




# Planning Your Conversion from IPv4 to IPv6

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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




## 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 <small>(a "/&gt; <td>2001:0DB8:0234::/48 2600:0000::/12</td> </small>	2001:0DB8:0234::/48 2600:0000::/12



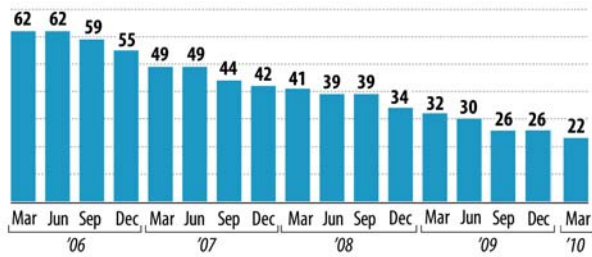
## IPv4 Address Space Utilization



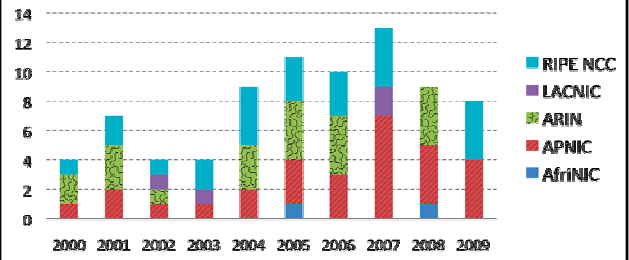
Category	Percentage
Available	6.25%
Unallocated	13.67%
Allocated	80.08%



## Available IPv4 Space in /8s



## IPv4 Demand – RIR Allocations



## 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

RIRs have been allocating IPv6 address space since 1999.

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Thousands of organizations have received an IPv6 allocation to date.

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ARIN has IPv6 distribution policies for service providers, community networks,

## Public Internet to IPv4 & IPv6

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

## 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

## 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

## 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

## 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

Develop IPv6 content with other government organizations

## 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



## 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/>

**Thank You**