BEFORE THE
U.S. DEPARTMENT OF COMMERCE

National Institute of Standards and Technology National Telecommunications and Information Administration	)	Docket No. 040107006-4006-01
Request for Comments on Deployment of Internet Protocol, Version 6	)	
Notice of Inquiry	)	

COMMENTS OF ALCATEL

I. Introduction

Alcatel North America, Inc., ("Alcatel") hereby submits these comments in response to the above entitled Notice of Inquiry ("Notice") concerning the U.S. Federal Government's role in the deployment of Internet Protocol, Version 6 ("IPv6"). Alcatel expresses its gratitude to the Department of Commerce, National Institute of Standards and Technology ("NIST"), and National Telecommunications and Information Administration ("NTIA") for initiating this proceeding in order to implement, in part, the President's *National Strategy to Secure Cyberspace*. The Administration's leadership on IPv6 and other IT matters is critical to maintaining the United States's leadership role in High Tech economy.

Due to its role in the worldwide communications equipment marketplace and its leadership in broadband access technologies, Alcatel welcomes the opportunity to provide insightful comments in this proceeding. Alcatel designs, develops, and builds next generation communications networks that allow telecommunications operators and enterprises to transmit a wide variety of content (voice, data, and video) to their customers and employees worldwide. Alcatel's product portfolio provides a full array of solutions for its customers, including fixed (terrestrial and submarine), mobile and satellite networks. In 2003, Alcatel had sales of Euro 12.5 billion and was active in over 130 countries.

Specifically, Alcatel's routers and enterprise switching products have been impacted by the transition from IPv4 to IPv6. As a worldwide equipment vendor, Alcatel has seen the demand for IPv6 compatible equipment increase most dramatically in the Asia market, due in part to government mandates and the address shortage issue associated with IPv4.[1] Presently, addressing and government mandates are motivating

[1] The address shortage in Asia Pacific is best view graphically at: http://www.caida.org/analysis/geopolitical/bgp2country/pics/pop_gdp_bgp4_bgp5.png

equipment vendors and service providers to migrate, but IPv6 offers a range or benefits to service providers and end users beyond the address space solution.

II. The U.S. Government Should Maintain its Leadership Role on IT Matters by Encouraging IPv6 Deployment, but a Mandatory IPv6 Transition in the United States Would be Unjustified at This Time.

Alcatel appreciates the varying options provided in the Notice for suggested government action, ranging from inaction to passive interaction with deployment to strict government mandates. Alcatel believes IPv6 is an evolutionary improvement to IPv4 and while IPv6 offers several exceptional benefits in terms of address space, security, and end-to-end transparency, it is generally a marketplace decision whether these benefits justify the cost of deployment. It is the understanding of Alcatel that service providers in the U.S. are not planning widespread IPv6 transitions or fork-lift upgrades in the immediate future due to the lack of IPv6-only applications and the sufficient revenue expectations needed to justify these costs.

An IPv6 mandate by the US Government is not necessary compared with Asian countries because U.S. providers have not realized acute shortages of assignable Internet addresses and have not had government mandates to deploy Version 6. The end of the "Internet Boom," the disparate assignment of IPv4 addresses between the U.S. and the rest of the world,[2] the use of Network Address Translation devices ("NATs") and the adoption of address conservation practices, such as Classless Inter-Domain Routing ("CIDR"), have slowed the consumption of IPv4 addresses. Additionally, innovative solutions, such as extensions to http and ftp that allow "virtual" services to exist without consuming additional IP addresses and the use of Dynamic Host Configuration Protocol ("DHCP") to allocate addresses and revoke idle addresses, have increased the efficient usage of existing allocated IPv4 address space.

However, the Department should be aware that the substantial benefits of IPv6 deployment, such as additional security features, IP mobility, and increased quality of service for next generation applications,[3] exceed the assignable Internet address issue. The rapid deployment of IPv6 in other areas of the world, particularly China, may one day place the U.S. at a competitive disadvantage by inhibiting the deployment of IPv6 applications and operational experience in this country. If IPv6 deployment in the United States is dramatically slower when compared with the rate in Asia, then the Internet in the U.S. could be isolated and the global reach of this network of networks may be compromised. While Alcatel does not currently support government mandates or widespread changes to the government's procurement policy at this time, this potential competitive disadvantage should encourage the private sector to migrate to IPv6.

III. IPv6 Represents a Significant Advancement in Internet Technology.

[2] India and China have one million and 30 million IP addresses, respectively. Both countries have populations in excess of one billion people.

[3] The benefits of IPv6 beyond assignable Internet addresses is discussed further in Section III of these Comments.

Alcatel strongly supports the private sector's migration from IPv4 to IPv6 due to the superior addressing capabilities, security, and potential for future peer-to-peer applications. While Alcatel does not support Government mandates for the private sector, it does encourage the Department to recognize and promote the benefits of IPv6 migration.

The primary benefit of IPv6 is the larger address space, which will alleviate the acute shortages in the Asian countries that have insufficient IPv4 addresses. When IPv4 addresses were originally being assigned, the U.S. received most of them because of the Internet's dominance in this country. Some commenters claim the U.S. has sufficient IPv4 addresses for the near future and a migration to IPv6 at this time is not necessary. However, Alcatel reminds the Department that in the brief history of the commercial Internet several instances of disruptive technologies and events, such as flat-rate pricing, broadband penetration, on-line gaming, etc., have debunked previous estimates of usage, applications, and bandwidth needs. With the ongoing convergence of multiple platforms and applications, long-term predictions for Internet address usage are unreliable.

Since the adoption of IPv6 would eliminate the need for NAT boxes, deployment could make the Internet more transparent, which will encourage experimentation and the creation of new applications. Currently the only application which is truly hindered by the use of NAT boxes on IPv4 is on-line gaming. It is difficult to determine which future applications will be impacted or unavailable due to the need to use NAT boxes on an IPv4 network compared to an advanced IPv6 network. However, if IPv6 applications and uses are superior, then development, commercialization, and the opportunity benefits will be enjoyed by only those networks that have made the transition.

IPv6 does potentially provide additional security by including a requirement in the standards to support IPSec whereas the standard IPv4 stack does not. However, it is important to understand that IPSec ensures transport-level security, but it does not secure any critical subsystems that are also involved in IPv6 operations, such as Neighbor Discovery, Routing, or DBC. Each of these components will have to be secured in order for the overall network security to substantially improve.

IV. IPv4 is Not Wholly Inadequate for Addressing in the U.S., Security Features, and Current Applications in the Near Term.

While Alcatel supports IPv6 migration for the private sector and agrees with several statements in the Notice concerning the shortcomings of IPv4, such as address shortages, NATs, and security, Alcatel disagrees with some of the wide-ranging assumptions that have been made about the inadequacy of IPv4 for the near-term. Alcatel believes IPv6 is a dramatic improvement compared to IPv4 and the Department should actively encourage private sector migration to IPv6, but it should be aware of certain enhancements to existing IPv4 networks that can provide the efficiencies, security, and applications that many have assumed require a wholesale IPv6 transition.

First, while statements that NAT boxes break end-to-end communications are accurate, this disruption may also provide a beneficial increase in the level of security to end users. This security is increased by masking open ports and addressing some security vulnerabilities, such as those typically exploited by RPC calls to Microsoft windows machines. While NATs are not firewalls, many NATs include firewall functionality, which can impede the exploitation of security holes in operating systems that may result in spamming, virus propogations, and the launching of distributed denial of service attacks against other hosts and web sites.

Second, while IPv6 does provide increased security features compared to IPv4, these features are optional not mandatory, thus are not always functioning. Moreover, the security remedies devised for IPv4, such as IPSEC and the firewall features in NAT boxes, provide for adequate security measures if deployed properly.

Third, IPv6 requires updated routing protocols including, but not limited to BGP4+, OSPFv3 and RIPng, which together have significant deployment implications since every Internet router today would need some form of upgrade. In many cases this is simply a new software image, but there are tens of thousands of legacy routers which will require hardware changes to reach similar performance levels for IPv6 as we today expect for IPv4. In addition to updating software, network management systems, network monitoring tools, service provider tracing tools, and lawful interception tools would all need to be upgraded. The wide use of multi-homing for resiliency potentially results in additional prefixes being advertised in the global routing table, and since these are longer bit-length than today's prefixes, it is anticipated that memory requirements will increase over time in IP routing products to handle this demand

V. Current Status of Deployment

While this is best answered by the service providers, it is the understanding of Alcatel that deployment is most evident in the Asia-Pacific region, but several service providers have deployed IPv6 networks or network components outside of Asia. NTT/Verio is currently offering IPv6 in Asia, Europe, and the USA. MCI has IPv6 exchange points at Metropolitan Area Exchange East (MAE East), MAE West, MAE Central, MAE Paris, and MAE Frankfurt.

VI. IPv6 Transition Schedules May Impact the Seamlessness of the Internet and Future Competitiveness of the United States.

While Alcatel does not support Government mandates to transition the U.S. from IPv4 to IPv6, it is concerned that if the U.S. transition lags too far behind other countries, then the global reach and seamlessness of the Internet could be frustrated. The Internet works due to its interconnectivity among networks and its general ease of use. This interconnectivity has created a true 'global village,' which could be threatened if new applications are developed that may only be employed by users in countries that have adopted IPv6 and to the exclusion of those that remain on IPv4.

Additionally, U.S. leadership in Internet technology should be a concern for the Department. The U.S. has maintained its leadership role in the Internet throughout its development, commercialization, and rapid growth of applications and uses. IPv6, with its superior addressing and peer-to-peer potential, will spawn new and exciting applications that may be incompatible with IPv4. If migration by the U.S. is significantly less rapid compared with Asian and other countries, the U.S. technical expertise in new application development could be disadvantaged and inferior to those other nations.

VII. Conclusion

Currently, Alcatel does not support a widespread government mandate for U.S. service providers to transition from IPv4 to IPv6; however, given the widely-recognized benefits of IPv6 the Department should actively encourage IPv6 deployment in the U.S.

Respectfully Submitted,

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