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Streaming USB2 and USB3 Cameras with libdc1394 in OS X

Revised 2/2/2017

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Applicable Products

- All FLIR machine vision USB2 and USB3 cameras, excluding Blackfly S USB3

Application Note Description

This application note provides information on how to set up, configure, and stream USB2 and USB3 cameras in Apple's OS X operating system, using open source libdc1394 and libusb libraries. Please note that FLIR does not support libdc1394 and libusb.

Preparing for Use

Before you use your camera, we recommend that you are aware of the following resources available from our [downloads page](#):

- **Getting Started Manual for the camera**—provides information on installing components and software needed to run the camera.
- **Technical Reference for the camera**—provides information on the camera's specifications, features and operations, as well as imaging and acquisition controls.
- **Firmware updates**—ensure you are using the most up-to-date firmware for the camera to take advantage of improvements and fixes.
- **Tech Insights**—[Subscribe](#) to our monthly email updates containing information on new knowledge base articles, new firmware and software releases, and Product Change Notices (PCN).

System Configuration

We have tested the configuration noted in the table below.

Component	Description
MacBook Pro 15"	Model MacBook Pro11,3
CPU	Intel Core i7 2.6 GHz
RAM	8 GB of 1600 MHz DDR3 SDRAM
Operating System	OS X 10.9.5 Mavericks
Software	Libdc1394 v2.2.3 Libusb v1.09
Camera	GS3-U3-60S6M firmware 2.7.3.0 FL3-U3-32S2C firmware 2.7.3.0

System Set-up

The following setup instructions explain how to install libusb and libdc1394 and how to connect a camera to stream on OS X.

Install libusb

These instructions were tested with version 1.09.

1. Download and install the command line tool and the latest version of [Xcode from Mac App Store](#).
2. Use Spotlight to locate Terminal and open Terminal.
3. Install Macport according to the instructions on <https://guide.macports.org/>.
4. Install pkg-config by entering:

```
sudo port install pkg-config
```

5. Install libusb by entering:

```
sudo port install libusb
```

Install libdc1394

These instructions were tested with version 2.2.3.

1. Download libdc1394 from <http://sourceforge.net/projects/libdc1394/files/libdc1394-2/2.2.3/>.
2. Extract the libdc1394 package on the desktop.
3. Open Terminal and navigate to desktop.
4. Enter the following commands:

```
sudo ./configure  
sudo make  
sudo make install
```

Note: At the end of the configuration, a summary of libdc1394 config appears. Verify that IIDC-over-USB support is enabled.



Before streaming images with a USB3 Vision camera, you must make a change to libdc1394's library. To make these changes:

1. Open the application terminal and navigate to the libdc1394 download folder.
2. Open libdc1394 download folder and navigate to dc1394 → usb.
3. Open capture.c.
4. Replace the line:

```
libusb_claim_interface (crawl->thread_handle, 0)
```

with

```
libusb_claim_interface (crawl->thread_handle, 2)
```

This change is needed for cameras using firmware 2.x.x.x and newer, as the interface mapping of EDP1 changes from 0 to 2 in this firmware.

5. Navigate to the libdc1394 download folder and enter the commands:

```
./configure  
sudo make  
sudo make install
```

Connect and Verify the Camera

To connect the camera and verify that it can properly stream:

1. Connect the camera to the Mac.
2. Open libdc1394 download folder and go to the **Examples** directory.
3. Run the Hello world example. This example detects the camera, captures a frame (not saved), and exits.

See the Troubleshooting section if Hello World indicates problems as follows:

- If the Hello World example cannot detect the camera, see [What if libdc cannot find my camera?](#).
- If the Hello World example cannot stream the USB3 camera, check that the camera is running at USB3 speed by following the instructions in [How do I verify that my USB camera is running at USB3 speed?](#).
- If the Hello World example cannot stream the camera and fails at the DC1394_CAPTURE_DEQUEUE function, see [I see "dc1394_capture_dequeue\(...\)" failed to return an image.](#)

Streaming the Camera

To use a USB2 or USB3 camera in OS X, run the default examples found in the libdc1394 → Examples directory.

- grab_gray_image to save a grayscale image.
- grab_color_image to save a color image.

Note: Use a user set/memory channel to save any configured camera settings. For more information on how to use memory channels, see [Using memory channels to configure default start-up settings](#).

Troubleshooting

How do I enable libdc1394 debugging?

Enable libdc1394 by entering the following command:

```
export DC1394_DEBUG=1
```

How do I enable libusb debugging?

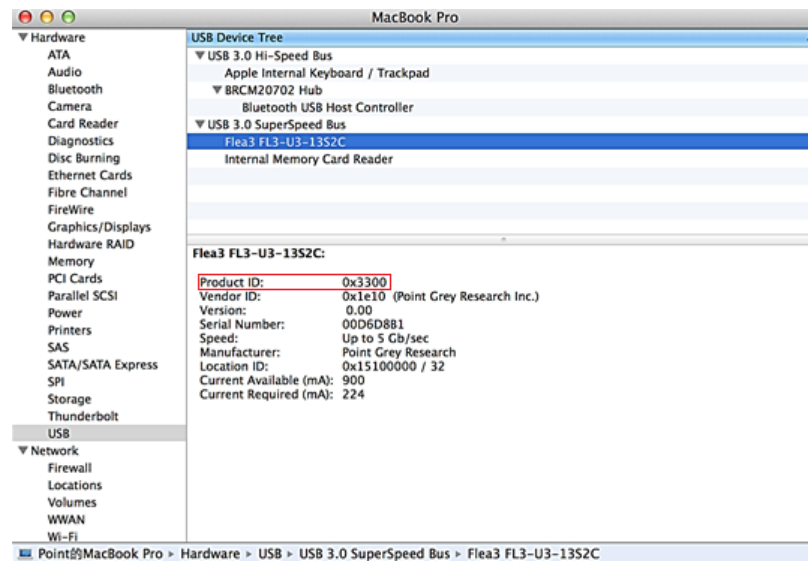
Use Terminal to navigate to the libusb download directory and enter the following commands:

```
./configure --enable-debug-log --prefix="$PWD/usr"  
sudo make  
sudo make install  
export DYLD_LIBRARY_PATH=$PWD/usr/lib
```

What if libdc cannot find my camera?

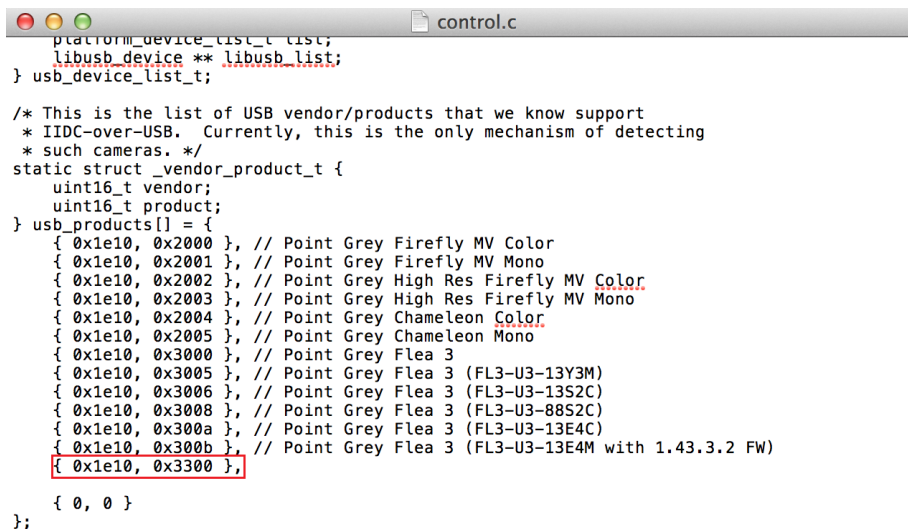
If the camera is not appearing in libdc, it may mean that the product ID is missing. To add the product ID:

1. Go to OS X System Information → Hardware → USB → USB Device Tree.
2. Select the camera and note the Product ID and Vendor ID.
 - An example of a Product ID is 0x3300.
 - The Point Grey Vendor ID is 0x1e10.



3. Go to the libdc1394 download folder.
4. Navigate to dc1394 → usb.
5. Open control.c and search for usb_products.
6. Enter the Vendor ID and Product ID as shown in the following example:

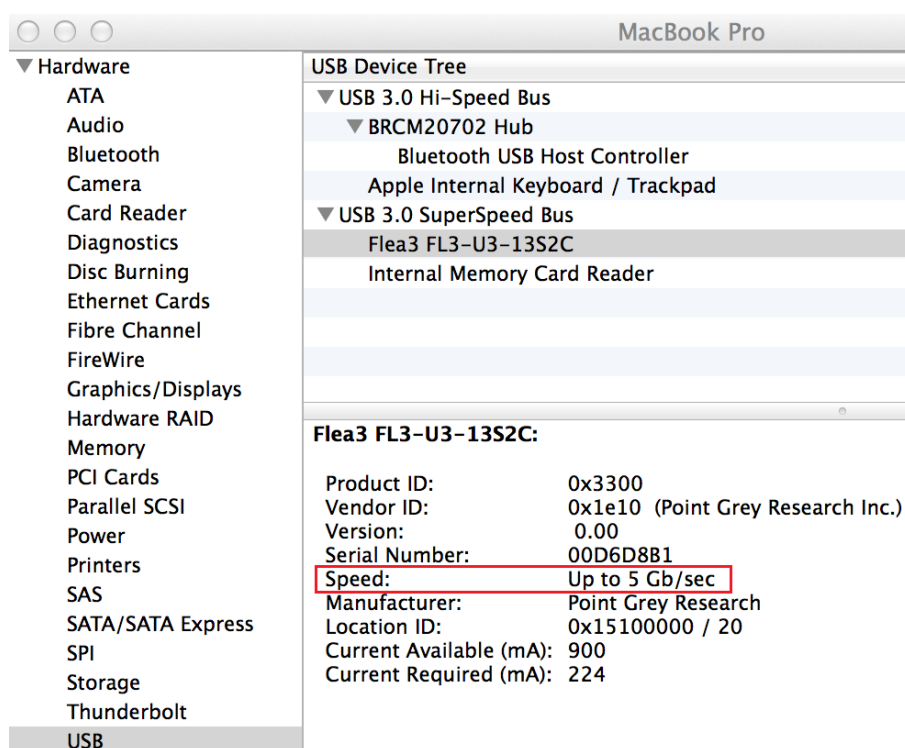
```
{ 0x1e10, 0x3300 },
```



How do I verify that my USB camera is running at USB3 speed?

To verify that the camera is running at USB3 speed:

1. Connect the camera to the computer.
2. Open the System Information application.
3. Check the running speed in the window as shown in the screenshot to determine that the camera is running at the correct speed.
 - Up to 480 Mb/s indicates that the camera is running at USB2 speed.
 - Up to 5 Gb/sec indicates that the camera is running at USB3 speed.



If your USB3 camera is running at USB2 speed, verify that you are using the recommended USB3 cable and host controller card. [TAN2011005 Recommended USB 3.1 System Components](#) offers additional details and suggestions.

The camera's firmware may need to be updated to USB3. See [KB 10312 Determining the firmware version used by my camera](#) for information on how to find out what firmware version your camera is using. To update the firmware, follow the instructions below.

How do I update my camera firmware to USB3?

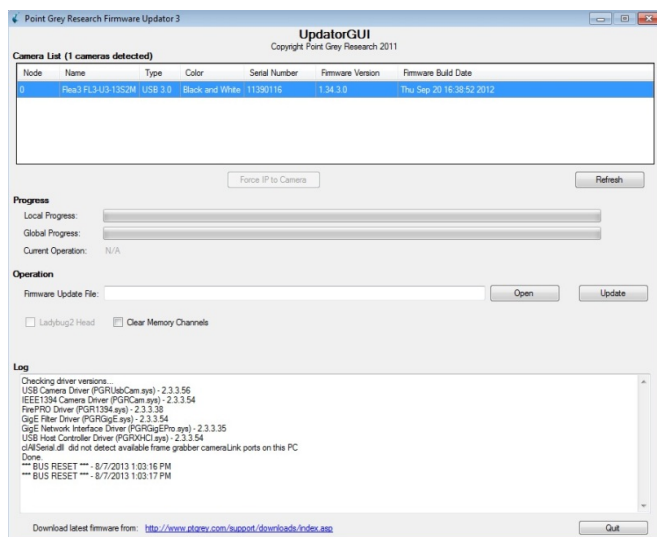
Note: Camera firmware that supports USB3 Vision has USB3 Vision Firmware in the title of the download link.

You can update your USB 3.1 camera firmware in Windows or Linux.

To update:

1. Download the latest FlyCapture2 SDK from our [Downloads](#) page.
2. Download the latest [USB3 Vision firmware](#).
3. Connect your camera to the computer and ensure it has powered up.
4. Open the UpdatorGUI utility that was installed with FlyCapture2 SDK.

Start menu→All Programs→Point Grey FlyCapture2 SDK→Utilities→UpdatorGUI3



5. Select the camera from the Camera List.
6. Click Open to select the firmware file.
7. Click Update to begin the update process. Do NOT disconnect the camera until the update is complete.

I see “dc1394_capture_dequeue(...)” failed to return an image

This is due to how libdc1394 and libusb handles buffer sizes. It’s a known issue with libdc1394 on OS X and Linux. To resolve this error, use either FlyCapture2 or libdc1394 to increase or decrease the image resolution by one or two pixels.



Downloads and Support

FLIR endeavors to provide the highest level of technical support possible to our customers. Most support resources can be accessed through the [Support](#) section of our website.

The first step in accessing our technical support resources is to obtain a Customer Login Account. This requires a valid name and email address. To apply for a Customer Login Account go to our [Downloads](#) page.

Customers with a Customer Login Account can access the latest **software** and **firmware** for their cameras from our website. We encourage our customers to keep their software and firmware up-to-date by downloading and installing the latest versions.

Finding Information

FlyCapture SDK—The FlyCapture SDK provides API examples and the FlyCap camera evaluation application. Available from our [Downloads](#) page.

API Documentation—The installation of the FlyCapture SDK comes with API references for C++, C#, and C code. Available from Start Menu→All Programs→Point Grey FlyCapture2 SDK→Documentation

Product Documentation—The camera's *Getting Started Manual* provides information on installing components and software needed to run the camera. The *Technical Reference* provides information on the camera's specifications, features and operations, as well as imaging and acquisition controls. They are available from the [Downloads](#) page.

Knowledge Base—A database of articles and application notes with answers to common questions as well as articles and tutorials about hardware and software systems. Available from our [Knowledge Base](#).

Learning Center—Our [Learning Center](#) contains links to many resources including videos, case studies, popular topics, other application notes, and information on sensor technology.

Contacting Technical Support

Before contacting Technical Support, have you:

1. Read the product documentation?
2. Searched the Knowledge Base?
3. Downloaded and installed the latest version of software and/or firmware?

If you have done all the above and still can't find an answer to your question, contact our [Technical Support](#) team.