



System & Network Requirements & Recommendations



Active Learning Platform

Education
& Training

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System Requirements and Recommendations

The topics in this section provide information regarding the system and browser requirements for using various components of the Active Learning Platform. In addition, this section of the online help provide information regarding recommended capture input devices, such as cameras and microphones.

Topics in this section include:

- [Recommended Browsers](#)
- [Device Communication in ALP Environment](#)
- [Classroom Capture Specifications](#)
- [Personal Capture Specifications](#) - for both Windows and Mac
- [Supported Input Devices](#) - provides lists of recommended cameras and microphones

The Active Learning Platform also offers a Windows PowerPoint Ribbon add-on, available for instructors or administrators to download and install.

The system requirements for the PowerPoint ribbon are:

- Windows OS (Mac version coming soon)
- Microsoft Office (PowerPoint) 2010 or 2013, either 32-bit or 64-bit versions

The Downloads page provides separate links for 32-bit and 64-bit downloads. Be sure you download the version appropriate to the MS Office version you are running (the MS Office version may be different from the Windows Operating System version).

To find out what version of PowerPoint you have installed, in PowerPoint, go to **File > Help**. The version number is shown on the Help page with the -bit version located in parentheses next to it.

Recommended Browsers

The Active Learning Platform is a web-based application, and as such does not have specific OS requirements.

It does however, have certain browser requirements. While we can't necessarily test every version of every browser out there, we do test the more recent and most popular browsers/versions.

Tested Browsers

- Google Chrome - most recent version
- Firefox - most recent version
- Safari 6+
- Internet Explorer 9 and higher.

Supported Browsers for LIVE streaming

Live streams are tested on and supported for viewing on all of the above-listed browsers.

HOWEVER, Live streaming requires the use of the Adobe Flash player, so be sure your installed version of Flash is the most recent. (Adobe will probably let you know if it needs to be updated...they're good like that.)

Echo360 does support the use of iOS browsers for viewing Live streams. How? iOS uses HLS instead of Flash for live streaming (which is good, because iOS doesn't support Flash). HLS stands for HTTP live streaming protocol, in case you were interested.

Device Communication in an Active Learning Platform Environment

The information on this page addresses the communication methods used by Echo360 capture devices. These devices need to communicate externally with the Active Learning Platform as well as internally to other servers via the local area network (LAN).

NOTE: The information on this page applies to **all** capture devices (exceptions noted):

- First generation Capture Appliance
- SafeCapture HD (SCHD)
- Classroom Capture (DHCP and NTP do not apply; handled by computer OS)
- Personal Capture (DHCP and NTP do not apply; handled by computer OS)

External Device Communication and Firewall Port Requirements

Capture devices require only two external communication ports; one to the Active Learning Platform server, and one to the default network time server.

If you use an internal time server, the external NTP server connection is not needed.

Port Description	Default Port	Port Direction	Protocol
HTTPS (Secure Hypertext Transfer Protocol) <i>Outbound required to Active Learning Platform server</i>	443	outbound	TCP
NTP (Network Time Protocol) to *.pool.ntp.org (default ALP time server) <i>(If you use an internal time server, this does not apply.)</i>	123	outbound	UDP
RTP (Real-time Transport Protocol) to Active Learning Streaming Servers <i>(Applies only to LIVE streaming; see Port Configuration for LIVE Streaming for details.)</i>	49152-65535	outbound	UDP

Internal Network Device Communication Ports and Methods

Device communications through the internal network or LAN are defined in the below table.

Port Description	Default Port	Port Direction	Protocol
DHCP (Dynamic Host Configuration Protocol) <i>(Appliance may be set to static addressing later but requires DHCP initially.)</i>	67, 68	both	UDP
DNS (Domain Name Service)	53	outbound	UDP
HTTPS (Secure Hypertext Transfer Protocol) <i>(Optional, for device web interface access, including ad-hoc capture UI)</i>	443	inbound	TCP
HTTP (Hypertext Transfer Protocol) <i>(Optional, for device web interface access, including ad-hoc capture UI)</i>	80	inbound	TCP
RTMP (Real-time Messaging Protocol) to users <i>(For LIVE streaming to users)</i>	80	inbound	TCP
Internal NTP Time Server (if used) <i>(If you use the default Echo NTP server, see table in section above.)</i>	123	outbound	UDP

Classroom Capture Specifications

Classroom Capture (CCAP) is a Windows-only software program that can be downloaded and installed on the PC resident in a classroom. It effectively turns the computer into a capture device, where the installed CCAP software and the attached cameras and microphones are used to capture classroom lectures.

See [Recommended Devices for CCAP and PCAP Windows](#) for information on supported capture input devices.

See Classroom Capture for Administrators or Classroom Capture for Instructors as appropriate, for information on installation, configuration, and use of CCAP.

System requirements for Classroom Capture

The following are the **minimum specifications** for a Classroom Capture PC:

- Windows 7 or Windows 8.1 operating system
- Windows .NET 3.5 (required - you will be prompted to install it if not present)
- Intel i5-2400 Quad Core Processor
- 2 GB RAM
- 10/100 network interface
- 20 GB free hard drive space
- Internal audio device or USB port for audio capture

NOTE: Capturing CPU or memory-intensive applications such as CAD or 3D modeling software may require a more capable computer.

Capture input

Audio MUST be captured. You can use the built-in sound card input, or 1/8" line-in/mic-in connection, or USB-based audio or capture device (including a microphone on an attached video camera, if there is one). Audio levels should be configured on the input to be as high as possible without reaching maximum levels during peaks, which can cause audible distortion during recording.

Display is captured from the local VGA screen buffer, and requires no external connection or configuration.

Video can be captured using the built in camera on the classroom PC or via a USB-attached video camera.

See [Recommended Devices for CCAP and PCAP Windows](#) for lists of supported and tested devices.

Capture options

Classroom Capture supports the following input combinations:

- Audio (A)
- Audio/Video (A/V)
- Audio/Display (A/D)
- Audio/Display/Video (A/D/V)
- Audio/Video/Video (A/V/V)

Capture products

Classroom Capture can generate the following output:

- Classroom Player presentation, including audio, display, and/or video
- Downloadable mp3 audio-only file
- Downloadable SD mp4 file, including audio, display, and/or video
- Downloadable HD mp4 file, including audio, display, and/or video

Personal Capture Specifications

Personal Capture (PCAP) is a downloadable, stand-alone application, for either Windows or Mac, that allows you to create captures using your personal computer, then publish them to one or more courses.

Please refer to the following topics as appropriate for further information and instructions:

- Personal Capture for Mac - Installation and user instructions for Mac users
 - **See Also:** [Recommended Devices for Personal Capture Mac](#)
- Personal Capture for Windows - Installation and user instructions for Windows users
 - **See Also:** [Recommended Devices for CCAP and PCAP Windows](#)

System requirements for Personal Capture for Windows

In addition to the below-listed system requirements, PCAP for Windows also requires Windows .NET 3.5. If it is not present at installation, you will be prompted to install it.

PCAP for Windows is **not** supported on netbook computers.

The following are the **minimum specifications** for a Personal Capture for Windows PC:

- Windows 7 or Windows 8.1 operating system
- Windows .NET 3.5 (required - you will be prompted to install it if necessary)
- Intel Core i5 Processor for A/V or A/D
- Intel i7 recommended for A/D/V or A/V/V
- 2 GB RAM
- 10/100 network interface
- 20 GB free hard drive space
- Internal audio device or USB port for audio capture

NOTE: Capturing CPU or memory-intensive applications such as CAD or 3D modeling software may require a more capable computer.

System requirements for Personal Capture for Mac

Personal Capture for Mac is supported on the Mac OS X 10.7 and above. However, if you are planning to upgrade your Mac OS, refer to the below note before doing so.

The following are the **minimum specifications** for a Personal Capture for Mac device:

- Mac OS X 10.8 or 10.9

- QuickTime 7.5.5 or later (installed with OS X, but you may need to update to the latest version)
- Intel Single Core 1.8 GHz processor (or equivalent) for A/V or A/D
- Intel Dual Core 1.8 GHz processor (or equivalent) for A/D/V or A/V/V
- 2 GB RAM
- 10/100 network interface
- 20 GB free hard drive space
- Internal audio device or USB port for audio capture (**audio is required**)

NOTE about Upgrading Mac OS: Personal Capture for Mac is supported on Mac OS X 10.9 and 10.10, however *upgrading* the Mac OS may cause corruption in an existing PCAP installation. Captures will work fine but publishing the capture will get stuck in the "Transcode Pending" state. If possible, upgrade the OS before installing PCAP Mac. If that is not possible and you encounter this problem, save any un-published captures, then uninstall and reinstall Personal Capture.

Capture inputs

Audio MUST be captured. You can use the built-in sound card input, a 1/8" line-in/mic-in connection, or a USB-attached audio device (including a microphone on an attached video camera, if there is one). Audio levels should be configured on the input to be as high as possible without reaching maximum levels during peaks, which can cause audible distortion during recording.

Display is captured from the local VGA screen buffer, and requires no external connection or configuration.

Video can be captured using the built in web-camera on the computer, or via one or more USB-attached video cameras.

NOTE: If possible, for externally-attached devices, install only the necessary drivers for the device. Do not install the accompanying application software, as these programs can sometimes interfere with PCAP.

Capture options

Personal Capture supports the following input combinations:

- Audio (A)
- Audio/Video (A/V)
- Audio/Display (A/D)
- Audio/Display/Video (A/D/V)
- Audio/Video/Video (A/V/V)

BEST PRACTICE: A/D/V and A/V/V recordings can be processor-intensive. Do test captures to be sure your computer and input devices can capture the quality

necessary. You may also want to review the published captures from the Classroom side, to be sure the output quality also meets your standards.

Capture products

Personal Capture can generate the following output:

- Classroom Player presentation, including audio and up to two visual inputs (any combination of display/video)
- Downloadable mp3 audio-only file
- Downloadable SD mp4 file, including audio, display, and/or video
- Downloadable HD mp4 file, including audio, display, and/or video

Supported Capture Devices

We test several cameras and input devices that are most common among our customers, however we cannot test every device on the market.

The devices listed in these topics are recommended for use with our products, and fall into one of the following two **Qualification Status** categories:

- The camera or input device **has** been tested and is officially qualified to work with Echo360 Capture products.
- The camera or input device **has NOT** been officially qualified by Echo360, however many Echo360 customers have reported consistent success with this device. Unfortunately, we cannot guarantee full compatibility of these devices but we have listed them for informational purposes.

Also keep in mind that the best device for the job depends on the method you are using to capture (i.e., SCHD or Classroom Capture) and what you are capturing (i.e., a class in a small meeting room or a lecture in a large auditorium).

See the following topics for capture input device recommendations:

- [Recommended Devices for SCHD](#)
- [Recommended Devices for Classroom Capture and Personal Capture Windows](#)
- [Recommended Devices for Personal Capture Mac](#)

Best practices for web cameras

The following are best practices for using webcams to capture media:

- **Current drivers:** Use the most current drivers for your web camera. You can find these drivers on the website of your PC or laptop manufacturer. You can also have the operating system of your computer search for current drivers.
- **OS Updates:** Please have the most current updates applied to your operating system.
- **Driver-only installation:** If possible, use the "driver-only" installation of the camera software. Most web camera vendors allow for this. In some cases, the software included with the web camera can interfere with the Personal Capture or Classroom Capture software, and the "driver-only" method is the supported method.
- **Test a capture:** Perform and review a test capture before using the camera routinely.

Recommended Input Devices for SafeCapture HD (SCHD)

The SafeCapture HD (SCHD) is a dedicated capture appliance and was designed to be used for Ad-hoc or Scheduled recordings in large venues with complex Audio/Video setups. The SCHD can capture full-motion output from any VGA, DVI or HDMI-enabled device, including document cameras, electronic whiteboards and computers (PC and Mac). Input resolutions from 640x480 to 1920x1200 are supported.

Supported input formats


The SCHD supports Digital or Analog input via a DVI-I connector, passively adaptable to VGA or HDMI input. Digital (HDMI) or Analog (Composite) video input NTSC and PAL are also supported.

Audio can be captured either via Professional line-level audio input with bare wire termination for direct wiring of stereo balanced (non-powered) or unbalanced audio; or via Consumer line-level input with Stereo RCA connector.

Audio is captured in AAC, sampled at 22.05kHz or 44.1kHz, encoded at bitrates from 32kbps to 128kbps CBR.

Supported video devices

Manufacturer	Model	Qualification Status	Features/Description	Use Cases
iSmart	IS-LT-03 (HD) 	Not Qualified by Echo360; Customers have reported success	Stand or ceiling mount 1080p/30fps HD PTZ camera 20x optical/12x digital zoom lens Lock tracking technology auto-tracks lecturer up to 15 meters while ignoring other moving objects Adjustable tracking area and tracking parameters 78 degree viewing angle	Automatic presenter tracking eliminates need for manual camera operation Suitable for all classroom, distance learning and video conferencing applications Best for use in a large classrooms or lecture halls

Sony	SRG-300H 	Qualified by Echo360	<p>Desktop or ceiling mount 1080p/60fps HD PTZ camera</p> <p>30x optical/12x digital zoom lens</p> <p>View-DR processing to master poor lighting conditions</p> <p>Supports industry-recognized VISCA protocol and built-in IP control</p> <p>65 degree viewing angle</p>	<p>Suitable for all classroom, distance learning and video conferencing applications</p> <p>Best for use in a large classrooms or lecture halls</p> <p>Ideal for classrooms with poor lighting conditions</p>
Sony	SRG-120DH 	Qualified by Echo360	<p>Desktop mount 1080p/60fps HD PTZ camera</p> <p>12x optical/12x digital zoom lens</p> <p>1/2.8-type Exmor CMOS sensor with the latest imaging technology and field-proven operability</p> <p>Includes View-DR processing to master poor lighting conditions</p> <p>Supports industry-recognized VISCA protocol and built-in IP control</p> <p>71 degree viewing angle</p>	<p>Suitable for most classroom, distance learning and video conferencing applications</p> <p>Best for use in a medium-sized classrooms</p> <p>Ideal for classrooms with poor lighting conditions</p>
Panasonic	AW-HE2	Qualified by Echo360	<p>NOTE: Requires additional HDMI splitter (Recommended HDMI Splitter)</p> <p>Desktop or ceiling</p>	<p>Suitable for most classroom and distance learning applications</p> <p>Best for use in a smaller</p>



mount 1080p/60fps
HD Electronic PTZ
camera

Compact, Full-HD
MOS camera

96 degree viewing
angle

classrooms

[AW-HE50S](#)



Panasonic

Not
Qualified
by
Echo360
Customers
have
reported
success

Desktop or ceiling
mount 1080i/60fps
HD PTZ camera

18x optical/10x
digital zoom lens

1/3" Full HD MOS
Integrated Pan-
Tilt/Camera with
HD/SD-SDI

DSP produces
realistic video in
varied lighting
conditions down to
3 lux

Suitable for most
classroom,
distance
learning and
video
conferencing
applications

Best for use in a
medium-sized
classrooms

Ideal for
classrooms with
poor lighting
conditions

Supported audio devices

Manufacturer	Model	Qualification Status	Features/Description	Use Cases
RevoLabs	<p>HD Single/Dual Channel Wireless Microphone System</p> 	<p>Not Qualified by Echo360; Customers have reported success</p>	<p>Supports both single and dual channel microphones</p> <p>For use with multiple RevoLabs wireless microphone types</p> <p>128-bit encryption with DFS20 proprietary audio processing</p>	<p>Suitable for use when existing RevoLabs microphones are in use</p> <p>Ideal for high-def, accurate reproduction of presenter's speech</p>

			algorithms 50 Hz-14 KHz frequency range	
Shure	<p>ULX-D Digital Wireless System</p> 	Not Qualified by Echo360; Customers have reported success	<p>For use with a wide variety of Shure microphones</p> <p>AES 256-bit encryption</p> <p>24-bit/48 kHz digital audio</p> <p>20 Hz-20 kHz frequency range with flat response</p>	<p>Suitable for use when existing Shure microphones are in use</p> <p>Ideal for situations where high level of encryption for wireless transmission is required</p>

Recommended Devices for Classroom Capture and Personal Capture Windows

Both Classroom Capture and Personal Capture for Windows use Windows Media Foundation (WMF) for capturing media. It is supported on Windows 7 and Windows 8. Windows Media Foundation is the latest toolkit from Microsoft and provides a solid foundation for supporting the latest input devices.

For best results, the cameras should be YUY2, RGB24 and M-JPEG compliant (the camera packaging should indicate this).

Personal Capture and Classroom Capture automatically detect attached USB devices. If the camera has a built-in microphone, you can use the same device to capture both audio and video.

Best practices for web cameras

The following are best practices for using webcams to capture media:

- **Current drivers:** Use the most current drivers for your web camera. You can find these drivers on the website of your PC or laptop manufacturer. You can also have the operating system of your computer search for current drivers.
- **OS Updates:** Please have the most current updates applied to your operating system.
- **Driver-only installation:** If possible, use the "driver-only" installation of the camera software. Most web camera vendors allow for this. In some cases, the software included with the web camera can interfere with the Personal Capture or Classroom Capture software, and the "driver-only" method is the supported method.
- **Test a capture:** Perform and review a test capture before using the camera routinely.

Test Protocol for Web Cameras

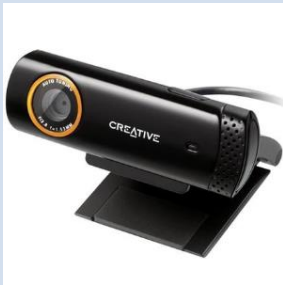
To ensure successful recording, we encourage you to follow the below test protocol the first time you use any web camera, especially if you are using a camera not specifically listed as a recommended device. In many cases an unsupported web camera will work.

Testing web cameras

1. Ensure there are no other software applications accessing the web camera while Personal Capture is running.
2. Do a 15 minute A/V recording with the camera.
3. Examine the media using the Personal Capture software editor.

4. Publish the capture and wait for processing.
5. Evaluate the processed capture. Does the output meet your standards?

Supported video devices (webcams)

Manufacturer	Model	Qualification Status	Features/Description	Use Cases
Creative	Live! Cam Socialize VF0640 	Qualified by Echo360	Monitor mount 800x600/30fps camera (non-HD) Noise canceling microphone	Suitable for use with Personal Capture on presenter's computer Best for use when presenter stays in a static location Ideal as an inexpensive solution where video quality is not important Low capturing resolution ensure better compatibility with under-powered systems.
HP	HD-3110	Qualified by Echo360	Monitor mount 720p/30fps camera with 5x digital zoom Pan and tilt	Suitable for both Classroom Capture and



functionality
 Directional microphone
 Face tracking and auto-focus
 Adaptive lighting and white balance adjustments

Personal Capture recording applications
 Best for capturing presenter as he/she moves around the room
 Ideal for rooms with poor lighting conditions

<p>HP</p>	<p>HD-4110</p> 	<p>Qualified by Echo360</p>	<p>Monitor mount 1080p/30fps camera with 5x digital zoom Pan and tilt functionality Directional microphone Face tracking and auto-focus Adaptive lighting and white balance adjustments</p>	<p>Suitable for both Classroom Capture and Personal Capture recording applications Best for capturing presenter as he/she moves around the room Ideal for rooms with poor lighting conditions</p>
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<p>Logitech</p>	<p>C270</p>	<p>Qualified by Echo360</p>	<p>Monitor mount, fixed focus 720p/30fps camera Noise reducing</p>	<p>Suitable for use with Personal Capture on presenter's</p>
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microphone
Automatic light correction

computer
Best for use when presenter stays in a static location
Ideal for rooms with poor lighting conditions

[C310](#)

Logitech



Qualified by Echo360

Monitor mount, fixed focus 720p/30fps camera
Pan, tilt, and zoom controls
Face tracking
Motion detection
Built-in mic with Logitech RightSound™ technology

Suitable for use with Personal Capture on presenter's computer
Best for use when presenter stays in a static location
Ideal for locations with increased background noise

[C525](#)

Logitech



Qualified by Echo360

Monitor mount 720p/30fps camera with autofocus
Pan, tilt, and zoom controls
Face tracking
Motion detection
Built-in mic with Logitech RightSound™ technology

Suitable for both Classroom Capture and Personal Capture recording applications
Best for capturing presenter as he/she

moves around the room
Ideal for locations with increased background noise

Logitech	C615		Qualified by Echo360	<p>Monitor mount 1080p/30fps camera with autofocus Pan, tilt, and zoom controls Face tracking Motion detection Noise reducing microphone Automatic low-light correction</p>	<p>Suitable for both Classroom Capture and Personal Capture recording applications Best for capturing presenter as he/she moves around the room Ideal for locations with increased background noise Ideal for rooms with poor lighting conditions High capturing resolution ensures best video quality</p>
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Logitech

[C905](#)

Qualified

Portable/noteboo

Suitable for



by Echo360

k 720p/30fps camera with autofocus
 Built-in mic with Logitech RightSound™ technology
 Can be mounted via desktop stand
 Automatic low-light correction

use with Personal Capture on presenter's computer
 Best for capturing presenter as he/she moves around the room
 Ideal for rooms with poor lighting conditions
 Ideal for locations with increased background noise
 Versatile mounting system provides additional placement options

C910

Logitech



Qualified by Echo360

Monitor mount
 1080p/30fps camera with autofocus
 Built-in stereo mics with Logitech RightSound™ technology
 Automatic low-light correction
 Logitech RightLight 2 technology

Suitable for both Classroom and Personal Capture recording applications
 Best for capturing presenter as he/she moves around the

			room Ideal for high-quality audio recording Ideal for rooms with poor lighting conditions High capturing resolution ensures best video quality
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Logitech


[C920](#)



Qualified by Echo360

Tripod-mountable 1080p/30fps camera with autofocus
H.264 video compression
Carl Zeiss® lens with 20-step autofocus
Built-in dual stereo mics with automatic noise reduction
Automatic low-light correction

Suitable for both Classroom Capture and Personal Capture recording applications
Best for capturing presenter as he/she moves around the room
Ideal for high-quality audio recording in noisy conditions
Ideal for rooms with poor lighting conditions

				High capturing resolution ensures best video quality Versatile mounting system provides additional placement options
Microsoft	<p>Lifecam Cinema</p> 	Qualified by Echo360	<p>Multi-mount 720p/30fps camera with autofocus</p> <p>TrueColor Technology with face tracking</p> <p>Wide angle lens</p> <p>360-degree rotation</p> <p>Wideband microphone</p>	<p>Suitable for both Classroom and Personal Capture recording applications</p> <p>Best for capturing presenter as he/she moves around the room</p> <p>Versatile mounting system provides additional placement options</p> <p>Ideal for picking up audio during recording in large room</p>
Microsoft	Lifecam HD-3000	Qualified by Echo360	Multi-mount, fixed focus 720p/30fps	Suitable for use with Personal

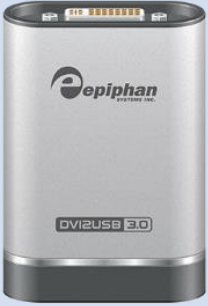


camera
TrueColor
Technology
Noise reducing
microphone

Capture on
presenter's
computer
Best for use
when
presenter
stays in a
static
location
Ideal for
locations
with
increased
background
noise

HP	HP Integrated Cameras	Qualified by Echo360	Specifications and features vary	Leveraging built-in functionalit y of existing hardware
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Supported video devices - other

Manufactu rer	Model	Qualificati on Status	Features/Descrip tion	Use Cases
Epiphan	DVI2USB 3.0 	Not Qualified by Echo360; Customers have reported success	1080p/60fps high performance video frame grabber Captures DVI/VGA and HDMI video display or camera sources Captures video and audio from HDMI sources Supports USB 3.0 or USB 2.0 data uplink Supports true 24-	NOTE: You must use the v3.30.1.000 4 64-bit driver to ensure proper functionalit y; available from <u>Epiphan.</u> Suitable for both Classroom and Personal

	<p>bit color Provides consistent frame rate performance regardless of content</p>	<p>Capture (Windows only) recording applications Provides flexibility to record any VGA, HDMI, or DVI source High capturing resolution ensures best video quality</p>
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StarTech

COMP2VGA



Not Qualified by Echo360; Customers have reported success


Format converter
Captures Composite and S-Video sources with audio
NTSC
Supported frequency range:
Horizontal = 31.4685KHz
Vertical = 60 Hz
Supported resolution:
720 x 480
PAL
Supported frequency range:
Horizontal = 31.25 KHz
Vertical = 50 Hz
Supported



NOTE: This device has been reported to work when used in tandem with the Epiphan device below

Suitable as a signal chain connection to convert a Composite source into a compatible USB source for Personal Capture:
Composite source -

resolution:
720 x 576

>
COMP2V
GA
COMP2V
GA ->
AV.io HD
AV.io HD -
>
Personal
Capture
computer


<p>Epiphan</p>	<p>AV.io HD</p> 	<p>Not Qualified by Echo360; Customers have reported success</p>	<p>Supports USB 3.0 or USB 2.0 data uplink</p> <p>Captures HD video at 60 frames per second.</p> <p>Captures DVI/VGA and HDMI video display or camera sources</p> <p>Captures video and audio from HDMI sources</p>	<p>NOTE: This device has been reported to work when used in tandem with the StarTech device above</p> <p>Suitable as a signal chain connection to convert a Composite source into a compatible USB source for Personal Capture:</p> <p>Composite source -> COMP2V GA COMP2V GA -> AV.io HD</p>
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				AV.io HD -> Personal Capture computer
Magewell	<p>XI100DUSB-HDMI</p> 	<p>Not Qualified by Echo360; Customers have reported success</p>	<p>Supports USB 3.0 or USB 2.0 data uplink</p> <p>Supports up to 1920x1200p60 (CVT-RB) Video Input</p> <p>Video output support up to 1920x1200p60 in YUY2</p> <p>Video output support up to 1920x1080p60 in RGB24</p> <p>The process of video and audio is done by the dongle and will not occupy CPU</p>	<p>Suitable for converting an HDMI source into a compatible USB source for Personal Capture</p> <p>High capturing resolution ensures best video quality</p>
Vaddio	<p>AV Bridge</p> 	<p>Not Qualified by Echo360; Customers have reported success</p>	<p>Supports USB 2.0 data uplink</p> <p>Captures HDMI, RGBHV, SD or HD component video inputs</p> <p>Captures balanced or unbalanced audio</p>	<p>Suitable for converting an HDMI source into a compatible USB source for Personal Capture</p> <p>High capturing resolution ensures best video quality</p>

Supported audio devices (external USB microphones)

Manufacturer	Model	Qualification Status	Features/Description	Use Cases
Acoustic Magic	<p>Voice Tracker (USB Array Microphone)</p> <p>*Sample Recording with Echo360</p>	Not Qualified by Echo360; Customers have reported success	<p>Picks up ranges at up to 30 feet</p> <p>Automatic and electronic scanning "listening beam" with a field of view of 360°</p> <p>Spatial filtering for noise reduction</p> <p>Constructive addition of multiple microphone elements for long-range</p> <p>Rapidly converging AEC algorithm (Voice Tracker II only)</p> <p>Embedded algorithms for ease of use</p>	<p>Suitable for capturing the presenter's audio as he/she moves around the room, as well as picking up questions from the class</p> <p>Best for use in a medium-to-large sized classrooms</p> <p>Ideal for locations with increased background noise</p>
Samson	<p>UB1</p>	Not Qualified by Echo360; Customers have reported success	<p>16-Bit, 44.1-48kHz sample rates</p> <p>Miniature, low-profile design</p> <p>Omnidirectional pickup pattern</p>	<p>Suitable for capturing the presenter's audio as he/she moves remains near the podium, or for meetings and conference</p>

				s Best for use in a medium-sized rooms
Jabra	<p>Jabra Speak 410</p> 	<p>Qualified by Echo360</p>	<p>Omnidirectional / Noise filter microphone Standard (E-STD) microphone sensitivity Mute function</p>	<p>Suitable for capturing the presenter's audio as he/she moves remains near the podium, or for meetings and conferences Best for use in a medium-sized rooms</p>
Blue	<p>Yeti Pro USB & XLR Microphone</p> 	<p>Qualified by Echo360</p>	<p>Multipattern condenser USB microphone Three custom condenser capsules and four different polar pattern settings: Cardioid, Stereo, Bidirectional and Omnidirectional A/D converter chip and separate analog circuit path for use with</p>	<p>Suitable for capturing the presenter's audio as he/she moves remains at the podium Best for use when presenter stays in a static location Ideal situations where high audio sampling rate is</p>

			professional studio mixers and preamps	required
			Built-in headphone amplifier for zero-latency monitoring, and direct controls for headphone volume, pattern selection, mute, and microphone gain	
			15 Hz-22 kHz frequency response and 92 kHz/24 bit Sample/Word	
Blue	Snowball USB Condenser Microphone 	Qualified by Echo360	Dual capsule design incorporates omnidirectional and cardioid elements to give you a choice -10dB pad switch eliminates noise and distortion when capturing signals at extreme volume levels 18 Hz-40 Hz frequency response and 44.1 kHz/16 bit Sample/Word	Suitable for capturing the presenter's audio as he/she moves remains near the podium
RevoLabs	xTag Wireless Microphone	Not Qualified by	Can be configured for use with lapel	Suitable for capturing the presenter's



Echo360; Customer s have reported success

mic Plug-and-play USB operation 65 foot range for microphone Bi-directional audio 8 hours of battery life

audio as he/she moves around the room, as well as picking up questions from the class using the microphone

Best for use in large classrooms or auditoriums

USB Desktop Microphone

Logitech



Not Qualified by Echo360; Customer s have reported success

Noise-canceling microphone Power switch 16 Hz-100 Hz frequency response

Ideal for capturing presenter's audio in a small desktop environment using Personal Capture

Not recommended for classroom use

CAD

U7 USB Boundary Condenser Microphone

Not Qualified by Echo360; Customer s have reported success

Frequency response tailored for speech Omnidirectional pick-up pattern for 360 degree coverage Condenser microphone


Ideal for meetings or conferences in small-to-medium sized rooms



element for
high sensitivity

Supported document cameras

Manufacturer	Model	Qualification Status	Features/Description	Use Cases
Samsung	SDP-760 	Qualified by Echo360	Compact 1080p/30fps document camera 3 Megapixel CMOS sensor Digital 16x zoom & Digital Image Rotation User scalable display outputs from XGA to 1080p	Best for scenarios that require easy transport and storage High capturing resolution ensures best video quality
Samsung	SDP-860 	Qualified by Echo360	SXGA (1280x1024)/30fps document camera 2D/3D Noise Reduction Technology 48X Combined Zoom (6X Optical + 8X Digital)	Best for capturing greater detail when pages are magnified Ideal for classrooms with poor lighting conditions
Samsung	SDP-960	Qualified by Echo360	SXGA (1280x1024)/30fps document camera	Best for capturing greater

			<p>camera 48X Combined Zoom (6X Optical + 8X Digital) Built-in reference monitor Proprietary Chipset with Noise Reduction Accepts SD Cards and USB Thumb drives for image/video storage</p>	<p>detail when pages are magnified Ideal for classrooms with poor lighting conditions</p>
<p>Wolfvizion</p>	<p>VZ-3</p> 	<p>Not Qualified by Echo360; Customers have reported success</p>	<p>1280x960 (4:3)/30fps document camera 12x Optical Zoom + 2x Digital Zoom High-speed autofocus with manual focus</p>	<p>Best for capturing high motion activities such as writing Ideal for use with transparencies</p>

Recommended Devices for Personal Capture Mac

Personal Capture for Mac uses QT Kit for capturing media. It is supported on OS X 10.8 and above. Personal Capture for Mac automatically detects attached USB devices. If the camera has a built-in microphone, you can use one camera for both audio and video capture.

Best practices for web cameras

The following are best practices for using webcams to capture media:

- **Current drivers:** Use the most current drivers for your web camera. You can find these drivers on the website of your PC or laptop manufacturer. You can also have the operating system of your computer search for current drivers.
- **OS Updates:** Please have the most current updates applied to your operating system.
- **Driver-only installation:** If possible, use the "driver-only" installation of the camera software. Most web camera vendors allow for this. In some cases, the software included with the web camera can interfere with the Personal Capture or Classroom Capture software, and the "driver-only" method is the supported method.
- **Test a capture:** Perform and review a test capture before using the camera routinely.

Test Protocol for Web Cameras

To ensure successful recording, we encourage you to follow the below test protocol the first time you use any web camera, especially if you are using a camera not specifically listed as a recommended device. In many cases an unsupported web camera will work.

Testing web cameras

1. Ensure there are no other software applications accessing the web camera while Personal Capture is running.
2. Do a 15 minute A/V recording with the camera.
3. Examine the media using the Personal Capture software editor.
4. Publish the capture and wait for processing.
5. Evaluate the processed capture. Does the output meet your standards?

Supported Video Devices

Manufacturer	Model	Qualification Status	Features/Description	Use Cases
Apple	iSight Camera (Macbooks and iMacs) 	Qualified by Echo360	Specifications and features vary Either external or built-in solution Requires no additional drivers	Leveraging built-in functionality of existing hardware
Logitech	C910 	Qualified by Echo360	Monitor mount 1080p/30fps camera with autofocus Built-in stereo mics with Logitech RightSound™ technology Automatic low-light correction Logitech RightLight 2 technology	Suitable for both Classroom and Personal Capture recording applications Best for capturing presenter as he/she moves around the room Ideal for high-quality audio recording Ideal for rooms with poor lighting conditions High capturing resolution ensures best video quality
Logitech	C920 	Qualified by Echo360	Tripod-mountable 1080p/30fps camera with autofocus H.264 video compression Carl Zeiss® lens with 20-step autofocus	Suitable for both Classroom Capture and Personal Capture recording applications Best for capturing presenter as he/she moves around the room Ideal for high-quality audio recording in

	Built-in dual stereo mics with automatic noise reduction Automatic low-light correction	noisy conditions Ideal for rooms with poor lighting conditions High capturing resolution ensures best video quality Versatile mounting system provides additional placement options
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Network Bandwidth and Data Usage for ALP

Echo360's Active Learning Platform (ALP) is a cloud based SaaS solution and as such does not have any on-site server requirements. However playback of recorded media and captures to students, presenting content to students in the classroom, and the uploading of recorded media from classroom recording devices, can represent a significant challenge to network infrastructure.

Since no two institutions or network setups are alike, we cannot accurately identify YOUR network needs. The information presented here is designed to help you identify network bandwidth requirements to provide a good student and instructor experience.

To figure out the network usage expected for ALP, you will need to determine the answers to some/all of the following questions:

- How many students are likely to be viewing classroom media while on campus?
- What are the peak times and/or peak dates for students viewing classroom media while on campus?
- What is the total volume per second/minute/hour your network can handle at any given time?
- Do you need to live-stream classes (i.e., most students need to watch remotely)? If so, how many classes are streamed live? How many at once?
- Of the students enrolled in live-streamed classes, how many are likely to be watching the live streams from ON campus?
- How will live or on-demand playback be affected by other uses of your network (file uploads, LMS usage, VOIP, or other systems)?

To help you make proper estimations and plan accordingly, see the following topics for data rates and volumes for ALP classroom media, and some sample calculations to get you started:

- [On-Demand Playback Data Rate and Usage](#)
- [Live Streaming Data Rate and Usage](#)
- [Large Classrooms Viewing Class Media](#)
- [Raw Recording File Size and Data Usage](#)

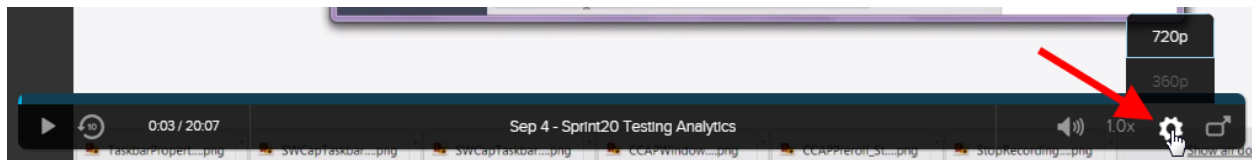
On-Demand Playback Data Rate and Usage

Even though you don't have to manage the data storage for your Active Learning Platform (ALP) system, you still have to manage the network bandwidth configuration that will make playback of the media as seamless as possible for users.

The table below shows the data rate and corresponding file size (per hour of recording) for streaming rich media via Echo360's HTML5 media player. These numbers are based on typical content processing. The higher quality and more source combinations result in larger overall volume per hour of playback. This is important to consider when deciding on scheduling policies for recordings.

The section below the table asks some basic questions and provides an [example calculation](#) for overall bandwidth needed for on-demand playback. For information on the kind of bandwidth needed for students to view presentations and participate in Activity slides, see [Large Classrooms Viewing Class Media](#). (Spoiler Alert: The network hit for presentations is relatively small.)

All captures are played back in HD by default, if the capture was recorded in HD. Students can change the playback to standard definition for smoother playback if necessary (click the gear icon at the bottom of the playback screen).



Audio-Only playback not shown: The numbers below are inclusive of the audio stream at 44 kbps, or 0.02 GB/hr. Use these figures to calculate total rate/volume for audio-only content.

Capture Components	High Definition (720p) Data Rate and Vol/hr of recording	Standard Definition (480p) Data Rate and Vol/hr of recording
Audio+Video+Video (AVV)	1152 kbps 0.49 GB/hr	264 kbps 0.11 GB/hr
Audio+Display+Video (ADV)	720 kbps 0.31 GB/hr	264 kbps 0.11 GB/hr
Audio+Video (AV)	576 kbps 0.25 GB/hr	232 kbps 0.10 GB/hr
Audio+Display+Display (ADD)	288 kbps 0.12 GB/hr	164 kbps 0.07 GB/hr
Audio+Display (AD)	144 kbps 0.06 GB/hr	82 kbps 0.04 GB/hr

What the numbers in the table indicate are that in order for a student to view a capture smoothly, the capture needs X number of kbps available. However, like YouTube videos, ALP tries to temporarily download the full capture, or at least buffer some portion of it, so that the student is actually viewing it locally rather than as a constant network stream. That's where the volume/hr comes in. An hour long AV capture, viewed in HD, for example, will buffer/download a file approximately 0.25 GB in size.

Technical Details: If you read the [Live Streaming Data Rate and Usage](#) topic, you'll note the discussion about the connection being used for the visual input (DVI or Composite) being more important to the size of the capture than the thing being captured (video or display). So why don't we have that here? Because the Echo360 media processor is able to distinguish live-action, high motion content (typically delivered from a video camera) from static content (typically delivered by a monitor or other display device). When the capture (or an uploaded video) is processed, the media processor optimizes the visuals, to generate a high quality capture using the least amount of data possible. What this means, though, is that if your A/D/D capture is actually two HD computer monitors both showing videos, the resulting capture will be more along the lines of an A/V/V capture in its resulting file size and bandwidth requirements.

Calculating overall on-demand usage

There are three aspects you need to consider, in order to determine the data requirements for providing media playback for students:

- The data rate and volume of the media from Echo360's cloud server to each student watching the capture. This is what is provided in the table above.
- The type of captures typically generated (audio/display? audio/display/video?).
- The number of students watching media, on campus, at any given time.

Provided below is a sample calculations, using this methodology and substituting the institutions own assumptions a figure for the peak expected bandwidth usage can be estimated.

Example Data – substitute as appropriate:

- 10 sections use Echo360 to capture lectures.
- Each section generates an A/D/V capture, at HD quality.
- Each section has an average of 25 students enrolled in the class.

At most, 250 students may try to view a capture at one time. YOUR data suggests that even during finals week, at peak, 10% of the possible views are happening, but not all at the same time, and not all from on-campus.

Using those figures, let's assume that during this peak usage time, only 5% of the students who could view a capture are viewing it WHILE on campus, at the same time. That's 12.5 students. Ok, 13. That half-student is going to step it up at the end of the semester.

So the peak data rate calculation would look something like this:

$$13 \text{ Students} \times 720 \text{ kbps} = \mathbf{9360 \text{ kbps}} \text{ or } \mathbf{9.3 \text{ Mbps}}$$

This is the total bandwidth required to smoothly play back an ALP capture to all 13 students on campus at the same time. Remember that if more than this is available at any point during the viewing, the capture is downloaded/buffered locally to the students' devices, lessening the "current" data stream need.

By comparison, a 720p YouTube video requires up to 6 Mbps **each**. So if your students are watching YouTube and not complaining, viewing classroom content should be no problem.

Second Example:

We've recently learned of an institution using ALP for almost 50 courses, including approximately 2800 students. Let's do the same calculation with the same assumptions: during peak week, 10% of the possible views happen, and we'll assume half of those possible views happen from on campus, all at the same time (which is unlikely but hey, it's an example).

- 10% of 2800 = 280
- 5% of 2800 (on campus) = 140 views happening at once, on campus
- 140 views x 720 kbps = 100,800 kbps/**101 Mbps**

That's a lot more than our original example. Comparatively speaking though, that's 140 students viewing classroom media taking up as much bandwidth as 17 students viewing a YouTube video.

Live Streaming Data Rate and Usage

Live streaming is the real time streaming of media from a classroom device to a media server, then providing that streamed media to students and instructors. Unlike on-demand playback where the video can be buffered over time and can cope with large fluctuations in available bandwidth, live streaming is much more sensitive to network quality and available bandwidth. As such the requirements for a good student experience are higher than for on-demand material.

The key components that will determine the demands placed on your network for live-streaming are:

- **How many students will be viewing the live-stream from ON-CAMPUS?**

This number may be very small, limiting YOUR bandwidth requirement to provide the stream. Institutions may only provide live-streamed classes for distance-education sections. Remote users who are off campus are not using the institution's network and do not need to be figured into the bandwidth requirements.

- **What types of connections are being used for the visual inputs?**

Live stream bandwidth figures are specified as a maximum bandwidth requirement. Unlike on-demand where the player can significantly buffer the recording, the opportunity for buffering a live stream is limited. As such, all calculations need to be done on a worst-case basis. While the actual average bandwidth usage may be significantly lower, there will be periods during the stream where complex images or fast movement or low lighting will cause the data-rate to burst higher. If there is not sufficient bandwidth for these events the playback experience will suffer.

DVI connections allow for higher resolution inputs, but require higher volumes of data than Composite (analog) connections do. Composite connections can only be video, but DVI connections can return either a display or a video camera feed. Meaning, if your live-stream includes two high-definition digital video cameras, connected to the capture device via DVI, the amount of data being streamed back to the users is going to be significantly higher than 2 composite inputs. This is covered in more detail below.

Streaming throughput for Live components

The following table lists the target and maximum data rates for each possible component of live streamed media. This is the base information used to determine the combined data rates for each type of Live stream possible.

Technical Details: Target vs. Maximum - The Target rate shown below is representative of the average bitrate used for each component. In a situation where the feed is more challenging (high-motion, low-light) the bitrate will be closer to the Maximum value.

Static display content (e.g., a presentation where pages are changed infrequently) requires a lower bitrate than dynamic content (e.g., a monitor showing a full motion video throughout).

Capture component (quality)	Target rate (kbps)	Maximum rate (kbps)	Frames per second
Audio (medium)	32	32	--
Audio (high)	128	128	--
SD Video (480p)			
Composite or DVI, all ratios	600	800	12.5 (PAL) 15 (NTSC)
HD Video (720p)			
Composite (NTSC or PAL)	1062	1593	30 (NTSC) 25 (PAL)
HD Video (720p)			
DVI 4:3	1770	2655	25
HD Video (720p)			
DVI 16:9	2360	3540	25

These are the base numbers we use to provide the combined component calculations shown below. Now...just so you understand how we got to the combined figures, be sure you understand the following:

- **A composite connection can only be to a video camera.** The bitrate is determined by the quality setting (HD or SD) but because it's analog, no other values apply.
- **A DVI connection can capture from a display device OR from a video camera.** And because it's a digital connection both the quality setting (HD or SD) and the ratio configured (4:3 or 16:9) affect the bitrate of the data stream.
- **All sources will be captured at the same quality.** All visual aspects are streamed/captured in SD or HD as selected in the capture configuration. It is not possible to capture one input at HD and the other at SD.

As is indicated earlier, what this means is that determining the needed streaming rates has less to do with what combination you are streaming (AV, ADV, AVV) and MORE to do with the type of connection you are using, along with the quality and ratio you have set for the inputs being captured.

The below table provides combined calculated data stream rates for all of the possible combinations (except audio only). We do this for you, so you don't have to. You're welcome.

Please note the following about the below calculations:

- The figures shown are in kbps (kilobits per second).
- The calculations use the high-quality Audio bit rate and the Target bitrate for the other input types from the table above.
- The DVI calculations apply to both 4:3 and 16:9 ratios - the higher (16:9) bitrate figure is shown below.

Input Combinations	A/D	A/V	A/D/V	A/D/D	A/V/V
All SD (DVI or composite)	728	728	1328	1328	1328
HD composite (NTSC or PAL)	--	1190	--	--	2252
All HD DVI	2488	2488	4848	4848	4848
HD composite + HD DVI	--	--	3550	--	3550

Notice in the above table that the bit rates for each input combination are the same across all of the multiple-visual-input streams, regardless of whether it's dual video, dual display, or video/display. That's because the connection and ratio determine the bitrate, not necessarily the thing being streamed. But as also stated above, static content uses less bandwidth than non-static or high-motion content.

Calculating overall Live streaming usage

There are two aspects of moving media from the classroom to students in real time:

- The throughput of the media from the capture device to the live-streaming media server (in this case a Wowza server).
- The subsequent throughput of the streamed media from the server to each student tuned into the Live class.

To calculate the total data streaming rate for a single live class, take the data rate for the media combination you are streaming (from the above table) and multiply it by the number of students watching the live class ON CAMPUS. You don't have to worry about students watching from somewhere else. They're not bogging down your network.

Be sure to add one extra streaming instance to account for the data being streamed from the device to the streaming media server.

For this calculation, we are using the following assumptions. Substitute your own situational data to generate your own calculations.

- The Live class will be streaming Audio, Display (DVI), and Video (Composite).
- The section has 100 students in it, but you expect only 15 students to view the class from on-campus.
- The quality selected for the capture is High Definition (applies to both video and display).
- These selections result in a target data rate for this A/D/V stream of 3550 kbps (from the above table).

To calculate:

1. The stream from the capture device to the Wowza server: **3550 kbps**
2. The stream from Wowza to 15 students: $15 \times 3550 = \mathbf{53,250 \text{ kbps}}$ or **53.25 Mbps**
3. Add them together to get the bandwidth needed for all: $\mathbf{53,250 + 3550 = 56,800}$ or **56.8 Mbps**

So to be clear, that's a total on-campus data streaming rate of 56.8 Mbps for this Live class, provided 15 students watch the class live, individually, from ON-campus. Your calculations may end up being lower if, for example, you only stream Live classes for sections with students who are NOT on campus.

Alternately, you may only use live streaming for popular speakers where you believe a large percentage of on-campus users will be viewing the stream and not using up your bandwidth with something else. For these situations, you can reduce the number of individual streams by providing the live-stream in a location where a large number of users can watch it together.

You will want to check the maximum bandwidth capability for your network, or check with your network vendor, to determine the maximum bandwidth of your wireless and wired connections. Use this information to determine the optimal configuration for live streams (what inputs to use), and which sections need to be streamed live (only those where most/all students will view from off-campus). You may also recommend that students watch the stream via a wired connection instead of a wireless connection.

Data Usage for Large Classrooms Viewing Class Media

One concern institutions may have is "how will my network handle large classes viewing classroom media all at the same time?" Specifically the question comes up in situations where there are lecture halls holding 250 students, all trying to view a professor's presentation and answer the activity slides, probably all connected via wireless network.

In this situation, your primary concern is likely the wireless access point through which all of those students may be trying to view classroom media. In addition, since it is unlikely that all of the students would be trying to view a single video on each of their individual devices (more likely the video is being shown on a main screen in the room), it's the presentation activities and any interaction (questions/responses) of students in the ALP Classroom that you may be most concerned with.

Classroom presentations may have interactive activities in them, requiring each student to be viewing it on their individual device, and responding accordingly, possibly taking notes, or asking questions in the classroom.

For the presentations there are a couple of sources of data:

- General Slides
- Media slides (with embedded media)
- Interactive Activities/Polling data
- Notes (being taken by students)
- Questions/Responses (being posted by students and/or the instructor or teaching assistant)

The data movement for Activity slides, Notes, and Questions is trivial; these generate between 1-2 KByte for each student response. For a 250-student class, this totals somewhere in the range of 375KB in total student responses, spread across several seconds or more. The impact on the network in this case is negligible.

The general slides will load for students more quickly or slowly, depending on the size of the slide and the items contained on it. Slides that consist primarily of text or simple diagrams will load quickly. Slides with very large, detailed graphics will load more slowly. But for most slides, the delay should be minimal.

Finally, we have media slides. This is a great unknown, because it's impossible for us to know where the media you are embedding came from, what kind of media it is, etc. What we CAN tell you is that media slides containing video links won't play until the student clicks play (unlike Facebook or other sites that use Autoplay), so up until that point, they act just like regular slides. The size of the preview graphic (poster image) will determine how quickly the slide itself loads.

Bottom line for presentations is that presenting through the ALP classroom, even to a very large number of students over a wireless access point, is unlikely to cause network congestion issues. The amount of bandwidth required for presentations is generally minimal, provided the wireless network isn't also being actively used for "extra-curricular" viewing by students on the same access point.

Raw Recording File Size and Data Usage

Since Echo360's Active Learning Platform (ALP) is a hosted SaaS platform, you don't need to worry about data storage for your captures. But you will want to know how big the raw media files being transferred from the recording device (the SCHED or the Classroom Capture installation) are.

Keep in mind that these media files are not streamed as they are captured, but are uploaded when the recording is finished. This is important if you have a lot of captured classes that end at the same time; understand that your network will be affected while these files are uploaded to ALP.

The figures provided on this page represent the total payload of the raw data uploaded to ALP at the end of the capture.

SCHED recording data volume

The following table lists the typical raw recording file sizes for the SCHED appliance. As with playback, all recorded files will be at the same quality (either SD or HD). It is not possible to capture some inputs at SD quality and others at HD quality.

All of the figures below are shown in **GB/hr**. This means that for every hour of recording, the figure given is the raw file size generated for each source.

Source	HD	SD
Display or Video (DVI/HDMI)	1.04	0.66
Composite Video	0.50	0.25
Audio	0.06	0.06

To determine the total data volume for a given recording, add together the relevant figures from the above table, then multiply by the length of the recording.

Examples:

- The raw files for a **one-hour DVI + Audio** recording, captured at a **high-definition 16:9 ratio**, will have a total uploaded file size of approximately **1.10 GB** (1.04 GB display + 0.06 GB of audio).
- A **one-hour Composite + Audio** recording captured at **high-definition** will have a total uploaded file size of **0.56 GB** (.50 GB video + .06 GB audio).

Classroom Capture recording data volume

The following table lists the typical raw recording data size/volumes for Echo360's Classroom Capture.

All of the figures below are shown in **GB/hr**. This means that for every hour of recording, the figure given is the raw file size generated for each source.

Source	High Quality	Medium Quality
Display	0.86	0.25
Video (USB/Webcam)	1.6	0.24
Audio	0.05	0.05

To determine the total data volume for a given recording, add together the relevant figures from the above table, multiplying by the length of the recording.

Examples:

- The raw files for a **one-hour Audio + Dual Video** recording captured at **Medium Quality** will have a total uploaded file size of approximately **.53 GB** (.05 audio + .24 + .24 GB video).
- If the capture is an **hour and a half**, take $.53 \times 1.5 = \sim .80$ GB (it's actually .795 GB but I like nice round figures).
- A **one-hour Display + Audio** recording captured at the **High Quality** setting, will have a total uploaded file size of approximately **0.91 GB** (0.86 GB display + 0.05 GB of audio).