Ethernet over Power (EoP)

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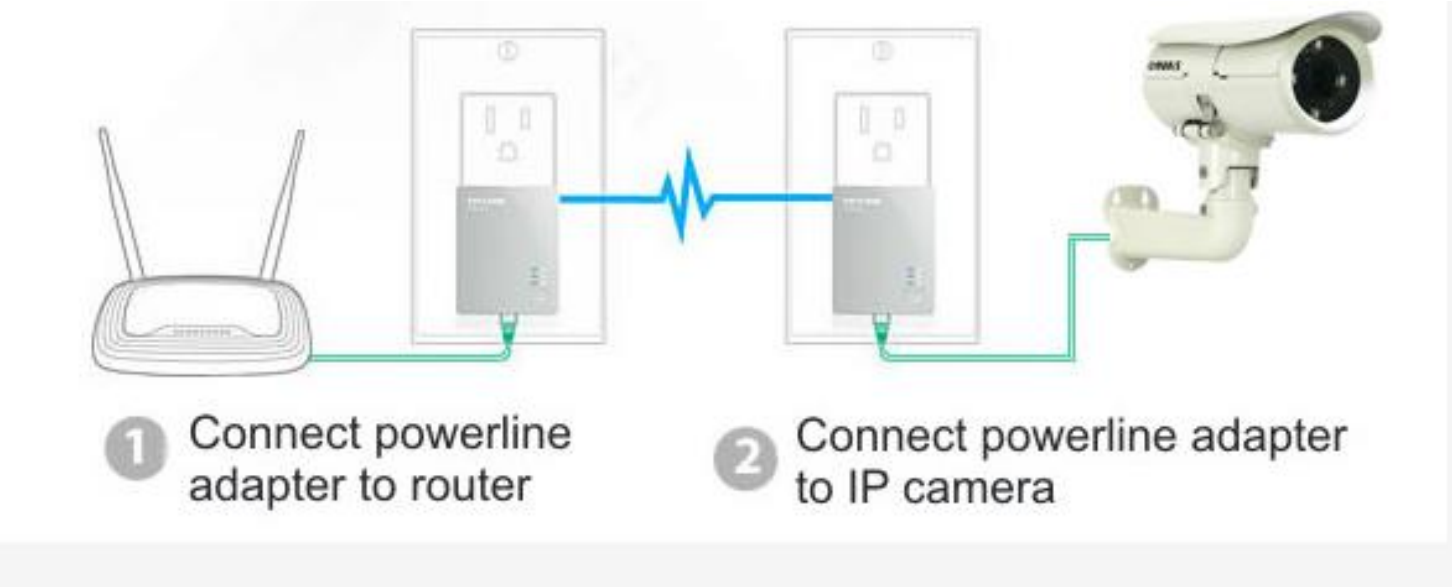
- also known as "Powerline networking" or "Powerline ethernet"
- technology for sending network data over power lines



Frequency of the Ethernet signal

- the concept is similar to DSL (Digital Subscriber Line),
  where a telephone line is used for both telephone service
  and internet connectivity

- the frequency of the power line is slow relative to the frequency of the Ethernet signal,
  which allows the Ethernet signal to run above the power line
  even though the power line voltage (120 V)
  differs from the Ethernet voltage (5V)

Powerline adapters

- powerline kit:
  - powerline adapters (two or more)
  - short Ethernet cables

NETGEAR Powerline Adapter Kit, 2000 Mbps

Powerline adapters

- the main adapter is plugged into a wall outlet and connected to the router by the Ethernet cable
- other adapters are connected to the devices

- some more expensive adapters can even serve as WiFi hotspots
- adapters require that each adapter be on the same circuit
- communication across phases causes slower than expected speeds

HomePlug specifications

- **The HomePlug Powerline Alliance** was formed to develop standards and technology for enabling devices to communicate with each other and the Internet, over existing structure/house electrical wiring

- **HomePlug 1.0**:
  - first introduced in June, 2001
  - provides a peak PHY-rate of 14 Mbit/s

HomePlug 85 Mbit/s adapter

Transfer speed

- 500Mb/s to 2Gb/s
- best performance for single-point connections and adapters plugged in directly to wall outlets

- factors affecting speed
  - the quality of the wirings
  - the distance from each adapter
  - interferences from devices such as microwave ovens and freezers
  - communication across phases

Pros

- low cost
- easy wiring using existing power outlets
- up to a 300-meter range
- some products are encrypted
- some have built-in Wi-Fi
- plug and play setup (no configuration required)

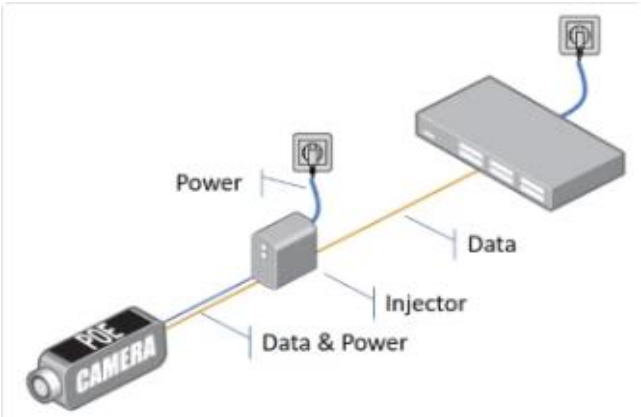
Cons

- often a lower connection speed compared to the advertised
- the connection degrades when the bandwidth is shared with more than one device
- using powerline adapters can be difficult in buildings with different circuit lines

Power over Ethernet (PoE)

Power over Ethernet (PoE)

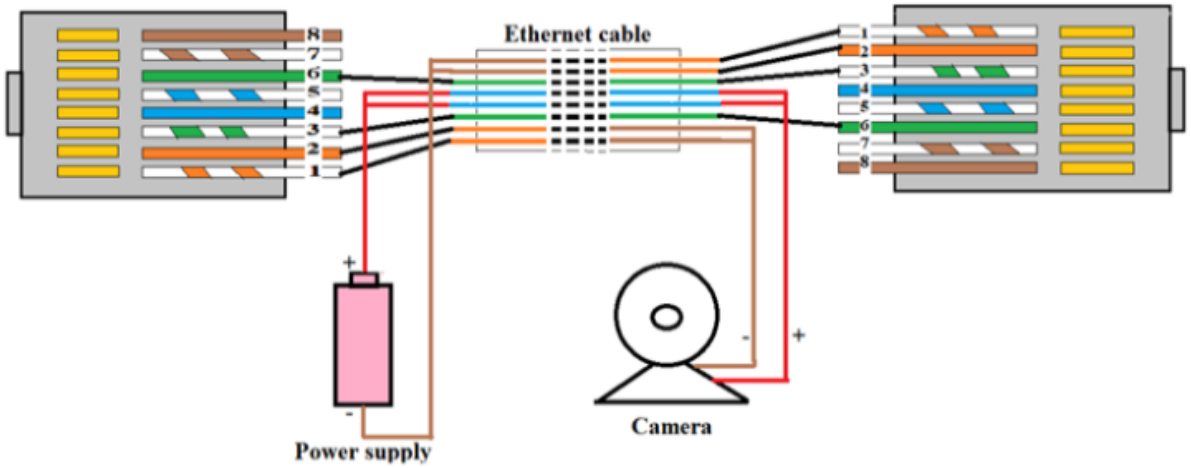
- technology for sending power over Ethernet network cables
- a single cable can provide both data connection and electric power to devices such as wireless access points (WAPs), IP cameras and VoIP phones



PoE Injector-Based Connection

Ethernet cable

- only 4 lines are used in low-speed Ethernet applications
- remaining 4 lines remain idle and can be used for power transfer

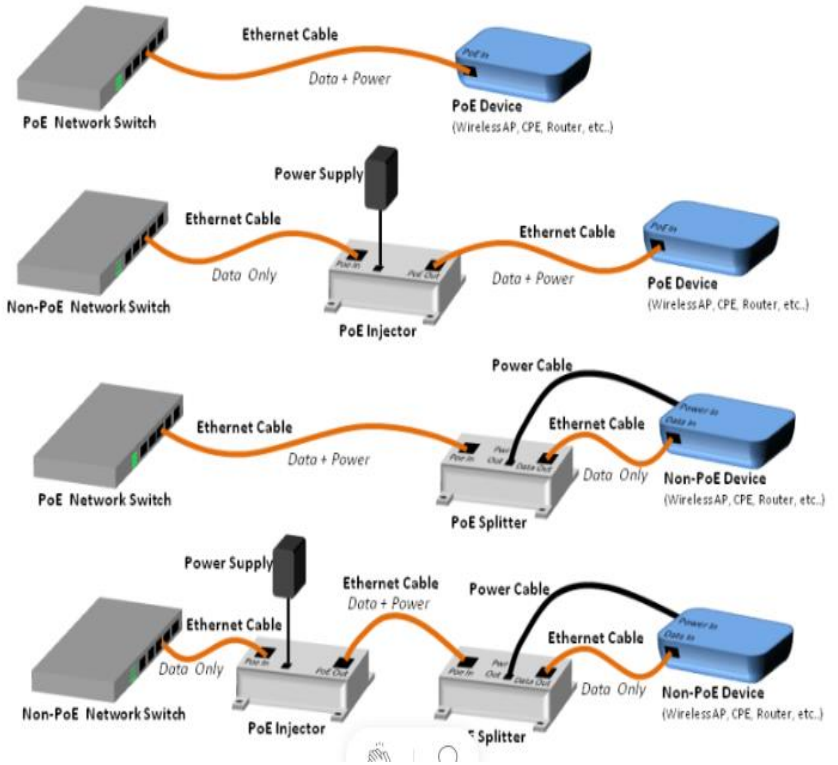


PoE Components

- Power sourcing equipment (PSE)
  - devices that provide (source) power on the Ethernet cable
- Powered device (PD)
  - device powered by PoE

Power sourcing equipment (PSE)

- Types:
  - a network switch (endspan, endpoint)
  - an intermediary device between a non-PoE-capable switch and a PoE device
  - an external PoE injector (midspan device)



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