University's New Network Backbone Secures Growth and Simplicity

George Mason University's multiprotocol network is readily configured for the needs of diverse users on three campuses.

EXECUTIVE SUMMARY
GEORGE MASON UNIVERSITY
• Higher Education
• Fairfax, Virginia USA
• 32,500 students; 5,000 staff
BUSINESS CHALLENGE
• Administrate many diverse, distributed networks with limited resources
• Maintain separate security policies and regulatory compliance for all networks
• Cope with unsustainable complexity in a growing network
NETWORK SOLUTION
• Multiple networks replaced by one network serving multiple user groups
• High-capacity switching to support increasing users and service demands
• Network easily configured to automate security protocols and virtualize data pools, reducing custom wiring
BUSINESS RESULTS
• Deployment relied upon existing staff and skills
• Greatly increased network flexibility and security at no greater cost
• Sustainable MPLS network prepared for demands of growth, regulatory compliance, and diverse user requirements

Business Challenge

George Mason University is an innovative, entrepreneurial institution in Virginia near Washington, D.C., distinguished in a range of academic fields including engineering and information technology, organizational psychology, health care, and visual and performing arts. With its professors conducting groundbreaking research in areas such as climate change, public policy, and the biosciences, the school's IT infrastructure must support many distinct groups of users. These groups vary widely, from students in a residence hall to researchers in the biotechnology practice group. Each user group requires its own network and security policies for information sharing and collaboration. Additionally, the university must meet various compliance requirements such as the Payment Card Industry Data Security Standard (PCI-DSS), the Health Insurance Portability and Accountability Act (HIPAA), and others.

With the growth of the university and the dynamic needs of each user group, managing and maintaining separate networks and policies had become very complex and time-consuming. "We support users in over 150 buildings across three campuses," says Randy Anderson, Director of Network Engineering and Technology. "We needed a solution that could meet the users' needs in a smart and efficient way. Clearly, installing individual networks for each user group was not a sustainable model. It would be a daunting and expensive undertaking."

George Mason University needed a solution that addressed network segmentation, traffic isolation, regulatory compliance, and security for user groups with independent policies. The solution needed to be reliable, flexible, and scalable and at the same time easier to manage and maintain.

Network Solution

After careful consideration, the network team decided that a network virtualization architecture utilizing a Multiprotocol Label Switching (MPLS) VPN core would be the best strategy to meet the university's requirements.

To support this new architecture, the university replaced its existing core network with the Cisco Catalyst 6500E Series Switch. "The 6500 switch provides us with a scalable, reliable, and feature-rich solution that will give us the flexibility to grow and evolve as new network technologies emerge," Anderson says.

The team's design entailed placing the new high-speed switches with 10 Gigabit capability at each of its campus core sites plus select building aggregation locations. The core switches are connected in a full mesh topology using multiple 10 Gigabit links, creating a high-performance and resilient MPLS core. The aggregation or building distribution switches connect into this MPLS core at 10 Gigabit speed.

To extend virtualization from the MPLS core to the access layer where the end users connect, the networking team chose the modular Cisco Catalyst 4500E Series Switch. "We already had 4500s deployed in our residence hall network and were very pleased with the performance and reliability," says David Robertson, Manager of Network Engineering. "Therefore, it was a logical choice for us to expand their use to other areas of our campus."

To provide the end-to-end network virtualization architecture, Layer 2 VLANs were used to segment user traffic at the access port. This Layer 2 VLAN then mapped directly into a Layer 3 MPLS VPN at the aggregation or building switch. "It really was simple to deploy because we were already familiar with configuring VLANs," Robertson says.

The Cisco Catalyst 4500E Series Switch with the Supervisor Engine 6L-E addition provides reliable high-performance switching for the university's needs. The switch provides Gigabit connectivity for end devices, Power over Ethernet (PoE), and quality-of-service (QoS) capabilities for wireless phones and access points. Access ports are secured by using the embedded features of Cisco IOS Software including DHCP Snooping, IP Source Guard, ARP Inspection, and Port Security. Another benefit is that the Supervisor Engine 6L-E provides 10 Gigabit uplinks, giving the university a high-speed backbone from closet to core to meet the most demanding bandwidth needs.

The university used the MPLS network to logically segment users without having to use firewalls to separate user groups. "The virtual firewall configuration that we were able to execute with MPLS allows us to minimize constraints on academic freedom and information sharing while meeting network security compliance requirements," says Ben Allen, Manager of Advanced Network Technologies.

Business Results

George Mason University's distributed campus environment is now supported by a dynamic network to support the changing needs of its students, faculty, researchers, and administrators.

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> —Randy Anderson, Director of Network Engineering and Technology, George Mason University

And the upgrade was done without an increase in IT budget or staff.

The use of network virtualization with MPLS VPN allows the university to have a very scalable any-to-any connectivity model that can extend across the campus and provides a quick and effective way to deploy discrete networks with their own individual security policies. Whereas previously the

university had a highly distributed security perimeter, the virtualized network has enabled staff to consolidate security functions and effectively manage security policies for each user group.

The university now plans to take advantage of its new virtualized network to offer more services to its end users. "With virtualization and MPLS technology deployed we can leverage this to provide private cloud computing services to our research user groups," says Allen.

Another benefit was the ability to meet PCI compliance at the point-of-sale units in the bookstore, cafes, and other sites. And maintenance became simpler. "Once we had installed the 4500s in the residence halls the number of trouble tickets declined dramatically," says Anderson. "By pushing 4500s into more of the network, the staff is able to work with a familiar platform, increasing their efficiency in configuring, installing, and pushing new services to the end users."

George Mason University is posed to quickly and adeptly respond to changes in end user requirements. In doing so, it offers dynamic services to end users in a transparent manner that enhances the overall user experience. "As a distributed university, it is important to have consistent user experience across all campuses," Anderson says. "The flexibility of the MPLS network helps promote seamless collaboration across disparate locations."

PRODUCT LIST
Routing and Switching
• Cisco Catalyst 4500 Series Switches
• Cisco Catalyst 6500 Series Switches

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