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IPv6 DEPLOYMENT PLAN OF GOVERNMENT IN

ASIA PACIFIC REGION COUNTRIES

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>> HYUN-KOOK KAHNG: Good afternoon. This is my first time to visit SUNY Korea. This is a brand new campus, actually. I'm really surprised. There is New York State in Korea, it's great.

My name is Hyun‑Kook Kahng from Korea University and I'm the Chair of the IPv6 Forum Korea.

This session is about IPv6 deployment plan for the government in our regions. And also we have talked too much too long how to deploy and when it'll be deployed. But now I believe that this is about time. So I hope this is the final session, the last session that we don't want to talk about the plan. So I hope that next year, let's talk about how it works.

So today we have four panelists, let me introduce briefly before we start, just name and country only. So on my left, Mr. Hyun‑Cheol Jeong from Korea. No applause, please. Annex the is Akihiro Sugiyama from MIC Japan and well known. And Kuo‑Wei Wu from Taiwan and he's an ICANN member, board member, actually. And the last Miwa Fujii is very famous, well known.

And we'll start about 15 minutes presentation, less than 15 minutes. And then we'll discuss about ‑‑ 90‑minute session is not a long time, but I hope that this is the opportunity to share our problems and find some goal or some kind of answers.

So from the beginning, let's start. And first the presenter will be Mr. Hyun‑Cheol Jeong. So could you start from the beginning? Hyun‑Cheol Jeong thank you. I will present my presentation in Korean because I am not fluent in English.

Already from 10 years ago, Korea started making efforts for IPv6; however, we haven't yet achieved much results compared to the amount of efforts we made, so during the presentation today, I would like to present the current status of IPv6 and our future plan.

As you may know very well, Korea is one of the IT power houses in the world based on the high speed broadband Internet, Internet shopping malls, Internet banking, online games and many other cyber economies, very active in Korea. And IPv6 address system has so far fully supported such Internet activities including the Internet shopping mall ‑‑ IPv4.

If you look at the table here, you can see that Korea has over 100 million IPv4 addresses. And for each person in Korea, if you look at the number of IPv4 addresses, Korean people have more IPv4 addresses. Korea has more IPv4 addresses, which is in some sense that is one of the obstacles to the fast adoption of IPv6 in Korea.

And we have secured many IPv6 addresses, as you see here. And in the private sector and public sector the IPv6 readiness is quite high, so both in private sector and public sectors, the IPv6 readiness is high. But if you look at the access network, such as router and switchers, IPv6 readiness, we're still, our lack of IPv6 readiness in the access network and also lack of the security‑related parts.

I mentioned that Korea has a large number of IPv6 addresses, and there are many equipment that have IPv6 readiness; but still, in Korea, the usage of IPv6 is very low. As you may have understood in the previous presentation, in the Asia Pacific region, Korea's IPv6 usage rate is relatively lower than other countries. And may have seen this picture very often. APNIC is measuring the IPv6 usage rate, and Korea is less than the average usage rate of the world, it's less than 1 percent, which is very low.

However, for the last 10 years, Korea made a lot of efforts to spread IPv6. The Korean government prepared a three‑phased plan to deploy IPv6. In the first phase, in the first phase plan, in order to secure the technical capabilities, we made a plan for developing technologies for the basic network and basic services and technologies for IPv6 deployment.

In the second phase, the Korean government and public agencies and research institutes led the efforts to introduce IPv6. The Korean government actually made a lot of support for this, and we improved relevant policies.

And in the third phase, in the commercial network, IPv6 need to be established. So we conducted various pilot projects for this.

Starting from if beginning of 2000, the Korean government has spent over 40.1 billion for deployment of IPv6. However, as mentioned previously, we haven't yet achieved a visible outcome. And what will be the reason?

There are two reasons for the delay of IPv6 deployment. The first reason is in Korea, some people say that Korea started too early the efforts for IPv6 deployment. We started the efforts from the beginning of 2000, the Korean government strongly drove the idea for IPv6; however, actually IPv6 didn't make progress as fast as we expected. The reason is because the movement and activities for IPv6 were done slower than we expected. And so far, we have been working on things with IPv4 addresses. And so far people couldn't find much justifiable reason to right away move to IPv6.

And the second reason is in order to deploy the IPv6 on a full scale, we need diverse stakeholders to move with us together, including the network operators, manufacturers and ISPs and policymakers as well as enterprises. All these interested parties must really fill the need for IPv6 and work together in a full swing for deployment of IPv6. But in Korea such ecosystem for IPv6 was not really created.

From the perspectives of the mobile network operators, they didn't feel the need to do this because of the lack of content. In the case of the content providers, they said the IPv6 network is not yet fully prepared, so we cannot provide the content. As such, people were criticizing each other for the delay of IPv6 deployment. And in this way, our plan for IPv6 deployment has been delayed.

And at the beginning of this year, conducted a survey of IPv6 and we asked questions of over 500 organizations and we asked them what kind of difficulties do you feel in adopting and deploying IPv6? And the result is this: The biggest difficulty they feel is cost. Those organizations were worried about additional cost coming from IPv6. And, secondly, they were concerned about the security. So when we deploy IPv6, they are worried that the IPv6 may do some harm to the existing services, so they were concerned a lot about the security part.

Thirdly, we are lack of experts, professionals, to deploy IPv6. So in deploying and establishing IPv6, we need experienced experts, but Korea, lack of such experts. These are the difficulties that the organizations or agencies feel in deployment of IPv6. So the government side also needs to make efforts for this.

So far, for about 10 years, we have exerted a lot of efforts for IPv6 deployment, but because of diverse reasons, the IPv6 deployment has been delayed, and it's almost zero; however, I think that the environment is changing. So actually there are some turning points for IPv6 deployment. There are revolutionary changes in the mobile world among Korean mobile operators, and some of the Korean mobile operators are now raising demand for the IPv6 because the smartphone users are rapidly increasing, and smartphone is two IP addresses. And if they use the private IPs from IPv4, they will soon be short of the addresses. So, also that's why some of the mobile operators are using dual lot. But many mobile operators feel the need for the new address system IPv6. So mobile operators are now raising demand for IPv6. And some of them are coming up with specific plans for IPv6 deployment.

And the Korean government last year, the government thought that the mobile sector can trigger the adoption of IPv6. And the SKT, which is the number 1 mobile operator in Korea joined the hands with the government to conduct the pilot project. So they proceeded with the pilot project where they offered the mobile IPv6 service. And they tried to solve technical problems in the process. And they proved that it is possible for the Korean mobile operators to transfer to IPv6.

And in July this year, the top three mobile operators in Korea and top three smartphone manufacturers had a meeting with the Korean government. And in that meeting, they agreed that it is essential for Korea to adopt IPv6 for their mobile services, and also they agreed that there is no ‑‑ there will be not much difficulty in adopting the IPv6 in terms of technology, as well.

So for next year, the mobile, the telecommunication industry will be able to adopt IPv6 on a full scale.

So IPv6 have not been enough in Korea because in IPv4 addresses large enough, however 2010 seems to be a turning point. I know in IPN, the shortage of IPv4 addresses, so in Korea for the new addresses to be introduced in the IPv4 version is actually not many. So we don't really have any IPv4 address to provide. So smart TV in your areas, the demand for new IP address is actually on the rise.

In the next generation Internet environment, if Korea hopes to keep its number 1 status, and also if Korea want to explore new business opportunities, then, you know, the transition to IPv6 is very much important and the government also realise this. So from this year the government is actually in the making the new five‑year, the road map for IPv6 deployment. And the government is actually targeting to announce this road map by the end of this year. And they are working quite hard at the moment. But 30 professionals and experts have fully engaged in this effort. And one of our panel members are the Chair, professor Kuo‑Wei Wu actually chairs the committee.

So in the taskforce, there are five Working Groups. Infraservice, manufacturing of product and service and policy and, lastly, the security. These are the five Working Groups under this Committee. So in each area, in order to spread the deployment of IPv6 in our role, the efforts they need to make, they are actually working on this.

So far, the study is actually in the making, and we haven't actually finalized yet, but these are actually the progresses we have made so far under this committee.

So first in the area of infrastructure, IPv6 is going to happen, is going to be available. So infra, the network, they might be the trigger in deployment of IPv6 because in other areas, they don't really realise the need for IPv6 yet. However, in IP network area, especially the network providers, you know, they don't really have the remaining IPv4 addresses anymore. Since address situation, especially mobile ISPs, mobile carriers, they have an urgent need for new addresses.

With the three major Korean mobile carriers and the manufacturers, we held a meeting. And these players are now making step‑by‑step preparations and in 24 next year, IPv6‑enabled smart phones are going to be up in the market and the service‑related service will also be available.

In the case of fixed network, IDC and some posting operators are also positioning ‑‑ for the research. And what they said is, you know, they have not been allocated enough IP addresses, and that actually poses problems in their businesses. That means even for VIDS and these players, we don't really have remaining IPv4 addresses anymore. So in each enterprises, they sort of set up the taskforces to introduce the IPv6.

You know, if customers want and the client want, then ISPs, they need to provide addresses. These are the start grounding Rule. However, they are not able to provide IPv4 addresses anymore, so it is inevitable for them to transit from IPv4 to IPv6.

And also in communication between the operators, IPv6 is also very much important. So, you know, the availability and compatibility of IPv6 is very important in the industry.

Second, this is actually government area, public sector. The government understands that the government need to take initiative in establishing IPv6, so in the government network service, from this year, the government started its effort to introduce IPv6, and this effort is going to be mature by 2017. So in every ministry and agency of Korean government, IIPv6 network will be completed. There are a lot of backbone projects initiated by the government. WiFi project is one of the examples. In these projects, the government is going to apply IPv6 actively so that the general public will be able to use IPv6 service, as well.

And, third, this is related to the content providers. Actually, the least demand is coming from, the least demand for IPv6 is coming from this area. For the contents providers, even though, you know, the system is changed from before to V6, they don't really get any benefits. What they need to fear is the cost. Even though they need to pay cost, they don't really get the benefit. So they are reluctant to transit to V6. So the government try to create a matching fund between the government and the private sector so that the government is going to encourage these content providers to transit to v6.

And also in Korea, there will be the regular Korea IPv6 day every year, so we will encourage players to transit to IPv6.

Fourth, it's the manufacturing area. By 2017, network items or network products or software products are going to be IPv6‑enabled once by 2017; however, to make this happen, manufacturers, they need to secure enough demand. So the government's going to make efforts to create enough demand. And also policy‑wise, in order to create IPv6 demand, the government is going to revise laws and policies.

And sixth area, this is related to the security. Korean government, whenever they consider introducing the IPv6, they have a lot of worries and concerns about IPv6 because they are concerned that IPv6 might be used as back door of Cybercrime or cyber violation. And the security measures related to the IPv6 have not been perfect yet. And the government is also going to support the security area, as well. And the government's plan, one of the plans is to set up comprehensive IPv6 supporting system. So the government will be very active in removing obstacles. And also the government, the committee aware, that every stakeholder can participate in.

I've covered the IPv6 status in Korea. And so far Korea has been sort of lagging behind in the IPv6 deployment; however, centred on the mobile industry, the new ecosystem for IPv6 is going to be wider and larger. This is it. Thank you very much.

[Applause.]

>> HYUN-KOOK KAHNG: Thank you. (awaiting English).

>> AKIHIRO SUGIYAMA: IPv6 in Japan through the perspective in our government. But first this is ‑‑ this IP addresses in the Asia Pacific region which other in Japan have exhausted their normal inventories of IPv4 addresses as of April 15, 2011. Allocates IP addresses in the areas has exhausted their normal inventories of IPv4 addresses as of 2012. It is now more important than ever for communications careers in Japan to effectively utilize the already distributed IPv6 and introduce IPv6 if succeeding presentations as soon as possible. This is concerning IPv6 deployment status in Japan. IPv6 access services by Internet service ‑‑ so sorry. 54 percent of ISPs in Japan provide the IPv6 access services according to ministry of affairs and communications as of March 2013. It was 37 percent as of March 2012.

According to the size of ISPs, 92 percent of major ISPs which are not more than 50,000 users provide the IPv6 access service as of March 2013. It was 33 percent in March 2012. On the other hand, only 30 percent of smaller ISPs provide IPv6 access services.

Japan, big ISPs have more progress in IPv6 depreliminary than small ISPs. IPv6 access service by television data service. 30 percent of CITV operators, which include 5 percent of IPv6 supported and 8 percent of experimental service supported provide the IPv6 access service according to by our ministry as of March 2013. For comparison, it was 6 percent as of March 2012. According to the size, 27 percent of operators which have more than 50,000 users provide the IPv6 access service as of March 2013. It was 8 percent in March 2012.

This is up by data centre operators. 46 percent of data centre operators, which includes 26 percent of IPv6 supported 20 percent of experimental service supported provided IPv6 access service according to our questionnaire. It was 50 percent as of March 2012.

According to the size of the operators, 56 percent of data centre operators which are more than 10 billion revenue provide IISP6 service as of March 2013. It was 46 percent as of March 2012.

48 percent of data centre operators which are less than 10 million in revenue provide IPv6 access service. It was 39 percent as of March 2012.

60 percent of access service providers under content service providers, which includes 30 percent of IPv6 access supported 4 percent of experimental service supported provide the IPv6 access service in March 2013 according to the questionnaire. 38 percent of ISPs which are more than ‑‑ in revenue provide the access service. 9 percent of ASPs and CSPs which have more than 10 billion in revenue provide IPv6 access service. IPv6 deployment by ASPs and CSPs deployment buy ISPs in Japan's case.

Until this point, I explained about Japanese domestic status of IPv6 deployment. From this point, I would like to explain about the IPv6 deployment from the perspective of Japan all over the world briefly. It is the survey presented by goal in our mystery Study Group. And this is publicly available from their website. It was surveyed how many users access to the website through IPv6. Japan is fifth position by the survey. I think we need the more effort.

This is the survey by APNIC on Cisco. There exist about 3,086,000 users in Japan. It is second in the world. However 10 percent of websites in Japan supports IPv6. By these surveys, it is concerns that we needed to enhance with service providers to support IPv6 study group since 2009 to promote measures for the smart introduction of IPv6 with consideration of exhaustion of IPV‑‑ other addresses in April 2011 the Study Group announced promotional measures for the smooth introduction of IPv6 in its third interim report in 2011 and released a progress report, including the verification results of the progress of the contents of the report in July 2012. The report shows the basic concepts in order to increase the usage of IPv6 services. Study items on these two, one is full up of previous reports and one is for the approach of the acceleration of the IPv6 deployment. This report was published on 26 July this year.

The premises of basic concepts for the future action for IPv6 deployment are as follows: 1) IPv6 service is important for the expansion of IPv6 services because of the lack of advantage of IPv6 for general Internet users. Since July 2012, when progress report was made up, operators, especially big ISPs which provide the IPv6 service, are increasing. However, the IPv6 service in some area isn't realized. Therefore, it is important to address the issues according to the following concepts. Basic concepts for as follows: 1) in order to provide IPv6 service for users, it is important to clear away the obstacles. From the perspective of expansion of IPv6 usage, it is important for data centre operators, PSPs and other governments to address ISPV6.

In addition, it is important for Japan to provide technical cooperation between Asian countries as appropriate.

4) it is necessary to cooperate between related parties on the shared recognition of issues to be solved on the schedule, considering the adoption of technology which corresponds to the international standard and disclosure of specifications.

This is our approach this year. Following that other have exhausted in other AP regions as of April 2011 on the measure ASPs has begun to deploy IPv6 services. It is expected that the use of IPv6 increases on the coexistence of IPv4 and IPv6 move forward.

On the other hand, there is possibility that such coexistence situation of IPv4 and IPv6 result in a threat to the Internet security. In order to solve this issue, we will do some practices to verify the security issues in the coexistence of IPv4 and IPv6 and establish the method to solve this issue.

Concerning technical verification, new measures against security threat in the coexistence of IPv4 and IPv6 is required. After having studied the measure, guidelines and best practices will be deployed. These guidelines will be shared between related parties.

For network operators, they can enhance security of their networks by following the right line. By accumulating know how on methods of security in IPv6 coexistence, we think that we can enhance the international competitiveness of Japan's network better. Thank you for listening my presentation.

>> HYUN-KOOK KAHNG: I don't have a slide because you can read the IPv6 on the website.

>> KUO-WEI WU: So here I want to report on what was in Taiwan. I was involved in the IPv6 project in Taiwan since 1996, actually. In 1996 when I was deputy Director of the super computing centre in Taiwan, we actually receive millions of dollars, almost 10 million every year to run IPv6 networking in academic and research networking. You can see that is from 1996 to almost 2005 or '6, almost 10 years, that means we almost spend hundreds of millions of dollars in the IPv6.

And of course at that time in the 1996 that cause the exponential networking. We are not talking about operational one.

And then after 2006, actually government moving that IPv6 project to the TWNIC. And TWNIC the government asked TWNIC to be the IPv6 promotion projects. And they provide almost 1 or 2 million sometime more, that is 3 million U.S. dollars per year to do the promotions from 2005 to maybe 2012? Almost seven or eight years long.

And according for that, last year, the government actually decided we are not going to spend more money on the IPv6 projects. The government ask the TWNIC to use their own money to do the IPv6 promotions because we already spend many millions of dollars in the networking and also in the promotion project and running IPv6 summit.

And I was actually I am still now Taiwan IPv6 advisory group. And actually what I'm saying, actually from the 1996 till now, I think we do a lot of work. Not only in Taiwan, I believe in Korea and Japan, China, many countries, we spent a lot of money in IPv6.

Then I'm thinking about since I was advisory group in the government, and now we might be need to jump over to just a single institution, we need to any about national strategies. When we talk about national strategy, I think we must be very reliable. We must use trusted data. It is not just, you know, a proposal to the government and didn't think about different stakeholders, you only thinking about the research, academic, you know, or maybe like a single institution. You need to do is thinking about the different stakeholders. What I mean, the different stakeholders, for example, in the past, we are thinking about is if you spend a lot of money into the academic networking because the students have no choice. And also we spend the money to do the promotion. And actually we keep telling the people IPv6 coming and coming many years. And of course we also educate the ISP and also the company how to run the IPv6. And I think IPv6 in general is in some of the university is quite well educated. They know how to run IPv6.

And the second problem is unique to tell the companies, if they are companies providing the content provider, when they turn on the IPv6, actually you need to pursue their senior officer why they need to turn on the IPv6 services. If they don't receive the money or any kind of money from the IPv6 services, it is really difficult to pursue the CEO or CFO to give him money. And if you push harder, you will make the CEO really in difficult position in his company. Sometimes he might lose his job, you know. So we have to be very careful and to deliver what we are going to say.

The second is the ISP. The ISP will ask you the same questions: Where can receive money from the user? Because you know the ISP or Telco, they must have income to support IPv6 services. Because provider of IPv6 services, as you know, you did not turn on IPv4. You not only need to provide more funding to buy equipment, you also need to have, you know, the human resources. You need to have additional portion of the people to run the v6 networking. You definitely cannot expect the people run the IPv4, for example, you have five people run the IPv4, you expect just five people run v4 and v6 at the same time. It don't work. At least you need to give them one more extra person, two more extra person to cover the IPv6 operations. So that is reality. I think we have to face that.

Another thing is the users. To be honest, users don't care. Users actually just want to make sure they can access the Internet, the content they want to use or they want to see. You know, or they want to access. So the users don't care if they are using v4, v6. That should be transparent for them. And of course I agree. At this moment, can we say because ‑‑ so we are not going to promote investment in the IPv6, just I'm saying because you are also thinking about compatibility ‑‑ competitive insure particularly from the government point of view, for example, in Taiwan, we have a competitive from many countries, just like Korea, just like Japan and China, everywhere. So how we can better use the resources to give the government good suggestions and put the money in the right place?

So if I remember is in the last two or three years, my comment to my government is of course you need to allocate money in the IPv6. But why you need to do? First of all, at least the government need to do something. For example, the government web site you need to turn on the IPv6 services. And I still remember three years ago when we talked to the government department computing centre, every department have their own computing centre. They have a DNS‑level website. When we say "you should turn on the IPv6 services," all the computing centres will be asking one thing: Can I add the budget? Can I put extra budget for the IPv6? How much you allow me to put? You know, you work for the government, you understand that. The government is not business operator. Their money actually from tax. So what you ask them, they can do it. They just add the budget. They just ask the budget from you. And now you need to answer how much budget you want to put it in for the government to turn on the v6, although we know we have to do it.

So we have a group to helping the government to evaluate if those money is feasible, reasonable. They are not spending the money to do funny things. They have to do on the IPv6 useful and reasonable.

And in our position, we are thinking about the reason why we want the government department to turn on the IPv6 services because we want them to have experience how to operate the IPv6 because operating the IPv6 is not 100 percent the same as the IPv4. You are facing different things, for example, issues, security issues, something like that. So you have to have a group to look into the detail is those budget reasonable? Then the second problems, the government ask all the Telco and ISP coming in the meeting and say: Can you do something at the IPv6 and the ISP will ask you: Where is money from? Because I cannot charge two more dollars from the user, just tell them I have v6 services for you. They will be send money, if you pay $10 for the ITSL, they don't care if it's v4, v6, it's still $10. You cannot charge 11 or 12 because you have v6.

So we suggested the government to do two things for the ISP in that industry. First, given the tax‑exempt. Give them the tax‑exempt so they have an incentive to turn on the IPv6 services to the user. Without incentive, I don't believe any company willing to spend money for nothing. If you tell them there's a future, they like to know how long? Three year, five‑year, 12‑year, 20‑year. They have to convince their finance CFO.

The second suggestion we gave them is no matter what, for every ISP or Telco in Taiwan, you have to turn on the IPv6. You maybe don't have to turn on for every user, but you must have a reasonable size of the users, v6 users. So the ISP and Telco have enough experience to operate IPv6.

So I think this is the situation I'm thinking about. And I would say my point is we must have trusted data just like a Jeff Houston provided in this morning. Without a trusted data, it's very difficult to justify what we are doing is correct. So I think that is a couple of things we need to have a real good suggestion to the government. At the same time, we need to have an index to evaluate what we invest is reasonable no matter there's company money or tax money. So I think that is basically I'm reporting about what happened in Taiwan. Thank you.

[Applause.]

>> HYUN-KOOK KAHNG: Okay, very good. We'll be back in Korean issues. Let's move on, please.

>> MIWA FUJII: Hello, everybody, my name is Miwa. I am from APNIC. We are responsible to distribute addresses and AS numbers, too. So I was asked to present something about IP. V6 deployment.

>> Yeah, please.

>> MIWA FUJII: I was asked to provide some update about IPv6 deployment in this region and also focusing on the government activities. So today I talk quick overview of v6 readiness by referring some of the statistics and I will introduce some of the anecdotal evidence of government effort and also accompanying with some actual end user readiness statistics. That means the access service' providers' readiness in each country. And I'd like to conclude my presentation by mentioning about some way forward message.

So, in order to review IPv6 deployment status, we need to dissect this Internet in logical order. As you know, Internet is a network of many networks. And these many networks include a lot of different service providers like Internet service providers, content providers, access providers and so on, end‑users and many other different stakeholders involved. And these multistakeholders need to move on to IPv6. So I just would like to give a very, very quick overview of the v6 deployment status.

The first place we can look into is the v6 deployment. The regional Internet registries existing in the world, five of them, five of us are distributing IPv6 services. And all of them distribute about 50 percent of their members already received from the relevant registries. So we can say safely IPv6 address distribution has been done and is still going on smoothly.

And the next place we can look into the announcement of these IPv6 services, this measurement is done by Jeff Houston. And this is showing the IPv6 announcement. And global routing table doesn't represent everything, but it's a good indication. And so far the last couple years, about 50 percent year on year growth we can see.

So from the announcement point of view, it's showing the relatively healthy growth. But, again, the announcement itself doesn't mean much. So we need to be careful when we read this kind of statistics.

Next place we can look into the core transit providers readiness. Oh, sorry. I'm moving my presentation slide. Okay. So next is the core transit providers' readiness. There are about 20 core transit providers, so‑called tier 1 ISPs in the world. 100 percent readiness on IPv6, but when you go far away from core to local regional areas transit providers, then readiness becomes smaller, like this.

So, again, we need to increase the effort to increase the transit providers' readiness in regional area.

And so I did basically same research with using the Cisco lab, Cisco.com data and captured data for the civil economies in different regions of their regional transit providers' readiness with IPv6. I won't go through details. You can take a look at this slide. I suppose in slide becomes available for you.

Although v6 readiness from end user point of view, as you can see, the color of these regions and economies showing relatively healthy color, like yellow to greenish color. That means the transit providers' readiness in this region is becoming higher and higher, which is quite encouraging because core transit providers' regional transit providers really need to be ready so that they can transfer IPv6 packet from end‑users.

So next place we can look into is the v6‑ready website. And I got this one from the Eric Wink's website. He works for Cisco but he's capturing this data historically. And according to his data, the Singapore is No. 5 in the world, Thailand, Japan and India, in that order, Asian economies are listed in the IPv6‑ready website.

And the last place we can look into the end‑users' readiness. And you saw this chart from Jeff, this morning's presentation already. This is world average. World average is about 1.3 right now, which is quite low. But if you dig into the individual level of economies and AS numbers, individual operators, you quite seeing quite diversified implementation level. So I just picked up several service providers, ISPs in this region, which is showing the higher level of IPv6 readiness. Again, Jeff mentioned this already, so I won't go through much details. KDDI in Japan showing about 30 percent, CTC a communication company showing about 30 percent. Internet Australia, about 13 percent. Mobile one Singapore, about 10 percent. Snap New Zealand, 9 percent. True mobile, true Internet Thailand showing about 6 percent. And star about 6 percent. So although the average is quite still low, if you dig into the individual economies, individual AS numbers, you start seeing different numbers. And that is the information we need to pay attention at this point.

So maybe we have seen this sort of development process. When we had IPv4 network, when we were having the deployment of IPv4 network. The v4 deployment and v6 deployment characteristics are very different so we cannot compare exactly v4 to v6. But some economies, some AS numbers started excelling and some economies and some AS numbers are behind the actual progress. And we may start seeing something similar we have seen before.

So let's look into some statistics and anecdotal work done by government.

So first Australia. Australia issued a strategy for the implementation of IPv6 in Australian government agencies. Version 1 was issued 2007 and version 2 updated version is announced 2009. According to this guideline, they set up basically mandate. The stage 3 implementation January 2012 and December 12 the agencies need to be ready with dual stack IPv4 and IPv6 and actual end date is, due date is 2015.

Then this is the data provided by the Australian government in last December and showing the IPv6 ready v4/v6 dual stack. 0 percent to 100 percent, kind of evenly scattered. And they are monitoring their deployment like this.

And this is the Australia's IP. V6 end I don't remember readiness. And I won't go into too much details. Current level is 0.5. But, again, even Australia average is 0.5, one of the ISPs excel with v6 readiness about 10 percent.

Next is China. As we learned this morning, China state council in November 2011 announced the IPv6 mandates to the industry and mentioned 3 million users for each operators, telecommunication mobile ready by 2015. 20 million users by 2015. But by saying so as Cindy mentioned, still those operators are kind of struggling. It is inevitable for IPv6 is kind of deployment case.

The government, Chinese state council announced, made this announcement accompanied with actual funding. I am not exactly sure how much money is actually delivered or not delivered yet, but it was a kind of outstanding announcement. Not only mandating date, but supporting some, providing some supporting fund.

Okay. This is the update for China made by the CNNIC most recent meeting last week. It says basically the IPv6 plan for e‑government extra net. Chinese government is trying to enable IPv6 in their own services. And that is quite popular strategy to be used by the government in this region to support the IPv6 deployment in industry, try to get ready their own network first.

Annex the slide showing the China's end‑users readiness. Again, Jeff mentioned we have a limitation to monitor their IPv6 readiness from outside of fire wall, but this is just an indication. Obviously there is some activities going on.

India, next is India. India is issued national IPv6 deployment road map. Now version 2 issued June 2020. According to this road map, they basically pointed out v6 service at all new enterprise customers by 2014, v6 services at all new retail wire line customers July 2014, v6 services for LTE customers 2013 and so on. Basically focusing on new subscribers to put on default on IPv6. And I think I saw this kind of strategy quite regularly from different governments and actual service providers.

The Japan ministry mentioned very similar strategy suggested by MIC2. And I think this is quite commendable strategy. Wu mentioned about it's so costly to deploy IPv6. Yes, it could be costly, but also deploying CZN, extending for other space, also costs money, too. We need to have a proper economic comparison. Most recently, the interesting document was published by Lee Howard from Time Warner cable. This is kind of first document published on the CZN economics. And we actually had a presentation made by Lee Howard about 10 days ago at APNIC 36 and it's recorded and video archived is available. So hope you can have a chance to look into that presentation.

So if you deploy ‑‑ if you are receiving new customers, why not give IPv6 default‑enabled CPE so that you don't need to go through the process? And also some of the successful ISPs in the region applied a strategy to upgrade provisional CPEs to be up graded automatically, their firm ware be automatically upgraded at the time of service upgrade so that in that way, legacy customers can be upgraded, too.

Anyway, back to India, so India set up some detailed activities and mandate and hope this kind of mandate will be monitored and if required necessary furthermore supportive action be taken. And India's current level of IPv6 readiness, we start seeing little bit activities, but still 0.03. But if you go back to the couple slides back, India's backbone, I mean the transit providers' IP. V6 readiness is relatively high to compare to other economies. And I guess that may suggest they have a widespread use of not devices prohibiting the transit to the IPv6 and also the old legacy widespread CPEs, there is not much strong strategies presented to replace those CPEs. And that will be prohibiting for them to increase the IPv6‑enabled users.

Next, Japan was mentioned so I won't go into too much details. But the MIC of Japan has been very actively working with the private sector. The partnership between public sector and private sector in Japan produced lots of outcomes. And they are constantly having the IPv6 study meeting. Most recent one was held on July 2013. Please correct me if I am saying something wrong because I got this information from MIC's website. The active discussion on CZN was held, and actually government officials and industry people exchanged information. The concerns on the CZN on its relatively high cost, possible negative impact to end‑users, I think that's a very positive approach to discuss issues about CZN between public sector and private sector and existing V6 test bed targeting the application providers content providers. This service providers area really need to pay attention to support them to move on to IPv6. And discussion on potential formats of V6 service delivery before IPv6 services. This has been explained already.

And discussion of possible to have an IPv6 launch Japan to increase v6 deployment in multiple service providers including content providers. And this is not an easy action. But it's really nice to see in kind of discussions that are happening. And Mr. Jeong mentioned about the v6 approach, as well, too. I think this kind of small country‑wide or regional‑wide v6 launch activities may have an interesting impact for the future development of IPv6.

And Japan's IPv6 deployment status is one of the highest in the world, 4.7 percent.

Annex the, Korea, I wouldn't go through too much because Mr. Jeong already mentioned about the effort. KISA has been providing extraordinary support to the industry. Just industry hasn't responded positively yet. And it's quite challenging. And I understand that. All we can say is probably keep applying the similar level of support or maybe increased level of support. It is quite interesting to learn about the KISA and SK telecom conducted tests. But success hasn't been transferred to production line yet. So probably next step is actually Mr. Jeong's mandate suggested, move on to the production level of LTE with IPv6.

Then next, yeah, Jeff mentioned this already, so the Korea has a lot of space to grow in the future with having the government support.

And Singapore, Singapore paid a lot of attention and a lot of continuous government activity to support the industry to move on to the IPv6 in the last couple years. Every year they organise IPv6 conference targeted to the decisionmakers. Like Kuo‑wei mentioned, we need to involve stakeholders. Multistakeholders of Internet, including banking sectors and so on and explain the importance of transition to IPv6. They provided some like create initial v6 demand by enterprise government agencies and so on, create IPv6 supply for network providers. And they also provided the subsidy for skill‑up trainings. And we, APNIC collaborated with Singapore IDA quite frequently to deliver IPv6 training courses, including security workshop. Yes.

So it didn't show the effort quite a while, but recently we start seeing some jump. This is coming from the mobile one and star hub effort deploying IPv6. So I think there are some dormant period, but once it's reached a certain point, and given there is not much IPv4 available, comparing the economics to deploying IPv6, some companies start making some decisions, conscious decision to move on to IPv6 in order to maintain sustainable growth.

Okay. So Taiwan as Kuo‑wei mentioned. So ministry of telecommunications has been very active. And the update, developed the IPv6 upgrade promotion programme and set up the Korea mandate date to deploy 50 percent, first 50 percent of the public network services enabled on IPv6 by year 2013. Remaining 50 percent to be enabled on IPv6 by year 2015. First one, 2013, and second 50 percent by 23015.

And they also mandate monitoring IPv6 deployment status in Taiwan and TWNIC actively engaged with this activity.

And this is current Taiwan's IPv6 readiness, 0.33 percent. Again, lots of space to grow. And I hope this new initiative from the government will help.

And Vietnam. Vietnam has been quite active, too, in the last couple years. Every year ‑‑ sorry this is typo. VIANIC and communications, Vietnam IPv6 taskforce got together, organized IPv6 conference in state of Vietnam. And tried to raise the awareness by inviting the decisionmakers again here. And most recent one, May 2013, the ministry of MIC, vice ministry of MIC and top ‑‑ launched IPv6 service means probably get ready for their backbone. But again they have CP issues, legacy equipment issues. So at this point 0.001 percent. And I hope we start seeing this effort actually start showing the actual statistics in the near future.

And conclusion, so IPv6 awareness level amongst the government in this region is very high. And we are having a lot of support continuously, which is very encouraging. And many initiatives from government has been implemented. Partnerships between public sectors and private sectors, developing national policy and guidelines enabling v6 in their own agencies, government networks, mandating v6 readiness in government procurement for ICT goods and services, raising v6 awareness among decisionmakers, providing timely skill‑up trainings and monitoring v6 deployment measurement and share information with our industry and include the necessity of v6 deployment in ministerial statements, like APNIC involved with EPIC and OECD and these governmental organizations included IPv6 into their ministerial statement, which give some momentum to the industry.

And we hope we can have continuous engagement from the government and further strongly.

And I'd just like to mention about ‑‑ I'd like to get attention for this chart. This chart was made through the ape ex database showing in ratio to fixed telephone lines among Asian and Oceana members and epic. This one is basically Philippines showing the 25 plus times more cell phone subscribers than fixed network. And the Papua New Guinea. Papua New Guinea's leap to the 20 times more subscribers in cell phone than fixed network is quite remarkable. And followed by Vietnam, Thailand and Malaysia. Many people in this session mentioned about the mobile operators and mobile devices will be the leader of the next growth of the Internet. And we need to think about this kind of future growth, from where the next growth is coming from and how we can maintain the end‑to‑end Internet principle throughout next wave. And we, the industry and government really need to communicate closely and exchange information and support Asia to support IPv6 in new services and technologies. Thank you.

[Applause.]

>> HYUN-KOOK KAHNG: Thank you. So now we already it's almost 4, but we started about 10 minutes later, so we have about 15 minutes, up to.

So this presentation was I think perfect. Taiwan presented detailed of the problems. And the Koreans said how can we overcome those problems? And Japan say this is the result that we overcome the current status. And then Ms. Fujii summarize everything in very good manner. So I want to give a chance to ask to the panelists, I want to give the chance to the floor to ask some kind of questions. If any questions, please introduce yourself and your affiliation. Is there anyone?

So to make it short, so I want to raise one question if it's good that somebody will follow. The thing is now in the presentations, even though many governments spent sizable resources, but still the penetration rate is very low. They spent the money but the volume doesn't increase. But Japan and Australia, they somehow raised some usage. Now, many ordinary users used IPv6. Then my simple question is: Was there any special role of the government? Or as Mr. Wu said, was it on industry to implement IPv6 or any other kind of tax‑exempt or any kind of some measures of some policy to increase it? So that's a very simple question to Japan.

>> AKIHIRO SUGIYAMA: Firstly, this is to stakeholders in Japan, not only government but also all stakeholders are doing effort to promote IPv6. So everybody needed to do effort.

And concerning government, we are doing budgeting programme as was said.

In my last slide, I introduced our approach. That slide explained about our budget, usage of budget concerning IPv6. That was our approach. Thank you.

>> HYUN-KOOK KAHNG: Thank you. Yes.

>> Well I can commend first from government point of view because the government, you have to have a strategy not only for today, also for the tomorrow and the future, no matter how long the future will be, even 10 years. We see this as something we have to do. I think every government need to put a budget. I think there is no question about that. What I try to tell you is when I suggest to my government, I didn't mean a very negative message. What I mean is because in the last more than 10 years, we spend a lot of money in IPv6. We should learn from last 10 years how we spend money. Is it effective? How we can spend the money more effective? So make the IPv6, real the money into IPv6. For example, let me give you one or two examples.

>> HYUN-KOOK KAHNG: One, please.

>> KUO-WEI WU: One, please. Okay. If you remember the last three or four years, the IPv6 summit. They spent a lot of money for the IPv6 ready logo. Do you know what is the IPv6‑ready logo? If you ever run the Internet, the networking, ready logo doesn't mean it works. So instead, they want to spend the money in the ready logo. Why you just don't do it? The ready logo doesn't mean you buy the equipment. Put it in. Work. Come on. I think that money is kind of waste. Instead of do the ready go, why not just ask to operate it so you learn the experience from that. Why you spend money into ready logo? Let me know. So I think we did a lot of wrong things in the past. No matter the government or academics. Even academic. You know, academic we spend a lot of time in telling the Internet of Things, it's a kindle app for IPv6. Well, we should learn Internet of Things and IPv6 can be the same thing but can be two different things. Don't messed up. When you messed up, you actually put the money into ‑‑ it's not effective. What I mean is we still need to put the money into IPv6 but just learn to be smart.

>> HYUN-KOOK KAHNG: That means that Japan and Australia was smart already.

[Laughter]

So I think if possible, it will be very good to share how they sort of manage that kind of a budget in Japan. I think if possible, then it will be, you could get some kind of information even later, then it will be very good information to other countries in our region because of course economies is quite different, but from that experience, I think that is very important and is valuable information to others.

Any other questions? Then let me ask a second question. What is the role of the government? I mean, government is game player or referee?

>> KUO-WEI WU: One word. The government have to have a vision.

>> HYUN-KOOK KAHNG: So it should not be a player? Just a referee? Just fair game?

>> KUO-WEI WU: For IPv6?

>> HYUN-KOOK KAHNG: Yes.

>> KUO-WEI WU: Because IPv6 involve a lot of stakeholders.

>> HYUN-KOOK KAHNG: That's right.

>> KUO-WEI WU: So the government cannot be the operator. You can arrange the budget. But I don't think you can run it.

You know, all you can do is locate a budget and ask your department to turn on the v6 now for your web services. Or maybe, yeah kind of, for example, in Taiwan, the government has a GSN. The government networking. All you can do is say turn on the IPv6. I think you can do that.

But in general if you want to make IPv6 real successful, don't just be visions, you just have a vision to share and also receive the message from the industry and the user and make a smart move. Because if ISP Telco and user and content provider, they don't see the incentive or the needs, I think the government just keep putting the resources money doesn't really go anywhere.

>> HYUN-KOOK KAHNG: Then I want to ask, too, to Japan here, was it desirable to give a kind of tax‑exempt or some kind of a measure, mandatory measure, to the private sectors? Is it desirable?

>> AKIHIRO SUGIYAMA: Currently we are ‑‑ in this stage, we are not conserving such method.

>> HYUN-KOOK KAHNG: Just fair game. No tax‑exempt? Nothing.

>> AKIHIRO SUGIYAMA: Current stage, no.

>> HYUN-KOOK KAHNG: Do you want to say something?

(awaiting translation).

>> I think the reason we have this kind of session, it is the plan of the government, what is the plan of the government to deploy this IPv6? It means implicitly, maybe, as to government to have some kind of leading role. But from our experience, Taiwan and Korea, we spent too much money. But the first time I believe out there was the best way; however, looking at the Chinese step, China is the only rich country in the world now.

[Laughter]

But, still, the traffic is not so high. Even though Japan's economy was not good, right?

[Laughter]

Was not good. Now is getting better. But, still ‑‑

>> Nobody.

>> HYUN-KOOK KAHNG: I said China is only rich country. Even U.S. is broke. So, anyway, entity and banks spent lots of money about 10 years ago. At that time the Japanese economy was not good. However, they spent. They had kind of some belief that this is the right way and did make the money to companies. But other countries in Taiwan, all other countries, didn't have that ability. But my question is: I'm really curious, how NTTN soft bank can survive through that kind of negative environment? No, no, no. So is it really good strategy that government plays a major role in the deployment? Because if the government plays a major role, then other companies lean to the government waiting for some resources. However, if the Japan or Australia, as I know, expressly they didn't give any help to the private sectors; rather, let them survive. Am I correct? They didn't play a game. Yes.

>> MIWA FUJII: Yes, I think the funding is very important aspect. But I think as I mentioned when I talked about MIC Japan's approach, private sector‑public sector partnership, but studies like LTE deployment, these kind of things need to be discussed and shared, the issues and potential risk. It doesn't cost much money, but to help the industry to make informed decisions. And I think that will be very helpful.

>> HYUN-KOOK KAHNG: Thank you. Yes. Please.

>> Jeff Houston, APNIC. I'm not sure that governments really need to stimulate private sector the way you're thinking, but there is a deeper trust. And it's actually all about the government's role in terms of openness and accessibility of markets. When the Internet opened up, it was at a time of deregulation of the telecommunications industry. And governments were actively encouraging the telecommunications sector to be open to private investment. And they sold off their own interests in their own national Telcos and essentially created a very vibrant and competitive sector.

You think and governments think that that will just continue. But that's not necessarily the case. Because if you constrain the market and lift the barriers and increase the barriers to entry, you end up in a market that is controlled by the incumbents. At that point, you actually have a distorted market, and typically that's when governments intervene.

Could that this happen the Internet in your country? Well, if you haven't got any IP addresses, and I wish to invest in your market and become an ISP, how am I going to do that? Because if I haven't got a single address, I can't compete. And even if you give me one address, thank you very much, and I have to do everything behind a massive mat, my service is crippled.

And if you think about it a bit more and you think about what happens to the content industry in your country, if the incumbents control the remaining addresses, you no longer have a competitive market. Do governments get actively engaged as soon as a market closes up? Of course they do. That's a very fundamental role.

So in some ways, I would actually say that I'm not sure governments need to do much now, but they need to be worried. And they need to look at this market. And they need to make sure that the market continues to be open, accessible and competitive. And if we go down a path of ever increasing nets and ignore v6, I'm not sure any of us could guarantee that those markets will remain open and competitive and accessible. The incumbents will be able to dictate the terms and conditions that basically competitors compete.

I'm not sure if it was a conscious thought by NTT in the way in which they structured their network, but I cannot compete in v6 right now. And that's a problem. Because now I'm forced in a much smaller domain.

So when you think about this question, it's not: Will the government pay me to do v6? It's is the public interest in an open, accessible and competitive market being preserved? And if it's not, there are very, very good grounds for regulatory intervention. And I think that's the key point you need to bear in mind here. Thank you.

>> HYUN-KOOK KAHNG: Thank you. Yes. Make it short.

>> KUO-WEI WU: Yeah, very short because the time is ran out. Actually I'm the same voice as Jeff. About five years ago, the Google come to Taiwan and looking for the ‑‑ and one of the Telco refuse because the Telco dominant almost 50 to 60 percent of the traffic in Taiwan. They refuse. This year, they don't care anymore. (laughing) because the Telco, you dominate 60 percent of the traffic is down to 20. Do you think the Google willing to ‑‑ they don't care, they don't care. So because we put the barrier, it's not necessary, it's a good strategy.

So I mean the government should the trusted data to show your industry or the company to say do something. At least for your own futures.

>> HYUN-KOOK KAHNG: Thank you, Mr. Wu. And now I get the sign that we have to wrap up this session. But I don't have time to summarize everything. But I believe that most of you understand and what's the message? Should the government has to do at this time? Thank you very much and thank you for the presenters. And thank you.

[Applause.]

[End of session.]

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