ARIN

ELECTIONS 2016

VOTER **GUIDE**

SLATE FOR

ARIN ADVISORY COUNCIL
ARIN BOARD OF TRUSTEES
NRO NUMBER COUNCIL

VOTING **OPENS**

3:00 PM EDT
THURSDAY, 20 OCTOBER

VOTING **CLOSES**

3:00 PM EDT
FRIDAY, 28 OCTOBER

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Advisory Council

Board of Trustees

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Please note that ARIN publishes the candidate responses as they are submitted; they are not altered or edited in any way.

ARIN ELECTIONS 2016

26 September 2016

Dear ARIN Member,

As your organization's Voting Contact, you are responsible for casting a ballot on behalf of your organization in the upcoming ARIN Elections. Participation from you in the election process is crucial, requires only minutes of your time, and is an important responsibility. In fact, this member-only benefit gives your organization the power to shape the future of ARIN, our community, and the Internet with one simple ballot.

This year ARIN seeks to fill two (2) seats on its seven-member Board of Trustees, six (6) seats on its 15-member Advisory Council, and one (1) ARIN representative to the Number Resource Organization Number Council (NRO NC).

ARIN Trustees oversee ARIN's strategic direction, goals, and financial health; while Advisory Council members facilitate ARIN's community-based Policy Development Process on matters of Internet number resource management. The NRO NC advises the NRO Executive Council on global Internet number resource policy proposals.

In preparation for voting, I encourage you to think about the issues and policies that are most critical to you and your organization, including the actions and outcomes you hope to see happen. Familiarize yourself with each candidate – specifically, take time to read the information made available online (at https://www.arin.net/participate/elections) including their biographies, answers to the candidate questions, and Statements of Support from community members. Note that ARIN will live stream candidate speeches during the Public Policy and Members Meeting in Dallas, TX on 20 October and provide archive video on 21 October.

Polls for the Board of Trustees and Advisory Council elections will open at 3:00 PM EDT on 20 October and close at 3:00 PM EDT on 28 October. As a reminder, all eligible Voting Contacts must log into their ARIN Online account and click on the "Vote Now" button located on their dashboard to access their organization's ballot.

Please contact members@arin.net immediately if you have any questions.

It's your voice, your vote – ***make it count!***

Sincerely,

John Curran
President and CEO
American Registry for Internet Number (ARIN)

2016 Advisory Council

Owen **DeLong**

Senior Network Architect at Akamai Technologies

http://www.arin.net/about_us/ac.html

Please provide a brief CV highlighting experience relevant to the duties of the ARIN Advisory Council.

I am currently in my 9th consecutive year on the ARIN AC. In that time, I have worked to improve ARIN policies to the benefit of the community. Of particular note, I have been instrumental in several efforts to reduce the minimum allocation sizes for IPv4 and IPv6, liberalize policies to make resources easier to get, and preserve needs basis in an effort to ensure that resources go to entities with actual need for the resources. I would like the opportunity to continue to serve the community in this capacity.

Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Advisory Council. How do you propose to resolve such conflicts?

I do not anticipate any conflicts of interest.
Should a policy issue arise where I have a conflict of interest, I will disclose such conflict to the AC and/or the community as appropriate and I will take appropriate action to resolve the conflict such as abstaining from the vote and/or possibly the AC deliberation of the policy if warranted.

Describe any limitations on your ability to attend AC and Public Policy Meetings in person or to serve the full three-year term.

I currently have no such limitations.

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

I have been attending ARIN meetings for more than a decade. I am serving my 9th year as a member of the ARIN AC. I have found working with the community to continuously improve ARIN policies very rewarding. I would like to continue that effort.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

I think IPv4 exhaustion will have little impact on ARIN's function, scale, or role beyond what has already occurred. However, I do believe that as we approach IPv4 deprecation in the coming years, ARIN's role will be significantly diminished. With our current IPv6 policies and the readily available IPv6 address space, ARIN will see much less frequent interaction with each organization. Likely this will lead to a potential for some staffing reduction mostly through attrition and some potential cost savings. I believe that there will be a reduced, but not eliminated need for continued policy improvement. (Note that at the current time, the IPv6 policies seem to be working very well and almost all of the current work remains focused on IPv4 policy changes).

What differentiates you as a candidate or makes you uniquely suited to the post?

In addition to my long experience in the ARIN policy process both as a member of the community and as a member of the AC, I have worked for a variety of different types of organizations at many different sizes and scales. While I currently work for a very large organization in my day job, I am also a very small organization and resource holder myself. I have also worked for various organizations (ISPs, Cloud Providers,

Web Hosting Providers, Colocation Facilities, Backbone Providers, End Users, etc.) at all different sizes. This gives me a uniquely balanced perspective across the diverse ARIN community and a strong ability to understand the issues expressed by and of concern to each segment of the community.

How do you separate your personal opinions from those of your organization and those of the community? What areas of policy, if any, need more attention and why?

I've never had any difficulty separating my own opinions from those of my employer or the community. I have always been very clear about my opinion/position. When I am participating on the floor of an ARIN meeting or on PPML, I express my position based on my own opinion. During deliberations and voting within the AC meetings, OTOH, I may express my own opinion (though rarely and I will clearly state it as my opinion), but I will always express my impression of the consensus of the community and I will almost always vote according to the will of the community. The rare exception is when I see a compelling harm which I believe may not be perceived or well understood by the community. I encourage anyone with concerns in this area to review my voting record over the past 9 years. You will see that I have often voted with the community even when I personally disagreed with the proposal.

What are your thoughts on the rights and responsibilities of legacy IP address holders?

I think that there's little need for continued concern over legacy. We should leave them be, continue to keep their records up to date in the database, and recognize that the fastest path to eliminating any concerns over legacy holders is to make IPv4 no longer relevant. We have to get to that point anyway simply to sustain the functionality of the internet.

What are your thoughts on needs-based justification for the receipt of IP addresses?

As everyone knows, I remain a strong proponent of needs-based justification for the receipt of IP addresses. I am not opposed to relaxing the criteria in useful ways, but I do not want to see IP addresses turned into a simple commodity where money is the primary means of controlling distribution or redistribution.

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

I think the biggest challenges will come in the form of coping with litigation from those dissatisfied the outcome of some transfer transaction or other aspect of IPv4 policy. As scarcity increases, so too will desperation. The sooner the community moves away from IPv4 as a primary protocol for the internet, the more this risk will be reduced. Unfortunately, ARIN has little control over the speed at which this happens.

If you could improve any aspect of the ARIN AC, what would it be?

I am pretty happy with the current functioning of the AC. I believe we operate relatively efficiently and that we do a lot of good work on behalf of the community. I don't have a specific idea for improving the AC to list here because I tend to express them as they come to me. As a result, most of my good ideas have been implemented and my not as good ideas have gained me another form of education.

The role of the ARIN AC is to advise the Board of Trustees on Internet number resources and policy related matters. Describe a similar experience you have had in such an advisory role.

As an incumbent on the AC, I've had this exact experience for almost 9 years now. In addition, many of my job functions have involved advising management on number resource policy matters and number resource strategies. I have also advised consulting clients on number resource policies.

Gary T. **Giesen**

Network Architect - CentriLogic

Please provide a brief CV highlighting experience relevant to the duties of the ARIN Advisory Council.

- Network Architect at CentriLogic
- Previously Network Architect at AKN
- Former member of the Board of Directors at the Toronto Internet Exchange
- Previously Technical Operations Manager at EGATE Networks

Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Advisory Council. How do you propose to resolve such conflicts?

I don't have any conflicts of interest that I'm aware of. Should one arise, I would immediately disclose the conflict and recuse myself from the discussion/vote.

Describe any limitations on your ability to attend AC and Public Policy Meetings in person or to serve the full three-year term.

I have no limitations with regards to attending AC and Public Policy Meetings, and have the full support of my employer.

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

I have attended numerous ARIN meetings both in person and virtually; I've also been an active participant in the Public Policy Meeting List (PPML), as well as a policy author. The most rewarding experience, both online and person, has been crafting and refining a policy proposal from inception to adoption, gathering input from the community, and turning it into useful and effective policy.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

ARIN must work hard to maintain its relevance in the face of IPv4 exhaustion. WIth increasing adoption of IPv6 and the distinct possibility that organizations may only ever have one transaction for address space, ARIN must offer more in terms of services to maintain their relevance with the community they serve.

What differentiates you as a candidate or makes you uniquely suited to the post?

I've had the good fortune of working for a number of different companies, that serve a broad cross-section of the industry. I've been a member of the board of directors of the TorIX Internet Exchange, and the Canadian Network Operators Consortium regulatory committee, providing me with experience in non-profit governance, telecommunications regulation, and public policy. I've been an active member of the ARIN PPML, and have seen a policy proposal from inception to adoption, so I am well-versed with the public policy process. I also believe I bring a unique experience both with regards to representing the needs of small business (which has typically been underrepresented at ARIN) and the unique Canadian landscape.

How do you separate your personal opinions from those of your organization and those of the community? What areas of policy, if any, need more attention and why?

I'm regularly tasked with having to separate my personal opinions from those of my employer and the community, and it's important to understand where they diverge, and why, to keep perspective on serving the needs of the community. I think policy needs the most work in the areas of small business being able to attain the address resources they need without having to jump through huge hurdles, as they are the ones least likely to have the resources available to them to successfully navigate the NRPM.

What are your thoughts on the rights and responsibilities of legacy IP address holders?

While legacy address holders hold resources that precede ARIN's existence, and their rights in that regard must be respected, they also hold large swaths of a limited and very valuable public good and as such we must work with them to achieve compromises that satisfy both their needs and the community at large.

What are your thoughts on needs-based justification for the receipt of IP addresses?

Needs-based justification of IP address resources is an essential component of good stewardship of IP address resources. While the paradigm is shifting in the transition from IPv4 to IPv6, in which the resources are far-less limited, careful management of resources is essential to ensure continued functioning of the Internet.

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

ARIN faces great challenges in the transition to IPv6, where organizations may only ever come to ARIN for address space once, and the traditional carrot of additional resources will no longer be an effective tool for enforcing policy. ARIN must morph to provide more services to make sure they stay relevant so that we have an accurate directory of resource holders.

If you could improve any aspect of the ARIN AC, what would it be?

I would like to see the policy process move more quickly, as I think in the current fast-changing landscape the policy process moves too slowly to keep up with the needs of the community.

The role of the ARIN AC is to advise the Board of Trustees on Internet number resources and policy related matters. Describe a similar experience you have had in such an advisory role.

As a Network Architect, I'm constantly tasked with advising and educating my customers with best practices with regards to resource management and best practices. I provide technical guidance to a number of departments within my organization.

Scott **Leibrand**

DLVR, Inc.

https://twitter.com/scottleibrand

https://www.linkedin.com/in/scottleibrand

Please provide a brief CV highlighting experience relevant to the duties of the ARIN Advisory Council.

9 years (3 terms) on the ARIN AC

Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Advisory Council. How do you propose to resolve such conflicts?

None.

Describe any limitations on your ability to attend AC and Public Policy Meetings in person or to serve the full three-year term.

None.

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

Yes. ARIN does a good job collecting input from vocal members of the community. We perhaps could be better at collecting more weakly held (yet still informed) opinions from less vocal community members.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

I hope ARIN will be able to continue automating various procedures (as we simplify policy) and streamline the rest. Aside from transfers of legacy space, which require significant work to review legal paperwork, most other interactions with ARIN should be extremely quick and require minimal back and forth with ARIN staff.

What differentiates you as a candidate or makes you uniquely suited to the post?

My 9 years' experience as a highly productive and engaged member of the ARIN AC is both what makes me well suited to run again, and why I hope you'll vote for someone else. :-) If there are enough qualified new candidates for the AC, I would encourage you to vote for them instead of for me: I would be more than happy to hand the baton off to the next generation and take at least a year off. However, if you don't believe that the non-incumbent candidates for AC have demonstrated sufficient engagement with the ARIN policy process to be qualified to join the AC, then I'm willing to run again.

How do you separate your personal opinions from those of your organization and those of the community? What areas of policy, if any, need more attention and why?

I've never really had any organizational or personal interests around ARIN policy that differ from the needs of most of the ARIN community, so conflicts of interest haven't been a problem in the 9 years I've been on the AC.

I have also been quite active in co-authoring policy proposals in areas that need more work, and will continue to do so as I see them.

What are your thoughts on the rights and responsibilities of legacy IP address holders?

ARIN should not (and doesn't) interfere with the ability of organizations who were allocated IP address blocks before ARIN's existence to continue to use them as they see fit. Organizations who wish to receive any new services from ARIN may sign the LRSA.

What are your thoughts on needs-based justification for the receipt of IP addresses?

ARIN needs to update policy to reflect the fact that nearly all IPv4 allocations and assignments are now made via transfer. As a result, IPv4 allocation and/or transfer policies need to be dramatically simplified to reflect the fact that we're no longer allocating from the free pool, and therefore don't need extensive checks on how much space people need. They can instead attest to the operational need, and decide for themselves how much space they want to purchase on the transfer market. I have co-authored several policy proposals codifying various approaches to moving us in that direction, and hope that the ARIN community moves one of them forward soon, so we can move on to adapting other parts of policy for the post-IPv4-exhaustion world.

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

ARIN needs to make a special effort to make sure everything it is doing is in the best interests of ARIN's membership and the larger Internet community ARIN serves. In some cases this will mean taking actions that may run counter to the interests of ARIN the organization.

If you could improve any aspect of the ARIN AC, what would it be?

The ARIN AC needs more new perspectives and engagement from new AC members who are willing to grapple with drafting policy changes where needed, leading discussion on PPML and at PPMs to foster consensus around policy changes, and shepherding those policy changes through the policy process as promptly as possible.

The role of the ARIN AC is to advise the Board of Trustees on Internet number resources and policy related matters. Describe a similar experience you have had in such an advisory role.

I think 9 years on the ARIN AC qualifies. ;-)

Isaac **Levy**

UNIX, BSD, Linux, Open Source community contributions.

https://www.linkedin.com/in/dotike

http://blackskyresearch.net/ike_res/IsaacLevy-Resume.txt

Please provide a brief CV highlighting experience relevant to the duties of the ARIN Advisory Council.

12+ years organizing around NYC*BUG, (New York City *BSD Users Group), http://nycbug.org
My role: founding admin member and collaborator since it's beginning in 2004.

Related, organizer/participant for NYC BSD Conferences 2005, 2006, 2008, 2010.
http://www.nycbsdcon.org

FreeBSD and OpenBSD, Contributor 1999 oward, (no commit bit in either)
OPNsense, 2015 onward, Contributor to this fully *BSD licenced Firewall Appliance from the beginning of the project
~2006, contributor to PFSense project
~1999, contributor to many open source / UNIX projects, (mostly patches from applied use)

Relevant Conferences/Communities where I have presented:
+ "Securing and Breaking FreeBSD jail(8) Virtual Servers", Defcon 14 Proceedings, Las Vegas NV, Aug 3, 2006
+ "Securing and Cracking FreeBSD Virtual Servers", ShmooCon Security Conference, WAshington DC, Jan 14, 2006
+ "m0n0wall and PFSense", NYC*BUG, September 2006, NYC
+ "An ISP Perspective on, jail(8) Virtual Private Servers (aka Emergence of UNIX skyscrapers online)", AsiaBSDCon, Univ. of Tokyo, March 10, 2007
+ "PFSense II, Rocking The Datacenter", NYC*BUG, March 2010, NYC
+ "Startup Infrastructure in a Post-Cloud Era", LMHQ NYC, April 21 2016
+ "OPNsense: On the Shoulders of Giants", NYC*BUG, September 16, 2015

Built internet-facing infrastructure since late 90's, mostly for technology startups, including a small web-hosting ISP, (iMeme).

My full CV available online here:
http://blackskyresearch.net/ike_res/IsaacLevy-Resume.txt

A *highly irreverant* high-level presentation on my team's infrastructure challenges at a Startup I worked at can be found here, and while not the most cordial first introduction to my work, it does it expose the breadth of my technical experience through implementation:
http://www.nycbug.org/index.cgi?action=event&do=view&id=10353#10353
http://www.nycbug.org/event/10353/nyc-bug-2014-11-05.mp3

Additionally, this presentation of mine is old- but still a very good representation of the way I think about infrastructure, (and technically still quite relevant/correct), from the Defcon 14 proceedings:
https://www.youtube.com/watch?v=77TcnLOaRr0

Far more recently, a more business-oriented presentation about infrastructure in a Post-Cloud era,
https://www.youtube.com/watch?v=YFXM_ayMhRg

And also recent, another *highly irreverent* interview I got roped into at AsiaBSDCon in Tokyo,
http://www.bsdnow.tv/episodes/2016_05_11-bsd_likes_ike

Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Advisory Council. How do you propose to resolve such conflicts?

I do not appear to have any conflicts.

Describe any limitations on your ability to attend AC and Public Policy Meetings in person or to serve the full three-year term.

No limitations. I live in NYC, and travel often.

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

I have not attended ARIN meetings.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

With so few words available, I see ARIN needing to grow it's ability to automate the process of understanding inet IPv4 usage- without having to massively scale human workers.

As I see it, while the world's IPv4 belt gets tighter, ARIN must find ways to automate deeper introspection of IP allocation and usage across the internet. When I say automation, I believe there are many programmatic ways to automate making IP address allocation and justification more useful to ARIN. When ARIN was founded, the idea of scanning every IPv4 address was by no means practical. Today, it's still a large task, but totally possible- and processing the data to produce meaningful output is likewise possible.

I'm not sure I have ever thought about ARIN's function changing, but ARIN's scale and role I absolutely see changing in the future.

What differentiates you as a candidate or makes you uniquely suited to the post?

From education in handling AS numbers, to handling and stewardship of netblocks, to just more IPv6 education- all are important, and I am capable of both helping to craft strategic topical material, and teach it.

With almost 2 decades in the *BSD and UNIX communities, I see my greatest asset here in building bridges- and "playing secretary" to the often cacophonous voices of developers, sysadmins, network admins, newschool devops- the users in Open Source software and internet computing.

Often, my role even in the *BSD community has been simply to connect the right developers, to the right users to solve a problem- or to let a new initiative grow.

My strengths can be used both ways, while pulling valuable contributions from the Open Source world at large, I believe I can work to strategically train and educate- (and more importantly, train more trainers), who can go back out into the world and enact change far larger than ARIN could do on its own.

How do you separate your personal opinions from those of your organization and those of the community? What areas of policy, if any, need more attention and why?

From my involvement in large, long-lived Open Source projects, I find it personally important to expose personal preference to the group, as early as possible. This not only facilitates the group's awareness of personal opinion or preference, but helps form into group comprehension and awareness.

In short, when working toward massive and long-lasting technical goals, with living breathing systems, I believe understanding context for any individual agenda or applied use often trivially reveals a solution which can be applied for the good of the whole. In essence, a community is never divorced from every individual participant in that community- at any level of the hierarchy.

What are your thoughts on the rights and responsibilities of legacy IP address holders?

I believe the rights and responsibilities of legacy IP address holders is often very complex, and context specific to the various address holders.

Yet, to generalize from my experiences with ARIN: the accountability chain for IP address allocation and use could be enforced much better. Even the small tech startups I've worked for have nearly always breezed their way through IP address justification forms, either directly from ARIN for full netblocks, or for ISP's doling out IPv4 blocks smaller than /24.

I estimate in my work history that perhaps 60% of the IP addresses held, were sitting dormant, (and may still be)- and my experiences, anecdotally but strongly, I can say are common.

It's too easy for organizations to waste space down around blocks /22 and smaller, particularly as ISP's have need to provide netblocks smaller than /24. I believe this space can be tracked better by ARIN.

I believe for legacy IP address holders with major block ownership, it's time for ARIN to roll up its sleeves and start auditing and addressing their usage- as publicly as possible. In these cases, ARIN can't just be the authoritarian cop, and ARIN needs public support to help legacy IP address holders prove their stewardship or re-justify their need. Yet, this is a delicate balance for ARIN, because too much direct public input can crate internet mobs and chaos.

But bigger and more important: removing the fear of the new" with IPv6 education. Would constructively trivialize legacy netblock matters.

What are your thoughts on needs-based justification for the receipt of IP addresses?

This is a sticky question.

On one hand, I believe needs-based justification for IP address allocation is absolutely mandatory for IPv4 space.

Yet, I believe that ARIN's current form based model is not very effective in proving justification, and that actual netblock scans, and live proofs of IPv4 addresses actually being "in use" will actually prevent waste and reclaim and manage IPv4 space going forward.

Without disproportionate manpower increases, ARIN needs to start scanning for actual usage, and carefully automate the human contact process to begin to truly

justify IPv4 address allocation.

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

I believe ARIN's greatest challenges are in leapfrogging from IPv4 to IPv6- with a few chicken/egg hurdles to come.

IPv4 management, now that it's an exhausted resource, will continue to be increasingly expensive to manage. Even the computational scanning I allude to in other questions here, has a human/machine/dollar cost. The social, political, and economic orginzational issues which come from disputes and resolution also have a growing human/machine/dollar cost.

Yet, the usefulness of refining IPv4 allocation management is loosing value every day, as more IPv6 adoption limps into practical applied use and implementations.

Navigating this change, at the right pace- is critical to growing the Internet through this time, and I believe it is ARIN's greatest challenge.

If you could improve any aspect of the ARIN AC, what would it be?

I'm sorry to say I do not know, I'm completely new to the ARIN AC structure and process. In one way this is a deficit for me, in another way, I could be new blood for ARIN AC.

The role of the ARIN AC is to advise the Board of Trustees on Internet number resources and policy related matters. Describe a similar experience you have had in such an advisory role.

Challenging question- many of my first thoughts are from my role at NYC*BUG, helping to bridge developers from different *NIX platforms, usually to help solve some network security problem. Each of these situations had complex and changing technical issues, complex personalities and agendas, as well as a large number of stakeholders.

2004/05, pf(4) firewall port to Freebsd by Max Laier: Through NYC*BUG, we rallied "the users" to spread knowledge, testing, use experiences for adoption and implementation acceptance for pf. Also worked on the OpenBSD side, connecting developers at conferences and on list and making them aware of their work, and the behavior of their respective implementations.

2008 at the NYC BSD Conference:
Part of the team that had these two on stage, shaking hands after presenting back to back:
Pawel Jakub Dawidek, ZFS implementation, FreeBSD
Matthew Dillon, HAMMER filesystem, DragonFlyBSD

One of my favorite pictures summarizing my role, (and the larger role of NYC*BUG):
http://blackskyresearch.net/ike_eric_wietse.2013.jpg
Left to right- me (nobody), Eric Allman (sendmail original author), Wietse Venema (postfix original author), at an tech event in NYC 2013.

Rob **McCann**

Clearcable Networks

ICF Canada (Intelligent Communities Forum Canada)

https://twitter.com/clearcable

Please provide a brief CV highlighting experience relevant to the duties of the ARIN Advisory Council.

Rob McCann is the founder and President of Clearcable Networks. He has been working with advanced broadband service deployments in mid-market and rural cable and telephone systems since 1998 and is responsible for building and maintaining technical, network, and application intelligence. Rob works closely with several carriers, cable systems, municipalities, and network service providers in Canada and the US providing them with the technology, integration, and business practices required to effectively operate voice, video, and data services in the changing broadband service provider industry. Most recently Rob represents Clearcable as an inaugural member and Director of The Intelligent Community Forum Canada and previously has served as a Director with the Society of Cable Telecommunications Engineers Ontario Chapter, a contributor to the CRTC Interconnection Steering Committee, and a frequent keynote speaker at the Canadian Cable System Alliance, Canadian Independent Telephone Association, and National Cable Telephone Cooperative annual trade shows. He holds a Bachelor of Mathematics degree from the University of Waterloo and a Bachelor of Arts degree in Economics from McMaster University.

Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Advisory Council. How do you propose to resolve such conflicts?

None.

Describe any limitations on your ability to attend AC and Public Policy Meetings in person or to serve the full three-year term.

None.

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

No. First will be Sept 13th.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

I forsee ARIN's role continuing to expand in outreach and education guiding and managing resource deployment while defining and highlighting best practices. This includes the ongoing maintenance of an accurate WhoIs database with appropriate contacts for various facets of deployed networks.

What differentiates you as a candidate or makes you uniquely suited to the post?

By combining my practical experience in both traditional information technology and service provider networks with my formal background, I provide a unique perspective on matching emerging technology with sound business principles to establish successful strategies for new product and service deployment. In this context, I believe by broad view of network deployment along with the business and social issues that surround broadband will help me provide valuable insight to the Board of Trustees.

How do you separate your personal opinions from those of your organization and those of the community? What areas of policy, if any, need more attention and why?

I believe that my personal opinions, regarding both community and organization, are material to the matters of policy; thus I expect to represent the greater good of the community by sharing those opinions and working with others to further the interests everyone. Individual perspective is important in policy development. I however set aside the specific needs of my business/organization and have done so in my work with the CRTC.

What are your thoughts on the rights and responsibilities of legacy IP address holders?

I believe that legacy IP address holders who operate and maintain their space, contacts, and membership in good standing should be able to retain and operate the space that is in deployment and temporarily lease or sell any access space that is assigned to them (such that it becomes assigned to someone else with a demonstrable need). I do not believe that legacy IP address holders who simply hold onto un-deployed or under-utilized space should be able to retain that space.

What are your thoughts on needs-based justification for the receipt of IP addresses?

Most certainly resource assignment should be matched with a demonstrable need by organizations who will operate and maintain it in accordance with policy.

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

Accuracy and clean up of the WhoIs database. More folks are looking to these details for copyright and abuse contacts, ensuring the appropriate network contacts are available will be vital to network security.

If you could improve any aspect of the ARIN AC, what would it be?

Accelerate outreach and strive for more diversity;

The role of the ARIN AC is to advise the Board of Trustees on Internet number resources and policy related matters. Describe a similar experience you have had in such an advisory role.

Working since 2005 on the Canadian Radio-Television Telecommunications Commission Interconnection Steering Committee working groups including Network Working Group, Business Process Working Group, and Emergency Services Working Group. One such initiative was the industry-led development of IP-IP Interconnection Guidelines for Telecommunications subsequently published at http://crtc.gc.ca/public/cisc/nt/NTGLIPIC11.doc

Alyssa **Moore**

Cybera - Alberta's Research & Education Network

twitter.com/lyssamoo

alyssamoore.ca

Please provide a brief CV highlighting experience relevant to the duties of the ARIN Advisory Council.

I am currently employed as a Policy & Strategy Analyst by Cybera - Alberta's portion of Canada's non-profit Research & Education Network. I am responsible for positioning Cybera as an authority on Internet, telecommunications, and computing policy by participating in relevant government consultations, facilitating advocacy opportunities, and monitoring relevant legislation, best practices, and regulatory bodies. My team coordinates strategic direction, government relations, stakeholder engagement, and promotes responsible policy development and implementation. I hold a Bachelor of Arts in Political Science from Carleton University. I also sit on the Programs and Events Committee of the Internet Society Canada Chapter, and serve on the Board of Directors of the Alberta Liberal Party.

Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Advisory Council. How do you propose to resolve such conflicts?

None.

Describe any limitations on your ability to attend AC and Public Policy Meetings in person or to serve the full three-year term.

None.

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

I became involved with ARIN shortly after my position was created at Cybera by following the PPML, participating (remotely) in the San Diego Public Policy Consultation, then attending and actively contributing during ARIN 37 as a fellow.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

I became involved with ARIN shortly *after* IPv4 exhaustion, so my experience has been only in the wake of exhaustion. It's clear that ARIN continues to play an important role in the indeterminate period of time between IPv4 exhaustion and complete IPv6 uptake. This includes continued promotion of IPv6 as well as monitoring, anticipating, and responding to the IPv4 transfer market. The shift away from allocation of resources toward maintaining an accurate registry also becomes increasingly important in the face of the transfer market, and as the Internet continues to grow.

What differentiates you as a candidate or makes you uniquely suited to the post?

I bring youth, enthusiasm, and a fresh perspective on the NRPM to the community. My background is non-technical, though I am adept at understanding, then translating and communicating technical concepts. I come from the worlds of policy analysis in a member-based networking organization in my work life, and party politics in my volunteer life. As a result, my strengths lie in building relationships, human capacity, and consensus - all necessary skills for shepherding policy and facilitating the PDP. Finally, I come from the underrepresented non-profit, research & education space and have good relationships with rural ISPs and municipal network initiatives in Western Canada.

How do you separate your personal opinions from those of your organization and those of the community? What areas of policy, if any, need more attention and why?

The AC is charged with taking into consideration the feedback of the community and the implementation of the will of the community. I hold the democratic principles and community driven nature of ARIN's Policy Development Process in high esteem. I am highly cognizant of my personal biases, and under no circumstances would allow those opinions to affect my ability to represent the greater ARIN community. When speaking openly at meetings, if elected, I would be sure to identify and differentiate personal statements from statements as a member of the AC. In terms of policy areas in need of more attention, continued language grooming and streamlining of section 8 of the NRPM is necessary to achieve clarity for ARIN staff and avoid loopholes leading to abuse of resources.

What are your thoughts on the rights and responsibilities of legacy IP address holders?

I am in support of legacy IP address holders' rights to the address blocks endowed upon them before ARIN's inception - including the rights to use of those address blocks, and to transfer those address blocks. While it would be demonstrative of goodwill on the part of a legacy IP address holder toward the community to transfer allocations on the basis of ARIN community-sanctioned policy, they should not be compelled to do so. I am not in favour of bestowing special status upon legacy IPv4 resources once they have been transferred from the original recipient.

What are your thoughts on needs-based justification for the receipt of IP addresses?

In the interest of fairness in the community and the spirit of the Internet, allocations should continue to be justified on a needs basis. However, the parameters of need and justification do not exist in a vacuum and should evolve to reflect the existence of and realities of the post-exhaustion transfer market. If elected to the AC, I will take the voices of all stakeholders in this debate into serious consideration.

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

Besides IPv4 exhaustion and the IANA stewardship transition, ARIN's greatest challenge is getting folks to understand and care about these issues through membership engagement, visibility, and communicating the RIRs' role in the Internet governance landscape to a wider variety of stakeholders.

If you could improve any aspect of the ARIN AC, what would it be?

The culture of the AC is one of collegiality, approachability, and transparency. As a result of this culture, I've come to know several members of the current AC and am confident that everyone involved cares deeply about ARIN's mandate and their role in advancing it. However, I'd like to see increased engagement with Canadian ARIN members, particularly outside of Ontario. I'm also keen on increased diversity, including better representation of women, minority groups, and the Caribbean region.

The role of the ARIN AC is to advise the Board of Trustees on Internet number resources and policy related matters. Describe a similar experience you have had in such an advisory role.

- Submissions and participation in hearings of the Canadian Radio-television and Telecommunications Commission (CRTC)
- Policy analyst and advisor to the VP Policy and CEO of Cybera
- Chair of the infrastructure policy subcommittee of a provincial political party
- Participant in various network and computing related government consultations

Tina **Morris**

Amazon Web Services

Please provide a brief CV highlighting experience relevant to the duties of the ARIN Advisory Council.

I am a Technical Business Developer at Amazon, specializing in IPv4 and IPv6 address resources. Prior to this I was working as a Network Engineer in the Cable Industry at Time Warner Cable and Bright House Networks for 10+ years and I have been in a role focused specifically on IP strategy since 2009. I have been participating in the ARIN community since 2008, and I have served one term on the ARIN AC beginning in 2013. Some of my responsibilities and accomplishments within the ARIN community include participating in numerous Fellowship and NomCom Committees, as well as shepherding several policies such as the recently adopted 2014-1 Out of Region Use Policy.

Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Advisory Council. How do you propose to resolve such conflicts?

I have no known conflicts of interest at this time, however if a conflict were to arise I would recuse myself from voting.

Describe any limitations on your ability to attend AC and Public Policy Meetings in person or to serve the full three-year term.

I do not anticipate any issue with attending all in person meetings for the full 3-year term.

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

Yes, I have attended all meetings and several PPC's since 2008. The most rewarding part of attending meetings has been the ability to network with peers. There is a very finite group of people in our community that understand and can help solve IP related problems, I am grateful to have had this opportunity to get to know so many of them.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

In my opinion we have already seen this shift in function because IPv4 address exhaustion occurred

in September of 2015. At that time most ARIN region companies were operating with a 3mo supply of addresses so they have already had to find their way in the post-exhaustion world. The lack of a free pool has driven up some additional interest in IPv6 but the largest increase in ARIN effort has been in the transfer arena, and the research required to ensure the legacy resources transferred are being completed by legitimate holders of the addresses. I believe this will continue to be a major focus of the organization for the next couple of years as any potential free space changes hands and IPv6 adoption gains momentum.

What differentiates you as a candidate or makes you uniquely suited to the post?

I have been an ARIN customer for both End User and ISP organizations, I also have experience with the Transfer Market and I interact as a customer with the other RIRs. I can therefore bring both my transfer market knowledge and observations of the other RIRs back to the ARIN region for consideration.

How do you separate your personal opinions from those of your organization and those of the community? What areas of policy, if any, need more attention and why?

Separating your personal opinions from your employer can be difficult because the environment you see every day at work does inevitably colors the way you see the world. However, I find the conversations I have with industry peers, especially at meetings often provides a very different perspective. When voting I consider the community at large not just my view.

What are your thoughts on the rights and responsibilities of legacy IP address holders?

Legacy adopters pre-date ARIN and represent the early adopters of the internet we have today, therefore I fully support their rights to the addresses and I appreciate the effort ARIN has put forth to find the right balance of services and responsibilities for these customers.

However, I do believe that Legacy holders should work harder to ensure their registry data is accurate. As many of these addresses are claimed and transferred for profit there is a lot of opportunity for space to be fraudulently claimed. It is in ARIN and the Legacy holders mutual best interest to ensure all information is updated and accurate.

What are your thoughts on needs-based justification for the receipt of IP addresses?

I believe need-based justification was once a very powerful and effective method of right sizing allocations. However now that the IPv4 free pool has been drained I think it holds less value. I am in favor of simplified transfers and reducing or removing needs-based for small transfers.

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

I believe ARINs greatest challenges continue to be, IPv6 Adoption, Registry Accuracy, and IPv4 Transfers.

If you could improve any aspect of the ARIN AC, what would it be?

I would like to increase the community feedback in a meaningful way. PPML is nice but it is dominated by a few individuals on many topics and silent on others. We need more input from the larger community to increase the speed of policy adoption.

The role of the ARIN AC is to advise the Board of Trustees on Internet number resources and policy related matters. Describe a similar experience you have had in such an advisory role.

I have served on the ARIN AC for 3 years, I have also advised my employer in a similar manner.

Joe **Provo**

Google, Inc

GweepCo Cooperative Network

https://www.linkedin.com/in/jprovo

Please provide a brief CV highlighting experience relevant to the duties of the ARIN Advisory Council.

NANOG Steering Committee/Board of Directors (2006 - 2010): representation of community; translation of community needs into organization action and policy; organization outreach; mentoring; volunteer co-ordination; documentation; process optimization; etc.
K12.MA.US delegated manager (1994 - present): management as a resource steward; co-ordination of volunteers
RSUC, UltraNet, RCN, ITA Software, Google (1990 - present): evaluate needs, craft/implement/operate sound technical solutions; training, presenting and mentoring; interprovider communication, negotiation and co-ordination; project and program management, internal negotiation to marshal resources; etc

Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Advisory Council. How do you propose to resolve such conflicts?

I am not aware of any conflicts with serving on the AC.

Describe any limitations on your ability to attend AC and Public Policy Meetings in person or to serve the full three-year term.

None.

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

Yes; I have attended multiple meetings, participated in PPML and the community in general. The most rewarding interactions have been with those holding opinions different than mine, thereby having the opportunity to play a role in reaching compromise and consensus on issues, be they on the mailing list or in the general sessions. As with many distributed organizations serving a broad constituency, ARIN has to balance inclusiveness with bringing items to conclusion. For the most part this is well done, but our industry is only accelerating. Therefore it would be wise to always explore opportunities to streamline procedures.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

The various v4 free pool exhaustions brings two major functions to the forefront for all RIRs:
- IPv6 outreach and education, generally in conjunction with operator communities
- Registry accuracy and continuity for IPv4 data as allocations transfer faster and eventually fragment further

Eventually the first will fade for ARIN as IPv6 continues to become part of everyday life in our region, but this doesn't mean other activities will evaporate. These just are the large-brush areas where near-term focus must rest.

What differentiates you as a candidate or makes you uniquely suited to the post?

Policy affects my engineering work, which is why I've been involved in both the policy and operations communities. It is however not my avocation, so I do not seek to bend it to my will. Therefore I believe I would be a balanced representative on behalf of the technical community.

How do you separate your personal opinions from those of your organization and those of the community? What areas of policy, if any, need more attention and why?

I compartmentalize well. My involvement in the Internet operations & policy communities spans my career, which is longer than the existence of my current (or any prospective) employer. My opinions are informed by this time spent and awareness of history. We must always recognize that where we are now is due to many decisions we as a community have made in the past, which easily could have gone in other directions. Awareness of such long-term impact is something which evades many organizations and surrounding debate, but is critical for those of us who wish to continue building the Internet. As this relates to policy focus, I would ask how each decision will accelerate the progress of IPv6 and not paint us into a future corner.

What are your thoughts on the rights and responsibilities of legacy IP address holders?

As a legacy resource holder myself, I firmly believe the intent under which such allocations were made (to provide needed resources to the requesters) is a solid and legitimate right. However we such resource holders do need to chip in for the services we use and bear the responsibility to keep our registry entries up-to-date.

What are your thoughts on needs-based justification for the receipt of IP addresses?

The fundamental purpose of needs-based justification has not changed: to ensure an equitable playing field for new entrants. In no small part, this is by prohibiting entities with large pockets from merely purchasing all they wish and stifling innovation. IP addresses are finite resources for actual technical use, not an investment vehicle.

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

To simply a complex problem: ensuring that the resources needed by emerging technologies and entities are met. In order to provide a runway for future enterprises, we must remain good stewards of resources today.

If you could improve any aspect of the ARIN AC, what would it be?

Having not served upon the AC, I do not believe I have enough information to make an informed opinion at this time. One should have the data and experience before executing arbitrary changes.

The role of the ARIN AC is to advise the Board of Trustees on Internet number resources and policy related matters. Describe a similar experience you have had in such an advisory role.

Prior to NANOG's transformation into an independent organization, the Steering Committee played an advisory role to Merit staff and Board of Directors, the actual decision-makers for the origination. My years serving on the SC were instructive in how to do so effectively and get our community's needs heard.

Allen **Shen**

Charter Communications

https://www.linkedin.com/in/shenallen

Please provide a brief CV highlighting experience relevant to the duties of the ARIN Advisory Council.

Time Warner Cable 1999 – Present
Principal Engineer – Operations Engineering – Herndon, VA 2013 – Present
Transitioned to focus on strategic technical and business initiatives for the Backbone when role expanded beyond also managing day-to-day operations. Responsibilities include:
• Managing Backbone peering with a focus on ensuring a balance between business strategy and operational objectives including bandwidth requirements.
• Driving Backbone scaling, design, and strategy to support future technical and financial requirements of the Backbone.
• Developing and managing the National Backbone $120M capital budget to within 2% variance
• Hands-on support of the Backbone maintenance windows for peering upgrades and changes

Director – National Backbone Operations – Herndon, VA
Sr. Manager
Manager 2009 – 2013
2006 – 2009
2001 – 2006
Promoted through a series of management positions of increasing responsibilities based on strong financial, operating, team building, and team leadership performance. Notable achievements:
• Led team that managed and augmented the TWC National Backbone core and peering to support traffic volumes that doubled every eighteen months.
• Ensured optimal commercial and residential customer service delivery by analyzing key performance indicators (KPIs), identifying areas of improvement, and working with Engineering, QA, and vendors to implement product and process enhancements to consistently meet five nines reliability.
• Forged processes and new tools to ensure supportability of the Backbone network to satisfy fault and performance management requirements.
• Developed and managed multi-million capital budget; delivered new features, met all growth targets, while meeting all financial objectives.
• Developed excellent project and team management skills and cross team collaboration to consistently deploy new technologies to improve existing products and successfully offer new ones.
• Maintained a positive work environment by encouraging individual ownership of projects and personal resourcefulness to problem solve.
• Conducted a variety of personnel actions including hiring, performance reviews, salary reviews, disciplinary actions, employee coaching, and career mentoring.
• Also led the Sustaining Engineering and IP Address management team during tenure; teams respectively solved systemic problems and ensured availability of IP addresses including establishing a relationship with ARIN.
Sr. Network Engineer – National Backbone Operations – Herndon, VA 1999 – 2001
• Responsible for the implementation planning, augmentation, and hands-on support of the Road Runner Internet Backbone.
• Maintained operational availability for all routers including troubleshooting of BGP and OSPF routing.
• Involved in negotiations for agreements with other ISPs for peering and transit to greatly reduce costs and improve performance of the network.
• Personally installed power equipment, routers, and circuits in effort to scale to Backbone to meet traffic demands
• Obtained CCNP certification and passed CCIE written exam.

Sprint 1996 – 1999
Network Design Engineer – Reston, VA 1998 – 1999
• Engineered Sprint's second-generation frame relay over ATM network.
• Collaborated with product management to understand and satisfy new product requirements and forecast network growth.
• Progressed frame relay evolution to increase revenues through new or improved data product offerings.
Network Operations Center Tech – Reston, VA 1996 – 1998
• Operationally supported commercial router networks of a worldwide set of customers including Fidelity Investments, Charles Schwab, and NASA.
• Interfaced with customers and vendors to improve network design and support processes.
• Gained vast knowledge of product support required by large-scale commercial customers.
• Promoted to role addressing "previously unsolvable" chronic issues in the network.

Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Advisory Council. How do you propose to resolve such conflicts?

None

Describe any limitations on your ability to attend AC and Public Policy Meetings in person or to serve the full three-year term.

None

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

Yes, I have attended many meetings for about 15 years. I find the most rewarding part is to see the passionate discussions on the variety of issues that come up as the landscape number management evolves. Rarely are issues and their solutions straightforward and one-sided, and I very much enjoy hearing from a diverse set individuals that offer viewpoints that are different from my initial opinion and experiences.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

It's always been ARINs function to implement and execute on a system that ensures a fair allocation to maximize availability of number resources to everyone in the region. Post-exhaustion, ARIN has a larger role focusing on transfers and movement of IP addresses across regions. Streamlining these processes and promoting self-governance while limiting unintended loopholes is the biggest challenge. In addition, applying lessons learned from managing IPv4 space in a forward thinking way to keep IPv6 management clean is of utmost importance.

What differentiates you as a candidate or makes you uniquely suited to the post?

I've had the opportunity to work for 20 years at large service providers. I've managed the IP address management team at TWC for many years. In addition, (without name-dropping) I've also come to learn lot from some of my colleagues here at TWC that have been very engaged in the ARIN community.

How do you separate your personal opinions from those of your organization and those of the community? What areas of policy, if any, need more attention and why?

While I'm fully cognizant of the large company network scaling challenges, I have an interest to the Internet community to do what's best for the longevity of the Internet. Philosophically, what is good for Internet will be good for both the small company or non-profit as well as for the large service provider as a healthy Internet benefits us all.

What are your thoughts on the rights and responsibilities of legacy IP address holders?

Ideally, legacy address owners should still be good stewards of that legacy space and abide by the same rules for efficiently using, registering, and transferring IP address space.

What are your thoughts on needs-based justification for the receipt of IP addresses?

Needs based justification is what has allowed IPv4 addresses to last as long as it has. Without this principle, there are big possibilities of entities abusing a rule vacuum to try to make an unreasonable profit. I know there are arguments that hoarding and speculating is not a real problem, but if the rules were changed to allow that to become reality, the "difficult to put the toothpaste back" situation would arise.

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

IPv4 exhaustion has the potential to have entities becoming more creative to exploit any loopholes in policies for either profit or hoarding. ARIN needs to be cognizant of this possible abuse while not bogging down legitimate daily business with red-tape.

If you could improve any aspect of the ARIN AC, what would it be?

The AC has been run by very intelligent people for many years so it would be premature for me to make any major suggestions given I have but a superficial outside-looking-in view of the AC. Ideally, I'd be able to participate as a member and observe the inner workings for at least a short time before I could make suggestions.

The role of the ARIN AC is to advise the Board of Trustees on Internet number resources and policy related matters. Describe a similar experience you have had in such an advisory role.

I have been serving on the technology committee for over a year for my large neighborhood advising on Internet related decisions to the Board. While making everyone you represent happy is impossible, getting feedback is still of utmost importance for any advisor to a board.

Alison **Wood**

State of Oregon

Converge One

Nike Oregon

https://twitter.com/wood_alison

https://branded.me/alisonwood

Please provide a brief CV highlighting experience relevant to the duties of the ARIN Advisory Council.

Network engineer with the insane joy of reading packet captures, solving mysterious network slowness complaints and committed to educating the people of why the network truly isn't the problem. Ever.

EXPERIENCE

November 2006 – Present Network Engineer, Technical Lead, State of Oregon
• Lead Analytics engineer for all agencies in the State of Oregon
• Technical Lead and mentor for network engineers and technicians
• Advisory role for Oregon State CIO and council
• Liaison between agency CIO's and State CIO
• Primary contact for creative solutions

January 2014-Present Network Engineer, Converge One
• Network Engineer developing, configuring and deploying network management solutions
• Responsible for advisement, capacity planning, network management and monitoring
• Technical documentation and reporting

November 1998-November 2006 Network Engineer, State of Oregon, Transportation and Human Services
• Network Engineer focusing on troubleshooting day to day operations for the two largest state agencies
• Responsible for advisement, capacity planning, network management and monitoring
• DHCP/DNS subject matter expert

EDUCATION

September 1991 –June 1995 Bachelor of Science, Computer Science, Western Oregon University

Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Advisory Council. How do you propose to resolve such conflicts?

I do not have any conflicts of interest.

Describe any limitations on your ability to attend AC and Public Policy Meetings in person or to serve the full three-year term.

No limitations.

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

I was very fortunate to attend ARIN 37 in Montego Bay. Over the course of a week I was able to connect with many ARIN members and assist with the development of ARIN policies. I was also able to bring back a tremendous amount of knowledge on RPKI, DDNS, and of course IPv6.

Working with the council was an enlightening experience on the complexities that ARIN faces.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

While the free pool is exhausted and ipv4 allocation grinding down, ARIN's role in v4 will remain active for many years. Several companies will run in a dual stack environment until the last possible moment, but ARIN's role will move substantially into the IPV6 realm and encourage, educate, and thru natural selection and financial needs tide rather than the wake will carry us forward.

What differentiates you as a candidate or makes you uniquely suited to the post?

As an engineer that currently advises a pool of CIO's, I am uniquely positioned to understand the technical aspects of ARIN policy while being able to communicate as an advisor. I also understand the technical implications that the policies present and the impact on the customer that is governed by them.

How do you separate your personal opinions from those of your organization and those of the community? What areas of policy, if any, need more attention and why?

My organization is responsible for computing for the state of Oregon. It is imperative that the rights and technological policies that I propose, support and bring to fruition are optimal for the success of the people of Oregon and the agencies that support them. State government can be a tough and highly political environment and it is imperative that leadership and guidance be provided in the best interest of the people and the success of our agencies and municipalities.

What are your thoughts on the rights and responsibilities of legacy IP address holders?

Legacy IP holders have the right to maintain their blocks, the right to offer them to other entities, the unfortunate right to hoard their large blocks and the right to bury their heads in the sand and stay in v4 land.

What are your thoughts on needs-based justification for the receipt of IP addresses?

Needs can be quite subjective and it is up to ARIN to drive policy based on perceived needs. While ARIN should not have to provide addresses based on futures or inhibit growth from assumptions, it is important to have guidelines and policies that allow for the fair dispersal of needs-based addresses. Enforcement, audits and consistency are key.

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

ARIN's greatest challenge is continuing to encourage the development of IPv6 in application development. From mobile apps, homegrown internal apps and everything inbetween need to be developed using IPv6. When very publicly popular applications like Pokemon Go are not sufficiently compatible with IPv6, development in that arena is discouraged. Over time I believe the cost of supporting IPv4 will outweigh the cost of developing in IPv6, but in the short term ARIN can assist with the education and awareness of IPv6.

If you could improve any aspect of the ARIN AC, what would it be?

The creation of a blog dedicated to the short but influential life of ipv5.

And... I was extremely impressed with the mentoring and guidance provided by the ARIN AC. I very much appreciate the diverse knowledge and character of the council members.

The role of the ARIN AC is to advise the Board of Trustees on Internet number resources and policy related matters. Describe a similar experience you have had in such an advisory role.

As the state of Oregon's network gained complexity, troubleshooting the connections of over 30,000 users required standardization. The state's data center is home to 12 large state agencies and many more municipalities. To function efficiently, reduce MTTR, simplify capacity planning and improve the user experience my team of engineers proposed standard templates, unified QOS settings, and a small menu of equipment - essentially standardizing business methods. These policies were brought to the CIO council of the customer base.

As a decision maker and engineer for these policies, I presented them to the council, answered questions, worked through an optimization process, security concerns, documented and implemented the changes. A direct result was reduced cost to the customer, increased uptime, simple lifecycle replacement and a simple franchise environment.

Chris **Woodfield**

Twitter, Inc.

NANOG - Program Committee member

https://www.linkedin.com/in/cwoodfield

Please provide a brief CV highlighting experience relevant to the duties of the ARIN Advisory Council.

Network Engineering, Twitter - 2011 - present
Sr. Staff Network Engineer 2011 - present
Staff Network Engineer - 2013-2014
Sr. Network Engineer - 2011-2013

Leads Twitter's edge architecture strategy, global traffic distribution, and application edge architecture. This involves, among other things, IP Address allocations and planning on a global network.

Yahoo, Senior Network Engineer 2010-2011
Drove operational deployments of Yahoo's next-gen (at the time) datacenter and distributed edge architecture.

Internap Corp.
Network Architect - 2006-2010
IP Operations Engineer - 2004-2006
Install Engineer - 2000-2004

In various roles, handled customer installations and support, including processing and evaluation of customer IP allocation requests, planning allocations to POPs to keep ahead of customer growth, and ensuring RIR registration data is correct.

Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Advisory Council. How do you propose to resolve such conflicts?

I do not foresee my membership with the NANOG Program Committee as a conflict, as the goals of the two organizations appear to be complimentary. I would plan to recuse myself from any decisions where there is an apparent conflict.

My job at Twitter does involve IP address allocations, planning, and handling ARIN support issues; I am prepared to pledge not to use any sort of "inside information" (to the extent that this exists; ARIN is commendably a very public organization) in dealings with ARIN or other registries, and if necessary, hand off duties to other engineers should there be unavoidable conflicts of interest.

Describe any limitations on your ability to attend AC and Public Policy Meetings in person or to serve the full three-year term.

I have no current limitations on my ability to attend meetings or to serve a full three-year term. If any limitations would come up during my term, I would disclose them promptly and resign from the AC if such limitation prohibits me from effectively carrying out the duties of the seat.

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

I have attended one ARIN meeting to date (ARIN 37 in Jamaica). I found the ability to learn a great deal about the policy goals and thought behind various proposals and existing policies; not just from presentations and Q&A but from private conversations with various AC members, directors, and other attendees.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

I see several changes:
1. ARIN's role as an IPv6 evangelist is now heightened; ARIN is in a rare position of seeing the state of the IPv4 exchange market in full, and as such can release relevant data to help drive the IPv6 transition along.
2. A number of policies have changed and will change as IPv4 management transitions from the role of a steward of unallocated space to that of a de facto regulator of the IPv4 transfer market. The primary goal of that stewardship should be avoiding, where possible, the artificial scarcity of IP addresses on the transfer market, with a secondary goal of ensuring the integrity of the allocation database. Often these two goals can be in conflict, as additional requirements on official transfers can translate to unofficial transfers of space, so balancing the two will be a hard problem to solve. I look forward to helping ARIN with that effort.

What differentiates you as a candidate or makes you uniquely suited to the post?

With 18 years of experience in this industry, I've been working in a number of engineering roles where IP allocation planning and policy come into play. Care must be taken (even when allocating private space) to ensure that allocations are not overly generous while ensuring that when allocations are available, sufficient allocations are given to meet business needs.

I've been on both sides of the fence here, working in the ISP business where I was required to evaluate requests from end users for assignments, and on the end-user side, as a requestor of IP address and ASN resources.

In addition, I've worked on IPv6 address plans at two companies now (Twitter isn't serving AAAA yet, but the network is dual-stack...), and as such I believe my experience with IPv6 makes me well suited to evaluated further policy recommendations.

How do you separate your personal opinions from those of your organization and those of the community? What areas of policy, if any, need more attention and why?

If elected, I would make clear that I have a duty to the ARIN AC to work in an individual capacity, not as a representative of my employer. I would actively push back against any pressure to do otherwise where I believe that the interests of my employer to do align with my own opinions on ARIN policy.

What are your thoughts on the rights and responsibilities of legacy IP address holders?

I would expect that we continue to encourage legacy holders to sign LRSA agreements, to the extent that we are able; I think we should encourage larger legacy holders (or allow the transfer market to provide said encouragement!) to find ways to use their space efficiently and redistribute unused portions.

I'd be curious as to how many legacy address holders have not signed LRSAs to date, and if any sort of individualized outreach has been performed by ARIN staff or AC/board members.

What are your thoughts on needs-based justification for the receipt of IP addresses?

I believe that it is a mistake to relax needs-based justifications, even in the face of IPv4 addressing becoming a market as opposed to a centrally allocated resource. The downside of such a stance is that "off-the-books" IP leasing arrangements will become more common; I believe that can be solved via better regulation of those types of arrangements (i.e. requiring SWIPs, etc).

IPv6, while admittedly a much larger address space, still has the potential for exhaustion via overly large allocation if needs-based justifications are relaxed too much. I'll not that there was a time where no one seriously thought we'd run out of IPv4 either!

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

I believe that the transition of its role in IPv4 allocations from conservator of a held resource (i.e. allocating space from the free pools) to a registry of IPv4 transfers has created a bit of an identity crisis among RIRs. RIRs are adopting divergent policies which at some point should be reconciled, and there is a large amount of uncertainty of what a post-exhaustion RIR will look like in the long term, at least up to the point where IPv6 is fully adopted.

If you could improve any aspect of the ARIN AC, what would it be?

This is a question probably better suited to someone who is already on the AC than an outsider seeking election for the first time; I'm sure the two points of view are very different. From my (admittedly outsider) perspective, I'd be curious if ARIN resource policy, which the AC is chartered to advise and guide changes to, extends beyond updates to the NRPM. If this isn't already the case, I'd be interested to see the AC take on policy matters beyond that document (for example: policy on request SLAs, request process workflow, WHOIS data formats, et al).

If I am elected to the AC, I'll guarantee I'll have a far more detailed answer to this question next year.

The role of the ARIN AC is to advise the Board of Trustees on Internet number resources and policy related matters. Describe a similar experience you have had in such an advisory role.

I am currently serving on the NANOG Program Committee, where we decide on program agendas for a triannual network engineering conference, and in the course of doing so, help guide policies for program material acceptance criteria, including desired subject matter, presentation standards, and other details.

At my day job, I am a part of the our Architecture Group, a cross-functional meeting of senior engineers to discuss new technology developments and current projects. As the only network engineer in the group, I advise the Group on our work, as well as assess how we can help other infrastructure or product groups in their efforts.

2016 Board of **Trustees**

Patrick **Gilmore**

https://www.linkedin.com/in/ianai

Please provide a brief CV highlighting experience relevant to the duties of the Board of Trustees of ARIN.

I have been working on the Internet for more than two decades. During that time, my day jobs have primarily focused on network architecture. Most of you probably know me from my position as Chief Network Architect at Akamai Technologies. Prior to that, I was the Chief Architect at national and international backbones. Currently I am CTO at Markley Group, an Infrastructure as a Service Company. These positions have given me a deep understanding of the technologies, economics, and, perhaps most importantly, politics underlying how packets get from point A to point B.

In my "spare time", I have worked on Internet governance and community organization. I am on the board and past chairman of the PeeringDB, the largest repository of peering information on the Internet. I am board member of the Seattle Internet Exchange and the London Internet Exchange, both of which are large member-owned peering exchanges. I am involved in many other grassroots organizations such as OpenIX. I am a former member of the North American Network Operators' Group Board of Directors, and personally initiated NANOG's transition from Merit to an independent corporation. Each of these organizations are consensus-driven, community-supported, and membership-based - precisely the type of experience required to help guide ARIN.

Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Board of Trustees. How do you propose to resolve such conflicts?

None.

Describe any limitations on your ability to attend Board and Public Policy Meetings in person or to serve the full three-year term.

None.

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

Yes I have attended ARIN meetings and otherwise participated.

Personally, I am happy there are so many enthusiastic and passionate members of the community willing to give their time and experience to the difficult job of helping ARIN and the Internet in general. I honestly believe the community has the collective wisdom and experience to solve any problem in ARIN's sphere.

My disappointment is when I see people squabbling over small things. Also, there are some who would use the forum for grandstanding or, frankly, just whinging about irrelevant things. Unfortunately, I am not sure how we can fix these problems without causing some deeper problems or stifling participation. But that is a common problem with community-based organizations. I consider it a cost of doing business.

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

First, the most obvious: IPv4 exhaustion. It is nearly cliche to mention it, but when there is an elephant in the room, you should introduce it.

Obviously this changes the very core of ARIN. Most think ARIN will become naught but a DB for v6 addresses. I think the stewardship of v4 transfers will be a far greater challenge. Despite some predictions to the

contrary, v4 transfers are still and probably will be a major issue for years.

Perhaps as important, and definitely more challenging in at least some ways, will be educating and engaging the community. Education & engagement are critical, as ARIN is a member-based organization. Unfortunately, many of the members are difficult to engage. While some would argue that is their right, I believe ARIN must do everything it can to ensure the disengagement is intentional, not through ignorance or lack of opportunity or education.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

ARIN has, in my mind, moved from a company allocating a scarce resource to managing the transfer of that resource between entities. Clearly ARIN should do its utmost to accelerate the adoption of IPv6, and do it in a manner which will be sustainable in the long term. However, it is not reasonable to think the v4 transfer space will get easier in the near term, or go away even in the medium term.

ARIN /must/ ensure IPv4 is not rendered less useful through the acts of independent companies or courts. For instance, those actors could create situations such as violating the uniqueness guarantee, which would be near disastrous.

In summary, I see work increasing significantly, then decreasing over multiple years, and ending at a lower level than today.

What are your thoughts on needs-based justification for the receipt of IP addresses?

Given that the system would collapse without the consensus of those using the system, needs-based justification seems the best viable choice. It also has the happy feature of avoiding capture by monopolies or through malfeasance.

That said, needs-based can be adjusted to the time and situation, and should be balanced in light of the community's greater good. The most obvious example is allowing blocks much larger than "needed" when allocating IPv6. There should be a "need", but the community has an interest in assuring fewer prefixes in the DFZ, fewer transactions at the RIRs, and other reasons for granting what could easily be seen as far more than "needed" for an initial allocation.

What are your thoughts on the rights and responsibilities of legacy IP address holders

Legacy holders were granted IP space based on several criteria which are no longer valid. As a simple example, many were granted "Class B" blocks when a /18 would have been more than sufficient under CIDR. The fact the technology changed over time is not at all their fault.

Further, they should not have their space taken from them simply because it was granted under a previous regime.

However, they were also granted the space in good faith as part of a working, collaborative effort call the Internet. The idea that this scarce resource would later be worth large sums was not even considered. Seeing legacy holders who no longer need their space sell it to the highest bidder is disappointing.

Legacy holders should remember their space is only useful because the rest of the community continues to honor their allocation. If the community decided to route their space to a new holder, they would be powerless - and resourceless.

In summary, legacy holders should feel perfectly safe using space they have used for decades. If they have more space than they need, they should return the excess to the community, the original source and only real arbiter of who 'owns' space.

What are your views on the NTIA IANA oversight transition, particularly as it may affect the addressing community?

Personally, I believe the US handled the stewardship of IANA better than most give them credit for. However, in the interest of avoiding not just impropriety, but even the appearance of impropriety, transitioning away from any individual sovereign government is a good idea.

Regarding the addressing community, I expect few if any visible effects. Giving the community more control is good, but as the NTIA had such a light touch, I do not see much changing for the holders and community at large.

ARIN does a measure of outreach and capacity building. Is this something that should be expanded, contracted, or maintained as is? In particular, much of this outreach and education has been centered around the transition from IPv4 to IPv6. Should that emphasis continue or are there other areas or topics that you feel should be prioritized?

Outreach should be expanded.

To be clear, ARIN does an excellent job of outreach. This is not a comment on their existing efforts.

The v4 to v6 transition should be a prime focus, and ARIN should spend a significant fraction of its resources on this. IPv6 is quite literally the future (although it should be the present!). Both ARIN and the community should push hard on preparing for it. Any creative avenues ARIN can come up with to encourage faster v6 adoption should be pursued.

But another major effort should center on IPv4 transfer policies and education. Fighting both misinformation and improper transfers is vital. If v4 space becomes unusable before v6 is truly ubiquitous, it will harm ARIN, and more importantly, the community. A few bad actors could result in things like damaging the uniqueness guarantee.

Please describe your Board Governance (or similar) experience.

I am and have been on the board of many organizations in the Internet community.

I was a member of the NANOG Steering Committee and personally initiated the migration from being part of Merit to its own 501(c)(3) corporation. I was then re-elected by the community to serve on the NANOG Board of Directors until my term limit.

I have been on the Board of Directors of the Seattle Internet Exchange (SIX) for over 8 years. The SIX is the largest Internet Exchange in the world with no monthly recurring fees and until recently was 100% volunteer run.

I have been on the board of the London Internet Exchange (LINX) for over 10 years, and served as Vice Chairman. I helped initiate term limits, which will force me to step down in May of 2017. LINX is one of the largest Internet Exchanges in the world, and is 100% member owned. I am also on the board of LINX America, the LINX's US subsidiary.

I have been involved with the PeeringDB since its inception and am on the Board of Directors. I served as Chairman for several years. The PeeringDB is a community-based organization which is the largest repository of peering information on the Internet.

In addition, I have been involved at various levels with community organizations over the last couple decades. All of which give me a good understanding of how community organizations can be created, grow, and evolve.

Merike **Kaeo**

CTO, Farsight Security

Member of SSAC (Security and Stability Advisory Committee) for ICANN

Please provide a brief CV highlighting experience relevant to the duties of the Board of Trustees of ARIN.

Merike is the CTO of Farsight Security, responsible for developing the technical strategy and executing its vision. She is an industry veteran who for over 25 years has worked in a variety of areas to provide strategic oversight and leadership across technical, operational and political boundaries. Prior to joining Farsight Security, Merike held positions as CISO and was the founder of Doubleshot Security, where she worked with numerous companies leading strategic operational security and resilient networking directions.

Merike is a member of the IEEE, a pioneer member of ISOC and has been an active contributor in the IETF since 1992. She co-chaired the IP Performance Metrics (IPPM) working group from 2000–2003 and has actively contributed to numerous IETF working groups, often acting as an unofficial liaison to foster cooperation between varying working groups across the routing, security and operations and management areas. She is deeply rooted in the community having supporting organizations such as NANOG, APNIC, RIPE, ICANN, IGF and ISOC. She was named an IPv6 Forum Fellow in 2007 for her continued efforts to raise awareness of IPv6 related security paradigms.

In 2007 Merike was instrumental in fostering cooperation and trust among the global NSP-Sec liaisons during the Cyber attacks against Estonia.

Merike received her BSEE from Rutgers University and her MSEE from The George Washington University.

Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Board of Trustees. How do you propose to resolve such conflicts?

At this time I do not foresee any conflicts of interest for performing any duties required as a member of ARIN's Board of Trustees. Should such a conflict come up in the future I would ensure that there is transparency to potential conflicts with all affected parties and resolve in a manner that would not negatively impact ARIN in any way.

Describe any limitations on your ability to attend Board and Public Policy Meetings in person or to serve the full three-year term.

There are no limitations on my ability to attend Board and Public Policy Meetings in person or to serve the full three-year term.

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

I have attended some ARIN meetings in the past and look forward to having a more active role. The most rewarding experience was the overall cooperative spirit of its members who actively engaged in creating processes that were in the best interest of the ARIN community. However, there remains the ongoing effort to increase participation of the community and I would encourage the continued efforts of ARIN in its outreach to bring forth added active participation.

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

As in any member driven community, ARIN will always face the challenge of meeting the diverse needs of the community.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

ARIN's core service is the management and distribution of Internet number resources such as Internet Protocol (IP) addresses and Autonomous System Numbers (ASNs). As such, the function, scale and role in the wake of IPv4 exhaustion will have to evolve to meet the needs of the constituency.

An important role will be to develop the processes and policies for effectively managing IP address space transfers and record maintenance. This will involve maintaining a high standard of transparency and community consensus that enables fair and impartial number policies to ensure that new organizations have a mechanism to access at least a minimum amount of resources from the transfer market. It also will require the continued cooperative work with other RIRs.

What are your thoughts on needs-based justification for the receipt of IP addresses?

As the Internet continues to evolve, the policies and processes surrounding the management and distribution of IP addresses will also need to evolve to the changing needs of the ARIN community.

What are your thoughts on the rights and responsibilities of legacy IP address holders

Any agreement that was reached in good faith at a given time needs to be respected. However there is a balance that must be reached as processes and policies change whereby the rights and responsibilities of legacy IP address holders do not vastly differ from non-legacy IP address holders.

What are your views on the NTIA IANA oversight transition, particularly as it may affect the addressing community?

During the NTIA IANA oversight transition process, the numbers community organized its efforts by creating the Consolidated RIR IANA Stewardship Proposal (CRISP) Team. The CRISP Team proposed no changes to the operations of the numbering-related function, relying exclusively on existing operational practices and building on existing structures.

Specifically, the Numbers community proposed that ICANN continue to serve as the IANA Functions Operator for numbering functions and perform those services under a contract with the five Regional Internet Registries (RIRs). It further proposed a contractual Service Level Agreement (SLA) between the Regional Internet Registries and the IANA Numbering Services Operator and a Review Committee (RC) comprising community representatives from each region to advise the RIRs on the IANA Functions Operator's performance and adherence to agreed service levels.

At this point I expect the addressing community to continue with existing operational practices and evolving to meet the agreed upon SLAs which are now being drafted.

ARIN does a measure of outreach and capacity building. Is this something that should be expanded, contracted, or maintained as is? In particular, much of this outreach and education has been centered around the transition from IPv4 to IPv6. Should that emphasis continue or are there other areas or topics that you feel should be prioritized?

Outreach and capacity building should be an ongoing effort for ARIN. As a board member I would look to see what the effectiveness has been in current efforts and also look to the constituency to determine areas where ARIN should focus and expand its outreach.

Please describe your Board Governance (or similar) experience.

In my technical career I have worked closely with corporate boards in most of my executive positions. I have had positions on Technical Advisory Boards for 4 companies. Additionally I have been on the Board of my Home Owner's Association (HOA), holding the role of president for 5 of the 9 years I was on the HOA Board.

Charlie **Liu**

Charter Communications

https://www.linkedin.com/in/charlie-liu-4636951?trk=nav_responsive_tab_profile

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Please provide a brief CV highlighting experience relevant to the duties of the Board of Trustees of ARIN.

Creative and pragmatic with the ability to attract and motivate bright contributors across multiple backgrounds and disciplines.

Enjoy problem solving, mentoring and presentation. Excel in observation, research, problem-solving and planning. Strong background and experienced in IP/TCP data networking, MPLS Layer 2 and Layer 3 VPN, optical transport network, MetroE and Cell Backhaul, cable/PON broadband access network, MPEG/IP video distribution, and IPTV/OTT, and Data Center technologies. Eight US Patents had been granted, and three more pending.

WORK EXPERIENCE
2016 (May) - Present: Charter Communications
VP, Engineering IP Management
• Plan, Lead, and Manage IP integration of all three entities (Charter legacy, TWC legacy, and Bright House legacy networks) of New Charter.

2013 (July) – 2016 (May): Charter Communications
Director, Engineering & IP Management
• Build a productive team from the ground up
• Hire engineers with expertise in both system and network to build up man power needed in the new IP addressing management team
• Establish IPControl system as the IP 'source of truth' for high speed internet data (with 4.9M+ customers) and voice (with 2.3M+ customers) within 5 months
• Establish the next seven lines of business (Backbone, Regional Core, Enterprise, Commercial Business, video, voice, and service) in IPControl system within 6 months
• Manage IP addressing team and establish process to streamline and centralize IPv4 & IPv6 address management
• Initiate engagement with Cisco Advanced Service to audit IPv4 blocks distribution in Charter production networks
• Identify IPv4 blocks that are free for allocation in any part of Charter IP networks, and IPv4 blocks that are stranded in specific routing/geographic area
• Develop proposal and plan to solve IPv4 exhaust problem in Charter. It includes applying more IP from ARIN, purchasing public IP, using squat space, and extracting IP stranded in specific routing areas
Obtain two /17 IPv4 allocations (totaling 64K IP addresses) from ARIN
Resulting in successful purchase of 1.3M IPv4 addresses (a /12 and a /14) from market
• Establish IPv6 allocation master plan across different lines of business. Approve and help push plan to accelerate IPv6 technologies deployment as the long term solution for IPv4 exhaust problem in Charter
• Streamline multicast IP allocation/assignment for linear video broadcast and video on demand distribution in Charter production IP network
• Partner with architecture/advanced engineering and provisioning teams to improve allocation efficiency, better route aggregation, reduce routing table size, improve routing stability, and allow network growth, either organic and/or acquisition

2013 (May) – 2013 (June): Technicolor
Director, Lead Technology Analyst
• Help colleague in Intellectual Property and Licensing Department develop strategy to license company's vast MPEG compression and UI patent portfolios to online video service providers such as Netflix and YouTube

2005 (March) – 2013 (April): COMCAST
Principal Network Engineer
• Data Center Architecture & Technology Evolution
• Familiar with new development in Ethernet Fabric, Virtualization, Cloud Computing, and burgeoning SDN
• Led On-Line-On-Demand IPTV initial service design and implementation in Comcast CRANs
• Led and completed MPLS based MetroE/Cell Backhaul and Layer 2 VPN Service Engineering Certification in Comcast CRANs
• Developed and successfully executed IPv6/IPv4 dual stacks implementation for 25+ Comcast CRANs (Converged Regional Area Networks), and IPv6 eBGP peering with Comcast backbone networks
• Worked with developers and successfully automated/scripted configuration generation for network wide IPv6 feature implementation
• Developed requirements to audit newly implemented IPv6 network to make sure it's congruent with IPv4 network
• Evaluated OPNET tool suite to enable network wide monitoring and network audit
• Developed IP-SLA implementation to actively measure end-to-end latency/jitter and packet loss in Comcast IPv6 and IPv4 networks

1991 – 2005: AT&T
IP Network Architect, IP Network Planning and Development
• Developed CoS (Class of Service) architecture to differentiate different type of services in AT&T IP backbone network.
• Secured AT&T global IP network infrastructure with OSPF/BGP/LDP Protocol Authentication.
• Lead MPLS Traffic Engineering feasibility study for AT&T IP Common Backbone Network to integrate voice and IP network.

• Developed architecture and routing design for AT&T MPLS Layer 3 VPN Service Offerings.

Feature Sponsor, & Lead System Engineer, Transport Network Evolution Planning
• Technology Planner - Optical Network Evolution Planning
• Feature Sponsor
Led cross process team to establish the feasibility, impact assessment, and the benefit of introducing Optical Layer Cross-Connect (OLXC) system into AT&T transport network.
• Lead System Engineer
Led a technical team of fifteen people to work with equipment vendors to define and finalize requirements for SONET DCS project.

System Engineer, Digital Provisioning Systems Department
• Established SONET/SDH Configuration Management and Fault Management in the DACScanTM -2000 Controller for both domestic and international markets.

1988-1991 – Argonne National Laboratory

EDUCATION
• Ph.D., Physics, Yale University, 1988
• B.S., National Taiwan University, 1979

AWARD
Institute Service Award, Chinese Institute of Engineers - USA (2002)

PATENT
• "Single Pass Load Balancing with Session Persistence in IPv6 Network", US Patent Application number: 20150067027 (Filed: August 30, 2013 ; Issued: March 5, 2015)
• "Quality of Service in Packet Networks" , U.S. Patent 8,989,029 (Issue Date: 3/24/2015)
• "Load Balancing and Session Persistence in Packet Networks", U.S. Patent 8,819,275 (Issue Date: 8/26/2014)
• "Ascertaining Per-Hop Network Characteristics", United States Patent Number 8,750,297 (Issue Date: 06/10/2014), EP 2388956 A1 (Nov. 23, 2011), CA 2740675 A1 (Nov. 20, 2011)
• "System and Method For Monitoring a Data Packet", United States Patent Number 7,796,535 (Issue Date: 09/14/2010)
• "Communications System For Delivering Multimedia Internet Protocol Packets Across Network Boundaries", United States Patent Number 7,684,391 (Issue Date: 03/23/2010) and United States Patent Number 7,929,531 (Issue Date: 04/19/2011)
• "Network Routing Method and System Utilizing Label-Switching Traffic Engineering Queues", United States Patent Number 7,564,871 (Issue Date: 07/21/2009) and United States Patent Number 8,005,103 (Issue Date: 08/23/2011)

PUBLICATIONS
Publish 16 major papers in professional journals, and more than 30 company internal publications

PROFESSIONAL AFFILIATION
• Member of IEEE (The Institute of Electrical and Electronics Engineers, Inc.)
• Member of SCTE (Society of Cable Telecommunications Engineers)
• Member of SMPTE (Society of Motion Picture and Television Engineers)

PERSONAL
• Site Manager for 2010 AAEOY (Asian American Engineer of the Year) Celebration – http://cie-usa.org more than 500 people attend the very successful gala event
• Yale GSAA (Graduate School Alumni Association) Executive Committee Member, 2009-2012
• Member of Board of Directors of CIE-USA/GNYC, 2005-2008
• President, and Chairman (2001) of CIE-USA/GNYC (Chinese Institute of Engineers, the Greater New York Chapter)
Transform the telecom centric professional society into an organization with three major sectors: Telecom, Biotech, and Energy. Double membership of the organization from 300 to 600+.
• Convention Chair, CIE-USA/GNYC Annual Convention on Oct. 14, 2000. Theme: "Embrace Internet and Biotechnology in the 21st Century – Examine its Social, Economic and Political Impacts." More than two hundred distinguished scholars, engineers and entrepreneurs attended the convention.
• Vice President (2000), Member of Board of Directors (2000-2002) of CIE-USA/GNYC

Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Board of Trustees. How do you propose to resolve such conflicts?

no conflicts of interest

Describe any limitations on your ability to attend Board and Public Policy Meetings in person or to serve the full three-year term.

no limitation

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

I have attended ARIN meetings, beginning from 2014. I find knowing the community driven process as a front end to define the number resource policy is very rewarding. I also enjoyed the opportunities to sever as a mentor in the Fellowship program in ARIN37 and ARIN36.

I think we should encourage more voice from internet service providers that provide last mile service to customers, such as AT&T, Verizon, and cable operators.

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

Ushering in IPv6 based internet gracefully, while still allow IPv4 based internet run and grow at its natural pace economically, is ARIN's biggest challenge,

Also, IANA stewardship transition is about to be completed and enter into implementation phase. ARIN needs to work with other RIRs to review ICANN performance, monitor and enforce SLAs. Requirements and interest among five RIRs might diverge over time.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

The transition from IPv4 based internet to dual stack and then IPv6 only is not an easy one. I believe ARIN can help accelerate the progress of IPv6 transition through policy making, bringing awareness, pooling local experts together and provide training via ARIN on the road sessions. Enterprises may consider moving to IPv6 an expensive task that doesn't generate any new off-setting revenues. ARIN on the road sessions should be expanded, and target local enterprise end customers.

What are your thoughts on needs-based justification for the receipt of IP addresses?

There are many good arguments to support need-based justification to receive IP addresses. There are equally good number of arguments to be against the needs-based justification. Many large enterprise customers like Microsoft and Amazon were willing to spend large sum of money to purchase IPv4 addresses while ARIN still had a couple of /8 equivalent IPv4 addresses to dole out. It's an indicator that the needs-based justification was not working very well at that time. In many cases, network and business growth is hard to predict based on past experience. Most companies cannot sit on prediction of its IP need for the next 24 or 12 months. They have to prepare for a longer runway, particularly in light of IPv4 exhaust, to ensure continuing business growth for the next 5-10 years, before IPv6 based internet is truly ubiquitous.

I think needs-based allocation is fair for the IPv4 addresses that ARIN still have, such as those on micro-allocations for exchange points and critical infrastructure, and/or any new IPv4 block through post exhaustion IPv4 allocation from IANA's recovered IPv4 pool. However, it's worth further discussion if needs-based justification for the IPv4 transfer from one organization to another organization needs to be relaxed somewhat, say from 2 years justification to 5 years.

What are your thoughts on the rights and responsibilities of legacy IP address holders

If the legacy IP address holders don't need the IPv4 blocks anymore due to its advances on IPv6 implementation for internal enterprise consumption, the legacy holders should return the IPv4 blocks to ARIN for the best of current internet operation. Current RFC1918 space is too small for large ISPs. It would help a lot if one or two /8s can be added into the RFC1918 space. It would help reduce number of incidents of video and/or voice network outage. If more than two /8s can be recovered, the additional IP blocks can get back to ARIN's free IPv4 pool for needs-based allocation.

What are your views on the NTIA IANA oversight transition, particularly as it may affect the addressing community?

Internet is global in nature. The transition will help meet the needs and expectations of the global customers and partners of IANA services. I am a firm believer that free and open internet can help build a free and open world. In principle, the multi-stakeholders model will help enhance needed trust among all stake holders, and help maintain the stability, security and resiliency of the open internet.

The transition has more to do with domain name system. However, IP (both IPv4 and IPv6) addressing is an integral part of DNS database, and health of internet based communication operation. ICANN coordinated allocations of IP and ASN numbers to RIRs who then distribute IP and ASN to internet service providers and others within others within their geographic regions. ICANN applies the policies developed by the affected parties. Al long as the established bottom-up process flow and independence of RIRs are maintained, the addressing community would not be affected by the stewardship change. It is important to make sure it's managed by private sector, not by any government, and any inter-government agency.

ARIN does a measure of outreach and capacity building. Is this something that should be expanded, contracted, or maintained as is? In particular, much of this outreach and education has been centered around the transition from IPv4 to IPv6. Should that emphasis continue or are there other areas or topics that you feel should be prioritized?

The outreach should be expanded. The IPv4 to IPv6 transition is of paramount importance, and should be continually emphasized. In the outreach, local experts for IPv6 should be organized to reach out to their own community and develop ARIN affiliated chapters to push for IPv6 reachable local content, such as e-education, e-government, e-health, and e-commerce.

Please describe your Board Governance (or similar) experience.

I served as a member of Executive Committee of CIE-USA/GNYC ((Chinese Institute of Engineers, the Greater New York Chapter) in 1999, and a member of Board of Directors (BoD) in 2000-2002 and 2005-2008. I also served as the President of CIE-USA/GNYC in 2001. With the support of EC and BoD members, I led the transformation of the organization from a telecom centric professional society into an organization with three major sectors: Telecom, Biotech, and Energy, and had very successful fund raising that rebuilt the financial strength of the Institute. The organization membership was doubled from 300 to 600+. I also served as the Convention Chair of CIE-USA/GNYC Annual Convention on Oct. 14, 2000. The theme was: "Embrace Internet and Biotechnology in the 21st Century – Examine its Social, Economic and Political Impacts." The convention was very successful with more than two hundred distinguished scholars, engineers and entrepreneurs attending the convention.

Bill **Sandiford**

https://twitter.com/Bill_Sandiford

http://www.billsandiford.ca

Please provide a brief CV highlighting experience relevant to the duties of the Board of Trustees of ARIN.

Durham.Net Inc. dba Telnet Communications 1996-2014
Founded in 1996, Telnet Communications is a niche ISP providing services to residential and business customers throughout in Canada. In 2007 Telnet Communications became a Competitive Local Exchange Carrier (CLEC) as recognized by the CRTC

President 2010-2014
Chief Technical Officer 2004-2010
Chief Operations Officer 1996-2004

• Founding shareholder of the corporation
• Directed company to successful acquisition in 2014
• Led the company through the process of becoming a CRTC licensed Competitive Local Exchange Carrier (CLEC) in 2007
• Built a strong management team to ensure the day to day affairs of the company are taken care of
Board Experience

Canadian Network Operators Consortium Inc. (CNOC) 2010 – Present
CNOC is a not for profit Canadian corporation that was formed to represent the interests of those in Canada that own or operate wire-line networks on a competitive basis and to promote innovation and productivity in Canada, as well as Canada's international competitiveness through the removal of barriers to increased competition in the provision of communications services;

President 2010 – 2016
Board Chairman 2010 – 2016
Government Relations Committee Chair 2011 – 2016

• Founding member of the organization
• Active participant in all committees of the organization
• Re-elected to 2 year terms in 2012, 2014, and 2016

American Registry for Internet Numbers 2009-Present
Applying the principles of stewardship, ARIN, an non profit corporation, allocates Internet Protocol resources; develops consensus based policies; and facilitates the advancement of the Internet through information and educational outreach

Board of Trustees 2014-Present
Advisory Council Member 2009-2013

• Member and volunteer of this highly respected organization
• Elected twice by the membership to serve on the Advisory Council
• Elected in 2013 to server a 3 year Board of Trustees term
• Actively participated in ARIN's IPv6 Outreach program

Canadian Internet Registration Authority (CIRA) 2012 - Present
Applying the principles of stewardship, ARIN, an non profit corporation, allocates Internet Protocol resources; develops consensus based policies; and facilitates the advancement of the Internet through information and educational outreach

Board of Directors 2012-Present

• Elected to a 3 year term in 2012, and re-elected to a further 3 year term in 2015
• Current Vice Chairman of the Board and Human Resources and Compensation Committee

Toronto Internet Exchange Community (TorIX) 2009 – 2011
Established in 2001, the Toronto Internet Exchange is the largest open public peering fabric in Canada. It carries over ten gigabits of traffic daily from over one hundred service providers such as Rogers, Q9, Google, and Akamai. As a not for profit exchange, the organization is committed to serving the community in providing a cost effective means to keep Canadian Internet traffic in Canada

Vice-President 2009-2011
Architecture Group Chair 2010-2011

• Successfully helped lead the organization through the attempted takeover of the exchange by a competitor
• Chaired the Architecture Group which ran a process to select the next generation switching architecture for the exchange in order to prepare for explosive growth

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Please disclose any conflicts of interest you may have with doing your duty as a member of ARIN's Board of Trustees. How do you propose to resolve such conflicts?

I am not aware of any conflicts of interest that would be applicable.

Describe any limitations on your ability to attend Board and Public Policy Meetings in person or to serve the full three-year term.

I am not aware of any limitations on my ability to attend Board and Public Policy meetings in person or to serve the full three-year term.

Have you attended ARIN meetings or otherwise participated in ARIN procedures in the past? What did you find the most rewarding from those meetings or procedures? What suggestions for improvement might you have?

I have attended all ARIN meetings dating back to ARIN XXIV in Dearborn, MI. Prior to serving my first term on the Board of Trustees, I served four years on the advisory council.

During that time I have found working with the community in a bottom-up policy process to be the most rewarding. Hearing the thoughts and ideas of the many community members and incorporating them into usable policy has been extremely rewarding.

What do you believe to be ARIN's greatest challenges? (maximum 150 words)

ARIN's greatest challenges over the coming years will be to properly maintain and operate the registry through a period of change.

With the exhaustion of the IPv4 pool, ARIN's function will shift towards being more focused on transfers and maintaining the registry than it was in the past. This will require careful planning and execution of strategic plans.

How do you foresee ARIN's function, scale, or role changing in the wake of IPv4 exhaustion?

ARIN's function and scale will invariable change in the coming years as the result of IPv4 exhaustion and the nature in which IPv6 is assigned/allocated.

Organizations receiving IPv6 allocations will likely come to ARIN for more space less frequently than they did for IPv4. As a result, the workload of the registration services department will likely decrease over time.

With regard to IPv4, ARIN's role will likely transition to a "caretaking" function with respect to maintaining the registry and processing transfer requests.

What are your thoughts on needs-based justification for the receipt of IP addresses?

Now that the free pool has exhausted, the community needs to take a close look at needs-based justification to determine if those policies still have a place in a world where the free-pool is exhausted. I believe that we should consult with all of our stakeholders on this issue in order to determine how best to move forward into the future.

We should only consider changes to the current policies once a thorough and exhaustive consultation is completed with the community.

What are your thoughts on the rights and responsibilities of legacy IP address holders

I believe that the "core" rights and responsibilities of ALL IP address holders, regardless of whether they are legacy or not, should be closely aligned.

The rights to use legacy addresses were given out during a period that was the "wild west" of the internet's formation. We should not assume that these address rights holders have any more, or less, rights or responsibilities than those given out at a later date.

What are your views on the NTIA IANA oversight transition, particularly as it may affect the addressing community?

The upcoming NTIA IANA oversight transition is a milestone that many in the community have wanted for a number of years and the community has worked hard to achieve.

ARIN, through its participation on the CRISP team, has worked hared to ensure that the effect of the transition on the addressing community will be minimal, and positive in any event.

ARIN's participants on the CRISP team, and the community as a whole, should be commended on meeting their goal of transitioning the IANA oversight role away from the NTIA.

ARIN does a measure of outreach and capacity building. Is this something that should be expanded, contracted, or maintained as is? In particular, much of this outreach and education has been centered around the transition from IPv4 to IPv6. Should that emphasis continue or are there other areas or topics that you feel should be prioritized?

During my tenure on ARIN's Advisory Council I spent a lot of time participating in community outreach. At the time, most of that outreach was focused on IPv4 exhaustion and IPv6 adoption. Since that time ARIN's outreach efforts have been scaled back.

I believe that ARIN should expand its current outreach efforts. While doing IPv4/IPv6 outreach several years ago we noticed that a great number of the contacts we had with community members were for issues other than IPv4/IPv6. I feel strongly that there is a need for continuing outreach into the community by ARIN. IPv4 exhaustion and IPv6 adoption is important, but there are many other reasons why members of our community may need to talk to us.

Please describe your Board Governance (or similar) experience.

I am a graduate of the University of Toronto Rotman School of Business NFP Director program. The program is designed to educate directors or trustees of not-for-profit organizations, like ARIN.

I am currently the Vice-Chairman of the Canadian Internet Registration Authority (CIRA). CIRA operates the .ca ccTLD registry.

I served as the President of the Canadian Network Operators Consortium (CNOC) for the past six years. CNOC is a trade association that represents independent ISPs and Telecom companies in Canada. Activities included government relations and many appearances before the CRTC. I stepped down from my role as President this past June but remain on the Board of Directors.

Outside of the technology space, I have sat on the board of numerous not-for-profit organizations in the community in which I reside.

2016 Number Resource Organization **Number Council**

Robert J. **Kenny**

I am currently employed at Pitt-Ohio (Transportation Sector) as a Network Engineer. I have worked in this capacity for the past 3 years.

http://www.facebook.com/rjkenny

Are you available to serve the entirety of a three-year term?

Yes.

Describe any limitations on your ability to travel to attend ARIN and ICANN meetings in person.

None at all.

Why do you want to serve on the NRO NC, and what goals do you want to accomplish?

I believe in the furthering of education and compliance standards, relating to the Networking field. I believe my insight and attention to detail, as well as knowledge with IPv4 and IPv6, will enable me to be a great representative for ARIN and all its partner affiliates.

What, if any, conflicts of interest might arise for you as an NRO NC member? Specifically, do you serve in what could be perceived as any Internet governance roles, provide any services directly or indirectly to ARIN, or represent any significant interest from the community?

No I do not. There is no conflict of interest.

What is your record of serving the Internet community in the ARIN region?

Populating addresses and keeping in all compliance's set forth.

What differentiates you as a candidate, or makes you uniquely suited to serve on the NRO NC?

The fact I take Networking very seriously. I am always open to new ideas and ways to improve current standards and practices. I would work both hard and diligently to ensure the continued success of ARIN and NRO as a whole.

Provide a brief biography of recent experience, associations, and affiliations relevant to serving on the NRO NC, including names of organizations, positions held, specific duties, and dates of service.

Held several elected offices at lodges and other governing bodies, such as Treasurer and Secretary.

In light of the ongoing transition from IPv4 to IPv6, do you have experience that you wish to share with the community that is noteworthy in terms of IPv6 adoption?

I have taken several IPv6 implementation courses, as well as consistently incorporating new IPv6 addresses and standards for large enterprise organization.

What is your view of the existing bottom-up, self-governance model and structure of the Regional Internet Registry (RIR) system? Do you believe there are other models or structures that would work better?

I believe the bottom-up approach works well for any self-governing body. I have held elected-seats in organizations outside the Networking field, and have found that letting members vote and debate actions and procedures, allow for an open-dialog and generation of new ideas to improve upon.

Jason **Schiller**

Google, Inc.

Are you available to serve the entirety of a three-year term?

Yes.

Describe any limitations on your ability to travel to attend ARIN and ICANN meetings in person.

No limitations.

Why do you want to serve on the NRO NC, and what goals do you want to accomplish?

At my core, I am an engineer and want to solve problems on their technical merit. As a network engineer for a large content provider, I will bring level headed operations and engineering mentality to the table in order to provide good policy which is in the best interest of the Internet as a whole.

I would like to serve on the NRO NC and continue in my role of providing oversight of the performance of the IANA function, and its ability to meet the needs of the community. It is important that there be a mechanism for the community to make known any concerns about the number resources component of the IANA operations, the measure of the IANA Numbering operations performance, the efforts to seek redress or enhancements of the IANA Numbering operations, the measure of IANA Numbering operations performance or the desire for a triggered IANA SLA review. It is most important that there be a process that is transparent, open, community driven, and bottom up for ongoing IANA numbering SLA development.

There are also a number of global issues surrounding IPv4 depletion and IPv6 adoption, and I believe it is important that we resolve these issues before the Internet suffers a tragedy of the commons.

Some of the issues I would like to help resolve include:

Should the needs based system that the community has (up until now) deemed fair continue to be used? What is ARIN's role when there is a market for IPv4 addresses? Does ARIN still have a stewardship role to play when they are no longer allocating or assigning IP number resources or is ARIN's stewardship role most important when IP addresses become scarce (or prohibitively expensive on the open market)? Will an open market tend to concentrate IPv4 address in large and wealthy organizations, or organizations that can best monetize IPv4 addresses, (perhaps this means indesirable organizations such as spammers)? If it does is that fair to services that derive little or no revenue per IP address, or smaller organizations that lack greater buying power?

How can we encourage the adoption of IPv6? How can we set the right balance between routability (fragmentation) versus sustainability versus administrative ease? How can we continue to support current IPv4 functionality while scaling to meet all of these potential IPv6 addresses?

What, if any, conflicts of interest might arise for you as an NRO NC member? Specifically, do you serve in what could be perceived as any Internet governance roles, provide any services directly or indirectly to ARIN, or represent any significant interest from the community?

No conflicts of interest.

What is your record of serving the Internet community in the ARIN region?

I have served on the NRO NC, which performs the role of the ASO AC over the last nine years. In that time I have twice served on the ICANN ASO AC nominating committee, and worked to craft interview questions in multiple selection cycles. Throughout my service term, I have been actively engaged in serving on all Global Policy Proposal Facilitator Teams to shepherd global policy proposals, and leading the effort for the ARIN region GPPFT advice wite-up. I have led efforts to craft advice provided to ICANN and IANA operators.

I have been actively engaged in the tedious work of reviewing and fixing our ASO AC Operating Procedures, including revising our election procedures, our ICANN Board of Directors selection process, removal process for ASO AC appointed roles, and creation of templates for Advice on Global Policy proposals and Genral Advice to ICANN and IANA.

I attended all ARIN meetings since ARIN XV (April 2005), with the exception of ARIN 36 which I attended remotely. I continue to be active in ARIN policy discussions both at the microphone in public policy meetings, and in informal meetings. I read PPML and have posted on occasion. I have authored policies and assisted others in crafting their policy proposals, and have been among a team of originators on a draft global draft policy, and an ARIN policy proposal. I presented at ARIN XX (October 2007) on the Implications of Global IPv4/IPv6 Routing Table Growth.

I am happy to have been involved with Google's web cast sponsorship since 2013.

I have attended and been a speaker at NANOG meetings since NANOG34 (May 2005).
Below is a list of presentations I have given:

- Inter-AS Traffic Engineering Case Studies as Requirements for IPv6 Multi-homing Solutions
(How IPv4 BGP TE is currently used as suggested requirements for an
IPv6 solution)
- Shim6: Network Operator Concerns
(What shim6 won't do that can currently be accomplished with IPv4
Multi-homing)
- IPv6 Panel: Time for the Transition or Just More GOSIP?
(Is IPv6 worth the trouble?)
- Open issues with ipv6 routing/multi-homing [with Vince Fuller]
(Why we need a multi-homing solution that is not shim6)
- PANEL:Pragmatismv6: a Grown-up, Critical Examination of IPv6
(Discussion of operators realistically deploying IPv6 in a manor consistent with IPv4
operational practices vs. standards developers who idealistically want to avoid de-aggregation)
- PANEL: TEOTWAWKI: The end of the world, as we know it (Discussion of operators about how IPv4 depletion will impact business as usual)
- BGP 101 and BGP 102 classes.

I attended several IETF meetings since IETF 61 (November 2004). I was a member of the Routing and Addressing directorate (RADIR). I have also been involved in the idr, grow, ipv6, v6ops, mboned, and pim working groups. I have made presentations to the GROW working group and the routing and addressing workshop (RAW).

What differentiates you as a candidate, or makes you uniquely suited to serve on the NRO NC?

I have worked on medium and large sized Enterprise LANs for American University, Georgetown University, and the Georgetown University Medical Center. I have worked on a medium sized WAN environment at the corporate headquarters of MannorCare, a managed care company, that had 230 remote nursing facilities. I have worked in the day to day operations and the longer term engineering departments of UUNET (Verizon Business / MCI / WorldCom), a large carrier grade ISP. I am currently working at Google, a large content services provider.

I have a strong technical background, a wide variety of end-site, ISP, and CDN experience, small and large network experience, as well as LAN and WAN environments. I am active in the industry, and have a degree in international relations and philosophy which makes me uniquely suited for this role.

I have served on and been actively involved with the NRO NC which performs the role of the ASO AC for the last nine years.

Provide a brief biography of recent experience, associations, and affiliations relevant to serving on the NRO NC, including names of organizations, positions held, specific duties, and dates of service.

I have been with Google for the past five years as a network engineer in the production network operations group. I have done everything from turning up new peering interconnects, provided oncall support to network operations, and using BGP based traffic engineering in order to mitigate hot peering points, to certifying and deploying new hardware, as well as designing and implementing a new network to deliver traffic from the Olympics to YouTube for live streaming.

In the past few years, my primary focus has been on IP number administration, as the chief numberista, and cleaning up, simplifying, process and tools, as well as implementing best practices for BGP policy.

Prior to Google, I was with UUNET (Verizon Business / MCI / WorldCom) for over 13 years. My job responsibilities ranged from customer facing High Speed Install of 56K frame relay to OC-3 links, completing maintenance on the network, serving as a point of escalation, to long term architecture and engineering projects such as integrating AS701 and AS19262 (completed while I was at Google), architecting and implementing 3 phases of IPv6 (GRE over lay, 6PE, and native), transforming the BGP architecture to reduce one level of hierarchy while not impacting the number of routes, paths, or forwarding decisions, LatAm (AS14551) architecture and implementation, UUCAST (AS704) phase 2 network architecture and implementation, setting and maintaining global routing policy standards.

Prior to UUNET I had combined three years experience in large scale LAN operations work at two universities, American University, and Georgetown University, and Georgetown University Medical center, as well as six months experience in a small scale WAN operations for ManorCare, a managed care company with 230 WAN connected remote nursing facilities.

In light of the ongoing transition from IPv4 to IPv6, do you have experience that you wish to share with the community that is noteworthy in terms of IPv6 adoption?

I am proud to have been responsible for UUNET (Verizon Business) offering a global IPv6 Launch just one week after the IANA depletion was announced. My effort included developing the IPv6 numbering plan, architecting and deploying IPv6 in the UUNET North America network in three phases, GRE overlay, 6PE, and native, and native IPv6 in Europe and Asia.

I am proud to work for Google, a company that has not only embraced IPv6 in a real way, but has made significant progress in pushing the wider community toward IPv6. Admittedly much of this was had been completed

prior to joining Google. I continue to work closely with Lorenzo, Erik, and Paul Marks to advance IPv6. As numbers administrator for Google, I ensure all products and services who have a need for IP number resources, either support IPv6 or have a plan to do so. Additionally, I require a well formed and well documented IPv6 numbering plan for each such product or service.
In customer outreach for UUNET, I have been insistent that the community needs to understand that the deadline to support IPv6 is not the day before their individual organization runs out, but rather the day the first organization runs out of IPv4 and is forced to make the difficult decision of offering an IPv6-only solution, degraded IPv4 over Carrier Grade NAT (CGN), reclaim low margin uses of IPv4 to be repurposed, stop growing, or purchasing IPv4 space on the open market. If most organizations deployed dual-stack, then when an individual organization depletes their available IPv4 addresses, they could painlessly transition to IPv6-only for new products, services, or customers.

I understand that there is real cost to deploying IPv6 whether it be equipment upgrades, recertification efforts, complexity of deploying new code and new configuration, and training. This comes with no new products, no new services, no new capabilities, nor new revenue. As such a deferral not only saves money, but allows your competitors to spend their time, and risk their network health to fix issues introduced with IPv6. The problem with this approach is deploying IPv6 for a large provider is a likely a two year process. In my mind it is a requirement for networks, products, and services to insure that each organization has a working IPv6 solution. We have already reached the stage where some networks are impacted by IPv4 depletion and are considering the expense of purchasing IPv4 addresses, deploying IPv6-only services or customers, or depending on a CGN or IPv4/6 DNS4/6 protocol translation, yet there are large networks that don't even have a roadmap for IPv6.

This means even for organizations that have embraced dual-stack, they will be forced to commit to either purchasing IPv4 addresses, forcing traffic to the legacy IPv4 Internet for through an expensive and poorer performing CGN, or not making the legacy IPv4 Internet available to their new customers. These are tough choices when trying to maintain market share against competitors who have not yet depleted their store of IPv4 addresses.

What is your view of the existing bottom-up, self-governance model and structure of the Regional Internet Registry (RIR) system? Do you believe there are other models or structures that would work better?

The current bottom-up, open, and transparent RIR system is working well. This governance model allows for fair and equal participation of all segments the RIR community. It allows operators and IP managers to create, develop and adopt number resource policies that are technically sound, and in the best interest of their customers, their network, and the borderless, global Internet as a whole.

I believe there is no better model.

I continue to argue that the NRO NC should take a more active role in shepherding global policy and improving global communication and coordination. It takes a long time for the same text to be discussed in person in each RIR's public policy meeting, modified, and agreed upon in all five regions. This is due to the timing of the meetings and lock-step nature of the global policy development process. Typically, global policy proposal text does not get modified until the results of a particular region's public policy meeting suggest there are objections or concerns that need to be addressed, this can be a lengthy process.

It may be possible to shorten this timeline by cross-pollinating ideas and concerns from each of the regions as the discussion unfolds in each region. The NRO NC could form a Global Policy Proposal Facilitator Team (GPPFT) which could act as shepherds by summarizing concerns and arguments within their own region, and bringing those ideas to other regions. GPPFT members could also spur along conversations in their own regional mailing lists even if a meeting is not pending. In this way it may be possible to front load the conversation, and determine and address objections without having to wait for all five regions to have an in person meeting to get common agreed upon text. This could maximize the possibility that a global policy proposal or a globally coordinated policy proposal would pass on the first round of in-person RIR meetings.

ARIN ELECTIONS 2016

VOTING **OPENS**
3:00 PM EDT
THURSDAY, 20 OCTOBER

VOTING **CLOSES**
3:00 PM EDT
FRIDAY, 28 OCTOBER

Watch for an email on **Thursday, 20 October at 3:00 PM EDT** with instructions on how to vote.