry

As noted in an earlier question (see question 3), implementing IPv6 in government networks creates an initial demand and learning opportunities for IPv6 deployment for vendors and service providers in the industry. Policies to support IPv6 adoption in government networks with clear mandate dates for monitoring, auditing, and reporting mechanisms built in will help. All government purchasing and contracting should place IPv6 compliance requirements on ICT products and services.

The Vietnam Government can also lead the industry and encourage partnership between the public and private sectors to help achieve effective IPv6 deployment. For example, governments can establish certification mechanisms to recognize specific products as "IPv6 ready". They may consider providing financial incentives such as tax relief for those who undertake concrete transition steps within a required timeframe or can provide IPv6 training opportunities to key technical stakeholders as part of the government's initiative. Governments can also promote IPv6 activities through media, events, competitions, awards, and other visible mechanisms.

Question Five

Could you evaluate the IPv6 deployment of Vietnam in general?

Response

Various statistical data can help with a response to this question. According to data provided by labs.apnic.net – that is, the ongoing data collection experiment for measuring end user IPv6 readiness – Vietnam has received 227 Autonomous System Numbers (ASNs) from APNIC. Networks with unique routing policies will have a unique ASN, therefore looking at the IPv6 readiness of Vietnam's ASNs will give us a reasonable understanding of IPv6 readiness among networks in Vietnam that are directly connected to the Internet.

- 123 of Vietnam's ASNs (54%) advertise their address prefixes (both IPv4 and IPv6 or only IPv4 prefixes) into the global routing table.
- Of those 123, 91 ASNs (74%) are seen via the APNIC experimental measurement system
- Of those 91, 15 ASNs (16%) have at least one globally routable IPv6 prefix.
- Of those 15, 7 ASNs (47%) with active IPv6 BGP appear to have end users active in IPv6.

These seven ASNs have some measurable IPv6 usage by their end users, and they present **about 0.001%**, as the average of IPv6 readiness among end users. It is quite small compared to the world average rate of 1%. It should be noted that the sampling number from those ASNs for Vietnam is still quite small. It appears a little more IPv6 implementation in the last mile is required in Vietnam to grow the base of end users that have access to IPv6 enabled Internet resources via IPv6 enabled access and core networks.

Like so many economies, IPv6 deployment to end users at the last mile is going to be a challenge for Vietnam. Service providers, including mobile network providers, in Vietnam need to have viable strategies to upgrade Customer Premises Equipment (CPE) and cost distribution plans for their future business growth.

As a reference, some service providers that have successfully deployed IPv6 in production networks in other part of the world applied the following common strategies:

- Providing IPv6 addresses and services to new subscribers as default
- Enabling IPv6 services for their existing customers whenever they upgrade their existing services

This is a logical way to manage IPv6 deployment, and it can be an effective strategy for network operators to consider in Vietnam.

Question Six

Playing the role of regulating address resource of Asia-Pacific Region, what actions has APNIC do in order to accelerate IPv6 implementing in the region? In the future, Does APNIC have any intention in the cooperation with countries in the region in order to further promotion on IPv6 deployment in the region?

Response

The APNIC Survey 2012 revealed collective feedback from the AP Internet community. Many survey respondents requested that, "APNIC should step up efforts regarding IPv6 deployment and training". More specifically, the survey respondents mentioned that APNIC should put effort into the following areas:

- Best current practice information on IPv6 deployment
- Advice and consultation on IPv6 deployment
- More practical hands-on training on IPv6 deployment

- Raising IPv6 awareness among stakeholders
- More facilitation with local Internet communities to help IPv6 uptake

APNIC will continue responding to such requests from the community by delivering more hands-on IPv6 training, providing engineering assistance on IPv6 deployment, and providing more community outreach with useful programs during APNIC Conferences and other regional events. APNIC will also keep providing up-to-date, hands-on IPv6 technical information including BCP and information sharing among Internet stakeholders via the www.apnic.net/ipv6 website.

We think providing customized information for decision makers in each stakeholder group, and most importantly, IPv6 skills training opportunities for network engineers, will support real and tangible IPv6 implementation. We are open to suggestions from the community for future collaboration.