

HDCVI PoC Technology

Save up to 30% on System Deployment Costs

White Paper by Dahua Technology



Release 1.0

Table of Contents

1	Background	2
2	Key Technology	2
3	Application Scenarios	6
4	Conclusion	7
5	PoC Products.....	8

1 Background

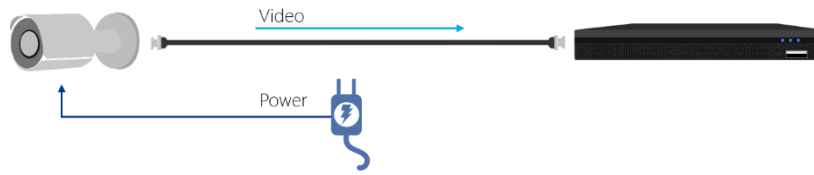
When deploying a video surveillance system, labor costs take up a significant proportion of total expenditures. In the case of relatively low cost HD analog systems, labor costs can comprise half or even more than half of the total system cost as the installation for each point must be designed and performed manually. Adding on to the total workload is the fact that each camera must be independently supplied with power. As a result, contractors and installers continuously seek ways to reduce labor costs in order to increase efficiency and earnings. However, they face a number of challenges:

1. If cameras are independently supplied with power, each point must be designed and configured with a power supply, plugs, and cables. In scenarios which require a relatively large number of devices, this significantly increases the costs and workload, and after-installation maintenance for power supplies at each point must also be provided.
2. Even if cameras are powered by a centralized power supply, each point still requires extra design and cabling work. At the same time, if poor quality materials are used, or the distance of power transmission is too great, it could cause an increase in voltage drops, resulting in the centralized power supply not being able to satisfy device requirements for normal operation.

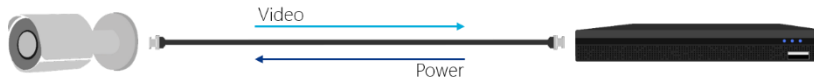
HDCVI PoC (Power over Coax) technology delivers power to cameras over the same single coaxial cable used for video transmission. This eliminates the extra design, installation, and maintenance required by independent camera power supplies, allowing contractors, installers, and end-users to save on labor and costs.

2 Key Technology

HDCVI PoC technology is the hybridization of a traditional HDCVI signal (including video, audio, and control signals) and a power source, allowing for transmission of data and power over a single coaxial cable. This technology achieves the direct supply of power to camera devices from storage devices or PoC transmitters via coaxial cable. Cameras connected over PoC do not require additional power sources as in traditional analog systems.



Non-PoC Power Supply (Traditional Analog System)



PoC Power Supply (HDCVI PoC System)

HDCVI PoC Technology supplies power over coaxial cable at distances of up to 400m. It also supports cameras with a rated power of up to 12W, allowing HDCVI PoC cameras to fully support motorized zoom and longer IR ranges. Resolutions and maximum power consumption over specified transmission distances supported by HDCVI PoC can be viewed in the chart below.

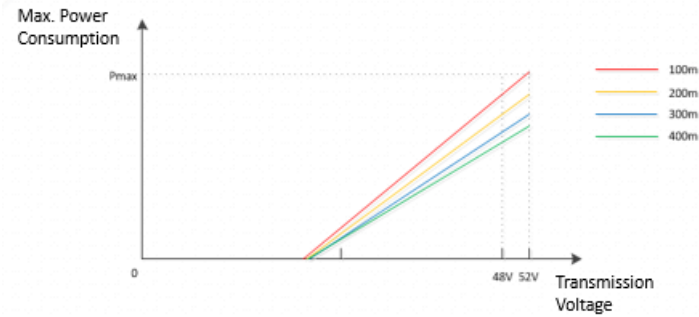
Power Consumption	Resolution	Transmission Distance
≤6W	1080P	400m
	4MP	300m
≤12W	1080P	400m
	4MP	TBC

There are a few key factors involved in achieving power supply over coax. The first is reducing power loss encountered during transmission via coaxial cable, which satisfies requirements for both increased transmission distance as well as cameras with higher power ratings. The second is to isolate video signals from the power current to avoid interfering with the video image sent from powered cameras. Power supply technology also needs to take the safety of its users into consideration and circumvent the risks to personnel and device fire hazards associated with the connection of non-PoC devices or system short-circuiting.

High-Low Voltage Conversion

The process of delivering power over coax is as follows: the power supplying device first outputs a high voltage signal and transmits it via coaxial cable. When the signal reaches a power receiver (camera device), it is converted to DC12V and used to power camera operation. In theory, the higher the transmitted voltage, the longer the maximum transmission range and the larger the power receiving end's supported device power rating. However, in actuality, higher transmission voltages lead to a significant increase in the cost and volume of PoC devices. Therefore, it is

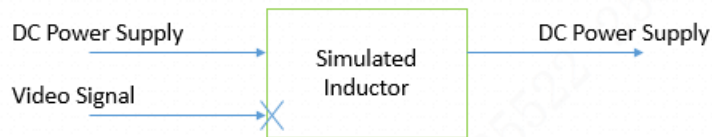
important to choose the most optimal transmission voltage possible to fulfill demand. The HDCVI PoC XVR transmits DC48V and the PoC transmitter transmits DC52V.



Relationship between PoC transmission voltage & power over various transmission distances

Power Isolation

Because the video signal and DC power supply transmitted over coaxial cable run in opposite directions, it is necessary for PoC technology to effectively resolve isolation issues presented by this configuration. The minimal effective frequency for the video signal is 25Hz, while the DC power supply is effective at a frequency of 0Hz. As both signals are extremely close in frequency, it is difficult to engage in isolation through the use of a singular inductor. HDCVI PoC uses a simulated inductor to achieve low-frequency isolation. In other words, it uses an analog circuit as an inductor to achieve the conduction of the DC power supply while blocking the video signal.



Power Source Isolation Diagram

Video & Signal Processing

When the load current in a PoC system undergoes a change (such as when a camera begins to zoom, focus, or enables its IR LEDs), the DC voltage will fluctuate, causing video abnormalities. HDCVI PoC technology implements a fluctuation detection circuit to detect and control fluctuation interference within the video signal. At the same time, HDCVI PoC technology uses a compensation circuit to compensate the low frequency signals within the video signal, ensuring the video signal transmitted within PoC systems and non-PoC systems is basically the same.

PoC systems must also guarantee that the reverse control signal (the control signal sent to

cameras by the XVR), flowing in the opposite direction of the video signal, is not affected. Because the video compensation circuit blocks the reverse control signal, HDCVI PoC technology imposes superposition and extraction methods on the reverse control signal to guarantee normal control over coax.

Load Recognition & Protection

During PoC operation, DC power is transmitted over coaxial cable at high voltages. To avoid causing damage to devices or personnel when a non-PoC device is connected to the system, HDCVI PoC has designed strict load recognition and protection mechanisms into its products, including load validity detection, load disconnection detection, excess current and short circuit detection, and discharge circuits.

- Load validity detection determines whether or not the power receiving device is a valid device. When an invalid device is connected at the power receiving end (such as non-PoC cameras, UTC controllers, optical transceivers, etc.), load validity detection will determine that it is unable to detect a valid device, and will not supply power to the power receiving end.
- Load disconnection detection begins after the power receiving device has been connected and the supply of power over coax has been initiated. It continuously detects whether or not the power receiving end has been disconnected. As soon as the power receiving end is disconnected, the power supplying end will cease power supply, and rapidly restores the voltage transmitted over the coaxial cable to safe levels via a discharge circuit.
- Excess current and short circuit protection is used to detect the electric current running through the system. If the system current exceeds the current threshold (via causes of system short circuiting such as line faults, improper operation, or human destruction), the power supplying end will cease power supply, thus preventing device and personal injury caused by overcurrent.

Camera Power Output

In real-world surveillance scenarios, users may have also installed supporting devices near their cameras, such as pickups. Aside from resolving the problem of supplying power to surveillance devices, if PoC systems were able to also solve power supply requirements for surrounding devices as well, it would deliver even more convenience to its users. HDCVI PoC technology has implemented a camera power output feature into select products. PoC cameras which support this feature are equipped with a power-out connector that output DC12V current with a max rated power of 2W.

3 Application Scenarios

HDCVI PoC technology can save on deployment time and costs across all types of coaxial HD surveillance systems. Below are a few examples of how PoC can benefit a number of application scenarios.

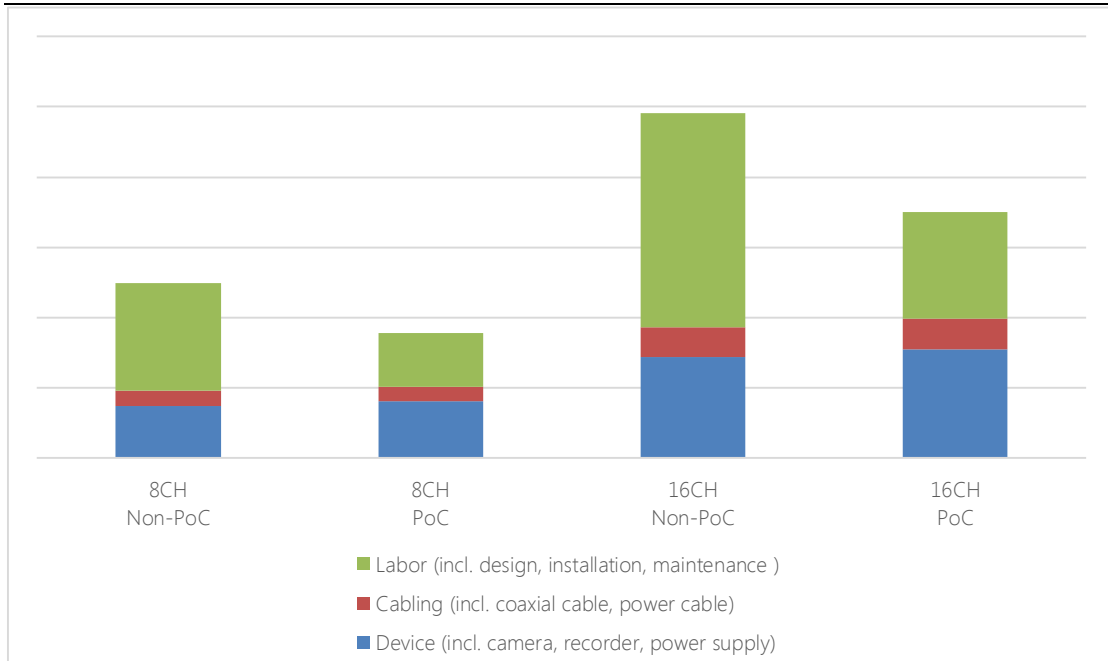
Large Shopping Malls

Surveillance systems in large malls are often comprised of a large quantity of cameras scattered throughout the application area. To supply power to each of the cameras, contractors must perform design and construction for power cabling at every point. Preparation work involved in the process of supplying power to each point consumes lots of time and money. HDCVI PoC is able to directly supply power to cameras over the same coaxial cable used for video transmission, not only saving the cost of extra power supplies, cables, and power accessories, but also reducing the total cabling workload by one half. In key areas such as entrances and exits, users may require higher resolution cameras to be able to see more details. HDCVI currently offers both 2MP and 4MP PoC-enabled cameras. When paired with a PoC embedded XVR, which supports up to 4K resolution, the system fully satisfies user resolution requirements.

Open Car Parks

In open car park applications, surveillance cameras are installed in an open-air environment, and it is not unusual for the devices to be located hundreds of meters away from the control center. In this type of scenario, there may not be nearby power sources which are readily available, making it difficult to supply power. In addition, if cameras are powered by a faraway control center, power loss experienced by power supply cabling leads to a rise in power supply costs, as well as an excessive drop in voltage, rendering power lines unable to fulfill requirements for normal camera operation. HDCVI supports a PoC power supply range of up to 400m, satisfying power requirements of cameras in scenarios with control centers located far away from monitoring points. HDCVI PoC cameras used in PoC systems feature a stable working voltage input, and are not affected by power supply conditions or distance, thus greatly enhancing system stability and reducing future maintenance costs.

The above application scenarios show that HDCVI PoC technology greatly reduces labor costs related to system design, installation, and maintenance. Below is a comparison between deployment costs for PoC and non-PoC systems in 8 channel and 16 channel configurations based on figures from North America.



The key takeaway here is that while PoC camera and XVR devices are slightly more expensive than non-PoC devices, and differences in cabling costs are negligible due to the inexpensiveness of power cables, *PoC eliminates the costs involved with the purchase, design, installation, and maintenance of extra power supplies*. PoC systems cut the total deployment workload by half, saving users up to 30% in surveillance system deployment costs over traditional analog systems.

4 Conclusion

HDCVI PoC technology achieves the simultaneous transmission of video signals and DC power over a single coaxial cable, significantly reducing the workload and costs involved in surveillance system deployment. HDCVI supports 1080p 400m and 4MP 300m PoC transmission, and ensures that video and control signals are not impacted by power transmission. HDCVI PoC systems provide cameras with stable input, guaranteeing system stability, and reducing maintenance costs. In addition, HDCVI has developed sophisticated PoC system protection mechanisms which guarantee users' equipment and personal safety via automatic detection and rapid power cutoff. These advantages make PoC an ideal solution for the construction of complex surveillance system applications involving many devices at a significantly reduced cost.

5 PoC Products

DH-HAC-HFW2231R-Z-IRE6-POC

2MP Starlight HDCVI PoC IR Bullet Camera



- 1/2.8" 2Mp STARVIS™ CMOS
- POC/DC12V±25%, Max. 6.8W
- Starlight, 120dB true WDR, 3DNR
- Max. 60m IR distance
- 2.7-13.5mm motorized lens
- IP67, CE, FCC, UL

DH-HAC-HDBW2231R-Z-POC

2MP Starlight HDCVI PoC IR Dome Camera



- 1/2.8" 2Mp STARVIS™ CMOS
- POC/DC12V±25%, Max. 8.8W
- Power Output: DC12V, Max. 2W
- Starlight, 120dB true WDR, 3DNR
- Max. 30m IR distance
- 2.7-13.5mm motorized lens
- IP67, IK10, CE, FCC, UL

DH-HAC-HFW1400/1200S-POC

4MP/2MP HDCVI PoC IR Bullet Camera



- High resolution of 4MP/1080P
- POC/DC12V±25%, Max. 4.6W/4.2W
- HD and SD output switchable
- 2.8/3.6/6mm fixed lens
- IP67, CE, FCC, UL

DH-HAC-HDW1400/1200EM-POC

4MP/2MP HDCVI PoC IR Eyeball Camera



- High resolution of 4MP/1080P
- POC/DC12V±25%, Max. 4.1W/3.2W
- Max. 50m IR distance
- HD and SD output switchable
- 2.8/3.6/6mm fixed lens
- IP67, CE, FCC, UL

DHI-XVR5108H-4KL-8P

8 Channel 4K Mini 1U HDCVI PoC XVR



- Built-in PoC module, all channels support PoC camera
- PoC capability: Max. 48W in total & Max. 12W for each channel
- H.264+/H.264 dual-stream video compression
- Supports HDCVI/AHD/TVI/CVBS/IP video inputs
- Smart search and Intelligent video system
- Supports audio & alarm over coaxial cable

DHI-XVR5208/16AN-4KL-8P/16P

8/16 Channel 4K 1U HDCVI PoC XVR



- Built-in PoC module, all channels support PoC camera
- PoC capability: Max. 48W in total & Max. 12W for each channel
- H.264+/H.264 dual-stream video compression
- Supports HDCVI/AHD/TVI/CVBS/IP video inputs
- Smart search and Intelligent video system
- Supports audio & alarm over coaxial cable

DH-PFM811-C/DH-PFM811-4CH

HDCVI PoC Transmitter



- Up to 400m long transmission via RG59
- Up to 400m OSD control
- DC12V~36V wide power input range
- Simultaneous power supply to max. 4 HDCVI cameras
- Hot plugging

About Dahua Technology

Dahua Technology is a world-leading video surveillance solution provider. Our company enjoys the world's second largest market share according to the IMS 2015 report. We believe in investing and building strong R&D capabilities for new technology and innovation. The company invests more than 10% of sales revenue in R&D every year. Dahua technology has more than 4000 professionals in R&D team, who are dedicated to provide cutting edge products and solutions for our valuable customers. The company has 592 patents in total till end of 2005 and advocates opens to share or license its technical know-how with global partners.

Dahua's product portfolio includes: Advanced Video Surveillance Products/Solutions and related Software, Access Control, VDP, Alarm, Intelligent Building Management Systems and Intelligent Traffic Management System etc.

Dahua's products are widely used in banking, public security, energy infrastructure, telecommunication, intelligent-building and intelligent-transportation etc. Many significant projects have been installed with Dahua's solutions including: The Sanxia Hydropower Plant, Six-Country Summit, Beijing Olympic Venues, APEC, Shanghai World Expo, UNESCO site in Italy and London Underground Subway as well as many others.