TWD

APPLYING TECHNOLOGY. AMPLIFYING RESULTS.

Implementing Next-Generation Network Infrastructures for Cloud Migration

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Introduction

Enterprise information technology (IT) is constantly evolving, as are the information and bandwidth needs of federal civilian and Department of Defense (DoD) agencies. Internal and external communications networks—including converged systems of voice, data, video and Storage Area Networks (SANs)—are vital to the ability of these agencies to deliver on their mission.

Keeping ahead of bandwidth and network requirements is a challenge for any government agency, especially as new collaborative technologies and cloud computing initiatives emerge, with their promise of increased efficiencies, greater economies of scale and lower cost of ownership. Implementing next-generation network infrastructures, integrating the latest technologies to increase bandwidth, reducing power consumption and virtually eliminating the chance for service loss are all considerations that agency leaders need to keep in mind. In today's network environment, more agencies are taking advantage of cloud technologies to increase the communications and collaboration capabilities of an organization, while simultaneously reducing operating costs.

An Issue of Balance

Balancing network needs with capabilities is a major issue within government. When needs exceed the bandwidth or switching capabilities of the network, agencies often are left with impossible challenges, including:

1. **Reducing network use in other areas.** This may mean sacrificing a necessary application for a critical one, constantly juggling and managing network use at great expense, as well as increasing the possibility of disruption or service failure.

2. **Adding additional network and systems infrastructure.** Building out more capacity, increasing bandwidth, or repetitively developing isolated islands of systems may work to solve an immediate problem, but this approach is cost-prohibitive and creates a patchwork system that is unable to meet future demand.

3. **Scaling back mission needs.** This virtually is never an option for federal agencies that must perform critical government functions.

Unfortunately, these options put agencies on the defensive against current needs, rather than positioning them to build the infrastructure necessary to meet the next network challenge.

The Three-Dimensional Challenge

In the past, the role of technology could be plotted on a simple two-dimensional graph similar to the supply-and-demand curve of economics. As demand for network connectivity increased, supply grew to meet this need.

Now, agencies are entering a new technology paradigm. IT infrastructure management and budget considerations are creating a three-dimensional challenge that is transforming networks through virtualization and cloud computing; redefining platforms such as mobile and collaborative environments; and accelerating application development into a more agile framework. The shift impacts Chief Information Officers (CIOs) and Chief Technology Officers (CTOs) in general, and agency communications networks in particular.

A New Network Infrastructure

Agencies at the center of these changing dynamics need well-engineered and reliable cloud computing-capable network infrastructures that improve mission readiness dramatically. The key is taking advantage of the latest network technologies and making them the backbone of a transformed infrastructure. This both broadens transport flexibility and increases an agency's scalability and agility, while saving on energy costs. Flexibility in transport is afforded by the solution's ability to converge data, voice, video and SANs.

Transport of SAN data outside of its immediate facilities enables cloud systems to blossom. Now SAN data can be shared with multiple data centers, or Local Area Network (LAN) rooms in a multitude of places. Storage cost reductions and the development of new solutions at individual data centers and LAN rooms can be accelerated. SAN data also may be replicated effectively at other data centers to lower data loss and increase uptime for all systems dependent on that data. These new SAN capabilities spell a faster path for agencies to migrate to more efficient cloud computing environments.

Increased Bandwidth, for Any Application

Bandwidth is the backbone of every agency's network infrastructure. As technologies have progressed, the needed growth in bandwidth capacity often lags behind. By leveraging leading network and switch technologies, agency bandwidth capabilities can increase upwards of 20 times, enabling a more agile and responsive environment to support the mission. This means that users gain 15 terabits of throughput, and with a unified fabric, the infrastructure can transport both IP data and SAN transport protocol simultaneously over Ethernet or Fiber-Channel over Ethernet (FCoE).

Agility improvements are more than wire-deep; networks and systems deployed to operate an application no longer need to be located in the same LAN or data center. Instead, agencies can empower developers to create applications on servers wherever they are and wherever the mission takes them. This is the heart of the cloud computing paradigm.

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Lowering Total Cost of Ownership

As the national deficit continues to reduce agency budgets, the focus on ways to reduce costs and increase efficiencies becomes ever greater for agencies. In addition, agencies need to find areas to decrease the amount of budget required to service existing systems—which the U.S. Government Accountability Office reported made up $58 billion of the $79 billion IT budget in fiscal 2014.[1]

Transforming networks and communications systems can yield proven cost benefits and lower the Total Cost of Ownership (TCO). For example, by replacing legacy network switches with newer, more modern solutions, agencies can effectively cut maintenance and support costs by more than 40 percent. The unified fabric can also reduce server input/output adapters (such as Network Interface Cards (NICS) and Fiber Channel (FC) Cards) by up to 75 percent. The great density of high-bandwidth interfaces means that fewer network devices are required, reducing power requirements by up to 30 percent. That's money better spent on new efforts to accelerate the mission and provide better citizen services.

Increased Agility

More can be done with less. As illustrated above, more modern switches require less physical infrastructure and enable faster redeployment for vital mission systems. The resulting smaller footprint has fewer cabling requirements and lower power needs. Deployments of new services are less likely to require a physical build-out that could take up to 18 months from procurement to completion, and would include electrical, heating, ventilation and air conditioning (HVAC), as well as cabling and physical space— all before a single IT service is deployed. Physical build-outs often require great capital outlays as well.

These newer switches also provide native support for virtual machines (VMs), and are actively aware of a VM migration from one physical platform to another as it is moved through the cloud. With minimal configuration changes, implementing new solutions can enhance VM migrations by maintaining provisioned policies for security, quality of service and performance, giving the agency the ability to move a VM swiftly from data center to data center, migrate the expected network performance parameters simultaneously and maintain application behavior.

No Loss, No Worries

In a time of increasing reliance on cloud computing infrastructures, Continuity of Operations (COOP) planning is no longer a luxury—it's a necessity. Solutions using newer switches provide agencies with a near-zero service loss architecture. This is achievable because the switches themselves were designed to stay operational at all times, a feature that is more important than ever as agencies transition to virtualized environments. Pre-failure detection and reporting are built into the switch design. Moreover, agencies can use their network management system to perform upgrades to the Internetwork Operating System (IOS) code without any service interruption, which means an agency can mitigate a security incident or vulnerability related to the switch without compromising the mission, while increasing bandwidth upwards of 20 times and enabling agencies to be more agile and responsive.

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For more information about TWD's services, visit our website **www.twd.com** or call **(703) 820.9777**.

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Energy Savings That Stack Up

According to the Department of Energy, a significant percentage of government electricity usage comes from data centers, estimating that 10 percent of the federal government's electricity use goes to data centers. On a national level, data centers consumed about 100 billion kilowatt-hours of electricity, representing more than two percent of all U.S. electricity use. Enhancing the efficiency of data centers provides an opportunity for significant cost savings. In fact, if all U.S. data centers were 20 percent more efficient, the nation could save more than 20 billion kWh by 2020, which translates to roughly $2 billion in cost savings.[2]

A Promise of Vigilance...and Success

TWD has deployed new network infrastructures for a variety of customers across the federal and DoD communities. The company completed a campus-wide cloud-enabling network infrastructure deployment at a major DoD agency location. As part of the deployment, TWD installed upgraded switches across the campus. It collapsed the distribution layer into the core and enabled enhanced Voice over Internet Protocol (VoIP), high-definition digital media streaming and FCoE transport for SAN distribution capabilities. The network infrastructure, which supports 6,500 users and five campus buildings, also uses a unified fabric approach that provides increased scalability and virtualization capabilities for cloud-based deployments.

Overall, the network decreased the agency's infrastructure requirements from six core switches to two, increased backbone bandwidth from 1Gbps to 20Gbps and increased the total network capacity from 10Gbps to 3.4Tbps. On-premise personnel are able to build private virtualized environments that offer group information sharing, application development on dedicated servers, centralized control/management and SAN functionality. The deployment improves the agency's ability to respond to its mission and operational requirements.

About TWD

TWD is a technology solutions company that for more than 20 years has served as a trusted partner in delivering the highest quality systems and services to all types of customers, from large federal agencies in highly secure environments to commercial companies and non-profits. Our customers choose us to solve their communication and collaboration needs, taking a holistic view of their current technology investments and customizing solutions to deliver compelling value in the form of lower costs and higher productivity—whether on-premise or from the cloud—whether customer owned or by way of a TWD managed service.

[1] United States. Government Accountability Office. *Information Technology: Agencies Need to Strengthen Oversight of Billions of Dollars in Operations and Maintenance Investments.* Report GAO-13-87. Washington: GAO, 2012.

[2] Tikoff Vargas, Maria. "10 Facts to Know About Data Centers." *Energy.gov.* U.S. Department of Energy, November 17, 2014.

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