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>>Komathi Ale: Ladies and gentlemen, welcome back. I hope you enjoyed your short break.

We will now start with the first plenary session. That is, IPv6: How ready is Asia for this critical resource? Which will be chaired by Mr Kuo-Wei Wu of ICANN.

>>Kuo-Wei Wu: I think some of you might be already see this video, but I'll just wake you up. So I try it in the very beginning.

VIDEO PLAYED

>>Kuo-Wei Wu: OK. I just try to wake you up.

APPLAUSE

>>Kuo-Wei Wu: This video is recorded at RIPE 55, many years ago.

Today, we are going to talk about IPv6, so first of all, let's try to remember the press release in February. If you remember this picture, and Paul Wilson was there, and that's me. IANA gave the last

five /8 to all the RIRs and of course APNIC got one of the /8s. As I know, by April, APNIC run out of -- well, actually it stopped normal distribution, as the policy in past. That means APNIC go to the last /8 now.

This is also an article given by Geoff Huston in 2006, talking about IPv6's evolution or revolution or extinction. I think now the picture is much clearer.

I back to talking about what is IPv6 in Taiwan.

It will be very short. In general, actually, the IPv6 start in Taiwan in 1997. If any one of you still remember what is called Internet2, that is the early days when IPv6 started, so IPv6 is not new. Actually it's quite old. IPv6 network is running for years, at least from 1996, 1997, until now.

The rest of the stuff you can see that Taiwan has a lot of IPv6 projects going on.

Actually, we continue to look for new IPv6 projects, from 2002 to this year.

The current status is we have basically two major IPv6 backbone running, of course one is running by the academic network and another one running by the research network. We have a simple IX layer, but we still have some problems.

First of all, I think IPv6 and IPv4 is not compatible. I think most of you should know. It seems

like we need to live with two spaces for a while.

The second is IPv6 currently we call it an island, because it's not single space. Some of the IPv6 network is not peer. Even like six or seven months ago, the two IPv6 backbones in Taiwan doesn't connect. Why doesn't it connect? Because one of the routers is down, but nobody figure out, because nobody use it, so you never know.

The next one, of course, the IPv6, the people using IPv6 when going to compare the experience under IPv4. So that is a big challenge for the IPv6, because it not only needs to run the network at the same time, he need to compete the user friendly with IPv4.

Of course, the next problem is because limited services provided by ISPs and ICPs. For example, if you go to the ISP in Taiwan, you must have a dedicated line. You cannot say: I want to connect with ADSL or 3G, you know, through the IPv6. Of course, Chunghwa Telecom, the largest of the ISPs, promised it's going to provide a user connection some time later this year or next year, but at this moment, it's still not public service yet.

Why IPv6?

I think first I would like to show you, this is the top 10 most popular websites.

If you look at these 10, most of them doesn't happen before year 2000 or maybe 15 years ago. Many of them started just 2004 or 2003. For example, you look at Facebook, you look at Twitter, most of them actually is just happened recently.

Of course, APNIC announce last /8 and new service and device continue to introduce in the market.

As you can see, the smartphone keep coming and more and more people using the smartphone and more new devices, for example, iPad, so when the new device want to get connected with the internet, we need an IP. If the IPv4 runout, what is the alternative for us? Of course, IPv6 is one of the solutions for us.

Of course, that is another very important thing is, you know, we still looking for the future innovations.

What is the government in Taiwan trying to do? Basically, I can tell you two things. First of all, the public sector will take the lead, what we recommend to Taiwan Government.

If the public sector don't take the lead, the private sector will just, you know, stand and watch.

The public sector take the lead for two purposes. The first is implement the v6 services for new services and devices, also try to build experience to share.

The second of all, we try to attract the private

sector to introduce IPv6 services.

We try to develop incentives from the tax system to give the ISP some incentive to provide the IPv6 services. No matter is ISP or IC B.

As you know, June 8 is World IPv6 Day.

I believe most of you maybe heard about it. The IPv6 Day, basically we like to, you know, ask everybody to try to connect under v6, to develop the potential business for v6 and link the v6 island into the single space if we can and create a chance for the next generation of innovation and we have confidence and opportunity and future in IPv6.

But this is the data I just took. We follow IPv6 website from Alec so, the top 1 million website and we see how many of those 1 million website turn on v6. We start monitoring from January this year. You can see it's increasing. Actually it's more and more websites turn on the v6 services.

Particularly in the worldwide IPv6 Day, you can see the dramatic move from 2,825 websites turn on v6 in the 1 million popular websites, up to 19,216.

But, just two days after, it dropped down to 6,402. That means several people turned on the v6 services on worldwide IPv6 Day, but after the day, they turn it off again. That is not what we suggest, but somehow it

happens.

Future? I give you just one minute of the talk of Prof Lawrence Lessig in the e-G8 in Paris.

VIDEO PLAYED

>>Kuo-Wei Wu: I think this is one of my last slides, to tell you, I think, we like to promote IPv6, because we want to preserve the internet architectures.

Let me first of all tell you today who is joining us in this session. The first one is Miwa from APNIC. The second is Chris and he will be join our ICANN board after the Singapore meeting. The third one is Rajnesh, from ISOC. The next one is Akinori Maemura, he will join us from Skype in teleconference. The last one will be Tetsuya Innami from CISCO. Can I just go through the order.

Miwa, can you give your point.

>>Miwa Fujii: Thank you, for your kind introduction and also thank you for all the local host who went through all the trouble to organise this wonder rIGF in Singapore.

My name is Miwa. I am from APNIC, Asia Pacific Network Information Centre. Before I start my talk on IPv4 and IPv6, I just want to comment briefly on what Kuo-Wei Wu said in his presentation about World IPv6 Day.

Obviously, a number of content providers participate

in this World IPv6 Day invent increase on the day significantly and dropped after 24 hours, but, in fact, that was the intention of the World IPv6 Day.

I'm so sure Rajesh from ISOC can elaborate this topic further more, but that was the intention, to find out the ... of the network for using IPv6. It was quite encouraging to see so many number of content providers participated and tested network.

During the process of this world IPv6 preparation period, lots of network engineers participate the process and it was so robust. A lot of problems were reported and simultaneously, a lot of solutions were proposed, too.

I think that was a great exercise and IPv6 is really happening.

So we need to make it happen. So let's make it happen. I would like to talk about it.

Did I kill enough time for my slides to be ready? Maybe should I just talk without showing the slide set?

While technical support person is working, I just talk using my own slide set.

Today I would like to talk about a few issues, about internet and APNIC itself, Asia Pacific Network Information Centre.

I would like to talk about briefly this IP protocol,

internet protocol, focusing on IPv4 and IPv6 and I also would like to talk about IPv4 address exhaustion and IPv6 adoption and what does this mean to all of us?

Then I would like to talk about briefly the current IPv4 address deployment status, then I would like to conclude my presentation by touching importance of multi-stakeholder approach in supporting the transition to the IPv6 and this multi-stakeholder topic has been covered in the morning session quite extensively, but again I just to like to reiterate how it's important, particularly when we talk about IPv6 transition.

About the internet. I think all of you know, the internet is a big network of various size of many networks interconnected.

This interconnectivity is provided through the technical communication standard called IP, internet protocol. Currently, we have two versions of IP, one is IPv4 and the other one is IPv6.

This we call internet resources. This internet resources are managed by Regional Internet Registries, we have currently five RIRs in the world. APNIC, Asia Pacific internet standard is one of them.

Regional Internet Registry is an open -- just give me a sec.

We are trying to enhance the technology used here to



present, but decided to give up, to go to analog. All right? So is everyone with me? Let's go back to my presentation.

I was talking about internet and I was talking about internet resources. Currently, we have two versions of internet resource, IPv4 and IPv6 and these resources are numeric asset number resources and they are managed by Regional Internet Registries. We have five RIRs in the world now. APNIC is one of them. We are open membership based industry bodies and we are non-profit, neutral and independent in my respectful submission of our services are to provide internet resource allocation in fair and consistent manner and we register those internet resources and we also provide other services such as training, supporting infrastructure and facilitating community cooperation.

When we manage these internet resources, obviously we need a mutually agreeable rules and these rules are technical community and internet community called policy and there is policy development process in place.

It is open, transparent and bottom-up process.

Basically, anyone can participate and the process is transparent. Any information, any discussion, any policy document available publicly and decisions will be made through the bottom-up process.

The internet provides an environment for many technology developments. Whenever new technology emerged, we need to have new policy discussion and policy will be discussed and if it's decided, reach the consensus, then it will be implemented through the collective responsibility of the community.

But technology keeps improving and changing, so probably the existing policies need to be reviewed constantly, or new policies may be required. So we go through this process all the time.

Now quickly let's review the internet protocol itself.

On the internet, you are nothing but an IP number. Please do not confuse IP with the domain name.

IP provides three important functionalities. One, defining packets, second, addressing interfaces which are connected to a network and, third, routing these packets with IP to the specific computing devices.

We have two types, IPv4 and IPv6, and every device directly connected to the internet needs to have a unique IP address.

IP address is a finite resource space and particularly this is the case for IPv4.

Let's recap about the size of IPv4 addresses. IPv4 address is a 32-bit address space. Part of 32 address

space is available within IPv4. That means about 4.2 billion addresses available.

Unit to describe size of IPv4, we use this slash notation. If you see /8, you can understand this first 8 bit is reserved to describe network bit and remaining 24 bit means 32 minus 8 equals 24 bit is reserved to identify individual interfaces.

When you see 1/8, this means about 16.5 million IPv4 addresses are available, individual IPv4 are available within one /8 network, so on with /16, /24, same logic will apply.

Let's compare IPv4 and IPv6. The obvious difference is the size address space. IPv6 is 128 bit space and IPv4 is 32-bit address space.

IPv6 address space size is much, much bigger than IPv4. Projected lifetime for IPv6, therefore, it's almost indefinite.

But in IPv4 case, as Kuo-Wei Wu mentioned, the final /8 was distributed to all Regional Internet Registries February this year by IANA and APNIC reach to the final /8 this April.

When Regional Internet Registries like APNIC, when we run out of our own IPv4 address pool, we used to get back to internet assign numbers authority, IANA, which is the operational organisation of ICANN to get more

free address space, but now even if we could back to IANA, we won't be able to get it, because IANA's free address space runs out in February this year. APNIC's final /8 release this final /8 free pool this April. Obviously, the answer is IPv6 and we need to move to IPv6.

Let's quickly review the impact of IPv4 address exhaustion.

Immediate impact. ISPs, when they run out of their own address pool, they used to come back to APNIC to request more IP addresses and we provided technical variation, if they justify their requirement, they could get the additional IPv4 addresses from APNIC, but obviously we reach the final /8 and APNIC technical community define a specific policy to manage this transition period. How to deal with this last /8 equal and fair manner.

That means once ISPs receive a certain amount of final IPv4 address from APNIC, they cannot come back and request additional IPv4 any more. That means they need to find out the way to live with remaining IPv4 in their organisation.

Obviously, there is limitation here. They need to have a plan to move to IPv6. Any organisation ISPs or internet organisations, multi-stakeholder organisations,

if they relying on IPv6 in their core business, they need to have IPv6 transition plan now, by now. If not, their business continue knewty is at stake.

If any organisation who relies on IPv6 still don't want to move to IPv6 and obviously they need to find out the alternative source for IPv4 addresses, there is no sustainable alternative option available at this point.

Let's quickly review the prolonged impact. Kuo-Wei Wu mentioned about this. The internet is a big internet of -- the internet is a big network of collective networks. Unless these collective networks move onto the IPv6, eventually, the internet itself will face the difficulty to maintain sustainability of the growth.

Because there is no more free IPv4 addresses available, no more new ISPs can come in, no more new business technology business using the internet will not be able to come into the market.

It will impediment of the further technological development as well.

So obviously, we need to move on to IPv6. IPv6 is the only viable option we have now.

Simply because it has much larger IP address space comparing to IPv4 and it will enable sustainable growth of the internet and possibilities of emergence of new technologies.

This morning, Ms Chia from the IDA mentioned about the mobile smartphone users in Singapore is two-thirds of the mobile phone users, two-thirds of mobile phones are smartphones in Singapore. It is not only Singapore's phenomenon. This phenomenon is happening in various part of the world and this smartphone is hungry with IP addresses. They are requiring IP addresses from everywhere, 24/7. Ever increasing always on end user using global IP addresses, we need to cope with this demand. IPv6 is the only option.

So what does this mean to all of us? The internet industry is facing a biggest charge, the biggest since inception of the internet. Internet multi-stakeholder need to transit is to IPv6 and maintain the global competitiveness, governments need to understand, to support industry to deploy IPv6.

IPv6 transition technologies. There are a couple of different technologies available. But deciding to support IPv6 in your network and completing actual implementation process are two different things.

You really need to have developing a specific plan, timelines and cost and you need to assess risks and incremental risks and opportunities and decide which technology you are going to use.

Obviously, each network is very peculiar and it has

its own uniqueness. There is no one solution available in here. You need to cultivate your own solution for your network.

All internet multi-stakeholders need to act now.

Particularly ISPs need to introduce IPv6 into their service portfolio, not only their backbones, their service production network needs to prepare IPv6 services.

To do is, you need to think about particularly if you are an ISP, you need to think about which technology can be used and what kind of IPv6 business plan will be most applicable to support such implementation of such technology.

So developing IPv6 business plan and choosing the IPv6 transition technology, it's a two important ways to help you to move forward in transiting to IPv6.

One more thing about the IPv6 transition technologies. We should not forget about the complexity provided by NAT.

The IP address 4 exhaustion currently we are facing is not the first time we face in the internet history. We experience this already in the mid-1990s. Then, IPv6 was developed. However, the network engineers chose easy and quicker, cheaper way to avoid the IP address shortage, which is NAT, network address translator.

Network address translator was widely used to cope with IP address shortage superficially didn't resolve the actual source of the problem, lack of IP addresses. Not only providing the real solution for the real problem, NAT also create the complexity to the network. It's only conserving the global IPv4 address by using the private IP addresses.

All ISPs who is using heavily relying on NAT to provide the production services, their customers, when they think about transition to IPv6, they need to consider how to manage these end host sitting behind the NAT, how to make this transition smoothly for these customers. It's an additional burden, additional thinking process required, but that's the fact, we have to cope with it.

Again, as I mentioned to you, as such, IPv6 business plan needs to be considered in conjunction with the when you think about choosinging the IPv6 transition technology.

Where are we now? This chart is showing the AS numbers, which is identifier number of each network, announcing their prefix, which is the addresses they are using to communicate with other networks. IPv4 versus IPv6.

About 11 AS numbers, about 11 networks existing in



the world now is announcing IPv6, which is quite encouraging and increase of last couple of years, particularly 18 months growth is significant. The networks start deploying IPv6.

Whether these deployed IPv6 is providing the production services or not is a different matter. We need to focus on to enable the production services on IPv6.

For that purpose, this World IPv6 Day was held on 8 June, was quite provided significant assistant for network engineers to use the actual network as test field and actually they concluded finished this testing 24 hours testing, without creating too much disruption, which is quite encouraging news.

So where are we now?

If you go to the IPv6 forum website, you can see the ISPs who complied all the requirements defined by IPv6 forum declared and they can define themselves IPv6 enabled ISPs.

About 100 of them is listed from AP region and of course there are ISPs who are already ready with IPv6, but not listed in this forum page. So there are more ISPs available.

Singtel is one of the not listed one, but I know they are ready with IPv6 in their backbone and I know

they are working on to provide the production services as well.

The important another stakeholder of the internet is content providers and content distribution network, CDN. As you know, content providers like Google and Facebook, Yahoo!, they are major driving force of World IPv6 Day. Those network engineers got together and came up with this idea to organise this testing, great testing day.

They are working hard and other network engineers are joining their effort.

One of the major concerns was for us, was content distribution network, CDN's readiness. CDN's network is different from ISPs. They have different complexity. Therefore, they are hesitating to move onto IPv6 for a while, but eventually, like Akamai announced, they are going to move to IPv6, although limited availability, they are going to try provide IPv6 production services for all their customers in 2012. It is quite encouraging news.

The interesting thing is I briefly mention about IPv6 transition technologies. There are various different technologies available, but one of the best ones, I think, is the IPv6 native. Obviously, implementing IPv6 without using any additional factors is the best way and Akamai chose this way, IPv6 native

deployment without using any additional function, additional equipment and so on.

So it's an interesting indication.

I made a list of the internet multi-stakeholders in here. We talked about how multi-stakeholder approach to maintain the sustainable growth of the internet is important this morning, like government, ISP, equipment vendors, application vendors, content providers and so on, particularly like government. The government can promote public and private sector cooperation and they can define IPv6 mandatory standard for government procurement.

Government networks tend to be the one with the largest network in one economy. If this largest one economy is getting ready with IPv6, it will provide a lot of training and educational opportunities for vendors who are supporting the government network.

So deploying IPv6 government infrastructure is a quite important thing and through that process, the public and private sector's cooperation will provide a lot of opportunities and learning chances.

I would like quickly to talk about preparing for IPv6 transition, what you need to consider.

You need to consider, first of all, review the impact of IPv4 address exhaustion to your network. You

need to do the inventory of your IT asset. You need to develop an IP deployment plan and particularly you need to consider staff training, the technology skill up doesn't happen overnight. You need to plan ahead. And without funding, budget, you cannot implement IPv6.

So obviously, budget readiness is another important factor.

I will skip this slide, because I mention it in an earlier slide.

How APNIC can contribute?

We can provide IPv6 workshops in collaboration with regional organisations. Feel free to contact us. If we can organise training in your particular region, we are happy to send our training team.

We can provide information to industry organisations decision makers, policymakers and regulators and CIOs of your organisation. We are happy to have round table discussion. We have conducted this kind of round table in a small room, very intimate environment, you don't need to fear, ask any questions, you can ask whatever the questions, we can have candid exchange of information and knowledge.

APNIC e-learning is available for anyone and we are contributing to your multi-stakeholder approach effort through the facilitation effort.

My last slide, the APNIC meeting 32 will happen in Busan in August end of August to early September. Anyone can participate in this. Feel free to join this interesting meeting and express your view and learn about IPv6.

My final message. IPv6, a prerequisite to the sustainable long-term development of a ubiquitous and open internet.

Thank you.

APPLAUSE

>>Kuo-Wei Wu: Thank you very much.

>>Chris Disspain: Thank you, Kuo-Wei. Good morning, everybody.

It seems when you join the ICANN board, that your whole previous history is erased,.

I have done some other stuff before that.

IPv6 is a deeply technical subject and it's a mystery to many and the biggest mystery to me is what I'm doing on this panel today, surrounded by a group of people who clearly understand IPv6 when I really have absolutely no idea what it means.

I have kind of figured out that perhaps -- and I could be wrong -- the reason I'm here is to provide a deeply non-technical point of view about IPv6.

I thought it might be worth just very briefly

telling you where we are in Australia and what the challenges are from a non-technical point of view in respect of IPv6.

I'm the CEO of AuDA, which runs .au. .au is, as the .au servers are, IPv6 enabled. The second level servers for .com.au and .net.au and all the other second-level .au are IPv6 enabled. So that's it, really, isn't it? We have done our job and we have IPv6 capability, so end of story.

There are some actual who believe that that's true, that we don't have to do anything else because we have turned on IPv6 and there ends our responsibility.

But what we have done is decided that we thought it might be worthwhile at least trying to talk to people further down the chain in .au in Australia about IPv6 and we met some very interesting reactions.

A significant number of ISPs' response to talking about IPv6 is that they can't be bothered to talk about it, because it's not really very relevant and if they want more IPv4 addresses, they will be able to get them and they will just go and buy up another small ISP and get some more addresses and so on.

On the other side of the coin there are a number of ISPs who have embraced IPv6 as some sort of unique selling proposition, you know, they can connect you

through IPv6.

But even they are not entirely sure what that unique selling proposition is. They just think IPv6 obviously has to happen, so they will use it, but they find it quite hard to sell it, if you like, to their customers.

The next step down, which is effectively the customers, there is almost no, as far as we can tell in Australia, there is very little understanding of what it's about and why it matters.

What's become clear to us is that if we're going to assist in any way to drive the requirement or to drive the uptake of IPv6 rather than just hanging around until problems start to be created because people can't access websites and so on, or they can't get IP addresses, if we're going to try and do that, there are a couple of things that we need to do.

The first is to engage government and our government is fairly engaged, it understands that IPv6 is important. It understands that it probably needs to do something about it and it understands that it can be a thought leader if it chooses to be in respect to that.

In fact, there is a sort of government agreement that all of the gov.au IP addresses will be IPv6 or the servers will be IPv6 compatible by, I think it's the beginning of 2013, but I can't remember exactly.

Anyway, that's the idea.

Of course, the problem is that government doesn't actually generally speaking have the foggiest idea what that actually means, in the sense that they don't know that they're going to need -- they might need new equipment, it's a matter for each department that runs their own servers.

Of course, in Australia, we have the glorious system of a federal and a state government, which gives us a grand total of nine governments, not counting local governments, and that's nearly one government per person in Australia. Of course, each one of those governments is going to go their own way and decide to do things their own way. So that's quite challenging, but that's they are engaged and they want to talk about it. So that's good.

ISPs views are very simply that if there's no commercial case and it's going to cost us money, why should we bother, at least for now.

Of course, the longer we leave it, the cheaper it's going to be, because the machinery will get cheaper and therefore, why would we bother to spend the money now?

One could spend many months banging one's head against a brick wall trying to persuade ISPs to change their minds, but what will persuade them is if their big



customers, their serious customers, their customers who are pay them a reasonable amount of money and who have a high profile, start asking for IPv6 connectivity.

Those sorts of customers are going to be the banks, government, obviously, large organisations with a breadth of internet presence.

For example, one of the largest supermarket chains in Australia is called Coles and Coles has a vibrant internet shopping website. It also owns a very large office re outset all over Australia which has internet ordering.

If organisations like that start to talk to their ISPs, to their providers about wanting IPv6 connectivity, then you might see the ISPs moving, but then the question is: why would Coles or their office stationery outset suddenly decide that they need to get IPv6 connectivity? The answer is they wouldn't, unless somebody tells them and explains why.

There we are, really, in a sort of loop.

A lot of people in this room, including me, have been involved in discussions about IPv6 for what seems like forever and, yes, we are at a point now where we have runout or we have effectively runout, but no one else seems to care all that much.

It might just be one of those things that it might

just be one of those thing that is sometimes happen where nothing happens until something happens that's got nothing to do with us.

In other words, it may just be not in our control. We may just accept that we have to provide the accessibility, we have to provide access to IPv6 and we can't really do anything else. At some point, a crisis will hit or, at some point, someone will stand up and say: I cannot get to this website because. You know, it's unlikely, I would have thought, that Zuckerberg is going to move Facebook solely on to IPv6. It's going to make a slight dent in his number of friends. The same thing applies to Google.

For quite some considerable time, we are going to be able to access stuff across both and as long as that is the case, then customers are not going to pick it up.

Most of you will know the old marketing theory about early embracers, trendsetters and then the mass and then the laggards.

The problem is that we're the really early embracers. It's hard to see any trendsetters out there.

People are not walking up to you in conferences going: great news, I have an IPv6 address.

They are walking up to you saying: great news, I have an iPad.

So I have no answers, I have a lot of questions, as you can tell. I'm not going to keep you much longer. I'm very interested in hearing what everybody else has to say and also in hearing some questions from the floor.

But thank you, Kuo-Wei, for the invitation, notwithstanding my total lack of technical knowledge.

Thanks, everyone.

APPLAUSE

>>Kuo-Wei Wu: Thank you, Chris. Now you know my position.

Usually people call me the number people and you are moving to the name people. Now is a good time for you to sit into the number group, you know. I think, of course, we like to hear the different voices. Not necessarily in IP community, because this is the whole development that we need a lot of people to involve and to aware. So thank you for your comment.

The next one, I think I will ask Rajesh. He represents ISOC. I think you know the worldwide IPv6 Day was initiated by ISOC. I think maybe it's a good time for Raj to tell us what had happened, the inside story or whatever. Thank you.

>>Rajnesh Singh: Thanks, Kuo-Wei. I'm not sure whether the outside story or the inside story, but let me try and tell you something at least.

Just for clarity, I am not on the ICANN board, like some of my colleagues on this panel, so I'm safe and secure.

My name is Rajnesh Singh, I'm regional director for the Asian bureau at ISOC. You all of course have heard about World IPv6 Day and looking across the room, I see most of you are from what we call our community, so I don't need to get into too much detail.

Basically, for those of you who are not aware of what it was, for 24 hours on 8 June, Facebook, Google, Yahoo! and more than a thousand websites turned on IPv6 access on what we called their front door, the front door being their main website. This was an important criteria that we as ISOC had, that it had to be the main website, not ipv6.something.com, but your main website.com or .net or what have you.

What was it all about? Number 1, it was not about turning off IPv4. We had some requests from the media saying does that mean that IPv4 is no longer existent now or we are turning that off? We would have liked to say yes, you are absolutely correct, but unfortunately we couldn't. So it was not about turning off IPv4, it was about enabling IPv6 on what you call a dual stack basis.

The goals were essentially to modify ISPs, how web

companies and others to prepare the services for IPv6.

So it was not just about the content providers, but everyone else who sells devices and applications and services which makes the internet work, because basically everything integrated together once you start using the internet.

We also need in order to see and understand what issues still need to be addressed to ensure a successful transition to IPv6 as IPv4 addresses run out.

Of course, one of the motivations for this is that there are a lot of big businesses who depend on the internet -- Facebook, Google and so on -- so they of course want to also protect their customer base, so if they turn on IPv6 and everything falls over, it's not very good for them from a business point of view, so that's why there is this need to have this test, this production trial to see how everything works out.

I should also add that there are been other notable efforts around IPv6, around the world, but this was really the first worldwide test flight and of course the largest ever we have had to date on the internet.

Some of the motivations for the World IPv6 Day event. One was about breaking the chicken and egg problem of IPv6 deployment. By stating a date of June 8, 2011 as a day when we would run a worldwide

test, it basically encourages people to say, OK, we now have a target date in sight and we can try and see if we can deploy our resources to meet that timeline.

Another motivation was improving IPv6 connectivity by understanding what sort of outstanding issues would be faced by what we estimated to be a small percentage of users, but of course as I said earlier, that small number of users may be a large percentage for some of these content providers.

A lot of organisations already have plans for IPv6 roll outs and again, you give them a date, a timeline, to get to.

Of course, for those who had not yet thought about IPv6 or were not really too keen on it, it sort of them them aware that the rest of the world or at least some part of the world is moving ahead with this and perhaps we should also start thinking about it now and try and sort this out.

I should of course also emphasise that the sort of collaboration that has build the internet to date is what we saw turn out for us on World IPv6 Day. The collaborative efforts from the community worldwide was quite impressive.

In terms of what actually happened, I should just add here that ISOC basically coordinated this event. We

came up with the idea, we started talking to some major content and network providers and then we all agreed that perhaps this is the way to do it.

The initial commitment we had were from Facebook, Google and Yahoo! and from content delivery networks, we had Akamai and Limelight networks.

Over time, as you started advertising that we are going to be doing this and inviting expressions of interest, we had a very large response from websites, ISPs, hosting companies and vendors from around the world.

By the time June 8 came around, we had more than 1,000 organisations that had contacted us and thousands of websites had turned on IPv6 for at least 24 hours on the day.

Talking about the Asia Pacific region and what happened here, quite a few of the countries had some sort of event or something happening in and around June 8.

We had press conferences, some did seminars and workshops and conferences. There was a lot of media coverage, a lot of media interviews. There were a lot of local resource lists put up, for example, in China, in Japan, in Hong Kong, Taiwan, Korea and as well, a lot of people were basically just keeping a watch,

particularly those with from the technical community to see what would happen.

Most of the ISOC staff who were involved with World IPv6 Day stayed up, so where I was at that moment in time was in Fiji, so it started at my 8 am, so it was not too bad.

Who turned on IPv6 on June 8? The obvious ones are on that list, Google, Facebook, YouTube, Yahoo!. As well there were some other content properties which are also fairly high ranked, in terms of users worldwide: Bing, Microsoft, bbc.co.uk, CNN and AOL as well.

I'm not sure how that's actually coming out on the screen. Here is a sampling of the websites that contacted us about World IPv6 Day and said they would like to participate and they would turn on IPv6 on the day.

You can see from that snapshot, they were from across the region. I can see Indonesia, Fiji, Nauru, Japan, Australia, Thailand, Korea, Sri Lanka. So these are all websites that on the day, they had IPv6 running and it was enabled and working. There were a few websites which although committed to having their site up on IPv6, on the day they had some issues which prevented them from being on-line completely.

The other interesting thing to note, just from



looking at those domain names on that slide, is that it's not just the technical community who were doing this. There were a lot of companies that I didn't actually know who they were and it's great to see to see who they do and who they are. As an example, in Fiji, the Freemasons, they enabled their website on IPv6.

A lot of personal websites were also put on IPv6, so it was encouraging to see the wide diversity of responses we had around that.

Looking at the US, government in particular, they put a lot of effort behind this and as you can see from this list, a lot of their governmental websites were enabled on IPv6 on the day.

Veteran affairs, commerce, census, education, treasury and so on.

The other very encouraging thing was that a lot of hosting companies added thousands of domains on the day to IPv6. Host.md put on 4,500 domains and from what we understand, it's now permanently put on IPv6.

Task.com.br put on roughly 7,000 and, again, they have been left on IPv6. Df.eu put 700,000 domains on IPv6. Strato.de put on 4 million. Currently, they are still all IPv6 enabled. Again, nice to see those sort of numbers pop up.

What did we actually see? What we saw was that the

response we had from organisations and companies was extremely encouraging. There was also realisation by a lot of content providers that they need to be IPv6 enabled, they need to support next transition on the internet and so they came pack ward to help us out on this.

In terms of what we were doing on the day, ISOC set-up what we call the participants dash board on our website where you could see how their websites were performing on the day, whether IPv6 was working or not and what percentages were coming through.

I should add that the statistics that ISOC had on its website registered with us, there are a lot of other websites who are of course enabled which are not on our list.

I just need to note that.

Longer term goal is of course to permanently turn on IPv6.

Some of that happened on the day, as we could see and that we continue to see.

Some will happen as a result of the activities on the day, but of course at a later date, as people put their resources together.

Some will need more time. We do realise that.

One other encouraging thing to note is that roughly

two-thirds of the participating websites who contacted us remained on IPv6 after the test period. That's shown on the graph, where we just before the day, we had just under 50 per cent. After the day, we were still around the 65-odd per cent remaining on IPv6.

Again, these are the sites that had registered with us and that we were monitoring. There are a vast number of other sites that we were not able to monitor because they had not registered with us.

That's about it from me. In terms of the future, I hope we as a community continue to work together and collaborate across all areas. This is not just a technical thing, it really impacts on how the internet will shape up in the future, so I hope you can also encourage people around you to start thinking about IPv6, put some effort into it and the technical community in particular is always here to help you. We have had a very collaborative form of working over the years and I'm sure that will continue in the future. There is some links on the slide that you can visit, if you so wish. The slides will be put up by the organisers on the website, so you are welcome to download this.

Before I end, there is one thing I want to add, that the Internet Society Asian's bureau is currently looking

for a regional affairs manager, so if you are interested, please visit our website and apply, if you so wish.

Thank you for that and I wish you well for the next day or so.

Thank you.

APPLAUSE

>>Kuo-Wei Wu: Thank you very much, Rajnesh.

The next one will be Akinori. Are you ready?

Hello?

>>Akinori Maemura: Hello. Can I start?

>>Kuo-Wei Wu: Yeah. I think you can start right now. I try to put in your projector on the screen. You can just go ahead, please.

>>Akinori Maemura: OK. Good afternoon, everybody. My name is Akinori Maemura from JPNIC and I am really happy to be here. Actually, I'm not there, but I'm really happy to have the opportunity of this, like this.

I would like to deliver you some update about Japan's internet, which is now taking action to the IPv6 internet.

Looking at two recent developments.

We have the big two news recently. One is the KDDI's announcement for IPv6 provision. KDDI is one of the three biggest carriers in Japan and they announced

their IPv6 offer on Monday, April 18. As you remember, the IPv4 exhaustion at APNIC occurred on Friday, April 15. Then Monday the 18th was the next working day of the APNIC's run out. So it's really recently, good timing for them to make a press release.

They said, KDDI said that effective immediately, their FTTH solution, whose name is au Hikari, is the now starting providing IPv6 addresses and then IPv6 internet access.

They say their IPv6 provision does not require no additional fee and any customer action needed.

In this case, KDDI will upgrade the CPE from the network side and once it was done, then the customer of the KDDI can use the IPv6 internet access.

It is really ideal way to provide IPv6 in the internet, in addition to IPv4 internet access.

Next slide describes about NTT's FLETS provision. NTT's FLETS is quite unique situation in Japan, Japan's internet, because almost all internet service providers actually rely on NTT's FLETS, in order to connect their network to the residential customers.

The NTT FLETS is the access major between ISP and residential users.

The NTT's FLETS's new provision, new offer whose name is Hikari next. Hikari, by the name, meaning

optical or fibre. So that is the NTT's NGN offer and this NTT NGN offer was announced three years ago. Then since that, the ISP association and the NTT East and west are helping negotiating about the IPv6 access offer to the ISP, then the preparation is finally done and NTT have already started their provision of this IPv6 internet access service from the beginning of June.

Then multiple ISPs have already announced the adoption of the FLETS Hikari next for their internet IPv6 provision. So including the KDDI access service, we have quite powerful major for ISPs and residential customer to gain the internet IPv6 access. It is really big news.

This slide is big news and I have a couple of things to talk with you today. Observation from the operators being successful.

This slide, from now on, my talk is not so fantastic, not so aggressive, but something informative.

IPv6 actually standardised in 1995 and it was actually assumed to be deployed gradually and replacing the IPv4 by the exhaustion of the IPv4 addresses. Awe you know, the IPv4 addresses already exhausted in Asia Pacific region.

But, it never happened until now. You are now seeing the two graphs, which was actually used in the

Geoff Huston slide in year 2008.

The left-hand graph was the assumption of the IETF, when they standardised the IPv6. So IPv6 deployment will be steadily happened, just after the standardisation, and until the IPv4 address exhaustion.

But, actually, it is not true. IPv6 deployment still, the level of that is still low and we are still suffering from the lack of services, which is actually provided to the customers.

This slide, why we have such a situation? This is a quite popular topic among the ISPs. We have three major reasons. IPv6 has no compatibility with IPv4 and IPv6 will not bring any direct merit for users. You know, usually, the internet user, ordinary internet users, using just URLs to access the internet and IP addresses itself are actually hidden in front of the customers.

Also, the IPv6 has no significant additional features, at least for the internet users.

But, on the other hand, preparation for the IPv6 cost. The ISP needs to make significant investment to deploy the IPv6 on to their network.

It is really -- I heard a lot of times that the ISP says that there is no business cases which can justify the investment on IPv6 and that there is no players who

deploying the IPv6. That is why I cannot move forward with IPv6.

This is a really famous topic.

Next slide, I think you need to press one more button, then the animation will be starting.

The internet is deployed over the IPv4 internet and we have the tremendous growth of the users and, of course, the services. Then we are now have the existing customers in the internet.

But suppose we had the two networks. One network has the full services and a lot of eyeballs and another has very few services and very few eyeballs. Which way is reasonable to go? If we have such a question, then the answer is quite obvious. The reasonable way is to IPv4. It is something like network externality access. The network is more valuable if it got many subscribers on that.

But we have the one thing afterwards, and that was the IPv4 address exhaustion.

Now the question is we have already run out of IPv4 addresses, but we still have many customers and many services who need to be connected to the internet. Then how to solve that, is the quite common question.

Now we have the operators with the dilemma.

The operators have the dilemma, one part is they



need to deploy the IPv6 definitely, because we will have more and more customers and services on the internet, but we cannot accommodate it with IPv4.

On the other hand, the operators need to invest a significant amount of money for no direct merit for the customers.

That's the dilemma.

The question is do we have some miracle to solve that or do we have the quite generous government to fund to solve this question?

I remember that Kuo-Wei Wu said the government should take the lead, but I am not so sure how much amount of money the government needs to invest on this.

But I would like to mention here that we have the solution. It is a not brilliant, not fascinating, but quite humble one, long, steady, low key and patient endeavours on the operators make it happen.

I had some talks with the operators who are quite being successful for the IPv6 deployment. I found it is really impressive that I found that they take a quite low key and patient efforts, which takes a long time.

Then they say: time is money. That is quite a common proverb and this is my first proverb to learn in English. The money is an investment. If we cannot invest any to the IPv6, we can invest time. That is

kind of solution.

What does it mean is, you know? For example, even if they cannot make a few big investment for IPv6, still they can make many small investments for over years for the IPv6 deployment.

The many small investments are easier to justify than a few bigger investments.

For example, if you plan several years, then network equipment is to be depreciated, fully depreciated in that four or five years. Then once they are aware, they can easily think of -- renew their equipment on depreciation to such equipment with IPv6 enabled.

Or if they are aware of the preparation of the IPv6, they can watch and track the formula upgrade of the vendors.

Then once, if the vendor, after the IPv6 enabled version of the firmware, which is reasonably available, then they can take it, once they are aware of such announcement or release.

Several years can make people wiser or more expertise. Play with the lab network and learn about IPv6 to gain the expertise, then, you know, if you don't have any expertise on IPv6, deploying the IPv6 costs, but once you have the literacy for the IPv6, then the cost for deploying the IPv6 will be lessened.

I know that many people are suffering from that kind of dilemma. I have been in the position to encourage the operators or some other stakeholders to prepare IPv6 in, for example, JPNIC or the Task Force on IPv4 Address Exhaustion in Japan.

IPv4 address exhaustion in Japan task force is doing some sort of information providing, for example, we have been providing action plan, action plan template, we were providing the training, we are providing the reference network design and status update for the industry or stakeholders. Such information provided from our side is to encourage the operators or other stakeholders to prepare for the IPv6.

Now in Japan, the NTT FLETS is at last ready for the residential customer to access the IPv6. Then ISP now much easier to deploy the IPv6 thanks to the FLETS network.

Then as I said, operators has been taking the patient efforts over years to prepare for the IPv6, without no or little visible investment which are being ... the management of the operators and such low key approach can be initiated by bottom up, I mean operators, network engineers, not the management.

I am so happy to see that such operators are now being successful to get prepared for the IPv6 and there

is I actually admire such, you know, the patient effort which helps the internet users and future internet users, who will definitely need IPv6.

That's all contents from my side. I am on the last slide.

Thank you very much for the sharing my presentation.

Thank you very much.

APPLAUSE

>>Kuo-Wei Wu: Thank you very much. The next one will be Tetsuya Innami.

>>Tetsuya Innami: My name is Tetsuya Innami, CISCO, Japan.

I'm one of the co-chairs of IPv6 Home Router Sub-working Group of the IPv6 Promotion Council of Japan.

Today I will introduce some activities of IPv6 Promotion Council in Japan.

The IPv6 Promotion Council aiming at pursuing international leadership, developing rich human resource, promoting new business and vitalising existing business.

This is organisation chart of the IPv6 council.

First business test bed WG. It is for education and prototyping.

The two working groups have IPv6 seminar for many time. Many people participate in them. We also for the IPv6 test bed platform in Tokyo and Osaka.

This is overview of the test bed. Some photos of people using the test bed.

IPv6 hands-on seminars is human resource development for supporting the integration of IPv6 technologies.

Its topics are ISP networks, IDC network, ISP/IDC/CATV/SOHO servers and network basics.

Organisation chart, next is IPv6 home routers working group. It is discussing future of IPv6 home routers.

Its background, in 2008, NTT East and west were planning for IPv6 access network services, it's called FLETS and they have very large impact for most ISPs in Japan.

Now this month, they starting to offer the IPv6 service, but in 2008, we had no place to discuss about IPv6 CPE routers in Japan.

IPv6 home router or home gateway working group was established in September 2008, with over 30 members. It's co-chairs are three people, JP IE is one of larger commercial providers in Japan and me from CISCO.

The subworking groups objectives is to bring together the minimum common functions of the IPv6 home routers, which can connect the IPv6 internet smoothly.

And to clarify the requirements which conforms the access service/IPv6 internet service in Japan.

And to publish the document that summarises the studies conducted by the SWG.

We publish the IPv6 home router guideline, release 1.0, in June 2009.

It summarised minimum common features required by IPv6 home routers. We have many public comments and they are adapted.

Originally, it is written in Japanese and English translated version is also available.

Please see this URL for more.

The major topics in the release 1.0 contents are access line, address assignment, access control, DNS, LAN configuration, Unicast/multi-cast routing.

Now we have release 2.0 document, published last year. We have added many useful contents, including NTT FLETS network and now we are working to publish the English version for the released document. It will come in a few months.

We are again our next step, it is comparing with others, like broadband forum. Their document, TR-124, functional requirements for residential gateway device. Number 2, RFC 6204, basic requirements for IPv6 customer edge router. IPv6 ready logo program, is just test scenario for the IPv6 CE interoperability test scenario, CE router, it is IPv6 forum, University of New

Hampshire.

So next step is World IPv6 Day in Japan. Our achievement of IPv6, World IPv6 Day, is promoted there, the v6 event in Japan. IPv6 Promotion Council, internet association of Japan, ISOC Japan local chapter, which rejuvenating and WIDE project and did press release for World IPv6 Day. Japan internet providers association has urged correspondence on ISPs in Japan with us.

Mediated between the participants and ISOC. It's a joint effort with IA Japan, IPv6 Promotion Council council.

23 Japanese participants through us and 67 sites from 60 organisations.

The result is a lot of people in Japan are analysing the data measurement today, but there might be no major disruption for local residential users, because in Japan, fallback program is even severe than other countries, because NTT ... IPv6 network.

IA Japan is planning to do survey to the IPv6 day participants.

Now it is only in Japanese and they prepare the English version.

Thank you very much.

APPLAUSE

>>Kuo-Wei Wu: It seems we have six minutes after the

original schedule, so I think we can open up one question.

Please, go ahead. You can point out who you like to ask, suppose like Chris.

>>Salanieta Tamanikaiwaimaro: First of all, I would like to thank the panel for most excellent and vibrant discussion, I particularly enjoyed the video in the beginning.

Hi, I'm Sala from Fiji and it's good to be here.

Very quickly, I work for a licensed carrier, which also owns an ISP back home and we are in the midst of planning to migrate from v4 to v6 and one of the things, because we are in an IG forum, I just thought I would take a step back, look at it from a macro perspective and sort of just throw this to the panel and the floor.

In terms of the governance aspects of it coming from a Pacific island country perspective, one of the things that sort of common in the Pacific is that we have poor anti dumping laws in terms of lack of standards and particularly I noted Miwa's presentation in terms of having a national strategy in place, where you have a multi-stakeholder approach in terms of addressing the issue.

You can't just lever it to the carriers, yes, they will be migrating, yes, there is training which APNIC is



facilitating in July, in terms of transitional, but also in terms of the actual policy writers, those in government, in terms of procurement, what sort of standards, how do we ensure that we don't get hood win asked when vendors try to dump old v4 products? I would like Paul Wilson's analogy, that he used in terms of transportation. I'm a non-techy, by the way, so that actually helps me understand the subject better.

So I guess what I'm trying to say is and I would like to make this call to ask, in part nothing, if APNIC, I know they have signed an MOU with SPC and I know their plan is under way to get IPv6 transition plans ready by 2012, but I think in terms of having a multi-stakeholder approach, there really needs -- it really needs to happen also in terms of training, because we have heard today from the panel and very well so, in terms of their costs implications.

In the Pacific, where economies have inflation like Solomon Islands are in double digits, this is a very real thing. In terms of planning, there needs to be, from a governance perspective, you know, like whether you run workshops, whether you invite different -- and you can't just limit today the Pacific IGF.

This has to be part of perhaps the ICT digital strategy, I don't know. But I do know that for ...

targets governments only. If APNIC has an opportunity to pursue them to open this up, it would be good.

So I'll just leave it there.

>>Kuo-Wei Wu: Thank you.

First of all, Paul, do you want to answer or Miwa you want to answer? First of all, for the education or training.

>>Miwa Fujii: Thank you very much for a great comment.

Yes, the government policymakers and government regulators, we need to bridge them, to bring in -- how can I say? Technical community need to approach the policymakers and regulators and bridge, fill in the gap of the difference of the technological understanding level and so that the policymakers and regulators are well informed when they start developing the procurement criteria and so on.

If you have proper procurement criteria, which is IPv6 mandated equipment purchasing, it becomes very clear for the vendors who are providing those services and products to the particular government networks, they need to be ready with those.

That process will help them to understand and of course APNIC is ready and also APNIC is very interested in to keep working with the organisations like SPC, providing the training and information dissemination

sessions, as I mentioned in my presentation slide, we are keen to organise small round table discussion with key decision makers if that helps in your community, let's work together.

As we have been working together already, like pack NOG, APNIC support, provide training, you have a main contact person in APNIC organisation and, yes, we are very keen to collaborate in the future as well.

Does that answer to your question?

>>Salanieta Tamanikaiwaimaro: Yes, thank you.

>>Kuo-Wei Wu: The final thing I can share with you is you can see from my presentation also Akinori, actually, different government have different policy in regarding that. Hopefully somebody can gather that information, so it can be provided for the government to see -- because the situation is very different from national to nation. So it might be that is an experience you can share. I think hopefully we have some space to put this national policy regarding for IPv6.

Sorry to run out of time and I know everybody is hungry for the Singaporean food, you know, so let me finish this panel here and thank you very our panellists to participate here and thank you for the audience to stay hereto listen to the presentation also the discussion.

Thank you again.

APPLAUSE

>>Komathi Ale: Thank you, panellists, can I invite Prof Ang  
to distribution a small token of appreciation.

Thank you, Prof Ang. Ladies and gentlemen, lunch  
will be served at gallery east. Please gather back here  
at 2 pm for the second plenary of the day.

Thank you.

