ICANN

The Internet Corporation for Assigned Names and Numbers

IPv6 FACTSHEET

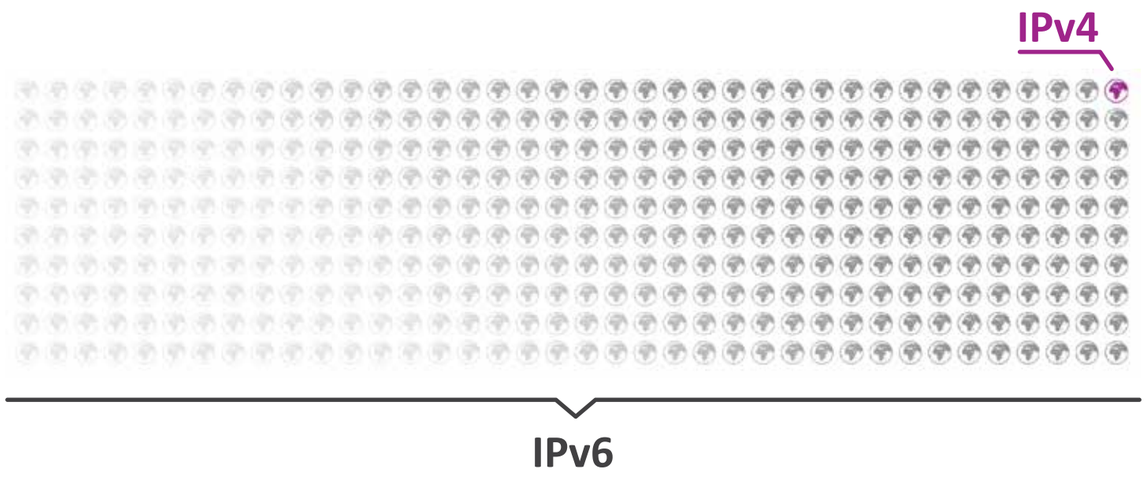
Introduction

Internet Protocol (IP) addresses are the unique numeric identifiers assigned to everything that is connected to the Internet, from web servers, through smartphones to cameras and printers. The most widely-used version of the Internet Protocol, IPv4, was developed in the early 1980s and has served the global Internet community for more than three decades. IPv4 has a capacity of just over 4 billion IP addresses, which seemed like more than enough for the experiment that the Internet started as in the 1980s. But after years of rapid Internet expansion, the pool of available unallocated IPv4 addresses has been almost fully allocated to Internet services providers (ISPs) and users.

Of the 4.3 billion IPv4 addresses, only 3.7 billion are usable by ordinary Internet access devices. The others are used for special protocols, like IP Multicasting. There are over seven billion people on the planet and, as of 2013, over 2.7 billion Internet users. Many of those users want to have more than one device with network connectivity. That's why we need IPv6.

Compared to IPv4's 32-bit address space of 4 billion addresses, IPv6 has a 128-bit address space, which is 340 undecillion (340 x 10^36) addresses. To put that in perspective, consider that our galaxy, the Milky Way, has an estimated 300 billion stars (300 x 10^9). There are over a trillion trillion more IPv6 addresses than stars in our galaxy. Because IPv6 is so large, it should last us considerably longer than the 30 years that IPv4 has lasted.

ISPs generally assign many thousands of network segments, called a /64, to a single subscriber connection at home, school, or business . If every person on Earth was given a connection with a /48, it would barely dent the available IPv6 address space. In fact, while the Earth's orbit around the Sun is only big enough to contain 3,262 Earths, it would take 21,587,961,064,546 Earths like ours to use all the addresses in the part of the IPv6 space we now use. That's a lot of addresses for a rapidly growing Internet!



What do IP addresses look like?

IPv4 addresses look like this: 192.0.2.53

IPv6 addresses look like this: 2001:0db8::53

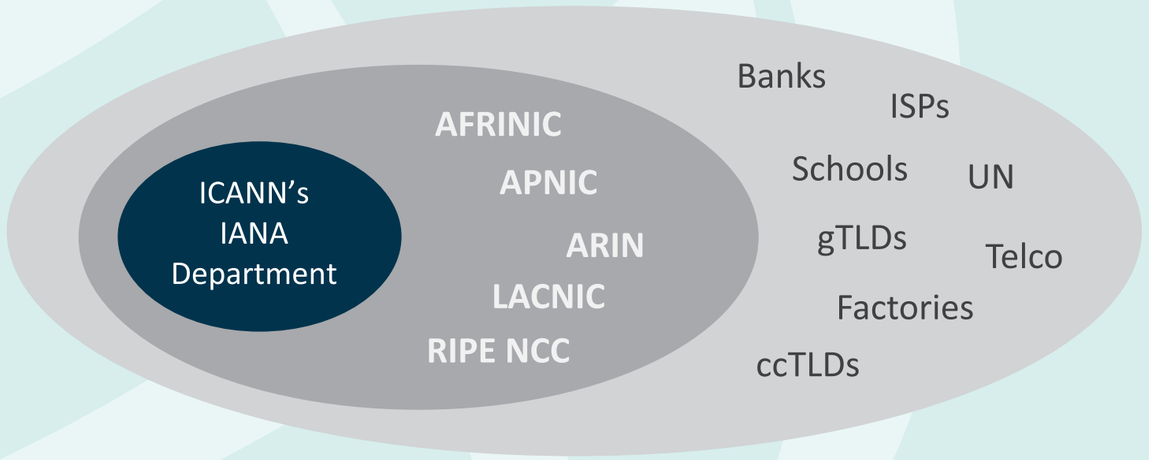
IPv6 addresses are written in hexadecimal, which can fit more information into fewer digits. Colons separate the segments of IPv6 addresses instead of dots. When you see two colons side by side in an IPv6 address, you know that all the segments between them contain only zeros. If you were to expand the IPv6 example used above without the colons, it would look like this: 2001:0db8:0000:0000:0000:0000:0000:0053

How are IPv6 addresses distributed?

IP addresses are distributed in a hierarchy. As the Internet Assigned Numbers Authority (IANA) functions operator, ICANN allocates IP address blocks to the five Regional Internet Registries (RIRs). They then allocate smaller blocks to ISPs and other network operators. From there, the ISPs and other Internet operators assign the addresses to the individual Internet connections used by most computer users.

Address distribution policies are developed in the RIRs' regional public policy forums. Representatives from industry, governments and civil society participate in these forums. The process is very similar to the consensus-based, (bottom-up) approach used to develop other ICANN policies, which are typically guided by ICANN's supporting (organizations).

The global policy for allocation of the IPv6 address space was ratified in 2006 and contains a formula for (determining) when an RIR qualifies for additional IPv6 address space and how much it can receive.
You can find the IPv6 allocation policy here: http://goo.gl/61TGDO



Are we ready for the transition to IPv6?

Most of the existing systems that we are using today actually support IPv6 already. For example, the laptops that we have in front of us support IPv6 and have done so for quite some time. IPv6 is not dramatically different on the network from IPv4, and those machines that we were using 30 years ago were capable of IPv4.

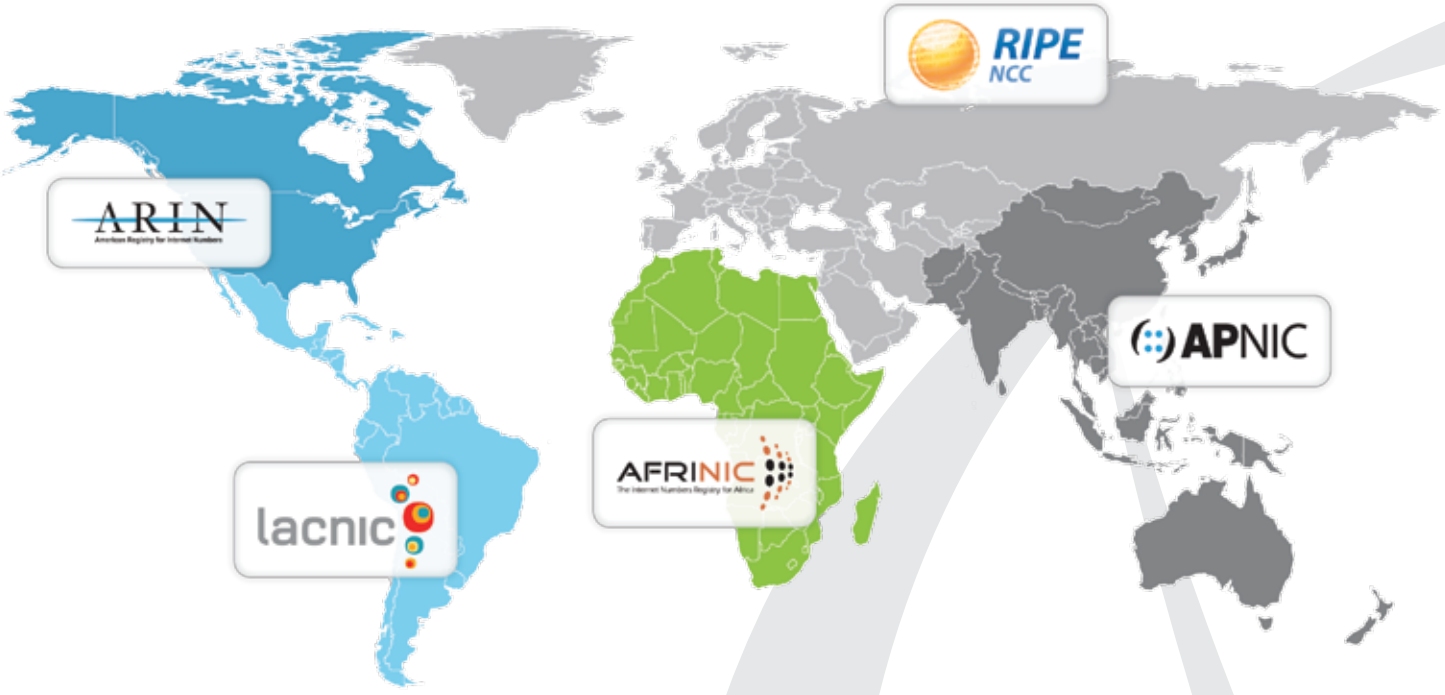
How can I get IPv6 connectivity?

If you're a home user, it's up to your ISP to initiate the transition from IPv4 to IPv6 on your network. In most cases, you won't have to do anything. If you are required to change something, such as your home router, your ISP will let you know. World IPv6 Launch began in 2012 and most major content providers and access networks have already started offering IPv6 services to ordinary Internet users. If current trends continue, it is estimated that half of the Internet users around the world will be IPv6-connected in less than six years.

More information and statistics about IPv6 deployment can be found at World IPv6 Launch:
http://www.worldipv6launch.org/

Which RIR runs the open policy forum for my region?

RIRs serve regions of roughly continental scope, with one RIR per continent. A list of regions and places served can be found on the NRO web site at http://goo.gl/OzbK9X.



Where can I find out more about IP address management?

Go to http://goo.gl/6KGs5e to listen to an e- learning podcast about IPv6.
You can read its transcript at http://goo.gl/P1DMyu

More information about IP address management can also be obtained from ICANN, the RIRs and the Address Supporting Organization's Address Council:

http://www.icann.org
http://www.nro.net
http://aso.icann.org