Paving the Way for the New IP

How to prepare your agency's network for the future.

In a world of shrinking budgets, data growth, and technology innovations, network infrastructures that were put in place 20 years ago can no longer handle today's IT requirements. The New IP represents a change in the network from a physical to a virtual entity and prepares federal IT environments for the future. The New IP is a user-driven, software-centric, virtualized network infrastructure firmly based on open standards.

Why Is the New IP Necessary?

"The cloud, mobility, big data—all of these megatrends came about after the network was put in place 20 years ago. The network needs to evolve."

— Anthony Robbins, VP, Brocade Federal

The era of cloud computing, mobile devices, social media and big data is fundamentally changing the industry, and federal data centers with networks that were put in place two decades ago cannot keep up with the changes. Modernizing the federal IT environment is now a necessity. Taking that action will not only foster innovation, it will help agencies provide better services to citizens and warfighters alike. And far from incurring extra cost to the agency, studies project that modernizing network systems

and procurement strategies can save federal IT organizations—not to mention taxpayers—up to $7 billion over five years.[1]

Modernizing the network will also make the network more secure—a key concern for agencies. A 2013 report from the security firm McAfee and the Center for Strategic and International Studies says the circa 1990 Information Superhighway must be strengthened to protect the U.S. from the growing threat of hacking, which costs the U.S. economy as much as $100 billion a year. The 2015 breach at the Office of Management and Personnel alone affected more than 20 million people and will cost the government billions of dollars over an estimated 40 years.

"There is no argument that federal agencies need to modernize their networks," said Steve Wallo, Chief Solutions Architect, Brocade Federal.

"But they need to do it in a strategic way that does not require re-architecting everything in the data center. The network needs to function as part of the entire IT system, complementing and integrating with the advancements in server and storage technologies, not running as a siloed entity. The New IP provides a path to accomplishing this goal."

Wallo says that the New IP is an advanced way to architect networks to ensure that they can accommodate the global explosion in users, devices, and content, as well as the heightened consumer expectations associated with mobile, cloud, social media, and big data. The New IP enables organizations to improve the agility, performance, security, and automation of their networks while simplifying network management. In addition, it improves the alignment of IT with agency missions.

[1] Brocade Federal Networking Solutions, "The Necessity of Network Modernization."
http://www.brocade.com/downloads/documents/white_papers/brocade-necessity-of-network-modernization-wp.pdf

The Old IP and the 3rd Platform

To understand the critical role the New IP will play in the future of network environments, it is important to look at the Old IP and why it no longer suffices.

The Old IP is a vendor-driven, hardware-centric infrastructure locked down by proprietary protocols with high maintenance costs. Twenty years ago it was a good solution based on the then-current requirements to move data, which resulted from the advent of the 2nd Platform, which was personal computers. But today's environment is centered on the movement and management of data at volumes that were inconceivable when the Old IP was introduced. For example, some of the network and data changes over the last 20 years include:

- In 1994, only 2,700 websites existed. In 2015, more than one billion websites exist.

- In 1995, less than 1 percent of the world population had an Internet connection. Today, almost 80 percent of people in the United States alone have access to the Internet.

- According to the U.S. Census , in 2013, 83.8 percent of U.S. households owned computers. In 2009, that number was 76.9 percent.

- In 2013, the average adult spent five hours and 16 minutes per day using digital devices (excluding phone calls). This was up from three hours and 11 minutes in 2010.

- As of January 2014, 74 percent of adults who are online use social networking sites.

- From 2013 to 2020, the digital universe will grow from 4.4 trillion gigabytes to 44 trillion. This number more than doubles every two years .

These trends have given rise to the 3rd Platform. The 3rd Platform is built on mobile computing, social networking, cloud services, and big data analytics. The 3rd Platform has massive scale—it will reach trillions of devices, monitors, and sensors. It will reach billions of users through millions of new applications and services.

The 3rd Platform requires network infrastructures that can handle the movement of data—lots of data and big data. The network environment that was put in place 20 years ago cannot keep pace—it is not simple, scalable, or agile. As a result, many government networks cannot efficiently take advantage of cloud services, mobility, and analysis of big data—cornerstones of federal government IT innovation. The Old IP network is a bottleneck that hinders innovation.

The New IP

Enter the New IP, a massive and radical simplification in the design of the network, according to Phil O'Reilly, CTO, Brocade Federal. The New IP is a networking paradigm with the primary objective of creating networks that help organizations tap into the unlimited possibilities of cloud, mobile, social media, and big data. The New IP is about the user experience—whether it is the experience of a 75-year-old person on Social Security or a digital warfighter who gathers important data when and where it is needed.

The New IP represents a fundamental change in mindset about the role of networking and its ability to support the massive scale of today's powerful computer models. The New IP is a model that promotes collaboration among an ecosystem of vendors to collectively accelerate the pace of federal IT innovation. In the federal IT environment, the New IP provides opportunities that directly address the critical business and technology challenges that agencies face. The New IP facilitates benefits include:

- Accelerating the journey to the cloud, strengthening cybersecurity initiatives, easing the impact of data center consolidation, and delivering robust data analytics on any device, anywhere, anytime

- Regaining control over networks, turning them into true business enablers that can quickly adapt to the changing needs of federal employees, citizens, and warfighters

- Enabling the adoption of higher-level orchestration tools such as OpenStack to allow coordinated provisioning and control of all layers of the IT architecture

- Adding security where needed, rather than bolting it onto the network edge; security in the New IP can also be behavior-based, rather than simply identity-based, enabling the network to effectively detect and respond to potential threats in real time

[2] Internet Live Stats, accessed July 17, 2015. http://www.internetlivestats.com/internet-users/

[3] US Census, Computer and Internet Use. http://www.census.gov/hhes/computer/

[4] eMarketer Digital Usage survey, July 2013. http://www.emarketer.com/Article/Digital-Set-Surpass-TV-Time-Spent-with-US-Media/1010096

[5] Pew Internet Project, accessed July, 17, 2105 (data updated regularly). http://www.pewinternet.org/fact-sheets/social-networking-fact-sheet/

[6] EMC[2] The Digital Universe of Opportunities: Rich Data and the Increasing Value of the Internet of Things. April, 2014. http://www.emc.com/leadership/digital-universe/2014iview/executive-summary.htm

Are Agencies Adopting the New IP?

Are agencies ready to adopt the New IP? To determine federal agencies' understanding, needs, and propensity to adopt key elements associated with the New IP, Brocade Federal commissioned Market Connections to conduct a study of federal IT decision makers. The statistics mentioned in the remainder of the paper were taken from that study.

Federal network modernization efforts focus on three characteristics that are critical to the new environment: simplicity, scalability, and agility. Without these three attributes, networks cannot respond to the rapid changes in technology. The study found that only about one in ten respondents feel that their agency's network infrastructure is fully able to support simple (12 percent), scalable (14 percent), and agile (12 percent) solutions to the movement and management of data. These low numbers indicate that the great majority of agencies do not have the infrastructure in place to handle the requirements of cloud services, mobility, and big data analytics, which are the cornerstones of federal agency innovation. Now, more than ever, it is important for agencies to invest in the infrastructure to support their needs both today and into the future.

The research revealed that agencies cite budget constraints, limited internal resources, and lack of expertise as the top challenges to making improvements in these areas. However, infrastructure improvement does not necessarily need to be a barrier to adopting the New IP. Brocade has identified five components of the New IP, outlined below. By gradually implementing each one, agencies can methodically prepare and manage their networks for the future, and can do so economically.

Building Blocks of the New IP

As a leader in helping federal agencies manage data on the network, Brocade describes the New IP as a modern way to architect an IP network, including both hardware and software, to provide profound mission and technology benefits.

Every component associated with the New IP is—at its core—agile, scalable, and flexible. Practically speaking, that means that agencies can implement these components as improvements are needed and as budgets allow. The key is to start now with each new procurement.

Open Standards

"Networks based on traditional IP technologies limit an agency's ability to take advantage of the incredible innovations that are happening in IT, an evolution that IDC calls the 3rd Platform. These advancements can enable dramatic improvements to the way agencies can securely deliver digital services to citizens, military personnel, government employees, and veterans."

— Rohit Mehra, Vice President, Network Infrastructure, International Data Corporation (IDC).

Are Agencies Adopting Open Standards?

90%

of respondents agree that open standards are important

BUT ONLY

57%

ARE CONSIDERING, OR HAVE IMPLEMENTED THEM.

TOP 3 REASONS

TO ADOPT

69% more flexibility
67% reduced cost
43% faster innovation

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Open standards are one of the foundations of the New IP. Open standards facilitate interoperability and data exchange among different vendors' products or services. They eliminate vendor lock-in, allowing agencies to select the right technologies for their mission needs. Open standards-based products give agencies flexibility while reducing cost and complexity—and accelerate the rate of innovation. Open standards can be applied to all layers of the infrastructure—the network, compute, and storage. They also facilitate high-level orchestration. Agencies that adopt open standards are more agile and are in a better position to respond to the network infrastructure needs of the cloud, mobility, social media, and big data.

Open source initiatives like OpenDaylight and OpenStack, which are designed to support Software-Defined Networking (SDN) and cloud adoption, have had a huge impact on network innovation, enabling IT leaders to work together to spread the adoption of emerging technologies. In fact, President Obama's recent Open Government Partnership Action Plan requires agencies to develop open source software policies to enable innovation and cost savings.

Almost all respondents (90 percent) believe open standards are important, yet only half (48 percent) are considering it or are planning to adopt it in the next few years, and only about one in ten (11 percent) have done so already. Due to the importance that agencies place on open standards, these adoption numbers seem low, considering the payoff: Those who have adopted open standards cite flexibility and reduced costs as the top reasons for taking this important step.

Of the 43 percent who are not considering open standards, the majority (61 percent) say security concerns are the primary reason. Understandably, security is a prevalent concern among agencies in all areas of IT. In the case of adopting open standards, this may be because a multivendor environment feels less secure. Yet the opposite is true: With the New IP, best-in-class security from a preferred security vendor can be built into the network instead of "bolted on," which requires network traffic to be routed to the security appliance for inspection. The ecosystem-centric approach of the New IP makes this built-in security possible in a way that the Old IP does not.

Adopting open standards is something every agency can start doing now, with any new procurement. The agency simply needs to add a requirement that the vendor adheres to open standards.

Multivendor Networks

"Networks based on a single vendor are vastly more expensive to operate and maintain than modern, multivendor networks."
—Gartner

By its nature, the New IP requires products and components to integrate with multiple vendors' products without having to re-architect the infrastructure. The New IP framework forces vendors to compete based on the value of their components. It also prevents vendor lock-in and ensures continuous innovation in the functionality and performance of each component.

Multivendor environments also enable the kind of competition that controls costs. One study showed that the introduction of a second vendor into a network reduced the total cost of ownership by 15 to 25 percent over a five-year period. As agencies continue to work with shrinking budgets, multivendor networks are a key means of controlling costs, encouraging competition between vendors.

With a multivendor enabled environment—which means that open standards are in use—agencies can replace network components with newer, more innovative technology based on who has the best solution at the time, not based on which vendor happens to already have components in place.

Ethernet Fabrics

No matter how ubiquitous scalable, software-enabled tools might become, the physical infrastructure will never completely disappear. Enter Ethernet fabric technology, a vital component of the software-enabled New IP network environment.

Ethernet fabrics are flattened architectures that simplify the network by replacing traditional point-to-point relationships. These software-enabled tools take cues from the software environment to prompt the hardware. They offer simplicity and automation, reduce network complexity, and form a core component of the New IP.

The majority (84 percent) of respondents have either implemented Ethernet fabric technologies into their data center (18 percent), are planning implementation in the next one to two years (28 percent), or are considering (38 percent) integrating Ethernet fabric technologies into their data center. The main reasons for doing so are ease of network management, followed by scalability (that is, minimal touch provisioning).

[7] Gartner, "Debunking the Myth of the Single-Vendor Network," November 2010 https://www.gartner.com/doc/1471937

[8] Ibid.

Ethernet Fabrics

Agencies need to choose the right hardware today to be protected in the future. Ethernet fabrics also prepare the network for Software-defined Networking (SDN).

Brocade® Ethernet fabrics are easy to install, integrate, and automate. Brocade minimal touch programming allows users to do in one step what takes multiple steps (and thus more time) in other environments. These fabrics are self-provisioning and self-healing, which eases scalability and dramatically reduces training and maintenance costs. Brocade fabrics also feature automation that reduces errors and accepts commands and controls from enterprise-level orchestration tools such as OpenStack.

NFV and SDN

The freedom to programmatically control the way data flows through a network eases manageability, supports automation, and helps administrators more quickly deliver customized services that enhance agency operations. Software-based technologies such as Network Functions Virtualization (NFV) and SDN provide dynamic delivery of services and new applications in minutes, instead of days or weeks. Both of these technologies are about agility and scalability, which are important components of the New IP. As vast amounts of data come in from different sources, these tools provide the agility to move the data, as well as the network service, as often as needed and whenever needed.

NFV moves network functions from special-purpose hardware devices to "common off the shelf" servers to dramatically reduce IT costs.

SDN is an approach to applying globally aware software control to all areas of the network, to access both physical and virtual switches and routers that typically use closed and proprietary firmware. The power of SDN is in the applications, which can provide the network with unique feedback from the rest of the IT environment and—most importantly—the user's data. This allows for specific automation, based on the entire IT arena, which was never possible using the Old IP.

Seven in ten respondents are currently considering or planning moving to a Software-Defined Network (59 percent) or have already moved (11 percent). Overall, respondents feel that SDN can deliver greater performance (53 percent) and ease of management (51 percent). Security (44 percent) and ease of deployment (41 percent) are other commonly perceived benefits.

Brocade has long been a leader in NFV services and performance, offering numerous virtualized network functions and software-enabled tools that can be placed in the architecture when and where they are needed, without disruption. Brocade is the industry leader in SDN, in part due to the in-house expertise. In fact, Brocade experts include people who have developed and defined SDN across the industry. In addition, Brocade is a Platinum member of the OpenDaylight project and focuses on open standards as the driving force behind the power of SDN. The Brocade SDN strategy uses

Ethernet Fabrics are a Must for the New IP

84% OF RESPONDENTS either have implemented, or are considering Ethernet fabrics.

TOP 3 REASONS FOR CONSIDERING ETHERNET FABRIC TECHNOLOGIES

62% ease of network management

51% promotes scalability

38% want technology that will work with higher level orchestration tools

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only one open standards-based controller, which further simplifies network functions and controls, and all Brocade products are SDN-aware.

Based on the OpenDaylight controller, the Brocade SDN Controller is a fully tested commercial edition that is documented, quality-assured, and ready for smaller enterprises up to carrier-class environments. In addition to the software itself, Brocade provides developer resources such as sample scripts, training, and full customer support. Users retain full intellectual property rights of applications that are developed on the Brocade SDN Controller and have access to a DevNet community repository and world-class subject matter experts.

Alternative Procurement Models

The ability to modernize using operational dollars can be advantageous for agencies facing budget constraints. Considering alternative acquisition models can speed adoption of the New IP. Opting for a vendor-neutral, requirements-based approach allows agencies to choose from a wider variety of solutions to meet their price, performance, and flexibility needs. In acquiring those solutions, agencies can use resources more efficiently through an alternative "pay-as-you-go" approach that spends Operating Expense (OpEx) dollars rather than Capital Expense (CapEx) funds. Utilization-based models, in contrast to capital procurement, allow agencies to scale in order to meet ever-changing demand and to upgrade based on needs instead of appropriation cycles.

Brocade Network Subscription (BNS) is an acquisition methodology that lets customers invest in new solutions with no upfront dollars: The customer pays a monthly fee with OpEx dollars for the duration of the subscription service. Over time, the customer has the autonomy to scale the hardware and software associated with this offering up or down based on requirements (as needed) and enjoys the ability to easily take advantage of new technologies with no penalties incurred.
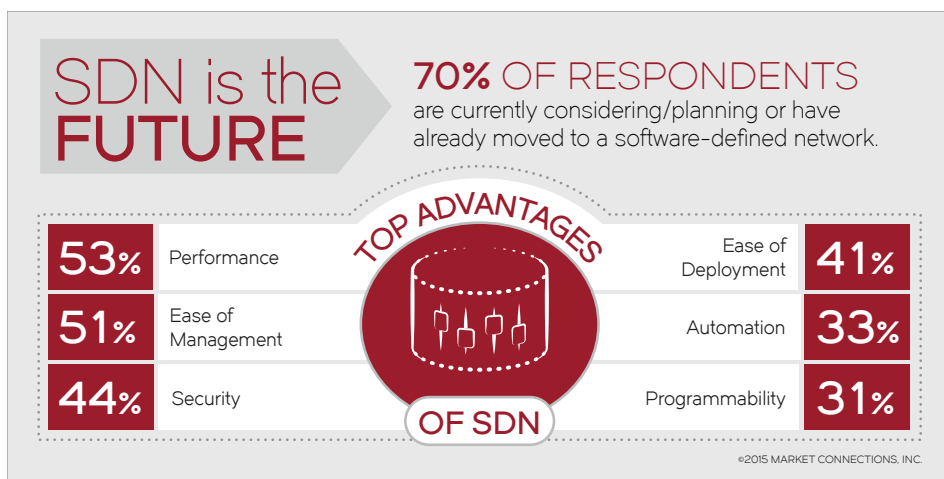
Conclusions

"Going forward, when your agency is procuring network solutions, ensure they are SDN-ready and based on open standards. Whether you use these features immediately is up to the pace of your agency, and not what the vendor wants. When you are ready to fully invest in the New IP, your infrastructure will be ready."
— Steve Wallo, Chief Solutions Architect, Brocade Federal

While the New IP is in its early stages, industry leaders are embracing the components and coming together to help federal agencies become quicker to innovate, meet IT initiatives, and provide better constituent services. Most agencies have already adopted some of the enabling technologies that are the foundation of the New IP.

However, overall agency infrastructures are not ready to support the current or future demands for moving data across the network. Agencies can, and should, start laying the foundation today. The components of the New IP are flexible, and agencies need not transition all at once. Instead, they can adopt components incrementally, as needs arise.

SDN is the FUTURE

70% OF RESPONDENTS are currently considering/planning or have already moved to a software-defined network.

TOP ADVANTAGES OF SDN

53%	Performance		Ease of Deployment	**41%**
51%	Ease of Management		Automation	**33%**
44%	Security		Programmability	**31%**

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About Brocade

Brocade is a key participant in this industry-wide effort to develop technologies and solutions for the needs of the modern network. Products are designed to integrate with OpenDaylight at the network layer and OpenStack at the orchestration layer. The Brocade team includes leading industry experts who help facilitate the process of modernizing agency networks. Brocade believes that the New IP will carry Federal IT environments into the future, and shows that commitment in every product that is developed. The Brocade promise is to lead the industry and be the best partner possible.

No matter where your agency is on the spectrum of modernizing your network, these five components are the core features of the New IP:

1. Move to open standards.

2. Implement a multivendor network.

3. Deploy Ethernet fabrics.

4. Initiate SDN and NFV.

5. Leverage alternative procurement models.

Adopting these five components of the New IP will set up your agency for the future while meeting your needs today.

About the Study

Brocade commissioned Market Connections to determine federal agencies' understanding, needs, and propensity to adopt key elements associated with the New IP. The blind online survey included 200 respondents from 64 federal agencies. Job roles included Network Manager, Network Administrator, and Data Center Manager/ Director. More than half (55 percent) were on a team that makes decisions regarding network infrastructure solutions, 46 percent evaluate or recommend network infrastructure solutions, and 29 percent manage or implement network infrastructure solutions.

About Market Connections
Market Connections delivers actionable intelligence and insights that enable improved business performance and positioning for leading businesses, trade associations, and the public sector. The custom market research firm is a sought-after authority on preferences, perceptions, and trends among the public sector and the contractors who serve them, offering deep domain expertise in information technology and telecommunications, health care, and education. For more information, visit http://www.marketconnectionsinc.com.

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