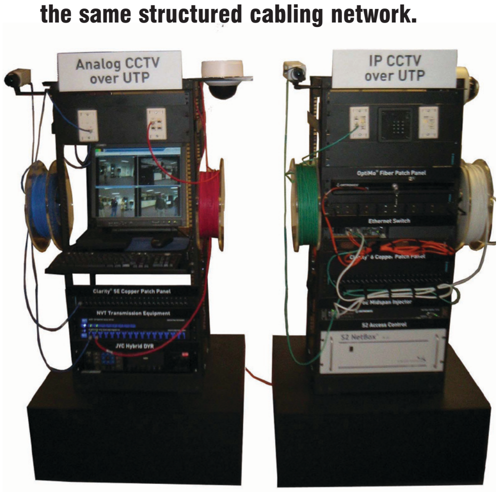
CCTV Cabling Considerations

By Carol Everett Oliver, RCDD, Marketing Analyst,
Berk-Tek, a Nexans Co.

ISC West is host to 26,000 attendees, which includes security installers, system integrators, end users and manufacturers of security and access control products. On the trade show floor, there are over 1,000 exhibitors displaying their latest wares – everything imaginable from turnstiles to mega pixel cameras, and of course, cabling. As in recent years, the buzz circles around "IP." At the center is the evolution of IP cameras. Ten years ago the first IP camera was introduced and shown at ISC West. This year out of the 300 exhibiting video surveillance camera manufacturers, more than 250 of them offer IP cameras.

While only 15 percent of cameras installed today are IP, most installers and integrators are seeing the shift from standalone proprietary video systems to a networked camera. Through balun and transceiver/receiver technology, even analog cameras can reside on the same network as IP cameras through UTP or fiber optic cable. But, the biggest concern by installers seems to be perplexity on compliance to telecommunications' industry standards, particularly cable distance limitations for maximum signal and data integrity.

The NetClear ESS security camera demo by Berk-Tek and Ortronics/Legrand features analog cameras and IP cameras residing on the same structured cabling network.



UNDERSTANDING STANDARDS

The structured cabling industry lives and breathes the TIA-568-B and ISO 11801 standards for commercial buildings. TIA/EIA-568 was developed 20 years ago through the efforts of more than 60 contributing organizations including manufacturers, end-users, and consultants. Together they created a standards organizaton, consisting of subcommittees to define standards for telecommunications cabling systems. The first version (TIA-568-A) was released in 1991 and updated in 1995 due to the adoption of PCs and advancements in data communication network technology.

Today's TIA-568-B defines standards that will enable the design and implementation of structured cabling systems for commercial buildings, and between buildings in campus environments. The bulk of the standards define cabling types, distances, connectors, cable system architectures, cable termination standards and performance characteristics, cable installation requirements and methods of testing installed cable. The main standard, TIA-568-B.1 defines general requirements, while -568-B.2 focuses on components of balanced twisted-pair cable systems and -568-B.3 addresses components of fiber optic cable systems.

The intent of these standards is to provide recommended practices for the design and installation of cabling systems that will support a wide variety of existing and future services. The original intent was to make sure that any IP-addresable application "down the road" would be able to comply with the standards. In doing so, the topology is defined as "star-wired," in which every end device is cabled back to a central switch. Applications and end devices are independent of one another. Other advantages to a standards' based system is that it is an open architecture for which products can be mixed and matched from different manufacturers and all systems are backwards' compatible, even as technology advances.

In the newly identified "ESS" (electronic safety and security) market, groups are being formed to address similar standards like those that govern the telecommunications industry, since applications such as video surveillance and access control, are now riding on the same or parallel data and telecom network. Existing organizations in the security world, such as SIA (Security Industry Association) and ASIS International (originally the American Society for Industrial Security), are leading the charge. SIA is developing security component standards, while ASIS develops security management practices.

CCTV INSTALLATION CONSIDERATIONS

With a standards' based system for CCTV, designers, specifiers and installers are learning about physical infrastructure including telecom room components and locations, which ultimately affect camera deployment methods. At ISC West, there were quite a few educational sessions devoted to physical infrastructure and understanding the different media (UTP and fiber vs. legacy coax) and current and evolving standards, such as PoE Plus. These educational seminars provided insight into CCTV installation considerations for an IP-based network.

Some of the concerns of the security integrators and installers focuses on structured cabling principles such as the telecom room location and equipment. Gone are the days of broom closets for security termination systems. A standards-based network for CCTV will provide better installation practices that will increase the longevity and reliability of the system as well as allow future scalability for other

TABLE 1: CCTV SYSTEMS, DISTANCES AND RECOMMENDED PRODUCTS

CCTV SYSTEM	CABLE	CONNECTIVITY	PERIPHERAL
Analog ≤328 ft with local power or midspan power	Category 5e or 6	Copper patch cords, WAO, patch panel (midspan power)	DVR Transceiver (balun) at camera midspan power Passive receiver
IP ≤328 ft with PoE	Category 6 or 6e	Copper patch cords, WAO, patch panel PoE Ethernet switch	DVR/NVR
Analog >328 ft. with local power	Enhanced Category 6 (non-IP)	Copper patch cords, WAO, patch panels	Balun, transceiver Active receiver equipment DVR
IP >328 ft. with local power	Fiber optic cable	Fiber termination panels, transceivers, ST connectors	Media converters DVR/NVR

applications, such as access control.

GOING THE DISTANCE…AND BEYOND

Of all the guidelines associated with structured cabling, the one that causes the biggest concern among security integrators is the 100-meter distance limitation. We often hear comments about cameras being able to run much further than the standards' 100 meters. While this may be true for analog video, there are problems for IP systems over Ethernet protocols.

Let's step back and look at why there is a distance limitation. When the standards were being formalized, the committee members carefully looked at the maximum distance of the existing UTP cable (Category 3) and studied twisted pair copper cable at different distances and confirmed that at 100 meters there were no potential latency problems and signal integrity and attenuation levels were acceptable. And, as copper UTP cables were better manufactured to handle higher bandwidths and speeds and emerging Ethernet protocols (from yesterday's 10BASE-T to today's 10GBASE-T), one of the benefits of standards is that they are backwards' compatible. Hence, the 100-meter rule lives on.

But there are approved cables and practices to run beyond the 100 meters over a structured cabling system, and stay within standards compliance.

Table 1 is a guideline chart that maps out the distances and components needed to prepare for the IP conversion from analog. Two important factors to note are, that through structured cabling, even with analog cameras, you can run analog video and futureproof your system today to prepare for IP. The second is to make sure you are aware that if you run your copper (UTP) cabling over the 100-meter distance for your analog camera, your camera will work fine with proper transceiver (passive) and receiver (active) equipment, but your infrastructure will not be IP-ready.

By adhering to the standards and selecting the right cabling, you will assure long-term reliability for any IP-addressable solution. ■

"Reel Time" addresses cable topics including both copper and fiber constructions, applications, installation practices and standards updates. If you have a particular cable issue, please send an E-mail to: carol.oliver@nexans.com and we will feature the solution in an upcoming issue