

CUSTOMER SUCCESS STORY

A UNIVERSITY NETWORK TRANSFORMS A CITY

EXECUTIVE SUMMARY

CASE WESTERN RESERVE UNIVERSITY

- One of the United States' leading independent research universities
- Established in 1826, located in Cleveland, Ohio's University Circle, the 500-acre, park-like home of more than 40 cultural, medical, educational, religious, and social service institutions
- More than 9,500 students and more than 5,000 faculty and staff

BUSINESS CHALLENGE

- Win research grants and attract talent to the university
- Establish an infrastructure to stimulate economic growth and bring high technology investment to the Cleveland area

NETWORK SOLUTION

- The largest, fastest metropolitan network in the area
- The largest, free public wireless hotspot

BUSINESS VALUE

- Low-cost, high-speed network and Internet access for community nonprofit organizations
- Stimulus to collaboration and innovation
- Magnet for business and investment

“Case is collaborating on a unique initiative, called OneCleveland, to wire all of Greater Cleveland into the largest, fastest metropolitan network in the world, creating an asset to attract business and stimulate economic growth.”

Lev Gonick, Vice President of Information Technology Services and Chief Information Officer, Case Western Reserve University



With one of the most advanced Gigabit Ethernet networks in existence, and perhaps the largest public wireless LAN service in the world, Case Western Reserve University is advancing its reputation and spurring the economic revival of Cleveland and Northern Ohio.

BUSINESS CHALLENGE

Igniting Regional Economic Renewal

Like all research universities, Case Western Reserve University wants to win the competition for research grants and attract the brightest minds. But it also has a greater goal in mind—to use its networked assets to help spur an economic revival in Cleveland and Northern Ohio, helping the region evolve from an industrial economy based on steel mills to a twenty-first century digital economy.

To accomplish this, Case has built one of the most advanced Gigabit Ethernet networks in existence, and perhaps the largest public wireless service in the world, serving the campus and University Circle. University Circle is a concentration of cultural, research, healthcare, and

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government institutions in a 550-acre park near central Cleveland with more than 1 million visitors per year. The world-famous Cleveland Orchestra, the internationally recognized Cleveland Museum of Art, the Cleveland Institute of Music, the Cleveland Institute of Art, the Cleveland Natural History Museum, and the Cleveland Botanical Gardens are just some of the more than four dozen institutions linked together by a network of extraordinary bandwidth and an unprecedented 20,000 Gigabit Ethernet ports.

The vision for a shared high-speed network doesn't stop at University Circle, however. "Case is collaborating on a unique initiative to wire all of Greater Cleveland into the largest, fastest metropolitan network in the world, creating an asset to attract business and stimulate economic growth," said Lev Gonick, vice president of information technology services and chief information officer at Case.

Case conceived the project in 2002 and helped form the OneCleveland, a nonprofit ISP partnering with nonprofit and government organizations committed to using advanced information technology to achieve community priorities for learning, economic development, and access to healthcare, culture, and e-government. The OneCleveland network connects organizations across the nonprofit spectrum—education, culture and the arts, research, healthcare, and government. Member organizations use the shared network to create and deliver new services for the welfare of the public, share information and collaborate, and operate more efficiently and cost-effectively. Starting with 23 members the first year, OneCleveland expects to reach all the areas of Greater Cleveland within four years.

A network this ambitious challenged the limits of available technology for scalability, performance, reliability, and manageability. At the same time, it afforded a rare opportunity to design the perfect network from the ground up. "If you want the best network design, you need to talk to Cisco," said Gonick.

NETWORK SOLUTION

The Largest, Fastest Metropolitan Network

OneCleveland is an extension of the Case university IP network, which sets records for speed and size. It is 10 to 100 times faster than most university networks, and the desktop connection is 1,000 times faster than people can get at home with DSL. Connecting 20,000 computers on campus and in the neighboring cultural and research institutions of University Circle, the network is one of the largest in world.

The Layer 3 (L3) network, designed with the assistance of Cisco Systems, is built on an all-fiber-optic infrastructure capable of handling the explosive growth. Implemented with approximately 250 Cisco Catalyst 6500 Series switches, the network architecture consists of a multiple 10-Gbps core and distribution L3 switches with multiple 1-Gbps uplinks to the access. OneCleveland's Network interconnects with Case as metropolitan area network (MAN) building an L3 core, which will utilize Dense Wavelength-Division Multiplexing (DWDM) with a 1-Gbps connections at the edge where subscribers join. Dual paths throughout make the network highly resilient and reliable. Every subscriber, even in the smallest location, gets 1-Gigabit network service and Internet access.

Case chose Gigabit Ethernet for the network because it is the same protocol that university departments and OneCleveland subscribers use for their local networks. Case selected the Cisco Catalyst 6500 Series Switch for the extraordinary scalability and investment protection the platform provided. "The roadmap for the Catalyst 6500 aligned with our commitment to robust technical standards along with a compelling case presented to those concerned with ROI," says Gonick. In planned phases, Case has upgraded the Catalyst 6500 switches in the core of their network three times, without discarding any of its hardware investment. When the common line cards are replaced by higher density ones, they are reused elsewhere in the network.

Subscribing organizations connect their network to the OneCleveland network through Cisco Coarse Wavelength-Division Multiplexing (CWDM) devices. A lower-cost, easier-to-install alternative to the DWDM devices used by carriers, the offered solution makes unprecedented bandwidth affordable for schools, nonprofit organizations, and government agencies. "We wanted to see what great things are possible when you remove network bandwidth limitations to creative thinking," said Dennis Risen interim technical director of OneCleveland, on loan from Case. "The vast scalability of the Cisco network solution eliminates bandwidth and performance as issues for a long time to come."

Standardizing on the Cisco solution also creates an extremely stable network that can be managed efficiently by Case's very small IT staff. The staff uses the CiscoWorks LAN Management System (LMS), the Routed WAN Management Solution (RWAN), and other tools that take advantage of the software intelligence throughout the Cisco network to automate routine tasks and help Case understand, monitor, and react to changing networking conditions. "We're really power users of the Cisco network management solution," said Gonick.

For example, they use QoS Policy Manager (QPM) to differentiate voice, video, and data applications and help ensure the required levels of performance. Internet Performance Monitor (IPM) in RWAN spots congestion and latency problems so Case can proactively troubleshoot network-wide performance.

IPM, along with 14 network analysis modules deployed across the network, helps Case focus on top talkers to stop virus and denial of service attacks. For security, Case relies on CiscoWorks VPN/Security Management Solution (VMS) to centralize and automate management of all Cisco PIX firewalls, VPN concentrators, and the network intrusion detection system, which watches for attack signatures and automatically reprograms the firewalls and routers to shun suspicious activity. "We need to maintain an environment conducive to academic freedom, while protecting the network from both internal and external abuses," says Gonick. "To achieve this balance, we're following the SAFE blueprint from Cisco for security."

The Largest Free Public Wireless Hotspot

To its advanced network, OneCleveland has added ubiquitous free public wireless access for everyone who comes to University Circle, visits art galleries downtown, sits in the park mall outside City Hall, or waits for the subway or bus at the Terminal Tower. Registered users have secure access to all network services authorized to them, while unregistered public users are limited to the public Internet. Cisco wireless-aware switches greatly simplified the integration of the wired and wireless networks.

The 1,430 Cisco Aironet wireless access points that Case deployed in September 2003 are just the beginning. A new square-to-square WiFi initiative with Cleveland Public Art will provide free wireless Internet access along Cleveland's Euclid Avenue for 14 blocks. In time, Case and OneCleveland intend to provide all of Cleveland wireless Internet access free of charge.

Case manages the entire wireless network using CiscoWorks Wireless LAN Solution Engine (WLSE). "We have vision for the wireless network, but we also have to be practical about it. WLSE is a big help in reducing deployment and operating costs," says Gonick. WLSE simplifies the everyday operation of WLANs, helps ensure smooth deployment, enhances security, and maximizes network availability.

BUSINESS VALUE

While many colleges and universities are seeking closer ties to their communities, Case is helping to drive the economic rebirth of Cleveland as a center for information technology and biotechnology.

Upsurge in Research Grants

Since Case has embarked on its bold initiative to become the world's most powerful learning environment—which includes deploying the largest, fastest campus network—the university's research grants from the National Institutes of Health (NIH) and National Science Foundation (NSF) to the university have increased by 21 percent. Invention disclosures have doubled. Revenue from royalties and commercialization efforts has jumped 400 percent. And Case has engaged in a growing number of groundbreaking projects:

- Collaborative performance art with dancers and musicians as far away as Los Angeles, all in real time
- Remote surgical procedures and diagnoses
- Advanced collaborative research on colliding galaxies with NASA and researchers at Case Western Reserve University
- Use of geographic information systems and proximity-based computing along with wireless devices for data gathering at the university's School of Social Work Poverty Center

Revenue Targets Exceeded

More than 150 institutions, representing 1,100 locations, are planning to be connected to the extended OneCleveland network, including dozens of Museums such as the Cleveland Institute of the Arts, numerous Colleges, Research Centers, Art and Culture Institutions such as the Cleveland Orchestra, and Government including the Greater Cleveland Regional Transit Authority and Hopkins International Airport. Cleveland Municipal School District wants to link 130 schools. Northern Ohio's three major healthcare providers, University Hospitals of Cleveland, MetroHealth and the Cleveland Clinic, want to connect not only their main facilities but 50 satellite locations as well. The City of Cleveland now wants to extend the connection to 25 neighborhood recreation centers. And the Cuyahoga County Public Library is eager to link 35 neighborhood libraries as quickly as possible. Cleveland suburbs are also asking to connect their city halls, schools, and libraries.

Financially, OneCleveland planned to break even in year four, with a target of 91 member organizations and 103 sites. With the outpouring of community support and interest, OneCleveland will beat its original revenue projections and be able to pass further savings on to its subscribers.

A Hotbed of Collaboration

Removing network bandwidth limitations and liberating people from tethered computer connections are providing new opportunities for collaboration and sparking innovative ideas in education, the arts, and research.

Area hospitals are developing wireless monitoring for implanted heart defibrillators. The Rock and Roll Hall of Fame finally sees a practical content distribution channel for sharing its vast music collection for educational purposes. Design students at the Cleveland Institute of Art and engineering students at the Case School of Engineering are collaborating on global positioning system (GPS) applications for self-guided tours of University Circle that incorporate audio, video, and speech recognition. The Cleveland Museum of Art is developing a virtual museum that students can "visit" in their classrooms. And the bandwidth of the network is enabling Case and the Veterans Administration Hospital to share a simulator lab.

NEXT STEPS

Network applications and services being developed by Case will be shared with Cleveland and the outlying region via the OneCleveland network. The university rolled out IP telephony to a first wave of 250 telephones in two campus buildings and is monitoring and reporting on the health and performance of the implementation using CiscoWorks IP Telephony Environment Monitor (ITEM) monitor. The goal is 10,000 IP telephones campuswide, possibly followed by low-cost IP telephone service citywide to OneCleveland members.

The vision for OneCleveland goes even further than a metropolitan intranet of vast bandwidth. Like the Cleveland Port Authority or the Erie Canal in the past, the OneCleveland network, pioneered by Case Western Reserve University, is a vital infrastructure for the present and future economic growth of Cleveland. "We want Cleveland to be an international city of technology," said Scot Rourke, OneCleveland's Business Development executive. "As OneCleveland links up with state and national networks, the network will become as important to regional economic growth in the twenty-first century as the railroads were in the nineteenth century."

FOR MORE INFORMATION

To find out more about Cisco Networking Solutions for Large Enterprises, go to:

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CISCO SYSTEMS



Corporate Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters

Cisco Systems International
BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters

Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

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