

Vigitron IP Infrastructure Design Educational Series



The 60 Watts Dilemma

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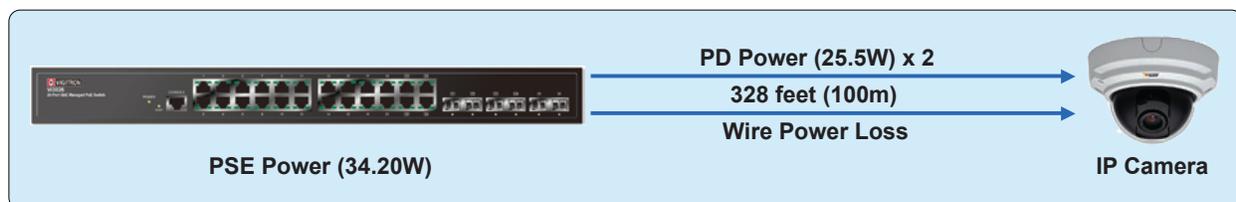
Just as the 802.3at non standards, standards were being approved camera manufacturers presented a new challenge with the introduction of cameras that required more than 30 watts. Many of these applications included PTZ domes and added to the power requirements with heaters and blowers. These created two areas of confusion. The first is the ability to define what a 60 watt camera is and what power sources are actually required. The second and more serious is how to provide that power. Both share a commonality in lacking any form of standardization.

Let's start with the definition of the 60 watts. As the term indicates, it requires 60 watts or greater. That doesn't necessarily mean all the required power comes from a single PoE source. In many cases, camera manufacturers require that PoE only power the camera itself. Looking at these cameras' power specifications will indicate a PoE power of 802.3at or 30 watts and leave the powering to the heaters and blowers to a required local A.C. power source. This brings into question the value of PoE power when it is restricted to the only providing camera power. Another group of PTZ cameras uses PoE for both camera and heater/blower functions, but only when the heater operates within a restricted temperature range. This usually means if your camera is installed in areas where the temperature that can fall below -20°C (approximately -20°F), you will still need a local power A.C. power source. The third type of camera relies only on PoE power for both PTZ and heater blower operations. Confusing and often the source of users finding their PTZ has failed at the most opportune time.

The three different operations of how these "PoE" cameras are powered brings into question the value of using PoE for greater than 802.3at, 30 watt applications. There is a value and it exists in the ability of centrally controlling power operations from a single accessible point. Certainly, those cameras that are solely dependent upon PoE have the greatest advantage. This brings to the second point of confusion, the composition of the PoE power. To review a brief history, 802.3af (15.4 watts) was the first PoE standard used for IP cameras and is, for the most part, a standard. 802.3at (30 watts) was introduced as four different standards. Two of which, Type 1 and Type 2, are supposed to be compatible, but in reality are not.

60 watts has no standards. To understand this, we need to look at the limitations of transmitting power over physical cables. Any form of transmission over a physical media has limitations in the form of resistance. As resistance increases, so does the heat generated by this process. The higher the power, the greater the resistance and resulting heat generated. Based on CAT-5e cable, a single wire can handle about 0.75 amps. In a PoE transmission, power is transmitted on a pair of wires or $0.75 \text{ amp} \times 2 = 1.5 \text{ amps}$. According to the 802.3at specifications, Class 4 specifications generally are considered to start around 48 volts. So we take $48 \times 0.75 = 36 \text{ watts}$ or 72 watts for the pair.

So how do we get to 60 watts? For "over" 30 watts, camera manufacturers use a dual PD (power device) system.



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Exceeding these power limits can be dangerous and could overheat the cable and its installation. It is the reason why any attempt to transmit 60 watt power over coax cable, which is only a single pair, should be considered with a great deal of caution. You should also request from the transmission equipment provider to see if they will accept liability for any damages.

The need to operate two PDs within a single camera is where the incompatibility exists. There are no standards as to the sequence of turning on separate PDs in a single camera. Most camera manufacturers provide their own PoE source in the form of a PSE or camera power supply. However, don't try to interchange these power sources between different cameras from different manufacturers because they will not work. If you attempt to use a third party version, make certain you confirm if the power source manufacturer has actually conducted certification testing and can provide proof of compatibility or provide any operational limitations.

Finally, there is the question of transmission distance. This takes us back to the physics of high powered PoE transmission. Even with manufacturer supplied PSEs, the distance limitation is still the Ethernet standard of 328 feet (100m). Most applications such as perimeter and parking lots will be hard press to find a power outlet within 328 feet of where the cameras need to be installed. This is where third party transmission equipment providers come into place, but again, the ability of transmitting 60 watts PoE power for distances greater than 328 feet (100m) is more limited and more complex than standard 802.3af and 802.3at. This combined with the non-standard make a detailed knowledge and interaction with the manufacturer critical to a successful installation.

Vigitron's Symmetric Bandwidth (SBW™) and Pass-Through-PoE (PTP™) assures the minimal loss of bandwidth and PoE over quoted distances using standard CAT cabling, RG-59, and single pair UTP/STP wiring. Performance claims are backed by certification and interoperation testing with leading IP camera manufacturers.

Vigitron offers several high powered PoE solution which can transmit 60 watts over distances up to 800 feet (242m), eliminating the need for any local power supply or source at the camera location. Vigitron high powered solutions are tested and certified with leading 30 watt plus IP camera manufacturers such as Axis, Bosch, Hikvision, and Sony. They help to provide 60 watt power for Axis Communications' security and demo rooms in their United States headquarters.

Suggested Vigitron Product(s):



Vigitron offers free and without obligation Design Center Services staff by trained factory engineers. To access Vigitron's Design Center, click [here](#) or direct any questions on any Vigitron related subjects to support@vigitron.com.

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