

Stream<sup>TM</sup>

# Integrator's User Manual

Point-of-View Video Built for Action

Stream User Manual, v1\_0, 11/6/2013

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## Contents

What's In the Box? .....	5
Get Ready.....	7
Set up the STREAM with a USB End Cap .....	7
Set up the STREAM with a Battery end cap and mount .....	8
Download and Install a supported video player .....	10
Setup your PC or Mac to talk to the USB interface on the Stream .....	11
Connecting to your camera over Wi-Fi (802.11 b/g/n).....	25
Connect to the Stream using the Android Phone Application .....	27
Integrator HTML Web Page .....	32
Set the System Time and Date.....	32
Using the STREAM.....	33
Stream buttons .....	33
Operating modes .....	34
File names on the STREAM .....	35
LED's.....	36
Record video .....	36
Record still photos or capturing MJPEG's .....	37
Uploading video clips and still photos to a computer .....	38
Delete video clips and still photos from the recorder .....	40
Remote Control of the Stream.....	40
Update the firmware on the STREAM.....	41
Settings.....	43
Adjusting settings.....	43
Settings Summary .....	43
Tips and guidelines for getting the most out of your STREAM .....	59
Choosing a video format .....	59
Understanding the STREAM Video Record Modes .....	60
Choosing a Record Mode .....	63
Optimizing video quality .....	63
Micro SDHC card choices .....	65
Overlay.....	66
Camera Access .....	67
Battery Choices .....	67
Troubleshooting.....	67
USB device not recognized .....	67
RNDIS driver not found .....	68
Streaming issues .....	68
Recording issues .....	68
Streaming delays.....	68
Access point connection issues.....	68
Wi-Fi Client Mode connection issues.....	68
Power Loss .....	68
Compliance, Warranty, and Support .....	69
FCC Compliance .....	69
Limited Warranty and Disclaimer .....	69

Return Policy .....	69
Return Merchandise Authorization .....	70
Obtaining Service and Technical Assistance .....	70
Contact us by phone at: 888.579.CAMS (2267) .....	70

# STREAM

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## Shoot, Tag, Edit, Share

The STREAM makes it easy to shoot great HD video, tag interesting shots while you're recording, edit videos while in the field, and share your videos.

Everything inside the STREAM has been designed to capture the highest quality HD video, and the durability of the Stream enclosures allows you to capture video just about anywhere you care to go. Dust, snow, water spray, shock, and vibration pose no threat to the state-of-the-art optics and electronics inside.

The modular system design allows you to mount the Stream almost anywhere—helmet, shoulder strap, roll cage, ski tip, power boat windshield, firearm, you name it, and a POV camera has probably been there.

## What's In the Box?

The STREAM you are integrating contains everything you need for your customers to take high quality HD video. The STREAM is built on a modular design that allows you maximum flexibility in how you mount, which in turn makes it possible for you to optimize the video you capture for your intended purpose. The STREAM doesn't dictate how you use it. You decide.



### **Wide Angle HD Lens**

The imaging system can capture video at 1080p and 720p at up to 60 frames per second. A six element all glass lens provides a field of view up to 142° for 1080p video. Everything is encased in a rugged, magnesium body and bezel that are sealed against dust and moisture. The lens is protected against contamination by a sealed glass shield.

### **STREAM Recording**

The STREAM controls recording, supports advanced image enhancement and exposure controls, and provides application programming interface (API) for adjusting a wide range of system parameters. The Stream is enclosed in a sealed enclosure that protects it from impact and vibration that would prove deadly to other systems. The Stream is rated at IP67 for protection against dust and moisture.

### **Power and Output Flexibility**

One of the features of the STREAM that gives great flexibility for integration is the end cap interface. This interface allows the stream to have multiple end caps which can be used for a variety of setups. The USB end cap provides a USB cable connection that can be used for power only or power, control, and streaming. The battery pack end cap provides a more mobile solution for power and can use the 802.11 interface for control and video streaming. Integrators may also want to explore custom end caps or lenses for the Stream.



### **Communication and Output Options**

The STREAM can be controlled through the following interfaces:



- Android or IOS phone using a free application to communicate with the 802.11 interface
- PC or Mac to USB interface using an HTML application you create or our integrator HTML interface page
- PC or Mac to 802.11 interface using an HTML application you create or our integrator HTML interface page
- Integrator's computer/product to USB or 802.11 interfaces to the Stream using the integrator's application.

### ***Mounting Systems***

One of the most powerful it where you want it to be. Our because they have always had flexibility. We have many existing work through difficult mounting integration needs.



features of the STREAM is that you can mount cameras created the POV video market rock solid mounts with extreme mounting mount options for the Stream, and can help situations as needed for your special

## Get Ready

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The STREAM is shipped with everything you need to start making great videos in HD, but a bit of assembly is required before you get started.

### Set up the STREAM with a USB End Cap

1. Remove the end cap from the Stream and install the Micro SDHC card included with the STREAM.
  - Squeeze the two latches on the Stream end cap and remove the end cap.
  - Insert the Micro SDHC card into the card slot (as shown below), until the card clicks into place. The Micro SDHC card label will face upward when it is inserted correctly.
  - Note that the Micro SDHC card has a notch on the right hand side when the label is facing up. If you insert the Micro SDHC card upside down, this feature will prevent the card from being fully inserted. **DO NOT** use unnecessary force to put the card into the slot. If it will not go all the way into the slot, remove the card and make certain the label is visible and the notch is to the right.
  - To remove the Micro SDHC card when it is latched, push and release the back edge of the card slightly and it will unlatch and project out a short distance. It can then be pulled out. There is a ridge at the top of the back end of the card or a small notch on the outer edge of the right side of the Micro SDHC card that may help you to remove the card after it is unlatched.

**Note:** The STREAM can use Micro SDHC cards from 4GB up to 32 GB maximum. Work with your sales representative to determine the correct size for your integration needs.



2. Replace the end cap onto the STREAM.
  - Squeeze the two latches on the USB end cap.
  - Insert the end cap into the back end of the Stream as shown below and release the latches.
  - Ensure that the latches are firmly seated into the latch holes to ensure IP67 protection



**Set up the STREAM with a Battery end cap and mount**



1. Remove the end cap from the Stream and install the Micro SDHC card included with the STREAM.
  - Squeeze the two latches on the Stream end cap and remove the end cap.
  - Insert the Micro SDHC card into the card slot (as shown below), until the card clicks into place. The Micro SDHC card label will face upward when it is inserted correctly.





- Note that the Micro SDHC card has a notch on the right hand side when the label is facing up. If you insert the Micro SDHC card upside down, this feature will prevent the card from being fully inserted. **DO NOT** use unnecessary force to put the card into the slot. If it will not go all the way into the slot, remove the card and make certain the label is visible and the notch is to the right.
- To remove the Micro SDHC card when it is latched, push the back edge of the card slightly and it will unlatch and project out a short distance. It can then be pulled out. There is a ridge at the top of the back end of the card or a small notch on the outer edge of the label side of the Micro SDHC card that may help you to remove the card after it is unlatched.

**Note:** The STREAM can use Micro SDHC cards from 4GB up to 32 GB maximum. Work with your sales representative to determine the correct size for your integration needs.



2. Ensure that the NP-120 Battery is charged



3. Install the NP-120 battery included with the STREAM into the battery mount.
  - Squeeze the two latches on the battery end cap. See pictures below.
  - Remove the cover and install the battery.  
Because of the seal, the hatch may stick slightly. This is normal. Excessive force is not required. Check to see that the latches are unlatched if it feels too tight.



- Replace the cover, and ensure the latches are back into place.

### **Download and Install a supported video player**

The Stream has been tested with several video players for streaming. Two of these are VLC and KM Player. Below are instructions for installing these two players. Both are free video players. Any video player supporting RTSP should work with the Stream for streaming and any video player supporting .mov or .mp4 video files with H.264 video and AAC audio codec support should work for video playback. We have used the Stream mainly with these players so your mileage may vary. Examples are given using VLC or KM Player. You will need to download and install a video player to work with your Stream.



#### **VLC**

Download and install VLC for Windows users: <http://www.videolan.org/vlc/index.html>

Download and install VLC for the Mac: <http://www.videolan.org/vlc/download-macosx.html>

#### **KM Player**

Download and install KM Player from:  
<http://www.kmpmedia.net>

## Setup your PC or Mac to talk to the USB interface on the Stream

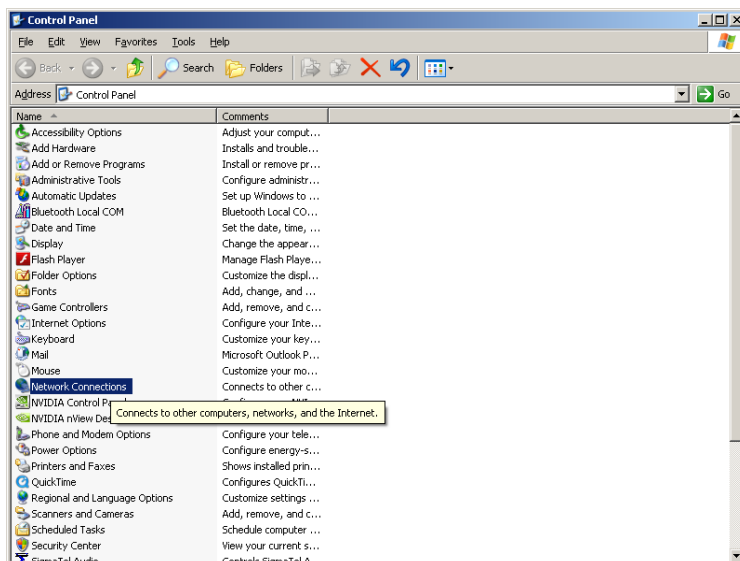
Setup for the Stream will be different for each Operating System. Please follow the directions below for your Operating System.

### WINDOWS XP Setup for USB access

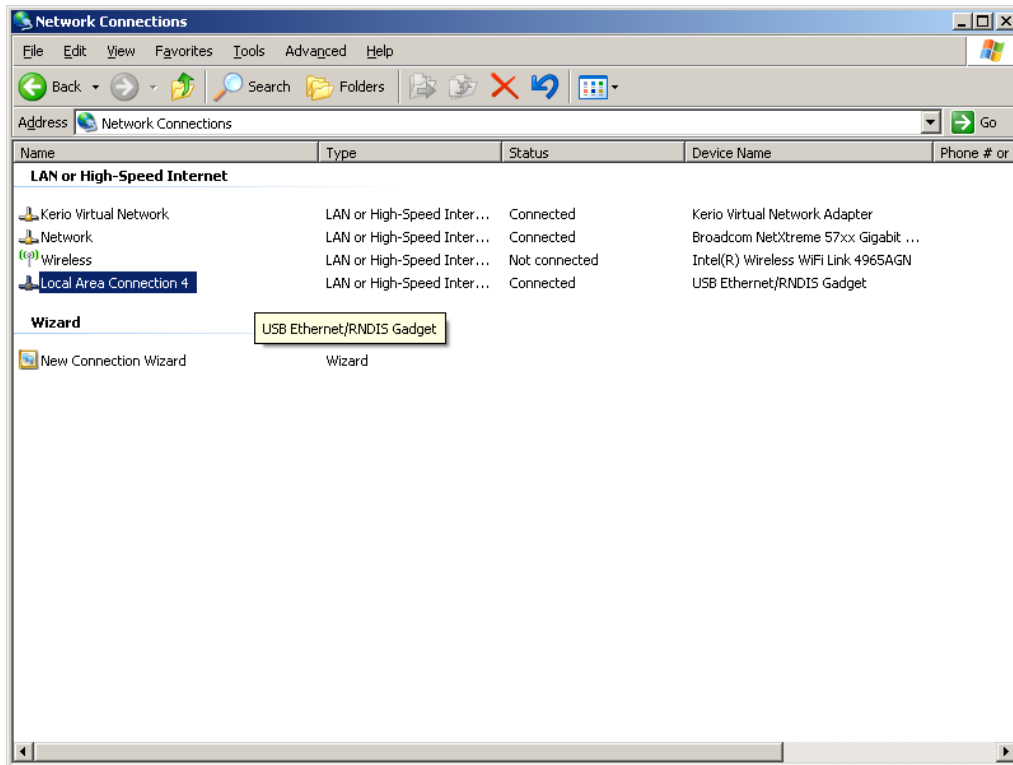
1. Plug in the USB cable from the Stream to your Windows XP computer. Push the power button on the Stream for less than 1 second and release. Wait approximately 25 seconds. Your computer should indicate that New Hardware is detected. It may ask for permission to upgrade your RNDIS driver, and if so, confirm/select 'Yes' or 'OK' to allow this to happen. If new hardware is not detected, or an RNDIS driver cannot be found, please see the section for Troubleshooting.



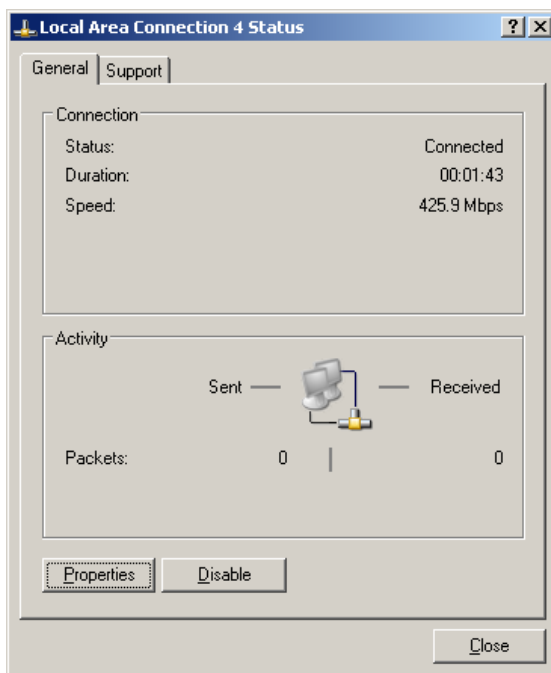
2. Go to the Start menu -> Settings -> Control Panel
3. Select 'Network Connections' by double-clicking the item highlighted in blue below:



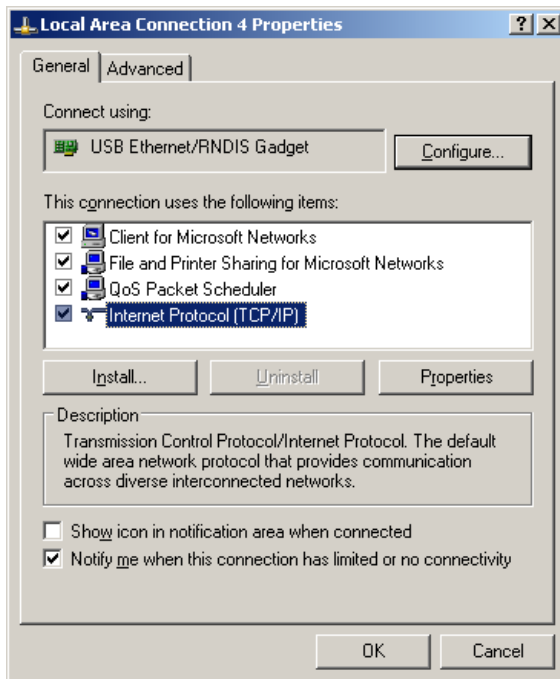
- Double click the 'Local Area Connection' option highlighted in blue in the Network Connections box below:



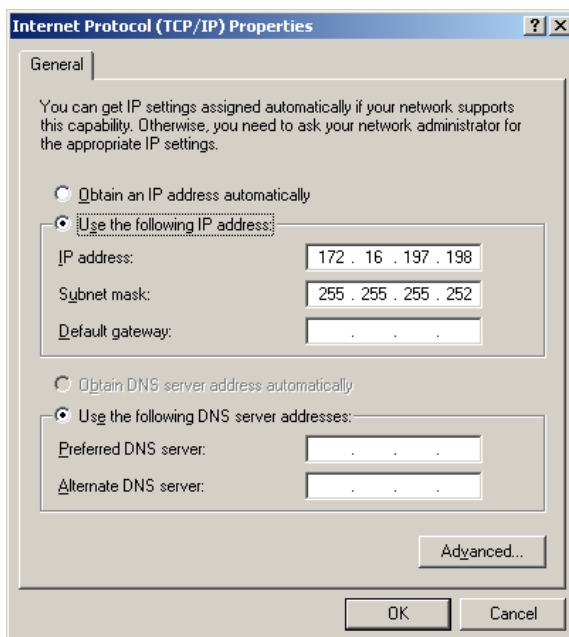
- In the Local Area Connection Status box, select the 'Properties button' as shown below and click the button:



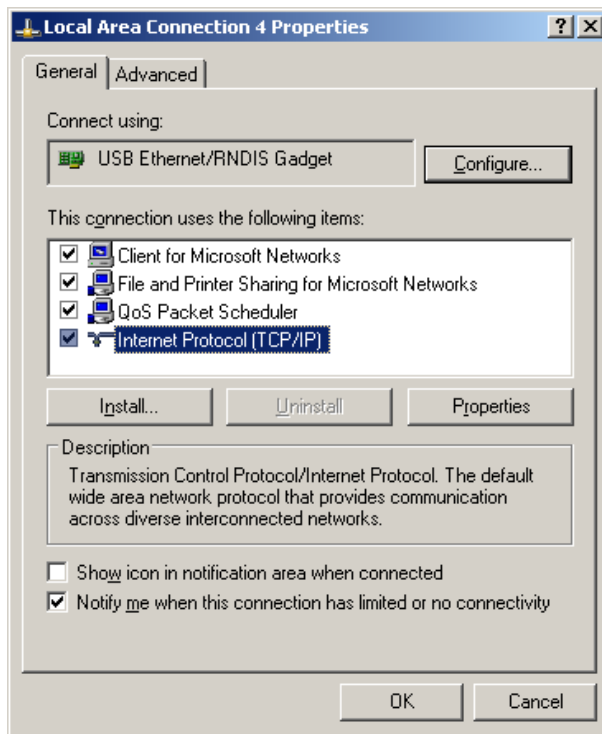
6. Select the Internet Protocol TCP/IP item highlighted in Blue, then select and click the 'Properties' button




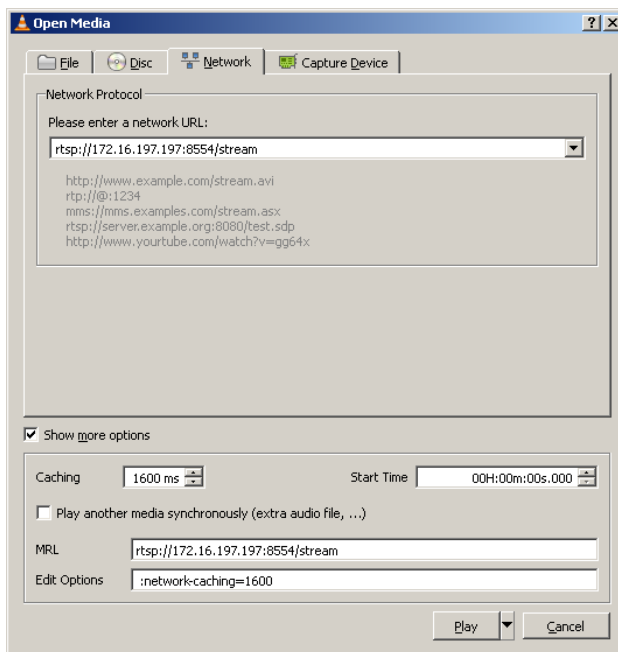
7. In the Internet Protocol Properties box, select the 'Use the following IP Address' option and input the IP address and subnet mask shown below, then select OK.



8. On the Local Area Connection Properties box, Select the 'OK' button.

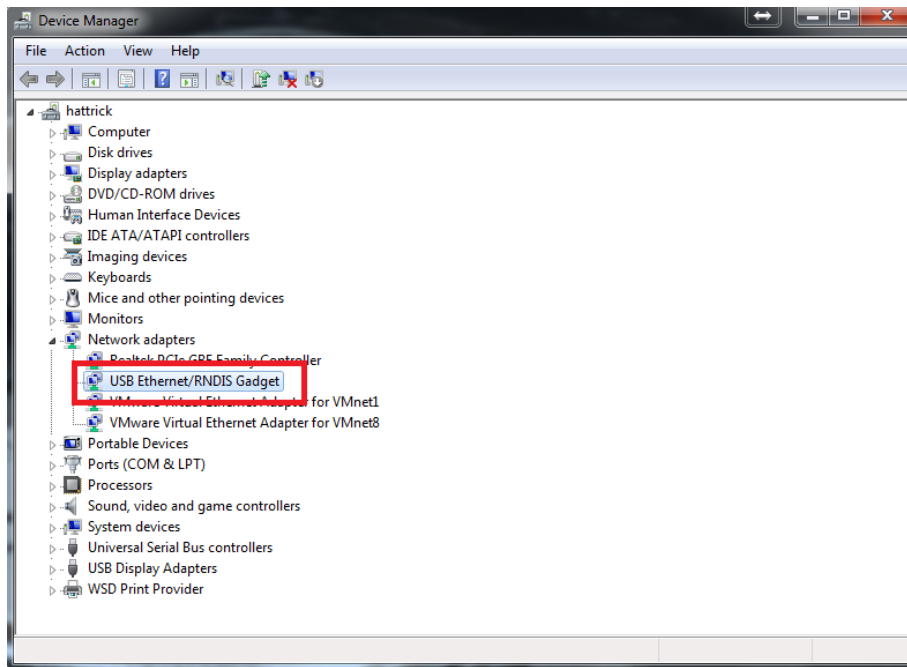


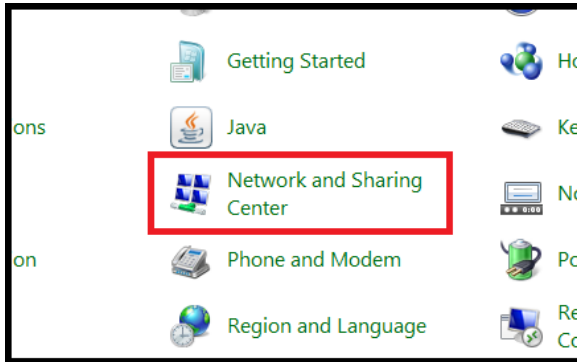
9.  Open VLC and select Open network stream and type in: `rtsp://172.16.197.197:8554/stream` and click play. If you are having trouble viewing the stream, you may need to increase the cache size by clicking the “show more options” check box and increasing the cache to a larger size.



### **WINDOWS VISTA Setup**

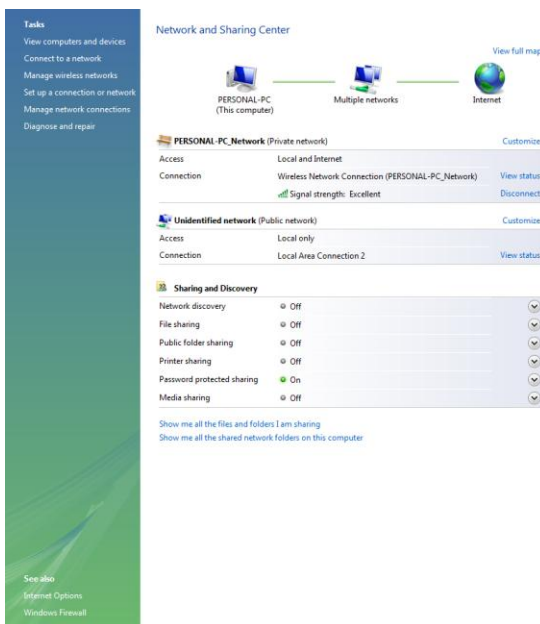
1. Push the power button on the Stream for less than 1 second and release. Wait approximately 25 seconds, and then you will see a new network adapter in your device manager. To see the device manager:
  - Go to control panel
  - Open Device Manager from control panel
  - Look for this device in the Network adapters:





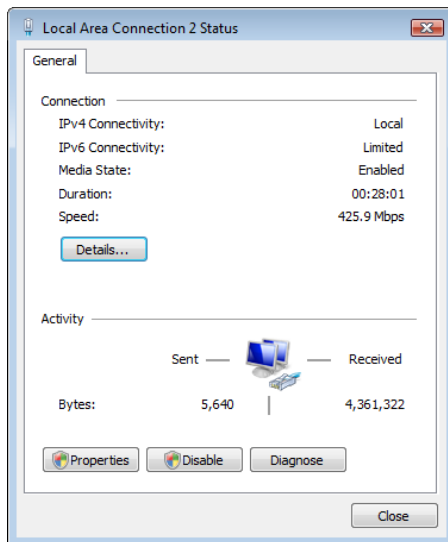
2. You will need to change your IP address on the new network adapter so you're on the same network. Open "Networking and Sharing Center" in the control panel

3. Select the "View status" option for the unidentified network connection

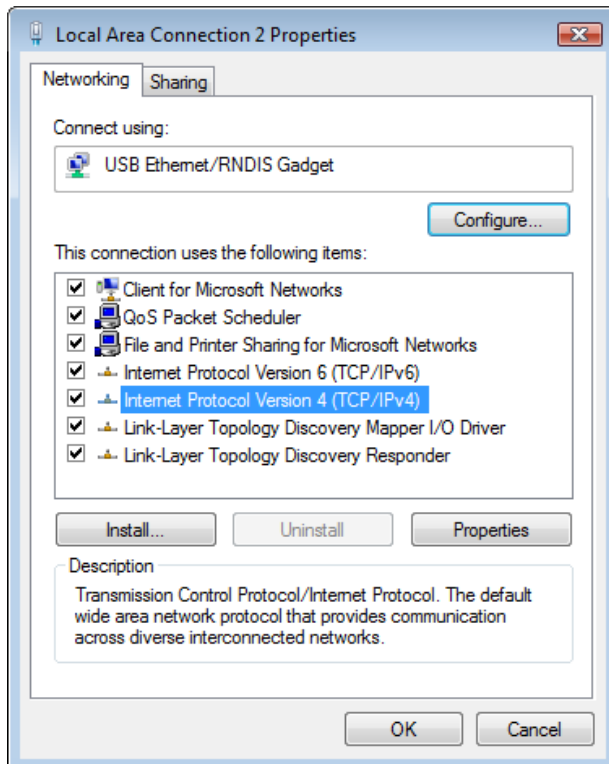




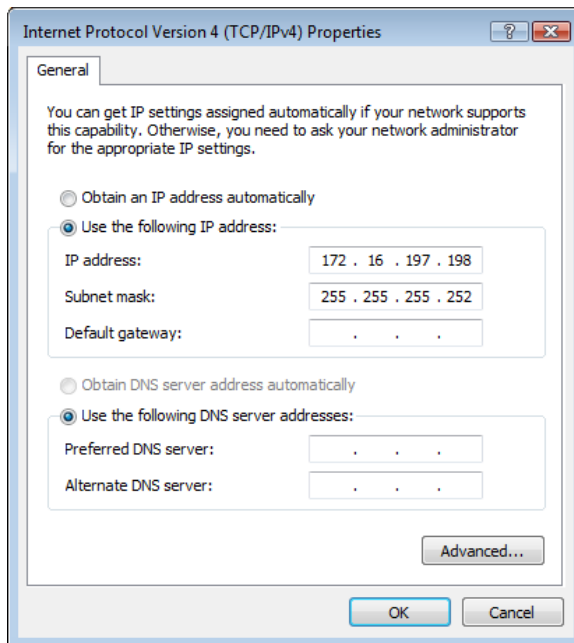
4. Select the “Properties” button on the Local Area Connection Window



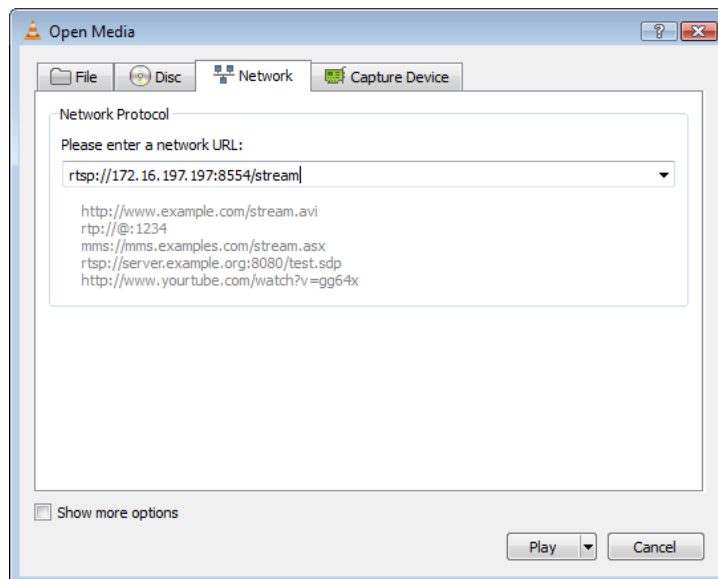
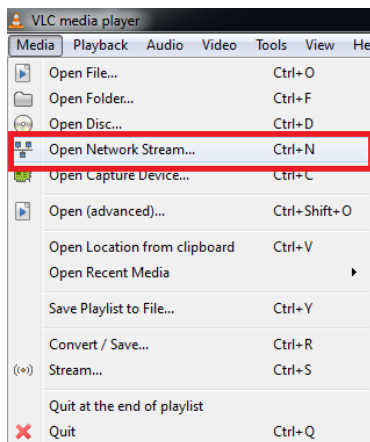
5. Select the “Internet Protocol Version 4(TCP/IPv4) and then select the properties button to change.



6. Make the next screen match what is shown below:

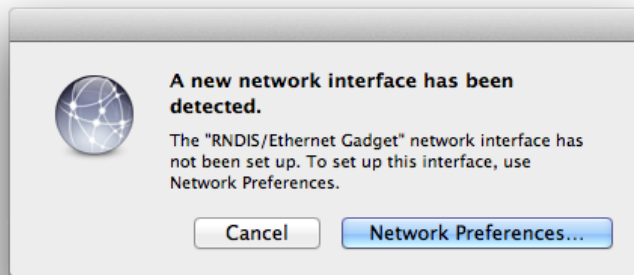


10. Open VLC and select Open network stream and type in:  
rtsp://172.16.197.197:8554/stream and click play.

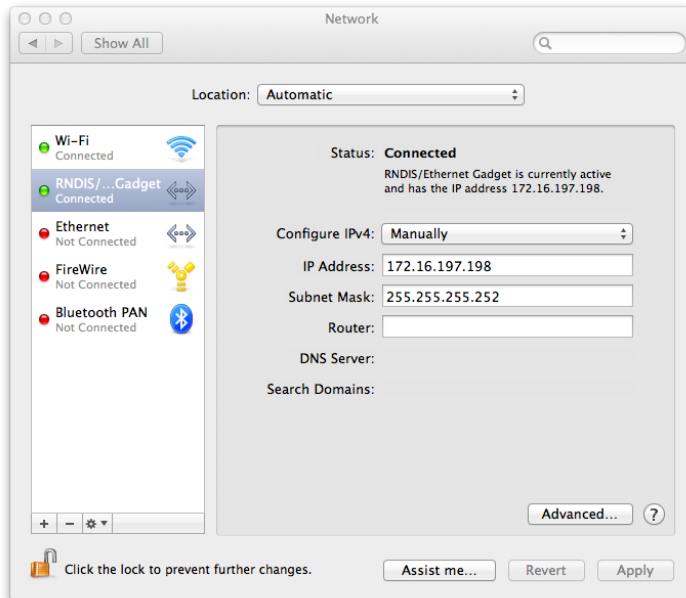



## MAC OS X Setup

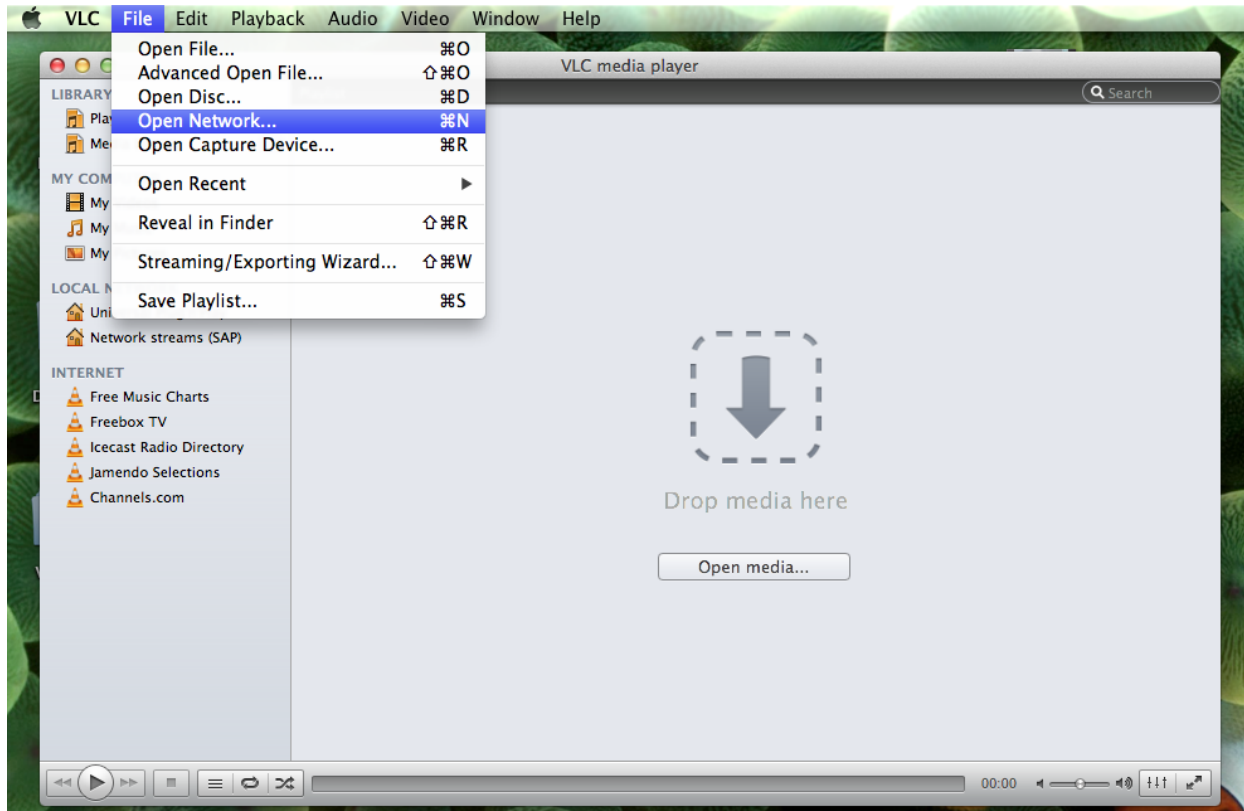
1. Plug in the Stream. Push the button on for less than 1 second and release. Wait approximately 25 seconds. Your computer should indicate that New Hardware is detected. It may ask for permission to upgrade your RNDIS driver, and if so, confirm/select 'Yes' or 'OK' to allow this to happen. If not, it will direct you to set up your network preferences. Select the Network Preferences button as shown below.



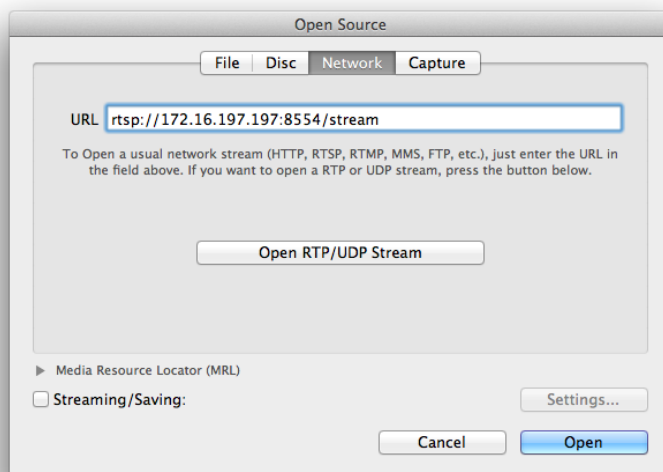
2. Change your settings to match the RNDIS configuration shown below. You may need to put in your admin password to make this change. This can be done by clicking the lock in the lower left corner, and using your password to unlock the lock. Once the change is complete, select the apply button, then relock the lock if necessary.



3.  Open VLC and select File->Open network.



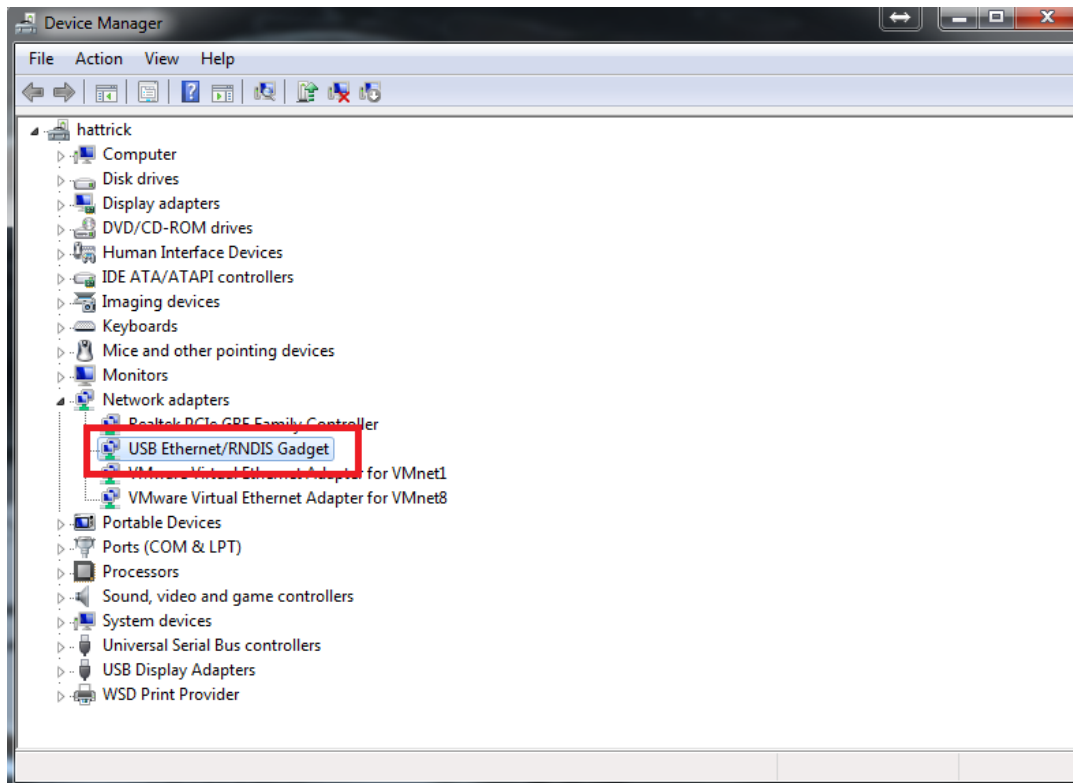
4. Type in: `rtsp://172.16.197.197:8554/stream` and click Open in the lower right corner.



## WINDOWS 7

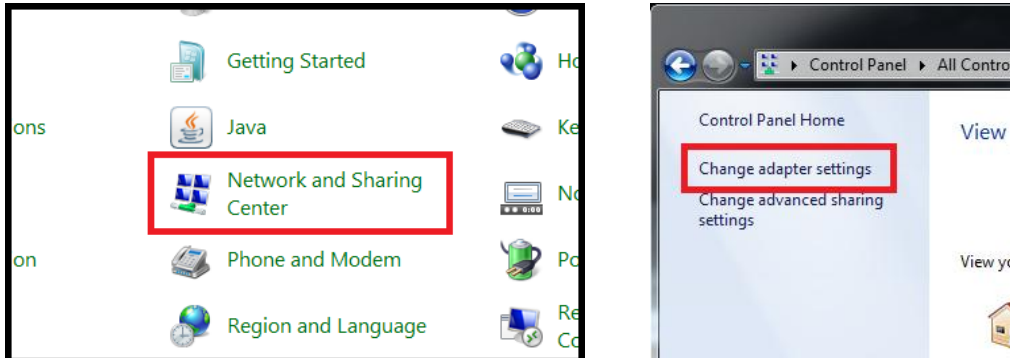
7. Push the power button on the Stream for less than 1 second and release. Wait approximately 25 seconds, and then you will see a new network adapter in your device manager. To see the device manager:

- Go to control panel
- Open Device Manager from control panel
- Look for this device in the Network adapters:

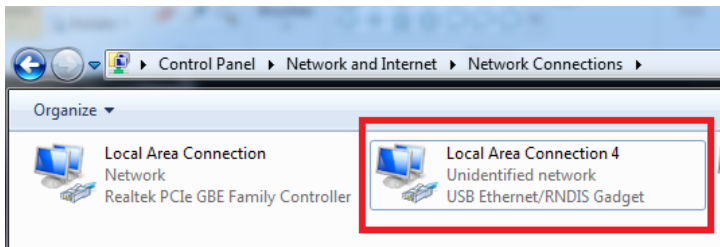


8. You will need to change your IP address on the new network adapter so you're on the same network.

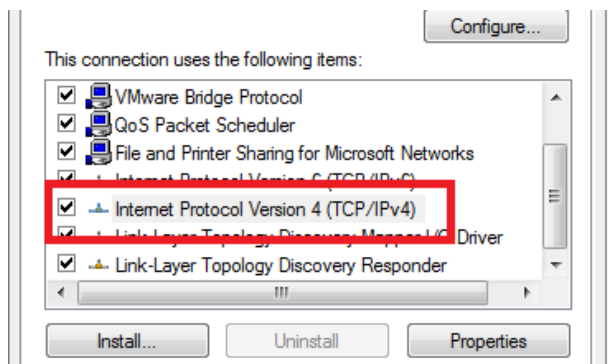
-Open "Networking and Sharing Center" in the control panel, then select "Change adapter settings":



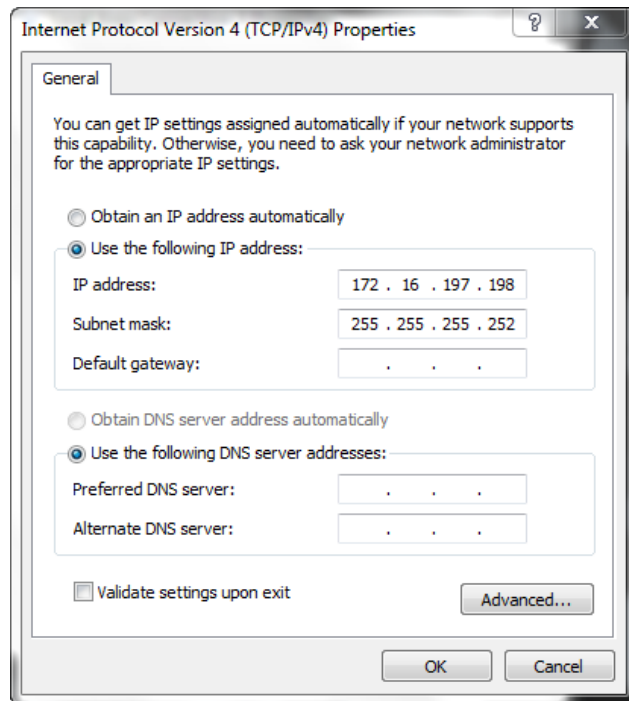
-Find the "USB Ethernet/RNDIS Gadget" and right click to select "Properties"



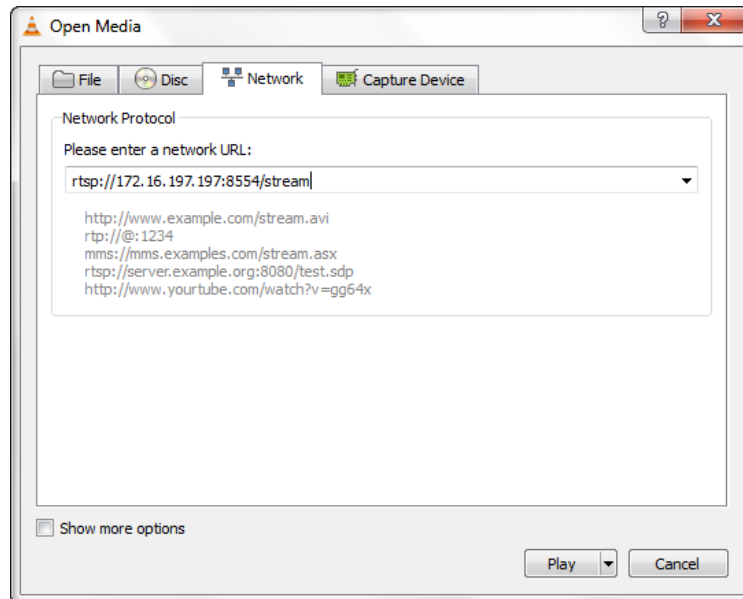
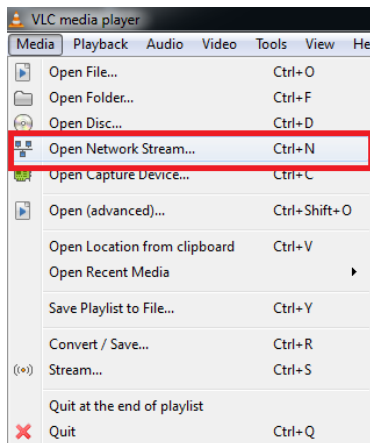
-Find the "Internet Protocol Version 4(TCP/IPv4)" and double click to change.



Make the next screen match what is shown below:



11. Open VLC and select Open network stream and type in:  
rtsp://172.16.197.197:8554/stream and click play.



## LINUX Setup

1. Prerequisite: You must have a computer running a version of Linux with the USBnet driver loaded and with support for RNDIS compiled into it. Most modern versions of Linux meet this requirement.
2. Turn on the camera and plug it into a USB port.
3. Get a terminal open as root.
4. Run `ifconfig -a` and locate a USB Ethernet adapter.

```
[root@localhost Desktop]# ifconfig -a
eth0      Link encap:Ethernet  HWaddr 00:1C:42:C8:AA:BD
          inet addr:10.211.55.6  Bcast:10.211.55.255  Mask:255.255.255.0
          inet6 addr: fdb2:2c26:f4e4:0:21c:42ff:fec8:aabd/64 Scope:Global
          inet6 addr: fe80::21c:42ff:fec8:aabd/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:4100 errors:0 dropped:0 overruns:0 frame:0
          TX packets:2555 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:5728029 (5.4 MiB)  TX bytes:148997 (145.5 KiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:46 errors:0 dropped:0 overruns:0 frame:0
          TX packets:46 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:4880 (4.7 KiB)  TX bytes:4880 (4.7 KiB)

usb0      Link encap:Ethernet  HWaddr AE:BE:24:BE:CB:F9
          inet6 addr: fe80::acbe:24ff:febe:cbf9/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:9 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 b)  TX bytes:1494 (1.4 KiB)
```

5. Assign an IP address and netmask to the USB Ethernet adapter identified in the previous step.

```
[root@localhost Desktop]# ifconfig usb0 172.16.197.198 netmask 255.255.255.252
```

6. You can now ping the camera at 172.16.197.197, use a web browser (e.g. Firefox) to get to the HTML administration page at <http://172.16.197.197>, and use a video player (e.g. VLC) to access the RTSP stream at <rtsp://172.16.197.197:8554/stream>



## Connecting to your camera over Wi-Fi (802.11 b/g/n)

### Access point

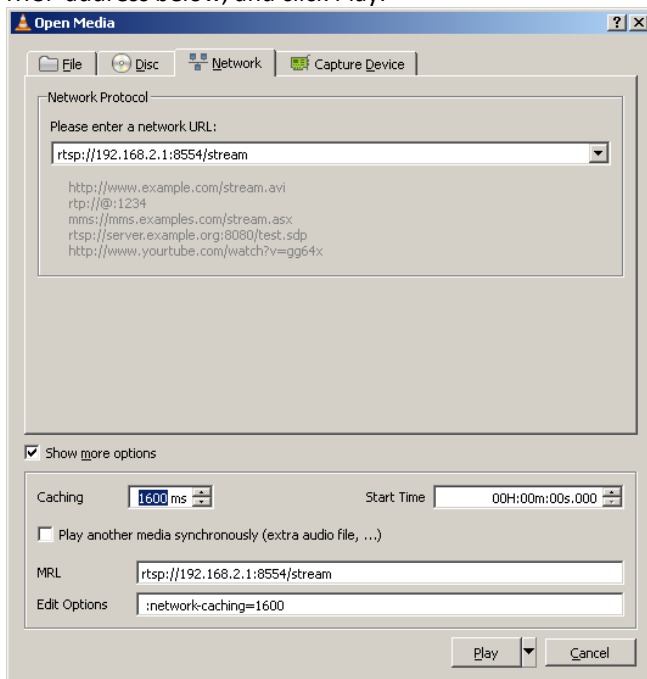
Connecting to the Stream in Access point mode means that the camera controls the Wi-Fi connection. This connection is used solely for the purpose of camera communication, control, and streaming, and does not connect the user to the Internet.

The Stream default settings automatically start the camera as an Access Point. Connecting to the Stream in this mode should be as simple as enabling the wireless network on your PC, Mac, phone or other device, finding the Stream in the Wireless Network options, selecting the stream and asking for a connection (SSID = Stream\_xxxxxxxxx where xxxxxxxxxx = the serial number, password=extremetech). Once the default password has been entered, the PC or Mac should attempt to make a connection to the Stream. Once this has been completed, you may now access the stream through the Web Programmable HTTP/XML interface in a web browser command line, integrators HTML page, or application, or you may use a video player that supports RTSP to stream video. To do this, you will want to do the following:

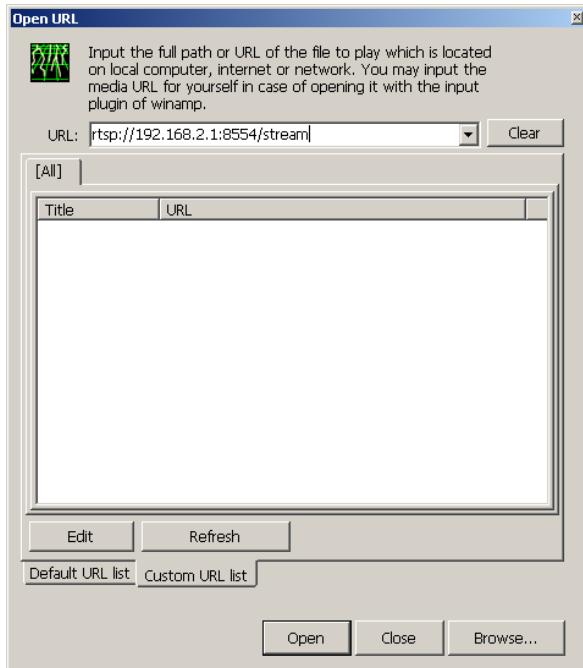
1. Open your player
2. Determine how to do RTSP Streaming on your chosen video player. For many players, this is done using the Media, File or Open menu and doing a Media->Open Network Stream, Open-> URL or Open->Network.

This may vary with different OS's and versions of the player.

For VLC (Two Flower) on Windows XP, it is Media->Open Network Stream. You will then want to enter the RTSP address below, and click Play.



For KM Player, after opening your player, you will want to right click your mouse over the player, select Open, and then move to the right and select Open URL. Then enter the same URL as above (rtsp://192.168.2.1:8554/stream), and click the open button at the bottom of the window – see the example below:



The Web Programmable HTTP/XML interface may be used to select a new SSID and/or password, though once this is completed, the connection may be lost, and so it is recommended to make changes to the wireless settings through the USB end cap.

There are several commands in the Web Programmable HTTP/XML interface that allow control of the access point interface (auto-enable, SSID, password, channel, encryption type, ip address). More information can be found on these in the Settings section or the Integrators API guide.

### **Client mode**

To operate in Client mode, some settings must first be changed in the Wi-Fi setup. The default settings are for Access point mode. Using the Web Programmable HTTP/XML interface, modify the SSID and password for the network you wish and enable the Wi-Fi Client mode.

An example command set may look like this:

1. Scan : <http://172.16.197.197/api/wificlient/scan>
2. Setup SSID : [http://172.16.197.197/api/wificlient/ssid=YOUR\\_NETWORK](http://172.16.197.197/api/wificlient/ssid=YOUR_NETWORK)
3. Setup password: [http://172.16.197.197/api/wificlient/password=YOUR\\_PASSWORD](http://172.16.197.197/api/wificlient/password=YOUR_PASSWORD)
4. Setup encoder type: [http://172.16.197.197/api/wificlient/enctype=YOUR\\_WIFI\\_ENCODER\\_TYPE](http://172.16.197.197/api/wificlient/enctype=YOUR_WIFI_ENCODER_TYPE)
5. Setup Auto Connect: <http://172.16.197.197/api/wificlient/autorun=1>
6. Save Settings: <http://172.16.197.197/api/system/settings/save>
7. Connect: <http://172.16.197.197/api/wificlient/connect>
8. Check Status until you see connected: <http://172.16.197.197/api/wificlient/status>
9. Force IP refresh: <http://172.16.197.197/api/wificlient/iprefresh>
10. Extract Wifi IP address: <http://172.16.197.197/api/wificlient/ipaddress>
11. Use wifi IP on your browser to access API: <http://<insert IP ADDRESS>> (e.g. <http://192.168.2.1>)
12. To access the stream over wifi, use your viewer to connect to <rtsp://ip address:8554/stream>

Prior to streaming over wifi, you should make sure that your pipeline is set up in a way to support low data rate streaming (i.e. 400 kbps, 200kbps).

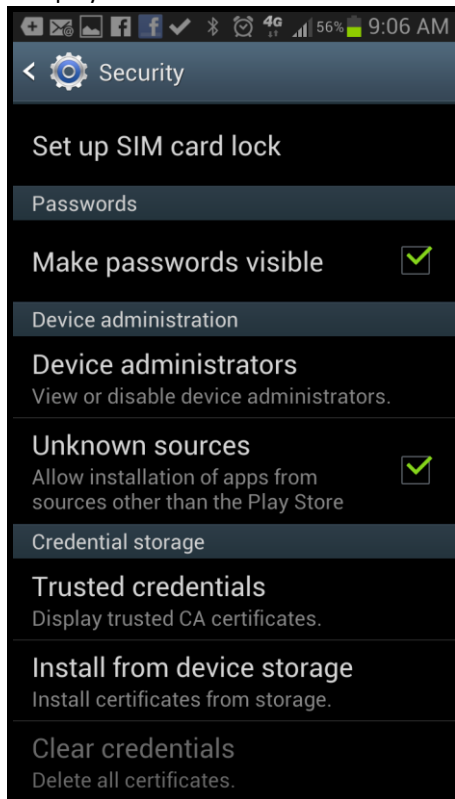
### **Connect to the Stream using the Android Phone Application**

At this time, the Stream has a sample Android application to assist in camera evaluation and to provide a baseline application to integrators who wish to create phone applications. The sample application for the V.I.O. Stream is available by sending a request sent to [customer.care@vio-pov.com](mailto:customer.care@vio-pov.com). At this time support is limited to Android 4.0 or higher.

To connect to the Stream using the Android phone application, you will need to install the application onto your phone. Once this is complete, you will need to set up your phone and start the application.

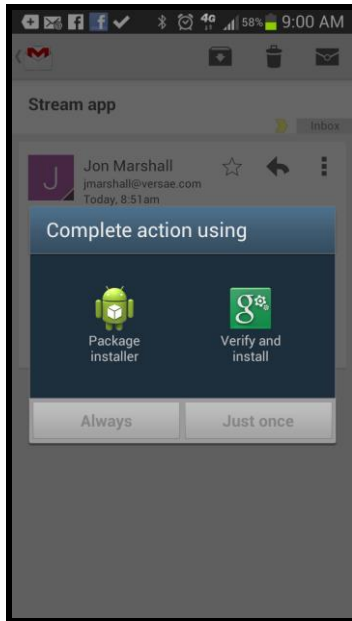
#### ***Installing the Android Application onto your phone***

1. In settings under security, you may need to select to allow installations of apps from sources other than the play store.

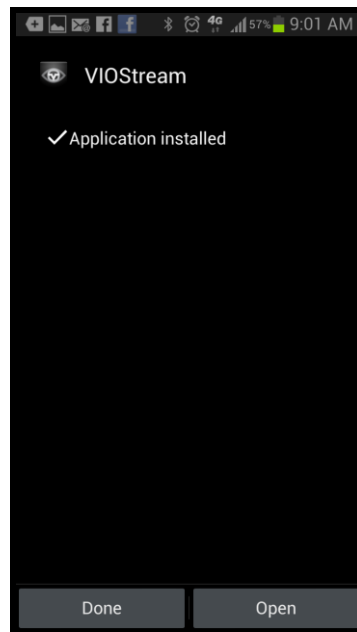
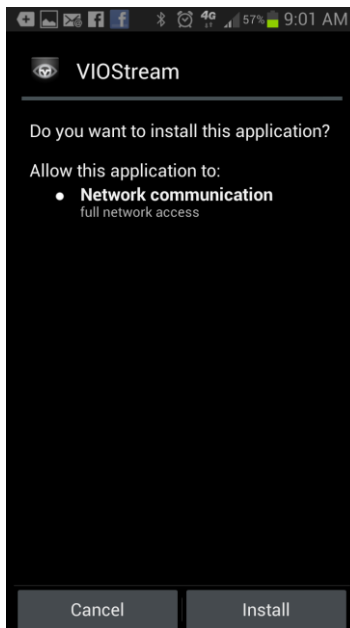


2. Download the VIOStream.apk to your device. This can be done by saving the .apk file to your device from an email.

3. Once downloaded, complete action using the Android packaging installer.



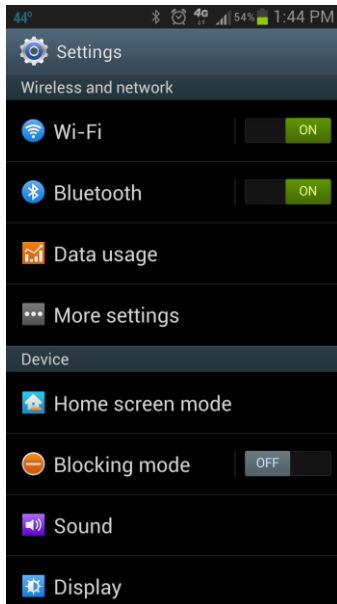
4. Select Install.



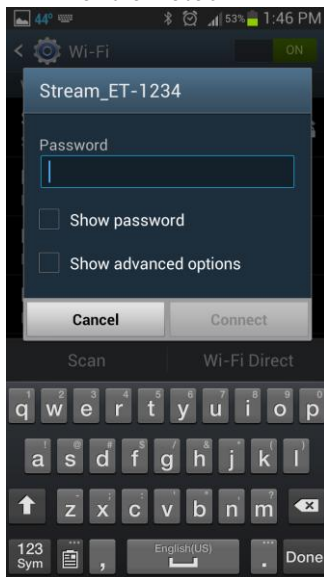
5. Once the application is installed, select 'Done' and follow the directions for setup of your phone below before trying to open or use the application.

**Setting up your Android phone application and basic use**

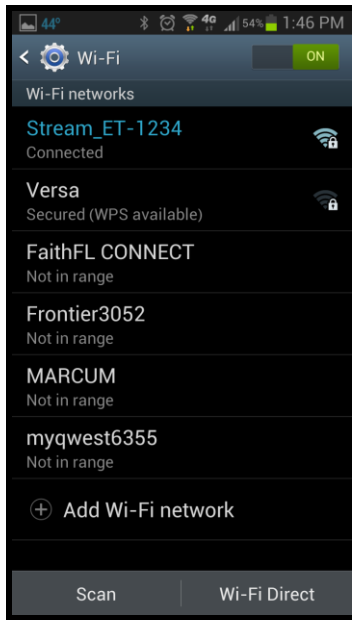
- 1) Open your phone settings and enable Wi-Fi on your phone as shown below.



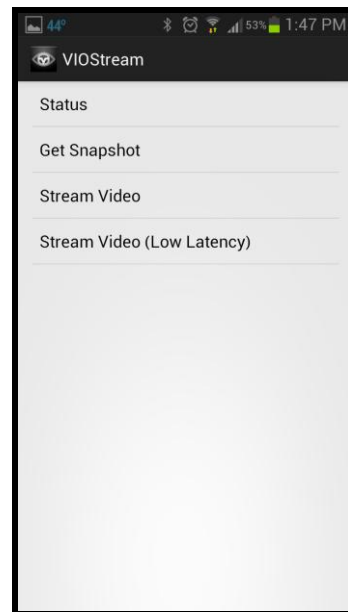
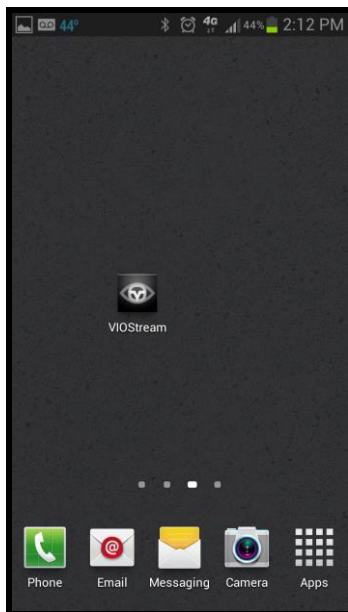
- 2) Select the Stream as a Wi-Fi Access Point to connect. Enter the camera default password = extremetech



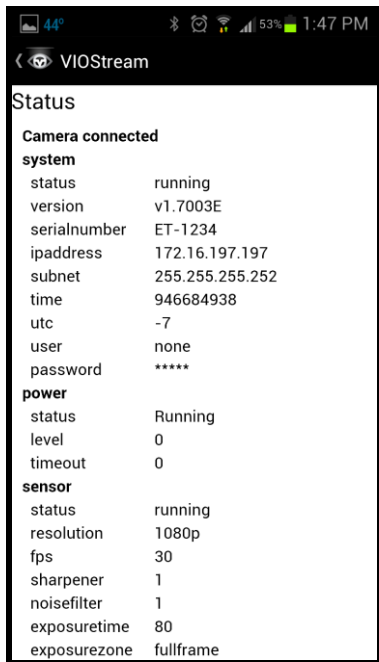
- 3) Ensure that Wi-Fi shows as connected as in the picture below.



- 4) Place the VioStream.apk on your Android phone
- 5) Launch the VioStream application. Once this is done you will see the application home screen.



- 6) To get the camera Status, touch the status screen. You should see a status similar to the screen below.



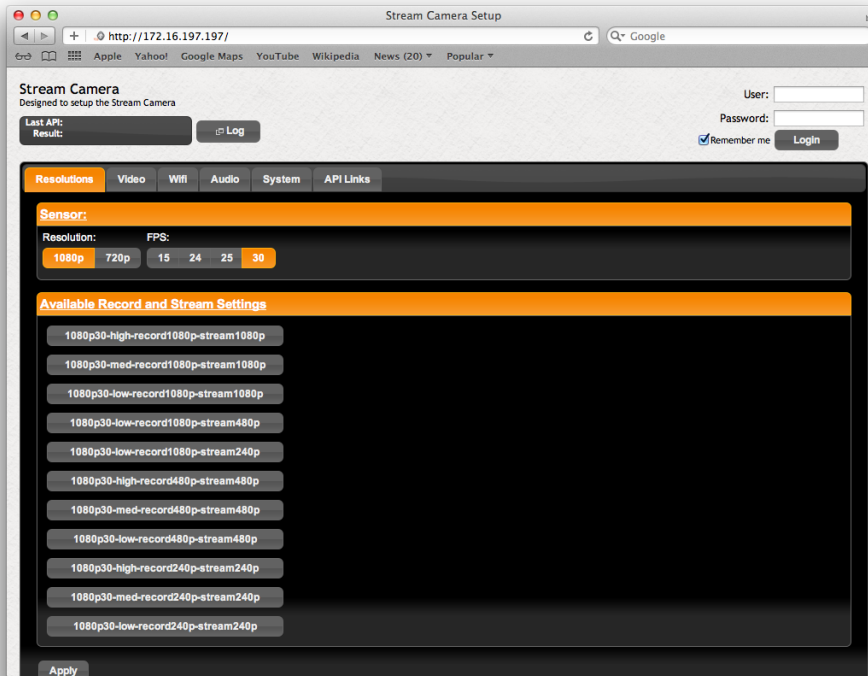
- 7) Use the other buttons to get a snapshot or video stream.



## Integrator HTML Web Page

To help with learning about the camera and integration of the camera, the Stream comes with an Integrator HTML Web Page. This page is designed to help you get familiar with the Stream's interface, evaluate the status of the Stream and to control or test something on the Stream.

To access the Integrator HTML Web Page once the setup above is complete, simply open your browser (Safari, Firefox, Chrome, etc.). In the browser URL window, enter the address of the camera and hit the Enter key. If you are accessing the camera through the USB interface using default settings, this will be 172.16.197.197. If you are accessing the Stream through the Wi-Fi interface using default settings, this will be 192.168.2.1. See the example below:



This will bring up an HTML page that will allow you to control and see responses from the Stream. This page is only one way to access the Stream interface. You may also access it by typing commands directly into the browser URL window and hitting return (such as "172.16.197.197/api/system/defaults" to restore defaults) or you may send these commands from an HTML page you create or other application.

The log button will bring up a window that will show the command sent and the response to any command.

## Set the System Time and Date

The time and date must be set in the Stream so that video clips, still photos, and other files will have the time and date that corresponds to the time recorded. It is recommended that the integrator set the time and date automatically through the application each initialization. The camera has a small real time clock battery backup that will last a few hours.

The time and date should be set by using the application programming interface to set the time. HTTP commands necessary to set the time are:



<ipaddress>/api/system/utc=xxx where xxx = -12 to 12

<ipaddress>/api/system/time=xxxxxxx where xxxxxx is the EPOCH time to set the time and date to.

---

The **Unix epoch** (or **Unix time** or **POSIX time** or **Unix timestamp**) is the number of seconds that have elapsed since January 1, 1970 (midnight UTC/GMT), not counting leap seconds (in ISO 8601: 1970-01-01T00:00:00Z). Literally speaking the epoch is Unix time 0 (midnight 1/1/1970), but 'epoch' is often used as a synonym for 'Unix time'. Many Unix systems store epoch dates as a signed 32-bit integer, which might cause problems on January 19, 2038 (known as the Year 2038 problem or Y2038).

It is best to set the time and date each time the unit is powered up. A backup battery does exist to back up the time and date. This battery lasts several hours and is rechargeable.

## Using the STREAM

### Stream buttons

There is one button on your Stream. This button is used to power on the camera, power off the camera, start or stop recording, or to reset the Wi-Fi configuration.



### Power up/Power down

The button turns the Stream on and off. To power up, briefly press the button (< 1 second) until the LED turns on (it will be yellow/red). The camera will take a few seconds to go through its power up sequence (LED will transition from yellow/red to solid green then to flashing green), and when it has finished, it will be in Standby mode with a flashing green LED.

To power down the Stream, press the button and hold for 3 seconds then release. If you are recording a video clip and you press and hold the button, the camera will close the file and will power down.

### Start Recording

When the Stream is in the Standby configuration (Green blinking LED), a brief button press (< 1 second) will begin a recording. The camera will use the default settings or any other settings that have been set through

the Stream's Web Programmable HTTP/XML interface. Once the Stream is recording, the LED will periodically flash red.

### **Stop Recording**

When the Stream is recording, a brief press to the button (< 1 second) will stop the recording. Once this is complete, the camera will return to a Standby mode with a flashing green LED.

### **Reset to defaults**

The camera defaults can be restored through the following options:

- When the camera is on, press and hold the button for 10 seconds. When the led starts to flash red, release, and press again briefly (< 1 second). The LED will shut off, defaults will be loaded, and then the application will restart if a something was running. A few second later, you will have a stream again with all the defaults, system wide.
- Send the Restore to default command through the Web Programmable HTTP/XML interface, by using the <ipaddress>/api/system/defaults command.

## **Operating modes**

The STREAM operates in several different modes, depending upon the function being performed. Because this manual refers to these modes frequently, it's worthwhile to review what they are and what they're used for.

**Stream Mode** is for viewing the video through the RTSP interface through a USB IP address or through a 802.11 Wi-Fi IP address to view the video stream.

**Record Mode** is for recording video or for setting up the recorder prior to recording.

**Stream and Record Mode** is for streaming and recording simultaneously as above.

**Standby Mode** is for adjusting the STREAM settings.

**Mass Storage Device Mode** is for uploading files to a computer via the USB port.

Other than knowing that they exist, the important thing to know about operating modes is that the STREAM can operate in only one mode at a time. This means that in most cases, you cannot adjust settings while recording or view video clips while compiling a highlight clip. There are a few settings, such as exposure zone, exposure time, noise filter, sharpener, and microphone settings that can be adjusted while recording or streaming.

## **File names on the STREAM**

Files containing video made with the STREAM are referred to as clips. Raw clips (clips that are the direct result of recording video with the STREAM) are named using an 8.3 format so that they are portable back to phones and tablets with limited file name size support.

***For Example:***

V0000000.mp4 - the V denotes a Video file.

S0000000.jpg – the S denotes a Still image

V000000A.mov – the V indicates this is a video, the A, B, C, at the end indicates the sequence of the 3 pieces of a loop or A/B for the two pieces of a loop and forward file.

## **LED's**

The picture below shows where to find the LED and Microphone hole.



### ***Powering up***

When the Stream is in the off state and the button is pressed briefly (<1 Second), the LED will turn Orange then Green. At this point the button may be released. The LED will be Orange for 15 seconds. At this point the USB driver or Wi-Fi will begin initialization and the LED will then be solid green for approximately 10 seconds while communication is established. The LED will begin to flash slow green (1x/second) when ready for operation. This indicates a standby or streaming only state.

### ***Standby or Streaming only***

The slow (1x per second) green blinking LED indicates the Standby or Streaming state.

### ***Recording***

A slow (1x per second) red blinking LED indicates the Stream is in Record Mode.

### ***Low Memory***

When the Stream detects that available space on the Micro SDHC card is getting low while recording, it will change the LED to Orange and will continue to slow blink.

### ***Low Battery***

When the Stream detects that the battery is getting low, it will increase the blink speed to fast blink. The color of the LED will stay the color of the current state (green for standby/streaming, red for recording/streaming).

## **Record video**

### **The basics**

1. When the STREAM boots up, it goes to Record Standby automatically. If you have set up the Stream to do automatic streaming on power up, it will also be streaming video.
2. Once you are in standby mode (blinking green LED), you can start recording using one of two methods. Either you can use the Web Programmable HTTP/XML interface to send a command to the camera to start recording, or you can briefly (< 1 second) press and release the button. Once the button press or

command is received, the camera will begin to record. This is indicated by the blinking red LED (1x/second).

If you are streaming, the video player will show the preview of what is being captured.

3. Once you are recording, you can tag a video file. To tag the clip being recorded, use the Web Programmable HTTP/XML interface to send a tag command to the Stream (<ip address>/api/record/tag).

A tag is a time marker on a clip, similar to a bookmark in a document.

Tags may also be used by other future editing features.

### **Record Modes**

The STREAM supports 3 **Record Modes** through the record interface commands. A complete discussion of what each **Record Mode** does as well as guidelines for selecting the right **Record Mode** is provided in [Understanding the STREAM Video Record Modes](#), below .

**Clip** records video like a standard video recorder. Once you start recording, video is captured continuously until you stop recording or the Micro SDHC card is full.

**Loop** records a short clip every time you send a tag command. The saved clip(s), referred to as a loop, includes action immediately before you send the tag command, as well as action immediately following.

**Loop & Forward** keeps no video until you send a tag command for the first time. Then a loop is captured and all action following that first tag is captured as well.

To set the **Record Mode**, use the Web Programmable HTTP/XML interface.

When you use the **Loop** method, **looptime** determines the length of the saved video loops. When you use the **Loop & Forward** method, **loopforwardtime** determines the length of the saved video . The actual length of a saved loop is never less than the **looptime** or **loopforwardtime**, but it can be longer. See [Understanding the STREAM Record Modes](#) for additional information about how the STREAM determines how much video to save in order to ensure that you capture the action immediately before and immediately after each tag.

### **Record using the Wi-Fi interface**

The STREAM allows you to control recording and set tags on a video clip without touching the recorder through use of the Web Programmable HTTP/XML interface over Wi-Fi. This allows you to place the Stream in out of reach places yet still control it. The Stream does not have a remote control, but allows integrators the ability to create a remote control capability through the Wi-Fi interface.

## **Record still photos or capturing MJPEG's**

### **Still Photo**

To save a still photo to the Micro SDHC Card, there are two commands that may be used in the Stills interface.

1. The capture.jpg (<ip address>/api/still/capture.jpg command will save a still photo to the Micro SDHC card in the Snapshots directory and will return the jpeg to the calling interface.
2. The save command (<ip address>/api/still/save command will only save a still photo to the Micro SDHC card.

### **MJPEG Interface**

In addition to the still photo interface, an MJPEG interface exists on the Stream. This interface allows the user to capture a single MJPEG or to start and stop a continuous stream of MJPEG's. Please see the Web Programmable API for details on the MJPEG interface.

## Playing video

### Select a video clip

You can get a list of your video clips on the recorder, delete files, or retrieve files for playback. To get a list of files on the Micro SDHC card, use the Web Programmable HTTP/XML interface to send the <ip address>/api/record/files command. This command will return a list of files. You may then do one of several things:

1. Use the HTTP Get interface to retrieve a file.
2. If you are using the USB end cap, you may place the Stream into USB Mass Storage Device Mode to retrieve files from the PC. This command looks like <ip address>/api/system/msd. Once this command is entered, the Stream will be placed into a special mode where the Micro SDHC card is connected to the PC or Mac or other computer and may be accessed via the USB slot directly. You should see a file folder open and can then access files from the Micro SDHC card.

## Uploading video clips and still photos to a computer

There are three ways to get files from the Micro SDHC card in the STREAM onto a personal computer.

1. Power off the Stream and remove the end cap/Micro SD card and use an SDHC Card reader attached to your computer.
2. Use the HTTP Get interface to retrieve a file.
3. Connect the STREAM to a USB port on your computer using the USB end cap and cable provided with the STREAM, and upload the files directly to the computer from the recorder.

When uploading files by either method, you need to be aware of the folder structure used by the STREAM. The example below shows this structure.

- **Stream** - the volume label for the Micro SDHC card containing the files. This volume label is on the Micro SDHC card provided with the STREAM. If you format that card or use a different card, the volume label will appear as "Unknown Device", unless you have set the volume label to some other text using a computer.
- **DCIM** - the name of the directory in which all video and still photos are stored.
- **Videos** - the name of the sub-directory in which all videos are stored.
- **Snapshots** - the name of the sub-directory in which all still photos are stored.
- **V0000000.mp4** is an example name of a video clip made with the STREAM
- **V0000000.xml** is an example name of an XML file that contains the tag information for the clip file.
- **V000000A.mp4** is an example name of a loop or loop and forward file

Details about STREAM file naming conventions are given in [File Names on the STREAM](#), above.

**Note:** This illustration shows the file structure. The order of the files in each folder depends on the operating system and your preference settings.

### Upload and/or delete files using a flash memory card reader:

- Make sure the STREAM is not recording video. Removing the end cap while recording will cause the entire clip to be corrupted. When the recorder is powered down and then powered back up, the internal logic will discover the corrupted clip and attempt to repair it, but a successful repair is not guaranteed. The best policy is to be sure you're not recording when you remove the Micro SDHC card.
- Remove the Micro SDHC card from the recorder and put it into the card reader.

- Use the regular procedures for uploading and/or deleting files using your reader.
- When you have finished, remove the Micro SDHC card from the reader and reinstall it in the Stream.
- **Note:** If you are using a Mac, when you delete files, you must be certain to also empty the trash. On a Mac deleted files are left in place and marked as being in the trash. Empty Trash is required to physically remove the files from the Micro SDHC card.

**Upload and/or delete files using a USB connection:**

- Connect the recorder to a USB port on the computer using the USB end cap and cable included with the STREAM.
- If the STREAM recorder is powered down, power it up.
- Use the Web Programmable HTTP/XML interface to send the mass storage device mode command to the Stream (<ip address>/api/system/msd)
- On a Mac, the recorder will appear in the Finder as an external drive.
- On a Windows PC, in Windows Explorer, the STREAM will appear as a removable disk under My Computer.
- Once the recorder is connected to your computer, you can transfer files from the recorder to your computer, or delete files on the Micro SDHC card in the same way you would transfer or delete files on any external drive such as a CD, DVD, or backup drive.
- **NOTE:** If the Micro SDHC card has no label, it will appear in the Finder or Windows Explorer as “NO NAME”, “UNKNOWN DEVICE”, or something similar. If the Micro SDHC card has a volume label, that label will appear as the name of the device. The Micro SDHC card provided with the STREAM is formatted with the volume label “Stream”.
- **Note:** If you are using a Mac, when you delete files, you must be certain to also empty the trash. On a Mac deleted files are left in place and marked as being in the trash. Empty Trash is required to physically remove the files from the Micro SDHC card.

Once the video files are on your computer, they can be treated like any other video files.

- They can be viewed using any suitable video player that runs on your system.
- They can be edited, compiled, and/or resized into your own custom videos.
- They can be burned onto CD's or DVD's.
- They can be uploaded to YouTube or any other video sharing site on the Internet.

## Delete video clips and still photos from the recorder

You can delete video clips and still photos from the Micro SDHC card without removing the card.

**Delete video clips and still photos using the Web Programmable HTTP/XML interface**

To delete clips on the Stream, the Stream must be powered up.

- If the Stream is not powered up, press the power button for 1-2 seconds to power it up.
- It is best to be in Standby mode. This can be done by stopping any recording or streaming in progress. This is done using the following commands:
  - <ip address>/api/record/stop
  - <ip address>/api/stream/stop
- To get a list of files on the Micro SDHC card, use the Web Programmable HTTP/XML interface to send the <ip address>/api/record/files command. This command will return a list of files.
- Use the Web Programmable HTTP/XML interface to delete a file. This command would look like <ip address>/api/record/file/V0000000.mp4/delete.

## Remote Control of the Stream

If you are using more than one STREAM system in the same area, at the same time you will need to ensure that your SSID is different for each camera.

You may use the 802.11 Wi-Fi interface to send commands to the Stream using the Web Programmable HTTP/XML interface. This



The Remote ID channel of the wireless remote is set using a small rotary dial located inside the remote control.

- To adjust the channel you will need to open the remote control unit by removing the four small Phillips screws at the four corners of the remote.
- Use a small flat bladed screwdriver to carefully rotate the pointer to the desired setting. Take care to protect the inner workings of the remote from dust and moisture while the cover is removed
- Replace the cover, tightening the four screws uniformly to create even pressure against the seal

## **Update the firmware on the STREAM**

From time to time VIO may make updates to the firmware in the STREAM available to camera owners. These updates improve system performance and may add new features. If you are having an issue, please check the support site below to determine if there has been a firmware update.

### ***Download a firmware update***

To check if there is a firmware update available, go to:

[http://www.vio-pov.com/support/stream\\_firmware\\_upgrade](http://www.vio-pov.com/support/stream_firmware_upgrade)

To download the new firmware, click on the **Download Firmware Upgrade** link toward the bottom of the page. The firmware will be downloaded in a ZIP file which contains the firmware plus a version specific set of the instructions given below.

### ***Install the Firmware***

#### ***Put the new firmware on a Micro SDHC card***

- Unzip the downloaded firmware upgrade file  
You will get a folder containing a PDF with upgrade instructions, and the firmware upgrade file which will have the format: Stream-x.yy.bin where “x.yy” is the version number for this upgrade.
- You can put the firmware on a Micro SDHC card in one of two ways
  1. Put the Micro SDHC card into an Micro SDHC card slot on your computer or into an Micro SDHC card reader attached to your computer, OR
  2. Connect you computer directly to the recorder with a Micro SDHC card in it using the USB link and going to Mass Storage Device mode (<ip address>/api/system/msd).
- In either case, simply drag the firmware BIN file onto the Micro SDHC card in Windows Explorer or OS X Finder. The firmware file goes into the top level folder/directory. The firmware does NOT go into the DCIM folder/directory.

If there is an upgrade file for an older version of the firmware on this Micro SDHC card delete that file at this time.

#### ***Put the Micro SDHC card with the firmware into the recorder***

- If you used a Micro SDHC card slot or a Micro SDHC card reader attached to your computer, dismount and remove the Micro SDHC card and put that card into the Stream and replace your end cap.
- If you copied the upgrade file directly onto the Micro SDHC card in the recorder using the USB link, disconnect the link to power down the recorder, and reconnect.

### ***Prepare the Stream***

- If using the battery end cap, check the battery level when the Stream goes into Standby mode. If you do not have at least half the battery power remaining, power down the recorder and install fresh batteries or charge the battery. It's essential that the Stream not lose power while the firmware upgrade is in progress.

### ***Install the firmware***

**IMPORTANT NOTE:** If using the battery end cap, do not install the firmware unless you have verified that the batteries have an adequate charge, see **Prepare the Stream**, above.

- From a power down state, hold the power button on the Stream for 5-6 seconds until the LED turns orange. After a moment, the LED will begin to blink orange at 1x/second.
- **IMPORTANT:** Do not turn the Stream off or remove the Micro SDHC card while the firmware is being updated. The update process takes only a short time (1 – 2 minutes).
- When the update is complete, the LED will change to either a solid green or solid orange state. Solid green indicates success. You will then need to power off the camera and power it back on again. If you see a solid orange state, try doing the update again.

### ***Check out the Stream***

- Power down then power up the Stream.
- Using the integrators HTML page, look at the system settings to make sure that the firmware version is correctly updated.

## Settings

---

Using the built-in settings, you can configure the STREAM to create optimal video in every shooting situation, maximize battery life, select **Record Modes**, and set the time and date.

The STREAM is shipped with default settings that create great HD video under most normal conditions, so you can choose to shoot without worrying about the settings at all, and if you do change the settings, you can return to the default values in a single step using the **reset to defaults** command.

### Adjusting settings

1. Power up the STREAM if it's not already on and go to the Integrator's HTML Web Page as described above.
2. Select the /API link near the top of the page. This command will give a response that details all of the current settings.
3. Use the other hyperlinks on the page to change other settings, or enter the specific commands through a browser window or application.
4. Each setting change will indicate success or failure in the response window.
5. Settings will only be in effect until the next power cycle unless you save the changes by sending the save settings command.

### Settings Summary

Here's a quick reference list of all the STREAM settings. Detailed information about the settings as well as tips and guidelines for their use are provided in the following section, [Tips and Guidelines for Getting the Most out of Your STREAM](#).

The STREAM is set to default settings values out of the box. These are also the values that are set if **Restore All Default Settings** is used.

### Key Setting Guidelines

There are two key pieces of information to remember when changing the settings:

1. To change sensor settings, including frame rate, data rates, and resolutions, the video stream, recording, and the sensor must ALL be turned OFF. If these functions are running, the camera may attempt to make the settings changes, however, the end result may not be the desired result.
2. To create video, you must settle on what combinations of functionality you desire. Settings for all resolutions, data rates, and frame rates must all be changed prior to turning the sensor on. A video pipeline is then set up, and you can start/stop recording or start/stop streaming, at will, but you cannot start recording and then change the streaming resolution (for instance). Even if the two don't seem connected, there is only one video pipeline and it must be set up prior to turning on the sensor.

There are a few settings that are tied to the sensor or video pipeline that can be manipulated while the sensor is running. These are the exposure settings (exposure zone, exposure time, noise filter, and sharpener) and the overlay settings. In addition, settings that do not affect the video pipeline may change during sensor operation, such as the microphone volume, power off timeout, etc.

### **Settings Overview**

All settings are documented in the VIO Stream protocol reference guide. This can be found on our web site under <http://vio-pov>

## VIO Stream API Protocol Reference

**Version 0.97 November 20 2013**

### **Introduction**

The VIO Stream API protocol is a web-based interface allowing for camera control over TCP/IP and HTTP/1.1. The API is accessed via the following URL on the camera:

[http://\\*camera\\_ip\\_addr\\*/api/\\*service\\*](http://*camera_ip_addr*/api/*service*)

#### **Services:**

- [system](#) - system controls
- [power](#) - power settings
- [sensor](#) - sensor settings
- [record](#) - video capture to sd card
- [stream](#) - streaming video
- [mjpeg](#) - image server
- [still](#) - image capture to sd card
- [overlay](#) - time and date overlay
- [wifiap](#) - wifi access point
- [wificlient](#) - wifi client
- [mic](#) - microphone settings
- [beeper](#) - audio alerts
- [sdcard](#) - sdcard

#### **system**

##### **Status**

This command will return the general system status.

`/api/system`

```
<system>
  <status>Running</status>
  <version>v1.5039</version>
  <serialnumber>ETP-1234-00001</serialnumber>
  <ipaddress>172.16.197.197</ipaddress>
  <time>1373912804</time>
  <utc>-7</utc>
  <user>none</user>
  <password>none</password>
</system>
```

Note that each item may be retrieved individually instead of as a group. For instance `/api/system/time` will retrieve only the time.

### ***set subnet mask***

`/api/system/subnet=255.255.255.252`

Sets the subnet for the IP over USB interface. This should be changed before the IP address. Once the IP address changes, the change takes effect.

### ***set IP address***

`/api/system/ipaddress=172.16.197.197`

Sets the IP address for the USB interface. Once this command is sent the IP address will change and the camera needs to be re-booted.

### ***set time***

`/api/system?time=1373912804`

Sets the system time in EPOCH.

### ***set utc (timezone)***

`/api/system?utc=-8`

Sets the Universal time code (UTC/GMT) for local time

### ***set user***

`/api/system?user=foo`

### ***set password***

`/api/system?password=bar`

Note that after setting a username and password, all subsequent requests must utilize HTTP basic authentication

### ***reset to defaults***

`/api/system/defaults`

Resets the system settings to the default manufacturers configuration

### ***save settings***

`/api/system/settingssave`

Saves the new setting configuration to memory so that these settings will be used until either they are changed by command or the reset to defaults is

used. If settings are changed and not saved, the previously saved settings will be reverted to at next power up.

***mount camera as mass storage device***

/api/system/msd

Note that mounting as a mass storage device will cause a loss of RNDIS (IP over USB) connectivity to the camera

***setup sensor/quality/record resolution/sensor resolution***

/api/system?resolution=1080p30-high-record1080-streamNO

The following resolution, quality level, and frame rate combinations are supported.

**1080p30 options**

1080p30-high-record1080p-streamNO  
1080p30-med-record1080p-streamNO  
1080p30-low-record1080p-stream1080p  
1080p30-high-record480p-stream480p  
1080p30-med-record480p-stream480p  
1080p30-low-record480p-stream480p  
1080p30-high-record240p-stream240p  
1080p30-med-record240p-stream240p  
1080p30-low-record240p-stream240p

**1080p25 options**

1080p25-high-record1080p-streamNO  
1080p25-med-record1080p-streamNO  
1080p25-low-record1080p-stream1080p  
1080p25-high-record480p-stream480p  
1080p25-med-record480p-stream480p  
1080p25-low-record480p-stream480p  
1080p25-high-record240p-stream240p  
1080p25-med-record240p-stream240p  
1080p25-low-record240p-stream240p

**1080p24 options**

1080p24-high-record1080p-streamNO  
1080p24-med-record1080p-streamNO  
1080p24-low-record1080p-stream1080p  
1080p24-high-record480p-stream480p  
1080p24-med-record480p-stream480p  
1080p24-low-record480p-stream480p  
1080p24-high-record240p-stream240p  
1080p24-med-record240p-stream240p  
1080p24-low-record240p-stream240p

**1080p15 options**

1080p15-low-record1080p-stream480p  
1080p15-low-record1080p-stream240p

### **720p60 options**

720p60-high-record720p  
720p60-med-record720p  
720p60-low-record720p  
720p60-high-record480p  
720p60-med-record480p  
720p60-low-record480p  
720p60-high-record240p  
720p60-med-record240p  
720p60-low-record240p

### **720p50 options**

720p50-high-record720p  
720p50-med-record720p  
720p50-low-record720p  
720p50-high-record480p  
720p50-med-record480p  
720p50-low-record480p  
720p50-high-record240p  
720p50-med-record240p  
720p50-low-record240p

### **720p30 options**

720p30-high-record720p-stream720p  
720p30-med-record720p-stream720p  
720p30-low-record720p-stream720p  
720p30-med-record720p-stream480p  
720p30-low-record720p-stream480p  
720p30-med-record720p-stream240p  
720p30-low-record720p-stream240p  
720p30-high-record480p-stream480p  
720p30-med-record480p-stream480p  
720p30-low-record480p-stream480p  
720p30-high-record240p-stream240p  
720p30-med-record240p-stream240p  
720p30-low-record240p-stream240p

### **720p25 options**

720p25-high-record720p-stream720p  
720p25-med-record720p-stream720p  
720p25-low-record720p-stream720p  
720p25-med-record720p-stream480p  
720p25-low-record720p-stream480p  
720p25-med-record720p-stream240p  
720p25-low-record720p-stream240p  
720p25-high-record480p-stream480p

720p25-med-record480p-stream480p  
720p25-low-record480p-stream480p  
720p25-high-record240p-stream240p  
720p25-med-record240p-stream240p  
720p25-low-record240p-stream240p

## **720p24 options**

720p24-high-record720p-stream720p  
720p24-med-record720p-stream720p  
720p24-low-record720p-stream720p  
720p24-med-record720p-stream480p  
720p24-low-record720p-stream480p  
720p24-med-record720p-stream240p  
720p24-low-record720p-stream240p  
720p24-high-record480p-stream480p  
720p24-med-record480p-stream480p  
720p24-low-record480p-stream480p  
720p24-high-record240p-stream240p  
720p24-med-record240p-stream240p  
720p24-low-record240p-stream240p

## ***power***

### ***Status***

/api/power

```
<power>
  <status>Running</status>
  <level>100</level>
  <timeout>0</timeout>
</power>
```

### ***set timeout (inactivity power off timeout)***

/api/power/timeout=1800

Power off after 30 minutes (1800 seconds). Setting the timeout to zero disables the power off timeout.

### ***turn system power off (but keep camera and API running to enable power on)***

/api/power/stop

### ***turn system power on***

/api/power/start



**sensor**

**Status**

/api/sensor

```
<sensor>
  <status>Running</status>
  <resolution>1080p</resolution>
  <fps>30</fps>
  <sharpen>0</sharpen>
  <noisefilter>0</noisefilter>
  <exposuretime>70</exposuretime>
  <exposurezone>spot</exposurezone>
</sensor>
```

Note that each item may be retrieved individually instead of as a group. For instance /api/sensor/fps will retrieve only the frames per second.

**sharpen**

/api/sensor?sharpen=1

You should generally have the sharpen turned on unless you plan to do sharpening in video post-production. Setting the sharpen to 0 will disable the sharpen.

**noisefilter**

/api/sensor?noisefilter=1

You should generally have the noise filter turned on unless you plan to do noise filtering in video post-production. Setting the noise filter to 0 will disable the noise filter.

**exposuretime**

/api/sensor?exposuretime=70

Increase exposure time to brighten / decrease to darken images (suggested range 40-90). The full range is from 10 to 255.

**exposurezone**

/api/sensor?exposurezone=fullframe

or

/api/sensor?exposurezone=spot

Spot uses the middle of the sensor for exposure calculations, while fullframe uses the entire frame

**record**

**Status**

/api/record

```
<record>
  <status>Stopped</status>
  <type>clip</type>
  <resolution>1080p</resolution>
  <quality>6000000</quality>
  <looptime>10</looptime>
  <loopforwardtime>10</loopforwardtime>
  <filetype>mov</filetype>
  <files>
    <file>
      <name>V0000000.mov</name>
      <lastmodified>946685322</lastmodified>
      <size>2007662</size>
    </file>
    <file>
      <name>V0000001.mov</name>
      <lastmodified>946685330</lastmodified>
      <size>2143798</size>
    </file>
  </files>
</record>
```

Note that each item may be retrieved individually instead of as a group. For instance /api/files will retrieve the list of files on the micro SDHC card.

**start recording**

/api/record/start

**stop recording**

/api/record/stop

**set recording mode**

/api/record?type=clip

or

/api/record?type=loop

or

/api/record?type=loopforward

"clip" mode will record as you expect. "loop" mode will record clips of length "looptime" seconds, and keep only clips during which "tag" is called (it may also keep clips the before and after the tag, if the tag was at the beginning or at the end of the loop). "loopforward" will record loops of "looptime" and then delete them, unless tag is called, in which case it will save the previous loop and keep recording the current file until recording is stopped.

***set filetype***

```
/api/record/filetype=mp4
```

or

```
/api/record/filetype=mov
```

***set looptime***

```
/api/record?looptime=30
```

specify looptime in seconds (30 seconds in this example)

***set loopforwardtime***

```
/api/record?loopforwardtime=30
```

specify looptime in seconds (30 seconds in this example)

***download a recorded video***

```
/api/record/file/V0000001.mov
```

***delete a recorded video***

```
/api/record/file/V0000001.mov/delete
```

***stream***

***Status***

```
/api/stream
```

```
<stream>
  <status>Stopped</status>
  <resolution>1080p</resolution>
  <quality>6000000</quality>
  <url>rtsp://172.16.197.197:8554/stream</url>
</stream>
```

Note that each item may be retrieved individually instead of as a group. For instance /api/url will retrieve only the url for the stream.

***start streaming***

/api/stream/start

***stop streaming***

/api/stream/stop

***mjpeg***

***Status***

/api/mjpeg

```
<mjpeg>
  <status>Stopped</status>
  <resolution>1080p</resolution>
  <quality>75</quality>
</mjpeg>
```

Note that each item may be retrieved individually instead of as a group. For instance /api/mjpeg/quality will retrieve only the mjpeg quality setting.

***get single image from camera***

/api/mjpeg/capture.jpg

***start mjpeg server***

/api/mjpeg/start

***stop mjpeg server***

/api/mjpeg/stop

***set jpeg compression level (1-99)***

/api/mjpeg?quality=75

***still***

***Status***

/api/still

```
<still>
  <status>Stopped</status>
  <resolution>1080p</resolution>
  <quality>75</quality>
```

```
<files>
  <file>
    <name>P0000000.jpg</name>
    <lastmodified>946685292</lastmodified>
    <size>142842</size>
  </file>
</files>
</still>
```

Note that each item may be retrieved individually instead of as a group. For instance /api/still/quality will retrieve only the still quality setting.

***get single image from camera and save it sd card***

/api/still/capture.jpg

***save image to sd card***

/api/still/save

***set jpeg compression level (1-99)***

/api/still?quality=75

***overlay***

***Status***

/api/overlay

```
<overlay>
  <enable>0</enable>
  <loc_x>50</loc_x>
  <loc_y>720</loc_y>
  <height>48</height>
  <color>blue</color>
</overlay>
```

Note that each item may be retrieved individually instead of as a group. For instance /api/overlay/height will retrieve only the height of the time and date overlay in pixels.

***start***

/api/overlay/start

Note that it is not recommended to use the overlay in "dual encoding" scenarios (simultaneous recording and streaming) due to performance limitations.

***stop***

/api/overlay/stop

***x position***

/api/overlay?loc\_x=50

Specifies the x offset for the time and date overlay.

***y position***

/api/overlay?loc\_y=720

Specifies the y offset for the time and date overlay.

***height***

/api/overlay?h=48

Specifies the height of the time and date overlay font (e.g. 24, 48, 96) in pixels.

***color***

/api/overlay?color=blue

or

/api/overlay?color=AF0F1F

Specifies the color of the time and date overlay characters (e.g. red, white, green, blue, black)

***wifiap***

***Status***

/api/wifiap

```
<wifiap>
  <status>stopped</status>
  <autorun>0</autorun>
  <ssid>Stream</ssid>
  <password>extremetech</password>
  <channel>11</channel>
  <encype>wpa2</encype>
  <ipaddress>none</ipaddress>
  <subnet>none</subnet>
</wifiap>
```

Note that each item may be retrieved individually instead of as a group. For instance /api/wifiap/ipaddress will retrieve only the ip address.

***start***

/api/wifiap/start

***stop***

/api/wifiap/stop

***restart***

/api/wifiap/restart

Restart after any settings change for changes to take effect

***set ssid***

/api/wifiap?ssid=Stream

***set password***

/api/wifiap?password=extremetech

***set encryption type***

/api/wifiap?encype=wpa2

wpa2, wep, and none are supported

***set autostart on***

/api/wifiap?autostart=1

***set autostart off***

/api/wifiap?autostart=0

***wificlient***

***Status***

/api/wificlient

```
<wificlient>
  <status>Off</status>
  <autorun>0</autorun>
  <ssid>foo</ssid>
  <iptype>DHCP</iptype>
  <ipaddress>none</ipaddress>
  <subnet>none</subnet>
  <enctype>wpa2</enctype>
</wificlient>
```

Note that each item may be retrieved individually instead of as a group. For instance /api/wificlient/autorun will retrieve only the autorun setting.

***start***

/api/wificlient/start

***stop***

/api/wificlient/stop

***set ssid***

/api/wificlient?ssid=foo

***set password***

/api/wificlient?password=bar

***set encryption type***

/api/wificlient?encype=wpa2

wpa2, wep, and none are supported

***set autostart on***

/api/wificlient?autostart=1

***set autostart off***

/api/wificlient?autostart=0

***mic***

***Status***

/api/mic

```
<mic>
  <enable>1</enable>
  <volume>100</volume>
  <alc>0</alc>
  <alclevel>7</alclevel>
  <boost>0</boost>
</mic>
```

Note that each item may be retrieved individually instead of as a group. For instance /api/mic/level will retrieve only the volume setting.

***set volume level (0-100)***

/api/mic?level=100

***enable***

/api/mic?enable=1

***disable***

/api/mic?enable=0



***turn auto-level control on***

/api/mic?alc=1

***turn auto-level control off***

/api/mic?alc=0

***set auto-level control sensitivity (1-10)***

/api/mic?alclevel=7

***set boost (0,1,2)***

/api/mic?boost=0

***beeper***

***Status***

/api/beeper

```
<beeper>
  <volume>5</volume>
</beeper>
```

***turn beeper on***

/api/beeper/start

***turn beeper off***

/api/beeper/stop

***set beeper volume (1-10)***

/api/beeper?volume=5

***sdcard***

***Status***

/api/sdcard

```
<sdcard>
  <status>inserted</status>
  <size>1645056000</size>
  <free>1612410000</free>
</sdcard>
```

Note that each item may be retrieved individually instead of as a group. For instance /api/sdcard/size will retrieve only the size of the Micro SDHC card in bytes.

***Format***

/api/sdcard/format

***Eject***

/api/sdcard/eject

## Tips and guidelines for getting the most out of your STREAM

---

Over time you will learn from experience exactly how you want to configure the STREAM settings for the conditions you shoot in. This section will help get you started and answer some basic questions about how to use the settings.

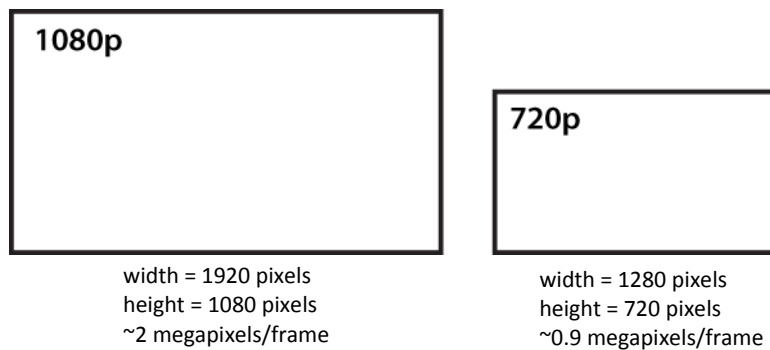
### Choosing a video format

The STREAM supports several different recording formats which are designated by industry standard labels such as 1080p30. In this example, '1080' designates 1080 horizontal scan lines in the frame, 'p' designates progressive scanning which means all lines in the frame are captured in each frame, and '30' designates 30 frames per second.

(You may have noticed elsewhere formats such as 1080i. In such a case, 'i' designates interlaced scanning in which the odd numbered scan lines are captured in in one frame and the even numbered lines in the next. This method uses less bandwidth and less file space, but in some circumstances such as filming rapid motion the perceived picture may not be as sharp as with progressive scanning. Also the frame rate is commonly left off the label for consumer video equipment because consumer TV sets automatically adjust to the frame rate of the incoming signal.)

#### Format Resolutions

In this illustration, the shape of each box shows the shape (aspect ratio) in which each format is displayed. The area of each box is proportional to the resolution. The actual physical size of any format is determined by the device on which it is displayed.



Comparison of STREAM Video Formats

Format	Resolution (Pixel Size of Frame)	Frame Rate (per second)	Best For
1080p30	1920 wide X 1080 high	30	Highest quality HD video when displayed on a high resolution, high quality monitor <sup>1</sup>
1080p25	1920 wide X 1080 high	25	Frame rate compatibility with European broadcast standards
1080p24	1920 wide X 1080 high	24	Frame rate compatibility with standard cinematography
720p60	1280 wide X 720 high	60	High quality HD video with the option for smooth slow motion playback <sup>2</sup>
720p30	1280 wide X 720 high	30	High quality HD video with somewhat reduced file size.
720p50	1280 wide X 720 high	50	Frame rate compatibility with European broadcast standards
720p25	1280 wide X 720 high	25	Frame rate compatibility with European broadcast standards

**Table Notes**

<sup>1</sup>1080p is higher resolution and, under identical conditions will generally produce a slightly sharper picture, but conditions are seldom identical and almost never ideal. Depending on the type of television receiver or computer screen on which the video is played back, room lighting, viewing distance from the screen, and other factors, the difference in picture quality between 1080p and 720p may or may not be significant or even detectable. It's best to try it and see.

<sup>2</sup>On the STREAM, 720p60 is recorded at 60 fps and 720p50 is recorded at 50 fps for compatibility with European broadcast standards which allows clips recorded this way to be played back in smooth slow motion, and for action filming these will often be the format of choice. Because, on the STREAM, 720p60 records twice as many frames as 1080p30 and 720p50 records twice as many frames as 1080p25, the resulting file sizes in these two situations are roughly the same.

**Understanding the STREAM Video Record Modes**

The STREAM supports three video **Record Modes**: **Clip**, **Loop**, and **Loop & Forward**.

- **Clip** works like a regular video recorder. After you start recording, the STREAM records continuously until you stop recording, and what you've recorded is stored in a file, called a "clip" on the Micro SDHC card.
- **Loop** allows you to select what action to record and save, without the need to be constantly starting and stopping the recorder. To use the **Loop** method you must set **Record Mode** to **Loop** and the **looptime** to an interval that is appropriate for your situation (more on that in a moment.) These are set using settings.
- **Loop** and **Forward** works like **Loop**, except that once you've captured the first **Loop** clip by sending the tag command, the recorder saves the previous segment plus all of the video from that point until you stop recording. The length of this Loop or pre-event video is determined by the **loopforwardtime** setting.

### How the three Record Modes work

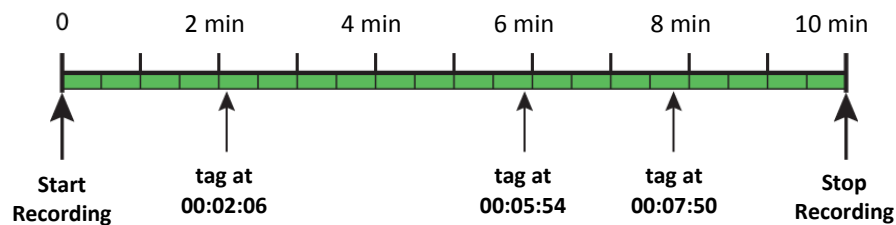
The illustrations below compare the **Clip**, **Loop**, and **Loop & Forward Record Modes**. When the explanation of the examples refers to a tag, it means to send a tag command through the Web Programmable HTML/XML interface.

In these diagrams, with the recorder in Record Standby mode, we show video recording done in a 10 minute period between starting recording and stopping recording. The green area on the timeline indicates what video footage is actually captured.

In all three examples, the **Tag** command was sent three times: at 00:02:06, at 00:05:54, and at 00:07:50. The examples show how the results are different in all three cases.

The **Loop Record Time** is set to 30 seconds.

#### Clip Method



Using the Clip Record Mode, recording starts when a record start command is sent and runs continuously until a record stop command is sent. This is exactly the way a standard video recorder works. In addition, each time the Tag command is sent, a tag is recorded, for later editing use.

#### Loop Method



Using the **Loop Record Mode**, recording starts when the **record start** command is sent, but the captured video isn't saved until a **tag command** is sent. When a **tag command** is sent at 00:02:06, a set of three short clips, called **loops**, are saved, one for each segment indicated in green around that tag. When a **tag command** is sent at 00:05:54, another set of loops is saved, and finally, when a **tag command** is sent at 00:07:50, a third set of loops is saved.

When in the **Loop Record Mode**, sending a tag command causes a set of loops to be saved, but it does NOT put a tag on the video. Each loop is saved as a separate, untagged clip.

#### How loops are defined

You may have noticed that the saved clip isn't always aligned exactly the same way with the clip. This is because of the way the **Loop Record Mode** captures the loop clips.

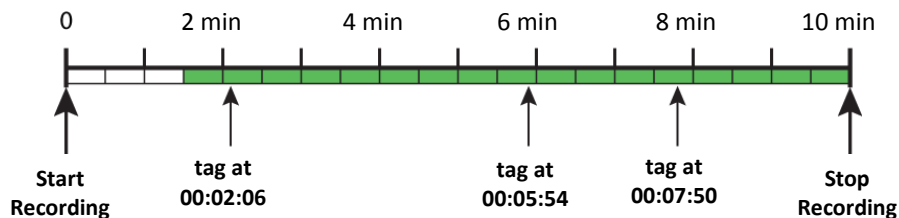
When the STREAM begins recording using the **Loop Record Mode**, it gets the Loop Record Time—30 seconds in this example—and begins recording a segment of that length. When that segment is complete, it is saved temporarily, and another segment is started. The drawings show the time line divided into 30 second chunks which correspond to the recorded segments for this example.

When you a **tag command** is sent to save a loop, the STREAM saves the entire segment you're in right now plus the segment that immediately precedes it and the segment that follows it. This means that if you a **tag command** is sent just after something exciting happens, you will capture what happened immediately before the tag. When using the **Loop Record Mode**, you don't need to anticipate what's going to happen in order to catch everything. Loop lets you catch things after the fact. Because the **Loop Record Mode** also saves the segment immediately following the current segment, if you hit tag near the end of the current clip you will still get one entire segment following your **TAG**.

**NOTE:** Each time you send a **tag command**, the STREAM saves four separate clips. One clip for the segment preceding the current segment, one clip for the current segment, one clip for the segment following the current segment, and an XML file for the tag which created the clips. Each of these is stored as a regular clip file. Nine clip files result from the example above. Also note that there are no entries in the 'tags' directory.

**Loop & Forward** is a combination of the Loop and Clip methods. When you start recording video is captured, but none of it is saved until the first time you send a **tag command**. At that point, the STREAM saves a loop just as it would in Loop, but from that point forward, all video is saved, as it would be when using Clip.

#### **Loop & Forward Method**



Once you have sent a Tag command to start saving captured video, sending a Tag command again adds a tag to the clip, again as it would if you were using clip.

Loop & Forward allows you to record using the Clip method, without starting the clip until the actions start. You can get everything set up, and get yourself over to the starting line without the need to record fifteen minutes of waiting time which you're going to want to edit out later anyway. When the starting gun is about to sound, send a tag to the camera and real recording starts.

Notice that when you do start to capture video, some of the preceding action is captured just as it is when using the Loop method. This helps ensure that you capture all the action even if you don't remember to hit Tag until right after the start. Just remember to set the Loop Record Time to a large enough interval to make sure you're covered.

**NOTE:** Loop and forward creates two clip files, one for the segment immediately preceding the current segment and one for the current segment plus all of the remaining video. Two clip files, the XML tag file, and the two tag clip files result from the example in the Loop & Forward illustration.

The first clip file in the DCIM directory is the segment that precedes the first tag, and the second clip file which starts 30 seconds later is for the remainder of the video. Notice that there are two tag files. The first time a **tag command** is sent it started the storage of the video but did not create a tag clip. The second and third time a **tag command** is sent it did create tag clip files and they are associated with the second main clip file. All three of the tags are recorded in the XML tag file.

## Choosing a Record Mode

**Clip** – Loop and Loop & Forward provide advantages under some circumstances, but generally, recording using the Clip method is the simplest and most effective approach. Using tags while recording with the Clip method allows you to identify significant events in the video. These tags or book marks may be used for manual editing at this time.

For any recording that will last only a few minutes, there is no reason to use any method other than Clip.

**Loop & Forward** – Loop & Forward allows you to get set recording, but allows you to limit your pre-event video to just that video prior to the initial tag. It guarantees a minimum amount of pre-event video. This feature uses the **loopforwardtime** to determine how much pre-event video to keep.

**Loop** – Every time you send the tag command through the Web Programmable HTTP/XML interface, you will end up with a short clip that captures the action near that tag along with the previous loop clip and the following loop clip if they exist.

## Optimizing video quality

Ultimately video quality is in the eye of the beholder. We can measure and adjust clarity, color accuracy, color depth, white balance, contrast, and all kinds of other things to make the video you take to look as good as possible to you and your friends. The STREAM includes both automatic controls that ensure high quality video under a wide variety of shooting conditions and manually adjustable settings for tweaking video quality.

One of the most difficult problems with hands-free POV video is that the scene you're filming changes continuously and since you may be busy hanging on and going as fast as you can, the camera needs to take care of the second to second details.

The STREAM has built-in dynamic exposure control and white balance logic that constantly adjusts, not just the exposure, but the white balance, contrast level, and color depth as well. Under almost any outdoor shooting conditions this results in high quality video.

The STREAM adds four settings that give you the optional ability to tweak the frame processing logic to create an optimal match between prevailing conditions and your preferences for the look of the final video. You can shoot high quality video all day without ever thinking about these settings, but under certain conditions, using the video adjustment settings can produce even better results. With just a bit of practice even a novice can learn when and how to make beneficial adjustments. If you're familiar with the adjustments available on a DSLR still camera, you will already know about these settings.

### Exposure Zone

The dynamic exposure control logic works by analyzing the light level and other key characteristics of the image in frames as they are captured by the camera head, and then adjusting the exposure level of the imager in the camera head to compensate for changes in light levels. When you ride from sunlight into shade, the STREAM will automatically increase the exposure level to compensate.

By default, the dynamic exposure control logic looks at all the pixels in the frame, which is referred to as **full-frame exposure zone**.

**Full frame exposure zone** is generally the best overall strategy, but under some shooting conditions this approach requires possibly undesirable compromises because different areas of the scene may have significantly differing lighting. The solution to this is to measure the light level on just the area of greatest

interest to ensure that it is recorded optimally, allowing peripheral areas to possibly be somewhat over or under exposed.

**Spot Exposure Zone** uses just the area in the center area of the frame for measuring the light level. Under conditions where the light levels in various parts of the frame vary greatly over time, this ensures that the area in the center of the frame which is normally the area of greatest interest, will be optimally exposed and balanced.

For example, on a ride through dark woods on a bright day, you will move in and out of shadow, and bright patches of sunlit sky will appear at various places on the frame at random times, possibly even when most of the scene is in dark shadow. Using the **Spot** exposure window will prevent these peripheral bright areas and very deep shadows from having any unwanted influence on the exposure control applied to the camera's view of trail immediately ahead of you.

### **Exposure Time**

Exposure Time allows you to shift the exposure level up or down from the level determined by the dynamic exposure control logic. Exposure time settings provide exposure flexibility similar to manual adjustment of the f-stop settings on a DSLR camera.

Exposure Compensation can be to values in the range 5 to 120 micro seconds. A setting of 5 microseconds will allow very little light into the sensor and may be under exposed or very dark, depending on your setting. A setting of 120 microseconds will allow maximum light into the sensor and may be over exposed or washed out, depending on your setting.

Exposure Compensation is most useful under extreme lighting conditions.

On a very bright day, with the sun high in the sky, when shooting over snow or open water, the recorded scene may be too bright and may look washed out and lacking rich colors as a result. Adjusting Exposure time down will reduce the exposure and can provide better color contrast and a richer look.

In this case, you might also choose Spot exposure zone so that if the sun gets into the top of the frame, it doesn't cause radical changes in the automatic metering.

On the other hand, if the sun is low in the sky and you are generally headed toward it, the sun may get nearer to the center of the frame, and when it does, it's brightness will override the rest of the scene, making everything else too dark. Setting Exposure Time to a higher level (even though this may seem backward) will provide better exposure for things in the foreground. The sun will be overexposed no matter what you do, so in this case you need to adjust for the things you want to see more clearly.

### **Noise Filter**

The Noise Filter can reduce the amount of noise—unwanted small spots or speckling—in the frame. Speckling is especially apparent when shooting in very low light which requires maximum exposure levels.

The Noise Filter is either on or off. When it is on it removes small specks and reduces larger ones on a frame by frame basis. The default is ON.

The Noise Filter is most appropriate when shooting in low light, especially if you are using Exposure Compensation to add exposure to the shot. Under those conditions, speckling can become intrusive.

Noise Filtering also increases the amount of footage that can be stored on a given Micro SDHC card, because, by eliminated random spots of color, it makes it possible to achieve a high level of compression without reducing video quality.

### **Sharpen**

The Sharpener enhances clarity by selectively increasing contrast along the edges of objects in the frame.

The Sharpener is either on or off. The default is ON.



Sharpening is most appropriate in lighting conditions that create a flat look to the frame because of lower than normal contrast. Gray overcast skies, deep shade, or indoors with indirect lighting can create this kind of situation.

Sharpening does not affect video compression, so the video file size will be roughly the same with sharpening turned on or turned off.

Sharpening should be turned off if you intend to edit the video on a computer after shooting because the adjustments made to the images by the sharpening process may interact poorly with other effects applied in later editing.

### **Image Quality / Data Rate**

When captured video is saved to the Micro SDHC card, the video data is compressed in order to significantly reduce the required amount of space on the card. The more that digital video is compressed the more likely it is that on playback a viewer may notice some loss of fine detail, general sharpness, or other effects.

Whether or not higher compression produces any noticeable effects depends upon on number of factors: what is being shot, lighting conditions, rapidity of movement, and other things. In addition, compression effects are much less likely to be noticed if the video is played back in a smaller format. If you play back your video in a window on a personal computer or downsize it for uploading to YouTube or some other sharing site, higher compression is much less of a consideration than if your target is play back on a large, full resolution HD television screen.

Higher compression is really only a consideration if you are shooting video that may overrun the capacity of your Micro SDHC card or the bandwidth of your Wi-Fi or streaming connection.

The best way to determine what is for you the best tradeoff between file sizes and picture quality is to try it and see. Record some video at the default data rates and then some similar video using higher or lower data rates. This testing will give the most reliable results if you do it under conditions that are like the conditions where you do most of your shooting.

### **Micro SDHC card choices**

The STREAM captures high quality HD video and is capable of recording at a high bit rate. Because of this VIO recommends minimum Micro SDHC card classes for use in the STREAM. The class of a Micro SDHC card should be printed on the card label, and should be on the Micro SDHC card's packaging or catalog description.

The Micro SDHC card class is normally displayed like this:



- For recording video at Image Quality levels up to 12 Mbits/sec, use Class 6 or higher Micro SDHC cards. The card class does not guarantee a minimum throughput rate, so as the card gets full if you are dropping frames, you may want to switch to a faster card. Each vendor's performance may vary so when in doubt, go with well-known card brands (such as Sandisk) and higher card class capability.
- For recording video at Image Quality levels any higher than 12Mbits/sec use Class 10 or higher Micro SDHC cards. These higher data rates may work up to 13 Mbits/sec.

The STREAM has been tested with Micro SDHC cards from SanDisk and Lexar. Other brands with the appropriate class level should work as well, but have not been verified by VIO in this device. The Stream has more streaming capabilities, and if you are having an issue with frames dropping, consider turning off your simultaneous streaming video when recording at your more challenging data rates.

## **Overlay**

The overlay settings give the integrator the freedom to choose the overlay options they would like. Text height options include 24 pixels, 48 pixels, and 96 pixels. The overlay requires an x pixel location, y pixel location and an overlay text pixel height. The x and y location indicate position to place text. The overlay functionality and API are being finalized and more detail will be available soon.

## Camera Access

Accessing the stream is as simple as connecting to its Wi-Fi signal and sending it commands through a browser or the HTTP/XML interface. This open interface also means that if you are on a shared network, anyone else with access to your local network can also connect to your camera and view your streaming video or send commands. To help protect access to the camera, we have provided a user id and password. Once the user id and password are set, all requests to the camera must first be authenticated. Removing the user id and password are as simple as entering an empty string for the user id and password. In addition, if you are using Wi-Fi, you may wish to change the default password to something you create, however, once this is done, you will need to remove your Wi-Fi camera profile and re-connect with the new password.

## Battery Choices

The STREAM battery end cap uses a rechargeable Lithium Ion battery. It is a 3.7 Volt, 1800 mA battery and it should be used only with a compatible battery charger. It is designed to last roughly 2 hours of battery life, however, this will vary based on settings (higher resolution and data rate will have lower battery life). Please contact us if you have other battery life needs. Other batteries may be used with the USB end cap. Many USB batteries are available commercially. The Stream should work with batteries that have a 5V, 600 mA to 2 Amp Output.

Each type of battery has advantages and disadvantages when used in the STREAM. The camera battery level indicators have been tailored to the battery provided in the battery end cap so other commercial batteries would need evaluation for battery level detection/reporting.

As with all Lithium batteries, the Stream's Lithium Ion battery has a limited temperature range.

### **Battery Details:**

- Rated battery voltage: 3.7 V
- Rated capacity: 1800 mAH
- Limited charge voltage: 4.2 V
- Charge time: 6 Hours
- Standard charging: 0.2C, 360 mA
- Max Charge Current: 1800 mA
- Max discharge current Continuous : 1800 mA
- Charging temperature: 0~45°C
- Discharging temperature: -10~60°C
- Weight: Approx 40 g
- Cycle life: 300 times, capacity≥80%

## Troubleshooting

### **USB device not recognized**

If you are using a Stream with the USB end cap, and it is not being recognized, please check the following items:

- Is the RNDIS/Ethernet gadget driver set up properly to talk to 172.16.197.198 in your network settings?
- Is your Stream connected to the USB 2.0 port and powered on (remember to wait about 25 seconds after power on to try to access the Stream and access it via 172.16.197.197).

## **RNDIS driver not found**

If an RNDIS driver is not found, you can usually find an RNDIS driver in one of the following places:

- CD's for your Operating System
- Support web site for your operating system

## **Streaming issues**

If you are having trouble viewing your stream on a viewer on your PC, Mac, or embedded system, try one of these things:

- Try to use a lower streaming data rate through evaluation of the many sensor/recording/streaming data rate combinations.
- Try to increase the size of your cache if your viewer has this capability.
- Some viewers are better than others – try an alternate viewer.
- Make sure that the sensor and streaming have been started and are both running.

## **Recording issues**

If you are having a problem where your recording is stopping prior to your expected recording stop, please ensure that you are using a high end Micro SDHC card. SD card capabilities vary drastically between card vendors.

Minimum card capabilities declared are often misleading, as they are measured/guaranteed only as clean card serial sector writes. Most file systems do not operate this way. Our recommendation is a minimum of a class 6 Micro SD card. If you are having issues, try a Class 10 card to determine if it your card's capability limitations.

## **Streaming delays**

The streaming delay will vary from viewer to viewer, depending on the settings the viewer uses as a default for caching, etc. The free video players are continuously being updated. Multiple options exist, each with pros and cons. The camera stream delay is currently less than 2 seconds. Additional delay may be introduced by the viewer. As of this release, KM player performed well both with 1080p high data rate streams and had the least delays introduced with longer stream times.

## **Access point connection issues**

***Ensure that there are no Ethernet/Wi-Fi conflicts on your PC or Mac –***

Check to make sure that if you are connecting to the camera as an access point, the Ethernet is not also connected to your computer. While this may work, it can sometimes cause confusion in the operating system causing loss of connection with the camera.

## **Wi-Fi Client Mode connection issues**

Ensure that your SSID, password, and encryption type are correct. If any of this information is not correct, a connection will not be completed.

## **Power Loss**

When power is abruptly lost (through yanking the battery / power during record), the file in progress will likely be recoverable at next power up, but may not be in all cases. In most cases, the power loss recovery code should recover most of the recording in progress. The last 1.5 minutes may be lost. Power loss recovery happens on the next power up. If a file is recoverable, it will be recovered at this time.

## Compliance, Warranty, and Support

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### FCC Compliance

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.

The STREAM has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

NOTE: EXTREME TECHNOLOGIES IS NOT RESPONSIBLE FOR ANY CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the STREAM Camera.
- Increase the separation between the STREAM Camera and receiver.
- Consult the dealer or an experienced radio/TV technician for help.

### Limited Warranty and Disclaimer

V.I.O. warrants its Product against defects in material or workmanship for 1 year from date of purchase unless otherwise specified. V.I.O.'s Product warranty is limited to the replacement or repair of the defective item at no charge if we determine such item to be defective. If the Product unit is replaced, it will be replaced with a new or, at our option, refurbished Product unit. This limited warranty shall not apply to any Product item subject to misuse, including static discharge, failure by Buyer to follow instructions, product modification, ordinary wear and tear, negligent or improper operation, or which have been installed or soldered or altered during assembly or use and are not capable of being tested or resold. Modification, repair, or attempted repair of Product by anyone other than V.I.O. without the written permission of V.I.O. will void this limited warranty. V.I.O.'s limited warranty is also voided on any Product that is found to have an altered or tampered with serial number. Defective items must be shipped by Buyer to V.I.O. prepaid. V.I.O. will ship the return or replacement or refurbished Product item to the Buyer using UPS Ground services. If the Buyer shipped the item to V.I.O. using express services, V.I.O. will match the service level for the return. If Buyer wishes to have the item express shipped to them, V.I.O. will charge the Buyer for the upgraded shipping charges.

EXCEPT AS PROVIDED ABOVE, V.I.O. MAKES NO OTHER WARRANTY TO BUYER, EITHER EXPRESS OR IMPLIED. ANY IMPLIED WARRANTIES AGAINST INFRINGEMENT OR WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED, EVEN IF V.I.O. HAS BEEN ADVISED OF SUCH A PURPOSE.

### Return Policy

Any Product item, other than Special or Custom Orders, purchased from V.I.O. may be returned within thirty days of purchase for any reason for a refund, exchange, or credit towards another V.I.O. purchase. The returned items must be in original condition and packaging. All original warranties, instructions, and

accessories must be accompanied by the original sales receipt. Return freight must be prepaid. No C.O.D. returns will be accepted. V.I.O. may refuse a refund or exchange or assess a charge for used or incomplete merchandise that is returned or exchanged. Items showing use or abuse will be returned by V.I.O. to Buyer. Returns or exchanges will not be made for items marked "as is" or "clearance." Refunds will be made by the same method as used to purchase the item. Refund checks may take up to 14 working days to process.

### **Return Merchandise Authorization**

Return Merchandise Authorization ("RMA") policies are subject to revisions. Contact the RMA Department regarding policies and returns. All returned merchandise requires an RMA number. To obtain an RMA number, contact V.I.O. Customer Service (8am - 4pm EST Monday-Friday) at 906.226.9393. Your RMA number must be clearly marked on the OUTSIDE of the returned package. Packages returned without this RMA number will be refused. Once the RMA number has been assigned, it is important to return the Product within two weeks, otherwise the RMA number will become void and the parcel will be refused. You must obtain a new RMA if you are unable to make delivery to our address within two weeks.

### **Obtaining Service and Technical Assistance**

We want to make sure you have the best possible experience with the STREAM; if you have any questions or need assistance feel free to contact us.

Our web site is: [www.vio-pov.com](http://www.vio-pov.com)

### **Contact us by phone at: 888.579.CAMS (2267)**

Our email is: [customer.care@vio-inc.com](mailto:customer.care@vio-inc.com)

For news, videos, and other updates from V.I.O., please visit our web site at [www.vio-pov.com](http://www.vio-pov.com)