

# Vigitron IP Infrastructure Design Educational Series



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## PoE Standards

### PoE Standards

Standards are like a warm blanket on a cold winter night. They make us feel safe and warm. A standard tells us the devices we use within our systems will interact with each other regardless of the manufacturer. For IP powered PoE devices, we depend on standards such as 802.3af for devices requiring up to 15.4 watts and 802.3at for devices power up to 30 watts.

We depend on the devices generating the power to be inter-operative by the devices receiving the power. Our dependence is not always justified. Let's see the reasons why.

The first reason has to do with the 802.3af classification. This occurs within a range of source and receiving device power.

### THE IEEE 802.3AF VS. IEEE 802.3AT AT A GLANCE

The following table shows a comparison of the 802.3af and 802.3at standards, highlighting the key system level differences. The following definitions are transcribed directly from the IEEE802.3at System Draft:

- **Type 1 PD:** A PD that advertises a power draw less than or equal to 12.95W (at the PD).
- **Type 1 PSE:** A PSE that designed to support a Type 1 PD.
- **Type 2 PD:** A PD that advertises a power draw greater than 12.95W (at the PD).
- **Type 2 PSE:** A PSE that is designed to support either a Type 1 or a Type 2 PD.

**Table 2 - PoE vs. PoE+ Differences**

Features	PoE (802.3af)	PoE Plus (802.3at)
Cable Requirement	Category 3 or better	Type 1: Category 3 or better Type 2: Category 5 or better, with DC loop resistance < 25
Cable Current (A) PSE & PD	0.35 A	Type 1: 0.35 A Type 2: 0.6A
PSE Output Voltage (Vdc)	44-57 Vdc	Type 1: 44-57 Vdc Type 2: 50-57 Vdc
PD Input Voltage (Vdc)	37-57 Vdc	Type 1: 37-57 Vdc Type 2: 42.5-57 Vdc
Maximum PD Wattage (W)	Class 0, 3: 12.95W Class 1, 3.84W Class 2, 6.49W Class 4, Unused	Type 1: Class 0, 3: 12.95W Class 1, 3.84W Class 2, 6.49W Type 2: Class 4, Unused
Classification Requirements	1-Event Classification is optional for PSEs and Mandatory for PDs	Type 1: 1-Event Classification is optional for PSEs and mandatory for PDs Type 2: PSEs can deliver 2-Event Classification only, LLDP only, or 2-Event Classification and LLDP PDs must respond to 2-Event Classification and LLDP

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The power level within this range are classified with its associated class. A source which provides any power level received at the device between 6.49 watts and 12.95 watts is considered Class 3. Even more confusing is any received power level over 12.95 watts is considered Class 4. The detection pulse variations which trigger the IP PoE device to turn on follow the same confusing range. Regardless of whether we are determining the value of detection pulse voltage or the applied power, the use of class does not give us any fixed values.

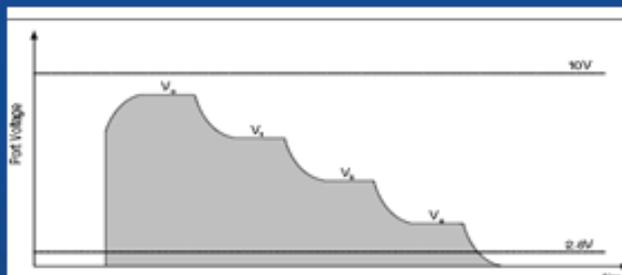
This situation is the cause of confusion as many times an IP camera specification will read both a specific power value and class, with the former being less of a value than the upper limit of the class itself. In this case, always plan on designing your infrastructure requirements for the highest PoE value. This takes into account the extra power required by the camera to handle surges. The listing of the class power also gives the manufacturer the ability to claim that any camera malfunctions are a result of not providing the power required on the camera specification sheet.

The lack of “standards” doesn’t just end with power. While waiting around for standards committees to come with a high-powered solution, the PoE chip manufacturers decided to go on their own. This provides two different approaches to 802.3at or 30 watt solutions.

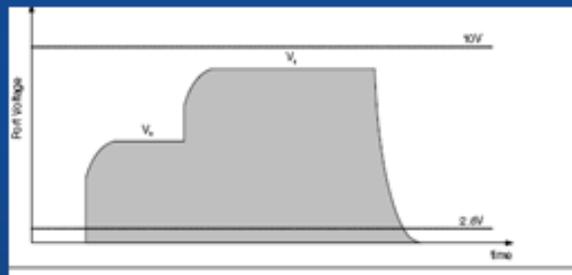
Within the PoE process, the PSE or the power source first detects the presence of the device requiring PoE. It, then, issues the detection pulse in the form of a voltage which is known as a one event classification. However, if the receiving device requires more than 12.95 watts (15.4 at the PSE), a second pulse is issued within 10ms of the first. Or not! The “standard” can accept either a one or two event classification. So much for standards. In reality, the one event (known as Type One) and the two event (known as Type Two) are supposed to be compatible. The reality is very different and often problems results from a type one PoE power source used with an IP camera. The results can be anything from a camera not powering up to an on-screen display that states there isn’t enough power, when in the reality, the camera is functioning normally.

But wait, there is more! The structure of detection pulses can differ regardless of whether 802.3af or 802.3at power is used.

### 4 Point Detection



### 2 Point Detection



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Detection pulses are either 4-point or 2-point. As with classification, a camera responding to either might ignore one or the other. A non-response to a detection pulse means the source providing the power will interpret there is no devices and will shut down the power. Sources providing power under the PoE standard are not required to generate both versions and there are known differences in how cameras will respond. In conclusion, PoE power is a complex issue.

Vigitron's Symmetric Bandwidth (SBW™) and Pass-Through-PoE (PTP™) assures the minimal loss of bandwidth and PoE over specified distances using standard CAT cabling, RG-59, and single pair UTP/STP wiring. Certification and inter-operation testing with leading IP camera manufacturers support our performance claims.

Vigitron offers several different product combination solutions designed to address the situations discussed assuring reliable operation.

### 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](mailto:support@vigitron.com).

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