

Federal Agencies Plan and Prepare for IPv6

IT leaders talk overcoming transition barriers, adopting the right tools and working with the most experienced vendors ahead of federal mandate requirements for IPv6 migration.

Federal agencies have been [mandated](#) to migrate federal information systems and services to IPv6, the next-generation internet protocol, by the end of 2025, facilitated by the Federal Energy Regulatory Commission. IPv4, the current version, has been in use since 1983 and the transition requires agencies to adopt 128-bit IPv6 with its more than 340 trillion unique addresses.

The mandate is largely driven by the ever-increasing number of internet-connected devices and their need for more IP real estate. To discuss the requirements for meeting this mandate and the benefits of making the change, members of government and industry recently spoke at [a FedInsider panel](#) to share implementation challenges and lessons learned in the migration.

THE CURRENT STATE OF IPV6 TRANSITION

The move for more IP real estate, the migration to cloud and the need to route connected devices through trusted internet connections are a few of the reasons why IPv4 addresses are depleting. “We use a lot of agency IP space in the cloud,” said Robert Sears, director of the N-WAVE program for the National Oceanic and Atmospheric Administration. “You need IPv6.”

It’s time to transition from the over-decade-old IPv4. Agencies need more IP space to advance technologically. So, the Federal IPv6 Task Force was established by the Federal Chief Information Officers Council to communicate with federal agencies, industry and other stakeholders on IPv6 adoption progress. Sears is the chair of the task force where he serves alongside of other members of the federal government.

“We are here to help guide and provide resources where we can to all federal agencies moving to the migration,” Sears said. The task force provides training events and federal reviewer meetings to bring agencies together to discuss technology, transition plans and reporting requirements. “We also work with the private sector to help them understand how they can help the government meet its requirements to move to IPv6,” Sears added.

The mandates also pose a particularly complex challenge: At least 80% of IP-enabled assets on federal networks must be operating in IPv6-only environments by the end of FY 2025. “That is quite a challenge for most agencies,” said Tom Coffeen, chief strategy officer and co-founder of HexaBuild.

That’s largely because agencies will have to deploy dual-stack transition technology — a device with network interfaces for both

Featured Experts:

■ **Robert Sears**
Director of the
N-WAVE Program,
NOAA



■ **Cricket Liu**
Chief DNS Architect,
Infoblox



■ **Tom Coffeen**
Chief Strategy Officer
& Co-Founder,
HexaBuild



■ **Allen McNaughton**
Director of Pre-Sales
Engineering,
Infoblox



IPv4 and IPv6. “Many agencies have struggled to get even a dual-stack deployment rolled out,” Coffeen said.

And while large cellular phone carriers have deployed IPv6 and have blocks of numbers assigned to them in order to accommodate the number of mobile devices on their networks, many commercial companies aren’t there yet either, according to Cricket Liu, Chief Domain Name System Architect at Infoblox. When it comes to most commercial entities, “outside of the carriers, there has not been a lot of progress in IPv6 supplementation,” Liu said. “Most of them are stuck in IPv4.”

STARING THE IPV6 JOURNEY

Before looking into transition services, Sears said it's important for agencies to complete a baseline assessment of systems and devices that can support upgrading to IPv6 networks and identifying those that cannot. That way, IT teams know whether they need translation-type services to run traditionally v4 network devices on v6. For example, it is more difficult for medical devices to switch networks and support IPv6 when they're already running on IPv4; and federal agencies may also be using network-dependent homegrown applications.

Sears said one of the easiest ways to start adopting IPv6 is to implement dual-stack technology. "A lot of folks probably have a IPv6 interface on their system that they are on right now and may not even know it," Sears said. "You could go in a lab and turn it on and start working with it." This way, IT teams can begin testing on the network.

Coffeen said having a proof of concept can start the migration to IPv6 in the least impactful way possible to existing operations and critical missions. "Having a network or set of networks where you are testing the functionality and testing capabilities of these various devices in the context of either dual stack or IPv6 only is important," Coffeen said. IT teams can test transition technologies in the form of network address translation or application gateways with guidance and

a proof of concept that goes beyond the high-level design.

Ultimately, Coffeen said, it all comes down to planning. "What we really want to encourage agencies and enterprises to do is look at the opportunities to really use IPv6 as a tool to expand what you can do operationally in the network with a sufficient address space, and that is something we have not had the privilege and benefit of," he said. For instance, assess whether the allocation is sufficiently large enough to provide flexibility with design and operation optimization.

Regular training throughout the IPv6 migration should also be part of the process, especially on the protocols and operational alignment. "The most important thing is to get training, start putting together a plan, and start understanding what you have," Liu added.

OVERCOMING IPV6 IMPLEMENTATION CHALLENGES

Considering the number of legacy applications in federal agencies' IT portfolios, agencies can dwell on needing to understand every aspect of their business system — especially those that won't run on an IPv6 network. This is daunting and makes it hard to get started with IPv6 transitions.

Sears said to move those legacy applications to the "need to work on" bucket, you should start with the low hanging

fruit. "It is easier to test with those," he said. "You only have a small sampling of devices with the operating systems and the hardware you have. First test that and then make a move."

Sears also recommended evaluating internal management infrastructure about how IPv4 devices are managed, and then work with vendors to communicate transition needs and capabilities. "Take it in chunks, but do not get hung up," he said.

To better understand what's actually on the network, Liu said having an IP address management structure will make IPv6 deployment much easier. "It is not going to give you a switch that you can flip to activate IPv6 on your network, but it will make things easier if you understand what is on your network today."

The task force is also working to help agencies overcome transition challenges by working with vendors and cloud service providers like AWS, Google and Azure to ensure IPv6 and dual-stack capabilities are available. "Look at who you are working with," said Sears. "For the government, we want to work with the innovators and tech leaders who are on the cutting edge of technology, that is where the government needs to be — with agencies supplying services to the taxpayer and getting the best possible services out there. So, who we partner with will say a lot about how rapidly that transition can occur."



Hosky Communications Inc.
3811 Massachusetts Avenue, NW
Washington, DC 20016
Contact: [John Hosky](#)

☎ (202) 237-0300
✉ Info@FedInsider.com
🌐 www.FedInsider.com
📘 @FedInsiderNews
🌐 [Linkedin.com/company/FedInsider](https://www.linkedin.com/company/FedInsider)
📱 @FedInsider



Carahsoft
1493 Sunset Hills Road
Reston, VA 20190
Contact: [Jenna Tabatabaian](#)

☎ (703) 889-9726
✉ Jenna.Tabatabaian@Carahsoft.com
🌐 www.Carahsoft.com
📘 Facebook.com/Carahsoft
🌐 [Linkedin.com/company/Carahsoft](https://www.linkedin.com/company/Carahsoft)
📱 @Carahsoft



Infoblox
One Dulles Technology Center
13454 Sunrise Valley Drive, Suite 570
Herndon, VA 20171
Contact: [Matt Jacoby](#)

☎ (631) 496-1615
✉ MJacoby@Infoblox.com
🌐 www.Infoblox.com
📘 Facebook.com/Infobloxinc
🌐 [Linkedin.com/company/Infoblox](https://www.linkedin.com/company/Infoblox)
📱 @Infoblox

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