

POE : Mode A vs Mode B

In the PoE scheme, two different types of devices are involved: **Power Sourcing Equipment (POE-SWITCH)** and **Powered Devices (PD)**.

POE-SWITCHs provide the DC power to **PD**s. POE-SWITCHs source up to 12 watts at 48 volts to each PD. A POE-SWITCH may be an **endspan device** or a **midspan device**. An endspan device typically is a network switch enabled to provide PoE power on each port. A midspan device is an **injector** connected in-line to each end device and adds power to the line.

Power is carried over the cabling using two techniques: **Alternative A** and **Alternative B**

Alternative A implements a simplex, or 'phantom feeding' method for delivering power to the end device. Power is carried on the same conductors as data. CAT-5 cabling for standard 10BaseT and 100Base-TX Ethernet uses two data/signal pairs connected to pins 1 and 2 and pins 3 and 6 on RJ-45 connectors. Power sourcing equipment superimposes power onto these pins via the center tap of internal signal coupling transformers. In the powered device (PD) the power is derived from these lines using the reverse technique.

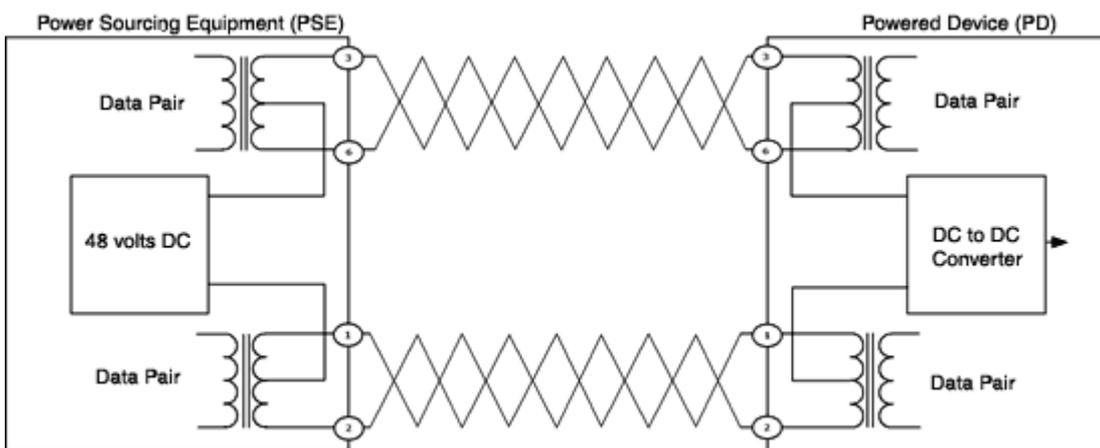


Figure 1: Power over Ethernet Alternative A

Alternative B carries power over spare wire pairs in the cable. The power sourcing equipment applies positive voltage to pins 4 and 5. Negative voltage is applied to pins 7 and 8.

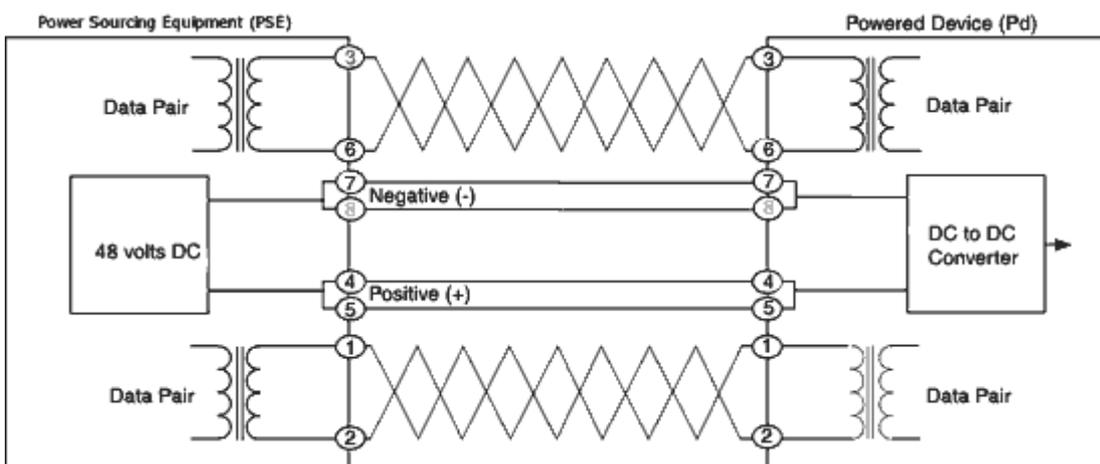


Figure 2: Power over Ethernet Alternative B

More on Powered Devices

PDs are designed to accept PoE in either format (Alternative A or B) so that they can receive power regardless of which Alternative is implemented in the POE-SWITCH. When operating in Alternative A mode PDs automatically adjust for polarity of the power supply voltage. This ensures that the device will operate even if a crossover cable is being used. (This sometimes happens if a Media Dependant Interface (MDI), such as a PC network card, is connected to the PD, which also is wired as a MDI.)

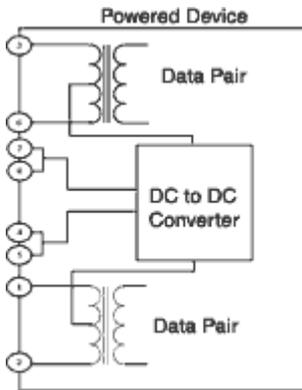


Figure 3: A Powered Device

PDs operate from 48 VDC (approximately) supplied by the POE-SWITCH, which means they are classified as a *Safety Extra Low Voltage (SELV)* device. The maximum current supplied by the POE-SWITCH is about 350 mA. With some loss in the CAT-5 cable, the PD is limited to about 12 watts of power. Maximum allowable cable resistance is 20 ohms.

More on Power Sourcing Equipment

The two types of POE-SWITCH (endspan and midspan) are used in different situations. Endspan POE-SWITCHs typically are used in new installations where a new switch or router is required. Midspan devices more often are added to an existing network to add PoE capabilities. Midspan devices are connected in-line, between the existing switch and the PD. They can be obtained as a single or multiple line units.

On initial power up Power Sourcing Equipment is designed to detect, and only supply power to the network device if it is identified as a PoE-enabled device. When first connected the POE-SWITCH initiates a detection process that involves low probing voltages to sense the type of PD connected while avoiding damage to non-PoE network devices.

Some Power Sourcing Equipment may also detect the power class of the PD. PDs are assigned to one of the following five classes, depending on the amount of power they require.

Class	PD Power (W)	Note
0	0.44 to 12.95	Default
1	0.44 to 3.84	Optional
2	3.84 to 6.49	Optional
3	6.49 to 12.95	Optional
4	Future use	Future use

If a PD does not support classification it is assigned a default classification of 0, indicating the POE-SWITCH should supply the maximum needed power. Classification of connected PDs allows the POE-SWITCH to optimize its power distribution.

POE-SWITCHs are able to detect several undesirable load conditions, including shorted communications cables, disconnected PDs and the connection of non-PoE devices. When a fault is detected the POE-SWITCH will disconnect power from the communications line before damage can occur.