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## Summary

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In 2017, Hikvision introduced TurboHD 4.0 DVR products, which vastly improve on previous TurboHD products. The Power over Cable (PoC) function is the biggest new feature in TurboHD 4.0 products. This document explains how the PoC function works and describes some related exception specifications.

## The Differences Between PoC and PoE

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- **PoE (Power over Ethernet)**

PoE is any of several standardized or ad-hoc systems that pass electric power along with data on twisted pair Ethernet cabling. This allows a single cable to provide both data connection and electric power to devices such as wireless access points, IP cameras, and VoIP phones.

- **POE Transmission Methods**

- *Midspan Device*

Using a separate PoE enabled device, bridging between the switch and a PoE enabled terminal device, typically using a free line pair that is not used in an Ethernet cable to transmit DC power. A midspan PSE (Power Sourcing Equipment) is a specialized power management device that is usually put together with the switch. It has two RJ-45 jacks per port, one with a short-term connection to the switch, and the other connects to the remote device. This type of device is also known as a PoE injector.

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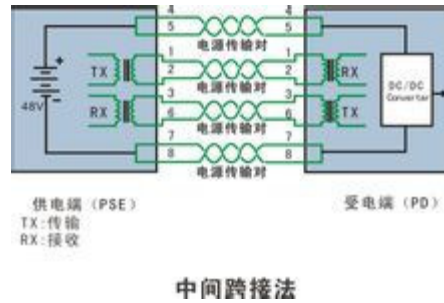


Figure 1, Midspan Device Circuitry



Figure 2, Midspan Device

### Endspan Device

An endspan device transmits the direct current in the core line while transmitting Ethernet data by using different frequencies. In general, it uses PoE switches. As the Ethernet data and transmission are using public line pairs, it eliminates the need to set the independent transmission of special lines, which is very convenient.

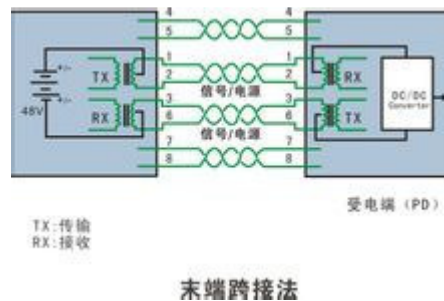


Figure 3, Endspan Device Circuitry

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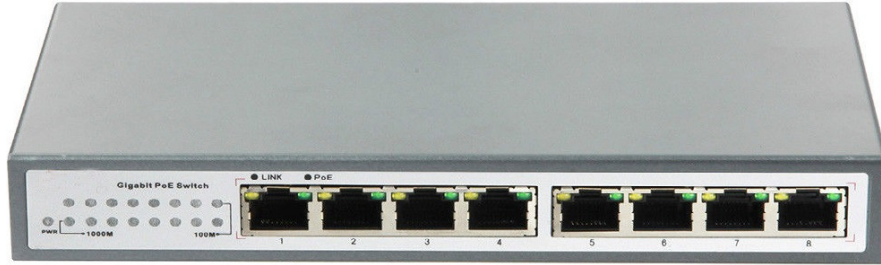


Figure 4, Endspan Device

- **PoC (Power over Coaxial)**

PoC technology combines and transmits high-definition video signal, coaxial signal, and power over a coaxial cable.

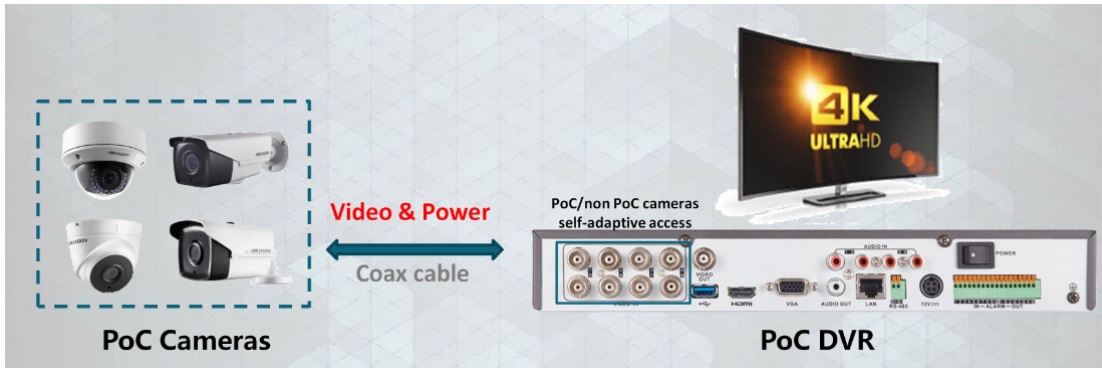


Figure 5, PoC Cameras and DVR

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## - PoC Principles and Wiring Topology

### *Traditional Wiring Topology*

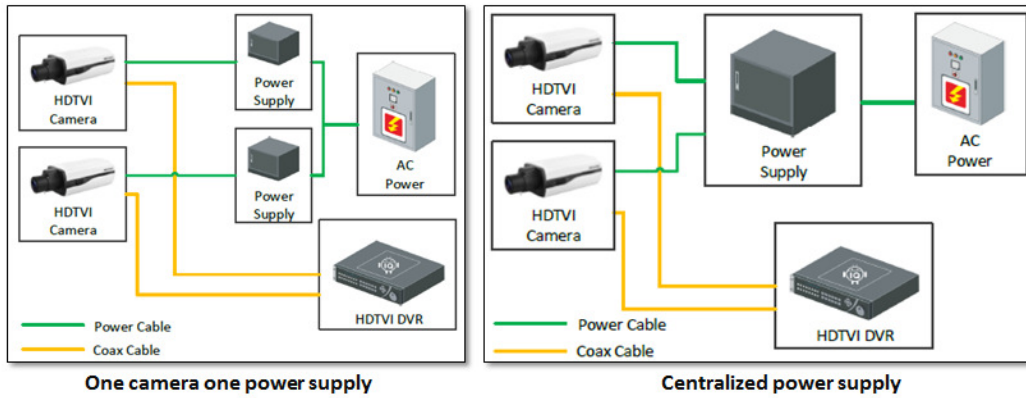


Figure 6, Traditional (Non-PoC) Wiring Topology

### *PoC 1.0 Wiring Topology*

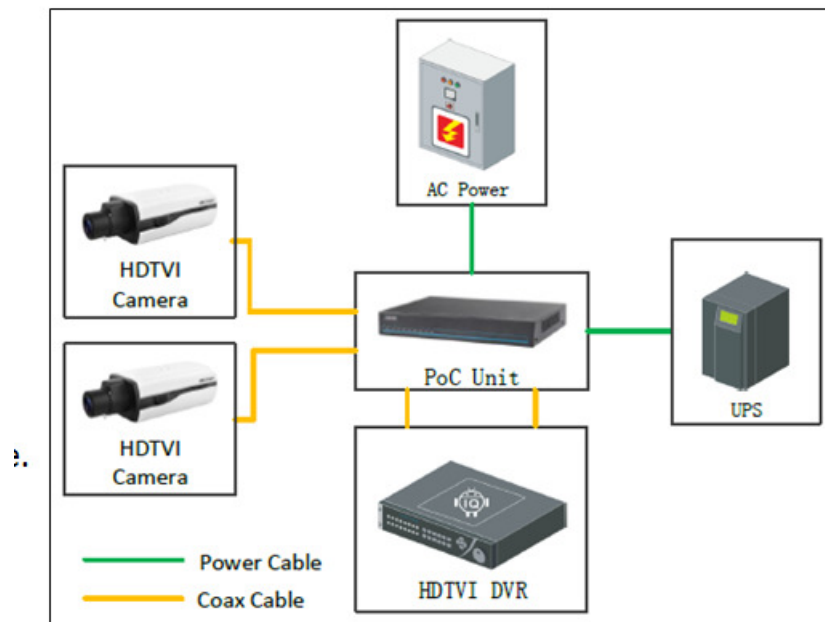


Figure 7, PoC 1.0 Wiring Topology

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**NOTE:** When a PoC unit is powered on, the camera and the PoC module are connected through a coaxial cable. The camera transmits the video signal to the PoC unit. The PoC unit supplies the power to the camera through the coaxial cable. The PoC unit then transmits the video signal to the DVR through the coaxial cable.

### PoC 2.0 Wiring Topology



Figure 8, PoC 2.0 Wiring Topology

**NOTE:** The camera and DVR connect directly through a coaxial cable, which simultaneously transmits video, control signals, and power.

The PoC DVR integrates the PoC power supply module into the DVR. PoC DVR supply voltage is 48 VDC, the control signal is the DC signal, and the video signal is the AC signal, so the technical difficulty of the PoC module is how to superimpose the AC and DC signals together for coaxial transmission. In the principle of the circuit, the role of the inductor is to isolate the circuit, and the role of the capacitor is to strengthen the circuit. The PoC module is located near the inductor and capacitor to process and separate the AC and DC to achieve coaxial transmission.

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## PoC Camera Connection and Coaxial Heartbeat Analysis

**Connection Status.** The signal detector in the PoC module analyzes the analog camera's online/offline status by detecting a video signal. The PoC module will not provide power to any camera that does not have video output.

**Coaxial Heartbeat Analysis.** When connecting a Hikvision PoC camera to a TurboHD 4.0 DVR, there will be a coaxial heartbeat analysis between the camera and the DVR, and it will determine whether it is an AT camera or an AF camera.

**Power Modes.** The default mode for AF-rated cameras is Low Power (6 Watts) mode, and the connection status on the local GUI is "AF." The power is 6 Watts or lower. AT-rated cameras support both High Power (12 Watts) and Low Power (6 Watts) modes. While working under High Power mode, the IR light can be enabled, and the power is 12 Watts or lower. In Low Power mode, the IR light cannot be enabled.

**Overcurrent Protection.** A PoC system provides overcurrent protection, which detects the real-time current output provided from the power module by monitoring the voltage drop between two ends of a resistor. When the circuit contains excessive current, the power output will be shut off immediately to protect the entire system.

**PoC Issues.** The coaxial function will be affected when certain issues occur in the PoC module. For instance, if the pinch board is not plugged in tightly or the PoC module is broken.

## TurboHD 4.0 Device Connection Time

**Single Channel PoC Camera.** Up to 30 seconds

**Multi-Channel PoC Camera.** Up to 1 minute

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### Third-Party PoC Camera Compatibility

**Third-Party Cameras.** Hikvision TurboHD 4.0 DVRs support only Hikvision PoC cameras at this time. Hikvision does not recommend any third-party cameras, either PoC or non-PoC, connecting to Hikvision TurboHD 4.0 DVRs because the high DC voltage in the PoC module is likely to damage third-party cameras without voltage protection.

**Hikvision Non-PoC Analog Cameras.** For those regular analog cameras, Hikvision recommends users power up the cameras first and then connect to the TurboHD 4.0 DVR.

### PoC Connection Mode and Transmission Distance

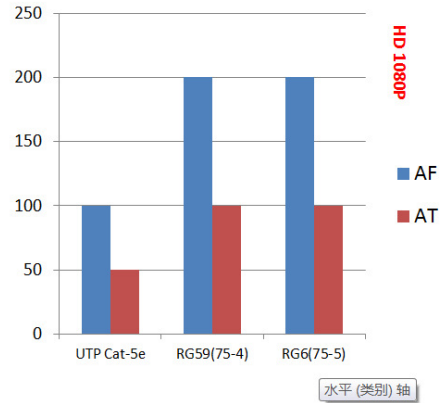
**Connection Mode.** Supports BNC cable and video balun-to-UTP cable. Does not support connecting an optical transceiver between a TurboHD 4.0 DVR and cameras because the optical transceiver does not have voltage protection.

**Video Transmission Distances.** Video transmission distance is in direct proportion to the cable material and the PoC camera power. Better material with lower impedance will provide longer data transmission distance. The following example illustrates this:

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## Turbo HD 4.0 PoC 2.0 Solution

	PoC.AF (max.6W)	PoC.AT (max. 12W)
RG6(75-5)	200m	100m
RG59(75-4)	200m	100m
UTP Cat-5e	100m	50m



Video transmission distances using PoC

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Figure 9, PoC Video Transmission Distances



Figure 10, Example of a PoC camera using RG6 cable at 300 meters



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## *PoC Maintenance and Upgrade*

For released and upcoming TurboHD 4.0 DVRs with the PoC function, the PoC module and the mainboard are all-in-one for 4-channel DVRs, but independent and detachable for 8-channel and 16-channel DVRs.

**CAUTION:** Unplug the power supply before replacing the PoC. With power on, the module carries 48 volts, which exceeds the maximum voltage (36 volts) the human body can withstand.



Figure 11, PoC Module

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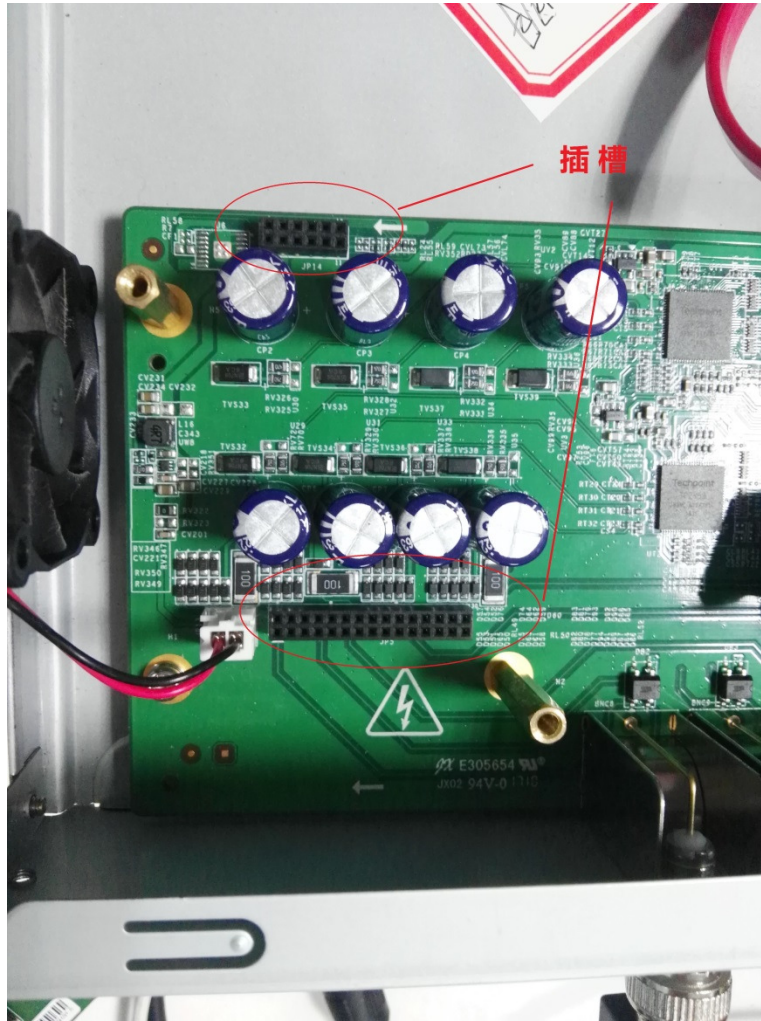


Figure 12, Mainboard Sockets

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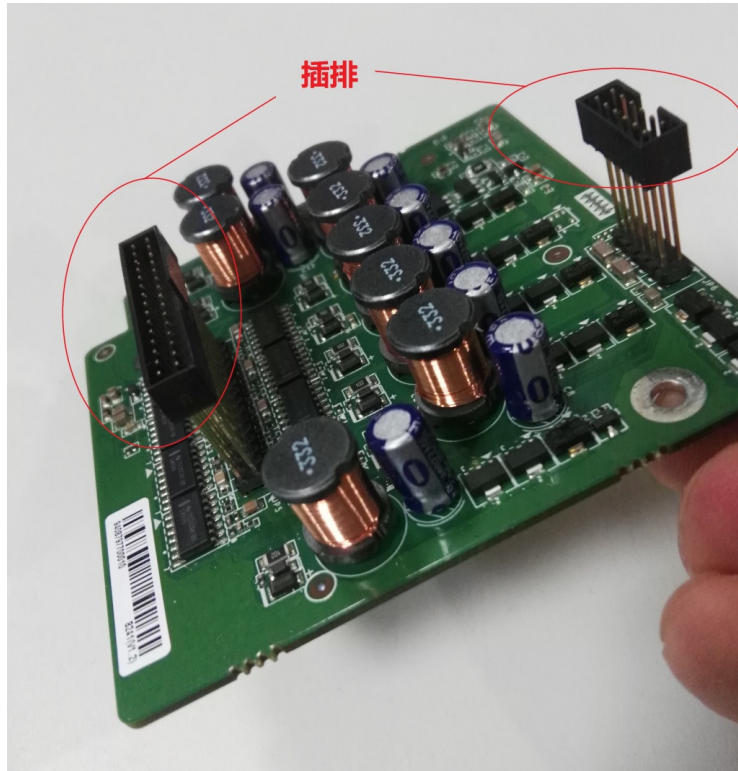


Figure 13, PoC Module Sockets

## PoC Safety Performance

**Overcurrent Protection.** The PoC module provides overcurrent protection, which detects the real-time current output from the power module by monitoring the voltage drop between two ends of a resistor. If the circuit contains excessive current, the power output will shut off immediately to protect the entire system.

**Under-Current Protection.** The PoC module also provides under-voltage protection. When a short circuit occurs in certain internal circuits of a camera or in the coaxial cable and makes the voltage output lower than a specific value, the PoC module will immediately shut off the power supply to that channel to prevent any potential issues, while leaving other channels normal and active.

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**Self-Adaption Feature.** The PoC module has a self-adaption feature, which can determine whether the connected camera is an AT (12 W) or AF (6 W). Thus, when a channel switches from AT to AF, the camera will not appear broken on that channel.

## PoC Cautions

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- **Power Adapters**

Use only the designated Hikvision power adapter. Other power adapters with different power ratings may cause the unit to reboot or cause other issues.

- **Third-Party PoC Cameras**

Third-party PoC cameras are not supported and non-PoC cameras are not recommended.

- **Non-PoC Hikvision Cameras**

Power on non-PoC Hikvision cameras prior to connecting to the PoC DVR.

- **Optical Transceivers**

No optical transceiver is allowed between the PoC DVR and cameras.

- **Maintenance**

Turn the PoC DVR power off before exposing the PoC module.