

Tecnológico de Monterrey Extends Learning to Students and the Community with Cisco End-to-End Network Solution

Tecnológico de Monterrey is using its Cisco network to deliver innovative e-learning initiatives both on and off campus, and to support education outreach programs in communities throughout Mexico.

Background

A private, nonprofit, nationwide university system, Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) is comprised of 33 campuses located in 29 cities throughout Mexico, regional sites across Latin America, North and Central South America, and Europe. Established in 1943, Tecnológico de Monterrey is the fastest-growing private university in Latin America. Today, the university hosts 98,000 students enrolled in 34 undergraduate programs, 49 master's programs, and 12 doctoral programs. Tecnológico de Monterrey's world-class academic community includes 7,800 professors and 14,600 employees. The university is also a leader in applying technology in education: Its Virtual University, established in 1997, enables the university to reach students in more than 18 countries throughout the world.



“(Our strategy) is to provide our students with a world class education... Take full advantage of the internet and networks to be more efficient from an administrative standpoint and leverage human resources,” explains Dr. Rafael Rangel Sostmann, Tecnológico de Monterrey President.

The Challenge

Technology has long been a cornerstone of Tecnológico de Monterrey's educational offerings. The university depends on its network to support e-learning programs throughout its campuses, to deliver education to off-campus students through its Virtual University, and to support its own administrative applications. As the university prepared to extend its course offerings, administrators found that its existing decentralized network could no longer meet the organization's needs.

“The university had a very large system consisting of many sites, which posed a problem because we needed to keep all of the sites connected reliably,” explains Tecnológico de Monterrey's Vice President for Information Technologies Luis Caraza. “It also placed great demands on the network. We were planning to offer 22,000 courses, and 15,000 of them would be delivered over the network. This would have a tremendous impact.”



Tecnológico de Monterrey sought a platform that could deliver support for multimedia applications such as voice over IP (VoIP), videoconferencing, and video on demand (VoD)—while improving reliability and performance. It would have to be both cost-effective and scalable, to accommodate growing numbers of users as well as more demanding applications.

The Solution

Tecnológico de Monterrey replaced its decentralized campus network with a Cisco® end-to-end solution using virtual private network (VPN) architecture. The university chose a Cisco end-to-end solution because it needed a platform that provided the highest possible reliability for critical applications. The Cisco solution also provided built-in support for VPNs, as well as the quality-of-service (QoS) features that Tecnológico de Monterrey needed for videoconferencing and VoIP.

“QoS was an important feature that we needed to support voice and video,” explains Arturo Servin, network manager at Tecnológico de Monterrey. “We need be able to control bandwidth for applications that require low latency. And in the future, as we employ more multimedia applications like compressed video, we’ll need to have even more QoS.”

To maximize performance while distributing traffic over its VPNs, Tecnológico de Monterrey employs Multi-Protocol Label Switching (MPLS), a packet-forwarding technology that uses labels to efficiently make data-forwarding decisions. Cisco 7200 and 3600 series routers provide connectivity between campuses, as well as the Internet, via dual leased lines provided by the university’s ISPs. Both Cisco routers provide support for data, voice, video, hybrid dial access, VPNs, and multiprotocol data routing in a high-performance, modular architecture.

“Under our VPN architecture, each campus is connected to every other campus, so there isn’t a central point of failure,” explains Servin. “If one site goes down, a campus can still connect with any other campus.”

The robust network architecture enables Tecnológico de Monterrey to deliver a variety of educational applications to students both on and off campus. Students and faculty use the Cisco network to access Web-based course management applications such as the Blackboard Learning System and Tecnológico de Monterrey’s own

WebTec application. Designed specifically for higher education, these applications allow students to collaborate, chat, get the latest course news, upload or download homework, and access many other education resources, all via the Web. More than 70 percent of Tecnológico de Monterrey’s students have laptops, and 50,000 Ethernet ports are available in classrooms, libraries, and other public spaces throughout the university’s campuses. To access a course management system or the Internet, students can simply plug in their laptops, log in, and authenticate.

The Cisco network’s advanced QoS features enable Tecnológico de Monterrey to deliver IP videoconferencing to its students using the H.323 protocol, connecting to foreign universities in any part of the world using the Internet 2 network. These QoS features also enable Tecnológico de Monterrey to support a VoD library and live streaming video feeds of Virtual University courses that can be accessed by any student in any country in North America.

“Our Virtual University program lets us offer continuing education, master’s degree programs, seminars, and other online education programs to off-site students,” explains Luis Caraza. “We can use technology to offer courses to all students who want to enroll, using the best teachers we have. And our master’s degree program for Virtual University is perceptibly more economic than the traditional program.”

The network benefits both students and faculty by allowing the university to provide higher-quality instruction to more students than before.

“Several professors have told us that, in the traditional classroom, when they have a discussion, some of the most important things said in a classroom might be overlooked,” says Tecnológico de Monterrey’s Beatriz Palacios. “They’ve said that using collaborative learning technology gives them a greater awareness of how students express their opinions and work with other students in the classroom. Because collaborative technology gives them a record of the discussion, they can refer back to it again after class, and provide additional feedback to students.”

Tecnológico de Monterrey’s innovative use of technology is not limited only to enrolled students. The university is also using its network architecture to deliver Web-based education to communities all over Mexico, via the Community Learning Center (CLC) network. CLCs are educational spaces equipped

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with computers connected to the Internet via satellite or dialup connections, which provide access to online educational content delivered by Tecnológico de Monterrey. More than 400 CLSs offer a diverse array of classes, including business courses, continuing education, health programs, and migrant worker support.

“Sixty-five percent of our community centers are located in indigenous communities; the rest of our centers are in poor or rural areas as well,” says Tecnológico de Monterrey's Mariali Cardenas Casanueva. “Many of these students have never seen a computer in their lives, so using a mouse or performing other tasks can be difficult in the beginning. But after they complete their first course, when asked if they would like to take another course online, they respond, ‘Yes, we've learned to manage the technology—let's continue.’”

The most recent CLC initiative is a health program designed to focus high-priority public health issues in Latin America. The program is based on a unique private and public alliance with Cisco, Reuters, Tecnológico de Monterrey Medical School and Virtual University, Macromedia, and Stanford University's Medical School. The CLC health program offers e-learning modules covering diabetes, hypertension, nutrition, childcare, and upper respiratory ailments. More than 25,000 people across Mexico and in parts of the U.S. currently participate in the CLC program, receiving information that wouldn't otherwise be available.

“Studies indicate that 30 percent of deaths in Mexico are related to diabetes,” explains Dr. Tracey Wilen-Daugenti, Stanford University Fellow. “The cost of diabetes in Latin America is 300 percent higher than any other health expenditure. The CLCs let us take proactive steps to combat diabetes and other health problems in geographically dispersed communities using the Internet.”

“Tecnológico de Monterrey is committed to fostering alliances among those who have and those who have not in order to build a broader social consciousness,” says Dr. Gabriela Villarreal of the Tecnológico de Monterrey Medical School. “The CLCs enable us

to provide quality education to disadvantaged communities, and participate strongly in the formation of the social consciousness of tomorrow's leaders.”

Cisco played an important advisory role to help the Tecnológico de Monterrey Medical School take full advantage of the power of the Internet.

“We know that Cisco has a lot of experience in Internet technology and content delivery, but what we appreciated most was the company's willingness to partner with us to extend learning to underprivileged communities,” says Casanueva.

The Tecnológico de Monterrey network also supports most of the university's administrative and business operations. By moving common administrative processes to the Cisco network, the university has been able to save money, provide more convenient services for users, and help its staff be more productive and efficient. For example, students can connect to the university's administrative databases via the Web to pay tuition or access grades and attendance records. They can also view course catalog information such as schedules, class locations, and instructor information. Delivering this frequently requested content via the Web reduces the amount of time administrators spend on the phone, freeing them to deliver better service to students.

Tecnológico de Monterrey also uses its network to provide curriculum support for its Cisco Networking Academy® program. This e-learning initiative gives students a variety of Internet technology skills. Nearly 4,000 students are enrolled at Tecnológico de Monterrey's three regional academies.

Results

By deploying an end-to-end Cisco network, Tecnológico de Monterrey has already experienced significant cost savings and enhanced reliability.

“By migrating to a centralized VPN architecture, we were able to reduce our IT costs by US\$1.3 million a year,” says Juan Jose Zamanillo, telecommunications director at Tecnológico de Monterrey.

“Under our previous network architecture, campuses were all connected to one another in local zones,” says Arturo Servin. “For example, if our Guadalajara site failed, all the campuses in its zone failed as well. Today, if one site fails, there’s no problem. It’s a very stable environment.”

Next Steps

Tecnológico de Monterrey is continually enhancing its network infrastructure to deliver a superior learning experience to students both on and off campus. For example, the university is steadily expanding its use of multimedia, such as streaming video and animation, in classrooms and at CLCs.

The Cisco converged voice and data network is also helping the university save money on its daily business communications. To reduce phone expenses, Tecnológico de Monterrey has begun to migrate its campus offices to a VoIP solution powered by Cisco Systems. Instead of paying long-distance charges for calls to campuses in different cities, administrators can use the university’s existing WAN for voice connectivity.

In the years ahead, with its scalable, flexible Cisco infrastructure, Tecnológico de Monterrey expects to continue its innovation and leadership in the academic world and beyond.



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.
Capital Tower
168 Robinson Road
#22-01 to #29-01
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

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