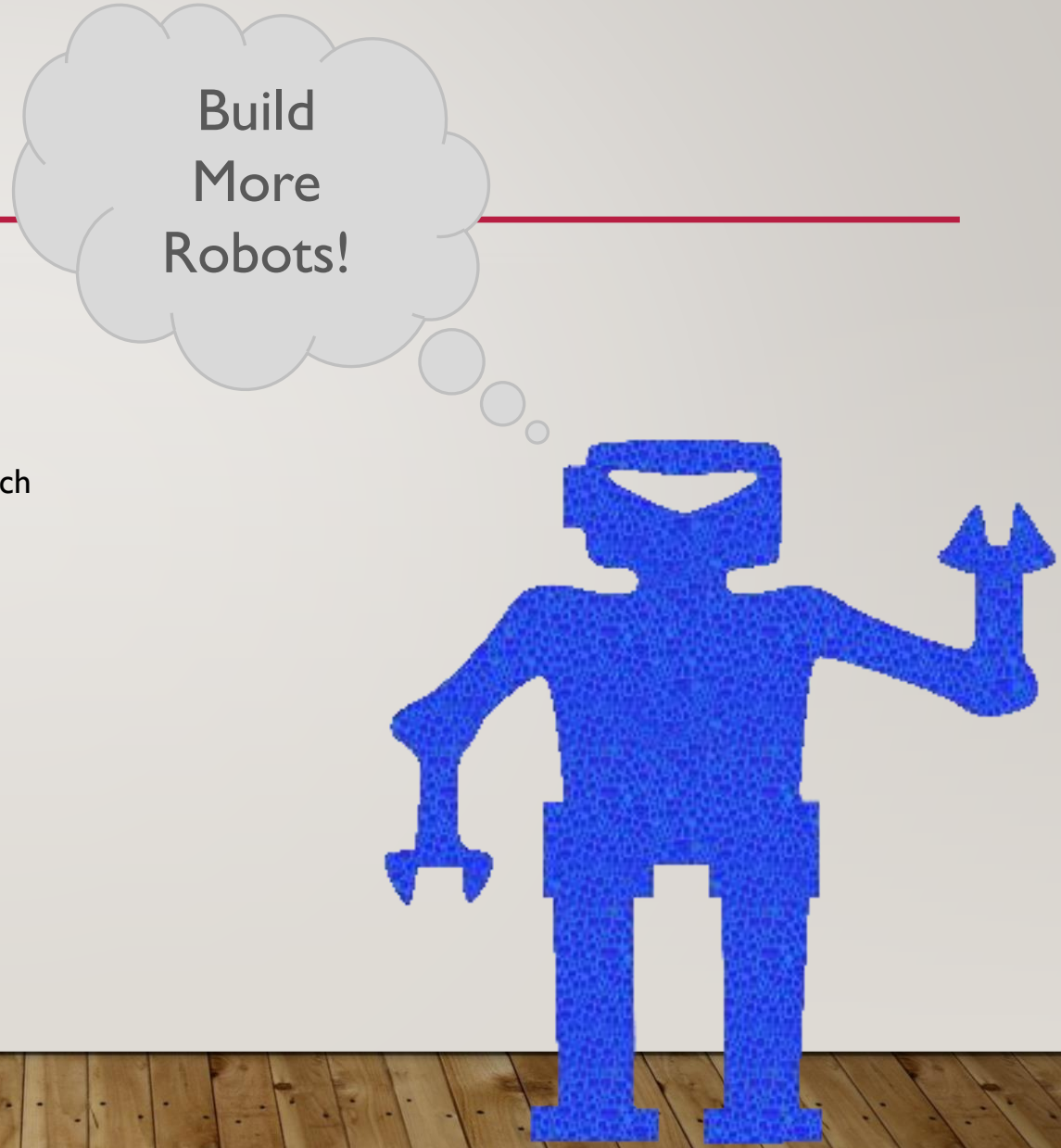
DPRG 2020 SEPT 12

ABOUT DPRG



- Founded 1984
- IRS 501c
- Meet Every Tuesday Night & 2nd Saturday of each month
- Build / Putz Around / Compete / Learn / Community Outreach

Our Quest:

- STEM for all ages
- Programming. Problem Solving & "Putting it all together“
- Sensors. Motors & Microcontrollers
- Fabrication. Cool Technologies & Building Stuff

WEB MEETING BROADCAST & RECORDING TOOLS

Carl Ott

WHY?

- Share Robot Projects!
- Mix & Switch Between Various Views
  - Code
  - Console Output / Telemetry
  - Mechanics
  - Robot In Action
  - Onboard Camera Video Stream
  - Intermedia Video Computations for CV
- Use a better or more mobile camera than your laptop camera
  - Ie. Phone Camera

BASIC PREMISE

Input from Many Sources

- Camera
- VLC Player
- Image
- Text
- Presentations
- NDI Stream
- Audio
- Etc.

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Real Time Broadcast Tools

- Modify
- Mix & Overlay
- Switch Between

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- Etc.

Real Time Broadcast Tools

- Modify
- Mix & Overlay
- Switch Between

Output to Many Destinations

- Virtual Web Camera
  - Zoom
  - Google Meet
  - Skype
- File
- Stream
  - Twitch
  - YouTube
  - Facebook
  - NDI Stream
- Etc.

BASIC PREMISE

Input from Many Sources

- Camera
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Production Control Room

https://commons.wikimedia.org/wiki/File:Celebro_Studios_Gallery.jpg
RuslonV / CC BY-SA (https://creativecommons.org/licenses/by-sa/4.0)

BASIC PREMISE

Input from Many Sources

- Camera
- VLC Player
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- Etc.

Production Control Room

Central Apparatus Room

Output to Many Destinations

- Virtual Web Camera
  - Zoom
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  - Skype
- File
- Stream
  - Twitch
  - YouTube
  - Facebook
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- Etc.

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By bfdingo - Fuji TV, CC BY-SA 2.0, https://commons.wikimedia.org/w/index.php?curid=39769599

BASIC PREMISE

Input from Many Sources

- Camera
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Output to Many Destinations

- Studio Monitor
- Virtual Web Camera
  - Zoom
  - Google Meet
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- File
- Stream
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  - Facebook
  - NDI Stream
- Etc.

Icons made by https://www.flaticon.com/authors/freepik

TODAY- DISCUSS 2 LAPTOP ENABLED TOOL SETS

- Some Overlap
- Some Unique Features
- Interoperable

Full Disclosure

- Learning Curves
- Can Hog Computer & Network Resource
  - Especially on Wi-Fi
  - Especially at 1080p and 4k
  - Yielding confusing behaviors…

OBS
Open Broadcaster Software®

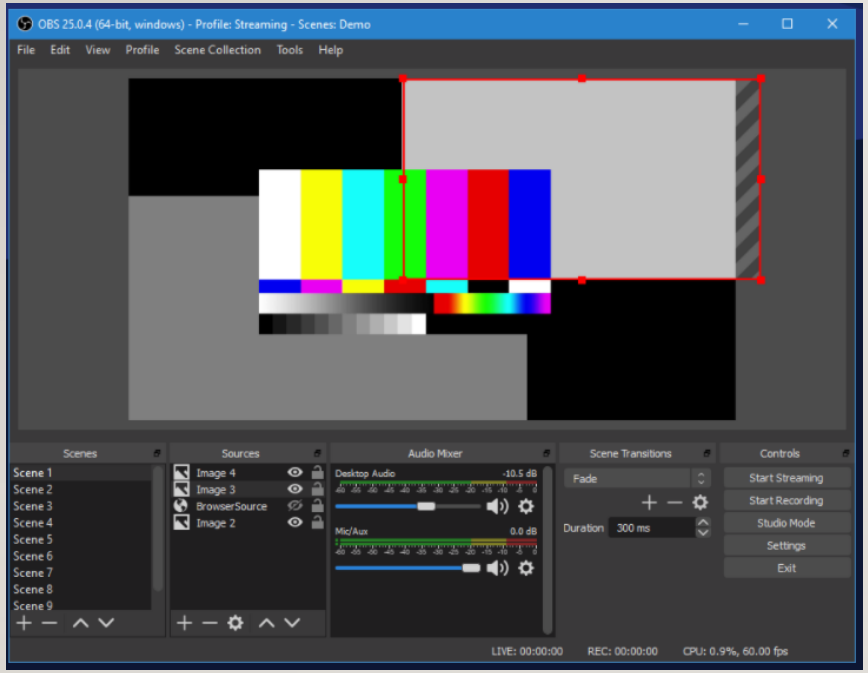
OBS Studio

Latest Release 25.0.8 - April 26th

Windows | macOS 10.13+ | Linux

Free and open source software for video recording and live streaming.

Download and start streaming quickly and easily on Windows, Mac or Linux.



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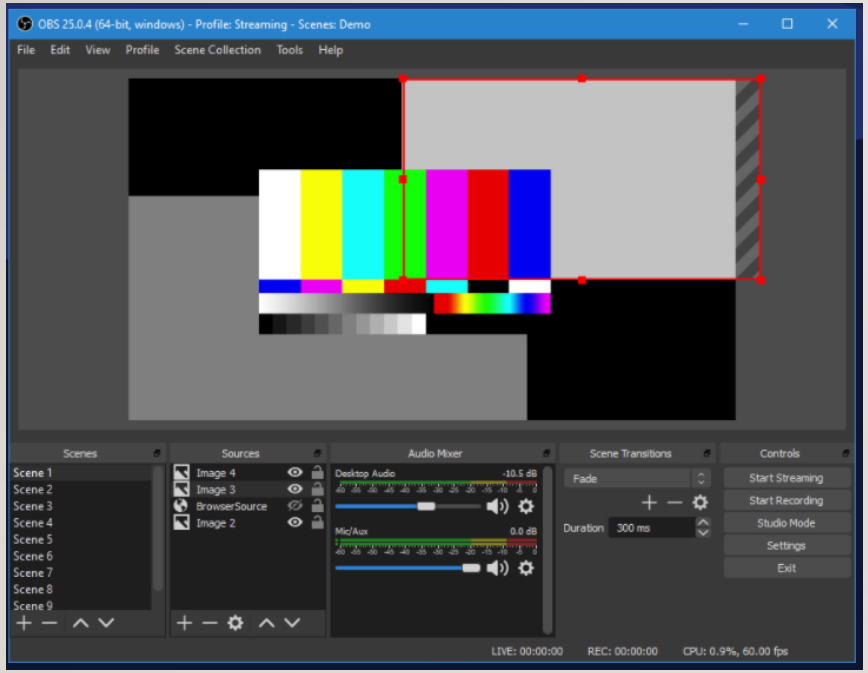
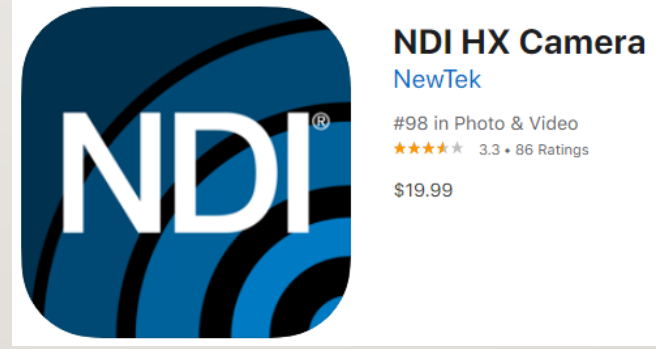
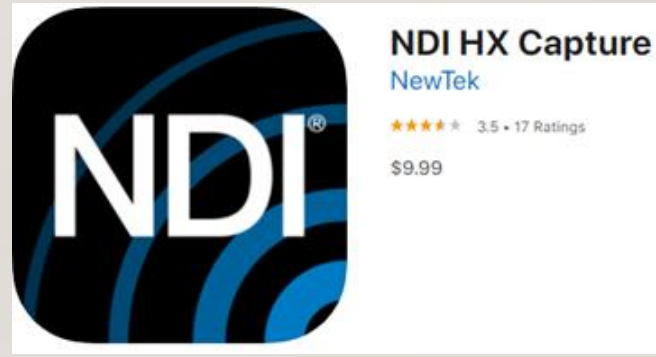
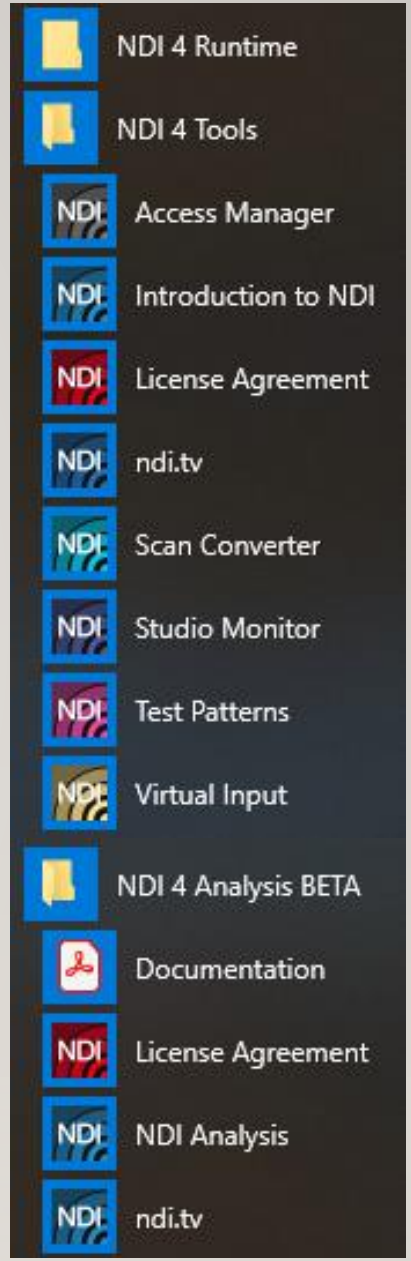


NDITools

Free NDI applications to start using NDI in your production workflows.







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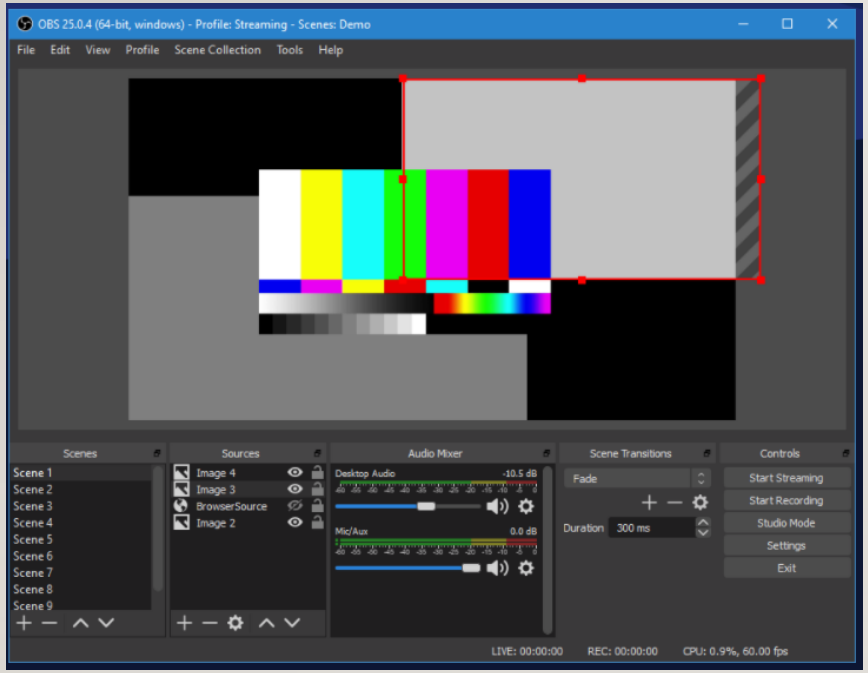
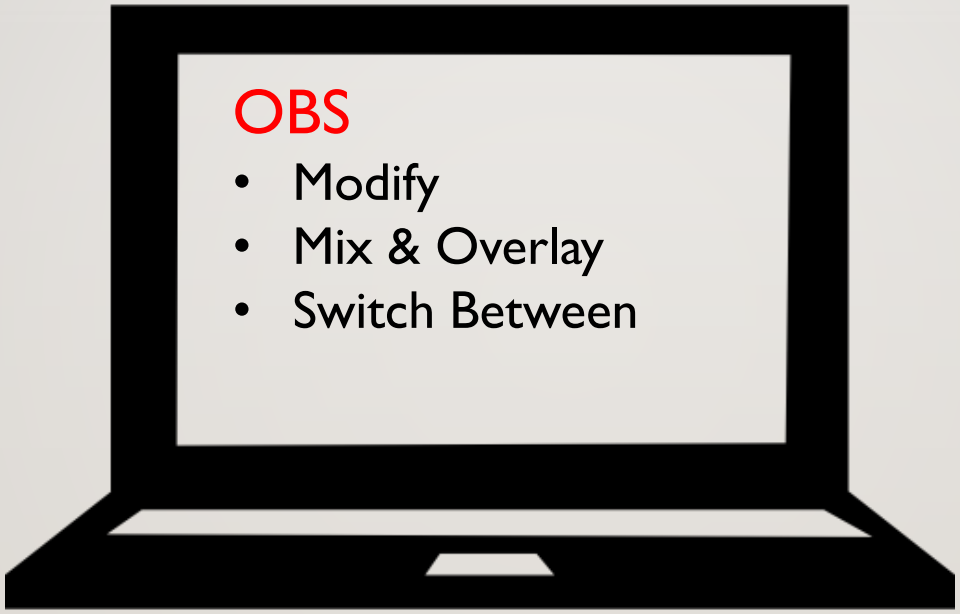


OBS- TOUR & DEMO #1

OBS
Open Broadcaster Software

Input from

- Camera
- Screen
- Text
- Audio



Output to

- Studio Monitor

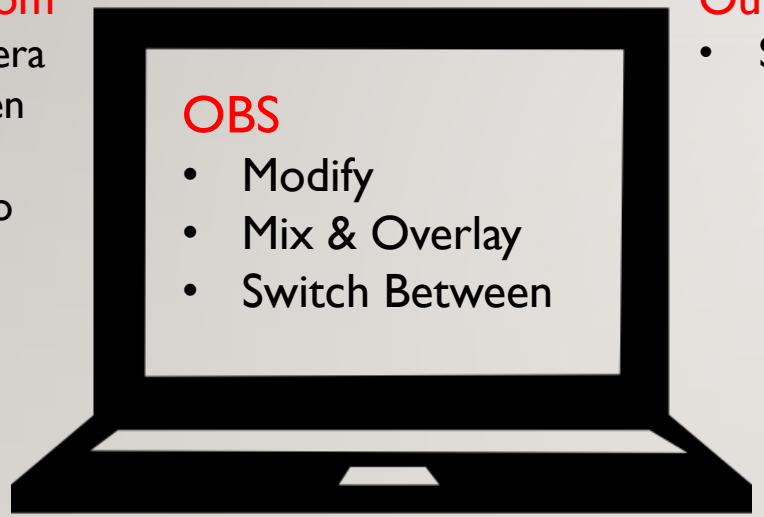
Icons made by https://www.flaticon.com/authors/freepik

OBS- TOUR & DEMO #1

- OBS Concepts
  - Scenes
  - Sources
  - Mixer
  - Transitions
  - Studio Mode
  - Output: Stream/Record
- OBS Demo
  - Output to Google Meet
  - Mix Title Overlay w/ Camera
  - Transition Between Scenes
  - Chroma Key (green screen – but doesn't have to be green…)

OBS- TOUR & DEMO #1 – UNDER THE COVERS

Input from
- Camera
- Screen
- Text
- Audio



Output to
- Studio Monitor

Icons made by https://www.flaticon.com/authors/freepik

FASTEN YOUR SEATBELTS

OBS- TOUR & DEMO #1 – UNDER THE COVERS

Input from
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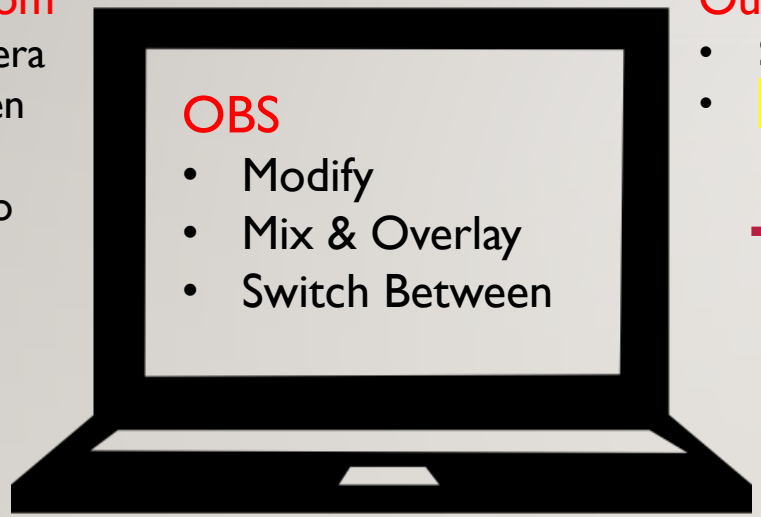
- Screen
- Text
- Audio



X1 Carbon

Output to
- Studio Monitor
- NDI Stream

Input from
- NDI Stream

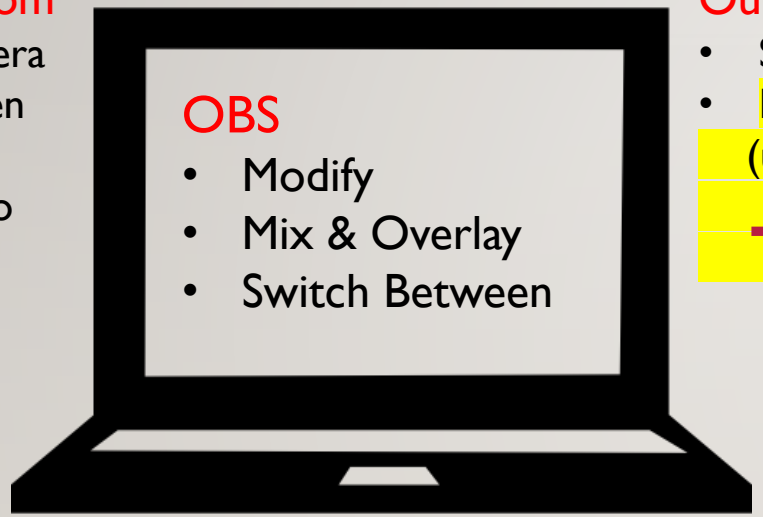
T530

Output to
- Google Meet…

Icons made by https://www.flaticon.com/authors/freepik

NDI – BRIEF DEMO

Input from
- Camera
- Screen
- Text
- Audio



X1 Carbon

Output to
- Studio Monitor
- NDI Stream (using NDI Scan Converter on X1 Carbon)

Input from
- NDI Stream

T530

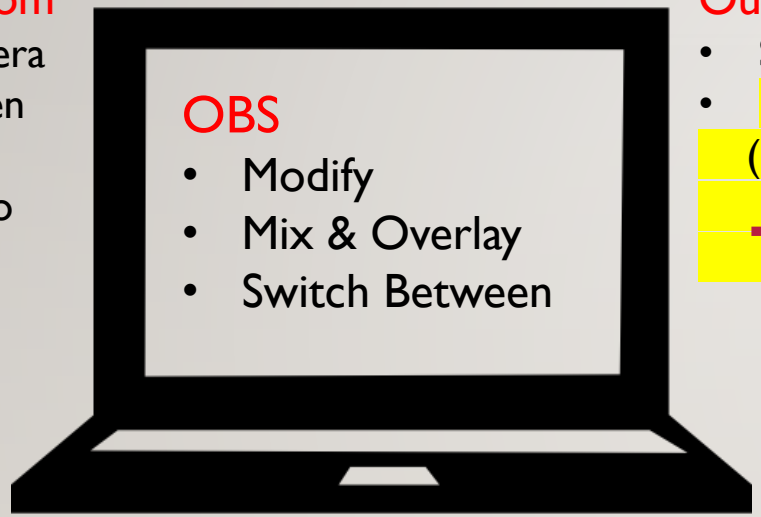
Output to
- Google Meet…

- App on X1 Carbon
- Scrapes laptop screen, since OBS has problems with my graphics card and 3 screen setup…
- Outputs an NDI stream

Icons made by https://www.flaticon.com/authors/freepik

OBS- TOUR & DEMO #1 – UNDER THE COVERS

Input from
- Camera
- Screen
- Text
- Audio



X1 Carbon

Output to
- Studio Monitor
- NDI Stream (using NDI Scan Converter on X1 Carbon)

Input from
- NDI Stream

T530

Output to
- Google Meet…

This approach lets me
- demonstrate the OBS control panel,
- **And** show the X1 Carbon **screen at full 1080p resolution**,
- **Without** the trouble from **the recursive problem** of picture of picture in picture of picture of picture in picture …

Icons made by https://www.flaticon.com/authors/freepik

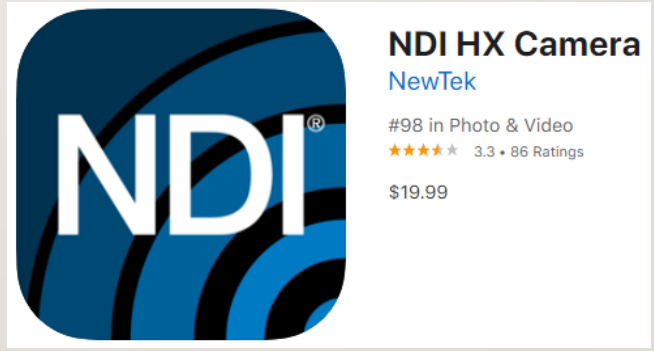
SHAKE YOUR HEAD TO CLEAR ANY CONFUSION

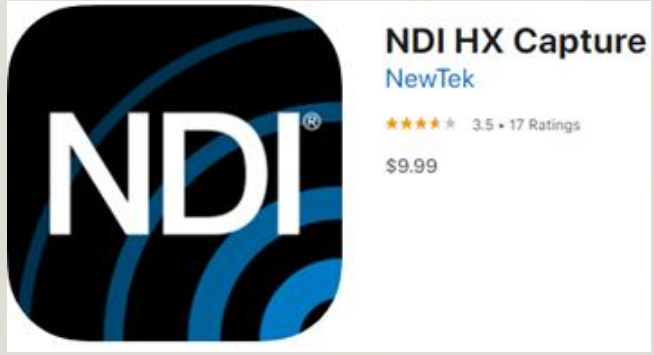
NDI TOOLS INTRO BRIEF VERSION

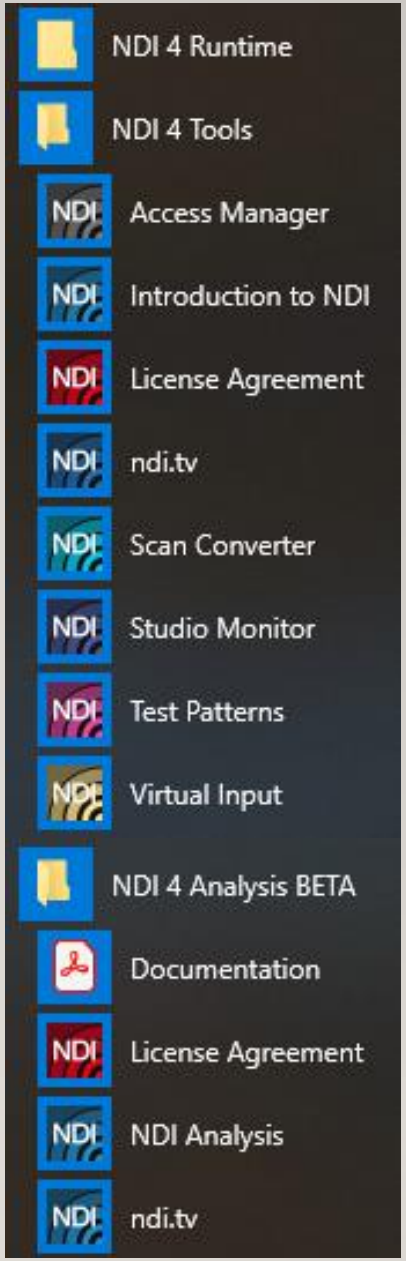
- Really deserves it's own separate presentation
- Not enough time for today
- Today – Demo a small subset (following slides)
  - NDI Scan Converter
  - Studio Monitor App
  - NDI HX Camera
- Any interest to dig deeper next time?
  - => during meeting- yes => so at some time in the future will dig in deeper

NDI Tools

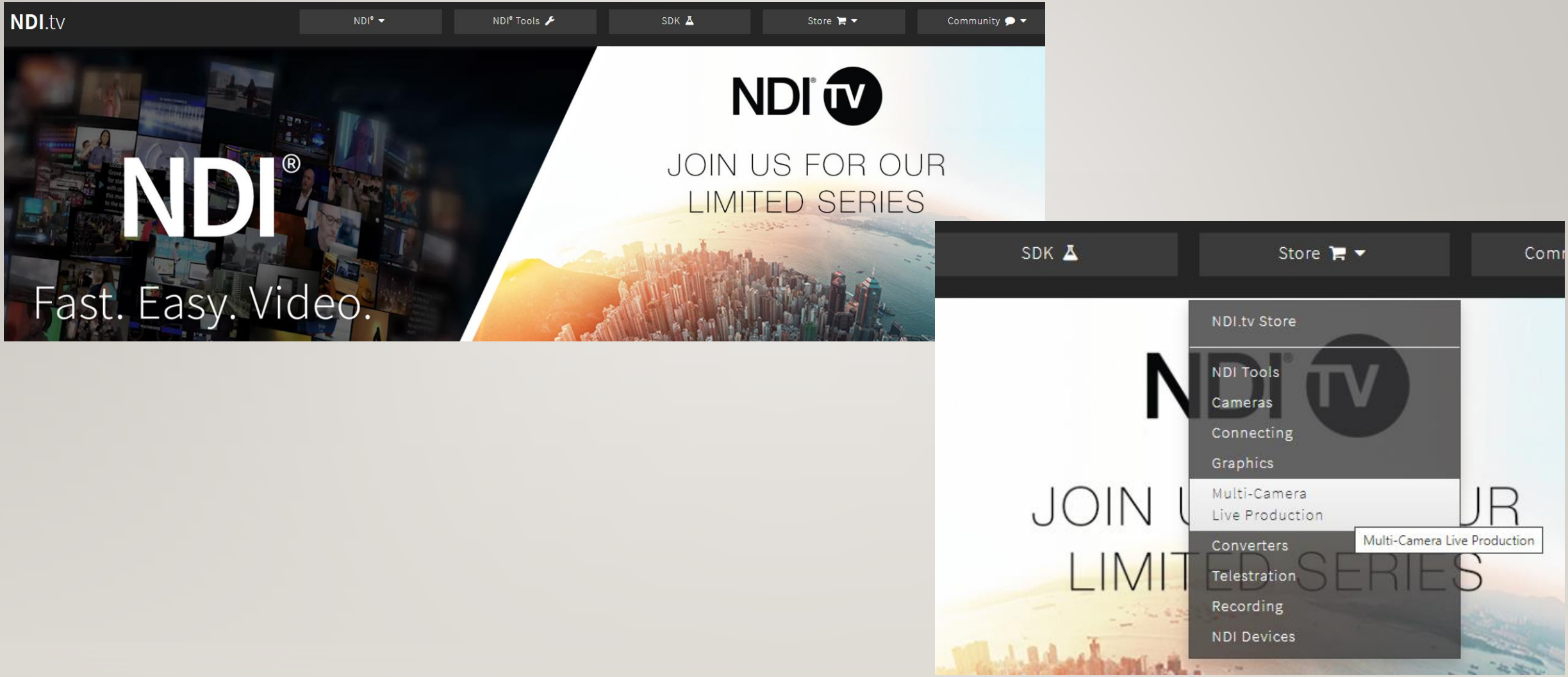
Free NDI applications to start using NDI in your production workflows.







WHAT IS NDI?



Live, Post-Production, Mobile Devices, and Delivery

NDI PROTOCOL

TECHNICAL BRIEF

November 14, 2016 - Version 2

https://233b1d13b450eb6b33b4-ac2a33202ef9b63045cbb3afca178df8.ssl.cf1.rackcdn.com//pdf/newtek-ndi-technical-brief.pdf

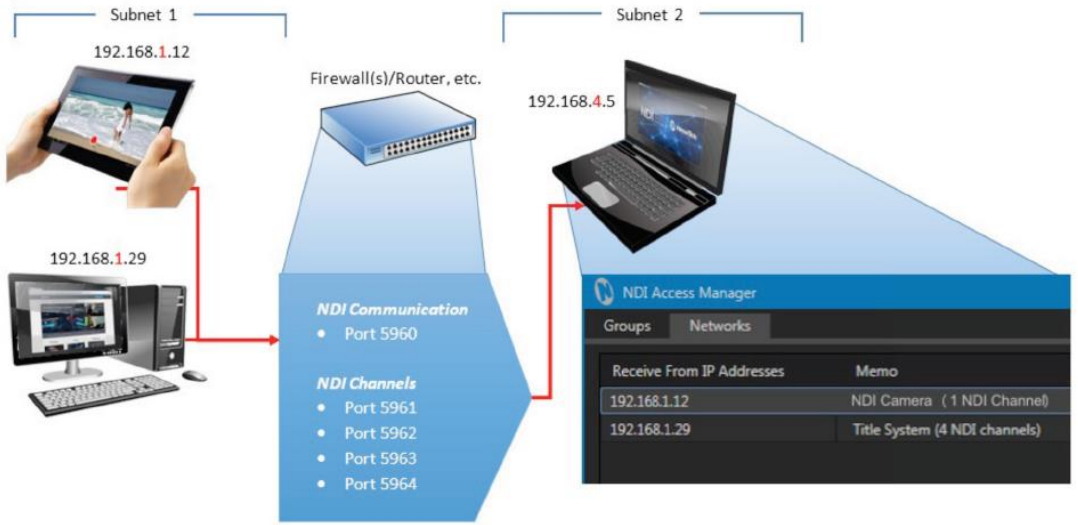


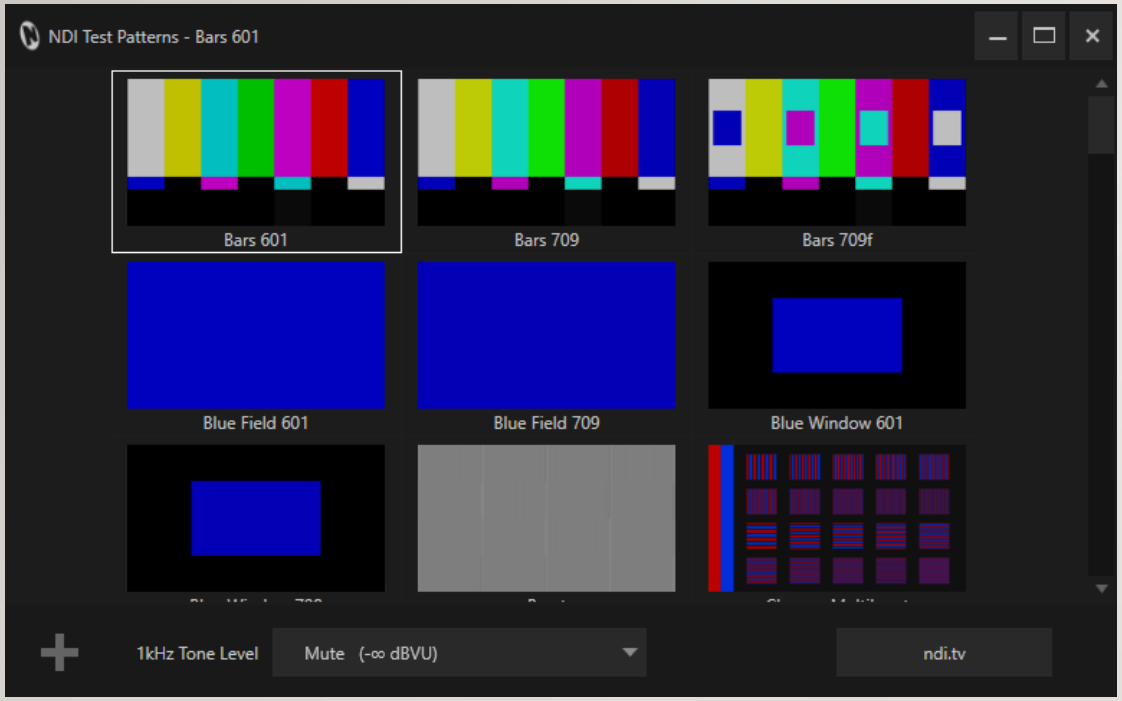
Figure 2. Sample Networking Scenario. The total number of NDI channels matters. You must ensure that, starting from port 5960, enough network ports are available to accommodate the maximum number of NDI video streams supplied by any one source – plus an additional port for the NDI messaging server. For example, adding an IP Address for a system supplying one NDI video stream to the Receive from IP Addresses list means ports 5960 and 5961 must be available. A second system serving eight NDI video streams would need ports 5960 – 5968 to be free, etc.

Example NDI video stream	Approximate bandwidth required
1 x UHDp60 video stream	250 Mbps
1 x UHDp30 video stream	200 Mbps
1 x 1080p60 video stream	125 Mbps
1 x 1080i60 video stream	100 Mbps
1 x 720p60 video stream	90 Mbps
1 x SD video stream	20 Mbps

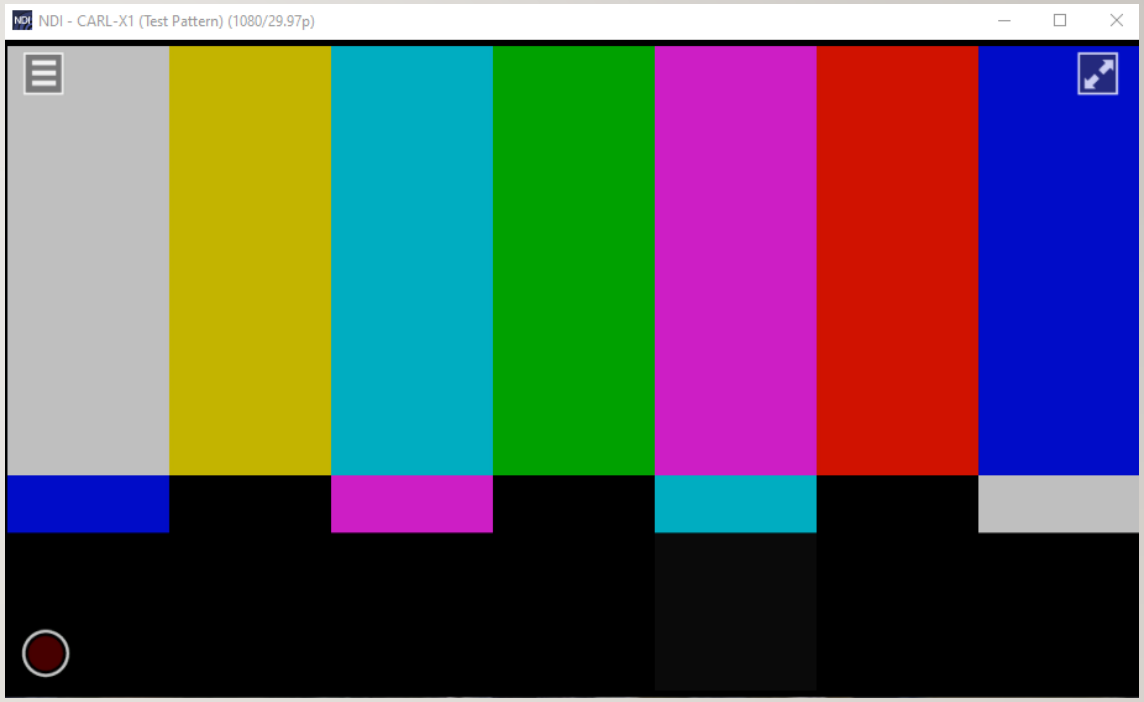
Table 1. Bandwidth Requirements. The approximate bandwidth required per NDI video stream for common video resolutions and frame rates.

STUDIO MONITOR & TEST PATTERN GENERATOR EXAMPLES

NDI Test Pattern Generator



NDI Studio Monitor



COMPARISON

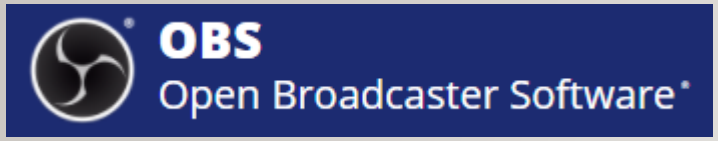
OBS

- Open Source Software Platform
- Start with a Laptop
- Rich Plugin Ecosystem
- Rich Production Options on Laptop
- Limited by Laptop/ PC Capabilities

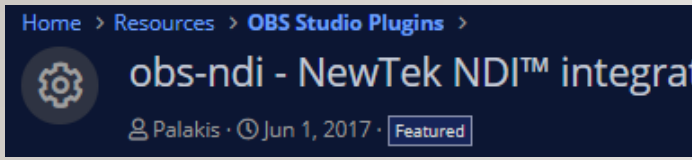
NDI TOOLS & ECOSYSTEM

- Open but Proprietary Platform
- Start with a Laptop
- Rich Documentation/ Toolset/ 3rd Party NDI Options
- Limited Production Options on Laptop
- Limited by Budget for Professional Hardware

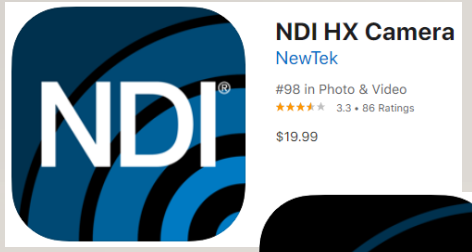
SOURCES



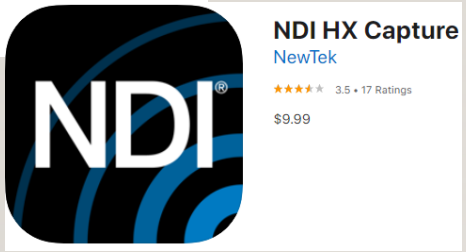
- Decent OBS Tutorial https://becomeablogger.com/obs/
- https://obsproject.com/
- https://obsproject.com/forum/resources/obs-virtualcam.539/
  - Native Virtual Camera coming to OBS release 26, brining slightly different capabilities vs. VirtualCam plugin…
- https://obsproject.com/forum/resources/obs-ndi-newtek-ndi%E2%84%A2-integration-into-obs-studio.528/



- https://www.cined.com/how-to-stream-live-from-ios-devices-for-free-using-newtek-ndi-hx-camera-and-obs-studio/
- https://www.obs.live/articles/2019/5/1/how-to-stream-with-two-pcs-using-obs-studio-and-the-ndi-plugin
- https://ndi.tv/tools/



- https://www.newtek.com/software/ndi-camera/
- https://apps.apple.com/us/app/ndi-hx-camera/id1477266080



- https://www.newtek.com/software/ndi-capture/
- https://apps.apple.com/us/app/ndi-hx-capture/id1501247823

ACCESSORIES

- Ring Light
  - https://smile.amazon.com/gp/product/B07K6GHL24
- Phone Clamp
  - https://smile.amazon.com/gp/product/B06XKV41C4
  - https://smile.amazon.com/gp/product/B071WKTMPQ
- Hotshoe to ¼ 20 adapter
  - https://smile.amazon.com/gp/product/B06XKV41C4

Includes gooseneck phone clamp – but is wobbly for heavier phones…

Better Phone Clamp Options
>> hotshoe to ¼”-20 adapter plus a smaller / fixed phone clamp

A little more capable & sturdy

Lower cost