

# APPLICATION NOTES

**PRODUCTS SUPPORTED:**  
CONVERGE® Pro 2  
P-Link Peripheral Products

CLEARONE DOCUMENT NTS-0053-001  
(REVISION 1.0) August 2017

POWER OVER ETHERNET (PoE) AND  
CONVERGE PRO 2 (CP2)  
P-LINK PERIPHERAL PRODUCTS

## Overview

This document describes information related to Power over Ethernet (PoE) and ClearOne's PoE supported CONVERGE Pro 2 (CP2) P-Link Peripheral Pro Audio products.

To power a ClearOne P-Link device, you must use a Mode B PoE injector that supplies power on pins 4, 5, 7, and 8. To daisy-chain multiple P-Link devices, you should use a PoE+ injector that provides 56 volts.

### Power over Ethernet (PoE)

PoE refers to passing electric power through a twisted pair Ethernet cable. Basically, this allows a single Ethernet cable to provide both a data connection and electric power to devices.

PoE has been standardized by IEEE 802.3 standards. Accordingly, there are two types available:

- A. PoE: This is covered by the 802.3af standard and provides up to 15.4 Watts of DC power.
- B. PoE+ or PoE Plus: This is covered by the 802.at standard and provides up to 25.5 Watts of DC Power (over two pairs).

## Terminology

### Power Sourcing Equipment (PSE):

This is a device that provides DC power on the Ethernet cable. Examples of PSE devices include PoE Ethernet Network Switches, and PoE Power Injectors.

### End-Span:

When the PSE is an Ethernet Switch, then it is called as End-Span device.

### Mid-Span:

When the PSE is NOT an Ethernet Switch, then it is called as Mid-Span device. For example, PoE Power Injectors.

### Powered Device (PD):

This is a device that consumes DC power through PoE. Power comes from PSE through an Ethernet cable to a PD. Examples of Powered Devices include some IP Phones, IP Cameras, Wireless Access Points, ClearOne Beamforming Mic Array 2, ClearOne USB Expander.

## PSE Powering PD

As per PoE standards, there are two modes available for powering devices. They are referred to as:

### Mode A

- Delivers power on the data pairs of 100-BASE-TX or 10-BASE-T cable.
- That is, pins 1 & 2 form one side of the DC supply and pins 3 & 6 form the other side.
- These are the same two pairs used for data transmission. That is, mixed data and power.
- This is similar to the phantom power technique used for powering microphones.
- In summary, mode A uses only 2 pairs for data and power.

### Mode B

- Delivers power on the spare pairs of 100-BASE-TX or 10-BASE-T cable.
- That is, pins 4 & 5 form one side of the DC supply and pins 7 & 8 provide the return.
- These are spare pairs and these spare pairs are used for power. That is, no mix of data and power.
- In summary, mode B uses 4 pairs for data and power.

Pins	Mode A		Mode B	
Pin 1	Rx +	DC +	Rx +	
Pin 2	Rx -	DC +	Rx -	
Pin 3	Tx +	DC -	Tx +	
Pin 4	Unused			DC +
Pin 5	Unused			DC +
Pin 6	Tx -	DC -	Tx -	
Pin 7	Unused			DC -
Pin 8	Unused			DC -
	Mixed <b>data</b> & <b>power</b>		No mix of <b>data</b> & <b>power</b>	

## ClearOne Pro Audio products that support PoE (PDs):

- Beamforming Mic Array 1 (White & Black)
- Beamforming Mic Array 2 (White & Black)
- USB Expander
- GPIO Expander
- DIALOG® 20 Wireless Receiver
- Touch Panel Controller

## ClearOne PoE Power Injectors (PSEs)

- PoE Power Injector
- PoE+ Power Injector

This below table shows ClearOne products that support PoE (i.e., PDs), PoE modes supported for powering from PSE, PoE Power injectors (i.e., PSEs) that we offer and the number of PD devices that can be supported.

S. No.	ClearOne PDs		Supported PoE Modes			ClearOne PSEs			
						PoE Power Injector (910-001-004)		PoE+ Power Injector (910-3200-202)	
	Product	Part Number	Mode A	Mode B	Mode A or Mode B	Supports One PD	Supports Daisy-Chain up to 3 PDs	Supports One PD	Supports Daisy-Chain up to 3 PDs
1	Beamforming Mic Array 1 (White)	910-001-003	YES	YES	YES	YES	NO	YES	NO
2	Beamforming Mic Array 1 (Black)	910-001-003-B	YES	YES	YES	YES	NO	YES	NO
3	Beamforming Mic Array 2 (White)	910-3200-201	NO	YES	NO	YES	NO	YES	YES
4	Beamforming Mic Array 2 (Black)	910-3200-201-B	NO	YES	NO	YES	NO	YES	YES
5	CONVERGE Pro 2 GPIO Expander	910-3200-301	NO	YES	NO	YES	NO	YES	YES
6	CONVERGE Pro 2 USB Expander	910-3200-302	NO	YES	NO	YES	NO	YES	YES
7	DIALOG 20 Wireless Receiver	910-6100-201	NO	YES	NO	YES	NO	YES	YES
8	Touch Panel Controller *	910-3200-501	YES	YES	YES	YES	NO	YES	NO

\* This has to be last device in the P-Link chain when daisy-chained with other PDs.

**NOTE:** Beamforming Mic Array 1 won't work with CONVERGE Pro 2 and its other peripheral products. It is included in this table just for comparison and reference.

CONVERGE Pro 2 P-Link peripheral devices (Beamforming Mic Array 2, GPIO Expander, USB Expander, DIALOG 20 Receiver) only support Mode B because,

- They send audio, control and power through proprietary P-Link connection.
- They support daisy-chaining multiple peripheral devices in the same P-Link chain that also daisy-chains power.
- It is an economical method for such a solution.
- It reduces the overall system price by reducing the number of PSEs needed to support a larger number of PDs.

### 3rd party PSEs

ClearOne PDs listed above work with the following 3<sup>rd</sup> party Mid-Span PSEs, as long as they meet the following requirements:

- PoE powering Mode supported as per the above table
- PoE standard PSEs (48 volt) can be used to power 1 peripheral device
- PoE+ standard PSEs (56 volt/36 Watt) can be used to power up to 3 peripheral devices

ClearOne peripheral devices (except for the Touch Panel Controller) are not regular Ethernet Network protocol supported products. They use our proprietary P-Link protocol. Therefore, they cannot be connected with End-Span PoE Network Switches for power.

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