



# Falcon Player Manual

**Version 4.2  
September 2020**

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**This couldn't have been possible without the help and support of Chris Pinkham and Daniel Kulp answering my never ending questions.**

Version	Comments	Date Published
2.0	Updated to FPP 3.1 Release	August 22, 2019
2.1	Changed Wi Fi Tethering instructions	August 28, 2019
2.2	Update to FPP ver 3.6	February 21, 2020
4.2	Update to FPP ver 4.2 and change manual version to match FPP release version.	September 28, 2020

# Introduction

The Falcon Player (FPP) is a lightweight, optimized, feature-rich sequence player designed to run on low-cost Single Board Computers (SBC). It was originally created to run on the \$35 Raspberry Pi, hence the middle 'P' in the short name but now the FPP supports many more systems. The FPP shorthand is still used but it is now just called Falcon Player. FPP is a software solution that you download and install on hardware which can be purchased from numerous sources around the internet. FPP aims to be controller agnostic, it can talk E1.31, DDP, DMX, Pixelnet, and Renard to hardware from multiple hardware vendors. This includes controller hardware from Falcon Christmas (<http://pixelcontroller.com>) and Kulp Lights (<http://kulplights.com>) as well as others.

Up until the end of the 2015 Christmas season, most users of FPP used the Raspberry Pi as the main player. Since then it has expanded with the BeagleBone series of SBCs being utilized as well.

The FPP can interface to a number of controllers. It can also play synchronized audio via an audio port /FM transmitter, synchronized video (via an HDMI), It supports USB devices and external interfaces via the GPIO bus. It can also drive pixels directly via the GPIO bus.

Many people use FPP as the main and only player by connecting it to one or more (E.131/DMX) controllers and run their light show sequences and audio off it. Others will use several FPPs operating in various modes to run their shows, play videos from a remote projector, control animatronics, or handle outside events that are all synched to the main (master) FPP.

The Raspberry Pi hardware running FPP software can be utilized with a cape to act as a controller to control a small matrix (36 P10 or 15 P5 panels) or 2 strings of pixels (approximately 1600 pixels per string at 20 fps, 800 pixels per string at 40 fps.)

The BeagleBone series SBCs have been extensively used with a cape to drive up to 96 P10 or 40 P5 panels (depending on the cape, a PocketBeagle only has 6 ports so can control 72 P10 or 30 P5 panels). The Beagle Bone series SBCs can also support other capes and act as a controller, such as the K4-PB, F8-B/K8-B, F16-B/K16A-B, F32-B/K32A-B, F8-PB/K8-PB, F40D-PB, K40D-PB, OctoPlus etc.

This manual covers the functional aspects of installing, configuring and operating the FPP, the most popular show player for Christmas and Halloween animated lighting displays.

The current version of Falcon Player will run on the following hardware:

- Raspberry Pi 2 Model B
- Raspberry Pi 3 Model B
- Raspberry Pi 3 Model B+
- Raspberry Pi 3 Model A+
- Raspberry Pi 4 Model B
- Raspberry Pi Zero-W
- Raspberry Pi Zero (A micro USB hub might be needed)
- BeagleBone Black (Rev C)
- BeagleBone Black Wireless
- BeagleBone Green
- BeagleBone Green Wireless (not recommended if using any capes)
- BeagleBone Gateway
- PocketBeagle

The philosophy of the FPP developers is to make the FPP as easy to install and use as possible, while still providing for much of the flexibility required by a diverse group of enthusiasts.

The FPP software is free to download and use and is provided by and supported by a number of volunteers.

Please refer to the Falcon Christmas website <https://FalconChristmas.com> for the latest news and discussions. In particular, the FPP forum page on the website is a great resource for help.

## **Acknowledgements**

The developers and authors of this software are volunteers.

A very special thanks go out to our families for supporting us in this hobby. Without their support we could not do this.

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# Hardware Needed

The Raspberry Pi and BeagleBone series SBC's have different requirements and setup instructions. Follow the instructions for your specific case. These instructions are the basics to get your device(s) running. Depending on your setup, you will need additional items after the initial setup to actually run your show (like power supply, network cables, wiring etc.)

## Raspberry Pi

Required Items:

- Supported Raspberry Pi
- Micro SD memory card. 4GB minimum, Class10 or better. 16GB or greater is recommended.(16GB will usually be way more than you will actually need)
- Power Supply for the Pi.
  - 5vdc 2.0A microUSB for the Pi Zero and Pi 2 series
  - 5vdc 2.5A microUSB for Pi 3 series
  - 5vdc 3.0A USB-C for Pi 4 series

Optional Items:

- Ethernet cable (If you are connecting to your network via Ethernet or want to use the Network Configuration process)
- USB to Micro USB cable (for devices that support USB Tethering. USB Tethering is usually an easier process)
- Wi-Fi USB adapter if you're using a Pi that does not have built-in Wi-Fi (Edimax Nano is recommended but it is best to stick with a 2.4Ghz only, the some of the 5Ghz cards have compatibility issues)
- Cape installed if you are using one.

## BeagleBone series (BB)

It is recommended to use the Beaglebone Black, BeagleBone Green or PocketBeagle. The BeagleBone Green Wireless cannot be used with capes.

Required Items:

- Supported BeagleBone SBC
- Micro SD memory card. 4GB minimum, Class10 or better. 16GB or greater is recommended. (16GB will usually be way more than you will actually need)
- Appropriate power supply.
- **If you are using a PocketBeagle- A Wireless USB adapter or USB Ethernet adapter is required to complete your setup depending on how you are going to connect your FPP to your network.** (Edimax Nano is recommended but it is best to stick with a 2.4Ghz only, most of the 5Ghz cards have compatibility issues)

Optional Items:

- Ethernet Cable (if you are connecting your FPP device to the network via Ethernet or want to use the Network Configuration process)
- USB Cable- If you want to install and configure the FPP device using the USB Tether method then you will need a USB to Mini USB cable (Micro USB if you are using a PocketBeagle or BeagleBone Green.) The USB Tethering method of installation is probably the easiest for the BeagleBone based devices.
- Octoscroller type Cape if connecting the BB to (P10/P5) Panels
- Other cape if you are using one.

# FPP Quick Start Guide

This section will give you the basic configurations to get you up and running but may not be the ultimate configuration that you will need to get your show up and running. Refer to the [FPP Details](#) for more in depth explanations of each function/setting of FPP.

## Installing the FPP Software

### Required Programs

To install the software, you will need a couple programs, one for formatting the MicroSD card and one for “burning” the image.

**Note: You cannot just copy the files to the card!**

If you don't have programs to accomplish this, here are a couple suggestions:

An SD card formatter

<https://www.sdcard.org/downloads/index.html> has a version for both Mac and Windows.

<https://gparted.org/> has a version for Linux systems.

An image writer program

<https://www.balena.io/etcher/> has a version for Windows, Mac and Linux operating systems.

<https://sourceforge.net/projects/dotnetdiskimager/> is a good option for Windows users.

There was a Step by Step instructional class presented at the Virtual Christmas Summit in July of 2020 that at the time of this manual is the most current method of installation and it is at <https://www.youtube.com/watch?v=ZV4o11XiaU0&t=108s>.

Canispater Christmas has some great tutorials with a nice sense of humor and he has one on how to install the FPP software at [https://youtu.be/X95Rv4JGG\\_Y](https://youtu.be/X95Rv4JGG_Y) and you can follow the instructions there if you like but the videos might be out of date.

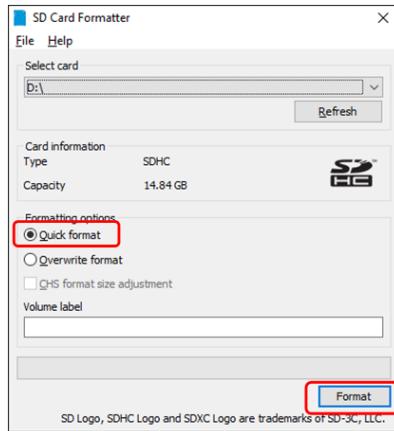
Note: If this is the **first** time you are installing a version of FPP greater than 2.0 on a BeagleBone **Black** (not any other derivative) then you have to hold down the boot button as shown in the video on powering up. Some people miss this while watching the video.

If you don't know how you are going to use FPP in your network, you should refer to the [Common Network Setups](#) section of the manual.

### Configuring the Micro SD (uSD) Card

After you have installed the two programs listed above (or use the versions that you have), then insert the MicroSD (uSD) card into your computer and do a Quick Format using the Formatting software (Not Windows or MAC file managers).

Below is a Windows screenshot using the SD Card Formatting software as an example:



## Getting the FPP software

You will then need to go to <https://github.com/FalconChristmas/fpp/releases> and download the **most current Image File, not the source code for your application! The Image file has the .img.zip in the file name.**

The Image Files are the files that start with FPP and then indicate the version and SBC image. Download the file that corresponds to the SBC you are using (Pi or BB). On the Github website there will be several releases listed. Not all of them have an image available. Scroll down until you find the first version with the images.

Note: There is a Pi-Kiosk image for advanced users that need a standalone application where the FPP device is connected to a monitor, mouse and keyboard, but this is **not** the recommended method to use.

Note: you might have to expand the Assets section to see if an image is available.

Here is an example of the most current release as of September 2020 (pick the most current release for your application)

### Before expanding

**4.2**  
dkulp released this 2 days ago · 0 commits to master since this release

**Enhancements**

- Support for new Beaglebone Green Gateway including the onboard WiFi and Ethernet. All capes that can physically fit onto the BBGG should work, but the double height USB connector on the BBGG will interfere with some capes. (like the K8-B/F8-B) \* (requires new image)
- Support for rtl812au based USB WiFi adapters \* (requires new image)
- Added support for PocketBeagle capes that use ttyS1 UART
- Bunch of updates to fsequtils command line utility for merging and converting fseq files
- Support for non-C++ plugins to be able to create FPP Commands (future plugins will use this)
- Added Hinkspix and AlphaPix controller discovery from network scan
- Support for using FLAC for media
- Store which temperature unit is used for display
- New "8 Pixel Clustered Zig/Zag" setting for 1/2 scan P10 panels
- Faster bootup on Beaglebones by preload some required modules \* (requires new image)

**Selecting an image**

For Raspberry Pi series including Pi 0, Pi B, Pi B+, Pi 3, Pi 3+, Pi 4 and Pi Zero use one of these images

- FPP-v4.2-Pi.img.zip
- FPP-v4.2-Pi-Kiosk.img.zip

For Beaglebone Black, Beaglebone Green, PocketBeagle, and Beaglebone Green Gateway use this image

- FPP-v4.2-BBB.img.zip

+ Assets ↗

## After Expanding:

### Selecting an image

For Raspberry Pi series including Pi B, Pi B+, Pi 3, Pi 3+, Pi 4 and Pi Zero use one of these images

- FPP-v4.2-Pi.img.zip
- FPP-v4.2-Pi-Kiosk.img.zip

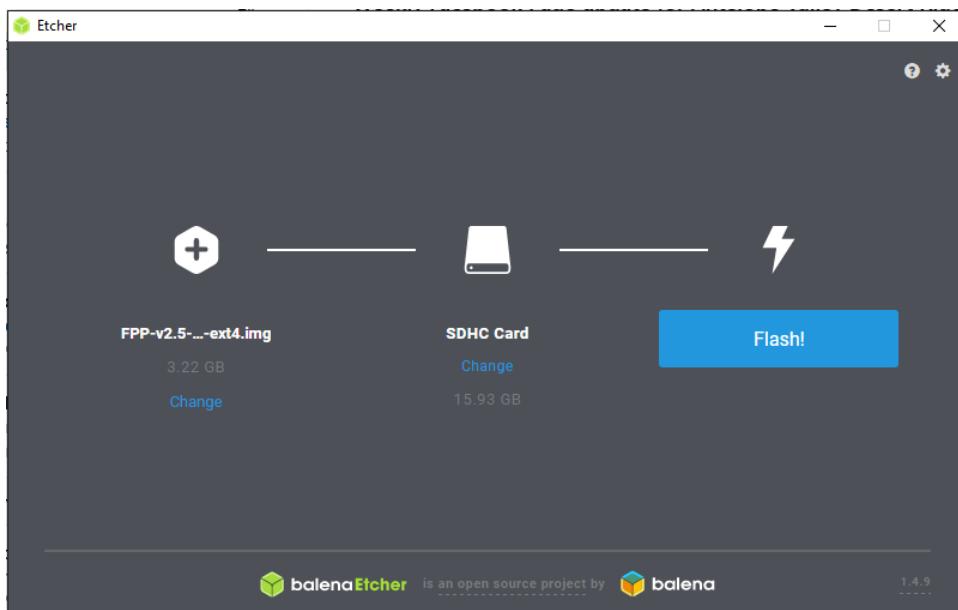
For Beaglebone Black, Beaglebone Green, PocketBeagle, and Beaglebone Green Gateway use this image

- FPP-v4.2-BBB.img.zip

Assets 7	
⌚ BBB-v4.2.fppos	605 MB
⌚ FPP-v4.2-BBB.img.zip	861 MB
⌚ FPP-v4.2-Pi-Kiosk.img.zip	1.2 GB
⌚ FPP-v4.2-Pi.img.zip	934 MB
⌚ Pi-v4.2.fppos	713 MB
⬇ Source code (zip)	
⬇ Source code (tar.gz)	

**Depending on your image-writing software, you may have to unzip the file before you can use it.**

Once you have downloaded the zip file for your application, you might have to extract the file first, depending on your imaging program. Then you have to burn the image onto the uSD card using the software for burning images (in this case, I am using Etcher) Make sure you are flashing the .img file and not the .zip file if your imaging software does not support imaging from a .zip file. If you are not sure, unzip the file first.



The image that is burned onto the card is not in a format that Windows or Macs can read so you might get an error message after the image is burned. DO NOT perform the format process after you have loaded the image.

Once you have the image file on the uSD card, make sure your Pi or BB is turned off and insert the uSD card into your Pi/BB.

Note: Some capes have RJ45 ports but they are NOT Ethernet ports they are used for DMX or Differential Receivers. They are not network connections and you cannot use these ports for initial setup.

## Software Installation

**FPP is configured from a Web based interface, you do not need to connect a monitor directly to the FPP and you can't access FPP directly using a keyboard and monitor connected to the Pi!**

You will access the FPP interface from your computer using a web browser.

**Note: Google Chrome is recommended. Internet Explorer and Microsoft Edge have problems displaying the interface correctly.**

Before you begin the software installation and configuration process, you should decide how you are ultimately going to have your FPP device connected to your network, either Wi-Fi, Ethernet, or in a few cases both. And then make sure that your FPP device has the appropriate connection or adapter installed prior to installing/configuring FPP. You also need to know what your home network router's IP address is (the 2 most common ones are 192.168.0.1 and 192.168.1.1 but there are many other common ones as well)

**Note: If your home router has an IP address with a subnet of 192.168.6.xxx, 192.168.7.xxx or 192.168.8.xxx then your FPP will have problems communicating in these environments. Those subnets are the default subnets used by Windows, Mac and Linux for USB tethering and could cause conflicts. You should change your home network to a different subnet to avoid problems.**

If you don't know how you are going to use FPP in your network, you should refer to the [Common Network Setups](#) section of the manual.

If you are unsure how you are going to ultimately configure your show network, then it is recommended to use the Network Connection installation process.

Due to the different configurations of each model of Pi and BeagleBone, the software installation is different and there can be more than one way to install the software. The following steps are a suggested method of installing the software on each model of SBC.

There are 3 basic ways of installing the software onto your FPP device and they are:

**USB Tethering-** USB Tethering is probably the easiest method to install and configure FPP. To install and configure FPP using USB Tethering, you will connect your computer directly to the FPP device with a USB cable. There are only a few devices that support USB Tethering.

The following devices can have the software installed and configured using USB Tethering:

- Raspberry Pi Zero W
- BeagleBone Black
- PocketBeagle
- BeagleBone Green

- BeagleBone Green Gateway

**Network Connection-** Installing and configuring the FPP software through a network connection can be accomplished almost as easily as the USB Tethering method. To install and configure your FPP device using a Network Connection requires you to connect your FPP device to your local network via an Ethernet cable. (**Not directly to your computer, that requires some advanced configuration**) If your FPP device does not have an Ethernet adapter, then you can usually install a USB to Ethernet adapter or choose another method to install and configure your FPP device.

Any of the Pis or BeagleBone SBCs can have the software installed and configured using the Network Connection method if they have an Ethernet connection or Ethernet adapter installed.

**Wi-Fi Tethering-** If you don't have a way to install and configure the FPP software through one of the more traditional methods, you can use the Wi-Fi tethering method on any FPP device that has Wi-Fi tethering capabilities, either on board or through a Wi-Fi adapter (**not all USB Wi-Fi adapters support Wi-Fi tethering.**)

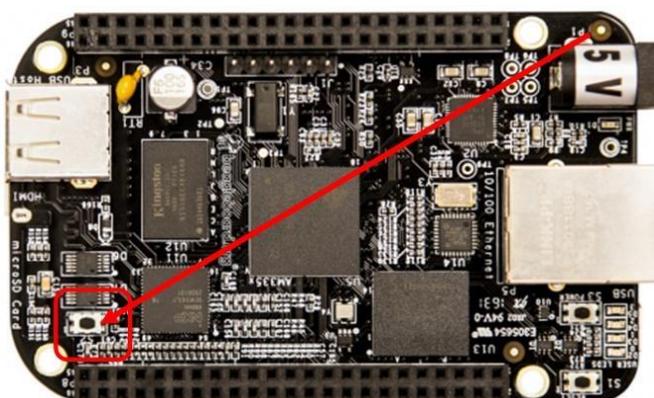
**Note: If the FPP device needs an adapter for a network connection that you are going to use for your network connection, then make sure it is installed before you start your setup.** (Like a BeagleBone Black that you want to connect to your network via Wi-Fi)

## USB Tethering Installation

**Note: If the FPP device needs an adapter for a network connection that you are going to use for your network connection then make sure it is installed before you start your setup.** (Like a PocketBeagle that you are going to ultimately connect via Wi-Fi)

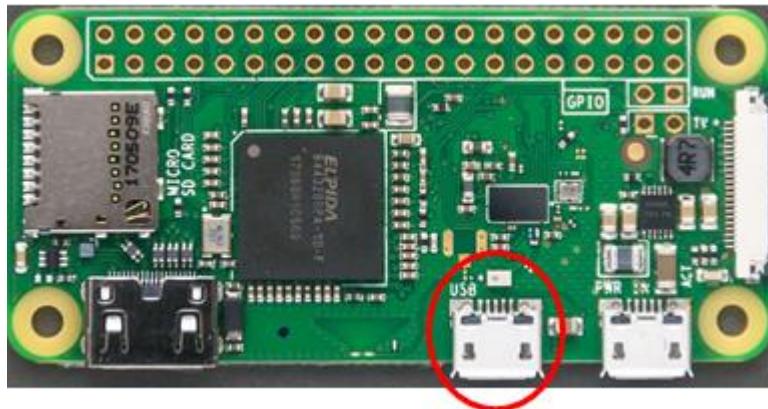
Note: Some capes will draw more current than a USB connection can provide, it is recommended to remove any capes before you connect the USB cable.

1. Make sure the uSD card with the proper image is inserted into the slot.
2. Make sure you have any network adapters that you will need for your network configuration.
3. Connect one end of the USB cable to your computer.
4. If you are installing to a BeagleBone **Black** and it is the **first time** that an FPP version release 2.0 or higher is being installed, then press and hold the S2 button and plug in the USB cable. Hold the S2 button for 5 seconds after you connect the power supply. (Located near the uSD card.)



5. All other devices-plug the USB cable into the FPP device.

Note: The Raspberry Pi Zero has two places to connect a micro USB. One is for power only and one is for USB. Make sure you plug the USB cord into the USB Port.

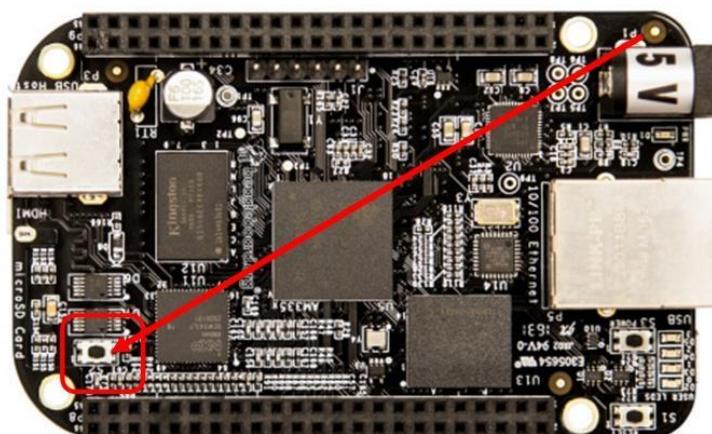


6. Wait approximately one minute (A Pi Zero might take slightly longer).
7. Open a web browser on your computer and if you are using a Windows computer, then enter 192.168.7.2 in the browsers address bar, if you are using a Mac or Linux computer then enter 192.168.6.2.
8. Continue to the [Initial Configuration](#) section of the manual to complete the setup.

## Network Connection Installation

**Note: If the FPP device needs an adapter for a network connection that you are going to use for your network connection, then make sure it is installed before you start your setup.** (Like a BeagleBone Black that you want to connect to your network via Wi-Fi)

1. Make sure the uSD card with the proper image is inserted into the slot.
2. Make sure you have any network adapters that you will need for your network configuration.
3. Connect the Raspberry Pi/BB to your router with the Ethernet cable.
4. If you are installing to a BeagleBone **Black** and it is the **first time** that an FPP version release 2.0 or higher is being installed, then press and hold the S2 button and plug in the appropriate power supply. Hold the S2 button for 5 seconds after you connect the power supply. (Located near the uSD card.)



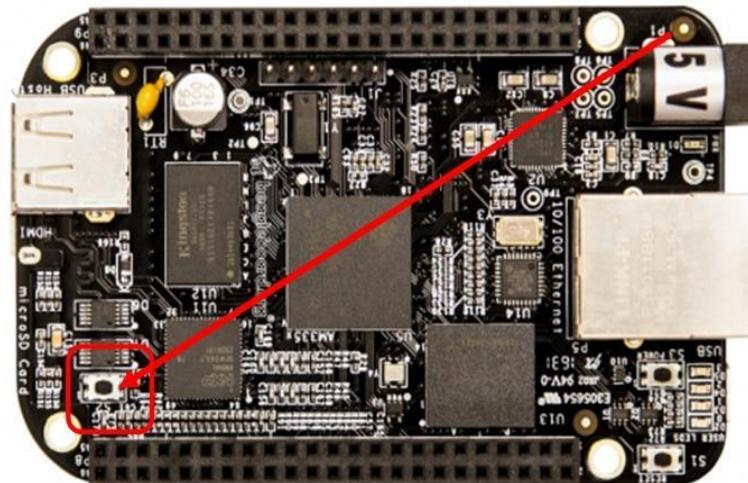
5. All other devices-connect the appropriate power to the device.
6. Wait approximately one minute (A Pi Zero might take slightly longer).
7. Enter <http://fpp> or <http://fpp.local/> in your browser. (If you are unable to connect to the FPP device using one of these addresses, go to the [Troubleshooting](#) section.)
8. Continue to the [Initial Configuration](#) section of the manual to complete the setup.

## Wi-Fi Tethering Installation

You can use Wi-Fi Tethering if your FPP device supports Wi-Fi Tethering. You can also use this method if your FPP Device cannot connect to your network so that you can make changes without having to erase the uSD card.

This will require using a computer with a wireless connection. Depending on your computer operating system, the method and screenshots will be slightly different.

1. Make sure the uSD card with the proper image is inserted into the slot.
2. Make sure you have any network adapters that you will need for your network configuration.
- Note: Many Wi-Fi adapters do NOT support Wi-Fi tethering (on board Wi-Fi usually does) so if you installed a USB Wi-Fi adapter the Wi-Fi tethering might not work.**
3. If you are installing on a BeagleBone **Black** and it is the **first time** that an FPP version release 2.0 or higher is being installed, then press and hold the S2 button and plug in the appropriate power supply. Hold the S2 button for 5 seconds after you connect the power supply. (Located near the uSD card.)
- 4.



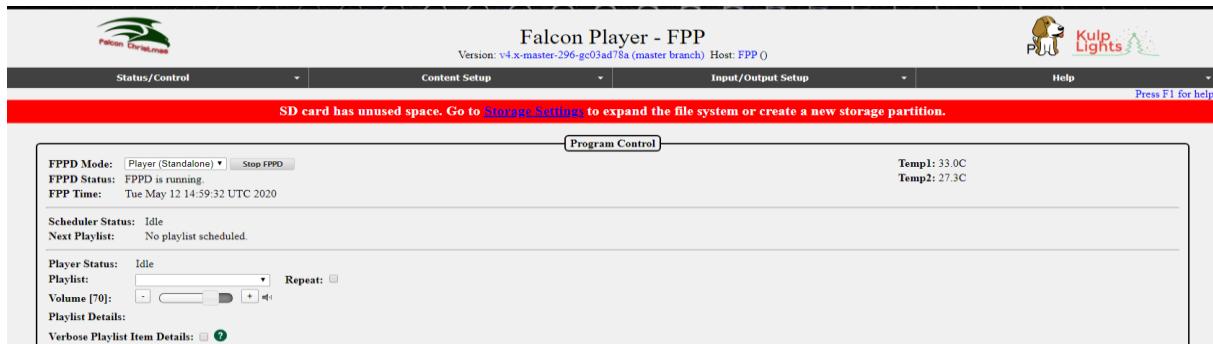
5. All other devices-connect the appropriate power to the device.
6. Wait approximately one minute (A Pi Zero might take slightly longer).
7. Go to your wireless networks on your computer and connect to the wireless network identified as FPP. The password is Christmas. (This process will vary depending on your operating system)
8. Type in 192.168.8.1 in your web browser to open the user interface.
9. Continue to the [Initial Configuration](#) section of the manual to complete the setup.

# Initial Configuration

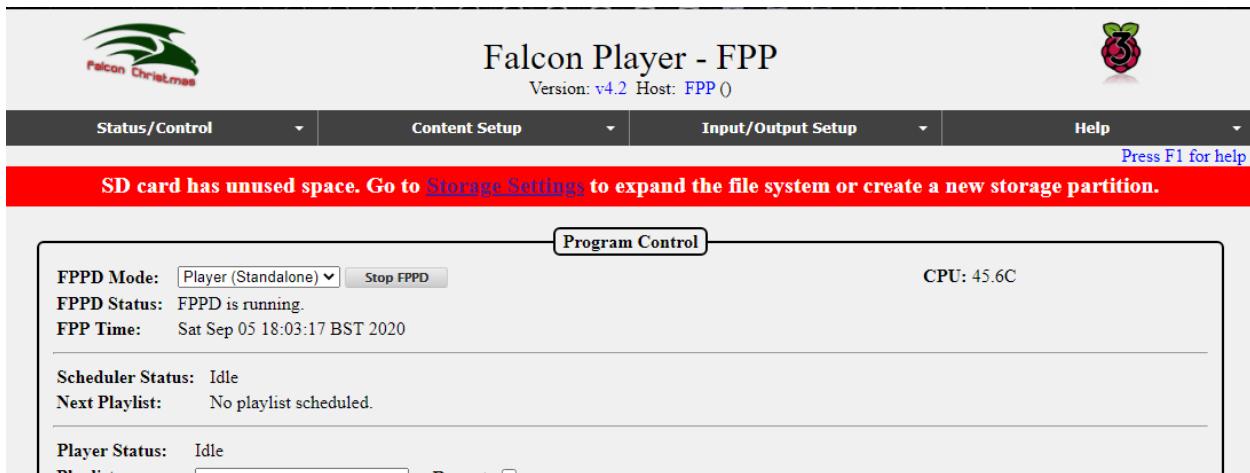
Once the FPP has been installed on your Pi/BB, then you need to complete your setup.

Your screen will look similar to these. The logo on the right will indicate the type of SBC that is being used.

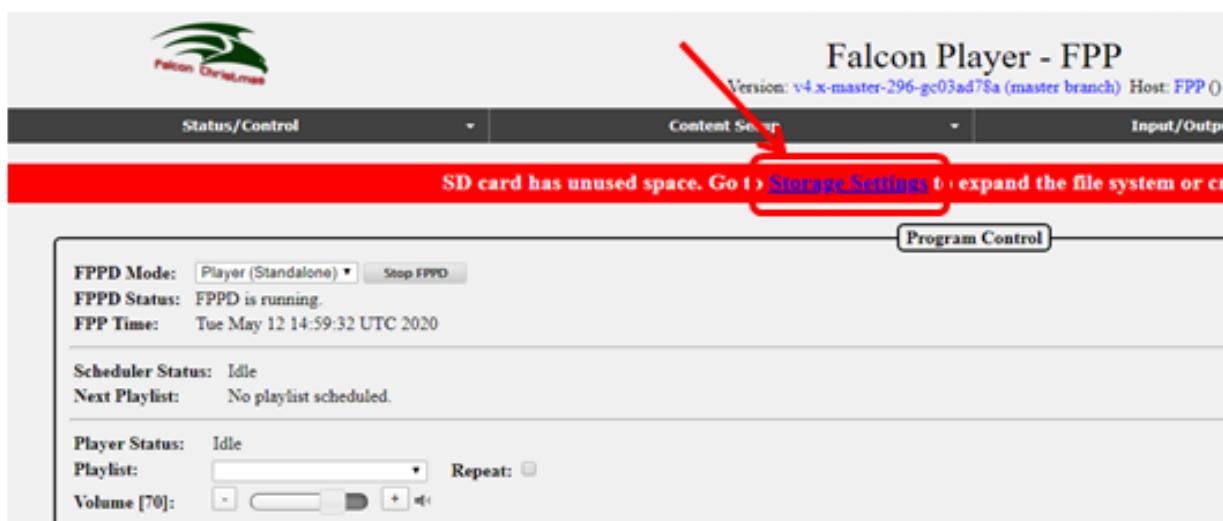
## Beaglebone Device



## Raspberry Pi Device



Click on the Storage Settings that is in the red banner.



Click on the Grow Filesystem button.



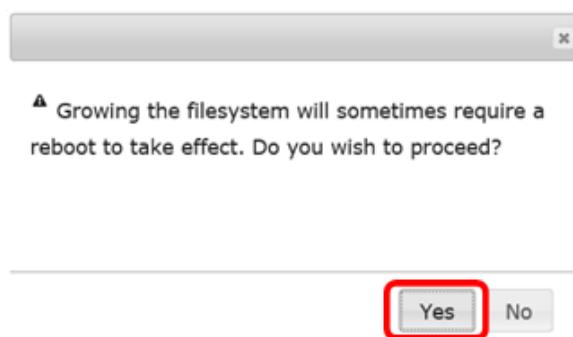
**Storage Device:** mmcblk0p2 - 3.4GB (0.7GB Free) (boot device)  
Changing the storage device to anything other than the SD card is strongly discouraged. There are all kinds of problems that using USB storage introduce into the system which can easily result in various problems include network lag, packet drops, audio clicks/pops, high CPU usage, etc... Using USB storage also results in longer bootup time. In addition, many advanced features and various capes/hats are known to NOT work when using USB storage.

In addition to the above, since it is not recommended, using USB storage is not tested nearly as extensively by the FPP developers. Thus, upgrades (even "patch" upgrades) have a higher risk of unexpected problems. By selecting a USB storage device, you assume much higher risk of problems and issues than when selecting an SD partition.

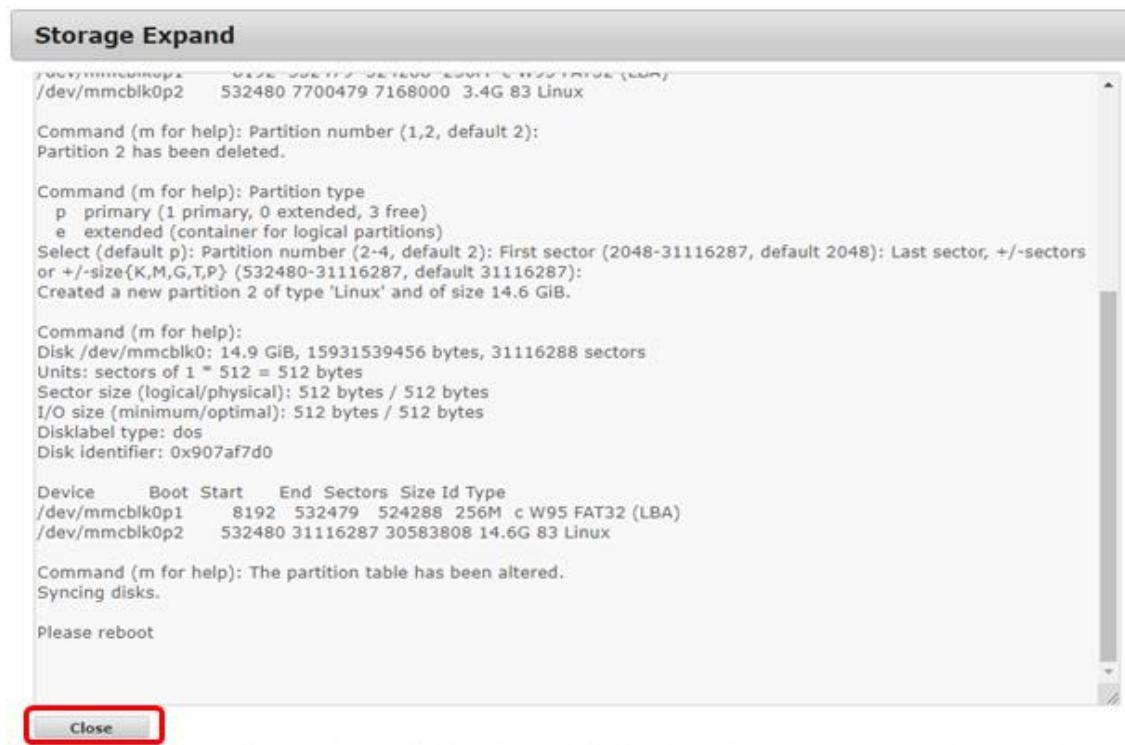
**SD Card Actions:**

**Grow Filesystem** This will grow the file system on the SD card to use the entire size of the SD card.

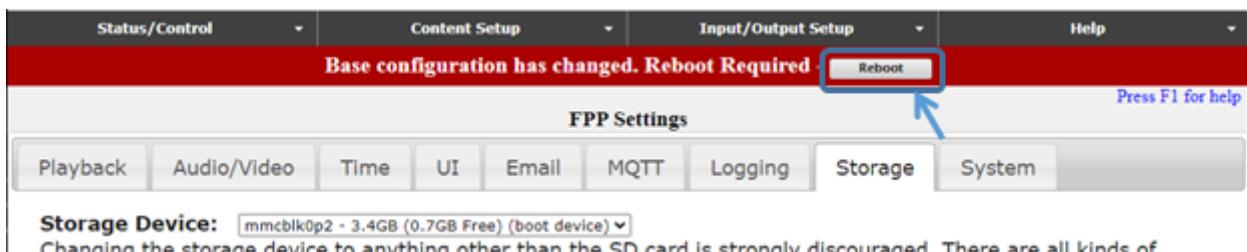
This should bring you to this screen, click on Yes:



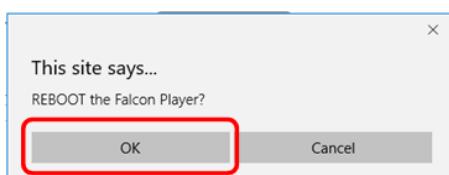
You should get to a screen similar to this, click on the Close button



When you get back to the main screen, click on the Reboot button



You will get a confirmation screen, click on “OK”



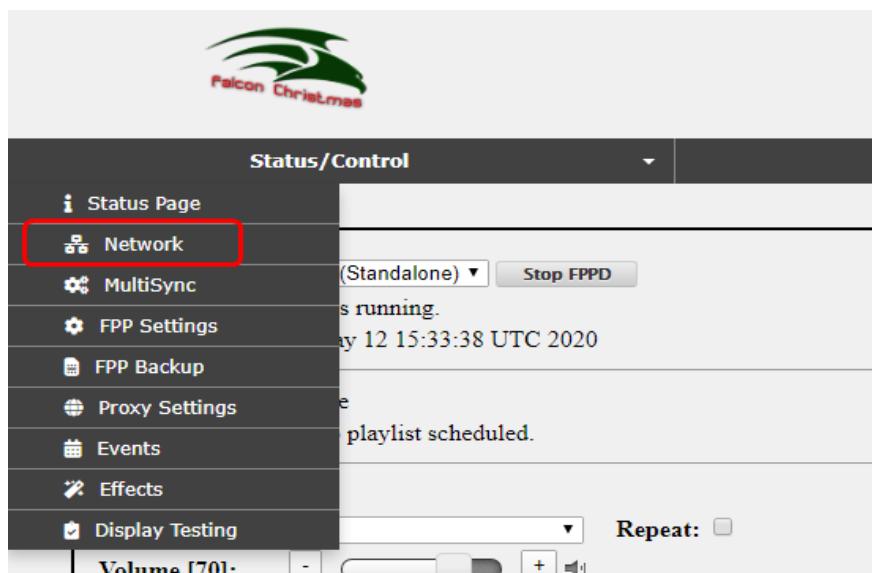
It will take several seconds for it to reboot (Pi Zeros could take about a minute to boot). After it reboots, you will need to set up other configurations and update the system to the current version. This is covered in the next section.

**Note: If you were using the Wi-Fi tethering method, then you will need to log into the FPP network and to the web page once the device has rebooted.**

## Initial Network Configuration

You should have decided how you want your network configured before you edit your network settings. If you are not sure, then refer to the [Network Configuration](#) section of the manual for more information. If you want a temporary network configuration you can use the [Wired with Separate Show Network](#) configuration so that you update the software and make final configurations before use the FPP in your final network configuration. This would be a good configuration for testing purposes as well.

Click on the Status/Control and then Network tab.



You should have a screen similar to this:

The screenshot shows two stacked configuration panels. The top panel is titled "Network Configuration" and contains fields for WiFi Drivers (set to External), Interface Name (wlan0), Interface Mode (set to DHCP), and Wireless Settings (WPA SSID and WPA Pre Shared key (PSK)). It also includes "Ping" buttons for IP Address, Netmask, and Gateway. The bottom panel is titled "Host & DNS Settings" and contains fields for HostName (FPP), Description, DNS Server Mode (set to DHCP), and DNS Server 1/2. It also includes "Ping" buttons for DNS Server 1 and 2. Both panels feature "Update Interface" and "Update DNS" buttons at the bottom.

## Wi-Fi Network settings

If you do not need to configure a Wi-Fi connection, then skip to the [Ethernet Network Settings](#) section.

### Note: Many Wi-Fi adapters do not support 5 GHz.

Normally the External Wi-Fi drivers work best so keep that setting.

1. Click on the wlan0 interface (wlan0 is the wireless interface)
2. Select DHCP if you want your router to assign the IP address, select Static if you want to assign the IP address yourself.  
Note: If you use DHCP, then the Host Name and DNS server is important to be configured correctly.
3. If you selected the Static option, enter your IP address, the Netmask should usually be 255.255.255.0 (it should be the same as your show or home network router) and the Gateway will be the IP address of your home or show router and will usually get filled in, but make sure it is correct.
4. Enter your WPA SSID and WPA Pre Shared Key (PSK). The WPA SSID is the name of your wireless network. The WPA Pre Shared key (PSK) is the password for your wireless network.
5. After you enter your wireless name and password, click on Update Interface
6. The Restart Network button will appear. **Do Not click on the Restart Network button.**

Network Configuration

Interface Settings

WIFI Drivers: External

Select an interface name to configure the network information for that interface.

Interface Name: 1 wlan0

Interface Mode: 2 Static  DHCP

IP Address: 3

Netmask: 3

Gateway: 3

Wireless Settings:

WPA SSID: 4

WPA Pre Shared key (PSK): 4

Hidden

5 Update Interface Create Persistent Names Clear Persistent Names

## Ethernet Network Settings

If you do not need to configure an Ethernet connection, then skip to the [Host & DNS Settings](#) section.

1. Click on the eth0 interface (eth0 is the wired interface)
2. Select DHCP if you want your router to assign the IP address, select Static if you want to assign the IP address yourself. (Static is recommended)
3. If you selected the Static option, enter your IP address, the Netmask should usually be 255.255.255.0 (it should be the same as your show or home network router) and will usually get filled in automatically.
4. **If you are using both network interfaces** (wlan0 and eth0) such as connecting to your home network through Wi-Fi and connecting to a controller or switch through the eth0 interface then **make sure the Gateway on the eth0 interface is left blank** while the Gateway on the wlan0 interface is set to your home (or show) Wi-Fi router (only one interface should have a gateway defined all other interfaces should leave the gateway blank).
5. If you selected the Static option and are not using the wlan0 interface, the Gateway will be the IP address of your home or show router and will usually get filled in, but make sure it is correct.
6. After you made sure that you have the correct Gateway address, click on Update Interface.
7. The Restart Network button will appear. **Do Not click on the Restart Network button.**

## Host & DNS Settings

The HostName is the “human” name that you can use to access your FPP. It is like typing google.com instead of typing 172.217.3.174 but be aware that if you don’t have a proper DNS server set up or another part of your network isn’t configured properly, then the HostName might not work properly but you will still be able to access the FPP by typing in the IP address. You will need to change the HostName to something that is meaningful to you. Something like FPPMaster, FrontLawn, HouseOutline, whatever fits your situation and makes sense to you. If you are not going to have any other FPP instances then you can keep it as FPP if you want but it is not recommended because in this hobby, people have a tendency to expand their show and it is highly recommended that you rename it so there will be no confusion in the future. The HostName can only have letters, numbers, and hyphens (-). It may not begin or end with a hyphen and cannot have any spaces. Once you change

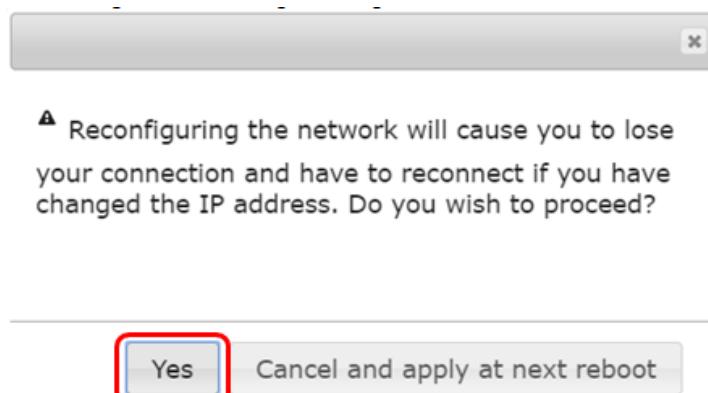
the HostName you will no longer be able to access it in your web browser using <http://fpp.local/>. You can access it using the name that you just created or the IP address, which is why the name should make sense to you. Make sure you save your name after entering it. So if you change the HostName to YardProps, then you could access the FPP by typing <http://Yardprops.local/>. You can also add more descriptive information about this FPP in the Description box that will show up in other sections of FPP such as Multisync.

The screenshot shows the Network Configuration interface. At the top, there are tabs for "Network Configuration" and "Interface Settings". Under "Network Configuration", the "WIFI Drivers" dropdown is set to "External". The "Interface Name" dropdown is set to "wlan0". The "Interface Mode" is set to "DHCP". Below this, there are fields for "IP Address", "Netmask", and "Gateway", each with a "Ping" button. Under "Wireless Settings", the "WPA SSID" is "HarrisChristmas" and the "WPA Pre Shared key (PSK)" is "6618163951". There is a checkbox for "Hidden". A "Update Interface" button is at the bottom. In the "Host & DNS Settings" section, the "HostName" is "YourMeaningfulName" and the "Description" is empty. There are two "Save" buttons: one red-bordered and one grey.

If the FPP is going to be connected to a Wi-Fi interface and to a controller with an Ethernet cable or as a Standalone player sending data to a switch via Ethernet, then you need to check the box at the bottom of the page to allow the data to pass through the FPP to the eth0 (this does not apply if you are using a cape or hat or running in Standalone mode.)

The screenshot shows the Tethering and Interface Routing configuration interface. At the top, there is a "Tethering" tab. Under "Tethering", the "Tethering Mode" is "If no connection", the "Tethering SSID" is "FPP", and the "Tethering Pre Shared key (PSK)" is "Christmas". A warning message states: "Warning: Turning on tethering may make FPP unavailable. Many WIFI adapters do not support simultaneous tethering and client modes. Having multiple WIFI adapters will work, but it's relatively unpredictable as to which WIFI adapter CONNMAN will bring tethering up on. Also, enabling tethering disables the automatic IP assignment on the USB0/1 interfaces on the BeagleBones and thus connecting to the BeagleBone via a USB cable will require you to manually set the IP address to 192.168.6.1 (OSX/Linux) or 192.168.7.1 (Windows)." Below this is an "Interface Routing" tab. A red box highlights the checkbox "Enable Routing between network interfaces".

Once you have configured all of your network settings, eth0, wlan0, Host and DNS, double check them to make sure they are correct. If they are correct, then click on the Restart Network button. You will get the following message:



Click on the Yes button.

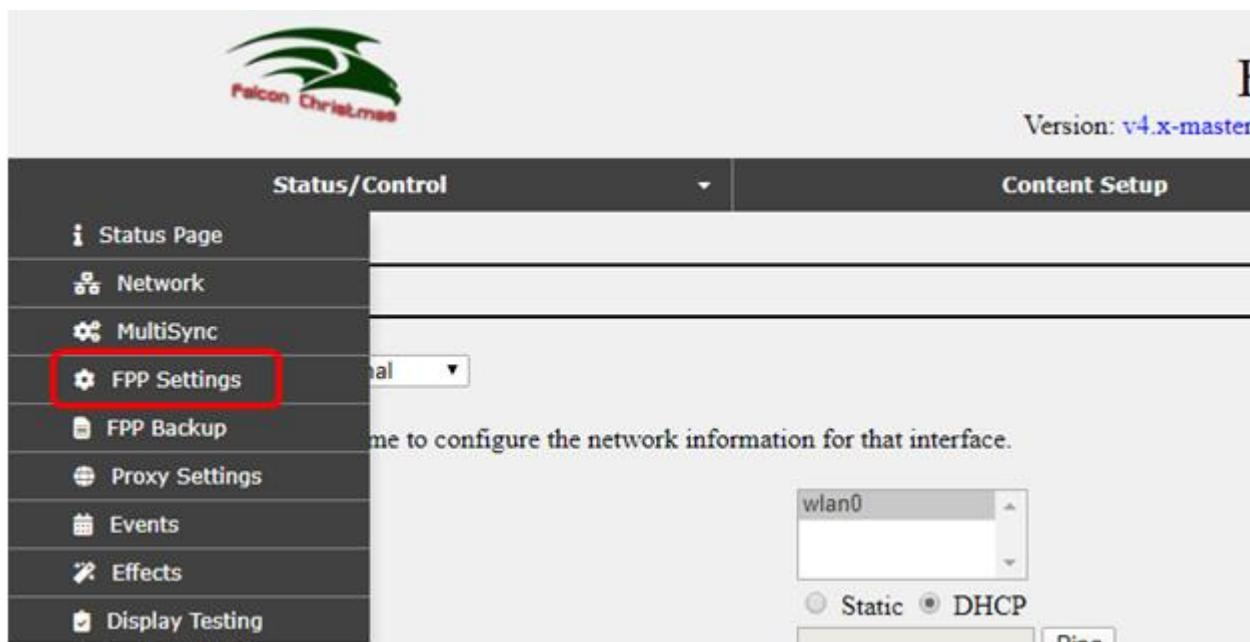
**At this point, your FPP will need to be connected to your network based on the configuration you set it for during the installation. It is recommended to click on the Shutdown button on the bottom of the screen before turning off or disconnecting the power.**



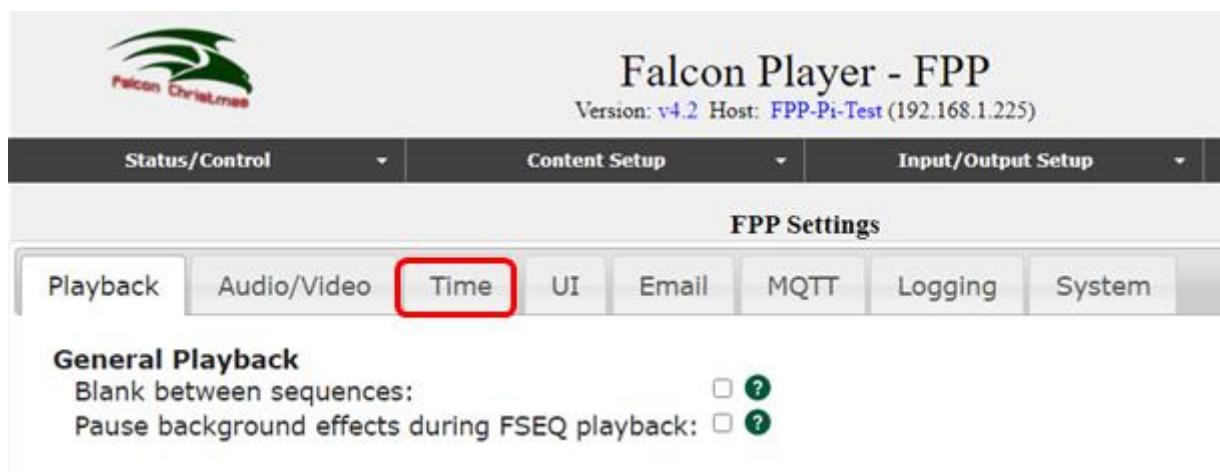
# Final configurations

Once you have your FPP connected to the network based on the configuration you entered in your network settings, you will have to open the FPP's web page. You can get to the FPP device by typing the Host Name or IP address that you configured (or if it was DHCP assigned, then the IP address that your router assigned it). If you cannot get to the FPP page, refer to the [Troubleshooting](#) section.

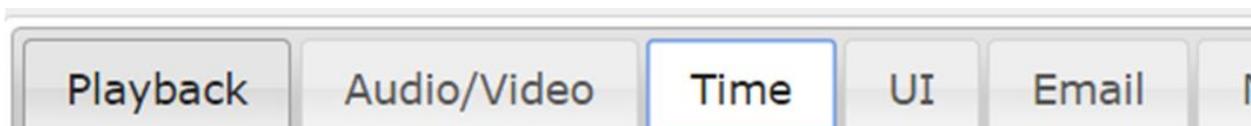
The next step is to configure your time settings, click on Status/Control and then FPP Settings.



This will get you to this page. Click on the Time Tab.



In most setup configurations, the FPP will have access to the internet and you can use the internet to keep the correct time.



## Time Config

Set Date:  (YYYY-MM-DD) ?

Set Time:  (HH:MM:SS) ?

Real Time Clock: pcf8523 (Kulp / Adafruit PiRTC) ?

Enable NTP:  ?

Time Zone: America/New\_York ?

[Lookup Time Zone](#)

To use the internet to keep accurate time, select Enable NTP and select the correct time zone. NTP is Network Time Protocol and will get the current time from the internet. You can use the “Lookup Time Zone” button to get your Time Zone (if your network is hosted in a different location, then this might give you the wrong time zone.)

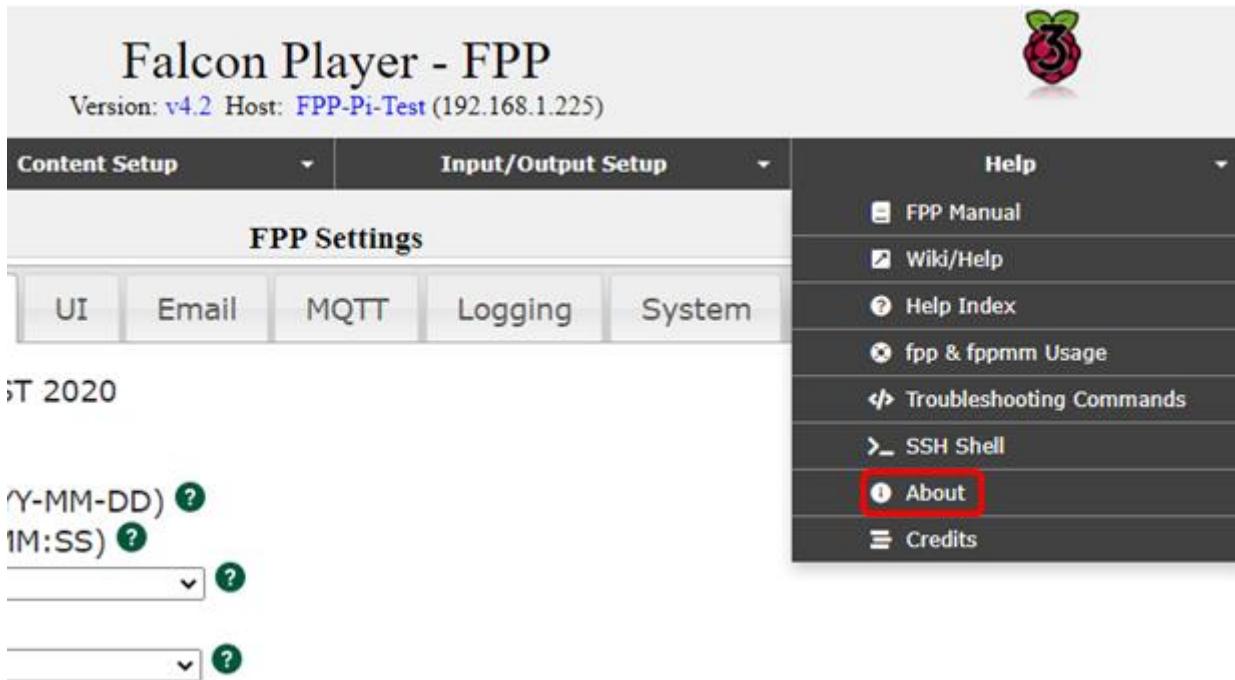
Once you make the change, you will need to Restart the FPPD.

A screenshot of the FPPD software interface. At the top, there is a red banner with the text 'Settings have changed. FPPD Restart Required - [Restart FPPD](#)'. Below the banner, there is a navigation bar with tabs: Status/Control, Content Setup, Input/Output Setup, Playback, Audio/Video, Time, UI, Email, MQTT, Logging, and System. The 'Time' tab is selected. In the main content area, the 'Time Config' section is shown, which includes fields for Set Date, Set Time, Real Time Clock (set to pcf8523), Enable NTP (checked), Time Zone (set to America/Boise), and a 'Lookup Time Zone' button. A red arrow points from the text 'If your FPP will not have access to the internet, then you can manually set the date and time.' down to the 'Restart FPPD' button.

If your FPP will not have access to the internet, then you can manually set the date and time. Most Pi and BB computers do not have a Real Time Clock installed so if you power down the FPP device it will lose the current date and time. If you power down the FPP, you will need to reset the time and date if you need an accurate time (for scheduling the start and stop time of your show). See the [Config/Set Time](#) section for more information.

# Updating the Software

You should update to the current version of the software. To check for updates click on the Help then About:



On this screen, you will see the FPP Version you are using (in this case it is 4.2) and if there is an update available, it will give you a notice. Click on the Update FPP button.

If next to Remote Git Version it says Unknown, that usually means FPP cannot reach the Internet. In most cases that means your network (usually the DNS configuration) is not set up properly. Refer to the [Troubleshooting](#) section for help.

A screenshot of the "About" screen in FPP. It shows "Version Info" with details like FPP Version: v4.2, Platform: Raspberry Pi (Pi 3 Model B), OS Version: Raspbian GNU/Linux 10 (buster), and Kernel Version: 5.4.51-v7+. It also shows "Player Stats" with counts for Playlists, Sequences, Audio Files, Videos, Events, and Effects. There are sections for "Local Git Version" (c03ad78) and "Remote Git Version" (da99e53), both with "Update is available" links. A "Upgrade FPP" button is present. The "System Utilization" section shows CPU Usage: 0.00% and Memory Usage: 18.77%. On the right, there are sections for "Disk Utilization", "Root Free S", and "Media Free S".

You will get a progress screen similar to this; it could take several minutes to update:

## FPP Upgrade

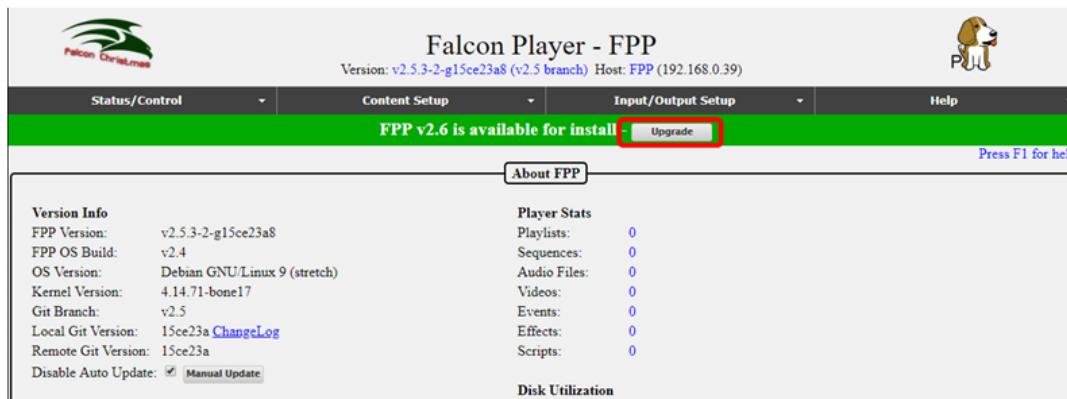
```
scripts/fpp_booc           |  0 +-
scripts/init_pre_network   | 10 ++
scripts/piRTC               |  7 ++
src/channeloutput/BBB48String.cpp |  4 ++
src/channeloutput/channeloutputthread.c | 20 +++
src/channeloutput/channeloutputthread.h |  2 ++
src/oled/SSD1306DisplayDriver.cpp |  2 ++
src/pru/FalconUtils.hp       |  9 ++
src/pru/FalconWS281x.p      | 39 +++++
www/api/controllers/settings.php |  4 ++
www/backup.php              |  6 ++
www/common.php               | 61 ++++++---
www/common/settings.php     | 11 ++
www/effects.php             |  4 ++
www/fppjson.php            |  6 +
www/js/fpp.js               | 55 ++++++-
www/multisync.php           | 263 ++++++-----+
www/pixeloverlaymodels.php  |  4 ++
www/playlistEntryTypes.json |  6 ++
www/scheduler.php           |  6 ++
www/settings-av.php         |  4 ++
www/settings-email.php      |  4 ++
www/settings-storage.php    | 25 +--
www/settings.json            | 21 ++
www/settings.php             |  2 ++
www/testing.php              | 56 ++++++-
www/troubleshootingCommands.php | 22 +-
36 files changed, 493 insertions(+), 213 deletions(-)
Synchronizing submodule url for 'external/RF24'
Synchronizing submodule url for 'external/rpi-rgb-led-matrix'
Synchronizing submodule url for 'external/rpi_ws281x'
Synchronizing submodule url for 'external/spixels'
```

Once it has updated, look at the bottom of the screen and click on the Close button

```
ccache g++ -fpch-preprocess -O3 -Wno-psabi -pipe -I ./ -fpic -DPLATFORM_BBB
channeloutput/USBDMX.cpp -o channeloutput/USBDMX.o
ccache g++ -shared channeloutput/USBDMX.o -L. -lfpp -o libfpp-co-USBDMX.so
=====
Restarting fppd...
=====
Update Complete.
```

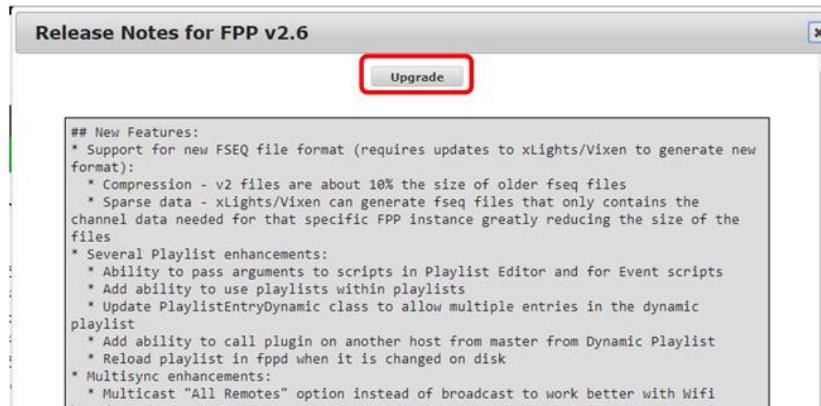
**Close**

Sometimes there will be an additional update available, if so, click on the Upgrade button.

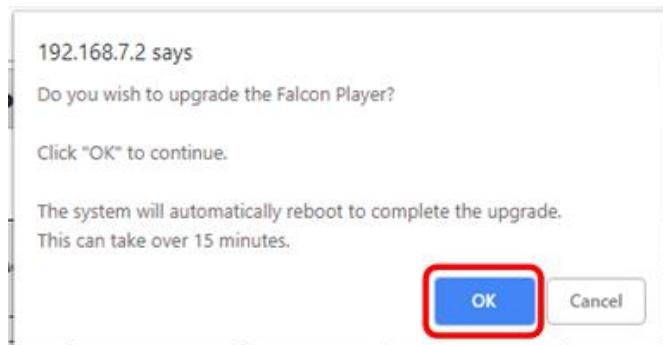


You will usually get a Release notes page; sometimes there are updates that require an update to the Operating System (OS) to get the full functionality and that information will be in the Release notes. Refer to the [Updating Section](#) for more information.

Click on the Upgrade button.



You should get a confirmation page, click OK

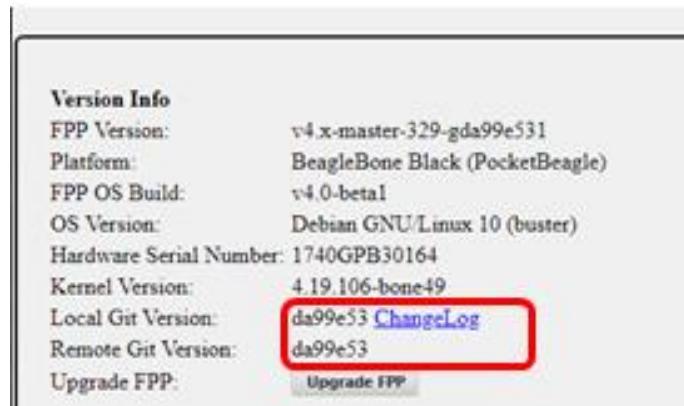


You will get an update screen, once it has updated, look at the bottom of the screen and click on the Close button

```
ccache g++ -fpch-preprocess -O3 -Wno-psabi -pipe -I ./ -fpic -DPLATFORM_BBB  
channeloutput/USBDMX.cpp -o channeloutput/USBDMX.o  
ccache g++ -shared channeloutput/USBDMX.o -L. -lfpp -o libfpp-co-USBDMX.o  
=====  
Restarting fpdd...  
=====  
Update Complete.
```

**Close**

When the update is complete, the screen will return to the About Page. You can verify that it is up to date. If it is up to date, the Local Git version will be the same as the Remote Git Version.



Your FPP software is now installed and up to date. There are many ways that FPP can be used and the settings required to run your show will vary depending on your particular setup. Refer to the appropriate section(s) for more information.

# FPP Details

The following sections go over each section of the FPP interface with more detailed explanation of each feature.

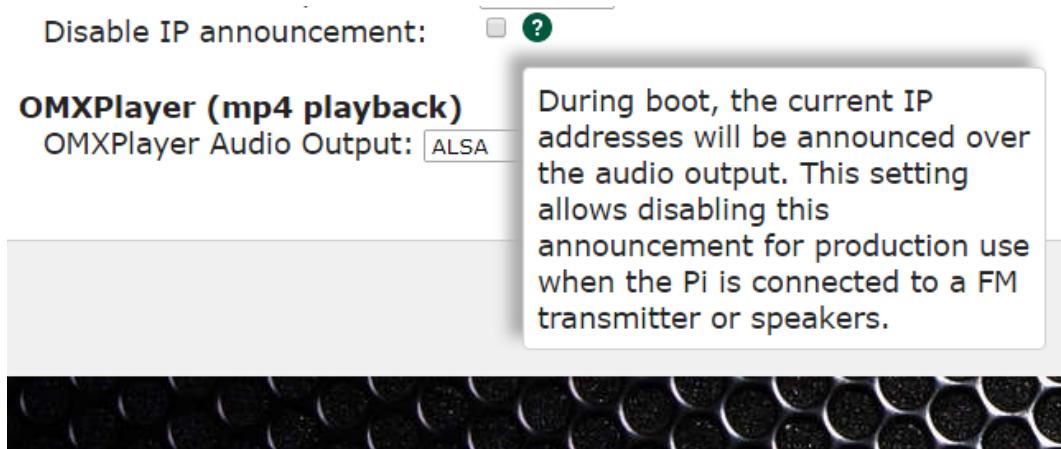
## General Overview

The developers have incorporated several methods to help users out and to explain the functionality of different settings. Most of the settings are loaded based on the device that the FPP is connected to so that it is less confusing. There are also different levels of the User Interface so that the more advanced settings/functions do not clutter up the screens. (Refer to the [UI Settings](#) for more information.)

Many of the settings or options will have a Help popup icon which is identified by the green question mark.

Disable IP announcement:  ?

Hovering your mouse over the question mark will bring up some additional information specific to that item.



## Program Settings and Navigation

The following sections will explain the program sections and settings and explain how they work. Depending on your current setup or version of FPP, the screens might be slightly different. There are 4 main sections in FPP. Status/Control, Content Setup, Input/Output Setup and Help.

At the top of each page is a status/navigation page.



The Main Page is accessed by using a web browser and entering the IP address or HostName of the Raspberry Pi/BB that you previously set up. For example in this case:

192.168.1.101 or http://YardPi.local/ (the actual IP or host name will be different depending on your setup).

1. Main navigation toolbar for different areas for settings/configurations and will be on every page. Clicking on one of these headings will give you more options to choose for that category and will be explained in the section pertaining to that selection below.
2. At the top of each page, the current FPP version number is displayed along with the host name and IP address(es) of the FPP.
  - a. In this case, the Version is 4.1.
  - b. In this case, the HostName is YardPi and can be used to access this FPP using <http://YardPi.local/> (your actual name may be different depending on how you set it up)
  - c. There are two IP addresses listed here, one for the wired (eth0 Ethernet connection) 192.168.101.1 and a wireless (wlan0) connection connecting to my home network, 192.168.1.101, (your IP addresses will be different or missing depending on your setup.) If your network is set up correctly, then you can access the FPP using either IP address.

Note: You will normally need to configure a static route in your computer or router in order to access both subnets (see the [Configuring a Static Route](#) in the Advanced settings)

3. This is a graphical representation of the SBC that the FPP is installed on. It will be different for the different versions of Pi or BB.
4. In the upper right corner is a link that says "Press F1 for help." Clicking on this link or pressing F1 on the keyboard will bring up help topics specific to the page you are currently viewing.



5. At the bottom of each page are controls for the Pi/BB SBC. These are used to reboot or shut down the Pi/BB. The Restart FPPD button, turns off the FPP Daemon, and restarts it. This allows the FPP to reload many of the configuration changes without having to do a full reboot of the Pi/BB.

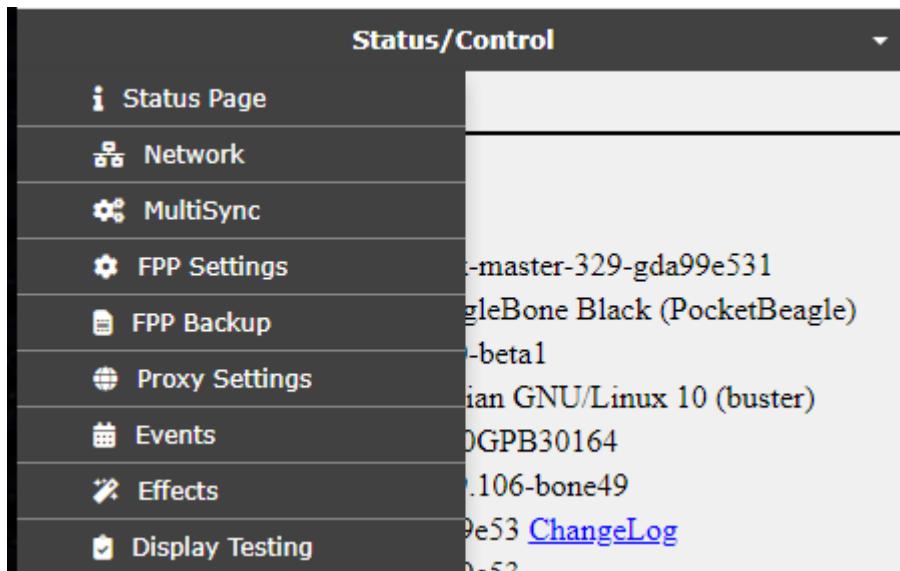


If there is a major upgrade available for the installed version, then a green bar will be displayed to give you the opportunity to upgrade to the next version. Minor versions will have to be manually installed from the Help>About page.



# Status/Control

This section is for various settings and status reports. Clicking on the Status/Control tab will give you several options to choose from:



## Status Page

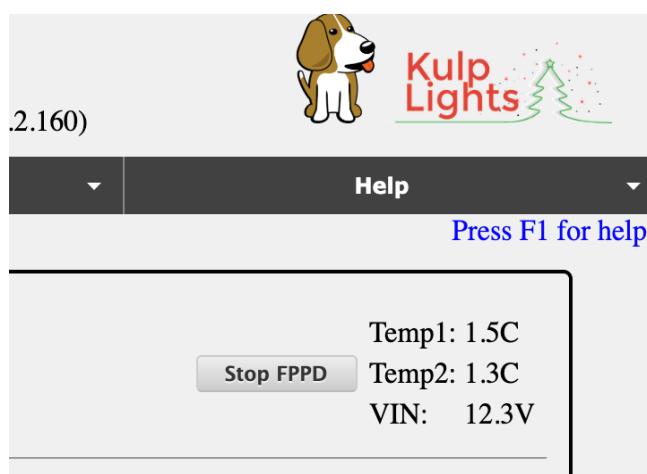
The Status Page is the default page that will load when you first log into FPP.

The screenshot shows the FPP Status Page with the following sections highlighted by numbered boxes:

- Program Control**: Shows FPPD Mode (Player (Master)), FPPD Status (FPPD is running), and FPP Time (Tue Sep 15 15:54:50 MDT 2020). It also displays CPU usage (132.5F) and a red box around the "Abnormal Conditions - May Cause Poor Performance" section which lists three failed ping attempts to DDP Channel Data Targets.
- Scheduler Status**: Shows the current playlist ('2020\_Christmas') and its start time (15:53:47). It includes a "Hard Stop at" button set to 19:00:00, a "Extend" button, and a "5m" button.
- Player Status**: Shows the current song ('06 - Mary Did You Know\_.mp3'), the playlist ('2020\_Christmas'), repeat status (checked), and volume (70%). It also shows elapsed and remaining times (00:09 and 03:13).
- Playlist Details**: Shows a detailed list of songs in the playlist:
  - 1. Seq+Med: Military\_ Intro fseq | military\_intro.mp3 Length: 00:19
  - 2. Seq+Med: Jungle Bell Rock fseq | 01 - Jungle Bell Rock.mp3 Length: 02:03
  - 3. Seq+Med: Mary Did You Know.fseq | 06 - Mary Did You Know\_.mp3 Length: 03:23
  - 4. Seq+Med: Rockin Around The Christmas Tree fseq | 01 - Rockin' Around The Christmas Tree (Single Version).mp3 Length: 02:06
  - 5. Sequence: StaticLights fseq Length: 05:00A red box highlights the sequence of songs.
- Control Buttons**: A row of buttons for controlling playback: Play, Previous, Next, Stop Gracefully, Stop After Loop, and Stop Now. A red box highlights the "Stop Now" button.

1. Program Control-this will give you the main settings for the mode of the FPP and the current status.
  - a. FPPD Mode- There are four modes for the FPP

- i. Player (Standalone)-This setting is used when this FPP is going to be the only player by itself or controlling other controllers. (**This is different from a Master/Remote configuration**) You can configure the FPP device in Standalone mode to output E1.31 data to other controllers or FPP devices as needed. This is commonly used if you are connected to a wired network and controlling one or many other controllers. If you are going to send data (DDP, E1.31 etc.) to the rest of your show network then you will also need to have the appropriate Channel Outputs setup.
  - ii. Player (Master)-This setting is used if you are going to have more than one FPP device and you want them to all be synchronized via sync packets. The Master will need a copy of the sequences (.fseq) and media (music) files. The Master FPP will also be where your Playlists and Schedules are created. If the Master is also connected to a controller then the appropriate Channel Outputs will need to be setup.
  - iii. Player (Remote)-This setting is used if you are going to synchronize this FPP and attached controller to a Master FPP. The Remote will need a copy of all the sequences (.fseq) that are going to be played. You will also need to have the appropriate Channel Outputs setup.
  - iv. Bridge-This setting is used to accept E.131 or DDP input data and pass them on to the attached controllers (i.e. Bridge). This is typically used for testing directly from XLights without creating a sequence.
- b. FPPD Status- This will show you the current status of the FPP.
- i. FPPD is Running-This indicates that the FPP is running and ready to run your show.
  - ii. FPPD is Stopped-This indicates that the FPPD has been temporarily stopped, either manually or via a script.
  - iii. FPPD is Updating-This indicates that the FPPD is updating the software and when complete should resume to FPPD is Running.
- c. FPP time-This will show the current date and time for the FPP. This is important if you have playlists or events scheduled.
- d. Stop/Start FPPD-This is used to stop or start the FPPD system.
- e. CPU- Raspberry Pis (the newer models) have a temperature sensor on the board and if you are using one of those then you can see the temperature. Some of the newer KulpLights.com controllers have temperature sensor(s) and voltage sensors and will display that info as well.



If you click on the temperature, it will toggle between Fahrenheit and Celsius.

2. Abnormal Conditions- If the FPP device identifies some conditions that can impact performance, then the messages will be listed in this section. A list of the errors and possible fixes are listed in the [Troubleshooting](#) section.
3. Scheduler- This section shows the status of your scheduler and options to control a playlist that is playing.
  - a. Scheduler Status-This will show the status of the Scheduler and the current playlist that is playing. If the playlist was started manually, it would indicate that as well.
  - b. Next Playlist-The next scheduled playlist will show what playlist is scheduled to play next and the start time and day that it will start.
  - c. Started at- This will show what time the scheduled show started.
  - d. "StopType" Stop at- This will indicate the stop strategy for the scheduled playlist that is currently playing and the time it is scheduled to stop.
  - e. Playlist time extension-You can manually extend (or reduce) a Scheduled playlist that is running. If you click on the Extend button, you can change the scheduled end time in minutes (you can use a negative number to shorten the end time). There is another button to extend the playlist in increments of 5 minutes. You can only change the end time by a maximum of 720 minutes (12 hours) or reduce it by 360 minutes (3 hours). Once a playlist has reached its scheduled end time, this option will no longer be available even though a song might still be playing (i.e. Graceful shutdown)
4. Playlist Info-This section will give you the current status of your playlist.
  - a. Player Status-this lists the current song that is playing. It will also tell you how long the current song has been playing and how much time is left until the end of the song. If there is no sequence playing, the status will be "Idle." It will also indicate if a song is shutting down gracefully (finishing the song and then shutting down.)
  - b. Playlist-This is a dropdown box with your playlists and sequences so that you can manually start one of your stored playlists or sequences.
  - c. Repeat- If this box is checked when you manually start a playlist or sequence, it will continue to play until it is manually stopped.
  - d. Volume-This is where you can control the output volume for the currently playing sequence. This can be used to control the volume supplied to an FM transmitter or external speakers.
  - e. Verbose Playlist Item Details- If this is selected, it will show a lot more information on each playlist item.
  - f. Playlist Details-This will show you the details of the currently queued playlist. If the playlist is playing, it will indicate which song is playing by highlighting it and putting an arrow next to it.
5. Player controls-This controls the currently queued playlist.
  - a. Play-This will play the queued playlist at the element selected. If the Repeat box is checked, the playlist will continue to play until manually stopped or a scheduled playlist starts.
  - b. Previous- This will step to the previous playlist item when a playlist is playing.
  - c. Next- This will step to the next playlist item when a playlist is playing.
  - d. Stop Gracefully-This will finish the song that is currently playing and then stop the playlist.
  - e. Stop After Loop-This will stop the playlist when the end of the currently playing playlist is reached.
  - f. Stop Now-This will stop the playlist immediately.

# Network

The Network page is where you set up your Network settings so that you can communicate with your FPPs and controllers and all of your FPPs and controllers can communicate as needed with each other. Networking works similarly whether you use wireless or wired and they work together.

The screenshot shows the Network Configuration interface with the following sections:

- Interface Settings:** Shows WiFi Drivers (External), Interface Name (eth0, wlan0), Interface Mode (Static selected), IP Address (192.168.1.100), Netmask (255.255.255.0), and Gateway (192.168.1.1). Buttons for Update Interface, Create Persistent Names, and Clear Persistent Names are present.
- Host & DNS Settings:** Shows HostName (FPP-Pi-Test) and Description. DNS Server Mode is set to Manual, with DNS Server 1 (192.168.1.1) and DNS Server 2 (8.8.8.8) listed. Buttons for Save, Ping, and Update DNS are shown.
- Tethering:** Shows Tethering Mode (If no connection), Tethering Interface (wlan0), Tethering Technology (Hostapd), Tethering SSID (FPP), and Tethering Pre Shared key (PSK) (Christmas). A warning message states: "Warning: Turning on tethering may make FPP unavailable. The WIFI adapter will be used for tethering and will thus not be usable for normal network operations. The WIFI tether IP address will be 192.168.8.1 for Hostapd tethering, but unpredictable for ConnMan (although likely 192.168.0.1)." It also notes that USB tethering is available for Pi Zero and Pi Zero W devices.
- Interface Routing:** Contains a checkbox for "Enable Routing between network interfaces".

Because there are so many variations of configuring a network, the network settings seem to be problematic for some people. The basic setup at the beginning of this manual should get you running. That setup might not be the best for you in the long run. The following should get you a better understanding for a better setup for your particular situation.

Canispater Christmas has a good video at <https://youtu.be/kn1BiolQbgw> and Keith Westley, one of the xLights developers, has a good video as well at <https://youtu.be/g0fOZs6UgXw>.

There is a good article that you should read about wireless and remotes at: <https://falconchristmas.com/forum/index.php/topic.4231.0.html>.

If you need more information on networks and IP addresses and how they work, then refer to the [Networking Configuration](#) section of the Advanced Options section.

## Interface Settings

Depending on the device, the FPP could have up to 2 network devices built-in (more if you install additional network adapters, but this is not common). One is labeled eth0 for Ethernet connections (wired) and the other is wlan0 connections (wireless). If you have both eth0 and wlan0 on your FPP, then you have to select and configure each one separately.

Network Configuration  
Interface Settings

WIFI Drivers: External

Select an interface name to configure the network information for that interface.

Interface Name:

Interface Mode: \* Static  DHCP

IP Address:  192.168.1.100

Netmask:  255.255.255.0

Gateway:  192.168.1.1

There are two options for Interface Mode, Static and DHCP.

- DHCP-Your home router will assign and manage the IP address(es) for your FPPs and controllers, this is the easiest method but has some drawbacks. Your router might not save the IP address if your FPP has been disconnected from the network for a lengthy time so it might cause problems in the future.
- Static-You will assign the IP address for your FPPs and controllers. This is usually the preferred method so that you can always access your devices. Using this option, you have to make sure that the IP addresses are unique. You have to be careful to not assign an IP address to an address that your router has already assigned to another device through the DHCP process. Most routers will assign DHCP addresses at the lower end of the range, but this isn't always true. Some routers have the ability for you to limit the range of IP addresses that it will use for DHCP in order to prevent any conflicts.

**NOTE: If you are using both network interfaces they must be on different subnets! Also only assign one interface to have a Gateway and that will typically be the interface that is connected to your router.**

To set up your networks, select the network (Interface Name) you want to set up and enter the details.

IP Address - This will be the IP address for this particular FPP device and interface. This IP address must be unique and no other devices should share this address. The IP address must be in the same subnet as the network it will be communicating with (this is the first three sets of numbers in the IP address).

Netmask - This will almost always be 255.255.255.0

Gateway – The Gateway should only be configured on the network interface that is communicating with your home or show router. If you have two network interfaces, then only one should have a Gateway configured. The Gateway should be the IP address of the router that this interface is connected to.

If you are configuring the wlan0 interface then you will have some additional settings to configure.

<b>Wireless Settings:</b>		
WPA SSID:	<input type="text"/>	<input type="checkbox"/> Hidden
WPA Pre Shared key (PSK):	<input type="password"/>	

The WPA SSID is your wireless network name and the WPA Pre Shared Key is the password for your Wi-Fi.

Once that is complete, then click on the Update Interface button. This saves your settings. If you need to set up the other network, click on that network and then you will have new options to enter your details. Click on Update Interface when completed. When you are finished with all of your changes, reboot the FPP. If you are setting up your eth0 network, the Wireless Settings will not be available.

If you are unsure of what your settings should be, refer to the [Networks](#) and [Network Configuration](#) section of the manual.

If you are using more than one Ethernet interface (common for users with a Color-Light board) and you need the Ethernet adapter to keep the configuration order, then you can create a Persistent Name. The best practice would be:

- Power down the FPP device.
- Make sure that only the primary Ethernet interface is installed.
- Power up the FPP device.
- Plug in the USB Ethernet adapter.
- configure the eth0 and eth1 devices
- Click on Update Interface
- Click on Create Persistent Name

This will save your eth0 and eth1 configurations so that they will load up in the correct order..

## Host & DNS Settings

This section is to assign some networking settings that are for this device.

<b>Host &amp; DNS Settings</b>	
HostName:	<input type="text" value="YourMeaningfulName "/>
Description:	<input type="text"/>
DNS Server Mode:	<input checked="" type="radio"/> Manual <input type="radio"/> DHCP
DNS Server 1:	<input type="text" value="192.168.0.1"/>
DNS Server 2:	<input type="text" value="8.8.8.8"/>
<input type="button" value="Save"/>	
<input type="button" value="Ping"/>	
<input type="button" value="Update DNS"/>	

HostName- You can give a meaningful name to your FPP device and this can be used to access your device in a web browser instead of using the IP address. It is important that your FPP/Controllers have unique Host names. If you are not going to have any other FPP instances then you can keep it as FPP if you want but it is not recommended because in this hobby, people have a tendency to expand their show and it is highly recommended that you rename it so there will be no confusion in the future. The HostName can only have letters,

numbers, and hyphens (-). It may not begin or end with a hyphen and cannot have any spaces.

Description-This is used to provide some additional information or a more meaningful name for your device and does not have the limitations as the Host Name. This will show up in your Multi-Sync page and the xLights FPP connect screen.

DNS Server Mode- This is to select what DNS server the FPP is going to use. If you are using DHCP addresses on all of your interfaces, then you should set the DNS Server Mode to DHCP as well. If you select DHCP then the FPP device will attempt to get a DNS address from the DHCP Server (usually your home router). Not all connected devices have a DNS server so selecting DHCP might not work. (See the [Network Configuration](#) for more information.) If you have set a Static IP address on any of your interfaces, then you need to configure the DNS Server. You have the option of selecting a main DNS Server and a backup one. It is usually recommended to set one server to 8.8.8.8 and the other to the IP address of your router.

## Tethering

There are two types of Tethering that can be used with FPP. One is Wi-Fi Tethering where the FPP will behave as its own Access Point and USB Tethering where the FPP is connected directly to the computer via a USB cable.

### Wi-Fi Tethering

Wi-Fi Tethering is useful in order to access the FPP if there is no network connected to either the Ethernet or Wi-Fi connection. This is especially useful for the Raspberry Pi. To connect to the FPP device when the Tethering mode is active, your FPP device will need to be fairly near your computer. You will then need to connect to the FPP WI-FI network that should be visible in your computer's network settings. Depending on your Operating system the process could be different but the process is the same as when you first connected your computer to your home Wi-Fi.

The password for the network will be Christmas. Once you are connected to the FPP network, you can access the FPP with the IP address of 192.168.8.1

**Tethering**

Tethering Mode:	If no connection
Tethering Interface:	wlan0
Tethering Technology:	Hostapd
Tethering SSID:	FPP
Tethering Pre Shared key (PSK):	Christmas

**Warning:** Turning on tethering may make FPP unavailable. The WIFI adapter will be used for tethering and will thus not be usable for normal network operations. The WIFI tether IP address will be 192.168.8.1 for Hostapd tethering, but unpredictable for ConnMan (although likely 192.168.0.1).

On the Pi Zero and Pi Zero W devices, USB tethering is available if using an appropriate USB cable plugged into the USB port, not the power-only port. Don't plug anything into the power port for this. The IP address for USB tethering would be 192.168.7.2.

There are 3 WI-FI tethering modes available

- If no connection-This is the default setting. If the FPP device does not detect a network connected to any of the network ports, it will activate a Wi-Fi access point when it powers up called FPP.

- Enabled-When this option is selected; the FPP device will boot up and activate the Wi-Fi access point.
- Disabled-When this option is selected; the Wi-Fi access point will not be activated.

You can change the SSID name and password if you want.

There is a warning but this warning is more for the BeagleBone SBCs where you have to add a separate USB Wi-Fi adapter. The Raspberry Pi's internal Wi-Fi works well in the Wi-Fi Tether option and if you are using a BB SBC it is recommended to use a USB tether connection or Ethernet connection.

### USB Tethering

There is also the option of using USB tethering for the BB SBCs, Raspberry Pi Zero, and the Pi Zero W. To connect using the USB tethering, connect the SBC via the USB port to your computer. (On the Pi Zeros, there are two USB ports, one is for power only, the other is a true USB connection, make sure you connect to the correct port. This will supply the power as well.) After the SBC is properly connected and is booted up, you can access the FPP by using the IP address of 192.168.7.2 if you are using a Windows computer or 192.168.6.2 if you are using a Mac or Linux computer.

**Note: Due to the number of various USB Wi Fi adapters, the Wi Fi Tethering might not work using a USB Wi Fi adapter (this does not apply to the internal Wi Fi adapters on the Raspberry Pis or BeagleBones). The recommended method of Tethering the BeagleBones is through the USB connection.**

### Interface Routing

If you are using your FPP device to communicate to one network via Wi-Fi and passing the communication through your eth0 interface then you need to check the Enable Routing between network interfaces. (Like a controller attached to your FPP device, not a hat or cape.) This will allow communications to pass through your FPP device to the connected controller.



### MultiSync

The MultiSync page is typically where you setup a Master/Remote Layout but has evolved into a much more useful interface for all of your FPP devices and most controllers. A Master/Remote layout can eliminate the need for Ethernet cables connecting all of your FPPs/controllers and allows for widespread model placement. You can use a Master/Remote configuration with a wired setup as well to save network traffic but usually doesn't give you a lot of benefit. You can also see the status and other system information on all of your FPP devices and upgrade them from one interface. See the [Master/Remote](#) section of the Advanced Settings section for more information on the setup and functionality of the Master/Remote layout.

**Note: In the displayed images, several errors are shown for demonstration purposes, this is NOT normal.**

**The MultiSync page will display differently depending on your user level and the mode the FPP device is configured.**

You can filter the list by typing information in the header of each column.

FPP MultiSync							
Hostname	IP Address	Platform	Mode	Status	Elapsed	Version	
FPPMaster *	192.168.1.100	Raspberry Pi 3 B Raspberry Pi Model B Rev 1.2	Master	Playing: The Greatest Show.fseq 01 The Greatest Show Amazon Edited.mp3	00:06	4.x-master-286-g4edea27b	

MultiSync page for FPP device in Master mode

FPP MultiSync							
Hostname	IP Address	Platform	Mode	Status	Elapsed	Version	
FPPMaster	192.168.1.100	Raspberry Pi 3 B Raspberry Pi 3 Model B Rev 1.2	Master	Playing: The Greatest Show.fseq 01 The Greatest Show Amazon Edited.mp3	00:14	4.2	
		Cannot Ping DDP Channel Data Target 192.168.1.102					
		Cannot Ping DDP Channel Data Target 192.168.1.103					
		Cannot Ping DDP Channel Data Target 192.168.1.106					
F16V3	192.168.101.2	Falcon F16v3 Falcon F16v3	Bridge	Bridging		2.5	
PocketScroller	192.168.1.104	PocketBeagle TI AM335x PocketBeagle	Remote: Enable Sync: <input type="checkbox"/>	Playing: The Greatest Show.fseq	00:14	4.1	
		Received DDP data from 192.168.1.100					
PBSingingElements	192.168.1.105	PocketBeagle TI AM335x PocketBeagle	Remote: Enable Sync: <input type="checkbox"/>	Playing: The Greatest Show.fseq	00:14	4.1	
		Received DDP data from 192.168.1.100					
YardPi	192.168.1.101 192.168.101.1	Raspberry Pi 3 B Raspberry Pi 3 Model B Rev 1.2	Remote: Enable Sync: <input type="checkbox"/>	Playing: The Greatest Show.fseq	00:14	4.1	
YardPi	192.168.1.225	Raspberry Pi 3 B Raspberry Pi 3 Model B Rev 1.2	Player	Idle		4.2	
FPP-Pi-Test	192.168.1.225	Raspberry Pi 3 B Raspberry Pi 3 Model B Rev 1.2	Player	Last Seen: 2020-09-15 22:18:34		4.2	
Send MultiSync to ALL remotes via Multicast (239.70.80.80): <input checked="" type="checkbox"/>							
Send MultiSync to ALL remotes via Broadcast: <input type="checkbox"/>							
MultiSync Unicast Discovery IPs (CSV list): <input type="text"/> *							
HTTP Discovery IPs & subnets (CSV list): <input type="text"/> *							
Hide 10.x.x.x/8 Subnets in systems list: <input type="checkbox"/>							
Hide 172.16.x.x/20 Subnets in systems list: <input type="checkbox"/>							
Hide 192.168.x.x/16 Subnets in systems list: <input type="checkbox"/>							
Auto refresh status of FPP Systems: <input checked="" type="checkbox"/>							
Advanced View: <input type="checkbox"/>							

MultiSync page for FPP device mode other than Master

FPP MultiSync							
Hostname	IP Address	Platform	Mode	Status	Elapsed	Version	
PocketScroller	192.168.1.104	PocketBeagle TI AM335x PocketBeagle	Remote	Idle		4.1	
FPPMaster	192.168.1.100	Raspberry Pi 3 B Raspberry Pi 3 Model B Rev 1.2	Master	Idle		4.2	
		Cannot Ping DDP Channel Data Target 192.168.1.102					
		Cannot Ping DDP Channel Data Target 192.168.1.103					
		Cannot Ping DDP Channel Data Target 192.168.1.106					
YardPi	192.168.1.101 192.168.101.1	Raspberry Pi 3 B Raspberry Pi 3 Model B Rev 1.2	Remote	Idle		4.1	
PBSingingElements	192.168.1.105	PocketBeagle TI AM335x PocketBeagle	Remote	Idle		4.1	
YardPi	192.168.1.225	Raspberry Pi 3 B Raspberry Pi 3 Model B Rev 1.2	Player	Idle		4.2	
MultiSync Unicast Discovery IPs (CSV list): <input type="text"/> *							
HTTP Discovery IPs & subnets (CSV list): <input type="text"/> *							
Hide 10.x.x.x/8 Subnets in systems list: <input type="checkbox"/>							
Hide 172.16.x.x/20 Subnets in systems list: <input type="checkbox"/>							
Hide 192.168.x.x/16 Subnets in systems list: <input type="checkbox"/>							
Auto refresh status of FPP Systems: <input checked="" type="checkbox"/>							
Advanced View: <input type="checkbox"/>							

\* - Advanced Level Setting

The MultiSync devices section contains useful information on all of the discovered FPP devices in your network.

FPP MultiSync							
Hostname	IP Address	Platform	Mode	Status	Elapsed	Version	
FPPMaster	192.168.1.100	Raspberry Pi 3 B Raspberry Pi 3 Model B Rev 1.2	Master	Playing: The Greatest Show.fseq 01 The Greatest Show Amazon Edited.mp3	00:14	4.2	
		Cannot Ping DDP Channel Data Target 192.168.1.102 Cannot Ping DDP Channel Data Target 192.168.1.103 Cannot Ping DDP Channel Data Target 192.168.1.106					
F16V3	<a href="#">192.168.101.2</a>	Falcon F16v3 Falcon F16v3	Bridge	Bridging		2.5	
PocketScroller	<a href="#">192.168.1.104</a>	PocketBeagle TI AM335x PocketBeagle	Remote: Enable Sync: <input type="checkbox"/>	Playing: The Greatest Show.fseq	00:14	4.1	
		Received DDP data from 192.168.1.100					
PBSingingElements	<a href="#">192.168.1.105</a>	PocketBeagle TI AM335x PocketBeagle	Remote: Enable Sync: <input type="checkbox"/>	Playing: The Greatest Show.fseq	00:14	4.1	
		Received DDP data from 192.168.1.100					
YardPi	<a href="#">192.168.1.101</a> <a href="#">192.168.101.1</a>	Raspberry Pi 3 B Raspberry Pi 3 Model B Rev 1.2	Remote: Enable Sync: <input type="checkbox"/>	Playing: The Greatest Show.fseq	00:14	4.1	
YardPi	<a href="#">192.168.1.225</a>	Raspberry Pi 3 B Raspberry Pi 3 Model B Rev 1.2	Player	Idle		4.2	
FPP-Pi-Test	<a href="#">192.168.1.225</a>	Raspberry Pi 3 B Raspberry Pi 3 Model B Rev 1.2	Player	Last Seen: 2020-09-15 22:18:34		4.2	

- Hostname- This will list the Hostname of all of your discovered FPP devices. The current device will be noted in bold text. **If you have more than one device with the same Hostname, the display might not be accurate.**
- IP Address- This will list the associated IP address(es) for the FPP Devices. In the case that an FPP device has more than one network configured, it will list all of the networks. The IP addresses are hyperlinks that will take you to the associated FPP device if clicked. **If you have more than one FPP device with the same Hostname, then the display might not be accurate.**
- Platform- This will show what SBC the FPP is installed on including the model and other information.
- Mode- This will show the FPP mode that each device is running.
- Status- This shows the current Status of the FPP Device. If it is playing a sequence, then it will show the sequence that is playing.
- Elapsed- If a sequence is playing it will show how much time has elapsed on the sequence on the Master and any remote. If the FPP is in Bridge Mode, then it will show that it is bridging.
- Version- This will show what FPP branch and version is installed on the device.

The MultiSync Options section will allow you to select different options for how the devices will be displayed and some additional functionality.

Send MultiSync to ALL remotes via Multicast (239.70.80.80):	<input checked="" type="checkbox"/>	<a href="#">?</a>
Send MultiSync to ALL remotes via Broadcast:	<input type="checkbox"/>	<a href="#">?</a>
MultiSync Unicast Discovery IPs (CSV list):	<input type="text"/> <a href="#">?</a> *	
HTTP Discovery IPs & subnets (CSV list):	<input type="text"/> <a href="#">?</a> *	
Hide 10.x.x.x/8 Subnets in systems list:	<input type="checkbox"/>	<a href="#">?</a>
Hide 172.16.x.x/20 Subnets in systems list:	<input type="checkbox"/>	<a href="#">?</a>
Hide 192.168.x.x/16 Subnets in systems list:	<input type="checkbox"/>	<a href="#">?</a>
Auto refresh status of FPP Systems:	<input type="checkbox"/>	<a href="#">?</a>
Advanced View:	<input type="checkbox"/>	

- Send MultiSync to ALL remotes via Multicast-This will send a Multicast packet to all devices that have been identified as needing the sync packets. This is a newer method and preferred over All Remotes Broadcast but does not work with FPPs with a version less than 2.6 or if you are using a Falcon Controller as a remote\*
- Send MultiSync to ALL remotes via Broadcast -This will send a Broadcast sync packet to every device on the network whether they need it or not. This is an older method that was used but not commonly used now. Broadcast packets are sent at a slower speed and not as often as Multicast.
- MultiSync Unicast Discovery IPs (CSV list):- This is used for FPP instances/controllers that are not discoverable due to their firmware.
- HTTP Discovery IPs & subnets- You can enter the IP address of devices that are in a different subnet than the FPP device in order to get the information on the MultiSync page.
- Hide Subnets- You can hide subnets from the list. This can be useful if you have an FPP device connected to a show network and your home network and you only want to display your show network devices. (more of a developer option)
- Auto Refresh status of FPP Systems- Selecting this option will refresh the screen every second (5 seconds if you have the Advanced View option selected)
- Advanced View- Selecting this option will give you more details such as the system utilization and the GitHub version compared to the local version.

FPP MultiSync													Press F11
Hostname	IP Address	Platform	Mode	Status	Elapsed	Version	Git Versions	Utilization	Select				
FPPTest2 *	192.168.1.225	BeagleBone Black TI AM335x PocketBeagle	Master	Idle		FPP: 4.x-master-338-g0ea606d9 OS: v4.0-beta1	Local: <b>b2f0ea3</b> Remote: b2f0ea3 Branch: master	CPU: 5% Mem: 20% Uptime: 7 min	<input checked="" type="checkbox"/>				
FPPMaster	192.168.1.100	Raspberry Pi Raspberry Pi 3 Model B Rev 1.2	Master	Protected		FPP: 4.x-master-286-g4edea27b OS: v3.4	Local: <b>b2f0ea3</b> Remote: b2f0ea3 Branch: master	CPU: 2% Mem: 16% Uptime: 4 days	<input checked="" type="checkbox"/>				
FPPTest1	192.168.1.250	Raspberry Pi Raspberry Pi 3 Model B Rev 1.2	Master	Idle		FPP: 4.x-master-338-g0ea606d9 OS: v4.0-beta1	Local: <b>0ea606d</b> Remote: b2f0ea3 Branch: master	CPU: 1% Mem: 17% Uptime: 3 days	<input type="checkbox"/>				
PocketScroller	192.168.1.104	BeagleBone Black TI AM335x PocketBeagle	Remote	Idle		FPP: 4.x-master-337-ga7a4d49f OS: v4.0-alpha4	Local: <b>a7a4d49</b> Remote: b2f0ea3 Branch: master	CPU: 4% Mem: 22% Uptime: 3 days	<input type="checkbox"/>				
PBSingingElements	192.168.1.105	BeagleBone Black TI AM335x PocketBeagle	Remote	Idle		FPP: 3.x-master-351-gea822030 OS:	Local: <b>ea82203</b> Remote: b2f0ea3 Branch: master	CPU: 4% Mem: 22% Uptime: 22 days	<input type="checkbox"/>				
YardPi	192.168.1.101 192.168.101.1	Raspberry Pi Raspberry Pi 3 Model B Rev 1.2	Master	Idle		FPP: 3.x-master-351-gea822030 OS:	Local: <b>ea82203</b> Remote: b2f0ea3 Branch: master	CPU: 50% Mem: 18% Uptime: 4 days	<input type="checkbox"/>				

If the OS is not up to date, it will display it in red, otherwise it will be green. You can update one or several of the FPP devices at the same time from this screen by selecting the devices and the Upgrade FPP option and clicking the Run button.

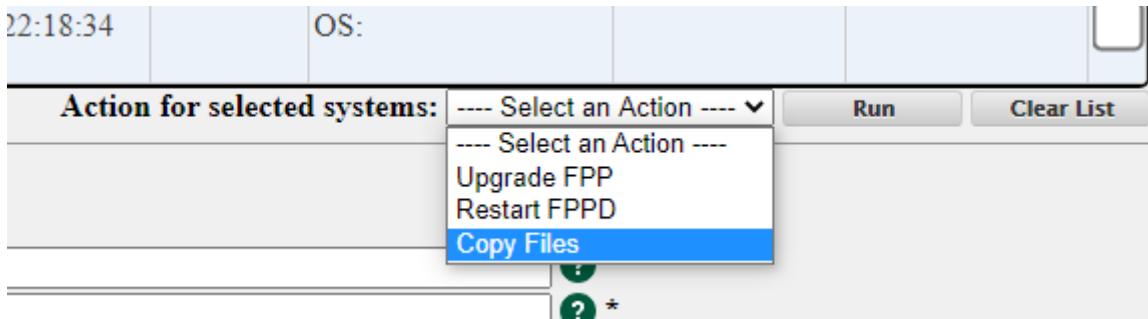
Hostname	IP Address	OS: v4.0-beta1	Remote: b2f0ea3	Mem: 20%	Uptime: 7 min	Select
Master		FPP: 4.x-master-286-g4edea27b OS: v3.4	Local: <b>b2f0ea3</b> Remote: b2f0ea3 Branch: master	CPU: 2% Mem: 16% Uptime: 4 days	<input checked="" type="checkbox"/>	
Master	Idle	FPP: 4.x-master-338-g0ea606d9 OS: v4.0-beta1	Local: <b>0ea606d</b> Remote: b2f0ea3 Branch: master	CPU: 1% Mem: 17% Uptime: 3 days	<input type="checkbox"/>	
Master	Idle	FPP: 4.x-master-337-ga7a4d49f OS: v4.0-alpha4	Local: <b>a7a4d49</b> Remote: b2f0ea3 Branch: master	CPU: 4% Mem: 22% Uptime: 3 days	<input type="checkbox"/>	
Master	Idle	FPP: 3.x-master-351-gea822030 OS:	Local: <b>ea82203</b> Remote: b2f0ea3 Branch: master	CPU: 4% Mem: 22% Uptime: 22 days	<input type="checkbox"/>	
Master	Idle	FPP: 3.x-master-351-gea822030 OS:	Local: <b>ea82203</b> Remote: b2f0ea3 Branch: master	CPU: 50% Mem: 18% Uptime: 4 days	<input type="checkbox"/>	

When the devices are updating you can see a progress screen. When completed, you can Reboot or Restart FPPD.

FPP MultiSync												
Hostname	IP Address	Platform	Mode	Status	Elapsed	Version	Git Versions	Utilization	Select			
FPPTest2 *	192.168.1.225	BeagleBone Black TI AM335x PocketBeagle	Master	Updating		FPP-4.x-master-338-g0ea606d9 OS: v4.0-beta1	Local: <b>0ea606d</b> Remote: b2f0ea3 Branch: Unknown	CPU: 71% Mem: 21%	<input checked="" type="checkbox"/>			
		Log:	<pre>0 0 0 0 0 0 0 -1:00:00:00 0 7 12 3H 7 9999 0 0 1095k 0 0:00:11 --:--:-- 0:00:05 1109k 27 12 3H 27 3447k 0 0 1065k 0 0:00:06 0:00:01 0:00:05 1812k 46 12 3H 46 5895k 0 0 2025k 0 0:00:06 0:00:02 0:00:04 2030k 70 12 3H 70 8855k 0 0 2259k 0 0:00:05 0:00:03 0:00:02 2263k 89 12 3H 89 10.8k 0 0 2252k 0 0:00:04 0:00:01 0:00:01 2256k 100 12 3H 100 12.3k 0 0 2296k 0 0:00:05 0:00:05 --:--:-- 2259k</pre>									
FPPMaster	192.168.1.100	Raspberry Pi Raspberry Pi Model B Rev. 1.2	Master	Updating		FPP-4.x-master-286-g4eade27b OS: v3.4	Local: <b>4ede27</b> Remote: b2f0ea3 Branch: master	CPU: 28% Mem: 15%	<input checked="" type="checkbox"/>			
		Log:	<pre>delete mode 100644 www/js/jquery-3.4.1.min.js create mode 100644 www/js/jquery-3.5.0.min.js create mode 100644 www/js/jquery-migrate-3.1.0.min.js delete mode 100544 www/js/jquery-migrate-3.1.0.min.js Synchronizing submodule url for 'external/RF24' Synchronizing submodule url for 'external/rpi-gb-led-matrix' Synchronizing submodule url for 'external/rpi-gpio' Synchronizing submodule url for 'external/pixels'</pre>									
FPPTest1	192.168.1.250	Raspberry Pi Raspberry Pi Model B Rev. 1.2	Master	Idle		FPP-4.x-master-338-g0ea606d9 OS: v4.0-beta1	Local: <b>0ea606d</b> Remote: b2f0ea3 Branch: master	CPU: 1% Mem: 17%	<input type="checkbox"/>			
PocketScroller	192.168.1.104	BeagleBone Black TI AM335x PocketBeagle	Remote	Idle		FPP-4.x-master-337-ga7a4d49f OS: v4.0-alpha4	Local: <b>a7a4d49</b> Remote: b2f0ea3	CPU: 49% Mem: 22%	<input type="checkbox"/>			

\* As of the writing of this manual, the Falcon Controllers (in Remote Mode) do not support the Multicast format but this should be fixed in a future update to the Falcon Controller. Also, not all home networking equipment supports Multicast.

There are additional actions that can be utilized with the Action section of the MultiSync page:



On the far right of the screen are check boxes for you to select which device(s) you want to take an action on. Those actions are:

Upgrade FPP- you can upgrade the software on any or all of your devices at the same time from this screen

Restart FPPD- You can restart the FPPD on any or all of your devices at the same time from this screen

Copy Files- You can copy files from this FPP device to other FPP devices. You can't individually select which files are uploaded, it will copy all files of the type selected to the FPP(s) selected. Be careful with copying sequences because there are some sequences that are only compatible with the device they are stored.

#### Copy Files from Master to Remotes

- Copy Sequences ?
- Copy Effects ?
- Copy Videos ?
- Copy Events ?
- Copy Scripts ?
- Compress FSEQ files during copy to Remotes to speed up file sync process ?

**Copy Files**

Compress FSEQ Files-If this box is checked, the Master FPP will compress the FSEQ files before sending them to the remotes. This is primarily for older V1 FSEQ files that are not compressed by the sequencer (xLights, Vixen, etc.). Newer V2 FSEQ files are typically compressed already and don't need to be compressed again.

**Note:** [FPP Connect](#) in xLights is a more robust method of uploading files to your FPP devices (including to your Master). FPP connect can upload files in the sparse format which will reduce the file sizes tremendously. FPP connect can also configure your inputs and outputs and other settings as well.

## FPP Settings

This page is to setup some administrative functions and settings. The settings are organized by function to ease navigation.

**The FPP Settings page will display differently depending on your user level.**

The screenshot shows the 'FPP Settings' interface with a tab bar at the top containing 'Playback', 'Audio/Video', 'Time', 'UI', 'Email', 'MQTT', 'Output', 'Logging', 'Storage', 'System', and 'Developer'. The 'Playback' tab is selected. Below the tabs, under the heading 'General Playback', there are two configuration options: 'Blank between sequences:' with a checkbox and a help icon, and 'Pause background effects during FSEQ playback:' with a checkbox and a help icon. At the bottom of this section, there is a legend: '\*' - Advanced Level Setting, '\*\*' - Experimental Level Setting, and '\*\*\*' - Developer Level Setting.

## Playback

The Playback setting is used to configure general playback settings.

**The Playback Settings page will display differently depending on your user level.**

- Blank between sequences-This setting will send out blanking data to turn the pixels off when a sequence finishes. If you want a looping sequence where the pixels don't turn off or "blink" between loops this should remain unchecked. Otherwise, checking this box will tell FPP to force all pixels off at the end of each sequence.
- Pause Background Effect Sequence during FSEQ playback- Effect sequences take priority over FSEQ files. Select this option if you have Background Effect Sequences and you want the FSEQ file to take priority over the Background Effect Sequence.

## Audio/Video

The Audio/Video tab is used to configure your general audio and video settings. Many of the settings will be configured based on the FPP device and attached hardware.

**The Audio/Video Settings page will display differently depending on your user level.**

## General Audio/Video

Audio Output Device:	bcm2835 ALSA (Pi Onboard Audio) <span style="border: 1px solid black; padding: 2px;">? </span>
Audio Output Mixer Device:	PCM <span style="border: 1px solid black; padding: 2px;">? </span>
Audio Output Format:	Default <span style="border: 1px solid black; padding: 2px;">? * </span>
Default Video Output Device:	HDMI <span style="border: 1px solid black; padding: 2px;">? </span>
Media/Sequence Offset:	0 ms <span style="border: 1px solid black; padding: 2px;">? * </span>
Disable IP announcement:	<input type="checkbox"/> <span style="border: 1px solid black; padding: 2px;">? </span>

\* - Advanced Level Setting

\*\* - Experimental Level Setting

\*\*\* - Developer Level Setting

- Audio Output Device- You can select which device you want to play your audio. If you do not have any audio devices installed, like a SoundBlaster, then you will only have the option of the onboard audio device. The BeagleBone SBC does not have onboard audio. If you have a Raspberry Pi then you will have the option of bcm2835 ALSA. The Pi onboard audio will output the sound to the 3.5mm audio jack on the Pi.
- Audio Output Mixer Device- FPP will identify the available installed output devices and provide the option to select which device you want to output the audio. It will be set to the default for the FPP device. For the Pi, it will be PCM, the BeagleBone SBC does not natively have an audio device so it will be blank. If you have a SoundBlaster Play 3 or similar device this should be set to speaker.
- Audio Output Format- You can select a specific sampling rate and device, normally the default works the best. But if you need a specific sampling rate, you can select the rate that matches your audio. (\* This is only visible with an Advanced or higher level setting in the UI tab.)
- Default Video Output Device- If you are using your FPP to directly play a video, then you can select which device you want the video to play on. You can select the HDMI output port or you can select a Pixel Overlay model which is usually a P10/P5 panel display or Virtual Matrix.
- Media/Sequence Offset- This setting is used to synchronize the media to the sequence. This can be used if your FM transmitter or other audio processing device(s) creates a consistent lag in the broadcast (this is rare, but it does happen). This can also be used to fine tune the synchronization in a Master/Remote configuration where there is consistent network delay between Master and Remote. (e.g. if you are using a Wi-Fi extender to reach an FPP remote that is far away from the Master and has additional network delay because of the extender) (\* This is only visible with an Advanced or higher level setting in the UI tab.)
- Disable IP announcement- When the Raspberry Pi boots up, it will announce its IP address over the audio device. If you do not want this announcement, then select this option.
- Ignore Media Sync Packets- You can select this option on a FPP device in Remote mode and if the Media Sync Packets are ignored, then the remote will start and stop

the video when queued but it will not attempt to keep in sync with the master. The video might play smoother but could become out of sync with the Master. (\* This is only visible with an Advanced or higher level setting in the UI tab.)

## Time

This tab is used to configure your time and location settings. If you want your Playlists to automatically start at scheduled times, then the FPP that is scheduling the show has to be configured to keep accurate time (not the remotes). It is recommended to use the NTP server method of keeping time but that requires access to the Internet. If your FPP doesn't have access to the internet, then you can manually set the date and time. If your FPP device ever gets shut down or rebooted and it doesn't have a Real Time Clock or configured for NTP, then the time will get reset.

FPP Time: Wed May 20 22:59:15 MDT 2020

**Time Config**

Set Date:  (YYYY-MM-DD) ?

Set Time:  (HH:MM:SS) ?

Real Time Clock: pcf8523 (Kulp / Adafruit PiRTC) ?

Enable NTP:  ?

NTP Server:  ?

Time Zone: America/Boise ?

[Lookup Time Zone](#)

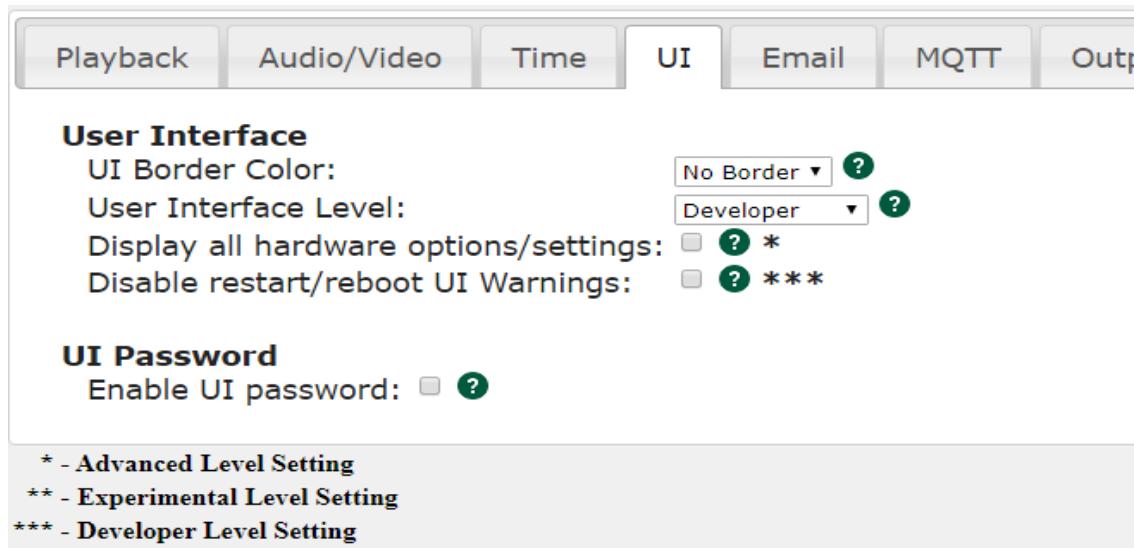
\* - Advanced Level Setting  
\*\* - Experimental Level Setting  
\*\*\* - Developer Level Setting

- FPP Time- This will show your current System date and time and the configured Time Zone.
- Set Date – You can manually set the date if your FPP device doesn't have a network connection. The time is in 24 hour format (Military Time).
- Set Time – You can manually set the time if your FPP device doesn't have a network connection.
- Real Time Clock-If you have a Cape/Hat attached that has a Real Time Clock (RTC), you can select the Cape/Hat from the drop down list. (FPP will attempt to identify the attached cape and load that device.) Once you select the correct Hat/Cape, you will need to reboot the FPP device and then set the time from this page.
- Enable NTP-This is Network Time Protocol and if your FPP device is connected to the internet, then you can configure your FPP to keep current time with the NTP. You would select the Enabled radio button.
- NTP Server- If you want a different Time server than the default then you can enter the IP address of the Time Server you want to use. You should normally keep the NTP Server blank.

- Time Zone- If you are using a Network Time Protocol server to keep the current Date/Time, then you will need to select your time zone so that your FPP can adjust the time accordingly.
- Lookup Time Zone- You can click this button to lookup your current Time Zone. Depending on your network provider, you might get incorrect results.

## UI

The UI settings page will allow you to change the appearance of the User Interface (UI).  
**The UI Settings page will display differently depending on your user level.**



The screenshot shows the 'UI' tab selected in a navigation bar. Below it is a section titled 'User Interface' with the following settings:

- UI Border Color:** No Border
- User Interface Level:** Developer
- Display all hardware options/settings:**  \*
- Disable restart/reboot UI Warnings:**  \*\*\*

Below this is a section titled 'UI Password' with the setting:

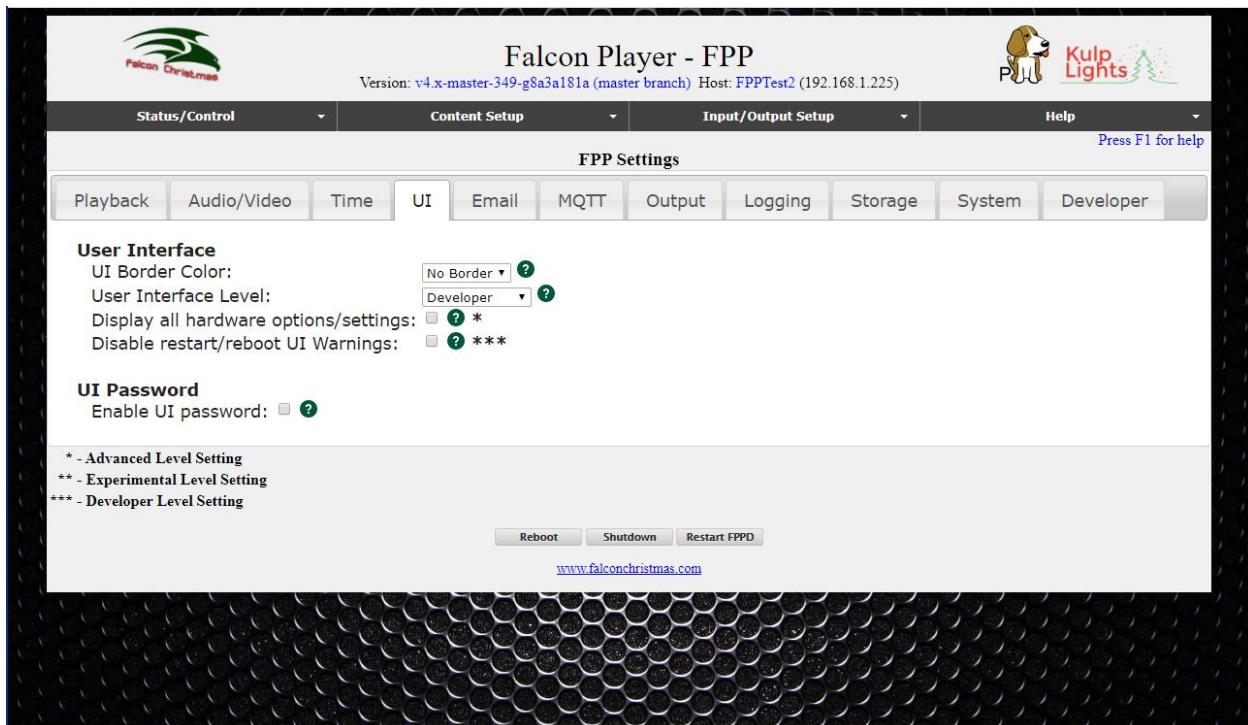
- Enable UI password:**

At the bottom of the UI section, there are three levels of notes:

- \* - Advanced Level Setting
- \*\* - Experimental Level Setting
- \*\*\* - Developer Level Setting

- UI Border Color- You can select the border color of the user interface (webpage). This could be helpful if you have several devices and you want some visual clue which FPP device you are working on.

### No Border



The screenshot shows the Falcon Player - FPP web interface with a 'No Border' configuration. The top navigation bar includes links for Status/Control, Content Setup, Input/Output Setup, Help, and a developer note: 'Press F1 for help'. The main menu bar includes Playback, Audio/Video, Time, UI, Email, MQTT, Output, Logging, Storage, System, and Developer. The UI tab is selected.

The UI settings section is identical to the one in the previous screenshot:

- UI Border Color:** No Border
- User Interface Level:** Developer
- Display all hardware options/settings:**  \*
- Disable restart/reboot UI Warnings:**  \*\*\*

Below the UI settings is a UI Password section:

- Enable UI password:**

At the bottom of the UI section, there are three levels of notes:

- \* - Advanced Level Setting
- \*\* - Experimental Level Setting
- \*\*\* - Developer Level Setting

At the very bottom of the interface are three buttons: Reboot, Shutdown, and Restart FPPD. The URL [www.falconchristmas.com](http://www.falconchristmas.com) is also visible.

## Blue Border



- User Interface Level- There are 4 User Interface levels that are designed to display only the information needed for the user level in order to make navigation easier and to remove un-needed clutter from the screen. Those levels are:
  - Basic- This will give you access to all of the needed settings, configurations etc. that most users will need.
  - Advanced- This will give you access to some of the Advanced features/settings in FPP. The Advanced user level can be helpful for people that have unusual configurations that need further configuration or need access to some advanced features that most users don't use.
  - Experimental- This will give you access to some settings/configurations that are in the testing phase and need more testing before being moved to one of the other levels. Making changes to settings/configurations in the Experimental UI level might not work properly until fully tested.
  - Developer- This will give you access to some settings/configurations normally used by the developers for testing. Making changes to settings/configurations in the Developer UI level might create problems if configured incorrectly.
- Display all hardware options/settings- By default, FPP will only display the options/settings based on the device and hardware that has been detected to eliminate the display of settings that are incompatible with the device or not used. Selecting this option will display all options/settings for all devices - even if they are not connected. If this option is selected, you will be able to make changes to settings that could cause problems or unexpected results.  
**(\* This is only visible with an Advanced or higher level setting in the UI tab.)**  
Disable restart/reboot UI Warnings- This will disable the reboot and/or restart warnings when a setting has changed. This is used for developer testing and if you disable it, you might not be warned when a reboot/restart is required and your results might not be what you expected.

- (\* This is only visible with a Developer level setting in the UI tab.)
- Enable UI Password- By default, there is no password required to access FPP via the web interface. **Changing the password is only for advanced users as it could cause some of the functionality of FPP to be disabled without additional formatting.** It is not usually required to set a UI password because the UI can only be reached from a computer that has access to your local network. You can set a user password to access the UI. The password has to be at least 8 characters. Once the password is set, you will have to use the username of admin and the password you set to access any of the screens.

## Email

You can set up an email account in FPP to use for sending information to an email account by using a script. Due to some ISP blocking protocols, the FPP has to be set up to use a Gmail account to send the emails.

**Outbound Email Configuration**

Gmail Account:  ?

Gmail Password:  ?

Destination From Text:  ?

Destination To Email:  ?

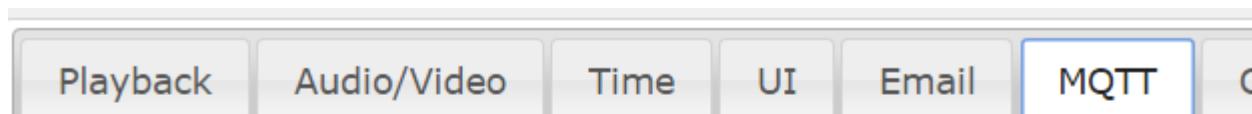
**Configure Email** **Send Test Email**

- Gmail Username-This is the username of the Gmail account you want to use to send your email. It will be your full Gmail login name, such as [johndoe@gmail.com](mailto:johndoe@gmail.com).
- Gmail Password-This is the password for the Gmail account you identified.
- Destination From Text-This can be used to identify the FPP that is sending the email. Usually it is the Gmail account used for the FPP emails.
- Destination To Email-You need to enter the email address that you want your email messages to be sent.
- Configure Email-this will save your email settings, you will be prompted to reboot.
- Send Test Mail-You can test your configuration by using the test button.

Note: You will have to change your security settings in Gmail to allow 3<sup>rd</sup> party access to your email account to let FPP use the Gmail account.

## MQTT

This section is used to set up MQTT settings if you are going to automate your FPP with an MQTT server such as a home automation system.



### MQTT

Broker Host:  ?

For more info [Press F1 for more details](#)

Once you enter in your Broker host (either IP address or HostName) and hit the Enter key, you will get more options to fill out.



### MQTT

Broker Host:  ?

Broker Port:  ?

Client ID:  ?

Topic Prefix:  ?

Username:  ?

Password:  ?

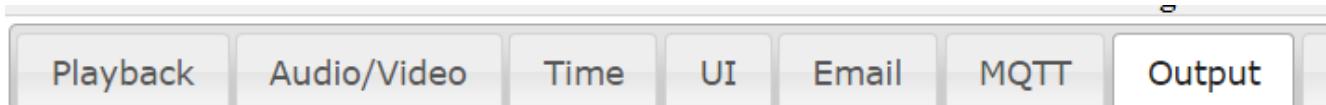
CA File:  ?

Publish Frequency:  ?

- Broker Host- This is the HostName or IP address of your MQTT Broker
- Broker Port- This is the TCP port number that your MQTT Broker is listening to.
- Client ID- If this is not set, your MQTT host will create one.
- Topic Prefix- Enter the Topic Prefix to be used when sending messages to the MQTT Broker.
- Username- This is the Username to authenticate with the MQTT Broker.
- Password- This is the Password to authenticate with the MQTT Broker.
- CA File- This is an optional CA file to authenticate the MQTT Broker's certificate. This is only required when using SSL encryption and self-signed certificates.
- Publish Frequency- Optional Frequency to publish FPP status to the MQTT Broker. If this is set to zero, then it will only publish on demand.

## Output

This section is only available if you have the user level setting set to Advanced or above and is used to configure some global output settings.



## Output Control

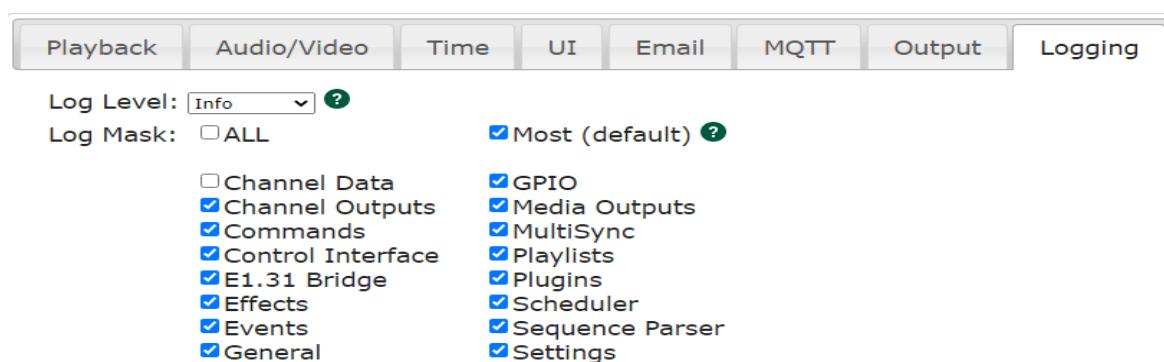
Always transmit channel data:  ? \*

E1.31 Bridging Transmit Interval: 50ms ? \*

- Always transmit channel data- This setting forces transmission of channel data out to controllers whenever FPP is running. FPP will normally only transmit data when there is a sequence playing or the system is running in Bridge mode or a Pixel Overlay model is enabled. Some older controllers go into test mode when not receiving data. This setting causes FPP to always send data so the controllers do not go into test mode. It is not recommended to set this unless you are using one of the older controllers that need this setting.
- E1.31 Bridging Transmit Interval- This setting allows for a different timing interval when operating in Bridge mode. The default is 50ms and it is recommended to keep this setting. **Warning- some devices do not support rates other than 50ms. FPD does not support a rate other than 50ms.**

## Logging

This page is used to set the logging criteria for your FPP device. FPP creates several logs that can be beneficial for troubleshooting your system if something isn't working correctly.



- Log Level- This will set the log level for all of the logs that are being generated and selected in the Log Mask section. **It is not recommended to change this unless requested by the development team for advanced troubleshooting.**
  - Warn- This will create the smallest log file and lists only the items that have been identified as a warning. This is the recommended setting for production systems.
  - Info- This setting will include all of the warnings and additional messages for items that are needed for informational data for troubleshooting. It is not recommended to use the Info Log Level unless requested by the development team for advanced troubleshooting.
  - Debug- This setting will include all of the Info level messages and include the debugging level messages. It is not recommended to use the Debug Log Level unless requested by the development team for advanced troubleshooting.

- Excessive- This setting will include all log messages. It is not recommended to use the Excessive Log Level unless requested by the development team for advanced troubleshooting. Using the Excessive Log level will potentially create log files that are excessively large and could impact performance.
- Log Mask- This will identify the different type(s) of logs that you want to generate. This setting is used for advanced troubleshooting. You should leave this setting at “Most” unless directed by the FPP development team for advanced troubleshooting.
  - All-
  - Most
  - Channel Data
  - Channel Outputs
  - Commands-
  - Control Interface-
  - E1.31 Bridge-
  - Effects-
  - Events-
  - General-
  - GPIO-
  - Media Outputs-
  - MultiSync-
  - Playlists-
  - Plugins-
  - Scheduler-
  - Sequence Parser-
  - Settings-

## Storage

This section is only available if you have the user level setting set to Advanced or above and is used to configure the location to store your sequences and other media files.

**Storage Device:** mmcblk0p1 - 29.8GB (26.1GB Free) (boot device) ▾

Changing the storage device to anything other than the SD card is strongly discouraged. There are all kinds of problems that using USB storage introduce into the system which can easily result in various problems include network lag, packet drops, audio clicks/pops, high CPU usage, etc... Using USB storage also results in longer bootup time. In addition, many advanced features and various capes/hats are known to NOT work when using USB storage.

In addition to the above, since it is not recommended, using USB storage is not tested nearly as extensively by the FPP developers. Thus, upgrades (even "patch" upgrades) have a higher risk of unexpected problems. By selecting a USB storage device, you assume much higher risk of problems and issues than when selecting an SD partition.

**eMMC Actions:**

- Flash to eMMC \* This will copy FPP to the internal eMMC.
- Flash to eMMC \* This will copy FPP to the internal eMMC, but use BTRFS for the root filesystem. BTRFS uses compression to save a lot of space on the eMMC, but at the expense of extra CPU usage.

It is not recommended to use any other method of storage than the uSD card because other devices such as a USB drive have been shown to cause lags and other problems in the playback of a show. USB storage used to be the preferred method of storing your media files but many changes have been made in both xLights and FPP so that the best method of storing your settings and media is on the SD card. There are also advanced backup methods that make using a USB drive for storage obsolete.

**eMMC Actions-** If you are using a BeagleBone Black or Green then your device will have on-board eMMC memory and you can select to have the operating system copied to the eMMC. This is not normally the recommended method. You can select the standard storage method or the BTRFS method but it uses a compression algorithm that could

slow the FPP device down slightly. (\* This is only visible with an Advanced or higher level setting in the UI tab.)

## System

The System tab is used to configure some of the system wide settings.

The screenshot shows the 'System' tab selected in a top navigation bar. Below it, there are two main sections: 'System Settings' and 'Geographic Location'. In 'System Settings', there are four configuration items: 'Locale' set to 'USA', 'Blank screen on startup' (unchecked), 'Force HDMI Display' (unchecked), and 'Status Display' set to 'Disabled' with a dropdown for 'FPPD Boot Delay' showing '0s'. In 'Geographic Location', the 'Latitude' is set to '43.5537174' and the 'Longitude' is set to '-116.330533'. There are also 'Lookup Location' and 'Show On Map' buttons.

**Locale-** The locale setting is used to configure some region specific settings such as Holidays to be used in the Scheduler.

**Blank Screen on Startup-** By default the FPP will display system data to the HDMI port when it boots up and will remain until other data is sent out to the HDMI port. The screen blanking will turn the text console off after one minute so that it does not remain on the monitor. If you are using this FPP to play video through the HDMI port, then you probably want to enable this setting. (This option is only available on Pi based FPP devices as the HDMI port is disabled on BeagleBone based systems)

**Force HDMI Display-** On the Raspberry Pis, if the HDMI port is not connected on boot up it won't detect the HDMI device. If you power on your devices at the same time, the Pi might not detect the connected HDMI device. If you select this setting, the Pi will always try to output to the HDMI port even if it wasn't detected at boot up. (This option is only available on Pi based FPP devices as the HDMI port is disabled on BeagleBone based systems)

**Status Display-** If you connect an OLED screen to the I2C bus of the FPP device, you can configure the device here. This will usually get auto-populated on boot up if one is installed. The display will give you some basic information on your device such as IP addresses, status and sequence that is playing. Several different models of OLED screen are supported and you use this setting to select which model you have.



FPPD Boot Delay- You can add a delay to booting up the FPP. This is helpful if you power down all components in your show, like routers and switches, and turn them on all at the same time. FPP could start before the routers and/or switches have had a chance to fully initialize which can cause communication errors. If you are not powering down your routers and/or switches, then leave the default setting of 0s.

(\* This is only visible with an Advanced or higher level setting in the UI tab.)

BeagleBone LEDs-The BeagleBone series of SBCs have 4 LEDs on the board and the function of each can be controlled or turned off. You can change the default settings for the LEDs, the most common change is to disable them if the lights might be distracting. It is recommended to keep the defaults. (This option is only available on BeagleBone based FPP devices.)

Geographic Location- If you want to use the Sunrise or Sunset option of scheduling your Playlist to start or end, then you will need to enter your location in Latitude and Longitude. You can get this information by clicking on the Lookup Location button, but depending on your internet provider, this information could be incorrect, so verify if you use this option. You can also get your information by entering your address into LatLong.net or GoogleMaps.com. If you use GoogleMaps, then after you enter your address, the Latitude and Longitude will be in the address bar after the @ symbol. The Latitude is listed first and then the Longitude. Make sure to use the – sign if it is indicated. You can double check the entry by clicking on the View Location button and verify that the coordinates are correct.

## Developer

**The developer tab is only available with a UI Level of Developer.** This section is useful if you want to switch FPP versions or other developer testing.

The screenshot shows the FPP UI with the 'Developer' tab selected. The top navigation bar includes tabs for Playback, Audio/Video, Time, UI, Email, MQTT, Output, Logging, Storage, System, and Developer. The 'Developer' tab is highlighted with a grey background.

**Git Branch:** A dropdown menu is set to 'v4.2'. Below it is a note: "Note: Changing branches may take a couple minutes to recompile and may not work if you have any modified source files." A red warning message follows: "WARNING: Switching branches will run a 'git clean -df' which will remove any untracked files. If you are doing development, you may want to backup the source directory before switching branches using this page." A 'Reset Local Changes' button is present, with a red warning message: "WARNING: This performs a 'git reset --hard HEAD' to revert all local source code changes".

**Git Status:** A text area displays: "On branch v4.2. Your branch is up to date with 'origin/v4.2'. nothing to commit, working tree clean".

**UI Platform Masq:** A dropdown menu is set to 'Default'. To its right is a red '\*\*\*' icon.

**Git Branch-** You can change which version of FPP you want to use with this setting. This setting is useful if you want to upgrade to the Master Branch where the latest improvements have been implemented prior to the official release. Note that some upgrades require an OS rebuild so you might not get all of the benefits of the Master Branch without upgrading the OS. (refer to the [update section](#))

**Reset Local Changes-** If you have manually changed the code in FPP, then clicking this button will revert the code back to the original code.

**Git Status-** This will show you the status of your local FPP version.

**UI Platform Masq-** When FPP boots up, it will auto detect the FPP device and only display settings that are relevant to your device. If you are developing Plugins or other functionality and want to see the options, then you can change the Platform mask to display the options based on that platform. Be careful making changes while in this mode as it could have an adverse effect on your FPP device.

# FPP Backup

FPP has several backup options available. You can update just your configuration files through the JSON Configuration Backup or your configuration and all relevant files through the File Copy Backup. This can be useful in restoring your FPP device.

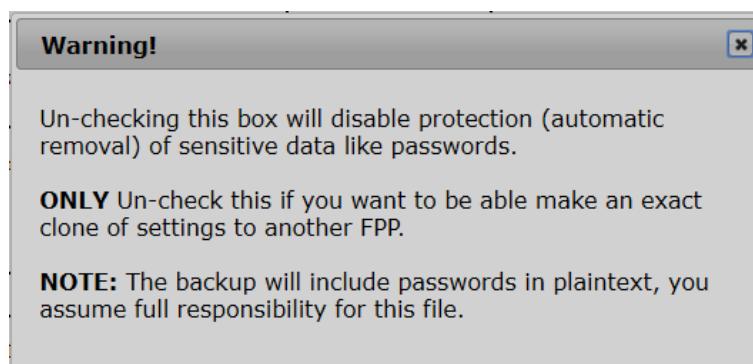
## JSON Configuration Backup

The JSON Configuration Backup will save all or a portion of your different settings and store them on your computer to restore at a later time. This will only save the selected configuration files; it will not save sequence files, audio files, etc.

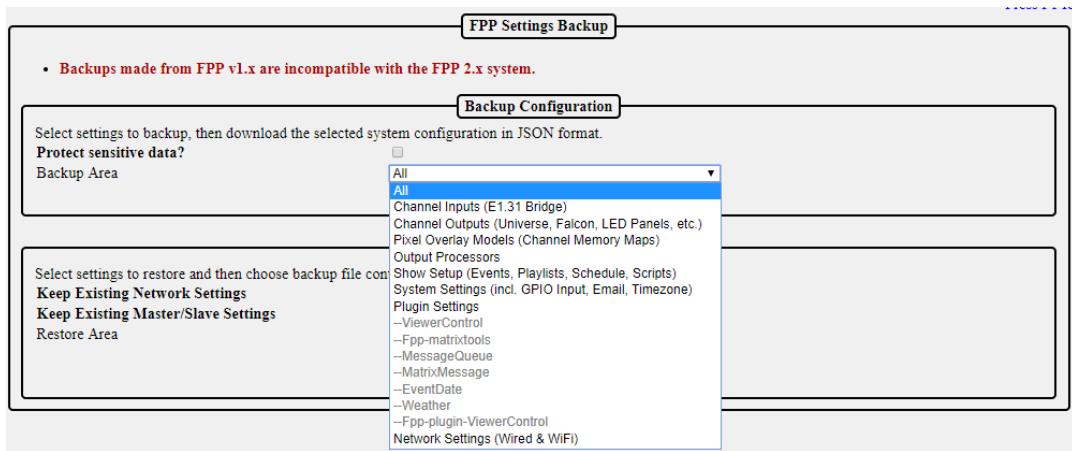
The screenshot shows the 'FPP Backups' interface. At the top, there are two tabs: 'JSON Configuration Backup' (which is selected) and 'File Copy Backup'. Below the tabs, there are two main sections: 'Backup Configuration' and 'Restore Configuration'.  
**Backup Configuration:** A box containing instructions: 'Select settings to backup, then download the selected system configuration in JSON format.' It includes a checked checkbox for 'Protect sensitive data?' and a dropdown menu set to 'All'. A 'Download Configuration' button is at the bottom.  
**Restore Configuration:** A box containing a warning: 'JSON Backups made from FPP v1.x are incompatible with the FPP 3.x system.' It includes checkboxes for 'Keep Existing Network Settings' and 'Keep Existing Master/Slave Settings', both of which are checked. It also has a dropdown menu set to 'All', a 'Choose File' button with 'No file chosen', and a 'Restore Configuration' button.

### Backup Configuration (creating a backup)

Protect sensitive data- If you have this selected, then the password to your wlan0 network will not be saved and you will have to log into the device once the configurations have been restored and enter your wlan0 password. If it is not selected, then a complete backup will be saved and when restored the FPP should be functional. Just be aware that anyone that has access to the backup file you saved will be able to view your wireless password if they open up the backup file. If you change the setting to allow a complete backup, you will get the following information box.



Backup area-This will select what portion of your FPP configuration you want to save, normally you will select all. You can select individual sections if you want.



Download Configuration- click on this button to save your configuration settings. This will prompt you for a location to save your configuration file onto your computer. The file will be named with the device name and a timestamp in the name so that you can identify the most current version in case you have more than one backup.

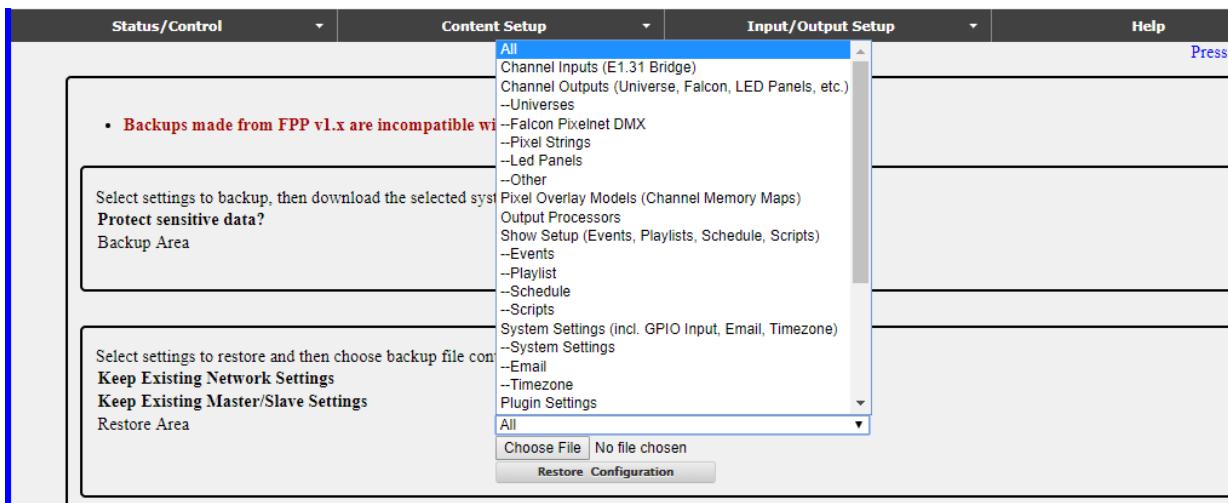
**NOTE:** This will not save your media files such as sequences, music, or videos.

### Restore Configuration

Keep Existing Network Settings-If this is selected, then the network settings that are saved on the FPP will not be updated to the settings on the saved backup.

Keep Existing Master/Slave Settings- If this is selected, then the Master/Slave settings that are saved on the FPP will not be updated to the settings on the saved backup.

Restore Area-You can select only a specific area to restore on the FPP. Any other settings that are configured on the FPP will not be updated.



Choose File-Click on this button and find the backup file that you want to use for your restored settings. Make sure it is the correct one if you have multiple configurations saved.

Restore Configuration-If you have a backup file selected, then you can click this button to restore the FPP from your backup file with the settings selected.

## File Copy Backup

The File Copy Backup utility gives you the ability to copy every item stored on your FPP device with the exception of the operating system. This can be very useful in maintaining copies of your FPP devices in case of an unforeseen event. You can save your backups to several different locations depending on your needs.

FPP Backups

JSON Configuration Backup    File Copy Backup

**File Copy Backup/Restore**

Copy configuration, sequences, etc... to/from a backup device.

Copy Type:    
USB Device:  Refresh List  
Backup Path:

What to copy:  Configuration  Events  Sequences \*  Scripts  Music  Backups \*  
 Playlists  Plugins  Images  Effects  Videos

Delete extras:  (Delete extra files on destination that do not exist on the source)

\* Sequence backups may not work correctly when restored on other FPP systems if the sequences are FSEQ v2 files and the Channel Output configurations of the two systems do not match.  
\* Backing up Backups will copy all local backups to the USB device.

Note: if you plugged in the USB drive after the FPP device booted up, you might have to press the Refresh List button to get the current USB status.

Copy Type- Select the type of copy function that you want to perform.

FPP Backups

Press R

JSON Configuration Backup    File Copy Backup

**File Copy Backup/Restore**

Copy configuration, sequences, etc... to/from a backup device.

Copy Type:    
USB Device:   
Backup Path:

What to copy:  Configuration  Events  Sequences \*  Scripts  Music  Backups \*  
 Playlists  Plugins  Images  Effects  Videos

Delete extras:  (Delete extra files on destination that do not exist on the source)

\* Sequence backups may not work correctly when restored on other FPP systems if the sequences are FSEQ v2 files and the Channel Output configurations of the two systems do not match.  
\* Backing up Backups will copy all local backups to the USB device.

- Backup To USB- This will allow you to copy the selected items from this FPP device to the USB drive you select.
- Restore From USB- This will allow you to copy the selected items from the selected USB drive to the original locations on this FPP device.

**NOTE: This will overwrite any files currently on your FPP Device.**

- Backup to Local FPP Backups Directory- This will allow you to copy the selected items from this FPP device to a backup folder on the uSD card that is on this FPP device.
- Restore From Local FPP Backups Directory- This will allow you to copy the selected items from a backup folder on this FPP device to the original locations on this FPP device.

**NOTE: This will overwrite any files currently on your FPP Device.**

- Backup To Remote FPP Backups Directory- This will allow you to copy the selected items from this FPP device to a backup folder on a different FPP device within your show network. When you select this option, you will get an additional field to enter the Hostname or IP address of the FPP device that you want to send the Backup files.
- Restore From Remote FPP Backups Directory- This will allow you to copy the selected items from a backup folder on a remote FPP device to the original locations on this FPP device.

**NOTE: This will overwrite any files currently on your FPP Device.**

USB Device- When you choose any of the USB options, this will become available. You will select the USB drive that you want to load files to or from. If your USB drive is not visible, click on the Refresh List button.

Hostname/IP- When you choose any of the Copy to Remote or Copy From Remote options, this will become available. You will enter either the Hostname or IP address of the remote FPP device that you want to load files to or from.

Backup Path- If you select any of the Copy To options, this will populate with the Hostname of the FPP device, you can change this if you want but make sure you know which FPP the backup belongs to. If you select any of the Copy From options, this will populate with the available backup directories. If you selected the Copy From USB option and the USB does not display the correct Backup path, then click the Refresh List button.

What to copy- You can select the items that you want to copy to the backup folder selected.

Delete extras- If you select this option, the restore function will delete any existing files that are on the FPP device before restoring from the selected backup folder.

**There is no advanced warning if there is not enough space to save your backup files, but during the backup process there will be an error message similar to this if there wasn't enough space:**

```
rsync: write failed on
"/var/tmp/ctp/nutcracker/.git/objects/pack/pack-
736c8d4bcfad7ab17fd41db17e9159af688db24.pack": No space left on device (28)
rsync error: error in file IO (code 11) at receiver.c(393) [receiver=3.1.2]
```

**If you didn't get a complete backup, the restoration process will not be complete.**

## Proxy Settings

The Proxy Settings allows you to route network traffic through an FPP device to a connected controller.

Proxied Hosts		
#	IP/HostName	Link
1	192.168.101.2	<a href="#">192.168.101.2</a>

You can configure the FPP to act as a Proxy Host by entering the IP address of the controller(s) that are attached to the FPP device. By doing so, you do not need to enter static route(s) in either your computer or router. This is helpful for people using Mac computers where the route is not persistent. If you need to access the controller through the web UI then you can click on the link in the Proxied Hosts page or type the IP address of your FPP device that is connected to the controller followed by /proxy/ and then the address of your controller. (Not all controllers support the Proxy Host functionality. Falcon controllers (with current firmware) and KulpLights.com controllers support the Proxy Host functionality.)

Note: If you use xLights for configuration settings, then you can enter the controller's proxy settings in xLights and xLights will be able to communicate with your controller.

## Events

Events are a method to activate an effect, FPP Command or script. Examples of how to configure these are at the end of this section. Events can be triggered in 4 different ways.

- Playlist- You can trigger an event as part of a Playlist like a Lead In item. This could be useful for things like starting a radio or other device through a relay at the beginning of your show and turning them off at the end of the show.
- Sequence- You can trigger an event in the middle of a sequence. This could be useful for things like triggering a Count Down display on a Matrix panel at certain points in a sequence.
- GPIO Input- You can trigger an event through one of the GPIO input pins on your FPP device. This could be useful for things like having a push button play a certain sequence or start your show.
- Manual Trigger- you can trigger an event from the Event page. This can be useful for testing your Events.

Events				
Event Control Channels:		Major: 31233	Minor: 31234	Use legacy 10x multiplier for Event ID's in Control Channels: <input type="checkbox"/>
<input type="button" value="Save"/>				
ID	Name	Command	Arguments	
1/1	Extend 20	Extend Schedule	"1200"	
1/3	RunCountdown	Run Script	"RUN-COUNTDOWN-SCRIPT.sh" "" ""	
1/7	MatrixTest	Remote Run Script	"192.168.1.250" "PlayVideoDrummer.sh" "" ""	
1/21	KillRemoteVideo	Remote Run Script	"192.168.1.250" "KillAllVideo.sh" "" ""	

**Event Control Channels-** You can trigger an event from within a sequence. In order to do so, you need to set up a “dummy” pixel in your layout to capture your trigger signals. If you are not going to trigger your event from within a sequence, then you don't need to set these channels. The Event Control Channels are used to identify the channel number of your dummy pixel. If you are going to trigger events from within a sequence, then your dummy pixel will be a 1 pixel single line model in your layout as a placeholder to process your events. The Major Event Control Channel will be the first channel for this pixel and the Minor Event Control Channel will be the next channel. If you make changes to the Event Control Channels, make sure you click on the Save button.

**Use Legacy 10x Multiplier for Event ID's in Control Channels-** Some older sequencing programs do not reflect channel numbers from 0-255 on DMX channels internally as 0-255 so a method was developed so these sequencing programs could utilize the events function. In order to do so, when you entered the Major and Minor ID number in your DMX channel for your Major and Minor ID numbers, you had to enter the ID

numbers after you multiplied them by 10. xLights and most current sequencing software handles channel numbers from 0-255 so you can leave this option unchecked if you want to enter the event ID in your sequencing program without multiplying it by 10.

**Event List**-This will list all of the events that you have created along with the relevant details. From this section you can add an event, trigger an event, edit an existing event or delete an existing event.

**Event Editor**- This section is for editing saved Events or entering the details of a new Event that you want to setup.

The screenshot shows a window titled "Event Editor". Inside, there are three input fields: "Event ID (Major/Minor)" with a dropdown arrow, "Event Name" with a text input field, and "Effect Command" with a dropdown arrow. At the bottom are two buttons: "Save Event" and "Cancel Edit".

- **Event ID (Major/Minor)**- The Event ID is just a way to identify each event so that you can trigger the event that you want to trigger. If you are triggering an event from a playlist, you will select the Event ID of the event that you want to trigger. If you want to trigger an event from within a sequence then you will set the Event ID to be sent to a model in your layout.
- **Event Name**-Enter a name that makes sense to you as to what the event does. You might have several events that are similar so make the name clear as to what it does like StartMainPlaylist and StartOvernightPlaylist.
- **Effect Command**-There are several Effect Commands available and depending on the Effect Command, there will be additional options to select.
  - All Lights Off- This will turn all of the lights off.
  - Brightness- You can set the overall brightness of your display. You can also send the command to your remotes.
  - Effect Start- This will start an effect that has been previously saved on the FPP device.
  - Effect Stop- This will start an effect that has been previously saved on the FPP device.
  - Extend Schedule- You can extend (or shorten) the playlist that is currently playing if it was started through your scheduler. You will enter the number of minutes that you want to change your schedule end time. Negative numbers will shorten the playlist.
  - FSEQ Effect Start- You can start any of your stored .FSEQ files. You can select it to loop so it will play until you manually stop it. You also have the option to run it in the Background (running in the background will play an effect until a playlist is played and when the playlist ends, the background effect will resume)
  - FSEQ Effect Stop- You can stop any of your stored .FSEQ files that are currently playing through an Event.
  - GPIO- You can set the state of the GPIO pins to on or off.
  - Insert Playlist After Current-You can insert a saved playlist to start after the currently playing playlist completes.
  - Next Playlist Item- This will start the next playlist item in a currently playing playlist. If you are on the last item in your playlist, it will start the first item in your playlist.

- Overlay Model Clear- You can clear the data displayed on a Pixel Overlay Model.
- Overlay Model Effect- This will apply different effects to a pixel Overlay model. The effects that you can choose are:
  - Color Fade- You can fade in/out a solid color that you select. You can select the duration of the Fade in and Fade out.
  - Bars- you can display scrolling bars on your Pixel Overlay Model. You can select the colors, direction, number of bars, duration etc. to display.
  - Text- You can display text on your Pixel overlay model. You can select the font, color, font size and scroll options.
- Overlay Model Fill- This will apply a solid color effect to a Pixel Overlay model.
- Overlay Model State- This will apply a state to a Pixel Overlay model such as enabled, disables, Transparent and Transparent RGB.
- Pause Playlist- This will pause the currently playing playlist.
- Play Media- This will play media files on your Pixel Overlay model.
- Prev Playlist Item- This will start the previous playlist item in a currently playing playlist. If you are on the first item in your playlist, it will start the last item in your playlist.
- Remote Effect Start- This will start an effect that is stored on one of your remote devices. You will have to enter the effect name exactly as it is stored on the remote.
- Remote Effect Stop- This will stop an effect that is currently playing on one of your remote devices. You will have to enter the effect name exactly as it is stored on the remote.
- Remote FSEQ Effect Start- You can start any of your stored .FSEQ files on a remote FPP device. You can select it to loop so it will play until you manually stop it. You also have the option to run it in the Background (running in the background will play an effect until a playlist is played and when the playlist ends, the background effect will resume)
- Remote Run Script- This will start a script that is stored on one of your remote devices. You will have to enter the script name exactly as it is stored on the remote.
- Remote Trigger Event- This will start an event that is stored on one of your remote devices. You will have to enter the Major and Minor Event ID for the event you want to trigger.
- Restart Playlist Item- This will restart a currently playing playlist item.
- Resume Playlist- This will resume a previously paused playlist.
- Run Script- This will start a script that is stored on this FPP device. You will select the script and enter any Arguments or Variables if needed
- Start Playlist- This will start a playlist that is stored on this FPP Device. You will need to select the Playlist and if you want it to repeat.
- Start Playlist at Item- This will start a playlist at a specific item in that Playlist. You will need to select the Playlist and if you want it to repeat.
- Start Playlist at Random Item- This will start a playlist at a random item in that Playlist. You will need to select the Playlist and if you want it to repeat.
- Stop Gracefully-This will stop the currently playing playlist Gracefully (complete the currently playing item and then stop)
- Stop Now--This will stop the currently playing playlist immediately.

- Toggle Playlist- This will toggle the playlist to a different playlist and you can select the Stop type.
- Trigger Event- This will start an event that is stored on this FPP device. You will have to enter the Major and Minor Event ID for the event you want to trigger.
- Trigger Multiple Events- This will start up to 4 events that are stored on this FPP device. You will have to enter the Major and Minor Event ID for each event you want to trigger.
- URL- You can use URL GET or POST actions to control/communicate with your PPF Device. Enter the URL, Method and any data required.
- Volume Adjust- You can adjust the volume either up or down in steps.
- Volume Decrease- You can adjust the volume down in steps.
- Volume Increase- You can adjust the volume either up in steps.
- Volume Set. - You can set the volume to a set level from 0 to 100%.

Don't forget to save your event(s) once you are done.

The following steps will demonstrate how to create an event to get triggered from the three methods that can trigger an event.

## Creating an Event to be Triggered in a Playlist

This example is to demonstrate how you can display a countdown to Christmas (or any date that you want) by using a Playlist entry. This will assume that you have already set up the [Event Date Plugin](#) (and associated Plugins and script). But you can trigger any other Event that is properly configured.

- Go to the Events page and click on Add Event, this will open the event Editor.
- Set the Event ID to an available number. (1/3 for this example)
- Enter an Event Name that would explain what the event is doing (RunCountdown for this example.)
- Select the Run Script option for the Effect Command.
- Select the Script that you want to run (RUN-COUNTDOWN-SCRIPT.sh for this example) and save the event.

Event Editor	
Event ID (Major/Minor):	1 / 3
Event Name:	RunCountdown
Effect Command:	Run Script
Script Name:	RUN-COUNTDOWN-SCRIPT.sh
Script Arguments:	
Environment Variables:	
<b>Save Event</b>	<b>Cancel Edit</b>

- Go to the Playlist section in FPP.
- Select the Playlist that you want the Event to be triggered from.
- In the New Playlist Entry select:
  - Type- Event, the window will change to allow the relevant options.
  - Event- Select the Event that you want triggered (for this example it is 01/03- RunCountdown) and click on Add.

New Playlist Entry

Type: Event  
Event: 01 / 03 - RunCountdown

Add Remove

#	Type	Media File / Script / Event / Pause	Sequence / Delay / Data
-- Lead In --			
-- Main Playlist --			
1.	Seq/Med	01 - Jingle Bell Rock.mp3	Jingle Bell Rock.fseq
2.	Seq/Med	military_intro.mp3	Military_Intro.fseq

- Drag the Event to the location in the playlist that you want it to be activated.

#	Type	Media File / Script / Event / Pause
1.	Seq/Med	01 - Jingle Bell Rock.mp3
2.	Seq/Med	military_intro.mp3
3.	Event	01_03 - RunCountdown
4.	Seq/Med	06 - Mary Did You Know_.mp3
5.	Seq/Med	01 - Rockin' Around The Christmas Tree (Single Version).mp3
6.	Sequence	---

## Creating an Event to be Triggered in a Sequence.

This example is to demonstrate how you can activate a Projector from within a sequence. This will assume that you have already set up the [Projector Control Plugin](#) (and associated scripts). But you can trigger any other Event that is properly configured.

Open xLights and determine what unused channels you are going to use for triggering your event. This will vary greatly depending on how you have your layout configured. Usually you can add a DDP or E1.31 Universe to the end of the Controller that you are configuring the event for or use an unused channel in an existing DDP or E1.31 Universe.

Here is a screenshot of the Setup screen of a display in xLights.

Number	Network...	Port	Universe or Id	Num...	xLights/Vixen/FPP Mappi...	A...	Description
1	E131	192.168.101.2	100-114	512	Channels 1 to 7680	Yes	F16V3-Yard
2	E131	192.168.1.106	120-127	512	Channels 7681 to 11776	Yes	F8B Right Yard
3	E131	192.168.1.102	200-210	512	Channels 11777 to 17408	Yes	F8PB-LeftRoof
4	E131	192.168.1.103	300-301	512	Channels 17409 to 18432	Yes	F8PB-RightRoof
5	E131	192.168.1.104	400-427	512	Channels 18433 to 32768	Yes	PocketScroller
6	E131	192.168.1.105	500-505	512	Channels 32769 to 35840	Yes	F8PB Singing Elements

And we want to put the Event on the F16V3-Yard Controller. You can see that channels 1-7680 have been designated for this controller.

Here is a screenshot of the layout screen of the same display.

> Whole House			
> Mega Tree	#100:1 (1)	#114:32 (7200)	WS2811:1-8
> Boscoyo Star 23 3 ring	> Mega Tree:1 (7201)	#114:302 (7470)	WS2811:9
> Arches 04	#120:1 (7681)	#120:150 (7830)	WS2811:10
> Arches 03	> Arches 04:1 (7831)	#120:300 (7980)	WS2811:10
> Arches 02	> Arches 03:1 (7981)	#120:450 (8130)	WS2811:10
> Arches 01	> Arches 02:1 (8131)	#121:88 (8280)	WS2811:10

From these screenshots you can see that the last Universe (114) on the F16V3-Yard ends on Channel 7680, but the last model on that controller, Boscoyo Star 23 3 Ring, ends on 7470 so we have 210 unused channels that are designated for the controller that are not getting used and we can use any of those to trigger the event. For simplicity sake, we will use Channels 7471 and 7472 for our Major and Minor Event Control Channels, but keep in mind that if you change models on this controller, you might have to redo your Event settings and Layout in xLights.

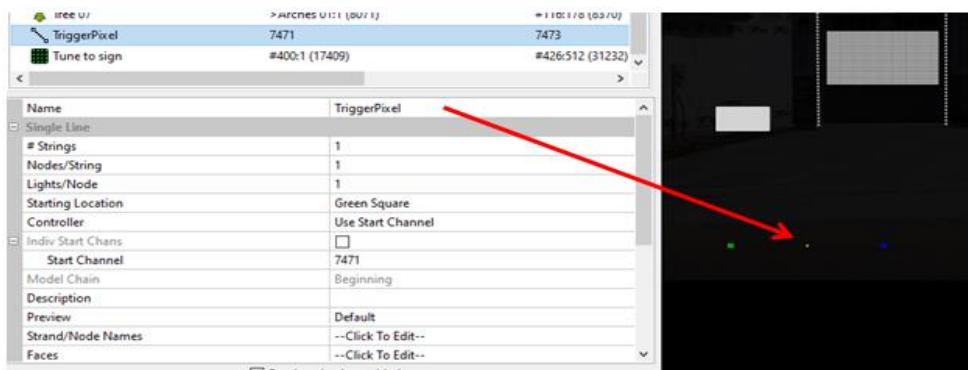
Open xLights and go to the Layout tab (or the method for your sequencing software) and add a Single Line model. Set the following properties:

Name- TriggerPixel (or whatever name makes sense to you)

# Strings- 1

Nodes/String- 1

Start Channel- 7471



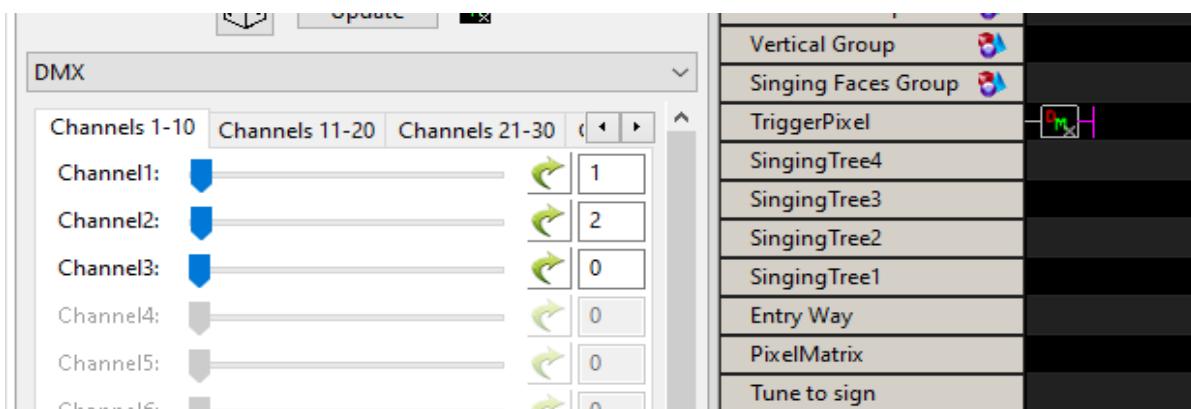
Go to your FPP Event Page and you will set the Event Control Channels, the Major channel is the first channel of your pixel that you configured in your sequencing software, for this example we are using 7471, then enter the next channel, 7472 in the Minor box. Also check the box to use Raw Event IDs. The Projector Control Plugin will create the events you need if properly configured.

Events				
Event Control Channels:		Major: 7471	Minor: 7472	Use Raw Event ID's in Control Channels (instead of 10x Event ID): <input checked="" type="checkbox"/>
<input type="button" value="Save"/>				
ID	Name	Command	Arguments	
1/1	PROJECTOR-PROTOCOL	Run Script	"PROJECTOR-PROTOCOL.sh" ***	
1/2	PROJECTOR-ON	Run Script	"PROJECTOR-ON.sh" ***	
1/3	PROJECTOR-OFF	Run Script	"PROJECTOR-OFF.sh" ***	
1/4	PROJECTOR-RGB	Run Script	"PROJECTOR-RGB.sh" ***	
1/5	PROJECTOR-VIDEO	Run Script	"PROJECTOR-VIDEO.sh" ***	
1/6	PROJECTOR-DIGITAL	Run Script	"PROJECTOR-DIGITAL.sh" ***	
1/7	PROJECTOR-IP	Run Script	"PROJECTOR-IP.sh" ***	
1/8	PROJECTOR-PASSWORD	Run Script	"PROJECTOR-PASSWORD.sh" ***	

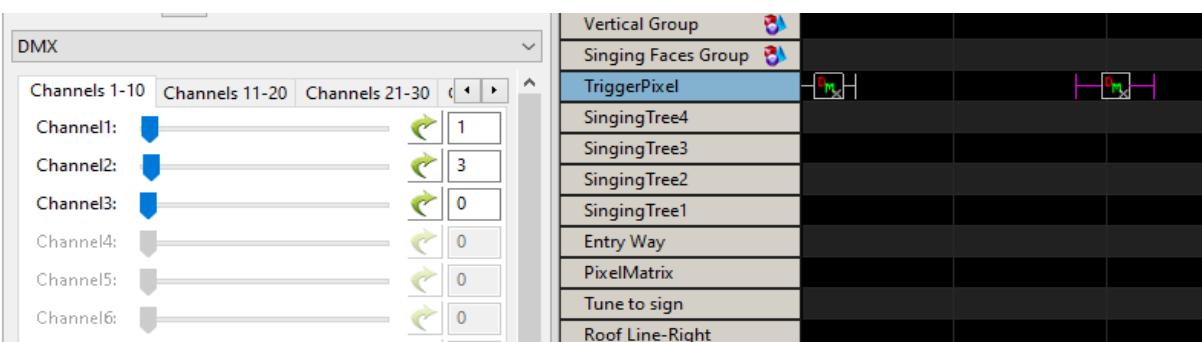
You see that the Projector-On Event has an Event ID of 1/2 and Projector Off is 1/3.

Then go to the Sequencer tab and open the sequence that you want to create your trigger.

Add a DMX Effect to your TriggerPixel (or whatever you called it) and we want to turn the Projector on at the beginning of the sequence, so we will set Channel 1 to 1 (which is the first part of the Event ID 1/2) and Channel 2 to 2 (which is the second part of the Event ID 1/2)



Then a little bit later in the sequence, we want to turn the projector off. The Projector Off has the Event ID of 1/3 so we will configure Channel 1 to 1 and Channel 2 to 3.



## Creating an Event to be Triggered by a GPIO Button.

This example is to demonstrate how you can start a playlist from a pushbutton connected to one of the GPIO pins. This will assume that you have already wired up the button to the GPIO pin. If you are not sure how to do this, refer to the [GPIO Button Input](#) section. But you can trigger any other Event that is properly configured.

- Go to your Events Page in FPP.
- Click on Add Event and the Event editor will open.
- Set the Event ID (this is just a number to identify the event, there is no significance in the number, just pick one of the available numbers) For this example we set the Event ID to 6/9.
- Enter an Event Name. Make the name something that reflects what the event does.
- Select “Start Playlist” from the Effect Command drop down box.
- Select the Playlist that you want to start when the button is pressed. For this example, we used the “Christmas” Playlist.
- Click on the Save Event button.

ID	Name	Command	Arguments
6 / 9	StartPlaylist	Start Playlist	"Christmas" "false"

**Event Editor**

Event ID (Major/Minor):

Event Name:

Effect Command:

Playlist Name:

Repeat:

- Go to the GPIO Inputs in the Input/Output tab of FPP
- Click on the En. (enable) box next to the pin that you are using (you might have to refer to a Pinout chart to see which pins are GPIO pins). For this example, we are using gpio2\_25 (which is Header 1 Pin4)
- Select the event that you want for either the Rising or Falling trigger that you are using (this will depend on how you wire your button.) For this example, we are using the Falling Trigger and selecting the 6/9- StartPlaylist Event.
- Set the Pull Up/Down if you want to use the internal Pull up or Pull Down resistors. Select None/External if you are going to wire your button circuit with a Pull up or Pull Down resistor.
- Click on the Restart FPPD button at the top of the page.

Settings have changed. FPPD Restart Required -

Press F

**GPIO Input Triggers**

Built-in GPIO Inputs				Events				Pull Up/Down		Hdr - Pin
En.	GPIO #	wiring #	Rising:	Falling:	Falling:	Falling:	Falling:	Pull Up	Pull Down	
<input type="checkbox"/>	gpio2_23	87	-- No Event --	-- No Event --	-- No Event --	-- No Event --	-- No Event --	<input type="checkbox"/>	<input type="checkbox"/>	P1-02
<input checked="" type="checkbox"/>	gpio2_25	89	-- No Event --	6 / 9 - StartPlaylist	-- No Event --	-- No Event --	-- No Event --	<input type="checkbox"/>	<input type="checkbox"/>	P1-04
<input type="checkbox"/>	gpio0_5	5	-- No Event --	-- No Event --	-- No Event --	-- No Event --	-- No Event --	<input type="checkbox"/>	<input type="checkbox"/>	P1-06
<input type="checkbox"/>	gpio0_2	2	-- No Event --	-- No Event --	-- No Event --	-- No Event --	-- No Event --	<input type="checkbox"/>	<input type="checkbox"/>	P1-08
<input type="checkbox"/>	gpio0_3	3	-- No Event --	-- No Event --	-- No Event --	-- No Event --	-- No Event --	<input type="checkbox"/>	<input type="checkbox"/>	P1-10

## Effects

Effects or effect sequences are normally used where you want to have some components of your show run and/or turn off or in parallel with and independent of the main show sequences.

**Effects**

Loop Effect:  Run in Background:

Start Channel Override:

Effects Library		Type
12 Days		FSEQ
BabyShark		FSEQ
Boise Mini expo		ESEQ
Donde esta Santa Clause		FSEQ
Feliz Navidad		FSEQ
Hallelujah_Military		FSEQ
Heroes in Blue		FSEQ
Hippo		FSEQ
Jingle Bell Rock		FSEQ
Let it Snow		FSEQ
Little Drummer Boy		FSEQ
Mary Did You Know		FSEQ
Men_In_Blue_intro		FSEQ
Military_Intro		FSEQ
Mr Grinch		FSEQ
Rockin Around The Christmas Tree		FSEQ
StaticLights		FSEQ
Text Me Merry Christmas		FSEQ
That Time of Year		FSEQ
The Greatest Show		FSEQ
santa tell me		FSEQ

ID	Running Effects

The Effects page is used to manually start or stop effects. You can run multiple effects on two models that have the same attributes. In order to do so, you will need to enter the channel offset from the model that the effect was created on. For example, you have two mini tree models and you created an effect on one of the trees and this tree has a start channel of 1326. To apply the same effect to another mini tree of the same size that has a start channel of 1842 you would select the effect from the Effects Library and enter 516 in the Start Channel Override and then click on the Play Effect. If the second model had a start channel that was lower than the one the effect was created on, then you would enter a negative Start Channel Override.

## Display Testing

The Display Testing screen can be used to test the channel outputs as well as to quickly test sequences without having to define playlists etc. This is a useful tool for troubleshooting!

### Channel Testing

**Channel Output Testing**

Enable Test Mode:

**Channel Range to Test**

Start Channel:  (1-8388608) Model Name:

End Channel:  (1-8388608)

Update Interval:  1000ms

---

**Test Patterns:**

Note: RGB patterns have NO knowledge of output setups, models, etc... "R" is the first channel, "G" is the second, etc... If channels do not line up, the colors displayed on pixels may not match.

**RGB Patterns:**

Color Order:

- Chase: R-G-B
- Chase: R-G-B-All
- Chase: R-G-B-None
- Chase: R-G-B-All-None
- Chase: Custom Pattern:  (6 hex digits per RGB triplet)
- Cycle: R-G-B
- Cycle: R-G-B-All
- Cycle: R-G-B-None
- Cycle: R-G-B-All-None
- Cycle: Custom Pattern:  (6 hex digits per RGB triplet)
- Fill:

R:  255  
 G:  255  
 B:  255

---

**Single Channel Patterns:**

Channel Data Value:  255

- Chase:
- Chase Size:
- Fill

Enable Test mode-When this is selected, (a checkmark in the box) then the test mode is active. **Make sure you deselect this when you are done testing or you will get unexpected results.**

Channel Range to Test-This section is used to select a range of channels that you want to test. You do not need to change anything here unless you want to select specific channel ranges. You can also select testing by individual models if you have your

models setup in the Pixel Overlay Models. This setting will apply to the settings selected in the other options

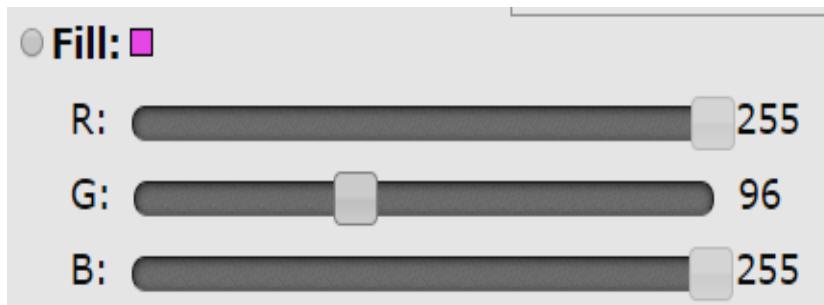
Update Interval-You can change how quickly the pattern changes with this slider.

## Test Patterns

There are two different test patterns you can run. You can run them by channel pattern or by RGB Pattern. The RGB Patterns are used for testing the lights. The Single Channel Pattern is used to test items like servos, relays, DMX channels, etc.

RGB Patterns-This setting will test the lights based on specified colors. The color order can be changed to match the color order of the lights you are testing.

- Chase R-G-B This pattern will set every 3 lights in a red, green, blue pattern and then shift this pattern up the string of lights.\*
- Chase R-G-B-All > This pattern will set every 4 lights in a red, green, blue, white pattern and then shift this pattern up the string of lights.\*
- Chase R-G-B-None> This pattern will set every 4 lights in a red, green, blue, off pattern and then shift this pattern up the string of lights.\*
- Chase R-G-B-All-None> This pattern will set every 5 lights in a red, green, blue, white, off pattern and then shift this pattern up the string of lights.\*
- Chase Custom Pattern-You can create a custom pattern for your chase. The numbers for the colors are the standard hexadecimal RGB color notation where there are 6 total digits and the first 2 are the intensity of red (00-FF), the second 2 are the intensity of green (00-FF), and the third set is the intensity of blue (00-FF). You can enter up to 9 colors.\*
- Cycle R-G-B > This pattern will cycle all the lights in a red, green, blue pattern.\*
- Cycle R-G-B-All > This pattern will cycle the lights in a red, green, blue, white pattern.\*
- Cycle R-G-B-None> This pattern will cycle the lights in a red, green, blue, off pattern.\*
- Cycle R-G-B-All-None> This pattern will cycle the lights in a red, green, blue, white, off pattern.\*
- Cycle Custom Pattern-You can create a custom pattern for your cycle. The numbers for the colors are the standard hexadecimal RGB color notation where there are 6 total digits and the first 2 are the intensity of red (00-FF), the second 2 are the intensity of green (00-FF), and the third set is the intensity of blue (00-FF). You can enter up to 9 colors.\*
- Fill- If you select this option, then all of the lights will be illuminated with the color selected in the sliders. There is a graphical representation of the color in the box next to the Fill option.\*



You can also click on the color indicator box to choose from a color picker tool.



**Append Color to Custom Pattern-** This will add the color selected by the color sliders to the Chase: Custom Pattern text box.

**Single Channel Patterns-**This setting will test your prop based on channel value. Test Value is the value sent. The fill option will send the Test value to all the channels. There are several Chase Sizes options.\*

When you select a Chase Size, it will send out a packet the size of the selected chase size with the first channel being the Test Value selected and the remainder of the packet channels set to 0, and then the packet will repeat.

**\*Note: The RGB Patterns do not take into account output setups so depending on your configuration the colors might not display in a true Red/Green/Blue pattern.**

## Sequence

The Sequence testing tab will allow you to test a stored sequence.

**Sequence:** 12 Days.fseq

**Start Time:** 0 (Seconds from beginning of sequence)

**Play** Play/stop the selected sequence  
**Stop** Stop the selected sequence  
**Pause/UnPause** Pause a running sequence or UnPause a paused sequence  
**Step** Single-step a paused sequence one frame  
**Step Back** Single-step a paused sequence backwards one frame

**Sequence Testing Limitations:**

1. This page is for testing sequences, it does not test audio or video or synchronization of a sequence with any media file. It does test Master/Remote sequence synchronization.
2. The Sequence Testing functionality currently only works when FPP is in an idle state and no playlists are playing. If a playlist starts while testing a sequence, the sequence being tested will be stopped automatically.

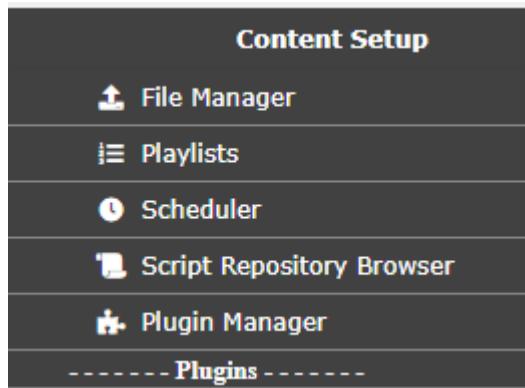
Select the sequence that you wish to test from the drop down list. You can specify the start time (offset) if you wish to start from any point other than the beginning of the sequence. Use the Control buttons (Play, Stop) to play through the sequence if you are using a Master/Remote configuration. If you are using the Stand Alone mode, then all of the player functions will work.

**Note:** Only the sequence data is output on the local system. Audio or video is not played. Network and channel configuration definitions must have been defined prior to Display Testing.

Ensure that Enable Test Mode on the Channel testing tab is not enabled.

# Content Setup

This section is to manage the contents that you can customize for this FPP



## File Manager

The file manager is where you can manage your personalized files on your FPP. From this screen, you can upload, download, and in some cases, modify the files that are on the FPP. Some of the personalized files are: sequence files, effect sequences, music files, video files, scripts, system logs and miscellaneous files.

A screenshot of the FPP File Manager. The top navigation bar includes tabs for Sequences, Audio, Video, Images, Effects, Scripts, Logs, and Uploads. The Sequences tab is active. Below the tabs, a table lists sequence files with columns for name, size, date modified, and time modified. A message below the table states: "Sequence files must be in the Falcon Player .fseq format and may be converted from various other sequencer formats using [xLights](#) or [Light-Elf](#). [xLights v4](#) uses .fseq as its native file format. [Vixen 3](#) and recent versions of [Vixen+](#) also have the ability to directly export .fseq files." At the bottom, there is an "Upload Files" section with a "Select Files" button and a placeholder text "Drag & Drop or Select Files to upload".

Name	Size	Date Modified	Time Modified
12 Days.fseq	85.54MB	12/11/18	10:44 PM
All I want for Christmas is You.fseq	115.38MB	12/11/18	10:47 PM
Auld Lang Syne.fseq	121.33MB	02/02/19	06:29 PM
BabyShark.fseq	42.09MB	12/11/18	10:44 PM
Carol of the Bells.fseq	63.67MB	11/20/18	09:38 PM
Chicken Dance.fseq	77.98MB	12/31/18	06:41 PM
Donde esta Santa Clause.fseq	69.61MB	12/11/18	10:46 PM

You can upload files to your FPP by dragging them from your computer's file manager onto the Upload Files section of the FPP File Manager. You have to drag it into the small box that has the dotted lines surrounding it.

The FPP will display the files in the tab that is appropriate for the file type. If you have uploaded a file that doesn't match one of the standard file types, they will be displayed in the upload tab.

Some tabs will have some additional options besides download, rename and delete.

Audio-This tab will also have the option to listen to the audio.

Video-This tab will also have the option to view the video properties such as encoding, video length, bitrate, resolution, frames per second, and various other properties.

Images- This tab will also have the option to view the file.

Scripts-This tab will have several options.

- View-You can view the script code
- Run-You can run the script code. This is helpful for testing purposes.
- Edit-You can edit the script code from within the browser.
- Copy-You can copy an existing script and save it with a different name. This is useful if you have similar scripts with different options.

Logs-This tab displays a list of several system logs that can be used for troubleshooting. You can view or download an individual log or you can select the Zip option which will bundle all of the system logs into a Zip file and download them onto your computer. (The location it is downloaded to depends on your computer's configuration but is usually in the downloads section)

Uploads-This tab will contain any files that do not fit the standard FPP formats.

## Playlists

FPP was mainly designed to play playlists, but a playlist is far more than a list of songs. The playlist is a very versatile function of the FPP. A playlist is an organized group of sequences, events, scripts, videos, etc. that are to be played in a particular order. The playlist is where you combine your sequences, videos, events etc. to create your light show. You can have several playlists so that you can have a different show for certain timeframes or days of the week or any other combination of playlists. You can even have a playlist within a playlist.

The screenshot shows the FPP software interface for managing playlists. It consists of two main sections: 'Playlists' and 'Playlist Details'.

**Playlists Section:**

- Select Playlist to Edit:** A dropdown menu listing existing playlists: 2019Christmas, 2020\_Christmas, CML-Action-ClearQueue, CML-Action-DisableViewerControl, and CML-Action-EnableViewerControl.
- Create New Playlist:** A form with a text input field labeled "Enter Playlist Name" and a "Create" button.

**Playlist Details Section:**

- Playlist Name:** 2020\_Christmas
- Playlist Description:** (empty text input field)
- Items Duration:** A table showing the duration of items in the playlist:

Lead In:	1	00:19
Main Playlist:	3	07:33
Lead Out:	1	05:00
- Buttons:** Save, Delete, Copy, Rename, Randomize, Reset.
- Edit Playlist Entry:** A form for adding entries. Fields include Type (Sequence and Media), Sequence (12 Days.fseq), Media (15 - The 12 Days of Christmas.mp3), and Video Out (Default). Buttons: Add, Insert Before, Insert After, Edit, Replace, Remove.
- Verbose Playlist Item Details:** A detailed list of items in the playlist:

-- Lead In -- (1 item, 00:19)	
1. Seq+Med:	Military_Intro.fseq   military_intro.mp3
-- Main Playlist -- (3 items, 07:33)	
2. Seq+Med:	Jingle Bell Rock.fseq   01 - Jingle Bell Rock.mp3
3. Seq+Med:	Mary Did You Know.fseq   06 - Mary Did You Know_.mp3
4. Seq+Med:	Rockin Around The Christmas Tree.fseq   01 - Rockin' Around The Christmas Tree (Single Version).mp3
-- Lead Out -- (1 item, 05:00)	
5. Sequence:	StaticLights.fseq
- (Drag entry to reposition)**: A placeholder text at the bottom of the list.

A Playlist has 3 sections:

Lead In- This section will only play once when your playlist first starts. This can be useful to activate items before your show actually begins or a one-time announcement. This will not repeat even if the repeat option is selected in the Scheduler or Status page.

Main Playlist- This section lists your main playlist items and if the repeat option is selected in the Scheduler or Status page will repeat until the playlist is stopped.

Lead Out- This section will only play once when your playlist ends. This can be useful to deactivate items that were activated at the beginning of your show or a closing announcement.

For example, during the week, you might only want a small portion of your sequences to play and on the weekend, all of your sequences to play. Then you would create 2 playlists with the order of the sequences/events to play for each playlist.

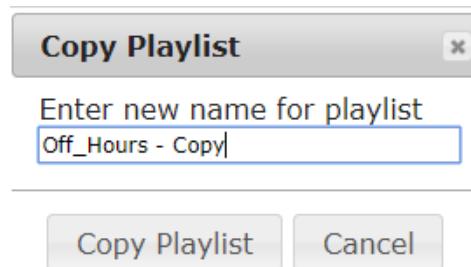
The Playlist tab has two sections for managing your playlists.

Playlists- This section shows a list of all of your saved playlists and the option to add additional playlists to your FPP.

- If you want to edit one of your existing playlists, then you can select the playlist that you want to edit in this section and the details will populate in the Playlist Details section below.
- If you want to add a new playlist then you would type in the name of the playlist you want to create in the New Playlist textbox and then click on the Add button. The playlist will be in the Playlist Details section below so that you can add your Sequences, events, etc. to your playlist.

Playlist Details- This section is used to manage your individual playlists. The playlist that is being edited will be displayed in the textbox at the top of the Playlist Details section.

- Save-This will save the changes that you have made to your playlist
- Delete-This will delete the playlist that has been selected
- Copy Playlist-This will copy the current playlist and give you an option to create a name for the new playlist.



- Rename- This will allow you to rename a playlist.
- Randomize-This will reorder the items in your Main Playlist in a random order.

Edit Playlist Entry-This section is used to add/edit the details of your selected playlist.

- Type-Select the type of playlist entry that you want to add to your playlist, there are several options. If you select the Auto-Select Matching Media/Sequence, FPP will automatically load the associated file with the item you selected.
  - Sequence and Media - This option is for playing an entry has both a .FSEQ file and associated media file (music and/or video)

- Media Only- This option is for playing media only when there are not any lights being controlled like displaying pictures on a matrix or TV.
- Sequence Only- This option is for playing sequence data only when there is not any media associated with the sequence, like an animated sequence
- Branch- This option allows you to modify the playlist while it is actually running by branching to other areas of the playlist depending on certain test criteria. This can be used for things like reducing the volume of your output depending on the time of day.
- Channel Remap- This option will remap channels to another channel range. This is helpful if you move a prop(s) to a different port on a controller and you can't rebuild the sequence.
- Dynamic- This entry is for playlist items that are created from an outside script/plug-in or process and allows for items to be played "on the fly".
- Event- You can trigger an event from within a sequence. This could be used for things like starting a fan for a blow up prop or any other predefined event.
- FPP Command- You can select one of the available FPP commands as a playlist item.
  - All Lights Off- This will turn all of the lights off.
  - Brightness- You can set the overall brightness of your display. You can also send the command to your remotes.
  - Effect Start- This will start an effect that has been previously saved on the FPP device.
  - Effect Stop- This will start an effect that has been previously saved on the FPP device.
  - Extend Schedule- You can extend (or shorten) the playlist that is currently playing if it was started through your scheduler. You will enter the number of minutes that you want to change your schedule end time. Negative numbers will shorten the playlist.
  - FSEQ Effect Start- You can start any of your stored .FSEQ files. You can select it to loop so it will play until you manually stop it. You also have the option to run it in the Background (running in the background will play an effect until a playlist is played and when the playlist ends, the background effect will resume)
  - FSEQ Effect Stop- You can stop any of your stored .FSEQ files that are currently playing through an Event.
  - GPIO- You can set the state of the GPIO pins to on or off.
  - Insert Playlist After Current-You can insert a saved playlist to start after the currently playing playlist completes.
  - Next Playlist Item- This will start the next playlist item in a currently playing playlist. If you are on the last item in your playlist, it will start the first item in your playlist.
  - Overlay Model Clear- You can clear the data displayed on a Pixel Overlay Model.
  - Overlay Model Effect- This will apply different effects to a pixel Overlay model. The effects that you can choose are:
    - Color Fade- You can fade in/out a solid color that you select. You can select the duration of the Fade in and Fade out.
    - Bars- you can display scrolling bars on your Pixel Overlay Model. You can select the colors, direction, number of bars, duration etc. to display.
    - Text- You can display text on your Pixel overlay model. You can select the font, color, font size and scroll options.

- Overlay Model Fill- This will apply a solid color effect to a Pixel Overlay model.
- Overlay Model State- This will apply a state to a Pixel Overlay model such as enabled, disabled, Transparent and Transparent RGB.
- Pause Playlist- This will pause the currently playing playlist.
- Play Media- This will play media files on your Pixel Overlay model.
- Prev Playlist Item- This will start the previous playlist item in a currently playing playlist. If you are on the first item in your playlist, it will start the last item in your playlist.
- Remote Effect Start- This will start an effect that is stored on one of your remote devices. You will have to enter the effect name exactly as it is stored on the remote.
- Remote Effect Stop- This will stop an effect that is currently playing on one of your remote devices. You will have to enter the effect name exactly as it is stored on the remote.
- Remote FSEQ Effect Start- You can start any of your stored .FSEQ files on a remote FPP device. You can select it to loop so it will play until you manually stop it. You also have the option to run it in the Background (running in the background will play an effect until a playlist is played and when the playlist ends, the background effect will resume)
- Remote Run Script- This will start a script that is stored on one of your remote devices. You will have to enter the script name exactly as it is stored on the remote.
- Remote Trigger Event- This will start an event that is stored on one of your remote devices. You will have to enter the Major and Minor Event ID for the event you want to trigger.
- Restart Playlist Item- This will restart a currently playing playlist item.
- Resume Playlist- This will resume a previously paused playlist.
- Run Script- This will start a script that is stored on this FPP device. You will select the script and enter any Arguments or Variables if needed
- Start Playlist- This will start a playlist that is stored on this FPP Device. You will need to select the Playlist and if you want it to repeat.
- Start Playlist at Item- This will start a playlist at a specific item in that Playlist. You will need to select the Playlist and if you want it to repeat.
- Start Playlist at Random Item- This will start a playlist at a random item in that Playlist. You will need to select the Playlist and if you want it to repeat.
- Stop Gracefully-This will stop the currently playing playlist Gracefully (complete the currently playing item and then stop)
- Stop Now--This will stop the currently playing playlist immediately.
- Toggle Playlist- This will toggle the playlist to a different playlist and you can select the Stop type.
- Trigger Event- This will start an event that is stored on this FPP device. You will have to enter the Major and Minor Event ID for the event you want to trigger.
- Trigger Multiple Events- This will start up to 4 events that are stored on this FPP device. You will have to enter the Major and Minor Event ID for each event you want to trigger.
- URL- You can use URL GET or POST actions to control/communicate with your PPF Device. Enter the URL, Method and any data required.
- Volume Adjust- You can adjust the volume either up or down in steps.
- Volume Decrease- You can adjust the volume down in steps.

- Volume Increase- You can adjust the volume either up in steps.
- Volume Set. - You can set the volume to a set level from 0 to 100%.
- Images- You can display images through the HDMI port. This could be useful if you want to have a virtual “picture frame” You can select all of the images that are in your Images folder by entering /home/fpp/media/images for the path. Or you can select individual images by entering the full path and image file name (/home/fpp/media/images/yourimagenamehere). You will select the transition type that you want in between images. Then you would add a Pause Entry for the amount of time that you want the image to display. If you are displaying individual images, you will need to add a Pause entry after each picture for how long you want the image to display before it transitions to the next one. If you select the Images path, FPP will play the images in a random order.
- MQTT-You can send and receive a few limited home automation commands from FPP to integrate FPP with your home automation system.
- Pause-You can add a pause to your playlist. This can sometimes be useful if you have other actions going on that you want to pause the sequences being played.
- Playlist-You can embed a playlist within a playlist. One example, you have three different shows you play during the week, but each show has a Lead In playlist of a few songs. You could put the Lead In songs in one playlist and then for the Lead In on each of your three daily playlists, you could just enter the one Lead In playlist instead of recreating the Lead In songs in each playlist.
- Plugin-There are several plugins that are available that you can include in your playlist. (see the [Plugin Manager](#) section for more detail)
- Volume-You can adjust the volume from within the playlist. This can also be used with the Branch item and adjust the volume depending on the time of day.
- Script-You can run a script from within the playlist, there are several pre-written scripts available or you could write your own. (see the [Script Repository Browser](#) section for more detail)
- URL-This entry will allow you to send URL commands to outside programs or processes. This can be used for things like turning on/off smart power strips or if you have a website, you could send what song is currently playing.

## Scheduler

The Scheduler page is where you can set up predefined playlists to play on a preset schedule. You must have previously created a playlist in order to schedule one.

Note: For the schedule to start on the correct time, you must have your time settings configured properly. (refer to the [Config/Set Time](#) page in the Status/Control section of FPP.)

Schedule										
Save		Add		Delete		Reload				
#	Enable	Start Date	End Date	Playlist	Day(s)	Start Time	End Time	Repeat	Stop Type	
1	<input checked="" type="checkbox"/>	2019-01-01	2020-01-13	2019Christmas	▼	Everyday	09:23:00	11:00:00	<input checked="" type="checkbox"/>	Graceful
2	<input type="checkbox"/>	2019-01-01	2020-01-01	2019Christmas	▼	Everyday	09:01:00	09:10:00	<input checked="" type="checkbox"/>	Hard Stop
3	<input type="checkbox"/>	2019-01-01	2099-12-31	StaticLights	▼	Everyday	22:01:00	01:00:00	<input checked="" type="checkbox"/>	Graceful
4	<input type="checkbox"/>	2020-01-21	2099-12-31	StaticLights	▼	Everyday	23:45:00	02:00:00	<input checked="" type="checkbox"/>	Graceful

You can have multiple playlists for different days of the week or even different holidays.

The Save button must be clicked after any additions/modifications in order for them to be saved.

The Delete button will temporarily delete the selected schedule; to make it permanent, click on the Save button after it is deleted.

The Reload button will reload the saved Schedule, so if you make changes but have not saved them, this will load what is currently saved to take you back to the beginning.

To create a schedule, click on the Add button and then fill in the items pertaining to the playlist (to edit an existing playlist, just modify the sections as needed)

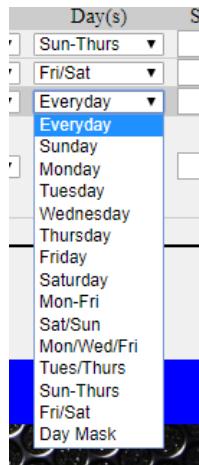
Enabled-This will allow you to select whether you want the playlist to be active or not. You might have playlists that you want to manually change that are scheduled for the same time frame and you can select which one is enabled.

Start Date-This is the date that you want the chosen playlist to start playing. This can be a date way in the past and the playlist will play when the next start Time/Day is reached. If you configured your Locale in the [FPP Settings](#) selection, you can select holidays by name instead of entering the dates manually.

End Date-This is the last day that you want to playlist to play. It can be far into the future if you desire. The playlist will stop playing after the selected end date. If you configured your Locale in the [FPP Settings](#) selection, you can select holidays by name instead of entering the dates manually.

Playlist-This is the playlist that you want to play during the selected timeframe.

Days(s)-You can select any combination of days for your playlist to play. Several of the more common day combinations are listed in the drop down. If the combination you want is not listed, then select the Day Mask and place a check next to the days that you want the playlist to play.



Start Time-This is the time that you want your playlist to begin. The time has to be entered in the 24 hour format. When you click on the Start Time box, there will be listed start times for every half hour. You do not need to select one of those times; you can enter any time that you want. There is also a Sunrise and Sunset option that you can select which will adjust the start time to coordinate with your local Sunrise/Sunset time. In order for this to work properly, you will need to have your Time configurations set up

correctly to include your Latitude and Longitude coordinates (see the [Config/Set Time](#) section.)

**End Time**-This is the time that you want your playlist to end. If there is a sequence playing when it reaches this time, the sequence will end according to the Stop Type you have selected. The time has to be entered in the 24 hour format. When you click on the End Time box, there will be listed end times for every half hour. You do not need to select one of those times; you can enter any time that you want. There is also a Sunrise and Sunset option that you can select which will adjust the end time to coordinate with your local Sunrise/Sunset time. In order for this to work properly, you will need to have your Time configurations set up correctly to include your Latitude and Longitude coordinates (see the [Config/Set Time](#) section.) If your schedule is to go beyond midnight, select the end time that you want your schedule to end. FPP will understand that the end time is actually on the next day and stop accordingly.

**Repeat**-If this box is selected, then the playlist will continue from the beginning when it is finished and keep repeating the playlist until the scheduled end date/time is reached. If it is not selected, then the playlist will only play once. This also needs to be checked if there is a possibility that a previously scheduled playlist might still be playing when this playlist is scheduled to start (like in a Graceful Stop situation.)

**Stop Type**- There are three Stop Types that you can select from.

- Graceful- This will play the song that is currently playing and then stop, if you have a Lead Out section, that will also play so it is possible that your schedule will not end on the exact time selected.
- Graceful Loop- This will complete the current playlist (including Lead Out section) and then stop.
- Hard Stop- This will end the playlist at the time scheduled. If a song is playing, it will stop in the middle of the song.

**Note: If a playlist does not have the Repeat option selected**

- It will only start if there is no other sequence playing at the scheduled start time.
- It will play all of the sequences in the list and then stop. If the schedule for this playlist ends before all of the sequences have played, then when the end time is reached, the currently playing sequence end time will be based on the Stop Type you selected. The rest of the items in the playlist will not get played. It is probable that the playlist will not end exactly on the scheduled end time.

**Note: If a playlist does have the Repeat option selected**

- Then it will start at the scheduled start time if there is no other sequence currently playing, or start when the currently playing sequence ends as long as it is within the scheduled time frame.
- It will play all of the sequences in the list and then start over at the beginning of the main playlist and continue until the end time of the schedule has been reached. When the end time is reached, the currently playing sequence in the list will end based on the Stop Type selected. It is probable that the playlist will not end exactly on the scheduled end time.

**Updating a Playlist/Schedule**- If you update a Playlist/Schedule during a time period that it was scheduled to play then there are a few things to consider.

- If you upload new sequences and add them to a playlist that is currently playing, they will not play in the current cycle and if the Playlist is scheduled to repeat, it will play in the next cycle.
- If you updated existing sequences or events that are already in a playlist, then the updated sequences/events will be played the next time that particular sequence or event is played.

**Repeating Schedules-** You can create a schedule in FPP that is a continuously repeating schedule based on a certain criteria that will span every month or every year. This is helpful for people that use FPP for more than holiday lighting or more specialized schedules (like landscape or other types of lighting). FPP will ignore any specific field comparisons if there is a 0 entry in a particular field, i.e. 00 for Month and 0000 for year.

For example, here are a couple schedules:

Start Date	End Date	Result
0000-02-14	0000-02-14	Plays every February 14th (Valentine's Day)
0000-00-01	0000-00-07	Plays the first week of every month

You can also have a 24 hour schedule by entering a date in the Past and a date way in the future and set the start time to be 00:00:00 and end time of 24:00:00.

## Script Repository Browser

Scripts are small program codes to perform specific functions that have a wide range of functionality. There are several scripts available from FPP or you could write your own.

The screenshot shows a software interface titled "Script Repository". It displays a list of scripts organized into categories. Each script entry includes an "Install" button, a "View" button, the category name, the filename, and a brief description. The categories shown are Config, Control, and a few others. The scripts listed include "Enable\_HiFiBerry.sh", "CheckIfPlaying.sh", "CycleRandomPlaylists.sh", "GoToNextPlaylistItem.sh", "GoToPreviousPlaylistItem.sh", and "PlayEffectWhenNotPlayingFSEQ.sh".

Category	File Name	Description
Config	Enable_HiFiBerry.sh	Script to enable support for a HiFiBerry DAC on the Pi
Control	CheckIfPlaying.sh	Run scripts based on whether or not FPP is currently playing a sequence of some sort
Control	CycleRandomPlaylists.sh	Randomly cycle through playlists
Control	GoToNextPlaylistItem.sh	Jump to the next item in the current playlist
Control	GoToPreviousPlaylistItem.sh	Jump to the previous item in the current playlist
Control	PlayEffectWhenNotPlayingFSEQ.sh	Play an effect sequence whenever a .fseq sequence is not running

The Script Repository lists the scripts by category based on the functionality of the script. Scripts can be used as a part of a playlist or as part of a plugin. You can install the script or view the actual script code from this screen. Once the script is installed, it can be managed from the File Manager section of the FPP. You may be required to edit some scripts to make

them functional. For example, the Remote Control example scripts need to be modified to include the IP address of the remote FPP instance that you wish to control.

NOTE: your DNS settings must be configured and working in order to view the Script Repository.

## Plugin Manager

Plugins are additional components that have been developed by the developers or individuals to provide functionality that can then be used from within the FPP. You can develop your own Plugin or install a Plugin from a third party if you wish. These are used to perform more complex operations than scripts.

The screenshot shows the FPP Plugin Manager interface. At the top, there's a search bar with placeholder text: "If you do not see the plugin you are looking for, you can manually add a plugin to the list by providing the URL for the plugin's pluginInfo.json file below and clicking the 'Retrieve Plugin Info' button." Below the search bar is a "pluginInfo.json URL:" input field and a "Retrieve Plugin Info" button. The interface is divided into several sections:

- Installed Plugins:** A section containing "Viewer Control" (with a description, author, and icons), "Event Date" (with a description, author, and icons), and "Big Buttons" (with a description, author, and icons).
- Available Plugins:** A section containing "Vast V-FMT212R" (with a description, author, and icons), "Model Testing" (with a description, author, and icons), and "Template Plugin" (with a description, author, and icons).
- Incompatible Plugins:** A section containing "After Hours Music Player Plugin" (with a description, author, and icons) and "Election 2016" (with a description, author, and icons).

The Plugin page has 5 sections in order to ease navigation.

### Retrieve Plugin Info

This section is where you can enter the URL for a Plugin that has not been incorporated into the official release of FPP and FPP will download the relevant information from the plugin. The URL needs to point to the location that the pluginInfo.json file for the plugin is located. If there isn't a valid pluginInfo.json file, the plugin will not be installed.

If you do not see the plugin you are looking for, you can manually add a plugin to the list by providing the URL for the plugin's pluginInfo.json file below and clicking the 'Retrieve Plugin Info' button:  
pluginInfo.json URL:

[Retrieve Plugin Info](#)

## Installed Plugins

This section contains plugins that have been installed and next to the plugin there are several options.



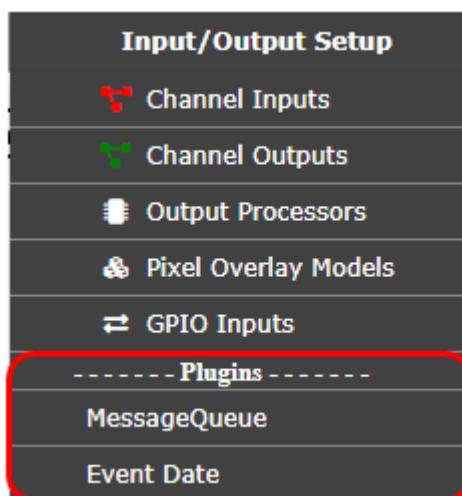
- is used to check for updates to the selected plugin.
-  is used to delete the selected plugin.
-  is used to go to the home page for the plugin and can be useful for installation information.
-  is used to view the source code page for the plugin.
-  is used to go to the bug reporting page for the plugin.

## Available Plugins

This section contains plugins that are directly available through the FPP interface but haven't been installed. To install the plugin, click on the install icon.



Note: Most plugins will require some sort of configuration or setup before they will operate correctly. The plugin author will determine which menu heading the plugin should fall under. The plugin's configuration and other relevant pages will be located at the bottom of the menu dropdown. There might be more than one plugin page for the plugin.



Refer to the plugin's home page or help page for more information on the configuration and usage of the plugin. Some of the more common plugins have setup instructions in the [Common Plugins](#) section of this manual.

## Template Plugin

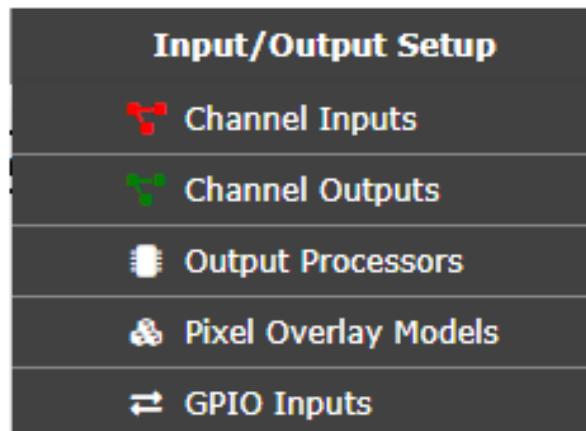
This section is to assist plugin authors in creating a plugin for FPP and the structure required for a FPP Plugin. See the [Plugin Development](#) section in the Advanced Settings section for more details on creating a Plugin.

## Incompatible Plugins

This section will list available plugins that have compatibility issues with the installed version of FPP. You can go to the developer's website and view the code and possibly fix the code to make it work for your application.

# Input/Output Setup

The Input/Output section is used primarily to define the channel/universe configurations of the controller connected to the FPP. It is also used to configure other input or output configurations



## Channel Inputs

The Channel Inputs section is to identify the E1.31 Universes that this instance of FPP is going to be receiving in Bridge Mode (do not enter E1.31 Universes that other FPPs are using.) If you are not using your FPP in Bridge mode or if you are using DDP, then you do not need to configure the Channel inputs.

Bridge Mode is where the FPP will accept the E1.31 data coming in and pass it through the selected network port to a controller or other E1.31 device. If you have events or other output processes that are triggered by channel data, they will be processed.

**Note:** xLights has a function called [FPP Connect](#) that will upload this information for you and is the recommended method to prevent typographical errors.

The screenshot shows the "E1.31/ArtNet Bridge" configuration screen. At the top, there is a header "E1.31/ArtNet Bridge". Below it, a section titled "E1.31/ArtNet Bridge Mode Universes" is highlighted with a border. This section contains a table for managing bridge universes. The table has columns for Input, Active, Description, Input Type, FPP Channel (Start, End), and Universe (#, Count, Size). A row is shown with values: Input 1, Active checked, Description "F16V3 Yard", Input Type "E1.31 - Unicast", FPP Channel Start 857, End 11096, Universe # 101, Count 20, Size 512. There are buttons for "Save", "Clone", and "Delete". A note at the bottom says "(Drag entry to reposition)".

**(Note: if you are using DDP, then you do not need to set up E1.31 Bridge Mode Universes. FPP will automatically receive and recognize DDP packets with no configuration needed)**

**Input-** This is just a reference for the line.

**Active-** You can make the Universes defined on a line active by selecting this box, if you don't want it active, remove the checkmark.

**Description-** Enter a description to help you identify the controller that these Universes are assigned.

**Input Type-** Enter the input type that this FPP device will be receiving, it is usually best to select E1.31 Unicast.

**FPP Channel (Start)-** Enter the Start Channel that you want these Universes to start, if this is the only controller in your network, then it is typically 1 but if you have more than one controller, you will have to determine what the start channel should be. This can usually be determined from your xLights Setup screen.

**FPP Channel (End)-** This will be calculated based on the information entered.

**Universe (#)-** This is the first Universe number that you are assigning. It can be any number from 1-63999 and doesn't need to begin at 1.

**Universe (Count)-** Enter the number of Universes you are going to assign to this FPP device. Universes do not have a direct correlation to ports, it is recommended to define Universes based on controllers and only define the number of Universes you actually need. In the screenshot above, there are 20 Universe of 512 channels defined (101-121).

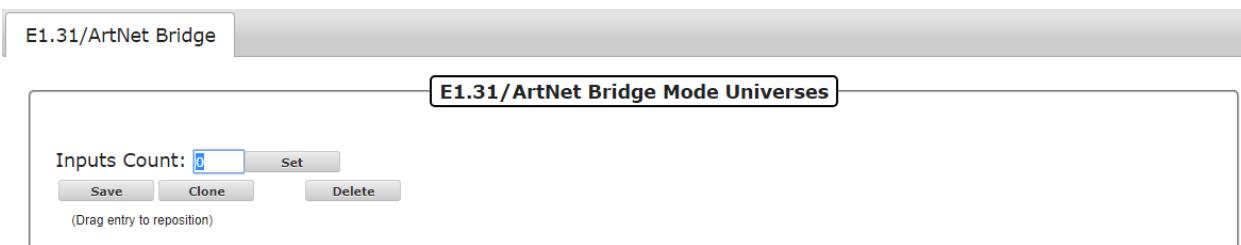
**Universe (Size)-** Enter the number of channels that you want each Universe to have. The common Universe size is either 512 or 510 channels and they both work equally well. Just make sure that you use the same Universe numbers and sizes in all areas related to this FPP device (xLights, etc.)

E1.31 Bridge mode is useful if you want to control your lights/props directly from xLights, xSchedule or other software and is useful in testing from xLights as well. If you are not going to use Bridge Mode, then you don't need to set up any Universes in the Input page but it could be helpful in testing.

Your E1.31 Bridge Universes/FPP Start channels/Universe size needs to match what you set up in your show player (e.g. xLights/xSchedule) and the controller. If you need additional information on Universes, refer to the Resources section about [Universes and Channels](#).

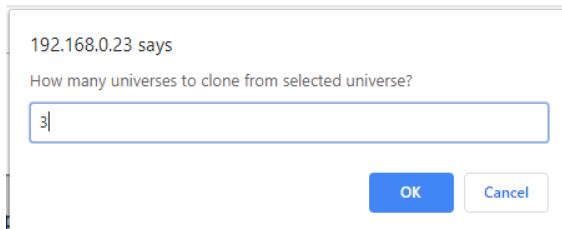
**Important! If you change the FPP Start Channel numbers, Universe #, Universe Count or Universe size after you have configured your Universes, make sure that you adjust any of the other Universe Lines because FPP will not “auto correct” your Universe #s or FPP Start Channel numbers.**

## Adding E1.31 Bridge Mode Input



If you choose to enter E1.31 Universes manually, you would normally enter 1 for the Inputs count and click on Set. Then enter all of the relevant information in the fields that get displayed.

The Clone button will copy the settings of the selected Line # (Universe #, Universe Count, Universe Size and Universe Type) to the lines below. FPP will then ask how many Universe lines you want to clone. This is not normally needed with the ability to define several Universes on one line.



When you click OK, FPP will paste the settings into the number of Universe lines that you entered below the selected Universe line and increment the Universe # on each cloned line.

Note: You have to enter a valid number of Universes to clone. If you select more Universes to clone than there are Universe lines below the selected Universe, then the clone process will not be completed.

You can also delete a Universe line by selecting it and clicking on the Delete button.

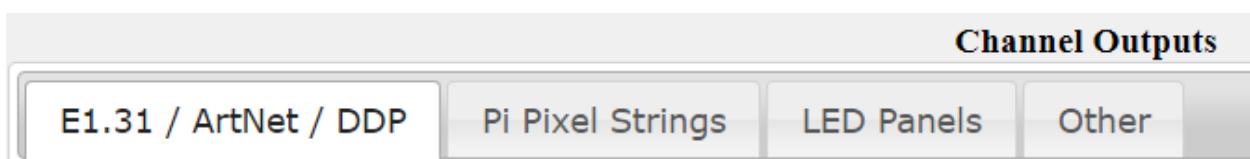
**Important! You have to click on the Save button after you make any changes in order for them to be saved. After you save the configuration, you will get a message at the top of your screen indicating that you have to restart FPP for the change to take effect.**



## Channel Outputs

The Channel Outputs page is where you configure FPP to output the channel data it receives to the various controllers/hats/capes that are connected to the FPP. There are several types of output configurations and you will have to configure the output that is appropriate for your application. Depending on the SBC (Pi or BeagleBone) that you have connected, the Channel Output tabs will be different.

### Pi Channel Outputs



## BeagleBone Channel Outputs

The screenshot shows a software interface titled "Channel Outputs". At the top, there is a horizontal navigation bar with four tabs: "E1.31 / ArtNet / DDP" (which is highlighted in blue), "BBB Strings", "LED Panels", and "Other". Below the tabs, there is a large text area containing instructions about setting up channel outputs.

You will need to set up your channel outputs to match the controller that is connected to your FPP device.

Here are the Channel output types and typical usage.

- E1.31- If your FPP device is connected with an Ethernet cable to a controller (or switch that is connected to controllers) that are using E1.31/Artnet or DDP data, then you will need to configure the outputs in this tab. DDP is the preferred protocol if you have a controller that supports DDP (e.g. KulpLights.com. ESP PixelStick controllers)
- Pi Pixel Strings- If you are using a Pi Hat then you would configure the outputs on this tab.
- BBB Strings- There are several capes that you can add to the BeagleBone series SBC to control up to 40 strings of pixels. If you have a KulpLights controller, this is where you will configure the pixel strings for it.
- LED Panels- This is for setting up P10/P5 panels that are connected to either a BB OctoScroller type controller or a Pi Matrix hat type controller.
- Other-There are several other output types that are not commonly used but available, such as DMX Pro, LOR, Renard, Pixelnet, GPIO, etc. to name a few.

### E1.31/ ArtNet/ DDP

Your E1.31 Universes/FPP Start channels/Universe size needs to match what you set up in your show sequencer (e.g. xLights) and the controller. If you need additional information on Universes, refer to the Resources section about [Universes and Channels](#)

You can use [FPP Connect](#) in xLights to upload your configuration and is the recommended method. This helps prevent typographical errors in copying the information.

You only need to Enable and Configure E1.31/Artnet/DDP outputs if you need this FPP device to send out E1.31 data through one of its network interfaces. If you have an attached Cape/Hat or running in a Master/Remote mode, you usually do not need to Enable/Create E1.31 outputs.

**Warning:** If you are not going to use FPP to send E1.31 data **and select the UDP option in FPP Connect, FPP Connect will configure AND ACTIVATE your E1.31 outputs this could cause lagging and unexpected results if you don't need to output E1.31 data.**

If you are using xLights, you can export the E1.31 Channel Output settings into your FPP by using the FPP Connect feature in the Tools section of xLights by selecting the UDP option.

**Enable E1.31 / ArtNet / DDP Output:** Source Interface: **eth0** Outputs Count: **6** 

Out put	Act ive	Description	Output Type	Unicast Address	FPP Channel		Universe			Mon itor	De Dup	Ping	
					Start	End	#	Count	Size				
1	<input checked="" type="checkbox"/>	F16V3-Yard	E1.31 - Unicast	192.168.101.2	1	12288	100	24	512	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Ping
2	<input checked="" type="checkbox"/>	F8PB-LeftRoof	DDP - Raw Channe	192.168.1.102	12289	15357	200	1	3069	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Ping
3	<input checked="" type="checkbox"/>	F8PB-RightRoof	DDP - Raw Channe	192.168.1.103	15358	16335	300	1	978	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Ping
4	<input checked="" type="checkbox"/>	PocketScroller	DDP - Raw Channe	192.168.1.104	16336	30159	400	1	13824	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Ping
5	<input checked="" type="checkbox"/>	F8PB Singing Elements	DDP - Raw Channe	192.168.1.105	30160	33111	500	1	2952	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Ping
6	<input checked="" type="checkbox"/>	F8-PB Matrix	DDP - Raw Channe	192.168.1.106	33112	46083	600	1	12972	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Ping

- Enable E1.31/Artnet/DDP output- If you need your FPP to output this type of data, then make sure you check the box to enable E1.31/Artnet/DDP output.
- Source Interface- Select the interface that you want the data to be sent out, this is typically eth0.
- Outputs Count- You can enter a Count here. This will set the number of lines to the number you selected and the recommended method is to use only one line per controller/FPP device.
- Set Button- once you enter the Outputs count, click on the Set button and FPP will populate the outputs screen with the number of lines you entered in the Output Counts and then you can modify them as needed.
- Save button- This will save your changes.
- Clone button- This will make a copy of the selected output and paste the information into the line items below it.
- Delete button- This will delete the selected output.
- Line #- This is used to Identify each line of Universe(s) saved on your FPP.
- Active- A Universe line can be Active or not. If it is not active, then data will not be transmitted to all the universe(s) on that Line #. It is important to only activate the outputs that are actually needed by this FPP device.
- Description-This can be used to provide information on how each Universe Line # is assigned. This is usually something to identify the controller.
- Type- This is used to identify how the Universe Data is going to be transmitted. This is normally DDP, Multicast or Unicast with DDP being the recommended method for devices that support the DDP protocol, but for specialty configurations it can be set for Artnet. E1.31 data should typically be set to Unicast for better efficiency. DDP Data is normally configured for Raw Channel numbers. DDP- One Based will convert the output data for each controller/FPP device to begin on channel one, and if you select this option, you will need to manually configure those FPP devices/Controllers to match this configuration.
- Unicast Address- If you are using Unicast or DDP data, then the IP address of the device you are sending the data to needs to have it entered in this box.
- FPP Start Channel-This normally reflects the Absolute Channel that is reflected in your Sequencing Program for that range of Universes (xLights, Vixen, etc.)
- FPP End Channel-This is calculated based on the information you entered to help verify that the information you entered is correct.
- Universe #- This shows the starting universe number for the Universe Line #.
- Universe Count-This will indicate how many Universes are defined for that line. You can define multiple Universes on a line and is the recommended method.
- Universe Size- This is how many channels each Universe is designated. All Universes on that line will have the same number of channels. It is more common to use either

- 512 or 510 but you need to make sure you use the same numbering system for all interfaces in your show, such as your Scheduling program and your player program.
- Priority- You can select a priority for the E1.31 packages. If a device receives E1.31 data from 2 sources, then the device will use the one with the highest priority. This is only valid for controllers that support the E1.31 priority function and is not very common.
  - Monitor- If you select this option, FPP will monitor the device that is receiving the E1.31 data and if it becomes unavailable it will stop sending the data until the device starts to respond again.
  - DeDup- By selecting this option, FPP will use an algorithm for sending data packets and if a packet is a duplicate of the previously sent packet FPP will not send the duplicate. This could reduce the bandwidth used on your network.
  - Ping- You can click this button to verify that your network configurations are set correctly

**Important! If you change the FPP Start Channel numbers, Universe #, Universe Count or Universe size after you have configured your Universes, make sure that you adjust any of the other Universe Lines because FPP will not “auto correct” your Universe #'s or FPP Start Channel numbers.**

## Adding E1.31 Output Channels

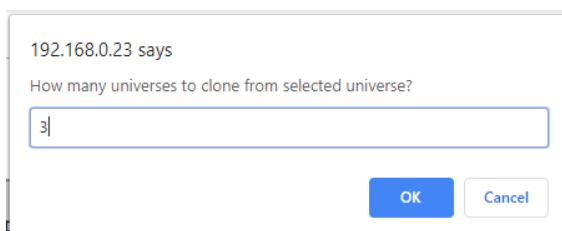
The screenshot shows the FPP configuration interface with the "E1.31 / ArtNet / DDP" tab selected. The main area contains the following controls:

- Enable E1.31 / ArtNet / DDP Output:** A checkbox.
- Source Interface:** A dropdown menu set to "eth0".
- Universe Count:** An input field containing "0" with a "Set" button next to it.
- Buttons:** "Save", "Clone", and "Delete". Below these is the note "(Drag entry to reposition)".

The Source Interface specifies which network interface the FPP is going to output the channel data to the controller. This is most commonly done through the eth0.

If you choose to enter E1.31 Universes manually, you would normally enter the number of controllers that you need to send data to for the Outputs count and click on Set. Then enter all of the relevant information in the fields that get displayed.

The Clone button will copy the settings of the selected Line # (Universe #, Universe Count, Universe Size and Universe Type) to the lines below. FPP will then ask how many Universe lines you want to clone. This is not normally needed with the ability to define several Universes on one line.



When you click OK, FPP will paste the settings into the number of Universe lines that you entered below the selected Universe line and increment the Universe # on each cloned line.

Note: You have to enter a valid number of Universes to clone. If you select more Universes to clone than there are Universe lines below the selected Universe, then the clone process will not be completed.

You can also delete a Universe line by selecting it and clicking on the Delete button.

**Important! You have to click on the Save button after you make any changes in order for them to be saved. After you save the configuration, you will get a message at the top of your screen indicating that you have to restart FPP for the change to take effect.**



## Pi Pixel Strings

A screenshot of the 'Pi Pixel Strings' configuration page. At the top, there are tabs for 'E1.31 / ArtNet / DDP', 'Pi Pixel Strings' (which is selected), 'LED Panels', and 'Other'. Below the tabs, there are buttons for 'New Type:' (set to 'RPIWS281X'), 'Add Output', 'Clone String', 'Save', and 'Revert'. A note says 'Press F2 to auto set the start channel on the next row.' The main area shows a table for 'RPIWS281X Output'. The table has columns: Port, Protocol, Description, Start Channel, Pixel Count, Group Count, End Channel, Direction, Color Order, Null Nodes, Zig Zag, Brightness, and Gamma. There are two entries: 1) WS281X Porch Rail (Port 1, Start Channel 1, Pixel Count 180, End Channel 540, Direction Forward, Brightness 100%, Gamma 1.0) and 2) WS281X Outlines (Port 2, Start Channel 541, Pixel Count 105, End Channel 855, Direction Forward, Brightness 100%, Gamma 1.0). The 'Output Enabled' checkbox is checked for both entries.

If you are using a PiHat type of controller, you will set up your channel outputs here.

- New Type- Select the type of pixels that you are going to be connecting to your Pi. You can choose between RPIWS281X or spixels. RPIWS281X is used for most pixels such as WS2811, WS2812, etc. protocol. This type can control two strings of ws281x pixels. Spixels can drive 16 independent strings of APA102, LPD6803, or LPD8806 pixels directly off the Raspberry Pi's GPIO ports by emulating SPI outputs in software. The data and ground lines attach directly to the Pi while power for the pixels is injected from another source.
- Add Output- Clicking on this will allow you to add the pixel strings to your Pi hat.
- Clone String- Selecting this will copy the settings of the selected string to the number of strings selected below. It will update the Start Channel to follow after the previous string.
- Save- Selecting this will save your configuration.
- Revert- Selecting this will revert the screen to the currently saved configuration
- Output Enabled-Check this box to enable the Pi Pixel String output.
- Port- Indicates the number of the output port on the hat.
- Protocol- Indicates the protocol for the pixels attached to the port of the hat.
- Description- You can enter a description for the pixels attached to the port.
- Start Channel- Enter the start channel that corresponds to the start channel in your sequencing software (xLights, Vixen, etc.)
- Pixel Count- Enter the number of pixels connected to that port of the hat.
- Group Count- If you have groups of pixels that are going to be illuminated exactly the same all of the time, you can put them in groups.
- End Channel- This indicates the ending channel for the string.
- Direction- Selecting reverse will reverse the data sent to the pixels so that it will act like the data is coming in from the end of the string.

- Color Order- You can select a color order to match the color order for the pixels you are using.
- Null Nodes- If you are using Null Nodes in the beginning of your string to help boost the transmission distance, then enter the number of Null Nodes you have in the string.
- Zig Zag- This setting is useful for items like a Mega Tree where one string is used for more than one strand of the tree. This is more commonly set up in the sequencing software (xLights, Vixen, etc.) Enter the number of times the string changes direction. **Do not use Zig Zag if you used the Strands/String setting in your sequencing software.**
- Brightness- You can set the brightness for your pixel string. Many dense props are very bright and a lower brightness might look better. This also reduces the power required to light the pixels.
- Gamma- This is a correction factor that can be entered due to the way that our eyes perceive colors in the dark. It can also be used to correct color variations on pixel strings from different vendors.
- 

## BBB Strings

The BeagleBone series of SBCs has several capes and configurations and is very versatile. There are several capes available from <http://kulplights.com>.

**BeagleBone String Capes**

<b>Enable BBB String Cape:</b> <input checked="" type="checkbox"/>													
<b>Cape Type:</b> FR-PB w/ Expansion (8 Serial)													
		Press F2 to auto set the start channel on the next row.											
Port	Description	Start Channel	Pixel Count	Group Count	End Channel	Color Order	Null Nodes	Zig Zag	Brightness	Gamma			
1)		1	0	0	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
2)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
3)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
4)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
5)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
6)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
7)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
8)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
Differential Receiver: Standard ▼													
9)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
10)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
11)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
12)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
Expansion Type: Standard ▼													
13)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
14)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
15)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
16)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
17)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
18)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
19)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
20)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
21)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
22)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
23)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
24)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
25)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
26)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
27)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
28)		1	0	1	0	Forward ▼	RGB ▼	0	0	100% ▼	1.0		
<b>Serial Mode:</b> <input checked="" type="checkbox"/> Disabled ▼													

The capes from KulpLights.com can drive 800 pixels per port at 40 fps (roughly 1600 per port at 20 fps). They F8 can also drive other components to control additional pixels like an Expansion Board, Differential Expansion Board, Differential Receiver, or Smart Differential Receivers from <http://pixelcontroller.com>.

The capes also have RJ45 ports and depending on the cape, some can be used to drive 4 channels of serial data each. If you do not send any serial data then you will have all the ports available to connect Differential Receivers. Each RJ45 port can connect to one Differential Receiver or up to 3 daisy-chained Smart Differential Receivers with a Cat5 cable up to 250 feet to the furthest Receiver. The Differential Receivers and Smart Differential Receivers each have 4 ports for pixel string connections.

At the top of the page, you have the following options:

- Enable BBB String Cape- If you are using a BBB Cape then this box needs to be checked
- Cape Type- You will need to select the type of Cape that you are using and the type of output you are going to use. If you are using one of the Expansion Boards the select one of the options with the Expansion Board Setting. If you are going to use any of the RJ45 ports for outputting serial data, then select one of the options that corresponds to the number of serial channels you are going to output (Each RJ45 port outputs 4 serial channels). If you are not going to output any serial data from the F8, then select the (No Serial) option.
- Clone String- If you select a string port, you can clone the data to the string ports below. Once you select a string port, click on the Clone String button and you will be asked how many copies of the string you want to clone below the selected string.
- Save- This will save your settings
- Revert- This will revert to the last saved settings.
- Press F2 to auto set- When you complete a row of the configuration, you can press F2 and it will fill in the start channel on the next row. This is helpful if you have several ports that are running contiguous channels.

You can add only one Expansion Board or one Differential Expansion Board to the F8.

- Expansion Board- This will add 16 more ports to be connected locally.
- Differential Expansion Board- This will add the ability to add up to 4 Differential Receivers. Each Differential Receiver has 4 ports and each Differential Receiver can be located up to 250 feet from the F8 with a Cat5 cable connecting them. If you use Smart Differential Receiver boards, then you can add up to 3 Differential Receiver boards to each port of the Differential Expansion board by connecting them in a daisy chain.

Each port on all of the controllers/receivers have the following options:

- Description- You can enter a description for the pixels attached to the port.
- Start Channel- Enter the start channel that corresponds to the start channel in your sequencing software (xLights, Vixen, etc.)
- Pixel Count- Enter the number of pixels connected to that port of the hat.
- Group Count- If you have groups of pixels that are going to be illuminated exactly the same all of the time, you can put them in groups.
- End Channel- This indicates the ending channel for the string.
- Direction- Selecting reverse will reverse the data sent to the pixels so that it will act like the data is coming in from the end of the string.

- Color Order- You can select a color order to match the color order for the pixels you are using.
- Null Nodes- If you are using Null Nodes in the beginning of your string to help boost the transmission distance, then enter the number of Null Nodes you have in the string.
- Zig Zag- This setting is useful for items like a Mega Tree where one string is used for more than one strand of the tree. This is more commonly set up in the sequencing software (xLights, Vixen, etc.) Enter the number of times the string changes direction. **Do not use Zig Zag if you used the Strands/String setting in your sequencing software.**
- Brightness- You can set the brightness for your pixel string. Many dense props are very bright and a lower brightness might look better. This also reduces the power required to light the pixels.
- Gamma- This is a correction factor that can be entered due to the way that our eyes perceive colors in the dark. . It can also be used to correct color variations on pixel strings from different vendors.

## LED Panels

This tab is for configuring P10 or P5 Panels that are going to be controlled by a Hat or Cape connected to the FPP device. Due to P10 and P5 panels not having a universal standard design, there are many settings that might need to be configured to get them to work correctly. The settings available are different depending if the FPP device is on a Raspberry Pi or BeagleBone SBC.

Pi LED Panels Screen

**LED Panels**

<b>Enable LED Panel Output:</b> <input type="checkbox"/> <b>Panel Layout:</b> W: <input type="text" value="3"/> H: <input type="text" value="3"/> <b>Single Panel Size (WxH):</b> 32x16 1/8 Scan	<b>Start Channel:</b> <input type="text" value="1"/> <b>Channel Count:</b> 13824 (4608 Pixels)
<b>Model Start Corner:</b> Top Left	<b>Default Panel Color Order:</b> <input type="text" value="RGB"/> <b>Wiring Pinout:</b> Standard
<b>Brightness:</b> 100%	<b>Use CPU PWM:</b> <input type="checkbox"/>
<b>Panel Gamma:</b> 2.2	<b>GPIO Slowdown:</b> <input type="text" value="1 (multi-core Pi's)"/>
<b>Panel Interleave:</b> Off	
<b>Color Depth:</b> 8 Bit	
<b>Connection:</b> Hat/Cap/Cape	

**Save**

**LED Panel Layout:**

Advanced Layout?

View Config from front?

**Front View**

O-1	O-1	O-1
P-1	P-1	P-1
C-Def	C-Def	C-Def
O-2	O-2	O-2
P-1	P-1	P-1
C-Def	C-Def	C-Def
O-3	O-3	O-3
P-1	P-1	P-1
C-Def	C-Def	C-Def

- O-# is physical output number.  
 - P-# is panel number on physical output.  
 - C-(color) is color order if panel has different color order than default (C-Def).  
 - Arrow indicates panel orientation, click arrow to rotate.

**Notes and hints:**

- When wiring panels, divide the panels across as many outputs as possible. Shorter chains on more outputs will have higher refresh than longer chains on fewer outputs.
- If not using all outputs, use all the outputs from 1 up to what is needed. Data is always sent on outputs up to the highest configured, even if no panels are attached.
- The FPP developers strongly encourage using either a BeagleBone based panel driver (Octoscroller, PocketScroller) or using a ColorLight controller. The Raspberry Pi panel code performs poorly compared to the other options and supports a much more limited set of options.

## BB LED Panels Screen

**LED Panels**

<b>Enable LED Panel Output:</b> <input checked="" type="checkbox"/>	<b>Start Channel:</b> 16336
<b>Panel Layout:</b> W: 3 H: 3	<b>Channel Count:</b> 13824 (4608 Pixels)
<b>Single Panel Size (WxH):</b> 32x16 1/8 Scan	<b>Default Panel Color Order:</b> RGB
<b>Model Start Corner:</b> Top Left	<b>Wiring Pinout:</b> PocketScroller
<b>Brightness:</b> 5	<b>Output By Row:</b> <input type="checkbox"/>
<b>Panel Gamma:</b> 2.2	
<b>Panel Interleave:</b> Off	
<b>Color Depth:</b> 12 Bit	
<b>Connection:</b> Hat/Cap/Cape	

**Save** (this will save changes to BBB tab & LED Panels tab)

**LED Panel Layout:**  
 Advanced Layout?  
 View Config from front?

**Front View**

- O-# is physical output number.  
- P-# is panel number on physical output.  
- C-(color) is color order if panel has different color order than default (C-Def).  
- Arrow Indicates panel orientation, click arrow to rotate.

**Notes and hints:**

- When wiring panels, divide the panels across as many outputs as possible. Shorter chains on more outputs will have higher refresh than longer chains on fewer outputs.
- If not using all outputs, use all the outputs from 1 up to what is needed. Data is always sent on outputs up to the highest configured, even if no panels are attached.

- **Enable LED Panel Output-** If you are using a P10 or P5 panel, this needs to be checked.
- **Panel Layout (WxH)-** enter the number of panels you are using in Width by Height.
- **Single Panel Size (WxH)-** Enter the size in pixels of each individual panel and the scan rate. (P10 panels are 32x16 and P5 panels are 64x32)\*
- **Model Start Corner-** This should typically be upper left if you are using xLights and bottom left if you are using Vixen. For other Sequencing software, you should match the setting in that software.
- **Brightness-** You can adjust the overall brightness with this setting.
- **Panel Gamma-** You can apply a Gamma correction to help correct the way our eyes process colors in dim situations.
- **Panel Interleave-** some outdoor panels (possibly others) use a non-standard transmission of the data. If they do, then this setting will need to be modified to match the transmission method of your panels. This setting is not available on the Raspberry Pi devices.
- **Color Depth-** Is used to set the number of possible colors. The color depth can be reduced to reduce flicker on larger sets of panels if needed.
- **Connection-** This is to identify the type of LED Panel controller you are using and will usually auto-populate to the correct connection type.
- **Start Channel-** This is the start channel for your LED Panel and is usually the Absolute address identified in your sequencing software.
- **Channel Count-** This is the total number of channels that your panel array will require.
- **Default Panel Color Order-** Panels can have a different color order. You can set the color order for your panel with this option.
- **Wiring Pinout-** This setting is to identify which SBC the LED panel controller is being used. It will normally auto-populate with the correct selection if it can be detected.

- GPIO Slowdown- Some panels have a slower refresh rate than the standard ones and might show some ghosting; this can be remedied by adding some slowdown to the refresh rate that is being sent to the panels. This setting is not available on the BeagleBone devices.
- Output by Row- Some panels will output the data by rows instead of sequentially, if that is the case, you can select this option. This setting is not available on the Raspberry Pi devices.
- Save- this will save your configuration.

\*- Some 1/4 scan and 1/2 scan panels use a non-conventional addressing mode and you might have to use one of the A, AB or ABCD addressing mode panel types. There usually is no indication on the panels so it might be trial and error to select the correct one. These options are only available on the BeagleBone systems.

## LED Panel Layout

Panels can be configured in several ways and it is important that the configuration matches the actual assembly/connection of your panels. The panels should be connected to as many outputs as possible so that you have a higher refresh rate. For example, if you have 4 panels it is better to connect 1 panel each to 4 different ports than daisy-chaining all 4 panels off a single port. Each panel has to be identified how it is connected to the controller and the order that the panels are connected together. This is configured by setting the Output Number and Panel Order numbers in the Layout screen. The FPP device needs to know the exact way that you assembled your LED panels together and the way they are connected to both the controller and each other. There are 2 views in order to configure your LED Panel layout.

### Standard LED Panel Layout

#### **LED Panel Layout:**

Advanced Layout?

View Config from front?

<b>Front View</b>		
O-1	O-1	O-1
P-1	P-1	P-1
C-Def	C-Def	C-Def
O-1	O-1	O-1
P-1	P-1	P-1
C-Def	C-Def	C-Def
O-1	O-1	O-1
P-1	P-1	P-1
C-Def	C-Def	C-Def

- O-# is physical output number.
- P-# is panel number on physical output.
- C-(color) is color order if panel has different color order than default (C-Def).
- Arrow indicates panel orientation, click arrow to rotate.

Make sure that you are referencing the panels correctly. You can configure the panels as if you are looking at the panels from the front or from the rear, more commonly referred to as a

“wiring view.” To change the view, toggle the “View Config from front” checkbox. Make sure you save any changes made before you change the view.

The panel arrows can go in any direction you like to make wiring easier when you assemble the panels but they have to match in FPP. To change the arrow orientation, click on the arrow in the corresponding LED panel and it will rotate each time you click it.

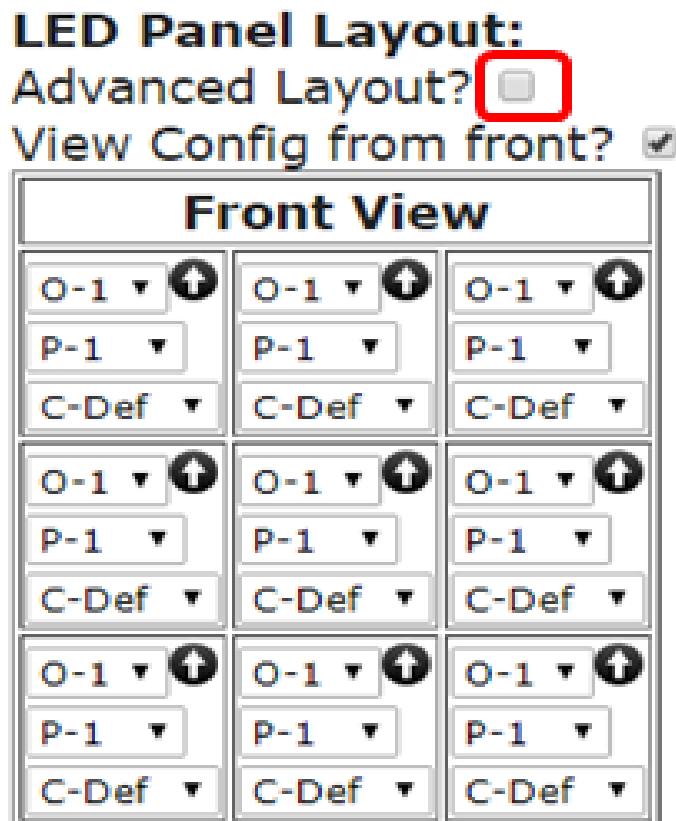
The Output Number is the Setting that looks like O-1, O-2, etc. A panel is considered to be connected to an output if the data ribbon is wired directly to the controller or the data ribbon is wired to another panel that is connected to that port.

The Panel Order number is the Setting that looks like P-1, P-2, etc. This is the order that panels are connected to a particular port. The first panel connected to a port would be P-1, the next panel in the chain would be P-2, etc.

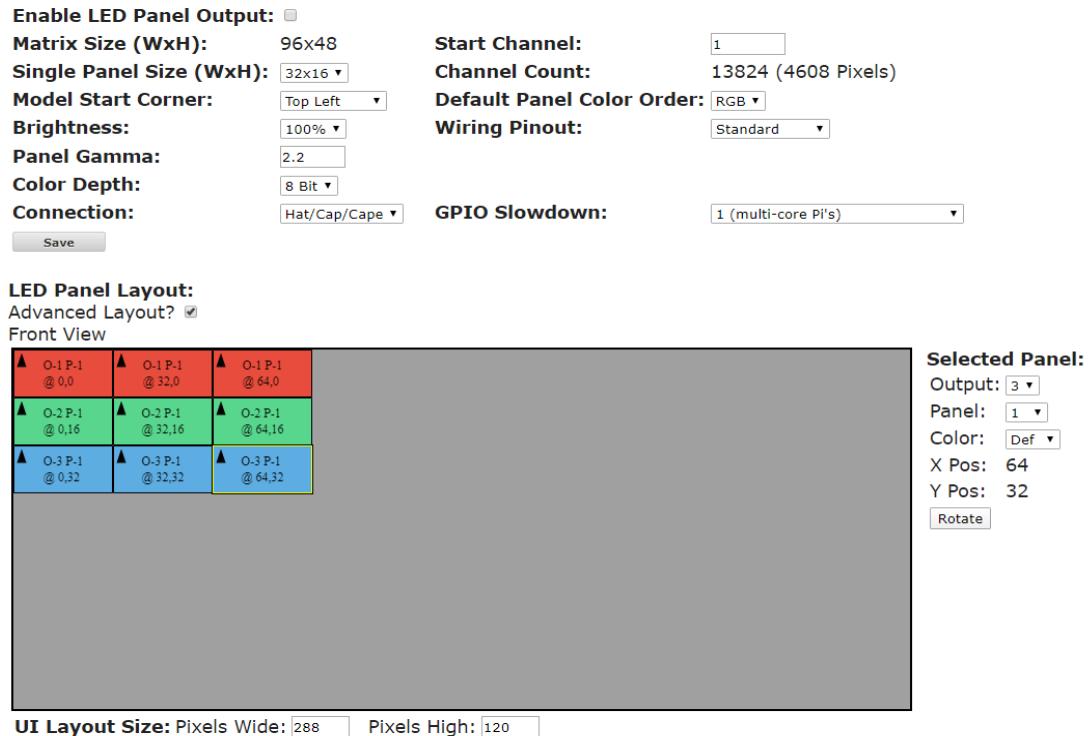
The Color Order is the setting that looks like C-Def. This is the color order of the RGB pixels and it is common for them to be in different orders depending on the manufacturer. If the colors are not displaying correctly, then you can change the order here or in xLights (**don't change it in both.**)

#### Advanced Layout View

You can change the layout to the advanced view by selecting the Advanced Layout button. This view is for more complex layouts. You can define panels in any orientation, the panels don't have to be in the same orientation and they can be separated and the effects will display correctly. You can only use the front view in the Advanced layout.



You will get a screen similar to this:



The Advanced Layout has the following sections/features:

Matrix Size- This is in the upper left section of the top window, this indicates the minimum matrix size that is needed to represent the matrix configuration you have configured.

Channel Count- This will indicate the number of channels needed to represent your matrix. These numbers will change based on the configuration but are not used for the configuration in your sequencing software and don't impact network traffic.

Advanced Layout Configuration screen- If you have assembled your panels in a "non-standard" configuration, then you can mimic your configuration in this panel so that it will display properly. You can drag the individual panels to the position you need and by using the Selected Panel section you can configure the Output Port, the Panel Order, the Color order and rotate the panel so that the arrows are aligned correctly. For easy identification, the panels are color coded based on the Output Port connection.

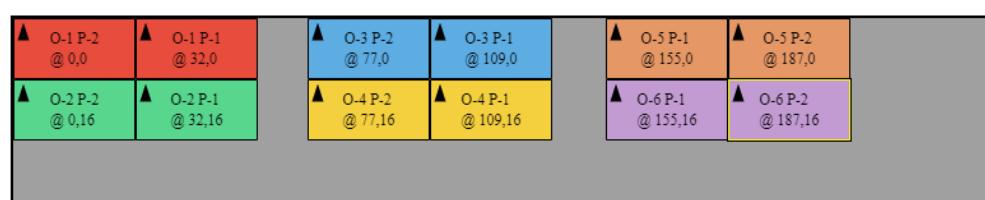
UI Layout Size- This will configure the "window" (the grey box) that you have to move the panels around.

An example of how to use this would be that you have a 6x2 P10 panel and have 3 windows that are side by side but the windows have a gap between them and you are going to put 4 panels in each window. If you configure it in the "normal" way then scrolling items will not look correct because the scrolling items will be "pushed together" at the gap instead of a pause/space where the scrolling item should have. This is how that configuration might look:

## LED Panel Layout:

Advanced Layout?

Front View



## Selected Panel:

Output: 6

Panel: 2

Color: Def

X Pos: 187

Y Pos: 16

UI Layout Size: Pixels Wide: 256 Pixels High: 48

## Other

The other Output tab is to define other less common output types. This is the location that you would configure a Virtual Matrix.

If you are using a Pi Cap and need to send out DMX data, then the Output type would be DMX-Open and the Output Config Port will be ttyAMA0.

## Output Processors

The output processors page is utilized to modify the outgoing data. This can be useful for several things such as moving a prop after the .fseq file has been saved to the FPP, or adjusting the brightness if your controller does not support dimming.

The Output Processors are:

- Remap-

#	Active	Type	Description	Configuration					
1	<input checked="" type="checkbox"/>	Remap		Source Channel:	1	Destination:	1	Count:	1
				Loops:	1	Reverse:	None	By Channel	None
								RGB Pixels	RGBW Pixels

[Reboot](#) [Shutdown](#) [Restart FPPD](#)

The remap processor is beneficial for several things such as when a prop has been moved because a port on the controller isn't working or you have to replace a "dumb" string with a pixel string.

- Description-This can be used to identify the reason for the remapping for future reference.
- Source Channel- Enter the first channel you want to remap to another location.
- Destination- Enter the first channel that you want the data remapped to.
- Count- Enter the total number of channels that you want remapped.
- Loops- Enter the number of times that you want this remapping to occur, this can be helpful if you need to replace a dumb string with a pixel string. Enter the Source Channel and the Destination Channel and enter 3 for the Count. Then enter the number of pixels that are in the replacement string in the Loops box.
- Reverse- This can be useful if you wired a prop in reverse or changed a controller connection to the opposite end of a string. The reverse can be by channel or by pixel type.

- Brightness-

#	Active	Type	Description	Configuration			
1	<input checked="" type="checkbox"/>	Brightness		Start Channel:	1	Channel Count:	1

You can modify the brightness or Gamma correction on a range of channels. This can be useful if your controller doesn't support the brightness/gamma correction or if you can't reach your controller via the web interface.

- Hold Value-

#	Active	Type	Description	Configuration			
1	<input checked="" type="checkbox"/>	Hold Value		Start Channel:	1	Channel Count:	1

If a channel value in the fseq/e1.31 is 0, instead of outputting 0, it will use the last non-zero value.

This is mostly useful for servos or moving heads or similar where you don't want them going back to a "0" point in areas of the sequences that aren't sequences or between sequences

- Set Value-

#	Active	Type	Description	Configuration			
1	<input checked="" type="checkbox"/>	Set Value		Start Channel:	1	Value:	255

You can set a fixed value for a range of channels.

- Reorder Colors-

#	Active	Type	Description	Configuration			
1	<input checked="" type="checkbox"/>	Reorder Colors		Start Channel:	1	Nodes:	1

You can change the color order. This is helpful if you have to replace a string or part of a string and it has a different color order than the section replaced.

## Pixel Overlay Models

The Pixel Overlay Models feature of the Falcon Player allows the user to manually manipulate a particular model in real-time via Plugins or scripts before it is sent out to the controllers based on each model. This can be done while the rest of your display and channels are playing sequenced data. Pixel Overlay Models are typically used for Matrices or Mega Trees (or other dense props) but can be used for any model that you want to take manual control.

**Pixel Overlay Models**

Model Name	Start Ch.	Ch. Count	Orientation	Start Corner	Strings	Strands
Tune_To_Sign	5371	13824	Horizontal ▾	Top Left ▾	48	1
Window_Matrix	18542	3456	Horizontal ▾	Top Left ▾	24	1

The Real-Time Pixel Overlay system and Pixel Overlay Models allow overlaying user-provided data onto outgoing channel data via a special interface.

The Pixel Overlay Model has to match the settings configured in your sequencing software and string ports in your controller.

The Pixel Overlay Models can be exported from xLights to your FPP using FPP Connect and selecting the Models option.

If you want to manually enter the Pixel Overlay Models, these are the settings:

**Model Name-** This is a name to use to reference the Pixel Overlay Model in other areas of FPP such as Plugins, Scripts, etc. **The Model Name cannot have spaces.**

**Start Ch.-** The Start Channel needs to match the start channel in your sequencing software and your String Ports.

**Ch. Count-** This is the number of channels (not pixels) that this model is using.

**Orientation-** This will be the orientation that you configured the matrix in your sequencing software.

**Start Corner-** This will normally be Top Left if you are using xLights and Bottom Left if you are using Vixen for P10/P5 type panels. For other items like Pixel Matrices or Mega Trees, this will be the settings that you used in your sequencing software.

**Strings-** This will typically be the number of rows in your matrix for P10/P5 type panels. For other items like Pixel Matrices or Mega Trees, this will be the settings that you used in your sequencing software.

**Strands-** This will be 1 for P10/ P5 type panels. For other items like Pixel Matrices or Mega Trees, this will be the settings that you used in your sequencing software.

This can be used for examples such as the following:

- Displaying real-time dynamic text on a matrix or Mega Tree
- Displaying the current time or a Christmas countdown timer on a matrix
- Turning on/off individual channels for items such as a Tune-To sign, or inflatables without having to sequence the channels for these items in every one of your sequence files.

The Matrix Tools plugin available via the Plugin install page uses the Pixel Overlay feature to allow display and scrolling of dynamic text on a Pixel Overlay Model using a web interface. As an example of the power and flexibility of the Real-Time Pixel Overlay feature, you can also use the Matrix Tools plugin to draw in Real-Time on your matrix using your mouse and web browser.

## GPIO Inputs

En.	Hdr - Pin	GPIO # - GPIOID	Pull Up/Down	Commands	
				Rising Edge	Falling Edge
<input type="checkbox"/>	P1-02	87 - 2/23	None/External	Command:	Command:
<input type="checkbox"/>	P1-04	89 - 2/25	None/External	Command:	Command:
<input type="checkbox"/>	P1-06	5 - 0/5	None/External	Command:	Command:
<input type="checkbox"/>	P1-08	2 - 0/2	None/External	Command:	Command:
<input type="checkbox"/>	P1-10	3 - 0/3	None/External	Command:	Command:
<input type="checkbox"/>	P1-12	4 - 0/4	None/External	Command:	Command:
<input type="checkbox"/>	P1-20	20 - 0/20	None/External	Command:	Command:
<input type="checkbox"/>	P1-26	12 - 0/12	None/External	Command:	Command:
<input type="checkbox"/>	P1-28	13 - 0/13	None/External	Command:	Command:
<input type="checkbox"/>	P1-29	117 - 3/21	None/External	Command:	Command:

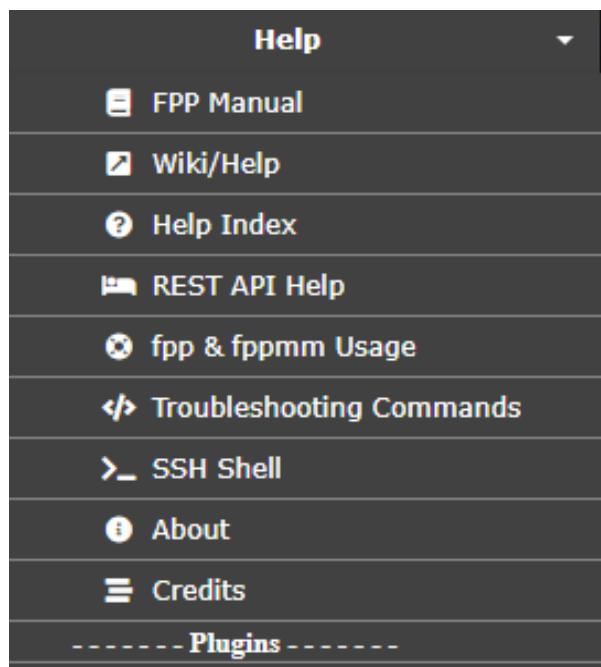
GPIO Inputs allow the triggering of internal FPP Events via external input. Each GPIO Input is connected to a pin on the FPP's GPIO header or attached to an add-on I/O board such as the PiFace. GPIO Inputs allow two events to be attached to each pin, one rising event and one falling event. In FPP, you can set the GPIO resting state to either high (pull up) or low (pull down) using the internal resistors or you can set the resting state using external pull up or pull down resistors. If you select the None/External option, make sure your circuitry connected to the pin establishes either a high or low state or else the pin will be floating which can cause false triggers. See the [GPIO Button Input](#) section for more detailed wiring information.

- En- If you are going to use the GPIO input function, then the pin you are using needs to be enabled by placing a check in this box.
- Hdr-Pin- This is for reference to locate the pin on the headers
- GPIO#- This is the Pin Label as identified by the manufacturer and for reference only.
- Pull up/Down- You can set the internal pull up or pull down resistor in this box.
- Commands- In this section, you can select a previously saved event for the rising and or falling events. Refer to the [Events](#) section for more details.

Input triggers can be useful for various things such as a button to start or stop a sequence, a motion sensor to activate a sequence or another external device just to name a few.

# Help

This section is for information on troubleshooting, references and updates.



## FPP Manual

This will show the most current FPP Manual if your FPP Device has internet access. If your FPP device does not have an internet connection, you can access the current FPP Manual at:

[https://falconchristmas.github.io/FPP\\_Manual\(4.0\).pdf](https://falconchristmas.github.io/FPP_Manual(4.0).pdf)

## Wiki/Help

If your computer has an internet connection, clicking this link will take you to the FPP Wiki site. The Wiki site might not have the most current information.

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### Falcon FPP

Contents

- 1 Falcon Player (FPP)
- 2 FPP Supported Hardware Platforms
- 3 Links
- 4 Developer Resources

**Falcon Player (FPP) [edit]**

The Falcon Player is a standalone sequence player allowing playback of your sequences without a dedicated PC. It is a similar solution to the conductor or director products. The software is free and runs on Raspberry Pi (~\$35) or BeagleBone Black (BBB) (~\$50) micro computer boards. FalconChristmas developers write the free software and you purchase a Pi or BBB from any vendor you choose and install FPP on the system. SD card, USB Flash Drive, Power Supply and any other options are not included in the base prices of these boards but your vendor may offer kits which include the additional components.

**FPP Supported Hardware Platforms [edit]**

Supported Hardware Platforms

# Help Index

The Help Index has links to various topics and information regarding those topics as a quick reference. The user manual has more detailed information on these subjects.



## REST API Help

This section is only available with a UI level setting of Advanced or above. This section is useful for people that are developing Plugins or other software enhancements and provides a list of endpoints and a test function to reveal the output for your device for reference.

### FPP API Endpoints

NOTE: FPPD endpoints are indicated by '\*' and require FPPD to be running or a timeout error will occur

Endpoint	Method	Description	
/api/help	GET	This help page	
*	GET	Gets a JSON description of the FPP Commands	<b>Output:</b> [ { "name": "Next Playlist Item" }, { "name": "Start Playlist", "args": [ { "description": "Playlist Name", "type": "string" } ] } ]
*	GET	Runs the given command with arguments separated by a slash /	<b>Output:</b> (dependent on Command run)
*	POST	Runs the given command with arguments provided in POST data instead of URL	<b>Input:</b> (JSON data dependent on command being run) <b>Output:</b> (dependent on Command run)
/api/configfile(/:SubDir)	GET	Get list of config files in /home/fpp/media/config(/:SubDir)	<b>Output:</b> { "Path": ":SubDir", "ConfigFiles": [ "File1", "File2", "File3" ] }

# fpp & fppmm

This page provides information on some of the fpp and fppmm commands that can be used in the shell or in scripts.

## fpp -h

```
Usage: /opt/fpp/src/fpp [OPTION...]

fpp is the Falcon Player CLI helper utility. It can be used to query
certain information and send commands to a running fppd daemon.

Options:
  -V          - Print version information
  -s          - Get fppd status
  -v VOLUME   - Set volume to 'VOLUME'
  -p PLAYLISTNAME [STARTITEM] - Play Playlist PLAYLISTNAME in repeat mode
  -P PLAYLISTNAME [STARTITEM] - Play Playlist PLAYLISTNAME once, optionally
                                starting on item STARTITEM in the playlist
  -c PLAYLIST_ACTION      - Perform a playlist action. Actions include:
    next       - skip to next item in the playlist
    prev       - jump back to previous item
    stop       - stop the playlist immediately
    graceful  - stop the playlist gracefully
    pause     - pause a sequence (not media)
    step      - single-step a paused sequence
    stepback  - step a paused sequence backwards
  -S          - Stop Playlist gracefully
  -d          - Stop Playlist immediately
  -q          - Shutdown fppd daemon
  -R          - Reload schedule config file
  -e EFFECTNAME[,CH[,LOOP]] - Start Effect EFFECTNAME with optional
                                start channel set to CH and optional
                                looping if LOOP is set to 1
  -E EFFECTNAME - Stop Effect EFFECTNAME
  -t EVENTNAME  - Trigger Event EVENTNAME
  -G GPIO,MODE   - Configure the given GPIO to MODE. MODEs include:
    Input     - Set to Input. For PiFace inputs this only enables the pull-up
    Output    - Set to Output. (This is not needed for PiFace outputs)
    SoftPWM   - Set to Software PWM.
  -g GPIO,MODE,VALUE - Set the given GPIO to VALUE applicable to the given MODEs defined above
                      VALUE is ignored for Input mode
```

## fppmm -h

```
Usage: /opt/fpp/src/fppmm [OPTIONS]

Options:
  -V          - Print version information
  -t on       - Turn channel test mode On
  -t off      - Turn channel test mode Off
  -t status   - Check current status of test mode
  -c CHANNEL -s VALUE - Set channel number CHANNEL to VALUE
  -m MODEL    - List info about Pixel Overlay MODEL
  -m MODEL -o MODE - Set Pixel Overlay mode, Mode is one of:
                      off, on, transparent, transparentrgb
  -m MODEL -f FILENAME - Copy raw FILENAME data to MODEL
  -m MODEL -s VALUE  - Fill MODEL with VALUE for all channels
  -h          - This help output
```

# Troubleshooting Commands

When you click on this link, the FPP will run several troubleshooting commands that can be useful to diagnose problems.

## Interfaces: ifconfig -a

```
eth0: flags=-28605 mtu 1500
      inet 192.168.1.100 netmask 255.255.255.0 broadcast 192.168.1.255
      inet6 fe80::ba27:ebff:fe61:fe1e prefixlen 64 scopeid 0x20
        ether b8:27:eb:61:fe:1e txqueuelen 1000 (Ethernet)
          RX packets 234133 bytes 24596895 (23.4 MiB)
          RX errors 0 dropped 0 overruns 0 frame 0
          TX packets 70466 bytes 24816845 (23.6 MiB)
          TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73 mtu 65536
      inet 127.0.0.1 netmask 255.0.0.0
      loop txqueuelen 1000 (Local Loopback)
        RX packets 241858 bytes 27636023 (26.3 MiB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 241858 bytes 27636023 (26.3 MiB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlan0: flags=-28669 mtu 1500
      ether b8:27:eb:34:ab:4b txqueuelen 1000 (Ethernet)
        RX packets 0 bytes 0 (0.0 B)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 0 bytes 0 (0.0 B)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## Wired: ethtool eth0

```
Cannot get wake-on-lan settings: Operation not permitted
Settings for eth0:
  Supported ports: [ TP MII ]
  Supported link modes:  10baseT/Half 10baseT/Full
                        100baseT/Half 100baseT/Full
  Supported pause frame use: No
  Supports auto-negotiation: Yes
```

The commands that it runs are:

- ifconfig –a  
This displays the configuration of all network interfaces on the FPP device.
- ethtool eth0  
This displays the current parameters of the eth0 interface.
- iwconfig  
This displays the current parameters of the wireless interface
- netstat –rn  
This displays the routing tables
- ping –c 1 \$(netstat –rn | grep '^0.0.0.0' | awk '{print \$2}')  
This will ping the default gateway and display the results.
- ping –c 1 github.com  
This will ping github.com to check for a network connection and display the results.
- sudo lsblk –l

- This lists all of the storage devices.
- sudo fdisk -l  
This will list all of the partitions on your storage devices.
- df -k  
This displays the file system information.
- mount | grep -v password  
This displays the details of all of the mounted devices.
- date  
This displays the current FPP system date and time and also the time zone.
- pgrep ntpd > /dev/null && ntpq -c peers  
This will check to see if the Network Time Protocol Daemon is running and then list the peers that the program is getting its time from.
- sudo hwclock -r -f /dev/rtc0  
This will determine if a real time clock is installed and display the time if there is one.
- free  
This displays the amount of used and free physical and swap memory.
- uptime  
This displays how long the FPP daemon has been running.
- top -bn1 | head -20  
This displays the CPU Utilization.
- cat /proc/cpuinfo  
This displays the CPI information.
- sudo lsusb -t  
This displays the USB information in a tree format.
- sudo lsusb -v  
This displays detailed information on the USB devices.
- sudo aplay -l  
This displays all of the audio playback devices
- (bin/ls -1d /proc/asound/card[0-9] |sed -e "s/.\*/card//"  
This displays all of the mixer devices
- uname -a  
This displays the kernel information
- lsmod  
This displays all of the kernel modules that are installed.
- sudo i2cdetect -y -r 2  
This displays if you have any devices connected to the i2c bus such as an oled display.
- ps -edaf --forest  
This displays a list of the currently running processes
- sudo journalctl -u fppinit  
This will display the FPP Initialization Log
- sudo journalctl -u fppcapedetect  
This will display the results of the Cape Detect Log.
- sudo journalctl -u fpp\_postnetwork  
This will get the Post Network Logs
- sudo journalctl -u fppoled  
This will display the OLED Logs

## SSH Shell

You can use the SSH Shell for advanced operations or troubleshooting using Linux commands. The user is fpp and the password is falcon.

Normally users do not need to use the SSH Shell for operations or configuring the FPP. The SSH Shell is typically used by advanced users that want to customize the FPP.

## About

The About page provides information about the current FPP version and statistics relevant to the running FPP. This is also the page that you will navigate to in order to perform a manual update.

**About FPP**

<b>Version Info</b>	<b>Player Stats</b>
FPP Version: v4.1	Playlists: 1
Platform: BeagleBone Black (PocketBeagle)	Sequences: 25
FPP OS Build: v4.0	Audio Files: 0
OS Version: Debian GNU/Linux 10 (buster)	Videos: 0
Hardware Serial Number: 1744GPB51168	Events: 0
Kernel Version: 4.19.94fpp	Effects: 0
Local Git Version: 71390f3 ( <a href="#">Update is available</a> ) <a href="#">ChangeLog</a>	Scripts: 1
Remote Git Version: 19b0b37 <a href="#">Preview Changes</a>	
<a href="#">Upgrade FPP</a>	<b>Disk Utilization</b>
FPP Upgrade Source: <a href="https://github.com">github.com</a>	Root Free Space: 11.13 GiB (77%)
Upgrade OS: BBB-v4.1.fppos <a href="#">Upgrade OS</a>	Media Free Space: 11.13 GiB (77%)
<b>System Utilization</b>	
CPU Usage: 0.42%	
Memory Usage: 21.91%	
<b>Uptime</b>	
18:05:31 up 46 days, 23:34, load average: 0.00, 0.00, 0.00	

This page has information that can be useful for troubleshooting or updating your FPP system.

### Version Info

- FPP Version- This is your current FPP Version.
- Platform- This will identify the SBC platform of this FPP device.
- FPP OS Build- This is the current operating system build.
- OS Version- This lists the SBC base operating system version.
- Hardware Serial Number- This will list the serial number for this FPP device.
- Kernel Version- This lists the Kernel Version.
- Local Git Version- This lists the current Git version that is installed. The ChangeLog link will show a summary of changes that have occurred since the initial release.
- Remote Git Version- This lists the most current Git version available. If this shows "Unknown" then your FPP does not have access to the internet. Possibly due to network configuration errors. If there is an update available, then a Preview Changes link will be available so you can view what changes the update will provide.

### Upgrade FPP

If there is an update available, FPP will indicate this on the Local Git Version and you can manually update the software by clicking on this button.

<b>Version Info</b>	
FPP Version:	v4.1
Platform:	BeagleBone Black (PocketBeagle)
FPP OS Build:	v4.0
OS Version:	Debian GNU/Linux 10 (buster)
Hardware Serial Number:	1744GPB51168
Kernel Version:	4.19.94fpp
Local Git Version:	71390f3 ( <a href="#">Update is available</a> ) <a href="#">ChangeLog</a>
Remote Git Version:	19b0b37 <a href="#">Preview Changes</a>
<b>Upgrade FPP:</b>	<a href="#">Upgrade FPP</a>
FPP Upgrade Source:	<a href="#">github.com</a>
Upgrade OS:	<a href="#">BBB-v4.1.fppos</a> <a href="#">Upgrade OS</a>

There are several options for updating your FPP device. You can upgrade from different sources based on the option selected in the FPP Upgrade Source. You can select GitHub to upgrade directly if your FPP device has a connection to the internet. If your FPP device does not have a connection to the internet but one of your other FPP devices does, you can change the FPP Upgrade Source to the FPP device that has the internet connection. With the FPP Upgrade Source configured to another FPP device you can also use the batch upgrade process in the MultiSync tab. Sometimes there is a release that requires an OS upgrade which requires more than a GitHub update. You can re-image the uSD card with the new image (which is usually faster) or use the “in place” upgrade by downloading the appropriate fppos file from GitHub and then uploading it to your FPP device. You will then get the option to upgrade the OS. If you do use the fppos upgrade, you probably will want to delete the fppos file after you are done because they are very large and take up a lot of space on your uSD card.

## System Utilization

This will show your system stats and performance

<b>System Utilization</b>	
CPU Usage:	0.62%
Memory Usage:	23.26%
<b>Uptime</b>	
14:19:08 up 3 days, 5:03, load average: 0.06, 0.01, 0.00	

- CPU Usage- This will show the utilization of the CPU at the time the page loads, it does not update until the page is refreshed.
- Memory Usage- This will show how much of the RAM is being used at the time the page loads, it does not update until the page is refreshed.
- Uptime- This shows the current system time and how long the FPP has been running.

## Player Stats

This shows an overview of the files saved on your system. If you click on the number next to the item, it will take you to the appropriate page where these are stored.

Player Stats	
Playlists:	 10
Sequences:	 25
Audio Files:	 24
Videos:	 0
Events:	 4
Effects:	 0
Scripts:	 8

## Disk Utilization

This shows the free space on your storage devices.

Disk Utilization	
Root Free Space:	24.82 GiB (85%)
Media Free Space:	24.82 GiB (85%)

## Credits

The Credits page gives credit to the major developers and contributors to the FPP software.

**Credits**

FPP Developed By:

David Pitts  
Tony Mace (MyKroFt)  
Mathew Mrosko (Materdaddy)  
Chris Pinkham (CaptainMurdoch)  
Dan Kulp (dkulp)  
Stephane Legargeant (ihbar)

Video Tutorials by:

Alan Dahl (bajadahl)

3rd Party Libraries used by FPP for some Channel Outputs:

[rpi\\_ws281x](#) by Jeremy Garff. Used for driving WS281x pixels directly off the Pi's GPIO header.  
[rpi-rgb-led-matrix](#) by Henner Zeller. Used for driving HUB75 panels directly off the Pi's GPIO header.  
[RF24](#). Used for driving nRF24L01 output for Komby.  
[OLA](#) by the Open Lighting Project (not currently in FPP UI).

# Glossary

Absolute Channel- A numbering system to uniquely identify each channel in each pixel and/or DMX device. It is simply 1 to the last channel needed. In xLights, you can have gaps in the numbering sequence. Due to the number of pixels utilized in most displays, the total number of channels can become quite large and difficult to manage.

BBB- A single board computer used to play sequences or act as a controller interface for animated holiday lighting. BBB is an acronym for BeagleBone Black. This acronym is commonly used for all of the BeagleBone series Single Board Computers.

Broadcast- A method of transmitting network data where the same data is sent to every device on the network.

btrfs- A filesystem for Linux that implements advanced features including compression but requires more CPU usage.

Channel- An identifier for a component in a lighting display. This is commonly used for pixels to set the color and brightness, but it can also be used for other items such as DMX channels for other components.

DHCP- Dynamic Host Configuration Protocol is a network management protocol where IP addresses can be dynamically assigned to devices on a network. This allows devices the ability to automatically communicate within a network. The IP address assigned to a device is not a permanent assignment and a device can get a different IP address the next time it connects to the network. To utilize DHCP, you have to have a DHCP server in your network. Most routers have a DHCP server on them.

DNS- Domain Name System is a naming system for devices or domains in a network. All devices in a network are identified by an IP address, such as 192.168.0.1. The DNS allows users to use more human friendly Host Names to access devices on the network. That way you can type something like google.com to access their website. But in reality Google's website is actually 172.217.11.238 (that is one of several devices on Google's domain.) This will also allow you to type something like fpp or whatever other host name you have saved on your FPP or other devices in your local network. To utilize DNS, you have to have a DNS server in your network and it has to be identified in the network settings. Most routers have a DNS server on them.

E1.31- A network protocol that is used to transmit DMX data. This is the most commonly used protocol in the animated holiday lighting hobby.

Effect- is a small sequence usually for just one model and can be used to overwrite the data that is being played by a sequence. It is commonly used with an event or via a manual trigger.

eMMC- Is a flash memory on the BeagleBone Black and BeagleBone Green computers. You can store the FPP operating system on the eMMC if you want.

eth0- The wired network portion of the FPP.

Event- An event can be a sequence or a script to run when a trigger is activated or it can be activated manually through the FPP interface.

**ext4-** The standard file system for Linux operating systems.

**FPP-** Falcon Player is a widely used player and operating system used in animated holiday lighting.

**fseq file-** The standard format for the raw data files used to inform controllers how to illuminate each light or which DMX channel to be activated.

**Gateway-** The IP address that a device will send network data to that it doesn't know how to properly route. This is usually your router or a FPP device where it is connected to two different subnets.

**Git-** A distributed version control system for coordinating work among developers and the core of the Github software hosting system.

**Host Name-** A human friendly name that you can assign a device to access through a web interface instead of typing the IP Address.

**IP address-** A numerical label to address devices in a network. This number is four parts separated by a decimal point. Each part can be between 0 and 255.

**Master/Remote-** An FPP method to synchronize several FPP devices by sending small sync signals to all of the remotes. This can be useful for very large displays or displays that are widespread and running Ethernet cables could be problematic.

**Multicast-** A method of transmitting network data where the same data is sent to all the devices that requested it but not to the devices that did not request it..

**MultiSync-** A way to identify relevant FPP instances in a Master/Remote configuration and to keep them synchronized with each other

**Netmask-** A numerical mask to identify the size of a subnet. This is typically 255.255.255.0 for most home networks.

**Network-** A group of devices connected through a digital telecommunications network to provide a method for these devices to share data.

**NTP-** Network Time Protocol is a networking protocol used to keep network system clocks synchronized with the accurate time.

**P10/P5 panel-** Display panels that are typically 6 inches in height by 12 inches in width. These panels have pixels that are spaced according to the panel type, i.e. P5 panels have pixels that are spaced 5 millimeters apart. These panels can be combined to make larger panels and are commonly used as a "Tune To" sign to display informational text and/or more detailed graphics.

**Pixel-** This usually refers to an LED light with individually addressable channels so that each pixel in a string/strand can be identified and lighted in a color that is independent from the other pixels in the string.

**Playlist-** A playlist is an ordered list of various items to display and is used by FPP to control the lights and other props used in the animated lighting hobby.

**Plugin-** A component developed to provide more functionality to the FPP.

**Port-** The physical connection point on a controller for pixel strings.

**Raspberry Pi-** A single board computer used to play sequences or act as a controller interface for animated holiday lighting.

**Real Time Clock-** A component that contains a highly accurate timing crystal used to keep accurate time in certain devices.

**SBC-** Single Board Computer is a small complete computer built on a single circuit board. The Raspberry Pi and BeagleBone series computers are the most commonly used single board computers in the holiday lighting community.

**Script-** A small program code used to perform a specific function in the FPP interface.

**SSH-** Secure Shell is a network protocol that gives users a secure way to access devices through a command line interface. This is usually for advanced users.

**Subnet-** A portion of a bigger network that is usually composed of devices within a range of IP addresses defined by the first 3 segments of a 4 segment IP address, i.e. 192.168.0.xxx where 192.168.0 is the “subnet” and xxx is the identifying address for each device in that subnet.

**Tethering-** A method of connecting two network devices directly to communicate between them with no routers or switches needed. This can be done through an Ethernet cable, USB cable or through Wi-Fi.

**UI-** User Interface. The method in how a user interacts with a device and/or program. FPP’s User Interface is through a web-page based interface.

**Unicast-** A method of transmitting network data where the data for each device is sent to only that device. This is usually more efficient than Multicast or Broadcast unless you want or need to send the same data to multiple devices.

**Universe/Channel notation-** A numbering system to uniquely identify each channel in each pixel and/or DMX device. It breaks the channels down into user defined groups called Universes. The user can define each Universe to be up to 512 channels in size. This is usually easier to manage than Absolute Numbering. You can have gaps in the Universes and they don’t have to start at the number one.

**uSD card-** A Micro SD card that is used to store computer data. In FPP this is usually the FPP operating system and related files.

**wlan0-** The Wi-Fi or wireless network portion of the FPP.

**WPA Pre Shared Key-** The password to gain access to a Wi-Fi network.

**WPA SSID-** The technical name for a wireless network.

# Advanced Options

This section is for information that is beyond the basic Setup and configuration settings.

## Network Considerations

In order for all of your devices to communicate with each other, the network has to be configured properly and this has been the source of many people's problems, especially when you are just beginning in this hobby.

In order to communicate with your devices and setup your show network, you need to know what your home router IP address is and what subnet it is using. It is usually 192.168.0.1 or 192.168.1.1. These are the most common, but other addresses may be used. If you don't know what your home network's router IP address is, sometimes it is on a label on the router or you can use the command ipconfig in a command prompt on your PC (ifconfig on Macs). Depending on how your computer is connected to your home network (wireless or wired) the default gateway will be listed in different sections of the report.

IP addresses are in the format of 4 groups of numbers separated by a ". ". And the numbers will range from 0 to 255. So an IP address will look something like 192.168.0.1. The first 3 groups of numbers are called the subnet; in this case the subnet is 192.168.0 (**192.168.0.1**). The device number is the last group of numbers; in this case it is 1 (**192.168.0.1**). It is important that you know what subnet your home network is using because devices can only communicate directly with devices that are in the same subnet. In order for devices to communicate with devices on a different subnet, you have to tell the systems how to communicate with each other, (more on that later.)

## Common Network Setups

There are four methods of show networking that are the most common; Standalone, Wired on Home Network, Wired on Separate Show Network, and Master/Remote. Each method has advantages/limitations and you will need to decide what works best for you.

Below are some examples and in the chart below the FPP(s) and controller(s) are the typical settings to create your network. You will need to know what the IP address is for your home network's main router. When numbering your devices, it is suggested to go on the higher end of the range because your router will usually typically, but not always, assign DHCP addresses at the bottom end of the range.

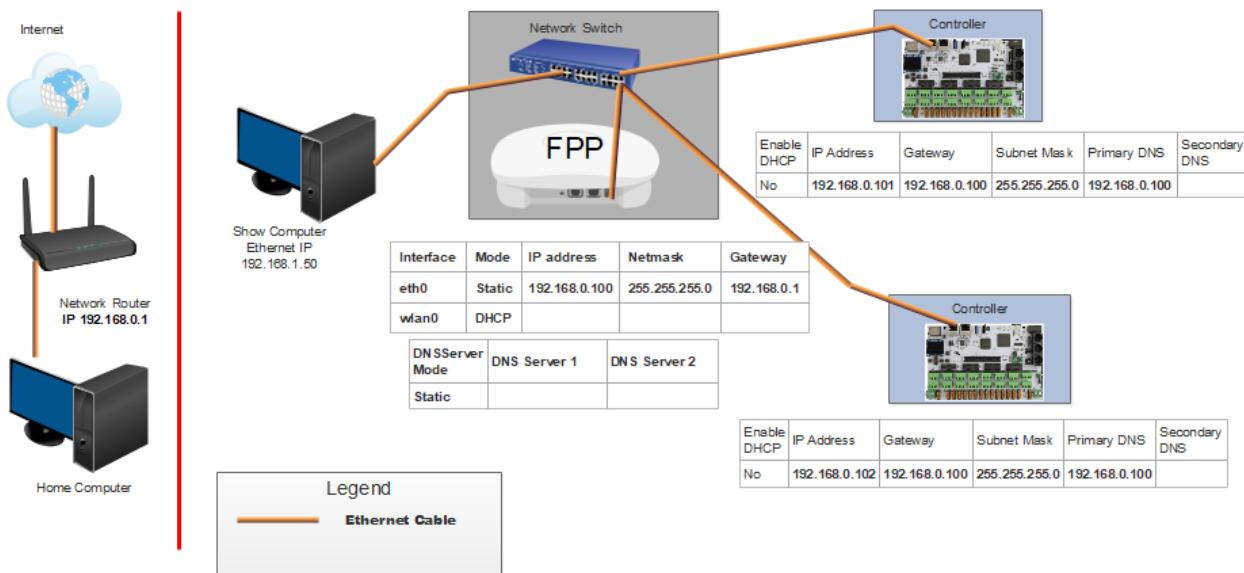
**The following examples will assume that your home network's router's IP address is 192.168.0.1. If that is not the case, then make the appropriate changes as explained above.**

### Standalone

This method has the light show totally separate from the home network without any interaction between the two networks. This has a few advantages/drawbacks.

- There is no connection to the internet so you will have to manage updates and other administrative functions by some manual process.
- There is no Network Time Protocol available so you will need some method to keep accurate time if you are going to use a schedule.

- You will need either a dedicated computer on the standalone network to make changes to your FPP and/or controller settings or a computer that you can change connections from your home network to your standalone network.
- If you only have one controller, then connect FPP directly to the controller with an Ethernet cable connected to the appropriate ports.
- You will need Ethernet cables run from the switch to the FPP and each controller.
- Make sure you have the Channel Outputs for each FPP set correctly.
- FPP mode needs to be set to Player (Standalone) and the E1.31/DDP outputs configured in FPP for the channels it is sending to the controllers.



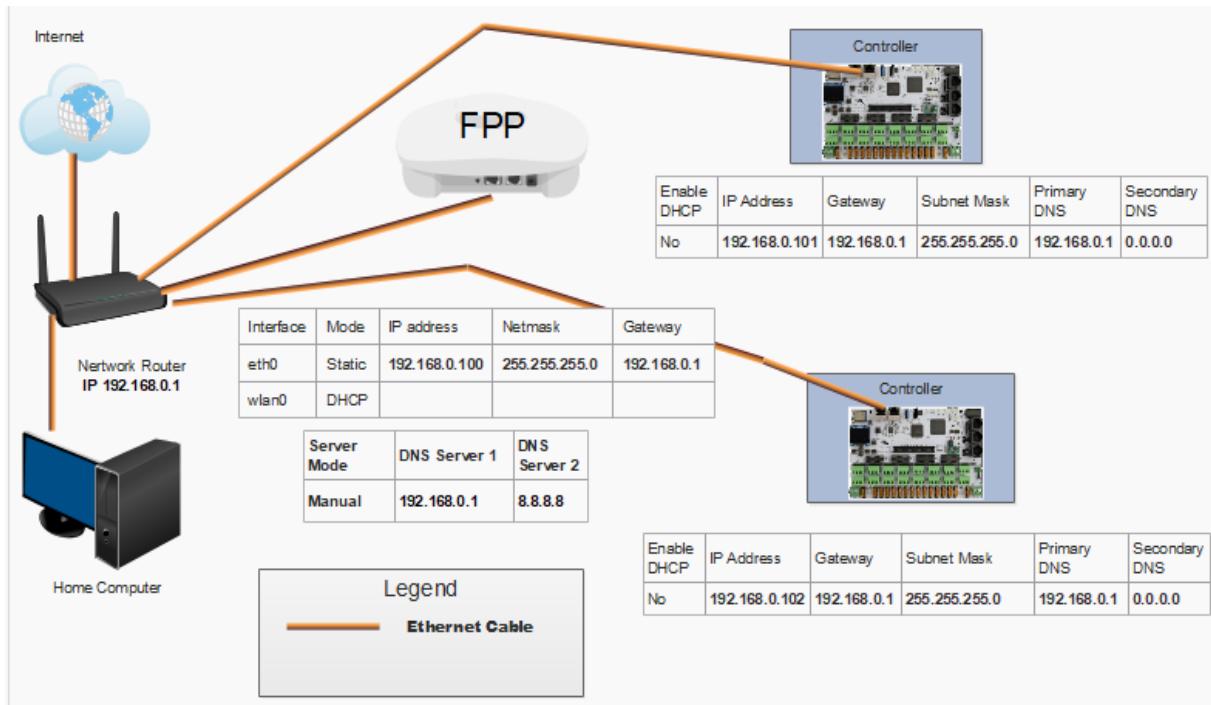
Note: In this case, you can make your FPP IP address any valid IP address. All of your controllers, FPP devices and computer will need an IP address that have the same first 3 sets of numbers as the FPP, and the last set of numbers must be unique.

### Wired on Home Network

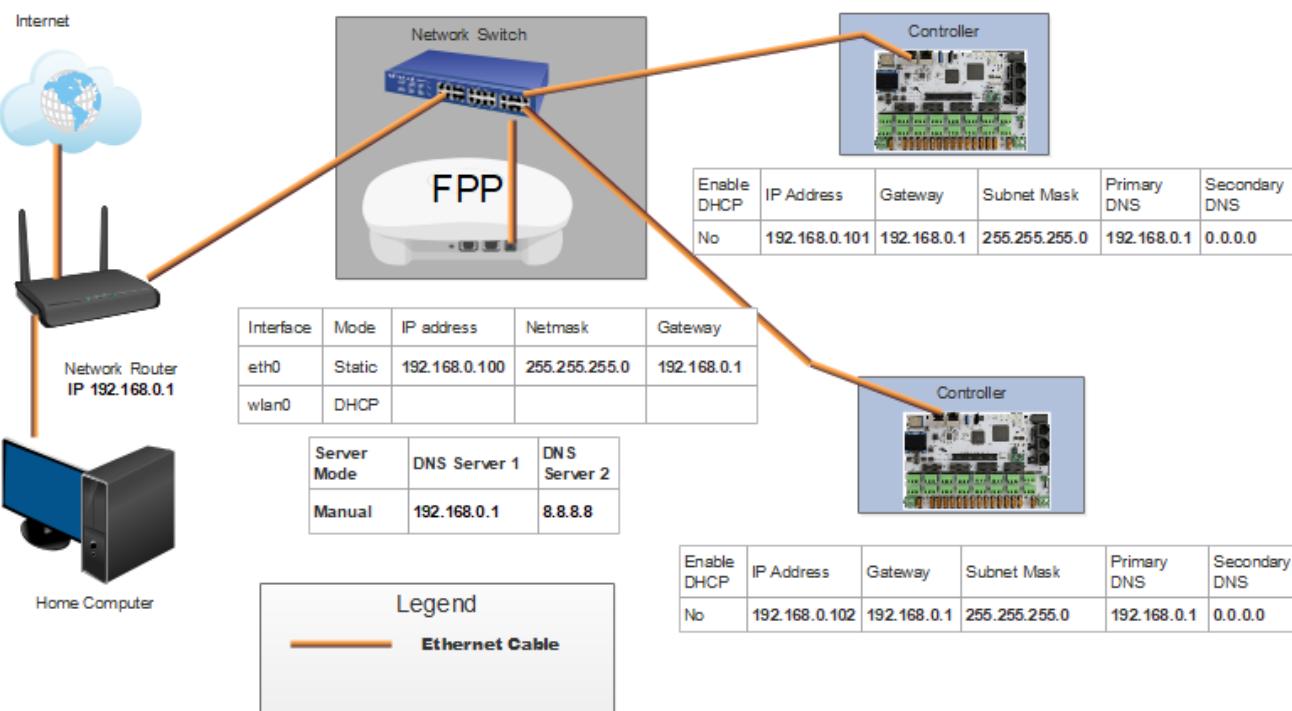
This method will use your home network for the E.131/DDP data transmission.

- All of your FPPs and controllers will have connection to the internet so updates can be performed from your home computer.
- Your FPP will have access to a Network Time Protocol so it will keep time for scheduling if you set up the NTP.
- You will need Ethernet cables run from the home network router to the FPP and each controller.
- Your show data will be transmitted using your home network which might cause a slowdown or lag for other devices on your home network.
- Make sure you have the Channel Outputs for each FPP set correctly.
- FPP mode should be set to Player (Standalone) and the E1.31/DDP outputs configured in FPP for the channels it is sending to the controllers.

## Without a Switch



## With a Switch



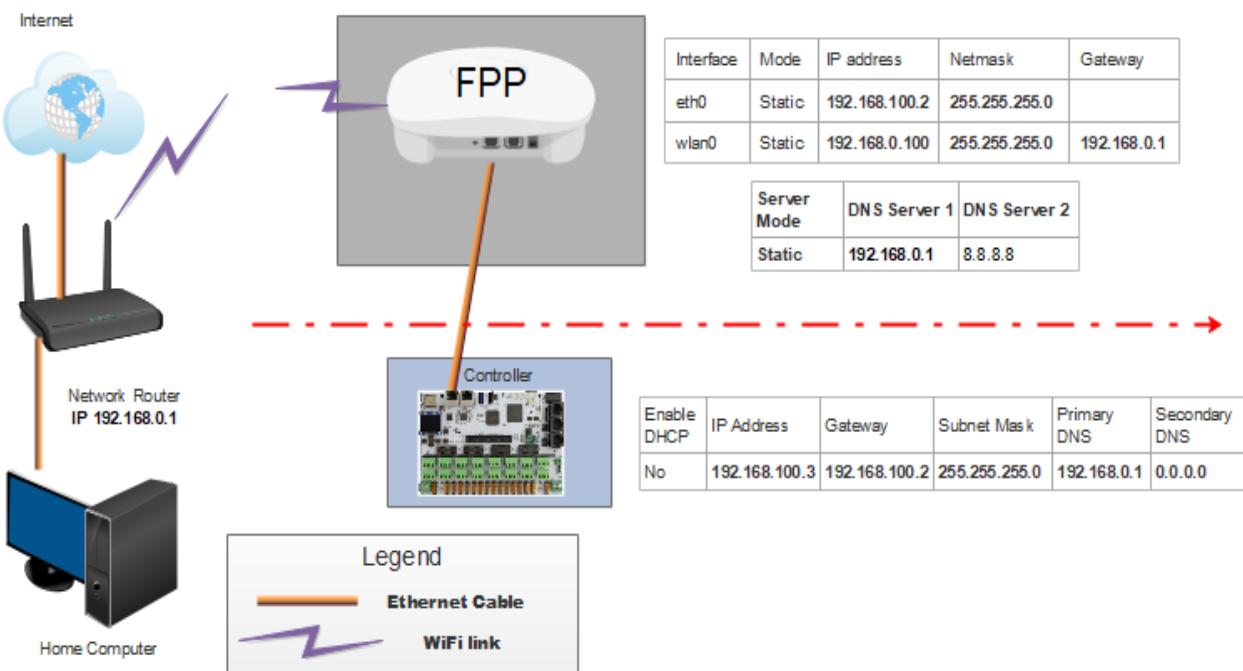
Note: All of the IP addresses have the same subnet (first 3 sets of numbers) as the home network router, in this case, 192.168.0 and the last set of numbers is unique. All of the gateways are the same as the IP address of the home network router, in this case, 192.168.0.1. Your network might be different depending on your home network router's address.

## Wired with Separate Show Network

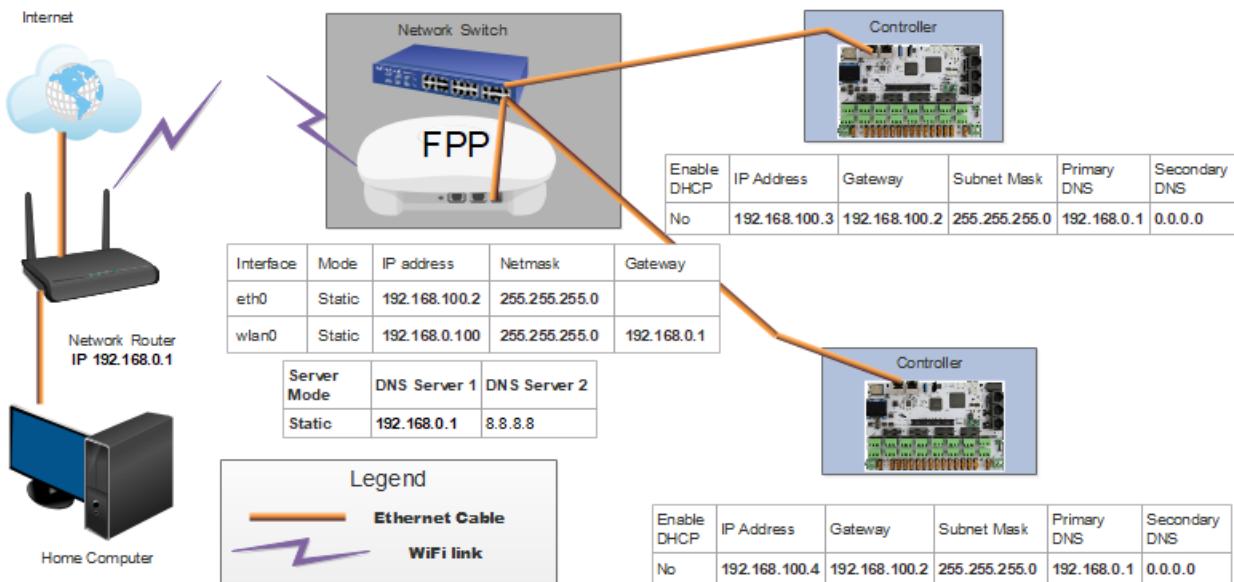
This method will provide a separation of the network traffic from your home network traffic and still allow internet access for FPP/Controller updates. This is one of the more common methods that are used. In order to access the controllers that are on the show network, you have to provide a method for the two networks to communicate with each other. There are two methods: [adding a static route](#) in your router or creating a route path in your computer. If you create a static route in your router, then all computers on your home network can access your controllers, but not all routers have a static route function. When adding a route path in a Windows computer, you can make it persistent so that if you turn off the computer, you can still access the controllers when you turn it back on. Macs don't have the persistent attribute to their route function so you will have to re-enter the route if you reboot your computer.

- All of your FPPs and controllers will have connection to the internet so updates can be performed from your home computer. (if you added a static route in your router)
- Your FPP will have access to a Network Time Protocol so it will keep time for scheduling.
- If you have more than one controller then you will need a switch. If you only have one controller, then connect FPP to the controller with an Ethernet cable connected to the appropriate ports.
- You will need Ethernet cables run from the switch to the FPP and each controller.
- Make sure you have the Channel Outputs for each FPP set correctly.
- Make sure you have the Enable Routing between network interfaces checked in the Network settings of the FPP
- FPP mode should be set to Player (Standalone) and the E1.31/DDP outputs configured in FPP for the channels it is sending to the controller(s).

### One Controller



## Multiple Controllers



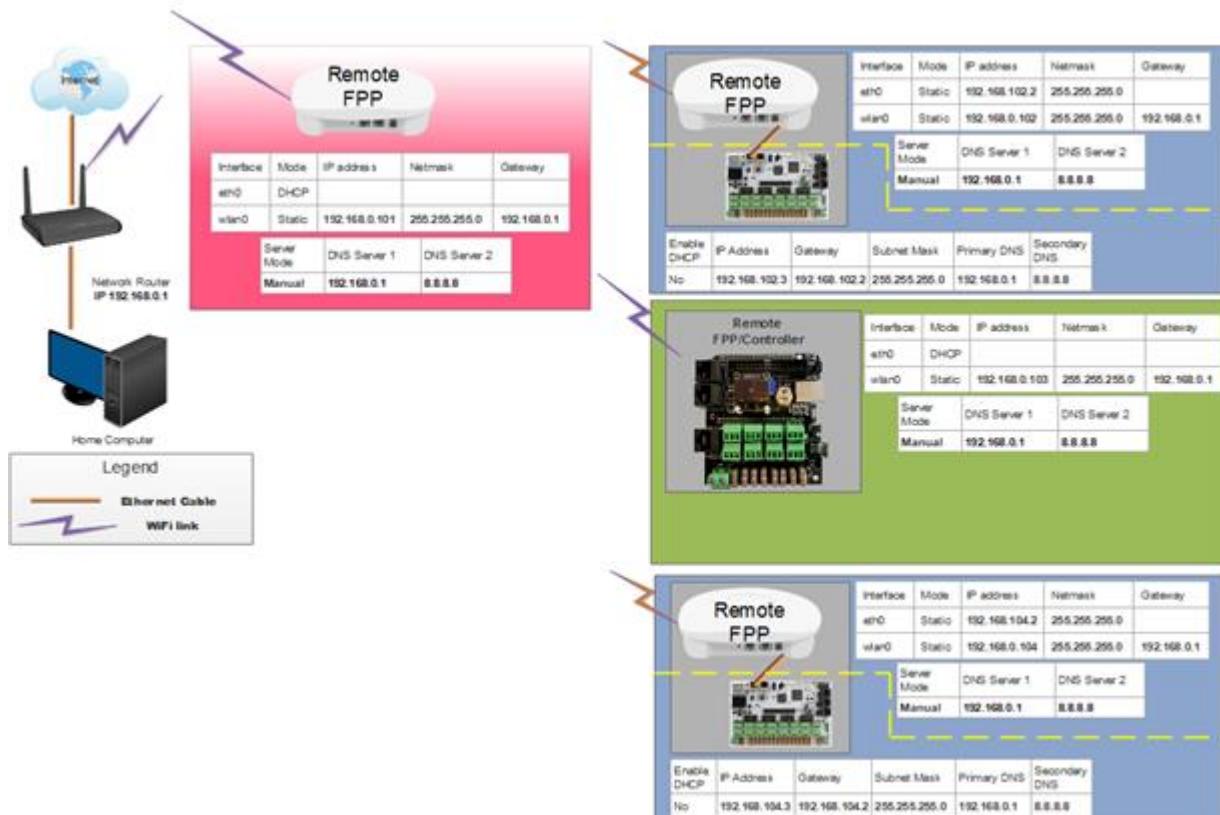
Note: The FPP wlan0 IP address will be on the same subnet (first 3 sets of numbers) as the home network router, in this case, 192.168.0. The eth0 on the FPP and the controllers will be on a different subnet, in this case, 192.168.100 (you pick the subnet). Do not put a gateway address for the eth0 on the FPP. The gateway on the FPP wlan0 should be the same as your home router IP address. The gateway(s) on all of the controllers should be the same as the eth0 IP for your FPP. You will need to set up routing to your controllers (see [Configuring a Static Route](#)). Your network might be different depending on your home network router's address.

## Master/Remote

This method eliminates the need for Ethernet cables connecting your FPPs and controllers even though you could use a wired network if you want. You will need an FPP device at each remote location. This is one of the more common methods that are used especially in larger shows or ones that are spread across a large area. The Master FPP will send a very small sync packet over your wireless network. Each FPP will need a copy of the .fseq files to play (or the video if you are using the remote FPP to play a video through a projector). In order to access the controllers that are on the show network, you have to provide a method for the two networks to communicate with each other. There are three methods; you can set the FPP device to be a Proxy Host (see [Proxy Settings](#) in the Status/Control section), adding a static route in your router or creating a route path in your computer. If you [create a static route](#) in your router, then all computers on your home network can access your controllers, but not all routers have a static route function. When adding a route path in a Windows computer, you can make it persistent so that if you turn off the computer, you can still access the controllers when you turn it back on. Macs don't have the persistent attribute to their route function so you will have to re-enter the route if you reboot your computer.

- All of your FPPs and controllers will have connection to the internet so updates can be performed from your home computer. (if you added a static router to your router)
- Your FPP will have access to a Network Time Protocol so it will keep time for scheduling if you set up the NTP.
- You do not need a network switch.
- You will need an FPP device at each remote location.
- You will not need any Ethernet cables connecting the different FPP devices.

- You will need a good Wi-Fi connection at all of your remote FPP devices.
- The Master FPP will need all media and sequence files stored on it.
- Each Remote will need all the sequence files and any videos, etc. that it will be playing directly stored on it.
- Make sure you have the Channel Outputs for each controller set correctly and only for the controller that is physically connected to it.



Note: The all of the FPP's wlan0 IP addresses will be on the same subnet (first 3 sets of numbers) as the home network router, in this case, 192.168.0. The eth0 on the Remote FPPs will each be on a separate subnet (you choose) and the attached controller will have an IP address in the same subnet as the eth0 subnet of the attached FPP. Do not put a gateway address for the eth0 on the FPPs. All of the FPP wlan0 gateways are the same as the IP address of the home network router, in this case, 192.168.0.1. Your controller's gateway will be the eth0 IP of the attached FPP. You will need to set up routing to each of your controllers (see [Configuring a Static Route](#) for more information). If you have 3 controllers, then you will have 3 routes. (If your controller is a hat or cape attached to a Pi/BB, then you don't need to create a route for those) Your network might be different depending on your home network router's address.

For an in depth discussion, refer to this post:

<https://falconchristmas.com/forum/index.php/topic,4231.0.html>

## Virtual Matrix

The Virtual Matrix function in the Channel Outputs section of FPP enables you to use the HDMI port to output sequence data to a projector or TV/Monitor. In order to use the Virtual Matrix output, you will need to create a Matrix model in your sequencing software and associated DDP or E1.31 Universes (DDP is recommended). Like all models, the Model

configuration in your sequencing software needs to match your Virtual Matrix configuration. The resolution of your display will be dependent on the resolution of your matrix, but be careful the number of channels can become quite large.

## Creating a Virtual Matrix

The higher resolution of your Virtual Matrix will create a larger .fseq file and render times. It will also add to your network traffic (Unless you are running a Master/Remote mode)

The maximum size Virtual Matrix that can be used to keep a somewhat standard aspect ratio is:

672 x 496 (4:3 Aspect Ratio.)

768 x 432 (16:9 Aspect Ratio.)

If you want a higher resolution you might try outputting video directly from the FPP (see next section)

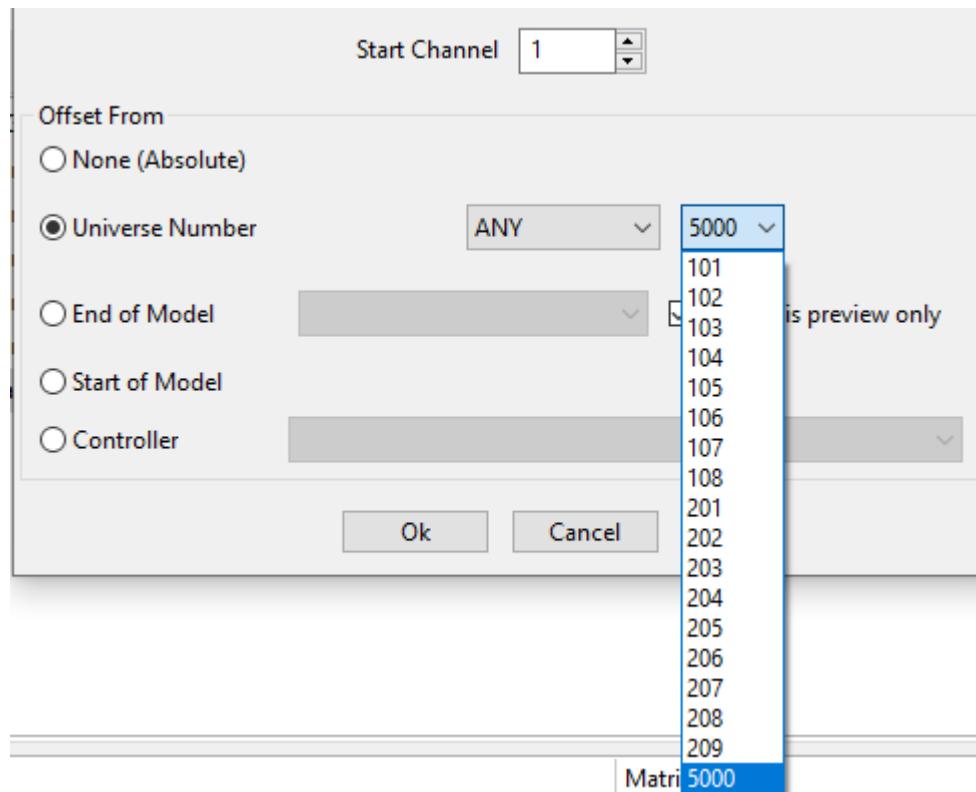
For this example we will use a Virtual Matrix of 192 x 112.

- Create the Network channels in the Controllers section of your sequencing software, DDP is recommended. In xLights you would select the Add Ethernet option. Because we are using a 192 x 112 Virtual Matrix, we will need to create 64,512 channels using the following settings:
  - Name- Create a name for your controller.
  - Description- Create a Description that identifies this FPP device if you want. (this is optional)
  - Id- Select an ID, this must be one that is not in the same range as your existing Universes/Ids. Something like 5000 would usually work.
  - Auto Size- Leave this unchecked.
  - Active- Make sure this is checked.
  - Vendor- Select FPP
  - Model- Select Virtual Matrix
  - Suppress duplicate frames- Check this.
  - IP Address- Set this to the IP address of the FPP Device that will be displaying your effects.
  - Protocol- Select DDP
  - Channels per packet- Leave at the default of 1440.
  - Keep Channel Numbers- Leave this checked.
  - FPP Proxy Host/IP- Leave this blank.
  - Channels- Set to the number that you need for your Virtual Matrix (in this case, 64,512 which is 192 x 112 x 3.)

Name	Protocol	Address	Universes/Id	Channels	Description
F16V3	E131	192.168.1.102	101-108	4096 [1-4096]	
F8PB_FrontYard	E131	192.168.1.101	201-209	4590 [4097-8686]	
FrontMatrix	DDP	192.168.1.103	5000	64512 [8687-73198]	

Name	FPPVirtual Matrix
Description	
Id	7
Auto Size	<input type="checkbox"/>
Active	<input checked="" type="checkbox"/>
Vendor	FPP
Model	
Suppress Duplicate Frames	<input type="checkbox"/>
IP Address	192.168.1.250
Protocol	DDP
Channels Per Packet	1440
Keep Channel Numbers	<input checked="" type="checkbox"/>
FPP Proxy IP/Hostname	
Channels	64512
Models	Matrix

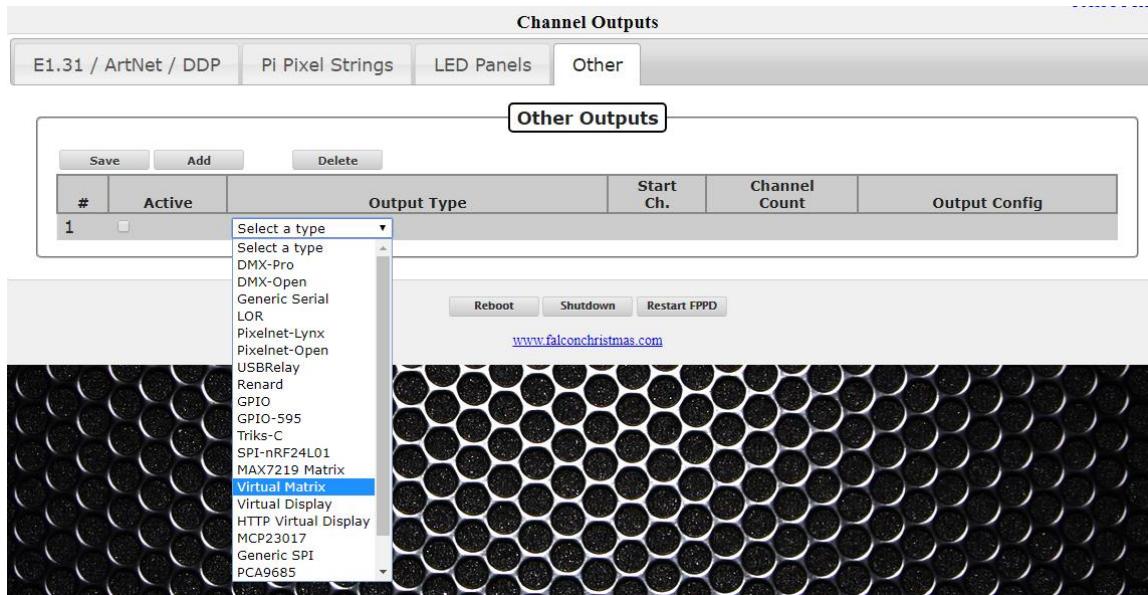
- Click On Save
- Create a matrix in your sequencing software with the resolution you want. (For this example we are using 192 x112) Using the following settings:
  - Name- Create a meaningful name for your matrix (for this example we are using Virtual Matrix)
  - Direction- Horizontal
  - # Strings- Enter the resolution height (for this example we will use 112.)
  - Nodes/String- Enter the resolution width (for this example we will use 192.)
  - Starting Location- Top Left
  - Start Channel- Click the Universe Number button and select the DDP Universe/ID you created for your matrix.



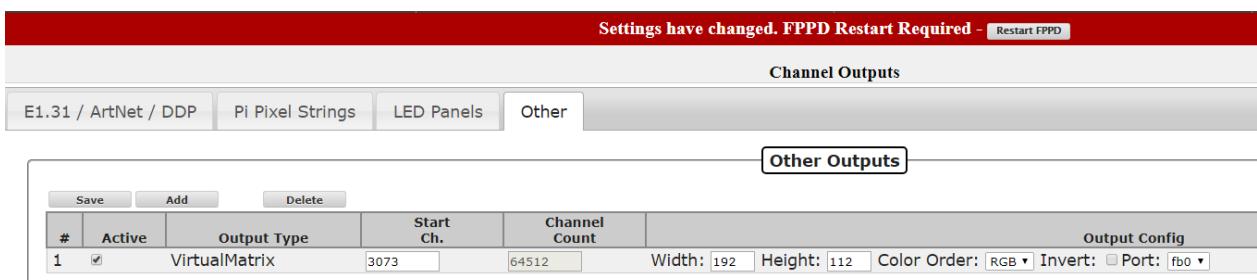
- Click on OK
- Click on Save
- Note the beginning channel number for your Matrix, in this case it is 8687.



- Create the Virtual Matrix in FPP.
  - Go to your Channel Outputs and the Other tab and select the Add button.



- Select the Virtual Matrix type and enter the following options:
  - Active box- Make sure this is checked
  - Start Channel- Enter the channel you noted in xLights that your matrix starts at (in this example it is 8687.)
  - Width- Enter the width of the matrix you created in xLights (for this example we are using 192.)
  - Height- Enter the height of the matrix you created in xLights (for this example we are using 112.)
  - Color Order- Leave it at the default RGB.
  - Port- Leave this at the default of fb0.
  - Click on Save
  - Click on the Restart FPPD in the red banner.



- Configure FPP to output your HDMI.

- Go to the Status/Control>Settings page. Make sure the Default Video Output device is set to HDMI.

You can now create sequences in your scheduling software and it will play on the HDMI port on your Raspberry Pi to your TV/Monitor or through a projector.

## Playing Video

Besides playing video as part of a sequence file there are two other ways of directly playing a video through the HDMI port on your Raspberry Pi. In either case you have to configure your FPP device to output your HDMI. The advantage of playing a video directly is that you can get a higher resolution. The biggest disadvantage is that the video might not be synched exactly with your audio file, usually it is very close and not noticeable.

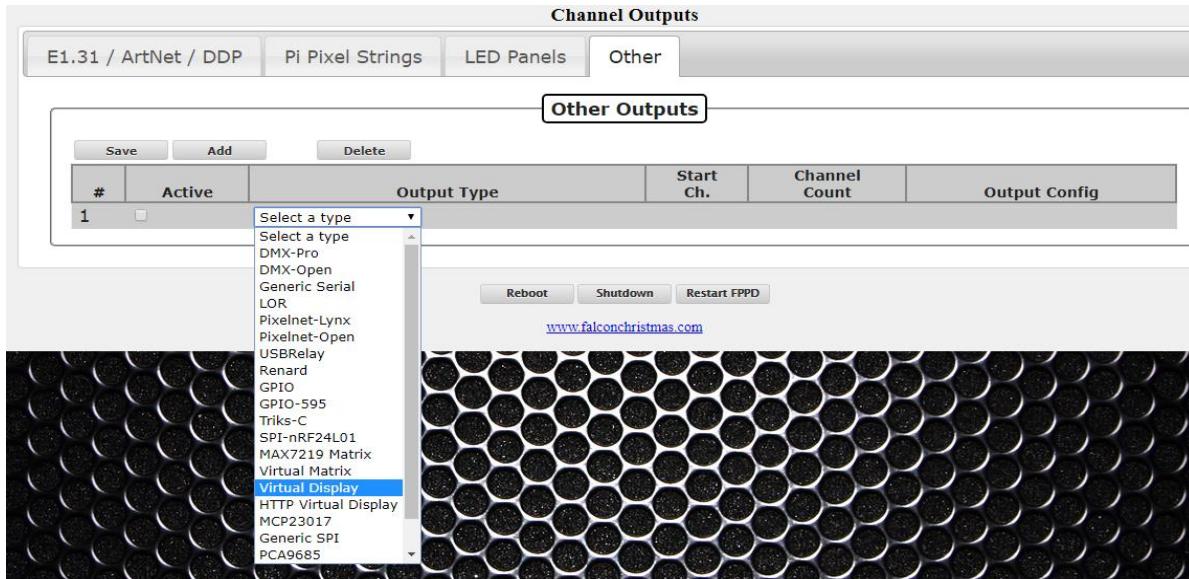
Go to the Status/Control>Settings page. Make sure the Default Video Output device is set to HDMI.

- Synching the video to the Sequence being played.
  - On a Raspberry Pi running in Master or Standalone Mode
    - Create your playlist in FPP using the video file as the audio source.-If you didn't use the same video file as the audio source in your sequencing software then there is a possibility that the video timing won't match the sequence.
    - When the video first starts, it might be slightly out of sync but will get in sync in usually less than a second or two.
- Starting Video Manually
  - You can start a video manually through several different methods, the video will not be synched to the sequence so the timing might drift a little especially on longer videos. This can be useful if you are playing short video clips but want the higher resolution. If syncing is important and manually triggering the video does not give you the desired results, then you should consider using the video as part of the actual sequence. Here are the different methods of manually starting a video.
    - As a Playlist entry.
    - As an event in a sequence or other event trigger.
    - Through the activation of scripts

## Virtual Display

You can have a TV/monitor display a “live” representation of your show by creating a Virtual Display. This will require a TV/Monitor to be connected to one of your Pi FPP devices via the HDMI port.

- Use FPP Connect in xLights to upload your models and full V2 sequence to the FPP device that you are going to use for your Virtual display.
- Go to the Status/Control>Settings page. Make sure the Default Video Output device is set to HDMI.
- Go to your Channel Outputs and the Other tab and select the Add button.



- Select the HTTPVirtual Display type and enter the following options:
  - Active box- Make sure this is checked
  - Start Channel- Leave this at the default of 1
  - Channel Count- Leave this at the default.
  - Width- Leave this at the default of 1280
  - Height- Leave this at the default of 1024
  - Color Order- Leave it at the default BGR.
  - Pixel Size- Leave this at the default of 2
  - Port- Leave this at the default of fb0.
  - Click on Save
  - Configure this device just like any other controller. If running Standalone, configure the outputs for all of the channels, if using Master/Remote configure this FPP as a remote.

#	Active	Output Type	Start Ch.	Channel Count	Output Config			
1	<input checked="" type="checkbox"/>	VirtualDisplay	1	8388608	Width: 1280	Height: 1024	Color Order: BGR	Pixel Size: 2
					Port: fb0			

Now when your show is running you will get a “live” visual representation on the monitor connected to your FPP device.

## HTTP Virtual Display

You can view a “live” representation of your show from your computer by creating an HTTP Virtual Display.

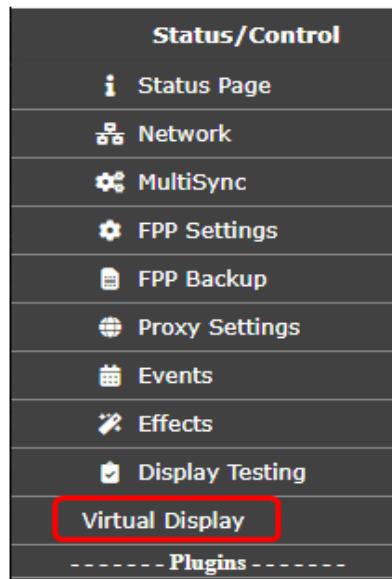
Use FPP Connect in xLights to upload your models and full V2 sequence to the FPP device that you are going to use for your HTTP Virtual display.

- Go to your Channel Outputs and the Other tab and select the Add button.
  - Active box- Make sure this is checked
  - Start Channel- Leave this at the default of 1
  - Channel Count- Leave this at the default.
  - Width- Leave this at the default of 1280
  - Height- Leave this at the default of 1024
  - Pixel Size- Leave this at the default of 2
  - Click on Save

- Configure this device just like any other controller. If running Standalone, configure the outputs for all of the channels, if using Master/Remote configure this FPP as a remote.

						<b>Output Config</b>	
#	Active	Output Type	Start Ch.	Channel Count	Width:	Height:	Pixel Size:
1	<input checked="" type="checkbox"/>	HTTPVirtualDisplay	1	46083	1280	1024	2 ▾

Now when your show is running, you can get to the HTTP Virtual Display from the Status/Control menu.



You will get a display like this:



NOTE: If the Virtual Display is not working, you need to add the HTTP Virtual Display Channel Output on the 'Other' tab of the Channel Outputs config page. Your background image must be uploaded as a file called 'virtualdisplay/background.jpg' and your pixel map must be copied to FPP's configuration directory from xLights as a file called 'virtualdisplaymap'.

# Common Plugins

There are several Plugins available from the FPP install, but you are not limited to those. You can install Plugins from a third party or create your own. Plugins should have installation information on the developer's web page. Some of the more commonly used Plugins are:

- Big Buttons- This Plugin will create a web interface within FPP so that a user can click on one of several buttons that will start a predefined script.
- Matrix Tools- This plugin allows you to control a matrix to add text or a drawing in real time.
- Event Date- This will allow you to generate a dynamic countdown to a specific date and display the results on a matrix. This plugin requires a few other plugins to be installed in order to function properly
  - Message Queue Aggregator for Plugins- This is a repository to store and manage messages so that other plugins can send messages to this plugin for processing at a later time.
  - Message Queue to Matrix Overlay- This plugin will coordinate with the Message Queue Aggregator for Plugins to output the accumulated data.
  - Matrix Tools
- Plugin to download Weather information for Message Queue- This will allow you to get the current weather data for a certain location and display it on a matrix.

## Big Buttons

The Big Buttons Plugin will create a web page with several buttons so that a user can click on one of the buttons which will activate a predefined script such as starting a playlist or a particular song to name a few of the common scripts. To install the Big Buttons Plugin, go to the Plugin Manager in the Content Setup section of FPP and click the download button.

If you do not see the plugin you are looking for, you can manually add a plugin to the list by providing the URL for the plugin's pluginInfo.json file below and clicking the 'Retrieve Plugin Info' button:  
pluginInfo.json URL:

**Available Plugins**

Plugin Name	Action
<b>Big Buttons</b>	
Vast V-FMT212R	

**Big Buttons**  
This plugin displays multiple big buttons in a grid on a page. Each button can be individually configured to run a different user script. The title and color of each button can also be configured.  
By: Chris Pinkham (CaptainMurdoch)

**Vast V-FMT212R**  
Basic RDS/Audio support for the Vast Electronics V-FMT212R USB FM Transmitter  
By: Mat Mrosko (Materdaddy)

Once the Big Buttons Plugin is installed it will need to be configured. Go to the Content Setup tab and click on the Configure Big Buttons.

**Content Setup**

- File Manager
- Playlists
- Scheduler
- Script Repository Browser
- Plugin Manager
- Configure Big Buttons**

You can have up to 20 buttons and each one can start a different script. You can write your own script or download one from the Script Repository. You can set a title for your Big Button page, select the color for each button, select the text size, and the text for each button.

The screenshot shows a configuration window titled "Big Buttons Config". At the top, there are fields for "Button Page Title" (empty) and "Text Font Size" (set to 10). Below these are four rows, each representing a button definition:

Button #01	Description: [empty]
	Script: -- Choose a Script -- ▾
	Color: -- Choose a Color -- ▾
Button #02	Description: [empty]
	Script: -- Choose a Script -- ▾
	Color: -- Choose a Color -- ▾
Button #03	Description: [empty]
	Script: -- Choose a Script -- ▾
	Color: -- Choose a Color -- ▾
Button #04	Description: [empty]
	Script: -- Choose a Script -- ▾
	Color: -- Choose a Color -- ▾

This will demonstrate creating a four button page where three buttons will play a particular song and the fourth button will play the master playlist. You will need to create three one song playlists for the songs that they can select and you have to create a master playlist. You will need to create four scripts for the actions for each button. I used the pre-installed script from the Script Repository.

Here is the script to start the playlist I created for Mary Did You Know.

The screenshot shows a script editor window titled "StartMaryDidYouKnow.sh". It contains the following shell script:

```

#!/bin/sh
#####
# StartPlaylist.sh - Start a playlist on the local system #
#
# The Playlist will play once and then stop.
#####
# Edit this line to hold the playlist name in quotes
PLAYLISTNAME="Mary_Did_You_Know"

# If you want to start on a specific numbered entry in the playlist
# then put the entry number inside the quotes on the line below
STARTITEM=""

fpp -P "${PLAYLISTNAME}" ${STARTITEM}

```

Note: This is a simple script and will immediately start the selected playlist, if you want the playlist that is playing to end gracefully, then you will have to modify the script accordingly.

1. Add a page title.
2. Select the font size.
3. Enter the description for the first button.
4. Select the predefined script to start the selected song.
5. Select the color for the button.
6. Repeat for the other 2 buttons
7. Enter the description for the fourth button.
8. Select the predefined script to play the master playlist.

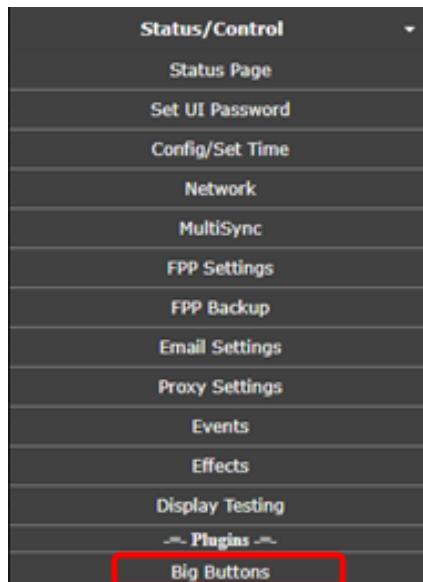
9. Select the color for the button.

Note: There is no Save button, once you enter the information, it is saved.

Big Buttons Config

Button Page Title: Select your Song	
Text Font Size: 12 ▾	
Button #01	Description: Play Mary Did You Know Script: StartMaryDidYouKnow.sh ▾ Color: blue ▾
Button #02	Description: Play Let It Snow Script: StartLetItSnow.sh ▾ Color: coral ▾
Button #03	Description: Play Christmas Sharks Script: StartChristmasSharks.sh ▾ Color: darkcyan ▾
Button #04	Description: Play Master Playlist Script: StartMasterPlaylist.sh ▾ Color: green ▾
Button #05	Description: Script: -- Choose a Script -- ▾ Color: -- Choose a Color -- ▾

To load the page, go to the Status/Control section and select the Big Buttons Plugin



You will get a screen similar to this:



Clicking on the button will start the selected playlist. The button will momentarily change color when clicked to indicate it was pressed. The buttons can control just about anything in FPP as long as you can write a script for it.

## Matrix Tools

The Matrix Tools Plugin will allow a user to display text and or draw on a matrix in real time. Other Plugins can use the Matrix Tools as well to draw on the matrix. To install the Matrix Tools Plugin, go to the Plugin Manager in the Content Setup section of FPP and click the download button.

The screenshot shows the 'Available Plugins' section of the FPP web interface. It lists three plugins:

- Vast V-FMT212R**: Basic RDS/Audio support for the Vast Electronics V-FMT212R USB FM Transmitter. By: Mat Mrosko (Materdaddy).
- Big Green Button**: Big Green Button used to start a playlist. By: Mat Mrosko (Materdaddy).
- MatrixTools**: This plugin uses FPP's Pixel Overlay feature to allow displaying dynamic text on a matrix and drawing on a matrix using your mouse in the web UI. By: Chris Pinkham (CaptainMurdoch).

A red box highlights the download icon for the MatrixTools plugin.

In order to use the Matrix Tools, you need to create a Pixel Overlay Model for your matrix. You can manually enter this in the Input/Output Setup section of FPP or export your models from xLights. Make sure that the channel numbers are correct in the Channel Outputs>LED Panels and the Pixel Overlay model.

The screenshot shows the 'LED Panels' configuration page. It includes the following settings:

- Enable LED Panel Output:
- Panel Layout (WxH): 3x3
- Single Panel Size (WxH): 32x16 1/8 Scan
- Model Start Corner: Top Left
- Brightness: 5
- Panel Gamma: 2.2
- Panel Interleave: Off
- Color Depth: 8 Bit
- Connection: Hat/Cap/Cape
- Start Channel: 11265
- Channel Count: 13824 (highlighted with a red box)
- Default Panel Color Order: RGB
- Wiring Pinout: PocketScroller

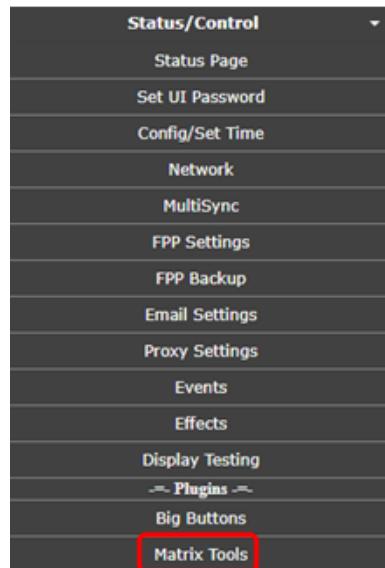
A red box highlights the 'Start Channel' and 'Channel Count' fields.

The screenshot shows the 'Pixel Overlay Models' configuration page. It displays a table with one entry:

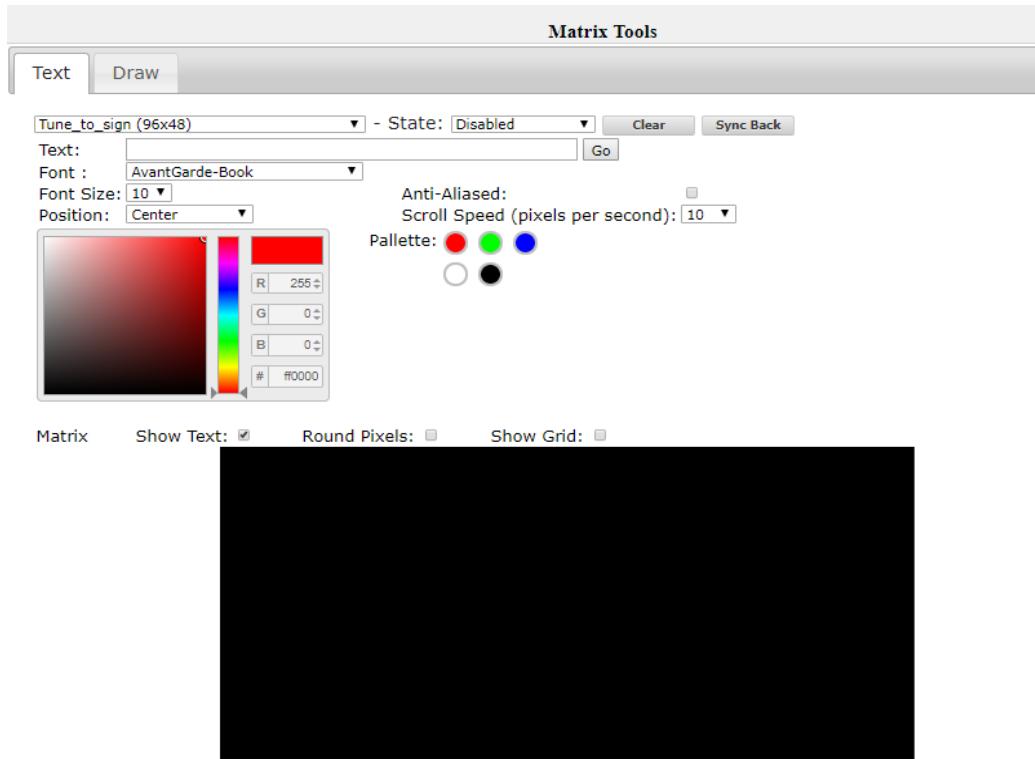
Model Name	Start Ch.	Ch. Count	Orientation	Start Corner	Strings	Strands
Tune_to_sign	11265	13824	Horizontal	Top Left	48	1

A red box highlights the 'Start Ch.' and 'Ch. Count' columns for the 'Tune\_to\_sign' model.

Once the Matrix tools are installed and you have the Pixel Overlay Model configured, you can open the Matrix Tools from the Status/Control section of FPP.



You will get a screen similar to this:



If you have more than one Pixel Overlay Model configured on this FPP then you will have to select the Pixel Overlay Model for your matrix in the first box. There are two tabs to use for the Matrix Tools, Text and Draw. Text allows you to type text and show that on the matrix with several options to display the text. The Draw tab allows you to directly draw on the matrix. You can have text displayed and draw on the Pixel Overlay Model.

Both tabs share:

- Pixel Overlay Model- This will list all of your Pixel Overlay models; choose the model that you want to display the live data.
- State- There are four different states

- Disabled- This is the inactive state for the Matrix tools
  - Enabled- This will stop all other data going to your Pixel Overlay Model and display only the data from the Matrix Tools.
  - Transparent- This will not stop other data coming into the Pixel Overlay Model and will display the Matrix Tools data at the same time. This will combine the channel data so will not display RGB colors correctly. This is only recommended for single color matrices.
  - Transparent RGB- This will not stop the other data coming into the Pixel Overlay model and any Matrix Tools data will override the other data being displayed and this is the recommended setting if you want to display the Matrix Tools data over the other incoming data.
- Clear- This will clear any Matrix Tools data that is displaying on the Pixel Overlay Model.
- Sync Back- This will synchronize the data that is displaying on your Pixel Overlay model, not just the Matrix Tools data. **This is not recommended as it is very CPU and web interface intensive and will slow everything down.**
- Color Picker- You can select the color using various methods in the color picker. You can click in the Hue slider to get the approximate color and then select the exact shade in the main window, enter the RGB value or enter the hexadecimal value for the color.
- Palette- You can select some of the basic colors which will in turn update the color picker to the palette color you selected.
- Preview screen- This will show you an approximation of how your text is displaying. You can change the appearance on the Preview Screen to be round or square pixels and you can show a grid to indicate the positions of all the pixels

The Text tab displays:

- Text- Type the text that you want to display.
- Go- After you have entered all of the attributes for the text to display, press the go button to display the text.
- Font- Select the type of font that you want the text to display.
- Font Size- Select the size of the font for the text to display.
- Position- You can select where you want the test to display, either centered, or scroll from left to right, right to left, bottom to top or top to bottom.
- Anti-Aliased- This will add shading to help eliminate the sharp edges.
- Scroll Speed- Sets the speed at what the text will scroll if you select one of the scrolling options.

The draw tab displays an auto fill and block fill option to fill the entire Pixel Overlay Model. To draw on the Preview screen, left click and hold down the mouse button and draw your desired design.

## Message Queue Aggregator for Plugins

The Message Queue Aggregator for Plugins is a helper plugin used to store and manage messages from other Plugins. To install the Message Queue Aggregator for Plugins, go to the Plugin Manager in the Content Setup section of FPP and click the download button.

**Available Plugins**

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**Vast V-FMT212R**

Basic RDS/Audio support for the Vast Electronics V-FMT212R USB FM Transmitter  
By: Mat Mrosko (Materdaddy)

**Big Green Button**

Big Green Button used to start a playlist  
By: Mat Mrosko (Materdaddy)

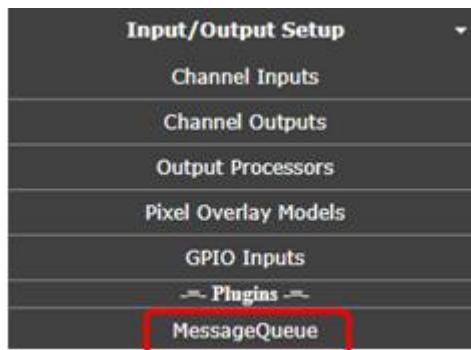
**EDM audio**

Basic RDS support for the EDM  
By: Ryan Lucas (drilucas)

**Message Queue Aggregator for Plugins**

Message Queue Aggregator for Plugins  
By: Ben Shaver (bshaver) and Pat Delaney (patdelaney)

Once it is installed, you will have to go to the MessageQueue Plugin page from the Input/Output Setup section in FPP.



On this page you have to enable the plugin to activate it. You can manually delete any messages that are stored in the database from this page if you want. You can change the message database file path but it is not recommended to do so.

FPP-Plugin-MessageQueue Version: 3.0 Support Instructions

Known Issues:

- NONE

Configuration:

- There is no configuration necessary. This plugin supports/allows plugins to communicate and share messages
- Current Plugins utilizing MessageQueue:
  - SMS Control
  - Matrix
  - SportsTicker
  - Weather
  - Election
  - Stock Ticker
  - RDS To Matrix
  - Event Date

To report a bug, please file it against the MessageQueue plugin project on Git: <https://github.com/FalconChristmas/FPP-Plugin-MessageQueue>

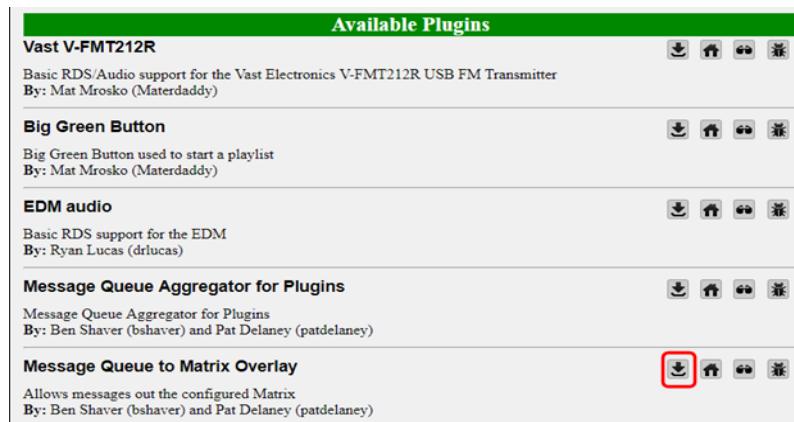
ENABLE PLUGIN:

Message File Path and Name (/home/fpp/media/config/FPP.FPP-Plugin-MessageQueue.db):

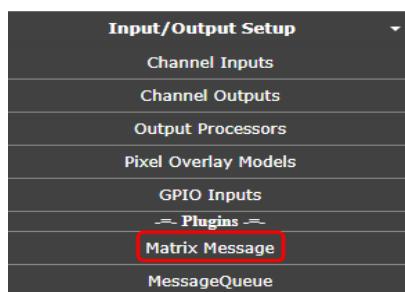
Message file database

## Message Queue to Matrix Overlay

The Message Queue to Matrix Overlay Plugin is another helper plugin and it is used to read the messages in the Message Queue Aggregator Plugin and display the data when it is requested from another Plugin. To install the Message Queue to Matrix Overlay, go to the Plugin Manager in the Content Setup section of FPP and click the download button.



Once it is installed, you will have to go to the MatrixMessage Plugin page from the Input/Output Setup section in FPP.



From this page, there are several configurations

FPP-Plugin-Matrix-Message Version: 2.5 Support Instructions

Known Issues:

- NONE

Configuration:

- This plugin allows you to use the fpp-matrixtools plugin to output messages from the MessageQueue system
- Select your plugins to output to your matrix below and click SAVE
- Configure your Matrix first before selecting here

ENABLE PLUGIN:

Matrix Name:

Overlay Mode: 1 = FULL OVERLAY, 2 = TRANSPARENT, 3 = Transparent RGB

Include Time:  Time Format:  Hour Format:

Include Plugins in Matrix output:

Font:

Font Size:   Anti-Aliased

Pixels per second:

Color: (#RRGGBB or common name 'red' or for a random color type 'random')

To report a bug, please file it against <https://github.com/LightsOnHudson/FPP-Plugin-Matrix-Message.git>

You need to configure the following settings:

- Enable Plugin- This needs to be checked to make the plugin active.
- Matrix Name- This is the Pixel Overlay Model that is your matrix.
- Overlay Mode- This is the setting from the Matrix tools on how to display the message. Select the number that corresponds to the effect you want. Full Overlay is the most common.
  - Full Overlay will block all other data being sent to the matrix.
  - Transparent will not stop other data coming into the Pixel Overlay Model and will display the Matrix Tools data at the same time. This will combine the channel data so will not display RGB colors correctly. This is only recommended for single color matrices.
  - Transparent RGB will not stop the other data coming into the Pixel Overlay model and any Matrix Tools data will override the other data being displayed and this is the recommended setting if you want to display the Matrix Tools data over the other incoming data.
- Include Time- If this box is checked, the when the messages are displayed, it will include the current system time so make sure you have an NTP or Real Time Clock configured.
- Include Plugins in Matrix Output- Select the plugins that are sending information to the Message Queue and that you want to display on your matrix. To select more than one plugin, hold down the Ctrl key and click each additional plugin that you want to manage.
- Font- Sets the font style that you want to display.
- Font Size- Sets the font size that you want to display.
- Anti-aliased- Will try to eliminate the jaggy edges on some fonts by applying shading.
- Pixels per Second- The speed that the message will scroll across the matrix.
- Color- The color for the displayed text. You can use the hexadecimal color notation or the common color name.
- Save Config- Will save the current configuration.
- Update Plugin- You can update the plugin if there is one available.
- Font Management- You can install other fonts if you need to from this function.

## Event Date

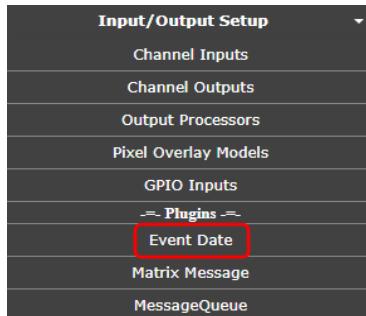
The Event Date Plugin will allow your matrix to display a dynamic countdown to a particular event. You can have other text included with the countdown if you desire. The Event Date Plugin needs 3 other plugins installed and configured in order to work correctly.

- Message Queue to Matrix Overlay
- Message Queue Aggregator for Plugins
- Matrix Tools

To install the Event Date Plugin, go to the Plugin Manager in the Content Setup section of FPP and click the download button.



Once it is installed, you will have to go to the Event Date Plugin page from the Input/Output Setup section in FPP.



You need to configure the following settings:

FPP-Plugin-EventDate Version: 3.0 Support Instructions

Known Issues:

- None

Configuration:

- Configure the date and time of your event
- Enter in the PRE TEXT that will appear before your countdown
- Configure 12 or 24 hour countdown mode
- Schedule the event in your Playlist to send the countdown out your Matrix

This plugin requires ACCURATE time for its calculation. Please ensure RTC is working properly

ENABLE PLUGIN:

Pre Text: (It is):

EVENT DATE:    Hour:  Min:

Post Text: (Until):

Event Name: (Christmas, Halloween, Labor day):

If Remaining time >= 1 day, include:

Include Hours:

Include Minutes:

Will appear as:

It is 139 days until THE EVENT!

Immediately output to Matrix (Run MATRIX plugin):

MATRIX Message Plugin Location: (IP Address. default 127.0.0.1):

To report a bug, please file it against the sms Control plugin project on Git:<https://github.com/FalconChristmas/FPP-Plugin-EventDate.git>

You need to configure the following settings:

- Enable Plugin- This needs to be checked to enable the plugin.
- Pre Text- Enter the text that you want to display before the countdown date.
- Event Date- Enter the date of the event.
- Post Text- Enter the text that you want to display after the countdown date.
- Event Name- Enter the name of the event that you are counting down.
- If Remaining time >= 1 day include.
  - Include Hours-
  - Include Minutes-

On the last day, the countdown will display the hours and minutes to the event, you can include the hours and minutes for the entire countdown by checking this box.

- Will appear as- This shows how the display will look.
- Immediately output to Matrix- If this box is checked, anytime the EventDate plugin is triggered, the message will be displayed on the matrix. If it is not checked, then the EventDate data will be stored until it is displayed using the RUN-MATRIX.sh script.

- Matrix Message Plugin Location- By default the IP address is 127.0.0.1 which is the loopback address of the Pi and should not be changed unless you are using some advanced configurations.
- Save Config- This will save the changes that you have made to the Plugin.
- Update Plugin- This will check for updates to the Plugin and install them.

To use the EventDate Plugin you have to run the RUN-COUNTDOWN-SCRIPT.sh script that is in the Script section of the File Manager (you will need to have the “Immediately Output to Matrix” checked). This is usually accomplished by incorporating the RUN-COUNTDOWN-SCRIPT.sh in a playlist but it can be triggered manually, through events or any other method that can trigger a script.

A script does not act like a sequence, it is just a trigger so if you have a sequence playing after running the script, then you will need to indicate in the playlist to wait for the script to complete before starting the next item in the playlist by checking the Blocking option.

## Weather Information

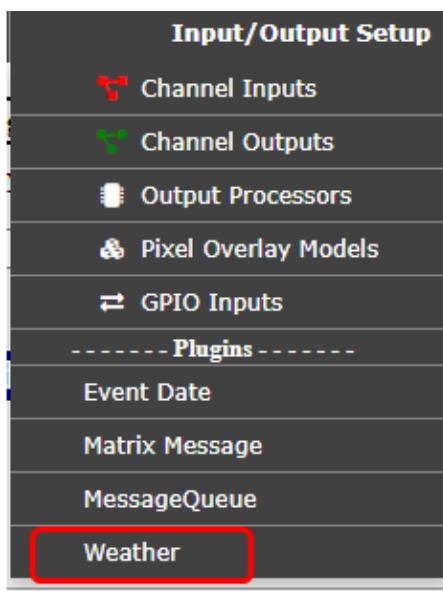
The Weather Information Plugin will allow your matrix to display the current weather for your location or any other location you choose such as the North Pole. The Weather Information Plugin needs 3 other plugins installed and configured in order to work correctly and you will need to get an API key from [https://home.openweathermap.org/users/sign\\_up](https://home.openweathermap.org/users/sign_up). The plugins you will need are:

- Message Queue to Matrix Overlay
- Message Queue Aggregator for Plugins
- Matrix Tools

To install the Weather Information, go to the Plugin Manager in the Content Setup section of FPP and click the download button.

A screenshot of a web page for the "Weather Information Plugin for MessageQueue". The page includes a brief description, credits, and a GitHub repository link. At the bottom right, there is a large red-bordered "Download" button. Below the main content, there is a horizontal bar with several small icons, one of which is also circled in red.

Once it is installed, you will have to go to the Weather Information Plugin page from the Input/Output Setup section in FPP.



You need to configure the following settings:

**FPP-Plugin-Weather Support Instructions**

Known Issues:

- None

Configuration:

- Configure your City & 2 Character State & Separator Character to display
- If you are not in the US, you can enter your Latitude and Longitude settings to get your local weather.

Link to settings: [System tab](#)

- Visit <http://home.openweathermap.org/> to sign up for an API KEY

ENABLE PLUGIN:

Pre Text (Text to display ahead of Weather data):

Post Text (Text to display after weather data):

Select your country  US  Other

City:

State:

Temperature type:

Include Locale in output:

Separator:

Include Temp:

Include Wind:

Include Humidity:

Include Degree Symbol (°):

API KEY:

Immediately output to Matrix (Run MATRIX plugin):  You normally will want this checked, or else you have to run 2 scripts to display your message

To report a bug, please file it against the project on Git: <https://github.com/FalconChristmas/FPP-Plugin-Weather>

- Enable Plugin- This needs to be checked to enable the plugin.
- Pre Text- Enter the text that you want to display before the temperature data.
- Post Text- Enter the text that you want to display after the temperature data.
- Select your Country- Select the US (United States) if you want to enter your location by city and state and select Other if you are not in the US or need to enter the Latitude and Longitude of your coordinates. If you select Other, then you need to configure your location in the FPP Settings>System tab. (When you go to that tab, there will be coordinates displayed, but they are not actually saved, you will need to enter your actual coordinates.)
- City- Enter the city that you want the weather.
- State- Enter the 2 digit abbreviation for your state.
- Temperature Type- Select the temperature type that you want the data to display in, either Fahrenheit or Celsius.
- Include Locale in Output- This will include the City and State in the output.
- Separator- If you want a separator symbol in between the fields, such as an | you can select one.
- Include Temp- Select this if you want the temperature to display.
- Include Wind- Select this if you want the Wind data to display.
- Include Humidity-Select this if you want the Humidity to display.

- Include Degree Symbol- Select this If you want the degree symbol to display with the temperature.
- API KEY- enter the API key that you received from <https://home.openweathermap.org>
- Immediately output to Matrix- If this box is checked, anytime the Weather Information plugin is triggered, the message will be displayed on the matrix. If it is not checked, then the Weather Information data will be stored until it is displayed using the RUN-MATRIX.sh script. It is recommended to have this checked.
- Save Config- This will save the changes that you have made to the Plugin.
- Update Plugin- This will check for updates to the Plugin and install them.

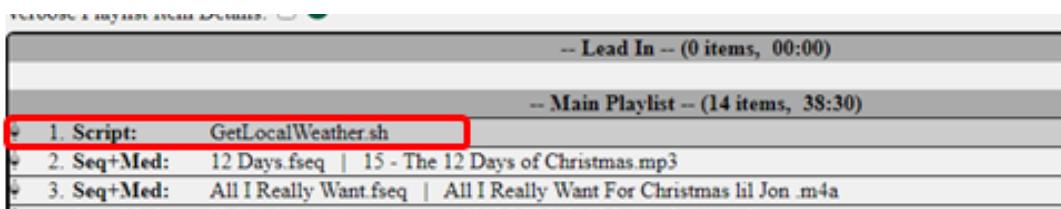
The output will be in this format (only the options selected will display):

"Pre text" + "Locale"+ "Temp" + "degree symbol"+ "Wind" + "Humidity" + "Post Text"

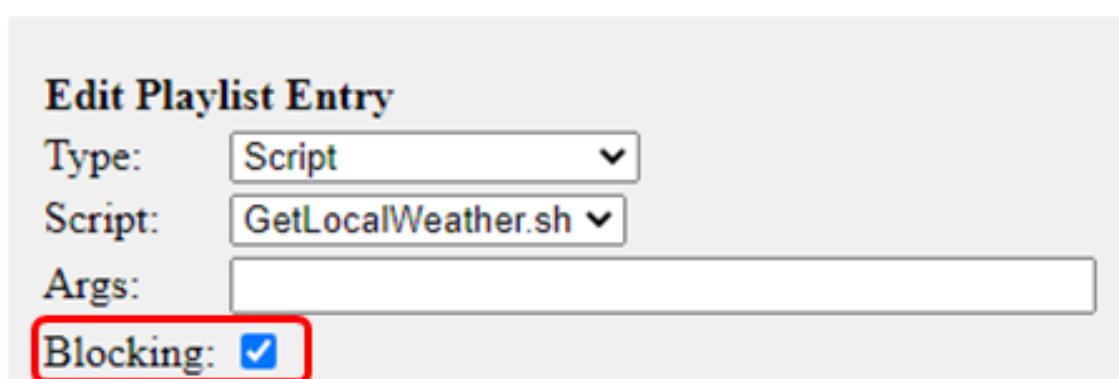
So if your Pre Text is "It is now", your Post Text is "in Falcon Colorado" and you selected the Include Temp, Include Wind, and Include Degree Symbol, the output would look like this:

It is now Temp: 62.4° Wind: W 5 MPH in Falcon Colorado

You will need to configure the Matrix Message Plugin to process messages from the Weather Plugin by including it in the output options. To use the Weather Information Plugin you have to run the GetLocalWeather.sh script that is in the Script section of the File Manager (you will need to have the "Immediately Output to Matrix" checked). This is usually accomplished by incorporating the GetLocalWeather.sh in a playlist but it can be triggered manually, through events or any other method that can trigger a script.



A script does not act like a sequence, it is just a trigger so if you have a sequence playing after running the script, then you will need to indicate in the playlist to wait for the script to complete before starting the next item in the playlist by checking the Blocking option.



## Projector Control

If you use a Projector in your display and it supports controlling remotely through a serial or Ethernet port. If your projector uses a serial port for remote control, then you will need a USB to Serial adapter.

**Projector control Support Instructions**

Known Issues:

- NONE

Configuration:

- Configure your connection type, IP/PJLINK, Serial

VER: 1.0  
ENABLE PLUGIN:

Connection type: **SERIAL** ▾  
SERIAL DEVICE: ▾  
Projector: **PJLINK** ▾  
Baud Rate:   
CHAR BITS:   
STOP BITS:   
Parity (none, even, odd):   
PJLINK IP:   
PJLINK PASSWORD:

**Save Config**

To report a bug, please file it against the Projector Control plug-in project on Git: <https://github.com/FalconChristmas/FPP-Plugin-Projector-Control>

**Update Plugin**

You will need to configure the plugin for the projector you are using; this information is usually available in the user manual for your projector.

- Enable Plugin- check this box to enable the plugin.
- Connection type- Select the connection type that you are going to use for your communication.
- Serial Device- If your connection type is Serial, you will have to select the Serial device that you are going to use. (normally you will only have one Serial device to select from)
- Projector- Many projectors support the PJLINK protocol, if your projector supports PJLINK you can select that, if not then select your projector from the drop down list.
- Baud Rate- Enter the Baud Rate that your projector utilizes. (9600 and 19200 are the most common.)
- CHAR BITS- Enter the CHAR BITS (the most common is 8).
- STOP BITS- Enter the STOP BITS (the most common is 1).
- Parity- Enter the Parity value (the most common is none).
- PJLINK IP- Enter the PJLINK IP address for your projector.
- PJLINK Password- Enter the PJLINK Password for your projector (if there is one).

After entering your information, click on the Save button.

The Projector Control plugin will generate several Events and Scripts that you can use to control your projector.

# Plugin Development

If you want to develop a plugin, then you can go to the Plugin Manager in the Content Setup section of FPP.



On this page is a Plugin template that has a shell for all the components that you will need to incorporate a plugin into FPP.

A screenshot of a website titled "Template Plugin". The title bar is orange with the text "Template Plugin". Below the title, there is a header "Template Plugin for FPP Plugin developers". To the right of the header are four small icons: a download arrow, a house, a gear, and a bug. Below the header, there is a paragraph of text: "This template plugin is designed to make it easier for plugin authors to create new FPP Plugins. You can manually clone the git repository or install the Template Plugin and then go to the plugin's config page and use the form to copy the template into a new plugin directory." Underneath this text is the author information: "By: John Doe (jdoe)".

The best method is to go to the website for the template and clone the files into a GitHub repository of your own. Clicking on the Source Code or Home buttons will take you to the GitHub repository for the Template Plugin.

A screenshot of a GitHub repository page for "fpp-plugin-Template". The top navigation bar shows "Branch: master", "New pull request", "Create new file", "Upload files", "Find File", and a green "Clone or download" button. The main area displays a list of commits from user "cpinkham". The commits are: "Update help examples.", "Initial commit of plugin template.", "No-op.", "Initial commit of plugin template.", "Initial commit of plugin template.", "Update help examples.", "Initial commit of plugin template.", "Move allowUpdates flag to top level of pluginInfo.json", and "Initial commit of plugin template.". Below the commit list is a file named "README.md". At the bottom of the page, the repository name "fpp-plugin-Template" is displayed.

The template has the following files and it is recommended to follow this file structure:

- Help- This is a folder to hold the relevant help files for your plugin and it is highly recommended to document the installation, configuration and operation of your plugin.

The Help files will be available to the user when they hit the F1 key or click the “Press F1 for Help” link at the top of your page. The file name for your Help file needs to match the file name for the page it is related to, but you are not limited to the suggested files. You can have pages with a different file name, you will need to include a matching help file with the same file name. The Help folder has the following files and if you don’t have a page with a matching name, then you can (not mandatory) delete the file.

- content.php- This will have the help information, formatted in html, for your content.php file in the main directory.
- help.php- This will have the help information, formatted in html, for your help.php file in the main directory.
- output.php- This will have the help information, formatted in html, for your output.php file in the main directory.
- status.php- This will have the help information, formatted in html, for your status.php file in the main directory.
- Scripts- This is a folder to hold scripts needed for your Plugin. There are some scripts that will run automatically at the appropriate time. These do not get saved in the Script folder in FPP. If there are scripts that the user will need to use, the Plugin author will need to copy those scripts into the FPP scripts folder, usually this can be accomplished by adding the copy routine in the fpp\_install.sh file. The Scripts that run automatically are:
  - fpp\_install.sh- This script will run when the user installs the plugin. If there are any special requirements for your plugin such as scripts or other files to be copied in the correct place, this might be the place to perform those functions.
  - fpp\_uninstall.sh- This script will run when the user uninstalls the plugin. If you created any special files and they are not needed for any other application, then you can delete these and perform any other cleanup functions in this script.
  - postStart.sh- This script will run after fppd starts. If your plugin needs any processes to run prior to the user accessing your plugin, this is where you should put these functions.
  - postStop.sh- This script will run after fppd stops and can be used for any cleanup processes.
  - preStart.sh- This script will run right before fppd starts.
  - preStop.sh- This script will run right before fppd stops.
- README.md- This file is used to display relevant information in regards to your plugin and will be displayed in the GitHub main page for your plugin. If your plugin requires another plugin to function, you might want to include it here as well.
- about.php- If you want to have an about informational page for your plugin, then you can use this template to display your about webpage. You will need to provide a link to it.
- content.php- This is a placeholder file for demonstration purposes. You can name your plugin file(s) anything you want, just make sure you link them properly in the menu.inc file.
- menu.inc- This file is required to provide navigation for your plugin.
- output.php- This is a placeholder file for demonstration purposes. You can name your plugin file(s) anything you want, just make sure you link them properly in the menu.inc file.
- pluginInfo.json- This is a required file.
- status.php- This is a placeholder file for demonstration purposes. You can name your plugin file(s) anything you want, just make sure you link them properly in the menu.inc file.

Once your plugin has been created, you can load your plugin by following the instructions for Retrieving Plugin Info in the Plugin page. If you would like to have your plugin available to other users, post the information in the Plugin section of the Falcon Christmas forum and if approved, a link will be added to the Available Plugins section.

# Resources

## Help

There are several resources available for help, here are a few of the more popular help resources are:

<http://falconchristmas.com/forum/> -This forum is very active and you can usually get a response fairly quickly.

<http://auschristmaslighting.com/forums/> -This forum is also very active and you can usually get a response fairly quickly. You don't have to be from Australia to post here.

<https://auschristmaslighting.com/> - This is the parent site for the auschristmaslightingforums and there are several resources there, one that is a must have is the AUSManual101.pdf. You need to register it in order to download the manual.

<http://www.xLights.org> This website has links to several resources including a forum. The information is geared towards xLights users but it is not exclusively xLights.

<http://videos.xLights.org/> -This website has several videos on all aspects of the Holiday Lighting hobby.

<https://www.youtube.com/channel/UCby1v6Kbi8AHMKV2yMyF1MQ/featured> - This is the Canispater Christmas YouTube channel and there are many very informational videos.

<https://zoom.us/j/175801909> - This website will take you to a live video conference site. They have xEssential training classes every Wednesday at 8:00 PM Eastern time, but there is usually someone there most of the time and is a good way to get instant help. You will have to install the software the first time you go to the website.

## Configuring a Static Route

If your network configuration is utilizing more than one subnet, then you will probably need to configure a Static Route. This can be accomplished in a few different methods and depends on the operating system you are using.

The examples below assume that your home/show router has an IP address of 192.168.0.1 and you are connecting your FPP to your home/show network via Wi-Fi and to your controller via Ethernet. Your controller needs to have an IP on a different subnet than your home/show network, for this example we will use 192.168.101.2. The FPP will need an IP address on the wlan0 interface in the same network as the home/show router, we will use 192.168.0.101 and it will need an IP address on the eth0 interface in the same subnet as the controller, we will use 192.168.101.1

Static Routing in router- Not all routers support static routing but most of them do and this is the preferred method. By adding a static route in your router, all devices connected to your network will have access to your controllers. Due to the large number of router manufacturers and the interfaces they use, the method could be different. The Static Routing is usually in an advanced section of the router and called Routing, Advanced Routing, Static Routing, etc. They will be similar to this:

## Static Routing

 Add  Delete

<input type="checkbox"/>	ID	Network Destination	Subnet Mask	Default Gateway	Interface	Description	Status	Modify
--	--	--	--	--	--	--	--	--

Network Destination:

Subnet Mask:

Default Gateway:

Interface:

Description:

Enable This Entry

- Network Destination- Enter the subnet of your controller, in this case it will be 192.168.101.0 (note the last number is 0 and NOT the address of the controller.)
- Subnet Mask- Enter 255.255.255.0
- Default Gateway- Enter the IP address of the wlan0 interface on the connected FPP, in this case it will be 192.168.0.101.
- Interface- This option might not be available, use LAN if it is an option.
- Description- This option might not be available. If it is, then enter a description about this route.

Static Routing in Computer - You can enter a static route into your computer. By adding a static route in your computer, only that computer will have access to your controllers. You can add a static route to more than one computer if needed. Windows and Mac computers have different methods.

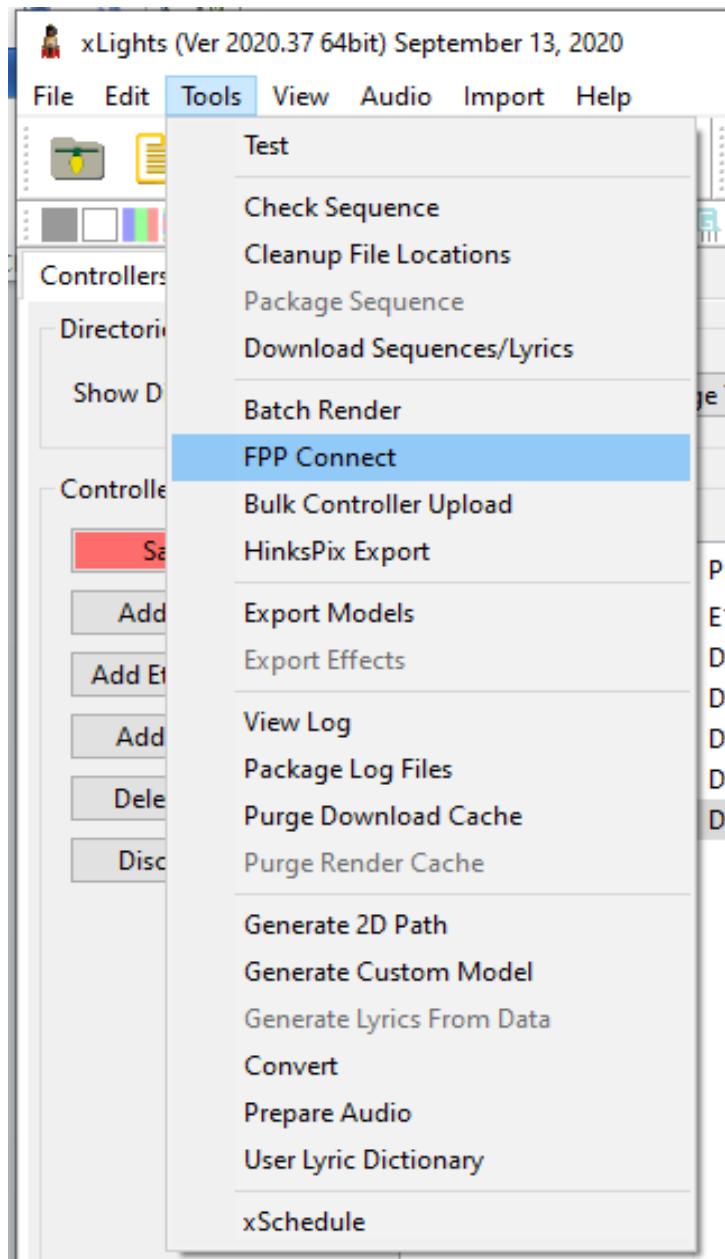
- Windows- Open a command prompt window (as an administrator) and based on the example given enter:  
`route -p add 192.168.101.0 mask 255.255.255.0 192.168.0.101`
- Mac- Open a Terminal window and based on the example given enter:  
`sudo route add 192.168.101.0/24 192.168.0.101`  
(Note: The route add function in Macs are not persistent so if the computer is turned off or rebooted, the route will need to be added again)

Creating a Proxy Host- You can use an FPP device to route network traffic between subnets by setting the FPP as a Proxy Host. This can be useful if you are unable to create a static route in your router and using a Mac computer (since the Mac doesn't support persistent routes.) You can use a Proxy Host with Windows computers as well. See [Proxy Settings](#) for more information.

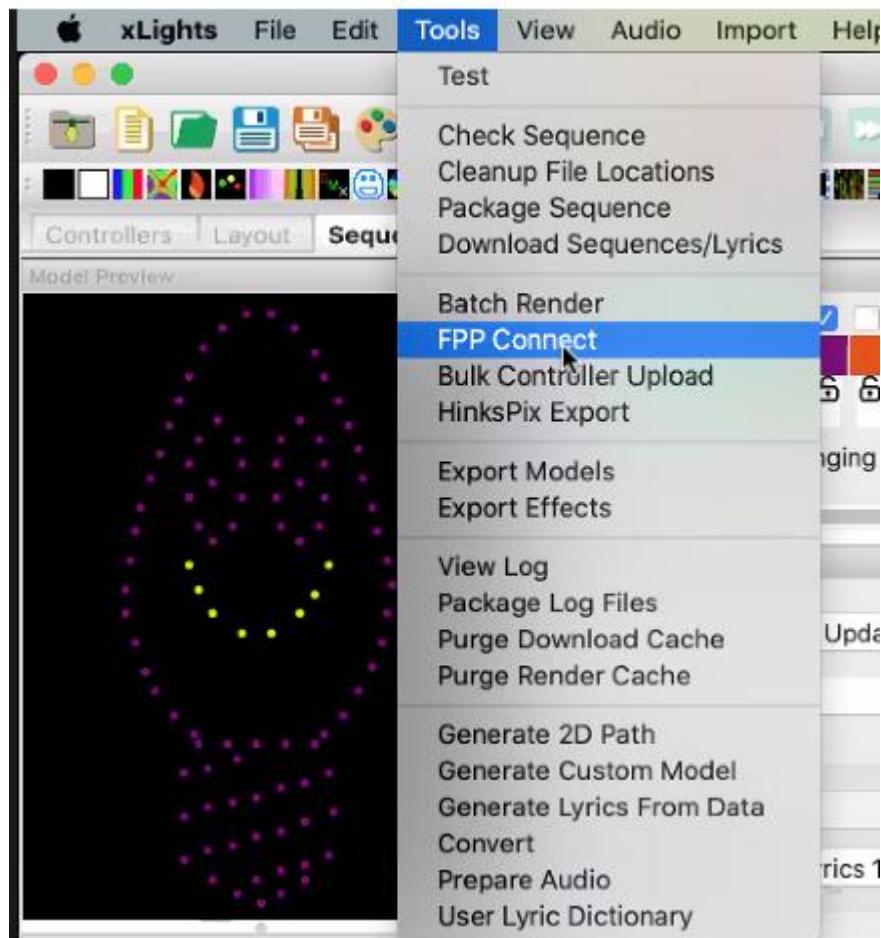
# FPP Connect

The FPP Connect function in xLights is probably the best and most efficient method to upload your sequences and media files to all of the FPP devices that need them. It can also be used to configure most of the settings in FPP for your port outputs. You can upload to one, all, or selected FPP devices in one step which greatly simplifies the process of updating your show data.

FPP Connect in Windows



## FPP Connect in a Mac



Once you open FPP Connect, it will usually discover all of the FPP devices in your system.

FPP Upload

Upload	Location	Description	Version	FSEQ Type	Media	Models	UDP Out	Playlist	Pixel Hat/Cape
<input type="checkbox"/>	FPPMaster - 192.168.1.100		4.2	V2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	None	<input type="button" value="..."/>	
<input type="checkbox"/>	YardPi - 192.168.1.101		4.1	V2 Sparse/zstd	<input type="checkbox"/>	<input type="checkbox"/>	None	<input type="button" value="..."/>	
<input checked="" type="checkbox"/>	PocketScroller - 192.168.1.104	PocketScroller	4.2	V2 Sparse/zstd	<input type="checkbox"/>	<input checked="" type="checkbox"/>	None	<input type="button" value="..."/>	<input type="checkbox"/> LED Panels - 96x
<input type="checkbox"/>	PBSingingElements - 192.168.1.105	F8PB Singing Elements	4.1	V2 Sparse/zstd	<input type="checkbox"/>	<input type="checkbox"/>	None	<input type="button" value="..."/>	<input type="checkbox"/> F8-B
<input type="checkbox"/>	FPP-Pi-Test - 192.168.1.225		4.2	V2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	None	<input type="button" value="..."/>	

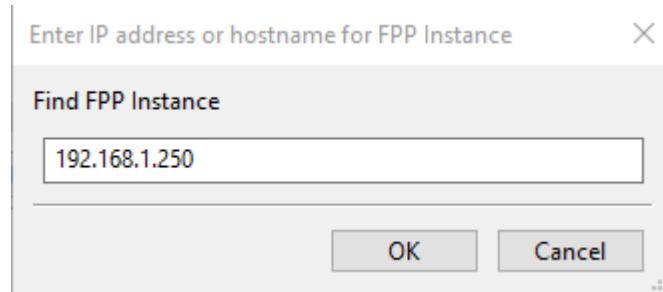
Filter: Only Current Directory   Folder: --Show Folder--

Sequence

Sequence	Modified Date	Media
D:\xLights\2020\Christmas\12 Days.fseq	2020-08-28 19:36:37	D:\xLights\2020\Christmas\Music\15 - The 12 Days of Christmas.mp3
D:\xLights\2020\Christmas\All I Really Want.fseq	2020-09-16 11:55:33	D:\xLights\2020\Christmas\Music\All I Really Want For Christmas lil Jon .m4a
D:\xLights\2020\Christmas\All I want for Christmas is You.fseq	2020-08-16 17:56:11	D:\xLights\2020\Christmas\Music\All I Want for Christmas Is You.mp3
D:\xLights\2020\Christmas\Alvin and the Chipmunks.fseq	2020-07-03 17:44:46	D:\xLights\2020\Christmas\Music\ALV... & THE CHIPMUNKS CHRISTMAS SONG.mp3
D:\xLights\2020\Christmas\Arches 04.eseq	2019-02-24 23:14:16	
D:\xLights\2020\Christmas\Auld Lang Syne.fseq	2020-04-25 09:52:23	D:\xLights\2020\Christmas\Music\Auld Lang Syne.mp3

Add FPP   Upload   Cancel

If one of your FPP devices does not show up in the list, you can manually add it by clicking on the Add FPP button and add the FPP address for the FPP device you want to discover.



Many times the reason for not discovering an FPP device is because you have more than one device with the same Host Name (like FPP) or a network configuration issue.

There are many options in the FPP Connect that provide a lot of functionality.

FPP Upload									
Upload	Location	Description	Version	FSEQ Type	Media	Models	UDP Out	Playlist	Pixel Hat/Cape
<input type="checkbox"/>	FPPMaster - 192.168.1.100		4.2	V2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	None	<input type="checkbox"/>	
<input type="checkbox"/>	YardPi - 192.168.1.101		4.1	V2 Sparse/zstd	<input type="checkbox"/>	<input type="checkbox"/>	None	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	PocketScroller - 192.168.1.104	PocketScroller	4.2	V2 Sparse/zstd	<input type="checkbox"/>	<input checked="" type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/> LED Panels - 96x
<input type="checkbox"/>	PBSingingElements - 192.168.1.105	F8PB Singing Elements	4.1	V2 Sparse/zstd	<input type="checkbox"/>	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/> F8-B
<input type="checkbox"/>	FPP-Pi-Test - 192.168.1.225		4.2	V2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	None	<input type="checkbox"/>	

**Upload-** This checkbox is to select which FPP devices you want to take action on. Whatever choices you select will apply to all of the FPP devices checked in this column.

**Location-** This is the HostName and IP address of your FPP devices (this is for information only).

**Description-** This is the Description that you entered in FPP to provide additional information to give more complete details about the FPP Device (this is for information only).

**Version-** This will show the FPP version that the FPP device is using. (this is for information only).

**FSEQ Type-** This is the format of the FSEQ file that you are going to upload. The formats are:

- V1- This is an older format and is quite a bit larger than the V2 format. This is typically only used for old versions of FPP.
- V2- This is a compressed version and more efficient than the V1 version. The V2 version will contain all of the channel data in the sequence.
- V2 Sparse/zstd- This is a compressed format but will be customized for the associated FPP device to only contain the channels this device needs which saves a lot of space.
- V2 Sparse/zstd Uncompressed- This is a V2 format that will be customized for the associated FPP device to only contain the channels this device needs which saves a lot of space but won't be compressed for controllers that cannot handle compression (this is not very common).

**Media-** If this box is checked, FPP Connect will upload the Media (.mp3/.mp4) that was used for the sequence as noted in the Media section of the File Selection box at the bottom portion of the screen to the FPP device on that same line.

**Models-** If this box is checked, FPP Connect will upload the Model Data (channels, positions, configurations, etc.) from your show layout and store them as Pixel Overlay Models to the FPP device on that same line. This can be useful if you want to test controllers by Model and required if you are going to use a Virtual Display or HTTPVirtual Display.

**UDP Out-** This option is used to configure and enable the E1.31/DDP outputs. The options are:

- None- This is used for devices that do not need to output E1.31/DDP data such as Cape type controllers or FPP devices running in Master mode.
- All- This will upload and enable all of the E1.31/DDP Output channels configured in xLights. Many times you will not need all of the E1.31/DDP channels configured so you will have to delete or make inactive the channels your FPP device does not need to send out. A main player that is outputting the show data to a switch that is connected to all of your controllers will need all of the E1.31/DDP channels configured.
- Proxied- This will only upload and enable the E1.31/DDP channels that are configured for the controller that is attached to this FPP device AND the FPP device is configured as a Proxy Host for that controller.

**Playlist-** If you are uploading sequences to an FPP device and want to ADD it to an existing playlist, you can select the playlist that you want them added to. All the sequences selected will be ADDED to the playlist. **If you already have the sequence in the playlist, this will still add it to the playlist and you will have the sequence(s) in your playlist twice.**

**Pixel Hat/Cape-** If your FPP device has a hat or cape and configured for local pixel ports, then this option will be available and if checked will upload the pixel port configuration to the controller.

## GPIO Button Input

You can use one of the available GPIO buttons to trigger an event. In order to do so, you will need to identify which pins are actually GPIO pins. Here are the pinout diagrams of the more common SBCs used. Make sure you confirm the GPIO pins of the SBC you are using before making your connections and always make connections with the power disconnected.

Raspberry Pi 3 GPIO Header

Pin#	NAME	NAME	Pin#
01	3.3v DC Power	DC Power 5v	02
03	GPIO02 (SDA1 , I <sup>2</sup> C)	DC Power 5v	04
05	GPIO03 (SCL1 , I <sup>2</sup> C)	Ground	06
07	GPIO04 (GPIO_GCLK)	(TXD0) GPIO14	08
09	Ground	(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)	(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)	Ground	14
15	GPIO22 (GPIO_GEN3)	(GPIO_GEN4) GPIO23	16
17	3.3v DC Power	(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)	Ground	20
21	GPIO09 (SPI_MISO)	(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)	(SPI_CE0_N) GPIO08	24
25	Ground	(SPI_CE1_N) GPIO07	26
27	ID_SD (I <sup>2</sup> C ID EEPROM)	(I <sup>2</sup> C ID EEPROM) ID_SC	28
29	GPIO05	Ground	30
31	GPIO16	GPIO12	32
33	GPIO13	Ground	34
35	GPIO19	GPIO16	36
37	GPIO26	GPIO20	38
39	Ground	GPIO21	40

Beaglebone Black Pinout Diagram

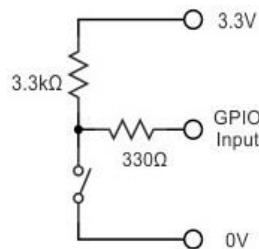


Function	Physical Pins	Function	Function	Physical Pins	Function
P9			P8		
DGND	1	2	DGND	1	2
VDD 3.3 V	3	4	MMC1_DAT6	3	4
VDD 5V	5	6	MMC1_DAT2	5	6
SYS 5V	7	8	MMC1_CMD	7	8
PWR_BUT	9	10	GPIO_67	9	10
UART4_RXD	11	12	EHRPWM1A	11	12
UART4_TXD	13	14	EHRPWM1B	13	14
GPIO_48	15	16	GPIO_44	15	16
SPIO_CS0	17	18	EHRPWM2A	17	18
I2C_SCL	19	20	EHRPWM2B	19	20
SPIO_D0	21	22	GPIO_46	21	22
SPIO_SLCK	23	24	MMC1_CLK	23	24
GPIO_49	25	26	MMC1_DATA4	25	26
GPIO_117	27	28	MMC1_DATA1	27	28
GPIO_115	29	30	MMC1_DATA5	29	30
SP11_DO	31	32	GPIO_61	31	32
SP11_SCLK	33	34	LCD_VSYNC	33	34
AIN4	35	36	LCD_HSYNC	35	36
AIN6	37	38	LCD_DATA13	37	38
AIN2	39	40	LCD_DATA12	39	40
AIN0	41	42	LCD_DATA11	41	42
GPIO_40	43	44	LCD_DATA10	43	44
DGND	45	46	LCD_DATA9	45	46
DGND			LCD_DATA8		
			LCD_DATA7		
			LCD_DATA6		
			LCD_DATA5		
			LCD_DATA4		
			LCD_DATA3		
			LCD_DATA2		
			LCD_DATA1		

The GPIO pins are in a floating state and you will have to “force” it high (a positive voltage) or low (ground). This is done by connecting a resistor from the GPIO pin to either 3.3V (pulling high) or to ground (pulling low). This can be accomplished through a setting in the FPP GPIO Inputs page or by wiring a resistor in your circuit (**it is not recommended to do both**).

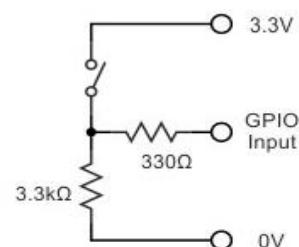
Here are some examples of using an external resistor to pull high or low.

## Schematic of external Resistor pulling the GPIO pin high



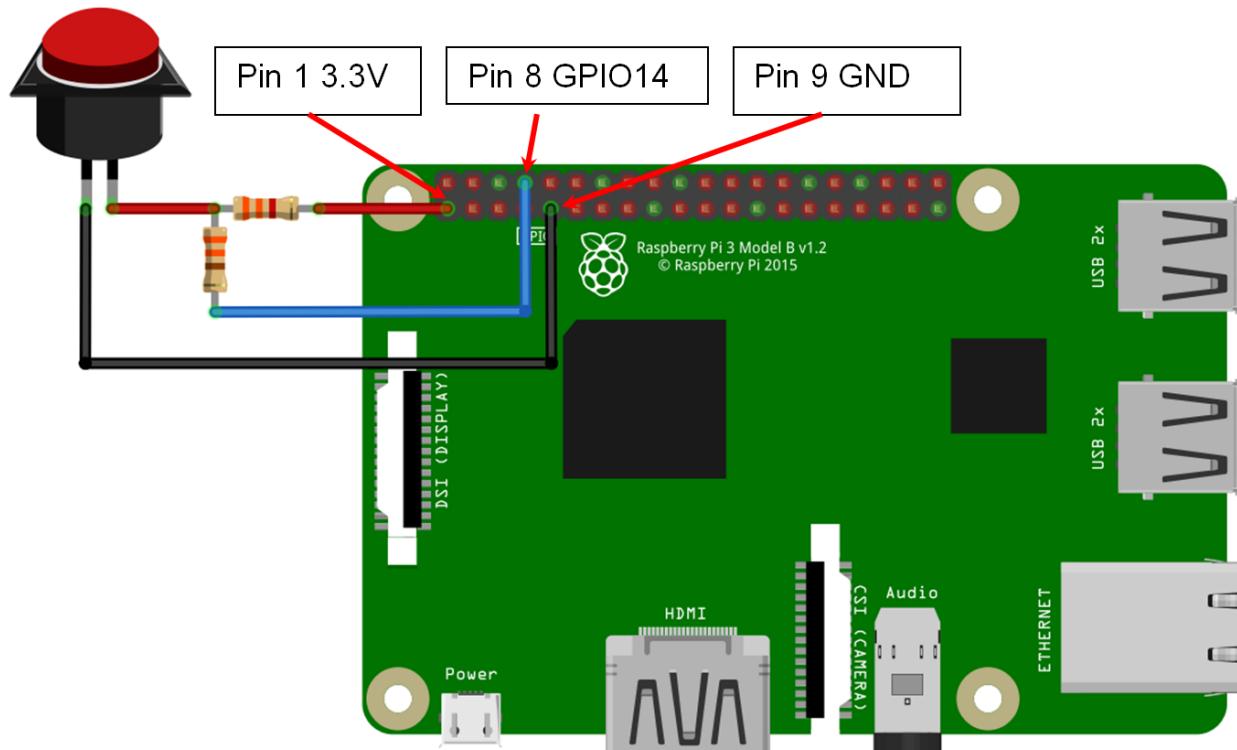
GPIO input is LOW (0)  
when switch is closed

## Schematic of external Resistor pulling the GPIO pin low

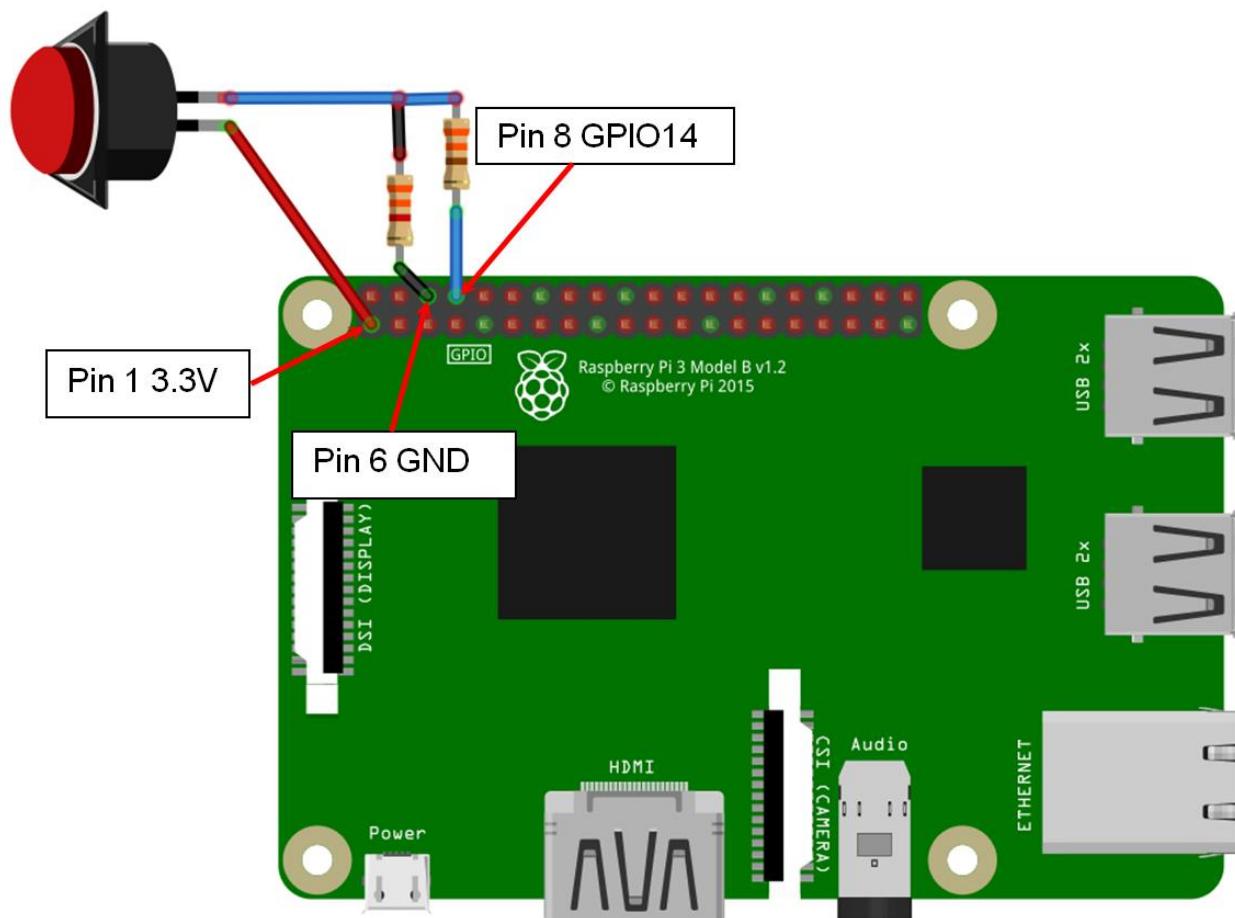


GPIO input is HIGH (1)  
when switch is closed

## Graphical example of external Resistor pulling the GPIO 14 pin high.



Graphical example of external Resistor pulling the GPIO 14 pin low.



There are 2 basic types of switches, Normally Open (designated NO) and Normally Closed (designated NC) and you need to know which kind of switch you will be using.

Normally Open- These switches will only let electricity flow through it when it is pressed.

Normally Closed- These switches let electricity flow through it until it is pressed and then the flow is stopped.

The GPIO triggers have two trigger types.

Rising Trigger-This is when the voltage on the GPIO pin transitions from ground to a positive voltage (the exact voltage varies but is around 1.3 v.)

Falling Trigger- This is when the voltage on the GPIO pin transitions from a positive voltage towards ground.

The Event Trigger type (falling or rising) will depend on a few factors such as GPIO pulled high or pulled low, switch is normally open or normally closed, and if you want the trigger to be when the button is pressed or released (you can use both triggers, you just need to identify the actions to take for each trigger)

To clarify this, if you have the GPIO pulled high and have a Normally Open button, then pushing the button will trigger a Falling Event and releasing it will trigger a Rising Event.

# Network Overview

Networks have been troublesome for most of the people getting started in the animated holiday lighting hobby. This is a **very basic overview** and should give you enough information to understand networks and troubleshoot them.

A network is a group of computer devices identified by an IP address. Networks are broken down into groups, typically called subnets. Think of an IP address as a telephone number. In order for devices to be able to communicate with each other, every device needs a “telephone number” (from now on called IP address) and they need to be a unique number. All IP addresses are formatted with 4 groups of numbers, each one separated with a “.” The numbers can only be 0-255. So they would look something like 192.168.110.23 or something similar. The first 3 sets of numbers are like an area code (192.168.110 in 192.168.110.23) and is called a subnet and the last set of numbers is like the “phone” number and is the device number (23 in 192.168.110.23). Only devices on the same subnet (having the same numbers in the first 3 groups) can communicate directly with each other. Any device in your network can communicate **directly** to any other device in your network that is in the same subnet, “area code” just like you can call someone directly by only dialing the 7 digit phone number.

If one device needs to communicate with another device that is on a different subnet, then that is similar to you trying to call someone in a different area/country code. You have to enter some additional “routing” information so the call can be routed to the correct number. When a device on a network receives a request to “call” a device in a different subnet, it does not know how to process the request so it will send the request to a Gateway. A Gateway is similar to an old fashioned operator. The Gateway can be any device that has an IP address but on the same subnet as the device sending the request and the Gateway needs to be able to process the routing of the data. The Gateway is usually your home network router or FPP device that is between a controller and the show network. The Gateway only has a small “phonebook” to know how to route the traffic. If the Gateway receives an IP address that it doesn’t know how to process, it will forward that request to the Gateway it has designated in its settings. Sometimes special instructions need to be given to the Gateway in order for the signals to get where they need to go and this is commonly done by establishing what is called a Static Route.

You can set up a Static Route in your computer. When you have set up a static route in your computer and your computer is told to send information to an IP address that is in the Static Route table, it will send the data to the Gateway defined for that static route. By having a Static Route set up in your computer, then only that computer will be able to communicate with the device that you are trying to communicate with unless you set up Static Routes on every computer in your network. Most routers will let you set up Static Routes and that way all computers in the local network will have access to the routing information. In Windows, you can set up the route to be persistent, meaning that it will be permanently stored on the computer. Mac computers do not have the persistent ability, so if you turn off or reboot your computer, you will need to add the Static Route again.

## Universes, Channels and Ports, oh my!

Many people have problems understanding the terminology and usage of channel addressing and ports. The developers are working on a few methods to eliminate the need to understand this but until it gets implemented this should help. A port is just a place to connect

your string of pixels. The controller will usually have several ports and the controller needs to know what data to send to each port. Our lighting networks usually have tens of thousands of channels and there needs to be a way to identify where each pixel is located. In other words, all of your devices (and you) need to know where every pixel is, what model it is on, what controller is sending the data for that model and what port(s) are being used to send the data to the pixel strings.

The animated holiday lighting evolved from DMX data and incorporates its protocol to send data and that protocol is Universes and Channels. By definition a Universe can have any number of Channels in it up to a maximum of 512 channels (you are the one who decides how many channels you want your Universes to address).

You can use Absolute Addressing where each pixel is assigned 3 channels and it is basically just a numbering from 1 to however many channels you need but this can sometimes get confusing and difficult to manage. You can break it down into Universes and Channels to help make it easier to manage.

Think of it this way, your lights are a long string of pixels. Let's correlate the pixels to people. The people have families, some are bigger than others. The families are equivalent to the models in your show. All the families are going to go on a train ride. The train cars only have single file seating so it is one person in front of the other. All the passengers will get a drink while on the train. The drink represents the data sent to your pixels to know what color to create. The travel agent (equivalent to the sequencing software) will create a list of all the passengers and the drink they ordered. The travel agent does not know what size the train cars are going to be so it will just assign the passengers' seating from front to back and assign their drink order to the position in the list. The train Terminal (equivalent to the controller) will coordinate the passenger seating and drink order with the attendants (the attendants are similar to the ports on your controller). The attendants, for whatever reason (union issues maybe? LOL), do not deliver drinks to the same number of people. The Terminal will know what size each train car is going to be for this trip and how many drinks each attendant will serve. The train car comes in different sizes but the biggest one can hold 512 people. The cars correspond to Universes. So to deliver the correct drink to the correct person, the Terminal will give each attendant the drinks they need in the order of the passengers in their section and tell them where to start serving.

For example, a particular trip will have 1578 people. This particular trip will use cars that hold 512 people, but the cars don't always have to be the same size. The Terminal will assign 4 cars for this trip to hold everyone. Attendant 1 can serve 490 drinks, attendant 2 can serve 560 drinks, attendant 3 can serve 520 drinks and attendant 4 can serve 580 drinks. The Terminal will give the attendant 1 490 drinks in order and tell him to start at car 1 seat 1. The terminal will give the attendant 2 560 drinks in order and tell him to start at car 1 seat 491 (he will have enough drinks to serve the last section of the first car, the entire second car and 26 people in the third car). Then give the attendant 3 520 drinks in order and tell them to start at car 3 seat 27 and give attendant 4 8 drinks in order and tell him to start at car 4 seat 35 (you should be able to do the math to see how this worked).

This is very similar in many ways to how Universe/Channel addressing works. When you are setting up your show, YOU decide how big your Universes are as long as they are no bigger than 512 channels. You can have Universes of different sizes (be careful with this as it might cause confusion).

A few things to note:

- There is no direct correlation between ports on a controller and the Universe/Channel addressing. The port just needs to know which Universe and channel to start on and how many pixels it is sending data to just like the attendant doesn't care how many cars are on the train or how many passengers are on the train. They just need to know which car to get on and which seat to start serving drinks to and when he runs out of drinks, he is done.
- The cars can have an arbitrary number assigned to them, the Terminal can have a number printed on the car and call the first car 100 the second car could be number 215 and as long as the attendants know the car number and what seat to start with, it works. Just like your universes don't have to start at number 1 and don't need to go up sequentially.
- The cars can be any size (up to 512) and not all cars have to be the same size. Again, the ports (attendants) only need to know which car to get on and what seat to start serving drinks.
- A port can supply data to part of a Universe or more than one Universe.
- A port doesn't need to start at the beginning of a Universe or even at the beginning of a model, just like an attendant doesn't need to start at the beginning of a car or beginning of a family. But for management purposes there are some times that you might want to start at the beginning of a Universe or a model. The choice is yours.

## **Troubleshooting**

In the FPP Status page, there are several warnings that might come up if the FPP device identifies some abnormal conditions. Some of those messages are:

Multiple Frame Skips During Playback – Likely Slow Network.

This indicates that there is something in your network that is slowing down the data, this is usually due to configuring E1.31/DDP outputs on devices that do not need them configured.

Could not resolve Host Name “some name here” – disabling output.- This usually indicates that your DNS server is not configured correctly. The DNS server address needs to be to a device that can actually process DNS requests. Computers and SBC’s do not normally have a DNS server installed but a home router usually does.

Repeated frames taking more than 20ms to send to Colorlite.- This usually indicates a slow network connection to the Colorlite.

Could not create output type “some output type here” Check Logs for details.

Could not initialize output type “some output type here” Check Logs for details.

FSEQ Data Block not available – Likely slow storage.-This is usually due to using a USB drive for storage or a uSD card that is not a Class 10 or higher rated card.

Could not ping DDP/E1.31 Channel Data Target “some IP address”- This is usually due to a controller not being powered on or not configured correctly when the FPP device is configured to output E1.31/DDP data to it.

Received DDP/E1.31 data from “some IP address”- This is usually due to FPP or xLights configured to send E1.31/DDP data to an FPP device that should not normally receive E1.31/DDP data such as an FPP device set in a Master or Remote mode.

Here are a few of the more common problems and their solution.

Symptom	Possible Causes	Remedy
You can't access the FPP device during the USB Tether installation process.	1. The FPP device doesn't have power.	Make sure that the FPP Device is connected via a USB cable to the computer and the power indicator on the FPP device is illuminated.
	2. (Pi Zeros only) The USB cable is plugged into the wrong port.	The Pi Zero has two USB ports, one is for power only. The correct one is closer to the center of the board and labeled USB and not PWR
	3. The USB cable is faulty.	There are some USB cables that are for charging only. Use another cable that is known to support power and data.
	4. Incorrect IP Address for USB Tethering	When using the USB Tethering method to access your FPP device, you can't use the HostName of the device, you have to use the tethering IP address. If you are using a Windows computer, the IP address is 192.168.7.2 If you are using a Mac or Linux computer, the IP address is 192.168.6.2
	5. The image on the uSD card is corrupt.	Format and Re-image the uSD card following the procedures in the <a href="#">Installing Software section</a>
	6. The uSD card is faulty.	Format and Re-image a known good uSD card following the procedures in the <a href="#">Installing Software section</a>
	7. The FPP device does not support USB Tethering.	USB Tethering is only supported by Raspberry Pi Zeros and BeagleBone devices.
You can't access the FPP device during the Networked installation process.	1. The FPP device doesn't have power	Check that the power is connected and the power LED is lit on the FPP Device.
	2. The Ethernet cable is faulty.	Test your Ethernet cable or use a known good one.
	3. The Ethernet cable is not fully inserted into the RJ45 jacks	Check that the cables are fully inserted at both ends.
	4. The Ethernet cable is plugged into the wrong port on the router.	Make sure that the cable is inserted into a LAN port and not a WAN port on your router.
	5. The pins in the RJ45	Conduct a visual inspection to

	connector are damaged.	make sure the pins are not bent or missing.
6.	You are trying to access the FPP device directly.	You do not access the FPP interface directly; you have to connect through a web browser like Google Chrome.
7.	You are using the wrong Host Name.	The correct Host Name for accessing a fresh install is <a href="http://fpp/">http://fpp/</a> or <a href="http://fpp.local/">http://fpp.local/</a> If you have other FPP devices on your network then the Host Name access might not work. Refer to the next item, DNS not resolving local names.
8.	DNS not resolving local names.	Sometimes a router will not resolve DNS host names (like <a href="http://fpp">http://fpp</a> ) so you have to enter the IP address for the FPP Device. This entails accessing your router and might be a little technical for some.  Log in to your router's administration page (many times the log in information will be on a sticker on the router, if not, look up the default login for your brand router)  Once you log in, there should be a device table or a connected devices section (What it is called depends on the router.)  You should see a device labeled FPP, enter the IP address associated with the FPP device.
9.	The FPP device doesn't have a good network connection.	Look in your available networks on your computer and see if there is an entry for FPP, if so, then the FPP device could not communicate with your network. Check all cables. Another issue is that the network you are connecting to is on a 192.168.7.xxx subnet.
10.	The image on the uSD card is corrupt.	Format and Re-image the uSD card following the procedures in the <a href="#">Installing Software section</a>
11.	The uSD card is faulty.	Format and Re-image a known good uSD card following the procedures in the <a href="#">Installing Software section</a>
You can't access the FPP device during the Wi-Fi Tether installation	1. The FPP device doesn't have power	Check that the power is connected and the power LED is lit on the FPP Device.

process.	2. The FPP device doesn't broadcast the FPP network.	<p>1. The FPP device is connected to a network of some kind. Make sure that you do not have the FPP device connected via Ethernet to any device or USB cable to your computer.</p> <p>2. The FPP Device doesn't have a Wi-Fi adapter. Make sure that your FPP device has a Wi-Fi Adapter</p> <p>3. Your Wi-Fi adapter does not support Wi-Fi tethering. Many USB based Wi-Fi adapters do not support Wi-Fi tethering. (on board Wi-Fi adapters on the Raspberry Pi and BB wireless versions supports Wi-Fi tethering)</p>
	3. The FPP device broadcasts the FPP network but you cannot connect to the FPP network.	Your Wi-Fi adapter does not support Wi-Fi tethering. Many USB based Wi-Fi adapters do not support Wi-Fi tethering. (on board Wi-Fi adapters on the Raspberry Pi and BB wireless versions supports Wi-Fi tethering)
	4. The image on the uSD card is corrupt.	Format and Re-image the uSD card following the procedures in the <a href="#">Installing Software section</a>
	5. The uSD card is faulty.	Format and Re-image a known good uSD card following the procedures in the <a href="#">Installing Software section</a>