Making Room: IPv6
Transition to New Internet Protocol Brings Challenges and Opportunities

By Dave Evans and Shaun Kirby, Cisco IBSG Innovations Practice

Just as the proliferation of cell phones overloaded area codes in the 1990s, the nearly 14 billion devices connected to the Internet today have nearly exhausted the supply of IP addresses in the current Internet protocol, known as Internet Protocol Version 4 (IPv4).

The continued growth of the Internet means every customer in the market will eventually need to transition to IPv6, the next generation of Internet architecture. IPv6 will provide what Cisco Futurist and Cisco IBSG Chief Technologist Dave Evans calls "connectivity without meaningful limits"—enough capacity for every atom on the surface of the earth to have 100 IP addresses, which is more than sufficient to accommodate new technologies used by the growing numbers of users, applications, appliances, and services.

The challenge for CIOs over the next few years is to come up with an IPv6 transition strategy. And although the technical aspect requires a clear plan, that's likely to be the easy part. The larger strategic issue will be to plan for the business opportunities that come with the ability—at least in theory—to connect anything and everything to the Internet.

"It's a mistake for CIOs to look at IPv6 as a technical issue—it is a business issue," said Rick Hutley, vice president of global innovations for Cisco IBSG. The addressing capability "opens up huge potential for managing business models and changing processes. For example, if you had an IP address to track everything, what would you do with that? How could it fundamentally change your business?"

Most networks have been running both protocols for several years, and any modern operating system is already IPv6 capable. Because of that, many businesses have been slow to develop transition plans. Evans sees that as a strategic misstep.

"There is a burning platform here," he said. When the IPv4 addresses run out within the next year, the Internet won't stop working, "but what opportunities are going to be lost because devices can't talk to each other?"

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IPv6 Advantages

Some of the benefits of IPv6, as outlined in the publication "Planning Guide/Roadmap Toward IPv6 Adoption within the U.S. Government," include:

- **Addressing and Routing:** IPv6's extremely large address space enables global connectivity to many more electronic devices—mobile phones, laptops, in-vehicle computers, televisions, cameras, building sensors, medical devices, and more.
- **Security:** IPv6's security comes in the form of IPsec, which allows authentication, encryption, and integrity protection at the network layer.
- **Address Auto-Configuration:** IPv6 address auto-configuration enables simple devices to achieve out-of-the-box, plug-and-play network access that is key to self-organizing networks.
- **Support for Mobile Devices:** IPv6-enabled applications can benefit from seamless mobility. The mobility comes in the form of Mobile IPv6, which allows devices to roam among different networks without losing their network connectivity.
- **Peer-to-Peer (P2P) Communication Tools that Can Improve Interagency Collaboration:** True end-to-end connectivity, enabled by the IPv6 address space and elimination of private network addresses, will allow optimization of media-streaming applications. This will permit timely video feeds and quality-rich information to be easily distributed to millions of locations.

On a business level, IPv6 has implications for productivity and services. One possible use, according to Hutley, might be for hospitals to put RFID tags on wheelchairs. They're expensive to buy, and it's costly to have nurses spend time trying to find them throughout a large hospital. Case studies have shown that tagging them would be more cost effective.

Taking it a step further, hospitals under IPv6 could track every surgical instrument, even individual cotton swabs, to make sure that nothing got left inside a patient during an operation. "From a technical perspective, it's feasible," Hutley said. "Would there be a business value in doing that? That's the question. The CIO needs to get with his or her business colleagues and say, 'Given that I can bring you this technical ability, let's have a conversation about what new services it would allow us to offer our customers.'"

Starting in 2011, IPv4 addresses will simply not be available in certain parts of the world, forcing those customers to go to IPv6. Even if companies are not directly impacted, they will need IPv6 to connect, communicate, and collaborate with those people, whether they are customers, suppliers, partners, or employees.

Hutley believes that the time to have those conversations is now, because the transition to IPv6 will take planning, procedures will need to be put in place, and technical issues will need to be resolved. "It may take two or three years," he said. "So now is the time to think about it and start asking yourself those questions."

IPv6 Roadmap

Cisco's Chip Popoviciu said companies should focus on getting "IPv6-ready," positioning themselves to be able to execute on a deployment plan with minimal cost and minimal impact on production. That means making sure the infrastructure and applications are ready,

and that operations and design considerations have been addressed. Once that has been achieved, migration could take place over a period of several quarters.

Popoviciu outlined several major steps to prepare for IPv6:

- Educate staff about IPv6 and its implications in an organized, well-planned manner.
- Assess where the organization stands with respect to IPv6, from infrastructure all the way to applications.
- Determine where the organization wants the network to be in 5-10 years, and what the gaps are between that and the current network.
- Align projects to IPv6 to reap the benefits of early planning.
- Build organizational awareness to promote the IPv6 strategy to all levels of management. Otherwise, parts of the organization might not observe the requirements of IPv6.

"In order to continue communicating at a global level, it's time to migrate to this next generation," said Peter Tseronis, chairman of the U.S. government's IPv6 working group. "Continuity of communications is the business case."

More Information

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