Customer Profile

Washington School for the Deaf

Cisco IP Communications and NXi software enable equal access to voice and TTY services

Washington School for the Deaf (WSD), in Vancouver, Washington, provides vital academic programs for more than 100 students from age 3 to 21. At the heart of the school's success is a dedicated staff of 120 professionals, including teachers, administrators, and outreach staff, who themselves are deaf, hard-of-hearing, and hearing. Since WSD transitioned from a traditional telephone system to Cisco IP Communications with NXi Telephony Services (NTS) text-messaging software from NXi Communications, all WSD employees have enjoyed equal access to communications services. "The Cisco and NXi solution makes it vastly simpler to communicate with all the school's stakeholders: students, staff, parents, board members, both hearing and non-hearing," says Lorana Myers, WSD supply officer.

Challenge

Like their counterparts in education, business, and government everywhere, WSD employees who are deaf and hard of hearing face challenges with everyday communications that hearing people take for granted. For instance, when WSD relied on a traditional telephone system, a teacher who was deaf and needed to talk to a hearing person by phone either needed to use a relay service or ask another staff member to call the parent and then interpret using American Sign Language. The latter method was time-consuming and could be awkward for private or sensitive conversations—for instance, discussing student issues with parents. "Because traditional phone systems don't address the unique needs of deaf and hard-of-hearing people, our deaf staff lacked both privacy and independence," notes Myers. The relay service worked well for local calls, but was costly for long-distance calls because the local relay service charged a higher toll than WSD would pay if the caller had dialed directly using the low-cost, state-controlled access network.

Even if they didn't need a relay service, hard of hearing and deaf employees could not take advantage of the state-controlled access network for long-distance calls because it required two-stage dialing. That is, to make a long-distance call the user first dialed the number, waited two to five seconds for another dial tone, and then entering a seven-digit access code. Employees who are deaf had to guess when the dial tone sounded—and might dial too soon or too late to successfully place the call.

Hearing faculty and staff in mixed environments can find their productivity eroded, as well. At WSD, for instance, they didn't know whether to expect a voice greeting or TTY tones when they answered the phone: Loud TTY tones were the only cue to acoustically couple the phone to the TTY device. Misunderstandings abounded. Once when the caller didn't respond immediately to her "Hello," a WSD staff member coupled the phone to her TTY, only later to discover that her caller, the school superintendent, had momentarily placed his hand over the handset to speak with someone. In addition, hearing people without TTY devices, including some parents, had no way to leave messages for staff members who were hard of hearing or deaf. And some hearing staff put in extra time interpreting, which cut into the time they had for their other responsibilities. "Frustration can build for all parties when there's not equal access," says Myers.

WSD resolved to implement a telephone system to meet the needs of all stakeholders, whether deaf, hard-of-hearing, or hearing. The goal: equal access, which would facilitate teamwork, privacy, and independence for all staff. To achieve this goal, the new system would need to support the following communication scenarios:

Calling Party	Dialed Party
Hard of Hearing or Deaf	Has an IP phone and TTY Has an IP phone only
Hearing	Hard of Hearing/Deaf and has both an IP phone and TTY Hearing and has an IP phone only

In all cases, the solution had to accept and facilitate retrieval of messages.

After contacting deaf schools around the country and determining that none had a system meeting all criteria, WSD invited leading IP telephony vendors to the campus to learn the requirements and submit a proposal. WSD chose Cisco Systems®. "Cisco immersed itself in learning our requirements and was the only vendor that didn't ask for a six-figure development fee up-front," says Myers.

Solution

Cisco proposed working with Obsidian Technologies, a Cisco IP Communications specialized partner in Oregon and Southern Washington that provides consultation, design, implementation, and support services for turnkey IP telephony, wireless local area network (WLAN), and security solutions. Obsidian Technologies began designing the solution in April 2003, working closely with NXi, a Cisco AVVID partner specializing in communications for the deaf. The partners commenced implementation in June 2003, and brought the system live in August 2003.

Voice and Text communications: Cisco CallManager and NTS

Two redundant Cisco CallManager servers form the core of the solution, providing telephony services throughout the school's 12-building campus fiber network. The servers, which reside on Cisco MCS 7825 platforms, are located in different buildings and run in parallel to ensure uninterrupted operation even in the event of a hardware or software error. The Cisco CallManager servers presently support 135 Cisco IP Phones and are capable of supporting up to 1000, providing ample growth capacity for the school. One Cisco CallManager server includes the Cisco IPCC Express Edition software, which provides automatic call distribution (ACD) of calls from hearing and non-hearing callers. People who call the school's main number are given a voice prompt to press 1 to continue. Callers who don't press 1 are presumed deaf and are automatically transferred to the NTS server.

The NTS server is the nucleus of equal access at WSD, working in conjunction with Cisco CallManager software to provide advanced text communications over the school's converged voice and data network. Using the NTS client software on a PC or laptop, all employees can take advantage of a visual interface to dial on-campus extensions and other phone numbers. They also can use their computer to type and read TTY messages, which has the added advantages of conserving desk space by eliminating the TTY and allowing staff to save conversation transcripts.

Because it manages two-stage dialing, NTS enables staff who are deaf to use the state-controlled network to place long-distance calls, significantly cutting the schools' toll costs. Users enter both the phone number and the access code at the beginning of the call, and then NTS automatically dials the network access number when the second dial tone becomes available. If a teacher who

is deaf wants to contact a hearing parent in Spokane, for example, he simply dials the parent's number and the network access number. The NTS server automatically contacts a relay service in Spokane, using the low-cost network to place the call. WSD employees also have the option of using a Cisco IP Phone 7940 or 7960 for two-stage dialing because the phones provide a visual prompt when it is time to enter the access code.

Both the Cisco IP Phone and NTS client provide visual indicators not only for dial tone, but also for ringing, hold, call termination, message waiting, and so on. A strobe light connected to the Cisco ATA 186 Analog Telephone Adapter provides another indication of incoming calls. "The NTS desktop interface and Cisco IP Phone indicate incoming calls, but the strobe is more noticeable if a teacher is in the classroom or otherwise not looking at the PC screen," explains Myers.

A Cisco Unity server residing on a Cisco MCS 7835 platform can handle voicemail sessions for both hearing and non-hearing users. "At WSD, Cisco Unity not only provides voice messaging for hearing people, it also provides intelligent call routing and redirecting of conversations," says Myers. When a hearing person calls a deaf person's extension, the system issues a voice prompt that the person called does not accept voice messages, and offers the caller the option to either insert the telephone handset into the TTY coupler to leave a text message or be routed to a hearing operator, who takes a TTY message. Either way, the message is delivered to the deaf user's NTS client software on the desktop. "With Unity and NTS, parents and others without TTY devices for the first time have the ability to leave messages for deaf staff and faculty," says Myers.

Intelligent Infrastructure

The Cisco CallManager, Cisco Unity, and NTS servers leverage a converged voice/data network on a fiber backbone, based on Cisco Catalyst 3500 Series switches with inline power. The Cisco Catalyst switches provide gigabit bandwidth capacity to wiring closets throughout the campus, each equipped with uninterruptible power supplies (UPS) used for the Cisco IP Phones . The Quality of Service (QoS) functionality built into the Cisco® IOS Software ensures that delay-sensitive voice and TTY traffic receives priority over data traffic, even in the event of congestion.

To allow incoming and outgoing calls to the IP network from the Public Switched Telephone Network (PSTN), the Cisco Catalyst switch connects to a Cisco AS5350 Access Gateway (see figure). The gateway, in turn provides a T1 Primary Rate Interface (PRI) that supports concurrent in-bound or out-bound calls, both to the NTS system used for text messaging and to remote dial-up users. A Cisco 2621XM Multiservice Router with voice gateway support provides access to the state-controlled access network.

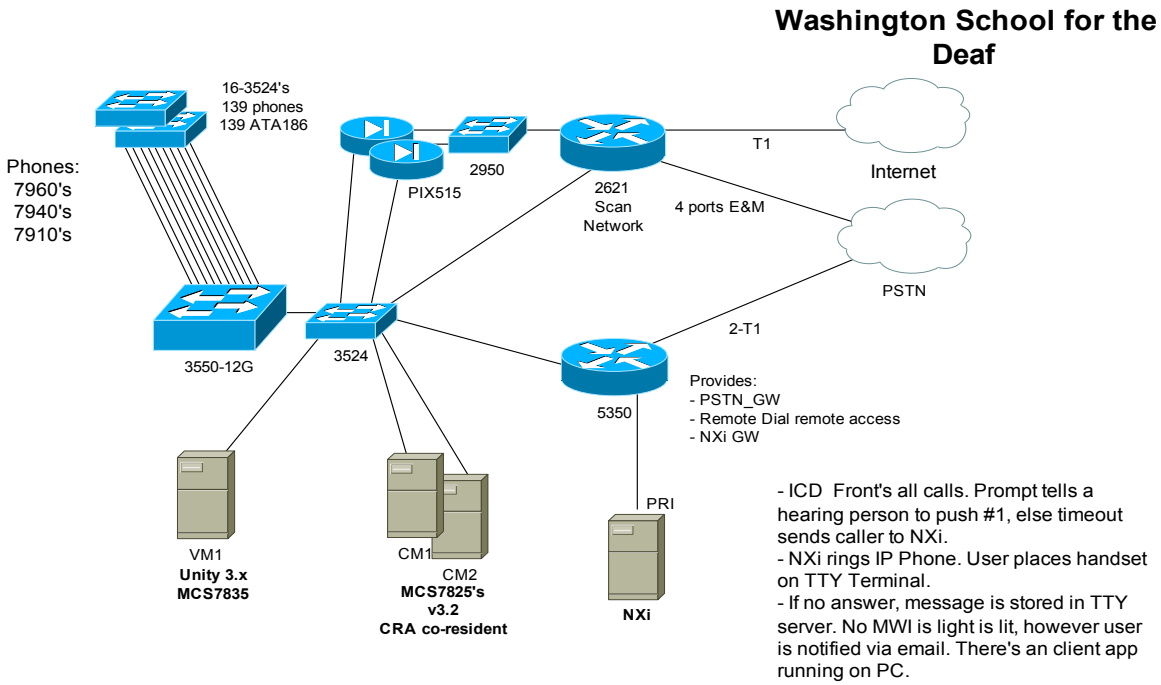

Figure 1 – WSD network. Cisco CallManager, Cisco Unity, and NTS talk to each other seamlessly.

Because the phone network must remain available 24 x 7, Obsidian designed the network for redundancy and reliability. "Fail-over is built into the network at the server level," explains Tony Foy, who managed the WSD deployment for Obsidian Technologies. "Spanning tree on the fiber network means that if one network path goes down, the network retraces its path to find another path." The value of redundancy was brought home just short months after implementation, when the WSD phone system continued working despite a power outage in the main building where the servers reside.

Results: Equal Access

Now WSD staff and faculty, both deaf and hearing, can make and receive calls independently using either their Cisco IP Phones or NTS client software on their PC or laptop. Employees are embracing the new system. "One of our deaf teachers used to e-mail me if she had questions during her prep time," says Myers. "Sometimes we barely had enough time to resolve the issue before class started—and that's if I received and opened her e-mails immediately. Now she uses her NTS client software to call me and we can converse in real-time, resolving questions much more quickly. With our Cisco IP Communications solution we can now do all the things that hearing people take for granted."

Myers notes that to inspire hard of hearing and deaf people to become excited about a communications device is an extraordinary milestone. "For the first time our staff who are deaf or hard of hearing can contact outside resources on their own—without having to rely on someone else to make a phone call," she says. "And they can receive calls without assistance, as well."

Obsidian, which conducted the training, reports that it couldn't have a more grateful user community. "I'll never forget seeing the excitement in the eyes of the schools' hard of hearing and deaf staff—most with masters' degrees—who for the first time had a way to do their jobs themselves, without being dependent on someone else," says Foy.

Myers concurs: "I hope my peers in other deaf institutions have the ability to realize a vision like this," she says. "With the Cisco and NTS solution we can finally communicate equally, which is a huge step."