

School District Upgrades Its Network and Reduces Operating Costs

EXECUTIVE SUMMARY

CUSTOMER NAME

Austin Independent School District
Austin, Texas, United States

INDUSTRY

Education

BUSINESS CHALLENGE

Increase the network's capacity, flexibility, and ability to support advanced services such as security, voice, and video.

NETWORK SOLUTION

- Upgraded network foundation to increase bandwidth while supporting existing applications.
- Implemented new quality of service features.
- Deployed content engines to enforce Internet usage policies.

BUSINESS RESULTS

- Saved \$36,000 per month by running voice over the network instead of leasing circuits and purchasing telephony services.
- Deployed advanced security features to help ensure regulatory compliance.
- Built a resilient network foundation for delivering wireless, video, and innovative new applications.

Austin Independent School District increased its network bandwidth to launch new services—and at the same time lowered operating costs.

BUSINESS CHALLENGE

The 107 campuses of the Austin Independent School District (AISD) serve approximately 80,000 students, who come from all economic backgrounds and speak 57 different native languages. AISD faces challenges similar to many school districts across the country. Rising state academic standards coincide with a growing recent immigrant student population and new caps on property taxes, which have hurt the district's ability to raise revenue and have resulted in budget reductions. One way that the AISD is overcoming these challenges is by building on a strong technology foundation that was originally created in Austin in 1994. At that time, the Greater Austin Area Telecommunications Network (GAATN) was formed as a joint effort between the City of Austin, AISD, University of Texas (UT) at Austin, and several other state and local entities. GAATN is a metro information super-highway, built on more than 300 miles of fiber that connects all participants' sites. Built on a highly redundant ring architecture, GAATN is designed for high availability.



For AISD, GAATN is a highly cost-effective alternative to leasing lines and receiving service from local service providers. The network connects every AISD campus and administrative building, supporting approximately 60,000 access ports. AISD's own network that connects to GAATN supplies the district with all of its data, voice, video, security, public address, workstation, storage, wireless, and 911 emergency services.

In 2005, AISD began a network upgrade program to improve network availability, increase scalability, and support new services. The existing network was based on an ATM and Layer 2-based switched infrastructure, using equipment from Cisco Systems®.

“We put many more services on our network infrastructure than most schools districts,” says Shlomi Harif, director of AISD network systems and support. “Because we work with UT Austin and other GAATN groups and because we provide dial tone service over our infrastructure, it must now be available 24 hours a day, every day and enable us to support advanced services, such as security, wireless, and video applications.”

In addition, AISD must ensure compliance with three regulations designed to protect children’s privacy and prevent exposure to content that isn’t suitable for children. The Children’s Internet Protection Act (CIPA) requires a filtering solution for keeping out inappropriate Internet content. The Family Educational Rights and Privacy Act (FERPA) protects the privacy of students’ education records. Schools are also subject to the Health Insurance Portability and Accountability Act (HIPAA), which protects the confidentiality of students’ health records. These regulations demand that AISD’s network include security capabilities designed to protect data privacy and confidentiality.

The district evaluated upgrade alternatives from many different vendors, but again chose Cisco® solutions for Cisco’s industry-leading support capabilities. The new network solution was designed to deliver maximum availability and scalability.

NETWORK SOLUTION

On the GAATN ring topology, a Cisco 10720 Optical WAN router is deployed at every AISD site. Multiple sites are connected on a Resilient Packet Ring (RPR), which is a Layer 2 ring technology specifically designed to meet the requirements of metropolitan-area networks with multipoint service requirements.

Figure 1. AISD GAATN Network Ring Topology



With the intelligence and scalability of Internet Protocol (IP) routing and the bandwidth efficiencies of optical rings, the Cisco RPR-based routers are an ideal choice for building a highly scalable metro optical transport network that is flexible enough to handle high-bandwidth voice, data, video, and other advanced applications while simplifying operations and service delivery. The RPR technology effectively doubles network bandwidth over traditional SONET fiber technology and provides sub-50ms network restoration capabilities in the event of a fiber cut.

Deployment of the RPR technology also allows AISD to effectively use dark fiber that it already owns, building 5-Gbps packet rings by directly connecting the Cisco 10720 WAN routers over dark fiber without the need for additional transport infrastructure. The Cisco 10720 Optical WAN routers enable high scalability, since new nodes can be added easily to the network without re-engineering the infrastructure.

AISD has implemented Layer 3 quality of service (QoS) features on the Cisco 10720 Optical WAN routers' WAN interfaces, providing priority service for voice traffic over the network. The district's Private Branch Exchange (PBX) voice systems are connected to the network and time division multiplexing (TDM) voice traffic is transported over the network with the required QoS. Less time-sensitive traffic, such as file transfers and Web downloads, are handled using low priority queues, transported with available bandwidth after voice traffic. The network also carries voicemail and electronic messaging traffic, which enables messaging applications to be transparently integrated and delivered as unified messaging services over the Cisco network.

Almost all of the district's secondary (grades 6-12) school campuses currently enjoy wireless connectivity and AISD plans to extend wireless capabilities to the elementary schools as well. With more than 700 Cisco Aironet® 1100 wireless access points installed, staff and teachers can securely log in to the network using 802.1x authentication and take advantage of mobile computers on carts to deliver lessons or access rich content.

“Our networking technology is a strategic component of our mission to ensure that our students achieve their learning potential. With extraordinary access to information and advanced security and content technologies, we have witnessed significant advances in our students' test scores, school rankings, and teacher certification.”

—Pascal Forgione, Jr., Ph.D, Superintendent, Austin ISD

BUSINESS RESULTS

In spite of the range of new services that have already been deployed or are in the planning stages, six people manage the entire network around the clock. Because the Cisco network builds on the existing infrastructure and relies on a common operating system across the network, AISD has delivered innovative new services that enrich students' abilities to learn—without adding staff.

“The network upgrade has delivered significant benefits to the district, in addition to exciting new learning opportunities for students,” says Gray Salada, chief information officer of AISD. “AISD has been able to extend its existing network investment, maximize the efficiency of our staff, reduce costs, and deliver the benefit of powerful new technologies district-wide. It represents a judicious use of taxpayer dollars.”

AISD provides dial-tone telephone service to 91,000 staff and students, making it one of the largest private phone carriers in the southwestern United States. The new Cisco network eliminated the need for to pay a service provider for telephone service and T1 circuits between locations, saving the district approximately \$36,000 per month just for dial-tone service.

The advanced security features deployed on the Cisco network have enabled AISD to maintain HIPAA, FERPA, and CIPA compliance, as well as protect its systems from spam and viruses. The network is segmented using virtual LANs (VLANs), which help prevent virus transmission between campuses. As a result, user PCs at one location cannot infect user PCs at other locations, which dramatically simplifies management and support tasks.

“With our firewalls, antivirus and anti-spam measures, and the Cisco content engines, we have a well-configured network with multiple layers of security,” says Justin Slocum, WAN network analyst for AISD.



With wireless coverage in place, most Austin schools are able to tailor lessons around specific curriculum offerings, provide access for more students to specialty resources, or even take classes outdoors. With 802.1x authentication implemented, students and staff can securely log in to the network, while guests can use the wireless network for Internet access only.

From a performance standpoint, application response time has dramatically improved. The previous network offered 10-Mbps access ports; today’s network provides a 100-Mbps, full-duplex port available.

“The upgrade allows us to provide more services to more customers without having to rebuild our fiber cable infrastructure,” says Kohlmorgan. “With the additional WAN capacity we have gained, we have been able to consolidate our file server structure and ensure automatic failover. Because we own our fiber, we can do this faster, better, and more economically than would otherwise be possible.”

Previously AISD had approximately 80 file servers, which it consolidated to four—two servers in front of two Storage Area Networks, each with the ability to fail over to the other. Not only does the district realize significant operational savings on server hardware and software licenses, it reduces the management burden on an already-lean staff.

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PRODUCT LIST

- Cisco 10720 Optical WAN routers
- Cisco 7300 Series content engines
- Cisco Catalyst 6509, 4500 Series, and 2950 Series switches
- CiscoWorks LAN Management Solution and CiscoWorks Wireless LAN Solution Engine

NEXT STEPS

AISD is about to undertake a video security project that will connect security cameras across the district to the network for delivering real-time video monitoring capabilities.

“With the previous network, we would have had to set up dedicated links between campuses to support something like this,” says Slocum.

“Now with our enhanced bandwidth and QoS features, we can easily support video over the IP network for a range of services, such as security monitoring, videoconferencing, video on demand, and streaming video applications.” To optimize performance for all campuses, Slocum says that another upcoming project is deploying load-balancing capabilities, which will enable AISD to direct users to the resources that they need at the least network cost.

“Our networking technology is a strategic component of our mission to ensure that our students achieve their learning potential,” says Pascal Forgione, Jr., Ph.D, superintendent of Austin ISD. “With extraordinary access to information and advanced security and content technologies, we have witnessed significant advances in our students’ test scores, school rankings, and teacher certification.”

TECHNICAL IMPLEMENTATION

AISD’s GAATN ring topology includes two fiber “super rings” and seven fiber “supernodes” that connect all AISD sites. Each supernode connects two rings to a super ring, and two of the supernodes are network operation centers, one of which is used for backup and recovery.

The network core is composed of Cisco Catalyst® 6509 switches connected by 10-Gbps Ethernet links. At every AISD site, a Cisco 10720 Optical WAN Router is deployed; multiple sites are connected on an RPR. Cisco 10720 Optical WAN routers provide metro edge access routing that optimizes optical transport using standards-compliant RPR technology that is designed specifically for use in packet-based metro networks.

In the AISD network, each RPR ring connects multiple sites to a distribution layer based on Cisco Catalyst 4500 Series switches, which connects to the network core. At each campus, Catalyst 2950 Series switches provide LAN connectivity, connecting to a Catalyst 4506 switch, which aggregates traffic for switching through the Cisco 10720 router that enables the site to access core network resources and all other locations on the network.

Cisco 7305 content engines are deployed at the network edge. Using Secure Computing’s SmartFilter, AISD implemented URL filtering to control access to external Websites without negatively affecting performance.

“The Cisco content engines are an effective tool for implementing and enforcing Internet usage policies,” says John Kohlmorgan, WAN manager for AISD. “They enable us to automatically update filter lists and perform required reporting for compliance. We also use them to cache Web content, which improves content delivery and WAN utilization as well as reduces the risk of noncompliance.”

FOR MORE INFORMATION

To learn more about Cisco switching solutions, visit: <http://www.cisco.com/go/switching>

To learn more about Cisco routing solutions, visit: <http://www.cisco.com/go/routing>

To learn more about Cisco 10720 Router and RPR, visit: <http://www.cisco.com/en/US/products/hw/routers/ps147/ps148/index.html>

To learn more about Cisco wireless solutions, visit: <http://www.cisco.com/go/wireless>

To learn more about Austin ISD, visit <http://www.austinisd.org>

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