

Air blown fiber offers installation advantages and flexibility in many applications.

NIC's at NITE: A Great Fiber Changeover Happening at USAA



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Replacing every NIC card in 12,000 PC's, 700 servers and about 2,000 printers would seem no easy task, but network designers for the new Ethernet to-the-desk protocol at USAA had one clear mission. "Every cutover will be transparent to the users, since we are installing these NICs at night," states Steve Ybanez, Network Cable Analyst for USAA (San Antonio, TX).

Having more than 12,000 employees at this location, this would be no easy moonlight job. The work encompassed an estimated 250 moves per week in the more than four million square feet of office space at the home office complex of the worldwide insurance and diversified financial services association. "Bringing all the pieces together - from thousands of miles of air blown fiber to

tens of thousands polymer connectors - on such a grand scale, made this installation one of the largest in networking history," notes Tim Stuart, RCDD of Datacom Sales & Associates (Austin, TX), the manufacturer's representative for many of the products used in the installation.

USAA's main campus includes eight buildings located on 280 acres in San Antonio, Texas. Previously there was one equipment room per building. When designing the new LAN layout, they scaled the number down to three telecommunications rooms. Ybanez likened this job to starting from scratch. "The telecommunications rooms had to be built on raised floors so that the cable could come up through the floor. In one building this meant turning a previous garage into a telecommunications facility to accommodate the equipment," states Ybanez.

The main successes of this installation were owed to the modular nature of air blown fiber and the easy-installable Quick-Cure' polymer SC connectors. The installation included 32,500 outlet locations and encompassed 4,838 miles of Sumitomo blown fiber optic cabling supplied through AIDCO.

The connectivity was further guided by 1,700 corresponding patch panels, 56,000 SC field installable connectors and 14,000 duplex SC patch cords from Methode Electronics, and more than three million feet of Enhanced CAT 5 cable from Helix/HiTemp Cables.

Plumbing the Fiber

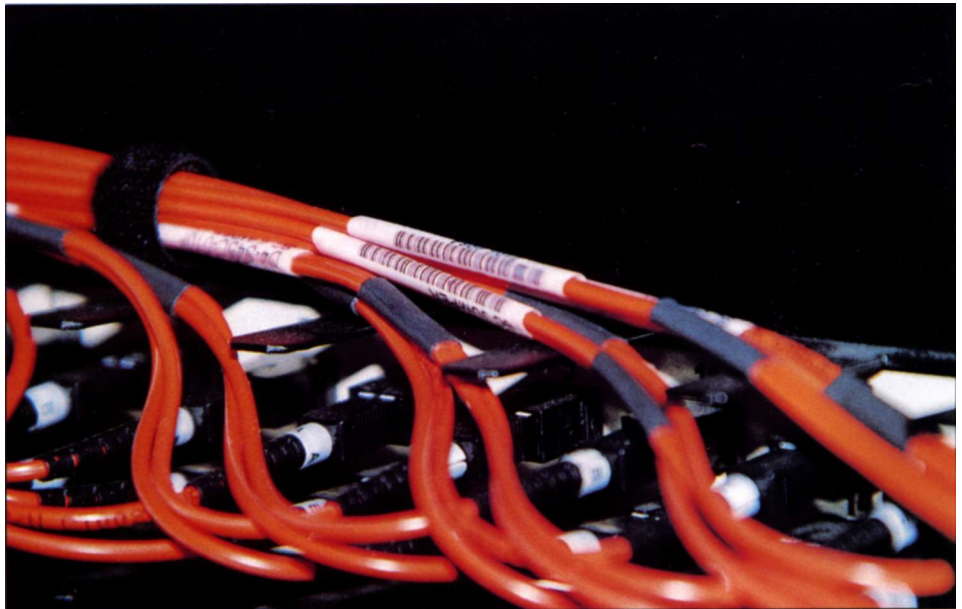
The entire installation took one and onehalf years in three phases. During all three phases the telecommunications rooms were being built simultaneously. The first phase of was installing the tubes for the air blown fiber, which took six months.

"People realign, people change and units move on a daily basis," states Joe Fleming, RCDD and LAN Specialist, Network Cabling & Infrastructure for USAA. "Since USAA can't predict many of the moves ahead of time, blown fiber was the perfect fit. Given this scenario, we needed the flexibility to move around the fiber for bandwidth on demand. Blown fiber can do this."

"Blown fiber is an elaborate plumbing system," adds Ybanez. The tubing



In the telecommunications closet are rows of fiber distribution panels and patch panels in data management racks.



Labeling the multitude of patch cords was achieved through a bar coding system, a service from Methode Electronics. For each cross connect, the technician easily matched the switch to a spreadsheet.

installed underneath the complex contains either 1, 2, 7 or 19 cells per tube, each carrying bundles of six strands of multimode, 18 strands of multimode or six strands of singlemode. Cell feet totaled 2,100,000 and strand feet totaled 25,550,000 nearly 5,000 miles.

"Tube cable infrastructure is 100% reusable with no waste. Once the tubes are in place and the fiber blown through, it can easily be blown out and put back on the

reel," explains Pat Gorrell, RCDD, of ALDCO (Chino, CA). "Initially, the cost of blown fiber is more expensive than conventional fiber optic cabling. But the savings of the installed cost actually lowers the overall cost."

Once the tubes were in place, the fiber was blown through the cells with pressurized nitrogen, 150 -250 psi depending on the length of the run. The fibers were then terminated with SC connectors into

te patch panels or to fiber distribution switches.

Labeling the multitude of patch cords was achieved through a bar coding system, a service from Methode Electronics. For each cross connect, the technician easily matched the switch to a spreadsheet. "This keeps your job neater longer. Without it, it would be a cabling nightmare," notes Jim Ray, Network Project Manager for USAA.

Making the Right Connection

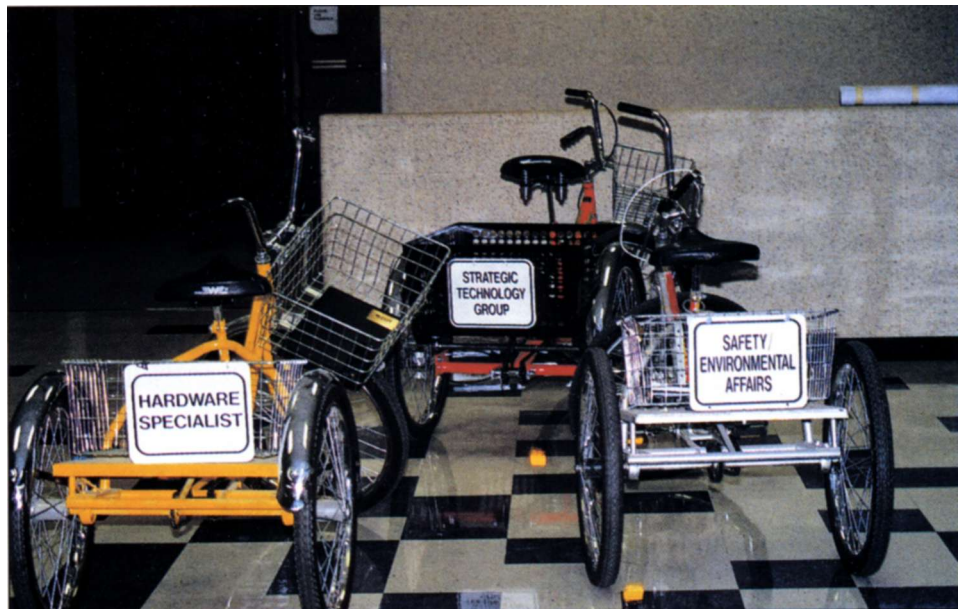
Between the 200 data management racks in the three telecommunication rooms were 1,000 patch panels, ranging from the common 24 port to high-density 144 port.

Methode provided 14,000 pre-terminated duplex patch cords with SC connectors in the patch panels with 56,000 SC Quick-Cure' field installable connectors to tie the fiber backbone with jumper cables to the CAT 5 based horizontal system, as well as future fiber to the desk. Methode connectors were also located in the patch panels at the bay cabinets for horizontal distribution

"USAA selected the Methode SC Quick-Cure polymer multimode connectors because of the ease of installation, speed of installation, reliability, quality and availability," states Ybanez. "I did extensive research on ceramic versus polymer. As a former installer, I know that polymer ferrule was much easier to polish and that Quick-Cure is proven technology."

"The key to the Methode connector is the pedestal on the end of the polymer ferrule that supports the fiber during polishing," states Ken Marchman, Director of Sales and Marketing, Fiber Optic Products Division, Methode Electronics. "This eliminates the need for an epoxy bead and also prevents inadvertent fiber breakage, which results in the reduction of polishing time as well as scrap."

On these connectors the pedestal tip is removed during the polishing, so there is no cleaving. "In a ceramic connector, if you ruin the cleave, you ruin the ferrule and connector," explains Marchman. "With the polymer, the termination is a success regardless of the cleave. That's why there is a 98% success rate with a typical insertion loss is less than 0.2 dB." "These connectors are so quick - less than 2 minutes to terminate - and sim-



Most of the transportation between departments at USAA's 280-acre home complex is handled through three-wheel cycles through a basement tunneling system.

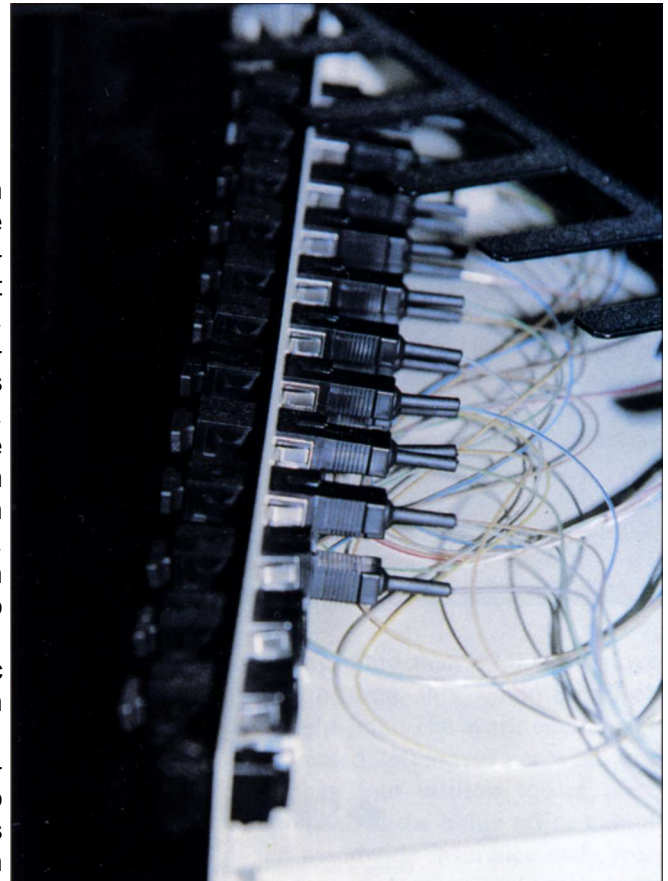
pie to connect that they removed the technical skill out of terminating the fiber," states Ybanez. "When choosing connectors I had to consider the inhouse technicians who would be installing them. I like to spec in something the technician would

There are five bays per floor and 35 beams per floor plate. Each bay area contains a free standing bay cabinet that includes fiber distribution panels for the backbone and CAT 5 patch panels for horizontal distribution.

From Beams to Bays

The original design included fiber from the telecommunications closets to data cabinets at each furniture beam, which have telecommunications outlets along its length every four feet. Workstations would be connected on each beam through a 24-port patch panel in the data cabinet. One Ethernet switch would be dedicated to each beam.

After installing three buildings this way, the networking team at USAA reviewed the layout and decided to centralize the cabinets into "Bay Areas," which would encompass up to 80 workstations per bay.



The fiber optic cable is terminated into the fiber distribution panels in the telecommunications room.

In doing so they dramatically lessened the number of distribution switches. "With a total number of 33,000 ports which

Bringing the pieces together made this one of the largest installations in networking history.

includes one voice, one low speed data and one for LAN, we actually reduced our closets, reduced the distribution switches



and in doing so, saved the company millions," states Ybanez.

Enhanced Category 5 was installed from the bay cabinets to the workstations to provide high-speed data capabilities. Eighty percent of the three and one-half million feet was "SpeedPull" , an enhanced Category 5 cable, custom designed by Helix/H iTemp Cables for USAA. These cables are six separate 4-pair twisted cables bundled together. This dramatically cuts down installation time and costs due to the ability to pull six cables simultaneously.

"The enhanced Category 5 cable is characterized up to 360MHz which provides all the bandwidth needed for

our current 100 megebit LAN environment," notes Steve. "However for future faster networking speeds and unlimited bandwidth capabilities, fiber, dark and live, was installed to some areas."

Lone stars branch out

There are 11 smaller USAA branch claims and appraisal offices in selected cities both in the u.s. and abroad. The U.S. regional offices have the same cabling infrastructure with air blown fiber backbone and enhanced CAT 5 to the desk. The identical infrastructure at the regional locations allow compatibility to the home office's networking system. All the old Token

Ring backbone and T-Base LAN will eventually change over to 100 MB Ethernet to the desk over ATM backbone.

The new NIC cards installed in the workstations, both in the home office and regional office will have the "auto sense" feature which allows bandwidth on-demand. The result is that the traffic is kept of the backbone and allows the switched back plane at the IDF's or bay's to become dedicated.

To create a failure-proof environment, each distribution switch is designed with redundancy. This minimizes down time in case of any failure. In addition, there are dual AC supplies for every switch.

Fiber for the Future

USAA's cabling infrastructure was designed with modularity to carry them into the next millennium.

Upon completion of the "NICs at Nite" project, the networking team will focus on the future of fiber to the desk. "With our own internal web site and with the onslaught of full motion video and video phones in the future, we will probably be looking at 1,100T-1 lines and full fiber to the desk capabilities," notes Ybanez. "USAA is a pioneer in the use of computers, telecommunications, image processing and other information technology and management tools which significantly increases the productivity of our 16,500 employees worldwide. This is one of many reasons that USAA was named 'Most Admired Companies' in 1997.

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