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To: IPV6
Subject: NTIA seeking input on IPv6 implementation decision-making process
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On behalf of the Wells Fargo IPv6 Program, the following information is provided in response to the NTIA Request For Comment.

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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?

IPv6 provides numerous benefits, including: greater space for growth; reduced requirement for readdressing duplicate address space in mergers/acquisitions; the ability to support low-functionality end-points that may lack DHCP and static addressing capabilities (IoT, even Android devices); the ability to reduce reliance on NAT (and associated logging complexity); the ability to more universally geo-locate address space (assuming ULA usage is reduced compared to RFC1918); and the simplification of routing tables through improved summarization.

2. What are the expected or unexpected benefits of implementing IPv6?

Unexpected benefits of implementing IPv6 include gaining a very detailed knowledge of all the technology used in the organization; establishing closer working relationships with application and procurement teams; gaining deeper insight into asset/inventory systems and how to establish relationships between elements; opportunity to provide specific, relevant technical training to a wide variety of engineering teams. It also provides a clean-slate for designing from the ground-up.

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 successful implementation depend directly on another service provider?

Obstacles for implementing IPv6 include uneven vendor v6 feature support, particularly for specific functionality (such as ND inspection, OSPFv3 neighbor authentication, VXLAN overlay v6 transport, etc.), as well as lack of support entirely in some critical product sets; limited or missing v6 support in many operational and security tools and services (including DDOS mitigation services). Competing internal priorities are a challenge. We established a multi-year program to take a methodical, cost-effective approach, but engineering teams are often faced with day-to-day 'firefighting' and top priorities that divert attention and focus.

2. How does an organization overcome those obstacles?

In order to address obstacles to IPv6 implementation, it is necessary to engage in early and frequent communication with vendors of products and services. We have worked with our Supply Chain to ensure inclusion of v6 requirements in RFx and contractual language. We have engaged in extensive lab testing to validate features and performance and to develop a phased set of requirements (i.e. heavier on optional capabilities in earlier phases, moving towards mandatory in later phases).

Incentives

1. What factors contribute to an organization's decision to implement IPv6?

The desire to remain fully connected to the Internet and support all customers as well as employees (i.e. VPN, outbound web proxy, e-mail) is a significant factor driving implementation. Risk mitigation in having to otherwise enable v6 in a rapid, reactive fashion (and possibly root out rogue internal implementations where it was needed but not supported) is another significant factor, as is perception that future mergers and acquisitions will be simpler if IPv6 is the pervasive enterprise communication standard protocol.

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?

The size of the organization: over 1,000,000 IP addresses in use and a history of continued growth through mergers and acquisitions is the most significant factor.

Motivation

1. What is typically the driving motivation behind an organization's decision to implement IPv6?

Risk mitigation of the Internet transitioning to IPv6, or IPv6 being required of the organization without appropriate preparation is the driving motivation for IPv6 implementation.

2. What are the job titles and/or roles typically involved in a decision to implement IPv6? What are those individuals' primary motivations when

it comes to implementing IPv6?
CIO, head of infrastructure, head of networking – primary motivation is risk mitigation and strategic planning.

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 of IPv6 is primarily a cost of doing business and risk management.

1. How long does the planning process for IPv6 implementation take?
For a large enterprise, planning for IPv6 implementation requires several years or more.

2. How long does actual implementation of IPv6 typically take? Is implementation a single event or evolutionary?
For a large enterprise, IPv6 implementation is definitely evolutionary (at this point in time), and is at minimum a multi-year effort in the three to ten year range (for pervasive deployment of IPv6 and the ability to begin phasing out IPv4).

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? If handled in an evolutionary fashion, much of the cost for IPv6 implementation can be included in organic growth and lifecycle refresh activities.
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.

If you have any questions or if you would like additional information about our IPv6 program, please let me know.

Best regards,

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