

Air Force Deploys New IT Environment to Enhance Network



Air Force District Washington creates a shared-computing environment to improve regional network performance.

Executive Summary

AIR FORCE DISTRICT WASHINGTON

- **Industry:** Federal–Defense
- **Location:** National Capital Region (Washington, D.C.)
- **Number of Employees:** 500+

CHALLENGE

- Replace aging infrastructure and servers beyond end of life (EOL)
- Consolidate number of server racks and improve storage capabilities
- Enhance integration of technologies to enable greater information sharing
- Reduce server maintenance time and costs

SOLUTION

- Implement a shared-computing environment (SCE), including a life cycle refresh of the entire EOL server base
- Adopt a phased approach to further use capabilities of new technologies to improve service, reliability, and capacity and shift toward a software-defined environment (SDE)

RESULTS

- Reduced number of server racks by 75 percent, consolidating 32 racks to eight
- Achieved more than a 60 percent reduction in heating, ventilating, and air conditioning (HVAC) and power consumption
- Replaced 400 EOL servers with a shared environment, generating immediate savings in capital expenses

Challenge

As a direct reporting unit to Headquarters Air Force (HAF) and the Air Force Chief of Staff, Air Force District Washington (AFDW) has a unique responsibility for the U.S. Air Force. It is responsible for aligning the Air Force command structure with other U.S. Armed Forces, improving Air Force support of the Joint Force Headquarters National Capital Region (JFHQ-NCR) and providing a single voice for Air Force cross-services and communications in the region.

AFDW supervises operations across Air Force facilities in the National Capital Region (NCR) including three primary locations: the Pentagon, Joint Base Anacostia-Bolling (JBAB), and Joint Base Andrews (JBA), where AFDW is headquartered. As such, part of AFDW's responsibility is ensuring the technology and services backing the network infrastructure are performing at a high level to support the operations of these facilities both individually and collectively as they jointly support Headquarters Air Force.

In 2012, the IT environment in the NCR was unstable. Faced with an aging infrastructure, AFDW performed daily troubleshooting maintenance to keep servers running, because hundreds of servers were nearing or at end of life (EOL) service. Andrews and Bolling were using different services and equipment models to support the network. The result was very little standardization, creating system integration and daily maintenance challenges. Furthermore, application owners used customized configurations without considering the impact on the entire IT environment. As a result, the technologies in place didn't interface together at all and that, combined with old and failing equipment, caused frequent outages and wasted resources.

These problems were felt across the NCR, impacting AFDW operations and those Headquarters Air Force applications supported by the Joint Base Andrews and Joint Base Anacostia-Bolling automated processing centers (APCs). It was clear that a comprehensive replacement effort was needed to establish a new, efficient IT environment to improve network reliability, accessibility, and flexibility moving forward.

Solution

With the existing environment containing a larger number of servers and various networking devices at or beyond EOL, AFDW and the 844th Communications Group, which provides enhanced communications reliability, survivability, information capabilities, and user support in the NCR, were presented with a unique opportunity. After examining the situation, the 844th Communications Group understood it could either develop a new IT environment that would provide flexibility and reduce costs, or it could do a one-for-one replacement of the EOL servers, maintaining the status quo and ultimately perpetuate the same problems in the long run by not capitalizing on newer, more efficient technologies.

The choice was simple. The 844th Communications Group opted to move forward with deployment of a shared-computing environment (SCE) to support NCR activities. To initiate the project, the 844th Communications Group convened a working group consisting of senior leadership and vendors, such as Cisco, EMC and VMware, along

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Entrance to Joint Base Anacostia-Bolling (U.S. Navy photo by Lt. Cmdr. Jim Remington/Released.)

with representatives from Lockheed Martin and IronBow Technologies, to determine the best path forward for implementing the new infrastructure and ultimately transitioning to a software-defined environment (SDE). These discussions produced a long-term, multiphase approach to the deployment. Further, this project aims to help AFDW comply with a larger effort to bring Air Force systems and services in line with the Department of Defense's consolidation and unified communications goals by 2020.

Phase One

Beginning in 2012 phase one initiated the development, integration, and delivery of an operational SCE. The first step was replacing the aging server infrastructure at Andrews and Bolling with newer and more efficient technology. This included deploying and integrating Cisco Unified Computing System™ (Cisco UCS®) technology, Cisco multilayer director switches and Cisco Nexus® switches in both facilities. Acting as the foundation of the new network, these technologies provided AFDW with the capabilities to meet its consolidation and performance needs. In addition, phase one executed the migration of AFDW's virtualized Microsoft SharePoint Services to the SCE, because it is a key application for users across the regional network.

Phase Two

Phase two, completed in 2014, expanded on the phase-one base SCE with convergent processes and enhancements. The implementation of resource pooling and load balancers, combined with capabilities from EMC V-Plex and VMware vMotion, offers improved communication, accessibility, and security capabilities. Phase two also included additional server and storage implementations, and increased RAM to accelerate network response speed and deployment of an active-active schema between Joint Base Andrews and Joint Base Anacostia-Bolling to further increase reliability and accessibility to information. Using this schema, nodal elements at these bases mirror each other so that if one experiences an outage, the other takes over.

Phases Three and Four

Phase three, which is expected to be completed in 2015, and phase four have not been put into motion; however, these phases will continue building on the solution that's been put in place. These additions focus on improving efficiency through smarter storage practices, increasing network speed, and completing AFDW's transition from a hardware-defined environment to an software-defined environment, or Cisco® Application Centric Infrastructure, in which provisioning and maintenance tasks are automated. Cisco Application Centric Infrastructure simplifies automation through an application-driven model and delivers software flexibility along with scalable hardware performance, which is important for organizations like AFDW that want to reduce the complexity of their network environments.

Results

While AFDW's end goal is not yet complete, the initial project phases have accomplished important objectives and yielded positive results. The SCE implementation has simplified AFDW's IT environment dramatically. The large number of server manufacturers, makes,

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and models that were previously used are gone. Under the new shared environment, AFDW is using Cisco servers only with what will be two models when the project is complete.

Also, this project has replaced more than 400 EOL servers to date, with more to be migrated during the later phases. These underperforming servers were replaced by the shared environment, increasing reliability for users because the equipment wasn't old and failing. In addition, this generated immediate savings on capital expenses. AFDW adopted thin provisioning to remove unnecessary storage capacity, so it isn't wasted. The approach reduced storage capacity by 40 percent, from 111 terabytes to 68 terabytes, during phase one without impacting operational performance.

The SCE implementation also reduced AFDW's physical and environmental technology footprint. AFDW consolidated 32 server racks to eight, a 75 percent decrease. Not only did this save physical space, but it also eliminated the maintenance needs associated with managing and operating that extra equipment. Finally, the consolidation effort led to roughly a 62 percent reduction in power and HVAC consumption, resulting in substantial cost savings.

Outside the measurable results, other realized and anticipated benefits are associated with the SCE implementation. For example, the cost savings achieved enabled AFDW to place three IT service professionals onsite to handle regular maintenance and any equipment issues. Further, technology adoption processes across AFDW are more streamlined with the SCE in place, and the 844th Communications Group now maintains configuration control of all devices in the environment. Also, the new environment uses core equipment and software from just a handful of providers: Cisco, EMC, Microsoft, and VMware. In the old environment, multiple configurations with little governance and various equipment types were purchased by application owners, creating a complex, silo-based technology environment that impaired information-sharing practices. The SCE in place today makes things easier for users with greater integration, streamlining processes, operations, maintenance, and lifecycle management through a controlled environment.

Next Steps

Looking forward, phases three and four offer tremendous potential to build on the benefits already achieved. Phase three, which is slated to begin in early 2015, focuses on enhancing the speed and efficiency of the network by reducing latency and adopting a non-blocking architecture that uses a tiered-storage approach, positioning data at certain levels based on relative importance and how often it is accessed. Phase four aims to complete the project by implementing software-defined data center (SDDC) capabilities, including software defined network, storage, and security, and establishing a Cisco Application Centric Infrastructure.

For More Information

To find out more about Cisco data center and virtualization solutions, go to: www.cisco.com/go/datacenter.

