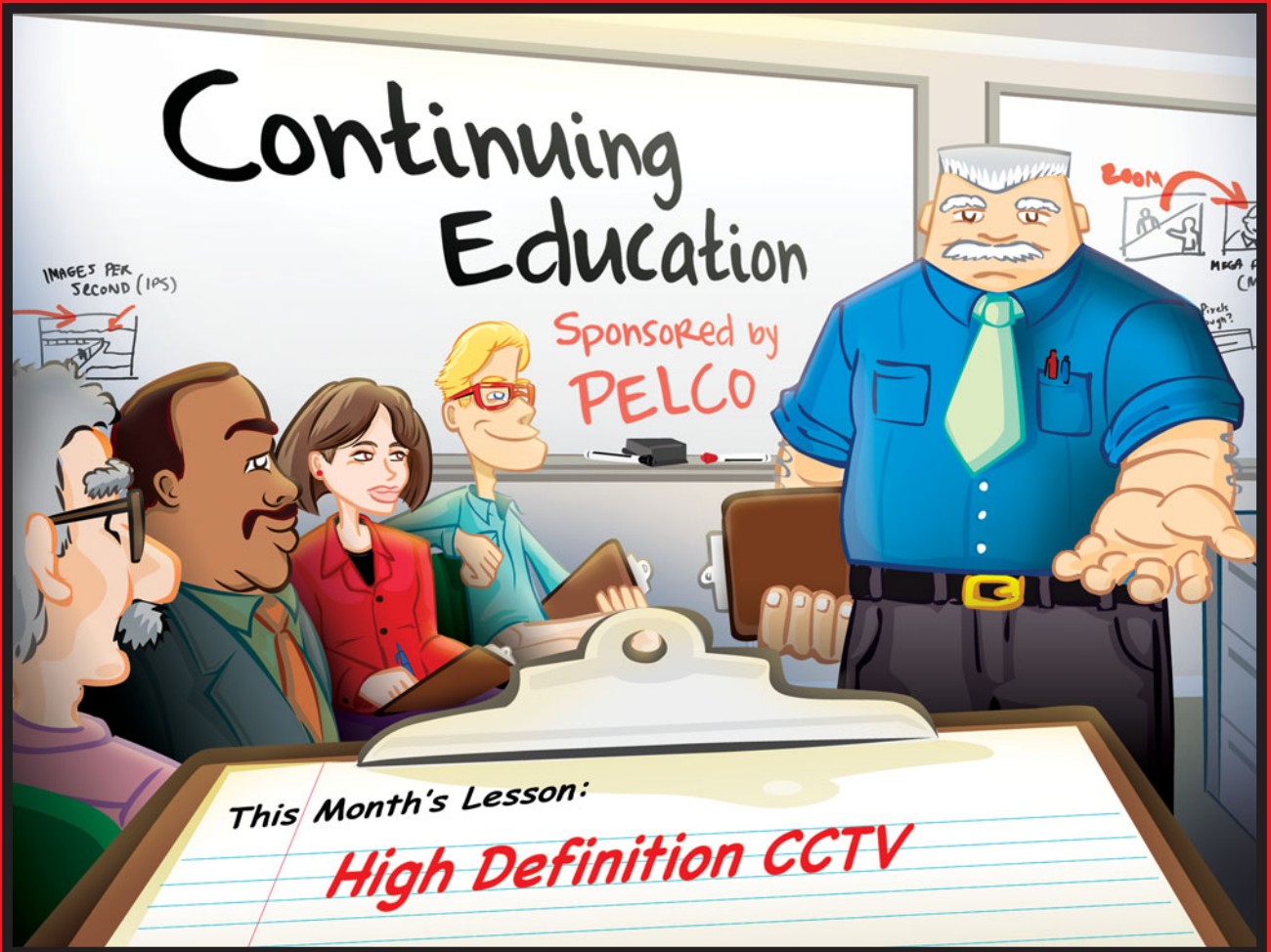


Advanced Video for

# D.U.M.I.E.S.

Dealers ▪ Users ▪ Managers ▪ Installers ▪ Engineers ▪ Salespeople



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Part  
1 of 4

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**D.U.M.I.E.S.**Redefining  
**High Definition**

IP megapixel technology has dominated the conversation when it comes to high definition (HD) video surveillance. However, a new alternative has emerged called HDcctv. Find out what it is, what it isn't and what it may become.

**W**elcome to Part I of the latest in *SECURITY SALES & INTEGRATION's* acclaimed "D.U.M.I.E.S." series: "Advanced Video for D.U.M.I.E.S." Brought to you by Pelco, this four-part series has been designed to educate readers about recent advances in technology and systems that are likely to shape this decade's progression of the video surveillance industry. "D.U.M.I.E.S." stands for dealers, users, managers, installers, engineers and salespeople.

The 2010 series will explore topics such as video management system (VMS) platforms, open system architectures, edge devices and this month's subject: high definition (HD) CCTV.

For many, the new path for video surveillance has been IP and megapixel networked cameras (For more on megapixel technology, see "D.U.M.I.E.S." 2009 at [www.securitysales.com/dumies](http://www.securitysales.com/dumies).) This technology has provided the surveillance industry increased image

BY BOB WIMMER

quality and a means to extend the operating distances of the system. The increase in quality came with a price. The price can be measured in both dollars and, in some cases, a technical challenge for security dealers as well as installers.

However, there now appear to be some alternative methods to achieving high quality HD video surveillance on the horizon. Some, such as HDcctv, do so without the need for IP and/or megapixel networked cameras. Others in the works are taking a different approach to meet the requirements of small to midsize HD applications.

“There is a demonstrated need in our industry for an easy-to-implement, reliable approach to HD video surveillance for 16-64 camera systems that doesn’t involve the complexities of IT networking or the shortcomings of many of today’s software-only solutions,” says Pelco Director of Global Marketing Herve Fages. “Pelco believes there is a better approach to meeting that need, one that is more cost-effective than HDcctv, and we are going to be delivering that solution very soon.”

Before digging in, a bit of a disclaimer is in order. The content presented in this article is based on conversations with people associated with and knowledgeable about this technology, as well as information furnished by manufacturers of HDcctv equipment. **It is not the purpose or intent to actively promote which HD method is better or worse for video surveillance.**

With that out of the way, let’s take a closer look at the new HDcctv technology, the organization championing it, how it compares to megapixel, and its pros and cons, as well as evaluate its potential in the marketplace.

#### TECHNOLOGY TO ‘DISRUPT’ INDUSTRY?

Todd Rockoff says a breakthrough he calls the “new disruptive technology” has entered the video surveillance marketplace.

Rockoff is executive director of the HDcctv Alliance and the industry’s leading spokesman for this new technology. The HDcctv Alliance is a global security industry consortium established to manage and promote technical standards for HD video surveillance. The organization has ratified HDcctv v1.0 specifications and opened the door for another method for security professionals to achieve HD video surveillance.

What is HDcctv? By definition, it is an open, industrial standard for transmitting uncompressed HD television signals that are not encapsulated in TCP/IP. HDcctv is a point-to-point system in which a camera can be plugged into a receiving device and display video without latency or configurations.

The technology is based on the modern-day HD TV that broadcast stations adopted for the consumer market on June 12, 2009. HDcctv has basically partnered with the Society of Motion Picture and Television Engineers

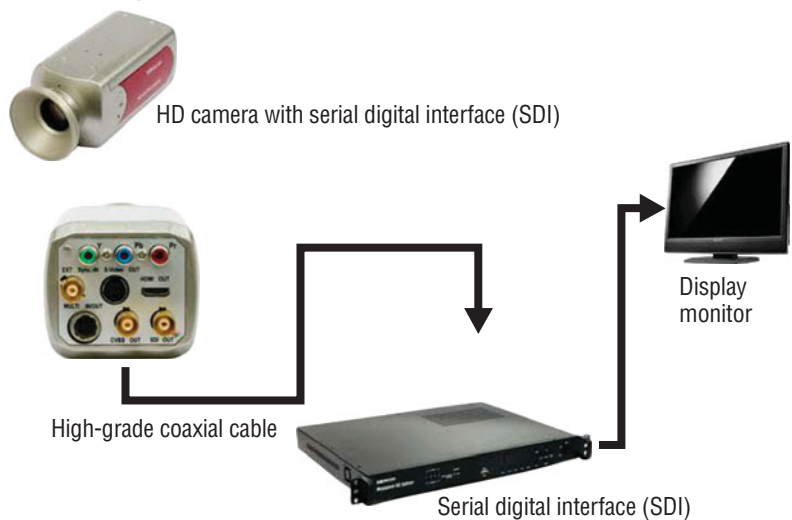
(SMPTE), which was founded to advance theory and development in the motion imaging field.

#### SMPTE 292M STANDARD ADOPTED

SMPTE 292M expands upon the organization’s 259M and 344M standards allowing for bit rates of 1.485Gbps and 1.485/1.001Gbps. These bit rates are sufficient for and often used to transfer uncompressed HD video. This standard is usually referred to as HD-SDI. It is part of a family of standards that define a serial digital interface based on a coaxial cable, intended to be used for the transport of uncompressed digital video and audio in a television studio environment.

The cabling used for the SMPTE 292M electrical interface is coax with a nominal impedance of 75 ohms. With that being stated, this new HDcctv technology allows security dealers and integrators to incorporate HD into their existing analog surveillance systems. This can be accomplished by us-

### Block Diagram of High Definition 1.3-Megapixel System



The new HDcctv technology allows security dealers and integrators to incorporate HD into their existing analog surveillance systems, although critics ask at what cost. This can be accomplished by using existing coaxial cable and standard installation methods.

# D.U.M.I.E.S.

ing existing coaxial cable and standard installation methods. The SMPTE 292M digital interface is known to be reliable (without use of repeaters) at cable lengths of 100 to 250 meters.

## HOW HDCTV AND MEGAPIXEL DIFFER

We could fill a book with all of the ways HDcctv and megapixel networked cameras differ from one another. This article is designed to discuss the major differences at this time.

“The HDcctv Alliance is not anti-IP and we recognize the wisdom of leveraging IP for the backhaul from the premises,” says Rockoff. At a quick glance, however, one of the differences between networked cameras and HDcctv is quite obvious. One system requires Category-5e or -6 wires to transmit the packetized video information whereas the HDcctv system incorporates RG-59, RG-6 or RG-11 coaxial cable.

What are some of the other comparisons? First, IP networked cameras compress the video and then packetize it for transmission. HDcctv on the other hand is a point-to-point transmission of video using line-by-line serial data.

The next area can be subject to extensive discussion as many of us who have worked with IP and megapixel cameras have been exposed to this situation. Because megapixel cameras transmit packetized video via TCP/IP, the number of images (due to processing power of the device) has been limited, especially as the megapixel quan-

tity increases. By contrast, HDcctv technology states that video is transmitted uncompressed and without being encapsulated in TCP/IP.

The result is a system in which a camera can be plugged into a receiving

## WHAT ABOUT OPERATING DISTANCES?

For TCP/IP the total distance between an Ethernet transmitter and receiver at the absolute end points of the network (maximum diameter from origin to final destination, if the wires

## HDcctv Cable Chart

Frequency = 1GHz (1,000MHz)  
Attenuation = less than 20db/100m  
Impedance = 75 ohms

*Distance for HDcctv depends on the quality of the cable*

Example:

Belden 8182	73 meters
Belden 7731A	151 meters

**Even though HDcctv is a point-to-point system because it incorporates SDI the specification for cable distance is the same as TCP/IP, approximately 100 meters for RG-59 coax. This is the recommended cable distance as stated in Version 1.0 of the HDcctv Alliance's standards. Applicability to UTP and fiber remains to be seen.**

device and the video displayed without latency and with zero configurations. In short, HDcctv allows for all 30 images per second to be transmitted for each camera without any software configuration.

So where are the hidden limitations? Due to the method of transmitting the video via SMPTE 292M the maximum quality of HDcctv cameras cannot exceed 2.1 megapixels at 1,080p. For 720p cameras the maximum will be 1.3 megapixels. For applications that require greater than 2.1-megapixel quality the answer will be IP megapixel network cameras.

were stretched out to form a straight line) is 100 meters (328 feet, or about the length of a football field). This limitation results from the timing of the Ethernet signals on the cable and not necessarily the cable characteristics, and is, therefore, a “hard” number.

Even though HDcctv is a point-to-point system because it incorporates SDI, the specification for cable distance is the same, approximately 100 meters for RG-59 coax. This is the recommended cable distance as stated in Version 1.0 of the HDcctv Alliance's standards. Future versions, according to the group, are slated to extend the operating standards to distances greater than 300 meters (~1,000 feet).

As an added note, the quality of the coaxial will be a major issue. Many applications in the existing security market have (let's say) tried to cut corners when it came to the coaxial cable specifications. Oftentimes, installed cable met some of the characteristics of RG-59 but not the requirements for CCTV-grade RG-59. This is referring to copper-covered steel center conductor with aluminum shield.

## HDcctv Megapixel Resolutions

Lines (V)	Pixel (H)	Images	Megapixel	SDI
1,080	1,920	30p	2.1	1.5Gbps
720	1,280	30p	1.3	

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## MORE ABOUT THE HDCCTV ALLIANCE

As mentioned, HDcctv Alliance ([www.highdefcctv.org](http://www.highdefcctv.org)) is a nonprofit, global consortium that manages open industry specifications for HDcctv — an all-digital transmission over coaxial

vestment in IP cameras, networking and equipment, Rockoff says. Such a solution could be appealing to smaller operations, such as small retailers, gas stations and convenience stores. These businesses appreciate the bene-

fits, Pelco is an active participant in several emerging video security standards organizations, including PSIA, ONVIF and IEC TC79," says Fages. "Pelco believes the activities of these organizations best meet the needs of the industry. Pelco does not plan to participate in the development of HDcctv."



Courtesy 5 Star Audio Video

Dennis Roberts, president of 5 Star Audio Video, represents one of the early success stories as his company has installed a four-channel HDcctv DVR in a casino in the Midwest, where it is in the final stages of gaining approval from that state's gaming commission.

cable of broadcast industry standards-compliant serialized uncompressed video for the security industry.

The group promotes industry adoption of HDcctv and provides education on its benefits to the security industry and end market. The alliance's compliance program facilitates the development of high-quality interoperable HDcctv devices. Those that have passed compliance testing display the HDcctv logo and are promoted by the organization.

The alliance has partnered with the SMPTE to include the family of video interfaces known as HD-SDI, covering transmission of 720p and 1,080p formats, among others, at data rates around 1.5Gbps. The result is the creation of derivative standards to enable "plug-and-play" security systems and equipment that deliver high-resolution, HD surveillance video with no delays, image artifacts or visible jitter.

The goal of the alliance is to establish a format users can implement in the near-term without a wholesale in-

vestment in IP cameras, networking and equipment, Rockoff says. Such a solution could be appealing to smaller operations, such as small retailers, gas stations and convenience stores. These businesses appreciate the bene-

fits of HD but may not have or need IP network components. The HDcctv Alliance's membership presently numbers a relative few and although it figures to grow, many remain firmly committed to supporting better established organizations with opposing approaches to the marketplace.

"In keeping with our commitment to open and integrated solu-

## Video Surveillance Technology Cost Comparison

Technology	Cost
IP	\$\$\$
HDcctv	\$\$
Analog	\$

Why has it taken so long for HDcctv to enter the surveillance market? Cost ... the microchips capable of capturing surveillance-grade HD images were expensive. Thus success of HDcctv may come down to economics.

## REAL-WORLD APPLICATIONS EMERGING

SG Digital of Simi Valley, Calif., is an example of a supplier looking to make its mark in HDcctv, having partnered with a Korean manufacturer.

According to Sales Manager Jeff Silverman, "As a result of our strategic pioneering partnership, we have the very first HDcctv installations in North America. Based on the feedback from our integrators and, more importantly, their end users, we feel that this is a game-changer for the CCTV industry."

Dennis Roberts, president of 5 Star Audio Video, represents one of the early success stories as his company has installed a four-channel HDcctv DVR in a casino in the Midwest, where it is in the final stages of approval by the state gaming commission.

"This is going to be huge," says Roberts. "The first casino I've installed a HDcctv DVR in is just blown away by the picture quality. There will be no more inconclusive calls because the [playing] cards are fully legible. HDcctv maintains 30 frames per second per channel for the gaming tables, where IP could not."

However, Pelco's Fages believes the potential applications are rather limited. "If a customer has existing cable runs that fit within the 100m limit, if they have no need to move their cameras, if they have no need to integrate video to IT-based building automation or physical security systems, and if they have no need to move video over a WAN environment, I can see the appeal of HDcctv for that limited set of installation requirements," he says.

## PROSPECTS FOR GROWTH

So why has it taken this long for HDcctv to enter the surveillance market? Aside from technical challenges that include scalability, megapixel support and closed architecture: cost. The mi-

“The two questions are: how cheap can they make it and how broadly will it be adopted?” says John Honovich, a security industry consultant who adds he sees potential for the technology if it can meet those challenges.

potential advantages it also carries a number of limitations I believe outweigh those advantages,” says Fages. “What’s more, there seems to be a mismatch between HDcctv’s benefits and the needs of the market segments most likely to adopt it. The HDcctv ‘sweet spot’ appears to be small systems with no live-view mission; but for these customers, HDcctv’s low latency offers little benefit. HDcctv appears to fix problems that are already being addressed by IP video vendors.”

## HDcctv Specifications

### HDcctv Alliance Release Schedule

Version 1.0. 3Q 2009, publication of first HDcctv specification
Version 2.0. 1Q 2010, back channel for speed dome (p/t/z) and other cameras
Version 3.0. 3Q 2010, bidirectional audio
Version 4.0. 1Q 2011, up-the-cable power, aiming for 25W over 300m via RG-59 cable

Enhanced versions of the HDcctv specification will build on the v1.0 specification to provide for advanced features. Some of those include 300-meter signal transmission, up-the-cable control, bidirectional audio and up-the-cable power.

crochips capable of capturing surveillance-grade HD images had been unaffordable.

Some industry analysts say success of the HDcctv standard will come down to economics and acceptance.

“I think this is going to be the future,” says Sonny Roberts, vice president of sales for Denison, Texas-headquartered integrator Gemco National Industrial Security (GNISEC). “With IP, you’ve got to get into the network and put it throughout the building. Not everybody has technicians who can do that. But we’ve got technicians who can plug in a camera and run wire. Using RG-6, I can run a camera 800 feet with a HD signal. I’m offering it to all my customers.”

Note that HDcctv cannot turn ordinary analog cameras into HD, but it will allow 780p and 1,080p images to be transmitted with the proper SDI over coaxial and twisted pair cable without encoding. The specification will also work with standard definition digital cameras.

Some manufacturers agree this form of HD video surveillance is being positioned as a less expensive alternative to IP megapixel cameras, which packetize images into files in the camera before piping them to a NVR or VMS.

Other suppliers remain mostly unconvinced. “While HDcctv offers some

## BUILDING ON THE FOUNDATION

Under the license agreement with SMPTE, the HDcctv Alliance has quickly developed v1.0 of its specification by directly reproducing many of the key technologies and requirements of HD-SDI. At the same time new capabilities and formats tailored to the unique needs of the surveillance industry have been added.

Subsequent versions of the HDcctv specification will build on the v1.0 specification to provide for advanced features. Some of those include 300-meter signal transmission, up-the-cable control, bidirectional audio and up-the-cable power. Version 2.0 was scheduled to be released as of this writing and will allow for pan/tilt/zoom (p/t/z) control. Version 3.0 and 4.0 will pave the way for up-the-cable power, aiming for 25W over 300m RG-59 cable.

Not everyone is getting excited about HDcctv. Some industry leaders reflect on the past stating that non-IP HD video surveillance technologies have been attempted before, but those products failed to gain traction. However, with more and more manufacturers providing a full range of products and the ratification of version 1.0 of the HDcctv Alliance, may-



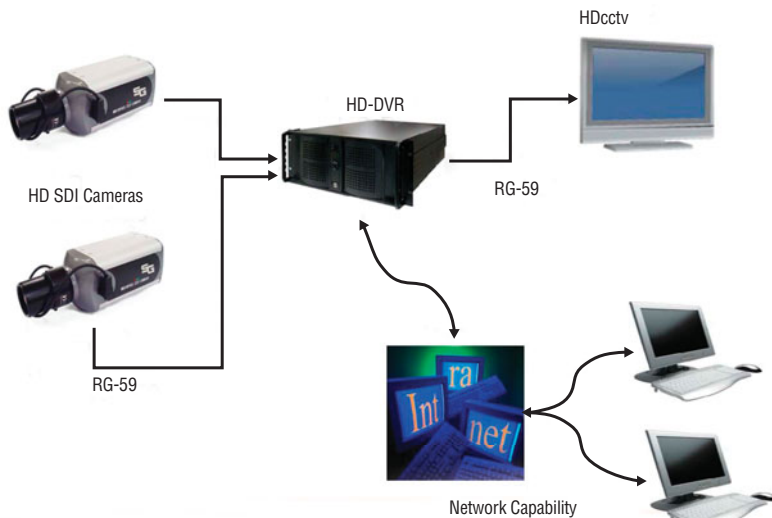
Courtesy Gennum

Technology that enables non-IP HD video is becoming more widely available, which could hasten HDcctv’s adoption in the marketplace.



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## Where HDcctv and IP Collide



HDcctv and IP-based systems need not be mutually exclusive as capabilities and configurations exist to achieve hybrid solutions. This allows HD SDI cameras to be ported onto computer networks and delivered to designated laptops, PCs or monitors via Web browsers or other interface software. However, HDcctv presently has many limitations.

be HD incorporating SDI technology has come of age. Or maybe not.

### WEIGHING THE PROS AND CONS

As we have seen, HDcctv technology does offer some advantages for installers and end users. However, it also poses some disadvantages, many of them due to system parameters. Let's sum up the pros and cons:

#### PROS:

1. The video is not broken up into packets and then transmitted via a network, which requires additional training for installers.
2. The transition from CCTV to HDcctv is very easy, just upgrade the DVR and selected cameras.
3. For the installer/operator, the only difference between HDcctv and CCTV is that the DVR recording configuration screens have both HD and SD resolution.

4. The video is not compressed, or packetized, producing no signal delays between a joystick command and the corresponding speed dome.

5. The incorporation of existing coaxial cable backbones.

#### CONS:

1. Higher equipment cost than standard CCTV.
2. Limited applications due to maximum 2.1-megapixel grade cameras.
3. Limited amount of available equipment selection. (This is largely due to the recent start-up of HDcctv.)
4. The ability to travel long distances; however; HDcctv will be compatible with fiber optics.
5. All cables are home-runs, therefore requiring more cabling especially for new installations.

### FUTURE REMAINS UNKNOWN

The advancement of HDcctv technology will largely depend on a few key areas. First, there needs to be an acceptance of the HDcctv Alliance as a governing body for this technology, and willingness on the part of major industry manufacturers to join this movement. Many large industry leaders have already invested a great deal of time and money into the IP/megapixel network arena; are they willing to either change or expand into HDcctv?

Product availability is another issue since it is unknown how many vendors will come forward to endorse this technology. Such widespread endorsement is necessary to allow dealers and integrators easy access to devices and choices in equipment selection.

It will be interesting to see how this new wrinkle plays out in the video surveillance industry. Will it get some legs under it before being supplanted by yet another, more attractive alternative? Even if the technology does gain a foothold, chances are that rather than HDcctv or megapixel becoming the de facto standard, both would settle in as viable options dictated by application and cost. ■

Robert (Bob) Wimmer is president of Video Security Consultants and has more than 35 years of experience in CCTV. His consulting firm is noted for technical training, system design, technical support and overall system troubleshooting.

### Next Up for 'D.U.M.I.E.S.': Video Management Systems

Be sure to check out the June issue of *SSI* for Part II of 2010's "Advanced Video for D.U.M.I.E.S." series. The second installment will explore how video management system (VMS) control platforms are affecting scalability, hybrid solutions, analytics, remote capabilities, integration, troubleshooting, ROI and TCO metrics and much more.



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