



2020 Jan 11

# DPRG 2020 SEPT 12

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# ABOUT DPRG

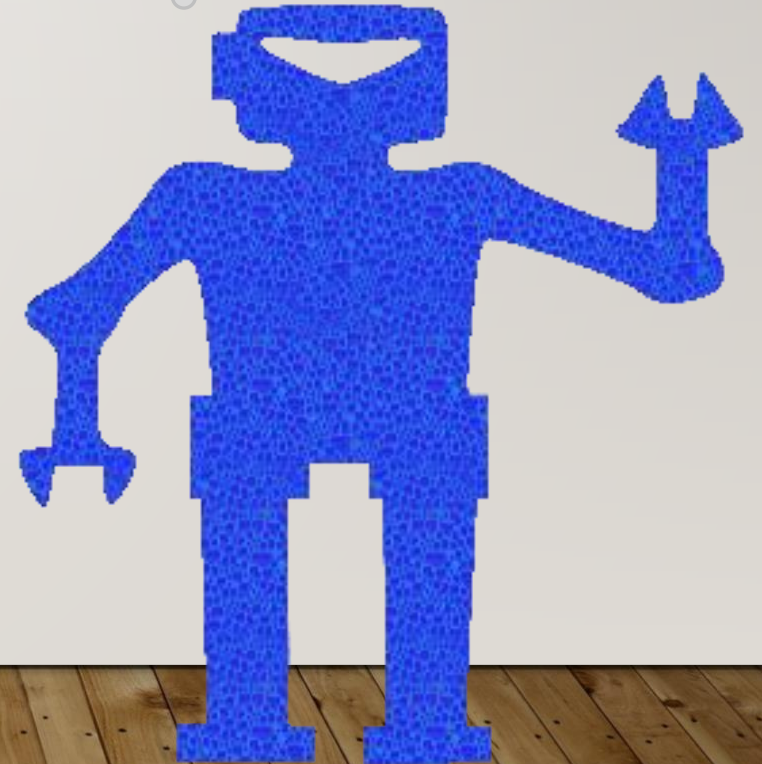
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- Founded 1984
- IRS 501c
- Meet Every Tuesday Night & 2<sup>nd</sup> Saturday of each month
- Build / Putz Around / Compete / Learn / Community Outreach

## **Our Quest:**

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

Build  
More  
Robots!



# WEB MEETING BROADCAST & RECORDING TOOLS

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Carl Ott

# WHY?

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- 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
  - I.e. Phone Camera

# BASIC PREMISE

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## Input from Many Sources

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

# BASIC PREMISE

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## Real Time Broadcast Tools

- Modify
- Mix & Overlay
- Switch Between



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## 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

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## Input from Many Sources

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## Production Control Room



[https://commons.wikimedia.org/wiki/File:Celebro\\_Studios\\_Gallery.jpg](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

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## Production Control Room

## Central Apparatus Room



## Output to Many Destinations

- Virtual Web Camera
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[https://commons.wikimedia.org/wiki/File:Celebro\\_Studios\\_Gallery.jpg](https://commons.wikimedia.org/wiki/File:Celebro_Studios_Gallery.jpg)  
RuslonV / CC BY-SA (<https://creativecommons.org/licenses/by-sa/4.0>)

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

# BASIC PREMISE

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## Input from Many Sources

- Camera
- VLC Player
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- Etc.



## Output to Many Destinations

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

# TODAY- DISCUSS 2 LAPTOP ENABLED TOOL SETS

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- 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

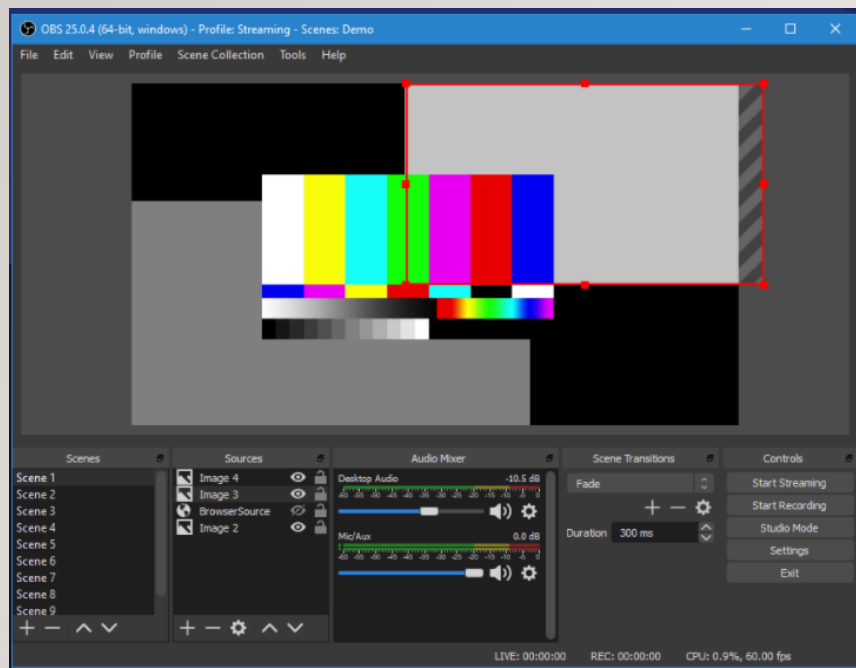
Windows

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.





**OBS**  
Open Broadcaster Software®

# OBS Studio

Latest Release 25.0.8 - April 26th

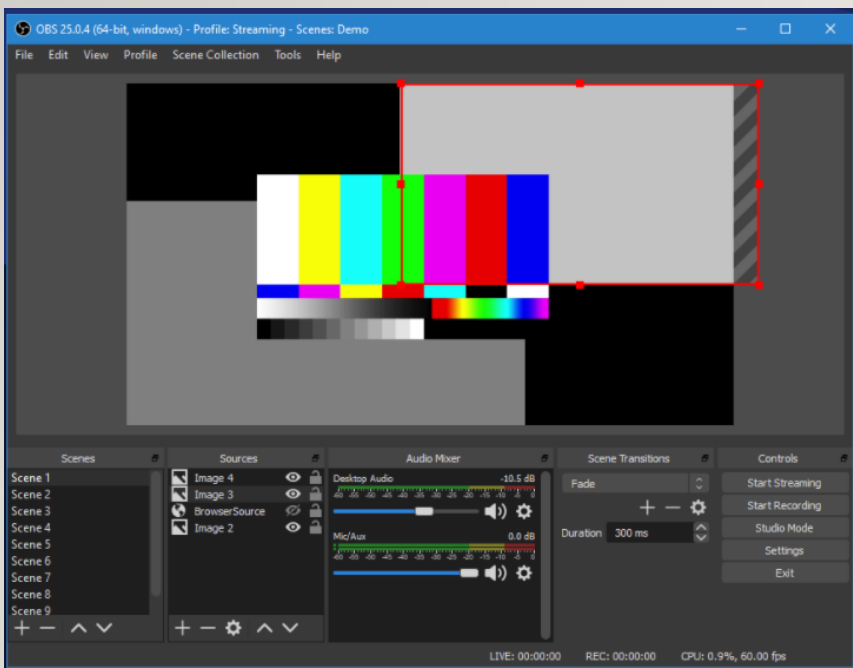
Windows

macOS 10.13+

Linux

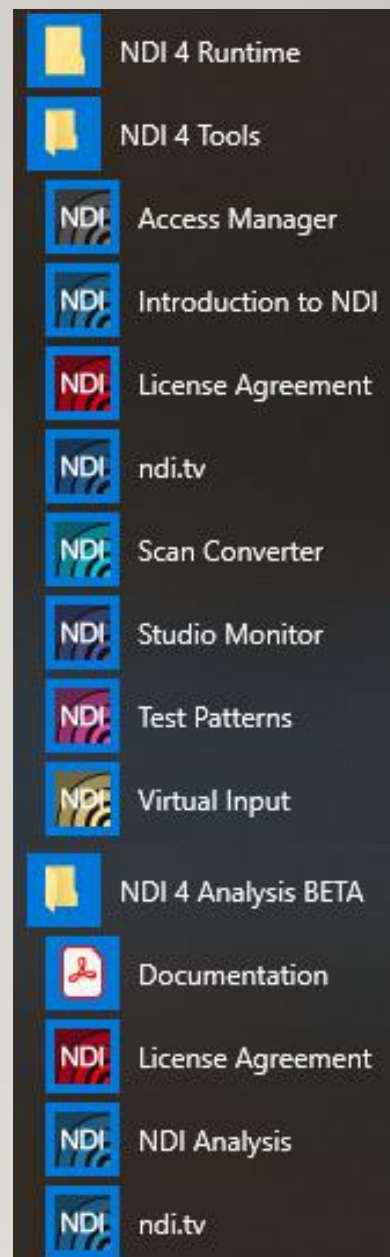
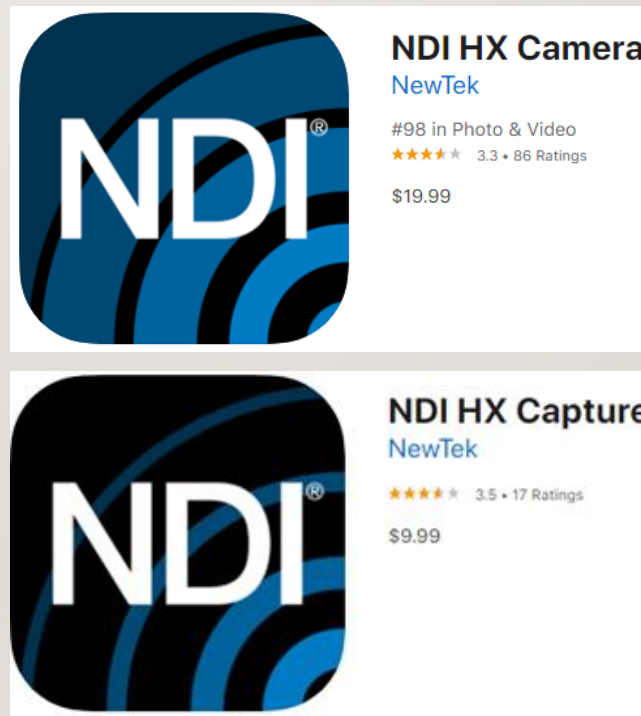
Free and open source software for video recording and live streaming.

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



# NDITools

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





**OBS**

Open Broadcaster Software®

# OBS Studio

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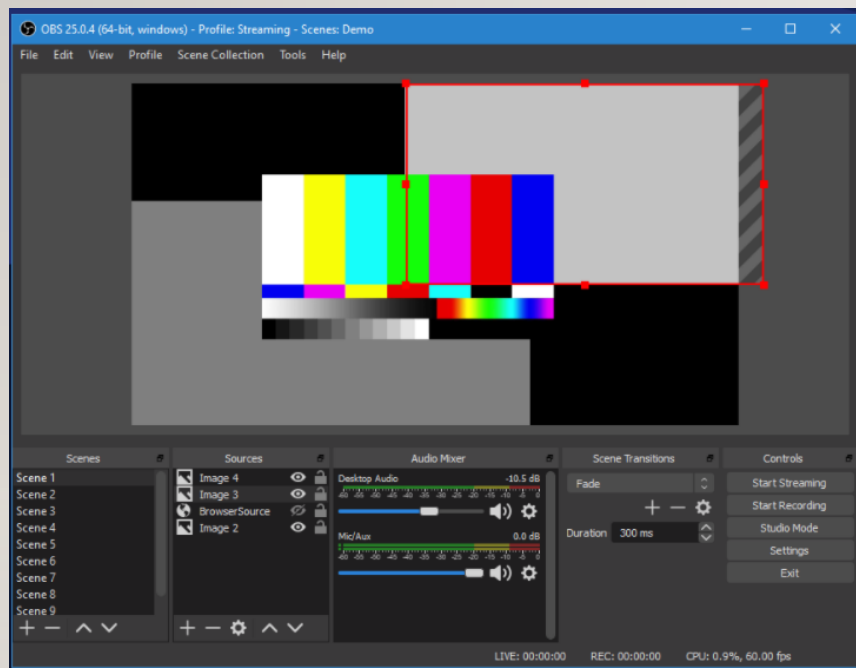
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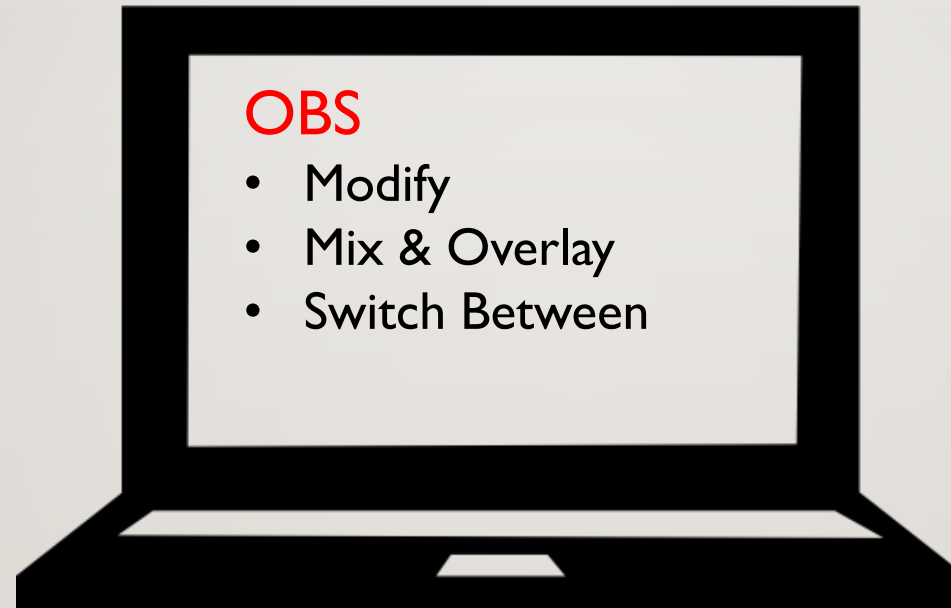
# OBS- TOUR & DEMO #I

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## Input from

- Camera
- Screen
- Text
- Audio



## Output to

- Studio Monitor

# OBS- TOUR & DEMO #I

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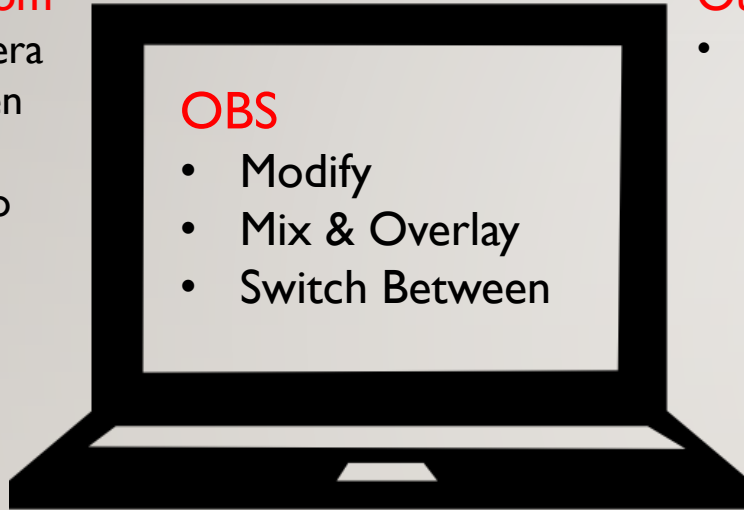
- OBS Concepts
  - Scenes
  - Sources
  - Mixer
  - Transitions
  - Studio Mode
  - Output: Stream/Record
- OBS Demo
  - Output to Google Meet
  - Mix Title Overlay w/ Camera
  - Transition Between Scenes
  - Chroma Key (green screen – but doesn't have to be green...)

# OBS- TOUR & DEMO #I – UNDER THE COVERS

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## Input from

- Camera
- Screen
- Text
- Audio



## Output to

- Studio Monitor

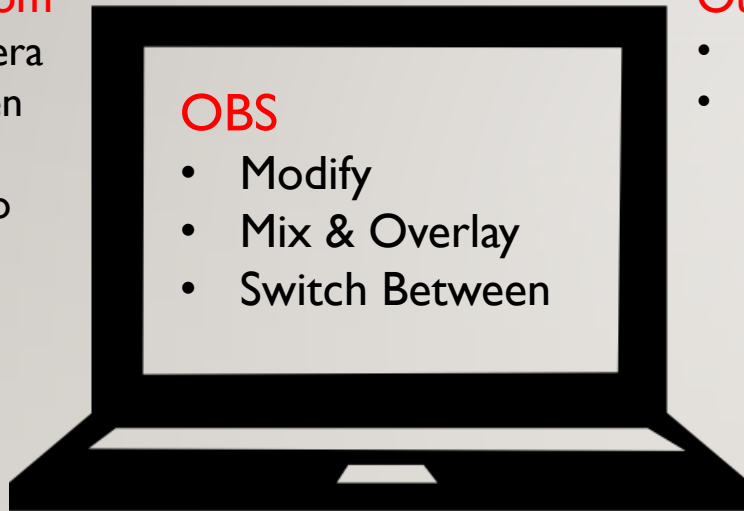
**FASTEN YOUR  
SEATBELTS**

# OBS-TOUR & DEMO #1 – UNDER THE COVERS

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## Input from

- Camera
- Screen
- Text
- Audio



XI Carbon

## Output to

- Studio Monitor
- NDI Stream

## Input from

- NDI Stream



T530

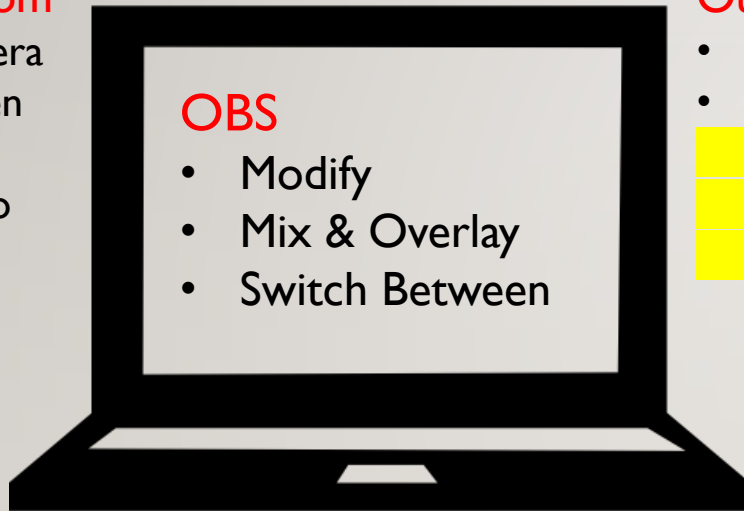
## Output to

- Google Meet...

# NDI – BRIEF DEMO

## Input from

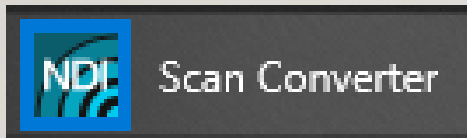
- Camera
- Screen
- Text
- Audio



**OBS**

- Modify
- Mix & Overlay
- Switch Between

XI Carbon



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

## Output to

- Studio Monitor
- NDI Stream (using NDI Scan Converter on XI Carbon)

## Input from

- NDI Stream



**NDI**

- Studio Monitor

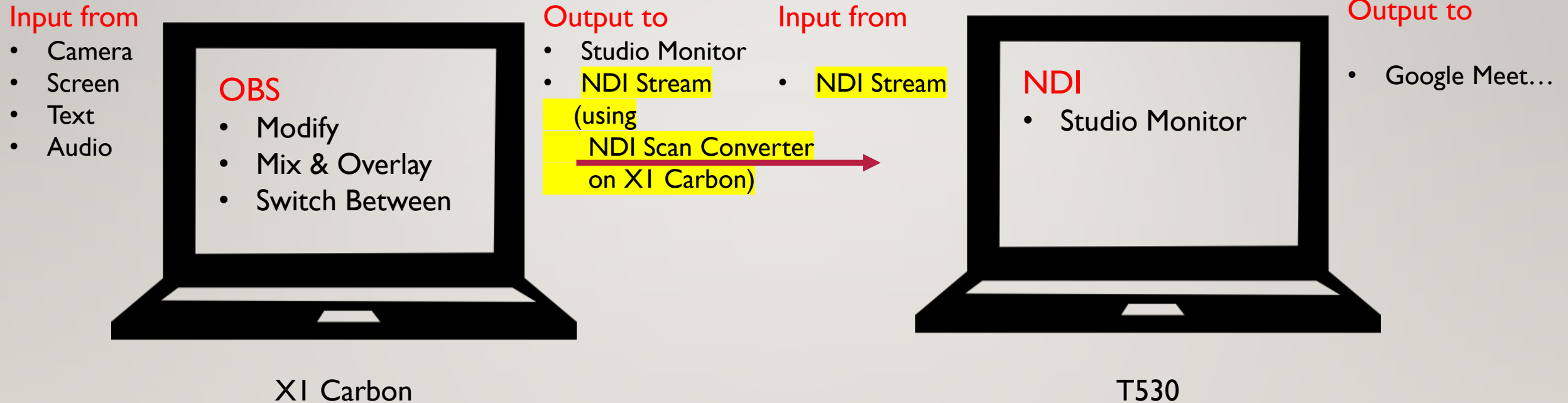
T530

## Output to

- Google Meet...



# OBS-TOUR & DEMO #1 – UNDER THE COVERS



This approach lets me

- demonstrate the OBS control panel,
- **And** show the XI 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 ...

SHAKE YOUR HEAD  
TO CLEAR ANY CONFUSION

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# NDI TOOLS INTRO

## BRIEF VERSION


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- 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

# NDITools

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






**NDI HX Camera**  
NewTek

#98 in Photo & Video  
★★★★★ 3.3 • 86 Ratings








\$19.99



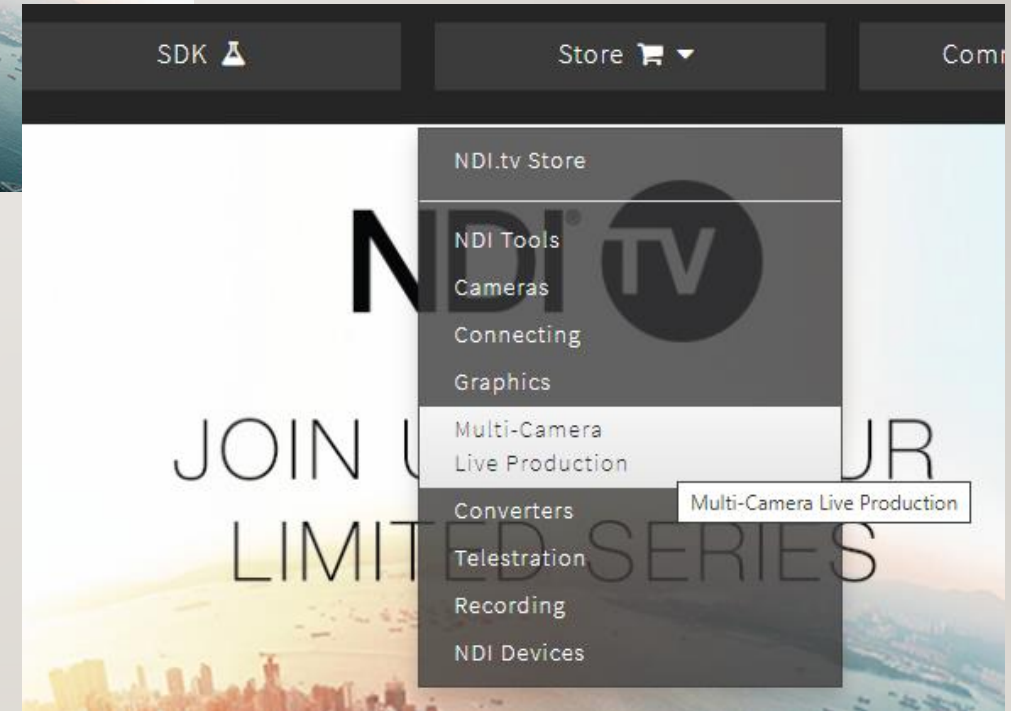
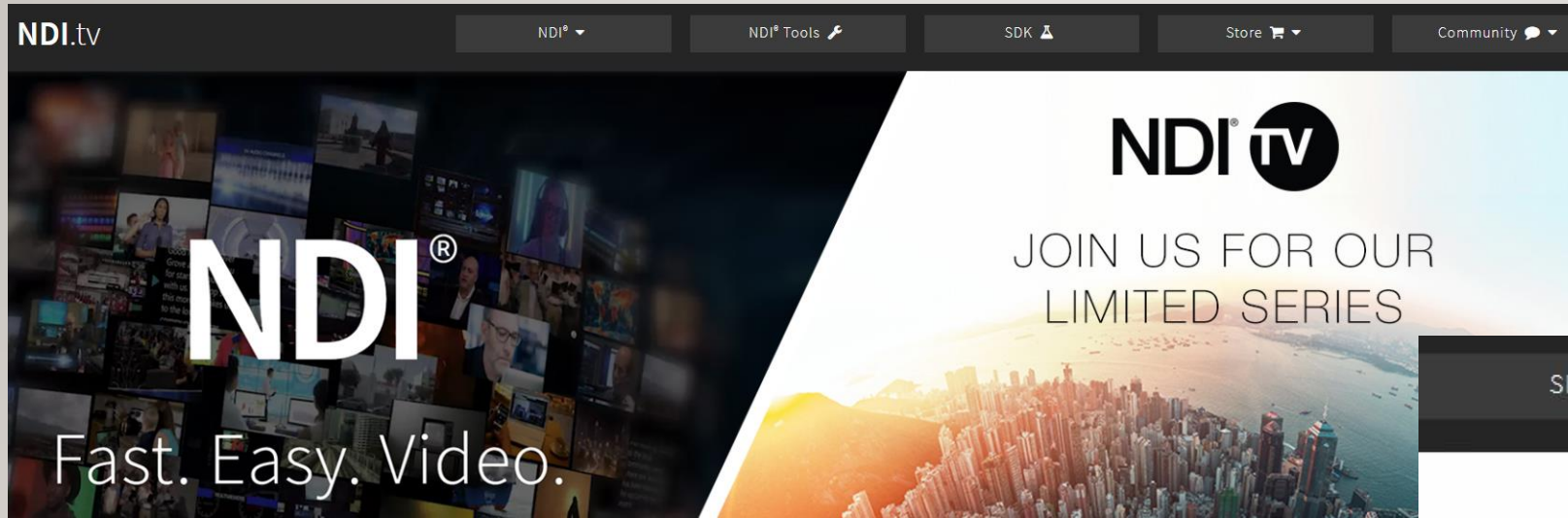
**NDI HX Capture**  
NewTek

★★★★★ 3.5 • 17 Ratings

\$9.99

-  NDI 4 Runtime
-  NDI 4 Tools
-  Access Manager
-  Introduction to NDI
-  License Agreement
-  ndi.tv
-  Scan Converter
-  Studio Monitor
-  Test Patterns
-  Virtual Input
-  NDI 4 Analysis BETA
-  Documentation
-  License Agreement
-  NDI Analysis
-  ndi.tv

# 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>

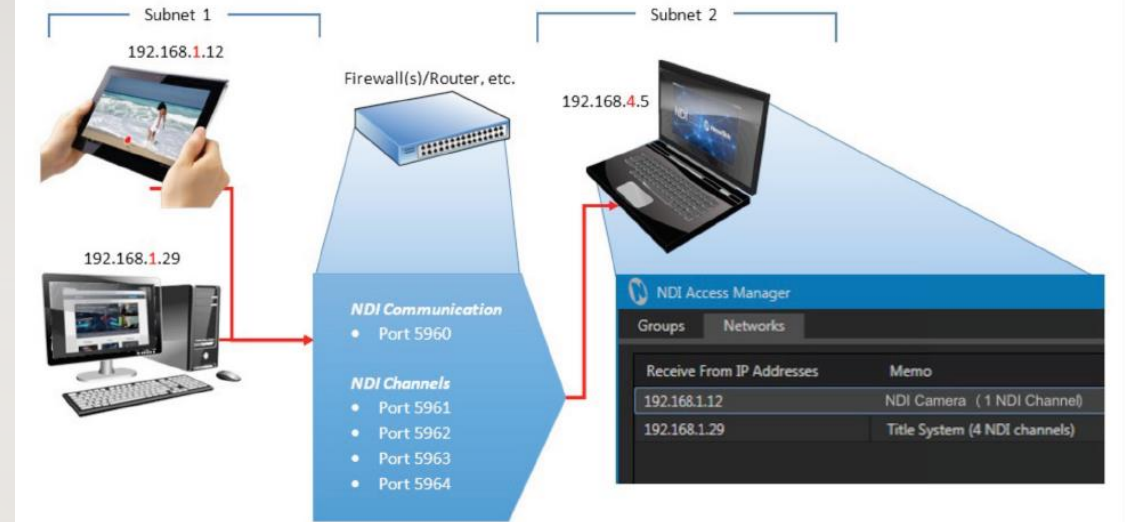


Figure 2. Sample Networking Scenario. The total number of NDI channels matters. You must ensure that, starting from port 5960, enough network ports are available to accommodate the maximum number of NDI video streams supplied by any one source – plus an additional port for the NDI messaging server. For 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.

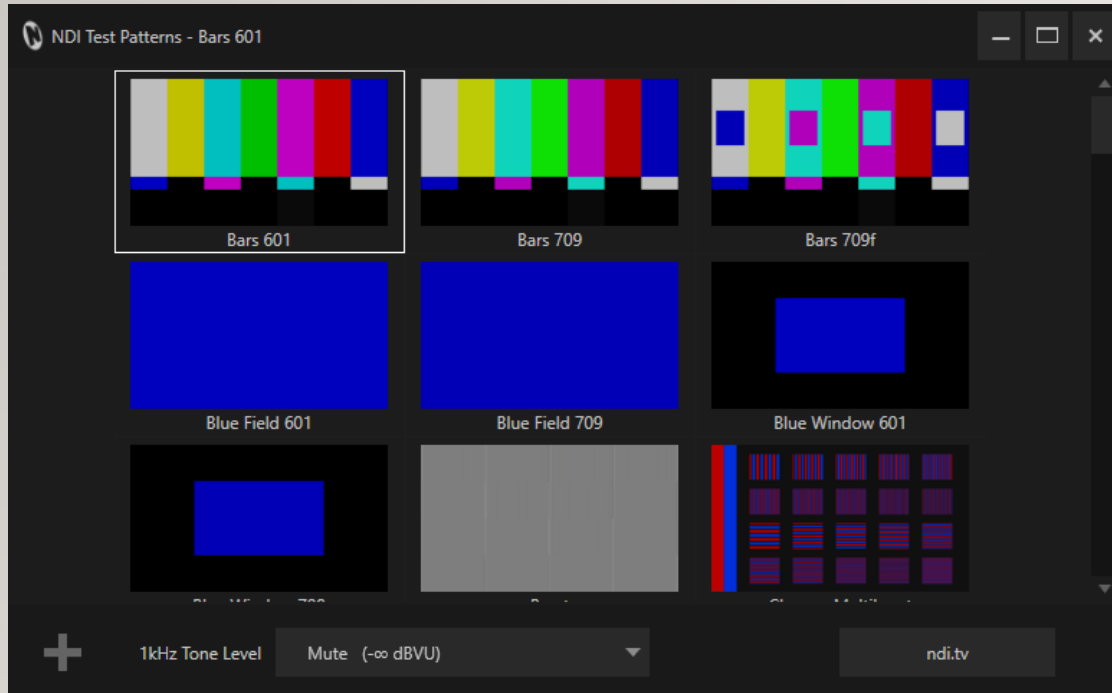
Example NDI video stream	Approximate bandwidth required
1 x UHDp60 video stream	250 Mbps
1 x UHDp30 video stream	200 Mbps
1 x 1080p60 video stream	125 Mbps
1 x 1080i60 video stream	100 Mbps
1 x 720p60 video stream	90 Mbps
1 x SD video stream	20 Mbps

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

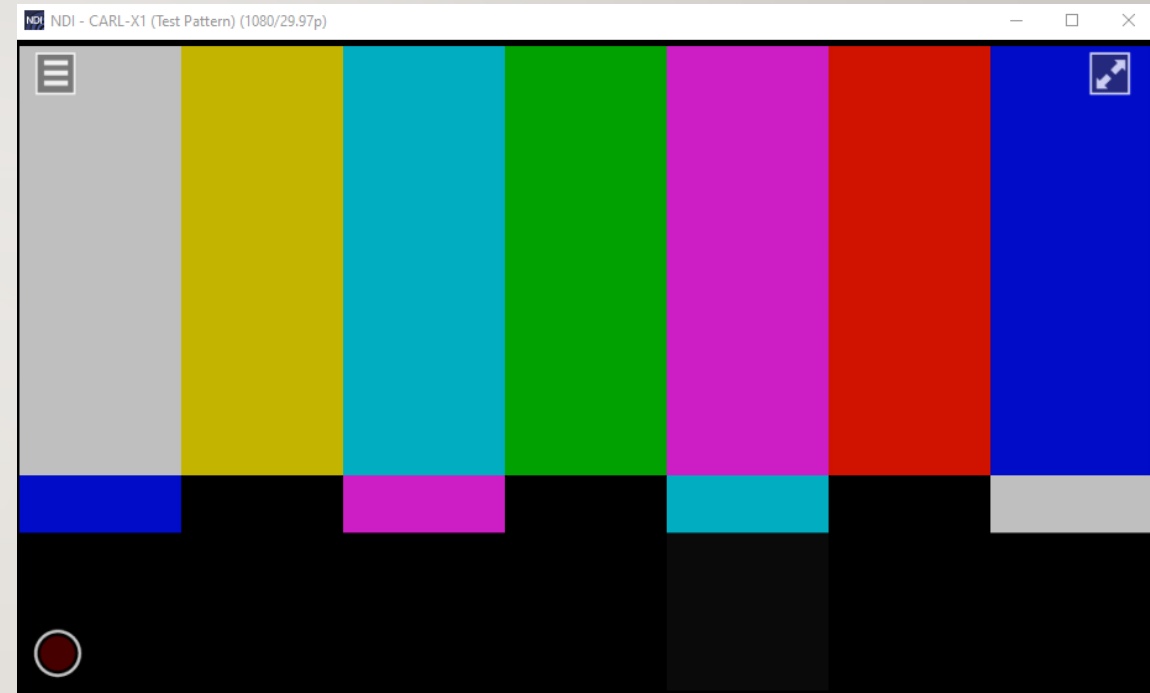


# STUDIO MONITOR & TEST PATTERN GENERATOR EXAMPLES

## NDI Test Pattern Generator



## NDI Studio Monitor



# COMPARISON

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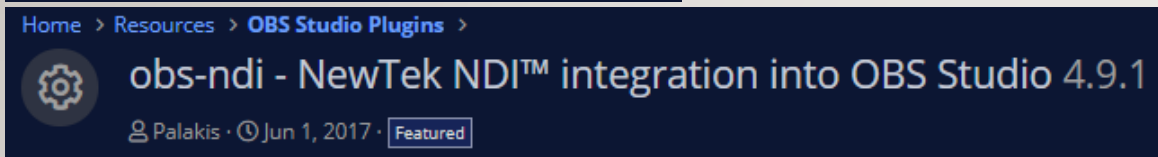
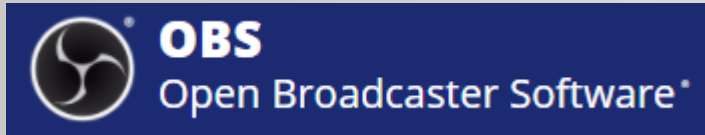
## OBS

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

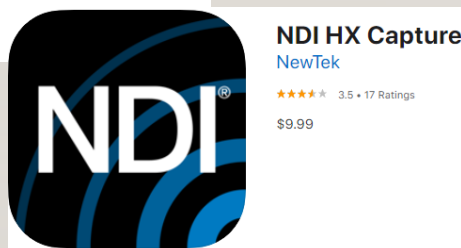
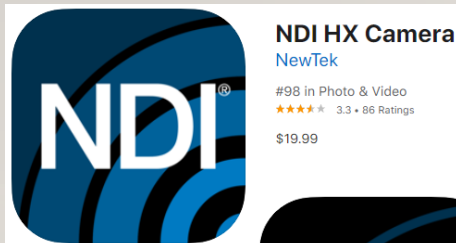
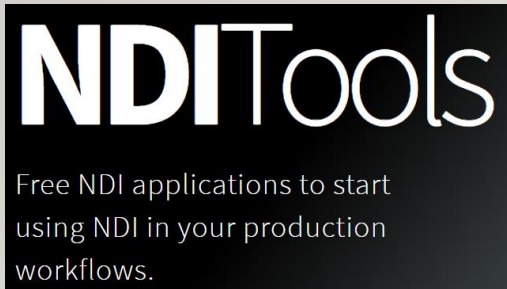
## NDI TOOLS & ECOSYSTEM

- Open but Proprietary Platform
- Start with a Laptop
- Rich Documentation/ Toolset/ 3<sup>rd</sup> 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, bringing 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/B06XKV4IC4>

- <https://smile.amazon.com/gp/product/B07IWKTMPQ>

- Hotshoe to 1/4 20 adapter

- <https://smile.amazon.com/gp/product/B06XKV4IC4>



10" Selfie Ring Light with 50" Extendable Tripod Stand & Flexible Phone Holder for Live Stream/Makeup, UBeeSize Mini Desktop Led Camera Ringlight for YouTube Video, Compatible with iPhone/Android

Visit the UBeeSize Store

★★★★☆ 11,656 ratings | 414 answered questions

Amazon's Choice for "ring light with tripod"

Was: \$59.99  
Price: \$49.99 ✓prime FREE One-Day & FREE Returns  
You Save: \$10.00 (17%)

Get \$125 off: Pay \$0.00 upon approval for the Amazon Business Prime Card. Terms apply.

Available at a lower price from other sellers, potentially without free Prime shipping.

Free Amazon product support included ~

Eligible for amazon smile donation.


Color: Black

- [Dimmable Ring Light] UBeeSize 10" Ring Light features 3 light colors (Warm, Cool White, Daylight) and 11 levels brightness in each color, 33 options in total. You can choose any option in between if there's a perfect setting.
- [Adjustable & Stable Tripod] Extending from 16" to 50", and tripod legs unfold up to 30" wide, the stable tripod can be adjusted to any height within as needed, short enough to stand on tabletop, tall enough to fit your height.

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

## Better Phone Clamp Options

>> hotshoe to 1/4"-20 adapter plus a smaller / fixed phone clamp



Camera Hot Shoe Mount to 1/4"-20 Tripod Screw Adapter, Flash Shoe Mount for DSLR Camera Rig (Pack of 4)

Brand: Anwenk

★★★★☆ 284 ratings | 7 answered questions

Amazon's Choice for "camera shoe"

Price: \$8.99 ✓prime FREE One-Day & FREE Returns  
Get \$125 off: Pay \$0.00 upon approval for the Amazon Business Prime Card. Terms apply.


Returnable within 30 days of receipt ~

Eligible for amazon smile donation.

Color Name: Hot Shoe Mount 4Pack

- Easily attach dsr accessories to camera hot shoe mount or cold shoe mount.
- Flash hot shoe mount with 1/4"-20 tripod screw adapter.
- To mount your microphone, LED light, monitor to DSLR, camcorder or digital camera, or adapt anything else that has a 1/4"-20 receptacle. Easy to use.
- Material: Aluminum Alloy. Looking for 1/4"-20 camera screw adapters as well? Search "B01B5MYL9M" to find camera screw adapter with best price.
- Package includes 4 pack of standard hot shoe adapters

Compare with similar items



Glif - Quick Release Tripod Mount for Smartphones (Apple iPhone, Samsung Galaxy, Google Pixel, etc). Universal, fits All Devices, Portrait or Landscape.

Brand: Studio Neat

★★★★☆ 254 ratings | 15 answered questions

Price: \$27.99 ✓prime & FREE Returns  
Get \$125 off: Pay \$0.00 upon approval for the Amazon Business Prime Card. Terms apply.

Returnable within 30 days of receipt ~

Eligible for amazon smile donation.

Compatible Devices: iPhone, Samsung Galaxy, Google Pixel, etc

Brand: Studio Neat

Color: Black/Gray

About this item

- Tripod Mount for Smartphones
- Quick Release lever allows for quick mounting.
- Contains a total of 3 tripod mounts (1/4"-20 size) for flexibility in orientation and added accessories.
- Fits devices with or without a case, between 58-99mm wide.

A little more capable & sturdy



Manfrotto Universal Smartphone Clamp, Pro Version (MCPIXI)

Visit the Manfrotto Store

★★★★☆ 889 ratings | 39 answered questions

Amazon's Choice for "manfrotto phone clamp"

Price: \$19.99 ✓prime & FREE Returns  
Get \$125 off: Pay \$0.00 upon approval for the Amazon Business Prime Card. Terms apply.

Available at a lower price from other sellers, potentially without free Prime shipping.

Returnable within 30 days of receipt ~ | Free Amazon product support included ~

Eligible for amazon smile donation.

Color: Black

Brand: Manfrotto

Item Dimensions LxWxH: 1.02 x 1.18 x 3.43 inches

Style: Universal Smartphone Clamp, Pro Version

Compatible Devices: Smartphones

About this item

- Holds smartphone with widths of 2.36" To 4.09"
- Universal tripod and lighting connections
- Double lock mechanism: spring lock and side lock
- Two 1/4" attachments: for landscape and portrait mode
- Ergonomic Italian design. Compact and lightweight.

Compare with similar items

New & Used (4) from \$18.39 ✓prime FREE Shipping

Report incorrect product information.

Similar item to consider

Lower cost