
LONDON – ASO Briefing to the ICANN Community
Wednesday, June 25, 2014 – 13:30 to 15:00
ICANN – London, England

LOUIE LEE: Hi. This is Louie Lee, and we are at the ASO Briefing to the ICANN Community, at the ICANN 50 Meeting in London. If I may have the ASO AC Members introduce themselves first? Then we'll continue on. Ron?

RON DA SILVA: Ron da Silva from Time Warner, ARIN Region.

RICARDO PATARA: Ricardo Patara from LACNIC Region.

SPEAKER: [Unclear 10:53], the SO AC from LACNIC Region too.

JASON SCHILLER: Jason Schiller, ASO AC from the ARIN Region.

LOUIE LEE: Of course myself, Louie Lee. I hail from the ARIN Region. I'm Chair of the ASO Address Council.

Note: The following is the output resulting from transcribing an audio file into a word/text document. Although the transcription is largely accurate, in some cases may be incomplete or inaccurate due to inaudible passages and grammatical corrections. It is posted as an aid to the original audio file, but should not be treated as an authoritative record.

WILFRIED WOEBUR: Wilfried Woeber, on the Address Council for the RIPE NCC Service Region.

ALAN BARRETT: Alan Barrett on the ASO AC from the AFRINIC Region.

FIONA ASONGA: Fiona Asonga, ASO AC from the AFRINIC Region.

AFTAB SIDDIQUI: Aftab Siddiqui, ASO AC from APNIC Region.

TOMOHIRO FUJISAKI: Tomohiro Fujisaki, ASO AC, also from APNIC Region.

LOUIE LEE: Continuing back around the table, and then I'll pass the mic around for the folks in the room that are not at the table.

SPEAKER: I'm [unclear 11:52] from the [Number Associate 11:55] in Japan.

LITO IBARRA: Lito Ibarra from LACNIC [board 12:03].

CARLOS REYES: Carlos Reyes, ICANN staff.

SUSAN HAMLIN: Susan Hamlin, ARIN Director of Communications.

[HOLLY SCARA]: [Holly Scara 12:19], ARIN Communications Manager.

PAUL RENDECK: I'm Paul Rendeck, the Director of External Relations for the RIPE NCC.

ELISE GERICH: Elise Gerich, ICANN, IANA person.

SPEAKER: [unclear 12:35], Head of Outreach and Communications, [Net Node 12:40].

ANTONY GOLLAN: Antony Gollan, RIPE NCC Communications Writer.

[MARIA]: [Maria 12:47], LACNIC's Communication Coordinator.

SPEAKER: [12:49], Secretariat Secretary.

AXEL PAWLIK: Axel Pawlik, RIPE NCC Person.

CARLOS MARTINEZ: Carlos Martinez, LACNIC Person.

NICK HYRKA: Nick Hyrka, Communications Manager, RIPE NCC.

LOUIE LEE: Excellent. [Dimitri], will you introduce yourself please?

DIMITRI: Dimitri [13:18] RIPE NCC AC Representative.

LOUIE LEE: Excellent. Okay. We've prepared a presentation, and it's focused on the status of IPv4 depletion and transfers, and following on with recent activities in the IPv6. Jason, if you would?

JASON SCHILLER: Hi, my name is Jason Schiller, and we're going to be presenting today on the status of IPv4 depletion and IPv4 transfers, and also IPv6. We'll take some discussion and Q&A at the end. However, please do interrupt me and ask questions. If I say some jargon that's particular to the RIRs and you don't know what RIR is, please stop me and interrupt me.

We're going to start off with IANA depletion. What is IANA depletion? Well, that's when the IANA free pool was emptied, and the IANA has no

more IPv4 addresses available for the RIRs. That happened when an RIR requested more space than was available in the free pool, with the exception of the last 5/8^{ths}, which is 83 million IP addresses.

Those were reserved by special use, to be determined by each region independently, to aid with IPv6 transition and to create a soft landing, to ease the pain of depletion of IPv4. That global policy was ratified by the ICANN Board on March 6th 2009. That the text of the policy there, as well as a URL to where you can find it. What about IPv4 space that gets returned to the IANA after that happens?

That's a very interesting question, because when the IANA emptied its free pool in February of 2011, what was then the existing policy ended, and they immediately moved to the exhaustion phase. In that phase, IANA allocated 1/8th to each RIR. At this point, IANA had no policy to make other IPv4 allocations.

We needed to deal with that issue, and we did so by passing a global policy for post-exhaustion IPv4 allocation mechanisms. Basically, what that policy did was instruct IANA to create and recover an IPv4 address pool, to collect any returned addresses in that pool, and that pool was to remain inactive until the first RIR had less than a /9 in its total inventory.

When that happened the policy was activated. The space in that pool was divided five ways equally, with the remainder left in the pool. They rounded down to the nearest ceter. Each RIR received 1/5th of what was in the pool, minus the rounding down and the remainders. Then this process repeats twice-yearly, on the 1st of March and the 1st of September thereafter.

Here is the text of the policy, which was ratified by the ICANN Board on May 6th 2012, as well as a link to where you can find it. Following IANA depletion is RIR depletion. That is essentially when the RIRs are out of addresses, except for soft-landing, which I'll talk about in a moment. In this case, the RIRs have no available addresses to provide organizations that are growing and requiring additional addresses.

That means once an organization uses up its own store, it must either stop growing, get additional addresses from transfers on the open market, transition their growth to IPv6 only, deploy some sort of address saving technology, such as carrier-grade NAT, or some combination of those things. What exactly is soft landing? In the RIPE and APNIC regions it's this concept that new and existing organizations can get exactly $1/22^{\text{nd}}$, which is a little more than 1,000 IP addresses

That's generally a large amount of addresses for a small organization. LACNIC has a similar policy, except they break theirs into two stages. For the first half of the addresses, any organization can get an additional $1/22^{\text{nd}}$ every six months, and then in the second stage, for the second half of the addresses, only new organizations can get exactly $1/22^{\text{nd}}$.

ARIN did something quite different from the rest of them. ARIN put aside $1/10^{\text{th}}$, which is about 4 million IP addresses, for new networks who are deploying IPv6 only, but need some small amount of IPv4 addresses for boot-strapping, for example to do IPv4 to IPv6 translation, or to be able to dual-stack their DNS servers.

AFRINIC also did two different phases. The first phase was business as usual, except that their cap was reduced from a $1/11^{\text{th}}$, which is about 4 million IPs, to a $1/14^{\text{th}}$, which is 500,000 IPs. In the second phase, when

only 1/11th is left, each organization can get up to 1/22nd at a time. They've also held back a 1/12th in reserve for future use.

The idea behind a soft landing was to try to create a smooth transition to IPv6, to prolong IPv4 availability, to maintain the existing IPv4 during transition to IPv6, and to ensure new entrants are able to get IPv4 addresses and remove any barriers to entry.

There also tends to be associated with this a more stricter IP requirement, tightening the justification window, for example, making it a little more difficult to get addresses, and to continue to promote efficient use of IPv4, especially when there are so few addresses left.

I'm going to talk now about some history in the depletion timeline. IANA depleted on February 3rd 2011. This is their announcement and the URL for where you can find it. Shortly thereafter, APNIC depleted on April 15th 2011, and RIPE depleted September of the following year. Then in May of 2014, LACNIC announced that they'd dropped below 1/9th of 8 million IP addresses, and that triggered IANA to redistribute the recovered addresses, which they did on the 22nd of May.

What they did was they gave an equivalent of 1/11th or 2 million IP addresses to each RIR. Here on the slide I've listed the individual blocks that were given out. On June 10th of 2014 LACNIC announced that they'd depleted their available pool. What we have left is ARIN and AFRINIC still holding IP space and doing business as usual.

Per Jeff Houston's predictions, ARIN looks like it's going to deplete in February of 2015, and AFRINIC in August of 2019, although there is some variation in the confidence interval there, for those windows. So what

are we doing? We're actively recovering addresses. We have recovery policies in all five regions. IPv4 addresses are valid, as long as the original criteria continues to be met. Resources of organizations who cease to exist are recovered.

If a company goes out of business, those resources are attempted to be recovered. Members who don't renew their membership annually are considered defunct, and those addresses are recovered as well. APNIC and LACNIC actively recover unused resources, as does ARIN. ARIN has a little bit of some interesting details to it thought.

They look for organizations that are out of compliance, and they request those organizations to renumber and return unused resources, to bring them back into compliance or near-compliance. They revoke resources for lack of payment, and for fraud. In the ARIN Region there is some churn in the addresses. Some are voluntarily returned. Some are revoked, usually for non payment, and some are reclaimed due to fraud or because a company has gone out of business.

Since 2004 we've received a little more than 3/8th or about 61 million IPs back. We've returned 1/8th, the equivalent of 16 million IPs to the IANA in 2012. This is a graph that shows the IP addresses that have been allocated or assigned year-by-year, as well as the ones that have been reclaimed. This is a listing of the IP addresses, year-by-year, that have been reclaimed, as well as the ASNs that have been reclaimed.

LACNIC, up until now, as of June of this year, we've recovered 53 ASNs and 86 IP blocks. That totaled to about 354,000 IP addresses. We also have transfer policies in each of the five regions. Transfer policies fall into three flavors: mergers and acquisitions, which happens whenever a

merger and acquisition occurs, when one company merges or buys another company. All the RIRs have a policy for this.

We also have specified transfer policies, which is just about transferring IP addresses from one organization to another. APNIC, RIPE and LACNIC have a specified transfer policy. Then we also have a special case inter-RIR transfer policy between members and different regions, which ARIN and APNIC have.

For merger and acquisitions, basically what we're talking about here is when a network, its equipment, its user base and the associated IPs are moved from one organization to another. The specified transfers to vary a bit from region to region. In APNIC, when there is a specified transfer, you can get up to a 24-month supply of addresses, and in the ARIN Region it's a little more complicated.

There still is the 1/24th minimum, but there are some additional conditions on the source and the recipient. If the source is inside the ARIN region, then they're not eligible to receive IPs from ARIN for 12 months. On the recipient side, if the recipient is in the ARIN Region, then they're required to justify a 24-month need. If the recipient or the source is outside of the ARIN Region then it's that region's policy that's applied.

In the case of LACNIC, they've recently implemented a transfer policy. In their case, the recipient must hold the block for one year, prior to transfer, and they must have a justified need of 12 months. They can't receive any space from LACNIC from one year. Here is a graph showing the APNIC transfers. The dark blue on the bottom is transfers within the

APNIC Region and the lighter blue on top is inter-RIR transfers with ARIN.

It's fairly linear in terms of its growth. If we look at the ARIN graph, this shows the transfers of the different types. The green there is mergers and acquisitions, and that number continues to be high. It also shows ASN transfers, which is fairly recent, starting in 2012 with a small number – three, seven and four, over the last three years, as well as inter-RIR transfers with APNIC, which has been rising since 2012, going from [617 to 24? 26:33].

This does look fairly linear, however you have to remember that 24 is only half of the year. If you double those numbers it actually looks like it's more exponential. It looks like transfers are starting to really take off. Here we have a graph of the RIPE transfers. This includes the number of transfer requests, as well as fulfilled transfers. AFRINIC lacks a specified transfer policy.

The LACNIC transfer policy is fairly new, just going into service, when they ran out of IPv4 addresses, when they depleted. There's not really any data to present at this time. Status of IPv6 address space. I think we've all seen these graphs, and they haven't changed over the years. All of the RIRs got 1/12th. They're making allocations from it. IPv6 deployment is on the rise, which is good.

I wanted to talk a little about what's actually happening in the world of IPv6. Networking, besides putting addresses onto networks. There was an effort in June 2011 called World IPv6 Day. The idea behind this was to try to get people to turn on IPv6 for 24 hours as a test flight. ISOC organized this. They had the day on June 8th 2011. It was initiated by a

number of large content providers. The goal here was to prove that IPv6 can work.

They also wanted to raise awareness for IPv6 broken-ness. Back then there was no concept of happy eyeballs. Happy eyeballs is where your client will try to get the data over IPv4 and IPv6, and use whichever works better. Back then there were some applications that if a destination was reachable over both IPv4 and IPv6, it would only try IPv6. That means if you were configured to use IPv6 but you weren't connected to an IPv6 network it straight-up would not work.

There were a lot of other applications that would fall back from IPv6 to IPv4, but there was a significant amount of latency for that fallback to happen. There was a lot of concern that content providers, the eyeballs that were trying to get to their content would bail out when the webpage didn't load quickly. They were concerned that their hit rates would go down.

They also wanted to motivated transit providers to turn on IPv6, and motivate vendors to support IPV6. One of their goals here was also to break the chicken and egg problem. There were these content providers that didn't want to deploy IPv6 because there weren't any v6 eyeballs. There weren't a lot of people that were asking for content over v6.

At the same time, the transit providers weren't incentivized to deploy v6, because all of the content that their customers wanted to get to was available over v4. This was followed up a year later with World IPv6 Launch, also organized by the ISOC. The difference here was that the goal here was to turn on v6 and leave it on permanently.

The [goal 30:08] ISP is to commit to turning on IPv6 for greater than 1% of their residential customer base, and content providers to turn on v6 on their main site and leave it on indefinitely. This means www.company.com would be dual-stacked, as opposed to what a lot of people did in the previous year, which was to set up an alternate site that would be something like www.ipv4.company.com, and www.ipv6.company.com.

Also, for home router vendors to participate they had to enable IPv6 by default. What you see here is a graph, as seen by Google, for IPv6 traffic, as a percentage of the total traffic it sees. You can see the graph is exponential, and we are on the rise. For a long time we were hovering at 0.5%. Then we had World Day and it started to become exponential. You can see it got steeper in the following year, and traffic continues to grow, doubling about every year.

We've moved from before World Day at 0.5% to 3.5%. If we zero in on some specific geographies we can see Germany is at 8.75%, the US is at 7.99%, so there are some good deployment stories out there. The other way to look at how well deployed IPv6 is is to look at the content providers. Alexia makes this list of top 50 websites. They're testing whether or not they're IPv6 enabled.

You can see prior to World Day we were right around 1%. On World Day we went up to 5%, but a lot of people then turned it back off the next day, and we dropped back down to 2%. We had about a permanent doubling for a year, and then we had the launch, at which point we went up to about 7%, and we stayed there until recently where we've eked up to about 8.7%.

The results. World Day, IPv6 traffic doubled from 0.24% to 0.41%, relative to IPv4 traffic. It's very exciting that it's doubled, but unfortunately it's a small slither of the total traffic. For website, the top 50 Alexa websites went from 1% to 5% on that day, and permanently 2% stayed on, so we doubled the v6 content on the Internet. Over 1,000 content providers participated. It generated a lot of interest in v6, and it disproved this IPv6 broken-ness would severely impact content providers.

World IPv6 Launch results. We now have 243 ISPs with greater than 0.1% of their IPv6 subscriber base enabled. We have 191 ISPs with greater than 1%. That is definitely the subscribers are moving up. They continue to double about yearly. IPv6 traffic is continuing to double year after year. As I mentioned on the previous slide and on the graph, we saw an uptake from the launch, from 2% to 7%, with a recent uptake to about 8.7%. Any questions?

LOUIE LEE:

Thank you very much Jason. I do know that there were a few more people that came in a little late, and I want to let you know, please do feel free to ask us questions. Many of us at the table are from the Address Council, and there are RIR staff in the room also. Were these topics the ones you were interested in? Were there others that you were interested in? Please speak up. We have plenty of time right now.

Okay. With that, we'll close the session. Thank you very much for coming. I'll ask ICANN staff to let me know when the recording is posted, so that we may distribute the link to it. We'll make sure that the

slides are in your hands, and if there's anything else to do there we'll work with you on that. Thank you.

[END OF TRANSCRIPTION]