IPV6 AROUND THE WORLD

IPv6 deployment is increasing its momentum globally, and IPv4 address exhaustion is approaching rapidly. Many parts of the world are engaged in 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. Securing a larger supply of global IP addresses is necessary to maintain the sustainable, long-term development of a ubiquitous and open Internet.

We are almost there. Technical, business, and government sectors have been preparing for Internet Protocol version 6 (IPv6) for over a decade. Key service providers and content suppliers are deploying IPv6 capabilities on their infrastructure. Numerous governments, through partnerships with the private and civil sectors, are actively engaged in activities designed to ensure their citizens have Internet access via the new protocol. End users are almost universally equipped with IPv6-ready computer operating systems. 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 actively working to ensure that all regions and sectors have access to the equipment and education necessary to join the IPv6 Internet.

NRO

www.nro.net

DISTRIBUTING IPV6 AROUND THE WORLD

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

To date, the RIRs have allocated the equivalent of more than nine billion /48 IPv6 address blocks to network operators; that is ~ 600 times the size of the entire IPv4 address pool. While this is a significant distribution of IPv6 addresses, it amounts to less than 0.004 percent of the entire IPv6 address pool.

IPv6 allocations are taking place across the world. In the AfriNIC region, serving Africa, IPv6 allocations are equivalent to 5,000 times the IPv4 address space that has been assigned to end users in the region.

The RIRs allocate IPv6 address space based on established need using policies created by the Internet community using open and transparent policy development processes. IPv6 address management policies are unrelated to its actual deployment. Because IPv4 and IPv6 will coexist for years to come, extra effort must be made to deploy IPv6 in the core and at the edges.

DOING BUSINESS OVER IPV6

Throughout the world, the commercial sector is embracing IPv6. 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 a few, provide or plan to provide IPv6 services to both business and residential customers.

- Comcast and Verizon (US) both have begun 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 decided its strategy for the transition and is implementing IPv6.
- RCP (Peru) supports IPv6 for all their corporate customers and they are planning to roll out IPv6 to their residential services.

- Apple IOS 4 now supports IPv6. iPhone users can access to the Internet via IPv6 with their handsets.
- 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. Examples include:

NORTH AMERICA

United States of America: The U.S. government has established an IPv6 task force, which has identified several key dates and activites for the deployment of IPv6. In December 2009 the U.S. Federal Acquisition Regulation was amended to require use of the USGv6 Profile and USGv6 Testing Program to define and verify IPv6 requirements in all new IT acquisitions. All outward facing servers and services to operationally use native IPv6 by the end of 2012.

SOUTH AMERICA

Brazil: The Brazil National Internet Registry, NIC BR, began making IPv6 allocations in 2003. NIC BR and the Brazilian Internet Steering Committee, CGI BR, led a national project to promote IPv6 deployment, working closely with operators on a capacity-building program based on online tutorials and face-to-face workshops. Since the project was launched in 2008, the number of Autonomous System Numbers in Brazil with IPv6 allocations has increased almost 15 times.

AFRICA

Algeria: The Algerian government has set up a local IPv6 taskforce with significant government involvement to increase local awareness and encourage network operators to implement IPv6.

Egypt: The Ministry of ICT and the national regulator set up a lab to conduct research on IPv6 for commonly used applications, such as VoIP and telemedicine, as part of the Egyptian IPv6 Task force efforts in the country.

Kenya: The Ministry of Information and Communication Technology in Kenya formed a national IPv6 Task Force involving the government, academic and civil society in addition to the NREN to Identify suitable transition mechanisms and to promote Kenya as a solutions provider for IPv6 services.

Mauritius: The Mauritian regulator sent out a public consultation paper revolving mainly around the IPv6 status and readiness in Mauritius. Based on the feedback, the Ministry of Communications has formulated its recommendations on the way forward to get Mauritius IPv6 ready.

Nigeria: The Nigerian government created a special committee (EFCC and NCC) to increase IPv6 awareness and study policy that can bootstrap the process.

South Africa: The Department of Communications in South Africa has also launched a call for a formation of a national IPv6 task force.

Senegal: The Senegalese government established a national committee for IPv6 transition that has come up with a strategic plan to help main enterprises and government structures to adopt IPv6.

Tunisia: The Tunisian government has set up a local IPv6 taskforce with significant government and civil society involvement.

EUROPE

European Union: In 2010, the European Commission laid out the Digital Agenda for Europe, which prioritizes the deployment of IPv6 throughout the European Union and globally. The EC has organized several multi-stakeholder events to examine the issues surrounding IPv6 deployment, including a two-day conference in December 2010, IPv6: The Way Forward, and an IPv6 Workshop in June 2011, bringing together government representatives with members of the technical and business communities.

Germany: The German Government's plans for a federal IPv6 network connecting all German municipalities are already serving as a model for other government network strategies.

MIDDLE EAST

Lebanon: Lebanese networks are among the first in the Middle East able to connect and peer at the Beirut Internet Exchange (Beirut IX) over IPv6.

Sudan: The Sudanese government has established a national task force that focuses on training and preparing the technical community for IPv6 deployment nation wide.

ASIA/PACIFIC

Australia: The Australian Government Information Management Office's strategy to deploy IPv6 across various departmental networks, to be completed in 2012, has been hailed as a model by other governments around the world.

China: The China Next Generation Internet project has been promoting IPv6 since 2003, focusing first on academic networks then expanding to industry networks in 2009. China showcased its progress at the 2008 summer Olympic Games in Beijing. The project has funded development of the largest IPv6 network in the world, used by about one million students.

India: The Indian government released a roadmap stating that all federal and state government ministries and departments and public sector companies will deploy IPv6 by March 2012.

Japan: The Japanese Task Force on IPv4 Address Exhaustion presents each key sector of industry with a clear path for IPv6 implementation. Constant feedback on these actions is published for community consultation.

Malaysia: Government initiatives will require Malaysian networks to be IPv6-enabled by 2012, 10 percent of .my ccTLD domain names to be registered with IPv6 by the end of 2010, and 50 percent of domain names to be registered with IPv6 address by 2012.

REGIONAL INTERNET REGISTRIES

The core function of the Regional Internet Registries (RIRs) is the allocation and registration of Internet number resources, including IP addresses. This is done based on policies developed in a consensus-driven process that is open to everyone.

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 that all Internet stakeholders understand the importance of timely IPv6 implementation.

All RIRs have deployed IPv6 in their own networks and make 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 (such as participation in the Internet Governance Forum), and IPv6 network measurement and analysis. The RIRs also engage governments in their respective regions to ensure that the needs and concerns of the public sector are understood.
Some specific RIR activities include:

ARIN: ARIN speakers have been active in regional technical operators forums including the North American Network Operators' Group, federal IPv6 task forces, state government organizations like the National Association of State Technology Directors, and many regional trade shows and conferences.

RIPE NCC: RIPE NCC staff have conducted on-site training events and created a wide range of educational documents for technical and governmental audiences. The RIPE NCC has also worked closely with the Middle East Network Operators Group to stage IPv6 Roadshow events throughout the Middle East, providing valuable training to the engineers who operate networks for government and enterprise.

LACNIC: Representatives from LACNIC have spoken at many technical and non-technical forums including LACNOG, Regulatel-AHCIET, local IPv6 task forces meeting, the CITEL-OAS meeting, and at regional UN and ITU events. As part of its training activities LACNIC has hosted several virtual seminars and workshops around the region.

AfriNIC: AfriNIC has launched the initiative of establishing an African Regional IPv6 task force, to primarily overlook IPv6 development and deployment in the region. The AFTF in collaboration with African governments, local and regional IPv6 task forces and organizations (African or foreign), Service providers, Internet Exchange Points, and research networks aims to share relevant information and know-how on IPv6 technology. This forum addresses the latest implementation and design issues of limited IPv6 connectivity and traffic at regional and global levels. AfriNIC's present IPv6 campaign is being undertaken at the regional level in Africa using a face-to-face approach for training and knowledge transfer. Since 2006, AfriNIC has trained over 1000 individuals on IPv6 deployment all over Africa.

APNIC: APNIC speakers have been active in regional forums including the Asia Pacific Economic Cooperation (APEC) and the Organization for Economic Co-operation and Development (OECD), and work with local organisations such as network operators groups (including SANOG, PACNOG) to provide practical IPv6 training for diverse audiences.

IPV6 AND THE TECHNICAL COMMUNITY

Much of the work necessary to make IPv6 access ubiquitous needs to be done by the technical community. Organizations such as the Internet Society (ISOC), the Internet Corporation for Assigned Names and Numbers (ICANN), and the Regional Internet Registries as well as many academic networks are involved in a wide range of joint initiatives to raise awareness about IPv6 and educate people on what still needs to be done.

Root Name Servers - As of 2009, nine of the 13 root name servers offer service over IPv6 at multiple locations around the world.

Reverse Root Name Servers – The five Reverse Root Name Servers operated by the RIRs support IPv6 natively.

Top-Level Domains - 15 out of 20 generic Top-Level Domains (TLDs) have deployed IPv6 on their infrastructure, including .com, .net, and .org. 152 out of 248 country code TLDs (ccTLDs), have deployed IPv6, including countries such as Kenya (.ke), Tanzania (.tz), Haiti (.ht), and Tunisia (.tn).

World IPv6 Day – On 8 June 2011, websites and ISPs around the world, including Facebook, Google, Yahoo, Akamai, and Limelight Networks, joined together for World IPv6 Day. Over 1000 websites took part in this successful global-scale IPv6 trial. This coordinated 24-hour "test flight" helped demonstrate that major websites around the world are well positioned for the move to a global IPv6-enabled Internet.

IPV6 FOR EVERYONE

Global IPv6 deployment is vital to ensuring continued growth and innovation, but it will not fundamentally change the nature of the Internet itself. Approximately 90 percent 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 adoption accelerates over the coming months and years, stakeholders in the Internet 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 top measure the "IPv6 readiness" of Local Internet Registries in the RIPE NCC service region. **http://labs.ripe.net/topics/ipv6ripeness**

IPv6 Tracker: A tool that allows you to monitor your visitor traffic to assess the effect IPv6 deployment would have on your website. http://labs.apnic.net/

www.nro.net