Government of Canada IPv6 Adoption Strategy

Chief Information Officer Branch

May 31, 2012
Version 1.2

Table of Contents

1 Background

The Internet is growing rapidly as a result of strong demand, fuelled in part by the widespread global deployment of wireless and Internet-connected devices. Most of the information carried across the Internet uses Internet Protocol version 4 (IPv4), which was designed in 1981. Devices that useIPv4 (e.g., computers, servers and smart phones) have anIPv4 address, and the maximum number of unique addresses that can be handled by IPv4 is approximately 4.3 billion, a number smaller than the number of people on Earth today.

As the number of devices has grown, so has the demand for IPv4 addresses. In the past two decades, more than 95 per cent of the world's IPv4 address space has been allocated and used. The Internet Assigned Numbers Authority (the global IP address registry) issued its lastIPv4 address blocks to the world's five Regional Internet Registries (RIRs) in February 2011. APNIC (the Internet registry for the Asia-Pacific region) allocated its last block ofIPv4 addresses in April 2011. TheRIR for Europe expects to allocate its last block ofIPv4 addresses in July 2012, and theRIR for North America expects to allocate the last of itsIPv4 addresses by July 2013.

A new version of the Internet Protocol, called IPv6, has been standardized to provide a solution to the issue of IPv4 address depletion.IPv6 supports 340 trillion trillion trillion addresses (compared withIPv4's 4.3 billion) and facilitates continued Internet growth and evolution.

Unlike some technology advances, IPv6 was not designed to be backwards compatible with its predecessor IPv4. This means that new devices that support only IPv6 may not be able to interoperate or communicate reliably with older devices that support only IPv4. Network operators, content owners and service providers may need to support both IPv4 andIPv6 in their

infrastructures for a number of years to assure the continuity and interoperability of Internet users and services.

Without the adoption of IPv6, Government of Canada (GC) users with onlyIPv6 Internet access may face limitations when accessingGC services. Similarly, without the adoption ofIPv6 by the Government of Canada, public servants may not be able to communicate and access IPv6-based services in the future. This connectivity gap may first appear in high-growth areas, such as in the Asia-Pacific region, where IPv4 address exhaustion occurred one year ago.

The Government of Canada recognizes that it must adopt IPv6 not only to maintain business continuity but also to continue growing and enhancing online services for Canadian citizens, businesses and public servants. Adopting IPv6 will also enable students, visitors, investors and business partners in other countries to easily find information about Canada onGC websites.

2 Approach

2.1 Guiding Principles

The following principles provided the foundation for the GC-wideIPv6 Adoption Strategy:

- Must allow ubiquitous IPv6 access to GC services by interested parties and conversely allow federal public servants access to the public Internet from domestic or international GC points of access;
- Must ensure continued high availability of services as a result of scalable, robust and secure infrastructure;
- Must align with GC enterprise network architecture and standards;
- Must minimize transition and operating costs, risks and operational IT impacts to networks and systems; and
- Should position the Government of Canada as a leader in adopting IPv6, thereby encouraging and facilitating the establishment of domestic commercial IPv6 services.

2.2 Consultation and Collaboration Activities

Establishment of principles and strategy development

The IPv6 transition principles listed in Section 2.1 were published on the Treasury Board of Canada Secretariat's website in June 2011, and they have been fundamental to the definition of the strategy. Close collaboration between the Secretariat, Shared Services Canada (SSC) and other departments has helped establish the project scope, strategy and timelines.

Development of policy instruments

The IPv6 policy roadmap that will enable and supportIPv6 adoption has been drafted. Departmental representatives continue to meet with the Secretariat on a regular basis, to contribute to the development of policy instruments, including the *Standard for GC Transition to IPv6* and the *IPv6 Network Equipment Procurement Guideline*. Policy instruments will be posted on the Secretariat's website as they become available.

Engagement with other international governments

The Secretariat's Chief Information Officer Branch (CIOB) is collaborating with counterparts in several other nations, including Australia, New Zealand, the United Kingdom (U.K.), and the United States (U.S.) to leverage lessons learned and best practices.

Engagement with industry

Industry Canada (IC) has been working with the telecommunications industry since 2009 to promote the awareness ofIPv6 solutions and to encourage its adoption in Canada.

The Secretariat, SSC and IC have engaged industry and other external stakeholders to align the GCIPv6 adoption strategy and technical and business requirements with the experiences and advice of industry and key external stakeholders.

3 Adoption Strategy

The GC IPv6 adoption strategy consists of a phased approach to progressively enable IPv6, while continuing to support IPv4. The strategy begins at the perimeter of theGC network and moves progressively toward the centre of the network. It is a business-focused approach designed to minimize cost and risk. The strategy leverages SSC's enterprise network renewal initiative and the regular equipment and software refresh cycles.

The benefits to the Government of Canada of adopting IPv6 are expected to include the following:

- Business partners and entrepreneurs from emerging economies who, in the future, may only have IPv6 Internet service will be able to access GC websites to do business and research.
- Canadian citizens travelling or living abroad and non-Canadians who may have access to IPv6 networks only will be able to access GC web services — for example, to access their personal income tax information through the Canada Revenue Agency or to apply for a student or work visa through Citizenship and Immigration Canada.
- Canadian public servants will be able to:
    - access the GC network in Canada to perform their work duties when posted or travelling abroad in an IPv6-only region;
    - exchange electronic documents with business partners for goods crossing our borders, when these business partners are located in an IPv6-only region;
    - conduct GC business with other governments located in IPv6-only regions; and
    - access websites connected to IPv6 networks to do research.

The GC IPv6 adoption strategy comprises three phases: Enabling Phase, Deployment Phase and Completion Phase.

3.1 Enabling Phase

The first phase is underway and is expected to be completed by the end of September 2013. The goal is to enable federal organizations to develop their individual plans for the adoption of IPv6. Actions planned for this phase include:

- Developing IPv6 architecture standards and technical requirements;
- Establishing governance bodies to oversee adoption, including a Steering Committee and a Community of Practice;
- Creating a change management strategy, including policies, training, and communications; and
- Enabling IPv6 connectivity for Internet-facing websites through a shared service.

3.2 Deployment Phase

The second phase will focus on the IPv6 enablement of the principalGC externally-facing websites and is expected to be completed by the end of March 2015. Actions planned for this phase include:

- Enabling principal-existing GC Internet-facing websites to be accessible by IPv6 users;
- Requiring all new Internet-facing websites and applications put in place starting April 2015 to be IPv6-enabled; and
- Providing public servants transparent access to the public IPv6 Internet.

3.3 Completion Phase

The third phase will focus on expanding the IPv6 enablement ofGC websites beyond the principal websites addressed in the Deployment Phase and, as necessary, this phase will focus on enabling IPv6 access toGC internal applications. This phase is expected to take a number of years to complete.

4 Reporting on Progress

The Treasury Board of Canada Secretariat will report on progress of the IPv6 Adoption Strategy implementation annually, at the end of March, on its website.

5 Summary

The Government of Canada is committed to enabling secure, robust and innovative e-government service delivery.

- Adoption of IPv6 will ensure that the Government of Canada remains accessible to citizens, businesses and other jurisdictions worldwide as the use of the World Wide Web and e-government continue to grow;
- The Government of Canada will work closely with SSC to adopt IPv6 in alignment with their overall network transformation plan. This will ensure that GC IPv6 adoption is done with the greatest efficiency and at the lowest possible cost;
- The Government of Canada will work closely with industry to ensure that Canada remains a viable and modern destination on the World Wide Web; and
- The adoption of IPv6 by the Government of Canada is expected to be a significant driver for the availability of IPv6 services to Canadian businesses and individuals, business partners, visitors and students, and will maintain Canada's competitiveness.