IPv6: No Longer Optional

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Quick History of the Internet Protocol

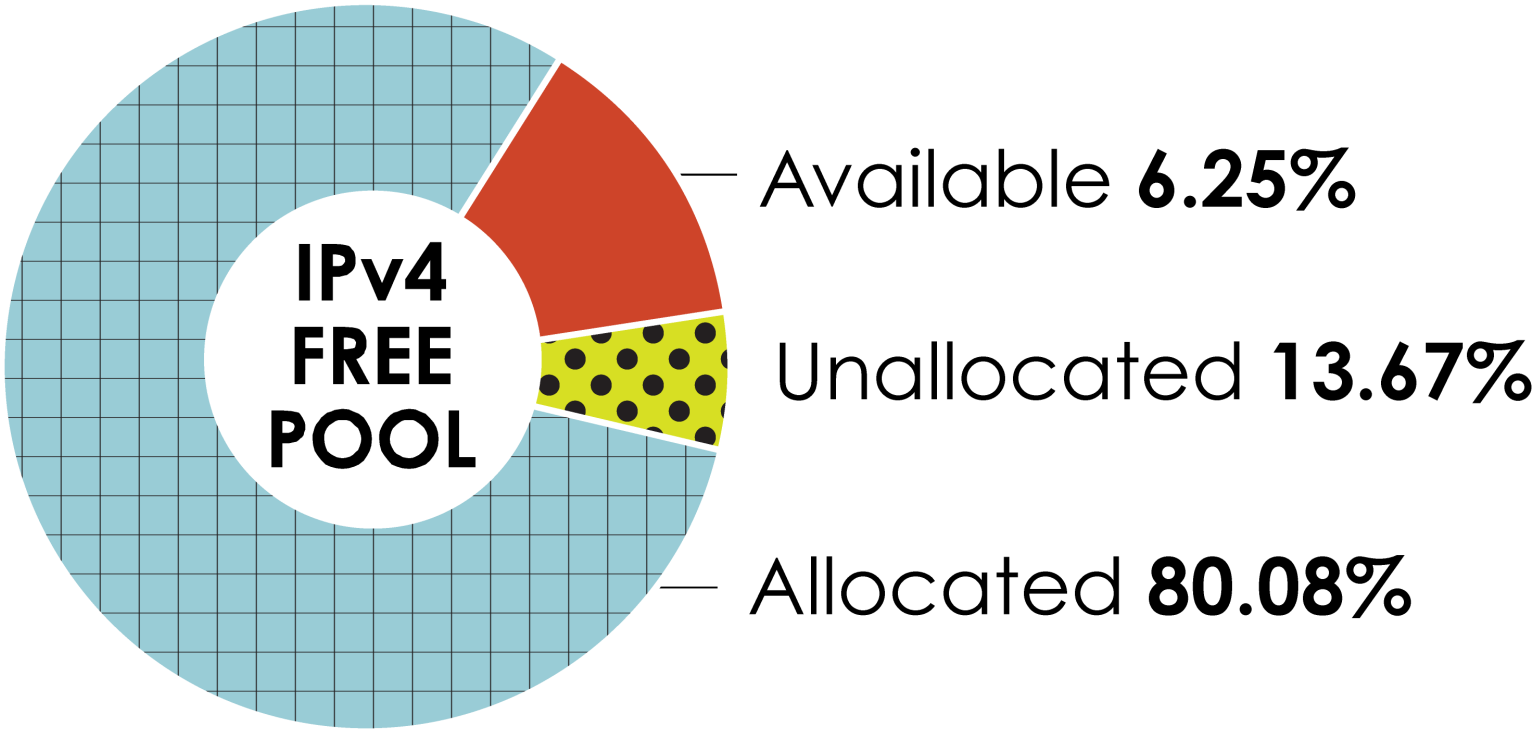
- Internet Protocol version 4 (IPv4, or just "IP")
  - First developed for the original Internet (ARPANET) in spring 1978
  - Deployed globally with growth of the Internet
  - Total of 4 billion IP addresses available
  - Well entrenched and used by every ISP and hosting company to connect customers to the Internet
  - Allocated based on documented need

- Internet Protocol version 6 (IPv6)
  - Design started in 1993 when IETF forecasts showed IPv4 depletion between 2010 and 2017
  - Completed, tested, and available for production since 1999
  - Total of 340,282,366,920,938,463,463,374,607,431,768,211,456 IP addresses available
  - Used and managed similar to IPv4

About IPv4 and IPv6

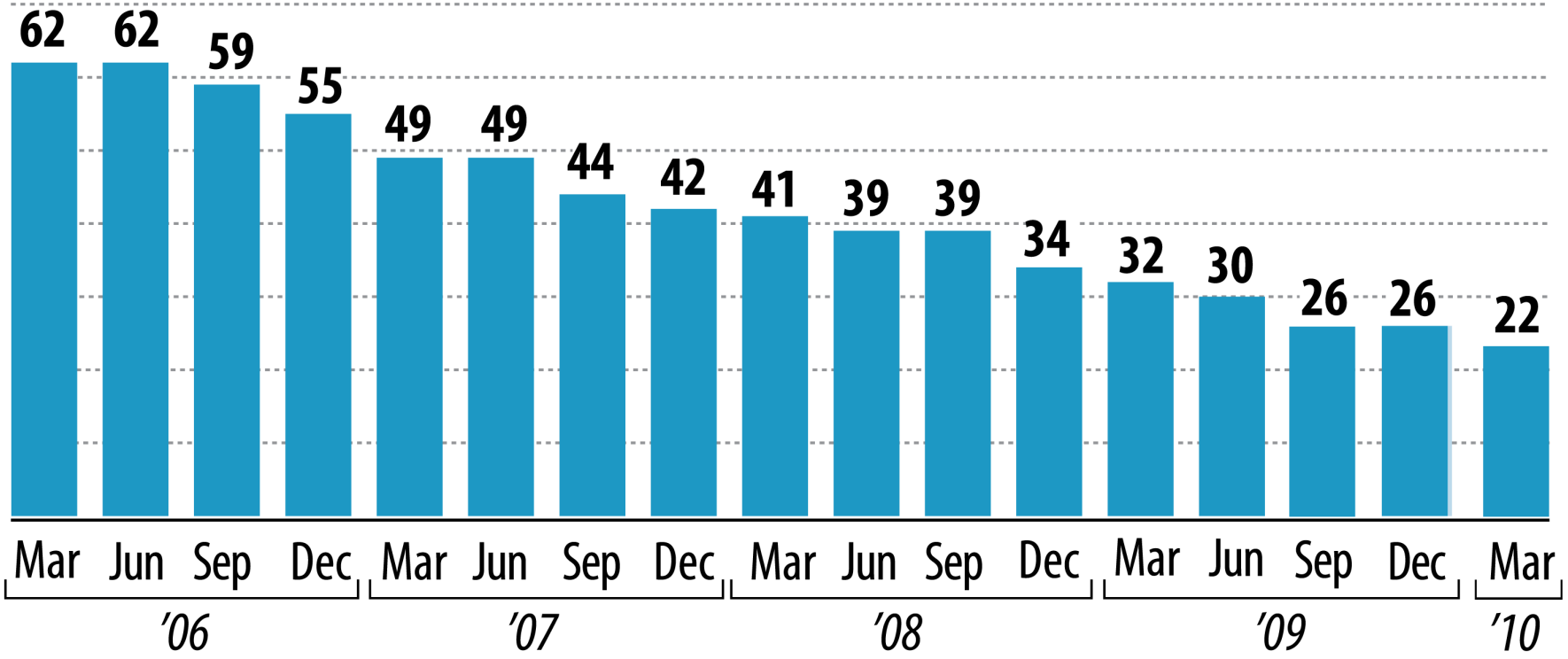
IP version	IPv4	IPv6
Deployed	1981	1999
Address Size	32-bit number	128-bit number
Address Format	Dotted Decimal Notation: 192.0.2.76	Hexadecimal Notation: 2001:0DB8:0234:AB00: 0123:4567:8901:ABCD
Number of Addresses	2^{32} = 4,294,967,296	2^{128} = 340,282,366,920,938,463, 463,374,607,431,768,211,456
Examples of Prefix Notation	192.0.2.0/24 10/8 (a "/8" block = 1/256th of total IPv4 address space = 2^{24} = 16,777,216 addresses)	2001:0DB8:0234::/48 2600:0000::/12

IPv4 Address Space Utilization



*as of 2 June 2010

Available IPv4 Space in /8s



In 2010, RIRs have been allocated ten /8s blocks as of 2 June, leaving sixteen /8s unallocated (16/256 = 6.25%)

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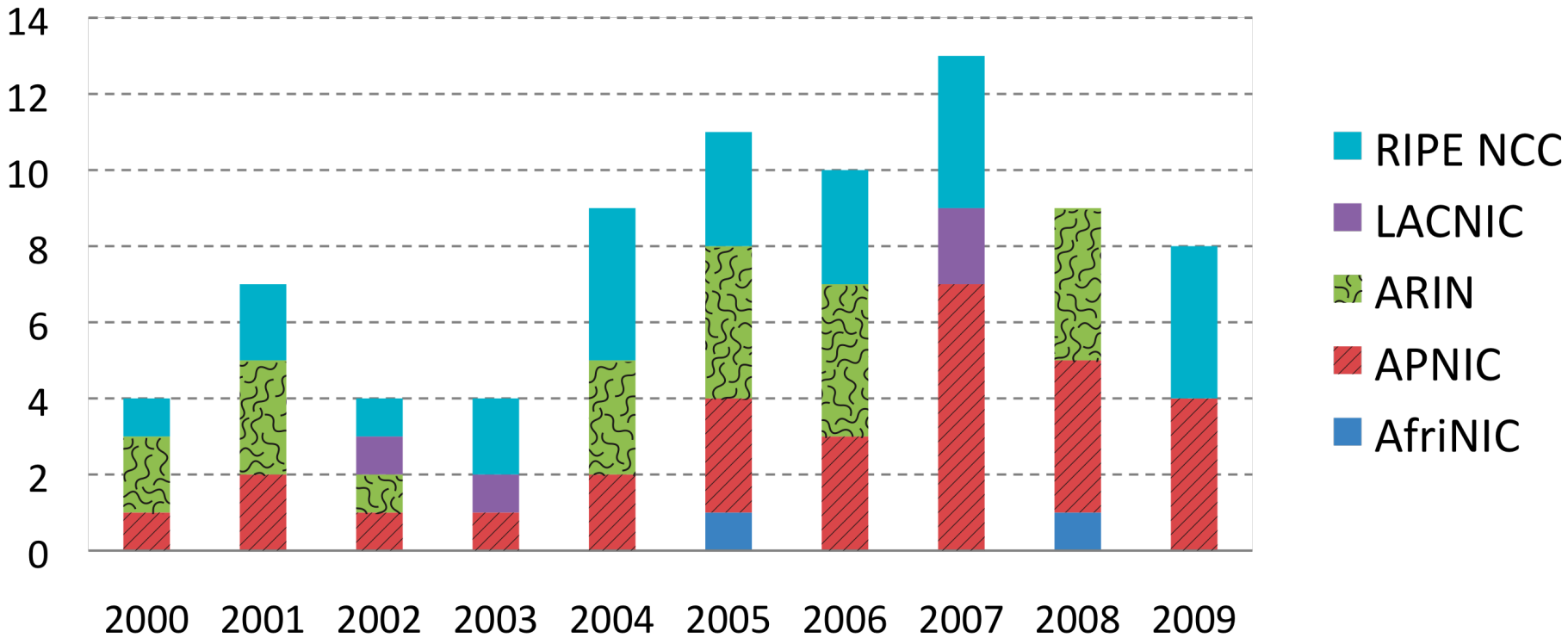
IPv4 Demand – RIR Allocations



In 2010, RIRs have been allocated ten/8s blocks as of 2 June.

IPv4 Depletion Situation Report

- The RIRs have needed between 8 and 12 /8s each year worldwide.
- There are 16 /8s remaining in the available pool as of 2 June 2010.
- Demand for IPv4 continues to grow from organizations around the world.

IPv4 & IPv6 - The Bottom Line

- We're running out of IPv4 address space.
- IPv6 must be adopted for continued Internet growth.
- IPv6 is not backwards compatible with IPv4.
- We must maintain IPv4 and IPv6 simultaneously for many years.
- IPv6 deployment has begun.

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IPv6 Deployment has begun

RIRs have been allocating
IPv6 address space since 1999.

Thousands of organizations have
received an IPv6 allocation to date.

ARIN has IPv6 distribution policies for
service providers, community networks,
and end-user organizations.

Today, the Internet is predominantly based on IPv4.

For the foreseeable future, the Internet must run both IP versions (IPv4 & IPv6) at the same time. (When done on a single device, this is called the "dual-stack" approach.)

Deployment is already underway: Today, there are organizations attempting to reach your mail, web, and application servers via IPv6...

Action Plans

What does this mean for:

- Broadband Access Providers?
- Internet Service Providers?
- Internet Content Providers?
- Enterprise Customers?
- Equipment Vendors?
- Government Organizations?

Call to Action
Broadband Access Providers

Your customers want access to the entire Internet, and this means IPv4 and IPv6 websites. Offering full access will require running IPv4/IPv6 transition services and is a significant engineering project.

Multiple transition technologies are available, and each provider needs to make its own architectural decisions.

Call to Action
Internet Service Providers

Plan out how to connect businesses via IPv6-only and IPv4/IPv6 in addition to IPv4-only.

Businesses are beginning to ask for IPv6 over their existing Internet connections and for their co-located servers.

Communicate with your peers and vendors about IPv6, and confirm their timelines for production IPv6 services.

Call to Action
Internet Content Providers

Content must be reachable to newer Internet customers connected via IPv6.

Access to your IPv4 only content will be dependent upon translation solutions run by the access providers.

Plan on serving content via IPv6 in addition to IPv4 as soon as possible.

Call to Action
Enterprise Customers

Mail, web, and application servers must be reachable via IPv6 in addition to IPv4.

Open a dialogue with your Internet Service Provider about providing IPv6 services.

Each organization must decide on timelines, and investment level will vary.

Call to Action
Equipment Vendors

There was probably limited demand for IPv6 in the past.

Demand for IPv6 support will become mandatory very, very quickly.

Introduce IPv6 support into your product cycle as soon as possible.

Call to Action
Government Organizations

Awareness

Coordinate with industry

Adopt incentives

- Regulatory
- Economic

Support and promote awareness and educational activities

Require IPv6-compatibility in procurement procedures

Officially adopt IPv6

IPv6 Adoption Needs

IPv6 address space

IPv6 connectivity (native or tunneled)

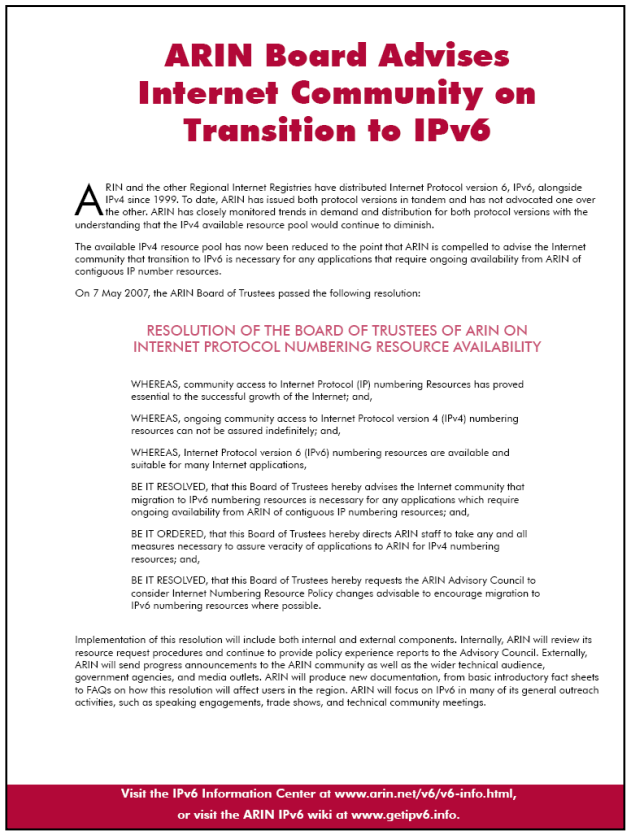
Operating systems, software, and network management tool upgrades

Router, firewall, and other hardware upgrades

IT staff and customer service training

Resources

- Information Page at www.arin.net/knowledge/v4-v6.html
  - Social Media at ARIN www.TeamARIN.net
  - IPv6 Wiki
  - Community Use Slide Deck
  - ARIN Board Resolution
  - Letter to CEOs



ARIN Board Advises Internet Community on Transition to IPv6

ARIN and the other Regional Internet Registries have distributed Internet Protocol version 6, IPv6, alongside IPv4 since 1999. To date, ARIN has issued both protocol versions in tandem and has not advocated one over the other. ARIN has closely monitored trends in demand and distribution for both protocol versions with the understanding that the IPv4 available resource pool would continue to diminish.

The available IPv4 resource pool has now been reduced to the point that ARIN is compelled to advise the Internet community that transition to IPv6 is necessary for any applications that require ongoing availability from ARIN of contiguous IP number resources.

On 7 May 2007, the ARIN Board of Trustees passed the following resolution:

RESOLUTION OF THE BOARD OF TRUSTEES OF ARIN ON INTERNET PROTOCOL NUMBERING RESOURCE AVAILABILITY

WHEREAS, community access to Internet Protocol (IP) numbering Resources has proved essential to the successful growth of the Internet; and,

WHEREAS, ongoing community access to Internet Protocol version 4 (IPv4) numbering resources can not be assured indefinitely; and,

WHEREAS, Internet Protocol version 6 (IPv6) numbering resources are available and suitable for many Internet applications,

BE IT RESOLVED, that this Board of Trustees hereby advises the Internet community that migration to IPv6 numbering resources is necessary for any applications which require ongoing availability from ARIN of contiguous IP numbering resources; and,

BE IT ORDERED, that this Board of Trustees hereby directs ARIN staff to take any and all measures necessary to assure veracity of applications to ARIN for IPv4 numbering resources; and,

BE IT RESOLVED, that this Board of Trustees hereby requests the ARIN Advisory Council to consider Internet Numbering Resource Policy changes advisable to encourage migration to IPv6 numbering resources where possible.

Implementation of this resolution will include both internal and external components. Internally, ARIN will review its resource request procedures and continue to provide policy experience reports to the Advisory Council. Externally, ARIN will send progress announcements to the ARIN community as well as the wider technical audience, government agencies, and media outlets. ARIN will produce new documentation, from basic introductory fact sheets to FAQs on how this resolution will affect users in the region. ARIN will focus on IPv6 in many of its general outreach activities, such as speaking engagements, trade shows, and technical community meetings.

Visit the IPv6 Information Center at www.arin.net/v6/v6-info.html, or visit the ARIN IPv6 wiki at www.getipv6.info.

Learn More and Get Involved

Learn more about IPv6

www.arin.net

www.getipv6.info

www.TeamARIN.net

Get Involved in ARIN

Public Policy Mailing List

Attend a Meeting

http://www.arin.net/participate/

FELLOWSHIP PROGRAM
American Registry for Internet Numbers

- Attend ARIN XXVI in Atlanta, Georgia!
  - Free meeting **registration**
  - Round-trip economy class **airfare** to the meeting, booked directly by ARIN
  - **Hotel** accommodations at the venue hotel, booked directly by ARIN
  - A small **stipend** to cover meals and incidental travel expenses.
- https://www.arin.net/participate/meetings/fellowship.html

Visit Us in the Exhibit Hall!

- Booth 513
- Educational Materials
- Swag

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Thank You