

NETWORKS: FIBER

Fiber Optic Transmission and Modern Parking Garages

Medium lends flexibility in design and implementation

As the population density increases and land becomes a scarce commodity, having open areas set aside solely for parking becomes increasingly difficult. As a result, the need for efficient parking garages becomes paramount. Anywhere large numbers of people congregate for work, business or recreation vehicles need to be accommodated.

As with all public facilities, personal security needs to be provided. The design of the parking garage lends itself to unique challenges in protecting the public. Parking garages by nature of their design have a mix of large open areas and small confined spaces. Surveillance, access control and emergency intercoms are critical to protection for the public.

Parking garages require multiple CCTV cameras strategically placed throughout the facility to provide surveillance. The inherent nature of this type of structure, distance between cameras and monitoring locations make fiber optic transmission the optimal transmission medium. Although other mediums such as wireless might be considered, the benefits to using optical fiber for this type of application are many. They include high bandwidth, longer distances, secure transmission and reliability.

In the recently completed parking center at the Jackson-Madison County General Hospital in Jackson, Tenn., optical fiber was chosen as the preferred medium. The eight-floor, 676-space garage was the first part of a five-phase hospital expansion. In addition

to the garage, the project includes a five-story medical office building and a walkway that connects the parking garage and the main hospital. The parking garage CCTV system is part of an overall integrated security solution that SimplexGrinnell is providing to help protect life and property at the Jackson-Madison County General Hospital. The solution includes analog CCTV, access control and emergency telephones throughout the campus, as well as an advanced security command center and a comprehensive service agreement to keep the systems in top working order. Integrator SimplexGrinnell made the decision to use optical fiber throughout the entire facility.

SimplexGrinnell's Joe Trowbridge was the project manager and he turned to Dave Downard of Vihon Associates of Tennessee to recommend a solution for their surveillance and monitoring challenges for the parking garage phase of the project.

That decision to use optical fiber as the transmission medium gave Vihon Associates many options on the type of surveillance system they could recommend for this phase of the project. Vihon Associates turned to ComNet Communication Networks, a fiber optic communications company, to design a solution based on the parameters of the project.

The central monitoring site would be located 2,500 feet from the termination room in the new parking complex. This distance was beyond the capability of coaxial cable and the decision to use fiber optic cabling became essential. The design specified



The eight-floor, 676-space garage was phase one of a five-phase hospital expansion. Photo courtesy of ComNet



Left: The advanced security command center at the Jackson-Madison County Hospital. Right: Server equipment rack for the installation.

by Simplex Grinnell called for installing 64 fixed cameras, 22 PTZ cameras and four high-resolution license plate cameras. All the CCTV surveillance signals were to be transmitted over 96 strands of multimode fiber between the garage termination room and the main hospital's central monitoring location. The plan also called for the video to be monitored and controlled from the main security control center as well as three other locations: the security director's office, the security coordinator's office and the main CCTV termination room.

Video encoding schematics

One question that came about was whether to choose an Ethernet-based or some other video-encoding scheme that could be transmitted over optical

fiber. Because of the decision to use optical fiber as the medium, this gave the designers the flexibility to use either encoding scheme. Optical fiber is an ideal medium for Ethernet, providing bandwidth, distance and noise immunity over other transmission media. One of the advantages of an Ethernet over optical fiber system is the ability to "network" all the video and security data, allowing numerous users to view and access the system from multiple locations throughout the facility simultaneously.

The design specification requiring four different monitoring locations made an Ethernet over optical fiber solution a viable option. It also offers a network reliability function that traditional point-to-point solutions cannot offer. Although Ethernet systems offer great potential, in some cases such as with the Jackson-Madison County Hospital, other solutions are more cost-effective. In 2003 SimplexGrinnell, who has been the integrator for the hospital since 1997, suggested a major upgrade for the CCTV system that included moving the entire system to an Ethernet-based system. At the time, due to the cost, bandwidth limits and quality of the recorded video, the hospital chose to use a traditional point-to-point fiber optic transmission system. In the seven years since that decision was made, advancements in Ethernet systems have been made to eliminate those limitations. In the case of the hospital, they had a legacy system in place and that was the determining factor in deciding the path of this expansion.

The final design called for placing all the cameras in strategic locations to ensure 100 percent coverage within the garage. Each camera had its feed transported by coaxial cable to a network closet in the garage facility. Eight-channel fiber optic video transmitters and four-channel fiber optic video transmitters with two channels of data, over a single optical fiber, transported the video and camera control from the garage to the main security command center monitoring location within the hospital and the three other locations designated for CCTV monitoring. The new security command center has been designed to handle all the current and future monitoring requirements. At the conclusion of the project it is estimated that over 550 security cameras will be viewable, controllable and recorded by the Jackson-Madison County Hospital's Security Department.

New Ideas in Fiber Transmission

Fiber optic transmission has become the preferred method of transmission for both point-to-point video and data or Ethernet over fiber. In their most basic operation both are extremely effective ways of delivering video and data from a remote surveillance location to monitoring station or stations. Both have distinct benefits and drawbacks. IP video over fiber offers the capability of redundancy, multiple location monitoring and scalability. But the downside is complexity that in many instances requires network experts to implement and in some cases offers less than great quality video.

Point-to-point systems offer simplicity to the point of being plug and play and easy to install and are known for DVD quality real-time video and the capability to transmit multiple channels of video over a single fiber. The downside is, if the fiber is compromised, the video is gone and in most cases monitoring can take place in one location.

The ComNet SHR fiber optic product line offers the capability to currently insert and drop up to eight channels of 10-Bit digital video and eight channels of serial data onto a fiber optic network with distances as far as 48km between nodes. The video and data can be extracted at an unlimited number of locations. The additional use of a second fiber ensures redundancy to the network eliminating a single point of failure. These two features plus the ease of installation give the user a simpler installation while retaining the beneficial functionality of an Ethernet-based system.

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