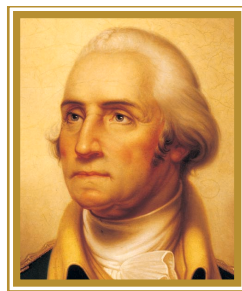


THE GEORGE WASHINGTON UNIVERSITY SUPPORTS EDUCATIONAL EXCELLENCE WITH SWITCHING, OPTICAL, SECURITY, AND WIRELESS SOLUTIONS FROM CISCO SYSTEMS

New high availability solutions increase network speed tenfold, protect data and systems, and enable new leading-edge learning applications

EXECUTIVE SUMMARY

The George Washington University, one of the leading institutions of higher learning in the United States, recently implemented new initiatives in business continuance, security, and wireless connectivity to meet the growing needs of students, faculty, and staff. By implementing a Cisco Systems® data center solution, combining Cisco® switches and optical platforms, George Washington is better able to protect its data center resources, optimize its operations, and support future growth in the user base and in campus technology initiatives. With increased network availability, security enhancements, as well as a tenfold increase in network speed, George Washington communication networks now serve as a catalyst for educational excellence.



THE GEORGE
 WASHINGTON
 UNIVERSITY
 WASHINGTON DC

The George Washington University implements new initiatives in business continuance, security, and wireless technologies to meet the growing needs of students, faculty, and staff. Switching, optical, security, and wireless solutions from Cisco Systems increase network speed tenfold, protect data and systems, and enable new leading-edge learning applications.

“Whether it is a new research project, a new building, or a new way of teaching, today it all requires high-speed connectivity. Our role is to make sure communication is never a concern, but rather it is seen as a driver for advancements in education and research at George Washington, as well as the greater mid-Atlantic communities we serve.”

*Bret Jones,
 director of technology engineering,
 The George Washington University*

Located in Washington, DC, four blocks from the White House, *The George Washington University* (GW) was created by an Act of Congress in 1821. Today, GW is the largest institution of higher education in the United States capital. The University offers comprehensive programs of undergraduate and graduate liberal arts study as well as degree programs in medicine, law, engineering, education, business, public management, and international affairs. Each year, GW enrolls a diverse population of undergraduate, graduate, and professional students from all 50 states, the District of Columbia, and more than 140 countries.

GW's mission statement holds within it the initial concepts of its visionaries and founders as it specifies the university to "commit itself to excellence in the creation, *dissemination*, and application of knowledge" and serve "as a catalyst for creativity in the arts, the sciences, and the professions by *encouraging interaction* among its students, faculty, staff, alumni, and the communities it serves."



The work of GW's Technology Operations (Tech Ops) team in the University's Information Systems and Services directly affects GW's goals to disseminate knowledge and encourage interaction. Tech Ops works with departments across GW, using advanced technologies to connect faculty, students, and staff. From delivering high-speed Internet and phone connections in offices, classrooms, residence halls, and wireless "hot spots," to defining and implementing strategies for business continuance and disaster recovery, to serving as one of the founding members of the *Mid-Atlantic Crossroads (MAX)*, Tech Ops provides the networking solutions required to keep GW and the greater mid-Atlantic research community connected.

CHALLENGE: STAYING AHEAD

To keep up with the changing requirements of the communities it serves, GW Tech Ops knows it has to stay one step ahead of user needs. On campus it was facing growing demands for bandwidth and wireless access, a robust business continuance strategy, and strong protection against security breaches.

As a founding force behind the MAX initiative, a multistate consortium founded with Georgetown University, the University of Maryland, and Virginia Polytechnic Institute and State University, Tech Ops faced additional network demands. Together these founding members provide advanced network services to the library, community college, primary/secondary schools, public sector, and the mid-Atlantic regional research and education community, including the National Institutes of Health, National Library of Medicine, National Science Foundation, Howard Hughes Medical Institute, NASA Goddard Space Flight Center, and National Oceanographic & Atmospheric Administration.

Previously, GW provided campus LAN connectivity using ATM technology and WAN connectivity between campuses using DS3 microwave services. "It was a very heterogeneous network; multiple boxes, multiple technologies, multiple vendors, multiple service providers," says Andrew Gallo, senior information systems engineer for GW. "Our DS-3 microwave links were very problematic and when they went down, the phones lit up. Originally the ATM strategy supported our needs, but over time vendor support continued to diminish. It became clear we needed to move away from ATM and the private line time-division multiplexing services we leased."

Starting with its core backbone, GW Tech Ops specified requirements for a high-bandwidth, highly available solution to connect both their data support facility and a data center in the District of Columbia (DC), with a data center located in its satellite campus in Ashburn, Virginia. "Our network spans from the center of the free world, as we are only a few blocks from the White House, to one of the fastest growing regions in the United States, Loudoun County, Virginia," says Bret Jones, director of technology engineering at GW. "This affords us many opportunities, yet it also requires that we put in place a robust program to assure business continuity. To provide the needed bandwidth and resiliency, we determined that an optical DWDM solution would be our best choice."

SOLUTION: SWITCHING, OPTICAL, SECURITY, AND WIRELESS



Cisco ONS 15454 MSTP

To replace its existing WAN infrastructure and interconnect its three main computing locations (including two data centers), GW chose the Cisco ONS 15454 Multiservice Transport Platform (MSTP), deploying a fully redundant, three-point, 102-mile dense wavelength-division multiplexing (DWDM) ring. The Cisco ONS 15454 MSTP solution offers DWDM functionality for metropolitan and regional networks, providing a comprehensive suite of transparent wavelength service interfaces, including service interfaces for storage-area networking, Ethernet, SONET/SDH, and video transmissions. Using the Cisco ONS 15454 MSTP, GW has deployed eight gigabits of Fibre Channel and Gigabit Ethernet uplinks over leased fiber, providing the needed high-speed, highly resilient connectivity for its campuses and data centers.

The DWDM network enables GW to support its business continuance goals of two fully redundant, real-time data sets. Currently, all university transactions are mirrored in real time at the secondary data center. GW wanted to have both data redundancy and network redundancy to ensure data and systems availability in case of a disaster or outage. This network also supports automatic nightly backups between campus locations, eliminating the need for ground transportation of tape backups.

“The increase in bandwidth is enormously beneficial, but a very close second in importance is the increase in resiliency,” says Jones. “We have built this network with no single point of failure. We use two different fiber paths from Virginia to DC going down two different streets, over two different bridges, into two different geographically separated buildings. We’ve brought each link down for testing purposes and it failed over perfectly, not a single phone call asking what happened. No one outside of us even knew it happened.”

“The Cisco ONS 15454 DWDM solution provides us numerous advantages,” says Gallo. “One of the key reasons we went with DWDM is the ability to carry multiple protocols without having to do any type of encapsulation or conversion magic. Also, in our data centers, space is a premium. This next-generation platform provides for the dense delivery of services, making it very real-estate friendly. Our experience has been that the Cisco ONS 15454 MSTP is very reliable and easy to manage and monitor. This has enabled us to redeploy staff to other projects instead of having them focused on keeping the network up and running.”

To connect the DC data support facility and data center, GW selected Cisco Catalyst® 6500 Series switches to provide distribution-layer switching and full redundancy. The dual-homed Cisco Catalyst systems handle switching and routing functions with security using access control lists (ACLs).

For delivery to the edge, GW selected Cisco Catalyst 4500 Series switches to provide both Layer 2 and Layer 3 functions to more than 10,000 GW network devices, including desktops. These platforms also provide multicast functionality, enabling applications such as high-bandwidth video distribution for on-demand learning.

The Cisco data center solution, combining Cisco switches and optical platforms, allows GW to protect its data center resources, optimize their operations, and support future growth in the user base and in campus technology initiatives.

“Our experience has been that the Cisco ONS 15454 Multiservice Transport Platform is very reliable and easy to manage and monitor. This has enabled us to redeploy staff to other projects instead of having them focused on keeping the network up and running.”

*Andrew Gallo,
senior information systems
engineer,
The George Washington University*

To meet the increasing demand for wireless access, GW is deploying Cisco Aironet® 1200 access points throughout its campus. This solution enables GW to deploy high performance and secure wireless LANs (WLANs), providing simultaneous support for both 2.4 GHz and 5 GHz radios, and support for IEEE 802.11b, IEEE 802.11a, and IEEE 802.11g technologies.

To ensure network security, GW's WLAN is protected by a secure authentication system using Cisco VPN 3000 Series concentrators. This provides advanced encryption and authentication techniques to ensure safe and secure computing.

RESULTS: SAFE, SECURE, AND SCALABLE NETWORKS FOR SUPPORTING EDUCATIONAL EXCELLENCE AND BUSINESS CONTINUANCE

For students, faculty, and staff, the advantages have been very clear. The Cisco data center solution provides throughput, availability, and security features to protect vital resources and support business continuance within and between data centers. The streamlined, consolidated data center architecture optimizes network performance and prepares the data center for virtualization technologies, enhancing agility, and enabling easy, flexible operations.

The entire network is poised for rapid growth in traffic, users, and new applications. At the halfway point of deployment, they now have more than 15,000 fiber ports going directly to the desktop, delivering Fast Ethernet (100 Mbps). This tenfold increase over the previous 10 Mbps Ethernet connectivity has a direct effect on the ability to disseminate knowledge and encourage interaction. "With these changes we are delivering a robust tool for our students to accomplish their educational goals," says Jones. "Our student and faculty needs are changing and growing rapidly, and this solution helps us stay ahead."

One example of this growth is the IP video-enabled medical teaching suites. These cutting-edge teaching facilities will generate massive amounts of video data in programs such as standardized patient exams. Standardized patients are lay people employed to simulate certain medical conditions. This program uses IP video to capture medical students performing an examination of a standardized patient. This is immediately available for review by both the prospective physician and the teaching staff for evaluating everything from bedside manners to clinical competence. "Without the new broadband capabilities that we are delivering, high-tech applications like the new medical suites would not have been possible," Jones continues. "This is just the beginning. We are looking at providing support for x-rays, CT scans, and other medical imaging applications within the classroom setting. Down the road we could even see requests for remote medicine, where our specialty clinicians can support examinations and procedures in outlying facilities. We have to stay ahead of the thinking of some of the brightest minds in the world. We strive to never limit the possibilities, which we do by technically supporting their vision."

FUTURE: DRIVING GROWTH

The GW Tech Ops team will continue to serve its communities, providing secure, high-speed, highly available connectivity to drive educational excellence. For example, GW houses a very large residential population on campus, and most, if not all, students carry mobile phones. Using hybrid phones that support cellular and 802.11g wireless connectivity, it will become possible for GW to offer on-campus wireless network connectivity. This will serve to create a highly cohesive community using IP and optical technology from the fingertips to the fiber to better disseminate knowledge and encourage interaction.

"Whether it is a new research project, a new building, or a new way of teaching, today it all requires high-speed connectivity," says Jones. "Our role is to make sure communication is never a concern, but rather it is seen as a driver for advancements in education and research at GW, as well as the greater mid-Atlantic communities we serve."

RELATED LINKS AND INFORMATION

- Cisco Business Ready Data Center
<http://www.cisco.com/go/datacenter>
- Business Continuity Solutions
http://www.cisco.com/en/US/netsol/ns340/ns394/ns224/ns378/networking_solutions_package.html
- Cisco Optical Solutions
<http://www.cisco.com/go/optical>
- Cisco Security Solutions
<http://www.cisco.com/go/security>
- Cisco Switches
<http://www.cisco.com/en/US/products/hw/switches/index.html>
- Cisco Wireless Solutions
<http://www.cisco.com/go/wireless>
- The George Washington University
<http://www.gwu.edu/>
- ISS Strategic Technology Plan
<http://www.gwu.edu/~iss/plan/fiber.html>

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