Transform agency operations with Network Function Virtualization

Bold shift to software-driven model simplifies and saves
Government agencies today, like organizations everywhere, are struggling to keep up with the demand on their networks. Increased use of mobile devices, work from home and alternative schedules, bandwidth-hungry applications, exploding video traffic, increased cyber risk, and dramatic increases in data loads are straining even the most robust agency infrastructures. As network demands multiply, many agencies find themselves saddled with outdated legacy environments that consist of a growing collection of single-function appliances.

The standard network configuration – separate appliances for the edge and aggregation routers, firewall, wireless LAN, WAN accelerator and other vital functions – is cumbersome, time-intensive to maintain and operate, and expensive to upgrade. Expanding capabilities often means increasing rack space and ratcheting up power (when and where possible), which increases complexity and risk. In many cases, the hardware comes from numerous vendors, and this complicates interoperability, support, and upgrades.

Accelerating technology innovation means hardware life cycles are becoming ever shorter. As each appliance reaches end of life, it becomes necessary to restart the cycle of design, engineer, procure, integrate, and deploy. That’s costly and time consuming.

Hardware-centric networks with long cycle times and fixed capacity are not satisfying users’ dynamic and expanding needs. Most network infrastructures are designed with a 6- to 18-month deployment timeline, require large upfront investments, and are difficult to modify midcourse or after completion. To complicate matters, many agencies are experiencing significant increases in mission and operational requirements while their budgets remain flat or are even reduced. Under pressure to decrease capital and operating expenses, agencies can no longer afford the budget spikes required for networks upgrades.

The old paradigm of stovepipe hardware-intensive infrastructure simply won’t keep up with explosive data demand. It’s clear that agencies need a new approach that allows them to focus on their missions instead of their aging and increasingly inadequate networks. Thought leaders in many agencies have begun making the bold shift to a software-driven model – an agile, virtualized platform that streamlines IT processes, accelerates delivery cycles, and reduces expenses.

Network Function Virtualization (NFV) is a new approach that uses cloud techniques to virtualize dedicated network functions that were previously delivered using dedicated hardware. It transitions routing, switching, firewall, and other functions from single or even multiple-purpose proprietary hardware devices to applications that can be hosted on standardized high-volume appliances. With NFV, the virtual devices can grow or shrink as needed and take on attributes that purpose-built hardware platforms cannot.

Game-changing capabilities

The Network Function Virtualization model provides dynamic and on-demand access to network functions. Instead of installing a physical router, WAN accelerator and firewall, for instance, an agency could turn up a software-based version of all three in near real-time. The model offers increased speed and a unique open design that allows organizations to run multiple functions simultaneously on one appliance. These appliances can be optimized for a wide range of customer use cases and can provide game-changing capabilities such as deploying a firewall from a centralized location in just hours instead of weeks. No need to send a technician across the country or halfway around the world to deploy a purpose-built firewall.

Virtualizing network functions means that CIOs struggling to support agency operations with ever-tighter budgets will no longer need to purchase dedicated hardware devices. NFV will improve capital efficiency, simplify network design, and reduce design-to-deployment timelines for new services or functions, enabling the IT department to respond more nimbly to changing agency mission and operational needs.

Agencies can transition from purpose-built network devices to virtual network services hosted on standardized servers to eliminate a large number of onsite hardware platforms and save money on space, weight, and power. Using virtualized modeling, simulation, and trouble-shooting enables agencies to determine the best architecture to meet their needs. Agencies will only pay for the services they need, so no more under-used hardware platforms. And instead of having to wait years to replace a hardware platform that is no longer useful, agencies can quickly and easily increase or decrease their virtual services when and where needed. Of course, the larger the mission or network, the greater the impact of the NFV model.

Better, more affordable support for agency missions

Government agencies have diverse missions to fulfill – from guarding the nation’s borders to protecting human health and fostering the stability of the country’s monetary system. IT departments ideally enable these missions by enhancing the agencies’ network efficiency and effectiveness. Unfortunately, according to the U.S. Office of E-Government and Information Technology, the Federal Government has suffered from “poor management of technology investments, with IT projects too often costing hundreds of millions of
Agency CIOs have often been hamstrung by inadequate budgets, unclear mandates, aging and inadequate legacy systems, and intense pressure to justify new IT expenditures. To help CIOs improve their agencies’ infrastructure, the Office of Management and Budget recently issued a memorandum expanding CIOs’ authority to create IT networks that will support the agencies’ missions and goals. (Executive Office of the President, Office of Management and Budget, 2015) The timing of this announcement – just as providers have begun introducing virtualized service – means that visionary CIOs can now take advantage of Network Function Virtualization to support agency missions in ways never before possible.

Proponents say that NFV can transform agencies’ IT infrastructure and operations with

- **Simplification** – reduced complexity and overhead
- **Automation and virtualization** – reduced staffing, travel, hardware devices and spares, time from design to deployment; increased agility and flexibility
- **Integration and orchestration** – ensured network, compute, and storage interoperability
- **Protection** – a higher level of security and trust

NFV enables CIOs to centralize intelligence and control, allowing agencies to increase or decrease network bandwidth and services as needed in real-time.

NFV enables organizations to access network functions through a public or private cloud, through a premises server, or with a combination of both. It also lets them leverage existing best practice security measures while layering new methodologies made possible by an API-based information interchange. Agencies can ensure that these services and their host platforms maintain the required security and trust profiles. Security options include but are not limited to encryption of data on the hard drive and running firewall as an application on the virtualization server.

To further protect the network, the agency’s provider should apply integrated and layered defense, comprehensive threat management, visibility, analytics, 24x7 response, and continual platform innovation. Top-tier providers will protect the NFV infrastructure with identity, accident and privileged access management to the network function, as well as with virtualization software and layered threat management defenses.

With NFV, agencies can respond quickly and reconfigure the network to add security as needed. In the event of an interruption, the provider can immediately shut down any compromised hardware or software and provision new capabilities – all within minutes. Dynamic security controls mean organizations can maintain full operational continuity. With traditional networks, geographic redundancy is expensive, but NFV makes redundancy cost-effective; agencies can use two appliances to support high availability and multi-level protection.

**Practical support for agency missions**

Network Function Virtualization also allows agencies to provide even remote branch offices the range and level of network services they require. Consider agencies like the USDA, which has more than 100,000 employees working from 4,500 locations, many in rural areas. Equipping and maintaining even a small office network is costly, and adding a new function to every agency location could take months or even years. NFV enables even the largest enterprises to deploy a new network service as an application in a matter of hours or days. In such a widespread organization, a multi-purpose infrastructure onsite or in the cloud can reduce the number of network devices across the enterprise by hundreds and even thousands.

Virtualization will enable agencies to easily manage change in a constantly shifting environment. With Network Function Virtualization, an agency could deliver all the network services used by the staff at its Washington headquarters to every branch and field employee. While NFV has the potential to help any organization, it will be especially useful in assisting agencies with highly distributed environments. Efficiency and IT spend can be optimized for all locations.

NFV can also benefit small organizations or temporary deployments by enabling quick response as needs arise. Agencies like FEMA that help communities recover after disasters have very specialized needs. Instead of hauling in truckloads of hardware devices and specialized equipment to

Flexible and secure, on-premises and in the cloud

CIOs will be able to leverage the flexibility of virtualizing network functions to meet growing mission and operational requirements within today’s budget constraints. NFV reduces the need to make wholesale network changes. As the functionality and performance of traditional network appliances approach end of life, agencies can replace the appliances with virtual services that will work on existing platforms, eliminating the need for a hardware forklift upgrade. Then when an agency is ready to replace other network functions, it can easily spin up additional services using the same appliance that is already running its first virtual applications.
set up a communications network, agencies could use NFV to quickly and securely establish a range of virtualized services hosted in a cloud or data center.

Once first responders are connected, they can quickly begin to communicate and share the status of materials moving in and out of the area, which zone rescues have taken place, and where search and rescue operations are still needed. This agility supports faster data sharing and better coordination of rescue and recovery efforts without the need for a massive IT deployment at the scene, making it easier to get help more quickly to people in life-threatening situations.

Finding the right vendor

NFV offers a revolutionary business and technology model that can help almost any government agency contend with challenges like limited power, constrained budget, and increasing security demands. Addressing these requires industry-leading technology, a comprehensive understanding of agency requirements, and the expertise to collaborate with agencies to deploy solutions that are optimized for key mission and operational use cases. CIOs should learn as much as possible about the portfolio, strategies, and successes of industry players so that they can select and work with the most effective partner for their agency.

Addressing agencies’ operational issues requires not only exceptional analytic capabilities but also the comprehensive and highly secure IT services of a well-established carrier. It’s important to find a trusted service provider that is a leader in Network Function Virtualization and software-defined networking.

Ideally, the NFV supplier should also be a global network provider with a strong track record in managed security services, experienced in integrating new capabilities into its network and delivering high quality and high availability. Agencies need a provider with a proven performance record, one who can help them define and implement solutions that protect their networks and data, unify communications and clouds, and modernize their infrastructure. Most will want a provider that’s a financially strong innovator whose technologies have been thoroughly vetted through rigorous certification processes.

The brave new world of virtual networks

Demands on agency networks will continue to grow. Agencies require technology that adapts along with their workloads, ensuring that the networks keep up with the demand for video, unstructured data, and anything else its staff or constituents may need. Virtualizing network functions will deliver the required network resources more quickly and with better performance than traditional networks. A number of government agencies with smart, innovative leaders are beginning to do virtualization proofs-of-concept and pilots.

Network Function Virtualization offers agencies a holistic way to design and manage next-generation networks. Instead of adding hardware and software from a number of vendors and hoping it works well together, agencies can create a series of virtualized platforms to support a wide range of network services. This approach can free agencies from the tyranny of worrying about their hardware and enable them to start to strategically plan their networks based on the functionality and performance required by the agency’s mission and operations.

Moving from giant racks of dedicated hardware to a consolidated appliance or cloud-based network may feel like taking a leap of faith. NFV is different from what most IT departments are accustomed to managing. But whether or not agencies feel ready to take that leap, it’s a fact that virtualization is coming. Those who have seen NFV in action believe it will forever change the way organizations manage their networks, enabling them to abandon old models that are expensive, complex, and cumbersome in favor of a new order that’s efficient, more reliable, and much greener. By using a thoughtful and diligent approach, agencies can use this new, dramatically improved approach to simplify IT and network operations, improve performance, increase bandwidth, and better support their missions.

Works Cited
