

IPv6 Around the World

Momentum for IPv6 deployment is increasing globally, and IPv4 addresses are becoming scarce. Around the world, there are efforts to increase broadband penetration: more smart phones and network-ready devices are entering the market, and the sheer number of Internet users is steadily increasing. A supply of global IP addresses larger than the currently available pool of IPv4 addresses is necessary to maintain the sustainable, long-term development of a ubiquitous and open Internet.

Technical, business, and government areas have been collaborating and preparing to deploy Internet Protocol version 6 (IPv6) since it first became available in the late 1990's. Key service providers and content suppliers are deploying IPv6

capabilities on their infrastructures. Numerous governments, through partnerships with the private and civil sectors, are actively engaged in activities designed to ensure their citizens have Internet access via IPv6. Meanwhile, the Internet technical community is proactively involved in a range of cooperative initiatives to raise awareness and prepare the technical infrastructure for large-scale IPv6 adoption.

Global IPv6 deployment is vital to the continued growth and stability of the Internet. Key organizations are implementing IPv6-ready networks and are working to ensure all regions and sectors have access to the equipment and education necessary to join the IPv6 Internet.



Distributing IPv6 Around the World

Drawing from a central global source of IP address space – the Internet Assigned Numbers Authority (IANA) – the five Regional Internet Registries (RIRs) manage the distribution of IP addresses directly to Internet Service Providers (ISPs) and network operators within their regions.

The RIRs allocate IPv6 address space based on established need, according to policies created by the Internet community, using open and transparent policy development processes. These policies determine how address space is distributed among regional networks and help network operators get the most out of their allocations.

Because IPv4 and IPv6 will need to coexist on networks for the foreseeable future, extra effort must be made during the transition phase to ensure all parts of the Internet remain reachable over both IPv4 and IPv6.

To date, the RIRs have allocated the equivalent of more than 11 billion /48 IPv6 address blocks to network operators, which is already significantly larger than the size of the entire IPv4 address space. While this is a significant distribution of IPv6 addresses, it amounts to less than 0.004% of the unallocated IPv6 address pool.

IPv6 allocations are being made all over the world. In the AFRINIC region, which serves Africa, IPv6 allocations are equivalent to 5,000 times the amount of IPv4 address space that has been assigned to end users in the region. Around half of the RIPE NCC's members located throughout Europe, the Middle East, and parts of Central Asia, have an IPv6 allocation.

Doing Business Over IPv6

Throughout the world, the commercial sector is embracing IPv6. Results of the 2012 Global IPv6 Deployment Survey, supported by the RIRs, show the level of IPv6 presence among the respondents continued to grow for the third straight year. The survey findings point to a shift in emphasis from “IPv6 preparedness” to IPv6 usage. Survey results are available at:

www.nro.net/documents/2012-ipv6-survey-results

While Internet traffic via IPv6 is still significantly less than IPv4, there has been an increase in the speed of deployment as market leaders such as Google and Microsoft deploy IPv6 in their products and on their networks.

Internet Service Providers

Many ISPs, including Free (France), Hurricane Electric (USA), XS4ALL (Netherlands), GTD Group (Chile), NTT (Japan), D-NET (Indonesia), and Sify (India), to name just a few, provide or plan to provide IPv6 services to both business and residential customers.

- Comcast and Verizon (US) have both commenced customer trials over IPv6.
- AT&T (US) offers new services and products to keep up with the US Government's federal mandate to deploy IPv6.
- Softbank Yahoo! Broadband (Japan) recently began to implement its IPv6 transition strategy.
- RCP (Peru) supports IPv6 for all its corporate customers and is planning to roll out IPv6 on residential services.
- Apple iOS 6 now supports IPv6, and iPhone users can access the Internet via IPv6 using WiFi and LTE.
- ISPs all over Africa now have native IPv6 services that they offer to their customers including LinkdotNet, TEdata(Egypt), Safaricom (Kenya), Simbanet (Tanzania), Internet Solutions and Tenet (South Africa), and Sonatel (Senegal).

Content Providers

Major Internet content providers such as Google (including YouTube), Yahoo, and Netflix provide the infrastructure for their users to access content directly over IPv6.



Governments Working Toward IPv6

Governments around the world support and promote the adoption of IPv6. Through partnerships with the private and civil sectors, governments are helping to ensure their citizens have access to all of the Internet's benefits. Today, that means access via IPv6, and its progress is occurring all around the world.

North America

The first phase of IPv6 adoption for the Canadian government focuses on IPv6 connectivity for public websites through a shared service by September 2013. The next phase will focus on enabling IPv6 across principal GC public websites by early 2015.

The US. Federal Government issued its first IPv6 transition plan in 2005 and is currently monitoring IPv6 deployment and conducting equipment testing. A 2010 mandate requiring US Government Executive Departments and Agencies to implement IPv6 by 2014 is in a phased approach.

Latin America

In particular, the Columbian Telecommunications and ICT Ministry published in 2011 a declaration recommending coordination efforts for implementing IPv6 in this country. Also, Ecuador's Telecommunications Ministry celebrated three different "Ministerial Agreements" demanding public sector IPv6 compatibility by establishing requirements for upgrades and other technical procurements. The first government that officially supported the adoption of IPv6 was Cuba in 2008 when their Ministry of Technology resolved that all the technology acquisitions must be IPv6 compatible.

Caribbean

As early as 2008 the Inter-American Telecommunication Commission (CITEL) recommended that its member states, in conjunction with the private and academic sectors, promote IPv6 in their respective countries. CITEL members include 13 Caribbean economies as part of the 35 independent state members. Organizations such as the Caribbean Telecommunications Union, with many Caribbean nation members, conduct widespread outreach and work closely with governments in the region on IPv6 deployment.

More specifically the government of Grenada has requested ISPs in the country do all they can to make the island IPv6 ready. The Bureau of Telecommunications and Post in Curacao last month sponsored an IPv6 day to promote awareness.

Middle East

Lebanese networks are among the first in the Middle East able to connect and peer at the Beirut Internet Exchange (Beirut IX) over IPv6. The Saudi Arabia IPv6 Task Force was established in 2008, bringing together stakeholders from the public and private sectors, and has held more than 10 meetings.

Africa

Governments in Algeria, Cameroon, Egypt, Kenya, Mauritius, Nigeria, Senegal, South Africa, Uganda, Tanzania, and Tunisia are among those who have created an IPv6 task force with significant government involvement to increase local awareness and encourage network operators to implement IPv6.

European Union

GEN6 (Governments ENabled with IPv6), launched in January of 2012, is a coordinated European Commission project to facilitate IPv6 deployment in public sector networks, and follows previous work including a two-day conference in December 2010, IPv6: The Way Forward, and an IPv6 Workshop in June 2011.

Asia Pacific

Several governments in the AP region have committed to IPv6 deployment within prescribed timelines. The Asia-Pacific Economic Cooperation Telecommunications and Information working group (APEC TEL) has written "IPv6 Guidelines" based on APNIC's recommendations. The biannual APEC TEL ministerial meeting, TELMIN, has produced two statements endorsing those guidelines.

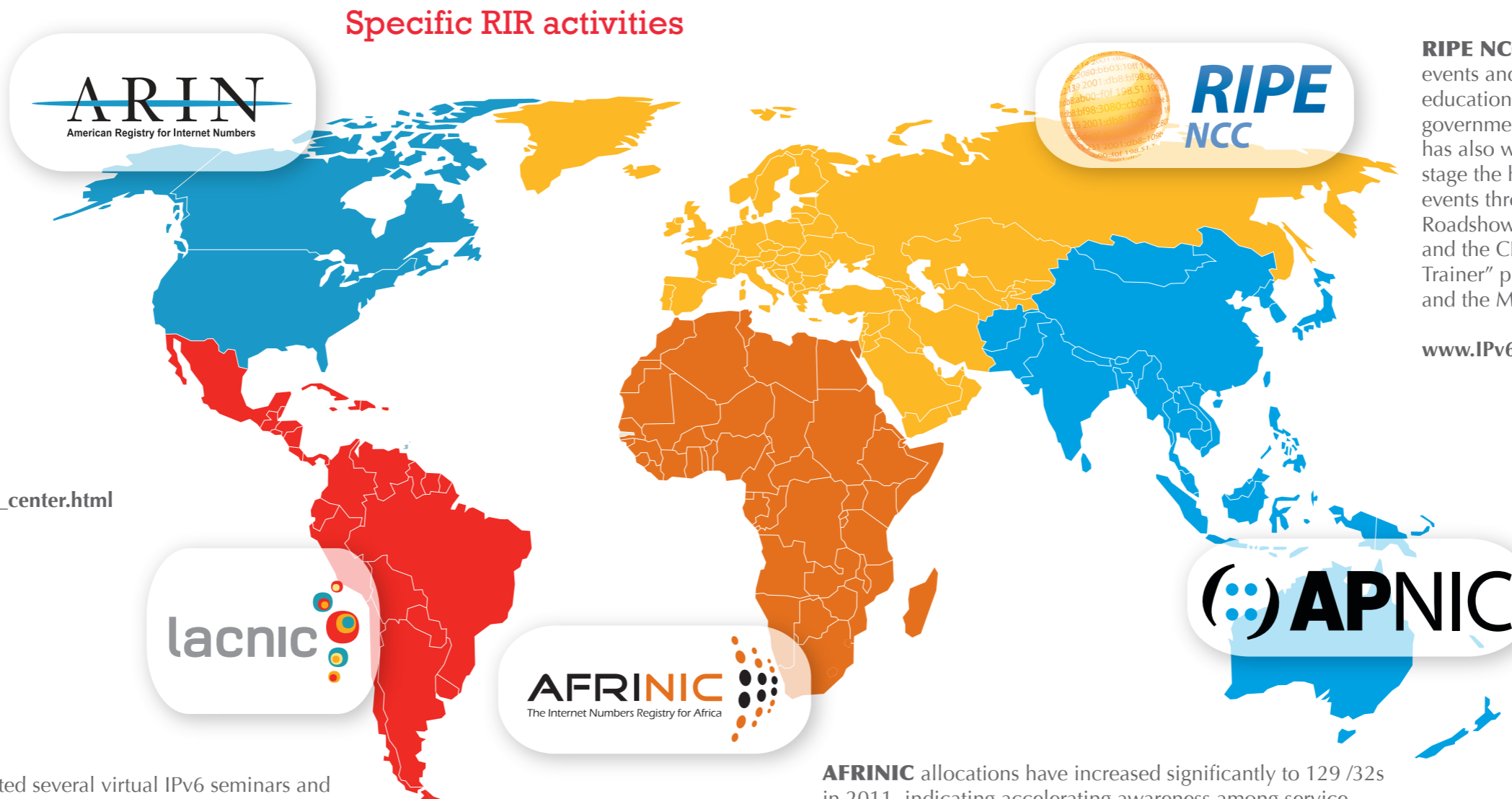
Regional Internet Registries

The core function of the RIRs is the distribution and registration of Internet number resources - IPv4, and IPv6 address space and ASNs. The policies that determine these processes are developed by open consensus. In addition, the RIRs play a vital role in raising awareness about IPv6. This includes human capacity building through training for technical staff, as well as more general outreach and education, ensuring all Internet stakeholders understand the importance of timely IPv6 deployment.

All five RIRs have deployed IPv6 in their own networks and have all of their services available over IPv6. RIRs also work closely with their communities to educate, promote, and share information relating to IPv6. These efforts include dedicated websites, training courses, multi-stakeholder outreach activities, and IPv6 network measurement and analysis. The RIRs also engage governments in their respective regions to ensure the needs and concerns of the public sector are understood.

In 2012, **ARIN** spoke or exhibited at the Consumer Electronics and Cable Shows, Interop, North American IPv6 Summit, Federal IPv6 task force meetings, Caribbean Telecommunication Union ICT Roadshows, and at Jamaica Internet Day. ARIN continues to be an active participant in regional operator forums such as CaribNOG and NANOG, and has hosted multiple "ARIN on the Road" educational events. ARIN also engages with the media, both to dispel misinformation and to help educate the non-technical community about changes coming as the IPv6 Internet grows.

www.arin.net/knowledge/ipv6_info_center.html



Specific RIR activities



RIPE NCC conducts on-site IPv6 training events and publishes a wide range of educational documents for technical and governmental audiences. The RIPE NCC has also worked closely with MENOOG to stage the highly successful IPv6 Roadshow events throughout the Middle East. IPv6 Roadshows will be expanded to Russia and the CIS countries in 2012. A "Train the Trainer" program is also underway in Russia and the Middle East.

www.IPv6ActNow.org

LACNIC has hosted several virtual IPv6 seminars and technical workshops around the region, including seminars during the World IPv6 Launch and a panel discussion during the 2012 ICANN meeting in Costa Rica. There has been a concerted effort this year to approach the non-technical public, to create discussion on IPv6 business models among participants. Finally, LACNIC helped coordinate an IPv6 Week in conjunction with NIC Brazil and ISOC.

www.portalipv6.lacnic.net

AFRINIC allocations have increased significantly to 129 /32s in 2011, indicating accelerating awareness among service providers and organizations. Likewise, the percentage of African ASNs that advertise IPv6 has jumped by 200% from 5.5% to 12.2%, indicating increased user deployment on routers. AFRINIC's outreach programs are also focusing on IPv6 deployment training, with almost 2000 engineers trained over the past two years. Dedicated training is also conducted at AFRINIC events on transition mechanisms, peering, and interconnection.

www.afrinic.net/index.php/en/statistics/ipv6-resources

APNIC has increased the frequency of IPv6 training courses and devotes a full day during the twice-yearly Conferences to practical discussions about IPv6 deployment. APNIC engages with intergovernmental forums in the region, and is regularly invited to the APEC TEL meetings and TELMIN ministerial meetings as an expert guest on IPv6. APNIC administers the APIIPv6 Task Force, where participants give updates on national progress.

www.apnic.net/ipv6

IPv6 and the Technical Community

The technical community is responsible for much of the work necessary to make IPv6 access ubiquitous. Organizations such as the Internet Society (ISOC), the Internet Corporation for Assigned Names and Numbers (ICANN), and the RIRs as well as many academic networks are involved in several joint initiatives to raise awareness about IPv6 deployment and how everyone can contribute.

Root Name Servers and Reverse Root Name Servers

Nine of the 13 root name servers offer services over IPv6 at multiple locations around the world. All five Reverse Root Name Servers operated by the RIRs support native IPv6.

Top-Level Domains

Fifteen out of 20 generic Top-Level Domains (TLDs) have deployed IPv6 on their infrastructure, including .com, .net, and .org and 152 out of 248 country code TLDs (ccTLDs) have also deployed IPv6.

World IPv6 Launch

On 6 June 2012, major Internet service providers (ISPs), home networking equipment manufacturers, and web companies around the world permanently enabled IPv6 on their networks. The event built on the success of World IPv6 Day held a year earlier, when websites and Internet service providers around the world, including Google, Facebook, Yahoo!, Akamai and Limelight Networks joined together with more than 1000 other participating websites for a successful global-scale trial of IPv6.

Global IPv6 Deployment Survey

In 2012, the NRO conducted the Global IPv6 Deployment Survey for the fourth time, and 77% of respondents indicated having some level of IPv6 presence today, an increase of 4% from the previous Survey. The Survey findings confirm that the emphasis for respondents has shifted from "IPv6 preparedness" to real usage.

IPv6 for Everyone

Global IPv6 deployment is vital to ensuring the continued growth and innovation of the Internet, but it will not fundamentally change the nature of the Internet itself. Approximately 90% of end users have

computer operating systems that work seamlessly over IPv6. This means that many home and small business users are simply waiting for their service providers to offer IPv6 connections. In some cases, they may already be using IPv6.

Looking Forward

As IPv6 deployment accelerates over the coming months, all Internet stakeholders need to be aware of the issues surrounding IPv6. The RIRs provide data, statistics, and analysis on IPv6 for the benefit of the Internet community and to inform decision making in all sectors regarding IPv6 deployment and network readiness. These projects include:

IPv6 RIPEness: A rating system developed by the RIPE NCC to measure the "IPv6 readiness" of RIPE NCC members. RIPEness provides a unique indicator of IPv6 readiness and shows data at various levels including by country, sector, and LIR size:

www.ripe.net

IPv6 Tracker: A tool developed by APNIC that allows you to monitor your visitor traffic to assess the effect IPv6 deployment would have on your website.

www.labs.apnic.net/tracker.shtml

