

ProDataKey/Vigitron Integration

Reliable Solutions



Components of a PoE system

PoE Sourcing Device (PSE)



PoE Switch



Midspan

Powered Devices (PD)

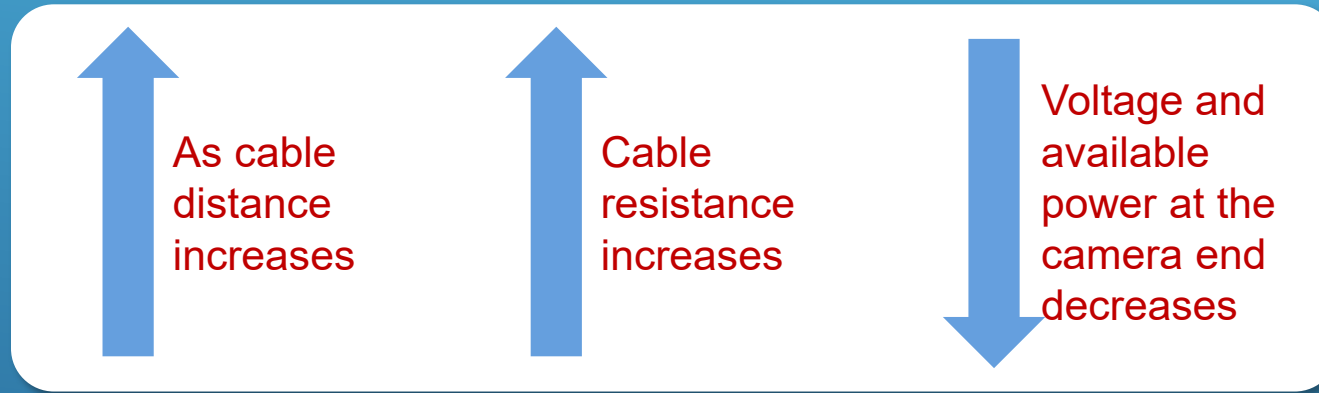


Up to 100m Cat5/6 UTP Cable

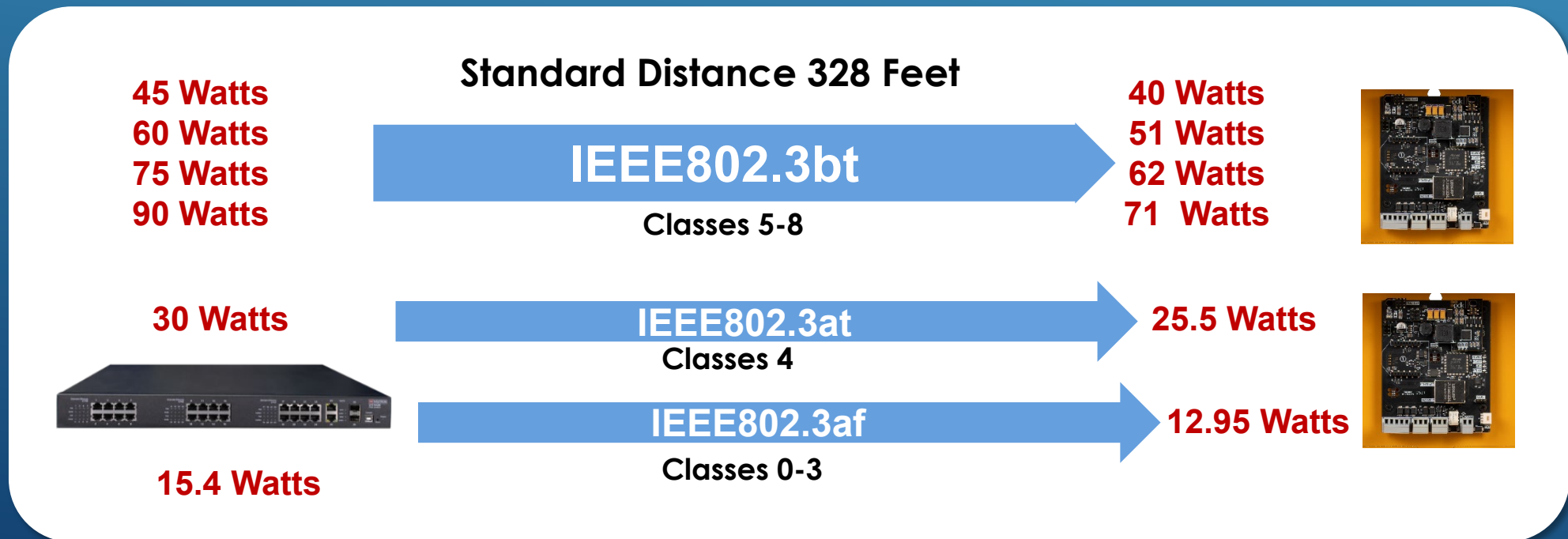
328 Feet/100m

While the main focus is on Power (PoE) keep in mind transmission carries both Power and Data

The Effect of Cabling on PoE



The Source/Load power difference is due to cable loss.



PoE Terminology

PoE

- Power over Ethernet

IEEE PoE Standards-and Compatibility issues

- **802.3af**: Provides four power levels/Classes, Class 0-3: Highest level is 15.4W. (Released Standard)
- **802.3at**: Provides five power levels/Classes, Class 0-4: Highest level is 30W. (Released Standard)
- **802.3bt**: Provides four power levels/Classes, Class 5-8: Highest level is 90W.

Power Sourcing Equipment (PSE)

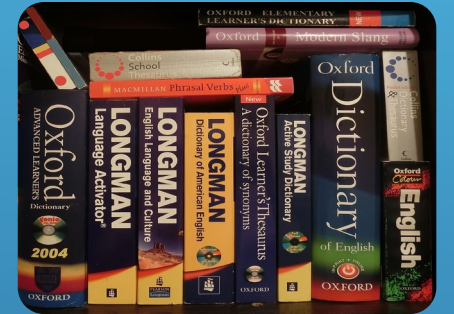
- This term defines the PoE source.
- This term also defines the product is compliant to the 802.3 PoE safety standards.

Powered Device (PD)

- This term defines the device that is powered by PoE

Injector

- “Injector”, “Passive PoE Source” or Always On” are terms that are applied to a power source that only provides power and is not compliant to PoE safety standards.
- They provide their maximum rated power to the PD regardless of safe power level required by the PD.



PoE Terminology

Detection Pulse-Used to detect valued connection

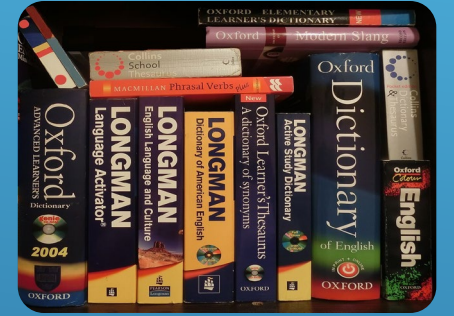
- **802.3af:** Provides four power levels/Classes, Class 0-3: Highest level is 15.4 Watts.
- **802.3at:** Provides five power levels/Classes, Class 0-4: Highest level is 30 Watts
- **802.3bt:** Provides four power levels/Classes, Class 5-8: Highest level is 90 Watts

Classification Pulse – Used to detect how much power is required

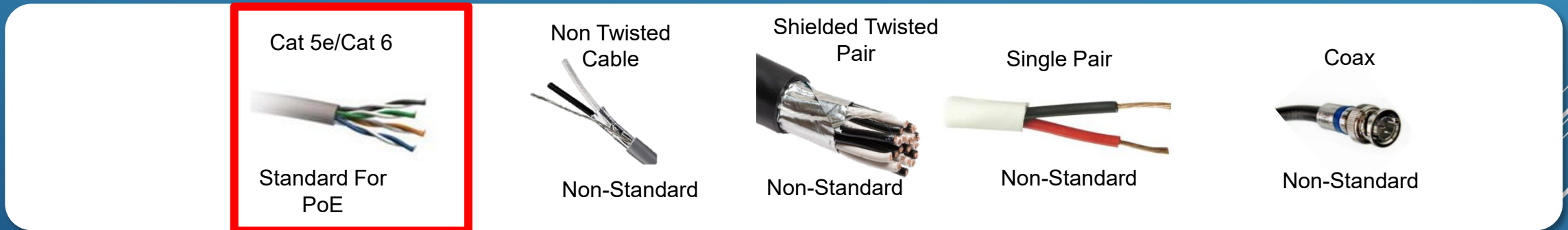
- This term defines the PoE source.
- This term also defines the product is compliant to the 802.3 PoE safety standards.

Class

- This term defines the power level that the PSE provides.

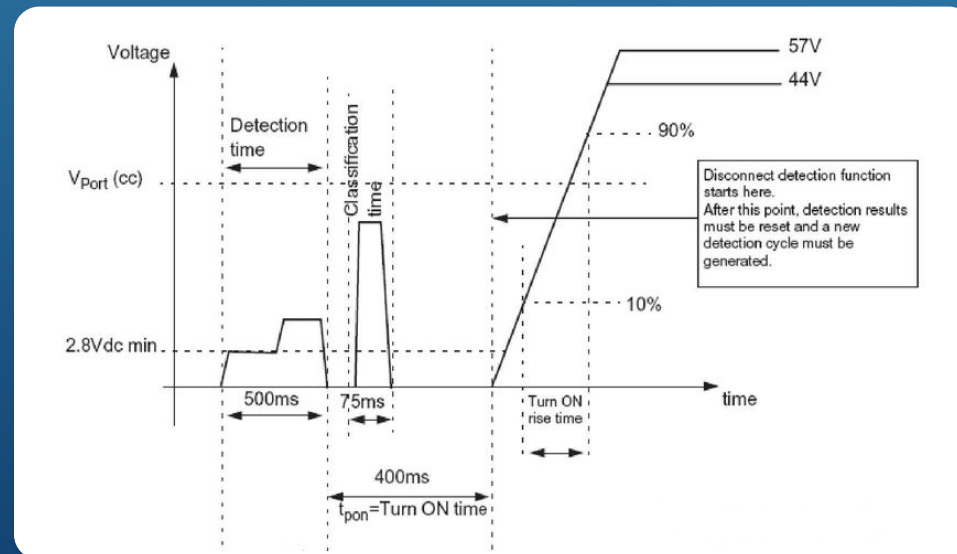


- PoE connections are controlled by IEEE standards that govern 8 different classes of PoE power ranging from 3.6 watts to 90Watts
- PoE standards were developed only for Cat twisted pair cable traveling over distances of 328 feet/100m

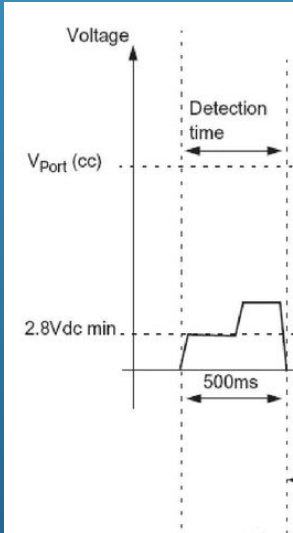


- In common use applications may require transmission over non standard wiring such as single pair or coax over distances greater than 328 feet/100m
- PoE manufacturers did not always wait for standards to be developed and as a result created different incompatible methods

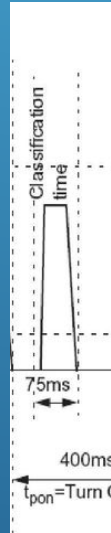
- The **PSE** such as a PoE Midspan or Switch sends a **Detection** (Discovery) Pulse to the **PD** (i.e. a PoE Camera).
- The **PD** places specific resistor on line to acknowledge that it is a valid PoE device.
- The “802.3at/bt” **PSE** sends **Classification** pulse(s) to know how much power the **PD** needs.
- The **PD** places specific resistor on line to let the **PSE** know how much power it needs. **22ohms**
- The **PSE** provides requested power level to **PD**. If the voltage at **PD** is lower than expected the **PD** does not start.
- If the **PSE** does not see the resistive element in 40ms, it assumes that there is no valid **PD** present.
- The **PSE** continuously monitors the current to the **PD**. If it exceeds the requested power level, **PSE** shuts down power.
- If PoE disconnected the **PSE**, depending on programing, sends **Detection** pulses until the whole cycle starts and power is restored.



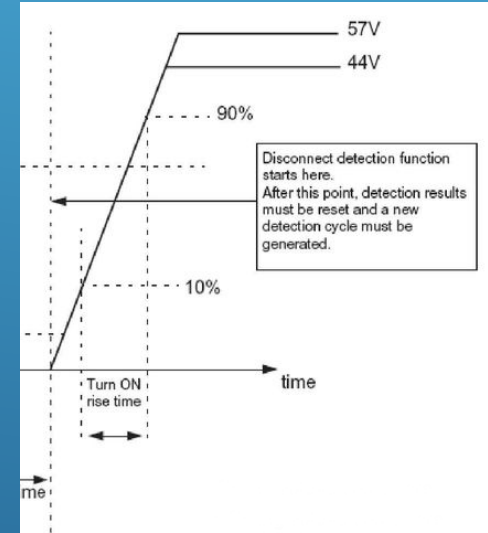
Break down of the PoE Process- Keys to successful and unsuccessful connections



Detection Pulse



Classification or Signature



PoE Application

Step 1:

PoE devices such as cameras are not powered until a connection is made to a PoE source. When this occurs the Source (PSE) issue a voltage (between 2-10VDC called the Detection pulse, which confirms a valid connection

Step 2:

The action of the detection pulse connecting with attached device (PD) which is a resistive element feeds back to the PSE the amount of power which also indicates the PoE class

Step 3:

Once a valid connection is and the PSE can provide the requested amount and PoE class – power will flow from the PSE to PD as a ramp. If at any point the amount of power exceeds that provided by the PSE the process shuts down

Key Differences Between Cat5E/6 and Coax



4 Wire Pairs



1 Wire Pairs

PoE over Coax Cables and Single Pair wires



- The resistance of different Coax cables and Single Pairs wires can vary drastically based on the material or thickness of these cables.
- To be safe, the PoE level over these wires should be limited to 37W.

Two Conductor Cables (802.3bt)

Total Power: $57V \times 0.75A = 42.75W$

Safe PoE Power Level: 37W

Step 3: PoE Transmission & Cables

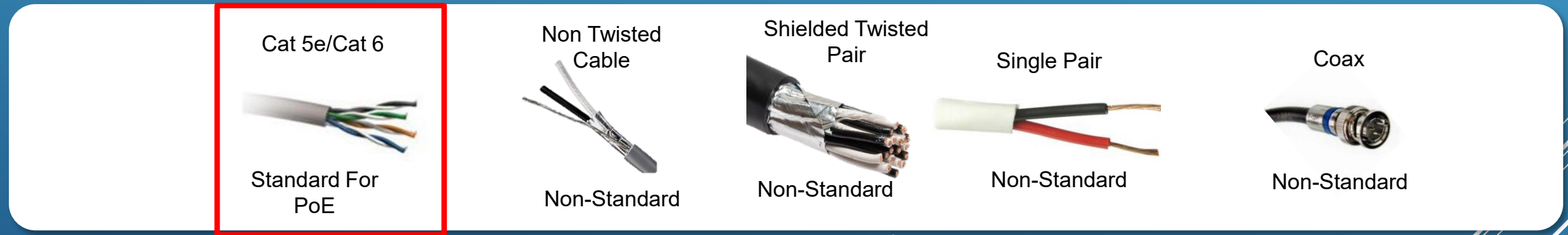
The following cable specs are useful experimental values that are used to Accept or Reject cables for PoE/IP Transmission:

UTP Cat Cable Acceptance Criteria

- Cable resistance per 303 meters =< 22 ohms
- Cable Capacitance =<10uf –coax considerations

RG59U & RG6 Rejection Criteria

- Resistance <19 ohm >=33
- Capacitance >=10uf –coax considerations



Cat 5e/Cat 6



Standard For PoE

Non Twisted Cable



Non-Standard

Shielded Twisted Pair



Non-Standard

Single Pair



Non-Standard

Coax



Non-Standard

Standard by IEEE

Decreased outside inference affects performance

Increased resistance and capacitance from shielding lowers performance

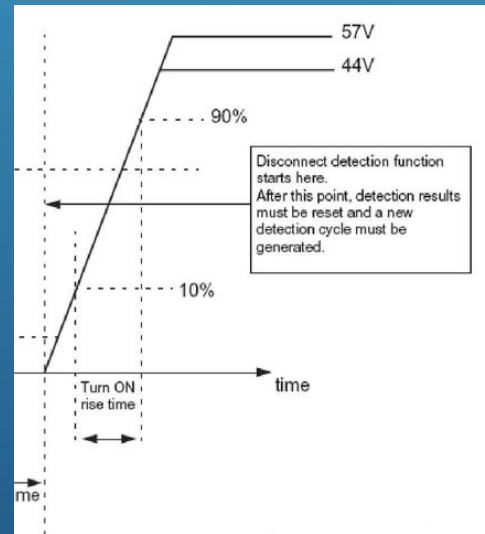
Various by wire gauge, and shielding

Most performance is based on RG59U, capacitive differences exist for other versions

Resistance/
Capacitance

“My connected device keeps shutting down”

After connection is confirmed PoE is provided as a ramp:



When the power drawn by the PDK Red exceeds the source a warning is issued

All of these functions not only result in increased power consumption but also create power surges when they are first turned on. These extra power consumptions usually are not shown on a product's specifications and can exceed the ability of PoE source to provide it and resulting a Power Shut down.

PoE Standards:

IEEE802.3af, IEEE802.3at, IEEE802.3bt

Class	Usage	Classification current (mA)	Power range at PD (W)	Max power from PSE (W)	Class description
0	Default	0–5	0.44–12.94	15.4	Classification unimplemented
1	Optional	8–13	0.44–3.84	4.00	Very Low power
2	Optional	16–21	3.84–6.49	7.00	Low power
3	Optional	25–31	6.49–12.95	15.4	Mid power
4	Valid for Type 2 (802.3at) devices, not allowed for 802.3af devices	35–45	12.95–25.50	30	High power
5	Valid for Type 3 (802.3bt) devices	36–44 & 1–4	40 (4-pair)	45	
6		36–44 & 9–12	51 (4-pair)	60	
7	Valid for Type 4 (802.3bt) devices	36–44 & 17–20	62 (4-pair)	75	
8		36–44 & 26–30	71.3 (4-pair)	99	



Class



Type

PoE Classes:

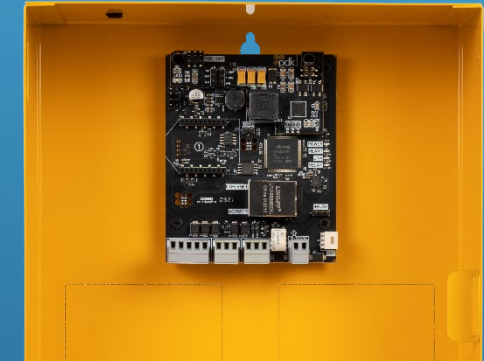
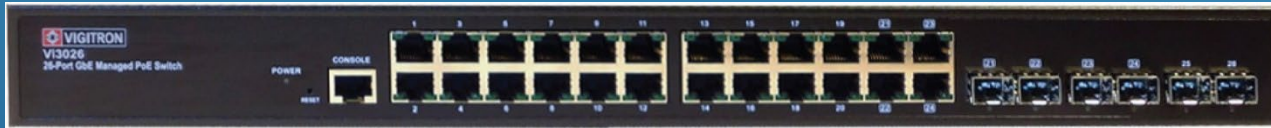
0-8

Defines power ranges

Types

1-4

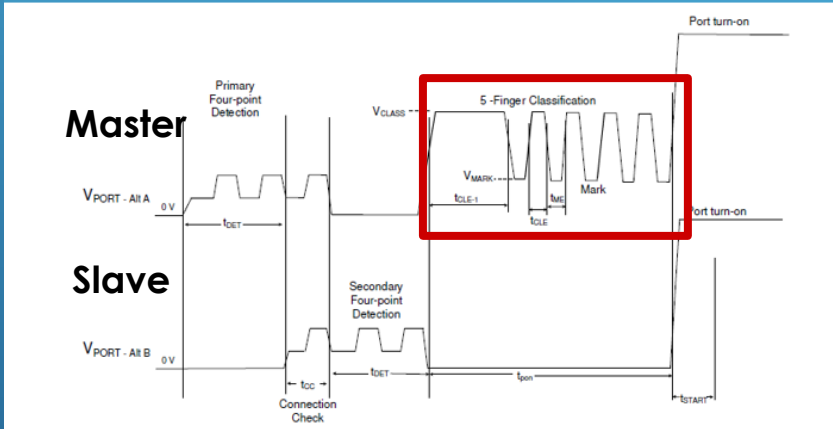
Defines how power is delivered – Number of wire pairs required



For PoE to Transmit- The PoE source (PSE) must recognize the connected Device

PoE Signature Differences

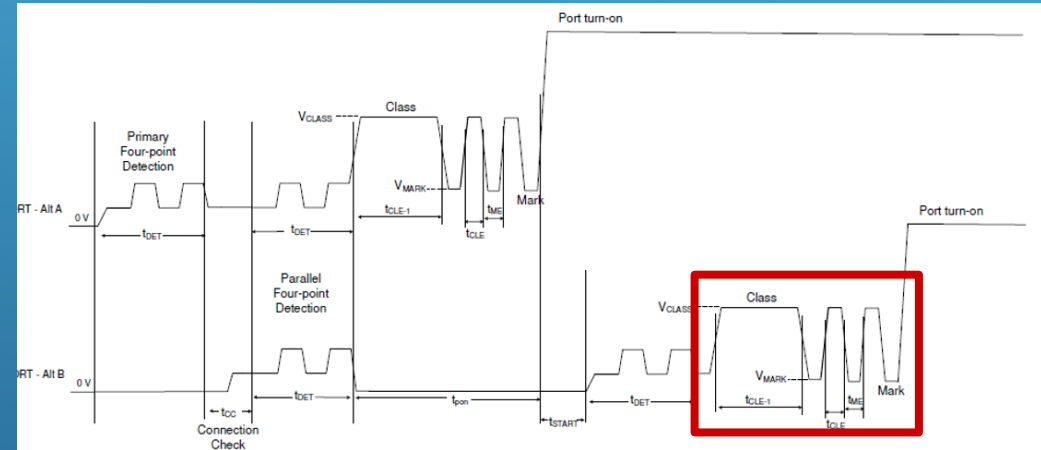
802.3bt PoE Classes 5-8



Different PoE Levels and Classes Transmit PoE Differently with Different Signatures

They are not compatible with each other

PoE Non Standard PoE+, ++, UPoE

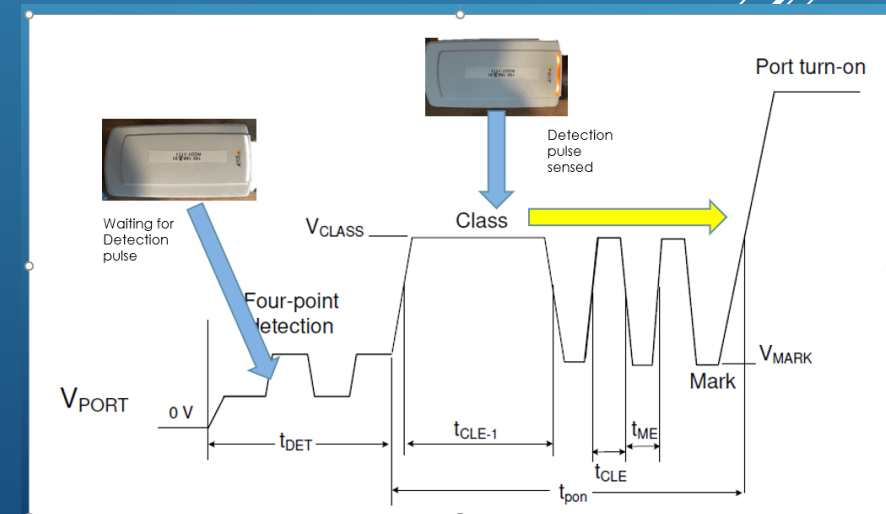


PoE Classes 0-4

The problem has do you know:

- How much power is your source really providing?
- How much power is being provided over your cable?
- How many cables are carrying power? That is your PoE Signature?

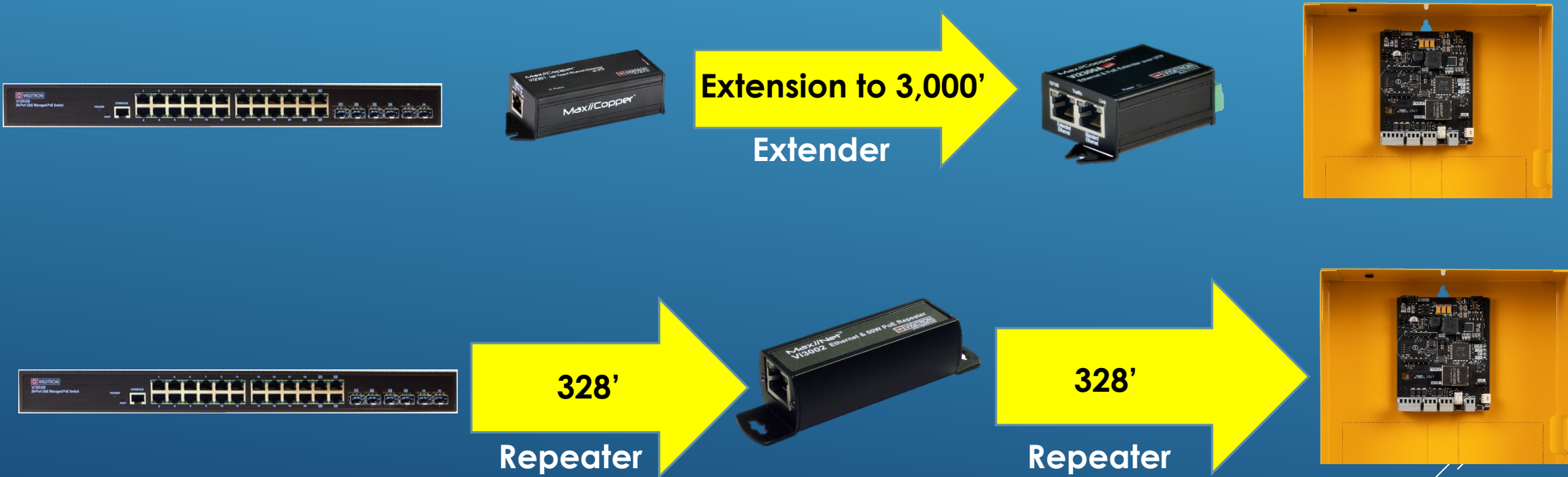
PoE is not just based on PoE volume



Extended Extender and Repeater Differences and Distances

There are two methods for extending cable distances beyond 328 feet

Extenders: They extended cable distances and are placed on either end of the cable



Repeaters must be placed within 328 feet/100m from the source and within 328 feet /100m from the connected device

PoE Transmission & Cables

Cat 5e/Cat 6



Standard
For PoE

Coax



Non-Standard

Single Pair



Non-Standard

Wire Pairs- 4

Max Bandwidth 10G

PoE Range
1-90W

PoE Capacity

All Classes
Class 0-Class 8
All Types
802.3af
802.3at
PoE++
UPoE
802.3bt

Wire Pairs- 2

Max Bandwidth 100Mbps

PoE Range
1-36W

PoE Capacity

All Classes
Class 0-Class 4
All Types
802.3af
802.3at

Wire Pairs- 2

Max Bandwidth 100Mbps

PoE Range
1-36W

PoE Capacity

All Classes
Class 0-Class 4
All Types
802.3af
802.3at

PoE & Bandwidth
dependent on Wire Gauge

PoE Transmission & Cables-Distance and Bandwidth

Cat 5e/Cat 6



Standard

100Mbps=328 feet

1000Mbps =328feet

10G =181feet

(Extended) 100Mbps =2,000 feet

(Extended) 10Mbps = 3,000 feet

Coax



Non-Standard

100Mbps=328 feet

1000Mbps =328feet

(Extended) 100Mbps =2,000 feet

(Extended) 10Mbps = 3,000 feet
w/PoE

(Extended) 10Mbps = 5,000 feet
wo/PoE

Single Pair



Non-Standard

Vigitron Only - 100Mbps Source

Depends on Wire AWG

24/2

200 feet= 98Mbps

1600feet =32Mbps

18/2

200 feet=72Mbps

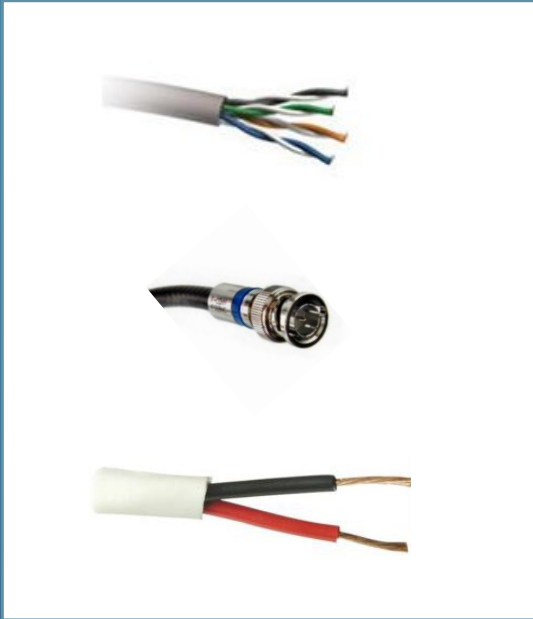
1000 feet =12Mbps

Cable Verses PoE Transmission

802.3af
802.3at
30W
(>30 not 802.3bt Compliant)

PoE+
PoE++
UPoE
36-74W (Not Compatible)

802.3 bt
Classes 5-8
>30W-90W (Required)



Two Device have the same PoE source requirements

Which is the right source?



Applications



Scenario 1:

1 Red 4 with centralized wiring for four doors- **(PoE: 802.3bt- 60W Source-47W Required)**

Scenario 2:

4 Red 1 not centralized with the door controller at the door each one controls one door worth of hardware
(PoE-for each Channel – 802.3at 30W source 25.5W required)

Scenario 3:

4 Red 2 not centralized with the door controller at the door each one controls two doors worth of hardware
(PoE-for each Channel – 802.3at 30W source 25.5W required)

Scenario 4:



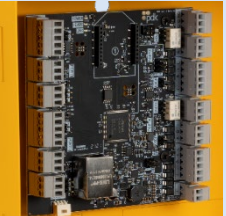

2 Red 1 not centralized with the door controller at the door each one controls one door worth of hardware
1 Red 2 Centralized wiring for two doors
(PoE-for each Channel – 802.3at 30W source 25.5W required)

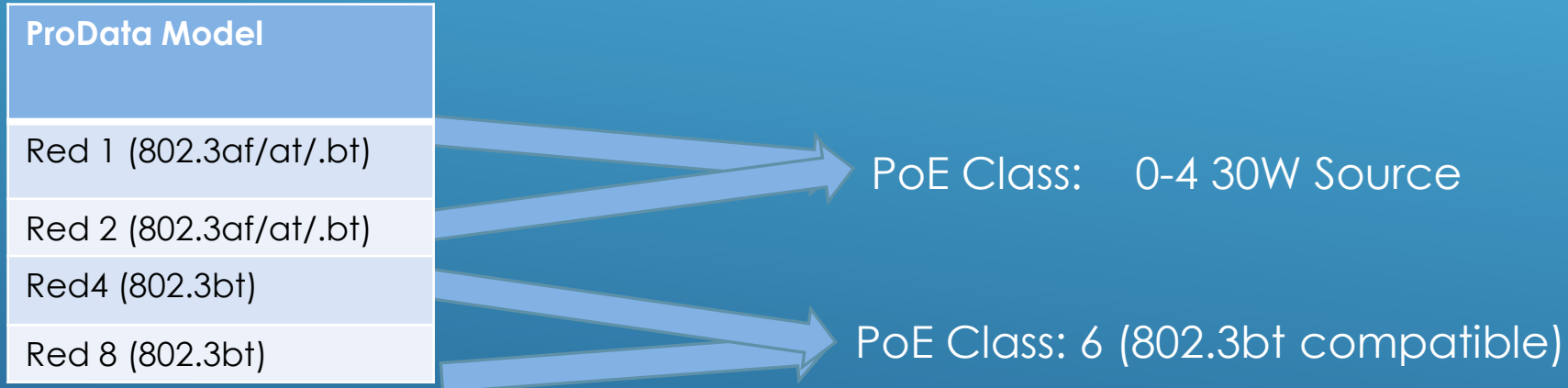
Scenario 5:

Red 4 centralized wiring
2 Red 2 not centralized with the door controller at the door each one controls two doors worth of hardware
2 Red 1 not centralized with the door controller at the door each one controls one door worth of hardware
(PoE-for each Channel – 802.3at 30W source 25.5W required)

**Important source must be 802.3bt
30W source = 27W at PDK
60W source = 60W at PDK**

ProData Model	802.3af 11W@0.8amps	802.3at 24W@1.7amps	802.3bt 27W@2 amps Requires 802.3bt Source	49W@3.5amps Requires 802.3bt Source
Red 1 	✓	✓	✓	✓
Red 2 	✓	✓	✓	✓
Red 4 	✓	✓	✓	✓
Red 8 Red 4 + Red 4 	✓	✓	✓	✓
Transmission Cable Types	UTP  Coax  Single Pair 	UTP  Coax  Single Pair	UTP 	UTP 

ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3bt 27W@2 amps Requires 802.3bt Source	49W@3.5amps Requires 802.3bt Source
Red 1 	√	√	√	√
Red 2 	√	√	√	√
Red 4 	√	√	√	√
R8 Red 4 + Red 4 	√	√	√	√



Red 1 and Red 2 can use most PoE sources provided the source power is not greater than 30W

Red 4 and Red 8 require a 60W source and must be 801.3bt compatible.
UPoE PoE will not work



Scenario 2:

4 Red 1 not centralized with the door controller at the door each one controls one door worth of hardware

Scenario 4:

2 Red 1 not centralized with the door controller at the door each one controls one door worth of hardware

1 Red 2 Centralized wiring for two doors

Scenario 5:

Red 4 centralized wiring

2 Red 2 not centralized with the door controller at the door each one controls two doors worth of hardware

2 Red 1 not centralized with the door controller at the door each one controls one door worth of hardware

ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3bt 27W2 2 amps Requires 802.3bt Source	<u>49W@3.5amps</u> Requires 802.3bt Source
Red 1	√	√	√	√
Red 2	√	√	√	√

PoE Class: 0-4



Applications-Standard Distance



Scenario 1:

1 Red 4 with centralized wiring for four doors

Scenario 3:

4 Red 2 not centralized with the door controller at the door each one controls two doors worth of hardware

ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3bt 27W2 2 amps Requires 802.3bt Source	<u>49W@3.5amps</u> Requires 802.3bt Source
Red 4	√	√	X	√
Red 8	√	√	X	√

PoE Class: 6
(802.3bt
compatible)



Applications-UTP Extended Distance



ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3bt 27W2 2 amps Requires 802.3bt Source	<u>49W@3.5amps</u> Requires 802.3bt Source
Red 1	√	√	√	√
Red 2	√	√	√	√

Configuration	Midspan-----Vi2301A-----cat5e-----Vi2301A-----Camera		
Transceivers	Vi2301A (2pcs)		
Cable Distance (feet)	Power available at PD		
3000 feet	Class 2 (6.49 Watts) @10Mbps	Class 2 (6.49 Watts) @10Mbps	Class 0 or 3 (12.95 Watts) @10Mbps
2500 feet	Class 2 (6.49 Watts) @100Mbps	Class 2 (6.49 Watts) @100Mbps	Class 0 or 3 (12.95 Watts) @100Mbps
2000 feet			
1800 feet		Class 0 or 3 (12.95 Watts) @100Mbps	
1500 feet			
1300 feet			
1000 feet			
800 feet			
500 feet	Class 4 (25 Watts) @ 100Mbps		
300 feet or less	15.4 Watts	30 Watts	37 Watts
PoE PSE source			

Cat6 (23AWG)		
Transceiver	Vi2301A (2 pcs)	Vi2701TX
Distance feet/meters	Power @ PD	Power @ PD
3000ft		12.95 watts Class 3 @10Mbps
2000ft		25.5 watts Class 4 @100Mbps
1600ft		50 Watts @100Mbps
800ft		
750ft		
600ft		
550ft	50 watts @100Mbps	
500ft		
328ft		60 watts @ 100Mbps
PSE Power	60W Source	74W Source

ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3bt 27W2 2 amps Requires 802.3bt Source	<u>49W@3.5amps</u> Requires 802.3bt Source
Red 4	√	√	√	√
Red 8	√	√	√	√

ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3at 27W2 2 amps (Vigitron36W Requires 802.3bt Source)	<u>49W@3.5amps</u> Requires 802.3bt Source
Red1	√	√	√	√
Red2	√	√	√	√
Red4	√	√	√	√
Red8	√	√	√	√

(11W) 802.3af (15.4W) Will not work

(11W) 802.3at (30W)-----Vi2300A-----1500 ft Cat5E-----Vi2300A----- : Red1/Red2 (Class 4) **802.3at**

(11W) 802.3at (36W)-----Vi2308A-----1800 ft Cat5E-----Vi2300A-----Red1/Red2 : (Class 5) **802.3bt**

(24W) 802.3at (36W) ----- Vi2308A-----800 ft Cat5E-----**Vi2300A**-----Red1/Red2 : (Class 5) **802.3bt**

(27W) 802.3bt (40W-72W) ----Vi2301A-----830 ft Cat5E-----**Vi2301A**-----Red4/Red8 : (Class 5-7) **802.3bt**

Class 8 which is a source of 90W an Device PoE or 71 would not apply to PDK



Applications-UTP Extended Distance 802.3bt Solutions



ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3at 27W2 2 amps (Vigitron36W Requires 802.3bt source)	<u>49W@3.5amps</u> Requires 802.3bt Source
Red 1	√	√	√	√
Red 2	√	√	√	√
Red 4	√	√	√	√
Red 8	√	√	√	√

R4

Setup.

Vi30210----- PM024P : Detects PD class 6

49Watts requires a 802.3bt PoE source

Vi30210 (60W)-----Vi2300A-----1000 ft Cat5E-----Vi2300A----- Detects PD class 6

Vi30210 (60W)-----Vi2300A-----2000 ft Cat5E-----Vi2300A----- Detects PD class 6

Vi30210 (60W)-----Vi2308A-----1000 ft Cat5E-----Vi2300A----- Detects PD class 6

Vi30210 (60W)-----Vi2308A-----2000 ft Cat5E-----Vi2300A----- Detects PD class 6

Vi30210 (60W)-----Vi2301AU-----1000 ft Cat5E----- Vi2301AU----- Detects PD class 8

Vi30210 (60W) -----Vi2301AU-----2000 ft Cat5E----- Vi2301AU----- Detects PD class 8



Applications-Coax Extended Distance



ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3bt 27W2 2 amps (Vigitron36W Source-802.3.bt)
Red 1	√	√	√
Red 2	√	√	√

Transceivers	Vi2401A (2pcs)		
Cable Distance (feet)	Power available at PD		
3000 feet	Class 2 (6.49 Watts) @10Mbps	Class 2 (6.49 Watts) @10Mbps	Class 0 or 3 (12.95 Watts) @10Mbps
2500 feet			
2000 feet	Class 2 (6.49 Watts) @100Mbps	Class 2 (6.49 Watts) @100Mbps	Class 0 or 3 (12.95 Watts) @100Mbps
1800 feet			
1500 feet			
1300 feet			
1000 feet			
800 feet			
500 feet	Class 0 or 3 (12.95 Watts) @100Mbps	Class 0 or 3 (12.95 Watts) @100Mbps	Class 4 (25 Watts) @ 100Mbps
300 feet or less			
PoE PSE source	15.4 Watts	30 Watts	37 Watts

The key is how the PDK-Red senses the amount of power

ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3bt 27W2 2 amps (Vigitron36W Source -802.3.bt)
Red 4	√	√	√
Red 8	√	√	√

Applications-Coax Extended Distance

ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3at 27W@ 2 amps (Vigiltron36W Requires 801.3bt Source)
Red 1	√	√	√
Red 2	√	√	√
Red 4	√	√	√
Red 8	√	√	X
	Locks at 802.3af	Locks at 802.3at	Locks at 802.3bt

The Key is the source power



Smart PD



Applications-Single Pair Extended Distance Based on Vigitron Vi27000 series



ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3bt 27W2 2 amps (Vigitron36W Source)
Red 1	√	√	√
Red 2	√	√	√

Configuration	Midspan-----Vi27000----- 24/2 twisted pair (CAT5) -----Vi27001-----Camera		
Transceivers	Vi27000 (RX) & Vi27001 (TX)		
Cable Distance (feet)	Power available at PD		
1100 feet	Class 2 (6.49 Watts)	Class 2 (6.49 Watts)	Class 2 (6.49 Watts)
1000 feet			
800 feet		Class 0 or 3 (12.95 Watts)	Class 0 or 3 (12.95 Watts)
600 feet			
500 feet			
300 feet			
200 feet		Class 4 (25.5 Wastts)	Class 4 (25.5 Wastts)
100 feet or less			
PoE PSE source	15.4 Watts	30 Watts	37 Watts

Configuration	Vi1120-----Vi27000----- 24/2 twisted pair (CAT5) -----Vi27001-----Camera		
Transceivers	Vi27000 (RX) & Vi27001 (TX)		
Cable Distance (feet)	Power available at PD		
1100 feet	Class 2 (6.49 Watts)	Class 2 (6.49 Watts)	Class 2 (6.49 Watts)
1000 feet			
800 feet		Class 0 or 3 (12.95 Watts)	Class 0 or 3 (12.95 Watts)
600 feet			
500 feet			
300 feet			
200 feet		Class 4 (25.5 Wastts)	Class 4 (25.5 Wastts)
100 feet or less			
PoE PSE source	120W DC Power Supply		

ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3bt 27W2 2 amps (Vigitron36W 802.3bt Source)
Red 4	√	√	√
Red 8	√	√	√



Applications-Single Pair Extended Distance Based on Vigitron Vi27000 series



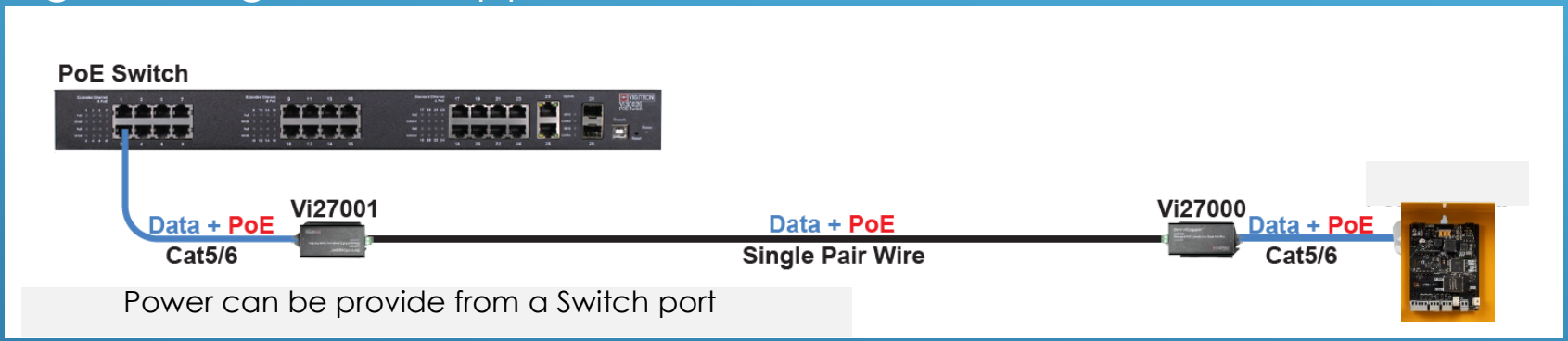
ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3bt 27W2 2 amps (Vigitron36W requires 802.3bt Source)
Red1	√	√	√
Red2	√	√	√

Configuration	Midspan-----Vi27000-----	18/2 Solid twisted-----	Vi27001-----Camera	
Transceivers	Vi27000 (RX) & Vi27001 (TX)			
Cable Distance (feet)	Power available at PD			
3000 feet	Class 2(6.49 Watts)	Class 2(6.49 Watts)	Class 2(6.49 Watts)	
2400 feet		Class 0 or 3 (12.95 Watts)	Class 0 or 3 (12.95 Watts)	
2000 feet				
1800 feet				
1500 feet				
1300 feet				
1100 feet				
1000 feet				
800 feet				
700 feet				Class 4 (25.5 Watts)
500 feet				
300 feet				
200 feet				
100 feet or less		Class 4 (25.5 Watts)		
PoE PSE source	15.4 Watts	30 Watts	37 Watts	

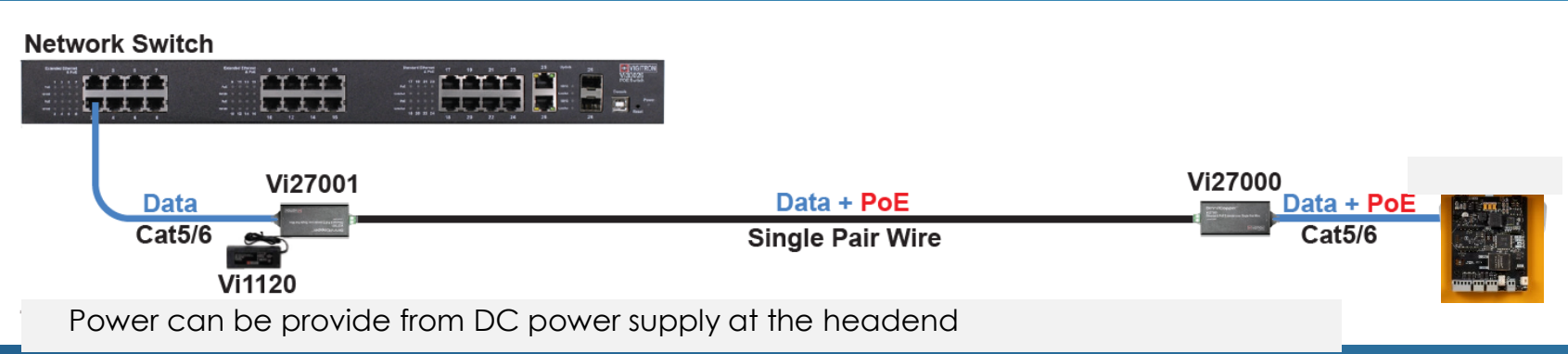
Configuration	Vi1120-----Vi27000-----	18/2 Solid twisted-----	Vi27001-----Camera	
Transceivers	Vi27000 (RX) & Vi27001 (TX)			
Cable Distance (feet)	Power available at PD			
3000 feet	Class 0 or 3 (12.95 Watts) & Class 2(6.49 Watts)	Class 0 or 3 (12.95 Watts) & Class 2(6.49 Watts)		
2000 feet				
1800 feet				
1500 feet				
1300 feet				
1100 feet				
1000 feet				
800 feet				
600 feet				Class 4 (25.5 Watts)
500 feet				
300 feet				
200 feet				
100 feet or less				Class 4 (25.5 Watts)
PoE PSE source				120W DC Power Supply

ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3at 27W2 2 amps (Vigitron36W Requires 802.3bt Source)
Red4	√	√	√
Red8	√	√	√

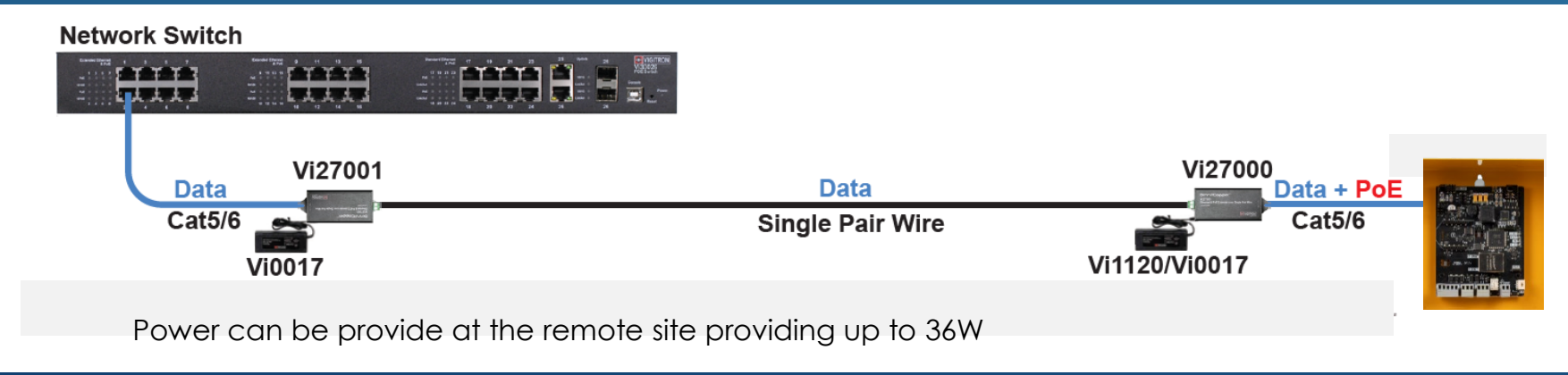
Vigtron Single Pair – Applications Solutions



PoE provided by Network Switch. System is dependent on Port PoE, Cable Type and distance



PoE power provided by separate PoE compatible DC power supply. System is dependent on cable type of distance



Power provided on the remote site resulting in a full 30W to the connected device



Applications-Single Pair Extended Distance



ProData Model	802.3af 11W@0.8amps	802.3at 24W@1.7amps	802.3bt 27W2 2 amps (Vigitron36W 802.3bt Source)	ProData Model	802.3af 11W@0.8amps	802.3at 24W@1.7amps	802.3bt 27W2 2 amps (Vigitron36W 802.3bt Source)
Red 1	√	√	X	Red 4	√	√	X
Red 2	√	√	X	Red 8	√	√	X
Cable 24/2 Twisted Pair		PoE source Vi1120-Vi27001-Vi27000		11W 450 feet		24W 100 feet	
Cable 24/2 Non- Twisted Pair		PoE source Vi1120-Vi27001-Vi27000		11W 500 feet		24W 100 feet	
Cable 24/2 Twisted Pair		PoE source 36W -Vi27001-Vi27000		11W 450 feet		24W 100 feet	
Cable 24/2 Non- Twisted Pair		PoE source 36W-Vi27001-Vi27000		11W 450 feet		24W 100 feet	
Cable 24/2 Twisted Pair		PoE source 30W -Vi27001-Vi27000		11W 450 feet		24W 0 feet	
Cable 24/2 Non- Twisted Pair		PoE source 30W-Vi27001-Vi27000		11W 450 feet		24W 0 feet	



Applications-Single Pair Extended Distance

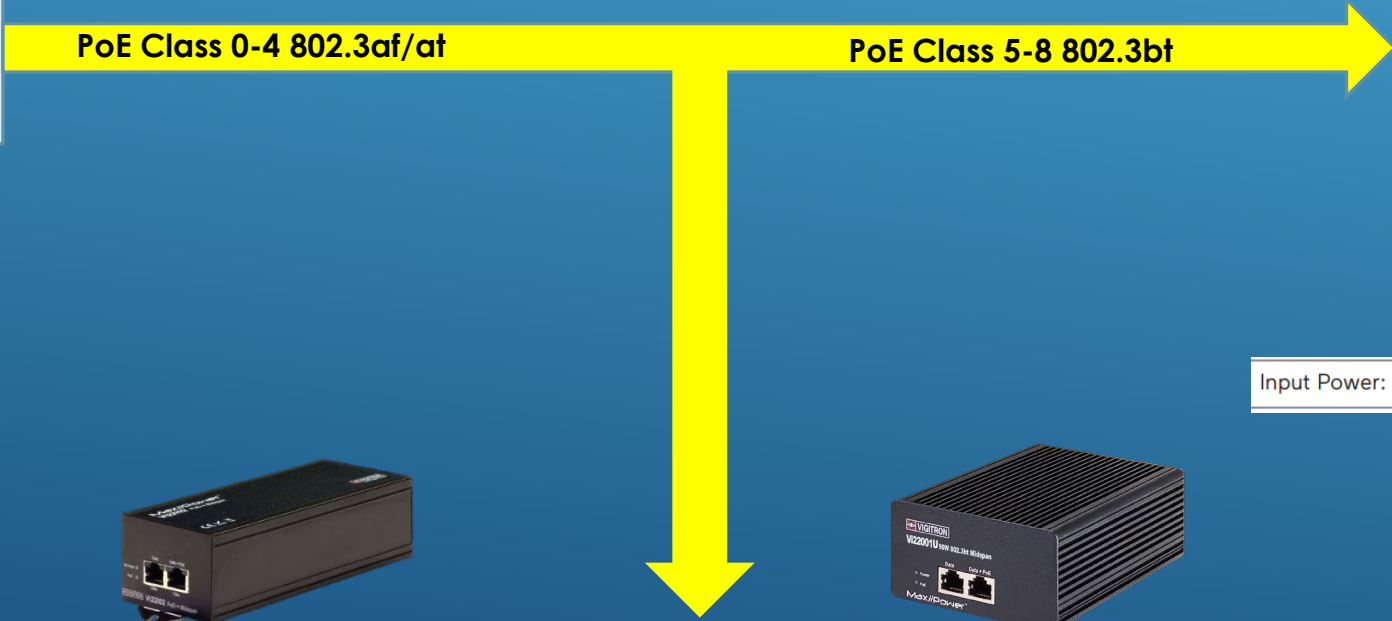


ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3bt 27W@2 amps (Vigitron36 W 802.3bt Source)	ProData Model	802.3af 11W@0.8amps	802.3at <u>24W@1.7amps</u>	802.3at 27W@2 amps (Vigitron36W 802.3bt Source)
R1	√	√	√	R4	√	√	X
R2	√	√	√	R8	√	√	X

Cable 18/2 Twisted Pair	PoE source Vi1120-Vi27001-Vi27000	11W 2100 feet	24W 1100 feet
Cable 18/2 Non -Twisted Pair	PoE source Vi1120-Vi27001-Vi27000	11W 1000 feet	24W 1000 feet
Cable 18/2 Twisted Pair	PoE source 36W -Vi27001-Vi27000	11W 2100 feet	24W 400 feet
Cable 18/2 Non- Twisted Pair	PoE source 36W-Vi27001-Vi27000	11W 1000 feet	24W 400 feet
Cable 18/2 Twisted Pair	PoE source 30W -Vi27001-Vi27000	11W 2100 feet	24W 0 feet
Cable 18/2 Non- Twisted Pair	PoE source 30W-Vi27001-Vi27000	11W 1000 feet	24W 0 feet

The 802.3bt Flip: Devices operating at both 802.3at and then 802.3bt

PoE Source



Input Power:	PoE++ (IEEE802.3bt Class 5); 24 VDC; 24 VAC
--------------	---

If the connected device operates a 802.3at (Class 4 or below) 25.5W – the signature reflects that

When the device power rises above Class 4, the signature becomes 802.3bt

Two PoE Values – The Difference is based on the PDK Detection

<30W

Max Power at the controller 25.5W 802.3af Class 0- 4

>30W

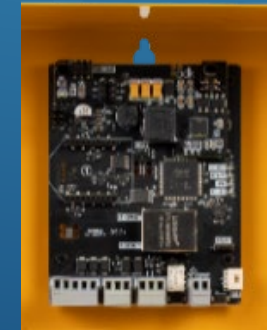
Max power at the controller 49W 802.3bt Class 0-8

>30W

Max power at the controller 49W 802.3bt 802.3bt Class 6

74W

Max power at the controller 49W 802.3bt 802.3bt Class 6



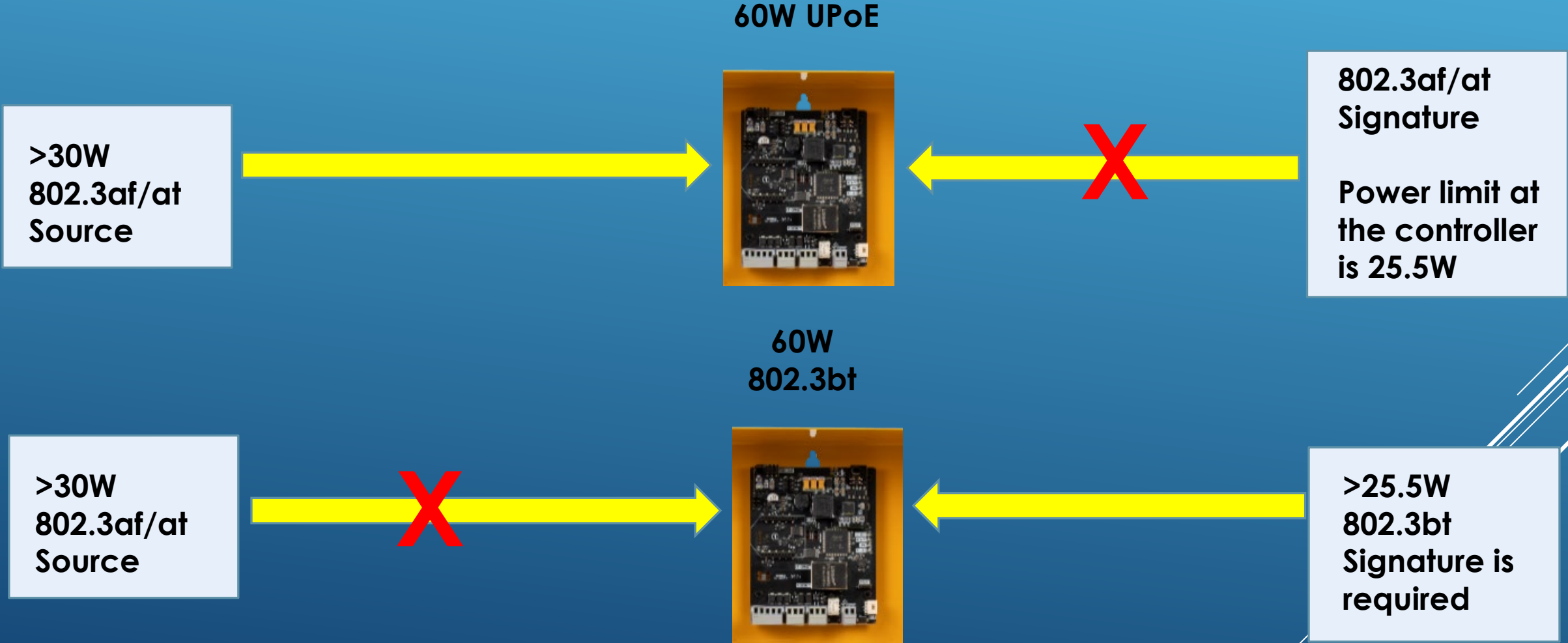
If the controller senses a 802.3af signal the max Power available will be 12.95W.

If the Controller sense a 802.3at signal the max power will be 25.5W

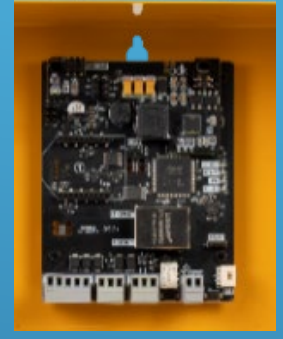
If the Controller senses a 802.bt signal the max power will be 49W

If the controller senses a 802.3bt signature it can handle power to 49W (the maximum to R4/R8)

UPoE vs 802.3bt What Works, What Doesn't



What are the PDK Controller Points that Determine available power

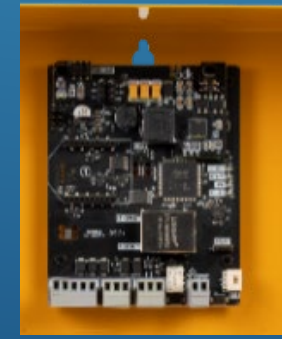


Key Point

If the source is 802.3af/at

Regardless of the amount of PoE source power

The maximum power the controller can provide is 25.5W



If the source is 802.3bt

The maximum power the controller can provide is 49W (Max for R4)

UPoE vs 802.3bt What Works, What Doesn't

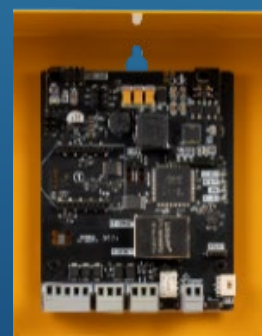


Key Point

802.3at



802.3bt



If the Source
is 802.3af/at

Max Source Power 30W

The max.
power the
controller can
provide is
25.5W

If the Source
is 802.3bt

Max Source Power 90W

The max
power the
controller
can provide
is 49W

Applications-Coax Extended Distance

Cat6 (23AWG)		
Transceiver	Vi2301A (2 pcs)	Vi2701TX
Distance feet/meters	Power @ PD	Power @ PD
3000ft		12.95 watts Class 3 @ 10Mbps
2000ft		
1600ft		25.5 watts Class 4 @ 100Mbps
800ft		50 Watts @ 100Mbps
750ft		
600ft		
550ft		
500ft	50 watts @ 100Mbps	
328ft		60 watts @ 100Mbps
PSE Power	60W Source	74W Source

If the max amount of controller power is 25W or under

The amount of source power doesn't matter – UPoE will be received as 802.3at

Cat6 (23AWG)		
Transceiver	Vi2301A (2 pcs)	Vi2701TX
Distance feet/meters	Power @ PD	Power @ PD
3000ft		12.95 watts Class 3 @ 10Mbps
2000ft		
1600ft		25.5 watts Class 4 @ 100Mbps
800ft		50 Watts @ 100Mbps
750ft		
600ft		
550ft		
500ft	50 watts @ 100Mbps	
328ft		60 watts @ 100Mbps
PSE Power	60W Source	74W Source

If the max amount of controller power is 25W or Over

The amount of source power doesn't matter – but the source must be 802.3bt

The Surge Factor

Surging is the difference between the power required when RED is not active and when it is. A sudden rise in power or when power is exceed a shut down can occur



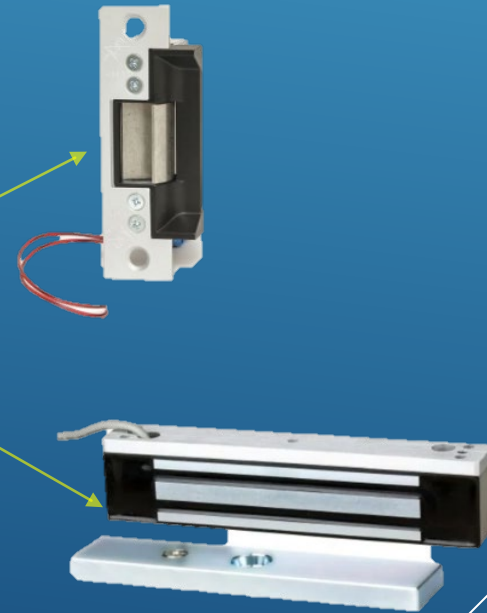
Always Design for the Surge



Resting

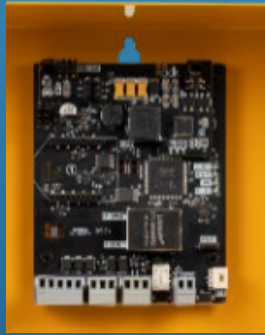


Active Surge



The 802.3bt Flip: Devices operating at both 802.3at and then 802.3bt

When Does this occur?



If resting is below 30W as detected by the controller the system will operate as 802.3af or 802.3at



Door Strike



Door Lock

If a surge results in Detection above 30W the controller will generate a 802.3bt requirement

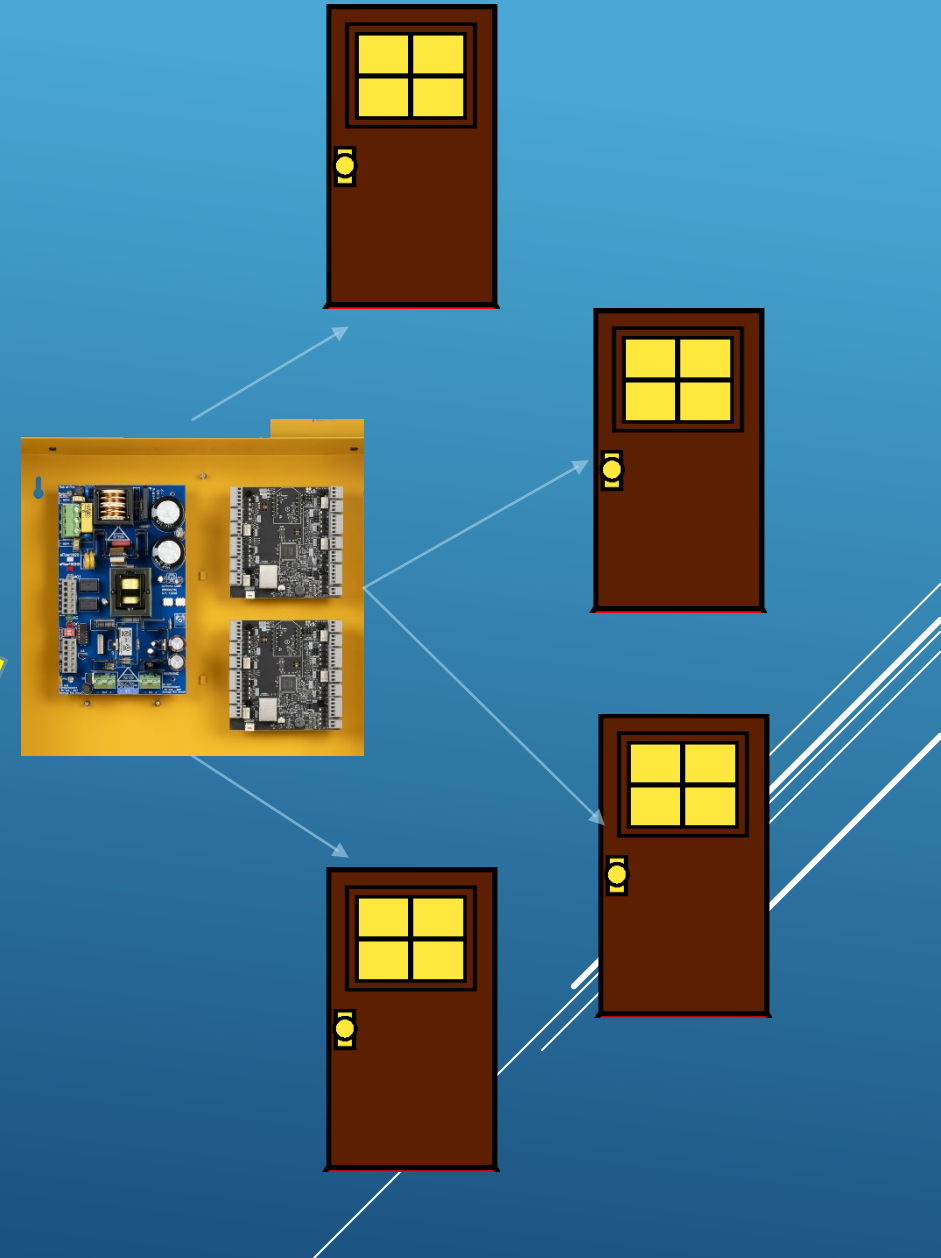
If the PDK controller generates a 802.3bt signature to a source that is only 802.3af/at PoE transmission will stop – As PDK lock to the incoming PSE source this can be avoided

Scenario 1:
R4 with centralized wiring for four doors
100M (328f) Single Data and PoE Source

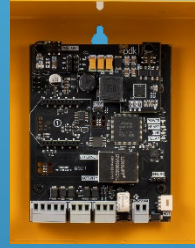
Standard Distance 328 feet 11W/24W/



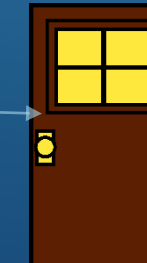
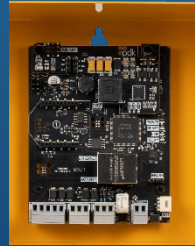
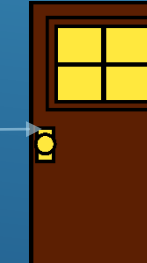
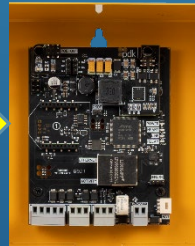
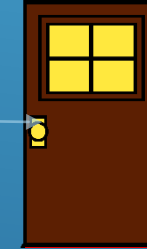
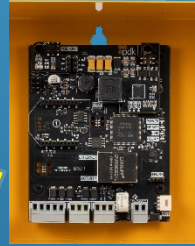
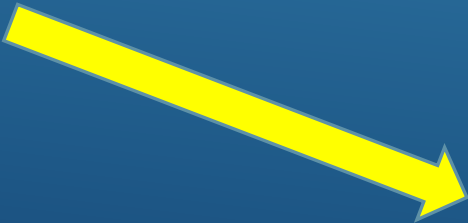
Standard Distance 328 feet 27W/ 49W



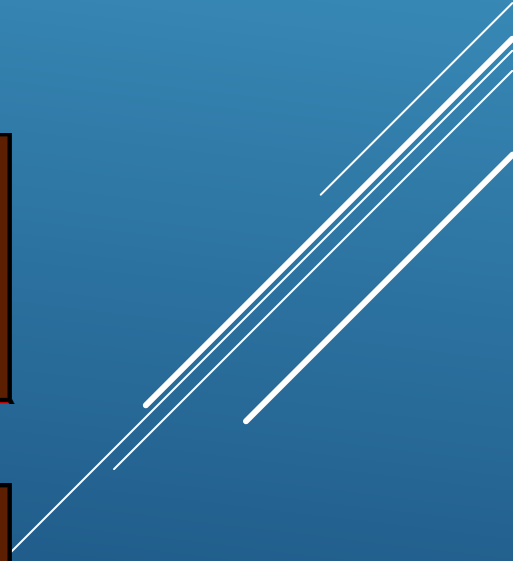
4 R1 not centralized with the door controller at the door each one controls one door worth of hardware



Standard Distance 328 feet 11W/24W



Standard Distance 328 feet 11W/24W



Scenario 3:

4 R2 not centralized with the door controller at the door each one controls two doors worth of hardware

Vi22001U



Standard Distance 328 feet 11W/27W/49W



Scenario 4:

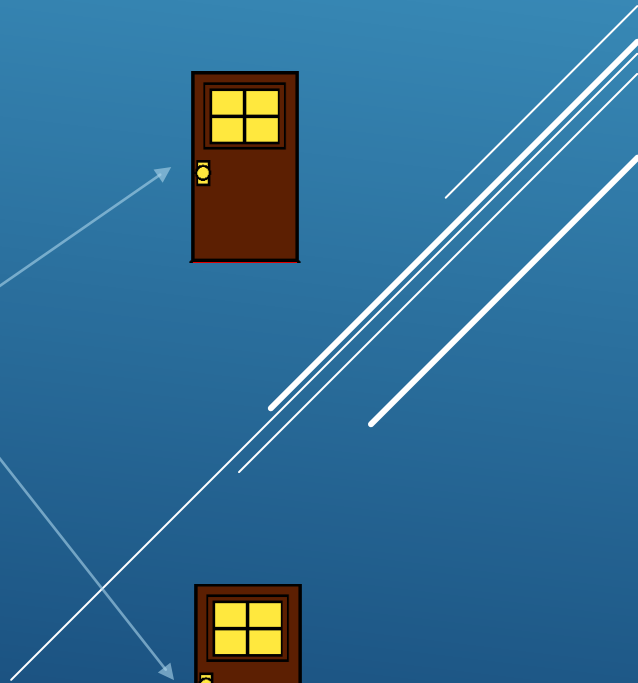
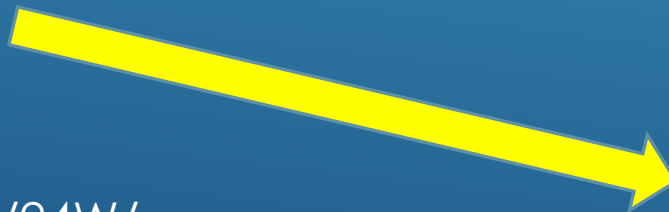
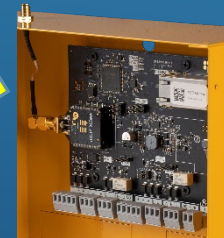
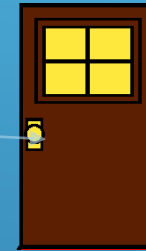
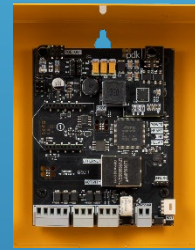
2 R1 not centralized with the door controller at the door each one controls one door worth of hardware

1 R2 Centralized wiring for two doors



Vi30110

Standard Distance 328 feet 11W/24W/

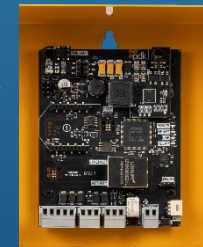
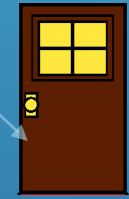
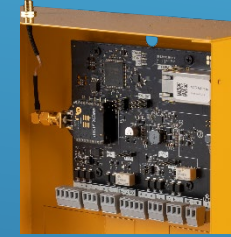


Scenario 5:

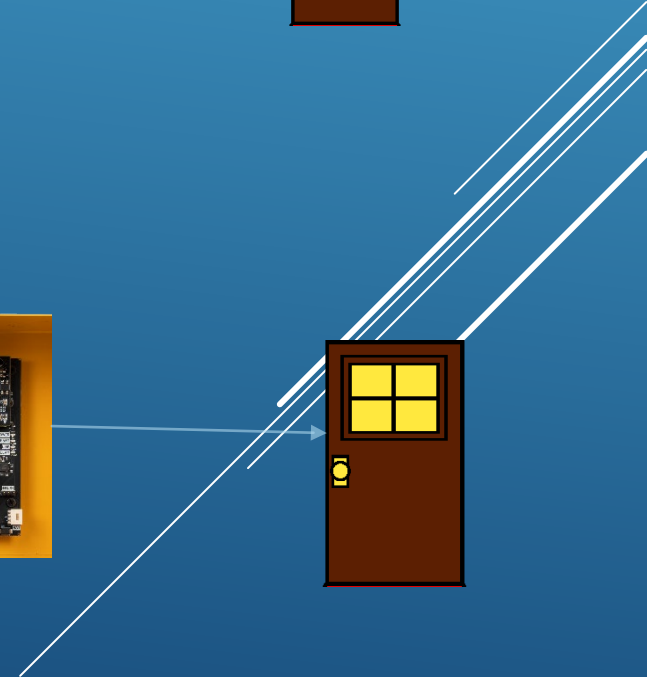
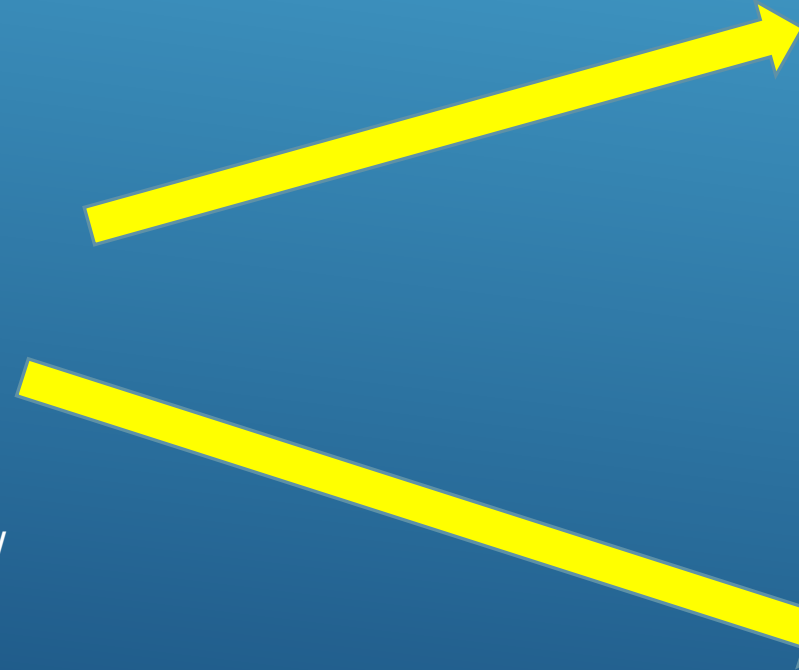
R4 centralized wiring

2 R2 not centralized with the door controller at the door each one controls two doors worth of hardware

2 R1 not centralized with the door controller at the door each one controls one door worth of hardware



Standard Distance 328 feet 49W



Scenario 5:

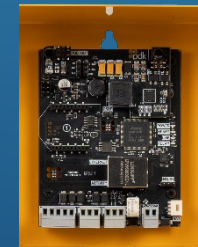
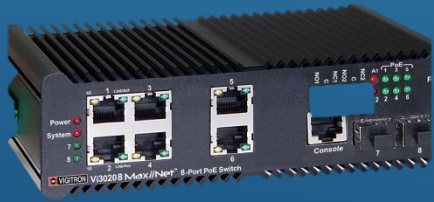
R4 centralized wiring

2 R2 not centralized with the door controller at the door each one controls two doors worth of hardware

2 R1 not centralized with the door controller at the door each one controls one door worth of hardware



Standard Distance 328 feet 49W

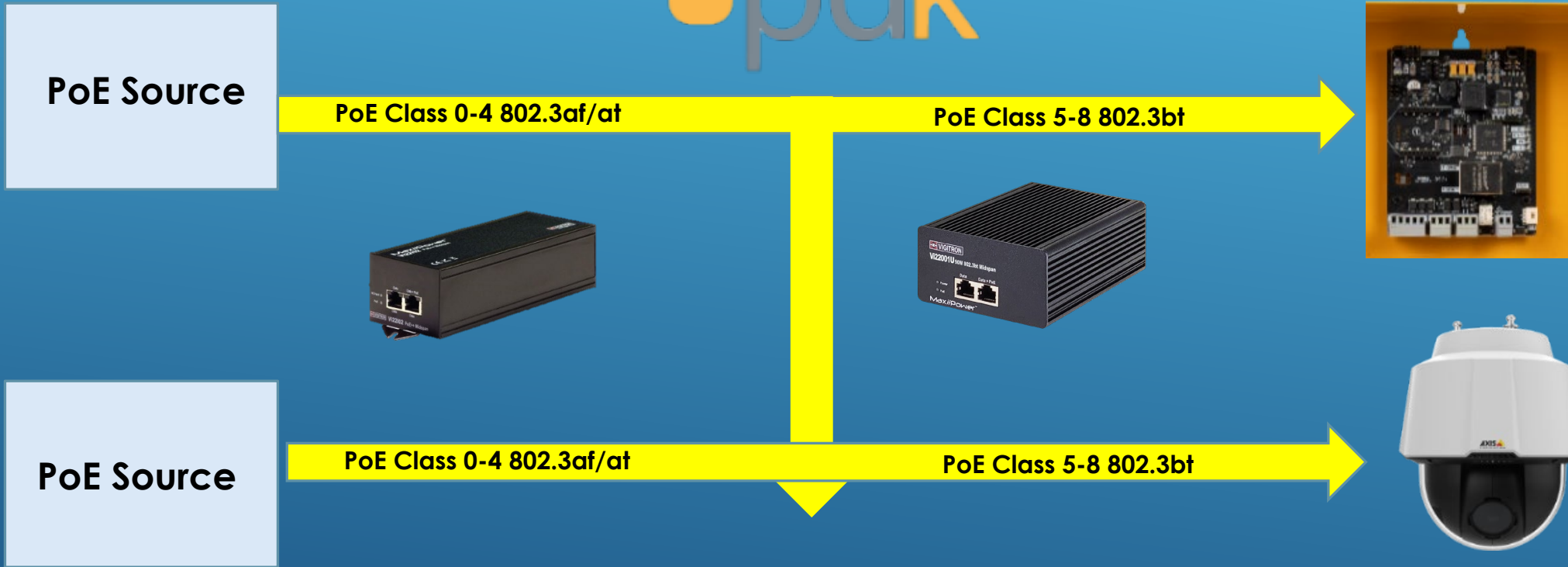


Standard Distance 328 feet 49W

The PDK Advantage



PDK PoE Consideration



Many 802.3bt products will flip their PoE signatures with source draws more than 30W – causing a disconnection.

PDK products lock to the incoming PoE source and will provide an indication when exceeded – it requires you to know the highest potential PoE power and provide it.

There is no network solution that can be applied to multiple applications

Each application is different depending on

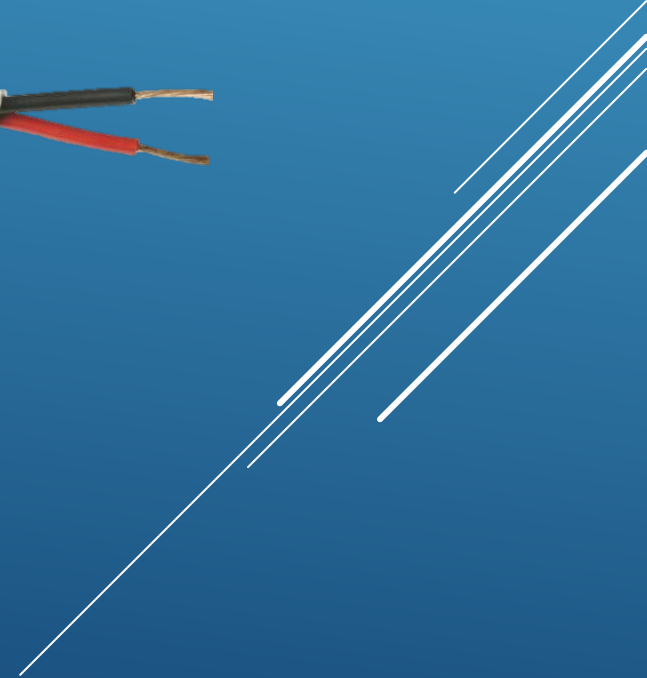
The PoE Source



Cable Type and Distance



Connected Device PoE and Data Requirements



Summary – PDK Design Considerations

1. My source has the required power – PDK device isn't powering up

a. Is the PoE compatible with PDK device- is it 802.3bt compliant?

2. My PDK device power up but when active shuts down.

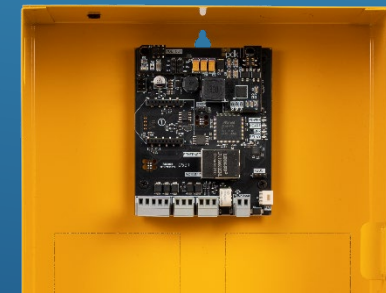
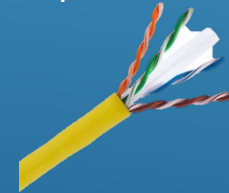
a. When active the power required is more than what can be provided

b. When active the PDK device signature (classification plus) required .bt signature)

3. I have a multi- door connections to a controller but only some worked

a. The PDK Red series senses the amount of power provided from the source and will only provide that power giving an indication when more is needed:

1. A pre- installation evaluation is important to match the required PoE to the application



Benefits of Vigitron's Design Center

Design Services: Saves Dealers time and money, and reduces the potential for costly after sales service calls by developing networking with Vigitron's engineering staff.

Vigitron's certification and IP camera inter-operability testing provides the bases for our Design Services staffed by expert system engineers. By providing only basic system component information, our system design team will provide the most cost effective and reliable infrastructure solutions meeting specific installation requirements.

Installers and distributors' staff can access the Design Center directly on the website at:

http://www.vigitron.com/IP_CCTV_Design_Assistance.aspx
or by emailing question to support@vigitron.com.



**VIGITRON DESIGN
SERVICES ARE
FREE AND
WITHOUT
OBLIGATION**

Vigitron Advantages

Over 200 IP/PoE Products covering every network category with the ability to provide complete network solutions

Products are designed, tested and quality controlled in the United States with local design and service support from skilled network engineers.

The industry's longest Lifetime warranty with complete protection for a full 3 years in even after a product goes end of life.

- MANAGED POE SWITCHES
- MANAGED FIBER SWITCHES
- HARDENED POE SWITCHES
- UTP ETHERNET EXTENDERS
- COAX ETHERNET EXTENDERS
- POE MIDSPANS
- POE SPLITTERS
- DROP & INSERTS
- FIBER OPTICS MEDIA CONVERTERS
- REPEATERS
- IP67 NETWORKING PRODUCTS
- ACCESSORIES
- ANALOG VIDEO TRANSMISSION



+ 3 Years

THANK YOU!

For more information, answer to questions, design center support, email support@vigatron.com



CONTACT VIGITRON

Phone: +1 (858) 484-5209

Email: support@vigatron.com

Website: www.vigatron.com

Design Center: www.vigatron.com/IP_CCTV_Design_Assistance.aspx

White Papers & Application Notes: www.vigatron.com/WhitePapers.aspx

Contact: Neil Heller

nheller@vigatron.com

+1 (714) 305-7044