



Lighting Control Options - Q4 2020

Explanation of how to send commands to lights

6/8/2020

WARNING - THIS IS A TECHNICAL DOSSIER THAT IS FORWARD LOOKING

Currently all of Scynce's lights are controlled via a dual radio that has both BlueTooth and Thread Mesh. We will be adding a new two-pin waterproof connector to all of our lights by Q4 of 2020 to give the option of either wired or wireless control. The new connector will serve to bypass the wireless controls and allow for a 0-10v analog or a digital signal to travel over a common twisted pair cable, such as a phone or ethernet (Cat 5) cable. Both types of wired signals described below will work seamlessly over the same 2 wires (that's why we just got it patented).

WIRELESS

Using the Theia app (available on Android and iOS platforms) a connection is made to a light or an Echo/Tempo via BlueTooth where commands are sent out. From there the Light/Echo/Tempo relays those commands over Thread Mesh technology. The lights never use BlueTooth to talk to each other as a mesh network is automatically formed between all the lights in a particular group and all communication happens via the Thread protocol from this point forward. This is an important piece as Thread (<https://www.threadgroup.org>) is an industrial wireless protocol that (1) is not WiFi, (2) operates at very low signal intensity and (3) has self-healing technology to automatically correct and compensate for any signal losses.

WIRED - 0-10v Signal

The analog 0-10v will be able to control the master intensity of the light, however it will not have any spectrum control.

WIRED - Digital Signal

The proprietary digital data signal can communicate any of the control data we need to send to or receive from the lights. Spectrum control, fan speed, intensity, wireless enable/disable, etc.

PROTOCOL

Each light will natively use wireless Thread Mesh to look for a command. If an analog or a digital signal is present it will toggle off Thread Mesh and take commands from the wired connection instead. Once the wireless is toggled off it will only turn back on once the analog or digital signal is disconnected.



SOFTWARE INTERFACES

- **Theia App:** Android or iOS app to control individual lights or groups of lights (up to 16 groups with a maximum of 250 lights per group)
- **Internet Gateway:** Web based portal to access a control dashboard from anywhere (desktop, mobile, etc). Dashboard allows users to add unlimited *Echo* devices. Typically there is one *Echo* per room/group.

HARDWARE DEVICES

- **Echo (air):** Interface with an internet gateway acting as the master controller. Commands are sent through the internet gateway (from anywhere through a web page dashboard), accessed either over WiFi or via a hard wired ethernet cable, via Bluetooth (using our Theia app) or by 0-10v analog (master intensity only), such as from a TrolMaster system, which also can be used only in a supervisory function (to dim the lights based on canopy sensor feedback: temp, humidity, PPF, etc.) leaving the *Echo* to control recipes (timing, spectrum and intensity). The *Echo* then communicates either wirelessly (via Thread Mesh) to send the commands out to the lights or via a twisted pair cable (like a Cat 5 cable) which then connects and transmits commands to the lights via a proprietary digital signal. Each *Echo* can control 99 zones with a maximum of 250 lights wirelessly or one zone and 100 lights over the digital wire. The *Echo* also serves to keep common time among all lights with battery backup for the clock.
*** Echo Air will be available in Q4 of 2020**
- **Tempo (air):** Interface with an internet gateway acting as the master controller. Commands could be sent through the internet gateway (from anywhere through a web page dashboard while connected via WiFi) or via Bluetooth (using the Theia app). The *Tempo* then uses Thread Mesh to relay commands up to 5 zones with a maximum of 20 lights total. The *Tempo* also serves to keep common time (with a battery back-up) among all lights. Some facilities may only wish to use the *Tempo* as a common time keeper. In this scenario the *Tempo* can facilitate this time keeping function to one group and up to 250 lights.
*** Tempo Air will be available in Q1 of 2021**
- **Shuttle:** Interface that acts as a translator from Modbus to Scynce's proprietary digital wired network. Commands are sent from an environmental control system over ModBus to the *Shuttle*. Each *Shuttle* connects and transmits the commands to the lights via a proprietary wired digital signal. A *Shuttle* can control one zone with a maximum of 100 lights.
*** Shuttle will be available in Q2 of 2021**

EXAMPLES

Theia App as the controller

- 1.) Theia App (from phone/tablet) --wireless--> Lights

TempoAir as the controller

- 1.) Web portal (internet gateway via WiFi) ----> Tempo --wireless--> Lights
- 2.) Theia App (from phone/tablet) ----> Tempo --wireless--> Lights

EchoAir as the master controller

- 1.) Web portal (internet gateway via WiFi or ethernet cable) ----> Echo --wired or wireless--> Lights
- 2.) Theia App (from phone/tablet) ----> Echo --wired or wireless--> Lights

* The Echo has analog inputs to accept TrolMaster or another analog signal as a supervisory command. For example, the Echo will run a recipe but a humidity sensor plugged into the TrolMaster will be able to dim the master intensity of the lights in the room for health and maintenance purposes.

** #1 wireless from the Echo to the Lights is not available until Q2 2021. The wired version should be available by Q4.

Third Party Controller

- 1.) ModBus, Bacnet, DMX, etc. signal (Argus, etc.) --wired--> Echo --wired or wireless--> Lights
- 2.) 0-10v signal (TrolMaster, etc.) --wired--> Echo --wired or wireless--> Lights
- 3.) 0-10v signal (TrolMaster, etc.) --wired--> Lights
- 4.) ModBus (Argus, etc.) --wired--> Shuttle --wired--> Lights

* #4 is not available until Q2 2021

