



Life after IPv4/ ARIN's Policy Development Process

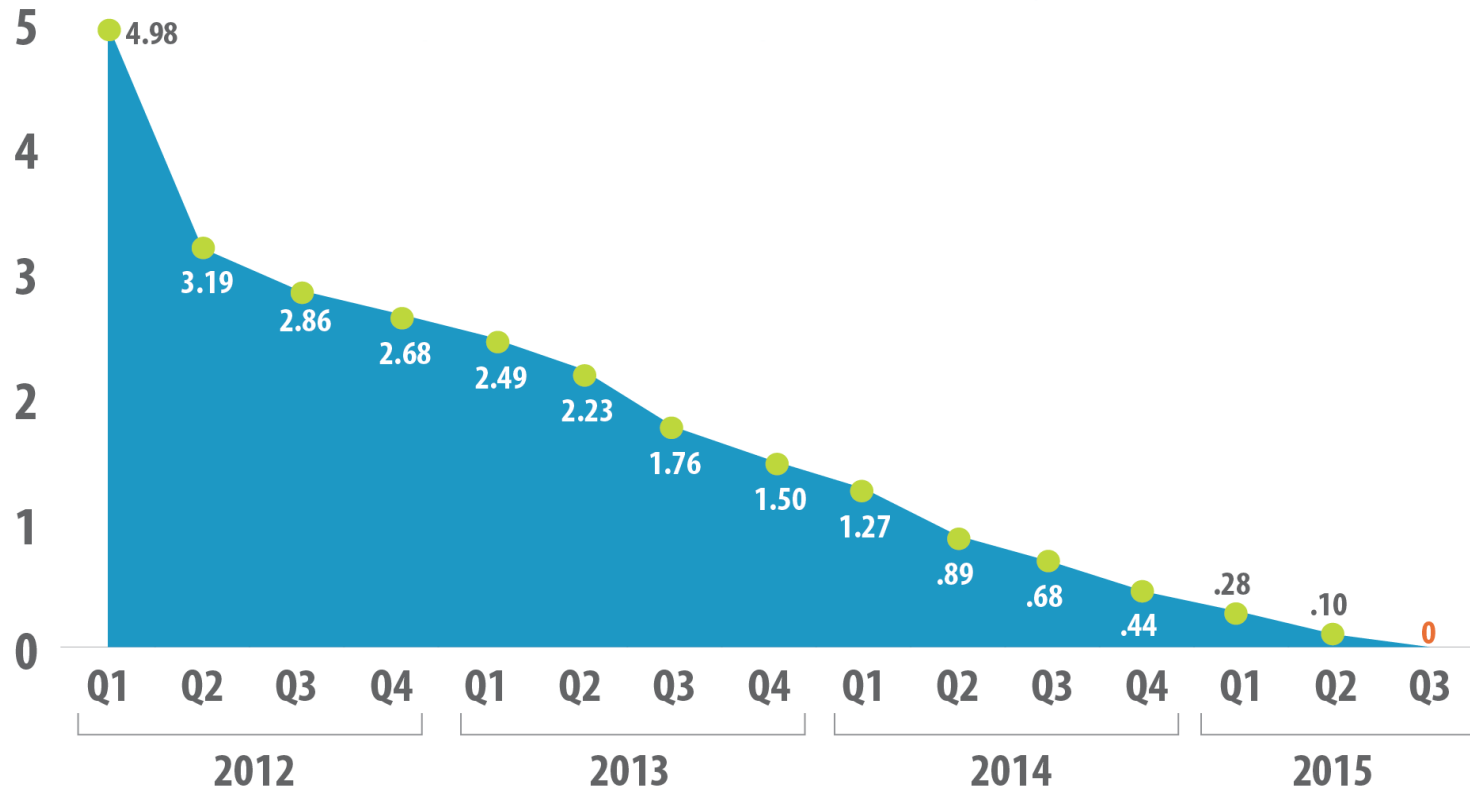
John Curran
President and CEO

Overview

- IPv4 depletion recap
- Post-depletion IPv4 options
 - IPv4 Waiting List
 - IPv4 Transfers
 - Dedicated IPv4 block to facilitate IPv6 deployment
 - IPv6
- Policy development in the ARIN region

IPv4 Address Space in ARIN Free Pool

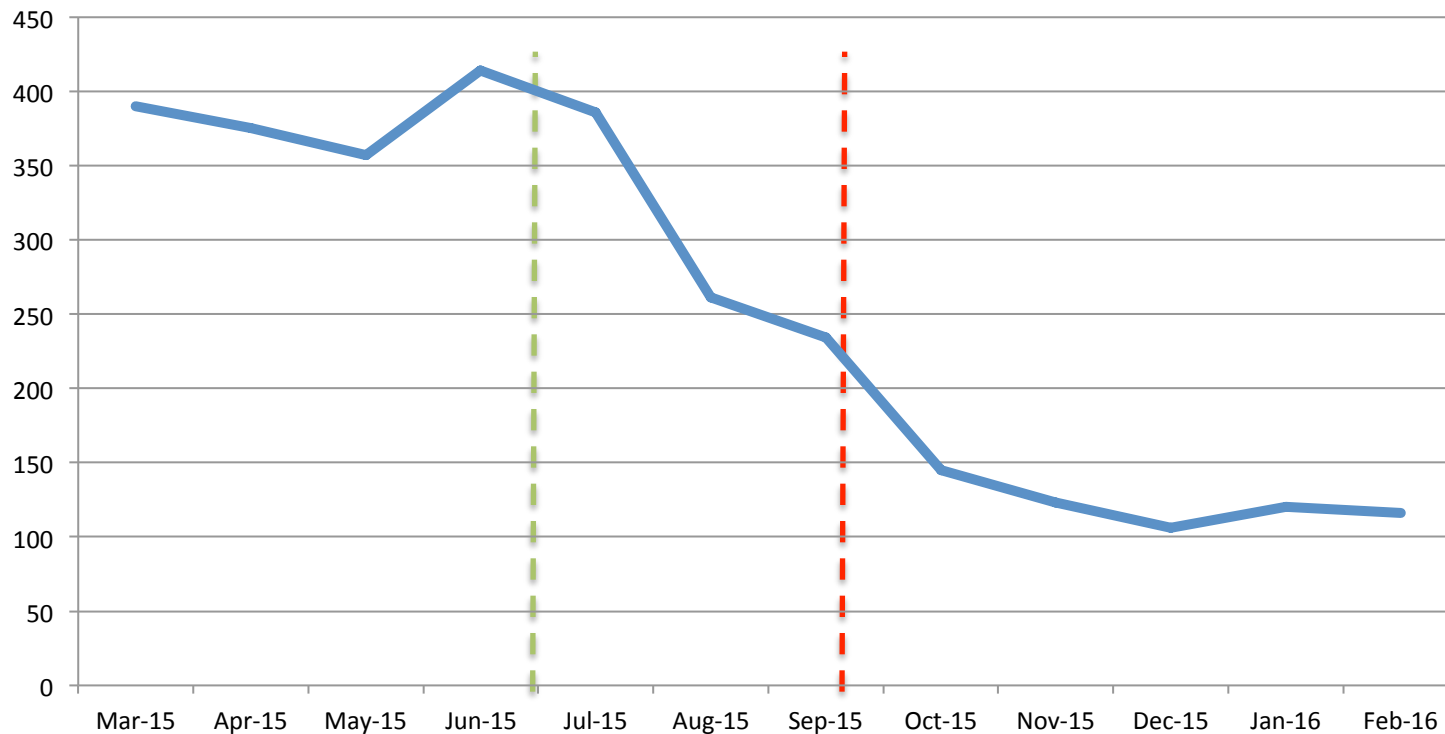
/8s



IPv4 Depletion Recap

- June 2015: IPv4 requests reach peak volume
 - 414 total requests
 - A mad rush for the last IPv4 blocks
- July 1st, 2015: First unmet IPv4 request
 - An org qualified for a block size that was no longer available
 - Within a few weeks, only single /24s remained in the free pool
- September 24th, 2015: Full IPv4 depletion
 - No IPv4 blocks available other than those reserved for specific policies
 - Significant drop in monthly # of IPv4 requests

IPv4 Requests – Past Year



----- = waiting list initiated

----- = IPv4 depletion

Reserved IPv4 Space

- /10 reserved to facilitate IPv6 deployment
- 2 /16s reserved for critical Internet infrastructure
 - Public exchange points
 - Core DNS service providers (excluding new gTLDs)
 - Regional Internet Registries
 - IANA

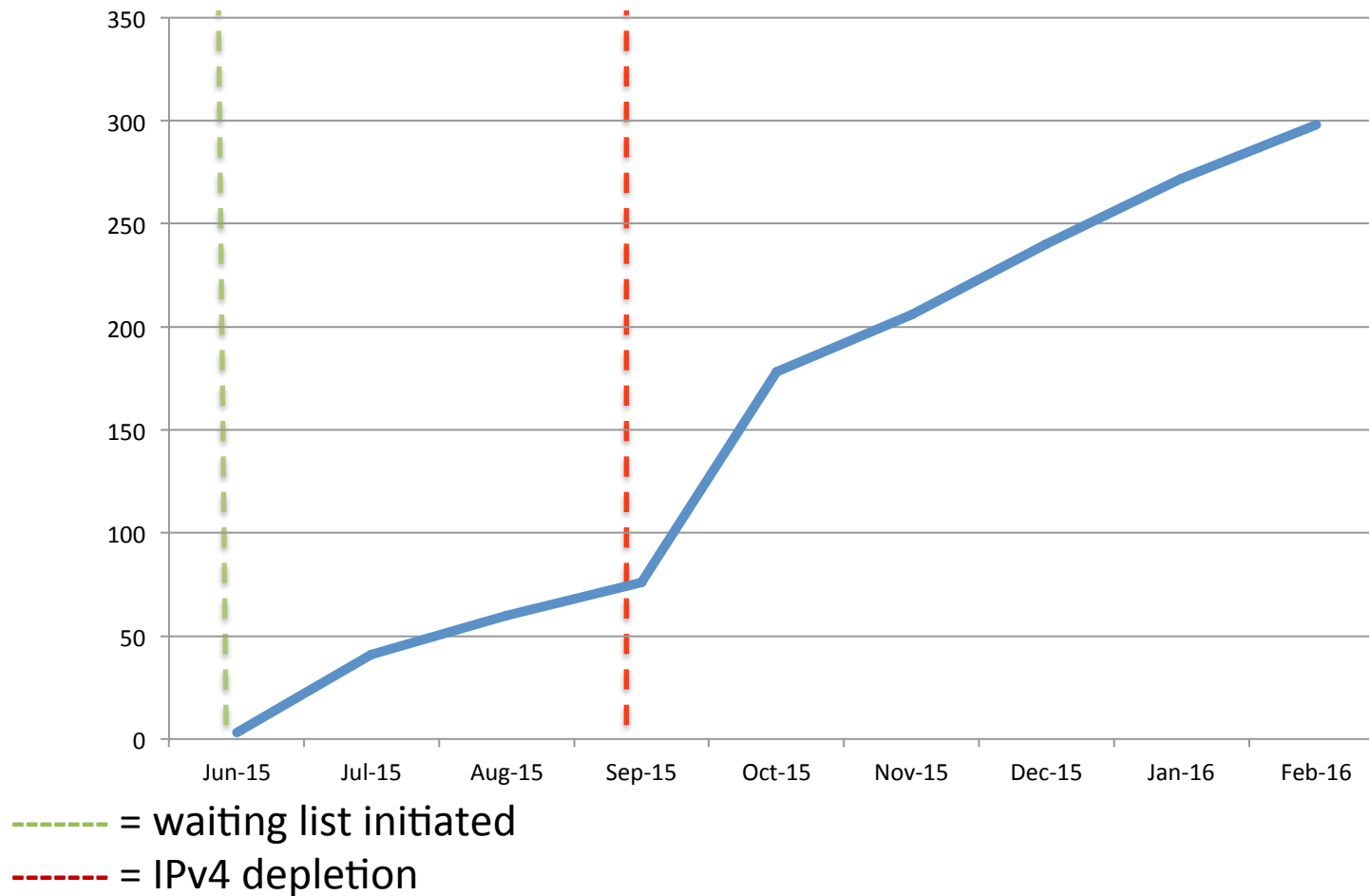
Post-IPv4 Depletion Options

- IPv4 Waiting List
- IPv4 Transfer Market
- Dedicated IPv4 block to facilitate IPv6 deployment
- Adopt IPv6

IPv4 Waiting List

- Policy enacted first time ARIN did not have a contiguous block of addresses of sufficient size to fulfill a qualified request
- Waiting List published on ARIN's web site
 - https://www.arin.net/resources/request/waiting_list.html
- Sources to fill it:
 - Returned to ARIN or **revoked** for non-payment and
 - **redistributed** by IANA per global policy for “post exhaustion IPv4 allocation mechanisms by IANA”

IPv4 Waiting List Growth



How Long Might You Wait?

- 364 tickets added since wait list started
- 33 wait list requests filled
 - 19 filled with IANA /14 equivalent issued in 9/2015
 - 13 filled with blocks previously held for organizations deciding whether to go on the waiting
 - 1 filled with space that had been revoked
- 33 filled via 8.3 transfer and removed from list (as required per policy)
- Demand is far greater than availability

Transfers of IPv4 Addresses

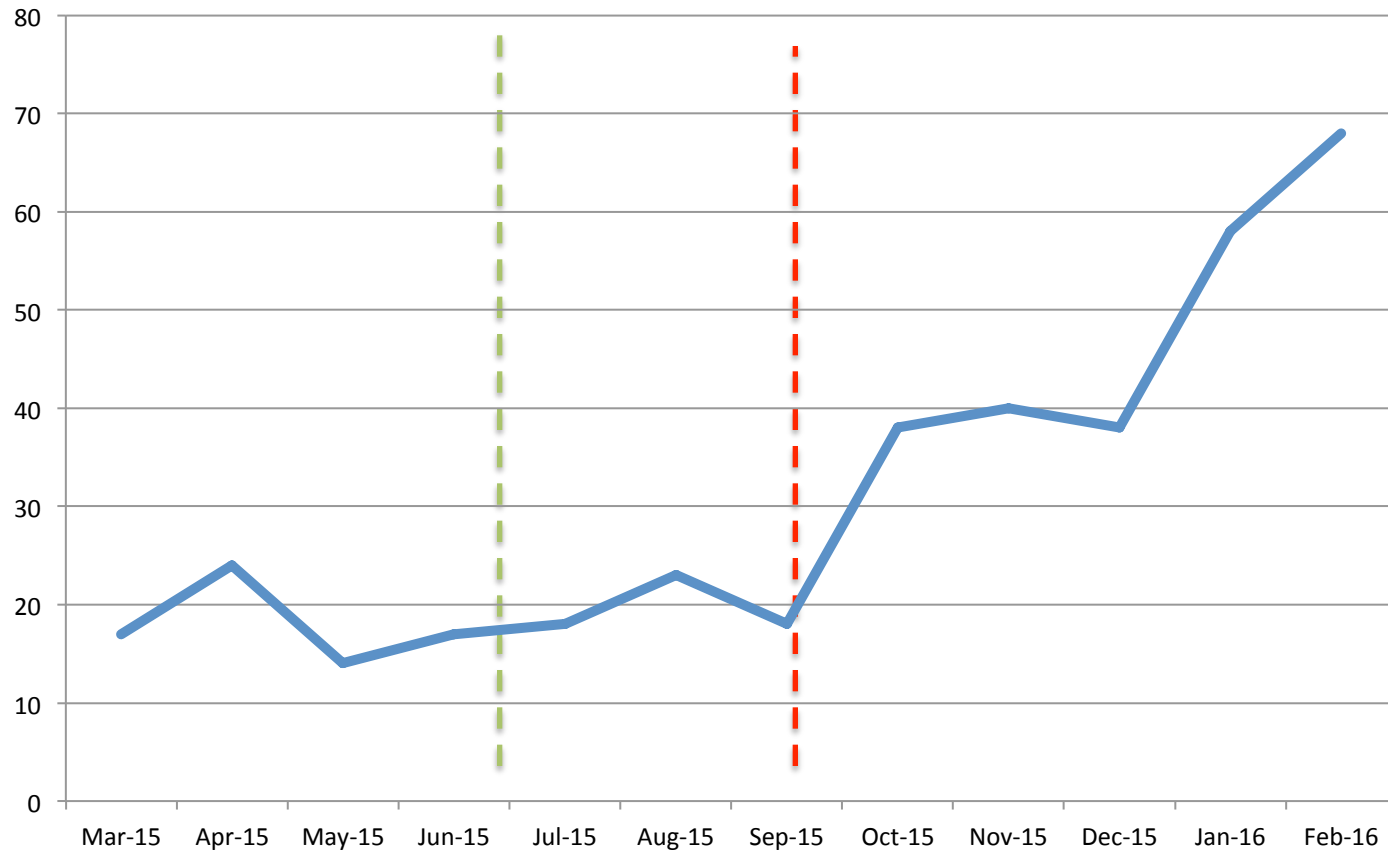
3 ARIN Transfer Policies Available:

- Mergers and Acquisitions (NRPM 8.2)
 - Traditional transfer based on change in business structure, including company reorganizations, supported by legal documentation
- Transfers to Specified Recipients (NRPM 8.3)
 - **IPv4 market transfer** based on financial transaction, supported by justified need (within region)
- Inter-RIR transfers to Specified Recipients (NRPM 8.4)
 - **IPv4 market transfer** based on financial transaction, supported by justified need (outside region)

Transfers to Specified Recipients (NRPM 8.3)

- Allows orgs with unused IPv4 resources to transfer them to orgs in need of IPv4 resources
- **Source**
 - Must be current registrant, no disputes
 - Not have received addresses from ARIN for 12 months prior
- **Recipient**
 - Must demonstrate need for 24-month supply under current ARIN policy

8.3 Transfers Completed

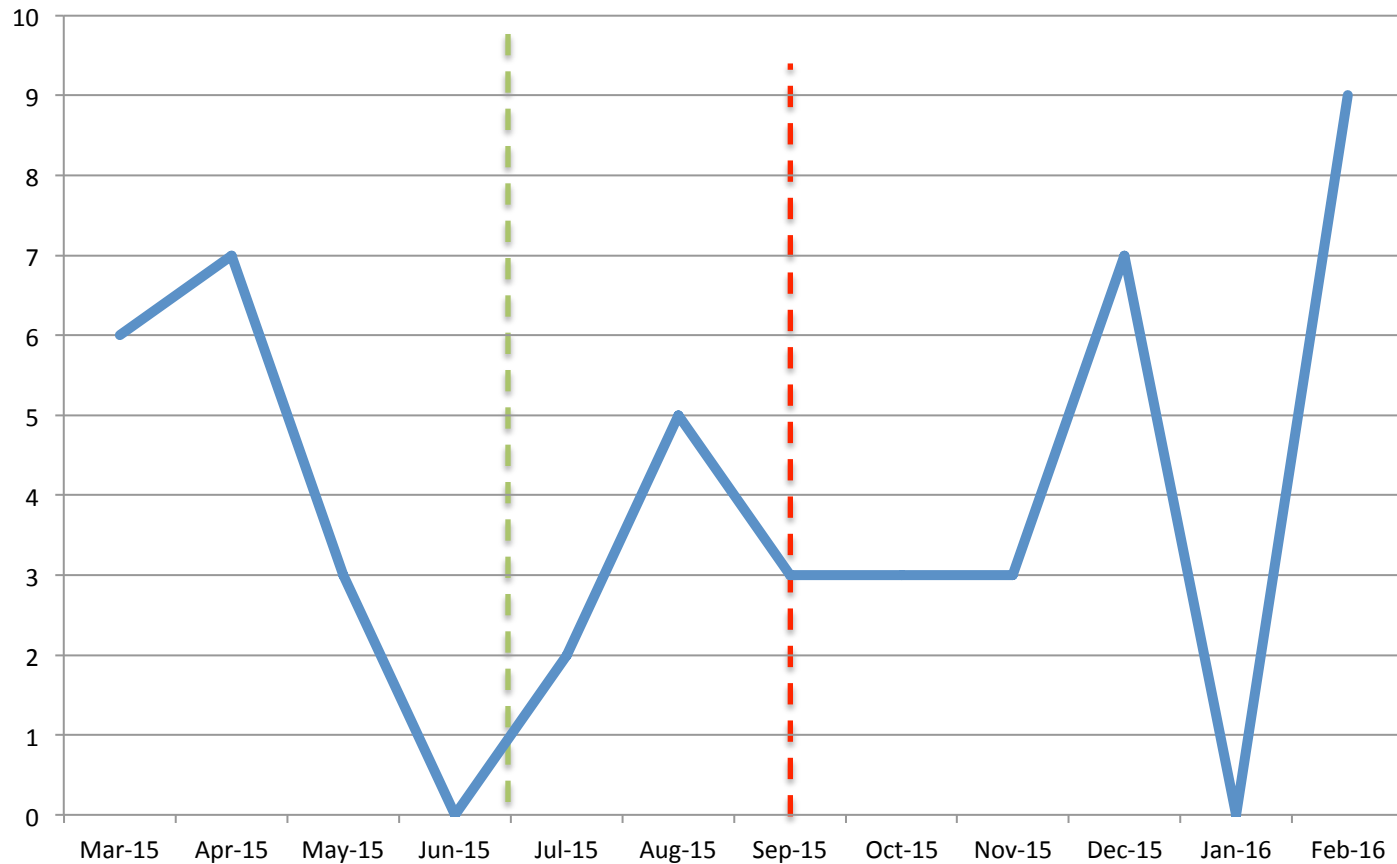


----- = waiting list initiated
----- = IPv4 depletion

Inter-RIR Transfers (NRPM 8.4)

- RIR must have reciprocal, compatible needs-based policies
 - Currently APNIC and RIPE NCC
- **Transfers from ARIN**
 - Source cannot have received IPv4 from ARIN 12 months prior to transfer
 - Must be current registrant, no disputes
 - Recipient meets destination RIR policies
- **Transfers to ARIN**
 - Must demonstrate need for 24-month supply under current ARIN policy

Inter-RIR Transfers Completed



----- = waiting list initiated
----- = IPv4 depletion

IPv4 Transfer Stats

- **Transfers to Specified Recipients (8.3)**
 - 505 prefixes transferred, ranging from /24s to /10
 - 23 ASNs
- **Inter-RIR Transfers (8.4)**
 - 215 prefixes transferred, ranging from /24s to /13s
 - 197 ARIN to APNIC
 - 12 ARIN to RIPE NCC
 - 5 APNIC to ARIN
 - 1 RIPE NCC to ARIN

<https://www.arin.net/knowledge/statistics/transfers.html>

Tips for Faster Transfer Processing

- Ensure all registration information is current
 - If not, we can help you get it up to date
- Request pre-approval
 - Ensures you can bid confidently
 - Turns transfers into a point-click-ship exercise
- Provide detailed information to support 24-month need when submitting transfer/pre-approval

Reserved IPv4 Block for IPv6 Deployment Requirements

- Used to facilitate IPv6 deployment (dual stacking, IPv4->IPv6 translation, etc)
- Need cannot be met from your existing ARIN IPv4 space
- Have an IPv6 block registered
- One /24 per organization every six months

Help! What Should I Do?

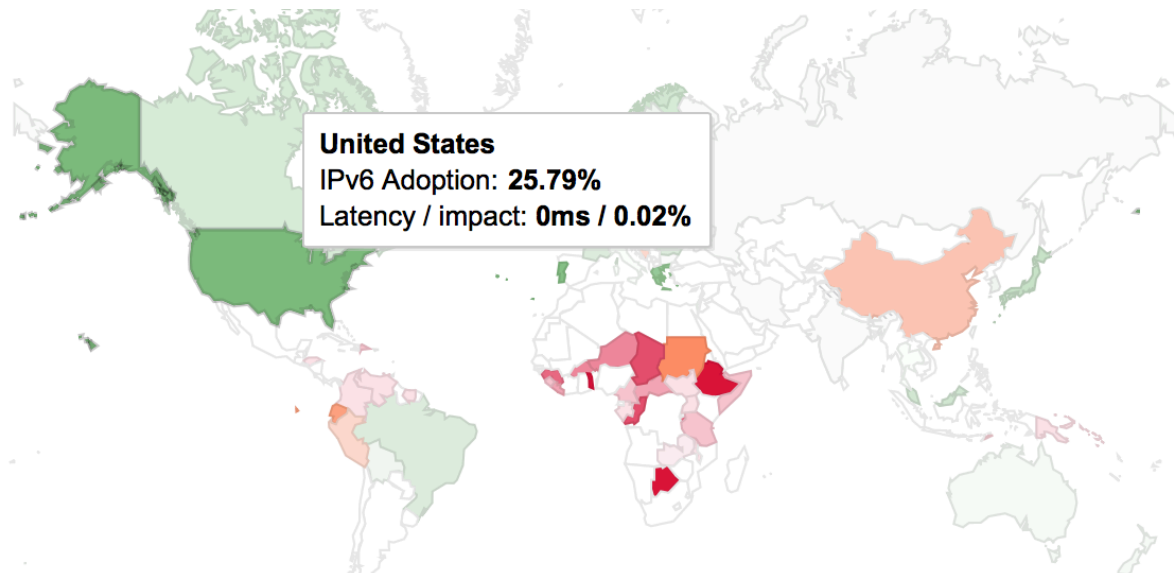
- Small networks can get a /24 once per six months for IPv6 transition
 - Cost likely to be lower than the transfer market
 - Reserved block likely to last several years
 - Can also have a request on the waiting list
- Larger networks can get pre-approved for 24 month need and seek IPv4 on the transfer market
 - Waiting list probably not a realistic option unless you can delay your IPv4 needs indefinitely
- All networks should begin IPv6 adoption

Moving to IPv6

Why Move to IPv6 Now?

- Being IPv4-only has costs
 - Transfer market, latency, CGN boxes, NAT
- Many operational issues solved by early adopters
- If not IPv6, then what?

Google's IPv6 Traffic Growing



- > 25% of US customers connected to Google via IPv6 - up from 10% one year ago today & growing rapidly

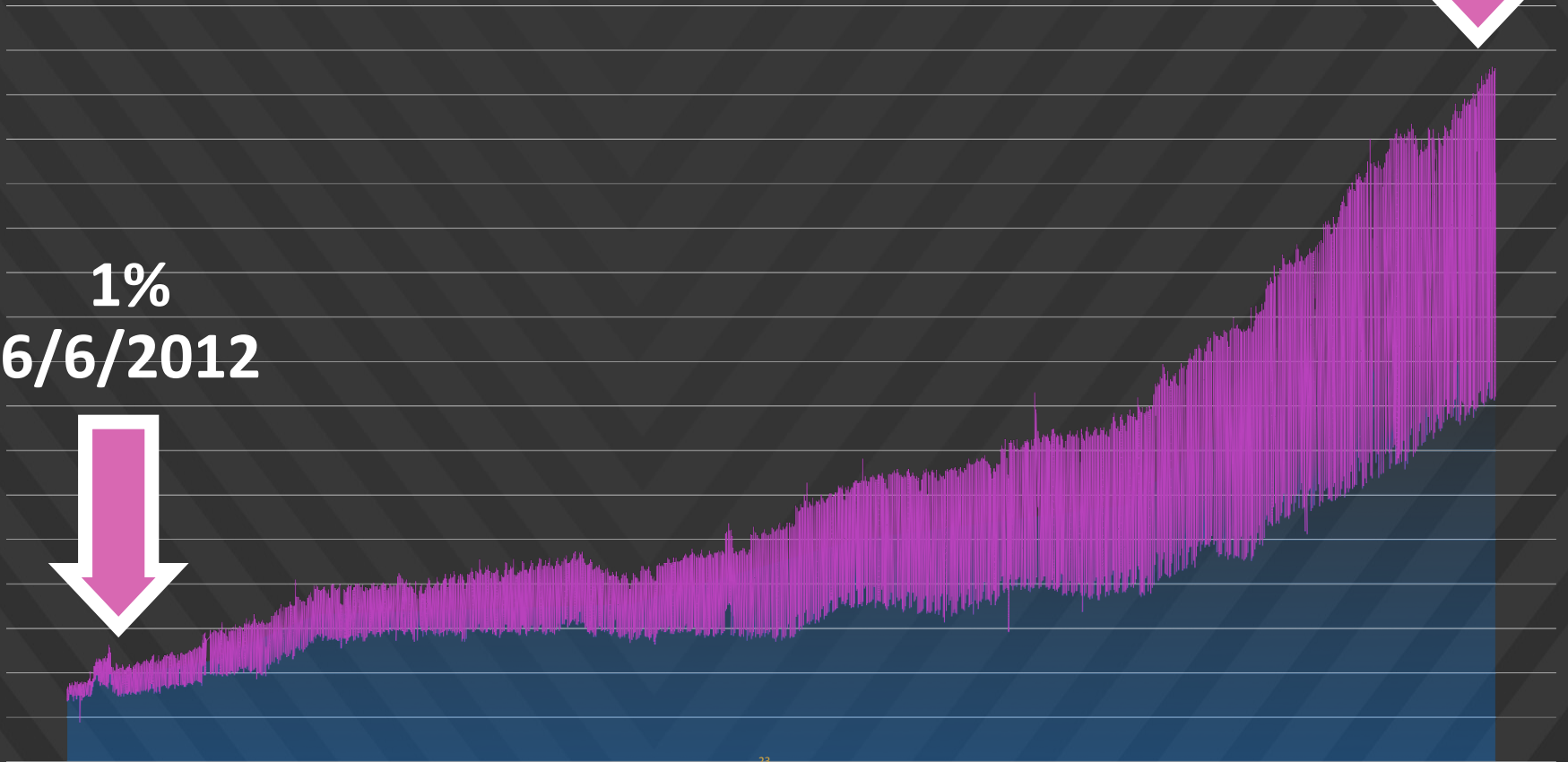
Facebook

- Over 10% of the world uses facebook over IPv6

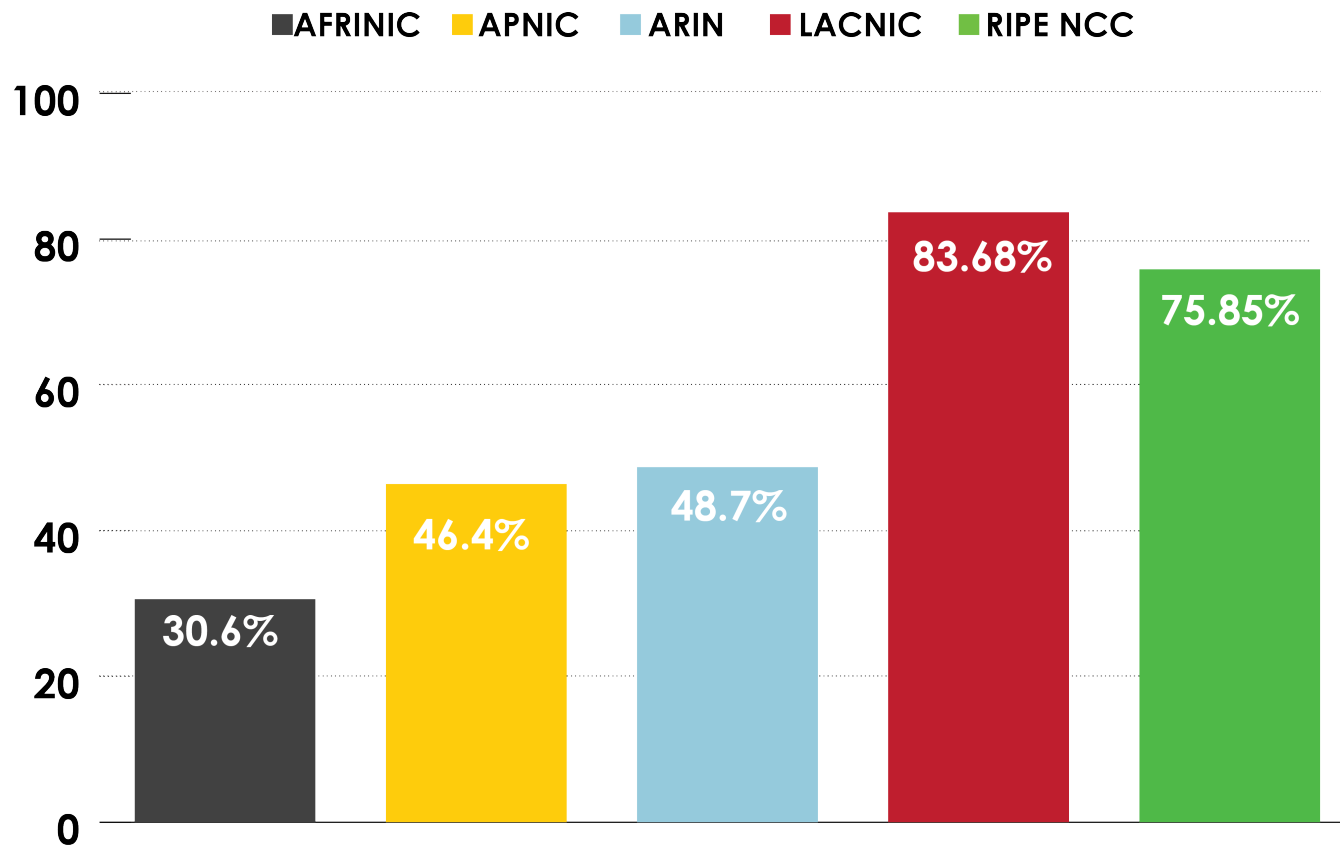
Over 10%
2015



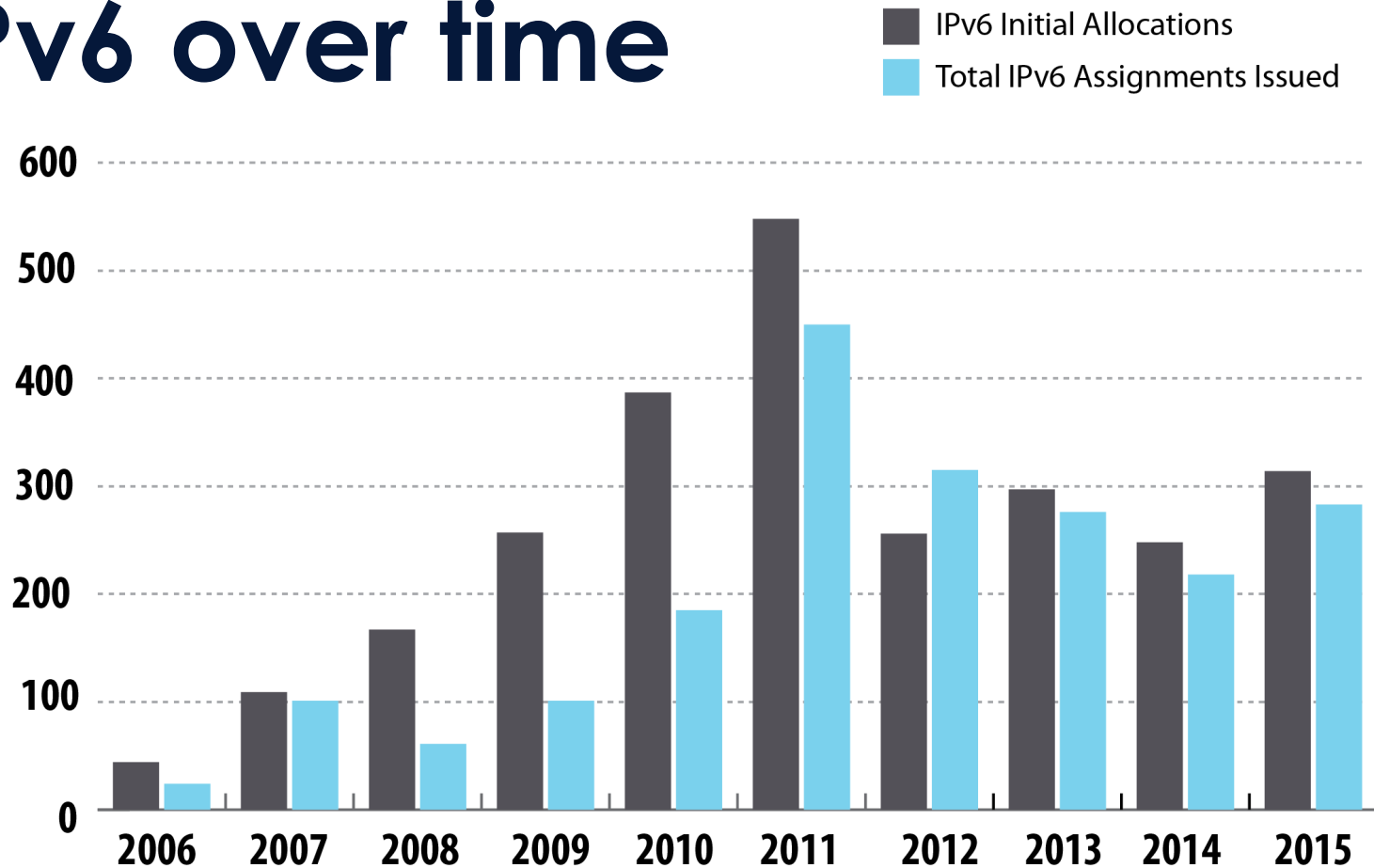
1%
6/6/2012



Global IPv6 Status Percentage of Members with IPv6



IPv6 over time



ARIN IPv6 Allocations and Assignments

Requesting IPv6 from ARIN is easy – ISPs

- Have a previous v4 allocation from ARIN or predecessor registry

OR

- Intend to multi-home

OR

- Provide a technical justification which details at least 50 assignments made within 5 years

Requesting IPv6 – End Users

- Have a v4 direct assignment from ARIN or predecessor registry
- OR**
- Intend to multi-home
- OR**
- Show how you will use 2000 IPv6 addresses or 200 IPv6 subnets within a year
- OR**
- Technical justification as to why provider-assigned IPs are unsuitable

Your IPv6 Checklist



- Get your IPv6 address space
- Set up IPv6 connectivity (native or tunneled)
- Configure your operating systems, software, and network management tools
- Upgrade your router, firewall, and other hardware
- Get your IT staff training
- Enable IPv6 on your website

Enable IPv6 on Your Website

WEBSITES THAT ARE FULLY

IPv6
ENABLED **MUST:**



**PUBLISH
AAAA RECORDS**



**BE REACHABLE OVER AN
IPV6 CONNECTION**



**SERVE DNS
OVER IPV6**

Learn More

www.GetIPv6.info



IPv6 Info Center

www.arin.net/knowledge/ipv6_info_center.html



www.TeamARIN.net

Operational Guidance

<http://www.internetsociety.org/deploy360/>



www.NANOG.org/archives/



http://nabcop.org/index.php/Main_Page

Internet Governance Forum – Enabling Environment for IPv6 Adoption

<http://www.intgovforum.org/cms/best-practice-forums/2015-bpf-outs>

ARIN's Policy Development Process

Overview

Basic steps

Major policy changes (examples)

A current proposal

How to get involved

Policy Development Process (PDP) Steps

- 1) Proposal – Someone in the community thinks a policy can be improved and documents
- 2) Draft Policy- Discussion on the list and possibly at meeting(s) - Is there really a problem? Is this a good solution?
- 3) Recommended Draft Policy - More discussion and presentation at meeting(s). Does community support turning this into policy?
- 4) Last call
- 5) Board Review
- 6) Staff Implementation (NRPM)

If you submit a proposal, you can participate further, or let the ARIN process “shepherd” it through the steps

Past Policy Changes: IPv6 Policy

Circa 2001: Initial IPv6 policy aligned with IPv4 at that time, conservation was important, small amounts issued for short periods, hierarchical distribution from upstreams, and, no end user policy at all

2003-2016 Dozens of proposals to improve IPv6 policy

Changes included: Minimum allocation size increased (/35 to /32), larger allocations from IANA, policy for end users, community networks (mesh networks), assignment sizes from ISPs to customers (/56s), larger amounts for ISPs and easier criteria, larger amounts for end users and easier criteria, bit boundary assignments and allocations, etc.

Policy Currently Under Discussion

- ARIN-2015-5: Out of Region Use
Would allow an organization to receive Internet number resources from ARIN for use out of region as long as the applicant is currently using at least the equivalent of a /22 of IPv4 space, /44 of IPv6, or 1 ASN within the ARIN service region.
- Earlier Abandoned Proposals
 - ARIN-2014-1: Out of Region Use
 - ARIN-2013-6: Allocation of IPv4 and IPv6 Address Space to Out-of-region Requestors
 - ARIN-2011-13: IPv4 Number Resources for Use Within Region
(continued on next slide)

2015-5 continued

- ARIN-2015-5 presented at ARIN 36 in Oct 2015
- AC found draft to be fair, technically sound and supported and promoted to recommended state (late Oct 2015)
- Presented as Recommended Draft Policy at NANOG 66
- Last Call was 24 February thru 9 March 2016
- AC sent to Board for adoption
- Board adopted policy 19 April meeting
- Pending implementation by Staff

How Can You Get Involved?

Two ways to learn and be heard

1. Public Policy Mailing List - open
2. Public Policy Consultations/Meetings - open
 - ARIN meetings (April and October)
 - ARIN Public Policy Consultations at NANOG
 - Remote participation supported

Takeaways

- 1) ARIN doesn't create number policy, you do.
- 2) Well documented policy development process includes assistance from ARIN AC and staff throughout the process.
- 3) Stay informed. Join the policy list and/or attend meetings (in person or remotely).

References

Policy Development Process (PDP)

<http://www.arin.net/policy/pdp.html>

Draft Policies and Proposals

<http://www.arin.net/policy/proposals/index.html>

Number Resource Policy Manual (NRPM)

<http://www.arin.net/policy/nrpm.html>

Q&A

