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DEPARTMENT OF COMMERCE

National Telecommunications and Information Administration

[Docket No. 160810714-6714-01]

RIN 0660-XC029

The Incentives, Benefits, Costs, and Challenges to IPv6 Implementation

AGENCY: National Telecommunications and Information Administration, U.S. Department of Commerce.

ACTION: Notice, Request for Public Comment.

SUMMARY: Recognizing the exhaustion of Internet Protocol version 4 (IPv4) address space and the imperative for Internet Protocol version 6 (IPv6) implementation and use, the National Telecommunications and Information Administration (NTIA) is seeking input to guide NTIA in future IPv6 promotional activities. Through this Notice, NTIA invites adopters and implementers of IPv6 as well as any other interested stakeholders to share information on the benefits, costs, and challenges they have experienced, as well as any insight into additional incentives that could aid future adoption, implementation, and support of IPv6. After analyzing the comments, the Department intends to aggregate input received into a report that will be used to inform domestic and global efforts focused on IPv6 promotion, including any potential NTIA initiatives.

DATES: Comments are due on or before 5 p.m. Eastern Time on [insert date 45 days after publication in the *Federal Register*].

ADDRESSES: Written comments may be submitted by email to ipv6@ntia.doc.gov. Comments submitted by email should be machine-readable and should not be copy-protected.

Written comments also may be submitted by mail to the National Telecommunications and Information Administration, U.S. Department of Commerce, 1401 Constitution Avenue N.W., Room 4725, Attn: IPv6 RFC 2016, Washington, DC 20230. Responders should include the name of the person or organization filing the comment, as well as a page number on each page of the submission. All comments received are a part of the public record and will generally be posted to https://www.ntia.doc.gov/federal-register-notice/2016/incentives-benefits-costs-and-challenges-ipv6-implementation without change. All personal identifying information (for example, name, address) voluntarily submitted by the commenter may be publicly accessible. Please do not submit business information that is confidential or otherwise protected. NTIA will accept anonymous comments.

FOR FURTHER INFORMATION CONTACT: Ashley Heineman, National Telecommunications and Information Administration, U.S. Department of Commerce, 1401 Constitution Avenue, N.W., Room 4701, Washington, DC 20230; telephone (202) 482-0298; email aheineman@ntia.doc.gov. Please direct media inquiries to NTIA's Office of Public Affairs, (202) 482-7002 or by email at press@ntia.doc.gov.

SUPPLEMENTARY INFORMATION:

Background: NTIA regularly seeks public input to help guide future action and policy decisions that address today's critical communications and technology issues. In this notice, NTIA seeks input concerning the adoption and deployment of Internet Protocol version 6 (IPv6). Every device that connects to the Internet requires an IP address. However, the tremendous demand for Internet connections has, for all intents and purposes, exhausted the supply of IP addresses available under the legacy Internet Protocol version 4 (IPv4) system. IPv6 is the next-generation

protocol which provides an identification and location system for computers on networks, and which routes traffic across the Internet.

The transition to IPv6, which was designed to expand the number of IP addresses, is critical for the continued, sustainable growth of the Internet. While IPv4 provides nearly 4.3 billion IP addresses, IPv6 offers 2^{128} (or 340,282,366,920,938,463,463,374,607,431,768,211,456 IP addresses), a number more able to meet the rising demand for Internet connections and to support the expanding Internet of Things. This demand will continue to grow as more devices come online.

Even during the relatively early days of the Internet, its exponential growth soon exposed the limitations of IPv4. Once the Internet technical community realized in the early 1990s that there would be a shortage of IP addresses, the Internet Engineering Task Force began developing a new protocol to expand the Internet address space. The first specification of the IPv6 standard was published in 1995 and an updated draft followed closely thereafter in 1998.[1] Despite the long history of IPv6, today only 32 percent of the Internet services in the United States are IPv6 capable.[2] While the IPv6 adoption rate in the United States is growing at a quicker pace than in the past, companies and other organizations that have yet to plan for IPv6 should begin implementation now rather than later, in order to lay a solid foundation for the future of our digital economy.

NTIA IPv6 Promotional Efforts: NTIA is already engaged in IPv6 promotional efforts. NTIA held a public workshop on IPv6 in 2010, and in 2011 developed the *IPv6 Readiness Tool for*

[1] *See* "Internet Protocol, Version 6 (IPv6) Specification," December 1998, *available at*: https://tools.ietf.org/html/rfc2460.

[2] According to measurements conducted by the Asia Pacific Network Information Center, *available at*: https://stats.labs.apnic.net/ipv6/.

Businesses, a comprehensive checklist for businesses preparing to deploy IPv6.[3] NTIA also joined a number of private and public organizations in 2011 for the Internet Society's World IPv6 Day to test the IPv6 functionality of websites and services.

Moving forward, NTIA intends to engage more directly in promoting IPv6 deployment and use, with a particular focus on implementation. To assist in this purpose, NTIA is asking those who have implemented IPv6 to share their experiences and to highlight in particular the factors and circumstances that supported their decision to move ahead and adopt the protocol. NTIA hopes to utilize input received through this request for comments to guide and inform future promotion efforts, including the IPv6 Best Practice Forum being organized for the 2016 Internet Governance Forum, which will be held in December 2016, in Guadalajara, Mexico.[4]

REQUEST FOR COMMENT:

NTIA invites comment on the following questions, in whole or in part:

Benefits:

1. What are the benefits of implementing IPv6? For example, what are the direct performance benefits of implementing IPv6 for end users, or for enhanced network security, as compared to IPv4?
2. What are the expected or unexpected benefits of implementing IPv6?

Obstacles:

1. What are the biggest obstacles related to IPv6 implementation? For example, is it difficult to access adequate vendor support for IPv6 hardware and/or software? Does

[3] NTIA also coauthored a study with the National Institute for Standards and Technology in 2006, entitled "A Technical and Economic Assessment of IPv6." These and other resources are listed on the "Additional IPv6 Resources" page on NTIA's website, *available at*: http://www.ntia.doc.gov/page/additional-ipv6-resources.

[4] Internet Governance Forum 2016, *available at*: http://www.igf2016.mx/.

successful implementation depend directly on another service provider?

2. How does an organization overcome those obstacles?

Incentives:

1. What factors contribute to an organization's decision to implement IPv6?
2. What additional incentives would be helpful in a decision to implement IPv6?
3. If one factor made the crucial difference in deciding to implement IPv6, as opposed to not implementing IPv6, what is that factor?

Motivation:

1. What is typically the driving motivation behind an organization's decision to implement IPv6?
2. What are the job titles and/or roles of the people within an organization typically involved in a decision to implement IPv6? What are those individuals' primary motivations when it comes to implementing IPv6?

Return on Investment:

1. What is the anticipated return on an IPv6-related investment? How quickly is a return on investment expected?
2. Is return on investment a reason to implement IPv6, or is implementation considered a cost of doing business?

Implementation:

1. How long does the planning process for IPv6 implementation take?
2. How long does actual implementation of IPv6 typically take? Is implementation a single event or evolutionary?

Cost of Implementation:

1. What are the different types of costs involved in implementing IPv6? What are the typical magnitudes of each type of cost?
2. How does an organization cover those costs?
3. How does an organization justify those costs?
4. What considerations are there for cost-saving?
5. What implication does the size of an organization implementing IPv6 have on cost?

Promotional Efforts:

1. What promotional efforts, if any, should NTIA take? What would have the most impact?
2. What promotional efforts, if any, are being led by the private sector? Have they been effective?
3. Which additional stakeholders should NTIA target? What is the most effective forum?
4. Should NTIA partner with any particular stakeholder group?

Additional Issues: NTIA invites commenters to provide any additional information on other issues not identified in this RFC that could contribute to NTIA's understanding of the considerations that organizations take into account when deciding to proceed with IPv6 implementation, as well as future IPv6 promotional efforts that NTIA may undertake.

Dated: August15, 2016.

Angela M. Simpson,

Deputy Assistant Secretary for Communications and Information.

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