The Role of Government in IPv6 Adoption

Summary

Governments around the world continue to enable IPv6 adoption. As the pool of IPv4 addresses runs out, a major challenge for governments is planning for a future Internet that can connect billions of people and devices. However, widespread acceptance and adoption of IPv6 have yet to occur. The goal for governments as well as for organizations that must work with the public sector is to deploy IPv6 securely and cost effectively, with minimal risk across the network and services infrastructure, to optimize the user experience at each point of the journey. Because of their own needs for Internet services, governments can play a role in helping to:

- Set policies to stimulate the development of IPv6 standards and protocols.
- Identify and facilitate technology and market solutions.
- Build out infrastructure to simplify private sector adoption.

As governments continue to mandate IPv6 adoption, organizations that work with the public sector will need to provide seamless access to public IPv6 resources from internal networks. This paper describes the challenges governments face in deploying IPv6, as well as the progress they have made so far. It discusses why enterprises continue to delay deployment and provides deployment recommendations for IT agency groups and the enterprises that work with them.

Understanding the Barriers to IPv6 Deployment

A number of concerns contribute to governments' reluctance to advocate widespread IPv6 deployment. Concerns include the costs to replace the large installed base of IPv4-compatible equipment and applications and the overhead to maintain both protocols while the world transitions to the new standard. They also include potential exposure to security vulnerabilities during the transition period, which can be mitigated with a sound change management strategy.

But governments are being compelled both by legislation and the needs of citizens to deploy new services that promote public safety and economic growth while safeguarding the state and national infrastructure. To name a few, these services include electronic healthcare records and other citizen centric "e-services," smart power grids, and next-generation communication networks. Unfortunately, IPv4 simply cannot support the growing number of devices needed to carry out these initiatives.

Organizations interacting with or dependent on these services must also support IPv6. Vendors developing new appliances and applications for both government and enterprise are increasingly focusing on IPv6 as a baseline, as shown in Figure 1. IPv6 is beginning to permeate the typical organization even today, sometimes without the IT manager realizing it until something breaks.

While IPv6 adoption is being mandated in the public sector, enterprises continue to view IPv6 deployment as a cost, rather than a business benefit. Ultimately, governments and enterprises must band together, as they did to address Y2K, to build the case for adoption so that those implementing the technology will view IPv6 as a benefit as opposed to a burden.

Government: Taking an Early Lead

How Governments are Implementing IPv6

Many of the original concerns motivating the development of IPv6—chiefly address depletion—may not be driving forces for governments. But IPv6 provides the next-generation infrastructure and foundation to implement government-sponsored initiatives such as smart grids, remote healthcare, global research, and cloud computing.

Asia/Pacific

Achieving independence from foreign technologies and products has fueled next-generation Internet projects in emerging regions. China, with over 200 million users, has the largest Internet active installed base in the world and more users than available IPv4 addresses. China's Next Generation Internet Project (CNGI)[1] includes IPv6 backbone construction, application development, promotion, and standards participation.

China's network already spans over 300 academic, industrial, and government research campuses within the country and also includes international IPv6 peering points. The 2008 Olympics provided the government with an opportunity to showcase a large-scale IPv6 implementation that included everything from security cameras to taxis. Hong Kong Shanghai Banking Corporation's (HSBC) adoption of IPv6 in China[2] is further evidence of the technology's momentum. Other nations in the region leading with IPv6 include Japan and Korea.

The Australian government first prepared its IPv6 implementation strategy for government agencies in 2007. The strategy proposed that all government agencies implement IPv6-capable hardware and software platforms by 2012 and be able to operate dual-stack IPv4/IPv6 environments by 2015. The Australian Chief Information Officer Committee (CIOC) endorsed a revised strategy in January 2009. This accelerated strategy recommends that agencies implement IPv6-ready hardware and software by the end of 2011 and have all systems IPv6-enabled by the end of 2012.[3]

Europe

The European Commission's[4] i2010 initiative has plans for broad deployment of IPv6 by the end of 2010, to be followed by a new initiative, the Digital Agenda. The flagship of the Europe 2020 Economic Strategy, this initiative will provide all EU citizens the ability to access high-speed Internet by 2013, use their mobile phones as a mobile wallet, and access all public services online by 2015. The UK government is in the midst of deploying an IPv6-based public-sector network on the heels of the European Commission initiative.

In 2008, the more than 40 nations that form Europe's Organization for Economic Co-operation and Development (OECD) issued a report providing guidance for focusing public policy in support of deployment.[5] The report also examines public initiatives in favor of IPv6 adoption, as well as IPv6 business drivers and economic benefits. The OECD released a follow-up report in 2009 with surveys of attitudes to IPv6 and measurement of IPv6 in use on the Internet.[6]

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1 China Next Generation Internet, http://en.wikipedia.org/wiki/China_Next_Generation_Internet.
2 HSBC Takes Lead in IPv6 Adoption, September 30, 2010, www.v3.co.uk/v3/news/2270757/hsbc-takes-lead-ipv6-adoption.
3 A Strategy for the Implementation of IPv6 in Australian Government Agencies," Australian Government Department of Finance and Deregulation, Information Management Office, July 2009, http://www.finance.gov.au/e-government/infrastructure/docs/Endorsed_Strategy_for_the_Transition_to_IPv6_for_Australian_Government_agencies.pdf.
4 "Advancing the Internet: Action Plan for the Deployment of IPv6 in Europe," European Commission, www.ipv6.eu/admin/bildbank/uploads/Documents/Commision/COM_.pdf.
5 "Internet Address Space: Economic Considerations," OECD, www.oecd.org/dataoecd/7/1/40605942.pdf.
6 "IPv6 Around the World," Number Resource Organization, March 2010, www.cu.ipv6tf.org/pdf/IPv6_Around_the_World_12Mar2010.pdf.

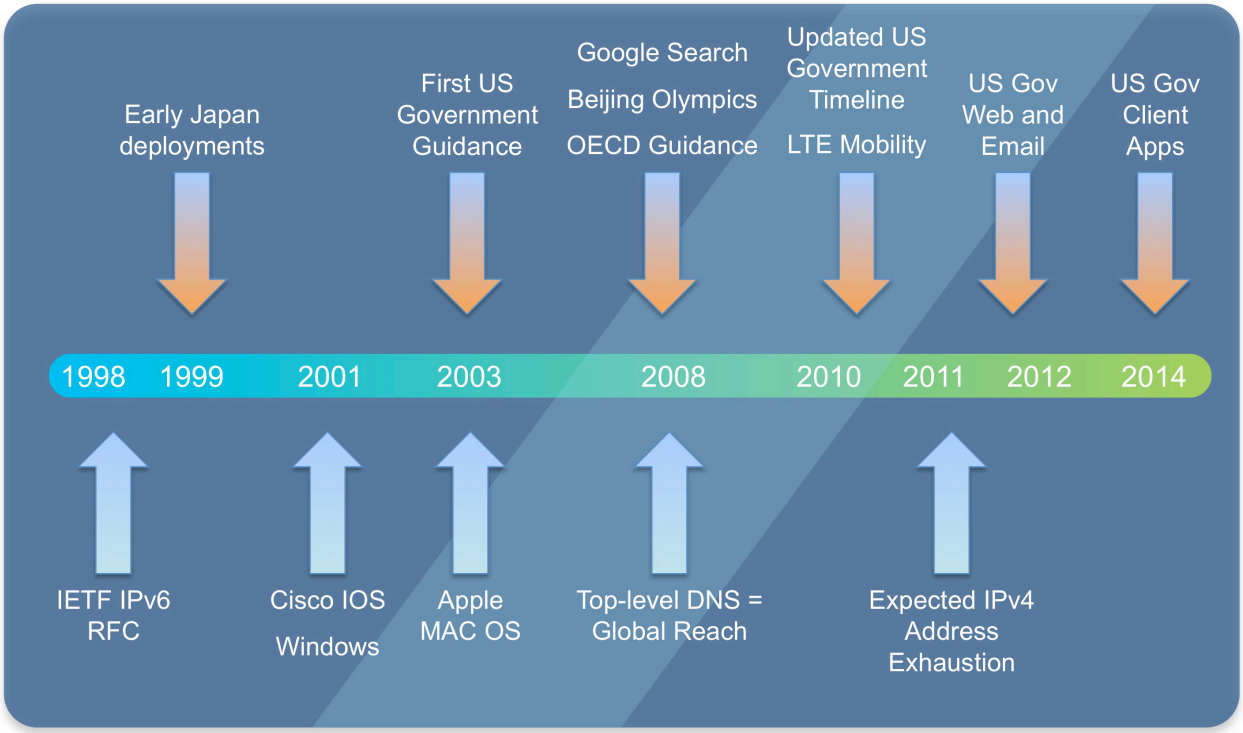
North America

The U.S. government—after almost a decade of small-scale initiatives beginning as early as 2003—has put in place federal mandates for IPv6 adoption to retain technical and market leadership and expand and improve services.[7] On September 28, 2010, the Obama administration updated its deployment timeline,[8] setting September 30, 2012 as the date that all federal agencies must IPv6-enable public-facing web services, including browser access, Domain Name System (DNS), and email. The second deadline, September 30, 2014, applies to internal client applications.

As part of the September 28, 2010 mandate, U.S. government agencies must now purchase IPv6-capable hardware and software if they have not done so already.[9] Beyond creating a demand for basic hardware and software availability, this mandate will go a long way toward galvanizing private sector IPv6 implementation.

The rationale behind government IPv6 leadership aligns closely with larger commercial and strategic initiatives that depend on the transition from IPv4. In all these cases, IPv6 provides the foundation for large-scale sensor and control networks.

Figure 1. IPv6 Deployment Progress Timeline



Enterprises: Delaying the Inevitable

Transforming Enterprise Reluctance to IPv6 Adoption

Nongovernment enterprise organizations are still generally reluctant to deploy IPv6, and many are misinformed. This is a concern for governments because enterprise adoption has implications for the economic vitality and security of a country.

[7] Planning Guide/Roadmap Toward IPv6 Adoption within the U.S. Government, May 2009, www.cio.gov.
[8] "Transition to IPv6," September 28, 2010, www.cio.gov/Documents/IPv6MemoFINAL.pdf.
[9] "A Profile for IPv6 in the U.S. Government," NIST SP 500-267, www.antd.nist.gov/usgv6.

The ramifications of IPv6 on the global workforce with respect to mobility, network security, machine-to-machine communications, and enterprise application efficiency do not yet figure into the process for deciding to adopt IPv6, resulting in a lack of support for IPv6 adoption among senior management.

A recent survey[10] conducted in New Zealand, and reflective of CIO viewpoints elsewhere, shows that many still consider IPv6 deployment to represent a cost more than a benefit. One bright piece of news from the survey is that general awareness of the criticality of IPv6 adoption among CIOs has grown from 54% in 2009 to 74% in 2010.

CIOs may no longer have a choice. Microsoft recently elevated IPv6 to a mandatory component of the Windows ecosystem, and the company no longer tests IPv4 functionality with new releases. As a result, disabling IPv6 functionality may lead to problems with network operations.

In addition, some newer enterprise applications, such as Remote Assistance in Windows 7 and DirectAccess in both Windows 7 and Windows Server 2008, are IPv6 only,[11] and managed hosting providers are announcing their own IPv6 initiatives.

Moving Forward

The Path to Agency Adoption

Government agencies facing implementation deadlines can take advantage of Cisco best practices for planning, buildout, and operation.[12] Cisco developed a phased approach in working with government partners and major enterprises. It consists of five phases, backed by technology expertise and a global support organization, that pave the way to IPv6 deployment success:

- Discovery: Identify the highest priority IPv6-critical areas in your network. This may be as simple as launching an Internet and web presence.
- Assessment: Perform IPv6 assessment to determine the scope of the design.
- Planning and design: Develop an IPv6 design that enables the technology to be introduced without disrupting your existing IPv4 network.
- Implementation: Begin IPv6 testing and implementation in pilot mode, then extend over time into production deployment.
- Network optimization: Verify proper IPv6 operation and adjust where required.

For a more detailed discussion of each of these phases, see the Cisco white paper "IPv6: How to Get Started."[13]

The Path to Enterprise Adoption

Enterprises and other entities that work with the public sector will need to get up to speed on IPv6. Government mandates will affect every interaction. In fact, the lessons learned from government deployments implementing dual-stack operations and migrating applications may accelerate private sector implementation timelines—speeding up global adoption.

Organizations that work with U.S. agencies should align IPv6 readiness with the 2012 and 2014 deadlines. The goal should be seamless access to public IPv6 resources from internal networks.

[10] "IPv6 Survey Shows Vital Messages Not Getting Through," Computerworld NZ, October 12, 2010, http://computerworld.co.nz/news.nsf/news/ipv6-survey-shows-vital-messages-not-getting-through.
[11] The Cable Guy: Support for IPv6 in Windows Server 2008 R2 and Windows 7, by Joseph Davies, Microsoft, Inc. http://technet.microsoft.com/en-us/magazine/2009.07.cableguy.aspx.
[12] "Cisco IPv6 Services Overview," Cisco, September 2010, www.cisco.com/en/US/services/ps6887/ps10716/docs/IPv6_Service_Overview.pdf.
[13] "IPv6: How to Get Started," Cisco, November 2010, wwwin.cisco.com/CustAdv/services/segments/enterprise/borderless/docs/ipv6_services_wp_how_to_get_started.pdf.

With the proliferation of smart grids and next-generation medical monitoring equipment, the utilities, healthcare, and education verticals will be among the first to interact with governments using IPv6. Telecommunications, following 4G mobility and next-generation set-top boxes, and banking are likely to follow.

Why Cisco?

Cisco takes a phased approach to IPv6 adoption based on long-term involvement in large-scale IPv6 deployments. We are committed to advancing our industry leadership by continuing to optimize IPv6 methodologies, architectures, and best-practice guidelines to help ensure success with your IPv6 implementation. We offer deep networking and business expertise, along with understanding of enterprises, service providers, and government organizations, to assist the IT manager at every step of the IPv6 adoption process.

Conclusion

IPv6 will connect public and private sectors in the near future. Cisco offers a phased approach to IPv6 deployment aligned to both public and private sector business needs, with global solutions that are flexible enough to adapt to local government mandates. Cisco delivers seamless, reliable, and secure access to enterprise assets by anyone, at any time, from any location, and across any device. The Cisco® solution overcomes deployment challenges by combining technical, business, and services expertise.

For More Information

For more information about Cisco IPv6 Services and solutions, visit www.cisco.com/go/ipv6.

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Printed in USA C11-6385470-00 12/10