Product:
PoE
Family:
PoE Switches
and Injectors

Tech Tip 14

Power Over Ethernet (PoE)

Power over Ethernet(PoE) or Active Ethernet is a technology capable of feeding power to devices located at the end of a Category 5e or superior Ethernet network cable LAN branch jointly with the data. Devices like Wireless Access Points (WAPs), IP PBXs Phone extensions or Video Over IP Surveillance cameras can be power fed through the same network cable that carries the data with the savings represented by not having to install AC mains outlets at the end

The following figure shows the evolution of this technology and standarization, and the consolidation of the IEEE 802.3af and 802.3at, and development of the IEEE 802.3 bt, which will augmente the output power to the 90 W level by utilizing the four pairs completely for power delivery. LED Lighting has been considered.

The technology implementation starts with a PoE Injector feeding DC power to the network cable of the chosen

1999	2003	2009	2013
PoL ≤10 W	**IEEE 802.3af PoE (15W)**	**IEEE 802.3af PoEP (30W)**	**Propuesto IEEE 802.3bt 4PPoE (90W)**

of the link to power those devices through the conventional local AC/DC power converters which can be quite expensive in infrastructure costs.

The PoE technology is advancing with two levels of power already in full deployment by the IEEE PoE Task Force, and with a third level in the development phase for feeding higher powered devices.

category and normally located at the Cabling Room, near the Switch or Hub. This Switch or Hub can also be PoE enabled, by integrating an injector in each output circuit.

Because the power and data must be able to reach at least the 100m distance of the link, the resistivity of copper generates losses and heat in the cable that should be taken care of,

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mainly when the cables are installed in dense bundles, in order to not surpass the limits of temperature in the center of the bundle that would have the lesser heat dissipation and become a hot spot. The use of lower gauges like (CAT 6A AWG 23) is recommended when requiring more power delivered to the load in remotely located equipment.

There are several kinds of injectors	
Active	IEEE 802.3 af IEEE 802.3 at Proprietary.
Passive	DC Voltage from 12 VDC to 48VDC.

Some devices are PoE compatible or "Active Ethernet Compatible", and accept the delivered power directly from the cable plus the Data; nevertheless, those devices which are not compatible directly with the PoE standards would probably need the use of a DC "Splitter", "Picker" or "Tap"), able to take the voltage in the standard use and convert to the DC voltage used by the device (Active Splitter), voltage that will feed power to the device through the equipment jack, tipically: 12V, 9VDC, 5VDC).

The Splitter can be of the passive type, in which case the delivered power to the device is unregulated voltage.

Summarizing, there are two types of Splitters:
• The passive, which simply takes the available unregulated voltage from the network cable and directly feeds the equipment. E.g. the unregulated voltage injected is 48VDC, the voltage available minus the voltage loss due to the resistance of the path results in the voltage delivered to the load.
• The regulated one, which picks the voltaje in the cable and converts it to common voltages used in devices such as 5V, 6VDC, 9VDC, 12 VDC, which enables the use of non-compatible with PoE equipment.

Hence, you will require the following in order to use PoE Technology:

•	(A IEEE 802.3af or IEEE 802.3at standard compliant Injector) + (A device directly compatible with it)
•	(A IEEE 802.3af or IEEE 802.3at standard compliant Injector) +(An Active regulated Splitter)+ (A non directly compatible equipment)

•	(A passive Injector)+ (A device directly compatible with it).
•	(A passive Injector)+ (A externally powered non PoE compatible equipment)+(A passive Splitter).
•	(A IEEE 802.3af or IEEE 802.3at PoE standard Switch or HUB) + (A device directly compatible with it).
•	(A IEEE 802.3af or IEEE 802.3at PoE standard Switch or HUB) + (A non directly compatible equipment)+(A regulated Active Splitter).

LanPro manufactures several PoE Active equipment for your projects:

•	**LP-Poe150** IEEE802.3af standard Injector, *http://www.lanpro.com/documents/en/active/ LPPoe150_IG_ENB01W.pdf*
•	**LP-Poe151** IEEE802.3af Splitter with 3 DC voltage selector: 12V, 9VDC, 5VDC, *http://www.lanpro.com/documents/en/active/ LPPoe151_IG_ENB01W.pdf*
•	**LP-SGP801** Gigabit Ethernet Switch with 8 x 10, 100, 1000 Mbps with PoE 802.3af standard ports. *http://www.lanpro.com/documents/en/active/ LPSGP801_SS_ENB01W.pdf*
•	**LP-SW902FGP** 9 ports Midspan Ethernet Switch with 8x 10/100M PoE plus 1x 10/100/1000M copper port interchangeable one SFP Gigabit port. *http://www.lanpro.com/documents/en/active/ LPSW902FGP_SS_ENB01W.pdf*
•	**LP-SG2402FP30** 802.3af PoE Switch with 24 x 10/100 Mbps ports PoE capacity 300W plus 2 copper or SFP Uplink 10/100/1000 ports. *http://www.lanpro.com/documents/en/active/ LPSG2402FP3x_SS_ENB01W.pdf*
•	**LP-SG2402FP35** 24 x 10/100 Mbps Ports PoE 802.3af Switch with 350W capacity plus 2 10/100/1000 Uplink copper or SFP ports *http://www.lanpro.com/documents/en/active/ LPSG2402FP3x_SS_ENB01W.pdf*
•	**LP-SGW2404FP** 24 x 10/100/1000 PoE 802.3af or 802.3at copper ports Manageable Gigabit Switch plus 4 x 10/100/1000 Uplink copper or SFP Gigabit ports and 400W Power Supply. *http://www.lanpro.com/documents/en/active/ LPSGW2404FP_SS_ENB01W.pdf*

Standards and Pins utilized

Eventhough the IEEE(USA Electrical and Electronic Engineers Institute) has published two standards and is getting prepared for an increase of power delivered in other levels, the voltage of choice has been 48

VDC in order to reduce the current required and the associated copper losses in the cable due to the distance traveled, with an increase on the distance reached, being it longer when the conductors AWG are lower. When the distance has not been taken into account, some manufacturers have chosen 24 VDC or 12VDC, resulting in lower distances and compromising cable heating limits. The user must pay attention in these cases to the pins utilized for power to avoid damages to equipment being served.

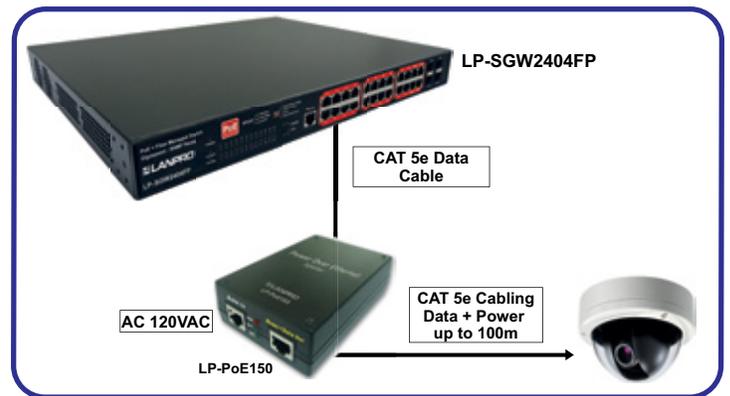## Multiport Injectors, PoE Switches.

There are Multiport Injectors in the market with 6 or 12 ports. They are used when the application requires many ports. The Multiport Switches integrate power and data in each port and utilize any of the standards already mentioned for your convenience and could also be manageable. The power supplies are designed to give enough capacity and 48 Volts to a maximum number of ports specified in the spec sheet.

PoE Application examples

1.- Case using a LanPro LP-SW902FGP PoE Switch compatible with the IEEE 802.3af standard, feeding some PoE powered equipment of the same standard.
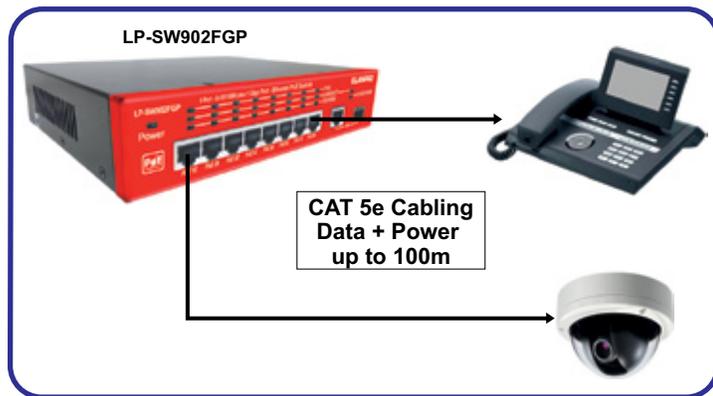
2.- Case using the non-PoE LanPro Switch LP-SGW2404FP to power a device using our 802.3af PoE injector model LP-PoE151.

LP-SW902FGP

CAT 5e Cabling Data + Power up to 100m

LP-SGW2404FP

CAT 5e Data Cable

AC 120VAC

CAT 5e Cabling Data + Power up to 100m

LP-PoE150

3.- Case using the non PoE Switch LP-SGW2404FP plus a PoE Injector LP-PoE151 and a LP-PoE IEEE 802.3af splitter LP-PoE151 feeding a non PoE equipment

LP-SGW2404FP

AC 120VAC

LP-P101

CAT 5e Data Cable

12VDC

LP-PoE150

CAT 5e Cabling Data + Power up to 100m

LP-PoE151

CAT 5e Data Cabling

Ticket Printer

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