



# **Demystifying IPv6: Ensuring a Smooth Transition**

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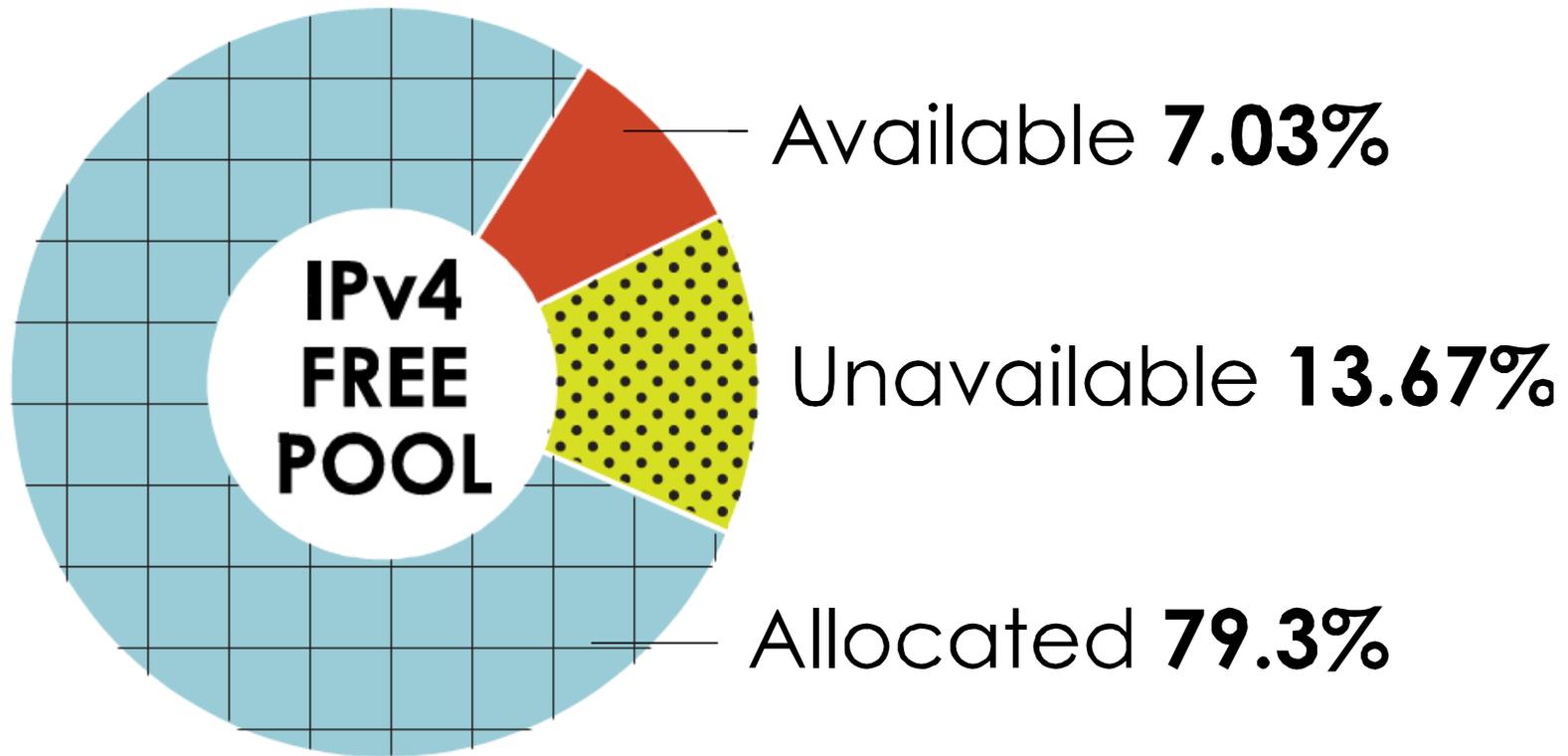
# Quick History of the Internet Protocol

- 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
  - 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

	Internet Protocol version 4 (IPv4)	Internet Protocol version 6 (IPv6)
<b>Deployed</b>	1981	1999
<b>Address Size</b>	32-bit number	128-bit number
<b>Address Format</b>	Dotted Decimal Notation: 192.0.2.76	Hexadecimal Notation: 2001:0DB8:0234:AB00: 0123:4567:8901:ABCD
<b>Prefix Notation</b>	192.0.2.0/24	2001:0DB8:0234::/48
<b>Number of Addresses</b>	$2^{32} = 4,294,967,296$	$2^{128} = 340,282,366,920,938,463,463,374,607,431,768,211,456$

# Available IPv4 /8s from IANA\*

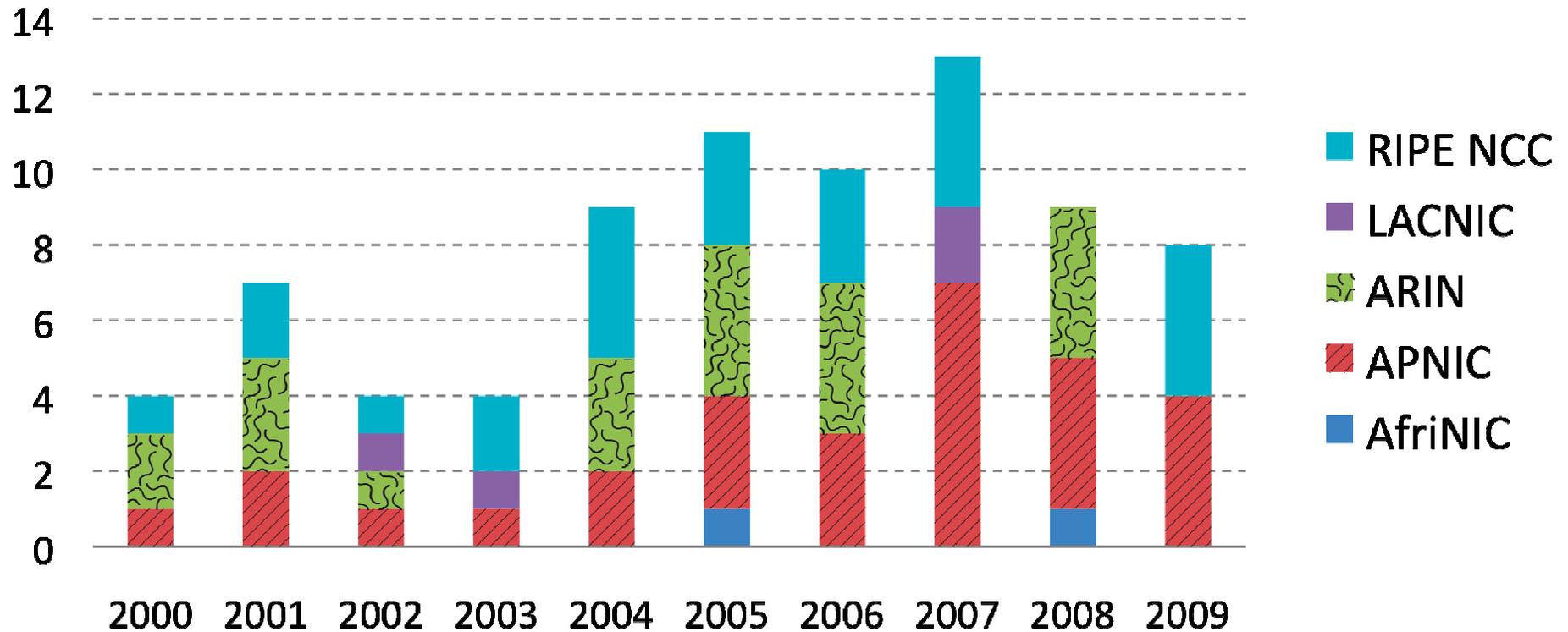


\* as of 8 May 2010

# What We Know

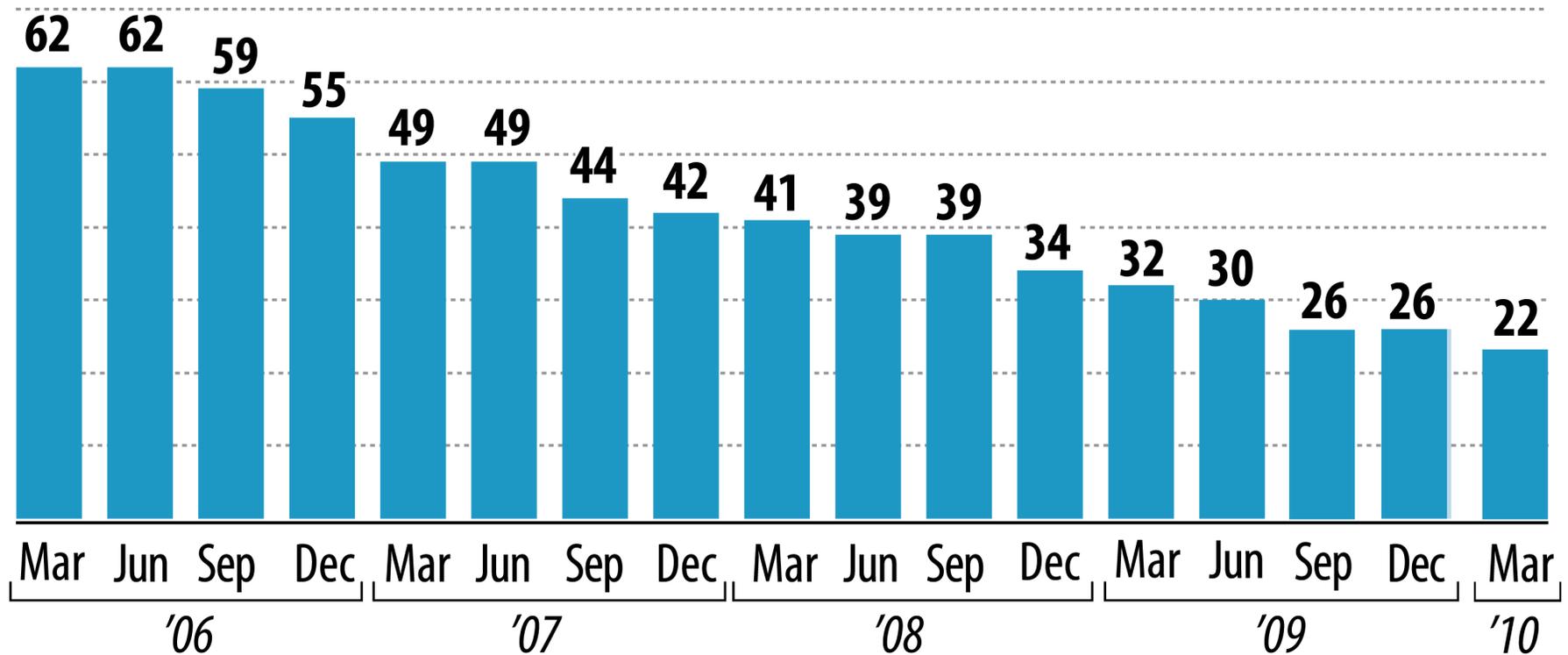
- RIRs allocate, on average, 10-12 /8s each year worldwide
- There are 18 /8s remaining at the IANA as of 8 May 2010
- Demand for IPv4 continues from organizations around the world

# /8s Allocated by IANA to RIRs



IANA has allocated eight /8s so far in 2010.

# Remaining IPv4 /8s from IANA



IANA has allocated eight /8s so far in 2010.

# What Will Happen (in no particular order)

- IPv4 demand continues
- IPv4 free pool depletes
- IPv4 NAT use increases
- IPv6 deployment

# 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



RIRs have been allocating IPv6 address space since 1999

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Thousands of organizations have obtained an IPv6 allocation to date

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

# Situation

Today, the Internet is predominantly based on IPv4.

The Internet must run two IP versions at the same time (IPv4 & IPv6) - this is the “dual-stack” approach.

# Situation

Today, there are organizations attempting to reach your mail, web, and application servers via IPv6.

In the near future there will be many more deployments using IPv6.

# Situation

## What requires contiguous number resources?

- Building out major new networks
- ISPs adding new customers

## What does this mean for:

- Enterprise Customers?
- Internet Service Providers?
- Equipment Vendors?
- Content and Hosting Firms?

# 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

## *Internet Service Providers*

Begin planning to connect customers via both IPv4 and IPv6 now.

Communicate with your peers and vendors about IPv6.

Consider IPv6 when making purchases.

# 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

## *Content Providers*

Content clients must be reachable to newer Internet customers.

Begin planning to connect hosting customers via both IPv4 and IPv6 now.

Encourage customers to use IPv6 and test their applications over it as soon as possible.

# Government Actions

## Awareness

Coordinate with industry

Adopt incentives

- Regulatory
- Economic

Support and promote activities

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](http://www.arin.net/knowledge/v4-v6.html)
  - Social Media at ARIN [www.TeamARIN.net](http://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](http://www.arin.net/v6/v6-info.html),  
or visit the ARIN IPv6 wiki at [www.getipv6.info](http://www.getipv6.info).

# Learn More and Get Involved

Learn more about IPv6

[www.arin.net](http://www.arin.net)

[www.getipv6.info](http://www.getipv6.info)

[www.TeamARIN.net](http://www.TeamARIN.net)

## Get Involved in ARIN

Public Policy Mailing List

Attend a Meeting

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

# Visit Us In The Exhibit Hall!

It's not the end of the world...



**IPv6:  
ARE YOU  
READY?**

[www.arin.net](http://www.arin.net)

The IPv4 free pool will be depleted in the next 2 years

**Native IPv6 customers are coming**

The time to adopt IPv6 is NOW!



- Booth #100
- Information & Fact Sheets
- Stickers & Goodies

# Thank You