Customer Success Story

University Builds an Intelligent Learning Environment with a Cisco Network

Case Western Reserve University built a digital university to support world-class teaching and research. At the same time, it extended its Cisco network resources to help create the model for a digital city.

Challenge

Case Western Reserve University (Case) is a leading independent research university, distinguished by its strengths in education, research, and community service. Nationally recognized academic programs attract approximately 9200 students annually, 5600 of which are professional and graduate students.

Students benefit from the University’s strong emphasis on experiential learning – gaining hands-on experience by participating in undergraduate research, studying abroad, working in cooperative programs, or becoming involved in the arts. Case’s location in Cleveland’s University Circle facilitates this learning approach. University Circle encompasses one square mile of green space that is home to more than 50 major cultural institutions, many of which rank among the world’s leading institutions of their kind, including the Cleveland Orchestra, Cleveland Museum of Art, Cleveland Institute of Music, the Cleveland Clinic, and University Hospitals – and Case’s close relationships with them facilitate students’ and faculty’s research and community service projects.

Case has established ambitious goals, one of which is to become among the world’s most powerful learning environments. This means not only providing students, faculty, and researchers with a robust technology infrastructure that supports basic productivity requirements, but one that advances research and enhances collaboration with the greater Cleveland community.

“We have challenged ourselves to deploy the best solutions for delivering the innovative capabilities we need to move the university’s teaching, research, and community service goals forward,” says Lev Gonick, Vice President for Information Technology Services and Chief Information Officer. “As we began to rebuild our IT infrastructure to support next-generation applications and services, we were excited to see how Cisco was providing an integrated, service-oriented network architecture that supports everything we want to do – and more.”

The Cisco Service-Oriented Network Architecture (SONA) is an architectural framework that enables organizations to maximize the value of their network services and resources. With the Cisco SONA framework, the network is the common, single element that connects and enables all components of an IT infrastructure – including clients, servers, and storage-to accelerate applications, optimize processes, and maximize IT resources.
The Cisco SONA framework enables an organization to easily deploy identity, voice, collaboration, mobility, and security services across an intelligent network – tailored to specific users, groups of users, or applications. By strategically investing in an infrastructure based on the Cisco SONA framework, Case is able to dramatically advance its vision of a powerful learning environment – not just for the university campus, but across the city of Cleveland as well.

**Networked Infrastructure and Services**

Case deployed a network backbone based on Cisco Catalyst® 6509 switches, which provides Gigabit Ethernet Internet connectivity across the campus. The Case network supports a range of high-quality video applications that are used in a wealth of learning and teaching environments. It also supports an extensive deployment of Cisco IP Communications (IPC) solutions, based on Cisco CallManager, with advanced features deployed to more than 7000 Cisco IP phones. By choosing Cisco IPC solutions, the university significantly reduced its telephony infrastructure costs by reducing its cabling and wiring infrastructure and simplifying the labor-intensive task of managing traditional telephone adds, moves, and changes. For example, when the university temporarily relocated 50 staff members, its Cisco IPC solution enabled it to avoid the cost of deploying temporary analog telephone lines, which would have been required in a traditional move.
Comprehensive wireless network coverage, including a public Wi-Fi network, is delivered from the same Cisco network. The Case campus supports 1350 Cisco Aironet® wireless access points; an additional 1700 are deployed throughout University Circle and enable public users to easily gain wireless Internet access, without having to perform lengthy log-in or authentication procedures. They simply turn on their wireless devices and automatically become network “guests” on a segmented portion of the public IP network that prevents access to any of the University Circle institutions’ individual networks. To access proprietary Case network resources, university users can log in over a virtual private network (VPN), which enables a secure connection and accountability for network management purposes.

As Case built its digital university around a powerful service-oriented network architecture, it shared its technology and knowledge with the community and played an instrumental role in creating one of the most innovative projects underway in any U.S. city. The project known as OneCleveland was established in 2003 as an initiative sponsored by CEOs of 10 leading civic and public sector institutions including Case, the City of Cleveland, the Cleveland Clinic Foundation, the Cleveland Municipal School District, the Cuyahoga County Public Library System, the Greater Cleveland Regional Transit Authority, Metro Health, Cleveland State University, and the Public Broadcasting System/National Public Radio (PBS/NPR) affiliate, ideastream, in northeast Ohio.

OneCleveland is a nonprofit provider of community-based ultra-broadband networking services to educational, governmental, research, arts, cultural, nonprofit, and healthcare organizations in Greater Cleveland. Its goal is to use the Cisco SONA-based infrastructure for connecting the community, enabling innovative application development, and transforming neighborhoods. The OneCleveland network has enabled the City of Cleveland to become one of the first “digital communities” in the nation, deploying innovative applications that transform government operations and increase economic vitality. Using the OneCleveland network, Cleveland has deployed an e-permitting application that uses mobile technology to integrate workflow for 11 departments and 500 employees, enabling them to file reports, schedule inspections, and issue permits from the field. Building, housing, and water inspectors have significantly boosted their productivity.

“The largest repository of fiber between Chicago and New York is in Cleveland,” explains Gonick. “We decided to take advantage of it, working together to connect the city’s major assets in education, healthcare, local government, and our cultural institutions. Today we are connected over a Gigabit Ethernet infrastructure unlike any other community in the nation. We own most of our fiber and are using Cisco networking equipment and the Cisco SONA framework in an integrated infrastructure to serve OneCleveland members.”

In August 2004, Case became the first subscriber to the OneCleveland network, directly connecting its own world-class, gigabit network. OneCleveland’s fiber network encircles much of the city and surrounding suburbs, connecting to the Internet backbone through a Global Crossing peering point in downtown Cleveland. Network subscribing members are connected to each other and to the Internet at gigabit speeds. The OneCleveland network also supports approximately 5000 Cisco Aironet wireless access points, providing wireless coverage for member organizations.

Virtual LAN (VLAN) connections are created on the fiber network to secure specific applications used by OneCleveland members. When an application must comply with security or privacy regulations, the organization can easily activate an individual wavelength of light, known as a lambda, and switch it onto a separate, independent path for routing all of the traffic associated with the secure application. For example, the Cleveland Municipal School District runs its traffic on its own optical wavelength to satisfy security and privacy requirements associated with its application content. Each member institution also employs its own security measures and private LANs to separate its internal traffic from that of the network at large.

The OneCleveland network is managed by non-Case personnel, freeing Gonick’s team from routine maintenance and monitoring activities and allowing them to focus on new application development.

“We did not need to add any IT staff at the university, in spite of the tremendous range of new applications we support,” says Gonick. “In the past, I had to keep personnel on call to manage issues relating to Internet service provisioning. I don’t have to do that anymore and I’ve been able to reallocate that staff to other emerging projects.”
“We have challenged ourselves to deploy the best solutions for delivering the innovative capabilities we need to move the university’s teaching, research, and community service goals forward. As we began to rebuild our IT infrastructure to support next-generation applications and services, we were excited to see how Cisco was providing an integrated, service-oriented network architecture that supports everything we want to do – and more.”

– Lev Gonick, Vice President for Information Technology Services and Chief Information Officer

Results

The Case and OneCleveland network has delivered several financial and productivity benefits to the university, as well as innovative new applications to the greater Cleveland community. By owning its own fiber and aggregating subscribers’ Internet traffic, Case and other OneCleveland subscribers have reduced their Internet costs by more than 50 percent. For example, there are no externally related costs associated with moving traffic between OneCleveland subscribing institutions. In the past, if a physician at University Hospitals wanted to send magnetic resonance imaging (MRI) data to a colleague at the Cleveland Clinic, the multi-megabyte file would have to travel over University Hospital’s network to its carrier-provided Internet connection. The file would then be routed over the carrier’s network to an Internet peering location, handed off to a different carrier and routed back through Cleveland to the Clinic. Both institutions pay for their separate connections and required bandwidth – annual costs that can easily reach into hundreds of thousands of dollars. With the Case and OneCleveland network, files are simply routed across the street on owned fiber at no cost, irrespective of file type or size.

“The network has revolutionized network economics,” says Gonick. “When I arrived at Case, we had a 36-Mbps connection to the Internet, which cost the university approximately $200,000 a year. Today, we have as much bandwidth as we can consume. In the past, a detailed analysis and justification was required to purchase a Wi-Fi solution, and today, no one can understand how we lived without it. While a financial return on investment is important, we also partially measure our return by what we can return to the community.”

Network services, such as IPC, also have significantly reduced costs for Case and OneCleveland members. When Case evaluated the potential value to the university of its Cisco IPC investment, it compared the one-time and recurring costs of IP telephony to traditional Centrex and PBX costs. Case found that a Centrex system with analog phones was 75 percent less expensive than IP telephony to install; however the annual recurring cost was 87 percent more expensive. A Centrex system with IP phones cost 26 percent more than the Cisco IPC solution, and its annual recurring cost was 91 percent higher. A PBX system cost 31 percent more to install and 85 percent more to operate annually. The Cisco IPC solution delivered important capital cost savings while significantly reducing long-term recurring costs.

The Cisco infrastructure also significantly reduced the costs associated with adding, moving, or changing telephony services. When the Cleveland Museum of Art began a multi-hundred million-dollar renovation, it had to relocate several hundred staff members to office space in downtown Cleveland. Moving hundreds of employees’ voice and data connections would typically cost hundreds of thousands of dollars and require provisioning of new voice circuits, deployment of dedicated T1 links, and perhaps a new PBX phone system. Instead, the museum left its existing telephone switch active, even though its building was closed, and purchased Cisco IP phones. With its connection to the OneCleveland network, museum staff simply plugged the phones in at their new location and conducted business as usual. The network remained up, the phones worked flawlessly, and outside callers never knew the difference.

Case is now following the museum’s lead as it moves 350 staff members to a new, 90,000-square-foot state-of-the-art facility in downtown Cleveland. Instead of provisioning new voice circuits, Gonick’s team simply moves network voice traffic through Cisco CallManager as new extensions of the university. By combining a flexible telecommunication environment with its Cisco IPC solution, Case expects to save more than US$500 per employee per year.
Innovative Applications in a Powerful, Collaborative Learning Environment

A wide range of exciting new applications is allowing students to fortify their intellectual foundations, enabling faculty to extend research, and bringing new opportunities to the Cleveland public. One of the first applications Case deployed for its undergraduate students is an innovative video project called MediaVision Courseware. In higher education, introductory courses are critical to a student’s success and students who succeed in introductory courses are far more likely to succeed in upper division classes and ultimately graduate. A university wants to retain as many students as possible because the greater the number of students who succeed, the fewer students the university must replace each year. Closely related to the university’s retention rate is its ability to maximize students’ abilities to learn. Today’s students are accustomed to a visual learning style, and Case’s MediaVision Courseware application delivers a rich media environment, which has resulted in better learning outcomes. The MediaVision Courseware includes digital video of all introductory courses, enabling students to search class sessions for specific concepts, reference chapter information, or replay lecture segments. Not only have students’ grades measurably improved, so has their learning confidence. Students also have access to campus administrative services through My Case – an integrated portal environment – for managing their academic and other campus transactions, such as registering for courses, accessing grades, working with advisors, providing feedback, and purchasing books.

Using the same network-based collaboration services that underlie the MyCase application, curators from the Cleveland Museum of Art relocated exhibits to the Case library and other libraries throughout Cleveland while the Museum was undergoing renovation. Through a portal application, the Case community and the public could visit Museum exhibits online, regardless of where the exhibits were installed around the city.

“One of the issues we face on an urban college campus is public safety,” says Gonick. “Over the OneCleveland network, we collaborate with public safety officers, improving communication and sharing information. We are able to share complete mappings of all university buildings, as well as incorporate Geographic Information Services (GIS) data into mappings for nearby critical public-sector buildings. The network is a powerful contribution to increased public safety.”

Several innovative new video applications are being used to help improve public healthcare and facilitate ongoing healthcare education, enabling schools and education centers to bridge gaps left by reductions in funding and resources. For example, The Cleveland Clinic uses a video application to conduct medical education classes at campuses and classrooms throughout the city. Case’s Dental Medicine Program is creating a video VLAN for conducting a public oral health program in the public schools. Dental students applied decay-preventive dental sealants to all third-grade children in Cleveland public schools. The students will be able to receive a follow-up “video check-up” in seconds, using digital video and photography, enabling dental students to analyze the impact of sealants on students’ teeth over time.

Many school systems across the country have had to severely reduce or eliminate music education programs as cost-cutting measures. In Cleveland, Case is helping return music to the public schools using collaborative music education programs delivered over the network. Case’s Music Department and the Cleveland Institute of Music are working on several interesting initiatives. Connected over the network to the Cleveland Municipal School District, the institutions are delivering interactive courses, such as introductions to musical instruments, musical styles, and musicology. Students who may have never been exposed to music can now benefit from Cleveland’s world-class resources. At the university level, students receive master instruction from musicians at Miami’s New World Symphony, the London Philharmonic, and the Vienna Philharmonic orchestras. While it may be impractical for a master musician to travel to Cleveland to teach, many are willing to use Case’s advanced network services to share their expertise interactively with students. Gonick hopes that eventually, instructors in Miami and Cleveland can deliver courses to students in both cities – all over the Cisco network infrastructure.

Another similar collaboration is occurring in Case’s dance department. One Case choreography instructor is also a principal dancer with the Martha Graham modern dance company in New York, dividing his time between the two cities. His students create video portfolios of their work, which he reviews and critiques when he must be in New York. Students can still benefit from one of the nation’s leading talents while the instructor can continue dancing and effectively contribute his experience as a teacher in a powerful learning environment.
The Case network also extends resources and research capabilities into Cleveland’s neighborhoods. The Case Mandel School of Applied Social Sciences (MSASS) provides students with the opportunity to participate in projects initiated by its front-line Poverty Center. As students work with clients and collect real-time data on neighborhood conditions and households, the data is transmitted wirelessly to a Website, where GIS technology allows policy-makers to view actual conditions in real time. This award-winning project has won valuable recognition for MSASS.

“Our students come to Case Western Reserve University with huge expectations,” says Gonick. “More than 38 percent of our students tell us that they come to Case because of our technology. When we ask our freshmen students how are we doing, more than 95 percent of the freshmen class says that we’re either meeting or exceeding their expectations. That is exciting.”

**Next Steps**

Case’s next efforts will focus on providing the university with a unified set of messaging services and introducing innovative new services that can be delivered to IP phone handsets. Case plans to offer a contest, complete with cash prizes, for student-developed IP applications that use Extensible Markup Language (XML) services. By inspiring students from across campus to design practical applications, Case not only encourages students to use the IP phones, the university encourages them to innovate with them as well.

“Everything we imagine – from being able to vote for student government, to delivering information from the student newspaper, to calendaring services – can be delivered to the screen of a Cisco IP phone,” says Gonick. “And those are just the first things that come to mind.”

The innovative new applications in place today have been made possible by Case’s strategic investment in an IT infrastructure framework that enables the university to connect its users and network resources over a single network. The Cisco SONA architecture is making it easy to use identity, voice, collaboration, mobility, and security services as it accelerates application deployment across its network in service of university goals. Whatever exciting new applications Case or OneCleveland members can imagine, the infrastructure is ready to deliver them. Case Western Reserve University and OneCleveland have created one phenomenal success.

**For More Information**

To learn more about Cisco Service Oriented Architecture, visit: [http://www.cisco.com/go/sona](http://www.cisco.com/go/sona)

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To learn more about Case Western Reserve University visit: [http://www.case.edu](http://www.case.edu)

To learn more about OneCleveland, visit [http://www.onecleveland.org](http://www.onecleveland.org)

This customer story is based on information provided by Case Western Reserve University and describes how that particular organization benefits from the deployment of Cisco products. Many factors may have contributed to the results and benefits described; Cisco does not guarantee comparable results elsewhere.

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