Cable Quality Differences – Seeing Is Believing

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Digital transmission will soon reign in all facets of video. In fact, Congress has mandated that, after February 17, 2009, full-power television stations will stop broadcasting in analog, and will continue broadcasting in digital only. Digital is a more efficient transmission technology that allows broadcast stations to offer improved picture and sound quality, as well as offer more programming options for consumers through multiple broadcast streams (multicasting). While this movement is affecting CATV, CCTV is also running a parallel course. Digital IP cameras for security is the fastest growing trend because of its ability to connect to cameras to the network for instant viewing through Ethernet. Digital security cameras will have the best resolution as megapixel technology evolves.

However, it is not only the cameras and the receiving equipment that create quality pictures, cable selection is a key variant, too. Going from a previous coax-based world to UTP and/or fiber for digital transmission, brings a new set of parameters. The old adage of "Just slap a BNC connector on the ends of a coax cable and connect the camera and it will work fine," will not hold true. Cable is no longer a commodity when it comes to digital video transmission. And if you think cable does not make a difference, just bend the cable in your own home and see what happens to the picture on your TV.

Basically digitizing video means turning the signal, or picture, into binary data bits. And, just as cable quality makes a difference in transmitting data, such as for speed and bandwidth, equally important is cable to pixels for picture quality. The electrical characteristics of twisted pair cabling affects the quality of the digital signal. Whereas analog signals are in the form of sine waves and once broken (or interfered, such as through noise) cannot be fixed. Digital – in the form of bits -- can degrade, too, but if at the end of that run the bitstream can be fully and correctly reconstituted, it can be as good as new. The quality of cable will make a difference in signal-to-noise ratio and "digital dropouts" which will contribute to digital transmission failure if a pixel or two can not be read.

Selecting fiber optic cable or UTP cable will be a choice dependent upon the environment, distance and certainly cost. The Reel Time column has previously addressed cable selection for video applications (See August 2006, April 2007, and May 2008). There are performance differences in Category 6 versus Category 5e (See September, 2007), which prove that Category 6 is a more robust and reliable cable, which will play an important factor based on the application and the environment. And, there is definitely a visible difference between a quality cable and an off-the-shelf minimum compliant cable.

LAB RESULTS

The Nexans Data Communications Competence Center (DCCC) lab in New Holland, PA, has conducted tests on different cables for both CATV and CCTV for video signal quality. The CATV test uses Berk-Tek's LANmark™-1000 with Ortronics'

This is a digital photo taken of an actual digital video film clip which is being transmitted over the high-quality NetClear® GT2 cabling solution, which exceeds the TIA/EIA minimum standards for Category 6. NetClear GT2 utilizes Berk-Tek's™ LANmark-1000 Category 6 cable and connectivity from Ortronics/Legrand.

This is digital photo of the same film clip is being transmitted over a minimum compliant Category 6 system. Although there is some error correction built into digital video systems, the lower signal-to-noise ratio may fail and the picture may become pixilated (as shown here).

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Clarity®6 connectivity and tested it against a Category 6 cable with lower overall measured performance. The CCTV test involves running data streams to IP cameras over Category 5e and Berk-Tek's LANmark-2000 Category 6 cabling and inducing noise over the cable.

For CATV, the higher the signal-to-noise ratio, the more accurate the transmission. The NetClear GT2 solution, using Berk-Tek's LANmark-1000 Category 6 cable and Ortronics' Clarity6 connectivity products, has a low insertion loss and a higher-than-standard signal-to-noise ratio. As mentioned before, some error correction can be built into digital video systems, but when the signal-to-noise degrades, transmission may fail or the picture may become pixilated. (See the examples)

The DCCC is currently involved in ongoing testing of IP cameras over local area network (LAN) topologies. Initial results indicate that premium-cabling solutions offer advantages over standard-cabling solutions in stressed network environments where levels of external noise are higher than normal. Medical facilities and manufacturing areas are two examples where external noise may be larger than the typical office environment. The advantages of a premium solution manifests itself as a decrease in frame errors.

Making sure that the cable meets, or even exceeds, industry cabling standards, will make a difference in the picture quality, reliability and longevity. The picture that is produced for either CCTV or CATV relies on both the quality of the camera itself as well as the transmission media. It is important for installers, contractors and specifiers to understand that quality cable is critical to the uninterrupted and uncorrupted operation of both CCTV and CATV transmission. ■

"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.