

# UTP GOES THE DISTANCE FOR CCTV

The big buzz in CCTV is running UTP cable out to the security cameras instead of time-honored coax. With the development of digital video, and other analog signal conversion hardware, running CCTV over other media, such as twisted pair has progressed. Deploying CCTV over UTP offers many advantages. It is smaller in design, easier to terminate and does not require a separate cable for remote camera power. PoE (Power over Ethernet) or a midspan Power Injector can provide power to the device using the same UTP cable as the video and data telemetry.

UTP cable is also TIA/EIA-568-B compliant, which will enable an easy migration path to video over IP. By installing a UTP-based system today will mean that your cable plant will be ready to accept any converging devices to your existing network without having to replace the cable. Only the devices, such as the cameras, will need to be replaced and updated.

It is necessary to note that when running video over the IP network, the length must be kept to 328 feet, per the TIA industry standards. However, longer runs can be installed, when needed for analog cameras not running over IP and UTP can perform as well, or better, at any distance. Through the use of transceiver technology, many existing analog cameras can utilize UTP for increased cable plant capacity, for attaching more cameras with smaller pathways (than traditional CCTV coax) and produce an improved picture at higher distances.

The Nexans DCCC (Data Communications Competence Center) at Berk-Tek's New Holland, PA, facility recently conducted several tests to

compare signal quality of "best case" RG-6U type coaxial cable with Berk-Tek's LANmark-350 (Category 5e) and LANmark-2000 (enhance Category 6) UTP cables. The purpose of this test procedure was to compare the video quality and signal output of these cable types.

## TEST SCENARIO

The two main types of security cameras are fixed or Pan/Tilt/Zoom (P/T/Z). The DCCC selected an indoor analog P/T/Z camera from Pelco because of its flexibility. Pictures were captured under standard indoor lighting to compare visual quality. In addition, output signals were measured using a Lecroy oscilloscope to show the variation of the received signal strength over the cable distance.

Three distances were used to benchmark CCTV applications: 328 feet, 750 feet and 3,000 feet. Normally when using coaxial cable the camera output goes through the cable directly to the DVR (Digital Video Recorder) or monitor. Average distance for coax is 300-500 feet and any lengths longer than 1,000 feet require a equalizing amplifier to boost the signal. Transmitting over the UTP cable required the use of a video transceiver, such as Network Video Technologies' NV-218A-PVD, which was used to convert the unbalanced analog signal to a balanced signal for transmission over twisted pair cabling. At longer distances (750 and 3000 feet) for UTP, the NV-862J active hub was used at the receive end for distance equalization adjustments needed to compensate for line loss and to capture the image output at the DVR.



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## CABLE COMPARISON RESULTS

Most RG-6U coax cables are constructed with 18 AWG copper as compared to Category 5e with 24 AWG and enhanced Category 6 with 23 AWG construction. The gauge affects the amp carrying capacity. For CCTV, this is very important for both the signal carrying capability and also if power is deployed over the UTP. However, even though coax has a larger gauge size, it is a single conductor and can not distribute power to the device without extra wires for power, i.e. a Siamese configuration.

With regard to visual clarity, the UTP cables performed as well as the coax cable in the 328 feet distance, but showed better performance at 750 feet and was significantly superior at the 3,000-foot range mainly because UTP is an inherently balanced cable backed by years of development and standards. When using active components the signal is fully equalized at the receive end. In addition, deploying UTP with active



**Coax**

equipment, cameras can transmit over significant distances with very little signal loss.

To get a quantitative measurement, signal strengths were checked using the Lecroy oscilloscope. The signal decreased in amplitude with increasing distance for both UTP and coax, yet according to the visual results, it is evident that video over UTP can be transmitted for longer distances.

The visible difference in the received image quality between the enhanced Category 6 and Category 5e at longer distances is likely due to the larger cop-



**LANmark-350 (Category 5e)**

per conductor gauge of the Category 6 cables. This can be attributed to the improved insertion loss and return loss performance of Category 6 cables when compared to Category 5e.

## TRENDS FOR CCTV

Running security cameras over UTP will not only increase the signal and picture quality (for both analog and digital video signals), but advantages of running CCTV over UTP cable also include:

- UTP is balanced cable with crosstalk immunity



### LANmark-2000 (enhanced Category 6)

- UTP offers high bandwidth capabilities which will be critical to transmit and store high-quality images when moving to IP
- One UTP cable can be used for both powering the device (PoE or Analog Power Injection) and capturing the video
- Substantial space savings in the pathways
- Reduced space and expense in the equipment room, i.e. rack space for termination equipment.

- Offers a perfect technology migration path, futureproofing the cabling plant
- Integrates with existing Ethernet-based communications systems for video over the data/voice LAN network

Ethernet is the dominant network technology that will continue to be the transport protocol as more and more devices converge onto a common network through UTP. Studies have shown that the cost to install UTP cabling is substantially less than the cost of installing coaxial cabling and if using PoE, a 50 percent reduction in installation time and expense can be realized. According to a recent industry study by FTM Consulting, UTP cabling is projected to capture 50 percent of the cabling market for video surveillance by 2010 over fiber's 31 percent and coax's 19 percent.

All of these statistics and studies point toward a future for a standardized structured cabling network, consisting of twisted pair, to provide the foundation in which both enterprise LAN and security systems will operate. "Today's security integrators can install an CCTV Cabling infrastructure for tomorrow with today's dollars," notes George Wojtan, datacom market manager for Network Video Technologies. Since 85 percent of all CCTV cameras installed are analog cameras and currently utilize coaxial cable and connections, by installing a transceiver with UTP cabling, existing systems can easily be upgraded to a standardized structured cabling environment. The cabling becomes the bridge between analog and digital IP technology, which is coming down the pike. ■