

Live Video Real-time Backup to a Laptop and video transmission too!

A presentation by John Krout



For PATACS+OPCUG
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This topic caught my attention a long time ago

- Back in 2003, my daughters began on-stage performances in **The Childrens Theater** in Arlington VA.
- I was shooting video of their performances in standard-def video onto miniDV tape.
- I had good quality mics on stage and made DVDs of those performances.
- That effort continued through 2011.

The problem with miniDV tape

- Transfer to the computer required connecting the camcorder via Firewire to the computer, and playing the tape.
- A 90-minute recording took 90 minutes to transfer.
- Sometimes I shot multiple performances of theater productions, to capture different angles.
- Sometimes I produced 12 DVDs per year!

The daydream

- While shooting live video, I wanted a way to make a real-time backup to a laptop.
- That would eliminate the lengthy post-production effort to copy each miniDV tape to a computer.
- Also, I wanted a way to transmit live video to the theater lobby, for the parent volunteers in the lobby to enjoy.

Now, all of that is practical

- Even with modern Full High-Defintion (FHD 1080) camcorders.
- Recording on flash memory cards reduces but does not eliminate the time to copy video to a computer.

AGENDA

- Connect a FHD camcorder to a HDTV via HDMI cable
- Adjusting default camcorder settings
- Connect a FHD camcorder to a laptop, using an HDMI-to-USB adapter.
- Use a laptop and free video recording software to make a real-time backup of a live video shoot
- Simultaneously, use the camcorder as a **webcam** for Zoom and other video teleconferencing software

Connect Your FHD Camcorder to an HDTV

Connect a FHD camcorder to an HDTV via HDMI

- Modern FHD camcorders include a **mini-HDMI** output socket.
- Modern FHD camcorders are sold including a **mini-HDMI to HDMI cable**.



- Connect the camcorder to a modern HDTV using that cable, for playback of video recordings.
- Watching LIVE camcorder video on an HDTV is different!

Camcorder viewfinder control icons may show up on HDTV

- Some icons also appear in video sent from camcorder to laptop.
- Visible control icons definitely ruin live video recorded on a laptop.
- Camcorder settings can be adjusted to **remove control icons in HDMI output of live video.**
- **Control icons remain visible on the viewfinder screen.**




Do you need to adjust your camcorder settings?

- Here is a simple way to find out. Connect your camcorder to an HDTV using the mini-HDMI to HDMI cable.
- Start the camcorder in playback mode, with the lens cover open.
- Set the HDTV to display the HDMI input to which the camcorder is connected.
- Perhaps you will see that your camcorder's default setting **does NOT transmit** those control icons via HDMI.







Also test HDMI output to HDTV when the camcorder is recording!

- It may be that Recording mode adds icons or removes icons in the HDMI output.
- Some of the Canon HF R series camcorders that I use include AVCHD recording mode. That mode **disables HDMI output**.
- I have to switch to MP4 recording mode to activate HDMI output while recording.

Adjust Recording format on Canon Vixia HF R series FHD camcorders

- Start the camcorder. On the viewfinder screen, tap the **Home icon** . Four choices appear.
- Tap **Recording Setup**. Two fields appear.
- If the Movie Format field says **MP4**, then you are done.
- If the Movie Format field says **AVCHD**, then tap that field.
- Two buttons appear. Tap the **MP4 button**.
- Exit back to the viewfinder screen.

Remove onscreen icons on Canon Vixia HF R series FHD camcorders

- Start the camcorder. On the viewfinder screen, tap the **Home icon** . Four choices appear.
- Tap **Other Settings** . Three Setup tabs appear: Camera , Display Setup , and System .
- Tap the **Display Setup tab** . A menu appears below.
- In the menu, tap **Output Onscreen Displays**. On and Off buttons appear.
- Tap the **Off button**. Exit back to the viewfinder screen.

Consult your camcorder manual

- Download the manual in PDF form from the camcorder maker's web site.
- You can use Acrobat Reader to search the PDF for keywords such as HDMI or icon or displays.
- That search process may be much faster than browsing the table of contents or the index if any.

**Connect your FHD camcorder
HDMI output to a laptop**

Connect your camcorder to a laptop

- Many laptops include an HDMI output port. Do not assume that is a two-way port.
- Laptops do ***NOT*** include an **HDMI *input* port**.
- **Adapters** are available to convert HDMI output from a camcorder to USB for input to a computer.
- Adapters are powered by USB power from the computer, so make sure you connect to a ***powered*** USB port.

Adapter examples

- The **JVA02** adapter, made by J5create, is available for about \$50.



- The **Cam Link 4K** adapter, made by Elgato, is available for about \$120. This adapter is compatible with FHD and 4K resolution video.



- The **Inland 1061** adapter is available for about \$15.



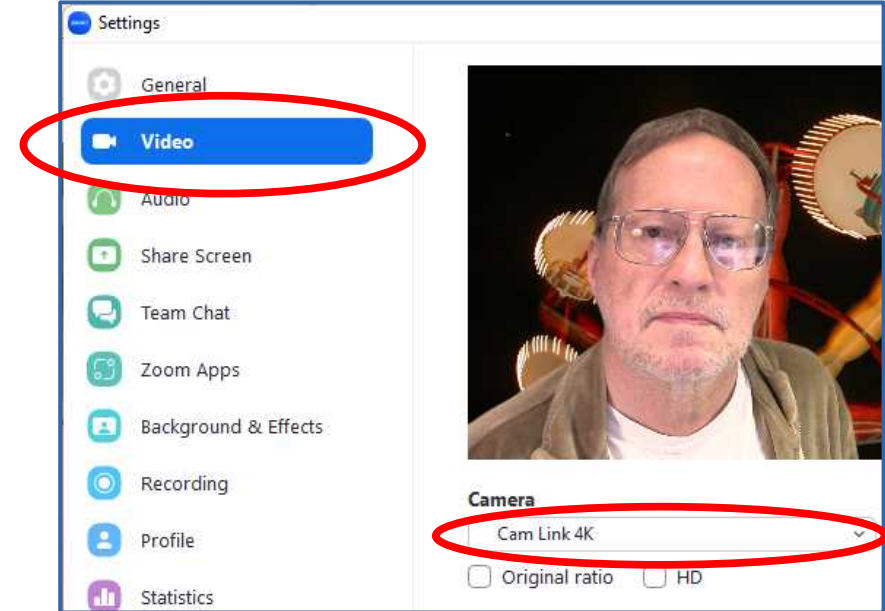
You Get What You Pay For

- SPEND MORE TO GET AN ADAPTER THAT WORKS INITIALLY AND IS RELIABLE IN THE LONG RUN.
- The Inland 1061 device failed as of my second test. It captured audio but the video was flat black.
- Another \$15 adapter device did not capture video, and showed only a test pattern.
- That second one is sold by many vendors on Amazon for as little as \$10. Those all look like this:



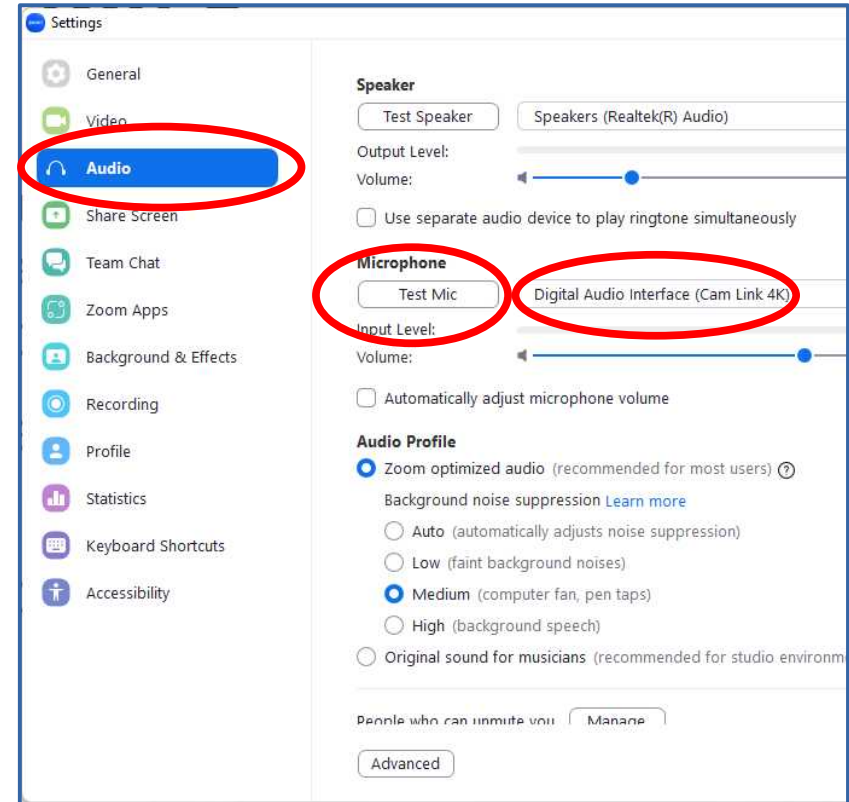
Test HDMI connection to your laptop

- If you are familiar with Zoom, that application on a laptop can be used to test the camcorder, adapter and cables.
- Open Zoom. Tap the **Gear icon** in the upper right corner (not shown). The **Settings window** opens.
- In that window, click **Video**.
- Under the viewfinder pane, find the word **Camera**. Under that word, use the menu to select your HDMI-to-USB adapter.
- If the camera's video appears, then you are good!



Test HDMI connection to your laptop

- Also test to confirm **Audio** from from the camcorder is reaching your laptop.
- In the Zoom Settings window, click **Audio**.
- Set the mic input field to your adapter.
- Click the **TEST MIC** button.
- Say something, and then wait. If you hear your voice via the laptop, then you are good.



Use a camcorder as a webcam


- When you complete those Zoom tests successfully, your camcorder is functioning as a webcam.
- The camcorder has **several advantages** over ordinary USB webcams or webcams built into laptop screens. Laptop built-in webcams are low resolution (1280x720).
- Camcorder autofocus is far more accurate than any webcam. Some camcorders include automatic face tracking.
- The camcorder zoom lens can bring distant subjects close to your audience. Weddings, concerts, plays, graduations.

Video recording software

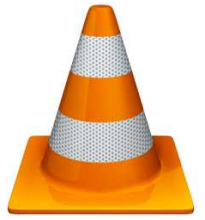
Three different free applications for recording video on a computer

- **VLC**, more than just a media player
- **VideoPad**, a video editor
- **OBS Studio**, a multi-function video application

Free VideoPad video editor software

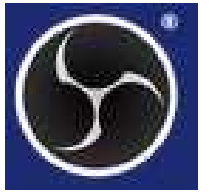
- Available for Windows, Mac and Ubuntu Linux 
- Might be able to record FHD video at 30 FPS. Depends on laptop CPU horsepower and other tasks running concurrently.
- Can be downloaded and used for free from the publisher, **NCHsoftware.com** in Australia.
- Buy a license if and when you need NCHsoftware to provide a ***fast*** tech support response.
- NCHsoftware told me that their **Debut** software cannot record live video *from camcorders*.

Free VLC offers both video recording and streaming



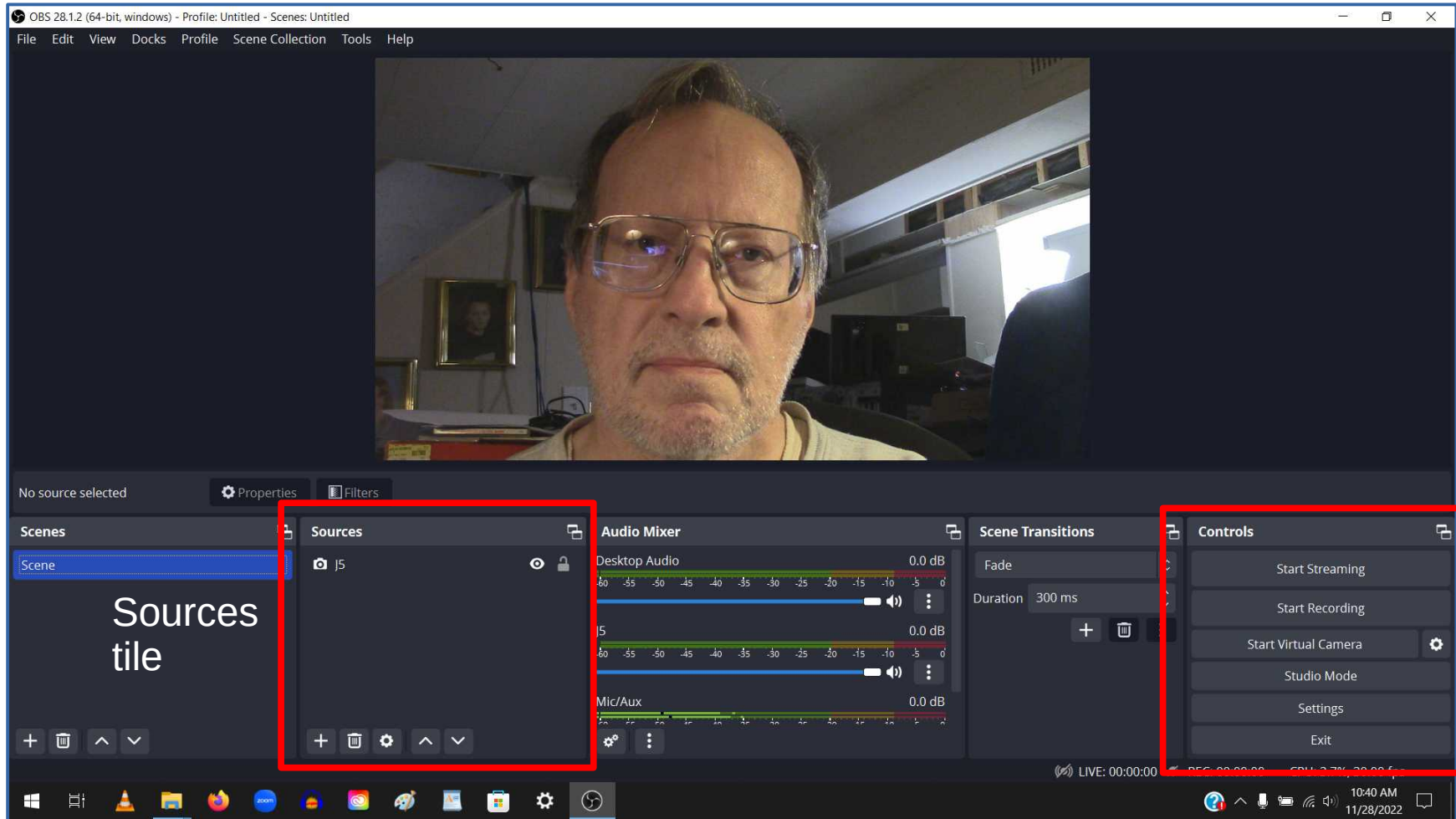
- In most video recording software, the CPU spends most of its time *encoding* the raw video stream from the camcorder to MP4 format.
- When I tried VLC for both video recording and streaming, it slowed down and was unable to do either without jitters (dropouts)
- VLC has one streaming advantage: it lets you stream directly from your computer, so your computer acts as a streaming server.

OBS Studio supports video recording and streaming



- Of the three applications I tested, OBS Studio is the only one that uses a **Graphics Processing Unit (GPU)** for encoding raw video to MP4 format.
- When using the GPU, OBS Studio records camcorder video into an MP4 file with no jitters.
- OBS Studio also is a streaming client, and can stream to web sites such as YouTube and Twitch so your audience can watch using a web browser.
- OBS Studio is **not** a streaming *server*, unlike VLC.

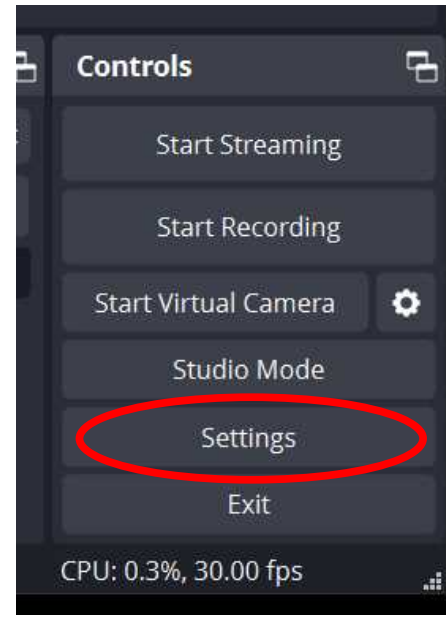
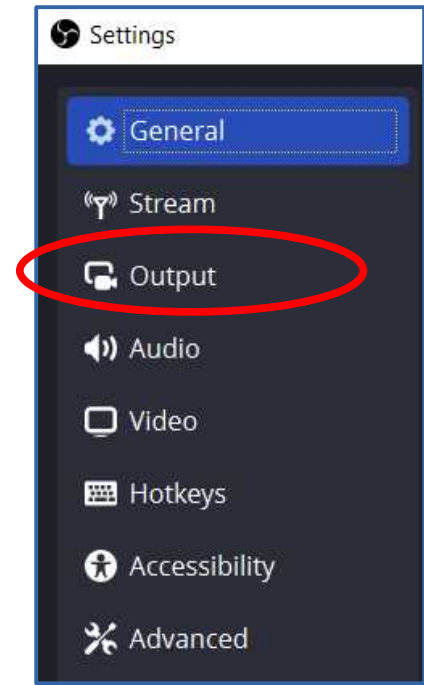
The OBS Studio main window



Controls tile

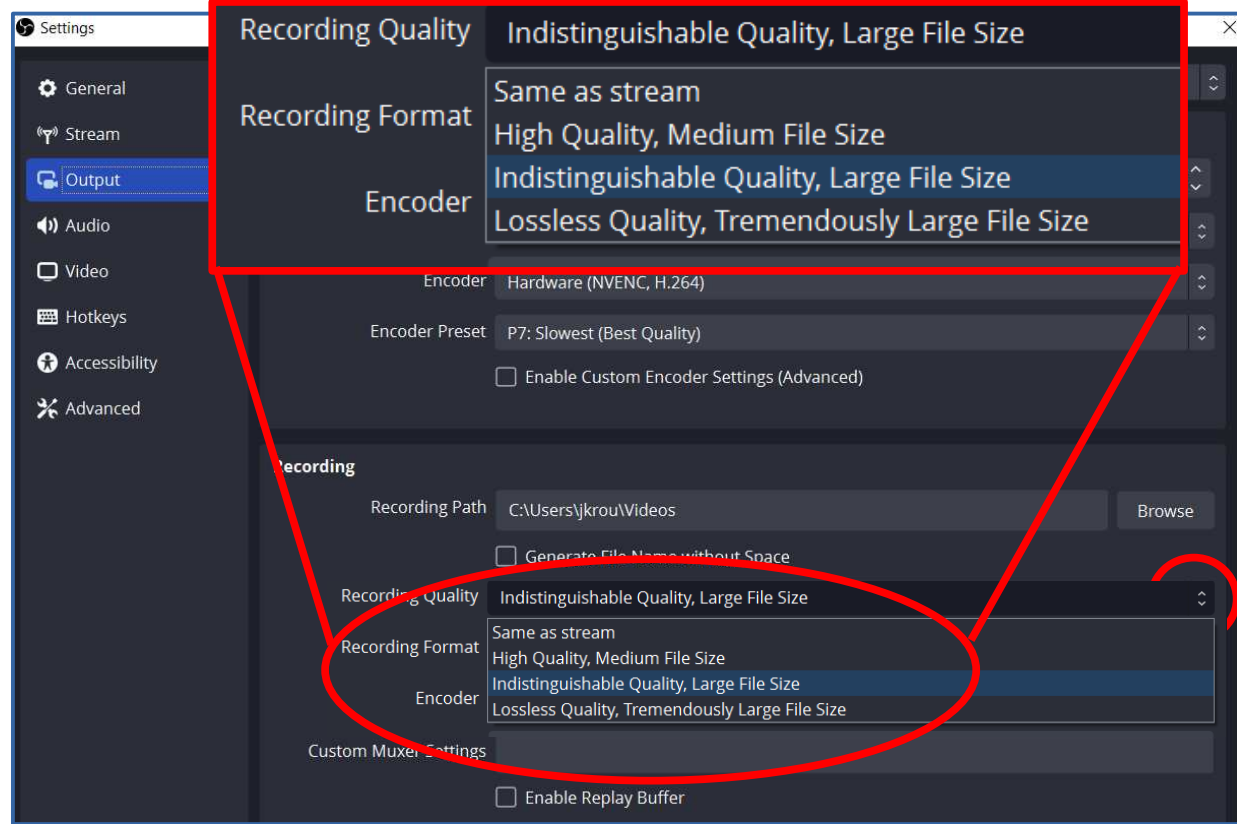
OBS Studio Settings

- In the main window, in the **Controls tile** on the lower right, click the **Settings button**.
- The **Settings window** appears, with several categories listed on the left. The default is **General**.
- Select the **Output** category.



OBS Studio Settings

- These **Output settings** have a tremendous impact on video file and video streaming quality.
- In the Recording pane, click the **Recording Quality** arrows on the right. A menu appears.
- Choose the recording quality that suits your needs.

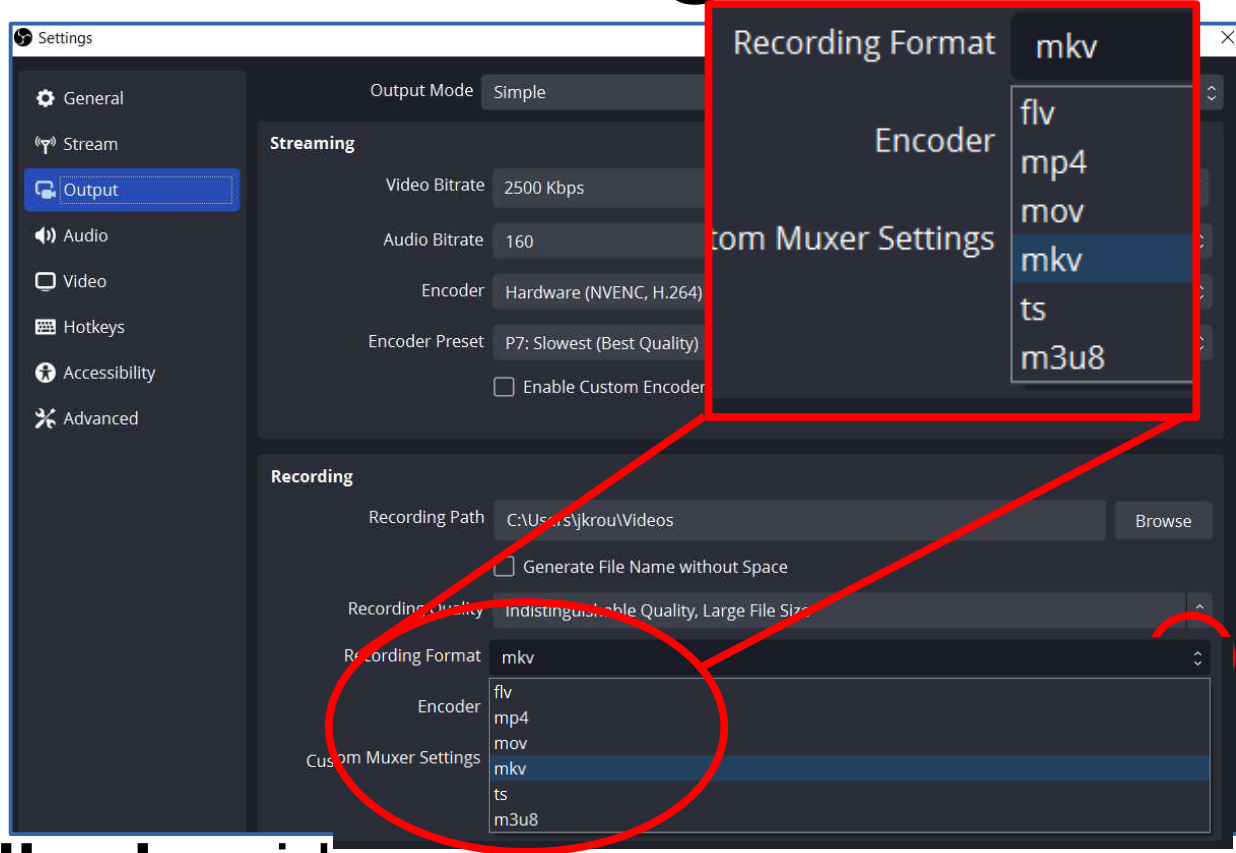


OBS Studio Settings

- The **Recording Format** field lets you choose a video file format.

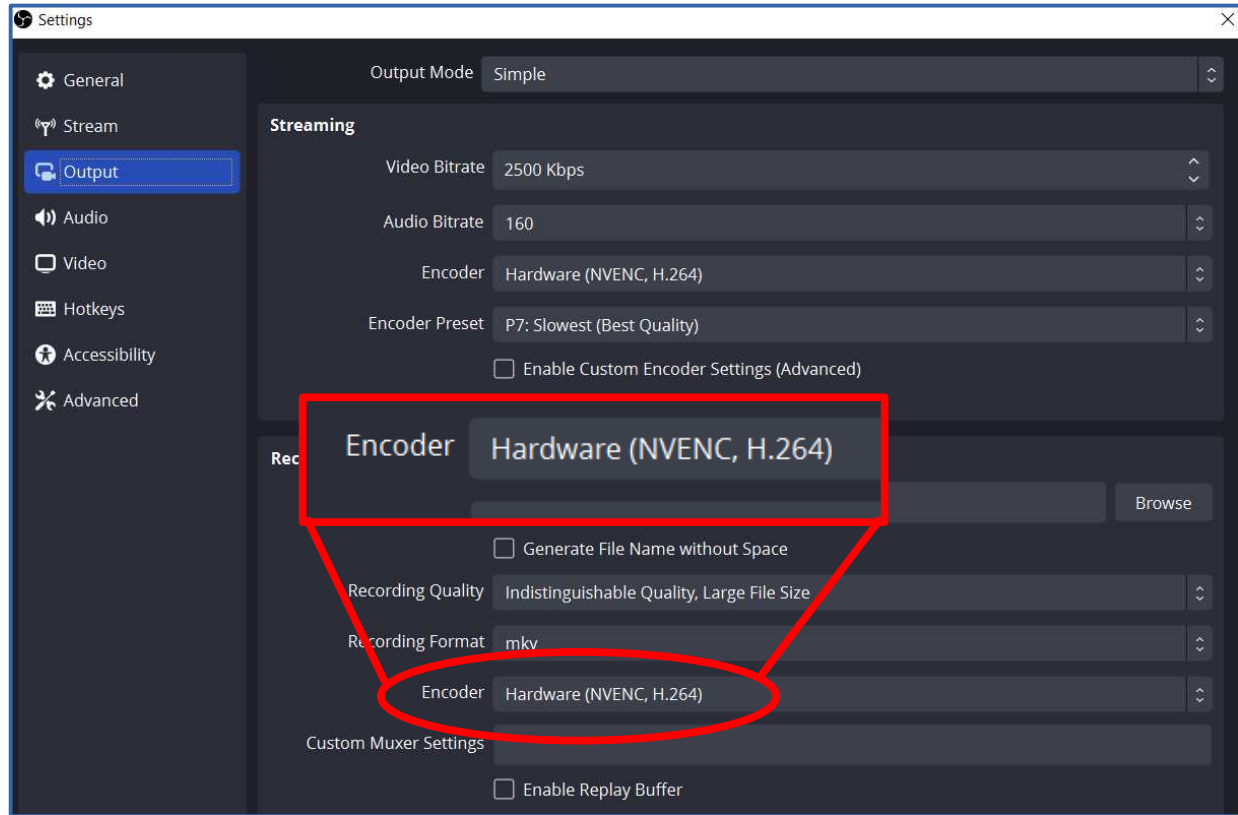
- OBS Studio docs recommend **MKV format**. Minimal impact on CPU?

- Use OBS Studio itself, or the free **Handbrake** video utility, to convert MKV to MP4.



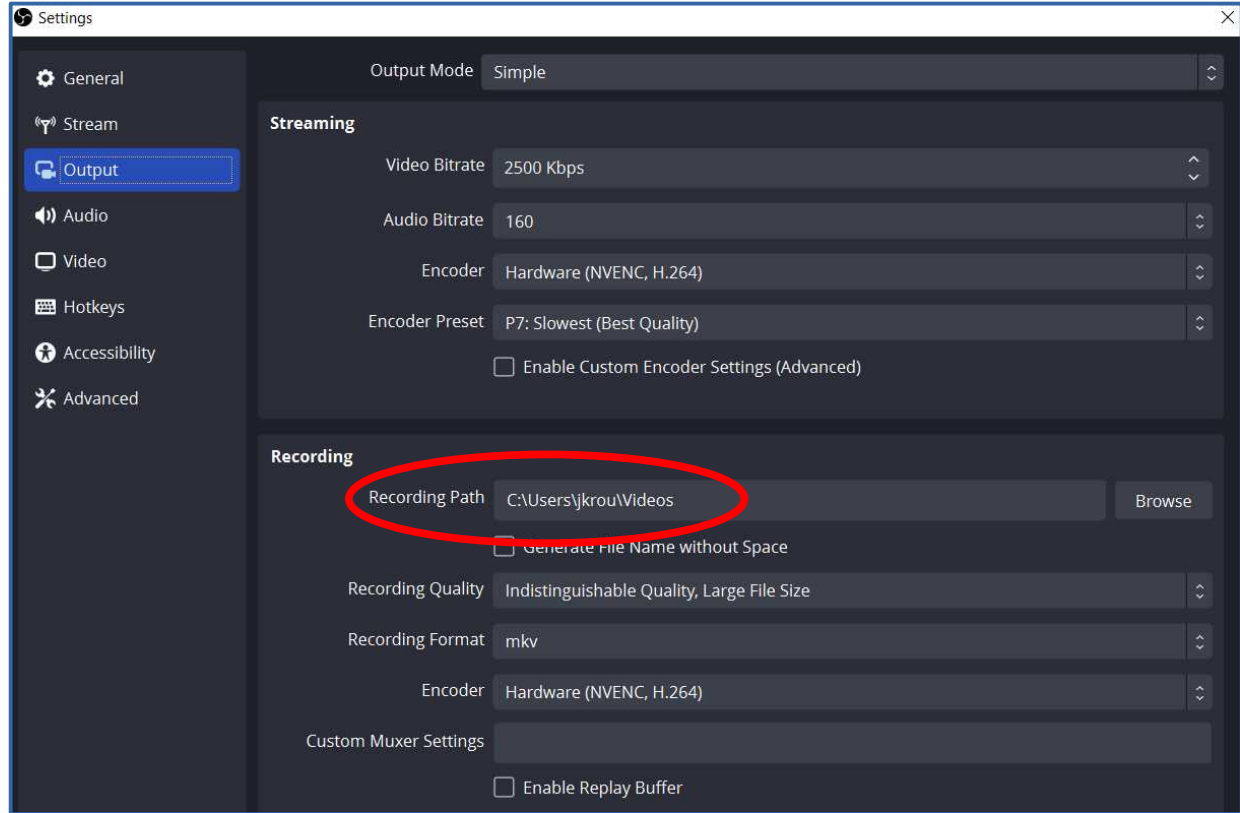
OBS Studio Settings

- Also the **Encoder field** is important.
- If it specifies a **hardware encoder**, that is ideal for recording jitter-free 30 fps video.
- I had no idea what NVENC meant:
NVidia encoder interface.
It allows use of a GPU to encode video, freeing the CPU.



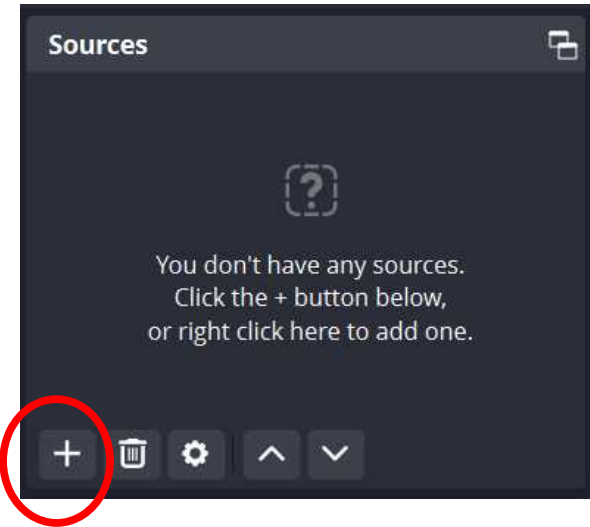
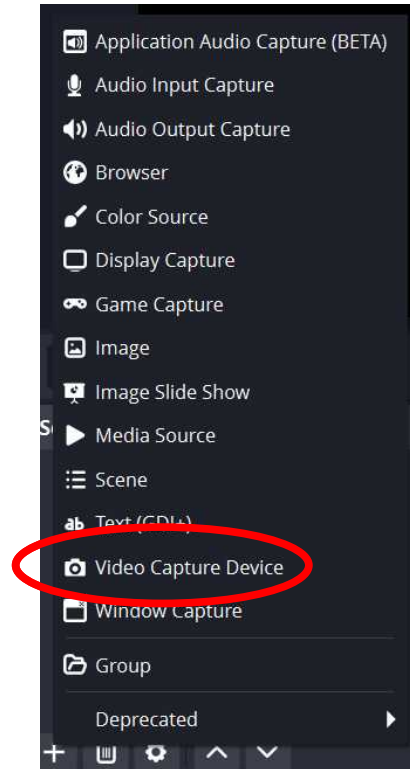
OBS Studio Settings

- The **Recording Path** field lets you specify where the recording file will be stored.
- The default is the Videos folder for your Windows account.
- If you attach a USB flash drive, portable hard drive, or Solid-State Disk(SSD) drive, then you may wish to change to that folder.



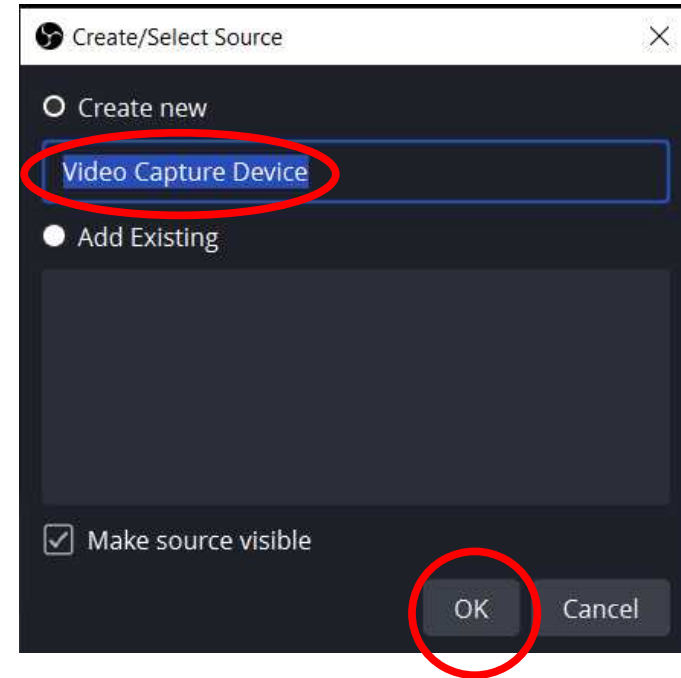
Setup up your Adapter in OBS Studio

- In the Sources tile, initially there is no video source to record.
- Tap the **+** button.
- A menu appears.
- In the menu, select **Video Capture Device**.
- The menu closes.
A new window appears.



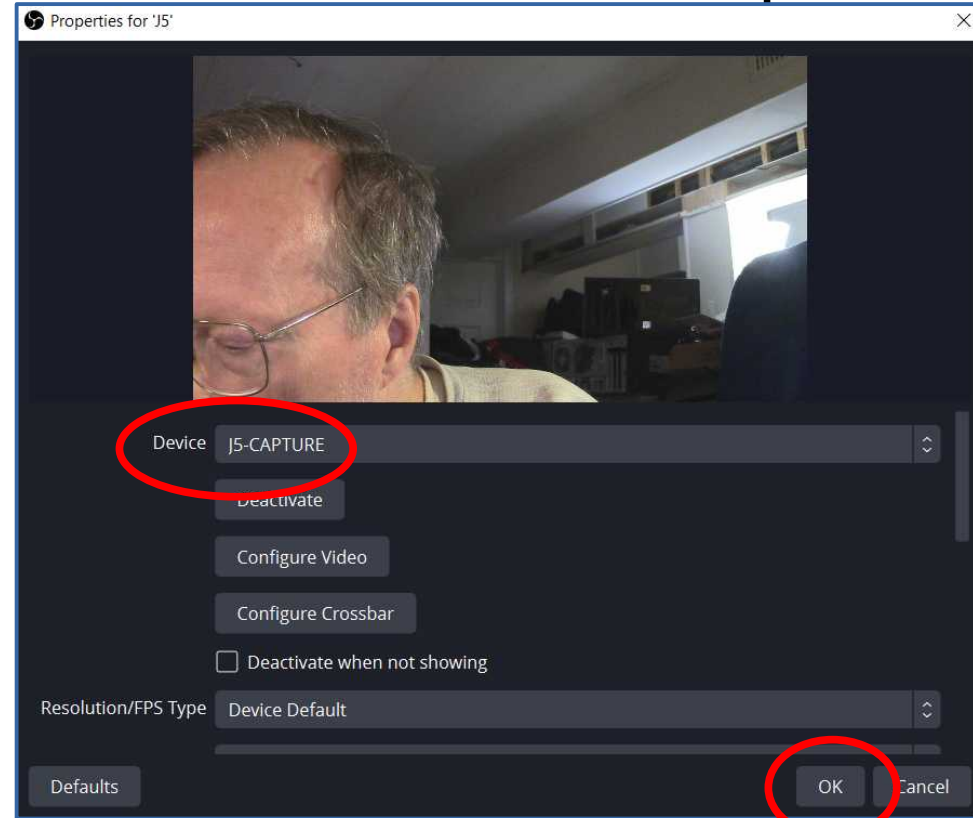
Setup up your Adapter in OBS Studio

- Note the Dark (blue) button color indicates the **default** radio button.
- The **Create new** button is selected by default.
- Click the field below the button. Here you can type a descriptive name for your adapter such as **J5**.
- Click the **OK button**. The window closes.



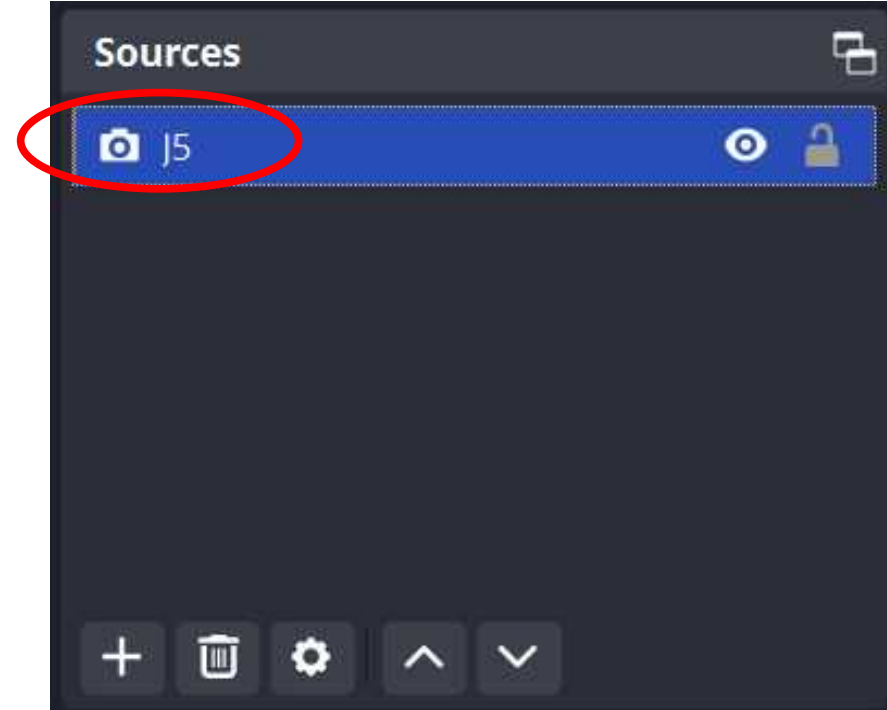
Setup up your Adapter in OBS Studio

- The **Properties for Video Capture Device** window opens.
- The detected video capture product (if any) is filled in.
- Click the **OK button**.
- The window closes.



Setup up your Adapter in OBS Studio

- The video capture device appears in the **Sources** pane.
- The descriptive name you specified is included.
- The blue highlighting indicates the device is now the **default video device** for recording.



Video Recording with OBS Studio

How to Start and Stop OBS Studio recording

- In the **Controls** tile, click the **Start Recording** button.
- Recording starts.
- The button changes to a **Stop Recording** button, with a **Pause** button to the right.
- In Windows, the video is recorded in your **Videos folder by default**. The file name is the current date and time.



Video transmission with OBS Studio

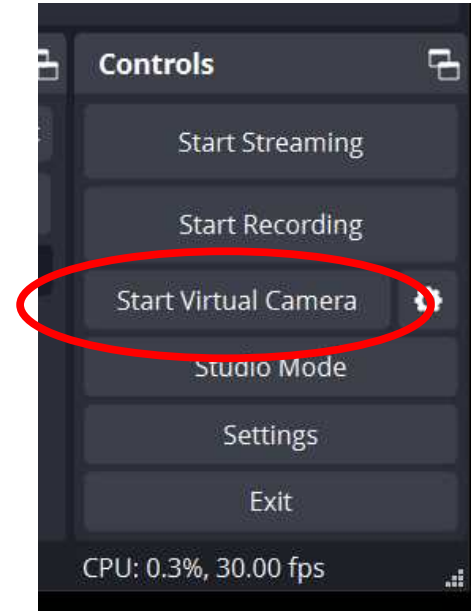
OBS Studio offers two options for transmission

- One option is to transmit directly to **YouTube** or **Twitch** or dozens of similar web sites.
- You must pre-configure OBS Studio to use your account on the chosen web site.
- The second option is to enable the OBS **Virtual Camera feature**.
- This feature provides OBS Studio video to any other laptop application that can transmit webcam video, such as Zoom.

OBS Virtual Camera on my laptop

I ran a test of OBS Studio at home:

- Recording camcorder video using OBS
- Enabling the OBS Virtual Camera
- Joining a Zoom meeting in progress
- In Zoom Settings, selecting the virtual camera, which I found was named **OBS Virtual Camera**



OBS Virtual Camera on my laptop

Test results:

- Zoom on the other computer showed my camcorder video with no digital glitches and apparently full Zoom frame rate (25 fps)
- After I stopped recording on the laptop, I converted the MKV video file to MP4 format, and played the MP4 file.
- The MP4 file showed no digital glitches and visibly smooth action.
- Windows File Explorer Properties for the MP4 file reported 1920x1080 resolution and 30 fps.

Real Life transmission issues

Unknowns on the go

- At school, work, church, or other sites where you might need to record and transmit video, several unknowns can cause problems.
- LAN bandwidth may cause problems.
- LAN security features may prevent transmission.
- If possible, do a test transmission in advance.

Test every unfamiliar LAN in advance

- Some LANs are configured to block live stream transmission, and perhaps even certain video teleconferencing applications.
- If you plan to use local WiFi for transmission, then test that WiFi well ahead of time to discover any transmission issues.
- Use a second laptop or a smart phone as the receiver.
- Also test the available bandwidth, using sites such as **fast.com** or **speakeasy.net/speedtest**.

Remote Audience considerations

- If you aim to transmit to volunteers in the lobby, then explain to them in advance how to receive the transmitted video on a smart phone: Zoom or YouTube or Twitch, for instance.
- Perhaps offer a test transmission in advance so the remote audience can get familiar with the receiver application's use.
- Developing or acquiring a how-to doc, or creating and posting a how-to video online, can pay off repeatedly.

Comparing Zoom and other options

- Zoom is perhaps less likely to be blocked by a local router than other transmission methods.
- YouTube and Twitch methods have one common characteristic: audience voice-chat is not possible.
- Twitch and YouTube permit audience members to chat via text, like Zoom chat.
- Zoom and web based methods such as YouTube are probably the most familiar to your audience.
- Zoom Pro also allows you to stream from Zoom to either YouTube or Twitch. I think of this as overflow seating.

**Software and web sites
mentioned in this presentation**

OBS Studio

- Free to download and use
- Available for Windows, Mac and Linux
- Download from web site:
www.obsproject.com
- Scan the QR code with your computer to go to that web page.



Save now, Scan later!

Windows: WIN+PRTSCR
Stores in Pictures/screenshots

Macintosh: COMMAND+SHIFT+5
Stores in Desktop folder

Linux: PRTSCR
Stores in /home/acct

Handbrake video utility

- Free to download and use.
- Available for Windows, Mac and Linux:
- Download from Web site:
Handbrake.fr



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VideoPad

video editor and live video recorder

- Free for Windows/Mac/Ubuntu Linux
- www.nchsoftware.com/videopad



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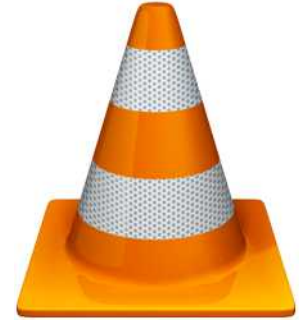
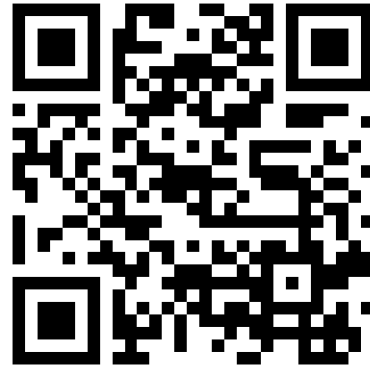
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VLC

for computer audio live-streaming,
receiving live streams, and general
media player

- Free for Windows/Mac/Linux
- www.videolan.org/vlc



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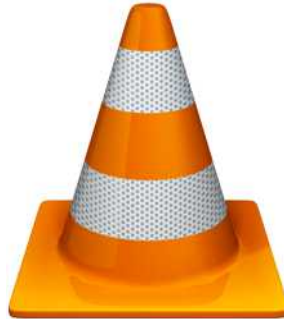
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VLC app

for receiving live streams and general media player

- Free from an app store near you!



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Elgato Cam Link 4K adapter

- The QR code points to the product web page on smile.amazon.com.



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J5create JVA02 adapter

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Bandwidth measurement Web sites

- Speakeasy.net/speedtest



- Fast.com



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THE END