Feast or Famine & Internet addresses

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From Experiment To Core Infrastructure

IANA begins allocating IPv4 addresses in early 1980

Who could imagine needing more than 2^{32} numbers?

IPv4: spreads like a pandemic

1985

Primarily Academic and Research Networks using IPv4.

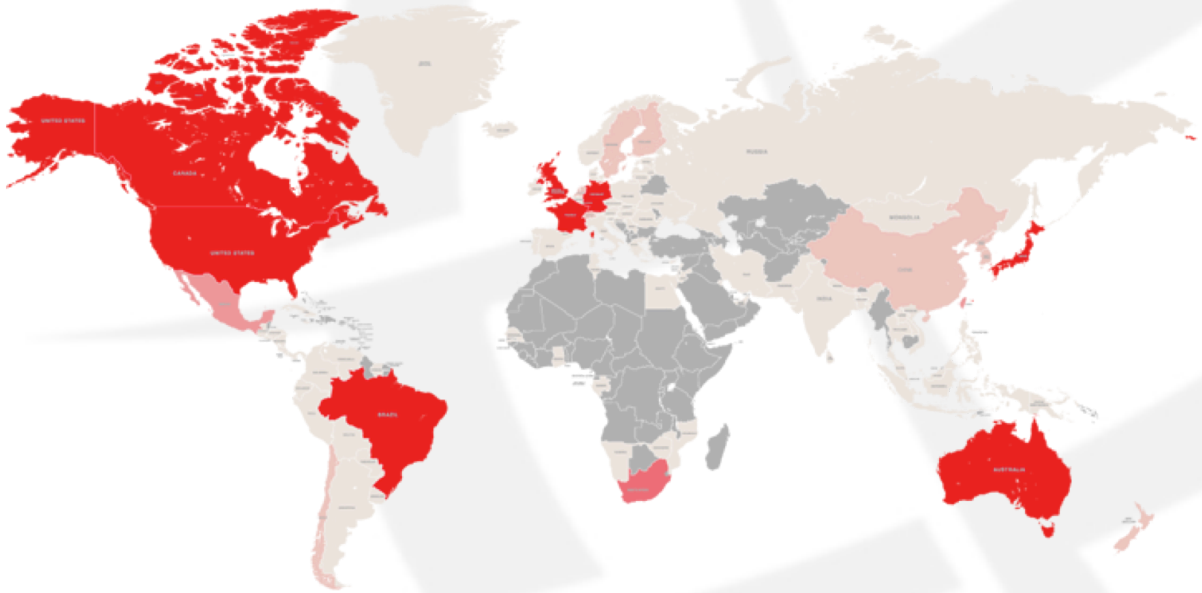
Grey – almost no numbers
Beige – very few numbers
Pink – more numbers

Data source: AfriNIC, APNIC, ARIN, LACNIC, RIPE NCC

IPv4: spreads like a pandemic

1995

As time progressed, Internet Service Providers built IPv4 networks and offered email and other Internet services.



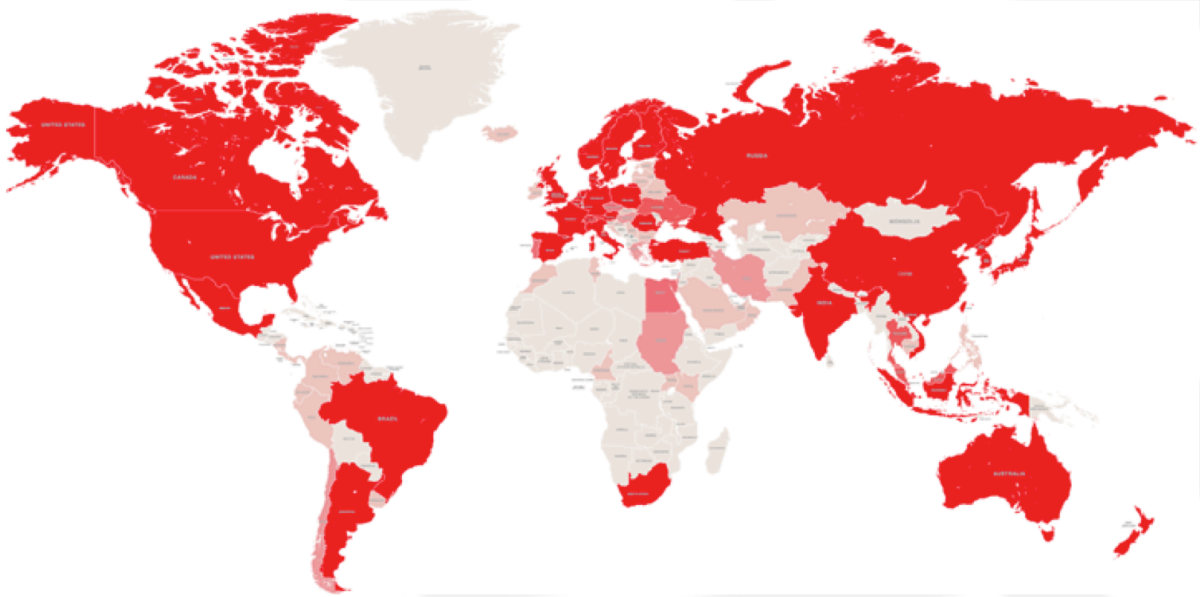
Grey – almost no numbers
Beige – very few numbers
Pink – more numbers
Red – most numbers

Data source: AfriNIC, APNIC, ARIN, LACNIC, RIPE NCC

IPv4: spreads like a pandemic

2010

Broadband services offered widely.
Widespread use of the web for business and commercial services.



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State of the IPv4 Pool - 2010

Approximately 3% of total IPv4 space left in the pool. That is approximately 100 million unique addresses.

What does this mean for the Internet?

Photo by Silverstealth.

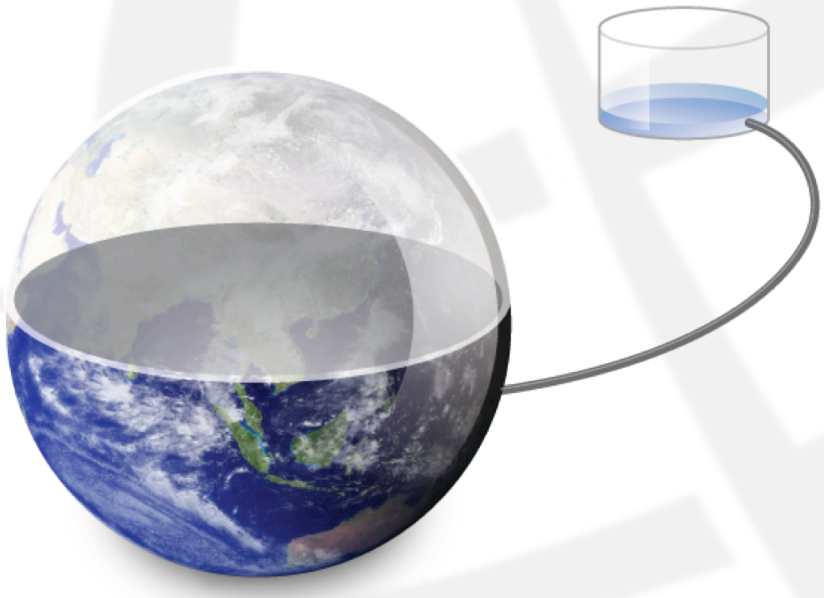
IPv4: launched the Internet

With a population of about 7 billion, only about half of the world can have an address.

Remember IPv4 has only about 3.7 billion unique addresses.

IPv4 is a victim of the success of the Internet.

What can be done to supply the needed addresses for new applications and services?



IPv6: more than enough

In 1998, a successor protocol, IPv6 was defined.

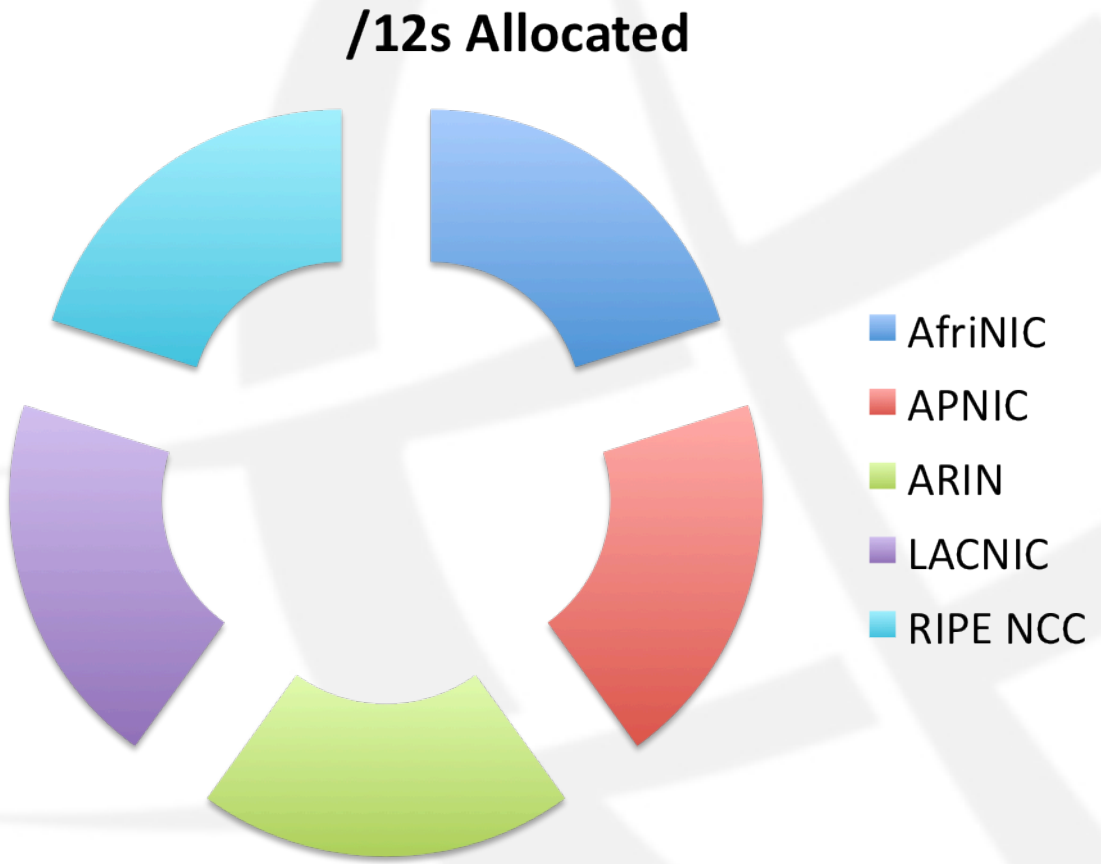
The 2 protocols are designed to work together.

IPv6 is $2^{128.}$ If all of Earth's 7 billion people received a /48, that is equivilant to receiving 1,208,925,819,614,629, 174,706,176 unique IP addresses.

IPv6: spread evenly, like butter

In 2006, all five Regional Internet Registries received a /12, when the global IPv6 allocation policy was ratified.

None of the RIRs have requested additional IPv6 address space yet.

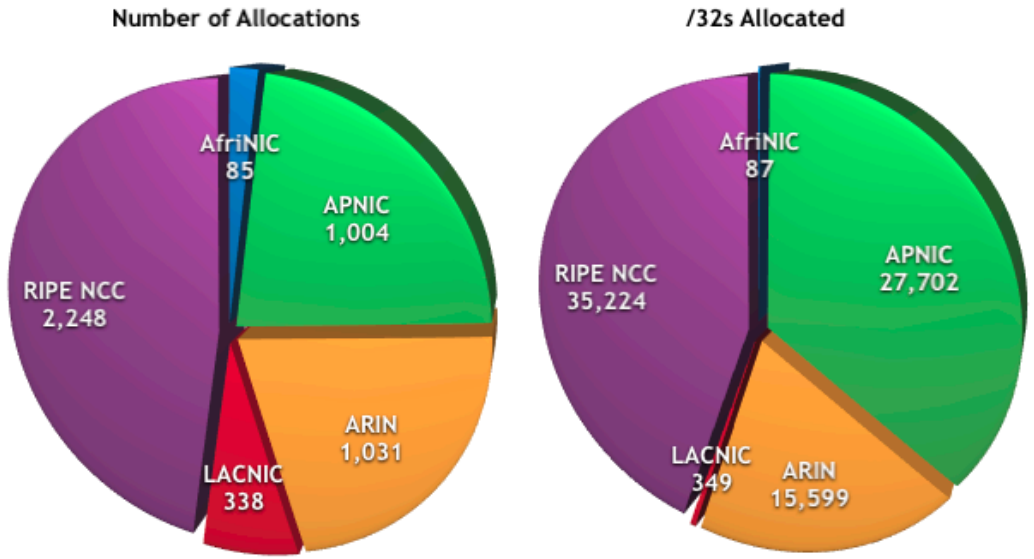


Looking in more detail

2010 is still early days for IPv6 deployment.

The growth and deployment of IPv6 is following a different pattern regionally than IPv4.

Asia and Europe are leading the way.



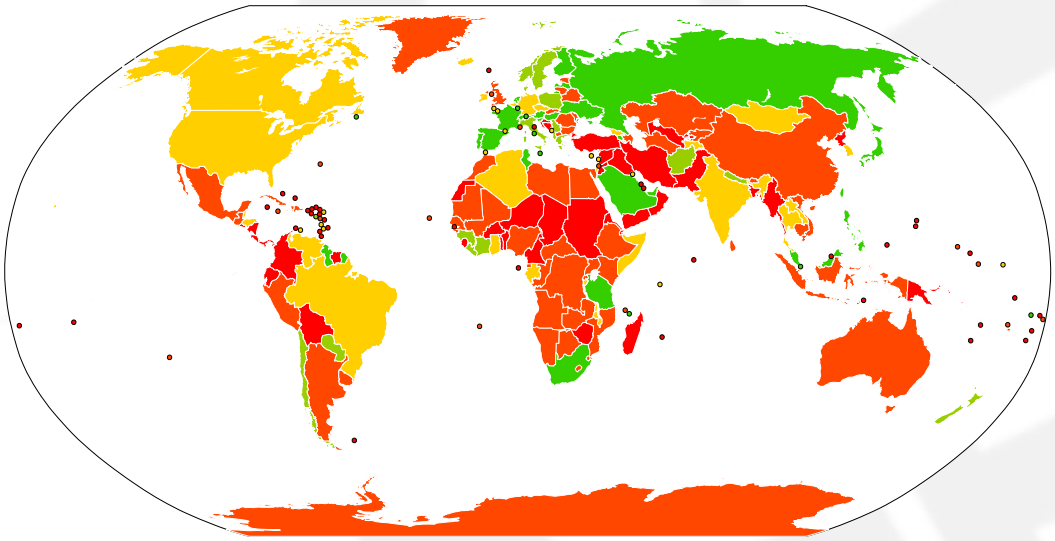
Data source: AfriNIC, APNIC, ARIN, LACNIC, RIPE NCC

Dependencies for IPv6 success?

- One key supporting technology is DNS
- Deployment of IPv6 DNS services needed in:
  - The root
  - Top Level Domains
  - Support for glue registration

IPv6 glue for TLDs in the root

IPv6 glue for TLDs was first added to the root in July 2004. Since then, most TLDs have added IPv6 connectivity for their nameservers and we track the diversity of routing for TLDs' nameservers.



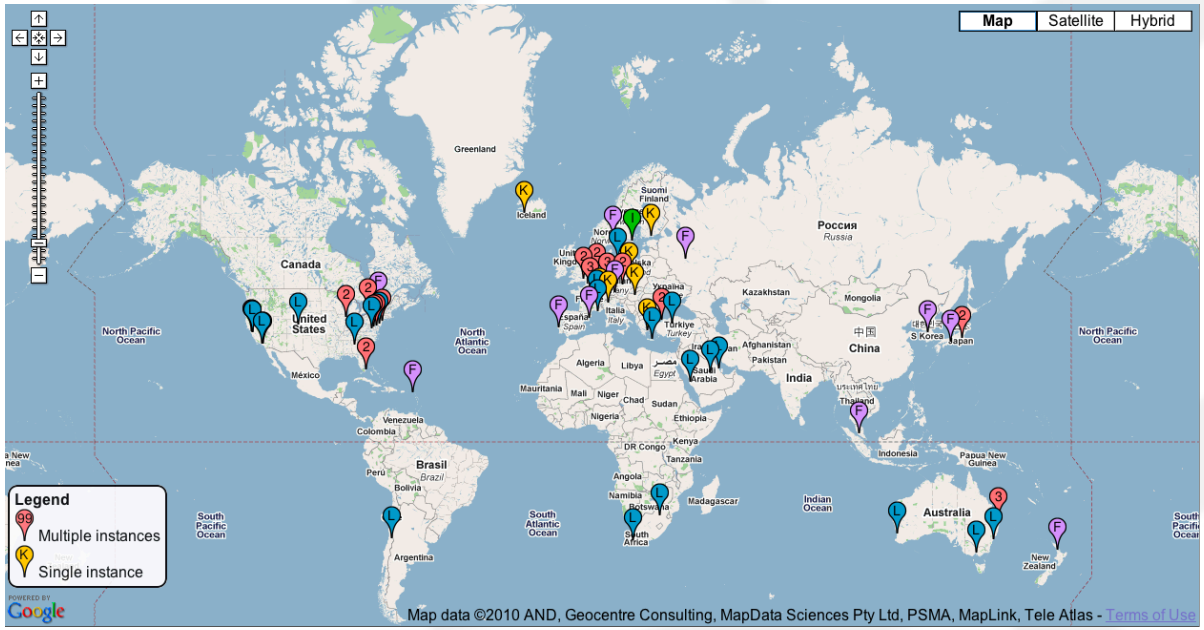
Situation in mid-October 2010

Red = 0 networks
Orange = 1 networks
Yellow = 2 networks
Pale Green = 3 networks
Green = 4+ networks

IPv6 has taken root in the DNS

IPv6 addresses for the root DNS servers were added to the root in January 2008. Additional servers' addresses have been added since then.

The map shows locations where root DNS servers are available over IPv6.

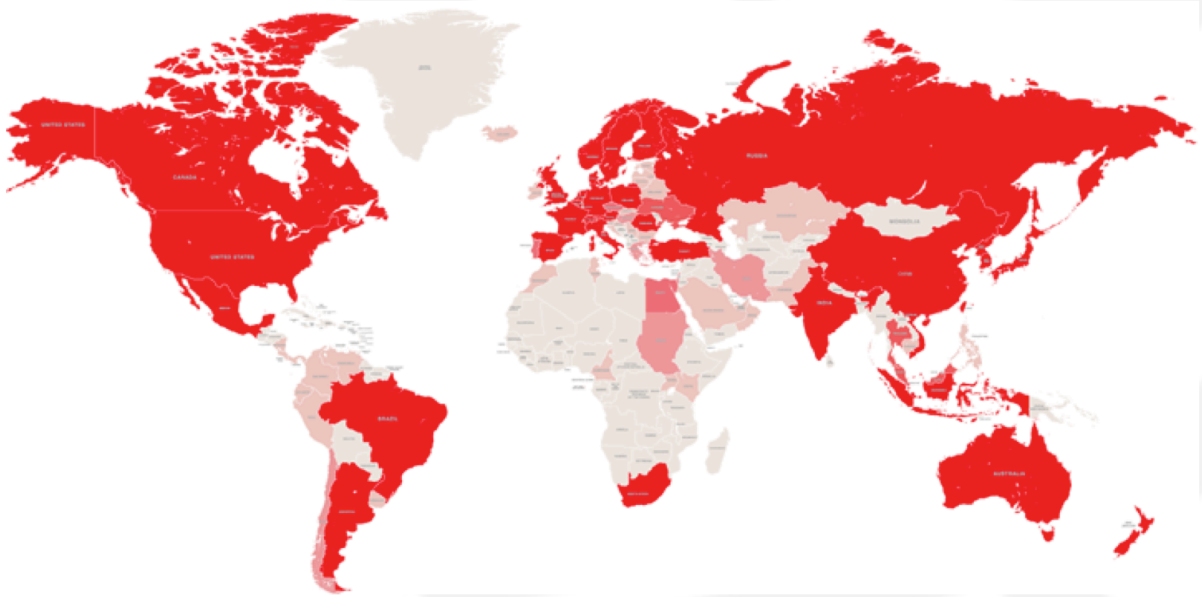


http://www.root-servers.org/meta/version-1.xml

IPv6 DNS readiness?

Those geographic areas with strong IPv4 deployment need IPv6 deployment, too.

A smooth transition is going to need root and TLD DNS servers available over IPv6



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Feast or Famine

The Choice is yours.

Seize the opportunity to avoid scarcity and famine of IPv4.

Begin the coexistance with IPv6 and feed the commercial appetite of the Internet for years to come.


ICANN
Thank you