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## Powering and Controlling Signalled Signs with an AVN-GPIO GPIO to LAN Transceiver

The release of the AVN-GPIO, a GPIO to LAN Transceiver (PTP, Ember+ & UDP) creates a unique opportunity for powering and controlling one or more Sonifex Signalled signs from a network connection. This paper explains how to achieve this, what you need to consider, and the limitations.

### Signalled LDD Range Overview

The Signalled range of professional LED studio signage was released over fifteen years ago. Each sign presents you with a terminal connector for applying DC power, and the input signals that control the sign. Power is in the form of a fixed 6V DC input in the case of the LD models, or a 7V – 36V DC input range on the LDD models. There are four illumination states that can be programmed (corresponding to the four states of the two input signals – off/off, on/off, off/on, on/on). Shorting an input to ground activates the input and the sign will illuminate in the state programmed for that input condition.

### AVN-GPIO Overview

The AVN-GPIO is a GPIO to LAN transceiver, capable of transmitting and receiving physical GPIO states across a local area network (LAN) as virtual GPIO signals using Ember+, or via UDP. These virtual GPIOs can then be used to control other Sonifex products, or be routed to a physical GPIO on a target product, which can be located a significant distance from the trigger signal. This allows traditional hard wired remote signals to be transmitted across a network using existing Cat5 cabling. The AVN-GPIO features ten GPIOs (eight are PTP enabled), which can be individually programmed as pull-low inputs or open collector outputs. It also contains a single pole, dual throw (SPDT) relay as a physical output, and a terminal block connector that makes connecting multiple power and ground signals simple.

### Controlling a Signalled Sign with an AVN-GPIO

It is possible to control a Signalled sign using an AVN-GPIO by connecting one or both of the Signalled’s inputs to GPIO ports (configured as outputs) on the AVN-GPIO. Since the AVN-GPIO’s outputs are open collector, it is also necessary to join the ground connections of the AVN-GPIO and the Signalled to ensure correct operation (see figure 1). When connected correctly and triggered, the AVN-GPIO will pull the Signalled input(s) to ground, changing the illumination state, and (if programmed to do so) illuminating the sign.

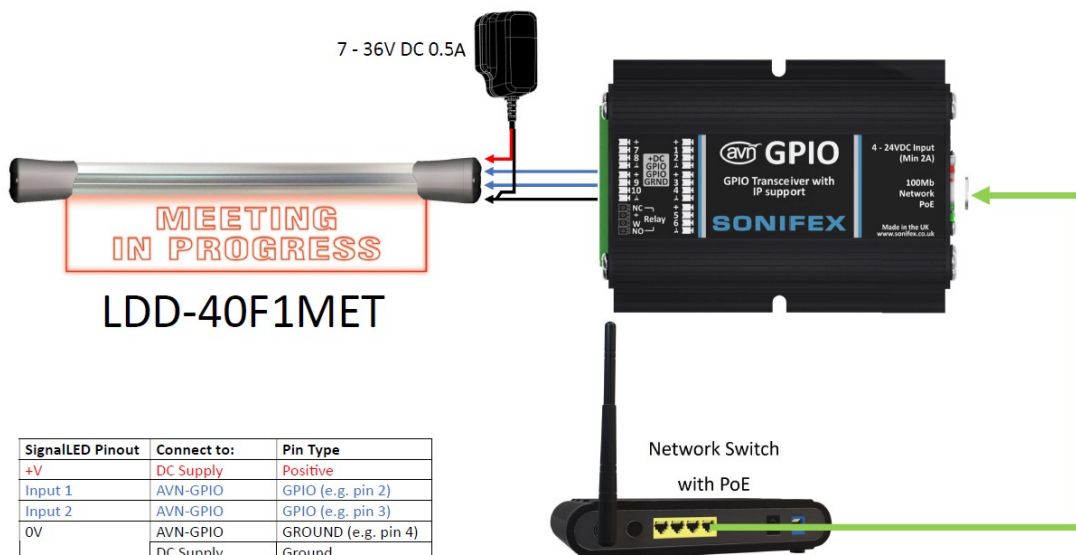


Figure 1 - Connecting a sign to an AVN-GPIO (control only)

The output from the AVN-GPIO can be controlled in a number of ways:

- Setting a physical output to respond to the state of a physical input from the same AVN-GPIO unit, then connect a physical switch to that physical input.
- Using the web server to set a timed event to trigger a physical output.
- Setting a physical output to respond to the state of a virtual GPIO of a connected Ember+ client, then changing the state of that virtual GPIO on the relevant device.
- Setting the physical output to respond to a virtual GPIO that is controlled by a physical input on a second AVN-GPIO. This physical input could be connected to a mixing desk “mic live” remote output for example (see Figure 2).

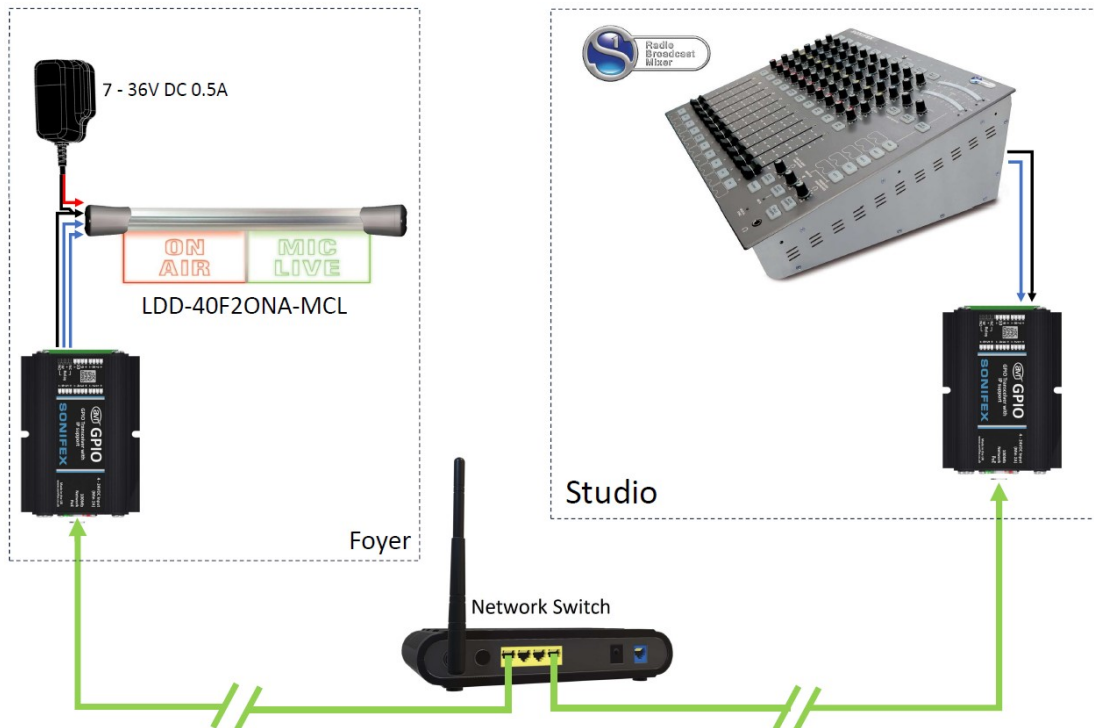
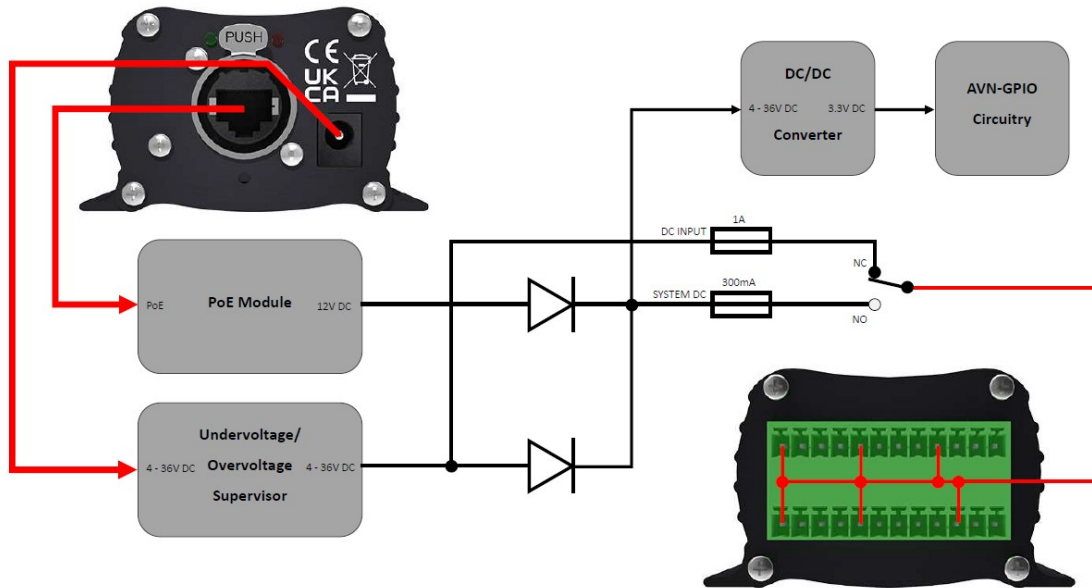


Figure 2 - Sending a GPIO status between 2 locations on the same LAN

## Controlling and Powering a Signalled LED Sign with an AVN-GPIO

It is also possible to provide power for one or more Signalled LED signs directly from an AVN-GPIO, but the source of the power (selectable by you) determines the type of sign (LD or LDD) and number of signs that can be powered (see Table 1). Inside the AVN-GPIO, the output power to the 24-pin terminal connector is internally switched and fused as shown in Figure 3.



**Figure 3 - External DC routing and fusing inside AVN-GPIO**

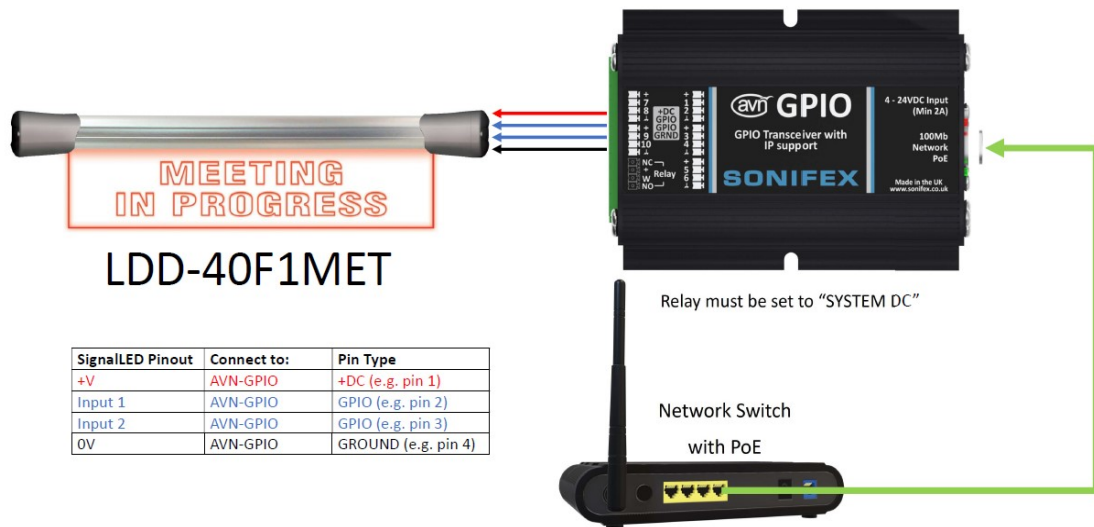
This configuration allows you to decide if you wish to power the unit by PoE, DC, or concurrently by PoE and DC (and therefore benefit from power redundancy). It also allows you to power the AVN-GPIO from a voltage based on the requirements of any external circuitry connected to the GPIO terminal block (provided it is within the AVN-GPIO's 4 - 36V DC window).

When System DC is selected as the power output source, it is only possible to source 300mA of current (total) at the GPIO terminal pins for powering external circuitry. This is because the internal PoE module has limited current capability, and sourcing more than 300mA from the AVN-GPIO could compromise the power integrity of the unit. When DC Input is selected as the power output source, it is possible to source up-to 1A of current (total) at the GPIO terminal pins for powering external circuitry.

If your application requires power redundancy at the GPIO terminal (i.e. you want your external equipment to remain powered if either the DC input or PoE supply fail), it is recommended to operate any external equipment from 12V (by connecting a 12V DC supply to the DC input connector). This is because the PoE module output is fixed at 12V, and if a different DC input voltage is used, the voltage at the GPIO terminal will follow the highest voltage (12V PoE or the DC input) and will then drop to the lower voltage if the higher source fails. This may be acceptable to your application, but it could cause issues with external equipment (e.g. fixed voltage relays).

### **Powering via PoE (applicable to LDD models only)**

The internal PoE module of the AVN-GPIO provides a 12V DC output, which is outside the 5-7V DC range of the power supply for the LD range of Signalled signs. It is possible, however to power the LDD range of signs from PoE. To control and power the sign from an AVN-GPIO, connect the units as shown in Figure 4. To use PoE power, the DC output source must be set to "SYSTEM DC". Refer to Table 1 to determine how many of each sign type can be supported by PoE power.



**Figure 4 - Controlling and powering a sign from an AVN-GPIO (using PoE)**

### Powering via DC input (applicable to LD and LDD models)

If PoE is not available, you have an LD model sign, or you wish to power a higher number of signs from the AVN-GPIO, the DC input of the AVN-GPIO can be routed to the DC output pins by selecting "DC INPUT" as the DC output source. Refer to Table 1 to determine how many of each sign type can be supported by an external DC supply (this is dependent on supply voltage).

N.B. The unpowered state of the relay is to connect the DC output to the DC input, so if you select SYSTEM DC as the output power source, the output will temporarily be connected to the DC input until the unit boots and the DC output source relay switches over.

### Determining Power and Setup Requirements

The table below allows you to look up the requirements for your application in the blue section and read across to determine the power supply required and the correct setting within the AVN-GPIO's web browser for the DC Output Source in the green section.

Application Requirements				AVN-GPIO Power and Setup Requirements			
Sign Size	Sign Type	No. of Signs to Power	Power Redundancy	Power Connection	DC in Voltage	DC in Current	AVN-GPIO DC Output Source
200mm	LD	0 (control only)	No	PoE or DC	4 – 36V	0.5A	Unimportant
			Yes	PoE and DC			
		1	Not possible	DC only	6V	0.5A	
			2 – 3			1A	DC Input
	LDD	0 (control only)	No	PoE or DC	4 – 36V	0.5A	Unimportant
			Yes	PoE and DC			
		1	No	PoE or DC	7 – 36V	1A	System DC
		2-7*	DC only	12 – 36V	DC Input		
		8-10*		24 – 36V			
		1-2	Yes	PoE and DC	12 - 36V	0.5A	System DC
400mm		LD	0 (control only)	No	PoE or DC	4 – 36V	
	Yes			PoE and DC			
	1		Not possible	DC only	6V	DC Input	
	LDD	0 (control only)	No	PoE or DC	4 – 36V		Unimportant
			Yes	PoE and DC			
		1	No	PoE only	N/A		System DC
		1		DC only	7 – 36V	1A	DC Input
		2-4			12 – 36V		
		5-7*	24 – 36V				
		1	Yes	PoE and DC	12 - 36V	0.5A	System DC

**Table 1 - Lookup table, application v requirements**

\* Whilst it is possible to power and control in excess of five signs from a single AVN-GPIO, there are only ten GPIOs available, so it is not possible to independently connect up both inputs of each sign if more than five are connected.